Title: **European COastal-shelf sea OPerational observing and forecasting system**

Acronym: **ECOOP**

Sub-Priority: 1.1.6.3 – Global Change and Ecosystems

Sub-Priority research areas:

VI: Operational forecasting and modelling including global climatic change observation systems
VI.1: Development of observing and forecasting systems
VI.1.2: Integrated development of European coastal and regional seas forecasting

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Type of Instrument: **Integrated project**

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72	INSTITUTO ESPANOL DE OCEANOGRAFIA	IEO	ES

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Project Summary

European COastal-shelf sea OPerational observing and forecasting system

ECOOP

Sub-Priority: 1.1.6.3 – Global Change and Ecosystems

Sub-Priority research areas:

VI: Operational forecasting and modelling including global climatic change observation systems
VI.1: Development of observing and forecasting systems
VI.1.2: Integrated development of European coastal and regional seas forecasting

Abstract

The overall goal of ECOOP is to:
Consolidate, integrate and further develop existing European coastal and regional seas operational observing and forecasting systems into an integrated pan-European system targeted at detecting environmental and climate changes, predicting their evolution, producing timely and quality assured forecasts, providing marine information service's (including data, information products, knowledge and scientific advices) and facilitate decision support needs.

This is to be attained through the following activities:

1. Integrate existing coastal and regional sea observing (remote sensing, in-situ) networks into a pan-European observing system
2. Integrate existing coastal and regional sea forecasting systems into a pan-European forecasting system and assimilate pan-European observation database into the system
3. Assess the quality of pan-European observing and forecasting system
4. Advance key technologies for the current and next generation pan-European observing and forecasting system
5. Develop and generate value-added products for detecting environment and climate change signals
6. Integrate and implement a pan-European Marine Information System of Systems (EuroMISS) for general end user needs
7. Develop methodology and demonstrate an European Decision Support System for coastal and regional seas (EuroDeSS) that responds to the needs from targeted end users, as emphasized in the GEOSS and GMES initiatives
8. Carry out technology transfer both in Europe and at intercontinental level, establish education and training capacities to meet the need for ocean forecasters

B.1 Scientific and technological objectives of the Project and state of art

B.1.1 Overall goal and mission

ECOOP addresses area VI of the sub-priority 1.1.6.2 *Global Change and Ecosystems: Integrated development of European coastal and regional seas forecasting systems.*

The overall goal of the project is to:

Consolidate, integrate and further develop existing European coastal and regional seas operational observing and forecasting systems into an integrated pan-European system targeted at detecting environmental and climate changes, predicting their evolution, producing timely and quality assured forecasts, providing marine information service's (including data, information products, knowledge and scientific advices) and facilitate decision support needs.

This is to be attained in ECOOP by working to:

1. Integrate existing coastal and regional sea observing (remote sensing, in-situ) networks into a pan-European observing system
2. Integrate existing coastal and regional sea forecasting systems into a pan-European forecasting system and assimilate pan-European observation database into the system
3. Assess the quality of pan-European observing and forecasting system
4. Advance key technologies for the current and next generation pan-European observing and forecasting system
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8. Carry out technology transfer both in Europe and at intercontinental level, establish education and training capacities to meet the need for ocean forecasters

Since the major part of the consortium is from regional alliances in operational oceanography, i.e., Baltic Sea (BOOS), North West shelf (NOOS), Iberia-Biscay-Ireland region (IBIROOS), Mediterranean Sea (MFS-MOON) and Black Sea (Black Sea GOOS) the pan-European ECOOP system will have the maximum sustainability in making long-term observations, forecasts and services. The ECOOP system is designed clearly for addressing end-user needs, e.g., detecting environment and climate change signals, forecast, decision making, technology transfer and international cooperation, and fits well with GEO/GMES initiatives and the GEOSS implementation plan.

ECOOP will meet the need for timely, quality assured long-term information as a basis for sound decision making, and will enhance delivery of benefits to society in the following initial areas as specified in the GEOSS Implementation Plan (which also complement the GMES initiative):

- Reducing loss of life and property from natural and human-induced disasters;
- Understanding environmental factors affecting human health and well-being;
- Improving management of energy resources;

- Understanding, assessing, predicting, mitigating, and adapting to climate variability and change;
- Improving the management and protection of coastal, and marine ecosystems;

ECOOP will also apply and further develop key technologies (e.g., observing system optimal design, super-ensemble forecasting, estuary-coast-offshore interaction, ecosystem and sedimentary forecast etc) for the sustainable development from the current generation to the next generation system, aiming for serving long-term implementation plans (e.g. GEOSS, in support of Water Framework Directive).

B.1.2 State of the art

Observing and forecasting systems

Past and on-going EU MAST and Operational Forecast (OF) Cluster projects have developed the necessary tools for advancing existing operational observing and forecasting systems. MFSTEP, TOPAZ and ODON have developed and optimised operational models and implemented data assimilation schemes in operational 3D ocean models for European regional seas. MAMA, PAPA, ARENA, ESODAE and SEANET have networked operational agencies and built up a basis for data exchange; observational network design methods have been developed in ODON and MFSTEP and some of the existing observing systems have been assessed. Advanced observing technologies have been developed and demonstrated in projects like EuroROSE, Ferrybox, ADRICOSM and Poseidon. Ecosystem modelling (e.g., ERSEM) has been conducted in all regional seas. The MERSEA system will provide boundary conditions and near real time satellite products for the regional sea models in the coming years. However these scientific advances have only been used in national or regional operational systems, and have not been effectively shared at a pan-European level. Progress made in observing systems and forecasting systems has not been effectively integrated. A logical next step is to consolidate and integrate the current generation of European coastal and regional observing and forecasting systems into a pan-European system with a common information platform and similar quality standards.

The EuroGOOS regional alliances have initiated integration of operational oceanographic activities in the scale of European regional seas. Significant progress has been made in data exchange and knowledge sharing. However, the levels of different regional alliances in making observations, operational forecast, quality assessment and information service are very different. The existing regional sea systems are not harmonised: a smooth workflow is not available at a pan-European level. Major obstacles lie in real-time data transferring, exchange and quality control at the regional and pan-European level. The level of operational assimilation and model validation varies significantly in different regional seas. The MERSEA Strand1 project demonstrated these obstacles and problems that are common to most of the existing regional systems.

ECOOP partners are key players in the MAST and Operational Forecast (OF) Cluster projects and MERSEA IP referred to above, as well as in BOOS, NOOS, IBIROOS, MFS-MOON and Black Sea GOOS. ECOOP will put these existing systems and research results into an integrated pan-European system. Some key technologies have to be further developed for the integration, e.g., regional to coastal downscaling methods, quality assessment for observing and forecasting system etc.

Information and decision supporting systems

In addition to the above, to better serve the end-user needs, a pan-European marine information system and decision supporting system has to be made, which is currently not available. Existing marine information systems in Europe have following limitations:

- They are at national or regional level but not a pan-European level
- Lack of product quality stamps for most of the forecasting variables.
- Lack of integration between model products and observations
- Many of them present only direct products from forecast and/or observations but not value-added products for targeted user group

GEO and GMES services

For the end-user service (especially addressed in GEOSS implementation plan and GMES initiative), a pan-European sea observing, forecasting and information system with a common platform and quality standard is essential. Currently such a system is not available although most of the components are there. The availability of existing services have been investigated in GMES phase 1:

- There are overlaps and restrictions in disseminating these services. A pan-European service is required to minimise the overlaps and maximise the dissemination.
- Existing in-situ observations are largely restricted in the nations who make them. An autonomous GMES operational in-situ marine component in Europe (in 2008) can only be realised by the pan-EU integration of operational observing systems.
- There are gaps in the existing services both in technology and regions. To reach a similar standard of service in Europe, further research and development is necessary.
- Some services are relatively mature, e.g., sea ice, oil drift, warnings of storm surge and high seas etc. For these services a pan-European integration is required. A multi-model based ensemble forecast could be a natural way to improve the quality of these services.
- A large number of existing services (especially related to marine subsurface and biochemical parameters) have not been quality assured. Model validation and data assimilation should be made to assure these services meet the minimum requirements of GMES.
- Observations from space and in-situ need to be optimally combined in order to provide the best product.

B.1.3 Progress beyond the state of art

ECOOP will for the first time integrate existing regional and coastal seas observing and forecasting networks into a pan-European system. ECOOP will thereby bring Europe in a leading position in meeting and implementing the goals and visions of outlined in the GEOSS Implementation Plan.

This will be achieved through:

- Assessing European coastal and regional sea observational networks (including biochemical parameters) through both applying existing methodology and developing new assessment methods and web-based assessment tools
- Integration of existing EU-wide marine observation systems, harmonising observation activities and co-ordination of accessing Earth Observation (EO) products in order to maximise the benefit from existing national and European resources
- carrying out R&D activities to improve the use of in-situ and remote sensing data for regional and coastal seas
- evaluating existing forecasting activity in pan-European scale and to identify common standard; establishing validation criteria of multidisciplinary information products; assessing the quality of multidisciplinary information products and identifying research priorities for optimizing of the pan-European forecasting system.
- Integrating existing modelling and forecasting systems and upgrade/develop systems in physics, downscaling, data assimilation or ecosystem to be ready for real time forecasting experiment

- Progressively developing and implementing modelling elements required for individual regional and coastal system advancement on the baseline systems
- Enhancing the exploitation of newly available data in order to improve the quality of coastal ocean forecasting, supporting the integration and consolidation of a pan-European network of observation, and enhancing the cooperation between scientific communities working in near coastal ocean and community of operational oceanographers downscaling their models to coastal scales.
- Integrating and implementing a pan-European Marine Information System of Systems (EuroMISS).
- Developing an integrated marine services in support of marine environmental management in European coastal areas (EuroDeSS), based on information products generated by the EuroMISS system.
- Quantifying the monthly to decadal variability of the shelf seas-coastal climate, quantifying the monthly to decadal variability of the climate effects on the lower trophic levels of the shelf seas-coastal ecosystems, quantifying the potential effects on shelf seas-coastal climate and ecosystems from global climate change predictions (decades-100 years), quantifying the potential effects on shelf seas-coastal ecosystems due to management scenarios and related to natural variability and producing multi-decadal reference databases and monthly climatologies of modelled shelf seas-coastal climate and ecosystems.
- developing capacity in non-EU countries to use the existing operational oceanographic products from both observing systems and forecasting models, developing local capacity of non-EU countries to observe and model the coastal ocean following the ECOOP standard and developing courses and educational material for new professionals.
- advancing the knowledge and research skills of the experts and operators and to promote contacts between service providers and end-user community.

B.2 Relevance to the objectives of the Global Change and Ecosystems Sub-Priority

B.2.1 Relevance to the call

ECOOP addresses all the objectives of area VI.1.2. The project will integrate, consolidate and develop existing regional and coastal ocean observing networks into a pan-European system. The system will specifically focus on detecting environmental and climate changes, predicting their evolution and effects, establishing a public information system and developing a targeted decision support system. These activities will be a substantial European support to the GEO initiative, the GEOSS implementation plan and will additionally support the implementation of GMES. The project includes a component of education, training and technology transfer aiming at facilitating international cooperation and transfer of the system concept to other regions of the world. The ECOOP consortium includes several SME's.

B.2.2 Relevance to the wider social and policy context of the Sub-Priority:

End-user needs from the European operational oceanography community, the fisheries sector, the marine economic sector, the health of the marine environment and environmental security, GMES, ICES, WFD, and EEA 6th action plan are the major driving forces of this project.

International Council for Exploration of the Seas (ICES)
ICES is the main body for giving regular management advice on the exploitation of fish stocks in European waters of the north Atlantic. There is an increasing awareness that the marine environment/climate is a major driver for the variability in the stocks, requiring the latest information of the ocean state to be operationally available.

Water Framework Directive(WFD)
WFD will start the long-term implementation plan. Knowledge of the land-estuary-coast-offshore exchange is crucial in order to design and evaluate the strategy of the implementation. This is a general question for all European countries. However, the coastal (a few kms from the coast) - offshore exchange is an unresolved question which needs very high resolution models and observations.

EEA 6th Action Plan and regional marine Conventions
The environmental state assessment and management is a major task for EEA and regional marine conventions. However this task is currently largely limited by following factors:

- Delay of observational data delivery
- Lack of representative observations for evaluation of the system
- Lack of consistent European standards on environmental assessment
- Lack of consistent regional-coastal-estuary model systems to provide an ecosystem-based approach for environmental management.

The pan-European coastal and regional observing and forecasting system (including assessment, information presentation and decision supporting) will largely ease the above limitations and facilitate the EEA 6th Action Plan.

B.2.3 Extent to which the objectives of the work programme are addressed

ECOOP addresses all the main objectives of the Work Programme *Global Change and Ecosystems.* It focuses on developing a system for integration of European observational and forecasting capabilities addressing issues concerning the ambitious objectives of Environmental Technologies Action Plan (ETAP) for the European Union as well as to the European Strategy for Environment and Health and the Group on Earth Observations (GEO) initiative and useful for the Global Monitoring for Environment and Security (GMES).

ECOOP will focus on the development and implementation of observing and forecasting systems to integrate long-term systematic observations of marine parameters of the European Regional and coastal Seas. Such a system will contribute to the detection and documentation of climate change and their societal impact, and will yield information and decision support for users and decision makers. Such integrated observing and forecasting capacity will support the activities carried out within the research priority "Global Change and Ecosystems". It will reinforce the contributions to the Group on Earth Observations (GEO), Global Monitoring for Environment and Security (GMES) and to Global Ocean Observing Systems (GOOS) and its coastal component (COOP).

B.2.4 Breakthrough and Innovation

ECOOP will, for the first time, build up the following pan-EU systems which are critical for GMES and the GEOSS implementation plan in the next 5-10 years in Europe:

- A pan-European coastal/shelf sea forecasting system
- A pan-European near real-time marine data exchange and quality control system

- A pan-European Marine Information System of Systems (EuroMISS)

In addition to this, ECOOP will provide tools and protocols for system quality assessment, including

- tools for assessing pan-EU coastal/shelf observing system in technology, system products, sampling schemes, cost and delivery time
- Operational tools for assessing pan-EU coastal/shelf forecasting products
- Common protocols for quality assurance of data in coastal waters

For key marine-related decision making issues such as climate change, oil spill and ecosystem health, ECOOP will build up 'Dedicated presentation systems with value-added products for supporting decision making'.

ECOOP will also advance key technologies for developing next generation observing and forecasting systems, including:

- Optimum design of the next generation coastal/shelf sea observing system
- Innovative methodology in marine ensemble forecasting, ecosystem and sedimentary forecasting, estuary-coast-offshore interaction.

B.2.5 Appropriateness of using a Integrated project

An integrated project is appropriate for the following reasons:

- ECOOP has a pan-European dimension and needs a critical mass
- As described in section 'State of the art', most of the scientific and technical components are ready for such an IP: both through past EU projects as well as through the regional operational oceanography alliances BOOS, NOOS, IBIROOS, MFS-MOON and Black Sea GOOS. To improve the work efficiency, avoid overlap of work, and share knowledge and data a logical next step is to consolidate and integrate the current generation of European coastal and regional observing and forecasting systems into a pan-European system with common information platform and similar quality standards.
- To build up ECOOP system, R&D on key technologies has to be conducted, e.g., downscaling techniques to very high resolution, quantitative assessment and design of observing network, model validation, sedimentary forecast etc.

B.3 Potential Impact

B.3.1 Innovative related activities

The coastal and regional seas are economically the most important parts of the world ocean and the subject of the majority of international agreements and conventions. More than 120 million people live within Europe's coastal regions and their quality of life is impacted by the environmental status of its regional seas. Conflicts between commerce, recreation, development, environmental protection, and the management of living resources are becoming increasingly contentious and politically charged. The social and economic costs of uninformed decisions are increasing accordingly. Transfer of matter from the continent to the coastal ocean is changing rapidly due to human activity. Without an adequate understanding of the nature, scale and extent of these changes, effective management and sustainable uses of coastal areas and resources will be extremely difficult.
For information needs common to many societal benefit areas, ECOOP will facilitate the development and provision of common marine products such as coastal "weather" (e.g., currents, turbulence, temperature, salinity, waves, water level, sea ice, light, wind, surface air temperature), oil spill fate, potentially harmful algae blooms, transport and dispersion of particles and distribution of water masses (e.g., fish eggs and larvae, contaminants, suspended matter, fresh water), eutrophication (e.g., nutrients, oxygen), trans-boundary transports of nutrients and suspended matter, pathways and dilution of potential polluted freshwater, long time-series of the regional ocean climate and ecosystem variability (lower trophic levels, with focus on the needs from fisheries)

The following are brief summary statements of topics covered and key outcomes in each area:

- Disaster mitigation: Reducing loss of life and property from natural and human-induced disasters. ECOOP implementation will bring a more timely dissemination of information through better coordinated systems for monitoring, predicton, risk assessment and early warning.
- Ecosystem protection and marine resources exploitation: Improving the basis for management and protection of coastal and regional marine resources. ECOOP implementation will seek to ensure that methodologies and observations are available to detect and predict changes in ecosystem conditions and to define information useful for sustainable exploitation of marine resources. Ecosystem observations will be better harmonized and shared, spatial gaps will be filled, *in situ* data will be better integrated with space-based observations and models**.**
- Human Health: Understanding environmental factors affecting human health and well-being. ECOOP will improve the flow of appropriate environmental data promoting a focus on prevention and contributing to the continued improvements in human health worldwide.
- Climate change: Understanding, assessing, predicting, and adapting to climate variability and change. Coping with climate change and variability demands good scientific understanding based on sufficient and reliable information coming from optimal estimates combining observations and models

B.3.2 Account taken of other national and international research activities

ECOOP will maintain a close cooperation with MERSEA from the beginning, through an overlap of the two Steering Groups. This will avoid any possible duplication between MERSEA and

ECOOP, and will effectively build up a MERSEA-ECOOP European system for Global-Regional-coastal coupled observing and forecasting systems. The global and regional forecasting systems built in MERSEA will be used as a basis to develop the ECOOP coastal forecasting system. The satellite observing system and data/information system built in MERSEA will also be maximally used in ECOOP. ECOOP will also coordinate with on-going national marine research activities via partners from major European operational agencies and regional cooperations BOOS, NOOS, IBIROOS, MFS-MOON and Black Sea GOOS. ECOOP partners are also involved in other EU and European-scale projects and initiatives such as GMES service element and sustainability projects, this will avoid overlap in research content between ECOOP and these projects and proposals.

B.3.3 Strategic impact of the proposed project

ECOOP will provide an overall conceptual and organisational framework to build towards an integrated Pan-European regional and coastal ocean observing and forecasting system to meet user needs. ECOOP will provide the European mechanism for ensuring the necessary level of coordination, strengthening and supplementing existing regional and coastal ocean observation systems, and for reinforcing and supporting these systems in carrying out their mandates and facilitating their transition to sustained operational use in order to meet international requirements set out in the GEOSS and GMES implementation plans.

So the competitiveness of European industry will benefit from the ECOOP developments in two ways: Directly by the provision of information enabling more efficient and safer operations at sea, and indirectly by creating an information framework from which services can be developed by SMEs

B.3.4 Exploitation and dissemination plans for ensuring use of the project results

End users and decision makers from the public and private sectors will be consulted to establish a feedback loop delivering assessments of the project outputs in terms of accuracy, reliability, and adequacy to their needs. The design of the information and decision support systems will be formulated taking account of their specifications.

A full range of information dissemination tools, formats, supports, and media will be exploited. ECOOP will develop a portal that will provide access to a wide range of real-time products handled in a distributed way by the observation, model data and products providers. It will also enable users to generate their own products. In agreement with internationally agreed standards the project will provide metadata catalogues and efficient data exchange and distribution tools to fulfil ECOOP operators and users needs. CD-ROMs, a project web-site, publications in scientific and technical journals, and presentations in conferences will also be used for a wide dissemination of results.

Informed decisions and policy making can only be based on sound scientific understanding and indisputable evidence. But policy makers need simplified information summaries in the form of indicators and indices. ECOOP will apply indicators developed by EEA and in other EU projects on the regional and coastal ocean environment in support of EU policy, and will address the objectives and vision of the GEO and GMES initiatives.

Impact on European education and training

Within ECOOP young researchers such as post-docs and PhD-students will be given a fully modern training within almost all of the fields constituting modern operational oceanography. ECOOP funding will support Masters, PhD and post-doctoral fellowships at some of the partner institutions.

The involvement of universities in the consortium means that the ECOOP approach and data products will be incorporated in existing earth system education programs.

Science and Society
Public interest in operational ocean observating and forecasting is already raised, and concern on environmental and climate issues in the regional and coastal seas is high on the public agenda. Through the establishment of a pan-European Marine Information System of Systems (EuroMISS) ECOOP have put focus on keeping the general public well informed and updated with essential information on the state of the European regional and coastal seas, and the progress of ECOOP.

B.3.5 Added value of carrying out the research on European level

Building an integrated pan-European regional and coastal observing and forecasting system requires that ECOOP operates at a European level, building on existing monitoring capacity and observation programs, to ensure that relevant, experienced and adequate resources are mobilised to address the goal and objectives of the work program and maintain pre-eminence within the international community. ECOOP will ensure strong links between the European operational oceanographic community and end users as well as decision makers to ensure that the marine information and decisions support actions for the European regional and coastal seas are relevant, and are of a uniform level of quality across all regions.

B.3.6 Contributions to standards, policies and regulations

ECOOP will through its close cooperation with the MERSEA IP project contribute to the development and implementation of unified pan-European standards for data formats, and protocols and in particular to free exchange of marine data. Several ECOOP participants are involved in international cooperation on defining satellite, in-situ, and model output format and standards, whose recommendations will be adopted in the course of the project.

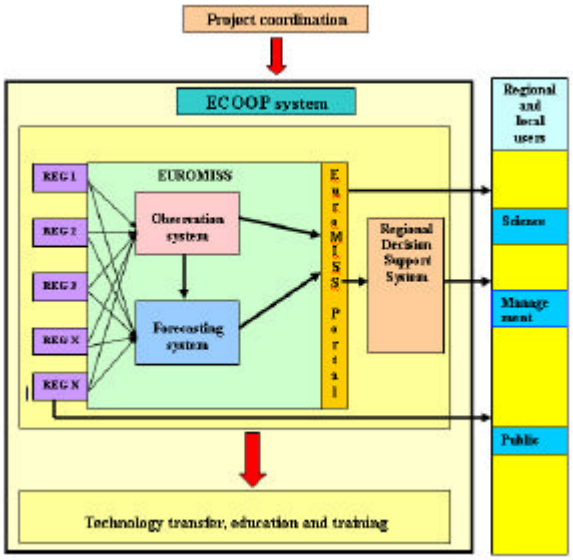
ECOOP will contribute to the development of standards for how an integrated regional and coastal forecasting system can be organised and implemented which can serve as a model for other regions of the world in the implementation of GEOSS.

B.4 Outline Implementation plan

B.4.1 Research, technological development and innovation activities

ECOOP will achieve its goals by implementing an integration of observations and modelling into a pan-European marine information system of systems (EuroMISS) and design of a European decision support system (EuroDESS) for coastal and regional seas.

The logics of ECOOP are illustrated in the figure below.



The work will be organised under 4 core themes, which are subdivided into 12 work packages:

1. Observation System
   - WP1: Quantitative assessment of observation systems: gaps and quality
   - WP2: Integration of observing networks (pan- EU baseline system)
   - WP3: Optimal synergy between remote sensing – in situ
2. Forecasting System
   - WP4: Modelling and forecasting system assessment: standards, quality, functions
   - WP5: Integration of modelling and forecasting systems (baseline system)
   - WP6: System development (downscaling, data assimilation, eco-modelling)
   - WP7: Synergy between coastal forecasting and newly available data and methodologies (a step towards next generation forecasting systems)
3. Information system – EuroMISS and EuroDESS
   - WP8: European Marine Information System of Systems (EuroMISS)
   - WP9: European decision supporting system (EuroDESS)
   - WP10: Hindcast and scenario studies
4. Technology transfer, education and training
   - WP11: International cooperation, technology transfer
   - WP12 Education and Training

WP1 - Quantitative assessment of observation systems: gaps and quality

Objectives:

To quantitatively assess European coastal and regional sea observational networks (including biochemical parameters) through both applying existing methodology (developed in EU FP5 project ODON) and developing new assessment methods and web-based assessment tools.

Description:

The European Sea observational network has been one of the major focuses in FP5 Operational Clusters. The FP5 project EDIOS has established a meta database of European Sea initial observation system, which allows users to view the data availability through the internet. Another FP5 project ODON has developed quantitative methodology for T/S observation network

assessment and design. Both projects are highly relevant to the GMES and GEOSS implementation plan. A natural next step is to combine updated EDIOS meta data and ODON methodology to give a pan-European Sea observational network assessment, including biochemical parameters. At the same time, some limits in ODON methods should be coped with new methodology. Finally it is ready to make a web-based tool for observational network assessment, so that users can take real advantage from this development work.
This WP aims to quantitatively assess European coastal and regional sea observational networks (including biochemical parameters) through both applying existing methodology (developed in EU FP5 project ODON) and developing new assessment methods and web-based assessment tools. The objective is broken into following tasks

- Quantitatively assess gaps and explained variance of pan-EU European temperature and salinity observational networks
- Quantitatively assess gaps and explained variance quality of biochemical observational networks for targeted areas
- Develop and demonstrate innovative new methodology for observation network assessment via ensemble modelling
- Develop assessment methods for integrated T/S and currents observing system
- Develop and demonstrate a web-based interactive network assessment tool

T1.1 - WP1 management

Objectives: To assure the appropriate communication and co-ordination between WP1 partners, and between WP1 and other WPs, and that the WP1 tasks and deliverables are completed according to the WP plan.

Description: The WP1 management works on two issues: 1) coordinating WP1 in close contact with ECOOP Steering Group (SG); 2) communicating with the partners to secure that the objectives are achieved and to assure that the work carried out by each partners is well coordinated. The first issue is addressed through the involvement of WP1 leader in ECOOP SG, and contact with relevant WPs - WP2 (integrated observation network), WP3 (synergy between remote sensing and i-situ) and WP7 (requirement for next generation systems). The second issue is worked out by a close cooperation between task leaders and partners, through working meeting, website, email and ODON methodology transfer.

S1.1.1 - Coordinating WP1 in close contact with ECOOP steering group

Objectives: Ensure proper links between WP1 and other WPs as well as ECOOP steering group, and contributions to entire project.

Description: Participating steering group meetings, contributing to write management reports and scientific reports. Make linkage between WP1 and WP2, WP7 and WP9 so that the output of WP1 can be readily used in Integration of observational networks (WP2), design next generation observing systems (WP7) and EuroDESS (WP9).

S1.1.2 - Scientific coordination

Objectives: Communicate with WP partners to ensure proper coordination between the partners, and the deliverables can be made in time.

Description: Planning and organising WP meetings together with WP1 task leaders, preparing the meeting minutes. Monitoring the scientific progresses made in the project, and ensuring the in-time delivery of the scientific results.

T1.2 - Pan-European T/S observational network assessment

Objectives: To quantitatively assess the effective coverage and explained variance of the information the pan-EU Sea T/S observational networks.

Description: Observing network assessment methodology developed in ODON will be applied in 5 pan-EU regional seas (i.e., Baltic Sea, NW shelf Sea, IBIROOS region, Med. Sea and Black Sea). The effective coverage of the observing networks will be calculated by combining a meta dataset and characteristic scales derived from 'proxy oceans'. The proxy oceans in general represent the state-of-the-art ocean model products. The explained variance of a given observation network can be assessed by using the proxy oceans with a multi-regression method.
In this activity, the proxy oceans will be made separately by 5 regional sea modeling centres. ODON methodology (covariance model analysis, scale analysis, effective coverage analysis) will be used for the statistical analysis. Regional Sea contractors are responsible to provide a metadata set (T, S) for the region and a 3-year medium-resolution model run. DMI will collect all the model data and do the statistical analysis. In the first 18 months, this task will carry out following subtasks:

S1.2.1 - Meta data and historical data collection

Objectives: Collect meta data and historical data for temperature and salinity measurements

Description: Meta data and historical data of temperature and salinity observational networks in 5 European regional seas will be collected for a given 3 year period by the 5 regional partners. This dataset will be used in subtasks S1.2.3 and S1.2.4.

S1.2.2 - Proxy ocean generation

Objectives: Generate proxy physical ocean condition for scale analysis

Description: 3-year physical model runs in a 3nm resolution (at least) for 5 European regional seas will be generated. The model ocean should represent the state-of-the-art model products.

S1.2.3 - Proxy ocean data analysis

Objectives: To provide necessary statistical information by analysing the proxy ocean data for estimating effective coverage of observational networks.

Description: meta data (generated in S1.2.1) and correlation models (generated in S1.2.3 first 18month) will be used to calculate the effective coverage of existing T/S observational networks for 5 regional European Seas. The explained variance of the existing T/S observational networks will be calculated by applying a multi-regression method on the proxy ocean data.

S1.2.4 - Assessment of the effective coverage and explained variance of existing T/S observational networks

Objectives: Generate horizontal distribution of effective coverage and explained variance of the existing European Sea T/S observational networks

Description: The results obtained in S1.2.3 will be used to assess the existing pan-European Sea T/S observation networks. The assessment report will be written.

T1.3 - Assessment of Biochemical observational network

Objectives: Assess the effective coverage and explained variance of biochemical observational networks in two demonstrated areas: Baltic Sea and South North Sea.

Description: This task will apply ODON observing system assessment methodology for assessing targeted biochemical observing networks in Baltic Sea and South North Sea. The task will focus on observations of chllorophil, oxegen and nutrient parameters. The proxy biochemical ocean will be generated by PML and FIMR ecological models. ODON assessment methodology will be used transferred (by DMI) to PML and SMHI, who are responsible for the statistical assessment.

S1.3.1 - Data collection and overall assessment design

Objectives: Collect meta data and historical biochemical data for network assessment, design assessment strategy.

Description: Generate biochemical meta data and historical data for the Baltic Sea and South North Sea; design proxy run time period, and purposes for the biochemical observational network assessment.

S1.3.2 - Proxy biochemical ocean generation

Objectives: Generate proxy biochemical ocean conditions using state-of-the art ecological models for two important areas of Europe's coastal waters. The target areas have a well-established regional monitoring and assessment co-operation and a significant stakeholder participation.

S1.3.3 - Statistical network assessment based on the proxy ocean

Objectives: Perform statistical assessment methods for selected biochemical parameters based on the proxy biochemical ocean condition.

Description: ODON assessment technology will be transferred from DMI to other task partners, who will jointly perform the following statistical analysis for their respective areas:

- Spatial-temporal scale analysis
- Comparison of model scales and observed scales (ferrybox data, buoy observations)
- Estimate effective coverage and explained variance

The statistical analysis results will be summarised to make an assessment report for the biochemical observational networks in the focused areas.

T1.4 - New methodology development and demonstration

Objectives: 1) Develop and demonstrate innovative new methodology for observation network assessment via ensemble modelling
2) Develop assessment methods for integrated T/S and currents observing system
3) Develop and demonstrate a web-based interactive network assessment tool

Description: Based on existing assessment methodology, for a user specified observation network, its effective coverage and explained variance can be estimated and therefore the effectiveness of the network can be assessed. The idea is to developed a web-based network assessment tool, so that users (e.g., monitoring agencies) can dynamically specify a sampling scheme and then get an assessment of this scheme. This forms the content of subtask 1.4.1
Existing observational network assessment methods are either based on the statistical analysis or observation system experiments, which are mainly performed for conventional T/S observing systems. This task proposes several innovative network assessment method: one is to estimate

effective coverage and explained variance of (proxy) model error by a given observational network by using ensemble modeling; the second one is to estimate the explained number of freedoms of the model by a given observational network by using ensemble modelling; the third one is to assess mixed T/S and velicity observing system by using OSEs. These innovative network assessment methods are developed in subtasks 1.4.2 and 1.4.3

S1.4.1 - Assessment of T/S and velocity observation systems

Objectives: Develop and demonstrate assessment method for mixed multi-platform T/S and currents observation systems

Description: Coastal and regional observational systems include multi-platform T/S measurements, e.g., CTD casts, XBT, Argo floats and gliders etc. As assessment of the impact of these different and innovative platforms will be provided, as tested in the Mediterranean Sea as part of the MFSTEP. In addition to T/S measurements, velocity measurements are expected to play an important role for coastal observing system. They include Lagrangian measurements from floats and drifters, as well as Eulerian measurements from HF radar and autonomous currentmeters. A new method for Lagrangian data assimilation, developed during MFSTEP for Argo position data, will be improved and implemented for coastal application using drifter data. Application to the Adriatic Sea boundary currents will be considered, with specific goal of assessing observing system capabilities to describe interactions between coastal currents and interior and consequences for bio-geophysical applications.

S1.4.2 - Development and demonstrate a web-based observation network assessment tool

Objectives: Development and demonstrate a web-based observation network assessment tool

Description: A web-based interactive tool of observation network assessment will be built up. It will allow users to prescibe a sampling scheme and then get an effective coverage map of this sampling scheme. At the begining, the tool will be made based on the ODON proxy data in the Baltic Sea (quality to be improved). When the task 1.2 is completed, the tool can be extended to the entire 5 regional seas based on the task 1.2 results.

S1.4.3 - Using ensemble modelling for observational network assessment

Objectives: Develop innovative network assessment by using ensemble modelling

Description: In this subtask, we will set up methods to evaluate the performance of observational networks by using ensemble simulations.
In one part of the work, we will at carry out ensemble model simulations, then the 'proxy model error' will be estimated by using the ensemble spread. In this way, the effective coverage and explained variance of the 'proxy model error' by the observational network can be estimated.
In a second part, we will use an idea of Bennett who proposed to objectively assess observational networks by estimating the explained degrees of freedom of model error by the network. We will extend this methodology by estimating the space-time representer matrix from ensemble simulations. The spectrum of singular values of the matrix will be used for assessment.

WP2 - Integration of observing networks (pan- EU baseline system)

Objectives:

- Integration of existing EU-wide marine observation systems,
- harmonising flow of real time and near real time observational data
- co-ordination accessing Earth Observation (EO) products

in order to maximise the benefit from existing national and European resources.

Description:

The aim of this module is to integrate existing marine observation systems, harmonise the flow of observational data and co-ordinate access to Earth Observation (EO) products in order to maximise the benefit from existing national and European resources. The work package consists of following items:

- Evaluate national and regional marine observation networks according to common scientific standards in data handling, transfer and distribution
- Develop and implement the ECOOP DMS (Data management system)
- Optimal use of resources to provide integrated - quality assured - data for the ECOOP information and forecasting system being one basis for the ECOOP decision support system
- Ensure proper and maximum real time and near real time delivery of observational data pan-European wide, including river run-off data and real time delivery of remote sensing data
- Ensure the quality of real time and near real time observational data by a series of protocols regulating the operational activity from collection, data transmission, and dissemination
- Build up a high level service for the exchange of observational data to avoid diversity in data management systems for upcoming projects
- Deliver quality assured climatologic observation data sets for the ECOOP information system

T2.1 - Network evaluation and data delivery

Objectives: Evaluate existing systems, identify products and services, data and time-space coverage, coordinate data collection, assure timely data delivery

Description: Provide an inventory of the data management systems used for regional and coastal observation system active in Europe according to common scientific standards on data handling, transfer and distribution. For this task following sources shall be used: the EDIOS data base, regional observing systems and EU-wide systems (SeaDataNet, BOOS, NOOS, PAPA, MAMA, MFSTEP, MOON, MedGOOS, BS-GOOS, ARENA, IBI-ROOS, MedARGO, ESEAS,....). This will identify the data collected in European coastal areas, assess the quality of products and services, as well as time and space coverage, objectives of the data collection, technologies and methodologies used. Select the use cases, establish and ensure the delivery of real and near real time data for different data collection systems in shelf and coastal areas. Identify the access to real time data of ship bounded instruments (e.g. SOOP, FerryBox, ...) , data of fixed stations, data of remote sensing (esp. altimeter data). Identify the most suitable system of data handling, transfer and distribution to be used pan-European wide. Identify consistent data interfaces and links to the MERSEA data management system. Compile quality assured climatological observation data sets, integrating existing bases

S2.1.1 - Provide an inventory of the data management systems used for marine regional and coastal observation systems

Objectives: Provide description and rationale for the data management systems for shelf seas and coastal observations. Assess their performance vs the project objectives.

Description: Provide an inventory of the data management systems used for real time and near real time regional and coastal observation systems active in Europe with common scientific standards on data handling, transfer and distribution. For this task the following sources shall be used: the EDIOS data base, regional observing systems and EU-wide systems (BOOS, NOOS, PAPA, MedGOOS-MAMA, MFS-MOON, BS-GOOS, ARENA, IBI-ROOS, MedARGO, SeaSearch, SeaDataNet, ESEOO, ESEAS,....).

S2.1.2 - Select the most suitable system of data handling, transfer and distribution

Objectives: Provide the best practices in data management (from data collection to telemetry and distribution) and define the common strategies.

Description: Select the most suitable system of data handling, transfer and distribution to be used pan-European wide. The existing practices will be compared and analysed. The most important users of the ECOOP data will be the forecasting centres and their requirements will be used in order to define priority lists for parameters, delay in data access and content of metadata. The different methodologies and technologies for data collection will be analysed in order to define the ECOOP data transmission methodologies. It will give a clear definition of 'real time' and 'near-real time' and what can be provided with the existing technologies. Common methodologies will be defined and released to partners before starting with data collection. This will assure data comparability and compatibility.

S2.1.3 - Establish and ensure the delivery of marine real and near real time data

Objectives: To design and establish a co-ordinated pan-European data flow of marine real time and near real time data to meet the ECOOP objectives.

Description: Establish and ensure the delivery of real and near real time data. ECOOP will co-ordinate efforts to collect data from various sources. The initial work will consist in:

- listing the available data from non-ECOOP programs that are of interest to the project
- specify the conditions for a collaborative framework (data access and exchange)

With the information on existing programmes and their respective data systems, ECOOP has to establish a common ECOOP data system with these programmes for the mutual benefit. The ECOOP data collection will include e.g. sea level gauges, coastal stations, shelf and coastal transects, Ferrybox, XBT lines, and current data from Eulerian and Lagrangian systems.
Access to data from existing programmes will have to be based on agreements between all partners. Data transmission and flow of ECOOP data will have to be organised such that access with a minimum time delay of 12 - 24 h , from acquisition to ECOOP products, will be met.
In the third year a thorough assessment of the data delivery system will be made to identify gaps and prolem areas and define remedies.

S2.1.4 - Identify and select consistent data interfaces and links to the MERSEA data management system

Objectives: Ensure an effective data exchange between data collectors and forecasting systems, create the links with other non-ECOOP operational data bases, especially with MERSEA.

Description: Commonalties but also some differences exist in the data flow of the many European programmes. Heterogeneity is due to the different objectives, different technologies, infrastructures, and formats. ECOOP must assure a collaborative framework for effective data exchange mechanisms, taking into account the existing heterogeneity. The work done in this subtask will be limited to the analysis of existing interfaces and the identification of the most consistent to the ECOOP objectives. The use of the existing data interfaces will constitute the zero version of the ECOOP data management system. The other systems will be developed in T2.2.

S2.1.5 - Compile quality assured climatologic observation data sets, integrating existing bases

Objectives: Acquire, evaluate and provide selected existing climatological data sets to be used for QC procedures

Description: There are European and national institutions and projects dedicated to the collection of historical data. Some climatological atlases and data bases have been produced. The subtask will evaluate the potential use of these climatologies, which then will be acquired and made available to the ECOOP partners. Theses climatologies will reside in selected data centres. The interfaces for the access will evolve during the project on the base of the work done in task 2.2. The initial version will be based on existing systems.

T2.2 - Establish a data management system to deliver real time and near real time data in an optimal and cost-effective mode

Objectives: Develop and implement a framework for managing and providing access to harmonised, quality assured observational and satellite data and associated metadata sourced from regional centres, and provide a single interface to the EuroMISS.

Description: This work package will build the ECOOP Data Management System (EDMS) based on the review of existing regional data centres undertaken in WP 2.1. In the first phase of the project, the EDMS will be a static web portal, providing information on, and links to, the existing regional centres. In the second phase, the EDMS will be extended to become a full data management system, integrating, in a dynamic way, the data, metadata and services available from the regional centres. The system will provide a common catalogue and common services interface across the participating regions. Because of the geographic spread of the data centres, the design of the EDMS is likely to be based on the "Broker" pattern. This abstracts the remote service invocation by encapsulating it in a distinct layer separate from the client (the EDMS) and distributed servers (regional centres). It can include a registry or naming service (for discovering servers) which allows services to be plugged into the system dynamically or switched to new locations. One aspect, of particular value to ECOOP, is that a server (e.g., one supplying river run-off data) could initially be run on the same machine as the EDMS (i.e., the client) and later moved to a remote server, or split between several regional servers as they come on stream, without affecting the application logic at the EDMS end. The EDMS will provide a single interface to EuroMISS.

S2.2.1 - Design and implement the ECOOP Data Management System appropriate for integrating all existing regional and coastal systems

Objectives: Build the ECOOP Data Management System (ECOOP DMS).

Description: The ECOOP DMS will be built in two phases. In the first, a static web portal will be constructed providing a synopsis of each participating regional data centre, its role and outputs (data etc.), quality control procedures / protocols, and links to any downloadable data, metadata, or

services (e.g., FTP, OPeNDAP). In the second phase, the full data management system will be implemented, integrating the more advanced regional data centres. This will provide a common catalogue and common services interface for all participating centres.

S2.2.2 - Define the metadata-interface

Objectives: Provide a common catalogue for all metadata.

Description: Metadata is an essential adjunct of all scientific data sets, providing a prospective user with critical information on such issues as provenance and quality, instrumentation and accuracy, dates, times and geographic location. "Discovery" metadata provide a minimal set of tags that allow a dataset to be found through database/catalogue searches. Sharing and cross searches between catalogues is facilitated by preparing metadata that conforms to a recognised specification, as for example, the metadata profile based on ISO 19115 / ISO 19139 recently released by CEN. All data providers in the ECOOP regional centres will be encouraged to follow the CEN recommendation.

S2.2.3 - Implement protocols for quality assurance in the ECOOP data management system

Objectives: Ensure a common and general quality of all data processed by the ECOOP DMS.

Description: All regional data centres and addtional suppliers currently implement calibration and quality assurance schemes for their data sets. The ECOOP DMS has to guarantee the quality standards according to the common procedures agreed in T2.4. Routine examination procedures will result in statistical reports. Adequate SW-modules will be implemented in the ECOOP DMS to ensure that all real time and near real time data meet common standards.

S2.2.4 - Implement the access to selected climatologic observation data sets (from WP2.1)

Objectives: Integrate the climatological observation data sets in the ECOOP DMS

Description: S2.2.4 will construct and implement a SW-interface to provide access to climatological observation data sets at selected data centres (S2.1.5) as part of the ECOOP DMS.
Adapt the ECOOP Data Management System architecture to include the climatological observation data sets
Delivery of the interface to the ECOOP DMS.

S2.2.5 - Implement data interfaces with EuroMISS (WP8)

Objectives: Implement the interface between the ECOOP DMS and EuroMISS

Description: EuroMISS is a "system of systems", integrating distributed data management centres such as the MERSEA Thematic Portals. The ECOOP DMS will act as another node in the EuroMISS network, providing a single connection point for the regional data centres that it, in turn, integrates.

T2.3 - Ensure proper and maximum real time delivery of remote sensing data

Objectives: Implementation quality controlled advanced satellite products to ensure the proper and maximum timely delivery to the EuroMISS(WP8)

Description: Most of the present operational monitoring systems are essentially basin-scale observational systems "extended" to coastal areas. As a consequence, satellite products for these systems were just adapted from global products, rather than from specific products for coastal

environment and applications. This task will build an operational system based upon the results of the R&D activity of WP3. Advanced satellite products for monitoring and assimilation into ECOOP models will be produced and delivered in real time during the operational phase (TOP) of ECOOP. The activity consists in:

- Design remote sensing acquisition phase
- Identify and select the in situ data required for integration with remote sensing data
- Production and delivery of the new remote sensing products developed in ECOOP during TOP
- Analysis of the end-to-end production and delivery to further optimize the system

S2.3.1 - Design the in situ and remote sensing acquisition phase

Objectives: Define the in situ and remote sensing acquisition system for test operational period (TOP)

Description: This subtask will define the details of the in situ and remote sensing data requirements for data assimilation during the operational phase of the ECOOP project (TOP). This will be done in close collaboration with other WPs. Activities include:

- Analyse the in situ data inventory of WP2.1
- Select the available NRT in situ data sets from the WP2.1 inventory
- Identify the in required situ data and existing data gaps relative to data assimilation during TOP
- Identify the NRT satellite data products for data assimilation in TOP
- Identify in situ data for advanced NRT satellite - in situ merged products for data assimilation
- Formulate the characteristics for the data delivery and management system specific for TOP

S2.3.2 - Production and delivery of the new remote sensing products during TOP

Objectives: Acquisition, processing and delivery of the new remote sensing products specific for TOP

Description: This subtask will produce advanced remote sensing products for data assimilation in models during the project's operational phases (TOP) taking place in the different European basins. Such advanced operational products will be constructed here on the basis of the R&D remote sensing results, such as improved algorithms, in situ R/S data merging, etc. The new satellite products specialised for the data assimilation in ECOOP models include:

- SST merged R/S - in situ products (IBIROOS, Adriatic, Baltic, North Sea)
- Altimetry merged R/S with tide gauges and MDT (IBIROOS and Black Sea)
- Ocean Colour merged R/S - in situ products (IBIROOS, Adriatic, Baltic)

This subtask will develop the connections between each local database and the ECOOP DMS for the duration of the top phases, in order to make data available to the entire ECOOP community. Product delivery will be assured via the data management system developed in WP 2.2.
Data quality control and assurance will be implemented on the entire data stream.

S2.3.3 - Analysis of the end-to-end production and delivery to further optimise the system

Objectives: Overall evaluation of the end-to-end data production and delivery systems

Description: This subtask will perform an overall evaluation of end-to-end production and delivery of data during TOP.
Activities include:

- Developing data transmission efficiency indicators
- Performing a monitoring of the efficiency in data transmission
- Highlight of R/S production problems
- Highlight of R/S and in situ data delivery problems
- Formulation of variations in data production and management for assimilation in view of the implementation of an operational system
- Formulate suggestions for the improvement of the ECOOP data management system

T2.4 - Quality assurance

Objectives: The quality of real-time and near-real-time observational data is assured by a series of protocols regulating the operational activity from collection, data transmission, quality control and dissemination. The already extisting protocols used in the regional centres and coastal institutions will be harmonised to achieve common defined "performance levels" for the ECOOP Data Management System.
Quality assured data sets will be the backbone supply for EuroMISS and EuroDESS.
Under ECOOP-objectives the presently existent QA protocols of comparable observing activities by other international programmes eg. HELCOM, OSPAR etc. will be considered.
A performance check of the entire ECOOP DMS over a 6 months period regarding transfer rates, maintenance of QA indicators, and the completeness of the data flow will indentify shortcommings and gaps.

Description: Identify the most suitable quality assurance protocols controlling the measurements, the data handling and transfer. Define common protocols for multi-disciplinary data, defining unique codes indicating the data quality.A concerted data quality control process for data handling, transmission and data flow will be carried out to indentify shortcommings and gaps.

S2.4.1 - Identify the most suitable quality assurance protocols

Objectives: The quality control for data pre-processing procedures used by the regional centres and the coastal observing centres will be compared. A common standard will be identified. Common protocols controlling the QA-software from the centres will be applied to the operational collection and transmission of data. Although there is considerable experience on data quality assurance in the processing stage, the development of common protocols for quality performance is a stringent requirement. Its application will be the first step towards establishing procedures for comparability and compatibility of data acquisition, transmission and exchange systems by each institution.

Description: Identify the most suitable quality assurance protocols controlling the measurements, the data handling and transfer to be used in the ECOOP Data Management System

S2.4.2 - Define common QA-protocols for multi-disciplinary data, including unique codes indicating the data quality

Objectives: Common protocols agreed by all partners are will control the data quality used for collecting and transmission, and for quality performance as well. The application of the protocols is a precondition to producing homogeneous real-time data sets for ECOOP. Already existent and practised protocols for ECOOP purposes, as defined above will be used by WP as the "performance criterion".

Description:Define common QA-protocols for multi-disciplinary data, including unique codes indicating the data quality

S2.4.3 - Define and apply a data quality control process for data handling and transmission
Objectives: For a six months trial period the quality of the data and data flow in ECOOP DMS will be analysed. A comparison between the data in the DMS and the qualified data in the regional centres and coastal institutions will be used to generate statistical metrics to evaluate the data performance of the DMS.

Description: Define and apply a data quality control process for data handling and transmission. This work will be done in a six months trial period to analyse the quality of the data and the data flow.

T2.5 - Establish a pan-EU data base for river run-off
Objectives: Establish a framework for integrating and harmonising observations of river runoff to the European coastal seas and providing them to coastal and shelf seas monitoring and forecasting services.

Description: This Task will facilitate access to runoff data for use in the ECOOP observing and forecasting system. The activities are: identifying the relevant data sources and their providers (catalogue), establishing effective methods for getting data from the providers to the ECOOP users and putting into effect actual data streams for the major sources. This work is necessary for ECOOP because fresh water fluxes to the coastal seas, and the accompanying nutrient and pollutant loads, are important for accurate monitoring and forecasting the coastal zone ecosystem, pollutant fate as well as for coastal flood management. Observing systems are fragmented, even within nations, and the data are difficult to access, especially in near-real-time (NRT). Efforts towards integrating observations have been mainly focused on hydrology and river flooding, not coastal monitoring. Consequently, predictive coastal ocean models usually rely on simple approximations of river runoff, such as climatologies. Integration is necessary since fresh water effects on the coastal seas are intrinsically trans-boundary.
Given the fragmented state of the European river observing system, this task will work through the five EuroGOOS regional associations: BOOS, NOOS, IBI-ROOS, MedGOOS and Black Sea GOOS. It will be most efficient to exploit the national contact networks represented by the association memberships. The task team therefore includes a key member from each regional association plus a task leader. Each regional partner will liaise closely with their association membership in carrying out the Work. This will ensure that the resulting data provision system is properly tuned to the needs of the regional users and that it will optimally benefit those users. This approach builds on early initiatives within some of the associations, e.g., a project with similar objectives has been started in NOOS as a "best endeavours" activity. The Task will cover both archived and on-line data, volume flux, nutrient and pollutant loads, but the focus will be on implementing a NRT data access to fresh water volume flux, since this is the basic time-critical data stream.

S2.5.1 - Assessment of existing river run-off data
Objectives: To gain an overview of available data and to select an initial set of data for use in ECOOP.

Description: River runoff data will include volume transport and nutrient/pollutant loads, suitable for use in coastal and shelf seas monitoring and forecasting. Both archived time series and data sources with near-real-time (NRT) availability will be sought. The Global Runoff Data Centre (GRDC) will be an important source of information. The partners will obtain additional information from the regional association memberships. The information will be collated into catalogues, regional and pan-European?, that will be available to coastal users. From the catalogue entries, an

optimal list of observation stations for rivers influencing the coastal and regional seas will be made (ECOOP River Station Lists). From the optimal list, the initial NRT data sets for the „ECOOP Data Management System" will be identified; these include the major rivers in each region for which there are NRT data readily available.

S2.5.2 - Interfacing to ECOOP Data Management system
Objectives: Define and test procedures for acquiring river runoff data from providers and making them available through the ECOOP data management systems.

Description: This subtask must: 1) clarify data policy issues within the various regions; 2) define data transfer procedures from data providers to the EDMS; 3) comply with data formats and procedures defined for the ECOOP Data Management system; 4) accommodate specific data exchange requirements in the regional associations; 5) test the data flow procedures on representative sources in each region. This subtask will co-ordinate closely with WP2.1 (EDMS). It will also take into account relevant European marine data management experience, such as MERSEA, SeaDataNet.

S2.5.3 - Implementation of initial data sets in ECOOP Data Management System
Objectives: Provide river runoff data in each region to users through the ECOOP Data Management System

Description: This subtask will focus on provision of NRT data, based on the lists from Task 2.5.1 and utilising the procedures developed in Task 2.5.2. The main activity will be effectuating the contacts with data providers and putting data acquisition procedures into operation. Access to the initial NRT data sets will be implemented for each region by the end of the project. Access to representative elements of the initial NRT data sets will be demonstrated during the TOP. Critique of the data provision will be solicited from ECOOP partners and other member users in each regional association, as input to an assessment and recommendations for improvements.

T2.6 - Products and services
Objectives: Produce added value products of real time and near real time observational data for EuroMISS. Design and implement a prototype of a system to archive the observational data for future use.

Description:
- Produce added value products based on the data compiled at 2.2
- Aggregate real and near real time data sets and prepare products for EuroMISS (WP8) using the interfaces from WP2.2
- Design a system to archive the observational data for future use

S2.6.1 - Definition and design of added value products
Objectives: To select and design the products to be developed in the task (i.e. consistent data sets, gridded data, vertically layered data, sub-inertial currents for drift estimation, etc.)

Description: The different representatives from all European water (a partner representing each EuroGOOS task team) plus an expert on satellite data will define and design the added value products to be developed (i.e. consistent data sets, gridded data, vertically layered data, sub-inertial currents for drift estimation, etc.)

S2.6.2 - Implement real and near real time added value products of observational data for EuroMISS (WP8)
Objectives: Implement real and near real time added value products to provide service to EuroMISS (i.e. consistent data sets, gridded data, vertically layered data, sub-inertial currents for drift estimation, etc.)

Description: The added value products designed in S2.6.1, will be developed for EuroMISS (WP8) using the observational real-time data provided by the interfaces designed in T2.2.

S2.6.3 - Design a system to archive the observational data for future use
Objectives: Design a system to archive the observational data for future use

Description: A study of the different existing systems today (NOOS, BOOS, ESEAS) will be carried out in order to understand which is the most feasible system for archiving large observational data sets. Several technical alternatives will be studied (i.e. ftp-boxes or OPeNDAP). Once the system is designed, a demonstration prototype will be set-up.

T2.7 - WP2 coordination (T2.0)
Objectives: Co-ordination and management of WP2

Description: The co-ordination of WP2 has to phase the work done within the subtasks. Supervise the priorities of the scientific plan and the related actions. Organise the subtask-leader network for a better efficiency of specific transversal actions. Harmonise whenever necessary WP2-plan to reach the aim of ECOOP during the project period. Co-ordinate subtask-leaders by getting everyone to agree on the objectives and schedules. Monitor the schedule of milestones and deliverables. Contribute to the implementation plan of ECOOP. Make accurate estimates to keep WP2 in time. Make corrections and implement solutions of the work plan in case of unforeseen problems. Manage the necessary meetings of all subtasks. Prepare the WP2-parts of the ECOOP-management reports. Schedule regular meetings with participants to set WP2 scope and component deadlines. Participation on ECOOP steering group meetings.

WP3 - Better use of remote sensing and in-situ observing systems for coastal/regional seas

Objectives:
Objective of WP3 is to carry out R&D activities to improve the use of in-situ and remote sensing data for regional and coastal seas. These data sets will be either assimilated or used for validation. Major limitations of remote sensing data in coastal regions are its temporal resolution and quality. The in-situ measurements can be used to validate and correct satellite measurements and to provide an improved temporal sampling of coastal areas (e.g. moored buoys, tide gauges). There is also a need to develop higher level merged in-situ and satellite products. These steps are generally necessary before the data are used for validation or assimilation.

WP3 will be focused on R&D activities. Tasks will be carried out in specific areas to demonstrate the potential of improvements. Improvements will then be implemented in WP2 operational systems and the new ECOOP remote sensing products will be distributed during the TOP period as part of WP2.

T3.1 - Optimal synergy between altimetry and tide gauge data

S3.1.1 - Optimal synergy between altimetry and tide gauge data

Objectives: The work will first consist in analyzing the consistency between altimeter and tide gauge data in the ECOOP regional/coastal seas. New absolute dynamic topography products in coastal regions will also be developed using GOCE data.

Description of work: Altimeter products are less accurate close to the coasts due to aliasing of the high frequency signals and degradation of the altimeter measurements. On the other hand, coastal tide gauges provide long-term and very precise sea level measurements with high temporal resolution. The differences between altimetry and tide gauges will be characterised in terms of high frequency signals, tidal corrections and other altimeter measurement errors. A good understanding of the characteristics of these differences (temporal and spatial scales) is required before merging the two data sets. In particular, it will be crucial to estimate how the tide gauge high frequency signals could be used to improve altimeter measurements. Development of merging techniques will then be carried out. The work will consist in defining and adjusting the parameters of optimal interpolation techniques in coastal regions (e.g. covariance models taking into account coastal dynamics).

A specific work will also be carried out to develop new absolute dynamic topography products in coastal regions. Because of geoid uncertainties, altimetry provides only sea level anomaly data. GOCE satellite mission (2006) will provide very accurate geoid models that will have a major impact on the use of altimetry in regional seas. Improved high resolution mean dynamic topographies should thus be developed from GOCE and altimeter data for regional/coastal seas. This will require to:

a. Compute a mean sea surface (MSS = sea level relative to ellispoid) along the European coasts using in-situ observations (tide gauge data) and altimeter data.
b. Compute mean dynamic topography (MDT) (MSS minus GOCE geoid).
c. Analyze the impact of MDT on altimeter data use.

R&D activities will be focused on the Bay of Biscay and Black Sea.

T3.2 - Improved Ocean Colour algorithms and products for Case-II waters

S3.2.1 - Improved Ocean Colour algorithms and products for Case-II waters

Objectives: Temporal and spatial patterns in surface chlorophyll fields or bio-optical properties are central to describing variability in coastal ecosystems, not only as measures of phytoplankton biomass, but also as input to models of primary productivity, ecosystem-based management of coastal water quality (e.g. eutrophication). Ocean Colour in coastal seas is a very difficult issue, however, due to the composition and optical properties of these waters (case 2). There is a continuing need to improve and test algorithms for estimating phytoplankton, yellow substance and suspended material in Case 2 waters and for atmospheric algorithms correction.

As part of this task, ocean colour algorithms and advanced techniques will be validated and tuned with in-situ data in two coastal regions: Bay of Biscay and Adriatic Sea. Analyzed products that merge in-situ and multi-sensor satellite data will then be developed and tested. The objective of the task is to propose, for these two regions, quality assessed ocean colour products with an accuracy suitable for environmental analysis and inclusion in the context of ecological modelling.

Description: The Adriatic Sea includes coastal and oligotrophic waters for which the ocean colour (OC) products are still affected by significant uncertainties. Recent developments in OC remote

sensing techniques will be applied. These include an optically-based technique for merging optical data from various sensors to create a consistent time series with optimal space/time coverage, and a dynamic combination of bio-optical algorithms developed for specific water types (novelty detection technique) to derive products of higher accuracy. This effort will also benefit from the presence in the Adriatic Sea of one of the main existing validation sites for OC (the Acqua Alta Oceanographic Tower), where a comprehensive data set of (bio-)optical atmospheric and marine measurements has been collected by JRC since 1995. CNR has also collected a large database of bio-optical measurements in oligotrophic Mediterranean waters.

The Gulf of Biscay is a very dynamic zone, with interactions between shelf/slope waters and open Atlantic and the influence of coastal/river inputs making optically complex waters. The derivation of quality assessed OC products for the region will benefit from in situ data collected in regular monitoring programs and real-time data collection by a monitoring network, that allows merging in situ and RS products.

T3.3 - Improved Sea Surface Temperature products in coastal seas

S3.3.1 - Improved Sea Surface Temperature products in coastal seas

Objectives: Satellite SST measurements are fundamentally important to coastal ocean forecasting and ecosystem assessment. Coastal areas have very large spatial variations of SST, very complicated coastal lines, prevailed upwelling events, etc which poses specific analysis problems. The objective of this task will be to improve the quality of SST R/S products in coastal seas using in-situ data.

Description: As part of this task, quality of existing products (e.g. from the GODAE High Resolution Sea Surface Pilot project, MERSEA, Medspiration) will be evaluated in selected coastal regions and new analyzed products that merge in-situ and remote sensing data will be developed. Activities will be focussed on the Gulf of Biscay, Adriatic Sea and in the Baltic-North Sea transition zone.

T3.4 - WP3 Coordination (T3.0)

S3.4.1 - WP3 Coordination (T3.0)

Objectives: Ensure coordination of WP3 tasks and provide links with other ECOOP WPs. Participate to ECOOP steering committee activities.

Description: Secure that the objectives and deliverables are achieved in time and with high quality, and that the working environment will inspire for future collaboration between the partners. Plan and execute two specific WP3 meetings. Coordinate WP3 with WP2 (transition) and other WPs.

WP4 - Modelling and forecasting system assessment. Standards, quality, functions

Objectives:

Objectives of the WP4 are to evaluate existing forecasting activity in pan-European scale and to identify common standard;

- to establish validation criteria of multidisciplinary information products;
- to assess the quality of multidisciplinary information products;

- to identify research priorities for optimizing of the pan-European forecasting system.

Description:
Nowcasting and forecasting of the marine dynamics has significance for the end-user community if final products have known quality. The set of variables of the multidisciplinary nowcasting/forecasting should be carefully selected and recommended for the validation. An experience of MERSEA, MFSTEP, ODON projects and other ongoing operational forecasting activity will be taken into account for the selection of important characteristics and proper protocols. Development of common model validation standards, which will provide a basis for model confidence diagnosis, definition of a quality controlled validation database structure from distributed data centres and common protocol to calculate standard validation criteria will be realized at the design of online model validation system to provide NRT model confidence. Establishing of common standards of multidisciplinary nowcasting and forecasting and online model validation system will be the baseline for the evaluation of gaps and overlapping and optimization of the pan-European forecasting approach. Recommendations of WP4 should be the part of general Core Theme 2 output to Core Themes 3 and 4.

T4.1 - Evaluation of nowcasting and forecasting activity in regional and coastal seas of Europe and establishing of common standards
Objectives: Compile inventory of ECOOP operational and preoperational activity in European regional and coastal seas and establish common standards

Description: Assessment of European regional seas operational and preoperational activity in regional and coastal seas will be based on carefully prepared inventory. The inventory will reflect difference of physical and geographic conditions of regions and sub-regions, models type, surface and lateral boundary conditions, mode of operation, etc. Important part of the inventory should be the list of products available in the real time or near-real time mode. Overall structure of the inventory is not evident a priori and should be defined by the task team. The next step is compiling of the inventory based on the structure of regional and sub-regional systems. Analysis of the inventory makes possible establish average standards of ongoing operational and near-operational activity and develop recommendation concerning improvement of some of them.

S4.1.1 - Compile inventory of ECOOP operational and preoperational activity in European regional and coastal seas (models, processes, atmospheric forcing, downscaling and links to the basin-scales, data assimilations, products)
Objectives: Define the structure of inventory of ECOOP operational and preoperational activity in European regional and coastal seas and compile it.

Description: All activity will be ended during first 18 months

S4.1.2 - Evaluate common standards of the nowcasting and forecasting activity.
Objectives: Establish common standards of the ECOOP regional and sub-regional systems

Description: All activity will be ended during first 18 months

T4.2 - Establishment of validation criteria of multidisciplinary information products
Objectives: Select parameters, establish metrics and define common protocols of offline and online validation of regional and sub-regional products.

Description: The set of variables of the multidisciplinary nowcasting/forecasting should be carefully selected and recommended for the validation. Experience from the MERSEA, MFSTEP, ODON projects and other ongoing operational forecasting activities will be taken into account for the selection of important characteristics and proper protocols. Development of common model validation standards, which will provide a basis for model confidence diagnosis, definition of a quality controlled validation database structure from distributed data centres and common protocol to calculate standard validation criteria will be realized at the design of offline and online model validation system to provide proper model confidence. This task will be done following results obtained in T4.1 and will depend on observations available in the 5 EuroGOOS regions (links with S4.1.1 and S4.3.1).

S4.2.1 - Define common algorithms and procedures of model validation
Objectives: To propose metrics and algorithms of model validations

Description: All activity will be ended during first 18 months

S4.2.2 - Establish common protocol to calculate standard validation criterions
Objectives: Formalize algorithms and procedures of model validation in the form of protocols

Description: All activity will be ended during first 18 months

S4.2.3 - Establish common principles of on-line product validation
Objectives: To develop general principles of online model products validation and provide protocols of online validation at the selected regions or sub-regions

Description: Online model validation depends on the availability of proper data flow. Data used for assimilation in the model as well as independent data could be used for online validation of models output. Since real-time data flow could be very different in different regions and coastal sub-regions, there is the reason to establish common principles of model products validation and to develop protocols for selected systems and to carry out online validation on the demonstration stage.

T4.3 - Evaluation of the quality of information products
Objectives: Evaluate the quality of selected products produced by regional and sub-regional systems

Description: Establish in collaboration with WP2 a (distributed) database responsible for archiving selected observations and making them accessible for the partners. Define parameters to be archived based on Task 4.2 results. Define procedures for routinely updating and accessing the database. Forecast products from regional systems are validated against the observations archived in the database following the criteria established in Task 4.2. The forecast and model validation in the present task is done both in retrospect, i.e., using archived observations, and on-line, i.e., using near-real-time (NRT) data. Operational forecast products are generally difficult to reproduce in retrospect without affecting the final forecast quality significantly. For example, it is known that numerical weather forecasts are improved by delaying the forecast run by some few hours, simply because more data is then available for the data assimilation. Therefore, reproducing the forecasts with their original quality requires very detailed information on the model input. Nonetheless, validating the forecast products in retrospect is beneficial because more observations will have entered the database than what is available for on-line validation. The advantages of on-line validation are that the procedures are relatively easy to set into routine drift at the forecast centre, and that the automatic production of forecast scores enables a daily monitoring of the forecast

system. The error scores can be used to detect errors in the systems at an early stage, and to evaluate possible improvements of the forecasting systems due to model upgrades and other changes to the operational systems

S4.3.1 - Establish regional validation databases
Objectives: To establish regional centres responsible for archiving quality controlled observations and making the data accessible for the partners.

Description: All activity will be ended during first 18 months

S4.3.2 - Validate regional products according to standard criteria using archive data
Objectives: Carry out and evaluate validation of forecast products against the observations archived is the regional data centres according to the standards obtained in Task 4.2.

Description: Observational data obtained from the database established in Task 4.3.1 will be used to validate forecast products from participating regional and coastal systems according to the standards established under Task 4.2. The focus will be on validation data archived up to and during the TOP (Mo 21-27). Each participating forecast centre will archive the forecast products that are specified for validation, and then perform forecast validations at certain intervals against the observations archived from the validation database. The forecast validation will be performed according to the algorithms and standards laid down in the protocol established in Task 4.2. The performance of the validation system and the benefits of the validation for modeling and forecasting will be evaluated, and recommendations for improvement will be made.

S4.3.3 - On-line validation of regional products
Objectives: Demonstrate on-line validation of regional products

Description: Regional forecast products are validated in near real time with observations available in an operational framework. Examples of such observations may be SST and SSH from satellite, surface currents from HF-radar and hydrography from floating buoys that transmit data directly to individual centres. The advantage of this is that the procedure is relatively easy to set into routine drift at the forecast center. In addition to the automatic production of forecast scores, this enables a daily monitoring of the forecast system.

T4.4 - Optimizing of the pan-European nowcasting and forecasting system
Objectives: Recommend improvement of the pan-European nowcasting and forecasting system.

Description: Selection of regional or sub-regional systems or their elements which are below common standards. Common standards for every region and sub-region evaluated by the subtask 4.1.1 will be used. Development of recommendations to WP6 about improvement of selected systems to common standards. Selection of products generated by regional or sub-regional systems, which do not correspond to the common validation standards according to evaluation carried out by the subtask 4.3.2. Recommend to WP6 improve proper models or their elements to increase the quality of the generated products to the common validation standards.

S4.4.1 - Recommendations on improvement of regional forecasting systems content according to common standards
Objectives: Identify systems which are below common standards, established by T4.1 and recommend their improvement

Description: All activity will be ended during first 18 months

S4.4.2 - Recommendations on improvement of regional systems according to products validation results
Objectives: Identify models producing products which quality is below common validation standards, established by T4.2, T4.3 and recommend their improvement

Description: Selection of products generated by regional or sub-regional systems, which do not correspond to the common validation standards according to evaluation carried out by the subtask 4.3.2. Recommend to WP6 improve proper models or their elements to increase the quality of the generated products to the common validation standards.

T4.5 - WP4 Coordination (T4.0)
Objectives: Manage and coordinate the work package activity

Description: Coordinate activity of the work package and Task Team meetings. Ensure preparation of proper reports. Contribute to the overall project development.

WP5 - Integration of modelling and forecasting systems (baseline system)

Objectives:
1. Integrate each system : MERSEA-regional-3 coastal systems into a unique integrated regional - GOOS (BOOS, NOOS, IBIROOS, MOON, Black Sea GOOS) system through downscaling
2. Upgrade/develop systems in physics, downscaling, data assimilation or ecosystem to be ready for real time experiment
3. run a real time experiment for each of the 5 integrated regional system over a 6 months period (TOP experiment)

Description:
This WP will ensure the links between MERSEA and ECOOP and will build the baseline pan-European system. This one is made up of 5 regional systems: BOOS, NOOS, IBIROOS, MOON and Black Sea GOOS and 3 sub-regional or coastal systems per regional systems that will be linked one to another and upgraded during the whole project.
The states of these systems are considered in 3 stages :
V0: systems at T0 (T0 = beginning of ECOOP)
V1: systems downscaled one to another (from MERSEA) + use of upgrades made in WP5 + TOP experiment during a 6 month period: T0+21 --> T0+27
V2: most advances upgrades -done in WP6, in hindcsat mode, ready at T0+36
This WP is divided into 6 tasks, the first one deals with the overall assessment of MERSEA/ECOOP coupled systems, the following 5 tasks take account on the 5 regional integrated systems one after the other.
For the 5 GOOS regions, it is planned:
A. For each integrated regional system:
1. Integrate MERSEA-regional-3 shelf/coastal systems-local systems (if any) into a unique system: V0
2. Upgrade integrated system according to upgrades done for individual system (regional or coastal) and that should be ready for V1
3. Run the TOP period (run regional system and provide IC and BC to coastal systems): V1

4. Ensure coordination with developments made in WP6, use them in integrated regional systems when available.

B. For each regional system: (some points may be already done for some regional systems)
1. Nest regional system to MERSEA global system
2. Provide IC and BC to 3 coastal systems
3. Upgrade regional system (in physics, downscaling, assimilation, ecosystem) to be ready for V1
4. Provide information for assessment and validation in WP4
5. Use formats required by EuroMISS (WP8) and by applications in EuroDESS (WP9)

C. for each shelf/coastal areas
Remarks: (i) coastal system made up of 1 coastal system or 1 coastal system + 1 or 2 local systems (ii) each coastal and local systems nested in MERSEA through downscaling (via intermediate systems)
1. Use IC and BC provided by regional systems
2. Upgrade coastal system (in physics, downscaling, assimilation, ecosystem) and provide upgrades to integrated regional systems, need be ready for V1
3. Provide information for assessement and validation to WP4
4. Use formats required by WP8 and WP9
5. Run the TOP experiment according to integrated regional system

T5.1 - Overall assessment of MERSEA/ECOOP coupled systems
Objectives: Assessment and upgrade of MERSEA and ECOOP operational coupling.

Description: This task will ensure links between MERSEA and ECOOP on one hand and between the 5 integrated regional systems on the other hand. First of all, an assessment of the existing coupling between MERSEA and version 0 of ECOOP systems will be done and plan and upgrade to improve it will be proposed especially to better fit with version 1 of ECOOP systems. Then the plan for the TOP will be defined and described and its performance will be evaluated during the running period. Afterwards, a new assessment of MERSEA and ECOOP coupling will be done and upgrades obtained will be underlined.

T5.2 - Regional Baltic integrated system
Objectives: To build up an integrated physical-ecological forecasting system for the Baltic Sea and 3 targeted coastal areas.

Description: During the project, the differents stages of the integrated BOOS system will be:

- system version V0 (months 1 to 6): existing regional and coastal systems will provide information required for assessment (WP4) and will be linked to EuroMISS to make available their present data (WP8)
- system version V1
  - months 7 to 21: downscaling between systems starting from MERSEA and upgrades of different systems in preparation for the real time experiment (TOP)
  - months 21 to 27: TOP
  - months 28 to 36: assessment of system version V1 including upgrades following the TOP
- system version V2 (months 13 to 36): follow up of developments done in WP6

Current Baltic Sea regional system V0 includes: a MERSEA Baltic 3D ocean forecasting system running by DMI with using 3D ocean model BSHcmod, and a coupled BSHcmod-sediment model running at BSH. In addition to this, BSH has a coupled physical-ecological model BSHcmod-

ECOHAM for the North Sea, and SMHI is running a high resolution Baltic Sea physical model HIROMB, which is also originally based on the BSHcmod code. The 3 targeted coastal systems are Baltic-North Sea transition waters, SE Baltic Sea and Gulf of Finland. Currently these coastal areas are covered by existing regional system V0.
The Baltic system V1 aims at an integrated Baltic regional-coastal coupled physical-ecological forecasting system, with data assimilation for physical parameters. In order to reach the Baltic V1 system, downscaling and physical-biochemical coupling work has to be done.
The Baltic system V2 will further extend V1 to couple with existing sediment transport and wave models, as well as enhanced resolution in the coastal systems. The major development work of the coastal system V2 will be done in WP6.

Task 5.2 are divided up into the following subtasks:

- S5.2.1 - Regional system capacity and TOP experiment
- S5.2.2 Downscaling and upgrades of targeted demonstration coastal areas (Baltic-North Sea transition zone)
- S5.2.3 - Downscaling and upgrades of targeted demonstration coastal areas (South East Baltic sea)
- S5.2.4 - Downscaling and upgrades of targeted demonstration coastal areas (Gulf of Finland)

T5.3 - Regional North West shelf integrated system
Objectives: The objective of this task is to consolidate existing coupled physical-biogeochemical coastal modelling systems in the NOOS region and embed them into the regional nowcast-forecast modelling system, provide connection to EuroMISS and demonstration in the target operational period TOP. Three target domains are considered: the southern North Sea, including transports through the straits of Dover, the Liverpool Bay coastal observatory system, and the western English Channel and Plymouth Sound modelling system.

Description: During the project, the differents stages of the integrated NOOS system will be:

- system version V0 (months 1 to 6): existing regional and coastal systems will provide information required for assessment (WP4) and will be linked to EuroMISS to make available their present data (WP8)
- system version V1
  - months 7 to 21: downscaling between systems starting from the regional model, and upgrades of the coastal modelling systems in preparation for the real time experiment (TOP)
  - months 21 to 27: TOP
  - months 28 to 36: assessment of system version V1 including upgrades following the TOP
- system version V2 (months 13 to 36): follow up of developments done in WP6.

Task 5.3 are divided up into the following subtasks:

- S5.3.1 - Regional system capacity and TOP experiment
- S5.3.2 - Downscaling and upgrades of targeted demonstration coastal areas (Southern North Sea to Skagerrak)
- S5.3.3 - Downscaling and upgrades of targeted demonstration coastal areas (Liverpool bay observatory)
- S5.3.4 - Downscaling and upgrades of targeted demonstration coastal areas (Western channel)

T5.4 - Regional Iberia-Biscay-Ireland (IBI) integrated system

Objectives: The objectives of this task are to build the baseline integrated IBIROOS system made up of a regional and 3 coastal systems: the Irish shelf system, the bay of Biscay and Western channel system and the Iberian coastal system, enhance this integrated system by upgrading individual parts of it and provide connections to EuroMISS and demonstration in a target operational period TOP.

Description: During the project, the differents stages of the integrated IBIROOS system will be:

- system version V0 (months 1 to 6): existing regional and coastal systems will provide information required for assessment (WP4) and will be linked to EuroMISS to make available their present data (WP8)
- system version V1
  - months 7 to 21: downscaling between systems starting from MERSEA and upgrades of different systems in downscaling, run-offs, atmospheric forcings and assimilation in preparation for the real time experiment (TOP)
  - months 21 to 27: TOP
  - months 28 to 36: assessment of system version V1 including upgrades following the TOP
- system version V2 (months 13 to 36): follow up of developments done in WP6 for HAB modelling and assimilation in the IBIROOS area

Task 5.4 are divided up into the following subtasks:

- S5.4.1 - Regional system capacity and TOP experiment
- S5.4.2 - Downscaling and upgrades of targeted demonstration coastal areas (Iberian coastal area)
- S5.4.3 - Downscaling and upgrades of targeted demonstration coastal areas (Gulf of Biscay and Western channel)
- S5.4.4 - Downscaling and upgrades of targeted demonstration coastal areas (Irish shelf)

T5.5 - Regional Mediterranean integrated system

Objectives:

The objectives of this task are to build the baseline integrated MOON system made up of a regional, sub-regional systems covering the whole Mediterranean sea and several coastal systems, enhance this integrated system by upgrading individual parts of it and provide connections to EuroMISS and demonstration in a target operational period TOP.

Description:

During the project, the differents stages of the integrated MOON system will be:

- system version V0 (months 1 to 6): existing regional and coastal systems will provide information required for assessment (WP4) and will be linked to EuroMISS to make available their present data (WP8)
- system version V1
  - months 7 to 21: downscaling between systems starting from MERSEA and upgrades of different systems in preparation for the real time experiment (TOP)
  - months 21 to 27: TOP
  - months 28 to 36: assessment of system version V1 including upgrades following the TOP
- system version V2 (months 13 to 36): follow up of developments done in WP6

Task 5.5 are divided up into the following subtasks:

- S5.5.1 - Regional system capacity and TOP experiment
- S5.5.2 - Downscaling and upgrades of targeted demonstration coastal areas (Western Mediterranean sea)
- S5.5.3 - Downscaling and upgrades of targeted demonstration coastal areas (Central Mediterranean sea)
- S5.5.4 - Downscaling and upgrades of targeted demonstration coastal areas (Eastern Mediterranean sea)

T5.6 - Regional Black Sea integrated system

Objectives: The objectives of this task are to build the baseline integrated Black Sea GOOS system made up of a regional and 3 coastal systems: the North Western shelf system, the Bosphorus and Western shelf system and the South coast of Crimea and North East Black sea system, enhance this integrated system by upgrading individual parts of it and provide connections to EuroMISS and demonstration in a target operational period TOP.

Description: During the project, the differents stages of the integrated Black Sea GOOS system will be:

- system version V0 (months 1 to 6): existing regional and coastal systems will provide information required for assessment (WP4) and will be linked to EuroMISS to make available their present data (WP8)
- system version V1
  - months 7 to 21: downscaling between systems starting from MERSEA and upgrades of different systems in preparation for the real time experiment (TOP)
  - months 21 to 27: TOP
  - months 28 to 36: assessment of system version V1 including upgrades following the TOP
- system version V2 (months 13 to 36): follow up of developments done in WP6

Task 5.6 are divided up into the following subtasks:

- S5.6.1 - Regional system capacity and TOP experiment
- S5.6.2 - Downscaling and upgrades of targeted demonstration coastal areas (North Western shelf system)
- S5.6.3 - Downscaling and upgrades of targeted demonstration coastal areas (Bosphorus and Western shelf system)
- S5.6.4 - Downscaling and upgrades of targeted demonstration coastal areas (South coast of Crimea, North East Black sea)

T5.7 - WP5 Coordination (T5.0)

Objectives: Secure that the objectives and deliverables are achieved in time and with high quality, and that the working environment will inspire for future collaboration between the partners. Coordinate the tasks of WP5, represent WP5 to the ECOOP steering group and ensure links with other WPs in ECOOP theme 2

Description: This activity will organise and coordinate WP5 and tasks meetings, will secure that the deliverables are met and will ensure links with other WPs especially WP6 and WP4 for upgrades and enhancements of systems as well as WP8 and WP9 for dissemination of information. It also

includes participation to steering committees and annual plenary meetings and will provide inputs to management reports when necessary.

WP6 - System development (downscaling, data assimilation, eco-modelling)

Objectives:
a) Progressively develop and implement modelling elements required for individual system advancement on the baseline systems of WP5, according to the priorities identified in WP4 and WP5 to reach V2 guided by the requirements of the decision support system (WP9), and available data streams (WP2)
b) Harmonise revised model outputs with EuroMISS (WP8) and EuroDESS (WP9).
c) Test each implementation in a TOP hindcast study
d) Evaluate (where appropriate) improvement to baseline system

Description:
Approach
Taking the analysis of the systems at the beginning of ECOOP (V0) carried out in WP4 and their development to the baseline systems (V1) in WP5, this WP will examine the requirements for each individual system, consider the available data streams to meet these requirements, then determine the modelling components necessary (or possible) to raise the level of system function above the baseline V1 to a new level V2. For example this may involve grid refinement to accurately resolve coastal and / or bathymetric features, implementation of additional physical processes where important (e.g. coupling between surface waves and currents), implementing ecosystem models which contain the appropriate ecosystem variables and address the local problems (e.g. eutrophication, HABs), introduce data assimilation for physical or ecological variables or both). The level of increased sophistication will depend on the level implemented in V1 – systems at the start of ECOOP (i.e. V0) will already have varying levels of sophistication requiring different amounts of effort to reach V1.
Developing systems from V1 to V2
The coastal systems within the five regional systems in ECOOP have, at the outset, differing degrees of sophistication. Our preliminary analysis shows that some systems at the end of ECOOP will have the same level of sophistication as some systems at the beginning of ECOOP. The more sophisticated systems will be developed to a stage which brings them closer to the 'next generation' systems being investigated under WP7.

T6.1 - Implementation of system developments
Objectives: Improve each coastal system above the level achieved in WP5

Description: Complete the region-by-region coastal system enhancements to move from V1 (of WP5) to V2.

S6.1.1 - Baltic regional coastal systems
Objectives: To develop Baltic coastal systems Version 1 into Version 2 for the 3 targeted coastal areas: Baltic-North Sea transition zone, SE Baltic Sea and Gulf of Finland.

Description: Baltic Sea coastal system V1 is a coupled physical-ecological model with preliminary data assimilation for physical parameters. The V2 will focus on improved physical data assimilation and coupled ecological-sediment-wave process study. For each of the three targeted coastal areas,

the V2 system will be a coupled physical-ecological-sediment-wave model, with a resolution of 0.5nm or higher and data assimilation of physical parameters

S6.1.2 - NW Shelf coastal systems
Objectives: Enhance the three coastal systems as follows
1) North Sea: add sediment processes, assimilate SST, T/S profiles, sea level, CDOM
2) Liverpool Bay: downscale system (1nm to 0.2nm), assimilate HF radar currents
3) Western English Channel: add wave and sediment processes, assimilate ocean colour
Implement HAB prediction scheme

Description: Complete implementation of enhancements to the three coastal systems: 1) North Sea 2) Liverpool Bay 3) Western English Channel

S6.1.3 - Irish and Iberian Atlantic coastal systems
Objectives: Enhance the three systems as follows
1) downscaling techniques between 2 hydrodynamic models
2) add ecosystem processes: have the correct horizontal and vertical scales as well as advection scheme to be able to predict correctly HAB
3) assimilation of new type of data availbale near to the coast

Description: Complete the implementation of enhancements to the three coastal systems: 1) Coastal Irish shelf 2) Coastal Biscay shelf 3) Coastal Iberian shelf

S6.1.4 - Mediterranean coastal systems
Objectives: Enhance the three systems as follows
1) Coupling the V1 MOON coastal models with an ecosystem model
2) implement the data assimilation technique suited for biogeochemical properties

Description: The main goal of this subtask is to proceed toward the implementation of enhancements to the three Mediterranean Moon coastal systems, namely 1) Adriatic Sea 2) Aegean Sea 3) Israeli shelf. The enhancements will focus on:
1) Coupling the V1 model with an ecosystem model
2) implement the data assimilation technique suited for biogeochemical properties.

S6.1.5 - Black Sea coastal systems
Objectives: Enhance the three systems as follows
1) assimilate altimetry, SST, ocean colour
2) add ecosystem processes, assimilate altimetry, SST, ocean colour
3) add ecosystem processes, assimilate altimetry, SST, ocean colour

Description: Complete the implementation of enhancements to the three coastal systems: 1) Bosphorus and Bulgarian coast 2) Romanian coast and NW shelf 3)Crimean coast and south-eastern Black Sea

T6.2 - System developments
Objectives: Improved coastal forecast systems (V2) over the level achieved in WP5 (V1)

Description: Complete the development of system enhancements

S6.2.1 - Downscaling
Objectives: 1) Downscale in Danish Straits transition zone, Liverpool Bay, and the Iberian coastal regions 2) Produce library of open boundary conditions and flooding-drying treatment

Description: This subtask will 1) Obtain appropriate resolution bathymetry (down to the resolution of 0.2km) 2) Establish new sub-domains, better accounting for inter-tidal areas where present 3) Contribute to a library of open boundary conditions and flooding-drying treatment

S6.2.2 - Additional physical processes
Objectives: 1) Couple wave models into the NW shelf systems 2) Couple models to real-time river runoff (where available)

Description: This subtask will 1) conduct process studies with wave-current interaction 2) Provide an interface with real-time river runoff.

S6.2.3 - Ecosystem function
Objectives: 1) Implement appropriate ecosystem modules or improvements to existing ecosystem modules 2) Implement HAB prediction scheme

Description: Complete 1)Identification of the key local physical and biogeochemical processes of potential importance to prediction of eutrophication, oxygen depletion, HABs and their consequences and descriptions in models. 2)Implement community sediment/ecosystem models as necessary in order to reach the same standard in ECOOP core areas. 3)Implement the most appropriate method (e.g. fuzzy logic routines, specialized functional groups) to make forecasts of both HAB type and probability.

S6.2.4 - Data Assimilation
Objectives: 1) implement ecosystem modules or enhance existing ecosystem modules 2) construct a library of assimilation schemes

Description: The different assimilation routines are implemented in different areas, e.g. SEEK in Eastern Mediterranean, EnKF/SEEK in the NW Shelf, OI/EnKF in the Baltic and Black Sea. Establish a library of assimilation schemes Implement schemes as necessary.

T6.3 - Validation of developments

S6.3.1 - Hindcast validation and evaluation.
Objectives: demonstrate the improvements to the system over the baseline systems, V1

Description: For each system select a subset of the TOP of WP5, conduct a hindcast, and evaluate using standard metrics established under WP4.

T6.4 - WP6 Coordination (T6.0)
Objectives: 1) Successful management of the WP 2) Delivery of all WP deliverables 3) Delievery of all necessary reports

Description: Continue to oversee the development of enhancements and their implementation in the coastal systems. Collate and write necessary reports

WP7 - Synergy between coastal forecasting and newly available data and methodologies (a step towards next generation forecasting systems)

Objectives:
The general objectives of this WP are:
(1) Enhancing the exploitation of newly available data in order to improve the quality of coastal ocean forecasting.
(2) Supporting the integration and consolidation of a pan-European network of observation.
(3) Enhancing the cooperation between scientific communities working in near coastal ocean and community of operational oceanographers downscaling their models to coastal scales.
The specific objectives are:
(1) To address scientific questions associated with the high resolution modelling in the near coastal area and demonstrate improved coastal forecasting models.
(2) To build up pre-operational systems for near coastal ocean.
(3) To provide improved forecast of ocean turbulence, which controls stratification, mixed layer depth and pycnocline depth, as well as transport of mater (biological and sediment) in the European coastal zone.
(4) To develop improved pre-operational sediment transport models and related benthic-pelagic modelling.
(5) To improve the quality of estimates on estuary-coast-offshore interaction based on modelling and data assimilation.
(6) To provide a design for the next generation observing system, including: hardware, software, quality assurance, sampling strategies.
(7) To provide an up-to date oceanographic component needed by the coastal engineering.
(8) To provide up-to date knowledge needed to understand the functioning of ocean margins.
(9) To demonstrate the value of super-ensemble forecasting for shelf areas
Research progress from WP7 will be used in improving the ECOOP forecasting systems.

Description: Operational oceanography at the global and regional scales is nowadays a reality but the downscaling to the coastal boundary layer is still a matter of proper scientific investigation before it becomes part of the operational suite. One important field of development is the extensive exploitation of presently available data (with high quality and capacity of contained information) such as ADCP (incl. back scatter signals resolving sediment concentration and transport), ferry box data, fine resolution (about 200 m) satellite images, autonomous underwater vehicles (AUV) etc. Resolving the coastal boundary layer requires further synergy between newly available data, modeling with very fine resolution and advanced methods (including data assimilation).
An integrated shelf and coastal observing system has to monitor the input and propagation of properties (chemical, biological, physical) from land to the sea and provide multidisciplinary data in an environment having high energy content. This implies that data must be collected at high spatial and temporal scales. The innovation in the sensing capacity must be accompanied by innovation in data transmission assuring, as much as possible, the availability with a short time delay of full resolution data to user. Another important point in the development of the observing system is the quality assurance of the data obtained from new technologies.
The high level of turbulence in the coastal sea (including high bottom stress due to tides and wind waves) facilitates erosion of sediment from the bottom. Fine sediment fractions reach sea surface and are transported by currents at large distances from the coast. Increasing number of observations on stationary data stations (including ADCP observations) exists already in the coastal boundary layer, revealing a complex structure of turbulence. The quality requirements for turbulence and sediment transport models are linked to the newly observed ADCP data. Additionally, newly-available satellite images with very high resolution reveal complex horizontal patterns shaped by

dynamics and prove that resolving properly sediment dynamics is one of prerequisites on the route to new-generation coastal forecasts.
The modelling activities should be accompanied by extensive data analyses, model validations against new data and possibly their assimilation in forecasting models. Because the computational requirements increase dramatically with increasing the resolution, there is a need of developing and testing fast and effective modelling tools. Answers to the question: "to what resolution shelf models have to be downscaled in order to resolve the basic coastal boundary layer processes (what is the minimum needed, optimal, and cost effective resolution)" will be tried.
Coastal forecasting is particularly important for coastal protection user communities, however sediment transport modelling capabilities are still limited in European Seas with the exception of some site-specific studies. Operational oceanography in the coastal areas should contribute to better forecasting sediment transport in order to construct sediment-change scenarios due to man-made influences, such as regulatory actions on river discharges and climate change. Thus this WP will develop sediment transport capabilities associated with coastal forecasting models. Particular attention should be given to the coupling between sediments and organic material.
The improvement of shelf/coastal observational and forecasting capabilities in European Seas is the central theme in this WP. It is well known that the predictability limit of ocean weather and sea level is relatively short due to: 1) atmospheric predictability limits and forcing inaccuracy; 2) initial/lateral boundary conditions inaccuracy; 3) model inappropriate representation of physical processes. One modern approach, the super-ensemble forecasting attempts to extend the limits of predictability. In general, the concept is that forecasts should be re-build on the basis of a probabilistic approach that considers the different errors entering the forecast, giving a posteriori an estimate of uncertainty in the forecast. This will give the correct information to users with probability of occurrence of events and it will advance our understanding of the causes of errors in the regional/coastal forecast systems.
Research progress from WP7 will be used in improving the ECOOP forecasting systems.

T7.1 - The observing systems
Objectives: Define new strategies and technologies for a multi-purpose, multi-disciplinary, multi-platform integrated shelf-costal observing system.

Description: The shelf areas can be subdivided into two boundary layers, one near the coasts and the other on the shelf break, connecting the open ocean with the shelf area. Naturally most of the human activities are developing in the coastal boundary layer and thus there is a precise need to develop the appropriate observational framework. Large number of observations with ADCP exists already in the coastal boundary layer, revealing a complex structure of turbulence. The quality requirements for turbulence models can be satisfied provided the latter are consistent with the newly observed data. The high level of turbulence in the coastal sea (including high bottom stress due to tides and wind waves) facilitates erosion of sediment from the bottom. Fine sediment fractions reach sea surface and are transported by currents at large distances from the coast. Newly-available satellite images with very high resolution reveal complex horizontal patterns shaped by dynamics and prove that resolving properly sediment dynamics is one of prerequisites on the way towards new-generation coastal forecasts.
An integrated shelf and coastal observing system need to monitor the input of properties (chemical, biological, physical) from land to the sea, and must be able to provide multidisciplinary data in an environment having high energy content. This implies that data must be collected at high spatial and temporal scales. Another important point in the development of the observing system, is the quality assurance of the data obtained from new technologies. This is strongly linked to the instruments calibration, which actually is 'static' (controlled water baths with know properties and no motion).

However, this kind of calibration is not providing the correct information on sensors response in a high energetic environment.

S7.1.1 - System analysis
Objectives: Review existing technologies and sampling strategies

Description: This task will be done in collaboration other WPs. The following issues will be specifically analysed: Eulerian measurements, autonomous underwater vehicles, vessel mounted sensors, autonomous floats, underwater observatories. This WP has different objectives with respect to the other 'observational WPs'. The analysis will serve to answer to the following questions:

- can the observational plans build on lessons learned from BOOS, NOOS, MFS serve the emerging needs of ECOOP (design a multidisciplinary, long-term, sustainable, pan-european observational network)?
- From the large amount of measurements carried out in the regional programmes, what elements can be selected reasonably to form the basis of a biogeochemical observational scheme implemented at Pan-European scale?
- Any scheme for long-term, large-scale observations must, of necessity, rely to some extent on autonomous platforms. The calibration of all sensors, especially the chemical and biological sensors, in a high energetic environment is notoriously difficult. How can be ensured that a large variety of sensors are calibrated to a rigorous standard?
- How can ECOOP build the elements of biogeochemical observation scheme on the recommendations of GOOS panels that have studied these issues?
- Analysis of observational requirements from models

S7.1.2 - System design
Description: This sub-subtask will prepare the design of an observing system based on different platforms. The new main emerging technologies will be described in terms of improvements in: sensors (e.g. faster response), area coverage, vertical resolution. In particular the following issues will be examined in depth:

- Eulerian measurements; the existing systems can be largely improved, by selecting the most effective components. For example the Shallow-water Environmental Profiler in Trawler-safe Real-time (SEPTR) system offer the possibility to profile the along the water column temperature, salinity, currents, turbidity, noise, wave, tide, solar irradiance, light attenuation. Other profiling system can have capability to provide the needed. New faster response sensors could be added (e.g. fast repetition rate fluorimetres, acustic systems for the evaluation of sediment transport).
- Semi lagrangian profiler is a response to the need of synoptic data in tidal shelf seas: this type of solution will be investigated and evaluated with applications to T, S measurements using the Pagode profiler developed in France.
- Autonomous underwater vehicles; AUV for rapid assessment have been developed. They now allow safer operations such as: very shallow water, reduced danger to divers, rapid deployability. AUV and Gliders concepts could be mixed to provide longer term operations at sea.
- Radars; these can provide surface currents in coastal areas with high spatial and temporal resolution.

S7.1.3 - Comparisons of regional experiences
Description: The major aim of this task is the comparison of experiences acquired in the regional GOOS areas. The combination of experiences will allow the definition of an optimal monitoring

strategy able to extract relevant combination of information for the three biogeographical areas: open ocean, coastal ocean and inshore. The area of interest will include deep ocean, shelf area and estuaries, in order to comprise many different scales and phenomena. The analysis will be based on different systems, different temporal and spatial coverage as well as technologies for the observations.

- Eulerian measurements. Experiences are underway in many coastal regions and the subtask will provide information. The analysis to be conducted in this task will consider some specific aspects: the capability of the technology to detect coastal variability; the modularity of the observing systems, and then the capability to be adapted to the different environments; the possibility to be protected (e.g. trawler safe system); the number of parameters that can be collected.
- Autonomous vehicles. Some of them will be selected in order to provide a synoptic coverage of the investigated area. It will be analysed the possibility: to change the mission of the systems to each single vehicle; the use of a certain number of vehicles and the change of mission to all of them; the modularity of the vehicles and the capability to be adapted to different environments; the number of parameters that can be collected.

T7.2 - Near coastal models

Objectives: (1) Address scientific questions associated with the high resolution modelling in the near coastal area and demonstrate improved coastal forecasting models.
(2) Build up pre-operational systems for near coastal ocean.
(3) Provide improved forecast of ocean turbulence, which controls stratification, mixed layer depth and pycnocline depth, as well as transport of mater (biological and sediment) in the European coastal zone.
(4) Improve the quality of estimates on estuary-coast-offshore interaction based on modelling and data assimilation.

Description: The modelling activities include development of unstructured models for coastal ocean, two-way nesting and data assimilation. These activities will be accompanied by extensive data analyses, model validations against new data their assimilation in forecasting models. Answers to the question: "to what resolution shelf models have to be downscaled in order to resolve the basic coastal boundary layer processes (what is the minimum needed, optimal, and cost effective resolution)" will be tried.

This task will address important processes in coastal boundary layer, which need to be resolved accurately and explicitly in order to extend predictive capabilities of operational tools. The systems of interest will include regional and shelf seas, estuaries, tidal flats and shallow ocean, river plumes, straits and sills. The preference when defining areas for demonstration will be given to areas with sufficient amount of historic observations for validation, and with continuously working measurements systems (ADCP, Ferry box, etc).

Of particular importance are the applications, which will illustrate the performance of developed systems, and will produce estimates for coastal ocean based on consistent models and new-generation data. Research progress from WP7 will be used in improving the ECOOP forecasting systems. More detailed description of the works are given in the sub-task descriptions.

S7.2.1 - Unstructured grids

Objectives: Advance coastal forecasting by developing and implementing advanced unstructured grid modelling the grid of near-coastal mode

Description: One of the most prominent problems for coastal models is the definition and implementation of time dependent boundary conditions. To put open boundaries far from the location of interest only mediates the difficulties and possible error sources. Furthermore, it would be clearly advisable if the information from larger scale models which are subject to data assimilation can be used in the time dependence at the boundaries of the local model to optimally describe the 'outside world'. We propose to use a model coupling that allows a seamless flow of information into the coastal model via an appropriate formulation of boundary conditions. The coupler model will provide the barotropic flow at the grid of near-coastal model. Although grids will be the same differences between fields in coupler and coastal models are to be expected mostly due to non-identical physics of two models (turbulence, wetting and drying, etc.). Potentially, information about the interior coastal dynamics and transports can be used for assimilation in the larger scale model. Specific attention will be given to the interpretation or misinterpretation of processes.
The following works will be performed. Their completion will denote the individual milestones listed below:
(1) Setup of regional and coastal models
(2) Run unstructured high resolution coastal model with traditional open boundary conditions and with those interpolated from POL model for test period. Provide output and compare it to that of AWI model driven by the same open boundary conditions and configured for the same area.
(3) Compare 5 solutions: original POL, original TUDELFT, TUDELFT with POL boundary conditions, AWI model with TUDELFT boundary conditions and AWI model with POL boundary conditions.
(4) Setup of full system. Run full system with regional POL model with and without data assimilation for one year. Take POL solution to feed the AWI coupler model. Use output from coupler model to drive local unstructured fine resolution TUDELFT model.

S7.2.2 - Two-way nesting
Objectives: Resolve relevant processes at adequate spatial scales in the entire calculation domain – without the computational overhead of having very high resolution in the entire domain.

Description: Using 2-way nesting ensures the impact of near coastal processes on the off-shore solution. Implementing 2-way nesting icludes: 1) additional book-keeping to store the relation between the areas of different resolutions e.g. position of the exchange zones 2) averaging and interpolation-schemes to go from fine to coarse and vice-versa 3) construction of numerical algorithms in the exchange zones between coarse and fine resolution.
The proposed nesting strategy relies on the already implemented parallel algorithms in GETM. Data exchange between a specific sub-domain and its neighbours is done via the Message Passing Interface. The nesting procedure allows for more than one nesting area in the model domain as well as recursive nesting levels. For the Wadden Sea a nested model system will be implemented with a coarse spatial resolution of around 2km for a domain covering the entire North Sea. Inside this domain 2-way nested domains with a resolution of 600m and 200m covering the Wadden Sea will be implemented. The Burgas Bay in the Black Sea will be resolved in high resolution and nested into an available coarser resolution model for the entire Black Sea
The following works will be performed:
(1) First version of nesting software
(2) Selection of averaging and interpolation methods in nesting zones.
(3) Robust numerical algorithms in nesting zones.
(4) Burgas Bay set-up developed

S7.2.3 - Assimilation of newly-available data

Objectives: (1) Address the new issues relevant for the coastal regions via an ad hoc scientific innovation applied for a combined utilization of complex high-resolution coastal model and data;
(2) Make best possible usage of a new-generation data from the satellites together with in-situ data (based on continuous ADCP, buoy and platform data with a very high temporal resolution) available for the European coastal region, (e.g. MARNET Stations and FERYBOX data in the German Bight).
(3) Implement the advanced assimilation methods into the existing nested-grid coastal modelling system

Description: Motivations: Assimilation of data in the near-coastal zone is not well developed even for traditional observations (e. g. tidal gauge data). Moreover, there is a huge amount of continuous ADCP and other in-situ observations on stationary platforms, which could provide valuable information needed to constrain coastal models.
Methodology: Use EnKF (Ensemble Kalman Filter) and the Singular Evoluted Interpolated Kalman Filter (SEIK). The modelling system is based on GETM.
The following test cases will be utilized: German Bight model with a downscaling to the Wadden Sea and Sylt-Römo very high resolution coastal systems.
Data to be assimilated: satellite observations (sea level, surface temperature) and in-situ (salinity, temperature, velocity in tidal inlets). The ADCP and some other existing in-situ observations (e.g. MARNET Stations, ICBM stationary data station "WATT", FERRYBOX Data) are highly innovative and unique for the European coastal area due to their continuous high resolution character and delivery of multiple physical characteristics. The methodology will provide realistic predictions of error statistics to be used in the analysis scheme. The superiority of the proposed works to similar existing ones is the synergy between new available data and numerical forecasting.
The structure of works includes:
(1) First version of the data-assimilation schemes based on existing OI, SEIK and EnKF algorithms (with improved strategies) for the GETM.
(2) Initialization module for GETM, analysis scheme for in situ/satellite data assimilation
(3) Data assimilation implementation into an idealized GETM set-up
(4) Coastal model application based on M1-M3 for German Bight and Wadden Sea model system, model validation

S7.2.4 - Applications

Objectives: (1) Evaluation of the role of stratification-current-turbulence interaction in the coastal zone and multiple forcing mechanisms (wind, wind waves, tides, fresh water, heat fluxes, etc.).
(2) Evaluation of the role of specific coastal forms (estuaries, zones with movable boundaries and embayments) for the coastal transport (and budgets).

Description: Applications will be made for three ROFI systems (Danube, Rhine/Meuse and Ebe), Wadden Sea and one island system (Southern coast of Mallorca). The selected ROFI-s and Wadden Sea are known for complex sediment dynamics. Here, the freshwater run-off from locks and diffuse groundwater sources leads to horizontal density gradients which are generally neglected but may have substantial impact on any kind of coastal transport. The selected island-system is characterized by a high spatial and temporal variability associated with the convergence of Mediterranean and Modified Atlantic waters, slope fronts and shelf/slope exchanges through instabilities.
High-resolution process-oriented numerical models (WP7.2.1-3) will be used for the ROFI and Wadden Sea systems. The coastal model in the island region will be coupled to the Regional Western Mediterranean integrated system (WP5.5) nested to basin scale Mediterranean model. The

observing platforms feeding forecasting system with data in this region will include oceanographic buoys, gliders and ships of opportunity.
All models will be used for calculating budgets of residual transports because budget (small residuals) estimates cannot be made from observations alone. It will be demonstrated in this sub-task how process-resolving pre-operational models can be integrated into existing operational systems. The modelling system will contribute to answer important scientific questions in the coastal zone, as well as provide information (EURODES) for water quality estimation. Input will be provided to WP6 and WP 7.3.
The work content includes:
(1) Develop pre-operational system for the the Southern coast of Malorca and set up of pre-operational systems based on WP7.2.2
(2) Analysis of processes in all selected coastal systems, transport and budget estimates

T7.3 - Sedimentary regimes modeling
Objectives:

- ***C***ombine traditional and new measurement techniques to observe sediment dynamics at a variety of time and space scales.
- Make inventory of presently available data needed for validation of sediment transport and morphodynamic models, as a function of scale.
- Develop sediment community model
- Develop pre-operational 3D sediment transport and morphodynamic modelling suite
- Provide to EURODESS estimates of budget and dynamics in targeted coastal zones

Description: The Community Sediment Transport Model (pilot version) will be validated using the available data sets (WP7.3.1) for the considered field sites.
All identified ranges of forcing terms and scales will be explicitly considered, including the role of surface waves in generating: i) turbulence, ii) wave induced mass fluxes and iii) wave induced currents within the breaker zone. The constraints of domain geometry and the corresponding boundary layer parameterizations will be also analysed. The models will be validated with available field observations and dedicated campaigns. The more recent available bathymetry will be used for this purpose.

S7.3.1 - Data: Inventory of needs and availability
Objectives: Make an inventory of the actual use of data (direct analyses and modelling).
Provide quality controlled data needed in sediment transport forecasting.

Description: This sub-task ends during the first 18 months (see Description first 18 months).

S7.3.2 - Community sediment model
Objectives: Critically compare the sediment transport and dispersion models available within the partnership (the partners will make their expertise available) and the present state-of-art.
Achieve a pre-operational 3D sediment transport and morphodynamic modelling suite suitable for the eventual coupling to an ecosystem model.

Description: The Community Sediment Transport Model (pilot version) will be validated using the available data sets (WP7.3.1) for the considered field sites. The emphasis will be on the performance of parameterizations and overall model for episodic and mid-to long-term conditions.
The structure of works includes:
(1) Harmonization of parametrisations and validation against available observations

(2) Link between suspended matter and marine ecosystems and focuses on modelling the interplay between sediment dynamics and life cycles. Here the role of transparency, which couples sediment and primary production, will be established.
(3) Intercomparison between Lagrangian and Eulerian sediment transport models will allow to identify the model capabilities to simulate “sediment weather” and "sediment climate".

S7.3.3 - Matter transport and budget in the coastal zone
Objectives: Provide (improve) estimates of sediment budget and dynamics in coastal zones, associated to the discharge in selected river plumes.

Description: All identified ranges of forcing terms and scales will be explicitly considered, including the role of surface waves in generating: i) turbulence, ii) wave induced mass fluxes and iii) wave induced currents within the breaker zone. The constraints of domain geometry and the corresponding boundary layer parameterizations will be also analysed. The models will be validated with available field observations and dedicated campaigns. The more recent available bathymetry will be used for this purpose.
The structure of works includes:
(1) Run sediment transport models to analyse the effect of river plumes (Danube, Ebro and Rhine) on sediment dynamics within a coastal area.
(2) Provide synthetic sediment budgets in targeted areas based on calibrated forecasting tools.

T7.4 - Super-ensemble forecasting in storm surge shelf modelling
Objectives: Several storm surge forecasting systems are operational today around Europe, but good improvement on accuracy and reliability can be obtained by means of data exchange and further collaboration between existing systems. Important steps in this sense have been developed at NOOS, where exchange from model outputs is now operational, but no real ensamble modeling is still done. No inter-institutional activity is established yet in the South part of the continent.
The main objective is to improve quality, reliability and accessibility of storm surge forecasting at European level by means of superensamble forecasting. This objective will be achieved by:
4.1) Creating ENSURF (multi-model Ensamble SUrge Forecast system). ENSURF will consist in several applications providing reliable storm surge forecasting based on multi-model ensamble technology. ENSURF will be designed with potential for relocation in new coastal areas.
4.2) Assess ENSURF errors by means of exploring model outputs and analysing sources of uncertainty (atmospheric modeling, impact of waves on sea level, impact of very high-resolution winds....)
4.3) Develop advanced and improved visualisation and analysis tools for ENSURF
4.4) Present ENSURF as a joint European service via the ECOOP mechanism for information distribution DMS and/or EUROMISS

Description: ENSURF (multi-model Ensamble SUrge Forecast system) will be operational by the end of month 36. ENSURF will consist in several applications providing reliable storm surge forecasting based on multi-model ensamble technology. The sorces of ERRORS will be fully explored and assesment will be provided in specially designed high resolution applications. New visual tools for model analysis will be used for ENSURF exploitation. The results will be integrated in EUROMISS.

S7.4.1 - Planning/Design
Objectives: Will establish the detailed plans and design the proper strategy to obtain the required results by maximising transfer of information and optimising available resources. The task will start

by identify existing forecast providers and forecast products and analysing the different strategies and outputs produced.

S7.4.2 - System development

Objectives: Creating a new super-ensamble forecasting system covering the Med-sea, the Iberian peninsula and the Bay of Biscay. A super-ensamble operational system for the South domain will be developed. It will be based on 2 ocean models (HAMSOM an Mog2D) and several atmospheric models- Puertos del Estado, Meteogalicia, MeteoFrance, POC-CNES.
At the NOOS area, Met.no will adapt ensemble (single-model) forecast products for use in the multi-model ensemble forecast system; recommend ways of combining ensemble and deterministic forecasts in the forecast tool. Build the adapted system at RIKZ and then transplant to DMI/met.no as proof of concept. In other words, the deliverable will be the ENSURF modeling component.

Description: By the end of this period the ENSURF modeling component will be finished

S7.4.3 - Visualization and analysis tools and link with EuroMISS

Objectives: Adapt analysis/visualisation tool to access observations from EDMS and/or EuroMISS and produce validation metrics [RIKZ, DMI]
RIKZ and DMI will improve existing tools for analyzing and visualizing model output data and will interface with EUROMISS, so we can produce a unified coherent output for the whole Europe. Interaction with ESEAS or EuroGOOS task teams is required in order to do real time validation all along Europe.
MeteoFrance and Puertos del Estado will implement the tools for the Southern multi-model ensamble and ensure connection with EuroMISS and EDMS.

Description: At the end of this period the ENSURF visualisation and analysis component will be finished and implemented

S7.4.4 - Validation and error assessment

Objectives: Analyse the output of the ensamble by means of comparisons with real data (Puertos del Estado, RIKZ, MeteoFrance).
Run the developed modeling component of ENSURF during the TOP (Mo 21-27), producing super-ensemble forecasts and validation metrics for selected locations (RIKZ, MeteoFrance, Puertos del Estado)
Make necessary minor revisions to ENSURF
The effect of the harbour dynamics in the signal as well as the impact of local changes in the wind and the Radiation stress from waves are potentially of great importance. A nested very high-resolution model working offline will be developed, both for the atmosphere and the ocean - POC-CNRS. The objective will be to analyse the operational solution of a basin scale super-ensamble model understanding which part of the signal is not modeled due to the poor resolution and the lack of radiation stress.

Description: All the studies will be finished. There will be a document on sources of error and impact of high-resolution modeling.

S7.4.5 - Dissemination activities

Objectives: Make super-ensemble water level forecasting methods available for implementation in the ECOOP community and beyond. Build awareness of the benefits of super-ensemble forecasting products among public users.

Description: Strong dissemination of the reults is planned in coordination with EuroMISS. Scientific papers to be published in peer-reviewed magazines about the benefit of super-ensemble modeling for storm surge forecasting and the soruces of errors.

T7.5 - WP7 Coordination (T7.0)
Objectives: Coordinate the tasks of WP7, represent WP7 to the ECOOP steering group and ensure links and transfer of knowledge with other WPs in ECOOP, particularly with WP6.

Description: Organise and coordinate tasks meetings and participation to steering committees and annual meetings.

1. Preparation of WP meetings
2. Input to to management reports.
3. Input to the planning of months 18-36
4. Coordination between tasks as well as with relevant WPs.
5. Communication with and reporting to project coordinator

S7.5.1 - Management of WP7
Objectives: This activity aims at providing efficient management frame to execute works in WP7 and coordination with other WP and the ECOOP Steering Group.

Description: Organise tasks meetings and participation to steering committees and annual meetings.

1. Preparation of WP meetings
2. Input to to management reports.
3. Input to the planning of months 1-18
4. Produce WP-reports

WP8 - General information system (EuroMISS)

Objectives:
With inputs from ECOOP WP2, WP5 and WP9 in particular, and building on earlier EC projects (such as MERSEA, DISMAR, SEADATANET, MOTIIVE) WP8 will define the initial European Regional and Coastal Seas information exchange and management systems (EUROMISS V0) harmonising the existing regional and European capacity. Task WP8.1 will define and demonstrate the necessary (industry) standards for future interoperability, including opendap and openGIS technology. In task WP8.2 the regional systems will be connected to the existing European thematic portals, and the coastal systems of WP5 will be connected to the regional information system. This will define EuroMISS V1, ready for the target operational period (month 21) of WP5. Task WP8.3 will provide assessment of EuroMISS at all stages from V0 onwards, to provide recommendations for future operation and upgrade to follow the end of ECOOP.

Description:
In WP8.1 existing and state of the art information systems will be reviewed, and the information exchange requirements of the ECOOP regional and coastal systems will be assessed. Requirements of the common information management system will be defined and demonstrated. In WP8.2 the existing European thematic portals will be extended to provide connection to the existing regional and coastal systems featured in WP5. WP8.3 will evaluate the capability of the present EuroMISS V0 system to meet requirements, and will assess the upgrades prepared for EuroMISS V1. The necessary metrics for this will be developed.

During months 18-36 the EuroMISS V1 will be demonstrated and applied for the target operational period of WP5 (months 21-27) and the performance of the EuroMISS system will be assessed. Recommendations will be provided for upgrade to V2 of the EuroMISS system, and WP8.1 will provide a (possibly limited) demonstration of emerging capability required for the next generation of EuroMISS, such as industry standard openGIS solutions.

T8.1 - Definition and Development of EuroMISS

Objectives: Within the ECOOP project the task 8.1 is in charge of defining and developing the European Marine Information System of System (EUROMISS). This system aims to provide an integrated access to the products inside and outside ECOOP.

It will be built on earlier EC projects (MERSEA, DISMAR, SEADATANET…) and will integrate the Thematical Portals that will be developed by Theme 1 and Theme 2. If possible, existing information systems such as MERSEA Thematic Portals will be extended to provide the necessary information exchange for coastal and regional applications and will therefore need to be linked to EUROMISS;

Main goals of this task are harmonization and integration of systems developed at regional and coastal level by individual partners. Considering the fact that EURODESS will be built upon EUROMISS a common architecture will have to be set up by task 8.1 and 9.1

Description: Task 8.1 will specify the architecture of the EUROMISS system able to connect together the ECOOP production TEPs , the MERSEA TEPS to provide useful services to the EURODESS system. In other terms it provides the "glue" between the different components of EUROMISS. This means that is has to put in place the ECOOP

- Discovery services : define the catalogues as well as the search tools in coherence with international standards (i.e. ISO 19115),
- Viewing services: define different versions of viewing services that would provide visibility to the outside word from standalone viewing services based on regional capabilities to more integrated viewing services of the ECOOP products, when defined.
- Downloading services. define different versions of downloading services first based on regional capabilities to move towards more integrated downloading services of the ECOOP products that will need to be access free.

Tools developed for the MERSEA IP will be extended to fulfill the needs of the regional and coastal applications taking into account the expertise gained within other European projects such as Dismar, Motive or current GMES projects such as Seadatanet or Marcoast. Task 8.1.1 will evaluate the compatibility, consistency, interoperability of different solutions to define an overall design of an information system as a component of the Integrated System and define the minimum performance criteria to be followed for the setting up of the information system. The architecture of EUROMISS will have characteristics that allow the application in distributed data systems and independent from platforms. In the second part of the project the task will be to develop a specification and user requirements for downloading services, and to provide a demonstration for at least one region of emerging industry standards providing evidence for recommendations for the architecture, catalogue, viewing and download services for EuroMISS V2 to take forwards after the end of ECOOP.

The EUROMISS system will be developed / implemented partly by WP8.1.2 for the common parts (ECOOP catalogues, integrated viewing and downloading services), partly by WP8.2 that will have to develop the connections to the EUROMISS system according to interface specifications that will be provided by WP8.1.1.

The implementation of the Euromiss information system will be done gradually.

The Version 0 of the system will provide a static WWW that will give visibility to the different elements of the ECOOP System and access to the standalone viewing and downloading services provided by the ECOOP partners
The Version 1 of the Euromiss Information system will:

- Provide a discovery service on ECOOP product by building a central catalogue in ISO19115 to guide the user to the ECOOP regional and coastal products (In-Situ and Satellite from WP2 , Forecast from WP6)
- Provide integrated viewing services of a subset of the ECOOP products for the demonstration pilot areas defined in WP6. Each time possible a first version of an integrated downloading service

The Version 2 of the Euromiss system will be specified from the assessment of the TOP period to define the Euromiss system to be sustained after the end of the ECOOP project

T8.2 - Regional management of Marine Information System of Systems for ECOOP. (EuroMISS-ECOOP)
Objectives: The objective of WP8.2 is to provide a regional connection to the existing European thematic portals, and to provide connection from the coastal systems to the regional thematic portals.

Description: Regional connection shall be provided from all ECOOP regional systems to the central EuroMISS Version 0 thematic portals, and for the Black Sea where no thematic portal previously exists, a thematic portal (opendap server) will be established. The coastal systems of WP5 will each be connected to the regional thematic portal. Version 1 of EuroMISS will be established ready for the taget operational period of WP5, and with connection tothe EuroDESS demonstrations of WP9.
For the end of ECOOP, regional plans will be drawn up, taking inputs from task 8.1, to specify the required upgrades in each region to build EuroMISS V2

S8.2.1 - Regional connection to pan-European thematic portals
Objectives: Establish regional connections to pan-European thematic portal, and to provide connection from the coastal systems to the regional thematic portals.

Description: Overall design of ECOOP RegionalMISS, including service of discovery, viewing and downloading, will be made. Common data catalogue and tools for the discovery, viewing and downloading are designed, in order to be in harmony with the MERSEA information system and ECOOP centralised information system.
The existing thematic portals from the MERSEA IP shall be extended to take account of the coastal systems in ECOOP, and an opendap thematic portal capability will be established for the Black Sea.
During and after the Targeted Operational Period, the requirements and for further improvements of the regional EuroMISS thematic portal will be identified´.

S8.2.2 - Establish coastal components of EuroMISS
Description: The ECOOP forecasting system includes 5 regional systems and 15 coastal systems. Each coastal system will build up a proper connection to EuroMISS, including data downloading service (recommended Opendap, OpenGIS) so that the regional EuroMISS can use the coastal products making viewing service, and including connection to the various pre-existing Thematic Portals, providing eg access to remote sensing data.

T8.3 - Evaluation of the performance of the EuroMISS

Objectives: The objective of task 8.3 is to provide assessment of the various versions of EuroMISS, and to provide quality assurance of the specifications defined in task 8.1, from the perspective of both the intermediate user, and of the end-user of the ECOOP information services.

Description: This activity will assess all versions of the EuroMISS information system of systems, from the initial regional capability (version 0), through the version 1 with coastal and regional connection to the European-level thematic portals ready for the target operational period in months 21-27.

A range of metrics will be developed in consultation with both intermediate and end-user community. Recommendations will be made at the end of ECOOP on the required upgrades at both the individual regional level and the pan-European system, defining "EuroMISS V2"

S8.3.1 - Assessment of EuroMISS V0, TOP and V1

Description: This activity will assess all versions of the EuroMISS information system of systems, from the initial regional capability (version 0), through the version 1 with coastal and regional connection to the European-level thematic portals ready for the target operational period in months 21-27.

A range of metrics will be developed in consultation with both intermediate and end-user community. Recommendations will be made at the end of ECOOP on the required upgrades at both the individual regional level and the pan-European system, defining "EuroMISS V2"

T8.4 - WP8 Coordination (T8.0)

Objectives: This activity will coordinate the tasks of WP8, represent WP8 to the ECOOP Steering Group, and ensure links with the other WPs in ECOOP theme 3, particularly WP9 for EuroDESS

Description: Lead and coordinate WP8 task meetings, and attend ECOOP SG meetings as required. Provide inputs to the detailed planning of months 18-36, and inputs to the required ECOOP management reports.

Coordination activities of WP8 include:

- Co-ordination between WP8 tasks (8.1-8.2-8.3) as well as with relevant project WPs (mainly WP2, WP5 and WP9)
- Communication with and reporting to project coordinator and management group
- Preparation of WP meetings

WP9 - Decision support system (EuroDeSS)

Objectives:

The overall objective is to develop integrated marine services in support of marine environmental management in European coastal areas (EuroDeSS), based on information products generated by the ECOOP system of systems.

Specific objectives:

- To evaluate existing elements of decision support systems (DSS) operating in European coastal seas.
- To define the specifications of EuroDeSS, in collaboration with end-users and GEOSS/ GMES stakeholders.
- To develop components of EuroDeSS in selected targeted areas where elements of such systems already exist.

- To operate and demonstrate the value of EuroDeSS for the Target Operational Period (TOP).
- To evaluate the performance of EuroDeSS and assess its impact, in consultation with end-users.

Description:
WP9 will design and develop elements of an integrated Decision Support System (EuroDeSS) for the European Shelf and Coastal Seas building upon the ECOOP observational and modeling products. The specifications of EuroDeSS will be defined in collaboration between product providers, service developers and selected users.
From the perspective of service content, EuroDeSS will take account of the needs articulated by the relevant GMES initiatives (EC/DG Research and ESA/GSE projects) namely MERSEA_Strand-1 and ROSES, COASTWATCH and the progress of MERSEA and MARCOAST. These services will focus on marine environment and security applications: marine ecosystem health (eutrophication and HABs), accidental pollution (oil spills), search-and-rescue operations, navigation safety, fisheries assessment. They will integrate the ECOOP observational and modeling data available through EuroMISS with dedicated models of: ecosystem functioning, oil weathering and drift, drift of objects.
From a technology view point EuroDeSS will follow best practices from existing GMES services as well as the interoperability standards and technical specifications adopted by GEOSS (expected for 2007). It will ensure compatibility with information technology standards adopted by EuroMISS (OpenDAP, WMS/WFS/WCS) and investigate access to decision support tools through web services. This will include thin client applications based on 'browser only' access to interactive tools and thick client applications with desktop tools accessing directly the relevant ECOOP data products. Web portals will provide information on all ECOOP data and application products and how to use them in support of decision making for crisis management and long-term planning.
An important goal is achieving interoperability between information systems and portability to all European coastal seas in which operational monitoring and forecasting systems are being developed. EuroDeSS components will be developed in targeted areas of the Baltic Sea, North Sea, western European shelf and Mediterranean Seas, where elements of integrated marine services already exist, associated with monitoring and forecasting systems developed through long term national and regional R&D programmes (POLCOMS, POSEIDON, MONCOZE, Algaline, Adricosm).
The development and demonstration of EuroDeSS in these areas will be accompanied by assessment of its functionality in collaboration with local end-users from the public and private sector as well as relevant European stakeholders (EEA, GMES, GEOSS).

T9.1 - EuroDeSS specifications & standards
Objectives:
- Formalise the requirements of the EuroDeSS
- Develop a model for the deployment and operation of the EuroDeSS
- Establish mechanisms of the deployment of a EuroDeSS application system

Description: The review of existing EuroDESS elements will consider multiple view points of users and technologies. This will include:
1. Scope of the DSS (What topic (project) area, what geographic area)
2. Responsibilities (Who deploys the DSS and who is responsible for using it)
3. Procedures for updating the DSS and assessing the DSS. Standards used.
4. Technology platforms used and required system interoperability

5. How the performance of the DSS is managed, i.e. how good is the information it provides, are users and providers happy with the system?

This gives a robust benchmark to gauge the improvements that ECOOP can provide in terms of DSS for coastal management and provide guidance to the development activities of 9.2 and the evaluation activities of 9.3. It also establishes that stable 'building blocks' for the development work of 9.2. The findings of 9.1 will incorporated into a series of conceptual and system models using the Unified Modelling Language (UML) to communicate the information to task 9.2

T9.2 - Development, management and demonstration of EuroDeSS for targeted applications/areas

Objectives: Develop targeted application elements of an integrated EuroDeSS according to the specifications laid down in Task 9.1. Demonstrate the usefulness and applicability of EuroDeSS through user-oriented demonstrations in a representative range of European coastal areas.

Description: The targeted applications to be developed cover three key GMES/GEO marine service areas: marine security (oil spill and search-and-rescue response support), ecosystem health (eutrophication, algal blooms) and fisheries assessment. Development is carried out on a limited number of well-established, state-of-the-art systems. The developed target services aim to embody best practises for similar decision support systems, and provide a framework for establishing local, regional and pan-European services for the coastal and shelf seas. The target applications are:

1. Marine security (oil spill and search-and-rescue support) in the northern North Sea
2. Ecosystem health in the North Sea
3. Marine security and Ecosystem health in the Aegean Sea
4. Marine security in the Iberian coast and the Western Mediterranean
5. Ecosystem health in the Bay of Bothnia
6. Oil-spills forecast in the Levantine
7. Ecosystem health in the Adriatic
8. Fisheries assessment in the North Sea

Each target application will be performed as a separate subtask, but following a common procedure. The existing systems are identified as version V0. These are developed (Mo 9-24), through adoption of standards from Task 9.1 and interfacing to EuroMISS, to V1 in time for the TOP. Demonstrations, with user involvement, are carried out during the TOP with the V1 systems (Mo 24-27). Assessment of the TOP demonstrations (reported in Task 9.2) leads to revision and development from V1 to the final V2 systems (Mo 24-33). Representative V2 systems will be applied to a new area as a relocatability demonstration near the end of the project (Mo 33-36). Verification of codes will be carried out routinely and tested in connection with the demonstrations. Coordination and exchange of ideas with similar applications (through meetings and reporting) will support the development.

Task 9.2 includes the following subtasks:

- S9.2.1 - Marine security in the Northwest Shelf seas
- S9.2.2 - Ecosystem health in the North Sea
- S9.2.3 - Marine security and ecosystem health in the Aegean Sea
- S9.2.4 - Marine security in the Iberian coast and the western Mediterranean
- S9.2.5 - Ecosystem health in the Baltic Sea
- S9.2.6 - Marine security in the Levantine Basin
- S9.2.7 - Ecosystem health in the Adriatic Sea
- S9.2.8 - Environmental status support to North Sea fisheries assessment

T9.3 - EuroDeSS evaluation including user perspectives

Objectives: Establish metrics for the evaluation of EuroDeSS operations.

- Apply evaluation criteria to EuroDeSS development and operations
- Contribute the EuroDeSS to the overall ECOOP evaluation

Description: The evaluation of EuroDeSS will consider the whole scope of service from the key perspectives of the deployed services and the ability to deploy future services.
An evaluation as to whether the services developed as part of 9.2 meet the requirements of the stakeholder communities. These stakeholder communities include both the users of the services and the providers of services. The quality ('fit for purpose') of the DSS will examine the information delivered by DSS (i.e. how it supports the decision making process), its deployment (i.e. how effectively it is aligned with user/provider systems) and its management (i.e. how providers can ensure consistency of deliver of the service and respond to updates).

A crucial evaluation of EuroDeSS is the ability to which it can be extended to provide additional services, for example to deliver new information or to deliver existing information to new users/regions. This flexibility embraces not only the technology interface of EuroDeSS, but also the 'business' interface. Task 9.3 will evaluate the EuroDeSS flexibility through a real example, e.g., adding a new DSS service or extending an existing DSS service. This real example will focus on testing the issues that would be generic across organisations establishing and using a DSS based on the EuroDeSS platform of ECOOP. As such it will directly evaluate the procedures established in the DSS Deployment manual

T9.4 - WP9 Coordination

Objectives: To co-ordinate to work carried out under WP9 of the project in order to ensure:

- delivery of products according to the DoW,
- complementarity with the work of ofther WPs and
- maximization of overall WP9 performance and bene fits

Description: Coordination activities of WP9 include:

- Co-ordination between WP9 tasks (9.1-9.2-9.3) as well as with relevant project WPs (mainly WP2, WP5 and WP8)
- Communication with and reporting to project coordinator and management group
- Preparation of WP meetings
- Reporting to EC (collating reports and deliverables)
- Overall monitoring and assessment of WP progress (milestones & deliverables)

WP10 - Hindcast and scenario studies on coastal-shelf climate and ecosystem variability and change

Objectives:

- To quantify the monthly to decadal variability of the shelf seas-coastal climate.
- To quantify the monthly to decadal variability of the climate effects on the lower trophic levels of the shelf seas-coastal ecosystems.
- To quantify the potential effects on shelf seas-coastal climate and ecosystems from global climate change predictions (decades-100 years).

- To quantify the potential effects on shelf seas-coastal ecosystems due to management scenarios and related to natural variability.
- To produce multi-decadal reference databases and monthly climatologies of modelled shelf seas-coastal climate and ecosystems.

Description:
The climate and scenario aspects of ECOOP, will focus on the North Sea shelf and coastal regions, with some emphasis also on the Baltic. Due to very similar challenges in the relatively large SESAME project including ECOOP participants representing the Meditteranian and the Black Sea, these areas are not included in this WP, but close contact with SESAME will be established. Although the focus on ECOOP is towards relatively short term operational issues, it is in general of great value to relate "today's" operational status and short term forecast to the "normal" climatological status and variability. Due to lack of process knowledge and quantitative ecosystem information, the use of indexes or anomalies from climatology may be of more value to science and management (e.g. fisheries) than absolute values with large errors. Within weather forecasting these norms are usually based on 30 years of observations. Due to the scarcity of observations in the ocean, such norms must for most areas be produced by 3D numerical models. This requires the models to be run for several decades, and with present availability of digitised information of the atmospheric forces, it is practical to focus on the last 30-50 years The present climate scenario/prediction models (coupled air-sea-ice models) have resolutions too course to realistically represent the shelf sea-coastal dynamics. These results therefore need to be downscaled, and this downscaled physics will be used as driving force to simulate the future development of the shelf seas-coastal ecosystems. It will also be quite interesting to compare today's status and variability with the scenarios of the future. There are several ongoing activities within EU trying to model 3D phytoplankton dynamics, harmful algae blooms and eutrophication issues related to physics, nutrients, light, sedimentation and re-suspension. Such simulations are of great interest to environmental agencies, OSPAR, HELCOM and ICES, in particular related to "what if" scenarios of reduced nutrient loads. Unfortunately these activities are not well coordinated with little trans-boundary knowledge transfer between ecosystems. In general there is also a great lack of validation of such models, and sound routines for validation needs to be developed and applied. Management scenario studies will mainly be related to eutrophication and harmful algal bloom issues. Scenarios studying the effects of reduced/increased loads of individual nutrients from individual rivers and nitrogen from the atmosphere will shed light on the potential effects of management actions seen in relation to natural climate variability and the potential/ predicted climate change From the research community there is a great need for historic databases of 3D model results first of all to produce long-term information on changes that has not been observed trough regular monitoring. Examples of such are time series on cross boundary transport of water masses, heat, salt, nutrients, plankton and fish larvae; distribution of water masses, positioning of fronts, distribution of fish larvae, primary production, timing of spring bloom, changes in coastal circulation patterns/ intensity etc. etc.

T10.1 - Hindcast and scenario studies on coastal-shelf climate and ecosystem variability and change
Objectives: Quantify the monthly to decadal variability of the shelf seas-coastal physics/ climate

Description: Produce and analyse monthly integrated values from the last 30-50 years of 3-Dimentional fields of temperature, salinity, turbulence and currents at selected depths or depth intervals, mixed layer thickness, and volume, heat and salt fluxes through selected sections. Perform validation of precision and accuracy. Intercompare overlapping results between participants. Deliver results to database and to EuroDESS.

S10.1.1 - Quantify the monthly to decadal variability of the shelf seas-coastal physics/climate.
Objectives: Quantify the monthly to decadal variability of the shelf seas-coastal physics/ climate

Description: Produce and analyse monthly integrated values from the last 30-50 years of 3-Dimentional fields of temperature, salinity, turbulence and currents at selected depths or depth intervals, mixed layer thickness, and volume, heat and salt fluxes through selected sections. Perform validation of precision and accuracy. Intercompare overlapping results between participants Deliver results to a database and to EuroDESS.

S10.1.2 - Quantify the monthly to decadal variability of the climate effects on the lower trophic levels of the shelf seas-coastal ecosystems
Objectives: Quantify the monthly to decadal variability of the climate effects on the lower trophic levels of the shelf seas-coastal ecosystems

Description: Produce and analyse monthly integrated values from the last 30-50 years of 3-Dimentional fields of primary production, concentration of functional groups of algae, nutrients and bottom oxygen, and sedimentation, and calculate cross-boundary time series of transports of nutrients and particulate matter through selected sections. Perform validation of precision and accuracy. If necessary and possible, perform a second simulation to improve the results. Intercompare overlapping results between participants. Deliver results to database and to EuroDESS.

S10.1.3 - Quantify the potential effects on shelf seas-coastal climate and ecosystems from global climate change predictions (future decades).
Objectives: Quantify the potential effects on shelf seas-coastal climate and ecosystems from global climate change predictions (decades-100 years).

Description: Estimate the future primary production (and assosiated variables) on the shelf seas by running the models used in Subtask 10.1.2 for several years several decades into the future with forcing from the downscaled climate simulations (Subtask 10.1.3, 18 months), and produce similar monthly averages as in Task 10.1.2.

S10.1.4 - Quantify the potential effects on shelf seas-coastal ecosystems due to management scenarios and related to natural variability
Objectives: Quantify the potential effects on shelf seas-coastal ecosystems from management scenarios and related to natural variability

Description: Simulate selected "what if" scenarios studying the effects of reduced (and maybe increased) loads of individual nutrients from individual areas/rivers and nitrogen from the atmosphere to shed light on the potential effects of management actions seen in relation to natural climate variability and the potential/ predicted climate change. The simulations needs to be run for multi-year periods with typically large differences in climate/ weather to study and compare the effects on the state variables as described in Subtask 10.1.2.

S10.1.5 - Produce multi-decadal reference databases and monthly climatologies of modelled shelf seas-coastal climate and ecosystems.
Objectives: Produce multi-decadal reference databases and monthly climatologies of modelled shelf seas-coastal climate and ecosystems.

Description: The full 3-D results from the long-term simulations in Subask 10.1.1 & 10.1.2 will be stored with an as high as practical possible time-resolution in an easy accessible database. Monthly means and monthly climatologies will also be produced and stored in the same database.

T10.2 - WP10 Coordination (T10.0)
Objectives: Secure that the objectives and deliverables are achieved in time and with high quality, and that the working environment will inspire for future collaboration between the partners

Description:Plan and execute four to six specific WP10 meetings, and secure that deliverables are met. Coordinate WP10 with the rest of the ECOOP activities. Take responsibility for the final WP10 report and promote the writing of scientific papers on the results.

WP11 - International cooperation and technology transfer

Objectives:
1) develop capacity in non-Eu countries to use the existing operational oceanographic products from both observing systems and forecasting models
2) develop local capacity of non-Eu countries to observe and model the coastal ocean following the ECOOP standards
3) develop courses and educational material for new professionals, so-called ocean forecasters

Description:
This WP deals with the development of educational material and bilateral exchange of professionals to be trained in the usage of operational oceanographic products. With the same system, non-Eu countries will have partial support to develop coastal forecasting systems that will match the ECOOP standards for coastal forecasting.
The non-Eu countries participants to this WP are scientists or operators of coastal forecasting systems that need to be trained on the type and quality of products available from the MERSEA, ECOOP and other projects converging into ECOOP.

T11.1 - Preparation of the training material
Objectives: To prepare a consistent description of existing operational oceanographic products and services for educational purposes

Description: Here in general, we follow the conclusions of the IOC Strategy document for Capacity Building (2005). The general conclusions are that the highest priority to implement operational oceanography in different areas of the world ocean is to enable the usage of already available operational oceanography products. At European level, several projects have developed or are developing a real time stream of operational oceanographic products:
1) MERSEA that develops the observational and forecasting products at the global and regional scales;
2) ARENA, MFSTEP, MAMA, PAPA, SEANET have developed systems that are operational at shelf scales and will be integrated into ECOOP.
Educational material explaining the state-of-the.art products of all the regional and shefl/coastal EU forecasting systems will be prepared in terms of Web based documents and software for remote visualization of products.

S11.1.1 - Educational material for existing operational oceanographic products and services

Objectives: Produce educational material describing the existing operational oceanographic products and services, comprehensive of the description of the funtionalities of ocean forecasting centers and products quality standards.

T11.2 - Focused training for usage of ECOOP operational oceanographic products and services

Objectives: To have medium term (two weeks) training courses for the selected participants at the ECOOP regional centers.

Description: This Task will use material produced in Subtask 11.1.1 to have medium term (two weeks) training courses for the selected participants at the ECOOP regional centers intersting for the trainees. The courses will be one month long and the aim will be to train the interested personnel on the products and services offered by the different operational systems in the region of interest (Baltic, Middle Atlantic shelf, Mediterranean and Black Sea). The courses should be organized in order to show the existing operational system, its working protocols and should provide the possibility to handle operational oceanographic products locally by the visiting personnel. Support will be given.

S11.2.1 - Bi-weekly training courses

Objectives: To organize and coordinate medium term (two weeks) training courses for the selected participants at the relevant regional forecasting centers

Description: A number of non-EU countries will be hosted by the regional ECOOP/MERSEA regional centers for a two weeks visit which will be conprehensive of:
1) frontal lectures with the educational material prepared in Task 11.1
2) the definiton and completion of a visitor project to assess and upgrade the non-EU country forecasting system, especially in terms of usage of the available operational oceanographic products.
Non-EU organisations involed are:
1) Marocco for the Middle Atlantic and teh Mediterranean;
2) Russia for the Baltic and Black Sea;
3) Georgia for the Black Sea.
Other partners from 11.3 could be hosted at request.

T11.3 - Integration of non-Eu existing operational forecasting systems

Objectives: To organize partner-tailored exchanges of personnel between ECOOP operational European oceanographic sites and non-EU countries organizations involved in operational oceanography.

Description: The activities of this Task are dedicated to the organization of exchanges of personnel between ECOOP operational European oceanographic sites (INGV, MERCATOR, DMI and MHI)and non-EU countries organizations (GAS, GFZ, INRH, SOI, RSHU, Uni-Alexandria and INAT) involved in operational oceanography. The visits will be defined on a bilateral basis in order to macth the needs of the non-Eu countries. The activities will aim to give support to scientists or operators that would like to implement observational ECOOP protocols for real time data exchange, make use of real time observations available from the ECOOP network, implement coastal forecasting models with the ECOOP standards.

S11.3.1 - R&D for non-Eu existing operational forecasting systems

Objectives: visit periods organization and coordination

Description: This Subtask will support the R&D of non-EU countries coastal systems following the standards of ECOOP. The R&D will be complemented by non-EU partner-taylored exchange of personnel at the relevant ECOOP regional centres.
The non-EU forecasting systems will be first assessed in terms of products and services offered or, whenever not existent, they will be designed in collaboration with ECOOP centres and implemented from scratch.

T11.4 - WP11 Coordination (T11.0)
Objectives: To coordinate the WP activities in terms of preparation of the material for the Web, the EU reporting and the management of the training visits, together with the dissemination of the educational material

Description: This Task is concerned with the coordination of the contributions from this WP of the material for the Web, the EU reporting and the management of the training visits, together with the dissemination of the educational material

S11.4.1 - Coordination of WP11 activities
Objectives: To coordinate Wp11 activities

Description: This subtask will be dedicated to plan and execute WP11 activities: material for the Web, EU reporting and management of the training visits together with the dissemination of the education material.

WP12 - Education and Training

Objectives:
The objective of this workpackage is both to advance the knowledge and research skills of the experts and operators and to promote contacts between service providers and end-user community.

Description:
The training will be practised through the exchange of young scientists, workshops, summer schools and distant-learning. These activities will serve to stimulate interest and awareness in coastal ocean problems and operational oceanography products as well as improving the skills of researchers and operators in the field of coastal operational oceanography.

T12.1 - Exchange of young scientists
Objectives: In order to create capacity in the regions without or limited expertise, young scientists from these regions will visit well developed forecasting centres for extended study and hands-on tutorial.

Description: Exchange of young scientists between the centers to disseminate know-how already developed in Europe (e.g. techniques and methodological skills, particularly new methods and tools developed), to transfer key technical and scientific developments.

T12.2 - Organization of summer schools and workshops
Objectives: Develope and improve man power capacity in the Europe through the organizing summer schools and workshops.

Description: Organization of summer schools to address critical scientific issues on coastal operational oceanography. The aim of this task is to attract young researches to the operational oceanography and to demonstrate to end-users the use of products from forecasting system. Hence, Two types of summer schools will be organized; the training of the end-users which will be connected to WP5, WP6 and WP11 and the summer schools designed to introduce graduate students and young scientists to the field of coastal operational oceanography.
Organization of workshops to combine and optimise critical aspects of hands-on targeted research with training activities to promote expertise in key areas while contributing to training and mobility within Europe. An important issue is to bring the scientists together with potential users. Dedicated workshops will stimulate results of the new developments in ocean forecasting and to promote contacts between research communities and users.

T12.3 - Using Distant-learning Technology
Objectives: Prepare a course on operational oceanography using an e-learning support.

Description: The information technology infrastructure, as appropriate, will be implemented to facilitate distant learning development on internet-based long-distance graduate and post-graduate courses among the main European institutions. This will be done by using an e-learning platform devoted to the broadcast of course that will be developed outside the project while the course material itself will be prepared in this task. The format of the course material will be adapted to one of the different Learning Management System (LMS) that can be used by the e-learning platform developed following the international SCORM standards. The course material itself will deal with operational oceanography at regional and coastal scales taking account on products and services that will be done in WP11.

S12.3.1 - Course material on operational oceanography
Objectives: preparation of the educational material on the operational oceanography

T12.4 - WP12 Coordination (T12.0)
Objectives: This activity will coordinate the tasks of WP12, represent WP12 to the ECOOP Steering Group

Description: Lead and coordinate WP12 task meetings, and attend ECOOP SG meetings as required. Provide inputs to the detailed ECOOP management reports.
Coordination activities of WP12 include:

- Coordinations of the organizations of the summer schools and workshops.
- Communication with and reporting to project coordinator and management group
- Preparation of WP meetings

B.5 Description of the consortium

A central part of the goal of ECOOP is to consolidate and integrate and further develop existing operational observing and forecasting activities in the coastal and regional seas of Europe. ECOOP therefore requires an untraditional combination of partners that can provide both observations over a wide geographical area and a diverse suite of modelling activities. It has therefore been essential to put together a strong consortium of partners representing a well balanced mix of operational organisations taking a national responsibility for operational oceanographic services, research and

development institutes, universities, national agencies responsible for ocean management and development, and small service enterprises, representing every regional sea of Europe.

A brief summary descriptions of the partners and key people are given in Appendix B5.

B.5.1 Consortium

The ECOOP partners are recognised internationally as experts in operational observation and forecasting, research and development in subjects such as physical and bio-geochemical ocean modelling, ocean remote sensing, in situ observing systems, data management as well as service provision to end-users and decision makers. They have been –and still are– active participants in most major international programmes concerning ocean research and development. They are members of many international programmes scientific or technical steering groups, committees, or boards, such as Global Ocean Observing System (GOOS), and EURO-GOOS, the Joint Committee on Oceanography and Marine Meteorology (JCOMM) of the Intergovernmental Oceanography Commission (UNESCO), International Council for the Exploration of the Seas (ICES), ESA and EUMETSAT programmes, etc.. The major part of the ECOOP consortium partners are active in the regional alliances in operational oceanography under EuroGOOS, i.e., Baltic Sea (BOOS), Northwestern shelves (NOOS), Iberia-Biscay-Ireland region (IBIROOS), Mediterranean Sea (MFS-MOON) and Black Sea (Black Sea GOOS), which forms the basis for the integration and consolidation work planned in ECOOP. Additionally several of the ECOOP partners are actively involved in the MERSEA IP project and in the international coordination and integration activities under GEOSS and GMES.

The close connection with the above mentioned programmes and international agencies ensures that the developments of ECOOP are at the forefront of current knowledge and at a high level of excellence, and are fully integrated with relevant international initiatives. Conversely, the ECOOP contribution will be recognised and integrated in the future as those programmes evolve.

Most of the ECOOP partners have been –and still are –co-ordinators or participants in diverse marine EU-funded research and development programmes, covering a wide spectrum of applications. Their participation in ECOOP marks the convergence of developments made in those previous and ongoing projects. Thus ECOOP draws upon a wide field of expertise and achievements. Moreover, the partners have built long standing working relationships and are used to collaborate on a variety of projects.

B.5.2 How do the partners complement each other

The ECOOP consortium includes partners from the public and private sectors, from academia, national and international agencies, research institutes and universities and SME's. Their collective multidisciplinary expertise covers all the fields required to achieve the objectives of the project.

Operational organisations

Several national meteorological institutes are partners in the projects, and by their statutes and international conventions, those agencies are responsible for forecasts and services in support of marine operations and safety (wave and sea state forecasts, storm surges, oil spills, search and rescue). Beyond ocean applications, they are also responsible for weather forecasts, warnings and decision support actions related to the regional and coastal domains. All those applications stand to gain in accuracy and reliability by the introduction of the integration and developments planned in

ECOOP. The involvement of those agencies in ECOOP guaranties that the ocean informations and services to be developed in ECOOP will be incorporated on a routine basis into their operational loca/national forecast services.

They bring to the project their experience in fully operational production of analyses and forecasts, powerful resources in data networks and computing capacity. Those agencies are seen as intermediate users of the ocean information to be delivered by the system: by incorporating that information into their forecasts and services, a very large class of end users will be reached.

Research institutes and universities

Marine Research Institutes have in most countries a wide range of missions, including research and development, monitoring and prediction of environmental and climate changes, coastal management and protection, risk assessment etc. They are concerned mostly with the coastal environment closely related to societal problems. Their mandate includes often the formulation of expert advice to local or regional authorities, reports to national policy makers and environmental agencies, and contributions to international committees. The marine scientist bring to the project expertise on ocean science, observation technology, data management, physical and ecological modelling, data assimilation. ECOOP benefits from the participation of partners from several major marine research institutes of Europe, who contributes to the project a wide range of interdisciplinary competence and a close connection with local and national users.

Several university institutions are engaged in ECOOP which brings both high level frontier marine research as well as teaching and supervision expertise into ECOOP. The later point is an important avenue for training and dissemination of results at the most advanced level.

SME's

ECOOP has several SME's engaged as partners contributing with their expertise and know-how to various parts of the project. The contribution from these companies (Novaltis, Bolding and Burchard Hydrodynamics, CLU Ltd., HR Wallingford, MARIS, TechWorks) do particularly address issues such as modelling, marine information services, development and implementation of marine data and information management systems and services, user contacts and development and management of Internet sites and applications.

The complementarily of the consortium is strong not only in the diversity of institutional framework, disciplines and skills but also geographically where all the regional key players are represented in the ECOOP consortium, bringing their knowledge and experience on the diverse characteristics of the individual regional and coastal domains.

B.5.3 Potential new participants

Since the planning of ECOOP started in 2004, it has generated considerable interest in a broad segment of companies and institutes working with observations, monitoring, forecasting and research related to the regional and coastal seas of Europe. It has not been possible, nor necessary, to include them all at the project. However, should there be a necessity in the course of the project, due to unforeseen circumstances or adjustments in the work plan, to modify the partnership, ECOOP has established a broad network to relevant institutions.

B.5.4 Sub-contracting

There is only little subcontracting in ECOOP. In some nations the operational oceanographic activities have been split between several institutions and they have joined efforts in relation to ECOOP forming a national consortium represented by one institute having the other institutes as sub-contractors.

B.5.5 Other countries

An important part of ECOOP is international cooperation with the purpose of developing capacity in non-EU countries using existing operational oceanographic products from both observing systems and forecasting models and to develop local capacity of non-EU countries to observe and model the coastal ocean following the ECOOP standards. Therefore ECOOP have several partners from Non-EU countries such as Tunisia, Morocco, Egypt, Russia, Georgia and China, to which special capacity building and training activities will be implemented.

B.6. Project Management

The overall coordination and management of ECOOP, which are related to the complexity of the task, the size of the consortium and the duration of the project, shall be assumed by DMI

B.6.1 Organisational structure

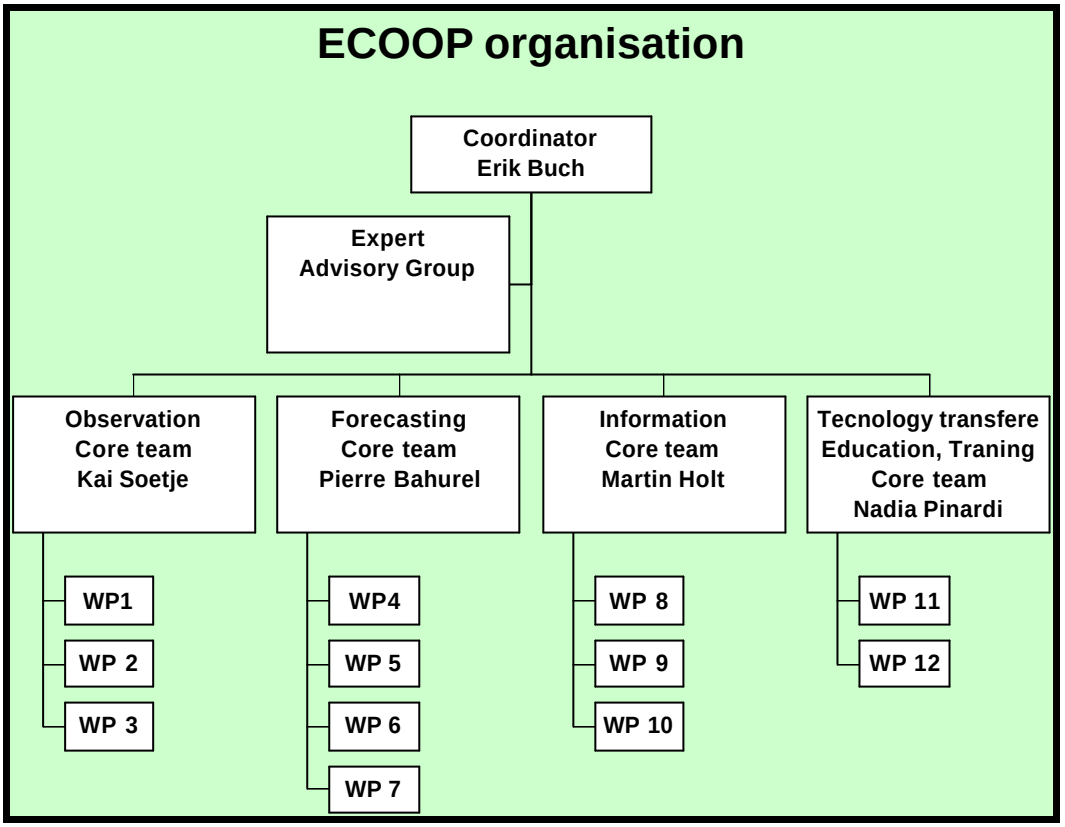
The organisational structure of the project is based on dividing the project up into 4 Core Themes following the logics of the involved work. The Core Themes are then subdivided into a total of 12 work packages

Core Theme 1: Observation System
- WP1: Quantitative assessment of observation systems: gaps and quality
- WP2: Integration of observing networks (pan- EU baseline system)
- WP3: Optimal synergy between remote sensing – in situ

Core Theme 2: Forecasting System
- WP4: Modelling and forecasting system assessment: standards, quality, functions
- WP5: Integration of modelling and forecasting systems (baseline system)
- WP6: System development (downscaling, data assimilation, eco-modelling)
- WP7: Synergy between coastal forecasting and newly available data and methodologies (a step towards next generation forecasting systems)

Core Theme 3: Information system – EuroMISS and EuroDESS
- WP8: European Marine Information System of Systems (EuroMISS)
- WP9: European decision supporting system (EuroDESS)
- WP10: Hindcast and scenario studies

Core Theme 4: Technology transfer, education and training
- WP11: International cooperation, technology transfer
- WP12 Education and Training



This allows a degree of delegation in the responsibility for the organisation, execution, and reporting of the project. It brings also **quality to the management**, as all the Core Theme and Work Package leaders have experience in leading large projects, or major units in their home institutions. They have all been involved in several previous European and other large international programmes. Together, the work package leaders constitute the Steering Group (SG).

For efficiency in day to day management the following groups will be established:

Management Team.
The strategic scientific planning and monitoring of ECOOP will be the responsibility of a management team comprising the project coordinator together with the leaders of the four Core Teams.

Steering Committee.

The Steering Committee is composed of the Work Package leaders and the coordinator (chair). The main task is to make propositions to the Management Team on the project work plan, budgets, and other matters necessary for the project advancement and success; and to implement the project orientations approved by the Management Team. Those responsibilities include :

- define and update the Work Plan;
- make progress reports on the state of advancement of the Project;
- establish the Project Deliverables for the Commission;
- propose the Project budget to the Governing Board as well as the allocation of funding between the Contractors;
- propose and implement the competitive selection procedure for new Contractors;

- make proposals to the Governing Board for changes in the consortium membership;
- the Executive Committee shall more generally propose any and all decisions required for the proper conduct of the Project.

Work Package Teams
Work Package Teams are composed of participants involved in carrying out the work of the relevant Work Package.

The Work Package leaders co-ordinate the tasks within their Work Package:

- integrate the work of the partners
- control and update planning of the tasks
- organise thematic meetings as appropriate
- monitor production
- co-ordinate work with other work packages
- stimulate scientific and technical exchange within their work package.
- report to the coordinator.

Thus the Work Package leaders contribute to the coordination and management through their activities within their respective work packages, and collectively to the overall project steering as members of the Steering Group.

Expert Advisory Group
External experts representing the stakeholders, users, agencies. Provides advice and guidance on the project orientation. They will participate in the preparation of final recommendations at the end of the project. They will meet in phase with the major milestones at Mo 21 and 35.

B.6.2 Coordination

The success of the project will depend on careful planning, allocation and administration of the resources, assessment of the risks and anticipation of the difficulties that may arise, constant monitoring of progress and respect of deadlines, quality control, reporting, and communication. Overall management of the project is under the responsibility of the project coordinator, but significant management tasks are performed by the theme- and work package leaders.

The coordination of ECOOP constitutes Work Package WP0, which is comprised of three tasks :

- Scientific and technical coordination
- Administrative and Financial coordination
- Communication

The project coordinator is Dr. Erik Buch, Centre for Ocean and Ice, Danish Meteorological Institute (DMI). The coordinator will be assisted by company CLU providing the PROGECTA software and by DMI's administration (Administrative and Financial Department).

Dr. Erik Buch (Head of Centre for Ocean and Ice). Graduated as Master of Science, Physical Oceanography, 1978; Lic. Scient. (Ph.D), Physical Oceanography, 1983; Bachelor of Commerce, Management, 1990 and Project Management, 1994. Senior scientist at Greenland Fisheries Research Institute, 1982; Head of Fisheries Department, same institute, 1985. Vice-Director, same institute, 1986. Head of Oceanographic Department, Royal Danish Administration of Navigation and Hydrography, 1990. Head of Division for Operational Oceanography, DMI 1998 (renamed to

Centre for Ocean and Ice in 2006). Responsible for the Danish oceanographic contribution to the Greenland Sea Project. Project co-ordinator for the Nordic contribution to World Ocean Circulation Experiment - NORDIC WOCE. Representing DMI in EuroGOOS, chairman of EuroGOOS Baltic Task Team since 1998, EuroGOOS officer since 1999, chairman of Danish EuroGOOS Committee. Great experience in oceanographic data collection, analysis and presentation. Responsible for oceanographic monitoring program in Greenland Waters since 1980. 104 publications

Scientific and technical coordination

This task covers the coordination of all scientific and technical activities. It will

- monitor the project planning and progress,
- ensure that deadlines are met, resolve bottlenecks,
- prepare deliverables,
- follow up regularly on the use of resources and budget,
- organise project meetings and internal reviews,
- maintain the documentation and quality plan.

At the level of the Themes- and Work Packages those tasks are assumed by their Leaders; the coordinator is responsible for the overall oversight of those issues at the project level.

The project coordinator is also responsible, more specifically of the following issues :

- preparing project reports;
- reporting to the Commission;
- take action to resolve conflicts, deal with contingencies and aleas;
- coordination with other EU – funded or other international projects;
- chairing Management Team and the Steering Group;
- implementation of the plans

In addition to ongoing scientific and administrative project review procedures facilitated within the Management bodies, a full review of the Project will be undertaken after the first 18 months (mid-term) of the project.

Administrative and financial coordination

All contractual, administrative and financial matters are the responsibility of the coordinator. The administrative and financial responsibility will cope with detailed budget management, transferring the Commission grant to the partners, and all contractual matters with the Participants. It will follow on the implementation of the Consortium Agreement, and solve all questions that might arise in the course of the project.

Specifically the following issues will be addressed:

- Overall administrative and financial management of the coordination.
- Keeps track of budgets.
- Management of consortium-level legal and ethical issues.
- Prepares financial and administrative reporting to the Commission.
- Knowledge and innovation-related activities, intellectual property issues.

Communication

Internal communication

The communication strategy adopted in the project aims at keeping all the partners fully informed about the status of the different activities underway. The target is to reach maximum transparency for all parties involved and hence increase synergy. All reports produced (like meeting and project reports, visit reports, publications, etc…) will be communicated to the coordinator who will be responsible for channelling this information to other partners when appropriate. The coordinator will likewise distribute to the partners relevant information obtained from sources outside the project (about other projects, and international programmes, from the Commission, or from various agencies).

A Project web-site will be developed at the beginning of the Project and will be continuously updated and enhanced throughout its duration. It will contain both external and internal access components.

External communication

ECOOP efforts to integrate and enhance European initiatives will be supported by a communication plan, linking the internal partnership and delivering ECOOP products and knowledge to the public audiences. The plan will be geared to communicate most efficiently and effectively to the various stakeholder audiences. All communication material will be available on the ECOOP web site. This communication strategy, aimed at the wide dissemination of the knowledge generated by the project, is seen as an important vehicle for training and outreach.

Communications on the project results and developments will be presented by the project partners at appropriate scientific and technical conferences. Reports will be delivered to targeted international committees (GEOSS, GMES, EuroGOOS, JCOMM, ICES). Multimedia presentations, posters will be created to enhance visibility of the project and recognition for its achievements. These promoting supports will be distributed during international meetings or conferences where ECOOP will be presented. They will also complement the course material to be developed in support of the various training and education sessions described in WP11 and WP12.

Hard copy material about ECOOP products (forecast data, observing data, software, interface tool, bulletins,…) will be distributed to partners and intermediate-users in order to disseminate information about the availability and the main characteristics of the ECOOP products. Awareness must be raised among policy makers on the value of the ECOOP Information System (EuroMISS) and Decision Support System (EuroDESS).

B6.3. Methods for monitoring and reporting progress

The work package leaders will report once every six months to the project coordinator about the progress of the work. The report will provide information about the technical progress, results obtained, deliverables completed, resources invested, and compliance with the work program.

The essence for project monitoring is the identification of deviations from the schedule, budget or work plan. The coordinator will, with support from Core Theme leaders, summarize the overall project status and update the progress bar chart including man-months using the data received from

all partners. He will coordinate the preparation of the project reports every six months and distribute them, and he will complete the internal reports (technical report, exploitation report, publishable summary, and synthesis report).

Every 12 months, the coordinator will prepare a consolidated overview of the budgetary situation of the project, on the basis of the cost statements he has received from the partners. This report will be submitted to the Commission. The payments that have been made are also reported. The budgetary situation is closely followed against the original annual budget plan which is to be made in the kick-off phase of the project.

Management software

The management of ECOOP will benefit from the use of the project management tool PROGECTA is a web based tool specifically tailored to monitor a large number of partners and activities, to ensure an efficient communication transfer. CLU ltd will adapt the software to the specific needs and structure of ECOOP project in order to have an efficient tool that will serve planning, allocation and good stewardship of resources, assessment of the risks and anticipation of the difficulties, constant monitoring of progress and respect of deadlines, quality control, reporting, and communication.

In particular, PROGECTA will support project management in:

- Schedule activities,
- Optimize resources respecting time and budget,
- Check the state of advancement of all the project activities,
- Control and evaluate delay between the real and scheduled activities deadlines,
- Allow excellent communication within component responsible, WP leaders and Project Co-ordinator,
- Use analytic tools (GANTT, Key Performance Indicators),
- Point out criticizes to be suddenly corrected (or took into account),
- Automatically generate management reports,
- Gather documents, data and scientific files,
- Help financial administration, keeping track of budgets,
- Inform partner about due date, activities changes, state of the play (activities reports).

PROGECTA will also manage mailing between the partners allowing different mailing lists to be set up for the whole project and for the components, WPs, and any other group that will have to use internal communication.

Different contributions, like Management and Technical Reports, will be collected through this system and then minimally re-processed to be submitted to the Commission. This last feature is a considerable help for the management since ti avoids loss of time and effort duplication. Finally, all documents will always be available on the web for a ready access by all partners, thus speeding up revisions and avoiding delays as much as possible

B6.4. Quality Assurance

Several tasks of the project are specifically dedicated to the quality control, validation and assessment of the production from the point of view of the scientific quality, of functional reliability of the system, of overall performance, and conformity to the user needs and programme objectives.

The participants will follow well established procedures for quality control of the codes and the data. The developments and improvements of the codes, including eventual bug fixes in the original model code will be fully documented using advanced version control systems.

The data products to be used in ECOOP consist of remote sensing data and in situ observations available in real time from European networks. Real time processing and quality control will be done in accordance with the recommendations of the international programmes overseeing the various data streams. The native input/output format will be well documented and the NetCDF format will be used to the degree possible and meta-data delivered with the data as soon as they become available.

All project developments and procedures will be fully documented. Deliverables will be reviewed and quality controlled before delivery.

B6.5. Management og knowledge

Data policy

The consortium agreement will spell out and identify pre-existing knowledge and the provisions for intellectual property safeguards.

The data policy of the project will follow closely that of the Resolution 40 of the WMO. It is based on the recognition that "The timely, free and unrestricted international exchange of oceanographic data is essential for the efficient acquisition, integration and use of the ocean observations gathered by the countries of the world for a wide variety of purposes including the prediction of weather and climate, the operational forecasting of the marine environment, the preservation of life, the mitigation of human-induced changes on the marine and coastal environment, as well as for the advancement of scientific understanding that makes this possible."

ECOOP will also take due account of the recommendations of GEOSS and GMES on the issues of access to data, pricing policy, intellectual property rights, ownership of the data, safeguarding and archiving. Whenever possible, the widest dissemination policy will be adopted by the project, aiming to provide free access to the project results. However, that aim will be weight against the pre-existing policies of the participating agencies and companies.
All those issues will be addressed first during the negotiation phase, as part of the consortium agreement.

Training and outreach
Those activities have been included in WP11 and 12; they are fully described in the corresponding sections of parts B4 and B8.

Intellectual Property Rights. Issues relating to pre-existing knowledge and know-how, as well as knowledge generated during the project will be an integral part of the Consortium Agreement.

Consortium agreements. The project coordinator will implement a Consortium Agreement to set out in detail the rights, responsibilities, and liabilities of participants to each other and towards the European Commission.

Project resources

Mobilisation of the critical mass of resources: ECOOP includes the leading European organisations within regional and coastal monitoring and forecasting. The consortium consists of approximately 72 partners and is a mixture of operational monitoring and forecasting organisations, research institutes and SME's. The partners involved have the expertise and equipment to carry out the project successfully.

Duration of the project: ECOOP is planned for a period of three years in order to secure close integration with MERSEA and to contribute to the implementation of GMES Marine Core Services and to the GEO(SS) 10 year Implementation Plan.

Overall financing: ECOOP requires an estimated Funding from EU of 7.4 million Euro (and similar resources from the participants) in order to address all essential components of the proposed Integrated European coastal and regional seas forecasting system. ECOOP will exploit all results from earlier relevant EU and nationally funded research projects.

B.7 Project resources

B.7.1 IP project Effort Form

	DMI	BSH	HCMR	IFREMER	IMR	IMS-METU	INGV	MERCATOR	METO	MHI	NERC	USOF	ENEA	AWI	AZTI-Tecnalia	BBH
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
RTD / Innovation Activities																
T1.2	8,0							3,3	5,9	14,0						
T1.3	0,1															
T1.4	7,5															
T2.1	0,5	1,5	4,0	0,6	1,4	0,5				9,0			5,0		1,0	
T2.2	1,4	1,5		1,3							1,6					
T2.3	1,0			3,0							0,9		0,2		3,9	
T2.4	0,2	3,3		0,6		0,5									1,2	
T2.5		1,5								7,0					2,8	
T2.6		1,0	3,0													
T3.1										20,0						
T3.2				5,0												
T3.3	4,0			5,0												
T4.1	0,8							0,6		4,0						
T4.2	1,0							1,4		5,5						
T4.3	2,6	0,9				0,5		3,6	1,7	12,0						
T4.4	0,5							1,1		3,5						
T5.1								11,4								
T5.2	4,4	4,8														
T5.3		4,5							8,1		4,5					
T5.4				7,0				10,7								
T5.5			15,5	4,5		1,0	6,0									
T5.6						4,0				40,0						
T6.1	0,4	1,4	6,5	2,3		0,5		0,2	1,0	7,0	0,6	4,0				
T6.2	1,4	2,0	6,5			1,0			2,7	18,0	1,4	4,0				
T6.3	0,5	0,7	2,0			0,5		0,2	0,6	7,0	0,4	4,0				
T7.1	1,6			3,0									7,6			
T7.2											0,8	8,0		10,0		9,5
T7.3		1,3	1,4								1,2	16,0				
T7.4	1,5															
T8.1			22,0	9,5												
T8.2	3,5	1,3				2,0		6,2								
T8.3						1,0			3,2							
T9.1			10,5		2,5											
T9.2			21,0		5,0		10,0		12,6						1,2	
T9.3			8,0													
T10.1	3,6				11,4						5,7					
T11.3	0,5						7,0	1,1		4,0						
Total Research	**45,0**	**25,6**	**100,4**	**41,8**	**20,3**	**11,5**	**23,0**	**39,8**	**35,8**	**151,0**	**17,0**	**36,0**	**12,7**	**10,0**	**10,1**	**9,5**
Training Activities																
T11.1							8,0				1,3					
T11.2	0,5						5,0	0,9		1,5						
T12.1										3,0						
T12.3						0,5		3,1								
Total Training	**0,5**	**0,0**	**0,0**	**0,0**	**0,0**	**0,5**	**13,0**	**4,0**	**0,0**	**4,5**	**1,3**	**0,0**	**0,0**	**0,0**	**0,0**	**0,0**
Consortium Management Activities																
T0.1	9,0															
T1.1	1,0															
T2.7		2,0														
T3.4				1,0												
T4.5										7,0						
T5.7								3,1								
T6.4											1,0					
T7.5												9,0				
T8.4									1,4							
T9.2																
T9.4			4,0													
T10.2					1,1											
T11.4							2,0									
T12.4						1,0										
total Consortium management	**10,0**	**2,0**	**4,0**	**1,0**	**1,1**	**1,0**	**2,0**	**3,1**	**1,4**	**7,0**	**1,0**	**9,0**	**0,0**	**0,0**	**0,0**	**0,0**
Grand Total	**55,5**	**27,6**	**104,4**	**42,8**	**21,4**	**13,0**	**38,0**	**46,9**	**37,2**	**162,5**	**19,3**	**45,0**	**12,7**	**10,0**	**10,1**	**9,5**

	BIU	CEFAS	CLS	CLU	CMRC	CNR	DMU-NERI	DNSC	FIMR	GAS	GFZ	GKSS	HRW	ICBM	IMEDEA-CSIC	INAT
	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32
RTD / Innovation Activities																
T1.2						4,0										
T1.3									5,3							
T1.4						4,0										
T2.1		3,4			0,8	1,5	2,0	0,9				1,0			3,2	
T2.2					10,5	1,2										
T2.3			3,0		1,8	6,5		4,0								
T2.4												3,0				
T2.5																
T2.6			0,8		3,5											
T3.1			11,0					3,0								
T3.2						4,8										
T3.3						4,8										
T4.1																
T4.2																
T4.3									1,5							
T4.4																
T5.1																
T5.2									6,0							
T5.3																
T5.4																
T5.5															6,7	
T5.6																
T6.1	4,0						2,6		0,5							
T6.2	5,0								1,0							
T6.3	1,0								1,0							
T7.1						2,6										
T7.2														8,0	2,0	
T7.3														2,0		
T7.4																
T8.1					10,0								5,5			
T8.2	3,3								1,5						4,0	
T8.3															2,0	
T9.1													6,5			
T9.2		0,9							8,7							
T9.3					5,4								2,2			
T10.1																
T11.3										5,0	2,0					18,0
Total Research	**13,3**	**4,2**	**14,8**	**0,0**	**32,0**	**29,4**	**4,6**	**7,9**	**25,5**	**5,0**	**2,0**	**4,0**	**14,2**	**10,0**	**17,9**	**18,0**
Training Activities																
T11.1				5,0												
T11.2										1,5						
T12.1																
T12.3																
Total Training	**0,0**	**0,0**	**0,0**	**5,0**	**0,0**	**0,0**	**0,0**	**0,0**	**0,0**	**1,5**	**0,0**	**0,0**	**0,0**	**0,0**	**0,0**	**0,0**
Consortium Management Activities																
T0.1				9,0												
T1.1																
T2.7																
T3.4																
T4.5																
T5.7																
T6.4																
T7.5																
T8.4																
T9.2																
T9.4																
T10.2																
T11.4																
T12.4																
total Consortium management	**0,0**	**0,0**	**0,0**	**9,0**	**0,0**	**0,0**	**0,0**	**0,0**	**0,0**	**0,0**	**0,0**	**0,0**	**0,0**	**0,0**	**0,0**	**0,0**
Grand Total	**13,3**	**4,2**	**14,8**	**14,0**	**32,0**	**29,4**	**4,6**	**7,9**	**25,5**	**6,5**	**2,0**	**4,0**	**14,2**	**10,0**	**17,9**	**18,0**

	INRH	IO-BAS	IOLR	IOW	IST	MARIS	MET-NO	MF	MSI	RBINS-MUMM	NERSC	NIVA	PML	PdE	RIKZ	RSHU
	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48
RTD / Innovation Activities																
T1.2																
T1.3													13,6			
T1.4																
T2.1		3,0	2,0						3,0					1,0	3,8	
T2.2														3,0		
T2.3																
T2.4				5,0										1,0		
T2.5							7,1								2,2	
T2.6		1,0												7,0		
T3.1														12,0		
T3.2																
T3.3																
T4.1							0,6									
T4.2							1,3									
T4.3		2,0			6,0		2,3			2,0			2,0			
T4.4							0,6									
T5.1																
T5.2																
T5.3							4,5			10,0			10,0			
T5.4					23,0									21,0		
T5.5			7,0													
T5.6		5,0														
T6.1					2,0		0,5			2,0						
T6.2					8,0		0,9			3,0			4,5			
T6.3					2,0		0,5			1,0			1,0			
T7.1																
T7.2				4,0												
T7.3				1,0									2,0			
T7.4							1,3	7,2						16,0	3,2	
T8.1						2,7										
T8.2										6,0				11,0		
T8.3												2,5				
T9.1							2,5									
T9.2					4,0		4,5	11,0			2,0	1,0				
T9.3							2,5				4,0					
T10.1													7,0			
T11.3	9,0															22,0
Total Research	**9,0**	**11,0**	**9,0**	**10,0**	**45,0**	**2,7**	**29,1**	**18,2**	**3,0**	**24,0**	**6,0**	**3,5**	**40,1**	**72,0**	**9,1**	**22,0**
Training Activities																
T11.1																
T11.2	1,0															10,0
T12.1																
T12.3											1,0					
Total Training	**1,0**	**0,0**	**0,0**	**0,0**	**0,0**	**0,0**	**0,0**	**0,0**	**0,0**	**0,0**	**1,0**	**0,0**	**0,0**	**0,0**	**0,0**	**10,0**
Consortium Management Activities																
T0.1																
T1.1																
T2.7																
T3.4																
T4.5																
T5.7																
T6.4																
T7.5																
T8.4																
T9.2							0,6									
T9.4																
T10.2																
T11.4																
T12.4																
total Consortium management	**0,0**	**0,0**	**0,0**	**0,0**	**0,0**	**0,0**	**0,6**	**0,0**	**0,0**	**0,0**	**0,0**	**0,0**	**0,0**	**0,0**	**0,0**	**0,0**
Grand Total	**10,0**	**11,0**	**9,0**	**10,0**	**45,0**	**2,7**	**29,7**	**18,2**	**3,0**	**24,0**	**7,0**	**3,5**	**40,1**	**72,0**	**9,1**	**32,0**

	SMHI	SOI	TECHWORKS	TUD	OC-UCY	ULG	AUDO	IASA-UAT	UNIBO	UNIV-GDA	LIM/UPC	UREADES	CNRS-POC	JRC-GEM	IMI	METEOGALICIA
	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64
RTD / Innovation Activities																
T1.2																
T1.3	5,6															
T1.4													16,9			
T2.1	2,0				6,0											
T2.2			3,5													
T2.3																
T2.4	2,0															
T2.5	2,4															
T2.6																
T3.1													12,0			
T3.2														11,0		
T3.3																
T4.1								1,5								
T4.2								3,5								
T4.3	1,4							5,0					2,0			
T4.4								2,0								
T5.1																
T5.2	6,9															
T5.3																
T5.4													2,0		17,0	24,0
T5.5					12,0			9,0					1,0			
T5.6																
T6.1	1,0								6,0	2,0			3,0		1,0	
T6.2	1,0								8,0	2,0			6,0		1,7	
T6.3	0,6								1,0	1,0			3,0		2,0	
T7.1																
T7.2				4,0		2,0										
T7.3				6,8				1,0	8,0		12,0					
T7.4													1,0			30,0
T8.1												5,3				
T8.2	1,9				12,0							5,8				
T8.3			2,0													
T9.1												3,3				
T9.2			1,0		12,0						0,9	1,3				
T9.3																
T10.1										18,0						
T11.3		25,0					13,0									
Total Research	**24,8**	**25,0**	**6,5**	**10,8**	**42,0**	**2,0**	**13,0**	**22,0**	**23,0**	**23,0**	**12,9**	**15,7**	**46,9**	**11,0**	**21,7**	**54,0**
Training Activities																
T11.1																
T11.2		6,0														
T12.1																
T12.3																
Total Training	**0,0**	**6,0**	**0,0**	**0,0**	**0,0**	**0,0**	**0,0**	**0,0**	**0,0**	**0,0**	**0,0**	**0,0**	**0,0**	**0,0**	**0,0**	**0,0**
Consortium Management Activities																
T0.1																
T1.1																
T2.7																
T3.4																
T4.5																
T5.7																
T6.4	1,5									2,0						
T7.5																
T8.4																
T9.2																
T9.4																
T10.2																
T11.4																
T12.4																
total Consortium management	**1,5**	**0,0**	**0,0**	**0,0**	**0,0**	**0,0**	**0,0**	**0,0**	**0,0**	**2,0**	**0,0**	**0,0**	**0,0**	**0,0**	**0,0**	**0,0**
Grand Total	**26,3**	**31,0**	**6,5**	**10,8**	**42,0**	**2,0**	**13,0**	**22,0**	**23,0**	**25,0**	**12,9**	**15,7**	**46,9**	**11,0**	**21,7**	**54,0**

	NOVELTIS	SYKE	IAP	IMC	NIMRD	UIB-GFI	UNI-MALTA (IOI-MOC)	IEO	
	65	66	67	68	69	70	71	72	
RTD / Innovation Activities									
T1.2								4,0	**39,2**
T1.3									**24,6**
T1.4									**28,4**
T2.1							4,0		**61,0**
T2.2									**24,0**
T2.3									**24,2**
T2.4									**16,8**
T2.5									**23,0**
T2.6								9,0	**25,3**
T3.1									**58,0**
T3.2									**20,8**
T3.3									**13,8**
T4.1									**7,5**
T4.2									**12,7**
T4.3				1,0					**46,5**
T4.4									**7,7**
T5.1									**11,4**
T5.2		6,0							**28,1**
T5.3									**41,6**
T5.4									**104,7**
T5.5	1,0			5,9			14,0		**83,6**
T5.6					120,0				**169,0**
T6.1		1,0			49,0			2,0	**100,5**
T6.2		0,6							**78,7**
T6.3		1,0						2,0	**33,0**
T7.1									**14,8**
T7.2									**48,3**
T7.3									**52,6**
T7.4	1,0								**61,2**
T8.1									**55,0**
T8.2									**58,5**
T8.3							8,0		**18,7**
T9.1									**25,3**
T9.2									**97,0**
T9.3									**22,1**
T10.1						8,0			**53,7**
T11.3									**106,6**
Total Research	**2,0**	**8,6**	**0,0**	**6,9**	**169,0**	**8,0**	**26,0**	**17,0**	**1697,7**
Training Activities									
T11.1									**14,3**
T11.2			6,0						**32,4**
T12.1									**3,0**
T12.3	1,0								**5,6**
Total Training	**1,0**	**0,0**	**6,0**	**0,0**	**0,0**	**0,0**	**0,0**	**0,0**	**55,3**
Consortium Management Activities									
T0.1									**18,0**
T1.1									**1,0**
T2.7									**2,0**
T3.4									**1,0**
T4.5									**7,0**
T5.7									**3,1**
T6.4									**4,5**
T7.5									**9,0**
T8.4									**1,4**
T9.2									**0,6**
T9.4									**4,0**
T10.2									**1,1**
T11.4									**2,0**
T12.4									**1,0**
total Consortium management	**0,0**	**0,0**	**0,0**	**0,0**	**0,0**	**0,0**	**0,0**	**0,0**	**55,7**
Grand Total	**3,0**	**8,6**	**6,0**	**6,9**	**169,0**	**8,0**	**26,0**	**17,0**	**1808,7**

B.7.2.IP management level justification of resources and budget

Justification of resources needed to carry out ECOOP

Budget
The expected cost of a project like ECOOP is more in the 20-30 Meuros range than in the 7 Meuros range, and we consider the current work plan to be extremely cost effective. We have voluntarily cut the budget of ECOOP from step 1 of the evaluation to step 2 by about 25%. This has been done by reducing the efforts on research and development components for improvement of existing systems and especially in the design and developments of future observation and forecasting systems. The budget proposed for ECOOP is however extremely tight.

Duration
ECOOP is planned for a duration of 3 years. During the first 21 month focus is devoted to the integration of existing observation and forecasting activities in the European regional and coastal seas into a pan-European system (going from V0 (existing systems) to V1 (first version of an integrated system), design and develop the European Marine Information Systems of Systems (EuroMISS) and the European Decision Support System (EuroDESS), initiate international cooperation, and training and education activities. Month 21 – 27 will focus on a Test Operational Period (TOP) demonstrating the capabilities of the V1 system. Parallel the development towards the final ECOOP system V2 will be initiated and which will be ended at month 36.

Personnel
The most important resource in ECOOP is top scientific experts on all aspects of operational monitoring and forecasting as well as information dissemination and service provision. Special emphasis is placed on employment of young researchers, on bringing in top scientists from new EU countries, and on bringing in top female scientists to the project.

Equipment
The work in ECOOP will be based on existing observations systems established as part of national or regional observation programmes, and data will be provided by the institutions involved, and as far as possible data from complementary ongoing projects and cooperative programmes will be incorporated into ECOOP.

Computing
ECOOP will be able to utilize supercomputing facilities at several of its partners for its modelling and forecasting activities and for research and development activities. High end super computer systems will have to be used for regional and coastal numerical models involved in ECOOP. These model systems are extremely demanding software systems which include comprehensive data storage facilities and high end data base system.

Data management
ECOOP will contain a data management facility based on experience gained by the marine operational service institutes, which depend upon smooth transitions from instrument, through calibration and processing, to assimilation into, and validation of, the forecasting models.

Outreach
ECOOP results will be made available to the general public as well as the specialists through a series of avenues, outlined in Workpackage 8 and 9. Transfer of capacity is a central component of ECOOP and so is training of students, and several capacity and training activities have been scheduled (WP11 and 12).

Management
ECOOP will contain a multi-tiered project management facility necessary for a project of this size, as outlined in B6. An Advisory Board will be appointed for keeping ECOOP well in sight and in phase with other international initiatives which will be prolific during the further development of GEOSS and GMES.

Mobilisation of the critical mass of resources.
ECOOP includes many leading European scientists with significant experience and expertise in regional and coastal marine research and operational monitoring and forecasting. The ECOOP consortium is composed of nearly 72 members, including several SMEs as full member of the consortium, a rather unique situation. The SMEs have been selected due to their high degree of expertise in very important domains such as modelling, marine information services, development and implementation of marine data and information management systems and services, and development and management of Internet sites and applications. The size of the ECOOP consortium, including 72 highly relevant partners and more than 100 PIs, is necessary for a project of this ambition. Vice versa it is quite natural that ECOOP plays the role of a big attractor for scientists interested in and responsible for operational observation and forecasting in regional and coastal seas. Most of the institutions are co-funding the ECOOP efforts so that the estimated total budget is nearer to 15-20 million Euro. The project will fully exploit other efforts that will take place in the field of operational oceanography, and will also fully exploit all results from former and ongoing EU research projects. The ECOOP partners are generally expected to raise additional funds for research and development in operational oceanography, funds that ECOOP obviously will benefit from.

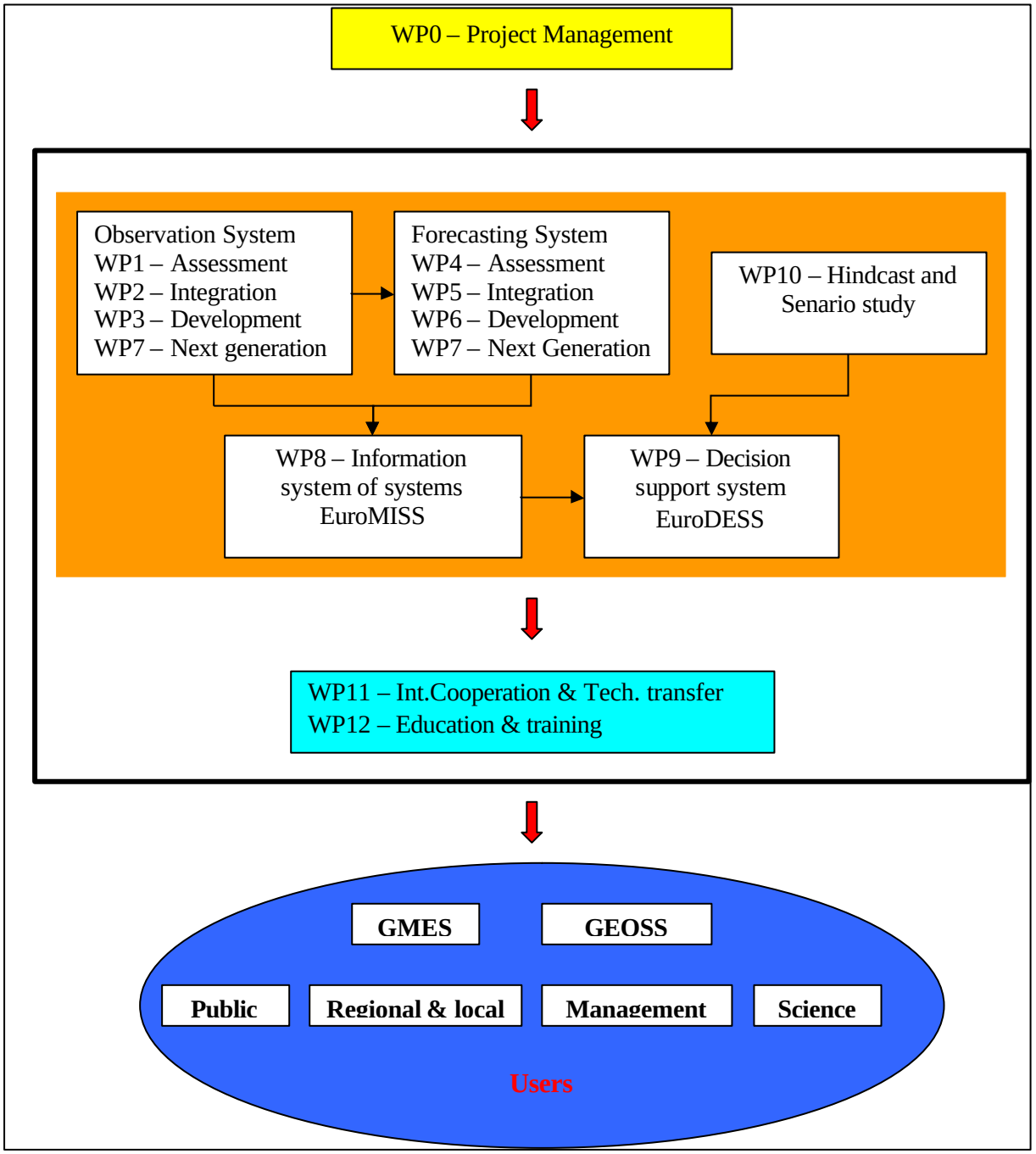
B.8 Detailed implementation plan – first 18 months

The overall goal of the project is to consolidate, integrate and further develop existing European coastal and regional seas operational observing and forecasting systems into an integrated pan-European system targeted at detecting environmental and climate changes, predicting their evolution, producing timely and quality assured forecasts, providing marine information service's (including data, information products, knowledge and scientific advices) and facilitate decision support needs. The goal will be approached by assessing, developing as necessary, implementing and integrating the existing systems (Ver.0) into a pan-European Sea observation (WP1-WP3), forecasting (WP4-WP5), information (WP8) and decision supporting system (WP9-WP10), i.e., Ver.1 system. The Ver.1 coastal system will then be upgraded into Ver.2 in WP6 and next generation system will be studied in WP7. The experience and knowledge in building up such an ECOOP system will be used in international cooperation, technology transfer, education and training (WP11 and WP12).

The ECOOP system is constituted with four components: observation system, forecasting system, information system and decision supporting system. The system covers five European regional systems and 15 targeted coastal areas. The ECOOP Ver.1 system should be ready in month 21 for the Targeted Operational Period. This means ECOOP Ver.1 should be preoperational at month 18. Major components of the Ver.1 observation and forecasting system include: data management

system (including collection, quality assurance and delivery), coupled physical-ecological forecasting system for 5 regional seas and with downscaling to the 15 targeted coastal areas. Hence during the first 18 months, major focus of ECOOP is to:

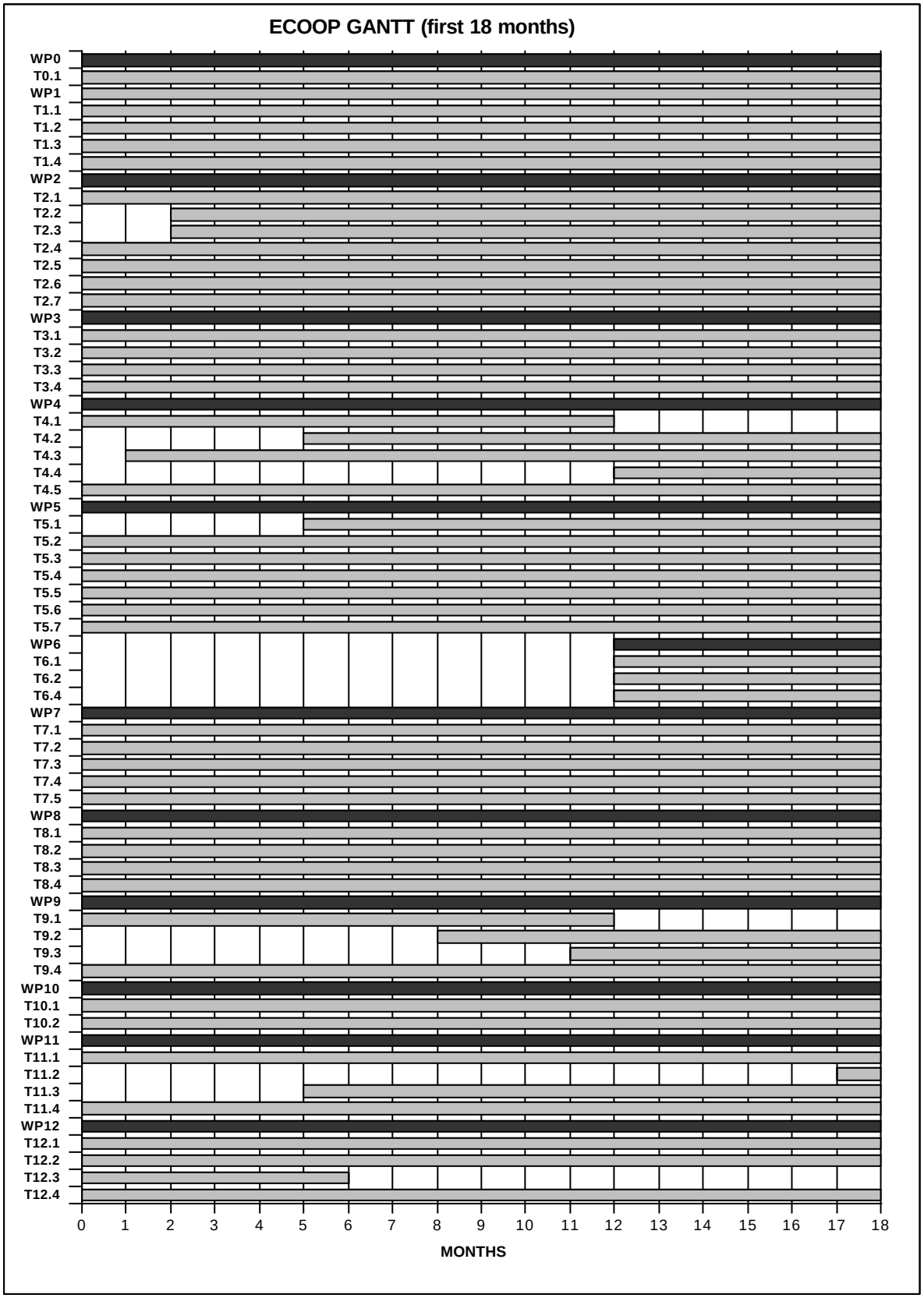
- Define and assess the quality of existing observation and forecasting systems (Ver.0 system),
- Design the Ver.1 observation and forecasting systems, information and decision supporting systems,
- Integrate and develop as necessary the Ver.0 system into Ver.1 system.



B.8.1 Workpackages List (18 month plan)

WP	Lead Contractor	MM	Start	End	Deliverables
WP0	DMI	10	Mo1	Mo36	D0.1.1.1, D0.1.1.2, D0.1.1.3, D0.1.1.4, D0.1.2.1, D0.1.2.2, D0.1.2.3, D0.1.2.4, D0.1.2.5, D0.1.3.1
WP1	DMI	49,5	Mo1	Mo36	D1.2.1.1, D1.2.2.1, D1.3.1.1, D1.3.2.1
WP2	BSH	102	Mo1	Mo36	D2.1.1.1, D2.1.1.2, D2.1.1.3, D2.1.2.1, D2.1.4.1, D2.1.5.1, D2.2.1.1, D2.2.1.2, D2.2.1.3, D2.2.2.1, D2.2.2.2, D2.2.2.3, D2.2.5.1, D2.3.1.1, D2.4.1.1, D2.4.2.1, D2.5.1.1, D2.5.2.1, D2.5.3.1, D2.6.1.1
WP3	IFREMER	91	Mo1	Mo18	D3.1.1.1, D3.1.1.2, D3.1.1.3, D3.2.1.1, D3.2.1.2, D3.2.1.3, D3.2.1.4, D3.3.1.1, D3.3.1.2, D3.3.1.3, D3.3.1.4, D3.3.1.5, D3.3.1.6
WP4	MHI	40,4	Mo1	Mo33	D4.1.1.1, D4.1.2.1, D4.2.1.1, D4.2.2.1, D4.3.1.1, D4.4.1.1
WP5	MERCATOR	246,3	Mo1	Mo36	D5.1.1.1, D5.1.1.2, D5.2.1.1, D5.2.2.1, D5.2.3.1, D5.2.4.1, D5.3.1.1, D5.3.2.1, D5.3.2.4, D5.3.3.1, D5.3.4.1, D5.4.1.1, D5.4.2.1, D5.4.3.1, D5.4.4.1, D5.5.1.1, D5.5.2.1, D5.5.3.1, D5.5.4.1, D5.6.1.1, D5.6.1.4, D5.6.2.1, D5.6.3.1, D5.6.4.1
WP6	NERC	53,8	Mo13	Mo36	
WP7	USOF	90,5	Mo1	Mo36	D7.2.1.1, D7.2.2.1, D7.2.3.1, D7.3.1.1, D7.3.2.1
WP8	METO	70	Mo1	Mo36	D8.1.1.1, D8.1.1.2, D8.1.1.3, D8.1.2.1, D8.2.1.1, D8.3.1.1, D8.3.1.2
WP9	HCMR	86,8	Mo1	Mo36	D9.1.1.1, D9.1.2.1, D9.1.2.2, D9.1.3.1, D9.2.1.1, D9.2.2.1, D9.2.3.1, D9.2.4.1, D9.2.5.1, D9.2.6.1, D9.2.7.1, D9.2.8.1, D9.2.9.1, D9.3.1.1
WP10	IMR	21,8	Mo1	Mo36	D10.1.1.1, D10.1.1.2, D10.1.2.1
WP11	INGV	70,3	Mo1	Mo36	D11.1.1.1, D11.1.1.2, D11.1.1.3, D11.3.1.1
WP12	IMS-METU	9,1	Mo1	Mo36	D12.1.1.1

B.8.2 First 18 month time schedule



B.8.3 18 month budget (A3)

			RTD		DEMO		TRA		MAN		TOTAL	
			Costs (€)	Requested grant to budget (€)	Costs (€)	Requested grant to budget (€)	Costs (€)	Requested grant to budget (€)	Costs (€)	Requested grant to budget (€)	Costs (€)	Requested grant to budget (€)
1	FC	DMI	370.315	185.158			0	0	95.450	95.450	**465.765**	**280.608**
2	AC	BSH	92.547	92.547			0	0	10.000	10.000	**102.547**	**102.547**
3	FF	HCMR	307.090	153.545			0	0	9.140	9.140	**316.230**	**162.685**
4	FC	IFREMER	472.709	236.354			0	0	24.804	24.804	**497.513**	**261.158**
5	FC	IMR	153.775	76.888			0	0	9.200	9.200	**162.975**	**86.088**
6	AC	IMS-METU	144.000	144.000			58.000	58.000	10.000	10.000	**212.000**	**212.000**
7	AC	INGV	91.201	91.201			50.800	50.800	10.400	10.400	**152.401**	**152.401**
8	AC	MERCATO	99.500	99.500			15.000	15.000	10.000	10.000	**124.500**	**124.500**
9	FC	METO	171.500	85.750			0	0	10.000	10.000	**181.500**	**95.750**
10	AC	MHI	150.600	150.600			4.950	4.950	11.140	11.140	**166.690**	**166.690**
11	FC	NERC	101.860	50.930			9.979	9.979	4.942	4.942	**116.781**	**65.851**
12	AC	USOF	38.085	38.085			0	0	10.560	10.560	**48.645**	**48.645**
13	FC	ENEA	20.000	10.000			0	0	0	0	**20.000**	**10.000**
14	FF	AWI	41.375	20.688			0	0	0	0	**41.375**	**20.688**
15	FC	AZTI-Tecr	65.037	32.519			0	0	0	0	**65.037**	**32.519**
16	FC	BBH	40.499	20.250			0	0	0	0	**40.499**	**20.250**
17	AC	BIU	17.891	17.891			0	0	0	0	**17.891**	**17.891**
18	FC	CEFAS	31.231	15.616			0	0	0	0	**31.231**	**15.616**
19	FC	CLS	164.000	82.000			0	0	0	0	**164.000**	**82.000**
20	FF	CLU	0	0			39.960	39.960	52.800	52.800	**92.760**	**92.760**
21	AC	CMRC	123.000	123.000			0	0	0	0	**123.000**	**123.000**
22	FC	CNR	192.855	96.428			0	0	0	0	**192.855**	**96.428**
23	FC	DMU-NER	25.000	12.500			0	0	0	0	**25.000**	**12.500**
24	AC	DNSC	30.000	30.000			0	0	0	0	**30.000**	**30.000**
25	FC	FIMR	46.680	23.340			0	0	0	0	**46.680**	**23.340**
26	AC	GAS	9.400	9.400			0	0	0	0	**9.400**	**9.400**
27	AC	GFZ	12.500	12.500			0	0	0	0	**12.500**	**12.500**
28	FC	GKSS	45.165	22.583			0	0	0	0	**45.165**	**22.583**
29	FC	HRW	245.969	122.985			0	0	0	0	**245.969**	**122.985**
30	AC	ICBM	25.700	25.700			0	0	0	0	**25.700**	**25.700**
31	FC	IMEDEA-C	107.213	53.607			0	0	0	0	**107.213**	**53.607**
32	AC	INAT	17.000	17.000			0	0	0	0	**17.000**	**17.000**
33	AC	INRH	9.660	9.660			0	0	0	0	**9.660**	**9.660**
34	AC	IO-BAS	20.160	20.160			7.600	7.600	0	0	**27.760**	**27.760**
35	AC	IOLR	25.800	25.800			0	0	0	0	**25.800**	**25.800**
36	AC	IOW	30.000	30.000			0	0	0	0	**30.000**	**30.000**
37	FC	IST	111.700	55.850			0	0	0	0	**111.700**	**55.850**
38	FC	MARIS	35.470	17.735			0	0	0	0	**35.470**	**17.735**
39	FC	MET-NO	238.143	119.072			0	0	4.238	4.238	**242.381**	**123.310**
40	FF	MF	60.325	30.163			0	0	0	0	**60.325**	**30.163**
41	AC	MSI	22.200	22.200			0	0	0	0	**22.200**	**22.200**
42	FC	RBINS-MU	84.999	42.500			0	0	0	0	**84.999**	**42.500**
43	FC	NERSC	30.000	15.000			9.999	9.999	0	0	**39.999**	**24.999**
44	FC	NIVA	27.000	13.500			0	0	0	0	**27.000**	**13.500**
45	FC	PML	88.921	44.461			0	0	0	0	**88.921**	**44.461**
46	FC	PdE	203.750	101.875			0	0	0	0	**203.750**	**101.875**
47	FC	RIKZ	56.670	28.335			0	0	0	0	**56.670**	**28.335**
48	AC	RSHU	6.405	6.405			0	0	0	0	**6.405**	**6.405**
50	AC	SOI	7.350	7.350			1.800	1.800	0	0	**9.150**	**9.150**
51	FC	TECHWOR	69.999	35.000			0	0	0	0	**69.999**	**35.000**
52	FC	TUD	51.500	25.750			0	0	0	0	**51.500**	**25.750**
53	AC	OC-UCY	63.030	63.030			0	0	0	0	**63.030**	**63.030**
54	AC	ULG	15.996	15.996			0	0	0	0	**15.996**	**15.996**
55	AC	AUDO	18.400	18.400			0	0	0	0	**18.400**	**18.400**
56	AC	IASA-UAT	49.792	49.792			0	0	0	0	**49.792**	**49.792**
57	AC	UNIBO	37.760	37.760			0	0	0	0	**37.760**	**37.760**
58	AC	UNIV-GDA	46.174	46.174			0	0	804	804	**46.978**	**46.978**
59	FC	LIM/UPC	56.755	28.377			0	0	0	0	**56.755**	**28.377**
60	AC	UREADES	63.000	63.000			0	0	0	0	**63.000**	**63.000**
61	FF	CNRS-POC	139.576	69.788			0	0	0	0	**139.576**	**69.788**
62	FF	JRC-GEM	100.680	50.340			0	0	0	0	**100.680**	**50.340**
63	FC	IMI	77.600	38.800							**77.600**	**38.800**
64	AC	METEOGA	29.000	29.000			0	0	0	0	**29.000**	**29.000**
65	FC	NOVELTIS	47.000	23.500			15.000	15.000	0	0	**62.000**	**38.500**
66	FC	SYKE	40.130	20.065			0	0	0	0	**40.130**	**20.065**
67	AC	IAP	0	0			7.200	7.200	0	0	**7.200**	**7.200**
68	AC	IMC	21.000	21.000			0	0	0	0	**21.000**	**21.000**
69	AC	NIMRD	22.004	22.004			0	0	0	0	**22.004**	**22.004**
70	AC	UIB-GFI	37.757	37.757			0	0	0	0	**37.757**	**37.757**
71	AC	UNI-MALT	35.300	35.300			0	0	0	0	**35.300**	**35.300**
72	FC	IEO	47.857	23.929			0	0	0	0	**47.857**	**23.929**
			5.582.559	**3.497.385**	**0**	**0**	**220.288**	**220.288**	**273.478**	**273.478**	**6.076.325**	**3.991.151**

B8.4 List of deliverables

WP	Deliverable	Title	Due date	Nat.	Diss. level
WP0	D0.1.1.1	Kick-off meeting	Mo1	O	PP
WP0	D0.1.2.1	Consortium agreement signed by all	Mo2	R	PP
WP0	D0.1.3.1	Project web site set up for internal and external communication and promotion	Mo2	O	PU
WP2	D2.2.1.1	Report on existing regional centres documenting role, data types, and services	Mo5	R	PP
WP2	D2.2.2.1	Review of metadata practices at regional centres	Mo5	R	PP
WP2	D2.1.1.1	Central web page for accessing the inventories (version 0)	Mo6	O	PU
WP4	D4.1.1.1	Inventory of forecasting activity at the ECOOP coastal systems	Mo6		
WP5	D5.2.1.1	Baseline integrated BOOS system V0: the regional system	Mo6	R	PU
WP5	D5.2.2.1	Baseline integrated BOOS system V0: Baltic - North Sea transition zone system	Mo6	R	PU
WP5	D5.2.4.1	Baseline integrated BOOS system V0: the Gulf of Finland system	Mo6	R	PU
WP5	D5.3.1.1	Baseline integrated NOOS system V0: the regional system	Mo6	R	PU
WP5	D5.3.2.4	Baseline integrated NOOS system V0: Southern North sea to Skagerrak system	Mo6	R	PU
WP5	D5.3.3.1	Baseline integrated NOOS system V0: the Liverpool bay observatory	Mo6	R	PU
WP5	D5.3.4.1	Baseline integrated NOOS system V0: The Western channel system	Mo6	R	PU
WP5	D5.4.1.1	Baseline integrated IBIROOS system V0: the regional system	Mo6	R	PU
WP5	D5.4.2.1	Baseline integrated IBIROOS system V0: the Iberian coastal system	Mo6	R	PU
WP5	D5.4.3.1	Baseline integrated IBIROOS system V0: the gulf of Biscay and Western channel system	Mo6	R	PU
WP5	D5.4.4.1	Baseline integrated IBIROOS system V0: the Irish shelf system	Mo6	R	PU
WP5	D5.5.1.1	Baseline integrated MOON system V0: the regional system	Mo6	R	PU
WP5	D5.5.2.1	Baseline integrated MOON system V0: the Western Mediterranean system	Mo6	R	PU
WP5	D5.5.3.1	Baseline integrated MOON system V0: the central Mediterranean system	Mo6	R	PU
WP5	D5.5.4.1	Baseline integrated MOON system V0: the Eastern Mediterranean system	Mo6	R	PU
WP5	D5.6.1.1	Baseline integrated Black Sea GOOS system V0: the regional system	Mo6	R	PU
WP5	D5.6.1.4	Description of Black Sea GOOS system V2 (regional	Mo6	R	PU

		system)			
WP5	D5.6.2.1	Baseline integrated Black Sea GOOS system V0: the North Western shelf system	Mo6	R	PU
WP5	D5.6.3.1	Baseline integrated Black Sea GOOS system V0: the Bosphorus and Western shelf system	Mo6	R	PU
WP5	D5.6.4.1	Baseline integrated Black Sea GOOS system V0: the South coast of Crimea and North East Black sea system	Mo6	R	PU
WP9	D9.1.1.1	Use-case document for EuroDeSS	Mo6	R	PP
WP0	D0.1.1.2	Interim progress report	Mo7	R	PP
WP0	D0.1.2.2	Interim management report	Mo7	R	PP
WP12	D12.1.1.1	Report on the content of the young scientists exchange program	Mo8	R	RE
WP1	D1.2.1.1	An updated T/S meta dataset in European Seas	Mo9	O	PU
WP1	D1.3.1.1	Biochemical meta dataset and historical dataset	Mo9	O	PU
WP2	D2.2.1.2	Delivery of a static web portal developed for ECOOP	Mo9	P	PP
WP2	D2.2.1.3	Report on the architectural plan for building the ECOOP DMS based on review of best practices (software patterns and design)	Mo9	R	PP
WP3	D3.3.1.1	Report on comparison between SST R/S and in-situ data (Adriatic)	Mo9		
WP3	D3.3.1.2	Report on comparison between SST R/S and in-situ data (Gulf of Biscay)	Mo9		
WP3	D3.3.1.3	Report on comparison between SST R/S and in-situ data (Baltic Sea)	Mo9	R	PU
WP4	D4.2.1.1	Algorithms and procedures of model validation	Mo9	R	PU
WP2	D2.3.1.1	Report on the design of the RT and NRT data satellite acquisition and delivery system for the TOP phase	Mo10	R	PP
WP9	D9.1.2.1	EuroDeSS system specifications	Mo10	R	PP
WP9	D9.2.9.1	Report template: Task 9.2 development and implementation plan	Mo10	O	PP
WP2	D2.1.1.3	Report on existing observation programs fitting the ECOOP objectives	Mo12	R	PU
WP2	D2.2.2.2	Report on the architecture of the ECOOP metadata catalogue system	Mo12	R	PP
WP2	D2.4.1.1	Review of the most suitable quality assurance protocols	Mo12	R	PP
WP2	D2.5.1.1	ECOOP River Data Catalogues (five regional) as digital spreadsheets	Mo12	O	PP
WP2	D2.5.2.1	ECOOP River Station Lists (five regional) as digital spreadsheets	Mo12	O	PP
WP2	D2.6.1.1	Report on designed added value products to be developed for EuroMISS	Mo12	R	PP
WP3	D3.1.1.1	Report on comparison between tide gauges and altimetry	Mo12		
WP3	D3.2.1.1	Report on comparison between R/S and in-situ data (Adriatic)	Mo12	R	PU
WP3	D3.2.1.2	Report on comparison between R/S and in-situ data	Mo12	R	PU

		(Gulf of Biscay)			
WP4	D4.1.2.1	Common standards of ongoing forecasting activity, gaps and overlapping	Mo12		
WP7	D7.2.2.1	First version of 2-way nesting scheme implemented in GETM	Mo12	R	PU
WP8	D8.1.1.1	Specification of EUROMISS architecture	Mo12	R	PU
WP9	D9.1.2.2	EuroDeSS system design diagrams	Mo12	R	PP
WP9	D9.1.3.1	EuroDeSS deployment manual	Mo12	R	PP
WP9	D9.2.1.1	Northwest Shelf seas DeSS application: development and implementation plan	Mo12	R	PP
WP9	D9.2.2.1	North Sea ecosystem DeSS application: development and implementation plan	Mo12	R	PP
WP9	D9.2.3.1	Aegean Sea DeSS application: development and implementation plan	Mo12	R	PP
WP9	D9.2.4.1	Iberian-Mediterranean DeSS application: development and implementation plan	Mo12	R	PP
WP9	D9.2.5.1	Baltic Sea DeSS application: development and implementation plan	Mo12	R	PP
WP9	D9.2.6.1	Levantine Basin DeSS application: development and implementation plan	Mo12	R	PP
WP9	D9.2.7.1	Adriatic Sea DeSS application: development and implementation plan	Mo12	R	PP
WP9	D9.2.8.1	North Sea fisheries DeSS application: development and implementation plan	Mo12	R	PP
WP11	D11.1.1.2	Web site for educational material	Mo12	D	PU
WP11	D11.3.1.1	Assessment of the non-EU operational products and service	Mo12	R	RE
WP0	D0.1.1.3	First annual project meeting	Mo13	O	PP
WP0	D0.1.2.3	First administrative and financial report	Mo14	R	PP
WP1	D1.2.2.1	Proxy physical ocean for European seas	Mo15	O	PP
WP2	D2.2.2.3	Delivery of the ECOOP metadata catalogue system, including web-based search interface	Mo15	P	PP
WP2	D2.2.5.1	Report on the architectures of both the ECOOP DMS and EuroMISS	Mo16	R	PP
WP4	D4.2.2.1	Common protocol to calculate standard validation criterions	Mo16	R	PU
WP4	D4.3.1.1	Establish regional validation databases	Mo16		
WP4	D4.4.1.1	Recommendations (to WP6) of regional forecasting systems improvement according to common standards	Mo16	R	PP
WP0	D0.1.1.4	Detailed implementation plan for mo 18 to 36	Mo17	R	PP
WP0	D0.1.2.4	Detailed financial plan for mo 18 to 36	Mo17	R	PP
WP0	D0.1.2.5	Interim Management report	Mo18	R	PP
WP1	D1.3.2.1	Proxy biochemical ocean	Mo18	O	RE
WP2	D2.1.1.2	Report on the inventories	Mo18	R	PU
WP2	D2.1.2.1	Draft report on common practices/protocols for data transfer and access	Mo18	R	PU
WP2	D2.1.4.1	Data interface for ECOOP version zero	Mo18	O	PU
WP2	D2.1.5.1	Acquisition of existing climatologies	Mo18	O	PU

WP2	D2.4.2.1	Report of the common QA-protocols to be used in the ECOOP DMS	Mo18	R	PP
WP2	D2.5.3.1	Report on interfacing river runoff data to the ECOOP Data Management System	Mo18	R	PP
WP3	D3.1.1.2	Report on the merging technique of tide gauges and altimetry	Mo18		
WP3	D3.1.1.3	New Mean Dynamic Topography for Black Sea and IBIROOS regions	Mo18		
WP3	D3.2.1.3	Report on multi-sensor merging and dynamic bio-optical algorithm selection (Adriatic Sea)	Mo18	R	PU
WP3	D3.2.1.4	Report on the merging technique between OC R/S and in-situ data (Gulf of Biscay)	Mo18	R	PU
WP3	D3.3.1.4	Report on the merging technique between SST R/S and in-situ data (Adriatic Sea)	Mo18		
WP3	D3.3.1.5	Report on the merging technique between SST R/S and in-situ data (Gulf of Biscay)	Mo18		
WP3	D3.3.1.6	Report on the merging technique between SST R/S and in-situ data (Baltic Sea)	Mo18	R	PU
WP5	D5.1.1.1	Assessment and plan for improvements for MERSEA and ECOOP coupling	Mo18	R	PU
WP5	D5.1.1.2	Plan for the TOP	Mo18	R	PU
WP5	D5.2.3.1	Baseline integrated BOOS system V0: the South-East Baltic sea including the gulf of Riga system	Mo18	R	PP
WP5	D5.3.2.1	Report on performance of v1 coastal models (NOOS system: the Southern North Sea to Skagerrak)	Mo18	R	CO
WP7	D7.2.1.1	Setups of three models (TUDELFT, POL, AWI) for the specified areas.	Mo18	R	PU
WP7	D7.2.3.1	Data-assimilation schemes based on SEIK and SEEK filters for GETM	Mo18	R	PU
WP7	D7.3.1.1	Report on the value of signals in the newly-available data for operational purposes	Mo18	R	PU
WP7	D7.3.2.1	Pilot-model-Documentation	Mo18	R	PU
WP8	D8.1.1.2	Specification of EUROMISS catalogue	Mo18	R	PU
WP8	D8.1.1.3	Specification of EUROMISS integrated viewing services	Mo18	R	PU
WP8	D8.1.2.1	Description of EUROMISS V0	Mo18	R	PU
WP8	D8.2.1.1	Regional components of EuroMISS V1 ready for target operational period	Mo18	P	RE
WP8	D8.3.1.1	Evaluation of EuroMISS V0	Mo18	R	CO
WP8	D8.3.1.2	Specification of metrics for EuroMISS evaluation	Mo18	R	PU
WP9	D9.3.1.1	EuroDeSS evaluation framework	Mo18	R	PP
WP10	D10.1.1.1	First 30-50 year climate simulations ready	Mo18		
WP10	D10.1.1.2	First 30-50 year simulations of primary production ready	Mo18		
WP10	D10.1.2.1	First 30-50 year simulations of primary production ready	Mo18		
WP11	D11.1.1.1	Documentation with technical details on the products and services	Mo18	R	PU
WP11	D11.1.1.3	Visualization tool for training	Mo18	P	PU

B.8.5 Workpackage description (18 month plan)

Workpackage number	**WP0**	**Start date or starting event:**					
Workpackage title: Coordination							
Participant id	1	20					
Person-months per participant:	4	6					

Objectives

WP0 - Coordination

The management objectives are:

- Ensure that the project reaches its objectives within the time and budgets limits.
- Coordination of activities.
- Manage and monitor the evolution of the project.
- Communication within and without project

Description of work

T0.1 - Coordination

The work during the first 18 month will primarely focus on securing the best start of ECOOP with attention to the project goals and workplan, focus on a good spirit among the project participants and on a good cooperation within the individual WP as well as in between the WP's
Special efforts will concentrated on:

- Consortium agreement
- Kick-off meeting
- 1. annual meeting
- First administrative and financial report
- Project web page

S0.1.1 - Scientific and technical coordination

The management of the project will start in effect before the official start date of the contract. The recommendations of the proposal review panel and the EU-Commision may require adjustments to the objectives and planning of the project during the contract negociation phase. During that period, the coordinator will consult with the Core Theme- and WP-leaders to finalize, in agreement with the Commission and the partners, all aspects of the project : structure (tasks), time table, final assessment and initial allocation of the resources.
The Consortium Agreement, to be signed during that phase, is an essential management instrument as it constitutes the effective contract between the partners. It affords the opportunity to identify possible sources of conflict, and to make provision for appropriate resolution procedures.
Formal agreements of cooperation with the already running MERSEA project have to be established – this is however believed to fairly straight forward since many ECOOP partners also are engaged in MERSEA. Links to other relevant projects will also be established during this phase.
The project kick-off meeting marks the effective launch of the project. It reinforces the sense of common purpose of all partners, and identifies the responsibility of each in the endeavour. Unresolved technical issues are identified and debated; cooperation between work packages is initiated. The

management exposes what is expected of each partner in terms of results, performance and reporting.
A annual meeting, involving all the participants, will be organised in month 13. Meetings in the Management Team and the Steering Group will be organised when needed - but at least twice a year; while the major part of running dialog, problem solving, conflict handling etc. will be handled through e-mail correspondence.

S0.1.2 - Administrative and financial coordination
First administrative and financial report (Mo 13).

S0.1.3 - Communication
Project web page will be available (Mo 3).
All project reports will be available on this page - internal reports only in a password-protected area.

Deliverables

D0.1.1.1 (Mo 1): Kick-off meeting
D0.1.1.3 (Mo 13): First annual project meeting
D0.1.1.4 (Mo 17): Detailed implementation plan for mo 18 to 36
D0.1.2.3 (Mo 14): First administrative and financial report
D0.1.2.4 (Mo 17): Detailed financial plan for mo 18 to 36
D0.1.2.5 (Mo 18): Interim Management report

Milestones and expected result

WP0-M1 (Mo1): Kick-off meeting
WP0-M27 (Mo13): First annual project meeting
WP0-M29 (Mo14): Detailed implementation plan for Mo 18 to 36

	WP1	Start date or starting event:					
Workpackage title: Quantitative assessment of observation systems: gaps and quality							
Participant id	1	8	9	10	22	25	45
Person-months per participant:	9	1,8	5,2	8	3,5	4	6
Participant id	61	72					
Person-months per participant:	8	4					

Objectives

WP1 - Quantitative assessment of observation systems: gaps and quality

To quantitatively assess European coastal and regional sea observational networks (including biochemical parameters) through both applying existing methodology (developed in EU FP5 project ODON) and developing new assessment methods and web-based assessment tools.

T1.1 - WP1 management

To assure the appropriate communication and co-ordination between WP1 partners, and between WP1 and other WPs, and that the WP1 tasks and deliverables are completed according to the WP plan.

T1.2 - Pan-European T/S observational network assessment

- To quantitatively assess the effective coverage and explained variance of the information the pan-EU Sea T/S observational networks.
- Collect meta data and historical data for temperature and salinity measurements
- Generate proxy physical ocean condition for scale analysis
- To provide necessary statistical information by analysing the proxy ocean data for estimating effective coverage of observational networks.
- Generate horizontal distribution of effective coverage and explained variance of the existing European Sea T/S observational networks

T1.3 - Assessment of Biochemical observational network

- Assess the effective coverage and explained variance of biochemical observational networks in two demonstrated areas: Baltic Sea and South North Sea.
- Collect meta data and historical biochemical data for network assessment, design assessment strategy.
- Generate proxy biochemical ocean conditions using state-of-the art ecological models for two important areas of Europe's coastal waters. The target areas have a well-established regional monitoring and assessment co-operation and a significant stakeholder participation.
- Perform statistical assessment methods for selected biochemical parameters based on the proxy biochemical ocean condition.

T1.4 - New methodology development and demonstration

1. Develop and demonstrate innovative new methodology for observation network assessment via ensemble modelling
2. Develop assessment methods for integrated T/S and currents observing system
3. Develop and demonstrate a web-based interactive network assessment tool
4. Develop and demonstrate assessment method for mixed multi-platform T/S and currents observation systems
5. Development and demonstrate a web-based observation network assessment tool

6. Develop innovative network assessment by using ensemble modelling

Description of work

In the first 18 months, WP1 will focus on the following tasks:

- Prepare physical and biochemical meta data and observations for network assessment
- Make proxy ocean runs in 5 European regional seas and start doing statistical analysis on the proxy ocean data.
- Design the assessment strategy and generate a proxy biochemical sea in the Baltic Sea and SE North Sea.
- Develop a web-based network assessment tool based on the ODON proxy data
- Assess impacts of innovative T/S monitoring platforms, start developing assessment method for mixed T/S and currents monitoring system
- Design and make model ensemble runs for network assessment study, calculate statistics based on model ensemble data

T1.1 - WP1 management

The WP1 management works on two issues: 1) coordinating WP1 in close contact with ECOOP Steering Group (SG); 2) communicating with the partners to secure that the objectives are achieved and to assure that the work carried out by each partners is well coordinated. The first issue is addressed through the involvement of WP1 leader in ECOOP SG, and contact with relevant WPs - WP2 (integrated observation network), WP3 (synergy between remote sensing and i-situ) and WP7 (requirement for next generation systems). The second issue is worked out by a close cooperation between task leaders and partners, through working meeting, website, email and ODON methodology transfer.

T1.2 - Pan-European T/S observational network assessment

In the first 18months, this task will collect necessary meta data and historical T/S data, make proxy ocean runs in 5 European regional seas and start doing statistical analysis on the proxy ocean data.

S1.2.1 - Meta data and historical data collection

Meta data and historical data of temperature and salinity observational networks in 5 European regional seas will be collected for a given 3 year period by the 5 regional partners. This dataset will be used in subtasks S1.2.3 and S1.2.4.

S1.2.2 - Proxy ocean generation

3-year physical model runs in a 3nm resolution (at least) for 5 European regional seas will be generated. The model ocean should represent the state-of-the-art model products.

S1.2.3 - Proxy ocean data analysis

Analyse characteristic scales, spatial-temporal correlation models based on the proxy ocean data; compare model SST characteristic scales with SST observations.

S1.2.4 - Assessment of the effective coverage and explained variance of existing T/S observational networks

T1.3 - Assessment of Biochemical observational network

In the first 18 months, this task will prepare meta data and historical biochemical data necessary for the assessment; design the assessment strategy and generate a proxy biochemical sea in the Baltic Sea and SE North Sea.

S1.3.1 - Data collection and overall assessment design

Generate biochemical meta data and historical data for the Baltic Sea and South North Sea; design proxy run time period, and purposes for the biochemical observational network assessment.

S1.3.2 - Proxy biochemical ocean generation

Ecological models used in PML and FIMR represent the state-of-the-art ecological model in the North Sea and Baltic Sea, respectively. The two models will be used to generate proxy biochemical ocean in a medium resolution (no lower than 3nm) for a period of 2-3 years.

The model quality will be validated against the large set of observations available from the long-term monitoring and assessment programs. Where clear errors in the proxy ocean can be identified and traced to errors during the proxy ocean generation process, the errors will be corrected with re-runs.

T1.4 - New methodology development and demonstration

- Develop a web-based network assessment tool based on the ODON proxy data
- Assess impacts of innovative T/S monitoring platforms, start developing assessment method for mixed T/S and currents monitoring system
- Design and make model ensemble runs for network assessment study, calculate statistics based on model ensemble data

S1.4.1 - Assessment of T/S and velocity observation systems

Make an assessment of the impact of different and innovative T/S monitoring platforms; and start to develop OSE method for assessing mixed T/S and currents observation systems.

S1.4.2 - Development and demonstrate a web-based observation network assessment tool

Develop a web-based interactive network assessment tool based on ODON proxy data.

S1.4.3 - Using ensemble modelling for observational network assessment

In this subtask, we will set up methods to evaluate the performance of observational networks by using ensemble simulations.

In one part of the work, we will at carry out ensemble model simulations, then the 'proxy model error' will be estimated by using the ensemble spread. In this way, the effective coverage and explained variance of the 'proxy model error' by the observational network can be estimated.

In a second part, we will use an idea of Bennett who proposed to objectively assess observational networks by estimating the explained degrees of freedom of model error by the network. We will extend this methodology by estimating the space-time representer matrix from ensemble simulations. The spectrum of singular values of the matrix will be used for assessment.

During the first 18 months, we will design and carry out ensemble model runs, and start to calculate statistical assessment indexes based on the ensemble model data.

Deliverables

D1.2.2.1 (Mo 15): Proxy physical ocean for European seas
D1.3.2.1 (Mo 18): Proxy biochemical ocean

Milestones and expected result

WP1-M8 (Mo6): Meta dataset ready
WP1-M9 (Mo6): Biochemical meta dataset ready
WP1-M14 (Mo9): Prototype web-based assessment management tool for North Sea ready
WP1-M28 (Mo13): Scientific report of WP1 and the first annual meeting
WP1-M33 (Mo15): Biochemical proxy ocean ready
WP1-M49 (Mo18): methods by using Ensemble modelling ikn network assessment is developed and tested.
WP1-M50 (Mo18): Methodology for assessing mixed T, S and velocity observational networks is developed and tested.

Workpackage number	**WP2**	**Start date or starting event:**					
Workpackage title: Integration of observing networks (pan- EU baseline system)							
Participant id	1	2	3	4	5	6	10
Person-months per participant:	2,1	6,6	7	2,5	1	1	9
Participant id	11	13	15	18	19	21	22
Person-months per participant:	1	0,3	7,5	2,3	0,8	14	3,5
Participant id	23	24	28	31	34	35	36
Person-months per participant:	1	2,9	3	2,2	2	1	5
Participant id	39	41	46	47	51	53	71
Person-months per participant:	4,7	2	4	3,6	2	3	3
Participant id	72						
Person-months per participant:	4						

Objectives

WP2 - Integration of observing networks (pan- EU baseline system)

- Integration of existing EU-wide marine observation systems,
- harmonising flow of real time and near real time observational data
- co-ordination accessing Earth Observation (EO) products in order to maximise the benefit from existing national and European resources.

T2.1 - Network evaluation and data delivery

- Evaluate existing systems, identify products and services, data and time-space coverage, coordinate data collection, assure timely data delivery
- Provide description and rationale for the data management systems for shelf seas and coastal observations. Assess their performance vs the project objectives.
- Provide the best practices in data management (from data collection to telemetry and distribution) and define the common strategies.
- To design and establish a co-ordinated pan-European data flow of marine real time and near real time data to meet the ECOOP objectives.
- Ensure an effective data exchange between data collectors and forecasting systems, create the links with other non-ECOOP operational data bases, especially with MERSEA.
- Acquire, evaluate and provide selected existing climatological data sets to be used for QC procedures

T2.2 - Establish a data management system to deliver real time and near real time data in an optimal and cost-effective mode

- Develop and implement a framework for managing and providing access to harmonised, quality assured observational and satellite data and associated metadata sourced from regional centres, and provide a single interface to the EuroMISS.
- Build the ECOOP Data Management System (ECOOP DMS).
- Provide a common catalogue for all metadata.
- Ensure a common and general quality of all data processed by the ECOOP DMS.
- Integrate the climatological observation data sets in the ECOOP DMS
- Implement the interface between the ECOOP DMS and EuroMISS

T2.3 - Ensure proper and maximum real time delivery of remote sensing data

- Implementation quality controlled advanced satellite products to ensure the proper and maximum timely delivery to the EuroMISS(WP8)
- Define the in situ and remote sensing acquisition system for test operational period (TOP)
- Acquisition, processing and delivery of the new remote sensing products specific for TOP
- Overall evaluation of the end-to-end data production and delivery systems

T2.4 - Quality assurance

- The quality of real-time and near-real-time observational data is assured by a series of protocols regulating the operational activity from collection, data transmission, quality control and dissemination. The already extisting protocols used in the regional centres and coastal institutions will be harmonised to achieve common defined "performance levels" for the ECOOP Data Management System. Quality assured data sets will be the backbone supply for EuroMISS and EuroDESS. Under ECOOP-objectives the presently existent QA protocols of comparable observing activities by other international programmes eg. HELCOM, OSPAR etc. will be considered.
- A performance check of the entire ECOOP DMS over a 6 months period regarding transfer rates, maintenance of QA indicators, and the completeness of the data flow will indentify shortcomings and gaps.
- The quality control for data pre-processing procedures used by the regional centres and the coastal observing centres will be compared. A common standard will be identified. Common protocols controlling the QA-software from the centres will be applied to the operational collection and transmission of data. Although there is considerable experience on data quality assurance in the processing stage, the development of common protocols for quality performance is a stringent requirement. Its application will be the first step towards establishing procedures for comparability and compatibility of data acquisition, transmission and exchange systems by each institution.
- Common protocols agreed by all partners are will control the data quality used for collecting and transmission, and for quality performance as well. The application of the protocols is a precondition to producing homogeneous real-time data sets for ECOOP. Already existent and practised protocols for ECOOP purposes, as defined above will be used by WP as the "performance criterion".
- For a six months trial period the quality of the data and data flow in ECOOP DMS will be analysed. A comparison between the data in the DMS and the qualified data in the regional centres and coastal institutions will be used to generate statistical metrics to evaluate the data performance of the DMS.

T2.5 - Establish a pan-EU data base for river run-off

- Establish a framework for integrating and harmonising observations of river runoff to the European coastal seas and providing them to coastal and shelf seas monitoring and forecasting services.
- To gain an overview of available data and to select an initial set of data for use in ECOOP.
- Define and test procedures for acquiring river runoff data from providers and making them available through the ECOOP data management systems.
- Provide river runoff data in each region to users through the ECOOP Data Management System

T2.6 - Products and services

- Produce added value products of real time and near real time observational data for

EuroMISS. Design and implement a prototype of a system to archive the observational data for future use.

- To select and design the products to be developed in the task (i.e. consistent data sets, gridded data, vertically layered data, sub-inertial currents for drift estimation, etc.)
- Implement real and near real time added value products to provide service to EuroMISS (i.e. consistent data sets, gridded data, vertically layered data, sub-inertial currents for drift estimation, etc.)
- Design a system to archive the observational data for future use

T2.7 - WP2 coordination (T2.0)

Co-ordination and management of WP2

Description of work

- Inventory of the existing regional and coastal data management systems
- Establish a central web-page for updating the inventories
- Ensure the delivery of marine real and near real time data, designing the ECOOP data flow
- Identify and select consistent data interfaces and links to the MERSEA DMS
- Evaluate the existing digital climatologic atlases
- Design the ECOOP DMS and the ECOOP metadata catalogue system
- Design of the interface between ECOOP DMS and EuroMISS (WP8)
- Definition of details in the requirements for in-situ and remote sensing data to fulfill the ECOOP goals
- Start the quality control process for the ECOOP DMS, agreement of the QA-protocols to be used in ECOOP
- Evaluation of the regional and pan-European river runoff data, define an optimal list of river rinoff data sets for the ECOOP DMS
- Definition and design of added value products, aggregation of real time and near real time data for consistent data sets to be delivered to Euro MISS(WP8)

T2.1 - Network evaluation and data delivery

Evaluate the existing data management systems used for regional and coastal observations using the EDIOS data base, the regional centres and EU-wide systems

S2.1.1 - Provide an inventory of the data management systems used for marine regional and coastal observation systems

The inventorying exercise will be completed in the first 18 months. The information will be gathered through sub-regional responsibles selected from the ECOOP partnership. The inventories constructed during the last year will be evaluated in terms of information provided. A unique web page will provide access to them and will provide the necessary information to access the information. This web page will serve as a 'user desk'. The existing inventories will be updated by the partners managing them, following the objectives of the project.

S2.1.2 - Select the most suitable system of data handling, transfer and distribution

The first 18 months will be used to collect the information on data management practices among the ECOOP partners. This will be done with a simple questionnaire, and a dedicated meeting, to be held with all WP2 partners. The forecast model requirements will be defined with another simple questionnaire and common meeting with other WPs. At the end of the first 18 months a draft report on common practices to transfer and access data will circulate internally. The final version will be

available to the public at the end of the second year activity.

S2.1.3 - Establish and ensure the delivery of marine real and near real time data

- Based on the acquired information on the data flow of the existing observational programmes, the main structure of the ECOOP data flow will be designed.
- In close co-ooperation with other ECOOP partners details of the data flow will be defined.

S2.1.4 - Identify and select consistent data interfaces and links to the MERSEA data management system

The work will be done during the first 18 months, in order to have some working procedures during the first phase of ECOOP.

S2.1.5 - Compile quality assured climatologic observation data sets, integrating existing bases

Evaluate the existing climatologic data bases.
Evaluate the existing digital climatologic atlases.

T2.2 - Establish a data management system to deliver real time and near real time data in an optimal and cost-effective mode

- Evaluate the existing regional centres documenting role, data types, and services offered with recommendations on best practises for local data management, metadata production, quality control, and on interfaces (e.g., OPeNDAP, FTP ...)
- Design and implement a static web portal developed for ECOOP
- Design the architectural plan for building the ECOOP DMS based on review of best practices (software patterns and design) for building a system
- Evaluate the metadata practices at regional centres (e.g., the metadata standards and profiles used, methods of metadata generation, and metadata catalogue systems).
- Design the architecture of the ECOOP metadata catalogue system to integrate all metadata from regional centres.
- Establish prototype of the ECOOP metadata catalogue system, including web-based search interface.
- Design of the ECOOP Data Management System architecture to include the climatological observation data sets
- Delivery of the interface between climatological compiling system and the ECOOP DMS.
- Design of the interface between the ECOOP Data Management System and EuroMISS in co-operation with WP8

S2.2.1 - Design and implement the ECOOP Data Management System appropriate for integrating all existing regional and coastal systems

- Evaluate the existing regional centres documenting role, data types, and services offered with recommendations on best practises for local data management, metadata production, quality control, and on interfaces (e.g., OPeNDAP, FTP ...)
- Design and implement a static web portal developed for ECOOP
- Design the architectural plan for building the ECOOP DMS based on review of best practices (software patterns and design) for building a system

S2.2.2 - Define the metadata-interface

- Evaluate the metadata practices at regional centres (e.g., the metadata standards and profiles used, methods of metadata generation, and metadata catalogue systems).
- Design the architecture of the ECOOP metadata catalogue system to integrate all metadata from

regional centres.
- Establish prototype of the ECOOP metadata catalogue system, including web-based search interface.

S2.2.3 - Implement protocols for quality assurance in the ECOOP data management system
To implement SW-modules designed for the ECOOP DMS to ensure a standard quality and documentation of the entire real time and near real time data.

S2.2.4 - Implement the access to selected climatologic observation data sets (from WP2.1)
Design and develop SW-interface.

S2.2.5 - Implement data interfaces with EuroMISS (WP8)
Design of the interface between the ECOOP Data Management System and EuroMISS in co-operation with WP8

T2.3 - Ensure proper and maximum real time delivery of remote sensing data

S2.3.1 - Design the in situ and remote sensing acquisition phase
This subtask is active for the first 10 months only

T2.4 - Quality assurance
- Identify the most suitable quality assurance protocols controlling the measurements, the data handling and transfer to be used in the ECOOP Data Management System
- Using the results from S2.4.1 of all suitable protocols a first common set of protocols will be agreed
- Define unique codes indicating the data quality

S2.4.1 - Identify the most suitable quality assurance protocols
This subtask is active for the first 12 months only

S2.4.2 - Define common QA-protocols for multi-disciplinary data, including unique codes indicating the data quality
Using the results from S2.4.1 all suitable protocols a first common set of protocols will be agreed.

T2.5 - Establish a pan-EU data base for river run-off
- Evaluate the river runoff data, regional and pan-European, including volume transport and nutrient/pollutant loads.
- Investigate the availability of both archived time series and data sources with near-real-time (NRT).
- Use as an important source of informationhe Global Runoff Data Centre (GRDC).
- Add additional information from the regional association memberships.
- Catalogue the information to be be available to coastal users.
- Establish an optimal list of observation stations for rivers influencing the coastal and regional seas (ECOOP River Station Lists).
- Define an optimal list of the initial NRT data sets for the “ECOOP Data Management System” .
- Clarify data policy issues within the various regions;
- Define data transfer procedures from data providers to the ECOOP DMS;
- Adopt data formats and procedures defined for the ECOOP DMS;
- Carify data exchange requirements in the regional associations;

- Initial tests of the data flow procedures on representative sources in each region.
- Contact identified data providers, both directly and through national members of the regional EuroGOOS associations, and initiate data delivery to the EDMS under the agreed terms.
- Identify a test provider able to provide NRT data early in the project period. Test the data acquisition and interfacing procedures (cf. subtask 2.5.2) on this data stream.

S2.5.1 - Assessment of existing river run-off data

- Evaluate the river runoff data, regional and pan-European, including volume transport and nutrient/pollutant loads.
- Investigate the availability of both archived time series and data sources with near-real-time (NRT).
- Use as an important source of information the Global Runoff Data Centre (GRDC).Add additional information from the regional association memberships.
- Catalogue the information to be available to coastal users.
- Establish an optimal list of observation stations for rivers influencing the coastal and regional seas (ECOOP River Station Lists).
- Define an optimal list of the initial NRT data sets for the „ECOOP Data Management System" .

S2.5.2 - Interfacing to ECOOP Data Management system

- clarify data policy issues within the various regions;
- define data transfer procedures from data providers to the EDMS;
- adopt data formats and procedures defined for the EDMS;
- clarify data exchange requirements in the regional associations;
- initial tests of the data flow procedures on representative sources in each region.

S2.5.3 - Implementation of initial data sets in ECOOP Data Management System

- Contact identified data providers, both directly and through national members of the regional EuroGOOS associations, and initiate data delivery to the EDMS under the agreed terms.
- Identify a test provider able to provide NRT data early in the project period. Test the data acquisition and interfacing procedures (cf. subtask 2.5.2) on this data stream.

T2.6 - Products and services

- Design of value added products of observational data (i.e. consistent data sets, gridded data, vertically layered data, sub-inertial currents for drift estimation, etc.)
- Implement real and near real time added value products to provide service to EuroMISS
- Evaluate the different systems used by the regional centres to sample large observational data sets
- At month 18th the different archiving systems will be under analysis

S2.6.1 - Definition and design of added value products

The definition and planning will be finished by month 12

S2.6.2 - Implement real and near real time added value products of observational data for EuroMISS (WP8)

- At month 18th the systems will be under development following the guidelines of S2.6.1

S2.6.3 - Design a system to archive the observational data for future use

- Evaluate the different systems used by the regional centres to sample large observational data

sets
- At month 18th the different archiving systems will be under analysis

Deliverables

D2.1.1.2 (Mo 18): Report on the inventories
D2.1.1.3 (Mo 12): Report on existing observation programs fitting the ECOOP objectives
D2.1.2.1 (Mo 18): Draft report on common practices/protocols for data transfer and access
D2.1.4.1 (Mo 18): Data interface for ECOOP version zero
D2.1.5.1 (Mo 18): Acquisition of existing climatologies
D2.2.2.2 (Mo 12): Report on the architecture of the ECOOP metadata catalogue system
D2.2.2.3 (Mo 15): Delivery of the ECOOP metadata catalogue system, including web-based search interface
D2.2.5.1 (Mo 16): Report on the architectures of both the ECOOP DMS and EuroMISS
D2.3.1.1 (Mo 10): Report on the design of the RT and NRT data satellite acquisition and delivery system for the TOP phase
D2.4.1.1 (Mo 12): Review of the most suitable quality assurance protocols
D2.4.2.1 (Mo 18): Report of the common QA-protocols to be used in the ECOOP DMS
D2.5.1.1 (Mo 12): ECOOP River Data Catalogues (five regional) as digital spreadsheets
D2.5.2.1 (Mo 12): ECOOP River Station Lists (five regional) as digital spreadsheets
D2.5.3.1 (Mo 18): Report on interfacing river runoff data to the ECOOP Data Management System
D2.6.1.1 (Mo 12): Report on designed added value products to be developed for EuroMISS

Milestones and expected result

WP2-M2 (Mo1): Subtask-leaders' meeting during the ECOOP-kick-off meeting
WP2-M5 (Mo6): Initial web pages for accessing existing inventories - Information on existing data acquisition and management systems
WP2-M10 (Mo7): Compilation of quality controls used in the regional centres
WP2-M12 (Mo9): Regional catalogues of all river stations collated and screened against ECOOP requirements ready.
WP2-M13 (Mo9): Deliverey of the static web portal
WP2-M19 (Mo12): Design on the architecture of the ECOOP metadata catalogue system
WP2-M24 (Mo12): Set of designs for added value products to be developed for EuroMISS
WP2-M30 (Mo15): Data interfacing procedures tested successfully for each region.
WP2-M31 (Mo15): Data interfacing procedures tested successfully for each region.
WP2-M34 (Mo16): Definition of unique codes for data quality
WP2-M35 (Mo16): Design of the interface between ECOOP DMS and EuroMISS
WP2-M38 (Mo18): Links with existing observational programs. Data exchange with non-ECOOP observational programs
WP2-M39 (Mo18): Design of the ECOOP observational program. Strategy and methodology for an integrated, multidisciplinary and multiplatform observational program
WP2-M41 (Mo18): Links with existing observational programs ñ Data exchange with non-ECOOP observational programs
WP2-M42 (Mo18): Design of the ECOOP observational program ñ Strategy and methodology for an integrated, multidisciplinary and multiplatform observational program.
WP2-M51 (Mo18): Beta-version on ECOOP-DMS SW for quality check

Workpackage number	**WP3**	**Start date or starting event:**					
Workpackage title: Better use of remote sensing and in-situ observing systems for coastal/regional seas							
Participant id	1	4	10	19	22	24	46
Person-months per participant:	4	11	20	11	7	3	12
Participant id	61	62					
Person-months per participant:	12	11					

Objectives

Objective of WP3 is to carry out R&D activities to improve the use of in-situ and remote sensing data for regional and coastal seas. Major limitations of remote sensing data in coastal regions are its temporal resolution and quality. The in-situ measurements can be used to validate and correct satellite measurements and to provide an improved temporal sampling of coastal areas. There is also a need to develop higher level merged in-situ and satellite products. These steps are generally necessary before the data are used for validation or assimilation.

WP3 is separated into three main tasks (altimetry, ocean colour and SST) :

- T3.1 - Optimal synergy between altimetry and tide gauge data
  The work will first consist in analyzing the consistency between altimeter and tide gauge data in the ECOOP regional/coastal seas. New absolute dynamic topography products in coastal regions will also be developed using GOCE data.
- T3.2 - Improved Ocean Colour algorithms and products for Case-II waters
  As part of this task, ocean colour algorithms and advanced techniques will be validated and tuned with in-situ data in two coastal regions: Bay of Biscay and Adriatic Sea. The objective of the task is to propose, for these two regions, quality assessed ocean colour products with an accuracy suitable for environmental analysis and inclusion in the context of ecological modelling.
- T3.3 - Improved Sea Surface Temperature products in coastal seas
  Satellite SST measurements are fundamentally important to coastal ocean forecasting and ecosystem assessment. Coastal areas have very large spatial variations of SST, very complicated coastal lines, prevailed upwelling events, etc which poses specific analysis problems. The objective of this task will be to improve the quality of SST R/S products in coastal seas using in-situ data.

Description of work

T3.1 - Optimal synergy between altimetry and tide gauge data
S3.1.1 - Optimal synergy between altimetry and tide gauge data

The work will first consist in analyzing the consistency between altimeter data sets and tide gauge data in the ECOOP regional/coastal seas. Altimeter products are less accurate close to the coasts due to aliasing of the high frequency signals and degradation of the altimeter measurements. On the other hand, coastal tide gauges provide long-term and very precise sea level measurements with high temporal resolution. The differences between altimetry and tide gauges will be characterised in terms of high frequency signals, tidal corrections, and other altimeter measurement errors. A good understanding of the characteristics of these differences (temporal and spatial scales) is required before merging the two data sets. In particular, it will be crucial to estimate how the tide gauge high frequency signals could be used to improve altimeter measurements. Development of merging

techniques will then be carried out. The work will consist in defining and adjusting the parameters of optimal interpolation techniques in coastal regions (e.g. covariance models taking into account coastal dynamics).

A specific work will also be carried out to develop new absolute dynamic topography products in coastal regions. Because of geoid uncertainties, altimetry provides only sea level anomaly data. GOCE satellite mission (2006) will provide very accurate geoid models that will have a major impact on the use of altimetry in regional seas. Improved high resolution mean dynamic topographies should thus be developed from GOCE and altimeter data for regional/coastal seas. This will require to:

d. Compute a mean sea surface (MSS = sea level relative to ellispoid) along the European coasts using in-situ observations (tide gauge data) and altimeter data.
e. Compute mean dynamic topography (MDT) (MSS minus GOCE geoid).
f. Analyze the impact of MDT on altimeter data use.

R&D activities will be focused on the Bay of Biscay (CLS, LEGOS, Puertos del Estado) and Black Sea (CLS, MHI).

T3.2 - Improved Ocean Colour algorithms and products for Case-II waters
S3.2.1 - Improved Ocean Colour algorithms and products for Case-II waters
The Adriatic Sea includes coastal and oligotrophic waters for which the ocean colour (OC) products are still affected by significant uncertainties. Recent developments in OC remote sensing techniques will be applied. These include an optically-based technique for merging optical data from various sensors to create a consistent time series with optimal space/time coverage, and a dynamic combination of bio-optical algorithms developed for specific water types (novelty detection technique) to derive products of higher accuracy. This effort will also benefit from the presence in the Adriatic Sea of one of the main existing validation sites for OC (the Acqua Alta Oceanographic Tower), where a comprehensive data set of (bio-)optical atmospheric and marine measurements has been collected by JRC since 1995. CNR has also collected a large database of bio-optical measurements in oligotrophic Mediterranean waters.

The Gulf of Biscay is a very dynamic zone, with interactions between shelf/slope waters and open Atlantic and the influence of coastal/riverine inputs, making for optically complex waters. The derivation of quality assessed OC products for the region will benefit from in situ data collected in regular monitoring programs and real-time data collection by a monitoring network, that allows merging in situ and RS products.

T3.3 - Improved Sea Surface Temperature products in coastal seas (links with GHRSST-PP).
S3.3.1 - Improved Sea Surface Temperature products in coastal seas (links with GHRSST-PP)
As part of this task, quality of existing products (e.g. from the GODAE High Resolution Sea Surface Pilot project, MERSEA, Medspiration) will be evaluated in selected coastal regions and new analyzed products that merge in-situ and remote sensing data will be developed. Activities will be focussed on the Gulf of Biscay, Adriatic Sea and in the Baltic-North Sea transition zone.

Deliverables

D3.1.1.1 (month 12)	Report on comparison between tide gauges and altimetry
D3.1.1.2 (month 18)	Report on the merging technique of tide gauges and altimetry
D3.1.1.3 (month 18)	New Mean Dynamic Topography for Black Sea and IBIROOS regions

D3.2.1.1 (month 9)	Report on comparison between R/S and in-situ data (Adriatic)
D3.2.1.2 (month 9)	Report on comparison between R/S and in-situ data (Gulf of Biscay)
D3.2.1.3 (month 18)	Report on multi-sensor merging and dynamic bio-optical algorithm selection (Adriatic Sea)
D3.2.1.4 (month 18)	Report on the merging technique between OC R/S and in-situ data (Gulf of Biscay)
D3.3.1.1 (month 9)	Report on comparison between SST R/S and in-situ data (Adriatic)
D3.3.1.2 (month 9)	Report on comparison between SST R/S and in-situ data (Gulf of Biscay)
D3.3.1.3 (month 9)	Report on comparison between SST R/S and in-situ data (Baltic Sea)
D3.3.1.4 (month 18)	Report on the merging technique between SST R/S and in-situ data (Adriatic Sea)
D3.3.1.5 (month 18)	Report on the merging technique between SST R/S and in-situ data (Gulf of Biscay)
D3.3.1.6 (month 18)	Report on the merging technique between SST R/S and in-situ data (Baltic Sea)

Milestones[1] and expected result

Month 18: Improved R/S data sets fully defined and ready to be implemented as part of WP2 activities in operational systems.

[1] Milestones are control points at which decisions are needed; for example concerning which of several technologies will be adopted as the basis for the next phase of the project.

Workpackage number	**WP4**	**Start date or starting event:**					
Workpackage title: Modelling and forecasting system assessment. Standards, quality, functions							
Participant id	1	2	8	9	10	37	39
Person-months per participant:	2,9	0,2	2,9	1,7	19	3,6	2,6
Participant id	42	56	68				
Person-months per participant:	1	6	0,5				

Objectives

WP4 - Modelling and forecasting system assessment. Standards, quality, functions

Objectives of the WP4 are:

- to evaluate existing forecasting activity in pan-European scale and to identify common standard;
- to establish validation criteria of multidisciplinary information products;
- to assess the quality of multidisciplinary information products;
- to identify research priorities for optimizing of the pan-European forecasting system.

T4.1 - Evaluation of nowcasting and forecasting activity in regional and coastal seas of Europe and establishing of common standards

- Compile inventory of ECOOP operational and preoperational activity in European regional and coastal seas and establish common standards
- Define the structure of inventory of ECOOP operational and preoperational activity in European regional and coastal seas and compile it.
- Establish common standards of the ECOOP regional and sub-regional systems

T4.2 - Establishment of validation criteria of multidisciplinary information products

- Select parameters, establish metrics and define common protocols of offline and online validation of regional and sub-regional products.
- To propose metrics and algorithms of model validations
- Formalize algorithms and procedures of model validation in the form of protocols
- To develop general principles of online model products validation and provide protocols of online validation at the selected regions or sub-regions

T4.3 - Evaluation of the quality of information products

- Evaluate the quality of selected products produced by regional and sub-regional systems
- To establish regional centres responsible for archiving quality controlled observations and making the data accessible for the partners.
- Carry out and evaluate validation of forecast products against the observations archived is the regional data centres according to the standards obtained in Task 4.2.
- Demonstrate on-line validation of regional products

T4.4 - Optimizing of the pan-European nowcasting and forecasting system

Recommend improvement of the pan-European nowcasting and forecasting system.

Identify systems which are below common standards, established by T4.1 and recommend their improvement

Identify models producing products which quality is below common validation standards, established by T4.2, T4.3 and recommend their improvement

Description of work

The set of multidisciplinary forecasting systems are established at the coastal and shelf seas of Europe within the framework of EC projects PAPA, MAMA, ARENA, MERSEA, MFSTEP,MOON, etc, national activity and coordinated under umbrella of such GOOS Regional Alliances as EuroGOOS, BOOS, NOOS, MOON, IBI ROOS, Black Sea GOOS,. The ongoing operational activity is considered as the basis for the development of common standards in the nomenclature of models, data assimilation procedures, products, observations for data assimilation, validation of product quality, etc. The WP4 activity during the first 18 months will consist of the assessment of the ongoing nowcasting and forecasting activity and establishing of common standards of multidisciplinary nowcasting and forecasting in European coastal and shelf seas. The WP4 activity will demand information about available coastal and shelf seas observing systems structure of WP1-3.

T4.1 - Evaluation of nowcasting and forecasting activity in regional and coastal seas of Europe and establishing of common standards

All activity in framework of Task 4.1 should be ended during ten months.

S4.1.1 - Compile inventory of ECOOP operational and preoperational activity in European regional and coastal seas (models, processes, atmospheric forcing, downscaling and links to the basin-scales, data assimilations, products)

The questioner about physical and geographic conditions of regions and sub-regions, models and products of regional and sub-regional systems will be prepared by the task team and distributed among regions and subregions. The inventory of the ECOOP operational and preoperational activity in European regional and coastal seas will be compiled based on the questioner replies.

S4.1.2 - Evaluate common standards of the nowcasting and forecasting activity.

This subtask will consider inventory of ECOOP operational and preoperational activity in European regional and coastal seas and establish the set of models, assimilation and validation procedures and products which could be considered as common standards. Possible gaps and overlapping of ongoing forecasting activity (atmospheric forecasting, validation data bases, etc) will be detected.

T4.2 - Establishment of validation criteria of multidisciplinary information products

Metrics, algorithms and protocols offline validation should be established.

S4.2.1 - Define common algorithms and procedures of model validation

Significant difference of physical and geographic conditions of regions and sub-regions provides difficulties for the definition of common metrics, algorithms and procedures of model validation. An experience of MERSEA, MFSTEP, ODON projects and other ongoing operational forecasting activity will be taken into account but adjusted for the validation of models of the ECOOP regional and sub-regional systems. Availability of offline and online validation data at every region and coastal sub-region should be taken into account using metadata base of WP2.

S4.2.2 - Establish common protocol to calculate standard validation criterions

Algorithms and procedures of model validation proposed by S4.2.1 should be formalized in the form of protocols for the routine application. Clear description of the model validation should be done for the application in T4.3.

T4.3 - Evaluation of the quality of information products

Validation data bases will be defined and implemented for each of the five regions. Coastal sub-

region participants should start generation of model products consistent with available observations from the validation data base. Dstributed data bases of simulation will be completed for the following validation of regional and sub-regional products.

S4.3.1 - Establish regional validation databases
This subtask will depend on and collaborate closely with WP2 (the ECOOP Data Management System; especially 2.2, 2.3, 2.4) as well as WP3. It will ensure that the EDMS (and consequently EuroMISS) is designed and developed to provide relevant and timely observational products for use in model and forecast validation. Important issues are: identification of relevant observational parameters based on the recommendations of Task 4.2, data formats and conversions routines, storage and retrieval of archived data, timeliness of NRT data for online validation, data transmission procedures to forecasting centres, quality control flagging. The result will be identified validation data sets readily accessible through the EDMS and procedures for interfacing them to the partners carrying out the validation.

T4.4 - Optimizing of the pan-European nowcasting and forecasting system
Selection of regional or sub-regional systems or their elements which are below common standards using evaluation of common standards for every region and sub-region carried out by the subtask 4.1.1. Development of recommendations to WP6 about improvement of selected systems to common standards.

S4.4.1 - Recommendations on improvement of regional forecasting systems content according to common standards
Selection of regional or sub-regional systems or their elements which are below common standards. Common standards for every region and sub-region evaluated by the subtask 4.1.1 will be used. Development of recommendations to WP6 about improvement of selected systems to common standards.

Deliverables

D4.1.2.1 (Mo 12): Common standards of ongoing forecasting activity, gaps and overlapping
D4.2.2.1 (Mo 16): Common protocol to calculate standard validation criterions
D4.3.1.1 (Mo 16): Establish regional validation databases
D4.4.1.1 (Mo 16): Recommendations (to WP6) of regional forecasting systems improvement according to common standards

Milestones and expected result

Workpackage number	WP5	Start date or starting event:	
Workpackage title: Integration of modelling and forecasting systems (baseline system)			

Participant id	1	2	3	4	6	7	8
Person-months per participant:	2	4,5	12	6,5	5	3	13
Participant id	9	10	11	31	34	35	37
Person-months per participant:	4	23	2	3,6	2	4	12
Participant id	39	42	45	46	53	56	61
Person-months per participant:	2,2	5	5	9	6	4,5	2
Participant id	63	64	65	66	68	69	71
Person-months per participant:	10	12	1	3	3	80	7

Objectives

WP5 - Integration of modelling and forecasting systems (baseline system)

1. Integrate each system : MERSEA-regional-3 coastal systems into a unique integrated regional -GOOS (BOOS, NOOS, IBIROOS, MOON, Black Sea GOOS) system through downscaling
2. Upgrade/develop systems in physics, downscaling, data assimilation or ecosystem to be ready for real time experiment
3. run a real time experiment for each of the 5 integrated regional system over a 6 months period (TOP experiment)

T5.1 - Overall assessment of MERSEA/ECOOP coupled systems

Assessment and upgrade of MERSEA and ECOOP operational coupling.

T5.2 - Regional Baltic integrated system

- To build up an integrated physical-ecological forecasting system for the Baltic Sea and 3 targeted coastal areas.
- To build up Baltic physical-ecological forecasting capacity and run the forecasting system in TOP experiment.
- Implement 2-way nesting of coastal system into the Baltic regional system
- Adopt physical-biochemical model to North Sea-Baltic transition zone.
- Downscaling of transport model to coastal system
- Generate boundary data for transition zone model system (spm bottom distribution, river input etc.)
- Test and validate the physical-biochemical model
- Run the coupled physical-biochemical model (3-0.5nm resolution) in TOP experiment.*)*

T5.3 - Regional North West shelf integrated system

- The objective of this task is to consolidate existing coupled physical-biogeochemical coastal modelling systems in the NOOS region and embed them into the regional nowcast-forecast modelling system, provide connection to EuroMISS and demonstration in the target operational period TOP. Three target domains are considered: the southern North Sea, including transports through the straits of Dover, the Liverpool Bay coastal observatory system, and the western English Channel and Plymouth Sound modelling system.

T5.4 - Regional Iberia-Biscay-Ireland (IBI) integrated system

- The objectives of this task are to build the baseline integrated IBIROOS system made up of a

regional and 3 coastal systems: the Irish shelf system, the bay of Biscay and Western channel system and the Iberian coastal system, enhance this integrated system by upgrading individual parts of it and provide connections to EuroMISS and demonstration in a target operational period TOP.

T5.5 - Regional Mediterranean integrated system

- The objectives of this task are to build the baseline integrated MOON system made up of a regional, sub-regional systems covering the whole Mediterranean sea and several coastal systems, enhance this integrated system by upgrading individual parts of it and provide connections to EuroMISS and demonstration in a target operational period TOP.
- To downscale and upgrade of targeted demonstration coastal areas in the Western Mediterranean sea:
- Northwestern Mediterranean, Balearic Shelf area and Gulf of Lions.
- To downscale and upgrade of targeted demonstration coastal areas in the Central Mediterranean sea:
- Adriatic Sea, Malta Shelf area and Sicily Channel.
- To downscale and upgrade of targeted demonstration coastal areas in the Eastern Mediterranean sea:
- Aegean Sea, Aegean and Levantine Sea, Southeastern and Northern Levantine shelf and Cyprus Sea area.

T5.6 - Regional Black Sea integrated system

- The objectives of this task are to build the baseline integrated Black Sea GOOS system made up of a regional and 3 coastal systems: the North Western shelf system, the Bosphorus and Western shelf system and the South coast of Crimea and North East Black sea system, enhance this integrated system by upgrading individual parts of it and provide connections to EuroMISS and demonstration in a target operational period TOP.
- Integrate the Black Sea North-Western shelf sub-system to the ECOOP environment
- Integrate the Black Sea Bosphorus and Western shelf sub-system to the ECOOP environment
- Integrate the South coast of Crimea, North East Black sea sub-system to the ECOOP environment

Description of work

For the first 18 months of the project, it is planned :

A. for each intergrated regional system

- to integrate MERSEA- regional - 3 shelf/coastal systems -local systems (if any) into a unique system: V0
- to ensure coordination with current developments made in WP6

B. for each regional system:

- to nest regional system to MERSEA global system
- to provide initial and boundary conditions (IC and BC) to 3 coastal systems
- to start upgrades in regional system (in physics, downscaling, data assimilation and ecosystem)
- to provide information for assessement of V0 to WP4
- to use formats required by WP8 and WP9 if defined

C. for each shelf/coastal areas

- to use IC and BC provided by regional systems

- to start upgrades in coastal system (in physics, downscaling, assimilation, ecosystem)
- to provide information for assessment of V0 to WP4
- to use formats required by WP8 and WP9 if defined

T5.1 - Overall assessment of MERSEA/ECOOP coupled systems

S5.1.1 - Overall assessment of MERSEA/ECOOP coupled systems

During the first year of this task, the assessment and plan of improvements for MERSEA and ECOOP coupling will be done and the plan for the TOP period will be defined.

T5.2 - Regional Baltic integrated system

S5.2.1 - Regional system capacity and TOP experiment

The purpose of this subtask is to build up a ECOOP Baltic regional forecasting system V1 and V2 based on existing systems (Baltic system V0). The Baltic regional system will be a model system of BSH, DMI and SMHI for the Baltic Sea. The system will have a horizontal resolution of 3nm for Baltic-North Sea. The system is made up of the circulation model BSHcmod (currently running at BSH and DMI), an ecological model based on ECOHAM (Ecological Model of Hamburg University running at BSH) and ERGOM (Institute of Baltic Sea Research, Warnemünde), the SPM transport model BSHdmod.E and a wave model WAM (DMI).

The Baltic regional system V1 only includes coupled, two-way nested physical-ecological model, with data assimilation for physical parameters. For V2 the system will be upgraded into a coupled physical-ecological-SPM-wave model. The Baltic system V1 will run operationally in the TOP experiment. This subtask includes following sub-subtasks:

5.2.1.1 Identify Baltic regional system V0 (DMI, BSH, SMHI)
5.2.1.2 Build up Baltic regional system V1 by extending existing BSHcmod-ECOHAM to the Baltic Sea (BSH, DMI)
5.2.1.3 Parallelisation of Baltic regional system V1 (DMI, BSH, SMHI)
5.2.1.4 Test and calibrate Baltic regional system V1 (DMI, BSH, SMHI)
5.2.1.5 Operational run of Ba,ltic regional system V1 in TOP (DMI)
5.2.1.6 Validate Baltic regional system V1 in TOP (DMI)
5.2.1.7 Couple wave model and BSH SPM with Baltic regional system V1 (BSH, DMI)
5.2.1.8 Data assimilation of water level (SMHI, DMI)

Due to the limited budget for this task, major contributions will come from institutional level.
This subtask will focus on 4 first points during the first 18 months.

S5.2.2 - Downscaling and upgrades of targeted demonstration coastal areas (Baltic-North Sea transition zone)

In this task a coastal model system of BSH, DMI and SMHI for the Baltic-North Sea transition zone ('Danish Straits') will be connected to the regional Baltic model system (Task 5.2.1). The coastal system will have a horizontal resolution of 0.5nm and will be interactively nested into the Baltic regional system. The system is made up of the circulation model BSHcmod, an ecological model based on ECOHAM (Ecological Model of Hamburg University running at BSH) and ERGOM (Institute of Baltic Sea Research, Warnemünde), the spm transport model BSHdmod.E and a wave model.

For version V1 the ecological model has to be adapted to the Baltic-North Sea transition zone and coupled to the circulation model, for V2 the system will be upgraded with developments from WP6 (integration of wave and spm transport modelling as well as physical ocean data assimilation).
The 18 first month of the project will focus on:

- Implement 2-way nesting of coastal system into the Baltic regional system

- Adopt physical-biochemical model to North Sea - Baltic transition zone
- Generate 0.5nm resolution boundary data (spm bottom distribution, river input etc.)
- Test and validate the physical-biochemical model

S5.2.3 - Downscaling and upgrades of targeted demonstration coastal areas (South East Baltic sea)

S5.2.4 - Downscaling and upgrades of targeted demonstration coastal areas (Gulf of Finland)

The Gulf of Finland is already covered with existing Finnish operational wave, water level and 3d physical-biological models (cf. www.balticseaportal.fi). The Gulf of Finland poses specific challenges to ECOOP through the large freshwater forcing from the river Neva at St. Petersburg, and the scattered archipelago on the northern shore of the Gulf, which requires high resolution and advanced modelling. In this task, a selection of existing models will be made more fine-scale, and coupled upscale to the ECOOP large scale systems.

Following development in WP6, a coupling downscale is implemented to better resolve estuarine and coastal processes that govern the transformation of land-based fluxes into off-shore concentrations. A real-time runoff forecast interface will be implemented to couple the catchment-resolving runoff forecasts to the operational ocean model.

Special attention is given to the appropriate provision of relevant information to applications, such as oil combating, search and rescue, as well as eutrophication problems (e.g. planktonic blooms) in the interface are between the sea and the society, ie. the coastal zone. The resulting system will be uniquely well-connected to the needs of the society when it comes to both the impacts and responses.

In first part of the project, a selection of existing models will be made more fine-scale, and coupled upscale to the ECOOP large scale systems.

T5.3 - Regional North West shelf integrated system

S5.3.1 - Regional system capacity and TOP experiment

This activity co-ordinates and oversees the development of the regional modelling capacity (POLCOMS-ERSEM) providing the necessary downscaling for the three coastal systems.

The regional modelling system will be upgraded in capacity, with inputs from WP6 as well as from national developments. Particular attention will be paid to the water column optical properties, and improved treatment of sediment distribution and resuspension.

S5.3.2 - Downscaling and upgrades of targeted demonstration coastal areas (Southern North Sea to Skagerrak)

In this task the coastal systems of BSH and MUMM will be connected to the regional model system, and the performance of the regional model in the central and northern North Sea (for providing boundary conditions) will be assessed through comparison with the model of met.no.

The coastal model system is made up of the BSH Cmod + EcoHAM model, at 0.5 nautical mile reoslution for the German Bight, and the MUMM MIRO&CO modelling system for the Dover Straits and Southern North Sea

For V1 the coastal system will be nested into the regional model, for V2 the system will be upgraded with developments from WP6.

In the first 18 months version 1 of the Southern North Sea and German Bight coastal models will be nested within the POLCOMS-ERSEM regional model. Data transfer between the model systems will be defined in terms of spatio-temporal characteristics and state variables. Model performance will be tested and compared with version 0 (using original boundary data) of the coastal models.

S5.3.3 - Downscaling and upgrades of targeted demonstration coastal areas (Liverpool bay observatory)

The one nautical mile Irish Sea polcoms-ersem model will be enhanced by the interaction of sediments and surface waves. The Irish sea model will be fully nested into the regional MRCS modelling system.

S5.3.4 - Downscaling and upgrades of targeted demonstration coastal areas (Western channel)

In the first 18 months the Western English Channel POLCOMS-ERSEM model developed at Plymouth Marine Laboratory will be upgraded in resolution and nested into the regional MRCS model, and an existing coastal 500m grid model of Plymouth Sound will be established in nowcast mode, nested into the western channel model.
This defines V1 for the TOP demonstration and evaluation.

T5.4 - Regional Iberia-Biscay-Ireland (IBI) integrated system

S5.4.1 - Regional system capacity and TOP experiment

Mercator and Puertos del Estado (or the Spanish operational project ESEOO-2) run 2 regional systems of the IBIROOS area and start to develop together an upgrade version that extends from North of Ireland to the Canary Islands on the Atlantic side with higher horizontal resolution and adapted atmospheric forcings and assimilation. One or the other system will be used in this task to ensure link with MERSEA on one side and with coastal systems on the other side. Developments dealing with downscaling and high frequency will also be done. This task can be divided into 2 parts:
A. Preparation, upgrading and running of the integrated IBIROOS regional system
Leader: Mercator, partner: Puertos del Estado

1. nest regional IBIROOS system to MERSEA global system
2. provide initial and boundary conditions to the 3 coastal systems of the area
3. provide information for assessment to WP4 and ensure link between WP4 and coastal systems
4. use formats required by EuroMISS (WP8) and provide information to coastal systems
5. Integrate MERSEA - regional IBIROOS- 3 coastal systems into a unique system -system version V0
6. improve downscaling between MERSEA and regional IBIROOS system
7. follow developments done in WP6

B. Improvements and upgrades of systems by adding high frequency (atmospheric forcing, tides). Application to the IBI regional system and to the Iberian coastal system
Leader: Puertos del Estado; partners: Mercator, POC, IST, MeteoGalicia
The improvements of employing high frequency forcing in regional circulation modelling will be explored by improving 2 of the main forcings: the atmospheric fields and the sea surface elevation open boundary conditions. For the last one, output from the existing sea level forecasting systems (MOG2D and Nivmar) will be employed. Results of these high frequency systems will be used to provide the barotropic component of sea surface elevation. This field will be used as boundary conditions for the regional circulation application by means of a sponge layer, improving the response of the sea level in the regional model (i.e. better representation of the inverse barometer effect) and damping the presence of barotropic clamped waves. On a second step, the regional system obtained will provide initial and boundary conditions (including sea surface elevation) to the coastal Iberian system, which itself will use high frequency atmospheric forcings. The downscaling between these 2 systems will have to be adapted to the high frequency. Validation and assessment of upgrades (in comparison with no high frequency) will be done for both the regional and the coastal systems. (The leader gets most of money and will do the job considering interest of all other partners. Small budget is allowed to other partners mainly for travel).

S5.4.2 - Downscaling and upgrades of targeted demonstration coastal areas (Iberian coastal area)

A. Prepare, upgrade and run the coastal Iberian system

Upgrades of the existing model will be to:

1. use IC and BC provided by regional IBIROOS system
2. provide information for assessment to WP4
3. use formats required by WP8
4. upgrade coastal system in assimilation: the aim here is to introduce sub-regional to local (coastal) scale observations into the predicted wind-current fields. This requires a two-way nesting of prediction models and a breakthrough in conventional variational techniques of assimilation. The initial approach will be based on reduced-order Kalman filtering as it is employed for a regional-scale assimilation. In the framework of this task the MOHID code will be adapted to allow the model to be run in the super-computer facilities that the partner MeteoGalicia has access.
5. upgrade of run-offs: the role of rivers run-off on the coastal systems will be underlined. Particular attention will be paid to the 3D structure of river discharge as some rivers can produce stratification near to the coast.
6. upgrade in atmospheric forcings: the high horizontal resolution of the current model will require high resolution meteorological boundary conditions. As the horizontal and vertical resolution of the meteorological models increase, boundary layer parametrization, micro-physics, subgrid scale flues, radiative fluxes, convective clouds and precipitation parametrizations must be adjusted, if not modified, to describe correctly these new phenomena and to adequately force the coastal oceanographic models.
7. follow and use (if request) developments done in WP6

B. Improving the downscaling methodology

Traditionally, off-line downscaling is done by interpolating the results from the lower resolution model to the grid with the higher resolution. The open boundary is then defined considering a Flow Relaxation Scheme or a radiation scheme, or both. This way it is possible to dissipate or/and radiate higher frequency processes not considered in the large scale solution. The initial condition is also defined from the large scale fields interpolated directly for the high resolution grid. However, this methodology must be implemented carefully. To avoid spurious oscillations it is necessary to have a spin-up where the forcing terms are slowly connected. An alternative methodology will be tested in this task. In this methodology, the interpolated fields obey to specific constraints, namely, mass conservation. In this way, the dynamic inconsistencies between the interpolated variables (S, T, U, V and h) are minimized. In this task, the VIFOP tool (Variational Initialization and Forcing Platform) that guides the user along the process of downscaling low resolution solutions off-line will be tested. Another activity to be developed (between month 18 and 36) will be improving the statistical consistency of the interpolation/extrapolation methods based on process convolutions.

S5.4.3 - Downscaling and upgrades of targeted demonstration coastal areas (Gulf of Biscay and Western channel)

The existing model of the Bay of Biscay and English Channel will be upgraded to use a finer horizontal resolution of 1 km and to assimilate temperature and salinity (satellite and in situ) data. It will also be used for HAB applications developed in WP6.

Detailed developments and upgrades proposed are:

1. use IC and BC provided by regional IBIROOS system and tidal boundary conditions from MOG2D
2. provide information for assessement to WP4
3. use formats required by WP8

4. upgrade coastal model in horizontal resolution
5. upgrade coastal model in assimilation: a sequential assimilation procedure will be implemented for SST. Moreover, CTD instruments will be deployed in the Bay of Biscay during the next years and will provide, on weekly to daily basis, several CTD casts on the continental shelf. An assessment of sequential assimilation technique will be started for assimilation of these hydrological (salinity and temperature) 3D data and those available from WP2
6. follow and use (if request) developments done in WP6

S5.4.4 - Downscaling and upgrades of targeted demonstration coastal areas (Irish shelf)

For this subtask IMI will use initial and boundary conditions from the regional IBI-ROOS system (Mercator) to force the Irish shelf ROMS physical and ecosystem model. Irish Shelf output will in turn be used to provide boundary conditions to local bay scale models for key bays along Ireland's west coast: namely Killary Harbour and Galway Bay. IMI houses extensive in-situ data sets for the Irish shelf region and for the specific bays we hope to downscale to. Therefore, extensive validation of the downscaled model will be a core element of this subtask. Validation will be undertaken with appropriate reference to the algorithms developed in WP 4.2.

Moreover the Irish shelf system will:

1. provide information for assessment to WP4
2. use formats required by WP8
3. follow and use (if request) developments done in WP6

T5.5 - Regional Mediterranean integrated system

S5.5.1 - Regional system capacity and TOP experiment

Mediterranean regional system

- Provide IC and BC to 3 sub-regional/coastal system
- Provide information for assessment and validation in WP4
- Use formats required by EuroMISS (WP8) and by applications in EuroDESS (WP9)

Integrated regional system

- integrate MERSEA-regional-shelf/coastal systems- local systems (if any) into a unique system: V0
- begin to upgrade integrated system according to upgrades done for individual sub-regional and coastal systems. Need be ready for V1

S5.5.2 - Downscaling and upgrades of targeted demonstration coastal areas (Western Mediterranean sea)

All coastal and shelf systems included in this subtask will:

Take all necessary steps to reach V1:

Increase horizontal resolution

Implement assimilation scheme

- Use IC and BC from the regional Mediterranean system in order to be nested in MERSEA
- Harmonise their outputs to meet EuroMISS (WP8) and EuroDESS (WP9) requirements
- Perform a TOP experiment T0+21 T0+27 (according to the Mediterranean regional system) assimilating satellite (SLA,SST) and in-situ observations
- Provide their forecasting products to WP4 for validation

Description of systems (versions V0 & V1)

Subregional: Northwestern Mediterranean Sea model (CNRS-POC)

Model: SYMPHONIE

Forecast release: weekly 5 days forecast (V0), daily 5 days forecast (V1)
Resolution: 3km (V0), 2km (V1)
Downscaling: VIFOP (V1), VIFOP + hybrid restart procedure (V1)
Data assimilation: SOFA (V1)
Shelf system: Balearic Sea area (CSIC-IMEDEA)
Model: IMEDEA
Forecast release: weekly 5 days forecast (V0), daily 5 days forecast (V1)
Resolution: 3km (V0), 1km (V1)
Downscaling: one-way nesting
Data assimilation: objective analysis (V1)
Shelf system: Gulf of Lions (IFREMER)
Model: MARS3D
Forecast release: daily 5 days forecast (V1)
Resolution: 0.7km (V1)
Downscaling: one-way nesting
Data assimilation: sequential Ensemble Kalman Filter (V1)

S5.5.3 - Downscaling and upgrades of targeted demonstration coastal areas (Central Mediterranean sea)

All sub-regional and shelf systems included in this subtask will start in the first 18 months to:

- Take all necessary steps to reach V1:
  - Increase horizontal resolution
  - Implement assimilation scheme
  - Implement variational initialization method (VIFOP)
- Use IC and BC from the regional Mediterranean system in order to be nested in MERSEA.
- Harmonise their outputs to meet EuroMISS (WP8) and EuroDESS (WP9) requirements.
- Perform a TOP experiment T0+21 à T0+27 (according to the Mediterranean regional system) assimilating satellite (SLA, SST) and in-situ observations
- Provide their forecasting products to WP4 for validation

Description of systems (versions V0 & V1)
Sub-regional: Sicily Channel Regional model – IMC
Model: POM
Forecast release: daily 5 days forecast (V0)
Resolution: 3,5 km (1/32°) (V0) à 2 km (V1)
Downscaling: VIFOP (V1)
Data assimilation: SOFA (V1)
Shelf system: Malta coastal area– ROSARIO (Univ. of Malta)
Model: POM
Forecast release: weekly 5 days forecast (V0)à daily 5 days forecast (V1)
Resolution: 1,1 km (1/64°) (V0) à 0,7 km (V1)
Downscaling: VIFOP (V1)
Data assimilation: SOFA (V1)
Sub-regional: Adriatic Sea - ADRICOSM (INGV)
Model: POM
Forecast release: weekly 7 days forecast (V0)à daily 7 days forecast (V1)
Resolution: 5 km (V0) à 2 km (V1)
Downscaling: open ocean advance O.B.C. (V1)
Data assimilation: SOFA (V1)

S5.5.4 - Downscaling and upgrades of targeted demonstration coastal areas (Eastern Mediterranean sea)

All coastal and shelf systems included in this subtask will:

- Take all necessary steps to reach V1:
  - Increase horizontal resolution
  - Implement assimilation scheme
  - Implement variational initialization method (VIFOP)
- Use IC and BC from the regional Mediterranean system in order to be nested in MERSEA.
- Harmonise their outputs to meet EuroMISS (WP8) and EuroDESS (WP9) requirements.
- Perform a TOP experiment T0+21 à T0+27 (according to the Mediterranean regional system) assimilating satellite (SLA, SST) and in-situ observations
- Provide their forecasting products to WP4 for validation

Description of systems (versions V0 & V1)
Coastal system: Aegean Sea – POSEIDON (HCMR)
Model: POM
Resolution: 5.4 km (V0) à 3.6 km (V1)
Downscaling: VIFOP (V1)
Data assimilation: SEEK filter (V1)
Coastal system: Aegean & Levantine Sea – ALERMO (Univ. Athens)
Model: POM
Resolution: 3.6 km (V0) à 2 km (V1)
Downscaling: VIFOP (V0)
Data assimilation: O.I (V1)
Shelf system: Cyprus sea area - CYCOFOS (OC-UCY)
Model: POM
Resolution: 1.5 km (V0) à 1 km (V1)
Downscaling: VIFOP (V1)
Data assimilation: SOFA (V1)
Shelf system: Southeastern Levantine shelf (IOLR)
Model: POM
Resolution: 1.25 km (V0) à 0.5 km (V1)
Downscaling: VIFOP (V1)
Data assimilation: SOFA (V1)
Shelf system: Northern Levantine Shelf (IMS - METU)
Model: POM
Resolution: 1.35 km Cilician Basin (V0) à enlarged area: 1.0 km Northern Levantine (V1)
Downscaling: VIFOP (V1)
Data assimilation: SOFA (V1)

T5.6 - Regional Black Sea integrated system

S5.6.1 - Regional system capacity and TOP experiment

Define and upgrade the Black Sea regional system, fulfill its real time operation and provide proper data for the links with EuroMISS
During the 18 first months, it will be done: assessment of the basin-scale system, provision of proper data for the link with the EuroMISS and upgrade of the downscaling

S5.6.2 - Downscaling and upgrades of targeted demonstration coastal areas (North Western shelf system)

Define and upgrade the Black Sea North-Western shelf sub-system and its link with the regional system, fulfill real time operation and provide proper data for the links with EuroMISS
During the first 18 months, it will be done: assessment of the Black Sea North-Western shelf sub-system, extension of the current region of operation, upgrade of the downscaling and provision of proper data for the link with the EuroMISS

S5.6.3 - Downscaling and upgrades of targeted demonstration coastal areas (Bosphorus and Western shelf system)
Define and upgrade the Black Sea Bosphorus and Western shelf sub-system and its link with the regional system, fulfill real time operation and provide proper data for the links with EuroMISS
During the first 18 months, it will be done: assessment of the Black Sea Bosphorus and Western shelf sub-system, extension of the current region of operation, upgrade of the downscaling and provision of proper data for the link with the EuroMISS

S5.6.4 - Downscaling and upgrades of targeted demonstration coastal areas (South coast of Crimea, North East Black sea)
Define and upgrade the South coast of Crimea, North East Black sea sub-system and its link with the regional system, fulfill real time operation and provide proper data for the links with EuroMISS
During the first 18 months, it will be done: assessment of the South coast of Crimea, North East Black sea sub-system, extension of the current region of operation, upgrade of the downscaling and provision of proper data for the link with the EuroMISS

Deliverables

D5.1.1.1 (Mo 18): Assessment and plan for improvements for MERSEA and ECOOP coupling
D5.1.1.2 (Mo 18): Plan for the TOP
D5.2.3.1 (Mo 18): Baseline integrated BOOS system V0: the South-East Baltic sea including the gulf of Riga system
D5.3.2.1 (Mo 18): Report on performance of v1 coastal models (NOOS system: the Southern North Sea to Skagerrak)

Milestones and expected result

WP5-M52 (Mo18): Completed integration of Version 1 Southern North Sea coastal model systems in regional model

Workpackage number	WP6	Start date or starting event:	
Workpackage title: System development (downscaling, data assimilation, eco-modelling)			

Participant id	1	2	3	4	6	8	9
Person-months per participant:	0,2	1	8	2,3	1,5	0,2	0,8
Participant id	10	11	12	17	23	37	39
Person-months per participant:	9	0,7	4	2,3	1,3	3,2	0,5
Participant id	42	45	57	58	61	63	66
Person-months per participant:	3	1	6	1,8	4,5	2,2	0,5

Objectives

WP6 - System development (downscaling, data assimilation, eco-modelling)

a) Progressively develop and implement modelling elements required for individual system advancement on the baseline systems of WP5, according to the priorities identified in WP4 and WP5 to reach V2 guided by the requirements of the decision support system (WP9), and available data streams (WP2)
b) Harmonise revised model outputs with EuroMISS (WP8) and EuroDESS (WP9).
c) Test each implementation in a TOP hindcast study
d) Evaluate (where appropriate) improvement to baseline system

T6.1 - Implementation of system developments

- Improve each coastal system above the level achieved in WP5
- To develop Baltic coastal systems Version 1 into Version 2 for the 3 targeted coastal areas: Baltic-North Sea transition zone, SE Baltic Sea and Gulf of Finland.
- Enhance the three coastal systems as follows
  1) North Sea: add sediment processes, assimilate SST, T/S profiles, sea level, CDOM
  2) Liverpool Bay: downscale system (1nm to 0.2nm), assimilate HF radar currents
  3) Western English Channel: add wave and sediment processes, assimilate ocean colour
- Implement HAB prediction scheme
- Enhance the three systems as follows
  1) downscaling techniques between 2 hydrodynamic models
  2) add ecosystem processes: have the correct horizontal and vertical scales as well as advection scheme to be able to predict correctly HAB assimilation of new type of data available near to the coast
- Enhance the three systems as follows
  1) Coupling the V1 MOON coastal models with an ecosystem model implement the data assimilation technique suited for biogeochemical properties
- Enhance the three systems as follows
  1) assimilate altimetry, SST, ocean colour
  2) add ecosystem processes, assimilate altimetry, SST, ocean colour
  3) add ecosystem processes, assimilate altimetry, SST, ocean colour

T6.2 - System developments

- Improved coastal forecast systems (V2) over the level achieved in WP5 (V1)
- Downscale in Danish Straits transition zone, Liverpool Bay, and the Iberian coastal regions
- Produce library of open boundary conditions and flooding-drying treatment
- Couple wave models into the NW shelf systems

- Couple models to real-time river runoff (where available)
- Implement appropriate ecosystem modules or improvements to existing ecosystem modules
- Implement HAB prediction scheme
- implement ecosystem modules or enhance existing ecosystem modules
- construct a library of assimilation schemes

T6.3 - Validation of developments
Demonstrate the improvements to the system over the baseline systems, V1

Description of work

Develop the base line modelling and forecasting systems (WP5, V1) to the operational level expected at the end of ECOOP (V2) which will provide inputs to all aspects of the Decision Support System (EuroDESS, WP9). This will build on the system assessments (WP4) to add components to individual systems as prioritised. By the end of ECOOP all systems should have advanced (to V2) beyond the base line implementation (V1), demonstrated in the TOP of WP5, to include the fundamental components required to meet the local forecasting requirements identified by WP2 and WP9.

T6.1 - Implementation of system developments
Begin the region-by-region coastal system enhancements described in subtask 6.1.1 to move from V1 (of WP5) to V2.

S6.1.1 - Baltic regional coastal systems
This subtask will focus on the implementation of a coupled physical-ecological-sediment-wave model for all the 3 targeted areas.

S6.1.2 - NW Shelf coastal systems
Begin implementation of enhancements to the three coastal systems: 1) North Sea 2) Liverpool Bay 3) Western English Channel

S6.1.3 - Irish and Iberian Atlantic coastal systems
Begin the implementation of enhancements to the three coastal systems: 1) Coastal Irish shelf 2) Coastal Biscay shelf 3) Coastal Iberian shelf

S6.1.4 - Mediterranean coastal systems
In the first 18 months activities will be devoted to the implementation of the first version of the V2 Moon systems, for the execution of the preliminary test simulations

S6.1.5 - Black Sea coastal systems
Begin the implementation of enhancements to the three coastal systems: 1) Bosphorus and Bulgarian coast 2) Romanian coast and NW shelf 3)Crimean coast and south-eastern Black Sea

T6.2 - System developments
Begin the development of system enhancements

S6.2.1 - Downscaling
This subtask will 1) Obtain appropriate resolution bathymetry (down to the resolution 0.2km) 2)

Establish new sub-domains, better accounting for inter-tidal areas where present 3) Ensure downscaling methodology adheres to specific constraints

S6.2.2 - Additional physical processes

This subtask will 1) Introduce wave-current interaction into several coastal systems. 2) Provide an interface with real-time river runoff.

S6.2.3 - Ecosystem function

Begin to 1)Identify the key local physical and biogeochemical processes of potential importance to prediction of eutrophication, oxygen depletion, HABs and their consequences and descriptions in models. 2)Implement community sediment/ecosystem models as necessary in order to reach the same standard in ECOOP core areas. 3)Investigate the most appropriate method (e.g. fuzzy logic routines, specialized functional groups) to make forecasts of both HAB type and probability.

S6.2.4 - Data Assimilation

This subtask will build in part on existing activities in MFSTEP and MERSEA, where different assimilation routines are implemented in different areas, e.g. SEEK in Eastern Mediterranean, EnKF/SEEK in the NW Shelf, OI/EnKF in the Baltic and Black Sea. Identify appropriate assimilation schemes for individual system dependent on data availability e.g. from remote sensing (satellite, radar) or in-situ (moorings, coastal stations, ferries).

Deliverables

Milestones and expected result

Workpackage number	**WP7**	**Start date or starting event:**					
Workpackage title: Synergy between coastal forecasting and newly available data and methodologies (a step towards next generation forecasting							
Participant id	1	2	3	4	11	12	14
Person-months per participant:	1,2	0,7	1,4	1	1,1	18	5,5
Participant id	16	22	30	31	36	39	40
Person-months per participant:	5,5	2	5	1,5	2,5	0,6	4,5
Participant id	45	46	47	52	54	56	57
Person-months per participant:	1	6	1,6	5,8	2	0,5	8
Participant id	59	61	64	65			
Person-months per participant:	7,8	0,3	6	1			

Objectives

WP7 - Synergy between coastal forecasting and newly available data and methodologies (a step towards next generation forecasting systems)

The general objectives of this WP are:

- Enhancing the exploitation of newly available data in order to improve the quality of coastal ocean forecasting.
- Supporting the integration and consolidation of a pan-European network of observation.
- Enhancing the cooperation between scientific communities working in near coastal ocean and community of operational oceanographers downscaling their models to coastal scales.

The specific objectives are:

- To address scientific questions associated with the high resolution modelling in the near coastal area and demonstrate improved coastal forecasting models.
- To build up pre-operational systems for near coastal ocean.
- To provide improved forecast of ocean turbulence, which controls stratification, mixed layer depth and pycnocline depth, as well as transport of mater (biological and sediment) in the European coastal zone.
- To develop improved pre-operational sediment transport models and related benthic-pelagic modelling.
- (5) To improve the quality of estimates on estuary-coast-offshore interaction based on modelling and data assimilation.
- (6) To provide a design for the next generation observing system, including: hardware, software, quality assurance, sampling strategies.
- (7) To provide an up-to date oceanographic component needed by the coastal engineering.
- (8) To provide up-to date knowledge needed to understand the functioning of ocean margins.
- (9) To demonstrate the value of super-ensemble forecasting for shelf areas

Research progress from WP7 will be used in improving the ECOOP forecasting systems.

T7.1 - The observing systems

- Define new strategies and technologies for a multi-purpose, multi-disciplinary, multi-platform integrated shelf-costal observing system.
- Review existing technologies and sampling strategies

T7.2 - Near coastal models

- Address scientific questions associated with the high resolution modelling in the near coastal area and demonstrate improved coastal forecasting models.
- Build up pre-operational systems for near coastal ocean.
- Provide improved forecast of ocean turbulence, which controls stratification, mixed layer depth and pycnocline depth, as well as transport of mater (biological and sediment) in the European coastal zone.
- Improve the quality of estimates on estuary-coast-offshore interaction based on modelling and data assimilation.
- Advance coastal forecasting by developing and implementing advanced unstructured grid modelling the grid of near-coastal mode
- Resolve relevant processes at adequate spatial scales in the entire calculation domain – without the computational overhead of having very high resolution in the entire domain.
- Address the new issues relevant for the coastal regions via an ad hoc scientific innovation applied for a combined utilization of complex high-resolution coastal model and data;
- Make best possible usage of a new-generation data from the satellites together with in-situ data (based on continuous ADCP, buoy and platform data with a very high temporal resolution) available for the European coastal region, (e.g. MARNET Stations and FERYBOX data in the German Bight).
- Implement the advanced assimilation methods into the existing nested-grid coastal modelling system
- Evaluation of the role of stratification-current-turbulence interaction in the coastal zone and multiple forcing mechanisms (wind, wind waves, tides, fresh water, heat fluxes, etc.).
- Evaluation of the role of specific coastal forms (estuaries, zones with movable boundaries and embayments) for the coastal transport (and budgets).

T7.3 - Sedimentary regimes modeling

- Combine traditional and new measurement techniques to observe sediment dynamics at a variety of time and space scales.
- Make inventory of presently available data needed for validation of sediment transport and morphodynamic models, as a function of scale.
- Develop sediment community model
- Develop pre-operational 3D sediment transport and morphodynamic modelling suite
- Provide to EURODESS estimates of budget and dynamics in targeted coastal zones
- Make an inventory of the actual use of data (direct analyses and modelling).
- Provide quality controlled data needed in sediment transport forecasting.
- Critically compare the sediment transport and dispersion models available within the partnership (the partners will make their expertise available) and the present state-of-art.
- Achieve a pre-operational 3D sediment transport and morphodynamic modelling suite suitable for the eventual coupling to an ecosystem model.
- Provide (improve) estimates of sediment budget and dynamics
- in coastal zones, associated to the discharge in selected river plumes.

T7.4 - Super-ensemble forecasting in storm surge shelf modelling

- Several storm surge forecasting systems are operational today around Europe, but good improvement on accuracy and reliability can be obtained by means of data exchange and further collaboration between existing systems. Important steps in this sense have been developed at NOOS, where exchange from model outputs is now operational, but no real

ensamble modeling is still done. No inter-institutional activity is established yet in the South part of the continent. The main objective is to improve quality, reliability and accessibility of storm surge forecasting at European level by means of superensamble forecasting. This objective will be achieved by:

- Creating ENSURF (multi-model Ensamble SUrge Forecast system). ENSURF will consist in several applications providing reliable storm surge forecasting based on multi-model ensamble technology. ENSURF will be designed with potential for relocation in new coastal areas.
- Assess ENSURF errors by means of exploring model outputs and analysing sources of uncertainty (atmospheric modeling, impact of waves on sea level, impact of very high-resolution winds....)
- Develop advanced and improved visualisation and analysis tools for ENSURF
- Present ENSURF as a joint European service via the ECOOP mechanism for information distribution DMS and/or EUROMISS
- Will establish the detailed plans and design the proper strategy to obtain the required results by maximising transfer of information and optimising available resources. The task will start by identify existing forecast providers and forecast products and analysing the different strategies and outputs produced.
- Creating a new super-ensamble forecasting system covering the Med-sea, the Iberian peninsula and the Bay of Biscay. A super-ensamble operational system for the South domain will be developed. It will be based on 2 ocean models (HAMSOM an Mog2D) and several atmospheric models- Puertos del Estado, Meteogalicia, MeteoFrance, POC-CNES.
- At the NOOS area, Met.no will adapt ensemble (single-model) forecast products for use in the multi-model ensemble forecast system; recommend ways of combining ensemble and deterministic forecasts in the forecast tool. Build the adapted system at RIKZ and then transplant to DMI/met.no as proof of concept
- In other words, the deliverable will be the ENSURF modeling component.
- Adapt analysis/visualisation tool to access observations from EDMS and/or EuroMISS and produce validation metrics [RIKZ, DMI]
- RIKZ and DMI will improve existing tools for analyzing and visualizing model output data and will interface with EUROMISS, so we can produce a unified coherent output for the whole Europe. Interaction with ESEAS or EuroGOOS task teams is required in order to do real time validation all along Europe.
- MeteoFrance and Puertos del Estado will implement the tools for the Southern multi-model ensamble and ensure connection with EuroMISS and EDMS.
- Analyse the output of the ensamble by means of comparisons with real data (Puertos del Estado, RIKZ, MeteoFrance).
- Run the developed modeling component of ENSURF during the TOP (Mo 21-27), producing super-ensemble forecasts and validation metrics for selected locations (RIKZ, MeteoFrance, Puertos del Estado)
- Make necessary minor revisions to ENSURF
- The effect of the harbour dynamics in the signal as well as the impact of local changes in the wind and the Radiation stress from waves are potentially of great importance. A nested very high-resolution model working offline will be developed, both for the atmosphere and the ocean - POC-CNRS. The objective will be to analyse the operational solution of a basin scale super-ensamble model understanding which part of the signal is not modeled due to the poor resolution and the lack of radiation stress.
- Make super-ensemble water level forecasting methods available for implementation in the ECOOP community and beyond. Build awareness of the benefits of super-ensemble forecasting products among public users.

Description of work

The first 18 months activity will be dealing with inventory of models and data, and solving availability and access problems. Fosus will be put on specific data in the costal zone, which have not yet (at all or routinely) been used in costal ocean forecasing, but have a very high information potential. Unstructured and nested models will be set up for tareted areas. Model intercomparisons and validation against observations will establish a reliable physical base, which will be further used in the development of assimilation techniques.

The main concepts that will be at the base of the development of observing systems will be: (1) repetitive measurements, (2) synopticity, (3) multidisciplinarity, integration of platforms, easy deployment and management, cost effectiveness, data reliability. Horizontal resolution in models will vary from 2-4 km at the ocean side down to 100-200 m. Very high resolution modelling activities will be focused on several selected coastal areas as demonstration cases. Some applications in the surf zone will need a resolution of about 10 m. Community sediment model and near coastal ecological models coupled with circulation models, as well as input to other WP-s will become available for the activites after the first 18 months.

The technical details are given in the following attachments: "Coastal/shelf/regional systems of interest (CSI) and areas for demonstration (AD)" and "Standards". Detailed description of the work is given for each task and subtask separately.

T7.1 - The observing systems

It will be analysed the technologies and methodologies of measurements: Eulerian, autonomous underwater vehicles, vessel mounted sensors, autonomous floats, underwater observatories. It will be evaluated the present state in quality assurance and what are the main elements to be implemented in ECOOP.

S7.1.1 - System analysis

This task will be done in collaboration other WPs. The following issues will be specifically analysed: Eulerian measurements, autonomous underwater vehicles, vessel mounted sensors, autonomous floats, underwater observatories. This WP has different objectives with respect to the other 'observational WPs'. The analysis will serve to answer to the following questions:

- can the observational plans build on lessons learned from BOOS, NOOS, MFS serve the emerging needs of ECOOP (design a multidisciplinary, long-term, sustainable, pan-european observational network)?
- From the large amount of measurements carried out in the regional programmes, what elements can be selected reasonably to form the basis of a biogeochemical observational scheme implemented at Pan-European scale?
- Any scheme for long-term, large-scale observations must, of necessity, rely to some extent on autonomous platforms. The calibration of all sensors, especially the chemical and biological sensors, in a high energetic environment is notoriously difficult. How can be ensured that a large variety of sensors are calibrated to a rigorous standard?
- How can ECOOP build the elements of biogeochemical observation scheme on the recommendations of GOOS panels that have studied these issues?
- Analysis of observational requirements from models

S7.1.2 - System design

Efforts must be made to render techniques for biogeochemical observations operational. A

combination of 'traditional' (e.g. existing) and 'new' (e.g. improved or developed) techniques could be required to achieve the best results for an operational system, as well as a combination of platforms. The observation system design must be based on three main elements: observing system simulation experiment; hardware design (platforms, sensors, data transmission); quality assurance techniques. Starting from S7.1.1 result it will be initiated the design of 'next generation' observing system, by defining some characteristics of instruments to be developed.

T7.2 - Near coastal models

During the first 18 months the emphasys will be on development and adaptaton of numerical tools and model validation. This includes setups of ustructured grid models and their "coupling" to regional models, adapting and developmemt of two-way nesting techniques and making the first steps towad using new-generation data from satellites together with in-situ data from continuous ADCP, buoy and platform data available for the European coastal region (e.g. MARNET Stations and FERYBOX data in the German Bight) and gliders in coastal forecasting.

S7.2.1 - Unstructured grids

The following works will be performed:
(1) Setup of regional and coastal models
(2) Run unstructured high resolution coastal model with traditional open boundary conditions and with those interpolated from POL model for test period. Provide output and compare it to that of AWI model driven by the same open boundary conditions and configured for the same area.

S7.2.2 - Two-way nesting

The following works will be performed:
(1) First version of nesting software
(2) Selection of averaging and interpolation methods in nesting zones.
(3) Robust numerical algorithms in nesting zones.

S7.2.3 - Assimilation of newly-available data

The structure of works includes:
(1) First version of the data-assimilation schemes based on existing OI, SEIK and EnKF algorithms (with improved strategies) for the GETM.
(2) Initialization module for GETM, analysis scheme for in situ/satellite data assimilation

S7.2.4 - Applications

The work content includes:
(1) Develop pre-operational system for the the Southern coast of Malorca and set up of pre-operational systems based on WP7.2.2

T7.3 - Sedimentary regimes modeling

This task will develop sediment transport capabilities associated with coastal forecasting models. Emphasys will be given to bringing together available measurements techniques to resolve sediment dynamics (e. g. back scatter signals from ADCP and fine resolution satellite data, ENVISAT) and modelling.
The contribution to delivering robust forecasts will be achieved through developing a meta-data set (observations plus quality assessments) on hydrodynamic drivers (river discharges, waves, circulation, mean water levels and associated turbulence) and corresponding morphodynamic and sediment transport responses (bed and suspended loads and sediment erosion/deposition patterns). This will be executed for the selected field sites that include areas where permanent monitoring (by partner Institutes) is underway (Wadden Sea and Ebro Delta coastal seas are two examples). Particular

attention will be paid to the compatibility of data from different sources and the coupling between various phenomena such as wind fields and waves plus surface currents.

S7.3.1 - Data: Inventory of needs and availability

The data sets include: (1) backscatter signals from long-term ADCP observations for e.g. sediment transport and drag from the seabed under energetic climatic conditions, (2) fine resolution satellite imagery for suspended sediment in river plumes and near coastal regions. The contribution to delivering robust forecasts will be achieved through developing a meta-data set (observations plus quality assessments) on hydrodynamic drivers (river discharges, waves, circulation, mean water levels and associated turbulence) and corresponding morphodynamic and sediment transport responses (bed and suspended loads and sediment erosion/deposition patterns). This will be executed for the selected field sites that include areas where permanent monitoring (by partner Institutes) is underway (Wadden Sea and Ebro Delta coastal seas are two examples). Particular attention will be paid to the compatibility of data from different sources and the coupling between various phenomena such as wind fields and waves plus surface currents.

The structure of works includes:

(1) Processing ADCP observations: collect data, quality control, data analysis and interpretation (focus on vertical structure), estimates of sediment transports, intercomparisons

(2) Analysis of fine resolution satellite imagery for suspended sediment in near coastal area. Focus on river plumes (in cooperation with WP3.2). Establish the value of signals for operational purposes. Analysis of characteristic spatial patterns and their dependence on meteorological and oceanographic conditions

S7.3.2 - Community sediment model

The emphasis will be on Eulerian versus Lagrangian codes for sediment dispersion and the more suitable formulations for sediment pick-up and deposition as a function of climatic drivers and the time scale considered. The suitability of these approaches for various sediment fractions and, eventually, for a combination of fractions will also be considered, with a view to the future linkage to an ecosystem model.

The “internal” and “external” boundary conditions will be also dealt with, looking for the most robust and efficient nesting and downscaling strategy and parameterizations.

The structure of works includes:

(1) Harmonization of parametrisations and validation against available observations

(2) Link between suspended matter and marine ecosystems and focuses on modelling the interplay between sediment dynamics and life cycles. Here the role of transparency, which couples sediment and primary production, will be established.

S7.3.3 - Matter transport and budget in the coastal zone

The emphasis will be on suspended particulate matter in the coastal area, looking at the various possible time scales, the averaged and impulsive fluxes and the resulting sedimentary budgets. From here an assessment of the morphologic evolution will be carried out, with the aim of determining sedimentary deposition/erosion patterns. These studies will be primarily focused on the considered field cases (Rhine, Ebro and Danube river plumes) using the data from WP7.3.1 and the community sediment model from WP7.3.2. The Rhine river plume will be considered in terms of the SPM in the German Bight and Dutch coast. Likewise, the East-Anglia plume will be considered for the fluxes and budget along the English and Frisian coasts, including also their final destination of (Skagerrak and Kattegat). The major issues here considered will be the effect of river plumes on sediment dynamics within a coastal sea such as the southern North Sea or the North Western Mediterranean and their surrounding coasts.

The structure of works includes:

(1) Run sediment transport models to analyse the effect of river plumes (Danube, Ebro and Rhine) on sediment dynamics within a coastal area.

T7.4 - Super-ensemble forecasting in storm surge shelf modelling
ENSURF design will be finished and the codes will be on the implementation phase.

S7.4.1 - Planning/Design
By the end oof month 18th all the objectives of the sub-task must be finished: A Development and implementation plan for the super-ensemble forecast system for water level in European Waters, and potential for relocation to new coastal areas. This will include forecast analysis and visualisation tool and forecast validation metrics

S7.4.2 - System development
The ENSURF modeling component will be under development.

S7.4.3 - Visualization and analysis tools and link with EuroMISS
The visualization tools will be under development.

S7.4.4 - Validation and error assessment
The studies will be under development. The high resolution model for model uncertainties analysis will be implemented. Results will provide feedback to the modeling component of ENSURF.

S7.4.5 - Dissemination activities
A plan for disseminating super-ensemble water level forecasting methods to the ECOOP community and beyond will be written. Articles will be submitted to non-scientific magazines (i.e. The Spanish Harbours magazine) in order to inform public users.

Deliverables

D7.2.1.1 (Mo 18): Setups of three models (TUDELFT, POL, AWI) for the specified areas.
D7.2.2.1 (Mo 12): First version of 2-way nesting scheme implemented in GETM
D7.2.3.1 (Mo 18): Data-assimilation schemes based on SEIK and SEEK filters for GETM
D7.3.1.1 (Mo 18): Report on the value of signals in the newly-available data for operational purposes
D7.3.2.1 (Mo 18): Pilot-model-Documentation

Milestones and expected result

WP7-M6 (Mo6): Setup of regional and coastal models
WP7-M7 (Mo6): Plan for the construction and implementation of ENSURF
WP7-M18 (Mo12): First version of nesting software
WP7-M20 (Mo12): Review of the existing sampling methodologies in the European regional seas
WP7-M21 (Mo12): Definition of new operational methodologies for multiparametric measurements
WP7-M22 (Mo12): Review of the existing sampling methodologies in the European regional seas
WP7-M23 (Mo12): Run unstructured high resolution coastal model with traditional open boundary conditions and with those interpolated from POL model for test period. Provide output and compare it to that of AWI model driven by the same open boundary conditions and configured for the same area.
WP7-M32 (Mo15): Selection of averaging and interpolation methods in nesting zones.

WP7-M40 (Mo18): Definition of new operational methodologies for multiparametric measurements
WP7-M43 (Mo18): First version of the data-assimilation schemes based on existing OI, SEIK and EnKF algorithms (with improved strategies) for the GETM.
WP7-M44 (Mo18): Initialization module for GETM, analysis scheme for in situ/satellite data assimilation
WP7-M45 (Mo18): Development of pre-operational system for the the Southern coast of Malorca
WP7-M46 (Mo18): Implemantation of a high resolution nested model for the error assessment
WP7-M47 (Mo18): Processing ADCP observations: collect data, quality control, data analysis and interpretation (focus on vertical structure), estimates of sediment transports, intercomparisons.

Workpackage number	**WP8**	**Start date or starting event:**					
Workpackage title: General information system (EuroMISS)							
Participant id	1	2	3	4	6	8	9
Person-months per participant:	1,4	0,5	13	7,5	3	3	2,3
Participant id	17	21	29	31	38	42	44
Person-months per participant:	1,6	8,2	4	2,9	1,9	3	1
Participant id	46	51	53	60	71		
Person-months per participant:	3	1	6	2,7	4		

Objectives

WP8 - General information system (EuroMISS)

With inputs from ECOOP WP2, WP5 and WP9 in particular, and building on earlier EC projects (such as MERSEA, DISMAR, SEADATANET, MOTIIVE) WP8 will define the initial European Regional and Coastal Seas information exchange and management systems (EUROMISS V0) harmonising the existing regional and European capacity. Task WP8.1 will define and demonstrate the necessary (industry) standards for future interoperability, including opendap and openGIS technology. In task WP8.2 the regional systems will be connected to the existing European thematic portals, and the coastal systems of WP5 will be connected to the regional information system. This will define EuroMISS V1, ready for the target operational period (month 21) of WP5. Task WP8.3 will provide assessment of EuroMISS at all stages from V0 onwards, to provide recommendations for future operation and upgrade to follow the end of ECOOP.

T8.1 - Definition and Development of EuroMISS

Within the ECOOP project the task 8.1 is in charge of defining and developing the European Marine Information System of System (EUROMISS). This system aims to provide an integrated access to the products inside and outside ECOOP.
It will be built on earlier EC projects (MERSEA, DISMAR, SEADATANET…) and will integrate the Thematical Portals that will be developed by Theme 1 and Theme 2. If possible, existing information systems such as MERSEA Thematic Portals will be extended to provide the necessary information exchange for coastal and regional applications and will therefore need to be linked to EUROMISS;
Main goals of this task are harmonization and integration of systems developed at regional and coastal level by individual partners. Considering the fact that EURODESS will be built upon EUROMISS a common architecture will have to be set up by task 8.1 and 9.1

T8.2 - Regional management of Marine Information System of Systems for ECOOP. (EuroMISS-ECOOP)

- The objective of WP8.2 is to provide a regional connection to the existing European thematic portals, and to provide connection from the coastal systems to the regional thematic portals.
- Establish regional connections to pan-European thematic portal, and to provide connection from the coastal systems to the regional thematic portals.

T8.3 - Evaluation of the performance of the EuroMISS

The objective of task 8.3 is to provide assessment of the various versions of EuroMISS, and to provide quality assurance of the specifications defined in task 8.1, from the perspective of both the intermediate user, and of the end-user of the ECOOP information services.

Description of work

In WP8.1 existing and state of the art information systems will be reviewed, and the information exchange requirements of the ECOOP regional and coastal systems will be assessed. Requirements of the common information management system will be defined and demonstrated. In WP8.2 the existing European thematic portals will be extended to provide connection to the existing regional and coastal systems featured in WP5. WP8.3 will evaluate the capability of the present EuroMISS V0 system to meet requirements, and will assess the upgrades prepared for EuroMISS V1. The necessary metrics for this will be developed.
The aim of this period is harmonisation and preparation for the target operational period of WP5 from month 21-27.

T8.1 - Definition and Development of EuroMISS

S8.1.1 - Specification and definition of EuroMISS
During the first 18 month, building on experience gained from other projects and national activities, S8.1.1 will develop a specification for the EuroMISS architecture, the EuroMISS products catalogue and the EuroMISS central viewing service. Care will be taken to ensure consistency with existing and emerging industry standards.

S8.1.2 - Development of common parts of EuroMISS
During the 18 first months , the task 8.1.2 will implement Version 0 of EUROMISS that will provide a static WWW that will give visibility to the different elements of the ECOOP System and access to the standalone viewing and downloading services provided by the ECOOP partners. It will also develop the common tools for Version 1 of the EUROMISS Information system that will provide:

- A discovery service on ECOOP product by building a central catalogue in ISO19115 to guide the user to the ECOOP regional and coastal products (In-Situ and Satellite from WP2, Forecast from WP6)
- Provide integrated viewing services of a subset of the ECOOP products for the demonstration pilot areas defined in WP6. Each time possible a first version of an integrated downloading service

By month18 the core components of EuroMISS V1 will be in place ready for demonstration and application during the target operational period of months 21-27

T8.2 - Regional management of Marine Information System of Systems for ECOOP. (EuroMISS-ECOOP)
The existing thematic portals from the MERSEA IP shall be extended to take account of the coastal systems in ECOOP, and an opendap thematic portal capability will be established for the Black Sea

S8.2.1 - Regional connection to pan-European thematic portals
Overall design of ECOOP RegionalMISS, including service of discovery, viewing and downloading, will be made. Common data catalogue and tools for the discovery, viewing and downloading are designed, in order to be in harmony with the MERSEA information system and ECOOP centralised information system.
The existing thematic portals from the MERSEA IP shall be extended to take account of the coastal systems in ECOOP, and an opendap thematic portal capability will be established for the Black Sea.

S8.2.2 - Establish coastal components of EuroMISS
The ECOOP forecasting system includes 5 regional systems and 15 coastal systems. Each coastal

system will build up an initial connection to EuroMISS to define V1 ready for the TOP

T8.3 - Evaluation of the performance of the EuroMISS
In months 1-18 this activity will assess all versions of the EuroMISS information system of systems, from the initial regional capability (version 0), through to version 1 with coastal and regional connection to the European-level thematic portals ready for the target operational period in months 21-27.
A range of metrics will be developed in consultation with both intermediate and end-user community, for application during the TOP.

S8.3.1 - Assessment of EuroMISS V0, TOP and V1
This activity will assess all versions of the EuroMISS information system of systems, from the initial regional capability (version 0), through the version 1 with coastal and regional connection to the European-level thematic portals ready for the target operational period in months 21-27.

Deliverables

D8.1.1.1 (Mo 12): Specification of EUROMISS architecture
D8.1.1.2 (Mo 18): Specification of EUROMISS catalogue
D8.1.1.3 (Mo 18): Specification of EUROMISS integrated viewing services
D8.1.2.1 (Mo 18): Description of EUROMISS V0
D8.2.1.1 (Mo 18): Regional components of EuroMISS V1 ready for target operational period
D8.3.1.1 (Mo 18): Evaluation of EuroMISS V0
D8.3.1.2 (Mo 18): Specification of metrics for EuroMISS evaluation

Milestones and expected result

WP8-M36 (Mo18): Assessment of EuroMISS V0. Report and recommendations for TOP

Workpackage number	**WP9**	**Start date or starting event:**					
Workpackage title: Decision support system (EuroDeSS)							
Participant id	3	5	7	9	15	18	21
Person-months per participant:	27	4,5	8	6,3	0,4	0,4	2,5
Participant id	29	37	39	40	43	44	51
Person-months per participant:	7	2	4,5	9	3	0,5	1
Participant id	53	59	60				
Person-months per participant:	6	0,5	4,2				

Objectives

WP9 - Decision support system (EuroDeSS)

The overall objective is to develop integrated marine services in support of marine environmental management in European coastal areas (EuroDeSS), based on information products generated by the ECOOP system of systems.

Specific objectives:

- To evaluate existing elements of decision support systems (DSS) operating in European coastal seas.
- To define the specifications of EuroDeSS, in collaboration with end-users and GEOSS/ GMES stakeholders.
- To develop components of EuroDeSS in selected targeted areas where elements of such systems already exist.
- To operate and demonstrate the value of EuroDeSS for the Target Operational Period (TOP).
- To evaluate the performance of EuroDeSS and assess its impact, in consultation with end-users.

T9.1 - EuroDeSS specifications & standards

- Formalise the requirements of the EuroDeSS
- Develop a model for the deployment and operation of the EuroDeSS
- Establish mechanisms of the deployment of a EuroDeSS application system

T9.2 - Development, management and demonstration of EuroDeSS for targeted applications/areas

Develop targeted application elements of an integrated EuroDeSS according to the specifications laid down in Task 9.1. Demonstrate the usefulness and applicability of EuroDeSS through user-oriented demonstrations in a representative range of European coastal areas.

T9.3 - EuroDeSS evaluation including user perspectives

- Establish metrics for the evaluation of EuroDeSS operations.
- Apply evaluation criteria to EuroDeSS development and operations
- Contribute the EuroDeSS to the overall ECOOP evaluation

Description of work

During the first 18 months of the project the main goals/activities of WP9 will be to:

- Initiate and complete the design of EuroDeSS (task 9.1)

- Initiate the development of Version-1 (V1) of EuroDeSS in the selected 8 applications / areas (task 9.2)
- Initiate the evaluation of EuroDeSS by defining the main evaluation framework (task 9.3)

The design of EuroDeSS will be based on the user requirements, the characteristics of the existing DeSS systems as well as the experience of other GMES projects. It will follow well established procedures and standards (e.g. RM-ODP) and will provide by month 12 deployment guidance to task 9.2 under which the selected components of EuroDeSS will be developed.
The development will begin by month 9 of the project and the two (common) activities for all 8 applications up to month 18 will be to:

- adapt the existing data management procedures of each application to the EuroMISS data standards and sources;
- refine the user-specific information and data products to meet specifications of Task 9.1

Finally, the definition of the main evaluation framework for EuroDeSS will be initiated on month 12; it will build on the results of task 9.1.1 and will be synchronized with the developments of task 9.2

T9.1 - EuroDeSS specifications & standards

S9.1.1 - Formalise EuroDeSS requirements

Task 9.1.1 will capture the needs of users for a EuroDeSS and fomalise them in a document that can be used to inform system design and development. It will establish;

- 'Demand side' needs for EuroDeSS (what users will they get that is different from present)
- 'Supply side' needs for DSS (what is needed to establish a DSS as part of EuroDeSS)

This assessment will embrace four different DSS user types;

1. Members of the community of providers of operational met services who govern the core DSS platform
2. Members of the community of organisations that wish to deploy a DSS on the EuroDeSS platform
3. Professional users who receive specialist services from EuroDeSS
4. Public users who receive general interest services from EuroDeSS

Input to the user-requirements analysis will come from the experience of team members, and the issues and commonalities of DSS deployment in the GMES Service Elements (Roses, Coastwatch and Marcoast) and GMES Integrated Projects (MERSEA). A set of 'strawman' use-cases will be established based on the methodology adopted by the GMES-INSPIRE harmonisation project MOTIIVE. This will be presented and discussed at a larger workshop of all the WP9 team members. The outputs from this workshop will be used to establish the final EuroDeSS use-case documents.

S9.1.2 - Model for EuroDeSS deployment and operation

Task 9.1.2 will formalise the design for EuroDeSS platform and accordingly will provide the specifications for the developing the EuroDeSS elements in Task9.2. Input to the system design process will come from the system use-case document 9.1.1-D1. The system design process will follow the procedures established by ISO RM-ODP (Reference Model for Open Distributed Processing). Technical detail to this process will be established through system design diagrams generated using UML (unified modelling language). The benefit of this approach is that it ensures all elements of the system design are captured and that the EuroDeSS design is in accordance with recognised standards in the information systems domain. As such it will cover;

- System Responsibilities (Who deploys the DSS and who is responsible for using it)
- System Procedures for updating the DSS and assessing the DSS and the corresponding standards used.
- System Technology platforms used and required system interoperability

The EuroDeSS platform will be based on the EuroMISS platform. Accordingly, establishing common architectural elements between these two ECOOP components is essential to ensure efficient system deployment. Furthermore, as the EuroDeSS platform provides the scope for interfacing with third party, i.e. non-EuroMISS systems, it must take account of these system architectures and operating characteristics.

S9.1.3 - Deployment framework of EuroDeSS application systems

Task 9.1.3 will extend the system design deliverables to provide deployment guidance and principles. As such, it will provide the EuroDeSS technical and business governance rules. The scope and content of this document will be established in part at a EuroDeSS 'deployment workshop' to be held between the teams which designed the EuroDeSS platform and the team establishing the EuroDeSS Services. This task will also suggest criteria to benchmark the operational characteristics of EuroDeSS to gauge the improvements that ECOOP can provide in terms of DSS for coastal management.

T9.2 - Development, management and demonstration of EuroDeSS for targeted applications/areas

S9.2.1 - Marine security in the Northwest Shelf seas

The existing services (V0) to be developed toward EuroDeSS in subtask 9.2.1 are:

i) Marine oil spill response support, including oil spill fate forecasting and supporting observations, e.g. SAR. The oil spill forecast model used for Norwegian national duties (met.no) is also interfaced to global, regional and local forcing data, giving a relocatable capability. A web interface is used to order simulations and to receive drift data; forecasts are produced on server side. Developmental oil spill models (UREADES) are ready for interfacing to the UK Oil Spill information service, used by the MCA, and to operational forcing data (as for search and rescue service, below) to give a relocatable service. Demonstrations will include wellhead blowout scenarios from the North Sea platforms, using the met.no model's novel deep source module, and surface spills in UK coastal seas. Inclusion of processed SAR imagery (NERSC) in the DSS will build on and coordinate with similar work in ROSES and MARCOAST, as well as national projects.

ii) Search and rescue support. The UK national search and rescue information system, which includes a drifting objects forecast model, is already interfaced to operational ocean forecast forcing data and is being enabled for web service operation. The model is run on client side using downloaded operational forcing data and proprietary PC software for viewing. The system is relocatable and will be made available to the project (UREADES).

For V1, both services will be adapted according to specifications from Task 9.1. They will be interfaced to ECOOP forcing data sources (EuroMISS), thereby ensuring relocatability at the coastal scale. User-specific information (e.g., oil types, floating object characteristics), region-specific information (e.g., bathymetric data, digital sea charts) and model data products will be refined to address a broader range of European users. Methods for accessing and including SAR information in the DSS will be implemented.

For service demonstration during the TOP, the V1 oil spill service will be exercised for typical scenarios of the North Sea offshore industry, e.g., well-head blowout, shuttle tanker grounding. Key users are the Norwegian Coastal Authority, the Norwegian State Pollution Control Authority, Norwegian Clean Seas Association for Operating Companies, DTI Oil and Gas Office, Maritime Coast Guard Agency and BP. The V1 search and rescue service will be demonstrated for scenarios within the regional NOOS systems in WP5, in particular the strongly tidal waters of the Irish and Liverpool Bay. The key user is the UK Coast Guard. Both systems will be applied to actual incidents, should they occur. Key users and other users (identified in 9.1) will be involved in the demonstrations

and the assessment.
For V2, the services will be revised according to the assessment of the TOP demonstration. The two methods for end-user interfacing – server side vs. client side computation – will be compared to elucidate their strengths and weaknesses in the EuroDeSS context.
A final relocatability demonstration of each service will be carried out for a new coastal area (to be recommended, Black Sea is likely candidate) after the TOP.
During the first 18 months of the project, the following tasks will be carried out:

- adaptation of existing data management procedures to EuroMISS data standards and sources;
- refinement of user-specific information and data products to meet specifications of Task 9.1;
- implement methods for accessing and including SAR imagery in support of oil spill monitoring.

S9.2.2 - Ecosystem health in the North Sea

This application will develop and demonstrate model based assessments of algal bloom activity in the NW European shelf seas (including harmful algal blooms) and will prepare demonstration products for web based dissemination. Application of dissolved oxygen "nowcast" information to coastal fish farming will also be developed and demonstrated. The system will provide information for evidence based decision making to help reduce uncertainty in the status assessments of ecosystem health in the North Sea, including assessment of the status of the OSPAR indicators including dissolved oxygen concentration, and will provide demonstration of the larger-scale ecosystem health indicators application to coastal aquaculture.
The existing services (V0) to be consolidated toward EuroDESS application include the POLCOMs-ERSEM MRCS model nowcasts running at the UK Met Office, the CEFAS SMART monitoring buoys in the North Sea and the NIVA Norwegian ferrybox monitoring. Therough the MERSEA project, at some time before ECOOP, the MRCS model will demonstrate five-day forecasts and these will also form part of this service demonstration.
For V1, these separate services will be brought together to provide colocated model and observation summaries, providing information for decision support. A web page to display the information will be constructed following the EuroMISS and EuroDESS guidelines. The quality of MRCS modelled dissolved oxygen and the utility for application in EuroDESS will be evaluated. Any requirement for improvements to the system will be communicated to WP6. This will be guided by comparison with available in-situ and ferrybox observations of various physical and biological properties. Discussions with representatives of users will be held, to determine appropriate demonstration locations for support to coastal aquaculture operations.
For service demonstration during the TOP, the information will be provided with weekly or daily update to a EuroDESS web page.
For V2, the system will be upgraded making full use of the available demonstrations from the TOP of WP5, the developments of WP6, and building on user feedback from V1.
During the first 18 months of the project, the following activities will be carried out:

- Gather the available model and observation datasets from recent hindcast periods and nowcasts, and assess the spatial and temporal coverage and characteristics of variability of the available OSPAR indicators, in particular dissolved oxygen.
- Develop and demonstrate model based assessments of algal bloom activity (including harmful algal blooms) and prepare demonstration products for web based dissemination.
- Develop and demonstrate application of dissolved oxygen "nowcast" information to coastal fish farming
- adaptation of existing data management procedures to EuroMISS data standards and sources;
- refinement of user-specific information and data products to meet specifications of Task 9.1;

S9.2.3 - Marine security and ecosystem health in the Aegean Sea

The existing marine services (V0) to be developed toward EuroDeSS are based on the POSEIDON monitoring and forecasting system that operates a network of oceanographic buoys in the Aegean Sea and a suite of regional weather, wave, hydrodynamic and ecosystem models. The oil spill service has been upgraded through the MARSAIS (EC/FP5) ROSES and MARCOAST (ESA/GSE) projects to incorporate R/S (SAR) data for the detection of oil slicks, enabling monitoring of illicit vessel discharges. The oil spill model uses weather, wave and circulation parameters (wind, air temperature, wave height, 3-D currents, density and diffusivities) through a dedicated interface to the specific operational forecasting products of the POSEIDON system. It can be activated trough a web interface on user demand (for real cases or scenario studies), or it is automatically activated upon detection of an oil slick by analysis of SAR data. The ecosystem model has been developed for the needs of MFSTEP (EC/FP5) project and is currently being upgraded to an operational service through the POSEIDON-II national project. Through the same project the observing network is enriched with additional biochemical data for calibration and NRT validation of ecosystem modelling products.

The V1 development of the Aegean Sea services will include adaptation of the above components to the EuroDeSS standards, following the specifications of task 9.1. The forcing fields interface will be upgraded to allow integration of ECOOP products made available through EuroMISS. The upgrade will also allow interfacing of the oil spill model to weather and wave products of variable temporal and spatial resolution, to enhance the portability of the service and make use of the best available regional forecasts. The ecosystem service upgrade will include generation and web dissemination of information products based on user requirements defined in 9.1.

The service demonstration during the TOP period will be carried out in collaboration with the Marine Environment Protection unit of the Ministry of Mercantile Marine who is the major user of marine GMES services in Greece. Efforts will be made to also engage smaller end-users (local authorities) who have the responsibility of marine environmental conditions in coastal areas. The main goal will be to demonstrate the value of accessing heterogeneous information products (model nowcasts and forecasts, in situ and R/S observations) in an efficient way for a) fast response to emergency situations (marine accidents, pollution, SAR operations) b) assessment of the regional eutrophication state and c) long term planning through "what if" scenarios.

The development of V2 of the service will be based on the experience gained during TOP and the service assessment in collaboration with the end users.

During the first 18months of the project the main activities of subtask 9.2.3 will focus upon:

- adaptation of the existing forcing-fields interface to EuroMISS data standards and sources;
- refinement of user-specific information and data products to meet specifications of Task 9.1;

S9.2.4 - Marine security in the Iberian coast and the western Mediterranean

The existing service (V0) to be developed toward EuroDeSS is operational capacity in oil spill drift forecast for the Iberian coast and the Western Mediterranean. This is notably based on MF, IST, UPC and AZTI expertise. MF has also to fulfil international commitments in the framework of the WMO and IOC JCOMM MPERSS regarding oil spill drift forecast support. The MF model can also be used to support, on demand, the Search and Rescue activities on this area.

For V1, these capacities will be adapted according to specifications from Task 9.1. They will also be interfaced to some operational oceanic current data sources (Mercator, MFS...) in order to evaluate the usefulness of these data and the way of applying them.

For service demonstration during the TOP, the V1 oil spill service as well as the V1 search and rescue service will be used for real cases (if they occur) or for typical scenarios. The key users are the national authorities in charge of the marine operation (Préfecture Maritime for the French part of the bay of Biscae and of the Mediterranean Sea, for example)

For V2, the results of the TOP demonstration will be taken into account to improve these capacities and the manner to use them.

During the first 18 months of the project, the following activities will be carried out:

- adaptation of existing data management procedures to EuroMISS data standards and sources;
- refinement of user-specific information and data products to meet specifications of Task 9.1;
- operational oceanic currents introduction in oil spill and SAR model ; usefulness assessment.

S9.2.5 - Ecosystem health in the Baltic Sea

The existing services (V0) to be developed toward EuroDeSS are:

(i) daily forecasts of ecosystem health, available currently in a limited form through a non-DSS access;
(ii) annual indicator fact sheets derived from operational monitoring and forecast model time series;
(iii) seasonal forecasts of the ecosystem health.

For V1, development will include: (i) interfacing the daily forecasts to EuroDeSS (ii) interfacing of EuroDeSS to indicators (iii) incorporation of probabilistic forecasts into EuroDeSS.
For service demonstration during the TOP, the service will be relocated to the Bothnian Bay. The resulting service will be demonstrated to (1) key policymaking bodies in the Baltic Sea (e.g. HELCOM secretariat and HODs) (2) regional environmental managers in Southern Finland and Estonia (3) representatives of the media around the Baltic.
For V2, the results of EuroDeSS assessment will be incorporated into the systems, in particular: (iii) incorporation of changes in anthropogenic forcing into the seasonal forecasts.
During the first 18 months of the project, the following tasks will be carried out:

- adaptation of existing data management procedures to EuroMISS data standards and sources;
- refinement of user-specific information and data products to meet specifications of Task 9.1;
- implementing thin EuroDeSS client for the daily and seasonal forecasts;
- evaluate the applicability of EuroDeSS to indicator production.

S9.2.6 - Marine security in the Levantine Basin

The existing service (V0) to be developed toward EuroDeSS is marine oil spill prediction, response and support. The Mediterranean oil spill forecasting model is currently interfaced to regional and local forecast forcing data. The model will be upgraded to use high frequency forecasts (6-hourly marine forecasts and hourly meteorological forecasts) that have recently become available. A high resolution relocatable module will be developed and demonstrations will include scenarios from the south Levantine Basin platforms, using this relocatable module.
For V1, the service will be adapted according to specifications from Task 9.1. It will be interfaced to ECOOP forcing data sources (EuroMISS), thereby ensuring relocatability at the coastal scale. User-specific information , region-specific information (e.g., bathymetric data, digital sea charts) and model data products will be refined to address a broader range of Levantine users. Use of the model for search and rescue operation will be simplified.
For service demonstration during the TOP, the V1 oil spill service will be exercised for typical scenarios of the Levantine Basin offshore industry, e.g., shuttle tanker grounding. Key users are the Subregional Contingency plan for emergency response to major pollution incidents in the Eastern Mediterranean Levantine, between Cyprus, Egypt and Israel and the corresponding contingency plan for Syria. The V1 search and rescue service will be demonstrated for scenarios near the Cyprus coast, where most of such incidents occur. The key users are the local Search and Rescue centres. Both systems will be applied to actual incidents, should they occur. Key users and other users (identified in 9.1) will be involved in the demonstrations and the assessment.
For V2, the services will be revised according to the assessment of the TOP demonstration.
During the first 18 months of the project, the following tasks will be carried out:

- adaptation of existing data management procedures to EuroMISS data standards and sources;

- refinement of user-specific information and data products to meet specifications of Task 9.1;

S9.2.7 - Ecosystem health in the Adriatic Sea

The existing services (V0) to be developed toward EuroDeSS is based on information products generated by the ADRICOSM observing and forecasting system that is producing operational forecasts and simulations since 2000. Different typologies of numerical models and observational datasets will be integrated. AdriDESS will consist in an integrated marine service in support of marine environmental management and coastal long term planning in the Adriatic Sea.

For V1, AdriDESS will be adapted according to specifications from Task 9.1 and interfaced to ECOOP forcing data sources (EuroMISS). The goal of the R&D activities will be to find the connections between the oceanographic datasets (simulations from year 2000 up to present days and longer) produced by ADRICOSM (models at 5 and 2 km resolution) covering the entire Adriatic Sea and the environmental datasets (HABs, Eutrophication, ecosystem dynamics, Anoxia, coastline evolution, sea level, sediment transport, nutrient loads …) to define the health of the marine ecosystem. AdriDESS will be defined in collaboration with the Agency for Environmental Protection and Technical Services (APAT) of Italy which is responsible for scientific and technical activities in the national interest to protect and manage the marine environment and its coastal zones through planning and monitoring.

For service demonstration during the TOP, AdriDESS will be devoted to provide information and application products to support long term planning. “What if scenarios” will be constructed together with the users. AdriDESS will be demonstrate in the planned target period and the evaluation of the performance will be done in consultation with APAT and possibly other local users (Regional environmental protection agency from Emilia Romagna (ARPA-EMR)).

For V2, AdriDESS will be revised according to the assessment of the TOP demonstration. Collaboration with APAT will help to evaluate the performance in order to meet users requirements.

During the first 18 months of the project, the following tasks will be carried out:

- integration of different typologies of numerical models and observational datasets;
- adaptation of existing data management procedures to EuroMISS data standards and sources;
- refinement of user-specific information and data products to meet specifications of Task 9.1.

S9.2.8 - Environmental status support to North Sea fisheries assessment

The existing service (V0) for this application is a demonstration paper-based amalgamation of material from a wide and disparate range of contributors, prepared by the ICES-EuroGOOS Planning Group for a North Sea Pilot Project.

For V1, the presentation will be consolidated and harmonised across the contributions, and a service web page will be established. This will allow a standard presentation of modelled monthly mean seabed temperatures and transports, and provide for a colocation with available fisheries research cruise physical observations.

Particular focus shall be given to assessment of the mean sea bed temperature and to assessment of transports across various sections.

For service demonstration during the TOP, the service webpage information shall be updated with model data and observation inputs from the North Sea system. Note that this is not a "real-time" service with daily update, but rather provides a retrospective summary (seasonal, quarterly, and possibly monthly) of the recent past status of the North Sea physical oceanography.

For V2, the lessons learned during the TOP application will be applied into deve,oping an upgraded webpage, and a more effieicnt method for generating the model-observation colocations and the monthly or quartlery mean values, making use of the EuroMISS capability as much as possible. This will allow ready application of the Status Summary service to other regional seas.

For the first 18 months of the project, the following activities will be carried out:

- Quarterly model and observation-based assessments of the North Sea temperature and salinity conditions (including transports across various sections) for evaluation by ICES fisheries assessment working groups shall be defined and demonstrated.
- A web-based dissemination of the status assessment will be developed. Particular focus shall be given to assessment of the mean sea bed temperature and to assessment of transports across various sections.

In months 18-36 the assessments of North Sea quarterly status will continue, with development following feedback from the ICES working groups using the summary. The present and recent years values shall be placed into historical context with the outputs of WP10. For evaluation, the North Sea status of additional parameters developed in ECOOP WP6 and in task 9.2.2 will be added to the summary.

T9.3 - EuroDeSS evaluation including user perspectives

S9.3.1 - EuroDeSS evaluation framework

Taking input from Task 9.1.3 (9.1.3-D1) this task will refine the criteria for the evaluation of EuroDeSS. Crucially this will cover the whole scope of the service from the perspectives of the deployed services and the ability to deploy future services. It is expected that the evaluation will not focus primarily on "does the decision support system help the user", but more "does the presence of ECOOP enable a better (reliable, cost-effective, scalable) decision support system in the coastal regions of Europe.

S9.3.2 - EuroDeSS Services evaluation

This subtask will provide an evaluation as to whether the services developed as part of 9.2 meet the requirements of the stakeholder communities. These stakeholder communities include both the users of the services and the providers of services. The quality ('fit for purpose') of the DSS will examine the information delivered by DSS (i.e. how it supports the decision making process), its deployment (i.e. how effectively it is aligned with user/provider systems), its management (i.e. how providers can ensure consistency of deliver of the service and respond to updates), and how adaptable it is at delivering new services. This activity will conducted in synchronisation with Task 9.2 and will also provide an update to Deliverable 9.1.3-D1 (DSS Deployment Manual)

Deliverables

D9.1.2.1 (Mo 10): EuroDeSS system specifications
D9.1.2.2 (Mo 12): EuroDeSS system design diagrams
D9.1.3.1 (Mo 12): EuroDeSS deployment manual
D9.2.1.1 (Mo 12): Northwest Shelf seas DeSS application: development and implementation plan
D9.2.2.1 (Mo 12): North Sea ecosystem DeSS application: development and implementation plan
D9.2.3.1 (Mo 12): Aegean Sea DeSS application: development and implementation plan
D9.2.4.1 (Mo 12): Iberian-Mediterranean DeSS application: development and implementation plan
D9.2.5.1 (Mo 12): Baltic Sea DeSS application: development and implementation plan
D9.2.6.1 (Mo 12): Levantine Basin DeSS application: development and implementation plan
D9.2.7.1 (Mo 12): Adriatic Sea DeSS application: development and implementation plan
D9.2.8.1 (Mo 12): North Sea fisheries DeSS application: development and implementation plan
D9.2.9.1 (Mo 10): Report template: Task 9.2 development and implementation plan
D9.3.1.1 (Mo 18): EuroDeSS evaluation framework

Milestones and expected result

WP9-M3 (Mo3): EuroDeSS Straw-man use cases established
WP9-M4 (Mo4): Workshop to establish EuroDeSS requiremnts
WP9-M11 (Mo8): Draft system design for EuroDESS and review workshop with EuroMISS (WP8)
WP9-M15 (Mo12): EuroDeSS deployment workshop (in conjunction with 9.1.3-M1)
WP9-M16 (Mo12): Final system design for EuroDESS
WP9-M17 (Mo12): EuroDESS deployment workshop (in conjunction with 9.3.1)
WP9-M37 (Mo18): EuroDESS evaluation/Deployment manual

Workpackage number	**WP10**	**Start date or starting event:**					
Workpackage title: Hindcast and scenario studies on coastal-shelf climate and ecosystem variability and change							
Participant id	1	5	11	58	70		
Person-months per participant:	1,2	5,3	2,3	9	4		
Workpackage number	**WP10**	**Start date or starting event:**					

Objectives

WP10 - Hindcast and scenario studies on coastal-shelf climate and ecosystem variability and change

- To quantify the monthly to decadal variability of the shelf seas-coastal climate.
- To quantify the monthly to decadal variability of the climate effects on the lower trophic levels of the shelf seas-coastal ecosystems.
- To quantify the potential effects on shelf seas-coastal climate and ecosystems from global climate change predictions (decades-100 years).
- To quantify the potential effects on shelf seas-coastal ecosystems due to management scenarios and related to natural variability.
- To produce multi-decadal reference databases and monthly climatologies of modelled shelf seas-coastal climate and ecosystems.

T10.1 - Hindcast and scenario studies on coastal-shelf climate and ecosystem variability and change

- Quantify the monthly to decadal variability of the shelf seas-coastal physics/ climate
- Quantify the monthly to decadal variability of the shelf seas-coastal physics/ climate
- Quantify the monthly to decadal variability of the climate effects on the lower trophic levels of the shelf seas-coastal ecosystems
- Quantify the potential effects on shelf seas-coastal climate and ecosystems from global climate change predictions (decades-100 years).
- Quantify the potential effects on shelf seas-coastal ecosystems from management scenarios and related to natural variability
- Produce multi-decadal reference databases and monthly climatologies of modelled shelf seas-coastal climate and ecosystems.

Description of work

The climate and scenario aspects of ECOOP, will focus on the North Sea shelf and coastal regions, with some emphasis also on the Baltic. Due to very similar challenges in the relatively large SESAME project including ECOOP participants representing the Meditteranian and the Black Sea, these areas are not included in this WP, but close contact with SESAME will be established. Although the focus on ECOOP is towards relatively short term operational issues, it is in general of great value to relate "today's" operational status and short term forecast to the "normal" climatological status and variability. Due to lack of process knowledge and quantitative ecosystem information, the use of indexes or anomalies from climatology may be of more value to science and management (e.g. fisheries) than absolute values with large errors. Within weather forecasting these norms are usually based on 30 years of observations. Due to the scarcity of observations in the ocean, such norms must

for most areas be produced by 3D numerical models. This requires the models to be run for several decades, and with present availability of digitised information of the atmospheric forces, it is practical to focus on the last 30-50 years. There are several ongoing activities within EU trying to model 3D phytoplankton dynamics, harmful algae blooms and eutrophication issues related to physics, nutrients, light, sedimentation and re-suspension. Such simulations are of great interest to environmental agencies, OSPAR, HELCOM and ICES, in particular related to "what if" scenarios of reduced nutrient loads. Unfortunately these activities are not well coordinated with little trans-boundary knowledge transfer between ecosystems. In general there is also a great lack of validation of such models, and sound routines for validation needs to be developed and applied.

T10.1 - Hindcast and scenario studies on coastal-shelf climate and ecosystem variability and change

Perform the first 3-Dimentional simulations of the last 30-50 years of temperature, salinity, turbulence and currents. Achieve relevant observations for validation of precision and accuracy. Define analysis methodology to be performed and specific products to be delivered.

S10.1.1 - Quantify the monthly to decadal variability of the shelf seas-coastal physics/climate.

Perform the first 3-Dimentional simulations of the last 30-50 years of temperature, salinity, turbulence and currents. Achieve relevant observations for validation of precision and accuracy. Define analysis methodology to be performed and specific products to be delivered.

S10.1.2 - Quantify the monthly to decadal variability of the climate effects on the lower trophic levels of the shelf seas-coastal ecosystems

Perform the first 3-Dimentional simulations of the last 30-50 years of primary production, concentration of functional groups of algae, nutrients and bottom oxygen, and sedimentation. Achieve relevant observations for validation of precision and accuracy. Define analysis methodology to be performed and specific products to be delivered.

S10.1.3 - Quantify the potential effects on shelf seas-coastal climate and ecosystems from global climate change predictions (future decades).

Downscale the predicted future climate to the shelf seas by running the models used in Task 10.1 for several years several decades into the future with forcing from the coupled climate prediction models, and produce similar monthly averages as in Task 10.1.

S10.1.4 - Quantify the potential effects on shelf seas-coastal ecosystems due to management scenarios and related to natural variability

Define "what if" scenarios to be simulated, define analysis to be done and prepare for simulations.

S10.1.5 - Produce multi-decadal reference databases and monthly climatologies of modelled shelf seas-coastal climate and ecosystems.

Discuss possible challenges by setting up the database and define the user interphase.

Deliverables

D10.1.1.1 (Mo 18): First 30-50 year climate simulations ready
D10.1.1.2 (Mo 18): First 30-50 year simulations of primary production ready
D10.1.2.1 (Mo 18): First 30-50 year simulations of primary production ready

Workpackage number	**WP11**	**Start date or starting event:**	
Workpackage title: International cooperation and technology transfer			

Participant id	1	7	8	10	11	20	26

Person-months per participant:	0,3	13	0,7	2	1,3	5	3
Participant id	27	32	33	48	50	55	67
Person-months per participant:	1	9	3	8	14	9	1

Objectives

WP11 - International cooperation and technology transfer

1) develop capacity in non-Eu countries to use the existing operational oceanographic products from both observing systems and forecasting models
2) develop local capacity of non-Eu countries to observe and model the coastal ocean following the ECOOP standards
3) develop courses and educational material for new professionals, so-called ocean forecasters

T11.1 - Preparation of the training material

- To prepare a consistent description of existing operational oceanographic products and services for educational purposes
- Produce educational material describing the existing operational oceanographic products and services, comprehensive of the description of the funtionalities of ocean forecasting centers and products quality standards.

T11.2 - Focused training for usage of ECOOP operational oceanographic products and services

- To have medium term (two weeks) training courses for the selected participants at the ECOOP regional centers.
- To organize and coordinate medium term (two weeks) training courses for the selected participants at the relevant regional forecasting centers

T11.3 - Integration of non-Eu existing operational forecasting systems

- To organize partner-tailored exchanges of personnel between ECOOP operational European oceanographic sites and non-EU countries organizations involved in operational oceanography.
- Visit periods organization and coordination

Description of work

The first 18 months of this WP are dedicated to the preparation of the educational material and to the start of the evaluation of the non-EU existing coastal forecasting systems. The exchange of the scientists and operators will start mainly in the second part of the project

T11.1 - Preparation of the training material

This Task will be completed in the first 18 months.

S11.1.1 - Educational material for existing operational oceanographic products and services

The SubTask is intended to collect all scientific and technical documentation about operational oceanographic products and services in order to organize a first systematic description for educational purposes for training in WP11 and WP12. The material to be developed includes:

1. specification of operational oceanographic products from all the European coastal/shelf forecasting systems;
2. available services with technical details on the system functioning;

3. product formats, data exchange protocols and archiving systems;
4. quality control and verification procedures to achieve ECOOP standards;
5. best practices in the field of ocean forecasting;
6. software tools for the visualization and downloading of operational products.

In particular a software tool, developed in a previous EU funded operational oceanography project will be customised to read and to visualize all the regional ECOOP forecasting systems products so that trainees will be allowed to navigate the products remotely.

T11.2 - Focused training for usage of ECOOP operational oceanographic products and services

S11.2.1 - Bi-weekly training courses

T11.3 - Integration of non-Eu existing operational forecasting systems

This Task is devoted to the organization of partner-tailored exchanges of personnel between ECOOP operational European oceanographic sites and non-EU countries organizations involved in operational oceanography. The visits will be defined on a bilateral basis in order to macth the needs of the non-Eu countries. Support will be given to scientists or operators that would like to implement observational ECOOP protocols for real time data exchange, make use of real time observations available from the ECOOP network, implement coastal forecasting models with the ECOOP standards.

S11.3.1 - R&D for non-Eu existing operational forecasting systems

In this first phase the non-EU countries systems will be made working with inputs from the regional forecasting centers of the region of interest. Exchange of personnel could be already active to assess the systems.

Deliverables

D11.1.1.1 (Mo 18): Documentation with technical details on the products and services
D11.1.1.2 (Mo 12): Web site for educational material
D11.1.1.3 (Mo 18): Visualization tool for training
D11.3.1.1 (Mo 12): Assessment of the non-EU operational products and service

Milestones and expected result

Workpackage number	**WP12**	**Start date or starting event:**					
Workpackage title: Education and Training							
Participant id	6	8	10	43	65		
Person-months per participant:	1,5	3,1	1,5	2	1		

Objectives

WP12 - Education and Training

The objective of this workpackage is both to advance the knowledge and research skills of the experts and operators and to promote contacts between service providers and end-user community.

T12.1 - Exchange of young scientists

In order to create capacity in the regions without or limited expertise, young scietists from these regions will visit well developed forecasting centers for extended study and hands-on tutorial.

T12.2 - Organization of summer schools and workshops

Develope and improve man power capacity in the Europe through the organizing summer schools and workshops.

T12.3 - Using Distant-learning Technology

Prepare a course on operational oceanography using an e-learning support.
Preparation of the educational material on the operational oceanography

Description of work

T12.1 - Exchange of young scientists

Steering committee will collect requests from regions who need training for young scientists and will arrange host institutions.
Visits will be realized

T12.2 - Organization of summer schools and workshops

First workshop will be organized when ECOOP system reached to V1.
Program of the first workshop will be prepared and presented to SG. Content and location of the first workshop will be decided by the SG.

T12.3 - Using Distant-learning Technology

S12.3.1 - Course material on operational oceanography

The material for a course on operational oceanography will be prepared. This course will content:

- some general information on oceanography focusing on operational oceanography interests as tide, storm surge, river plume, strong currents
- details on regional physical and biological oceanography
- and details on coastal physical and biological oceanography.

For these 2 last points, it will be proposed to focus on some specific applied examples in given areas.
This material will be developed to be used on an e-learning platform planned to be developed outside the project. If this one is not available, the course will be put in powerpoint format.
Content on the course will be done by the 4 partners, each of them focusing in different seas and/or at

different scale level. The course will be afterwards integrated to the platform.

Deliverables

D12.1.1.1 (Mo 8): Report on the content of the young scientists exchange program

Milestones and expected result

WP12-M25 (Mo12): preparation of the plan for training of young scientists and approval by Steering Committe
WP12-M26 (Mo12): Preparation of the content of the first workshop
WP12-M48 (Mo18): Organization of the first workshop

B.9 Other issues

We have not identified any ethical issues in ECOOP.

B.10 Gender issues

The ECOOP consortium includes women in senior scientist/management roles. ECOOP will promote participation of women in science, management and policymaker roles to ensure that women are involved in all aspects of ECOOP

APPENDIX B5

1 : DMI (DMI)

Danish Meteorological Institute

DMI was founded in 1872. Now, more than 125 years later, DMI has a staff of 400 employees and more than 600 associated observers, and an annual turnover of 250 million Danish kroner.

The main objectives of DMI continue to be the same as in 1872, notably:

- to make observations
- to provide forecasts and other information
- to communicate these to the public
- to contribute to the development of the meteorological, oceanographic and related geophysical sciences

DMI provides meteorological, oceanographic and related services for the community within the large geographical area of the Kingdom of Denmark (Denmark, the Faroe Islands and Greenland), including surrounding waters and airspace. DMIís area of activity comprises forecasting and warning services as well as continuous monitoring of weather, sea state, climate, and related environmental conditions in the atmosphere, over land and in the sea. The purpose of these activities is to assist in the protection of life and property as well as to provide a basis for economic and environmental planning (aviation, national defence, shipping, agriculture, sporting and recreational events, etc.). Through scientific research and development DMI secures the optimum accomplishment of its tasks and serves the community with up-to-date information.

DMI has been responsible for the operational monitoring of sea ice, operational support for ship traffic for safe navigation, storm surge warnings, wave forecasts, sea ice drift forecasts and other operational oceanographic products.

Dr. Erik Buch

Dr. Erik Buch (Head of Centre for Ocean and Ice). Graduated as Master of Science, Physical Oceanography, 1978; Lic. Scient. (Ph.D), Physical Oceanography, 1983; Bachelor of Commerce, Management, 1990 and Project Management, 1994. Senior scientist at Greenland Fisheries Research Institute, 1982; Head of Fisheries Department, same institute, 1985. Vice-Director, same institute, 1986. Head of Oceanographic Department, Royal Danish Administration of Navigation and Hydrography, 1990. Head of Division for Operational Oceanography, DMI 1998 (renamed to Centre for Ocean and Ice in 2006). Responsible for the Danish oceanographic contribution to the Greenland Sea Project. Project co-ordinator for the Nordic contribution to World Ocean Circulation Experiment - NORDIC WOCE. Representing DMI in EuroGOOS, chairman of EuroGOOS Baltic Task Team since 1998. Coordinator of the EU-funded project PAPA, WP leader in the MERSEA IP project. Great experience in oceanographic data collection, analysis and presentation. Responsible for oceanographic monitoring program in Greenland Waters since 1980. 104 publications

Dr. Jun She

Dr. Jun She, senior scientist, expertise on waves and 3D ocean modelling and optimum network design, employed by DMI since 1998 and responsible for R&D in DMI Centre for Ocean and Ice. Ph.D in climate dynamics, 1991; Working on typhoon wind simulation, altimetry data assimilation and model optimization at First Institute of Oceanography, China in 1991- 1995; visting researcher at JAMSTEC, Japan in 1995-1996 on optimal buoy array design, research assist. prof. at the Center for Coastal Physical Oceanography, USA in 1996-1998, on 3D ocean modelling and parameterization. Coordinator of EU FP5 project ODON.

Publication List

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Buch, E., J.Elken, J.Gajewski, B.Haakaansson, K.Kahma and K. Soetje, 2004. Baltic Operational Oceanographic System (BOOS). Ocean Obs. 04 Conference, Toulouse.

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She J., P. Berg, J.L. H¯yer, J. Larsen and J.W. Nielsen, 2006. On operational three dimensional hydrodynamic model validation. Proceedings of EuroGOOS 4th Conference, 2005, Brest, p519-526

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2 : BSH (BSH)

Bundesamt fur Seeschifffahrt und Hydrographie

Bundesamt fuer Seeschifffahrt und Hydrographie - The Federal Maritime and Hydrographic Agency (BSH), Germany

The Bundesamt fuer Seeschifffahrt und Hydrographieî (BSH) is a superior federal authority in Germany with responsibility f¸r maritime matters. It comes under the jurisdiction of the Federal Minister of Transport, Building and Housing and was formed in 1990 by merging the îDeutsches Hydrographisches Institutî (German Hydrographic Institute) and the îBundesamt fuer Seevermessungî (Federal Board of Tonnage Measurement).
The objectives of the BSH are:

- General shipping matters such as law of the flag, tonnage measurement, supervision of the Shipsë Gauging Offices, and administration of shipping subsidies;
- The type testing an approval of navigational systems and equipment;
- Hydrographic surveying and wreck search, issuing official nautical charts and publications;
- Marine scientific investigations to enhance the knowledge of the sea;
- Nautical and oceanographic services such as tide calculations, water level forecasts, storm surge warnings, and ice service
- Matters concerning the protection of the marine environment, monitoring the changes of marine environment;
- Supporting maritime shipping and fisheries through scientific and technical research.

The BSH participates in numerous federal and state committees and co-operates with more than 20 international organisations. It has close ties with the International Hydrographic Organisation (IHO), the International Maritime Organisation (IMO), UNESCOís Intergovernmental Oceanographic Commission (IOC), the International Council for the Exploration of the Sea (ICES) and the working groups of the London, Oslo, Paris and Helsinki conventions for the protection of the environment. The BSH also hosts the German secretariat of the Global Ocean Observing System (GOOS). The BSH is member of the EuroGOOS co-operation, EuroGOOS Baltic Task Team (BOOS)and North West Shelf Operational Oceanographic System (NOOS).

Kai Christian Soetje

Kai Christian Soetje, Dipl.-Oceanographer, head of Unit Marine Data and Interpretation Systems, Department Oceanography. Graduated as Master of Science, Oceanography, Hamburg 1977;
Scientific employee University of Hamburg, Evaluation, Standardisation and Interpretation of FLEX-76 Data, 1977-1979;
Head of Subject Operation of Marine Services,1996 - 2003; Development and implementation of an Decision-Aid-System for the water level service;
Member of the BOOS Steering group.
Leader of WP PAPA-OBS (Observations) EU-funded project PAPA
Thorough experience in data evaluation and interpretation. Project manager for the BSH-WWW-project Schifffahrt&Meer.
IT- Co-ordinator Department Oceanography.

Stephan Dick

Stephan Dick, Dipl.-Oceanographer, is head of the BSH modelling group and experienced in different operational modelling activities. After having completed his studies of oceanography in Hamburg (1985), he has been engaged in various national projects at the DHI (Deutsches Hydrographisches Institut ñ German Hydrographic Institute, predecessor of BSH) and the GKSS Forschungszentrum Geesthacht. Since 1990 he has been working in the modelling group of the BSH. His main tasks are the development of storm surge (M¸ller-Navarra et al., 2003), circulation (Dick et al., 2001) and dispersion models (Dick and Soetje, 1990; Dick and M¸ller-Navarra, 2002), validation of model results as well as different applications concerning all kinds of model data (e.g. Dick et al., 1999, Stolwijk et al., 1998). S. Dick is member of the NOOS steering group.

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Dick, S., S.H. M¸ller-Navarra (2002): An Operational Oil Spill Model for the North Sea and the Baltic - Model features and applications. Proceed. of Third R&D Forum on High-Density Oil Spill Response, 11-13 March 2002, Brest, IMO, 61-70
Gayer, G., S. Dick, A. Pleskachevsky, W. Puls, W. Rosenthal (2005): 2004: Numerical modelling of suspended matter transport in the North Sea. Ocean Dynamics (accepted for publ.).
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Stolwijk, S., N. Villars, R. Laane, A. Baart, S. Dick, E. Svendsen, A. Tappin, A. de Vries (1998): Comparison of the performance of five different water quality models of the North Sea. Environm. Modelling & Software 13, 455 - 460

3 : HCMR (HCMR)

Hellenic Centre for Marine Research

The Hellenic Centre for Marine Research (HCMR) is a governmental research organization operating under the auspices of the General Secretariat of Research and Technology (Ministry of Development). It has the mandate to promote basic research in all fields of aquatic environment and to deliver comprehensive scientific and technical support to the public. It was formed by the merging between the National Centre for Marine Research (NCMR) and the Institute of Marine Biology of Crete (IMBC) and it is now composed by the following five Institutes: Oceanography, Marine Biological Resources, Inland Waters (based in Anavyssos), Aquaculture, Marine Biology & Genetics (based in Crete). The HCMR personnel includes 217 scientists and 45 technicians while the administrative and auxiliary personnel numbers 43 and 115 persons respectively. HCMR operates the 62m R/V Aegaeo, the 23m R/V Filia and the manned submersible THETIS as well as two aquariums in Crete and Rhode Islands.

Within the last 20 years the Institute of Oceanography of HCMR has contributed to a large number of international research projects, carried out in several regions of the Mediterranean and the Black Seas, such as: POEM, METROMED, KEYCOP, PELAGOS, OTRANTO, CINCS, MATER, MEDATLAS, MARSAIS, DANUBES, INTERPOL, BIMS, EDIOS, IASON. In the same time it participates in large international initiatives such as GLOBEC, CLIVAR and GOOS and supports actively the efforts of IOC. Since 1996, HCMR is a member of EuroGOOS and contributes by (a) developing a national capacity in operational monitoring and forecasting through the POSEIDON project, and (b) participating in various EU funded research projects for the development of a European capacity in Operational Oceanography [MFSPP (1999-2001), MAMA (2002-2004), Ferry-Box (2002-2005), MERSEA-Strand1 (2003-2004), MFSTEP (2003-2005) and MERSEA-IP (2004-2008)]. The POSEIDON system was implemented during 1997-2000 through a 14Meuro investment of EFTA and the Hellenic Ministry of Economy and since the beginning of 2000 it provides operationally information and forecasts for meteorological conditions, sea-state, currents, hydrological structure and water quality in the Mediterranean and the Aegean Seas. The system is currently (2005-2007 POSEIDON-II) expanded and upgraded following a 10MEuro investment of the same funding agencies.

Kostas Nittis

Ph.D in Physical Oceanography (1993) B.Sc in Physics (1987). Senior researcher of the Institute of Oceanography of HCMR; member of the scientific team of the ìPoseidonî system; in-charge of Ocean Forecasting. HCMR delegate to EuroGOOS and elected member of the EuroGOOS Board since 2004. Main scientific interests: ocean dynamics with emphasis on water mass formation processes and inter-decadal variability; air-sea interaction; numerical modelling and forecasting of hydrodynamics; operational monitoring technologies. Contribution to selected international research projects: MAST3/MATER: modelling studies of Eastern Mediterranean thermohaline circulation. FP4/MFSPP & FP5/MFSTEP: design and implementation of the Mediterranean Moored Multi-sensor Array (M3A). FP5/MARSAIS: SAR products for regional monitoring-forecasting systems. FP5/MERSEA_S1: coordinator of end-user applications development (eutrophication, HAB, oil-spills) using operational forecasting services. FP6/MERSEA: coordination of Mediterranean Observing System ñ contribution to overall System Assessment.

Leonidas Perivoliotis

Leonidas Perivoliotis graduated from the Physics Department of the University of Athens in 1987 and received his M.Sc. in Physical Oceanography in 1990 from the same University. For the next eight years (1990-1998) he joined the Physical Oceanography group of Athens University where he worked as a research associate. During these years he was involved in many European projects related to numerical modelling, while he gained experience in computing resource management for operational applications. He currently holds a position of research scientist in the Hellenic Centre for Marine Research, as a member of POSEIDON project team, being responsible for the operational data post processing and numerical forecasting as well as the development of end user applications. He recently participated to the EC funded Mersea_Strand1 and the ESA/GSE funded projects ROSES and MARCOAST in which he is in charge of the oil-spill forecasting service.

Gerasim Korres

B.Sc in Physics (1989), M.Sc. in Physical Oceanography (1992), Ph. D. in Physical Oceanography (1996). Researcher of the Institute of Oceanography of HCMR; member of the scientific team of the ìPoseidonî system. His research interests and experience include ocean and wave modelling, data assimilation techniques and air-sea interaction processes. He has participated in 10 European and national funded research projects. Recent participation in European Research projects: FP4/MFSPP & FP5/MFSTEP: hydrodynamic and ecological modelling of the Eastern Mediterranean Sea. FP5/FERRYBOX: Assimilation of Ferry-box observations into the Aegean Sea model.

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4 : IFREMER (IFREMER)

Institut FranÁais de Recherche pour l'Exploitation de la Mer

IFREMER was created by decree of 5 June 1984, it is the only French organisation with an entirely maritime purpose. It operates under the joint auspices of the Ministries of "Education, Research and Technology", "Fisheries and Amenities", "Transport and Housing", and "Ecology and Sustainable Development". Being involved in all the marine science and technology fields, IFREMER has the capability of solving different problems with an integrated approach. Ifremer main missions can be summarized as follows:

- Ensure better knowledge, assessment, value enhancement and streamlining in the exploitation of marine resources
- Improve knowledge and means to protect and restore the marine environment
- Enhance the socio-economic development of the maritime world
- Provide assistance to the government, public authorities and organisations concerned with scientific, technical or economic research
- Create and manage facilities of national interest (fleet)
- Gather, disseminate and enhance national and international oceanographic information
- Contribute to implementing of agreements and conventions for international cooperation in the marine field

For the coastal environment, based on a long term experience of monitoring networks, instrumentation design and numerical modeling (coastal hydrodynamics, sediment transport and both pelagic and benthic ecology), Ifremer has launched in 2004 a full research Program on Operational Coastal Oceanography.

J. Legrand

Jacques Legrand, Program Director - Coastal Operational Oceanography at Ifremer, is a senior mechanical engineer (graduated in 1972 from Ecole Nationale SupÈrieure des Arts et Industries of Strasbourg, ENSAIS, then M.S. University of Hawai at Manoa, 1974). The scope of the programme that he is leading is to build an operational information system capable to deliver analysis and forecasts of the physical state and biogeochemical water quality in the coastal area.

He is presently the acting chairman of the Technology Working Group of EuroGOOS and coordinator of the Ifremer contribution to the Marcoast project (ESA-GMES Service ElÈment).

J. Legrand will receive support, for this project, of 2 specialists of coastal hydrodynamics, namely Dr. P. Garreau and P. Lazure, of a senior biologist with long ecperience about harmful algae blooms, Dr. P. Gentien, and of a senior engineer in instrumental development, Y. Aoustin.

S. Pouliquen

Sylvie Pouliquen joined IFREMER in 1992 to manage the Cersat satellite Data Centre. She is in charge of the Coriolis project (including the ARGO Global datacentre), and deputy Director of

MERSEA (as well as co-leader of the work packages on in situ data and information management). She is a member of the EuroGOOS Bureau, Co-chair of the Argo Data Management committee and of the EuroGOOS data exchange working group.

P.Y. Le Traon

Dr. Le Traon, Program Director - Operational Oceanography Systems at Ifremer, is one of the leading European Scientists in the field of remote sensing and operational oceanography. He holds a Ph.D. of University of Toulouse (1990) and a Habilitation ‡ Diriger des Recherches of University of Toulouse (1995). He is Principal Investigator of ERS, ENVISAT, TOPEX/POSEIDON and JASON-1 proposals and is a member of the ENVISAT and SMOS Science Advisory Groups (SAG). Dr. Le Traon is author or co-author of more than 60 publications in the international refereed literature. He is vice chair of the GODAE International steering team, of the international ARGO Science Team and of the MERSEA steering team.

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5 : IMR (IMR)

Institute of Marine Research (Norway)

The Institute of marine research (IMR) is a national centre for research on ocean life and the marine environment, and it employs a total of approximately 600 people. The main tasks of the institute are:

- To study and monitor life cycles and interactions of different organisms in the coastal and marine environment.
- To continuously update present knowledge of marine resources of importance to the fishing and aqua culture industries.
- To develop biological basis and technology for future-oriented fishing
- and aqua culture industries.
- To give the fisheries, authorities and industry advice on the
- management of our marine environment and resources.
- To support development of fisheries and management in third world
- countries.

IMR hosts the Norwegian Marine Data centre (NMD), which has a considerable activity on research data management.

Einar Svendsen
Research activities and fields of interest: 25 years experience in research on physical oceanography, remote sensing and marine ecology. Of special interest is the development and use of NORWECOM (the Norwegian Ecological Model system, operational from 1994) for studying links between physics (climate) and lower trophic level biology and fish recruitment prediction. The model is also used for quantification of long distant transports of nutrients, organic matter and pollution in relation to Norwegian (SFT) and international (OSPARCOM) management tasks. Has published about 50 scientific review articles and taken part in 17 larger expeditions (several as chief scientist) in the Arctic, Antarctic and the Northern Seas.

Morten Skogen
Research activities and fields of interest: More than 10 years of experience in coupled physical, chemical and biological ocean modelling. Main responsibility for maintenance and development of the NORWegian ECOlogical Model system (NORWECOM) used to study primary production and dispersion of particles such as fish larvae and pollution. Has published more than 25 scientific peer-review articles. Principal investigator (PI) in the EurOceans Network of Excellence. Currently coordinating 1 project funded by the Nordic Council of Ministers and 1 national funded project.

Bjoern Aadlandsvik
Research activities and field of interests: Background in mathematics. 18 years of experience with numerical oceanographic modelling. Emphasis on regional models for the Norwegian shelf areas. Applications to regional climate, transport modelling and marine ecology. Special emphasis on modelling transport of fish eggs and larvae. In addition he has experience in data analysis.
Selected publications 2000-2005:

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B. Ådlandsvik, A.C. Gundersen, K.H. Nedreaas, A. Stene, and O.T. Albert, 2004. Modelling the advection and diffusion of eggs and larvae of Greenland halibut (Reinhardtius hippoglossoides) in the northeast Arctic, Fisheries Oceanogr. 13, 403-415.
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Skogen, M.D., S¯iland, H. & Svendsen, E. (2003). Eutrophication issues attacked by a numerical model of the North Sea/Skagerrak. ICES C.M. 2003/P:6

6 : IMS-METU (IMS-METU)

Middle East Technical University, Institute of Marine Sciences
The Institute of Marine Sciences of the Middle East Technical University was established in 1974 with the mission of conducting oceanographic research and providing graduate level education in marine sciences. The Institute has a spacious campus at Erdemli, Mersin, on the Mediterranean coast. IMS offers M.Sc. and Ph.D. degrees in:

- Physical oceanography,
- Chemical oceanography,
- Marine biology and fisheries,

- Marine geology and geophysics.

Research performed by the Institute encompasses a wide range of topics in its main scientific disciplines. Recent studies involve field investigations and numerical modeling of coastal and basin circulation, water mass formation and exchange between basins, strait dynamics, ecosystem modeling and pollution studies, nutrient dynamics, primary production, fish population dynamics and fish stock assessment, investigations of the topography and sub-bottom structure of bottom sediments and rocks, aided by remote sensing methods where appropriate.
Major emphasis and weight have been given to long term, multi-national cooperative studies, resulting in the acquisition of basin wide comprehensive data sets for analyses. Research accomplished by the Institute over the years in the eastern Mediterranean, the Turkish Straits and the Black Sea has vastly increased our knowledge of these seas and has resulted in establishing a rich data base that can be used for the management of the marine environment. The IMS has led and/or participated actively a series of multi-institutional, international oceanographic programs devoted to understanding the physical, biogeochemical, and environmental characteristics of the Black Sea and development of the observing and forecating system in the seas surrounding Turkey.

Sukru¸ Turan Besiktepe
Present position: Assoc. Prof. and Director, Institute of Marine Sciences, Erdemli, Mersin, Turkey
Dr. Besiktepe's research interests include combining observations and dynamical models to attain dynamical processes in semi-enclosed seas with special emphasis on the Black and Marmara seas, dynamics of marine ecosystems, effects of physical processes in ocean ecosystems. Sukru Besiktepe is the Executive Secretary of Black Sea GOOS, and is active in collaboration with the international organisations active in the Black Sea region and represents Turkey in the Intergovernmental Oceanographic Committee.

Temel Ouz
Current research interests: Continental shelf dynamics, dynamics of two-layer stratified flows and its application to the Turkish Straits System, Mesoscale dynamics of ocean circulation, large scale and mesoscale circulation in the Mediterranean, Marmara and Black Seas, Modeling ecosystem dynamics and biogeochemical cycles and their coupling with circulation and upper layer physics, applications to Black and Mediterranean Seas.
web: http://www.ims.metu.edu.tr/
e-mail: oguz@ims.metu.edu.tr

Emin Ozsoy
Fields of interest/expertise: Wave mechanics, tsunamis, coastal and shelf circulation, strait dynamics, modeling of semi-enclosed seas, double diffusive convection, tracers, atmospheric transport and air-sea interaction.
Member of: The Earth, Ocean and Atmospheric Sciences Research Group of the Turkish Scientific and Technical Research Council T‹BİTAK, American Geophysical Union, ICSEM - Physical Oceanography Committee, IGBP/START Planning Committee for the Mediterranean (MEDCOM), SCOR Working Group on Double Diffusion (WG108)
web: http://www.ims.metu.edu.tr
e-mail: ozsoy@ims.metu.edu.tr

Publication List
Besiktepe T. (2003) Density Currents in the Two-Layer Flow: An example of Dardanelles Outflow, Oceanologica Acta,26/3, 243-253.
Gregg M. C. and E. zsoy (2002). Flow, Water Mass Changes and Hydraulics in the Bosphorus, J. Geophys. Res..
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Turul, S., &. T. Besiktepe and Saliholu (2002). Nutrient Exchange Fluxes Between the Aegean and Black Seas Through the Marmara Sea, Mediterranean Marine Science, 3:1, 33-42.

7 : INGV (INGV)

Istituto Nazionale di Geofisica e Vulcanologia
INGV is an independent organization working under the supervision of the Italian Ministry of Education, University and Research (MIUR). INGV is divided into administrative divisions and different Sections. The Group of Operational Oceanography belong to the Section of Bologna.
The group mainly works on Mediterranean nowcasting/forecasting activities ranging from real time data analysis to assimilation techniques development and forecast assessment. In p articular its areas of active research related to this project are:

- -Real Time quality control and dissemination protocols for satellite and in situ data
- -Optimal Estimation techniques for initialization of forecasts
- -Production and dissemination of daily ten days Mediterranean Sea forecasts and weekly high resolution Adriatic Sea forecasts.
- -Study of the Mediterranean and Adriatic Sea dynamics with numerical models.
- -Development of coupled marine ecological models for studies of short-term forecasts and of the impacts of the climatic change on the ecosystems.
- -Air-sea interaction studies in particular for off-line and synchronous ocean-atmopshere modelling.
- -Development of operational applications (i.e. oil spill forecasting system, rapid environmental assessment techniques)

The group of Operational Ocenography is responsible for the Mediterranean Forecasting System. In the framework of Operational Oceanography INGV has been involved in several European Union, ESA and Italian international Projects (MFSTEP, EVK3 -2001-00174, coordinator; MFSPP, MA53-CT98-0171, coordinator; ADRICOSM, ADRICOSM -EXT, coordinator; MERSEA-STRAND 1, EVK3-CT- 2002-0089 partner; MERSEA IP, SIP3-CT-2003-502885_MERSEA, partner; RODMAP, partner)

Nadia Pinardi
Nadia Pinardi holds a Ph.D. in physical oceanography from Harvard University and she has more than 20 years of experience in numerical modeling of the Mediterranean Sea. She is Associate Professor at Bologna University and holds an associate research position at INGV where directs the activities of the operational oceanography group. Pinardi is now coordinating the EU ìMediterranean ocean Forecasting System: Toward Environmental Predictions-MFSTEPî project.

Paolo Oddo
Paolo Oddo holds a Ph.D. in oceanography at the University of Bologna, Environmental Science.
Since January 2005 he is employed at Istituto Nazionale di Geofisica e Vulcanologia in Bologna, where he works in the Adriatic Forecast System and is the responsible for the development modeling system.

Giovanni Coppini
Giovanni Coppini holds a degree in Environmental Science Marine Section from the University of Bologna in October 2000. Since 2003 he is working at INGV first in the European Project MERSEA-STRAND-1 ìMarine Environment and Security in the European Area ñ Strand 1î) and then as project Director of the MFSTEP EU Project. He is now working in the the development of a decision support system in the Adriatic Sea.

Publication List

E. Demirov, N. Pinardi, "The Simulation of the Mediterranean Sea circulation from 1979 to 1993. Part I: The interannual variability", Journal of Marine Systems, 33-34, pp. 23-50 (2002). [ISI: 119; IF: 1.624; CI: 10] [cod. 4014272/02]
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Vichi M., Oddo P., Zavatarelli M., Coluccelli A., Coppini G., M.Celio, S. Fonda Umani e N.Pinardi, (2002) - Calibration and validation of a one-dimensional complex marine biogeochemical flux model in different areas of the Northern Adriatic shelf - Annales Geophysicae, MFSPP special issue, 21
Zavatarelli M. and N. Pinardi, ìThe Adriatic Sea Modeling System: A nested approachî Annales Geophysicae, 21 (Part 2): 345-364 (2003). [ISI: 75; IF: 1.031 ; CI: 4]

8 : MERCATOR (MERCATOR)

MERCATOR-OCEAN
MERCATOR OCEAN is a French public company entirely devoted to operational oceanography. Based in Toulouse, it was founded in April 2002 to lead the Mercator project and strengthen the development of an operational high resolution global ocean monitoring and forecasting capacity.
MERCATOR OCEAN performs as a consortium company (GIP), supported by the six major French institutes involved in oceanography, namely CNES (Space Agency), CNRS (National Research Center), IFREMER (Research Institute for the Exploitation of the Sea), IRD (Research Institute for Development), MÈtÈo-France and SHOM (Hydrographic and Oceanographic Service of the Navy). These public organisations have been supporting the Mercator project since its beginning (1995), and created MERCATOR OCEAN in 2002 as a focal structure to take the lead of this joint initiative for operational oceanography.

MERCATOR OCEAN forecasters provide weekly ocean bulletins to end-users, available on http://www.mercator.eu.org, providing on a pre-operational basis a 3D high resolution (1/158) depiction of North Atlantic and Mediterranean Sea, and starting in since 14 October 2005 the first European demonstrator on global ocean with a ¼° resolution. Research sea campaigns, navy operations, coastal modelling hindcast and forecasting systems, oil spill drift forecasting, offshore, sailing races, fisheries are some of the applications served by the current system.

As part of its activity, MERCATOR OCEAN developed a growing expertise on real time use of in-situ and remote sensed data, which relies on as various technical and scientific competences such as data validation, development of numerical model and associated data assimilation scheme, routine operation of an ocean forecasting system, scientific validation and assessment of the system outputs to meet end-user needs.

Pierre Bahurel
Director of MERCATOR OCEAN.
Formerly engineer in the Oceanographic department of SHOM (French Navy) in charge of space oceanography, lead the Soap/Soprane project to deliver the first operational ocean forecasting system. Since 1999, head of Mercator project (CNES, CNRS, Ifremer, IRD, MÈtÈo-France, SHOM) which became MERCATOR OCEAN Consortium company in 2002. Principal investigator of Jason-1 and ENVISAT satellite altimetric missions. Ocean expert of the CNES (French space agency) Science Committee for Earth observation. Member of the international Global Ocean Data Assimilation Experiment (GODAE). Involved in several EC and ESA projects and an active member of the EC/FP6 MERSEA Integrated Project: member of the Executive Committee and leading the

Design & Assessment activity of this targeted European Global to Regional Ocean Monitoring and Forecasting System. Develops and sets up the Global Ocean Operational Forecasting Center in Toulouse.

Dominique Obaton
Manager of regional physical oceanography in MERCATOR OCEAN.
PhD in physical oceanography in 1994. Researcher at IFREMER in the coastal modelling team during 8 years. Developed the system of the Brittany shelf using MARS2D in the frame on a regional program on algal bloom and eutrophication. Contributed to the development of the Western Mediterranean sea MARS3D system. Spent a year at NERSC (Norway) in 2002 to learn about EnKF assimilation scheme and to test SST assimilation on coastal areas. In 2004, joined MERCATOR OCEAN as IFREMER contribution to the Consortium to be in charge of regional oceanography. Active member of the IBIROOS sustained system, member of the Executive Committee and co-leader with a Spanish partner of the modelling WP. Ensures collaborations and services to coastal modelling teams mainly inside the Consortium and for the IBIROOS partners.

Publication List
Benkiran M., Greiner R., Dombrowsky E., 2006: îMultivariate and multidata assimilation in Mercator projectî, submitted to Journal of Marine Sytems
Crosnier L. and C. Le Provost, 2006, Inter-comparing five forecast operational systems in the North Atlantic and Mediterranean basins: The MERSEA-strand1 Methodology, Journal of Marine System, Special Issue ìMarine Environmental Monitoring and predictionî, in press.
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Larnicol G., S. Guinehut, P. Y. Le Traon, 2006: ì How to combine ARGO and remote-sensing data to monitor the ocean thermohaline variability : Application to the North Atlanticî submitted to JAOT

9 : METO (METO)

UK Met Office
The Met Office is a national meteorological service, with large computing facilities and extensive activities in weather and ocean forecasting and in climate research and prediction.
Detailed information on activities of the Met Office is available at: http://www.metoffice.gov.uk/

Dr Martin Holt
Manager of operational ocean model development. Joined the Met Office in 1984. In 1990 became responsible for development of the operational wave models run at the Met Office, and since 1996 has been manager of the team developing the operational wave models, and 3D shelf seas models. He is also responsible for operational aspects of the deep ocean model FOAM. Experience of project management includes implementation of the deep ocean FOAM model in the operational suite (1997), preparation and implementation of the shelf seas model in the operational suite (2000) and development and implementation of subsequent model upgrades including the nowcast running of POLCOMS-ERSEM for the NW European Shelf.

External project participation has included with ESA the application and use of ERS-1 and ERS-2 altimeter waves data, and Dr Holt has PI status with ESA for ENVISAT waves data. Other EU projects include the MAST-III ESODAE concerted action, and the FP5 MAXWAVE project. Dr Holt is Chair of the NOOS Steering Group, is co-chair of the ICES-EuroGOOS Planning Group for North Sea Pilot Project, and is a member of the JCOMM Expert Team on wind waves and storm surges.

Mr John Siddorn
Coastal Ocean Modelling Scientist. Joined the Met Office in 2002, initially looking at impacts of environmental change and then taking on a role within the shelf seas modelling group. Working mainly on the POLCOMS 3D hydrodynamic model developed at POL, with specific responsibilities for ecocystem modelling within the shelf seas framework.

Prior to moving to the Met Office he was employed as a Mathematical Modeller at the Plymouth Marine Laboratories. At PML he was responsible for setting up a fine-scale modelling capability for the Plymouth Sound region using a version of POLCOMS. Also worked with a number of other hydrodynamic modelling frameworks, as well as being closely involved in the development of PMLís version of the European Regional Seas Ecosystem Model.

External project participation has included the Mediterranean Forcasting System Pilot Project, KeyCoP (both European Union MAST III Programmes), MERSEA Strand 1 and MERSEA integrated project.

Publication List

Holt MW, 2005, Operational oceanography for the NW European shelf seas: NOOS 2002-2005 in proceedings EuroGOOS conference

John R. Siddorn, J. Icarus Allen, Jerry C. Blackford, Francis J. Gilbert, Jason T. Holt, Martin W. Holt, Jeff P. Osborne, Roger Proctor, David K. Mills, 2005, Modelling the hydrodynamics and ecosystem of the North-West European continental shelf for operational oceanography (accepted) J Marine Systems

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Siddorn, J.R., Allen, J.I. & Uncles, R.J. (2003). Heat, salt and tracer transport in the Plymouth Sound coastal region: A 3D modelling study. Journal of the Marine Biological Association of the UK, 83, 673-682.

Siddorn, J.R. & Allen, J.I. (2002). Surface heat fluxes and ecosystem function in the Cretan Sea (Eastern Mediterranean): a modelling study. Annales Geophysicae, 20, 1-12.

10 : MHI (MHI)

Marine Hydrophysical Institute

The Marine Hydrophysical Institute was originated in 1948 in Moscow and belonged to the Academy of Sciences of USSR. MHI was delivered to the Academy of Sciences of Ukraine in August 1961 and was replaced to Sevastopol in 1963. MHl is the research institute with broad interests in physical oceanography from small to large scales. Beginning from the mid of 70s MHI was responsible for the ocean space research programs of USSR. It was prepared the scientific program of the first Soviet oceanographic satellite ìKosmos-1151î which was launched in 1981. Processing, analysis and applications of the remote sensing data of IR, visible band and microwave passive sampling of the ocean is one of the major activities of MHI. Last decade MHI concentrated efforts on the multidisciplinary study of the Black Sea basin. One of the major goals of investigations concerns the development of the Black Sea Observing and Nowcasting/Forecasting systems where remote sensing is considered as the key element and supports by national Ukrainian projects of National Ukrainian Academy of Sciences and National Space Agency of Ukraine.

Korotaev Gennady K.

Deputy director

Field(s) of specialization: oceanography (operational oceanography, remote sensing of the ocean, modeling of the large-scale circulation, physic of mesoscale variability)

EDUCATION:

1992 - Professor

1981 - Sci.D. "Structure kinematics and dynamics of synoptical eddies in the ocean", MHI, Sevastopol, Crimea, Ukraine

1971 - Ph.D. "Methods of the boundary layer in the theory of steady marine currents", MHI, Sevastopol, Crimea, Ukraine

1968 - M.S. Mechanics and Mathematics Faculty, Moscow State University, Moscow, USSR

Recent research activities. (Principle investigator of the set of projects supported by NASA, Civilian Research and Development Foundation (USA), Science and Technology Center in Ukraine (USA, Canada, Sweden, EC), CNES (Space Agency of France), INREA (France) Ukrainian Academy of Sciences and Ukrainian Space Agency.

Kubryakov Alexander I.

Senior Scientist

Education: Moscow State University, Department of Mechanics and Mathematics, 1977

Highest Degree: Ph. D. in Physicsl and Mathematics

Scientific Interests:

Dynamics of upper mixed layer; mathematical modelling of ocean circulation; study of processes of formation and evolution of water masses: analytical methods, numerical simulations, experiments in situ and comparison analysis.

Dorofeev Victor L.

Senior Scientist

PhD in Physics and Mathematics, thesis title "About interaction of isolated vortices and Rossby waves with ocean coasts and bottom topography ", Marine Hydrophysical Institute, Ukrainian Academy of Sciences,Sevastopol, USSR. Supervisor: Prof. V.D.Larichev.

RESEARCH INTERESTS: Mesoscale variability,numerical simulation of mesoscale eddies and ocean curents, wind-driven circulation, data assimilation, ,ecological modeling.

Publication List

M. Chami, E.B. Shybanov, G.A. Khomenko, M. E-G. Lee, O.V. Martynov, G.K. Korotaev
Spectral variation of the volume scattering function measured over a wide range of scattering angles in a coastal environment Applied Optics, 2006 (accepted)
M. Chami, E.B. Shybanov, G.A. Khomenko, M. E-G. Lee, O.V. Martynov, G.K. Korotaev, G.A. Berseneva, T.Y. Churilova Variability of the relationship between the particulate backscattering coefficient and the volume scattering function measured at fixed angles Journ. Geoph. Res. Ocean 2006 (accepted)
Oguz T., Dorofeyev V.L., Korotaev G.K. Modeling ecosystem of the Black Sea. Ukr. Jour. of Physical Oceanography,2006 (accepted).
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Dorofeyev V.L., Korotaev G.K. Assimilation of satellite altimetry data in the eddy-resolving model of the Black Sea circulation. Ukr. Jour. of Physical Oceanography, No 1, 2004, p.52-68
G.K. Korotaev Remote sensing of the ocean from space. In: The Ocean Carbon Cycle Climate. M.Follows and T.Oguz (eds.)Kluwer Academic Publishers 2004 pp189-216.

11 : NERC (NERC)

Proudman Oceanographic Laboratory

POL was originally formed in 1866 and has been supported by the Natural Environment Research Council (NERC) since 1969. It is now a NERC Research Centre and an associate department of the University of Liverpool, linked and adjacent to the university's 5* Department of Earth and Ocean Sciences. POL maintains world-class interdisciplinary research strengths in estuarine and coastal systems, shelf oceanography, oceanographic data archiving and dissemination, plus strong capabilities in marine technology and operational oceanography. The laboratory has particular expertise in interdisciplinary modelling of estuaries and shelf-seas, coastal geomorphology, operational measurement of global sea-level, near-bed turbulence and acoustic measurement of currents and suspended matter. POL hosts the British Oceanographic Data Centre (BODC) and the Permanent Service for Mean Sea Level (PSMSL). POL research programmes related to this proposal are Shallow Coastal Seas: Function and Impacts Of Change (P2) and Modelling and Observation Systems for Coastal Seas (P3). The former is aimed at understanding small scale processes, their contribution to shelf sea circulation and impact on sediment transport and biological production, and other physical - biological interactions in shelf, slope and upper ocean waters, as well as short and long term morphodynamic changes. The latter provides expertise in near real-time observing systems and the 3-D POLCOMS (POL Coastal Ocean Modelling System) coupled to ERSEM (European Seas Regional Ecosystem Model). POL has a long history in operational oceanography and is also a partner in the National Centre for Ocean Forecasting (NCOF) which provides us with access to a wide range of meteorological and ocean model outputs.

Roger Proctor

Roger Proctor is a Band 4 scientist with over 20 years experience of modelling coastal seas. Leader of the POL Science programme "Modelling and Observation systems for shelf Seas". Research interests include: operational forecast systems (work package leader in EU projects ODON (Optimal Design of Observing Networks) and FerryBox; represents POL in NOOS (Northwest Shelf Operational Oceanography Services); particle tracking studies of the fate of oil spills and fish larvae dispersion; coupled hydrodynamic-ecosystem models to explore physical-biological interactions. Study areas include the NW European continental shelf and several regions around the world (e.g. New Zealand, USA, Korea, Australia). Executive Committee member for the National Centre for Ocean Forecasting. Member of the GODAE coastal/shelf Seas working group.

Michael John Howarth

Howarth has 36 years experience of studying the response of continental shelf seas to tidal, meteorological and density forcing by the planning and analysis of measurements, and their synthesis with theory and modelling, and of applying this understanding to predicting the oceanography of continental shelf seas. He setup and leads POLís Coastal Observatory.

Jason Holt

Jason Holt, a Band 4 scientist, leads the POLCOMS model development team within "Modelling and Observation systems for shelf seas" POL programme. With 12 years experience of modelling, observational and laboratory based aspects of physical oceanography, he specialises in the synthesis of model and observations to develop our understanding of shelf-sea physical and coupled physics-biological systems. Particular areas of interest include: the accuracy and predictive capability of shelf sea modelling systems; the shelf-sea-wide impact of small scale dynamical features; transports and budgets of heat, carbon, nutrients and SPM; and the use of massively parallel computers for shelf-sea modelling and their impact on our research capabilities. Leads the CASIX modelling science element, is a member of the QUEST Scientific Liaison Group and the NERC High Performance Computing Steering Committee.

Publication List

Recent publications include:

Andreu-Burillo, I., Holt, J., Proctor, R., Annan, J.D., James, I.D., Prandle, D. Assimilation of Sea Surface Temperature in the POL Coastal Ocean Modelling System, Journal of Marine Systems, in press.

Holt , J.T. and I.D. James (2001) An s-coordinate density evolving model of the North West European Continental Shelf. Part 1 Model description and density structure. Journal of Geophysical Research, 106, C7: 14015-14034.
Holt J.T. & Proctor R. (2003) The role of advection in determining the temperature structure of the Irish Sea, J Phys Oceanogr 33, 2288-2306.
Holt, J.T. , R. Proctor., J.C. Blackford, J.I. Allen, M. Ashworth. (2004) Advective controls on primary production in the stratified western Irish Sea: An eddy resolving model study. Journal of Geophysical Research, 109, C05024
Holt, J.T. , J. I. Allen, R. Proctor, F. Gilbert (2005) Error quantification of a high resolution coupled hydrodynamic-ecosystem coastal-ocean model: part 1 model overview and assessment of the hydrodynamics. Journal of Marine Systems, 57, 167-188.

12 : USOF (USOF)

University of Sofia, Department of Meteorology and Geophysics

The University of Sofia "St. Kliment Ohridski" has been founded in 1888, lectures in meteorology have been given since 1889. The Department of Meteorology and Geophysics has been established in 1946 as a part of the Faculty of Physics. The research in Meteorology and Oceanography is carried out in collaboration with the Institutes of Bulgarian Academy of Science. Fields of expertise: coastal and shelf sea oceanography (mostly Black Sea and Mediterranean), integrated coastal zone management, drift and oil-spill models, marine biology and chemistry and modelling of marine environment, climate modelling, dynamics of atmosphere and oceans. The Department has long lasting experience in numerous international projects (EU, IAEA, NATO) and in teaching in meteorology, geophysics and oceanography.

Emil Stanev

Prof. Dr. Emil Vassilev Stanev
M. Sc. in physics/meteorology (1972), Ph. D in physical oceanography (1977), Doctor of Physics (equivalent to habilitation degree, 1990). He was Alexander von Humboldt Fellow at the Institut f¸r Meereskunde, Hamburg, Visiting Professor at the University of Liege (Belgium) and IMGA/CNR (Italy). Fields of interest/expertise: physical oceanography, dynamics of atmosphere and oceans, air-sea exchange, marine biogeochemistry and modelling of marine environment. He is author of more than 90 papers in refereed journals and Editor of Ocean Modelling (Elsevier).

Elisaveta Peneva

Dr. Elisaveta Peneva (assistent professor), M.Sc. in physics/meteorology (1996), Ph.D in physical oceanography (2001). Elisaveta Peneva was Postdoc for two years in JRC (Ispra, Italy). Research interests: ocean modelling, regional atmospheric modelling, data analysis, climate dynamics, water quality. She is author of more than 10 papers in refereed journals and worked in several EU projects.

Nickolay Rachev

Dr. Nickolay Rachev (assistent professor), M.Sc. in physics/meteorology (1982), Ph.D in physical oceanography (1999). Nickolay Rachev was Postdoc for two years in ICTP and Instituto Thalassographico, Trieste, Italy. Research interests: ocean modelling, coastal sea oceanography. He is author of more than 10 papers in refereed journals and worked in several EU projects.

Publication List

Rachev, N. H. and Stanev, E. V. (1997) Eddy processes in semi-enclosed seas. A case study for the Black Sea, J. Phys. Oceanogr., 27, 1581-1601.
Stanev, E. V. (2005) Understanding Black Sea Dynamics: Overview of recent numerical modelling, Oceanography, Vol.18, No.2, 52-71.
Stanev, E. V., J. M. Beckers, Ch. Lancelot, J. V. Staneva, P. Y. Le Traon, E. L. Peneva, and M. Gregoire (2002). Coastal-open ocean exchange in the Black Sea: Observations and modeling. Estua. Coast and Shelf Sci., 54, 601-620.
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Stanev, E. V., G. Floeser, and J.-O. Wolff (2003c). First- and higher-order dynamical controls on water exchanges between tidal basins and the open ocean. A Case Study for the East Frisian Wadden Sea, Ocean Dynamics, 53: 146-165.
Stanev, E. V., J. Staneva, J. L. Bullister, J. W. Murray (2004) Ventilation of the Black Sea Pycnocline. Parameterization of Convection, Numerical Simulations and Validations against Observed Chlorofluorocarbon Data. Deep-Sea Res. 51/12, 2137-2169.
Stanev, E. V., J. ñO. Wolff, H. Burchard, K. Bolding, and G. Floeser (2003). On the Circulation in the East Frisian Wadden Sea: Numerical modeling and data analysis. Ocean Dynamics, 53, 27-51.

13 : ENEA (ENEA)

Ente per le Nuove tecnologie, l'Energia e l'Ambiente

ENEA (Agency for New Technology, Energy and the Environment) is the Italian government agency responsible for the areas of new technology, energy and the environment. Its two fundamental tasks are to conduct research in these areas and to diffuse the results nationally.
More particularly, ENEA's activities involves: research, development and testing of innovative technologies and equipment, and transfer of innovations to industry and public authorities; development of technologies, equipment and components designed to exploit renewable energy sources and to save energy, and stimulation of demand for them; design, construction and testing of

demonstration plants; environmental surveying and monitoring; research and assessment of the impact of productive activities on human and natural environments.

Manzella Giuseppe M.R.
He is working for ENEA since 1992. He has a decadal experience in physical oceanography - data analysis and data management. He has participated to several national and international oceanographic programs financially supported by EC, UNESCO, Italian Ministry of Research, Italian Ministry of Environment.

Marullo Salvatore
He works since 1979 on circulation of the Mediterranean Sea and air-sea interaction. He is an expert in data analysis and satellite oceanography. More in detail I was involved in the study of the heat budget of the Mediterranean Sea using both in situ and satellite data. He collaborate with Dr. Bignami et al. to the definition of new bulk formulae to estimate the longwave budget at the air-sea interface in the Mediterranean Sea and investigate new methods to estimate the shorthwave budgets using meteosat data. A significant part of its research effort is also devoted to field activity during several oceanographic cruises to measure hidrological and air-sea fluxes parameters.
Actually most of the research activity is devoted to the use of satellite data to study the ocean environment. These studies include:

- Analysis and processing of long time series of AVHRR data
- Ocean Color: Analysis of time series and chlorophyll algorithms
- Altimeter and scatterometer data
- Satellite data merging and objective analysis

Publication List
- Napolitano E., G. Sannino, V. Artale, S. MARULLO, 2003. Modeling the baroclinic circulation in the area of the Sicily channel: The role of stratification and energy diagnostics J. Geophys. Res.Vol. 108, No. C7, 3230
- Santoleri R., V. Banzon, S. MARULLO, E. Napolitano, F. DíOrtenzio, and R. Evans, 2003. Year-to-year variability of the phytoplankton bloom in southern Adriatic Sea (1998-2000): SeaWiFS observations and modelling studyî. J. Geophys. Res . VOL. 108, NO. C9, 8122, doi:10.1029/2002JC001636
- S. MARULLO, E. Napolitano, R. Santoleri, B. B. Manca, R. Evans, 2003. The variability of Rhodes and Ierapetra gyres studied by remote sensing observation, hydrographic data and model simulations during LIWEX (october 1994-april 1995). J. Geophys. Res. VOL. 108, NO. C9, 8119, doi:10.1029/2002JC001393.
- D'Ortenzio F., Ragni M., MARULLO S., Ribera díAlcal M., 2003. îHas biological activity in the Ionian Sea been enhanced by the Eastern Mediterranean Transient? Results from the analysis of remote sensing observationsî. Journal Geophysical ResearchVOL. 108, NO. C9, 8113, doi:10.1029/2002JC001556,

14 : AWI (AWI)

Alfred Wegener Institute for Polar and Marine Research
The Alfred Wegener Institute for Polar and Marine Research (AWI) is a member of Helmholtz Association of German Research Centers. Itcontributes significantly to global research in environmental and geosciencies. Currently the main part of AWI research and infrastructure responsibilities is within the MARCOPOLI program which merges the three thematic topics of marine, coastal and polar research as well as the associated infrastructure.

Jens Schroeter
Born 24.07.1951, Diplom in meteorology (1978, University of Hamburg), PhD in oceanography (1983, University of Hamburg)
Position: Senior research scientist at the Department of Climate System of AWI
Research interests and experience: Numerical ocean modeling, inverse methods, data assimilation in ocean circulation models

Sergey Danilov
Born 24.03.1959, Diplom in physics (Moscow Institute
of Physics and Technology, 1982), PhD in acoustics (1986, Acoustical
Institute of Russian Academy of Sciences); Position: Research scientist at the Department of Climate System of AWI; Research interests and experience: Numerical ocean modeling, geophysical fluid dynamics, theory of turbulence

Publication List
Danilov, S., Kivman, G., Schroeter, J.(2005).
Evaluation of an eddy-permitting finite-element ocean model in the North Atlantic, Ocean Modelling, 10, 35-49.
Sidorenko, D., Danilov, S., Kivman, G., Schroeter, J.(2006).
On the use of a deep pressure gradient constraint for estimating the steady state ocean circulation from hydrographic data, Geophysical research letters. DOI: 10.1029/2005GL024716
Danilov, S., Kivman, G., Schroeter, J.(2004).
A finite element ocean model: principles and evaluation, Ocean Modelling, 6,125-150.
Hellmer, H. H., Schodlok, M. P., Wenzel, M., Schroeter, J. G.(2005).
On the influence of adequate Weddell Sea characteristics in a large-scale global ocean circulation model, Ocean dynamics, 55(2), 88-99.
Wenzel, M., Schroeter, J., Olbers, D.(2001).
The annual cycle of the global ocean circulation as determined by 4D VAR data assimilation, Progress in Oceanography, 48, 73-119.

15 : AZTI-Tecnalia (AZTI-Tecnalia)

FundaciÛn AZTI - AZTI Fundazioa

AZTI-Tecnalia, Technological Centre, is a non-profitable organisation committed to the social and economic development of the food and fishing industries, and to the protection of the marine environment and its natural resources. The Marine Research Division of the centre carries out research in order to provide innovative solutions for the requirements of the sectors, administrations and society, to achieve a sustainable management of our marine resources. The R and TD areas in wich the unit is divided are:
- Integrated Coastal Zone Management
- Systems of Operational Oceanography
- Competitive and Responsible Fisheries Management.
- Aquaculture, Marine and Fishing Technology

Luis Ferrer RodrÌguez

PhD Thesis (2002): About the statistical and spectral behaviour of waves in coastal areas and their numerical modelling.
Research lines: Numerical modelling (hydrodynamic models, individual based models, ecosystem models), model programming, statistical and spectral oceanographic database, coastal and oceanic engineering, waves and marine climate, small and large scale experiments at laboratory and in the field.
Present job at AZTI (from 2003). Previous jobs: University of Las Palmas G.C. (5 years) and SIDMAR company (2 years).

Yolanda Sagarminaga Zabala

Research lines: Teledetection, Geographycal Information Systems, databases, biological Oceanography
Degree in Biology, University of The Basque Country (1993)
Present job at AZTI (from 1998)

Pantxika Otheguy Mendionde

Research lines: Fluid mechanics, oceanography and meteorology
PhD thesis (2005) in Hydrodynamics at LadHyX - Ecole Polytechnique (Palaiseau, France)
2002-2005 DEA (French Master degree) in Fluid Mechanics obtained with "Mention trËs bien" at "UniversitÈ Pierre et Marie Curie - Paris~6".
1999-2002 Engineering Degree of Ecole Nationale SupÈrieure des Techniques AvancÈes (ENSTA, Paris). Major : Fluid Mechanics, Oceanography and Meteorology.
Present job at AZTI (from 2006)

Publication List

-Ferrer, L., G. R. RodrÌguez y P. Izquierdo, (1997), Estudio numÈrico sobre la transformaciÛn de la altura de ola en aguas poco profundas por efectos de asomeramiento, refracciÛn y saturaciÛn, XXVI ReuniÛn Bienal de la R.S.E.F., September 1997, Universidad de Las Palmas de Gran Canaria.
-Izquierdo, P., G. R. RodrÌguez, J. C. Nieto y L. Ferrer, (1997), Estudio comparativo de diversas expresiones algebraicas para la soluciÛn en forma explÌcita de la relaciÛn de dispersiÛn de ondas, XXVI ReuniÛn Bienal de la R.S.E.F., September 1997, Universidad de Las Palmas de Gran Canaria.

16 : BBH (BBH)

Bolding & Burchard Hydrodynamics

Bolding & Burchard Hydrodynamics (BBH) was funded in Varese (Italy) in 1999 during an entrepreneurship programme of the European Communities. The purpose of BBH is research, development and scientific consultancy in the field of numerical hydrodynamics. The partners are Karsten Bolding (Denmark) and Hans Burchard (Germany), who both have a long-year experience in oceanography and coastal engineenring with specific expertise in three-dimensional hydrodynamic modelling, turbulence, mixing, coupled
ocean-atmosphere dynamics, data assimilation, computer science, etc.
BBH initiated and is very actively involved in the development and application of the two software packages GOTM and GETM. The General Ocean Turbulence Model (GOTM) is a one-dimensional modelling tool, which have played a major role in a number of European funded research projects. The General Estuarine Transport Model (GETM) is a three-dimensional hydrodynamic model for estuarine, coastal, and shelf sea dynamics. Both models are released under the Gnu Public License.

Karsten Bolding

Dr. Karsten Bolding has a M.Sc. in Civil Engineering and a Ph.D. in Physical Oceanography. Karsten Boldings main research activities are related to the development of numerical ocean models. Karsten Bolding is responsible for the maintenance of the GOTM and GETM source code. His research is focused on implementations of efficient parallel algorithms.

Hans Burchard

Prof. Dr. Hans Burchard has a M.Sc. in Applied Mathematics and a Ph.D. in Physical Oceanography. Hans Burchards main research activities are marine turbulence and numerical ocean modelling with focus on estuaries, coastal seas and shelf seas. Since 2002, he is Professor at the Baltic Sea Research Institute, Warnemuende.

Publication List

Bolding, K., H. Burchard, T. Pohlmann, and A. Stips, Turbulent mixing in the Northern North Sea: a numerical model study, Cont. Shelf Res., 22, 2707-2724, 2002.
Stips, A., K. Bolding, T. Pohlmann, H. Burchard, Simulating the temporal and spatial dynamics of the North Sea using the new model GETM (general estuarine transport model), Ocean Dynamics, 54, 266-283, 2004.
Villarreal, M.R., K. Bolding, Burchard, H., and E. Demirov, Coupling of the GOTM turbulence module to some three-dimensional ocean models, pp. 225-237. In: Baumert, H.Z., J.H. Simpson, and J. S¸ndermann (eds.), Marine Turbulence: Theories, Observations and Models, Cambridge University Press, Cambridge, 630 pp. 2005.
Burchard, H. and K. Bolding, GETM, a general estuarine transport model. Scientific Documentation, European Commission, Report EUR 20253, 157 pp., 2002.
Mathieu P.-P., E. Deleersnijder, B. Cushman-Roisin, J.-M. Beckers and K. Bolding, 2002. The role of topography in small well-mixed bays, with applications to the lagoon of Mururoa, Continental Shelf Research, 22, 1379-1395

17 : BIU (BIU)

Bar Ilan University

The Department of Geography and Environment at Bar Ilan University was founded in 1969 as the Department of Geography. In 2005 the word ìEnvironmentî was formally added to the name to reflect the increasing focus on the study of environmental topics and issues. The department offers BA, MA, and PhD degrees with specialization in physical geography, social geography, environmental studies, remote sensing and GIS, and geoarcheology. There are eleven full time, permanent faculty members as well as fifteen adjunct lecturers. They cover a wide range of fields with the physical geography faculty having expertise in meteorology, oceanography, geology, ecology, geomorphology, and petrology. Active extramural research is being conducted in all of the above fields. In the current academic year there are nearly 200 students studying for the BA degree, 55 MA students, and 17 doctoral candidates.

Steve Brenner

Prof. Steve Brenner is the current department chairperson. He holds a B.S. degree in meteorology and physical oceanography from the City College of New York (1975) and a PhD in meteorology from MIT (1982). He joined the department in a full time, tenured position in 2003 and before that served as the head of the department of physical oceanography at Israel Oceanographic and Limnological Research since 1985. His research interests include numerical modeling of atmospheres and oceans, geophysical fluid dynamics, operational oceanography, and seasonal climate forecasting. He has authored and coauthored over 150 scientific journal papers, chapters in books, conference proceedings, and research reports. His peer-reviewed papers have appeared in leading journals such as Deep Sea Research, Journal of Climate, Journal of Geophysical Research, Geophysical Research Letters, Nature, and Annales Geophysicae. He has participated in the EU projects MFSPP and MFSTEP as a partner and CYCLOPS as an advisor. He is currently a member of the Operational Advisory Group of MOON.

Publication List

Brenner, S., 2003. Simulations with a relocatable, nested, high resolution model: the eastern Levantine experience. In: Oceanography of the Eastern Mediterranean and Black Sea, A. Yilmaz (Editor), Tubitak Publishers, Ankara, Turkey, pp. 1022-1028.
Brenner, S., 2003. High-resolution nested model simulations of the climatological circulation in the southeastern corner of the Mediterranean Sea. Annal. Geophys., 21, 267-280.
Groom, S., B. Herut, S. Brenner, G. Zodiatis S. Psarra, N. Kress, M. Krom, C. Law, and.P.Drakopoulos, 2005. Satellite derived spatial and temporal biological variability in the Cyprus eddy. Deep Sea Res. II, 52, 2990-3010.
Brenner, S., I. Gertman, and A. Murashkovsky, 2005. Pre-operational ocean forecasting in the southeastern Mediterranean: Model implementation, evaluation, and the selection of atmospheric forcing. J. Mar. Systems, in press.

18 : Cefas (CEFAS)

The Secretary of State for Environment Food & Rural Affairs acting throught the Centre for Environment Fisheries & Aquaculture Science

Cefas is a multi-disciplinary scientific research and consultancy centre providing a comprehensive range of services in fisheries, management, environmental monitoring and assessment, and aquaculture to a large number of clients worldwide.
We have more than 500 staff, 3 laboratories and our own ocean-going research vessel, and over 100 years of fisheries experience. We have a wealth of experience in multi-disciplinary projects at both national and international levels. We have a long and successful track record in delivering high quality services to clients in a confidential and impartial manner. We have an extensive network of contacts, encompassing other policy, research, management and consultancy organisations. Many Cefas scientists are leaders in their field and advisors on international bodies such as ICES, EIFAC, NASCO, NAFO, STECF, ICCAT and the IWC.

David Mills

Senior Scientist - Centre for Environment, Fisheries and Aquaculture Science

PROFESSIONAL EXPERIENCE
Research into physical control of ecosystem structure and function and in particular:
Use of novel observational systems to improve observation of and understanding of marine systems
Development of more effective marine monitoring programmes
Development and application of complex coupled hydrodynamic-ecosystem models.
Development of technological solutions to improved observations of marine system

Leading role in the successful development of the CEFAS SmartBuoy programme and its subsequent commercialisation.
Interests span across the full range of oceanographic disciplines with much of my work carried out within multi-disciplinary programmes.
Providing policy and technical advice to Defra and ICES
Responsible for advice to DEFRA and ICES on environmental processes in shelf seas
Member of OSPAR Eutrophication Technical working group (ETG)
Head of UK ETG MON (Monitoring) delegation 2004
Chair of Intersessional Correspondence Group of ETG on application of numerical models for testing nutrient reduction scenarios – Chair of OSPAR workshop on eutrophication monitoring
Previous DEFRA representative on the UK Inter-Agency Committee on Marine Science and Technology (IACMST) GOOS Action Group
Natinal and International Collaboration and / or Representation
UK delegate to Seanet -an EU concerted action programme focussed on use of oceanographic instrumentation on buoys
Previous Chair and now member of the ICES Phytoplankton Ecology Working Group.
Co-chair and organiser of international workshop on eutrophication held in the Netherlands in March 2001.
Member of NERC Marine Science Peer Review Committee (2002-2003)
Member of MATSIS (Methods of assessing the trophic status of the Irish Sea) steering committee 2004 – 2007 – EU Intereg prgramme

19 : CLS (CLS)

Collecte Localisation Satellite
CLS was established in early 1986 as a subsidiary of CNES (French Space Agency) and IFREMER (the French national agency for the study and management of marine resources). CLS started an activity in satellite altimetry in 1990 with the creation of the CLS Space Oceanography Division. About sixty engineers and scientists now work in this division. The division is involved in numerous projects in remote sensing, oceanography and operational oceanography. A few recent accomplishments are listed below:
CLS was involved in the development of the ground processing systems of ENVISAT and Jason-1.
CLS on behalf of CNES and ESA is responsible for the validation of the scientific algorithms and products respectively for the Jason-1 and ENVISAT missions.
CLS developed and operates on behalf of CNES the SSALTO/DUACS multiple altimeter processing system. The system is serving the main operational oceanography centres in the world. SSALTO/DUACS processing techniques and merged altimeter products are internationally recognized.

Gilles Larnicol
Dr. Larnicol is the head of the oceanography department of the Space Oceanography Division. He hold an engineering degree from the Ecole Nationale SupÈrieure de Techniques AvancÈes (Paris) and a PhD from University of Bretagne Occidentale (Brest) in the field of ocean data analyses. He has experience both in operational a research oceanography through the participation to numerous EC and national projects. (E.g. MFSPP, MFSTEP, GYROSCOPE, MERCATOR, DIADEM/TOPAZ, MERSEA IP).

Marie-HÈlËne Rio
Marie-HÈlËne Rio is a research scientist in the Space Oceanography division of CLS. She has been working during her PhD on the combined use of geoid models (CHAMP, GRACE), in-situ data (hydrographic profiles and drifting buoy velocities) and altimetric measurements to estimate the ocean Mean Dynamic Topography. She thus acquired a wide range of knowledge of ocean dynamics, geodesy and space technics. Her mean dynamic topography is now used in the framework of several international projects (ENACT, GOCINA and MERSEA/MERCATOR), and it is a major contribution for up-to-date altimetric assimilation experiment.

Joel Dorandeu
J. Dorandeu is the head of the Altimetric Data Processing and Analysing Department of the CLS Space Oceanography Division and has a well recognized experience in altimeter systems quality check and performance assessment. He is Co-Investigator of ERS, ENVISAT, TOPEX/POSEIDON and Jason-1 proposals, member of the TOPEX/POSEIDON and Jason Science Working Team (NASA/CNES), and member of ENVISAT Ra-2&MWR Cross-Calibration and Validation Team (CCVT) (ESA) and Quality Working Group (QWG). He is Responsible of the CLS Near Real Time Altimeter data processing for oceanography and climate studies

Publication List
- Dorandeu, J, M. Ablain, Y. Faugere, F. Mertz, B. Soussi, and P. Vincent, 2004. Jason-1 Global Statistical Evaluation and Performance Assessment. Calibration and Cross-Calibration Results. Marine Geodesy, 27: 1-28

20 : CLU (CLU)

CLU ltd
CLU srl is a company composed by a team of young people with both scientific and organizational background. Its mission is to support scientific project management and contribute to disseminate efficiently their results to scientific and non-scientific people, choosing the best communicative tools and using them in the best way.

CLU was involved in several European projects as MATER, MFSPP and MEDNET; actually CLU is partner of MFSTEP (Mediterranean Forecasting System Towards Environmental Prediction) project supported by European Community (V Framework Program ñ Project n8: EVK3CT2002-00075) and involved in MERSEA IP - Marine EnviRonment and Security for the European Area-Integrated Project (VI Framework Program).
CLU's major activities are:

- Project management support;
- communication plan;
- new technologies and web site development;
- multimedia applications;
- communicative tools consistent with project's needs.

Luisella Bianco
a Physic degree - worked from 1994 to 1998 in a consulting company (Andersen Consulting) where she leaded different projects related to organization, communication matter and new media.
From 1999 to 2000 she collaborated at ISAO, managing the implementation of communication tool for dissemination of the project results (MFSPP, MEDNET, SINAPSI)

Claudia Cesarini
a degree in Environmental Science - has worked from 1996 to 2000 in collaboration with the scientific team directed by Nadia Pinardi at ISAO institute in Bologna, in important European project as MATER, MFSPP and MEDNET.
Her scientific background represents a fundamental contribute in managing scientific data dissemination, which is one of the most important aim of the company.

21 : CMRC (CMRC)

Coastal and Marine Resources Centre
The Coastal and Marine Resources Centre (CMRC) represents a multi-disciplinary group within the Environmental Research Institute, University College Cork, dedicated to coastal and ocean research and resource studies. CMRC is a leader in the application of GIS to coastal and marine issues in Ireland, and an acknowledged centre of excellence in the application of a range of specialized techniques in the assessment and management of resources. The overall objective of CMRC is to investigate the interactions between biological and physical coastal processes and human populations, with a view to establishing a level of sustainable utilization, and therefore, stimulating the adoption of scientifically based integrated coastal management. Research activities at CMRC focus on four main areas:
• Coastal Processes and Seabed Mapping;
• Integrated Coastal and Marine Area Management;
• GIS, Remote Sensing, Modelling and Internet Technologies;
• Marine Mammals and Seabirds.

Dr Éamonn Ó Tuama
Éamonn Ó Tuama, Senior Scientist, holds a Ph.D (1986) in Zoology (marine biology) from University College Cork, and is a member of the Irish Spatial Data Infrastructure Working Group. He has several years experience in teaching and research in Marine Science and has been actively involved in the application of information and communications technologies in the education and commercial sectors since the early 90's. Positions held include that of I.T. Consultant on several EU funded projects at the Aquaculture Development Centre, University College Cork, Manager of the CTI (Computers in Teaching Initiative) Centre at the University of Liverpool, and Projects Manager and Technical Design Consultant for a London-based international I.T. company specialising in web-based content management systems. He has been involved in a number of web mapping and data management projects since joining the CMRC in 2002, and was lead investigator for the design and implementation of the geo-portal for the DISMAR project. He has a particular interest in the development of web services in support of environmental informatics and GIS using open standards and protocols.

Mr Declan Dunne
Declan Dunne, Computer Scientist, graduated from University of Limerick, with a B.Sc. in Computer Systems (1.1 Hons) in 1998. After graduation he worked as a software engineer with Oracle in Dublin for 3 years. He joined the Coastal & Marine Resources Centre in 2002 as a researcher in the GIS team bringing skills in Java, databases and PHP scripting. He is currently working on the Marine GIS & Highperformance Computing Network project. This project is a web based GIS system that will provide
access to rapid modelling and data manipulation and subsequent analysis, interrogation and visualisation of the marine environment.

Publication List
Éamonn Ó Tuama. DISPRO - a portal for integrating EO products in a distributed GIS. A poster for the MERIS (A) ATSR Workshop, ESRIN, Frascati, Rome, 26-28 September 2005.
Hamre, T., S. Sandven and É. Ó Tuama. DISMAR: Data Integration System for Marine Pollution and Water Quality. Proceedings of 31st International Symposium on Remote Sensing of Environment, 20-24 June, 2005, St. Petersburg, Russia.

22 : CNR (CNR)

Consiglio Nazionale delle Ricerche (National Research Council)

CNR
The Consiglio Nazionale delle Ricerche (National Research Council, CNR) is the biggest Italian research organisation. CNR aims to promote, transfer and improve the knowledge in the main sectors of the scientific, technological, economic and social research activities. The CNR activity is focused on 11 macro areas of interdisciplinary scientific and technological research, that correspond to 11 departments, devoted to the planning, coordination and evaluation of the research activities carried out within 108 Institutes, more than 8,000 staff members, distributed all over Italy. The two CNR institutes involved in the project are part of the CNR Earth and Environment Department and have a long-term experience covering a wide range of fields. More in details:

- the Istituto di Scienze Marine (Institute of Marine Sciences, ISMAR) research activity covers most marine disciplines, with a multidisciplinary approach: from physics to geology, chemistry, biology, and fishery studies. Large interest is devoted to the Mediterranean Sea, but important activities involve the world oceans and the polar oceanography;
- the Istituto di Scienze dellíAtmosfera e del Clima (Atmosphere and Climate Sciences Institute, ISAC) is involved in several researches on meteorology, climate change, atmospheric structure, remote sensing of the Earth surface. The ISAC Satellite Oceanography Group has long term experience in marine circulation, satellite oceanography and air-sea interaction of the Mediterranean Sea;

Rosalia Santoleri
Head of the Gruppo di Oceanografia da Satellite (Satellite Oceanography Group, GOS). Physical oceanographer, working at CNR-ISAC as researcher since 1984. Her main field of interest is satellite oceanography and the combined use of in situ and satellite data to study the dynamics of Mediterranean Sea. She is responsible of the ISAC-GOS activity in several national and international projects and has experience of coordination of project at national level.

Annalisa Griffa
Annalisa Griffa is a physical oceanographer, working as a researcher at CNR/ISMAR La Spezia (Italy) since 1996. She also holds a joint position as Full Research Professor at the University of Miami (US), RSMAS. Her main scientific interests include the study of the general and coastal marine circulation, data assimilation in numerical models and analysis of Lagrangian data. She is also working on problems of transport and dispersion in marine environment and development of turbulent parameterizations. She is presently a member of the Marine Board of the European Science Foundation.

Fabio Raicich
Fabio Raicich is a physicist, working as a researcher at CNR Trieste since 1991. His scientific activity covers atmosphere-sea interactions, sea level analysis and modelling, teleconnections between meteorological and marine parameters and assessment of observing system effectiveness. He has participated in several national and European projects, among which MFSTEP, where he is responsible of the OSSE workpackage.
Publication List
Buongiorno Nardelli B., G. Larnicol, E. DíAcunzo, R. Santoleri, S. Marullo e P.Y. Le Traon, 2002. Near Real Time SLA and SST products during 2-years of MFS pilot project: processing, analysis of the variability and of the coupled patterns, Annales Geophysicae, 20, 1-19. 2002.

23 : NERI (DMU-NERI)

National Environmental Research Institute
The National Environmental Research Institute is an independent research institute under the Ministry of the Environment. Their statuary obligations include advising public authorities and governmental institutions by providing the scientific and environmental information necessary for decision-makers in areas where political, administrative and commercial activities are important to the environment. NERI is not a public authority. NERI activities cover both consultant jobs and tasks directly financed by government funds. They also perform strategic and applied research and is responsible for collection and the overall management and co-ordination of data on nature and the environment. As part of NERIs national obligations, NERI has implemented protocols for data collection and quality control for the Danish national monitoring programme (NOVANA). NERI is also responsible for maintaining the national marine database with data from the national monitoring program.

The NERI department of Marine Ecology (MAR) has a multidisciplinary approach with national expertise within marine biology, marine chemistry and physical oceanography. MAR has a long experience for monitoring marine areas including sites within the Danish marine NATURA 2000 Network. MAR is also working with evaluation of long-term changes in Danish waters. The department participates in several national, international and EU funded projects.

Jorgen Bendtsen
Ph.D. in Geophysics.
Post doc at the Danish Center for Earth System Science (DCESS), Niels Bohr Institute for Astronomy, Physics and Geophysics, University of Copenhagen.
Visiting scientist at the Potsdam Institute for Climate Impact Research, Potsdam, Germany.
Associate professor at DCESS
Scientist at National Environmental Research Institute
External lecturer at the Niels Bohr Institute for Astronomy, Physics and Geophysics.
Senior scientist at NERI

Publication List

Bendtsen, Jørgen, Karin E. Gustafsson and Jens Kjerulf Petersen. Modelling vertical mixing in the surface boundary layer using artificial age tracers. In Press, Journal of Marine Science, 2006.
Jørgen Bendtsen, Claus Lundsgaard, Mathias Middelboe and David Archer. Influence of bacterial uptake on deep-ocean dissolved organic carbon, Global Biogeochemical Cycles, , 16, (4), doi:10.1029/2002GB001947, 2002.

24 : DNSC (DNSC)

Danmarks Rumcenter (Danish National Space Center)

DNSC, formerly Danish Space Research Institute, is a governmental Research Institute under the Ministry of Science, Technology and Innovation. It was established as an independent institution in 1968 with the objective of conducting space research programmes based upon instruments developed and manufactured in-house and sent aloft with satellites, rockets and balloons. DNSC was responsible for the vector magnetometer on the Danish satellite ÿrsted, the Argentine/US satellite SAC-C, and the German satellite CHAMP. DNSC/DSRI was the lead proposer for the Swarm proposals. The Dept. of Geodesy and Dept. of Geodynamics have carried out major projects in gravity survey, geoid determination, sea level studies from satellite altimetry and tide gauge data, GPS and geodetic reference frames. DNSC has a long history of field activities in Greenland in connection with basic mapping and geodetic infrastructure. DNSC computes global state-of-the art grids of marine gravity and MSS from multi-mission satellite altimetry (latest published model KMS04).

Dr. Per Knudsen

Dr. P. Knudsen is state geodesist, Ph.D. and Head of Department of Geodesy. Per Knudsen has contributed to the research in the use of satellite altimetry for geodetic and geophysical purposes for about 15 years and made contributions to research in the use of satellite altimetry for marine gravity and dynamic ocean topography and for monitoring sea level with respect to ocean tides, seasonal variations, and long term changes. Per Knudsen has visited Dept. of Geodetic Science and Surveying, Ohio State University, (10 months), Politecnico di Milano (1 month), and Jet Propulsion Lab. (8 months). Currently, Per Knudsen leads a multidisciplinary EU project GOCINA (ìGeoid and Ocean Circulation in the North Atlantic regionî). He is Vice-chairman of the EU COST action 40 "EOSS", PI for NASA-CNES TOPEX/POSEIDON and Jason-1 satellite missions and for ESA ERS AO3-165. He is member of the GRACE science team. He was member of the project management board of "Multimedia and Network in Coorperative Research and Learning (MANICORAL)" - EU telematics programme, and earlier led a major national integrated geodetic-oceanographic project ìGEOSONARî (Geoid and Sea Level of the North Atlantic Region).

Publication List

Andersen, O. and Knudsen, P., The role of satellite altimetry in gravity field modelling in coastal areas, Phys. Chem. Earth, 25, 17-24, Pergammon, Berlin, 2000
Andersen, O. B., and P. Knudsen, Long term changes in sea level and sea surface temperature from ERS satellites, Earth Observation Quarterly, 69, ESRIN, 11-14, 2001.
Andersen, O. B. and P. Knudsen, Monitoring Long-Term Changes In Sea Level Using ERS Satellites, Physics and Chemistry of the Earth, in press. 2001.
Andersen, O. B., and P. Knudsen, Regional sea surface height and temperature trends from ERS satellites., Proceeding from ERS/ENVISAT symposium ìlooking down to Earth in the New Millennium, Gothenburg, Oct. 2000, ESA SP461, ESA publ div. ESTEC, Noordwijk, The Netherlands, 2001.
Andersen, O. B., P. Knudsen, and B. Beckley. Monitoring Long-Term Changes in Sea Level Using ERS Satellites. Phys. Chem Earth, 2002.
Andersen, O. B., P. Knudsen, and B. Beckley. Spatial correlation between regional long-term changes in sea level and sea surface temperature. Vistas for geodesy in the new milennium IAG Symposium, 125, pp. 551-556, Springer Verlag, 2002.

25 : FIMR (FIMR)

Finnish Institute of Marine Research

The Finnish Institute of Marine Research is a governmental research institute under the Ministry of Traffic and Communication. It's personnel is ca. 110 persons and the annual budget is ca. 5.8 milj. ECU.
The institute consists of three scientific departments, Departments of Biological, Chemical and Physical Oceanography as well as a Department of Technology and Logistics. Both fundamental and applied research is carried out. The institute is specialised in oceanography of cold seas with emphasis on the Baltic Sea. The main research activities concentrates on ecology of the Baltic Sea, dynamics, ice cover and heat budget of the sea, global change and material balance investigations. The research activities focus largely on international projects, 13 of those funded by EU in 2002.
Expertise and experience of the organisation
The institute has long had extensive operational daily service on ice conditions and ice forecast, sea level and wave height information and forecast service. Development of automation in marine monitoring has resulted in an extensive monitoring and information service on harmful algal blooms where automatic devices installed on several ferries in the Baltic Sea has been use since the beginning of the 1990's. The institute has carried out operational phytoplankton bloom monitoring since 1992. The daily information delivery is carried out with a specific Web site in co-operation with several research institutes in four languages (see http://www.balticseaportal.fi).

Tapani Stipa

Studies the interaction of phytoplankton groups with the physical environment with 1-D and 3-D process models. He has years of experience with small-scale hydrodynamics in coastal areas and its representation in numerical models. The reflection of

physiological characteristics on the generation of phytoplankton blooms (the spring bloom and the mid-summer cyanobacterial blooms) is his main research field at the moment. He is a member of several ICES and ESF working groups as well as the ICES oceanography committee, and the Finnish representative in the EUR-OCEANS NoE and several IOC meetings.

Kimmo Kahma

Senior scientist; Docent, Department of Geophysics, University of Helsinki. M.Sc. University of Helsinki, 1973, Mathematics. Dr. Phil. University of Helsinki, 1981, Geophysics. Scientist, Finnish Institute of Marine Research, 1972-1983 Docent, University of Helsinki, from 1982

Post-Doctoral Fellow, National Water Research Institute, Canada, 1983 – 1986. Senior Scientist, Natural Science Research Council of the Academy of Finland, 1986 – 1989. Scientist, Finnish Institute of Marine Research, 1989 – 1991. Deputy Assistant Professor, University of Helsinki, January - May 1992. Senior scientist, Finnish Institute of Marine Research from, 1992. Deputy Head of Department of Physical Oceanography, November 2003 - October 2004

Publication List

Stipa, T., Tamminen, T., Sepp‰l‰,J., 1999: On the creation and maintenance of stratification in the Gulf of Riga.-Journal of Marine Systems, 23:27-49.

Stipa, T., 1999: Water exchange and mixing in a semi-enclosed coastal basin (Pohja Bay).-Boreal Environment Research, 4:3076317.

Stipa, T., 2002: Temperature as a passive isopycnal tracer in salty, spiceless oceans. Geophysical Research Letters, 10.1029/2001GL014532

Matti Leppranta, M., Zhanhai, Z., Haapala, J., Stipa, T., 2001: Sea-ice kinematics measured with GPS drifters. Annals of Glaciology 33: 151-156.

26 : GAS (GAS)

Institute of Geophysics of Georgian Academy of Sciences

Institute of Geophysics is one of the oldest scientific institutes of Georgian Academy of Sciences
founded in 1933 and is one of leading scientific centers of the Academy. The Institute carries out fundamental and applied researches in following main directions:

- Monitoring of Geophysical fields (seismic, electromagnetic, gravitational, etc.) on the territory of Georgia; Stady of Earthís deep structure and its evolution;
- Engineering, prospecting and environmental geophysics; perfection of prospecting methods;
- Physics of atmosphere, Sea Dynamics, Monitoring of main hydrometeorological fields and modeling of ecological systems;
- Solar-Terrestrial Physics and physics of Cosmic Rays.

Institute is closely cooperating with Tbilisi State University in training of high level specialists in above mentioned directions.

One of main scientific divisions of the institute is Department of Mathematical Modeling of Geophysical and Ecological Processes in the Sea and Atmosphere (Head ñ Prof. Avtandil Kordzadze). For today in the Department a series of mathematical models are developed: models of dynamics of the Black and Kaspian seas, models of middle-scale and mezo-scale atmospheric processes, 2D and 3D models of spreading of polluting substances in the Black Sea, etc. Leading scientists of the Department participated in the NATO sfp 971818 project ìBlack Sea Ecosystem Processes and Forecasting/operational Database Management Systemî, in project ARENA (A Regional Capacity Building and Networking Programme to Upgrade Monitoring and Forecasting Activity in the Black Sea Basin).

Avtandil Kordzadze

Professional Appointments

1995 ñ till now ñ Professor of I. Djavakhishvili Tbilisi State University.

1989 - till now ñ Deputy Director in Scientific part of Institute of Geophysics of Georgian Academy of Sciences, Head of Department of Mathematical Modeling of Geophysical and Ecological Processes in the Sea and Atmosphere. Tbilisi, Georgia.

1984 ñ 89 ñ Senior scientific worker at Department of Computing mathematics (now ñ Institute of Numerical Mathematics of Russian Academy of Scien.) of the Academy of Sciences of the USSR, Moscow.

1975-1984 - Senior scientific worker at Computing Center of the Siberian Branch of the Academy of Sciences of USSR, Novosibirsk (Akademgorodok). 1967 ñ 1968, 1973-1975 ñ Junior scientific worker at Computing Center of the Siberian Branch of the Academy of Sciences of USSR, Novosibirsk (Akademgorodok).

Demuri Demetrashvili

2005 ñ Doctor of Sciences (Physics and Mathematics) at Institute of Geophysics of Georgian Academy of Sciences.

1981 - Candidate of Sciences (Physics and Mathematics) at I. Javakhishvili Tbilisi State University, Tbilisi, Georgia.

1971 ñ Specialist (Theoretical Physics; analogous to Master of Science degree) at I. Javakhishvili Tbilisi State University, Tbilisi, Georgia.

27 : GFZ (GFZ)

Department of Geophysics, Faculty of Science, University of Zagreb

The main activities of the Faculty of Science, University of Zagreb are higher (undergraduate, B. Sc., M. Sc. and Ph.D.) education and research. Faculty has following departments: Department of Mathematics, Department of Physics, Department of Geology,

Department of Geography, and Department of Biology, Department of Chemistry and Department of Geophysics (hereafter GFZ). Students at GFZ, which was founded in 1861, take courses in mathematics, physics, meteorology, oceanography and seismology.

Scientific activities of GFZ include experimental, theoretical and modeling investigations in meteorology, oceanography, seismology and geomagnetism. Thematically, they cover a wide variety of geophysical problems, such as inertial oscillations, seiches, processes driven by both surface and coastal buoyancy forcing, turbulent mixing in the Adriatic, mesoscale modeling of the airflow over the complex topography, wind gusts and turbulence, up- and down-slope winds, air quality modeling, climatology and climate change, macro- and micro-seismology, etc. Due to complex basin topography and bathymetry, a substantial effort is addressed to the investigation of air-sea interactions, such as response of the Adriatic to bora and sirocco forcing, sea- and land-breezes etc.

Zvjezdana Bencetic Klaic
Zvjezdana Bencetic Klaic, Associate Professor
Planetary Boundary Layer Pollution, Modeling of the Long-range Transport of Pollutants, Mesoscale Modeling, Biometeorology

Mirko Orlic
Mirko Orlic, geophysicist, physical oceanographer (Zagreb, Croatia, 26 May 1955). B. Sc. in physics ñ geophysics, 1978; M. Sc. in physical oceanography, 1981; Ph. D. in physics ñ physical oceanography, 1988; University of Zagreb. Visited several oceanographic institutes in Europe, spent a year as a visiting scholar at the Scripps Institution of Oceanography in La Jolla, Ca, USA (1993). Researcher at the Center for Marine Research of the Rudjer Boskovic Institute in Zagreb (1979-1983); Researcher (1983-1989), Assistant Professor (1989-1995), Associate Professor (1995-2000) and Professor (2000-), Head (1996-2000) of the Andrija Mohorovicic Geophysical Institute and Vice-Dean (2000-2002) of the Faculty of Science, University of Zagreb.

Zoran Pasaric
Research Areas
Llinear hyperbolic systems, transport of substance in random velocity field, wind dynamics of the Adriatic sea, analysis of satellite-measured sea-surface temperature.
Analytical modeling and empirical data analysis in physical oceanography and meteorology, forecast verification.

Publication List
D. Belusic, M. Pasaric, Z. Pasaric, M. Orlic and B. Grisogono: A note on local and non-local properties of turbulence in the bora flow. Meteorologische Zeitschrift (in press).
D. Belusic and Z. B. Klaic: Mesoscale dynamics, structure and predictability of a severe Adriatic bora case. Meteorol. Z. (in press).

28 : GKSS (GKSS)

GKSS Research Centre
The GKSS Forschungszentrum Geesthacht GmbH (GKSS) is one of 16 national research centres belonging to the Hermann von Helmholtz Association (HGF). One of the three main GKSS research areas covers environmental research focussing on water and climate in the coastal zone. Research at GKSS is problem-oriented and covers basic as well as applied research including the establishment of both technical and commercial prototypes. GKSS has gained experience for years and has cultivated a successful tradition in both the co-ordination of and participation in different sorts of EU research projects.
The research relevant for this project has been performed mainly in the working group on coastal ecology and environmental research, and in the working group on applied physics and marine technology.
Within these groups new sensors/instruments and automatic monitoring systems have been developed have been developed together with industrial partners and numerical models were used for the development of new monitoring strategies. There are well-equipped scientific laboratories, high sophisticated analytical instruments and facilities (research vessels, stations and buoys) for testing new sensors under operational conditions.
A national funded project on the application of a German FerryBox system is one of our current research topics. GKSS has been coordinating the EU funded project FerryBox.

Prof. Dr. Franciscus Colijn
PROF. DR. FRANCISCUS COLIJN is the Director of the Research Institute Westcoast (FTZ), a lecturer at the University of Kiel and acts as one of the directors of the Institute for Coastal research at GKSS. He has research interests that have ranged from estuarine and marine ecology, though to marine ecosystem indicators, monitoring and assessment of environmental health.

Dr Friedhelm Schroeder
Friedhelm Schroeder is heading the In situ Instruments group at GKSS Institute for Coastal Research. His main experiences are in the assessment and quantification of ecological processes. He specialized in the development of analytical methods and instruments for the detection of aquatic substances, and in the development and application of whole automatic and remote-controlled systems for the determination of environmental parameters and contaminants in coastal waters.

Dr Wilhelm Petersen
Wilhelm Petersen graduated in chemistry in 1979, Ph.D. in analytical chemistry in 1983. Fields of activity are trace element analysis, studies of biogeochemical processes in sediment and water, statistical analysis of time series of water quality data,

developing automatic, remote-controlled systems for investigation of water quality. He is recently involved in projects developing FerryBoxes on SoOís.

Publication List

Petersen, W., Wehde, H., Krasemann, H., Colijn, F. and F. Schroeder (2005). FerryBox and MERIS ñ Assessment of Coastal and Shelf Sea Ecosystems by Combining In-situ and Remote Sensed Data. Submitted to Estuarine Coastal and Shelf Science

Colijn, F., Petersen, W., Petschatnikov, M. and F. Schroeder (2002). A New System for Automatic Measurements of Biological-Chemical Parameters from Ferry Boats. ICES Annual Science Conference 2002, 1-5 October 2002, Copenhagen (Denmark).

29 : HRW (HRW)

HR Wallingford

HR Wallingford (HRW) is an independent company offering applied research, specialist consultancy and software development in civil engineering and environmental hydraulics to clients worldwide. The company has the status of a Research Association, has no shareholders and does not distribute profits. HRW became a private limited company in 1982, having been originally founded in 1947 by the British Government. Our current and recent project experience directly relevant to HR Wallingford;s role in ECOOP includes:

MOTIIVE (EC Funded) examines the relationship between GMES and INSPIRE in the marine domain. Specifically it examines the technical and business issues in deploying the standards of ISO TC211 and the Open Geospatial Consortium to operational metocean services in coastal regions. MOTIIVE is working closely with IHO, IOC and WMO.

COASTWATCH (GMES Service Element project) - HR Wallingford established the Hydrodynamics Service Element of the COASTWATCH project. This provided a lightweight but robust framework for coupling global forecasting models with wave transformation models to provide operational forecasts at the shoreline for storm warining and erosion managment.

MarineXML - (EC funded) - HR Wallingford lead an international team of oceanographic data experts and IT specialists to demonstrate how XML technology can be used for improved oceanographic data exchange.

Keiran Millard

Keiran Millard is manager of the Informatics Group of HR Wallingford Ltd. Keiran has over 15 years national and international experience in process, systems and coastal engineering. His key expertise is in information policy and technology for marine management and is author of several published guidelines on effective data use in coastal management. Keiran has been on the steering committee of nine European Commission projects advancing information provision for coastal and marine management, including three as co-ordinator (MOTIIVE MarineXML and ENVALDAT).

Nigel Bunn

Nigel Bunn leads the wave modelling team within the Hydrodynamics and Metocean Group at HR Wallingford. He has carried out wave modelling studies, to determine wave climates, operational thresholds and design extremes throughout the world. Nigel has also been instrumental in developing the joint HRW/Met Office capabilities in operational nearshore wave forecasting.

Quillon Harpham

Quillon Harpham is an Enginner in the Informatics Group of HR Wallingford. He has a broad experise in the development and application of web-based systems for the hydrodynamic community. He was responsible for software development and testing in the MarineXML project, in particular addressing the practical issues of 'cross-walking' between different data standards.

Publication List

Millard, K., et. al. 2005: Using XML Technology for Marine Data ExchangeÓ, Proc. 4th EuroGOOS, Conference ,Brest, France. [in press]

Woolf A, Millard K, Ross G, van der Wel F, European Developments In Gis Standards For Meteorological And Ocean Data, Meteorological Applications, special issue on EGU 2005 session ÓGIS in meteorology and climatologyÏ [in review].

Millard et al, 2003, MarineXML Ò using XML technology for marine data interoperability Proceedings of The Colour of Ocean Data, IOC Workshop Report No 188, VLIZ Special Publication No 16 Brussels, Belgium 25th-27th November 2002 pp163-175

30 : ICBM (ICBM)

Institute for Chemistry and Biology of the Marine environment, University of Oldenburg

The ICBM is a research institute of the Carl v. Ossietzky University in Oldenburg, Germany. The scientific concept of the Institute is based on the realization that research of global systems can only be successful with comprehensive, interdisciplinary methods. Different study groups work on the investigation of marine habitats. The main focus of the ICBM lies on the research of coastal waters, estuaries and semi-enclosed seas. A broad range of numerical models and modern modelling techniques (e.g. coupled modelling, nested-grid high resolution coastal modelling, sediment transport modelling, artificial neural networks, hybrid models, GIS-techniques, etc.) have been employed by the ICBM working groups (Mathematical Modelling Working Group, IMPULSE, Physical Oceanography). Most of the instituteís laboratories have a proven expertise in the field of biogeochemistry and physical oceanography, coastal ocean modeling (incl. sediment modeling). A second core knowledge base derives from the assimilation of various physical and biogeochemical data bases into the coastal ocean models. National and international co-operation is considered to be an integral part of the activities of the institute. One current topic is to analyse the effect of hydrodynamic transport processes on marine ecology or biogeochemistry into the coastal seas.

Dr. Joanna Staneva

Dr. Joanna Staneva is a researcher in IMPULSE Working Group working on a high-resolution nested-grid model for the German coast. Her scientific interests are focused on numerical physical oceanography, dynamics of shelf and semi-enclosed seas, data assimilation, regional oceanography, marine chemistry and modeling of the marine environment, dynamics of atmosphere and oceans, climate variability. She participated in more than 11 EU Projects (as a PI in two project) as well as NATO, IAEA and National Scientific Projects.

Prof. Dr. Joerg-Olaf Wolff
Prof. Joerg-Olaf Wolff is a professor in physical oceanography and leader of the Physical Oceanography (Theory) group at the Institute for Chemistry and Biology of the Marine Environment. His experience is in the field of physical oceanography, coastal modeling, sediment transport modeling, ocean-atmosphere dynamics. He is a principal investigator of the German Funded Project: BioGeoChemistry of Tidal Flats, sub-project: Hydrodynamics and Suspended Matter Budget in an Intertidal Basin of the East Frisian Wadden Sea. He is a Chief-Editor of Ocean Dynamics.

Publication List
Stanev, E.V., Wolff, J.-O., Burchard, H., Bolding, K., Flˆser, G., (2003): On the Circulation in the East Frisian Wadden Sea: Numerical modeling and data analysis., Ocean Dynamics, Vol 53(1), 27-51, ISSN 1616-7341
Stanev, E. V., and J. V. Staneva, (2000): The impact of the baroclinic eddies and basin oscillations on the transitions between different quasi-stable states of the Black Sea circulation. J. Mar. Sys., 24,1-2,3-26.
Staneva, J. V., D. Dietrich, E. Stanev, and M. Bowman, (2001): Rim current and coastal eddy mechanisms in an eddy-resolving Black Sea general circulation model. J. Mar. Sys. 3, 137-157.
Staneva, J. V. and E.V. Stanev, (2002): Water mass formation in the Black Sea during 1991-1995. J. Mar. Sys., 32, 199-218.
Staneva, J., M. Wenzel and J. Schroeter, 2002. Ocenic state during 1993/1999 determined by 4-D VAR data assimilation.International WOCE Newsletters, No: 42, 11-17.

31 : IMEDEA-CSIC (IMEDEA-CSIC)

Instituto Mediterr·neo de Estudios Avanzados (CSIC)
IMEDEA-CSIC is a joint research center of the Spanish Council for Scientific Research (CSIC) and the University of the Balearic Islands (UIB) located in Esporles, Mallorca. Since 1995, a significant part of its research is focused on interdisciplinary studies of the ocean and coastal interactions. The institute is step by step becoming an established centre of excellence at the European and international level, with more than 100 ongoing research projects, more than 100 peer reviewed papers and a total staff of 150 (40 permanent).
The IMEDEA-CSIC physical oceanography group is formed by 14 experienced researchers that participate in different research projects funded mostly by the European Commission and the Spanish National Plan for Research. Oceanographic activities of the group of physical oceanography at IMEDEA-CSIC include a wide range of activities in fields such as physical and biological oceanography, fisheries, coastal ecosystems and other disciplines related to the sea. In the context of ECOOP, the group of physical oceanography has contrasted experience in remote and in situ observations, data assimilation and numerical modelling. The results from these projects are more than 50 scientific papers published in peer reviewed international journals.

Joaquim Tintorè
Joaquim Tintorè, director of IMEDEA-CSIC, holds a Ph.D. in Physics from the Universidad de las Islas Baleares (UIB). His research interests have evolved from the understanding of physical processes in the upper ocean to the study of mesoscale variability and its interdisciplinary effects in relation to operational oceanography and ocean forecasting, using modelling, observations and data assimilation. His work has lead to more than 80 research publications in international refereed journals. He has been PI in 28 research projects and has also coordinated two European Commission funded projects of global European level. He has directed 8 Master thesis, 9 Ph. D. thesis and has been member of the editorial board of several international Journals. In 2003 he obtained the National Spanish Research Award for his research contributions.

Alberto Alvarez
Alberto Alvarez holds a Ph.D. in Physics from Universidad de las Islas Baleares (UIB). After being a PostDoc at the Physics Department of National Central University (Taiwan) 1997, he joined the Saclant Undersea Research Centre (Italy) 1999, and the IMEDEA in 2002. He has published 25 papers in international journals in different fields of science. His research interests include nonlinear time-series analysis and prediction, quasi-geostrophic theory and autonomous underwater vehicles.

Alejandro Orfila
Alejandro Orfila holds a Ph.D. in Physics from Universidad de las Islas Baleares (UIB). After being a PostDoc at the Cornell University (USA), he joined the IMEDEA in 2005. He has published 20 papers in international journals in different fields of science. His research interests include near-shore oceanographic processes using modelling, observations and data assimilation.

Publication List
Alvarez, A., Orfila, A., TÌntorÈ, J., 2004: Real time forecasting at weekly time scales of the SST and SLA of the Ligurian Sea with a satellite based ocean forecasting (SOFT) system. J. Geophys. Res., Vol. 109, N03. C03023
Jordi, A., A. Orfila, G. Basterretxea, J. TintorÈ, 2004: Coastal Trapped Waves in the Northwestern Mediterranean Sea. Continental Shelf Res. Vol. 25/2, pp. 185-196.

32 : INAT (INAT)

Institut National Agronomique de Tunisie

INAT, the National Institute of Agriculture Sciences of Tunisia, is the oldest tunisian high-School, founded in 1898. INAT has both Educational and Research mission.

Every year, nearly 200 students obtains their engineer diploma, 120 students are preparing their master, and 50 students are carrying out their Ph.D. researchs in different operationnal fields.

The different staff of scientists of INAT are involved in various research projects founded by E.U. or in the framework of bilateral cooperation (France, Belgium, Spain, Italy, Japan, USA).

The Departement of INAT that will be involved in ECOOP is the Department of Fisheries and Marine Sciences. This Departement is offering graduate education and post-graduate education related Marine Environment and Resources.

Dr Slim GANA that will be responsible for the relevant task of INAT within ECOOP.

Slim GANA

Ph.D. Physical Oceanography - University of Paris 6

Slim GANA is Associate professor at INAT. He is giving lectures of Physical Oceanography, Meteorology, Coastal Zone Planning and Remote Sensing for graduate students at INAT and other Tunisian Institute (ENIT, FST).

Research field of interest: Study of water masses dynamics and properties in the Med Sea. Combining of in-situ and remote sensed observations with physical constraints within diagnostic and prognostic models (data asimilation).

Member of the MOON Network Management Group and Science Steering Committee

Among the last publications or comunications:

* Soufi E., S. Gana et A. Bel Hadj Ali : "Analysis of the Tunis South Lake Water Plan by Remote Sensing", Proceedings of the Sixth International Conference on the Mediterranean Coastal Environment MEDCOAST 03, Ravenna, Italy, E. Ozhan (Editor), 2003.
* Kochlef M. et S. Gana: "Rehabilitation worksí effects on the water quality and on the ecosystem of south lake of Tunis", Proceedings of the European Water Resources Association Symposium on ìWater Resources Management: Risks and Challenges for the 21st Centuryî, Izmir-Turquie, Volume I, p265-274, 2004.
* Gana S. et E. Kochlef: ìJoint analysis of Sea Level variability and Sea Colour off the Tunisian coasts using Remote Sensed dataî. Proceedings of the Seventh International Conference on the Mediterranean Coastal Environment, MEDCOAST 05, E. 'zhan (Editor), 25-30 October 2005, Kusadasi, Turkey.
* Gana S. et M. Kochlef:"" Analytical and Numerical Model of the Water Circulation and fluxes of the Tunis South Lakeî, Symposium International ìAdvances in Marine Ecosystem Modelling Researchî, Plymouth, Abstract Book, p173, June 2005.
* Gana S., N. Brahim : "Analysis of water quality of some Tunisian Northern Lagoons by remote sensing", ECOLLAW conference: Environmental Change in Lakes, Lagoon and Wetlands of the Southern Mediterranean Region - Cairo, January 2006

33 : INRH (INRH)

Institut National de Recherche Halieutique

The scientific Institute of Marine Fisheries (ISPM) was created in 1969 and it has been in charge of fisheries research. In 1996, the institute became known as the Institut National de Recherche Halieutique (INRH). The headquarters are located in Casablanca with a network of five regional centres, two specialised centres and seven monitoring environmental stations in major harbours throughout the kingdom. Research is based around the following themes:

- Physical oceanography;
- Understanding of marine ecosystems;
- Identification of main production areas: primary and secondary production;
- Ecological assessment of potential sites for aquaculture;
- Enhancement of aquaculture technologies through the development of engineering, species diversification, nutrition, genetics, pathology etc.;
- Environment - fisheries resources relationship studies;
- Research and study to enhance the understanding of the marine environment and its impact on the marine resources;
- Continuous monitoring of the marine environment with respect to different biological and chemical pollution sources;
- Assessment of the fishery resources, the actual state of fish stocks and their exploitation level, in order to study factors that influence their life-cycle and provide data (including biological, technical and economic data) for fishery management purposes.
- Assessment of the biological and socio-economical impact on fisheries and on the marine environment, taking into account differences in coastal management;
- Monitoring of fish product and aquaculture quality;
- Study and experimentation on fishing technologies in order to introduce new techniques in a national context;
- Oceanography/fisheries databases;
- Sea mapping of the fishing areas.
- Implication into EU Data Marine Management Projects: MEDAR/MEDATLAS; SEA-SEARCH, SEADATANET, CARBO-OCEAN, NATFISH, EUROCEAN.

Abdellatif ORBI

Ph. Doctorate (Physical Oceanography)

Official Member of the Moroccan delegation at the World Summit of Sustainable Development in Johannesburg. Member of the Scientific Committee and the Headquarter of the National Institute of Fisheries in Morocco (INRH). Member of the National Committee for the territory management. Member of National Council of Climate. Member of National Council of Remote Sensing
Key qualifications: Hydrodynamic Modeling, Study of the upwellings, Study of the Interactions Fishery-Climate, Marine hydrodynamics, Mathematical modeling of circulation, Study of the functioning of the coastal and littoral ecosystems, Study of the potential sites in aquaculture.

Publications :
IDRISSI J., ZIDANE F., ORBI A., HILMI K., SARF F., RHARBI N., 2001 : Etude d'impact des apports terrigËnes sur l'activitÈ aquacole dans la baie de M'diq. Revue "L'Eau, l'industrie, les nuisances" juin-juillet 2001.

34 : IO-BAS (IO-BAS)

Institute of Oceanology ñ Bulgarian Academy of Sciences
The Institute of Oceanology, BAS, Varna is affiliated to the Bulgarian Academy of Sciences. The main research activities are focused on the field of coastal dynamics, marine physics, chemistry, geology, biology, ecology, ocean technique and technology, data management and underwater investigations. The Institute hosted Bulgarian National Oceanographic Data Centre (BGODC). Traditionally involved in all aspects of marine research it also offers consulting and expert services, environmental impact assessment studies, education and training. The total scientific stuff is 53 scientists (3 senior scientists - Professors, 14 senior scientists - Assoc. Professors, 34 scientists - Assoc. Researchers, DSci.-3, PhD- 24).
IO-BAS is the Regional Activity Centre and Focal Point of BSEP. The Institute participated in NATO SfS TU-fisheries and TU-Black Sea projects and is actively participating in NATO SfP ODBMS project. Institute participated in almost all GEF and Black Sea EU programmes implemented in the region. During last five years IO-BAS actively participate in a large number of FP5 and FP6 among which, Sea-Search, CESUM-BS, CRIMEA, EUROSEISMIC etc. The institute coordinates two of the Black Sea GOOS projects ARENA and ASCABOS.
The Institute's experts are involved in consulting decision and policy makers for elaboration of environmental friendly regulations and standards for sustainable management of Black Sea living resources at governmental and local authoritiesí level. The scientific staffs are qualified in environmental impact assessment expertise.

Hristo Dimitrov Slabakov
Director of the Institute of Oceanology - Bulgarian Academy of Sciences. He takes MSc (1969) and PhD (1982) degree in Technical University of Varna. Since 1986, he is Associated Professor at the Institute of Oceanology and a lecturer in the Naval Academy in Varna. He is also a licensed expert of the Bulgarian Ministry of Environment, member of Steering Committee of Black Sea GOOS and President of the National Oceanographic Commission. As a Co-ordinator of the ARENA and ASCABOS EC Projects (18 partners) he is well experienced in international cooperation both at the regional and European level. His areas of research activities are: marine explorations, oceanographic devices and instrumentation, laboratory calibration systems, operational oceanography, monitoring.

Atanas Vasilev Palazov
Head of ìOcean technologyî Department of the Institute of Oceanology ñBulgarian Academy of Sciences and Manager of the Bulgarian National Oceanographic Data Centre since 2002. Associated professor of ìScientific automationî (ìAutomated systems for information processing and controlî). Graduated in the Technical University of Varna, MSc. in 1979, next specialize in Applied Mathematics in the Centre of Applied Mathematics at the Technical University of Sofia1980-1981 and obtained PhD degree in Technical University of Sofia in 1987. His areas of scientific experience are: Scientific automation systems, Marine explorations, Data collecting and processing, Special software and hardware and Data management. He has more than 60 scientific publications and has participated in different scientific activities: 8 international (NATO SfP, ARENA, Sea-Search, ASCABOS etc.) and 34 national scientific projects, 32 scientific cruises, 6 international scientific experiments. He is the key person in development of the first Bulgarian operational automated system for coastal zone meteorological and sea observations ìKamchiaî.

35 : IOLR (IOLR)

Israel Oceanographic and Limnological Research
Israel Oceanographic and Limnological Research (IOLR; http://www.ocean.org.il) is a national research institution (non-profit governmental corporation) with the mission of generating knowledge for sustainable use and protection of Israel's marine, coastal and freshwater resources. IOLR conducts scientific research in the fields of oceanography, limnology, mariculture and marine biotechnology. The IOLR includes three research centersñ the National Institute of Oceanography (NIO: monitoring the Mediterranean and Dead Sea), the National Center for Mariculture (monitoring the Gulf of Aqaba), and the Kinneret Limnological Laboratory (monitoring the Sea of Galilee). The IOLR will be represented in ECOOP by Physical Oceanography Dept and Israel Marine Data Center (ISRAMAR) which are part of the NIO. Relevant experience includes: implementing and maintaining of operational wave forecasting system and hydrodynamic forecasting system; organization of XBT cruises, near-to-real-time monitoring of wave and hydrometeorological conditions of Israel coasts; oceanographic data management and analysis across the Levantine Basin. IOLR has been an active participant in POEM, POEM-BC, MFS, MEDAR-MEDATLAS II, Sea-Search, CYCLOPS projects. IOLR is member of MOON Assembly.

Isaac Gertman

Ph.D. in Phys. Oceanography at the State Institute of Oceanography in Moscow, (1986). Scientist, Israel Oceanographic & Limnological Research, Haifa, Israel, (since 1993). Appointed to head of the ISRAMAR in 2000 and presently is head of the Physical Oceanography Department. His main interests are: (i) marine thermohaline structures and circulation: formation, stability, long-term changes; (ii) marine operational forecasting; (iii) oceanographic data bases development. He is member of MOON Science Steering Committee and Management Group.

Alexey Murashkovsky
BA in Physics from Technion, Israel Institute of Technology in 1997. Has 6 years of experience in development and exploration of Mediterranean marine operational forecasting in Israel Navy. In 2003 joined IOLR and is responsible for implementing and maintaining of ISRAMAR's operational oceanography models as well as for supporting computer infrastructure of ISRAMAR. His main scientific interests are: (i) marine operational forecasting; (ii) marine thermohaline structures and circulation.

Publication List
Hecht A. and Gertman I. (2001). Physical Features of the Eastern Mediterranean resulting from the integration of POEM data with Russian Mediterranean Cruises.
Deep Sea Research. Part I, Vol 48/8: 1847-1876.
Murashkovsky A. and Gertman I. (2004).Correction of modeled sea surface wind in order to improve wave forecast.Rapp. Comm. int. Mer Medit. (CIESM Congress Proceedings). Vol 37: 127.
Brenner S., Gertman I. and Murashkovsky A. (2006). Pre-operational ocean forecasting in the southeastern Mediterranean Sea: Implementation and evaluation of the models and selection of atmospheric forcing. Journal of Marine Systems. In press.

36 : IOW (IOW)

Baltic Sea Research Institute Warnem¸nde
The Baltic Sea Research Institute Warnem¸nde (IOW for Institut f¸r Ostseeforschung Warnem¸nde) was founded in 1992 in accordance with a recommendation of the German Scientific Council. It succeeded the Institute for Marine Research Warnem¸nde, which as a member of the Academy of Science was for decades the most important institution for marine research in the GDR. The scientific programme of the new institute was dedicated to the Baltic Sea ecosystem.

The IOW has four departments representing the disciplines of physical oceanography, marine chemistry, biological oceanography and marine geology. An instrumentation group is affiliated with the Department of Physical Oceanography. Jointly the departments work on a long-term research programme.

Prof. Dr. Hans Burchard
Prof. Dr. Hans Burchard received his M.Sc. in Applied Mathematics in 1992 from the University of Hamburg, Germany. In 1995, he received his Ph.D. at the Institut f¸r Meereskunde of the University of Hamburg. After a one-year stay at the International Centre for Computational Hydrodynamics (ICCH) in Hoersholm, Denmark, he was employed from 1996 - 1998 at the Joint Research Centre (JRC) in Ispra, Italy. His main research activities are marine turbulence and numerical modelling of turbulent flow. He is developer of the Public Domain water column model GOTM (General Ocean Turbulence Model) and the three-dimensional circulation model GETM (General Estuarine Transport Model). From 1999-2001, he worked at the Institut f¸r Meereskunde of the University of Hamburg. Since 2002, he is Professor at the Baltic Sea Research Institute Warnemuende. At IOW his research focus is the understanding of estuarine, coastal and shelf sea dynamics by means of field observations and numerical modelling. He furthermore teaches Physical Oceanography courses in the physics department of the University of Rostock.

Siegfried Kruger
Siegfried Kr¸ger graduated in 1976 as engineer at the Department of Electronics of the University of Rostock, Germany. From 1976-1990 he worked as instrumentation engineer at the Institut f¸r Meereskunde of the Academy of Sciences in Warnem¸nde, Germany. In 1990 and 1991, he worked at the University of Kiel, Germany in the framework of a cooperation between the institutes in Kiel and Warnem¸nde. Since 1992, he is employed at the Baltic Sea Research Institute Warnem¸nde and is head of the instrumentation group. He has been leading the establishment and maintenance of the marine environment observation network (MARNET) in the Baltic Sea area with actually three autonomous measuring stations on behalf of the Bundesamt f¸r Seeschifffahrt und Hydrographie Hamburg und Rostock (BSH), He has been further PI in many national and international projects.

Dr. Lars Umlauf
From 1991-1998 Lars Umlauf studied Mechanics at the University of Darmstadt and at the UC Berkeley. In 2001 he received a Ph.D. in Mechanics with a work on turbulence modelling for geophysical flows. From 2001-2003, Lars Umlauf worked as a Post-Doc at the EPFL in different fields of lake research, among them turbulence modelling, dynamics of internal waves at sloping boundaries, three-dimensional modelling of lakes. Since November 2003, he is affiliated to the Baltic Sea Research Institute in Warnem¸nde, where he is developing and applying turbulence and coastal models and is teaching at the University of Rostock.

37 : IST (IST)

Instituto Superior TÈcnico
Instituto Superior TÈcnico (IST), the Engineering School of Lisbon Technical University is the biggest Engineering School in Portugal. The mission of MARETEC is to carry out research and development in the fields of marine environment and marine technologies and disseminate the research results through publication. The research is sponsored by research agencies, industry and

services and by the university itself. Priority is given to interdisciplinary projects involving water quality, ecology and sediment transport. MARETEC staff dedicated to these subjects occupies 17 people. Environmental modelling at MARETEC was initiated in the early 80ís developing hydrodynamic models based on the shallow water equations and their application to coastal and ocean hydrodynamics. As computer capacity and knowledge increased, more generic and integrated models were developed and integrated into a modular system (MOHID) which is presently being used and improved in a private company (HIDROMOD), in the National Laboratory of Civil Engineering and in several Universities in Portugal and abroad.

Ramiro Neves
Prof. Ramiro Neves, is an Associate Professor at IST. Presently is coordinater of 2 EU projects (ECOMANAGE and INSEA). In the past, he has also coordinated the work of this team in several National and European research projects funded by MAST (JEEP 92, OMEX, EUROMODEL, OPCOM) and Environment (MATURE, EUROSAM). His group is presently carrying modelling activities for 4 companies running wastewater systems and for the Portuguese water Authority, in the framework of the application of EU water related Directives. These projects represent about 50% of the funding of his research group. He has oriented 9 Ph.D thesis and more than 15 MSc thesis on mathematical modelling of the Marine Environment. He teaches Fluid Mechanics, Physical Oceanography and Modelling of the Aquatic Environment. Prof. Ramiro Neves was appointed by INAG (the Portuguese National Water Agency) to represent Portugal in the eutrophization modelling group of OSPAR.

Paulo Chambel Leio
Dr. Paulo Chambel Leit„o has a degree in Civil Engineering, a Master in Management, Ecology and Modelling the Marine Environment and a Ph.D in Environmental Engineering. He has a large experience regarding numerical simulation of transport processes of momentum and mass in marine environments in the framework of research and engineering projects. He has participated in several European Projects as National projects.

Luìs Fernandes
Luìs Fernandes has a degree in Environmental Engineering and a master degree in Ecology, Management and Modelling the Marine Environment . He has a large experience regarding numerical simulation of biogeochemical processes in estuarine and coastal environments in the framework of several national and European research projects. He has focus is research in studying transport processes modelling and interaction between the water column and the benthic system.

Publication List
Trancoso A., S. Saraiva, L. Fernandes, P. Pina, P. Leit„o and R. Neves (2005). Modelling MacroAlgae in Estuaries. Ecological Modelling vol. 187, (2-3) , Pages 232-246 September 2005.
Braunschweig F., Martins, F., P. Leit„o e R. Neves 2003 A methodology to estimate renewal time scales in estuaries: the Tagus Estuary case. Ocean Dynamics. Volume 53, Number 3; Pages: 137 ñ 145, September 2003

38 : MARIS (MARIS)

Mariene Informatie Service 'MARIS' BV
MARIS originates from Dutch government and is a leading SME with a long experience with marine data & information system developments and with management and participation in large multidisciplinary European projects. At present MARIS is coordinator of the Sea-Search project and technical director of the SeaDataNet project, that will succeed Sea-Search from April 2006 onwards. MARIS has special skills in developing and operating internet infrastructures including complex databases, geographical information applications, user-friendly interfaces, distributed content management, retrieval, presentation, import and export facilities. MARIS is also very qualified in organizing and managing organisational networks in the pan-European ocean & marine data community. MARIS is Data Management partner and IT developer and operator in a large number of European projects (both completed and ongoing) , such as MASS (4FP INCO), Black Sea Web (4FP INCO), EURONODIM (MAST3), EUROCORE (MAST3), EUMARSIN (MAST3), CASPSCIENCE-NET (5FP COPERNICUS), Sea-Search (5FP EESD), EUROPHLUKES (5FP EESD), EUROSEISMIC (5FP EESD), WADSIS (5FP INFO2000), MAGIS (5FP INFO2000), EMIDOI (5FP e-content), MERSEA (GMES). MARIS is the Coordinator of the Black Sea Web (4FP INCO), EURONODIM (MAST3), CASPSCIENCE-NET (5FP COPERNICUS), Sea-Search (5FP EESD), WADSIS (5FP INFO2000), MAGIS (5FP INFO2000), EMIDOI (5FP e-content) and SIMORC (6FP ñ EESD) projects. At present MARIS is coordinating the Sea-Search project, which network now consists of 33 National Oceanographic Data Centres and Marine Data Centres from 30 coastal states riparian to European seas. From 2006 onwards MARIS will be technical director of the SeaDataNet project (I3 ñ Research Infrastructures), which network consists of 50 National Oceanographic Data Centres and Marine Data Centres, Satellite Data Centres and Marine Application specialist centres from 36 coastal states riparian to European seas. MARIS has particular experience and expertise in the development of Internet databases, supporting combined alphanumeric ñ geographical user interfaces, incorporating dynamic mapping . Recent examples are the EU-SEASED website, featuring a metadatabase of over 300.000 marine samples, cores and seismic surveys from marine geological institutes in Europe (see www.eu-seased.net). MARIS is advisor and webmaster for the Netherlands National Oceanographic Data Committtee (NODC) and is engaged in the development of a national ocean & marine data infrastructure in the Netherlands interconnecting and giving transparant access to the databases of 8 national institutes.

Dick M.A. Schaap
Coastal Engineer - 1980 - Delft University. From 1980 to 1989 - Rijkswaterstaat, North Sea Directorate, head of Hydro-Meteo division and Project Engineer. From 1986 onwards projectmanager of MARIS project and from 1989 Managing Director MARIS foundation and from 1996 Managing Director of MARIS BV. Skilled in marine data management, organizing and coordinating (inter)national and European projects.

39 : met.no (MET-NO)

Norwegian Meteorological Institute

The Norwegian Meteorological Institute (met.no) provides the public meteorological and oceanographic services in Norway for both civil and military purposes. Core research activities are: developing and improving operational models for weather, ocean circulation, waves, sea level, sea ice; environmental emergency forecast services; general climate research and services. Oceanographic research and development is directed toward three main themes: 1) operational ocean forecasting; 2) climate modelling including coupling of atmosphere, ocean and ice; 3) operational ecosystem forecasting. Section Oceanography in the R&D Department develops and maintains operational and climate models for ocean circulation, water level, waves and sea ice, as well as models for oil spill prediction and drift of floating objects. From the 1970's met.no has provided a 24-hour oil spill prediction service for Norwegian authorities and oil companies. Since December 2001 met.no has run an operational service to support the Joint Rescue Coordination Centres in search and rescue operations in the open ocean.

Bruce Hackett

Bruce Hackett is a senior scientist at met.no and leads the research team for environmental oceanography research and development. He completed a graduate degree in physical oceanography at the University of Bergen in 1979. Current duties at met.no include management of projects in all aspects of ocean forecasting, including hydrodynamical and ecosystem modeling, drift modeling, data assimilation and information system development. He has previously participated in several EU projects under MAST3 and FP4 and was met.noís principal investigator in Mersea Strand 1 (FP5) and DISMAR (FP5 IST). He is currently met.no's PI in Mersea Integrated Project (FP6 RES), InterRisk (FP6 IST) and the national MONCOZE/MONBASE project.

Øyvind Sætra

Øyvind Saetra is a senior scientist at the met.no R&D Dept. He holds a PhD in physical oceanography at the University of Oslo from 1996. He has worked air-sea interaction, ocean modelling, specifically model validation and evaluation. In 2001-2004, he worked in the research department of the ECMWF, where he developed and implemented methods for validation of ensemble predictions. Current duties at met.no include management of projects in all aspects of ocean forecasting. He has participated in several EU projects such as EuroROSE and SHIPROUTES.

Harald Engedahl

Harald Engedahl is a senior scientist at met.no R&D Dept. He holds a PhD in physical oceanography at the University of Oslo from 1992. He has worked with numerical ocean models for daily operational forecasting. Currents duties at met.no include main responibility for all operational ocean forecast models, together with management of projects in all aspects of ocean forecasting.

Publication List

LaCasce, J.H., and H. Engedahl, 2005: Statistics of low frequency currents over the western Norwegian shelf and slope II: Model. Ocean Dynamics, 55, 222-237.

Hackett, B., ÿ. Breivik and C. Wettre, 2005: Forecasting the drift of objects and substances in the ocean. In Ocean Weather Forecasting, An Integrated View of Oceanography. Eds. E. P. Chassignet and J. Verron, Springer, 507-524.

Saetra, ÿ., J-R. Bidlot, H. Hersbach and D. S. Richardson. 2004. Effects of Observation Errors on the Statistics for Ensemble Spread and Reliability. Monthly Weather Review, 132. no 6. 1487-1501.

40 : (MF)

41 : MSI (MSI)

Marine Systems Institute at Tallinn University of Technology

Marine Systems Institute has been founded in 2002 as an autonomous research unit at Tallinn University of Technology on the basis of the Department of Marine Physics that belonged historically since 1972 to the different institutions. The Institute employes 30 persons, among them 16 with PhD or equivalent degree, and is a leading national research body to study the physical forcing of the Baltic Sea ecosystem. Research topics deal with water exchange processes at changing climatic conditions, including coastal processes, ecohydrodynamics and marine optics. Observational studies are closely linked with modelling activities. Expertise has been developed for high-resolution measurements, circulation/ecosystem/wave modelling and marine information systems. Many of the projects are run on the basis of national and international cooperation. The results of fundamental research are used for the applied tasks like operational and scenario forecasting of storm surges and floods, harmful algae blooms, oil spills, sediment dynamics and ecological effects of changing pollution load. Institute has been participating in a number of international projects, including those from the Nordic Council of Ministers and EC (e.g. BASYS, DOMTOX, MITEC, HABES, PAPA, Sea-SEARCH, SAFEICE, SeaDataNET). The institute is a leading national body in operational oceanography and is a member of BOOS, HIROMB and FerryBox consortia.

Tarmo Kiuts

Tarmo Kiuts, PhD, has a university diploma in geophysics (1986) and PhD in environmental physics (1999). Senior scientist and project leader in the Department of Ecohydrodynamics, Marine Systems Institute. He also works on a part-time position as senior hydrologist for Estonian Maritime Administration. He is dealing with hydrography of the Baltic deep basins, including the problems of deep water renewal, and with the hydrodynamics of the coastal zone and ice problems. He is leading a large number of projects.

He is national PI in EC SAFEICE project. Responsible for real-time coastal observations in the PAPA project and BOOS cooperation.

Inga Lips
Inga Lips, PhD, has a university diploma in hydrobiology (1997) and PhD in hydrobiology (2005). Senior scientist and project leader in the Department of Ecohydrodynamics, Marine Systems Institute. She is dealing with impact of physical processes on the phytoplankton dynamics. She is a national coordinaator of the Alg@line HAB information system and FerryBox coordinaator in the Marine Systems Institute.

Juri Elken
Juri Elken, Prof., PhD, has a university diploma in geophysics (1975) and a Ph.D. in oceanography (1983). He is director of the Marine Systems Institute and Professor of Oceanography at Tallinn University of Technology. He has been working with physical oceanography (synoptic eddies, fronts, deep lenses, general hydrography of the Baltic, circulation and water mass distribution of the Northern Atlantic), methods for objective analysis, numerical circulation modelling, marine ecosystem studies, monitoring strategies. He is a member of several national and international bodies, including BOOS Steering Committee and BONUS Network Steering Committee.

Publication List
Laanemets, J., Lilover, M.-J., Raudsepp, U., Autio, R., Vahtera, E., Lips, I., Lips, U. (2006). A fuzzy logic model to describe the cyanobacteria Nodularia spumigena bloom in the Gulf of Finland, Baltic Sea. Hydrobiologia, 544, 1, 31-45.

42 : RBINS-MUMM (RBINS-MUMM)

Royal Belgian Institute of Natural Sci ences - Management Unit of the North Sea Mathematical Models
MUMM is the Belgian federal scientific department responsible for the marine environment. It operates the national research vessel Belgica and the Belgian Marine Data Centre (BMDC), monitors the quality of the ecosystems of the North Sea and develops numerical models of marine physical and biological processes.

Patrick LUYTEN
Ph.D in Physics, 1981, Univ. Antwerp
Expertise: numerical modelling, marine turbulence, model integration, data assimilation
Activities: partner in 9 EU-MAST and FP5 projects, operational oceanography, author of the EU Community model COHERENS

Kevin RUDDICK
Education: 1987 B.A., Maths, Cambridge University; 1995 Docteur en Sciences, LiËge University.
Professional Experience & Skill: Physical oceanography, fluid dynamics, hydrodynamic and ecosystem modelling, optical remote sensing.
Currently head of Remote Sensing and Ecosystem Modelling (REMSEM) team at MUMM.
Coordinator of various national and international projects including the MARCOAST Harmful Algae Bloom alert and forecasting services.

Serge SCORY
Education: 1982, M.Sc. in Engineering.
Expertise: modelling of marine processes, operational oceanography, marine data management, impact assessment of human activities at sea.
Partner in several MAST and FP5 projects. Partner in the FP6 project ìSeaDataNetî. Head of the computer support unit and of the Belgian Marine Data Centre (BMDC) at MUMM. Belgian federal delegate to IODE (IOC).

Publication List
Lacroix, G., K. G. Ruddick, et al. (2004). "Modelling the impact of the Scheldt and Rhine/Meuse plumes on the salinity distribution in Belgian waters (southern North Sea)." Journal of Sea Research 52(3): 149-163.

Lacroix, G., K. Ruddick, Y. Park, N. Gypens, and C. Lancelot. 2006. Validation of the 3D biogeochemical model MIRO&CO with field nutrient and phytoplankton data and MERIS-derived surface chlorophyll a images. Journal of Marine Systems, 2006 (in press).

Luyten, P.J., J.E.Jones and R.Proctor, 2003. A numerical study of the long- and short-term temperature variability and thermal circulation in the North Sea. Journal of Physical Oceanography, 33, 37-56.

Luyten P., I. Andreu-Burillo, A. Norro, S. Ponsar, 2006. A new version of the European public domain code COHERENS. Proc. Eurogoos Conf., 2005, Brest, France (in press).

43 : NERSC (NERSC)

Nansen Environmental and Remote Sensing Center
NERSC was founded in 1986 as an independent non-profit research institute affiliated with the University of Bergen. The Nansen Center performs interdisciplinary basic and applied research related to the physical environment, natural resources and climate by integrated use of satellite and aircraft remote sensing, in situ observations, numerical modelling and advanced data assimilation techniques. The scientific personnel have professional background in remote sensing, oceanography, climatology, mathematics,

physics, informatics/computer science, geology and biology. Since 2003, NERSC has developed and validated eddy-resolving models in several regions of the world oceans, including the North Sea, the Norwegian Sea, the Barents Sea, the Gulf of Mexico and the South China Sea.

The Nansen Center has a strong international profile working in many multinational projects in Europe including Russia, North America, Asia and Africa. Staff at NERSC are approved PI¥s under several announcement of opportunity (AO) programs issued by the major space agencies, providing access to several types of Earth observation data. The Nansen Center is the leading institution of the Nansen Group, a global research network with more than 75 scientists conducting research projects in cooperation with partners around the world.

Johnny A. Johannessen
Dr. Philos from University of Bergen. Research Director in Ocean Remote Sensing, Nansen Environmental and Remote Sensing Center, Professor 2 in Satellite Oceanography, Geophysical Institute, University of Bergen. Experience in Earth Observation ocean/sea ice remote sensing and integrated monitoring and modelling. Authored/co-authored more than 160 scientific and technical publications, reports and book articles of which 60 papers are published in International Review Journals.

Laurent Bertino
Dr. Laurent Bertino is leading the modeling and data assimilation group at the Nansen Environmental and Remote Sensing Center (NERSC) and co-leading the Mohn-Sverdrup Center for Global Ocean Studies and Operational Oceanography. The Mohn-Sverdrup Center employs 20 young scientists on modeling and data assimilation studies of open oceans and coastal seas. Laurent has experience in data assimilation and environmental statistics and is responsible for the TOPAZ monitoring system. TOPAZ is the Norwegian contribution to the international initiative GODAE (Global Ocean Data Assimilation Experiment) and the Arctic component of the MERSEA system.

Publication List
J.A. Johannessen, B. Hackett, E. Svendsen, H. S¯iland, G. Evensen, L.P. R¯ed, N. Winther, J. Albretsen, M. Skogen, L. Pettersson, D. Durand and D. Obaton, Monitoring the Norwegian Coastal Zone Environment (MONCOZE), Building the European Capacity in Operational Oceanography, Proceedings of the Third International Conference on EuroGOOS, 3-6 December 2002, Athens, Greece, Eds. H. Dahlin, N.C. Flemming, K. Nittis, S.E. Petersson, Elsevier Oceanography Series, 69, 2003.
L. Bertino, N. Winther and J.A. Johannessen, Real time marine monitoring systems: Forecasting the oceans and regional seas. Hydro International, June 2004.
J.A.Johannessen, V.Kudryavtsev, D.Akimov, T. Eldevik, N. Winther, B. Chapron, On Radar Imaging of Current Features; Part 2: Mesoscale Eddy and Current Front detection. Journal of Geophysical Research, Vol. 110, C07017, 2005.

44 : NIVA (NIVA)

Norsk Institutt for Vannforskning
1. profile
The Norwegian Institute for Water Research (NIVA) is a private, non-profit research foundation with a staff of 220, including 130 researchers. NIVA has been Norway's leading research institute dealing with marine ecosystems and water pollution since 1958. NIVA carries out research, monitoring and development work on contract for public authorities and private clients in Norway and abroad. The EU research programmes, the Norwegian Development Agency (NORAD), the World Bank, and the European Development Bank fund a major part of international projects.
NIVA has a valuable experience and expertise on ocean colour validation protocols, including measurement, laboratory analysis, quality control, identification of match-ups, statistical inter-comparison exercises. NIVA operates real-time and long-term oceanographic (including ocean colour) measurements from a network of ships of opportunity cruising along the Norwegian coast and across the Skagerrak.

Dominique Durand
Dr. Dominique Durand (Project manager for NIVA): Dominique is research manager at the Norwegian Institute for Water Research - NIVA, leading the section for oceanography, remote sensing and marine modelling. He graduated in oceanography (1988) and in remote sensing (1991), and obtained a PhD in ocean sciences and remote sensing (2000). He is a member of the North-west shelf Operational Oceanography System (NOOS) board and is coordinating the Earth observation programme of the Norwegian Polar Environmental Centre. He has strong experience with GMES related projects through its former involvement in EC-MERSEA strand1, ESA ROSES, ESA-DeciDe-HAB.

Kai Sørensen
Kai Sørensen (Senior Scientist & Validation Expert): Kai is a senior scientist at NIVA with 20 years experience of using satellite data as supplement to other traditional data for monitoring water quality in fjords and coastal water. He has a B.Sc in chemistry and experience in marine chemistry, biology and marine optical measurements. Kai has conducted numerous remote-sensing projects regarding calibration and validation of optical space and airborne sensors. At NIVA he has worked for about 10 years using analytical methods to assess various water quality parameters, and using various types of optical field measurements of importance for remote-sensing techniques.

Henning Wehde
Henning Wehde graduated in physical oceanography in 1996 and received his Ph.D. in 2001 at the University of Hamburg. Since 1996 he has worked in several national and international projects such as ESOP II, CONVECTION and FERRYBOX. His primary

focus of research in oceanography is on the impact of physical environment on the ecosystem functioning as well with the help of field experiments and ocean observations from ferries as developing and applying numerical models. He has participated in 12 oceanographic expeditions mostly in the Northern Seas (chief scientist on 3). He has particular interests in improving ocean observations and linking in situ and remote sensing observations to physical and ecosystem modelling.

Publication List

Johannessen, J.A., L.H. Pettersson, T. Eldevik, D. Durand, G. Evensen, N. Winther and ÿ. Breivik, 2005. Coastal Physical and Biochemical processes. In ASPRS Remote Sensing Manual, Ch. 6, 20 pp.

45 : PML (PML)

Plymouth Marine Laboratory

Plymouth Marine Laboratory (PML) is a NERC Collaborative Centre. The research at PML is timely and highly relevant to UK and international societal needs and its research, development and training programmes have at their core the mission to contribute to the issues of global change, pollution and sustainability. As one of the worldís first truly multidisciplinary marine research centres, PML delivers research and solutions for national and international marine and coastal programmes. It is an independent, impartial provider of scientific research in the marine environment, with a focus on understanding biodiversity and ecosystem function, which is critical to providing solutions in terms of measures of ecological sensitivity, biogeochemical cycling, scaling biodiversity and forecasting the role of the oceans in the Earth System. It has centres of expertise providing skills and knowledge, which are leading in their respective fields internationally, particularly in molecular science, development and applications of novel technology, marine systems modelling and satellite remote sensing, which feed into advanced training programmes.
The CO-PIís for the proposal and their relevant expertise are Allen (coupled hydrodynamic ecosystem modelling and assimilation); and Torres (data assimilation).

J. I. Allen

Mr J Icarus Allen, (Band 4) leads a multidisciplinary research group which includes conceptual, numerical and statistical modelling, remote sensing, and optics. His primary research interest is the development of complex marine system models for both hypothesis testing and forecast. He has been involved in or acted as principle investigator in 24 national and EC scientific projects and he has published 42 peer reviewed papers and written over 25 non-peer reviewed papers and contract reports.

R. Torres

Dr R Torres has a PhD from the University of Wales, Bangor. He joined PML modelling group in 2002 acquiring expertise in data assimilation, interpreting and modelling marine systems and its relationship with the physical environment by developing mathematical Harmful Algal Blooms models. He has published 9 peer reviewed papers.

Publication List

Holt JT, Allen JI, Proctor R, Gilbert F, (2005). Error quantification of a high resolution coupled hydrodynamic ecosystem coastal ocean model: part 1 model overview and assessment of the hydrodynamics. Journal of Marine Systems, 57, 167: 188
Allen JI, Blackford J, Gilbert F, Siddorn JR, (2004). Turbulence as a control on the microbial loop. Journal of Sea Research, 52, 1 : 20
Allen, J.I., Blackford, J., Holt, J., Proctor, R., Ashworth, M., Siddorn, J. 2001. A highly spatially resolved ecosystem model for the north-west European continental shelf. Sarsia. Vol. 86, no. 6, pp. 423-440.
Pinardi N, Allen JI, Demirov E, De Mey P, Korres G, Lascaratos A., Le traon P-Y, Maillard C, Manzella G, and Tziavos C. 2003 The Mediterranean ocean Forecasting system: first phase of implementation (1998-2001). Annales Geophysicae. 21: 3-20
Torres R, Allen JI, Figueiras FG, (2006). Sequential data assimilation in an upwelling influenced estuary. Journal of Marine Systems (in press)

46 : PdE (PdE)

Puertos del Estado

Puertos del estado (Spanish holding of harbours) has the role of coordinating and supporting the activiites of the main harbours in Spain. Amongst their legal competences is the study of the physical environment in the coastal area. This is done via a research group (¡rea del Medio FÌsico). The lines of work are:

- Control and Management of the Measuring Networks of Puertos del Estado: scalar and directional wave data, sea level, radar data, and coastal meteorological data.
- Support and development of an Oceanographic Database: contains information from different sources as measuring networks, numerical models and statistical analysis, etc. Some data are generated at the department and other by purchase or exchange with different institutes.
- Development of Numerical Wave and Ocean circulation Models.
- Operational forecast: waves and sea level forecasted for the Spanish harbours on a twice a day cycle.
- Infraestructures response to p hysical environment

Enrique Alvarez Fanjul

PhD in Physics. With 15 years of experience in numerical modelling he is co-author of NIVMAR, a storm surge prediction system for the Spanish coasts. He participated in several European projects like PROMISE, HIPOCAS, ECAWOM or VISIMAR. He has also been a member of the ESEAS Technical Committee. Head of the permanent networks of Puertos del Estado, is directly responsible of the management of the Puertos del Estado Deep Water Buoy Network. At this moment coordinates a national project (ESEOO) for the establishment of an oceanographic operational system after Prestige accident.

BegoÒa PÈrez GÛmez
Physicsist, with 14 years of experience in tide gauge network managing as director of the REDMAR, the Puertos del Estado tide gauge network. She has participated in international projects like MedGLOSS, has been National Delegate of the COST Action 40 EOSS (European Sea Level Observing System), and member of the Governing Board and the Technical Committee of ESEAS. She has expertise in tide gauge data quality control and analysis, ranging from harmonical analysis to extreme value computations. Part of her work is related with numerical modelling, co-author of NIVMAR, a storm surge prediction system for the Spanish coasts. Nowadays is chair of the GLOSS Technical Subgroup, created in 2005.

JosÈ Dami·n LÛpez Maldonado
B.S. in Physics and M.S. in Electrical Engineering. He has about 15 years of development experience in the field of Computation Techniques, Parallel Programming and Comunications Systems.

Publication List

- Alvarez Fanjul, E., PÈrez GÛmez, B., RodrÌguez S·nchez-ArÈvalo, I. Nivmar: A storm surge forecasting system for Spanish Waters. SCI. MAR., 65 (Suppl. 1): 154-154. 2001.
- Carretero, J. C., Alvarez Fanjul, E., GÛmez, M., PÈrez GÛmez, B., RodrÌguez, I. Ocean Forecasting in narrow shelf seas: application to the Spanish coasts. Coastal Engineering, 41. 269-293. 2000.

47 : RIKZ (RIKZ)

Rijksinstituut voor Kust en Zee, RIJKSWATERSTAAT
RWS/RIKZ or National Institute for Coastal and Marine Management/ RIKZ" is part of the Ministry of Transport, Public Works and Watermanagement, Directorate General Rijkswaterstaat (RWS). Its aim is to provide advice and information on the sustainable use of estuaries, coast and seas, and on coastal flood protection. For this purpose, the National Institute for Coastal and Marine Management develops and maintains a knowledge and information structure. As a knowledge bank, the RIKZ is also at the service of other parts of central government and it co-operates with various agencies and organisations at international level. Rijkwaterstaat has 15 years of experience with the assimilation of storm-surge models and are also very active in the field of environmental assessments, real-time monitoring, modelling, storm-surge forecasting and data management.

RIKZ plays a central role in monitoring the Dutch coastline and sea areas and applies hydrographic and water quality models to integrate scientific results and to describe the distribution, transport, fluxes and sources of sea water and antropogenic compounds in the North sea. To this end, the institute works hand in hand with the academic and research world, nationally and internationally, to develop methods and instruments with which to take measurements and to deliver information.

Msc. J.C. Borst (first name: KEES)
At this moment Senior Advisor and Projectmanager for international activities in the field of Monitoring and Informationmanagement. From 1997-2002 head of the National Monitoring System Water of the RIKZ and involved in general EuroGOOS activities since 1993 and active member of NOOS. He was overall co-ordinator of the first EuroGOOS Conference in The Hague (1996) and co-editor of the Proceedings of this Conference. He is/was also active in a lot of EU-projects and initiatives such as REMMSBOT, SEANET-Data Interface and ESODAE-1, TRANSPOSE,EDIOS, SEA-Search I and II and SEADATANET. Further involved in European discussions on GMES, INSPIRE and GEOSS.

Msc. Phd. M. Verlaan (first name: MARTIN)
1993 Master of Sciences in Applied Mathematics at Twente University of Technology,
1998 Phd in Technical Mathematics on efficient Kalman Filtering algorithms with applications to shallow water flow. At present he works at the National Institue for Caostal and Marine Management as a projectleader in the hydrodynamics group on the development and management of data-assimilation software and applications for storm-surge models and coastal hydrodynamics models.

Msc C.J.M. van Ruiten (first name: KEES)
Senior information expert on hydro-informatics and received his degree in Applied Physics on acoustic topics. He has been active in EU-MAST projects since 1987 (TRIDSIMA,ESODAE) on hydro-instrumentation and just finalized as a coordinator the project COASTBASE in the EU-IST-program. Recently has been involved in the more ecological oriented Implementation of the European Water Framework Directive. Efficient use of information for decition making is the key element is his recent work.

Publication List
Stel, J.H., H.W.A. Behrens, J.C. Borst, L.J. Droppert, J.P. van der Meulen: Operational Oceanography; The Challange for European Co-operation; Proceedings of the First International Conference on EuroGOOS; Elsevier, 1997

48 : RSHU (RSHU)

Russian State Hydrometeorological University
The Russian State Hydrometeorological University (RSHU), the key University in Eastern Europe and the only one in Russian Federation specialized in hydrometeorological sciences (meteorology, oceanography, hydrology, ecology).It was created in 1930. Today RSHU has the status of the regional educational center of World Meteorological Organization in Eastern Europe.

RSHU research activity includes research of atmospheric and oceanic processes, atmosphere-ocean interaction, methods of weather analysis and forecast, estimation of possible climate changes under the influence of natural and anthropogenous factors, creation the diagnostic and forecasting models of the natural, development of the scientific-methodical bases for increase of stability of the water and air environment to the anthropogenous loadings and other directions.

Tatyana Eremina
Associated professor at the Department of Oceanology and senior researcher in Russian State Hydrometeorological University. Modeling of water quality, biochemical transformation of substance in the water, ecosystem modeling, interaction between fresh and salt water in the stratified es tuaries, ecological investigations in estuaries and coastal shallow water, enviromental investigation in the Baltic Sea

Alexey Nekrasov
Professor of the Chair of Oceanology
(i) Physical oceanography, tides, tidal energy, tsunami, sea level variations
(ii) Oceanography of the Baltic Sea and the Gulf of Finland and their coastal zone
Theoretical and experimental (field expeditions) study of oceanographic characteristics of the Baltic Sea and the Gulf of Finland. Investigation of tides in the Arctic regions including Siberian Shelf and White Sea. Study of sea level oscillations in the Okhotsk, White and Baltic Seas

Publications:
Eremina T, Korneev O., Rybalko A., Fedorova N. Estimation of ecological conditions in the Eastern Gulf of Finland according to results of observations obtained by RV ëSibiriakoví in 2000-2001. BFU Bulletin N4-5, St.-Petersburg, 2002, p.16-18 (E)
Eremina T, Neelov I.A.Isaev A.V.Ryabchenko V.A.Savchuk O.P.Vankevich R.E. Simulations of the Gulf of Finland ecosystem with 3-D model. Proc.Estonian Acad. Sci. Biol. Ecol.- 2003. - 8470; 52/3. р.р.347-359. (E)
Research at open Baltic aboard a small sailing vessel. Abst. Baltic Sea Cong. 2003, Helsinki, Finland, August 24-28, 2003, p.121 (E)
A.A. Androsov, Y.V. Liberman, Nekrasov A.V., D.A. Romanenkov, N.E. Voltzinger. Numerical Study of the M2 tide on the North Siberian Shelf. Continental Shelf Research, v. 18, 1998, p. 715-738
Nekrasov A.V., Eremina T.R. and Provotorov P.P. Hydrophysical processes: Gulf of Finland in circumstances of anthropogenic impact. Institiue of Limnology RAS, St. Petersburg, 1999, p. 5-47; (In Russian);
Nekrasov A.V. An intensive upwelling in the Eastern Gulf of Finland and attendant effects. Abstr. Baltic Sea Science Congress 2001ñPast, Present and Future ñ A Joint Venture, Nov. 2001, p. 256;
A.V. Nekrasov, I.K. Lebedeva. Estimation of baroclinic Rossby radii in Luga-Koporye region. BFU Research Bulletin, No 4-5, 2002, p. 89-93.

49 : SMHI (SMHI)

Swedish Meteorological and Hydrological Institute

SMHI is a governmental institute under the auspices of the Swedish Ministry of the Environment. SMHI comprises expertise within the field of meteorology, oceanography, hydrology and climatology. SMHI has about 575 employees.

Bertil Haakansson

Scientist in regional physical oceanography, covering theoretical and experimental work. Key issues are coastal zone and strait water exchange and basin wide circulation studies. Long experience with applications of marine remote sensing data of alga blooms, marine optics, SST, river discharge and sea ice. He is a member of the Remote Sensing Research Committee (FAK) at the Swedish National Space Board. Review assignments for 8 different research journals. Writer of 19 per reviewed papers and 47 other papers. SMHI representant in JCOMM, EuroGOOS and HELCOM.

Lennart Funkquist

M.Sc. LF has for a long time been a specialist in numerical modelling of the ocean circulation and data assimilation. Special attention has been given to the construction of high-resolution operational models for the Baltic Sea. He has been the SMHI official responsible person for 4 EU projects and has published more than 15 reports, papers and conference contributions during the last years.

Philip Axe

Work with eutrophication and oceanographic data analysis (physical and chemical) for Swedish Environmental Protection Agency (SEPA) and international organizations (e.g. Helcom); Wave data analysis for private industry; Transistional, coastal & marine data reporting to the EEA; Responsible for the Oceanographic Data Centre for BALTEX; Database design and implementation. Work on EU-funded projects(ODON, OAERRE, EOSS). At sea 4 weeks per year.

Publication List

Andersen, H., J., Aigars, J., Claussen, U., HÂkansson, B., Karup, H., Laamanen, M., Lysiak-Pastauszak, E., Martin, G. & G. Nausch 2005. Development of tools for assessment of eutrophication in the Baltic Sea. DHI Report 2005, under Contract from HELSINKI COMMISSION.

Axe P., M. Hansson and B. HÂkansson, 'The National Monitoring Programme in the Kattegat and Skagerrak', SMHI Oceanografi Report Nr. 77, 2004, 39 pp. ISSN 0283-7714

Haakansson, B. & D. Bowers - Guest Editors ñ 2005. Baltic Sea Remote Sensing and Bio-optical Modelling. Int. J. Remote Sensing, Vol. 26, No. 2, 229 ñ 423.

Kratzer, S., Haakansson, B and C. Sahlin 2003. Assessing Secchi and Photic Zone Depth in the Baltic Sea from Satellite data. AMBIO Vol. 32, No. 8, 577 - 585.

Haakansson, B. 2000. Satellite remote sensing of the coastal ocean: water quality and algae blooms. In Seas at the Millennium: An Environmental Evaluation, Ed. C. Sheppard, Vol. 3, 293 ñ 302, 2000 Elsevier Science Ltd..

SandÈn, P. and B. Haakansson (1996): Long-term trends in the Secchi depth in the Baltic Sea. Limnology and Oceanography, Vol. 41, No. 2, 346 - 351.

Funkquist, L., 2001. HIROMB, an operational eddy-resolving model for the Baltic Sea. Bulltein of the Maritime Institute in Gdansk, Vol XXVIII, No. 2, pp 7-16.

Funkquist, L. and Dahlin, H. 2002. Forecasting of sea level, currents and sea ice in the Baltic Sea. In: Ocean Forecasting, ed. N. Pinardi and J. Woods, Springer Verlag, pp 231-241.

50 : SOI (SOI)

State Oceanographic Institute of Roshydromet

State Oceanography Institute (SOI) is a leading research institution of the Federal Service for Hydrometeorology and Environmental Monitoring (Roshydromet), Russian Federation, responsible for long-term (year-to-year) monitoring of the Black and Azov Sea hydrological and hydrochemical state and pollution based on observations at the Roshydromet coastal hydrometeorological stations, from small ships, and satellites. SOI is deeply involved in national programmes aimed at providing the end-users (mainly national governmental bodies) with the information on the Black Sea state and pollution. The expertise of the SOI personnel lies in wind wave, thermohalinic and dynamic field modelling, stochastic methods for sea state prediction with a lead time of several years to 10-15 years, methods for chemical analysis of the water and bottom samples. Since 2003, the institute has been involved in ARENA project, and since December 2005, in the ASCABOS project, both devoted to laying bases for operational oceanography (including nowcasting and forecasting) in the Black Sea. The major area of the SOI activities in the ARENA and ASCABOS projects is sharing expertise in the Black Sea state and pollution monitoring with the young scientists and end-users.

Alexander Grigoriev

Graduated from the Odessa Hydrometeorological Institute in 1980 (M.Sc.). From 1980 till 1982 he served in the Soviet Army. In 1983 he joined the Marine Hydrophysical Institute (MHI, Sevastopol, Crimea) where he obtained a Ph.D. in 1992. In 1999 he joined the State Oceanographic Institute (SOI) of Federation Service of Russia for Hydrometeorology and Environmental Monitoring, Moscow, Russia. At present he is Head of Laboratory of modelling of currents and structures of sea water. Current research interests include numerical simulation of sea and ocean currents and water structures, data assimilation, assimilation of satellite data in circulation model, mesoscale eddies, coastal flows, wind-driven circulation of the Black Sea and Caspian Sea.

Iliya Kobatchenko

Graduated from Moscow University, Department of Geography, as oceanologist in 1975. Received his PhD in the State Oceanographic institute in 1984. Since 1993, is the head of Wind-Wave Laboratory.
Research interests: wind-wave and sea current modeling

Alexander Postnov
Graduated from Moscow State University , Department of Geography as meteorologist-climatologist in 1976. In 1976-1996, was a research associate and head of Laboratory for Mesoscale Meteorology in the Central Aerological Observatory, Moscow. Received his Ph. D. at the same Observatory in 1985. In 1996, joined the State Oceanographic Institute as the head of Laboratory for Ocean Climate and Marine Meteorology. During 2003-2005, was the SOI Deputy Director for scientific activities. Since 2004 is the Secretary of the GOOS Working Group of the Russian National Oceanographic Committee. Since May 2001, is a member of the Black Sea GOOS Steering Committee. Since March 2003, is the ARENA WP-3 (Capacity building) leader.
Research interest in ocean and sea climate change, marine atmospheric boundary layer, CO2 in sea water and marine air.
Publication List
Alexander Kubryakov, Alexander Grigoriev, Avtandil Korzadze, Simona Stefanescu, Dimitry Trukhchev, and Gennady Korotaev. Nowcasting subsystem of the circulation in the Black Sea nearshore regions.- 4-th EuroGOOS Conference. European Operational Oceanography: Present and Future. Abstracts. 609 June 2005, Brest, France. p.210.

51 : TechWorks (TECHWORKS)

TechWorks MArine Ltd
TechWorks Marine provides clients with world-class solutions to monitor the marine environment. We supply real-time data from our monitoring platforms. This real-time data enables our clients to make effective management decisions. Our solutions are based on our proprietary data acquisition and transmission system the TechWorks Marine Black Box (TMBB). The TMBB is designed for use in hostile environments delivering data via real-time telemetry to viewed online 24/7. TechWorks Marine provide clients with the information they require to make the right decision. Our Technology ensures we can deliver data in real-time from any location to you via our secure web page. The TechWorks Marine Black Box (TMBB) real-time data acquisition and transmission system is designed for marine use in hostile environments and can be fitted with multiple input sensors to measure numerous environmental conditions. In addition to commercial work TechWorks Marine is also involved in several EU research projects: MerSea, MATSIS. We are also involved in the SPICOSA proposal.

Charlotte O'Kelly
Charlotte is the CEO of TechWorks MArine Ltd. In October 2004, TechWorks Marine was awarded the Technology award at the Irish National Enterprise Awards by the county Enterprise Boards, subsequently in December 2004 Charlotte was awarded the Dublin female entrepreneur of the year award. In June 2003 she participated in the Coca-Cola national enterprise awards at which TechWorks Marine was awarded the second prize by T·naiste Mary Harney. In May 2002, TechWorks Marine was awarded the prize for best innovation and new technology award at the Shell LiveWIRE awards.
She has carried out extensive market research into the product development and has been key to identify new growth markets such as the aquaculture markets for the technology developed by Techworks Marine.
Recently charlotte has become an expert evaluator for the UE commission on research proposals in the marine sector, this has added to charlotteís rounded research background in the areas of operational oceanography and real-time monitoring systems.
At present Charlotte is developing new sales channels in Ireland, Scotland and Canada, and is entering these markets with the guidance of the main aquaculture insurance company worldwide who would like to see the TMBB system rolled out to all itís client sites.

Philip Trickett
Philip is responsible for all technical development activities within TechWorks Marine, including the development of our TechWorks Marine Black Boxô (TMBB) data collection and transmission system. Philip is responsible for all the sensor/ equipment servicing and maintenance within the company. In addition to this Phil has recently taken on a technical sales role, visiting clients and doing demonstration and well as training.
Philip has been key to the development of the TMBB product and the full system integration. Philip designed the TMBB from proof of concept to commercialization both the hardware and software elements of the development.
At present Philip manages the growing technical team at Techworks, not only looking after the service and maintenance of existing client sites, but also looking into streamlining product development and itís subsequent deployment.
Philip has recently been responsible for the new technology implementation for the Irish Marine Institute and the Irish EPA as part of the EU funded MATSIS project, for which he has developed an "intelligent" real-time monitoring and sampling system.

52 : TUD (TUD)

Delft University of Technology
Delft University of Technology, Faculty of Civil Engineering and Geosciences, Department of Environmental Fluid Mechanics

Our research is focusing on the physical processes which are studied in great detail. The thus obtained knowledge is integrated in numerical models, suitable for the engineering practice.
For these activities use is made of the associated Fluid Mechanics Laboratory equipped with a wave basin, several long flumes for waves and currents in combination with sediment, and an annular flume and settling column for cohesive sediment research.
The numerical "laboratory" is organized around a 32-node Linux Cluster. Numerical models for the prediction of flow and waves are being developed with key words like: unstructured grids 3D, large scale inundation, stratified flows, large eddy simulation, waves in shallow water SWAN.

dr. J.C. Winterwerp
Dr. Winterwerp is associate professor and expert on morphodynamics and sediment transport in estuarine environments. He has a part-time affiliation with Delft Hydraulics.
He has executed many hydrodynamic, hydro-thermal and hydro-morphological studies all over the world as project leader and as expert in multi-disciplinary project teams, using various mathematical models. Amongst these are sediment transport studies for the navigational channels of Rotterdam, The Netherlands; of Cochin, India; for Neva Bay, St. Petersburg, Russia; for the Segara Anakan Lagoon, Java, Indonesia; for the Yangtze estuary and the Yellow River, China; for the Humber estuary, UK; for the Loire estuary, France; and for the Atchafalaya estuary, USA.
He is the author / co-author of more than 90 publications in Scientific Journals and Reference Books and contributed to many International Conferences.

Publication List
2005 J.C. Winterwerp, ìReducing harbour siltation; Part I: Methodologyî, ASCE, Journal of Waterway, Port, Coastal and Ocean Engineering, November/December 2005.
2004 J.C. Winterwerp, W.G.M. van Kesteren, ìIntroduction to the physics of cohesive sediments in the marine environmentî, Elsevier, Developments in Sedimentology, 56.
2004 M. van Ledden, M., W.G.M. van Kesteren and J.C. Winterwerp, ìA classification for erosion behaviour of sand-mud mixturesî, Continental Shelf Research, Vol 24, pp 1-11.
2003 J.C. Winterwerp, T. van Kessel, ìSiltation by sediment-induced density currentsî, Ocean Dynamics, Vol 53, pp 186-196.
2002
J.C. Winterwerp, ìOn the flocculation and settling velocity of estuarine mudî, Continental Shelf Research, Vol 22, pp 1339-1360.
2001 J.C. Winterwerp, ìStratification effects by cohesive and non-cohesive sedimentî, Journal of Geophysical Research, Vol 106, No C10, pp 22559-22574.

53 : OC-UCY (OC-UCY)

Oceanography Centre, University of Cyprus
Oceanography Centre, University of Cyprus (OC-UCY)

The Oceanography Centre is a Cyprus institution for studying the sea water characteristics of the Mediterranean Sea. The Oceanography Centre operating at the University of Cyprus (previously within the Department of Fisheries and Marine Research) and plays a key role in the marine research of the Eastern Mediterranean Levantine Basin. The Centreís scope of activities include numerical models (flow, oil spill and general pollutant dispersion and sea state predictions), satellite remote sensing, remote in-situ monitoring, hydrography (physical, chemical), data and metadata management and information, operational oceanography: improvements and development of monitoring and forecasting systems. The Oceanography Centre is associated in EuroGOOS, MedGOOS, MedGLOSS, ESEAS and MOON initiatives on operational oceanography.
Within the framework of several research projects, funded by EU (listed above) and national programs, the Oceanography Centre has developed the last 6 years the CYCOFOS-the Cyprus Coastal Forecasting and Observing System, which in fact is the first high resolution operational coastal/ocean forecasting and observing system in the Eastern Mediterranean. The system provides operationally, since the beginning of 2002, forecasts for sea currents, temperature, salinity, sea state, near real time information on satellite remote sensing SST, remote sea level, temperature and salinity profiles.

George Zodiatis (Principal investigator)
George Zodiatis (Principal investigator) holds a Ph.D. in Oceanography from the LHMI-RSHMU University, St. Petersburg and he has more than 20 years of experience in oceanography of the Mediterranean Sea and participation in International and European research projects. At present he is the Vice Director of the Oceanography Center, University of Cyprus. Prior he worked at the Department of Fisheries and Marine Research, Nicosia, and the National Centre for Marine Research, Athens. He is coordinating the work of a team participating in several EU projects such as MEDATLAS-II, MFSPP, CYCLOPS, MAMA, Sea-Search, ESEAS-RI, MFSPP, MERSEA-1, MERSEA-IP.

Robin Lardner
Robin Lardner holds a Ph.D. and Sc.D. in Applied Mathematics and Theoretical Physics from Cambridge University. He is emeritus Professor of Applied Mathematics, Simon Fraser University, Canada. At present, he is Associated Researcher at the Oceanography Centre, University of Cyprus. The last 7 years he active participated in EU research projects such as :MFSPP, MFSTEP, MERSEA-1.

Dan Hayes and Georgios Georgiou
Dan Hayes holds a Ph.D. in Physical Oceanography from University of Washington. He is Associated Researcher at the Oceanography Center, University of Cyprus. Prior, he worked for the British Antarctic Survey in Cambridge, UK. He participates in EU projects such as MFSTEP, MERSEA-IP. Georgios Georgiou holds a Ph.D. in Chemical Engineering from the University of Michigan. He joined the Department of Mathematics and Statistics of the University of Cyprus in 1992. At present he is the Director of the Oceanography CentreIn the past 5 years, he has been involved in oceanographic projects, in collaboration with the Oceanography Centre. He participated in EU funded projects such as : MEDATLAS II, MFSPP, MAMA, MERSEA-1, MFSTEP.

54 : ULg (ULG)

University of LiËge

Univeristy of LiËge has a long tradition in studying ocean sciences and coastal marine systems. The group of Prof Beckers is member of the MARE (Marine Research) institute and specialized in 3D hydrodynamical modelling, data assimilation and data analysis.
Each year, the international LiËge Colloquium on ocean dynamics is organized.

Jean-Marie Beckers
Jean-Marie Beckers is professor for physical oceanography and his research focuses on hydrodynamical modelling, including data assimilation, nesting techniques and statistical assessments. He has authored and co-authored 90 peer-reviewed publications, edited several special issues of Journal of Marine system, serves
as editor for Ocean Dynamics and is member of the ESF Marine Board. He also organized several international colloquia.

Publication List
A. Barth A., Alvera-Azcarate, J.-M. Beckers, M. Rixen, and L. Vandenbulke.
Multigrid state vector for data assimilation in a two-way nested model of the
Ligurian Sea. Journal of Marine Systems, accepted, 2006.

J.-M. Beckers, M. Gr¥egoire, J. Nihoul, E. Stanev, J. Staneva, and Ch. Lancelot.
Modelling the danube river influenced north-western continental shelf of the
black sea: Part I: Hydrodynamical processes simulated by 3D and box models.
Estuarine, Coastal and Shelf Science, 54:453ñ472, 2002.

55 : AUDO (AUDO)

Alexandria University, Department of Oceanography
Oceanography Department, Faculty of Science at Alexandria University, Egypt, is the First Marine Science Department established in the Middle-east since 1948. It has research and educational Activities at undergraduate and postgraduate levels. It also supports the Arab countries with the specialists in the marine sciences environmental studies. Research is done in the physical, chemical, biological and geological oceanography fields and two many publications; national and international are available. It has also links with the sectors of industry to cooperate in solving environmental problems. In the next paragraphs few publications are mentioned for the PI and his collaborators in the Physical Oceanography field.

Ahmed Abdel Hamid El -Gindy
Date of Birth: 24/6/1945
Specialization:Physical Oceanography
Degrees obtained: B.Sc. 1966, Master of Science 1974, Ph.D. in Physical Oceanography 1983, Assisatat Prof. 1988, Prof. 1994.
Fields of Research: Hydrography, Sea level changes, Ocean dynamics and air sea interaction.

Number of publications: 53 papers.

Hazem Ahmed Nagui
POST: ASSISTANT LECTURer
Deg. Master of Science 2001 , Working in Ph.D. degree
Res. field: hydrodynamic Modeling and remote sensing

Publication List
1- El- Gindy, A.H., El- Sirafy I, Mohamed Darwish, Nagwa Helmy and Nawal El- Boraay (2000). Hydrodynamic modeling of currents in Abukir Bay, Egypt.
Proceedings of the 10th International Conference "environmental Protection is a must", held at Sheraton Hotel, Alexandria, 9-11 May, 2000, published by Alexandria University, and International Scientists Association. P.174.
31 - El- Gindy A. H| (2000). Currents and their variability in the Eastern Harbour and Qaitbey areas (Alexandria). UNESCO Publishing coastal management source books 2. PP. 144- 147.
2- El-Gindy A.A.H., Abdallah M.A. and Shaltout (2004). Wave refraction along Abuquir ñ Rosetta coast Egypt. Proceedings of the Conference (Coastal Zone Asia Pacific 2004, ìImproving the Quality of Life in Coastal Areasî. 5-9 September, 2004, Hilton Hotel, Brisbane, Australia (Abstract p. 30), Full text on CDROM, ISBN-1-921017-007).
3- Magdy M.Farag and Ahmed A. H. El-Gindy (2004). Study SST Distribution in Eastern Mediterranean Sea as an index of its physical environment by remote sensing. International Symposium on remote sensing and development, Syria, Damascus, GORS, 27- 30/9/2004.
4- Abdallah M. Abdallah, Ahmed El-Gindy and Esam Deebes(2005). Estimation of sedimentation rates in the navigation channel of Damietta harbour of Egypt. Journal of Arab Academy for Sciences & Technology and Maritime transport, Vol. no. 30, pp. 54- 61.

56 : IASA-UAT (IASA-UAT)

Institute of Accelerating Systems and Applications - University of Athens
The Ocean Physics and Modelling Group (OPAM) is part of the Institute of Accelerating Systems and Applications (IASA). IASA is associated with the National and Kapodistrian University of Athens and the National Technical University of Athens. It is hosted at the University of Athens Campus. IASA has more than 20 faculty members and a number of Post Doctorate Researchers and PhD students. Its activities comprise of applied research. The Ocean Physics And Modelling (OPAM) group has a significant experience on numerical simulation of coastal and open ocean dynamics. A wide range of numerical models including 1-D (mixed layer), 2-D

(depth integrated) and fully 3-D schemes have been used for a variety of applications such as: coastal circulation, sea level variations, upwelling, general circulation, open ocean convection etc., focusing mainly on the general circulation, the deep and intermediate water mass formation and the interaction of the Mediterranean Sea with the atmosphere on various time scales, from seasonal to climatic. Both data analysis and numerical modelling are used as tools for these studies. In recent years, the group has also been involved in operational oceanography of the Mediterranean Sea and more specifically of the Eastern Mediterranean with the development of a high-resolution operational numerical model called ALERMO (Aegean Levantine Eddy Resolving MOdel). It is also involved in the study of the transport of the Saharan dust within the Mediterranean Sea following its atmospheric deposition. Finally, the group developed the TRITON wave forecast system, which goes from global to regional down to coastal scales. This system has been developed in cooperation with the Atmospheric Modelling and Weather Forecast group of the same institute. Both ALERMO forecast system and TRITON wave forecast system are in operational use at the wed site of the OPAM group (www.oc.phys.uoa.gr).

Sarantis Sofianos
Dr. Sarantis Sofianos graduated in Physics from the University of Athens, Greece (1994). He received his Ph.D. in Meteorology and Physical Oceanography from the University of Miami, USA in 2000. He has 10 papers published in journals and books, 12 publications in conference proceedings and participated in 20 conferences and meetings. He participates in several EU, national and international projects. His research focal points include the general circulation of semi-enclosed seas, coastal processes (with emphasis on sea straits) and numerical modelling of the oceanic general circulation.

Nikolaos Skliris
Dr. Nikolaos Skliris graduated in Physics from the University of Athens, Greece (1992). He received his M.Sc. (1994) and Ph.D. (2001) in Physical Oceanography from the University of Liege, Belgium. He has 6 papers published in journals (and 1 submitted), 5 papers in conference proceedings, while he participated in 18 conferences and meetings. His research focal points include numerical modelling of open-ocean and coastal areas and ecohydrodynamic research with the use of numerical models.

Publication List
G.Korres and A.Lascaratos, 2003, An eddy resolving model of the Aegean and Levantine basins for the Mediterranean Forecasting System Pilot Project (MFSPP) : Implementation and climatological runs, Analles Geophysicae, MFSPP ñ Part I Special Issue, 21, 205-220.¨

57 : UNIBO (UNIBO)

Alma Mater Studiorum Universit‡ di Bologna, Centro Interdipartimentale per la Ricerca sulle Scienze Ambientali
The Interdepartmental Centre for Environmental Science (UNIBO-CIRSA) is located at the Ravenna, Campus of the Bologna University. UNIBO-CIRSA, operates in the field of marine modelling through the SINCEM laboratory (Laboratorio di Simulazioni Numeriche del Clima e degli Ecosistemi Marini. The SINCEM group develops methods and numerical models of the atmosphere, ocean and marine ecosystems. The general aim of the research is to understand the ocean and atmosphere natural variability over global and Mediterranean spatial scales. UNIBO-CIRSA participates to the operational marine forecasting system in the Adriatic Sea. Previously, UNIBO-CIRSA participated to the ADRICOSM project (ADRIatic sea integrated COastal areaS and river basin Management system pilot project) and is now participating to the ADRICOSM -EXT project.
SINCEM has also developed a fully coupled physical and ecosystem model that is implemented in the whole Adriatic Sea.

Marco Zavatarelli
Marco Zavatarelli is currently research staff member at the Physics Department and at the Interdepartment Center for Environmental Sciences of the Bologna University. He holds a doctorate in Marine Environmental Sciences (Genoa University).
His main scientific activity is in the field of numerical modelling of the ocean general circulation and ecosystem dynamics. In the past he held research positions at Princeton University (USA), the Danish Hydraulic Institute-Ecological Modelling Centre (DK), the International Institute for applied Systems Analysis (A) and the National Research Council (I). He has participated to several EU funded Projects mainly concerned with the numerical modelling of the Adriatic Sea general circulation and ecosystem dynamics, but also contributed to biogeochemical data analysis. He is Author of about 25 internationally peer-reviewed papers.

Luca Polimene
Luca Polimene holds a PhD in Environmental Sciences from the University of Bologna since 2005. His research activities are devoted to the development of the biogeochemical flux model of SINCEM and the understanding of the dynamics of the dissolved organic matter in the Adriatic Sea marine ecosystem.

Luca Giacomelli
Luca Giacomelli holds a Laurea degree in Environmental Sciences since 1997. He is responsible for the software development at SINCEM laboratory and the statistical analysis of multivariate data sets. He is working in the framework of the MFSTEP project for the delivery of the forecasting products.

Publication List
Polimene L., Pinardi N., Zavatarelli M., Colella S. (2006). The Adriatic Sea ecosystem seasonal cycle: validation of a three dimensional numerical model. Journal of Geophysical Research, in press.
Polimene L., Allen J. I., Zavatarelli M. (2006). DOM-Bacteria interactions in marine systems: A theoretical modelling study. Aquatic Microbial Ecology, in press.

58 : UNIV_GDA (UNIV-GDA)

Institute of Oceanography Gdansk University + Institute of Oceanology PAS + MI Gdansk

The Institute of Oceanography, created at the University of Gdansk in 1970, is a part of the Faculty of Biology, Geography and Oceanology. Institutes employ 14 professors, 29 associate and assistance professors, 5 research assistants, 59 PhD students and 24 technical staff. Educational activities include four lines which are as follows: biological, physical, chemical oceanography and marine geology. The study programme offers courses for both undergraduate and postgraduate students. The students get practical training at sea on the Institute's boat and on research vessels of co-operating institutions.

Structure of the Institute contains six departments with main fields of interests as follows: Department of Marine Biology and Ecology concentrates on marine ecology and ecophysiology of marine organisms, temporal and spatial changes in the occurrence of phytoplankton species, including the harmful ones. Department of functioning of Marine Ecosystems develops ecophysiological studies, including energy budget, biochemical compositions and processes are focused on the behaviour of Baltic species. Department of Marine Plankton Research main scientific interest contains biology and ecology of marine zooplankton from boreal and polar regions. Department of Marine Chemistry and Environmental Protection scientific profile of the Department emphasis basic research in the marine contact zone: air-sea and water-sediment interactions. Department of Marine Geology is concentrated on geological, bio geological processes, marine hydrogeology and hydro geochemistry as well as litho logical investigations. Department of Physical Oceanography main fields of activity cover: numerical modeling of hydrodynamics of the Baltic Sea and ecosystem processes in it on regional and local sea scales, operational forecasting in ecohydrodynamics, wind wave, system identification techniques for sea state modeling and satellite remote sensing methods. Hel Marine Laboratory located at the Hel Peninsula concentrates at monitoring of biological life of inshore waters and marine mammals in the Polish zone of the Baltic. Institute is equipped in research vessel "OCEANOGRAF-2".

Jan Jedrasik

Jan Jedrasik, phd, is employed as an academic teacher at Department of Physical Oceanography, Institute of Oceanography, University of Gdansk, Poland. His main scientific interest's concerns ecohydrodynamic modelling particularly at the Baltic Sea. He is internationally experienced with scholarships, participating at conferences, workshops and working at three European projects.

Publication List

Jedrasik J., 1997, A model of matter exchange and flow of energy in the Gulf of Gdansk ecosystem - overview,Oceanol.S tud., 26 (4), 3-20.
Jedrasik J., Szymelfenig M., 2005. The ecohydrodynamic model for the Baltic Sea. Part II - validation of the model. Oceanologia, 47 (4): 543-566.
Kowalewska-Kalkowska H. Kowalewski M., 2005. Operational hydrodynamic model for forecasting of extreme Hydrological events in the Oder Estuary. Nordic Hydrology, 36 (4): 411-422.
Oldakowski B., Kowalewski M., Jedrasik J. Szymelfenig M., 2005. Ecohydrodynamic Model of the Baltic Sea, Part I: Description of the ProDeMo model. Oceanologia, 47 (4): 477-516.

59 : LIM/UPC (LIM/UPC)

Laboratori d'Enginyeria MarÌtima / Universitat PolitËcnica de Catalunya

The Laboratori d'Enginyeria MarÌtima (LIM/UPC) is a Research Group within the Departament d'Enginyeri Hidr‡ulica, MarÌtima i Ambiental (E.T.S. Eng. Camins, Canals i Ports de Barcelona) of the Universitat PolitËcnica de Catalunya (UPC) in Barcelona.

LIM/UPC develops its activities and offers its services through three big lines of work: basic research, applied research/technological development, and diffusion/ transfer of knowledge. Within these three big lines of work, LIM/ UPC works actively in the following thematic fields: coastal and estuarine hydrodynamics, coastal morphology, oceanographic engineering, harbour engineering, climate and water quality of the marine environments, and integr ated coastal zone management.

Prof. AgustÌn S·nchez-Arcilla

Prof. AgustÌn S·nchez-Arcilla, PhD on Marine Sciences by UPC (1979) and Civil Engineer by UPM (1977), is Professor at the Universitat PolitËcnica de Catalunya (UPC, Technical University of Catalonia) and Head of the Laboratori d'Enginyeria MarÌtima (LIM/UPC) (1990-to date). His research activities include topics as coastal and estuarine hydrodynamics, coastal morphology, oceanographic
engineering, harbour engineering, climate and water quality of the marine environments, and integrated coastal zone management.

Dr. Manuel Espino

Dr. Manuel Espino, PhD on Marine Sciences by UPC (1994) and Civil Engineer by UPC (1990), is a Lecturer at the Universitat PolitËcnica de Catalunya (UPC, Technical University of Catalonia). His research activities include topics as coastal and estuarine hydrodynamics, oceanographic engineering, climate and water quality of the marine environments, and integrated coastal zone management.

Publication List

CACERES, I., SANCHEZ-ARCILLA, A., ZANUTTIGH, B., LAMBERTI, A., FRANCO, L. (2005). "WAVE OVERTOPPING AND INDUCED CURRENTS AT EMERGENT LOW CRESTED STRUCTURES". COASTAL ENGINEERING, 52 (10-11): 931-947.

RUBIO, A., ARNAU, P.A., ESPINO, M., FLEXAS, M.D., JORDA, G., SALAT, J., PUIGDEFABREGAS, J., SANCHEZ-ARCILLA, A. (2005). "A FIELD STUDY OF THE BEHAVIOUR OF AN ANTICYCLONIC EDDY ON THE CATALAN CONTINENTAL SHELF (NW MEDITERRANEAN)". PROGRESS IN OCEANOGRAPHY, 66(2-4): 142-156.
FLEXAS, M.M., VAN HEIJST, G.J.F., JORD¿, G., S¡NCHEZ-ARCILLA, A. (2004) "NUMERICAL SIMULATION OF BAROTROPIC JETS OVER A SLOPING BOTTOM: COMPARISON TO A LABORATORY MODEL OF THE NORTHERN CURRENT". JOURNAL OF GEOPHYSICAL RESEARCH, 109: C12, C12039.
JIM...NEZ, J.A., S¡NCHEZ-ARCILLA, A. (2004). "A LONG-TERM (DECADAL SCALE) EVOLUTION MODEL FOR MICROTIDAL BARRIER SYSTEMS". COASTAL ENGINEERING, 51: 749-764.
SIERRA, J.P., SANCHEZ-ARCILLA, A., FIGUERAS, P.A., GONZALEZ DEL RIO, J., RASSMUSSEN, E.K., MOSSO, C. (2004). "EFFECTS OF DISCHARGE REDUCTIONS ON SALT WEDGE DYNAMICS OF THE EBRO RIVER". RIVER RESEARCH AND APPLICATIONS (PRINT) , 20 : 61-77.

60 : UREADES (UREADES)

University of Reading

Reading University has a strong international reputation for environmental science, gaining a 5* recognition in both in teaching and research. The Environmental Systems Science Centre (ESSC) was formed in 1995 and is a NERC funded research centre focussing on uses of Earth Observation data for modelling and data assimilation. The centre is hosted on the University site and deals with land surface, the atmosphere and marine sciences. Prof. Haines leads the marine informatics group. ESSC is a founder partner of the National Centre for Ocean Forecasting (NCOF). Together with Computer Sciences the ESSC also hosts the Reading eScience Centre (RESC) focussing on applications of Grid computing methods within the environmental sciences.

Keith Haines

Prof. Haines group has worked for many years on ocean data assimilation. He has developed new algorithms for assimilating satellite and in situ ocean data sets and he works closely with the UK Met. Office and with ECMWF, who have adopted these methods for operational ocean and seasonal forecasting. He is also Director of the Reading e-Science Centre and coordinator of a UK project: Grid for Ocean Diagnostics, Interactive Visualisation and Analysis, involving oceanography and Computer Science groups. He also works on the role of the N Atlantic ocean in coupled climate modelling and in Rapid Climate change.
Prof HAINES has been involved in several EU projects and has coordinated 2 framework IV programs, ENV-GANES and MAST-MEDNET. He is part of the EU MERSEA project. He is on the Executive board of the National Centre for Ocean Forecasting. He has been a member of the UK-NERC Marine science board and the UKís Earth Observation program board. He has been external examiner for Southampton Oceanography Centre's Marine Science Undergraduate degree program. He has over 65 publications in internationally refereed journals.
Keith HAINES graduated in Natural Sciences from Cambridge and did a PhD at Imperial College London in Dynamical Meteorology. He spent 2 years in the US at MIT before taking a post as Lecturer, and then Reader, in the Meteorology department at Edinburgh University. He moved to ESSC in Reading University in 2001 as BMT Marine Informatics Professor.

Jon Blower

Dr Jon Blower is the Technical Director of the Reading e-Science Centre. He holds a BA in Natural Sciences from Cambridge and a PhD in Volcanology from Bristol. He worked for the software company Tessella. He now works on Grid computing and middleware development and on Web and Grid Services for data management, and on geospatial database architectures and file systems for handling Terabyte data stores

Chunlei Liu

Dr Chunlei Liu works on Marine Research and Marine data management projects at ESSC using operational NCOF data. He worked on the e-Science and Grid computing GODIVA project setting up a distributed compute grid for visualising large ocean data sets and he has also worked on ocean diagnostics for thermohaline circulation studies. He is also the data manager for the National Centre for Ocean Forecasting and represents the UK in the Data management and services within the GMES MERSEA project.

Publication List

Troccoli, A., and K. Haines, 1999: Use of the Temperature-Salinity relation in a data assimilation context, J. Atmos. Ocean Tech., 16, 2011-2025.

61 : CNRS -POC (CNRS -POC)

PÙle d'OcÈanographie CÙtiËre

CNRS-POC is a group of scientists from two laboratories (LEGOS and Laboratoire d'AÈrologie) involved in coastal ocean modelling and satellite altimetry. The objective of POC is to study the physical processes responsible of oceanic motions in various coastal areas and to develop methods allowing to predict them. Our tools are mainly numerical modelling and data assimilation. We develop large scale barotropic modeling allowing to represent the propagation in the coastal zone of gravity waves formed far away, and 3D modelling based on the grid nesting from the regional scale forced by OGCM up to the chosen scale. Concerning data assimilation, we develop in barotropic and 3D models ensemble methods which allow to characterize empirically the model errors and to associate them to the errors on the forcing terms. In collaboration with the engineering company Noveltis, POC has developped an operational system giving every week a forecast of the oceanic circulation in the North Western Mediterranean Sea.

Pierre De Mey

Directeur de Recherche, PhD in 1983 Ph.D. in oceanography. Project scientist for the assimilation aspects in the MERCATOR ocean forecasting project from 1997 to 2003. Partner or workpackage leader in European projects such as MFSTEP, MERSEA. My activities include both the development of ocean data assimilation tools, and scientific activities using ocean estimation and prediction techniques. Special topics are the predictability and observability of the ocean circulation from space, and the study of the large-scale and coastal variability of several ocean basins such as the Mediterranean and Atlantic.

Claude Estournel

Directrice de Recherche, PhD in 1982 on the atmospheric boundary layer. 10 years of research on the study of radiative and turbulent processes in the atmospheric boundary layer. 15 years of research in coastal oceanography. About 25 scientific papers in peer-reviewed journals. Main interests : coastal modelling, ocean-atmosphere interactions, sediment transport modelling. Experience in European projects: Metro-Med, Interpol, MFSTEP, Eurostrataform, Insea

Publication List

Estournel C., Zervakis V., Marsaleix P., Papadopoulos A., Auclair F., Perivoliotis L., Tragou E., 2005. Dense water formation and cascading in the Gulf of Thermaikos (North Aegean) from observations and modelling, Continental Shelf Research, 25, 2366-2386 doi:10.1016/j.csr.2005.08.014

Mourre B., De Mey P., Lyard F. and Le Provost C., 2004

Assimilation of sea level data over continental shelves : an ensemble method for the exploration of model errors due to uncertainties in bathymetry, Dynamics of Atmospheres and Oceans. 38, 93-121. doi:10.1016/j.dynatmoce.2004.09.001

Auclair F., Marsaleix P., and De Mey P., 2003

Space-time structure and dynamics of the forecast error in a coastal circulation model of the Gulf of Lions. Dynamics of Atmospheres and Oceans, 36, 309-346. doi:10.1016/S0377-0265(02)00068-4

Estournel C., Durrieu de Madron X., Marsaleix P., Auclair F., Julliand C. and R. Vehil, 2003

Observation and modelisation of the winter coastal oceanic circulation in the Gulf of Lions under wind conditions influenced by the continental orography (FETCH experiment). Journal of Geophysical Research 108, C3, pages 7-1 to 7-18. doi:10.1029/2001JC000825

62 : JRC-GEM (JRC-GEM)

Joint Research Centre - Global Environment Monitoring Unit

The JRC is a Directorate-General of the E.C., whose mission is to provide customer-driven scientific and technical support for the conception, development, implementation and monitoring of EU policies. The Institute for Environment and Sustainability (IES) is one of 7 Institutes of the JRC, whose mission particularly adresses the EU strategies for the protection of the environment and sustainable development.

The Global Environment Monitoring Unit (GEM) of IES includes studies of marine and coastal waters at global and European scales, much based on the use of Earth observation, particularly ocean colour.

JRC has been a member of the IOCCG (International Ocean Colour Coordinating Group) since its creation in 1996, co-authored the first 3 IOCCG reports, and is presently involved in 3 IOCCG Working Groups, including that on ocean colour data merging. JRC contributed with ocean colour remote sensing data and/or in situ optical measurements to European projects for diverse (including operational) applications (COASTLOOC, COLORS, DIADEM, ICAMS, Ö) and is currently active in the ocean colour field in the MERSEA IP and GMES Service Element MARCOAST.

Frèdèric MELIN

- Ph.D. in Oceanography from Toulouse University (France, 2003).
- - 1998-2006: Joint Research Centre of the E.C., Ispra (Italy) - Responsible for the development, processing and archiving of ocean remote sensing products (mainly based on optical sensors). Research on the development, validation and applications of remote sensing products derived from optical remote sensing, including aerosol load, marine apparent and inherent optical properties, biomass and primary production of phytoplankton.
- 1995-1998: Jet Propulsion Laboratory (NASA ñ California Institute of Technology) - Study of the seasonal and interannual variability of the equatorial Pacific and Indian Oceans with coupled ocean-atmosphere models, satellite and in situ data.

Jean-Francois BERTHON

- Ph.D. in Biological Oceanography from the UniversitÈ Pierre et Marie Curie (Paris, France).
- 2003-2006: Joint Research Centre of the E.C., Ispra (Italy) - His research at JRC addresses the development of algorithms for the inversion of satellite ocean colour data in European marine and coastal waters in order to derive environmental and biogeochemical indicators for the monitoring of water quality. It involves both the activities of bio-optical modelling and in situ measurements for the development and the assessment of the algorithms. It includes collaborations with other members of JRC-Ispra working on satellite image processing and on marine and inland waters ecology.
- 2002-2003: "MaÓtre de ConfÈrences" at the UniversitÈ du Littoral CÙte díOpale (France).
- 1996-2001: Joint Research Centre of the E.C.

Publication List

Charria, G., MÈlin, F., Dadou, I., Radenac, M.-H., GarÁon, V., 2003. ëRossby wave and ocean color: the cells uplifting hypothesis in the South Atlantic subtropical convergence zone.í Geophys. Res. Lett., 30, 1125, 10.1029/2002GL016390.

DíAlimonte, D., MÈlin, F., Zibordi, G., Berthon, J.-F., 2003. ëUse of the novelty detection technique to identify the range of applicability of empirical ocean color algorithms.í IEEE Geosci. Remote Sens., 41, 2833-2843.

63 : IMI (IMI)

Irish Marine Institute

The Marine Institute is Ireland's national agency whose role is twofold:

1 - To support existing marine businesses and related activities through the provision of key scientific services and advice and through the results of research to provide for wise management decisions to guide the on-going sustainable development of the marine resource.

2 - To support RTDI (research, technology, development and innovation) activity to create further employment and to underpin future innovation, growth and wealth creation in the marine area.

The Marine Institute, established under statute in 1992 has grown rapidly in the intervening period. In 2002, the Institute has a staff of 140 people, located in 11 facilities around the country.

The Ocean Science Services team within the Marine Institute will act as coordinator for the ESONIM project. The team brings diverse expertise to the consortium being charged with responsibility for major Irish marine infrastructure (including Irelandís two research vessels), the Irish national seabed survey (jointly with Geological Survey of Ireland), the marine equipment pool and real-time operational networks of marine weather buoys and coastal tide gauge stations. Ocean Science Services bring both a data producer and end-user perspective to the project.

Glenn Nolan

Glenn Nolan (B.A., M.Sc., Ph.D.) manages the oceanographic services programme for the Marine Institute having responsibility for the day-to-day running of the Irish weather buoy network of five operational platforms around the Irish coast and the Irish Tide gauge network currently being developed. Glenn also has responsibility for ocean modelling, remote sensing and provision of oceanographic data from vessels and other platforms to marine data end users.

Marcel Cure

Marcel Cure (B.Sc, M.Sc., Ph.D.): Currently team leader for ocean modelling at the Marine Institute with 20 years observational and oceanographic modelling experience. In charge of an active research team using the ROMS physical circulation model for diverse

applications in and around Ireland including search and rescue operations, HAB studies, fisheries and ecosystem modelling and data assimilation.

Publication List

Development of the Irish National Tide Gauge Network Guy Westbrook*, John Wallace and Glenn Nolan (EuroGOOS 2005 conference proceedings)

Operations and developments in the Irish Weather Buoy Network Sheena Fennell*, Guy Westbrook, Glenn Nolan and Kieran Lyons (EuroGOOS 2005 conference proceedings)

IberiañBiscayñIreland regional operational oceanographic system (IBIROOS) physical modelling State-of-the-art and plans Dominique Obaton*, Enrique Alvarez Fanjul, Marcos Garcia Sotillo, Manuel Ruiz-Villarreal, Pedro Montero, Paulo Chambel Leitao, Rodrigo Fernandes, Yann-HervÈ De Roeck and Marcel Cure (EuroGOOS 2005 conference proceedings)

The European Seafloor Observatory Network Implementation Model (ESONIM) G.D. Nolan*, M. Gillooly, N. O'Neill, I.G. Priede, O. Pfannkuche, P. Linke, G. Waterworth, J.-F. Rolin, P. Hall, P. Lee and C. OíRourke (EuroGOOS 2005 conference proceedings)

Nolan, G.D. (2001) Feasibility study on the use of coastal oceanographic moorings as an early warning system for Harmful Algal Events (HAEs) in Irish coastal waters. Conducted on behalf of the Marine Environment and Health Services Division, Marine Institute

64 : MeteoGalicia (METEOGALICIA)

ConsellerÌa de Medio Ambiente. Xunta de Galicia

Regional meteorological service. Mostly devoted to operational meteorology and oceanography, as well as to enviromental modelling.

Vicente Perez-Munuzuri

Director of MeteoGalicia.

Prof. Titular de Universidad. Santiago de Compostela.

Publication List

Only for the last 5 years and in reviewed journals:

A.C. Carvalho, A. Carvalho, I. Gelpi, M. Barreiro, C. Borrego, A.I. Miranda and V. PÈrez-MuÒuzuri. "Influence of Topography and Land Use on Pollutants Dispersion in the Atlantic Coast of Iberian Peninsula". Atmos. Environ. (2006).

P. Carracedo, S.

Torres-LÛpez, M. Barreiro, P. Montero, C.F. Balseiro, E. Penabad, P.C. Leitao and V. PÈrez-MuÒuzuri. "Improvement of Pollutant Drift Forecast System Applied to the Prestige Oil Spills in Galicia Coast (NW of Spain): Development of an Operational System". Marine Pollution Bulletin (2005).

V. PÈrez-MuÒuzuri, R.R. Deza, K. Fraedrich, T. Kunz and F. Lunkeit. "Coherence Resonance in an Atmospheric Global Circulation Model". Phys. Rev. E 71 065602(R) (2005).

V. PÈrez-MuÒuzuri, M.N.Lorenzo, P. Montero, K. Fraedrich, E. Kirk and F. Lunkeit. "Response of a Global Atmospheric Circulation Model to Spatio-Temporal Stochastic Forcing: Ensemble Statistics". Nonlinear Processes in Geophysics 10 453-461 (2003).

C.F. Balseiro, P. Carracedo, B. GÛmez, P.C. Leitao, P. Montero, L. Naranjo, E. Penabad and

V. PÈrez-MuÒuzuri. "Tracking the Prestige Oil Spill: An Operational Experience in Simulation at MeteoGalicia". Weather 58(12) 452-458 (2003).

M.J. Souto, C.F. Balseiro, V. PÈrez-MuÒuzuri, M. Xue and K. Brewster. "Impact of Cloud Analysis on Numerical Weather Prediction in the Galician Region of Spain". Journal of Applied Meteorology 42(1) 129-140 (2003).

C.F. Balseiro, M.J. Souto, E. Penabad, J.A. Souto and V. PÈrez-MuÒuzuri. "Development of a Limited-Area Model for Operational Weather Forecasting Around a Power Plant: The Need for

Specialized Forecasts". Journal of Applied Meteorology 41(9) 919-930 (2002).

M.J. Souto, J.A. Souto, V. PÈrez-MuÒuzuri, J.J. Casares and J.L. Berm?dez. "A Comparison of Operational Lagrangian Particle and Adaptive Puff Models for Plume Dispersion Forecasting". Atmos. Environ. A 35(13) 2349-2360 (2001).

V. PÈrez-MuÒuzuri and I.R. Gelpi. "Application of Nonlinear Forecasting Techniques

for Meteorological Modeling". Ann. Geophysicae 18, 1349-1359 (2000).

65 : NOVELTIS (NOVELTIS)

NOVELTIS

The activities of NOVELTIS are devoted to the promotion of scientific expertise and its federation in the domain of Environmental and Space Sciences.

Muriel LUX

Muriel Lux holds a Ph D in Physical Oceanography of the UniversitÈ de Bretagne Occidentale (Brest). She works as a scientific engineer at Noveltis and carries out activities of modelling and ocean forecasting (MFSTEP) in close collaboration with the POC

Gwenaele JAN

GwÈnaÎle JAN Scientific Engineer Dr in oceanography at Noveltis. Holds a PHD Physical oceanography and numerical modelling at LODYC (University of Paris 6, France) and a Master degree in Oceanography-Meteorology-Environment, University of Paris 6, France). 1995-1996.

Relevant Experience: Modelling the impact of the Air-Sea interaction in the upper ocean layers in the Mediterranean Sea / Ocean circulation with 3D ocean circulation and the use of a 2D gravity waves model. Altimetry applied to the ocean: Absolute calibration of the radar altimeters satellite. Use of tide gauges measurements.

Laurent Roblou
Laurent Roblou, scientific engineer at NOVELTIS, with expertise in high frequency ocean modelling (tides, wind-induced processes, ...) and coastal altimetry processing.
Publication List
Lux M, H. Mercier and M. Arhan (2001) : Interhemispheric exchanges of mass and heat in the Atlantic ocean in January-March 1993. Deep-Sea Research, 48, 605-638.
Lux M., H. Mercier M. Arhan : Deep circulation in the equatorial Atlantic Ocean : Bifurcation and conversion of NADW. EGS (European Geophysical Society), The Hague, May 1996. Annales Geophysicae, part II, vol. 14.
G. Jan, Y. MÈnard, M. Faillot, F. Lyard, E. Jeansou; P. Bonnefond. Offshore Absolute Calibration of Space Borne Radar Altimeters. Marine Geodesy, 2004. Vol. 27, N 3-4, pp 615-631.
P.Daniel, G.Jan, F.Cabioc'h, Y.Landau and E.Loiseau. Drift Modeling of Cargo Containers. Spill Science & Technology Bulletin. Vol 7.n05-6,pp279-288,2002
Vignudelli, S., P. Cipollini, L. Roblou, F. Lyard, G. P. Gasparini, G. Manzella, and M. Astraldi 2005. Improved satellite altimetry in coastal systems: Case study of the Corsica Channel (Mediterranean Sea), Geophysical Research Letters, 32, L07608, doi:10.1029/2005GL022602.
JJ Martinez-benjamin, M Martinez-Garcia, S Gonzalez Lopez, A Nunez Andres, F Buil Pozuelo, M Espino Infantes, J Lopez-Marco, J Martin Davila, J Garate Pasquin, C Garcia Silva, P Bonnefond, O Laurain, AM Baron Isanta, MA Ortiz Castellon, J Talaya Lopez, B Perez Gomez, E Alvarez Fanjul, G Rodriguez Velasco, D Gomis, M Marcos, Y MÈnard, G Jan, E Jeansou, F Lyard and L Roblou, 2004. Ibiza absolute calibration experiment: survey and preliminary results, Marine Geodesy, 27:657-681. DOI:10:1080/01490410490883342

66 : SYKE (SYKE)

Finnish Environment Institute
SYKE is a national research and development centre under the Ministry of the Environment, Finland. The institute provides environmental information, publishes assessments on the state of the environment, conducts research on the environment and environmental effects of activities and analyses approaches and methods for the prevention and mitigation of harmful effects.

With a staff of about 600 the institute spans a broad range of research activities and expert services. The Research Department has seven broad research programmes: Global Change, Contaminants, Protection of the Baltic Sea, Biodiversity, Environmental Technology, Environmental Policy and Integrated River Basin Management. The Baltic Sea research is focused on studying ecological impact of nutrient loads, changes in coastal water quality and assessment of environment protection measures using also modeling tools. The Expert Services Department is responsible for various expert, authority and development functions within nature conservation, water resources management, environmental protection and management, control of chemicals, and environmental damage mitigation. SYKE is in charge of measures against major oil and chemical spills and contributes to the development of operational oil spill models. SYKEís combination of research and expert services provides a firm background for providing policy advice and offering operational products for the community.

Maria Gastgifvars
Research Scientist, Graduated in 1998 as M.Sc. (Tech.) at the Helsinki University of Technology. Since 2001 worked in the Baltic Sea Protection Programme in SYKE. Participating in the international BOOS and HIROMB (High Resolution Operationanal Model for the Baltic SEa) co-operation. Responsible for partner tasks in the PAPA Thematic Network project during 2001-2005.

Heikki Pitknen
Chief Scientist, PhD 1994/ Univ. Of Helsinki. Worked since 1981 in research projects on eutrophication and nutrient loading of the Baltic Sea and its coastal waters. Experience in questions related to coastal and marine eutrophication widely used in various contexts (EU, HELCOM and other Baltic Sea co-operatio). Editor of the scientific background report for the inter-ministerial WG preparing the Finnish Programme for the Protection of the Baltic Sea (2000-2003). Project manager of the EU/HELCOM financed MINDEC 88 Project (2000-02). Project manager of the SEGUE Consortium 2003-06 (Searching efficient protection strategies for the eutrophied Gulf of Finland, 9 research institutes from Finland, Sweden, Estonia and Russia. Funding: Acad. of Finland, Ministry of the Env., Nordic Council of Ministers). 20 papers in international peer reviewed journals, about 50 other scientific articles.

Publication List
Elken, J., Golubkov, S. M., Pitkonen, H. and Sarkkula, J. (Guest editors), 2003. Special issue on the changing state of the Gulf of Finland ecosystem. Proceedings of the Estonian Academy of Sciences, Tallinn, 52 (3) 171-362.
Gastgifvars, M., Lauri, H., Sarkanen, A., Myrberg, K., Andrejev, O., Ambjˆrn, C. (in press). Modelling surface drifting of buoys during a rapidly-moving weather front in the Gulf of Finland, Baltic Sea. Estuarine, Coastal and Shelf Science.
Pitkonen H., Lehtoranta, J. & R‰ike, A. 2001. Internal nutrient fluxes counteract decreases in external load: The case of the estuarial Gulf of Finland. Ambio 30:195-20.

67 : IAP (IAP)

Institute of Atmospheric Physics
The Institute of Atmospheric Phy sics (IAP), Chinese Academy of Sciences, originated from the former Institute of Meteorology of Academia Sinica established in February of 1928, one of the earliest eight institutes engaged in the research of modern natural sciences in China, is a comprehensive research institution focusing on the atmospheric motion, physical and chemical processes and the interactions between the atmosphere and its surrounding environment. Many research subjects have been initiated and developed

in the Institute in China, such as atmospheric dynamics, numerical weather prediction, satellite meteorology, comprehensive disaster mitigation, global climatic change, atmospheric chemistry and atmospheric environment etc.
IAP has a strong research group in ocean modeling, data assimilation and forecast. In particular, the first experiment on the extra-seasonal climate prediction by numerical model (AGCM) was performed in the world in 1988 and the prediction system was established and operated thereafter (CLIVAR, 1996). IAP developed the first operational oceanic data assimilation system in China. The system is now used in National Climate Center. A new 3DVar assimilation system, OVALS (Oceanic Variational Data Analysis System) was developed and applied successfully in the researches for the Tropical Pacific, China regional seas and ENSO forecasts. This system was also used in National Center for Marine Environment Forecast of China.

Prof. Jiang Zhu
Deputy Director of IAP. Research interests: Ocean modelling and data assimlation, optimal control methods and applications to geosciences.

Prof. Zhou Guangqing
PhD in climate dynamics, 1996; Director of Information Center of Institute of Atmospheric Physics (IAP), Chinese Academy of Sciences since 2003; Senior Scientist (Professor) in IAP since 2002 working on ocean general circulation model (OGCM) development and coupling with atmospheric models, short-term climate prediction especially ENSO prediction, oceanic data assimilation and its application in shot-term climate prediction. 1998-2000: developing a 3DVar oceanic data assimilation system which is operationally used in National Climate Center of China; 2002-2004: developing OVALS (Oceanic Variational Analysis System) and applying in tropical Pacific and China adjacent seas.

Dr. Changxiang Yan
Research scientist. Main research interest: ocean altimetry data assimilation.

Publication List
Han, G., J. Zhu and G. Zhou, 2004: Salinity estimation using T-S relation in the context of variational data assimilation. J. Geophys. Res., 109. doi:10.1029/2003JC001781
Yan,C. X., J. Zhu and G. Q. Zhou, 2004: The roles of vertical correlation of the background covariance and T-S relation in estimation temperature and salinity profiles from surface dynamic height. J. Geophys. Res. 109.doi:10.1029/2003JC002224
Zhou，G.Q. and Q.C. Zeng, 2001, Predictions of ENSO with a Coupled GCM, Adv. Atmos. Sci. 18, 587-603.
Zhou, G.Q. and X. Li, 2000: A global oceanic data assimilation system based on an ocean general circulation model, Development of Operational Dynamical Models for Short-term Climate Predictions, Meteorological Press of China, Beijing 2000, 393-400pp，ISBN 7-5029-2515-5. (in Chinese)

68 : IMC (IMC)

Fondazione IMC Centro Marino Internazionale ONLUS
The IMC is an international marine station located in Sardinia, western Mediterranean. The IMC expertise is in oceanographic data acquisition, management and dissemination, numerical physical modelling, coastal zone management, coastal ecosystem functioning. IMC activities in oceanography focus on: the implementation of 3D regional numerical circulation models at high resolution to realise a forecasting system in the Mediterranean basin; the management of in-situ physical data with the organisation of off-shore cruises and the deployment of oceanographic instruments; the building of a Mediterranean network of marine institutes with the implementation of regional coastal and shelf numerical circulation models and capacity building activities.
The IMC has been involved in several multipartner European and National projects as coordinator or partner.
Roberto Sorgente
numerical ocean circulation modelling; IMC senior researcher and responsible of several EU projects, over 10 years experience in high resolution ocean forecasting numerical models
Publication List
1. S. Natale, R. Sorgente, S. Gaberöek, A. Ribotti and A. Olita, ìSea Surface Temperature Forecasts of the Central Mediterranean Sea: Sensitivity to Atmospheric Forcing - Preliminary Resultsî, (2006), Proceedings of the Fourth International Conference on EuroGOOS, accepted
2. I. Puillat, R. Sorgente, A. Ribotti, S. Natale, V. Echevin, Westward Branching Of LIW Induced By Algerian Anticyclonic Eddies Close To The Sardinian Slope, (2006), Chemistry and Ecology, accepted
3. Ribotti A., Murru. E., Santinelli C:, Seritti A., Sorgente R. ìDissolved organic carbon and hydrological characteristics in the Sardinia Sea: first observationsî, (2004), Oceanologica Acta, accepted.
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69 : (NIMRD)

70 : UIB-GFI (UIB-GFI)

University of Bergen, Geophysical Institute

The University of Bergen has a strong international reputation in research and education with its 17 000 students and 2 500 staff. The university has had approximately 100 contracts in the 5th framework program, and now has 34 contracts in the 6th framework program, including coordination of 4 integrated projects. The University has a strong research record on ecology and cross-disciplinary research on environmental research and natural resource and water management. The university has also considerable experience in handling EU-contracts. The university has hosted several EU-funded workshops and conferences, and has often been the contractor of such events elsewhere in the world.

Corinna Schrum, Associate Professor

1989-1990 Bundesamt f. Seeschiffahrt und Hydrographie, Hamburg, Germany
1990-1997 Research Fellow University Hamburg, Institute of Oceanography, Germany
1997-2004 Assistent (Wiss. Assistent), University Hamburg, Institute of Oceanography, Germany
2004-2006 Senior Scientist, Danish Institut of Fisheries Research, Copenhagen, Denmark
Since Feb. 2006 Associate Professor, University of Bergen, Geophysical Institute, Norway

Diploma thesis: 1990, University Hamburg
PhD: 1994, University Hamburg

Research activities: Modelling of Regional Shelf Systems, fronts, modelling of coupled systems atmosphere-sea ice-hydrosphere-biosphere, climate variability, modelling of larval transport and development, IBM and life cycle modelling of marine organisms.

Principal investigator for a number of national and international research projects, funded by the EU (6th framwork), EU-INTAS, NATO, German Reserach Foundation, German Ministry of Education and Research, ESA.

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Janssen, F., Schrum, C. ,Huebner, U. and Backhaus, J. (2001): Validation of a decadal simulation with a regional ocean model for North Sea and Baltic Sea. Climate Research, 18, 55-62.
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71 : UNI-MALTA (IOI-MOC) (UNI-MALTA(IOI-MOC))

University of Malta (IOI-Malta Operational Centre)

The IOI-Malta Operational Centre was set up through collaboration between the IOI and the University of Malta. The main areas of concern of IOI-MOC include the strengthening of inter-faculty co-operation in marine affairs within the University of Malta, the organisation of long and short-term training courses on coastal and ocean management and the conduction of research in physical oceanography and operational oceanography. IOI-MOC also seeks to sustain the interaction between local institutions that are active in marine affairs, and promote an inter-sectorial approach at a national level. It maintains links with international marine organisations such as the UNESCO/Intergovernmental Oceanographic Commission (IOC) and the International Commission for the Scientific Exploration of the Mediterranean Sea (CIESM).

Aldo Drago

Dr Aldo Drago is currently the Director of the IOI-Malta Operational Centre (IOI-MOC) at the University of Malta. He is the Maltese delegate to the Intergovernmental Oceanographic Commission (IOC/UNESCO), to the International Commission for the Scientific Exploration of the Mediterranean (CIESM) and the National Representative for the Committee on the International Oceanographic Data and Information Exchange (IODE/IOC). He is also the National Delegate for Malta on the Joint WMO/IOC Technical Commission for Oceanography & Marine Technology (JCOMM). Since 1998, he has served as the Executive Secretary of MedGOOS (the Global Ocean Observing System for the Mediterranean) with office in Malta.
He obtained his Ph.D. in physical oceanography from the University of Southampton in 1999. His initial engagement was with the Malta Council for Science and Technology in 1991, where he conducted a number of programmes and initiatives both locally and internationally and served as the Coordinator of the Marine Sciences Network. Since then he conducted the participation of IOI-MOC in several projects including the coordination of two high profile EU-funded international projects, namely MAMA (Mediterranean network to Assess and upgrade Monitoring and forecasting Activity in the region) involving marine research institutions from all the Mediterranean countries and targeting the design and initial implementation of a regional routine

ocean/coastal monitoring and forecasting system in the Mediterranean; and GRAND with the participation of GOOS Regional Alliances worldwide.
Dr Drago leads the Physical Oceanography Unit that is engaged in marine research projects within local, international and regional programs, such as: MedGLOSS, ESEAS, MFSTEP and Sea-Search.
His major current contributions in Malta concern the Marine Foresight Pilot Project conducted in collaboration with the Malta Council for S&T, and coordination in support of the establishment of a National Marine Research Centre. Dr Drago is also a member of the National Commission for Sustainable Development (NCSD) and the Advisory Board of the Malta Council for Science & Technology.

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DRAGO A. (2000), Sea Level Measurements in Malta, in IOC Workshop Report no.176 ìMedGLOSS Workshop and Coordination Meeting for the Pilot Monitoring Network System of Systematic Sea Level Measurements in the Mediterranean and Black Seasî, annex IVb, pp.8-11.
DRAGO A. (2002), Estimating the future climate in the Maltese Islands, contribution submitted to WGIII Report on Vulnerability & Adaptation in connection with Maltaís 1st Communication to UNFCCC.

72 : IEO (IEO)

INSTITUTO ESPA-OL DE OCEANOGRAFIA
The IEO, established in 1914, is the largest marine research institution in Spain. It includes the headquarters in Madrid and eight laboratories distributed along the mainland coast and the archipelagos and, organizationally, it belongs to the Ministerio de EducaciÛn y Ciencia. It is the official Spanish representative, or one of the members of delegation, in most of the international oceanographic organisations and programmes (IOC, ICES, GOOS, CLIVAR, WOCE, EuroGOOS, etc.). The IEO, nowdays has a wide expertise in the fields of physical and chemical oceanography and marine ecology. It is the advisory body to the government in marine affairs, particularly in fisheries matters. It has also a long experience in a wide range of ocean surveys and international experiments.

ALICIA LAVIN
Dr. Alicia LavÌn is Senior Scientist at the IEO from 1989 and responsible for physical oceanography since 1978 in a large number of international projects. Main EU projects involved: Development of a real-time in situ observing system in the North Atlantic Ocean by a n array of Lagrangian profiling floats (GYROSCOPE), Shelf-Edge Advection, Mortality and Recruitment (SEAMAR), Shelf-Edge Fisheries and Oceanography Studies (SEFOS), Multidisciplinary Oceanographic Research in the Eastern Boundary of the North Atlantic (MORENA), Cooperative Studies on the processes controlling recruitment of clupeiform fish in different regions (SARP), and Transport through the 24?N section in the North Atlantic of the Wold Ocean Circulation Experiment (WOCE) and FerryBox. Co-chair of the regional GOOS IBIROOS.

MANUEL RUIZ VILLARREAL
Dr. Manuel Ruiz Villarreal is a physicist with a background in ocean numerical modeling and turbulence. He is scientist at the IEO since 2002. He is experienced with the development and application of a number of ocean hydrodynamical models. He has developed several aspects of hydrodynamical models (turbulence models describing the vertical exchange, boundary conditions, horizontal advection schemes, etc.) for a number of baroclinic tridimensional models (MOHID, GETM, ROMS) and is a co-author of the water-column module of the General Ocean Turbulence Model (GOTM) that currently is used by over than 130 users.

MARIA JESUS GARCIA
MarÌa Jes?s GarcÌa is Senior Scientist at the IEO where she has been involved within the Spanish Oceanographic Data Center. She is the Spanish representative in the International Oceanographic Data and Information Exchange (IODE). She is member of the ICES Marine Data Management Working Group. She has been in charge of the IEO tide gauge network since 1988, being national delegate by the European Sea Level Service (ESEAS) and contact person in the Global Sea Level Observing System (GLOSS).

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M. Ruiz Villarreal, Gonz·lez-Pola, C., DÌaz del RÌo, G., LavÌn, A., Otero, P., Piedracoba, S. and Cabanas J.M. Oceanographic conditions in North and Northwest Iberia and their influence on the Prestige oil spill. Marine Pollution Bulletin. In press. Submitted 2005
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