

SOME HYDROLOGICAL AND NEPHELOMETRIC ASPECTS OVER NAZARÉ AND SETÚBAL (PORTUGAL) SUBMARINE CANYONS.

Carla GARCIA¹; Henrique COELHO² and Ramiro NEVES³

¹ MsC, MARETEC, Taguspark, Núcleo Central, nº 363, 2780-920 Oeiras (carla.garcia.maretec@taguspark.pt)

² PhD, HIDROMOD, Taguspark, Núcleo Central, nº 349, 2780-920 Oeiras (hcoelho.hidromod@taguspark.pt)

³ Professor, MARETEC, Taguspark, Núcleo Central, nº 363, 2780-920 Oeiras (ramiro.neves@ist.utl.pt)

1. INTRODUCTION

Continental margins are the most significant interface on Earth for sediment distribution. About 90% of the sediment generated by erosion on land is deposited on continental margins. After their initial transport into the marine system by rivers, particles are dispersed on the shelf and at the shelf edge under the combined influence of current and wave action, under forcing conditions governed by local hydrodynamic conditions, meteorology and climate.

Our main goal is to try to understand the role of submarine canyons in the transport of inorganic and organic particles for the deep ocean.

The western Iberian margin is characterized by a narrow shelf adjacent to a steep irregular slope with intense wind induced summer upwelling occurring at the shelf edge. It is dissected by several steep canyons. The largest canyons (Nazaré and Setúbal) intersect the entire continental shelf, allowing them to intercept sediment carried over the shelf and upper slope by alongshore currents and providing a direct conduit of particles from the upper shelf to the deep sea, nevertheless, while the Setúbal Canyon has a direct connection to a river mouth, the Nazaré one, is Km's apart from a river source.

Since particles transport is directly connected with the hydrodynamics our first approaches was to look at it, and try to see what may be the most significant features for the sediment transport.

2. MATERIAL AND METHODS

The data presented in this work was collected during the 64PE204 cruise performed on the R.V. PELAGIA, This cruise, and also this work, is integrated on the European EUROSTRATAFORM project, and took place between 02 and 22 of November 2002. Water column characteristics were studied with CTD equipped with several sensors including a turbidity sensor, and water samples were collected with a Rosette sampler. Water samples were filtered for the study of particulate suspended matter. Several stations were occupied both in the Nazaré (20) and Setúbal (15) canyon axis, walls and adjacent shelf (Fig. 1).

In this present work our main objective was to concentrate on study the hydrodynamic and nephelometric aspects over the axis of Setúbal and Nazaré submarine canyons.

Profiles for nephelometry, salinity and temperature were performed for both canyons, along its axis.

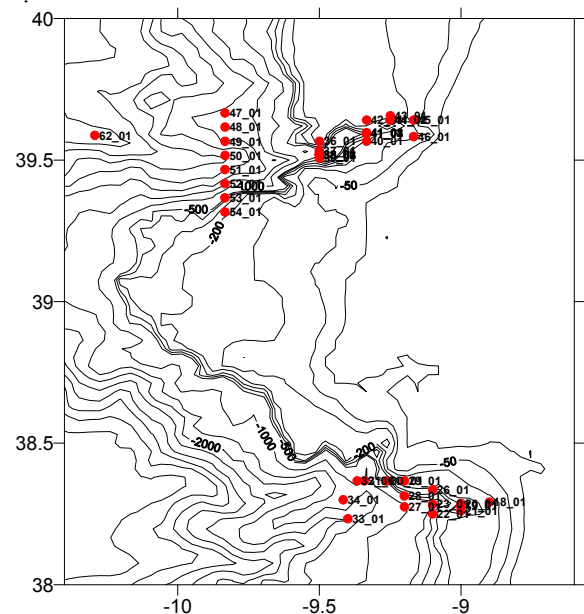


Figure 1: Location of the stations performed along the Setúbal and Nazaré Canyons during the 64PE204 cruise.

3. RESULTS and DISCUSSION

Looking at Figures 2 and 3 (salinity and temperature) it's evident the water stratification in both canyons. It can easily be seen, between the approximately 600m and 1500m water depth, the entrance in the canyon of Mediterranean water (more saline), being these signature more evident in Setúbal canyon.

Concerning nephelometry the observations indicate the higher values along the entire water column in the stations nearest the coastline, in the follow stations it can be seen well developed bottom nepheloid layers that can extend seaward for some Km, accompanying the stratification. Although the Nazaré canyon has no connection with a river source nephelometry values are several orders of magnitude higher then on the Setúbal canyon.

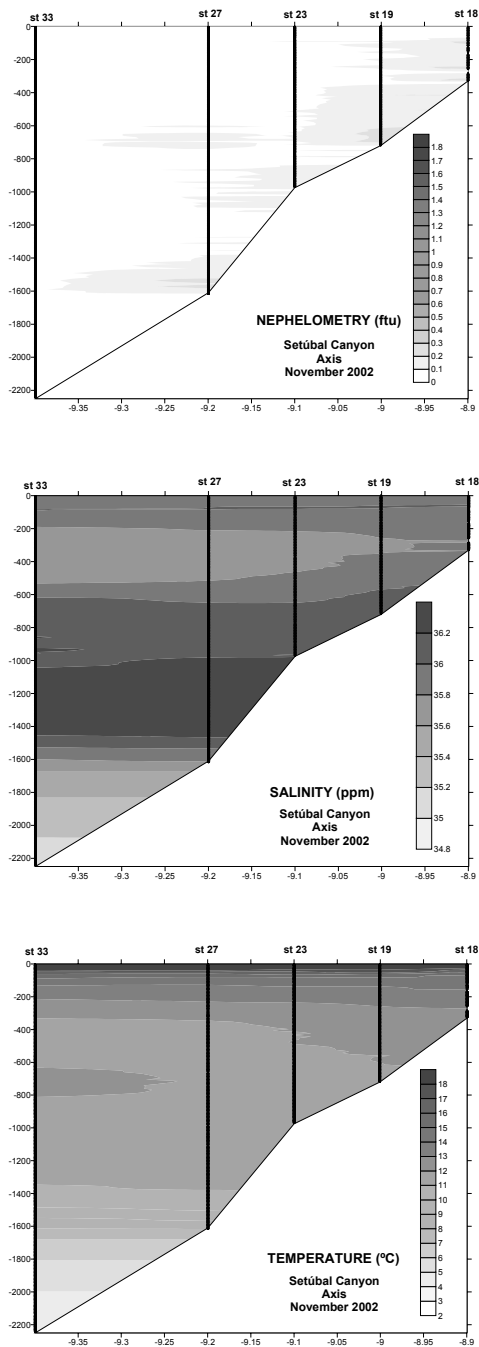


Figure 2: Nephelometry, salinity and temperature profiles along the axis of Setúbal Canyon.

4. CONCLUSIONS

Previous work (Jouanneau et al, 1998) had already shown very low values for particulate matter leaving the Sado estuary what may explain the lower concentrations found on the Setúbal canyon.

Bottom and intermediate nepheloid layers seem to be closely related to currents and internal waves inside the canyon, having higher importance on the Nazaré Canyon.

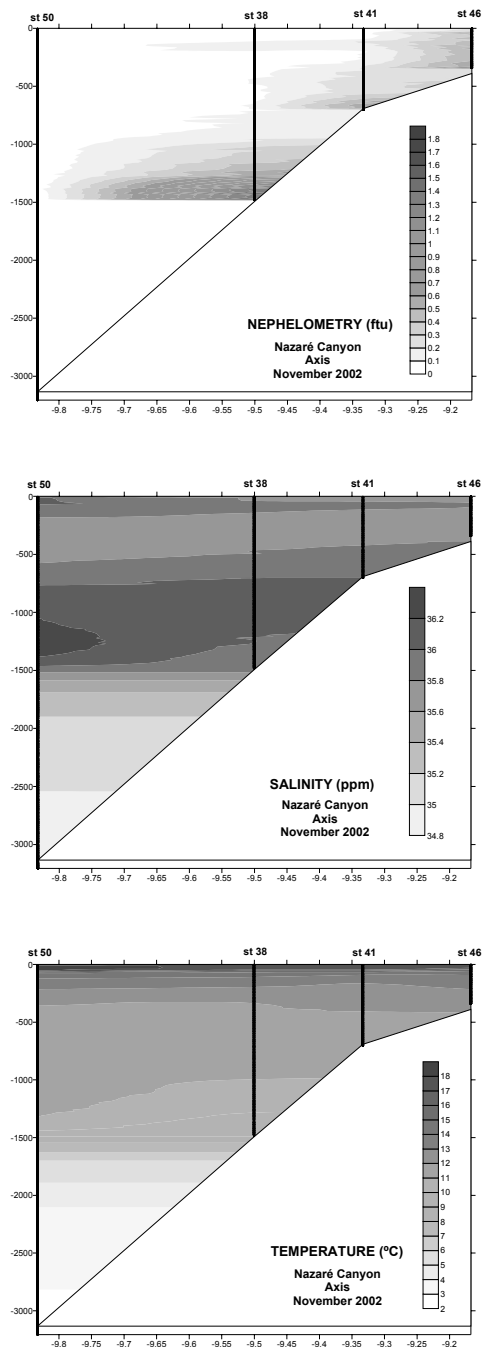


Figure 3: Nephelometry, salinity and temperature profiles along the axis of Nazaré Canyon.

ACKNOWLEDGEMENTS

This work is funded by FCT under research grant SFRH/BD/1346/2000. The authors wish to express their acknowledgement to the NIOZ, for providing the CTD data.

REFERENCES

- Jouanneau J.M., Garcia C., Oliveira A., Rodrigues A., Dias J.A., Weber O. (1998) Dispersal and deposition of suspended sediment on the shelf off Tagus and Sado estuaries, S.W. Portugal. *Progress in Oceanography*, vol. 42, pp. 233-257.