

Holocene Evolution on the Septentrional Catalan Shelf

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The septentrional sector of the catalan continental shelf is characterized by an irregular width, and narrow and deeply incised submarine canyons (Cape Creus and La Fonera) (Stanley et al., 1976). The shelf is narrow (6-19 km) in front of onland structural highs (Pyrenaic Axial Zone and Bagur Massif), showing a rocky and abrupt coast line; while is wide (17-30 km) in front of the onland Neogene depressions (Bajo and Alto Ampurdán), where Fluvia, Muga, and Ter rivers develop deltas, and longitudinal beaches are predominant. The shelf break is gentle and is located around 150 m waterdepth. Dominant oceanographic processes are waves from storms generated in the nearby Gulf of Lyon, a N-S general current regime, and a clockwise geostrophic flow in the Gulf of Rosas.

The sedimentological analysis of surficial samples reveals three types of sediments: a) terrigenous gravels and coarse-to-medium sands (-2.80 ϕ - 1.25 ϕ mean) on the abrupt coasts, and medium-to-fine terrigenous sands (1.21 - 2.57 ϕ mean) on the longitudinal beaches; b) fining-offshore muds with a terrigenous sand fraction, on inner and middle shelf prodelta areas (4 ϕ - 9 ϕ mean), and on the north sector (5 ϕ - 7 ϕ mean); and c) coarsening northwards palimpsest sediments (7 ϕ - 3 ϕ mean) on the outer shelf, having a mainly terrigenous sand fraction, with bioclastic components (35-45%).

The core (up to 1.5 m long) stratigraphy suggests two main types of transgressive sequences (Fig. 1). 1) coarsening-, and fining-upward sequences in the prodelta areas, well correlated with the high-resolution seismic facies (Diaz and Ercilla, 1989). These sequences represent muddy deposits with thin intercalations of sandier horizons whose number and thickness decreases toward the distal prodelta, where only mud is found. 2) fining-upward transgressive sequences, offshore the prodelta areas. These transgressive sequences show an erosional basal contact and are composed (from bottom to top) of: shell fragments and other bioclastic (bryozoans, serpulids crusts) on a muddy matrix and fining upwards sands, sometimes grading to shelf muds.

Sedimentary processes, that have dominated on the septentrional catalan shelf during the Holocene, record the interaction of terrigenous input from several river sources and the local oceanographic conditions. The sedimentary processes are responsible for the present surficial sediment distribution: Holocene sediments on the inner and middle shelf, and palimpsest sediments (Pleistocene deposits mixed with the modern sediments) on the outer shelf. The main active sedimentary processes are: 1) longshore drift and offshore downwelling bottom flows, that distribute the coarse sediments in a narrow sand belt parallel to the coastline; 2) advection of fine-grained river-carried sediment, that is distributed by the general current regime, forming the prodeltas across the inner and middle shelf; 3) resuspension of fines by storm waves and gravity-induced processes and their deposition offshore the prodelta areas; and 4) escape of fine-grained sediment from the Gulf of Lyon, that mainly contributes to the muddy covering on the northern shelf sector.

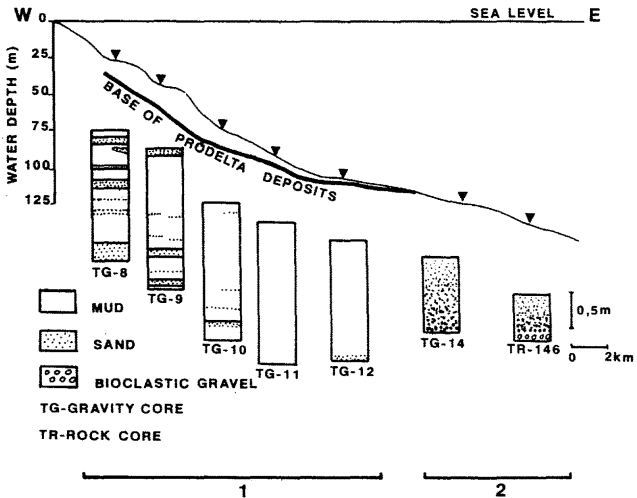


Figure 1.- Types of transgressive sequences on the septentrional catalan shelf: 1) coarsening-, and fining-upward sequences in prodelta areas, and 2) fining-upward transgressive sequences, offshore the prodelta areas.

REFERENCES

- DIAZ, J.I. AND ERCILLA G., 1989. Holocene prodeltaic depositional history in the gulf of Rosas, Northwestern Mediterranean Sea. AAPG Annual Convention, 1990, (in press).
- STANLEY D.J., GOT H., KENYON N.H., MONACO A. AND WEILER Y., 1976. Catalanian, eastern Betic, and Balearic margins: structural types and geological recent foundering of the western Mediterranean basin. *Smithson Contributions to the Earth Sciences*. Number 20, pp 1-29