

VERY HIGH RESOLUTION SEISMIC SIGNATURE OF THE HOLOCENE FOIX DELTA SYSTEM (NE IBERIAN PENINSULA, WESTERN MEDITERRANEAN)

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Abstract

Analysis of very high-resolution (Kongsberg Simrad Topas) seismic profiles and multi beam bathymetry data (Kongsberg Simrad EM-3000) from the northeastern continental shelf of the Iberian Peninsula (Catalonian margin), reveals that the sedimentary sequence developed above the acoustic basement consists in a highstand system tract of the last depositional sequence.

Keywords: Western Mediterranean, Holocene deltaic bodies, sea-level changes, very high resolution seismic sections.

The geological setting is dominated by a set of deltaic Holocene systems performed from North to South developed in relation to Llobregat, Besós and Foix rivers. The morphological sketch shows a narrow shelf of 12 km in width, with two well-defined shelfbreaks at 120 m and 180 m. The most northern sector is characterised by a relatively wider shelf, close to 16 km in width, and localised bathymetric irregularities that are the expression of a set of sand ridges developed over a restricted area in the inner and middle shelf (between 25 and 80 metres) and represent a shore-subparallel reliefs formed on a high-energy environment dominated by storm events near the shoreface during a sea level standing. The shelfbreak is mostly abrupt due to the existence of four incised canyon heads performed in relation to river Foix and other tributaries that seems to have an active role in the transport of sediments from shore to deep basin (1).

Several authors (2, 3) have pointed out the particular stacking pattern of the delta system based on high and medium resolution seismic profiles. A strongly reflective basal surface, composed by superimposition of various bodies different in age, is mainly erosional and it is related to the well-known transgressive surface.

Under the deltaic deposits there are two units, representing a coastal lagoon environment, consist of paralic sediments and littoral bodies preserved from shoreface erosion and also by a rapid sea level rise.

The distal facies of coastal deposits are represented seaward. The sequence preserved is interpreted as highstand deltaic complex transported mainly by the Foix river and deposited under various conditions.

The deltaic system include two units separated by regional non-erosional surfaces, formed during periods of possible reduced deposition, in a prograding sigmoid estuarine/deltaic complex. The last two units shows opaque seismic facies with acoustic maskings in the proximal prodelta due to existence of gas and organic matter accumulated in the sediments. The presence of gas is not only inferred from masking but also from deformed structures in the reflectors caused by the gas fluid interbedding and the subsequent expansion in some particular direction. These observations imply new considerations on the importance of gas fluid as an active role on the resulting non-tectonic structures.

The most recent unit of the highstand systems tract is composed of a distal mud patch derived from the Foix, Llobregat and Besós rivers. Dispersal and deposition of this modern mud sheet are largely controlled by the regional circulation pattern and sediment supply.

References

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