Reconstruction of Late Quaternary Shorelines in the Eastern Mersin Bay : Inferred from high-resolution seismic records and known sea-level curves

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Analyses of an extensive grid of Late Pleistocene/Holocene erosional surfaces from seismic reflection profiles along with previously published sea-level curves and several sedimentary environment information from Eastern Mediterranean (See ERGIN *et al.*, 1991 and references therein) permit an outline of the paleogeography of the Eastern Mersin Bay (E. Mediterranean) during the Late Pleistocene and Holocene changes of sea level (Figs. 1 and 2.). Taking a reduced accuracy into consideration; when combined with suitable global average sea-level curves not seriously affected by tectonic or isostatic complications, the high-resolution shallow-seismic profiles enable us to construct not only the positions but also the ages of the formerly subaerial and lowered Late Quaternary shores in the Mersin Bay. A number of uncertainties in the rates of sea-level fluctuations, which are difficult to quantify, still remain. Nevertheless, we believe that, with the results presented here, it is possible to interpret the Late Pleistocene to present paleogeography of the continental shelf of Eastern Mersin Bay.

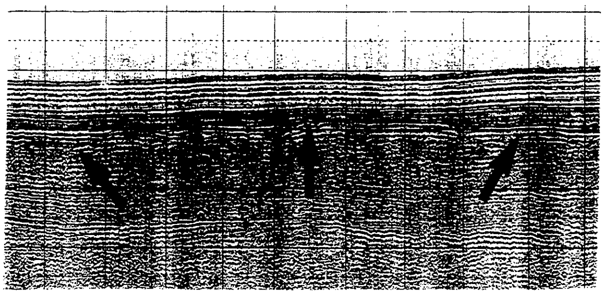

Fig. 1.- High-resolution seismic profile obtained off the coast of Mersin, southeastern Turkey. Note the pre-Holocene erosional surface.

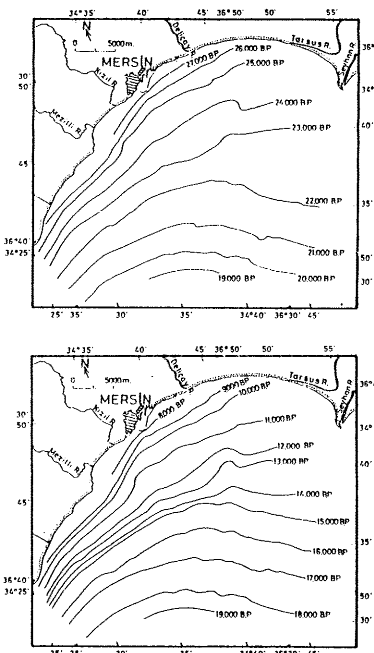

Fig. 2.- Isopach map of the Late Pleistocene (top) and Holocene (bottom) shorelines of Mersin Bay, lasted from about 27 000 to 8 000 yrs B.P.

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Messinian sedimentary history in the Valencia Trough continental margins, Northwestern Mediterranean Sea

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Sparker and multichannel seismic reflection profiles across the Valencia Trough enables a detailed analysis of the Messinian erosional surface and associated deposits. The isobath map of the Messinian surface shows large subaerial canyons draining mainly the Iberian continental margins. Most of these canyons meet the Messinian Valencia Valley, that runs parallel to the axis of the Valencia Trough. In the canyon tributary system we find evidence for several episodes of erosion and deposition during the Messinian.

The depositional processes in the Valencia Trough margins during the Messinian resulted in the formation of three main sedimentary units related to the Messinian drainage system: (1) canyon or valley floor deposits, (2) canyon or valley fill deposits, and (3) alluvial fan or piedmont deposits. At the same time, in the deeper parts of the basin, sedimentation of the Messinian evaporite sequence, took place.

(1) The morphology of many of the Messinian canyons shows trapezoidal crosssectional profiles, and sinuosities between 1:0 and 1:1, which suggest that these canyons transported mainly bedload deposits. In addition our seismic profiles show at the base of these canyons subparallel, high amplitude reflectors. We interpret these to be related to coarse-grained fluvial channel floor deposits, because they occur in incised erosional valleys, in contrast to lenticular depositional turbidite channel-levee complexes that have formed in the Valencia Trough floor in the Pliocene-Pleistocene marine sequences (NELSON and MALDONADO, 1988; ALONSO *et al.*, 1990). Our interpretations are further confirmed by the fluvial and lacustrine deposits reported from DSDP sites 122 and 123 respectively (RYAN *et al.*, 1973; CITA *et al.*, 1987), and drill holes in the Castellon continental shelf that show sands and conglomerates in Messinian thalweg positions (STAMPFLI and HOCKER, 1989).

(2) Canyon-fill sequences are observed in numerous Messinian canyons. They usually show parallel to subparallel high amplitude reflectors onlaping the canyon walls. Locally we observe two cycles of canyon-fill sequences. In this case each cycle starts with subparallel, high amplitude reflectors, related to coarse-grained sediment, and ends with subparallel reflectors of low amplitude, that correspond to fine-grained sediment. The two cycles in each canyon-fill sequence appear to represent transition from subaereal to deep-water marine depositional conditions.

(3) Alluvial-fan deposits are recognized at the mouth of the Ebro and Foix canyons. The morphological character between these two tributaries and the Valencia Valley floor is that of a piedmont plain which received a large volume of unconsolidated sediment eroded during the Messinian time.

The factors controlling the depositional patterns during the Messinian are a combination of tectonics, climate, and sea level changes. The early Miocene rift structures of the Valencia Trough controlled the location of the Messinian drainage network. Volcanic intrusions further affected Messinian drainage patterns and valley morphology. Arid climate prevailed in the northwestern Mediterranean Sea during Messinian. Typically small streams in arid climates can transport far more coarse grained sediment than big river systems in tropical areas. Under these conditions mainly canyons containing bedload deposits were produced.

The three erosive episodes and two fill sequences observed in the Valencia Trough, resulted from fluctuations in the Mediterranean sea level during the Messinian that were related to global eustatic changes and tectonic closure of the Straits. The basal erosional surface corresponds to the early Messinian isolation of the Mediterranean Sea from the world oceans. This caused sea level lowering, subaerieal exposure and erosion of the continental margins. There is little data on this episode but the magnitude of sea level drop is estimated to be about 2.500 m. Restricted inflow periods at the end of this episode brought the necessary marine water to form the main Messinian salt. At the end of the Messinian there is evidence for another episode of isolation of the Mediterranean Sea that is responsible for the formation of the unconformity between the Messinian and the Pliocene sequences. The magnitude of minimum sea level drop at this time is estimated to be about 2.000-2.200 m. In between these two episodes a third intra-Messinian erosional surface has been observed. The different erosional episodes suggest that there were altrernating epidodes of flooding and retreat of Atlantic waters through the Betic Portal and/or Rif Strait, which agrees with the data from tha Betic Strait shown by MULLER and HSU (1987). The opening of the Strait of Gibraltar during early Pliocene resulted in the final flooding of the Valencia Trough basin.

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