In the Gulf of Cadiz there is a significant development of bottom-current deposits because of the outflowing of the Mediterranean Undercurrent, shears along the Cadiz continental slope on its way from Gibraltar Strait. The sediment distribution pattern along the slope is a consequence of the interaction between the dense, saline Mediterranean water surface, and the irregular bathymetry resulting from an unusually complex tectonic setting. Variations in the slope of the Mediterranean Undercurrent affect the distribution of superficial sediments and the type and size of seafloor bedforms (NELSON et al., in press).

The presence of the Mediterranean Undercurrent impinging on the seafloor below 300 m water depth controls the sediment dispersal on the upper slope, whereas the presence of two smooth terraces on the middle slope, and abrupt diapiric ridges and steep valleys in the central area, control the sediment dispersal in deeper areas. On the upper slope terrace and along the upper slope, a tongue-like surficial deposit develops parallel to the general SE-NW bathymetric contours (Fig. 1). In this continental slope there is a clear gradation from medium-fine sand beds interbedded with mud close to the Gibraltar strait, changing northwards to coarse silt beds. Immediately to the west near the Faro Delta off Portugal, the second downslope terrace on the middle slope is mostly covered by finegrained, siltyclayey deposits interbedded with biogenic sands. Lithology of the contourite sediment drift bodies banked against the diapiric ridges also varies from fine sand on the SE to sandy silt on the central ridge and valley area, and silt in the NW area.

On the middle slope, the sediment distribution pattern is complex in the ridge and valley area where the Undercurrent flows down valley with higher current speeds and is locally eroded or depositional. Because of the Mediterranean Undercurrent shows both contour-parallel and valley-perpendicular flow, the coarse-grained sediment of the valley facies trends perpendicular to the small-scale bedforms and the finer-grained contourite deposits of adjacent sediment drift facies. Grain-size and compositional changes in sand lag deposits that are transported from the outer shelf and upper slope by high-energy processes, form on valley floors. The margins of eastern valleys are covered by sand clinoform deposits, whereas western channels are covered by sandy clayey silt.

Similar to the surface texture, the composition of the sand fraction in the surface sediment also varies from SE to NW and from valley floor to intervalley areas and slope terraces. The central and SE valley floor areas are covered by coarse-grained sand. A small amount of plakhonitic constituents is found in the SE and upper slope regions. However, high quantities of plakhonitic constituents, mostly foraminiferal tests, are found in the sand fraction of the contourite deposits in the NW area. Lithology of the upper 2 meters of sediment consists of sandy contourite layers interbedded with coarse-grained sand deposits. On the NW flank of the southern Outer shelf, the coarse sands increase in size and are also characterized by sharp upper boundaries. In this area, the coarse sands increase in size in the upper boundary and along the upper slope, the coarse-grained sediment of the valley facies trends perpendicular to the small-scale bedforms and the finer-grained contourite deposits of adjacent sediment drift facies. Grain-size and compositional changes in sand lag deposits that are transported from the outer shelf and upper slope by high-energy processes, form on valley floors. The margins of eastern valleys are covered by sand clinoform deposits, whereas western channels are covered by sandy clayey silt.

Since that opening, high sea level that results from the opening of the Strait of Gibraltar at the beginning of the Pliocene, has gradually increased throughout the Holocene. Since the origin of the Mediterranean Sea, the incoming of Mediterranean water at the Strait of Gibraltar at the beginning of the Pliocene, and the development of a strong Mediterranean undercurrent have permitted circulation through the Strait and the development of a strong Mediterranean Undercurrent.

Thus the cyclic deposition of sand or muddy layers and contourite or hemipelagic drape sequences appears to be related to these Mediterranean and Quaternary sea level changes rather than on the Mediterranean water circulation patterns.

Figure 1. Textural map (sand % - gravel) of surficial sediment from the Gulf of Cadiz continental shelf and slope (modified from NELSON et al., in press).

REFERENCES


