



Tectonic control on seafloor morphology at the Alboran Ridge and Yusuf lineaments: insights from swath bathymetry and sub-bottom profiling.

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The Alboran Sea in the western Mediterranean is affected by post-Miocene deformations conditioned by the coeval convergence between the African and Eurasian plates. Its central sector -encompassing the Alboran Ridge and the Yusuf Lineament- depicts an abrupt morphology, where active tectonic processes shaping the seafloor can be analysed. Using multibeam bathymetry and high-resolution sub-bottom profiles we conducted a detailed morphological and structural characterization of seafloor features, determining the nature and distribution of the most recent faults and folds.

The Alboran Ridge is the most prominent linear feature in the Alboran Sea (>130 km in length). This bathymetric high corresponds to a complex fault-zone that is one of the outstanding major structures in the Gibraltar Arc System. Recent uplifting and deformation in the Alboran Ridge has been caused by sub-vertical, strike-slip and reverse faults with associated folding in the shallower sediments, the trend of which shifts progressively from SW-NE to WNW-ESE. Towards the east the Alboran Ridge connects with the Yusuf Lineament. This escarpment also corresponds to a fault-zone but involves transtensive faulting and subsidence in the Yusuf pull-apart basin. Buried and modern submarine slides detected at the slopes of both the Alboran Ridge and the Yusuf Lineament are clear signs of submarine instability and are probably linked to seismically active structures.

Recent deformation is heterogeneously distributed along the system formed by the Alboran Ridge and Yusuf fault-zones. Furthermore, a narrow SSW-NNE fault-zone involving folding and reverse faulting cuts across the western end of the ridge. Upper-crustal seismicity is concentrated along this SSW-NNE fault-zone, which represents an active left-lateral (transpressive) strike-slip structure cutting across the Alboran Ridge and partitioning the present-day deformation in the Alboran Sea. The tectonic framework we obtained in the Alboran Sea basin would help us to understand more fully the nature of the interaction between the African and Eurasian plates and determine how the deformation is partitioned along this segment of the plate boundary.

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