

# RECENT FAULT ACTIVITY AND THE INTERACTION WITH CARBONATE DEPOSITIONAL SYSTEMS IN THE ALBORÁN SEA (WESTERN MEDITERRANEAN SEA) BY SUBBOTTOM PROFILERS

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## Abstract

An ultra-high resolution seismic study in the Alborán Sea was carried out with the Parasound system to study the recent tectonic activity of prominent fault systems and their interaction with Quaternary carbonate systems. Since the Late Miocene, the Alborán Sea and surrounding areas are subject to compression, which influences the depositional history including coastal Quaternary carbonates. The western Mediterranean is characterized by a moderate seismicity, generally tracing major sinistral strike-slip faults, which cut the entire basin. These faults, the Carboneras and Palomares Faults, truncate and warp the Quaternary sediments pointing to recent fault activity in the Gulf of Almería.

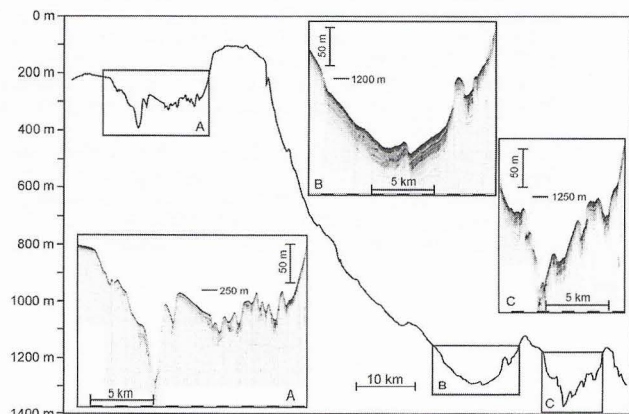
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The Alborán Basin located within the Eurasian-African Convergence Zone that is an approx. 500 km wide corridor with distributed seismicity (Fig. 1) which exhibits several structures related to neotectonic deformation. Regions of adjacent coeval compression and extension in an overall dextral transpressional setting are found in the Alborán Basin which is dominated by strike-slip faulting.



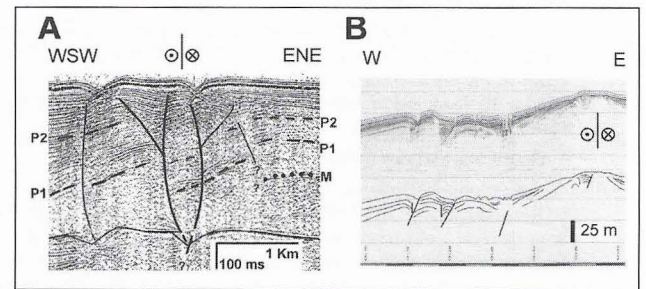
**Fig. 1.** Tectonic map of the Alborán Sea, with the recent seismicity (dots, filled dots = deep earthquakes). Inset shows study area and section of Fig. 2. CF = Carboneras Fault, PF = Palomares Fault.

In order to image late Quaternary depositional and tectonic processes in the Alborán Sea the German research vessel R/V *Meteor* operated along the Almería coast in the year 2001 (M51/1 cruise). The area has been previously investigated by a number of high- and low resolution seismic studies (1; 2 Fig. 3A), which outlined the complex Neogene tectonics in the western Mediterranean region. Two active left-lateral strike-slip faults, the NE-SW striking Carboneras Fault and the N-S trending Palomares Fault, control the depositional conditions of the carbonate prism of Cabo de Gata region (Fig. 2).



**Fig. 2.** Parasound section (topography and sediments) across the Gulf of Almería and the Cabo de Gata (see Fig. 1)

Historical data point to major earthquakes during the last 1000 years (3), which occurred along the major strike-slip faults. The last earthquake with a magnitude > 6.2 occurred on 15. September 1522, destroying Almería. On-shore paleoseismic evidence with surface ruptures is missing (4), the epicenter is unknown. In Parasound investigations, we have found several fault strands in the Gulf of Almería (deep channels in Fig. 2), some of which are associated with faults, folds and onlap-patterns (Fig. 3B). The faulted recent sediments in an area of relatively high sedimentation rates, lead us to the conclusion that off-shore faulting must be very recent. An off-shore epicenter related with the earthquake of 1522 is also corroborated by historical tsunami drawings. Hence, we contribute to a seismic hazard assessment of the Western Mediterranean region.



**Fig. 3.** A seismic section from Estrada *et al.*, 1997; B Parasound section (location on Fig. 2 platform left of A). Note folding and faulting of the recent sediments.

## References

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