

# The crustal domains of the Alboran Basin (Western Mediterranean)

Author : Gómez de la Peña, Laura - [lgomez@geomar.de](mailto:lgomez@geomar.de) – B-CSI, Institut de Ciències del Mar, CSIC, Pg. Marítim de la Barceloneta, 37-49, 08003 Barcelona, Spain. *Currently at:* GEOMAR Helmholtz Centre of Ocean Research, Wichhofst. 1-3, 24148 Kiel, Germany.  
Co Author : Ranero, César - [cranero@icm.csic.es](mailto:cranero@icm.csic.es) – B-CSI, ICREA at Institut de Ciències del Mar, CSIC, Pg. Marítim de la Barceloneta, 37-49, 08003 Barcelona, Spain.  
Co Author : Gràcia, Eulàlia - [egracia@cmima.csic.es](mailto:egracia@cmima.csic.es) – B-CSI, Institut de Ciències del Mar, CSIC, Pg. Marítim de la Barceloneta, 37-49, 08003 Barcelona, Spain.

The Alboran Basin is located in the westernmost Mediterranean. It is part of the Gibraltar Arc System, being surrounded by the Betics and the Rif orogenic belts. Across this basin runs the boundary between the Iberian and African tectonic plates. Although numerous geological and geophysical studies have been carried out in this area during the last ten years, the processes that led to the formation of the basin and that controlled its deep structure and later evolution still remain unclear. So far, the crustal structure of this area is poorly-known, as a comprehensive wide angle seismic survey of the basin has not been carried out yet and deep seismic surveys, mainly tomographic models, do not have enough resolution to solve the crustal configuration of the basin.

We analyze crustal-scale images of a grid of new and reprocessed multichannel seismic profiles showing the tectonic structure and variations in reflective character of the crust of the basin. The interpretation of the nature of the domains has been ground-truthed with available basement samples from drilling and dredging.

The results reveal four different types of crust in the Alboran Basin: a) a thin continental crust underneath the West Alboran and Malaga basins, that transitions to b) a magmatic arc crust in the central part of the Alboran Sea and the East Alboran Basin, c) the North African continental crust containing the Pytheas and Habibas sub-basins, d) the oceanic crust in the transition to the Algero-Balearic basin. The crust is configured in a fore-arc basin (West Alboran and Malaga basins), a magmatic arc (Central and East Alboran), a back-arc system in the easternmost part of the East Alboran Basin and mainly Algero-Balearic Basin. The North Africa continental crust does not seem to have been involved in this subduction-type structure. The distribution of active tectonic structures in the current compressional setting corresponds generally to the domains boundaries possibly representing lithospheric-scale pre-existing comparatively weak structures.

Keywords: deep structure, crustal domains, active tectonics.