



## **The Carboneras sinistral fault: a transfer structure accommodating differential extension during the Miocene and Quaternary (Western Mediterranean)**

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We present 2 high-resolution multichannel-seismic reflection lines (HR-MCS), multi parametric echo-sounder profiles and bathymetric data collected parallel to the sinistral Carboneras fault zone during the IMPULS (2006) seismic survey. The state of knowledge of the region indicates different crustal and tectonic features to the north and to the south of the fault zone. For this reason we analyzed the shallower and deeper tectonics imaged by the HR-MCS to compare deformation styles and amount of extension, and finally to define the tectonic role of the fault zone.

HR-MCS lines show a common tectonic style characterized by listric normal-faults with roll-over anticlines and extensional depocenters. Locally to the south, these faults show a lateral-component of slip at the vicinity of the Adra Ridge dextral-normal fault. These listric faults affect the basement made up of thinned continental crust intruded by subduction-related magma up to the Tortonian–Quaternary sediments. HR-MCS profiles show two impulses of extension and associated depocenters, during the Tortonian–Messinian and the Plio–Quaternary. Nevertheless these common features, the sense of extension is SW-directed to the north and NE-directed to the south. Furthermore, the amount of extension is larger to the north, as inferred by the occurrence of large extension-related depocenters in contrast with minor depocenters to the south. The difference in amount of extension is larger for the Tortonian–Messinian extensional pulse than for the Plio–Quaternary one. The seismic dataset supports that the Carboneras fault zone worked as a transfer fault between opposite-directed extensional systems congruent with westward-directed extension in the central and southeastern Betics and eastward-directed extension in the eastern Betics and the east Alboran and Algero-Balearic basins.