



## Seismotectonics of the Alboran domain, Western Mediterranean – active shallow tectonics and deep-seated shadows of the past

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The Alboran Basin is located in the western-most Mediterranean Sea and is surrounded by the Gibraltar-Betic and Rif orogenic arc. Geological evidence suggests that the most important phase of formation started in the early-to-mid-Miocene. Currently two conflicting models are discussed for its formation: One model proposes contractive tectonics producing strike-slip faults and folds with sedimentation occurring in synclinal basins and in regions of subsidiary extension in transtensional fault segments. A second model proposes slab roll back that caused contraction at the front of the arc and coeval overriding plate bending and extension and associated arc magmatism. However, this phase has been partially masked by late Miocene to present contractive structures, caused by the convergence of Africa and Iberia. The collaborative research project TOPO-MED of the ESF TOPO-EUROPE programme and the Spanish TOPO-IBERIA provided excellent new seismological onshore/offshore station coverage, receiving a wealth of local earthquake data to study the seismotectonics of the Alboran/Betics/Rif domain. In the Alboran Basin most earthquakes occur along the Alboran Ridge, indicating strike slip motion. At the northern terminus of the Alboran Ridge seismicity bends and extends towards the Algerian margin, indicating strike slip motion. However, a number of earthquakes occur southward of the Spanish coast indicating a set of strike-slip faults. This area is believed to be the nucleation area of the 1522 Almeria (MSK ~ IX) and 1910 Adra (MSK ~ VII) earthquake and bathymetric swath-mapping data indicate a set of SSW-NNE trending faults. On 11 April 2010 a Mw=6.2 deep-focus earthquake occurred at 635 km below Granada, Southern Spain. We used teleseismic waveform inversion of body-waves to study its source mechanism and compare it to deep-focus earthquakes in Argentina. Focal mechanisms, centroid depth and P-axes of events from the eastward dipping South American subduction zone are nearly identical to the source parameters of the Granada event, suggesting that the Granada earthquake is indeed related to past eastward dipping subduction zone, favouring the second proposed model to explain the evolution of the Alboran domain.