



Complexity of the Ibero-Magrhebian region: intermediate depth earthquakes

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The Ibero-Magrhebian region is located at the plate boundary between Eurasia and Africa and it is a tectonically complex region. A sign of the complexity, is the occurrence of intermediate depth earthquakes ($40 < h < 150$ km), located in south Spain, between Granada- Malaga and at the west part of Alboran Sea, together with the occurrence of very deep earthquakes ($h \approx 650$) near Dúrcal (Granada). Intermediate depth shocks are mostly confined within a relatively narrow region (50 km width) located East of Gibraltar, extending NNE-SSW from the Malaga (Spain) area to a region offshore the Moroccan coast. The moderate magnitude of the intermediate depth events (less than 5.5), the heterogeneity of the crustal structure in the region, and the strong influence of microseismic noise on seismic data represent significant challenges for the inversion of focal mechanism based on waveform modelling. We have estimated the focal mechanisms of 9 intermediate depth earthquakes (M_w 3.3 to 4.5) occurred in the period 2002-2009 from moment tensor inversion of broad-band data at regional distances, using the recently developed Kiwi tools. Moment tensor inversion is carried out by fitting body waves amplitude spectra, solving for strike, dip, rake, scalar moment and improving the original hypocentral depth. For each earthquake, we carry out a set of inversions, comparing results using different station subsets, seismic phases and earth models. The new obtained results, together with other selected solutions estimated previously using different methods, show a change on the stress pattern: to the west of $4.5^\circ W$, focal mechanisms show vertical tension axis, while to the east, they show vertical pressure axis. These stress orientations are not present in deep earthquakes, where the pressure axes dip 45° to the east. The intermediate and deep earthquakes may be related to some kind of subduction or delamination processes, more recent for the intermediate depth shocks and older for the very deep activity.