



Seismotectonics of Morocco from regional centroid moment tensors

Antonio Villaseñor (1), Lahcen el Moudnib (2), Robert B. Herrmann (3), and Mimoun Harnafi (2)

(1) CSIC, Institute of Earth Sciences Jaume Almera, Barcelona, Spain (antonio@ictja.csic.es, +34-934110012), (2) Institut Scientifique, Université Mohammed V, Agdal, Rabat, Morocco, (3) Department of Earth and Atmospheric Sciences, Saint Louis University, Saint Louis, MO, USA

We have obtained new regional centroid moment tensors (RCMTs) for 35 earthquakes occurred in Morocco and vicinity between 2008 and 2012. During this time period an unprecedented number of broadband stations (more than 100) were operating in the region, providing high-quality waveform data that were used to obtain RCMTs from waveform inversion. The main part of this dataset was composed of temporary broadband stations that were concurrently deployed in different seismic experiments (i.e. IberArray, PICASSO, Muenster, Bristol).

The events analyzed in this study are moderate in size, ranging in moment magnitude M_w from 3.5 to 4.8. Their predominant mechanisms correspond to reverse and strike-slip faulting, although normal and "mixed" mechanisms are also observed. In spite of this variability in mechanism type, when analyzed in terms of the orientation of the P (compression) axes two major groups can be distinguished. The first group, corresponding to earthquakes in the Atlas and NE Morocco is characterized by near-horizontal P axes oriented in an approximately NW-SE direction that coincides with the direction of convergence between Africa and Eurasia. A small clockwise rotation of the orientation of the P axes is observed from eastern Morocco to the western Atlas. The second group corresponds to earthquakes in the western Rif, that are characterized also by horizontal P axes, but oriented in a SW-NE direction, almost perpendicular to the first group. These earthquakes are part of a cluster located north of Ouezzane. The mechanisms in this second cluster are consistent with recent GPS results that show that the western Rif is moving in a SW direction with respect to the African (Nubia) plate.