



Regional Stress Field in the Maghreb Region From an Updated Focal Mechanism Catalog (1954-2014)

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In order to investigate the regional stress field in the Maghreb region we construct a focal mechanism catalog for earthquakes that occurred from 1954 to 2014. To this intent, all available moment tensor solutions of past earthquakes obtained from different sources were checked, compared and corrected. Furthermore, the focal solutions of all recent earthquakes with magnitude down to 4 and for which data is available were calculated using a new method based on waveform fitting of observed seismograms and synthetics calculated for a range of fault angles and hypocenter depths. Observed seismograms of all stations for a given earthquake were thus collected, processed and subject to a rigorous quality control according to the corresponding signal-to-noise ratio. An average 1-D earth model for the Maghreb-western Mediterranean region was also constructed to calculate synthetics.

The misfits between these observed seismograms and a set of synthetics calculated for every value of fault angles (strike, dip and rake) and hypocenter depths were calculated after respectively, a phase fitting obtained by shifting the seismograms to the best cross-correlation between data and synthetics, and amplitudes scaling. The best configuration of fault angles and hypocenter depths was then selected according to the smallest average misfit over all stations. If a systematic time shift was noticeable for all stations or most of them, an additional relocation step was done to obtain the most accurate earthquake's epicenter.

Most of the earthquakes included in the catalog define several spatial clusters for which the assumption of homogeneous stress can be fulfilled. Hence, a stress inversion for each cluster was performed and a stress ratio indicating the dominance of compressional or tensional stresses as well as the directions and dips of the tensional, intermediate and compressional axis were obtained.