



Amplitude spectra moment tensor inversion applied to shallow earthquakes in Spain

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A method for moment tensor inversion of shallow earthquakes ($h < 40\text{km}$) at regional distances ($\Delta < 350\text{km}$) using broadband seismic data has been developed and applied to earthquakes in the Ibero-Maghrebi region. The approach of the analysis is done by amplitude spectra inversion technique using radial and vertical components of P waves and transversal components of S waves. Green functions are obtained by applying reflectivity method to horizontally layered media. Different lithospheric models have been used for the Pyrenees, Betics and Alboran Sea. The inversion method is applied to four shallow earthquakes in the Ibero-Maghrebi region. These events present different characteristics in terms of crustal structure of the focal region, magnitude and azimuthal coverage of the epicenter. Namely, the Gergal earthquake (4/2/2002) is located in the Betics region, the Alboran earthquake (19/2/2003) in a semioceanic region and the Ripolles earthquakes (26/2/2003 and 21/9/2004) close to the Pyrenees. Seismic data used correspond to the broadband records of the Digital Spanish (IGN), ROA/UCM/GFZ, TEDESE and ICC networks. Results are compared with previous studies for this region and with first motion polarities solutions. Gergal earthquake presents a focal mechanism of normal faulting with a CLVD of 3%, depth of 9km and scalar moment of $0.86 \times 10^{16} \text{Nm}$ ($M_w = 4.6$). Alboran earthquake shows a strike-slip mechanism with a component of CLVD of 9%, focal depth is 3km and a scalar moment of $2.61 \times 10^{16} \text{Nm}$ ($M_w = 4.9$). The two studied earthquakes of Ripolles show strike-slip and vertical mechanism, CLVD components of 1% and 41%, depth of 7 and 4km and scalar moment of $0.85 \times 10^{14} \text{Nm}$ ($M_w = 3.3$) and $0.95 \times 10^{15} \text{Nm}$ ($M_w = 4.0$) respectively.