Tomography and geodynamics structure of the Ibero-Maghrebian region

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The present study has two main goals: 1) use the most actual seismological data from recent earthquakes in the extended Alboran region to develop a geodynamic-structural model for the region through the application of seismic local tomography techniques; 2) modelling seismogenic sources using specific applications of analysis.

The structural scheme detailed in depth will allows us to define possible structural blocks in region between north of Morocco and Alboran sea. Currently the GPS studies show local movements in northern morocco independently of the general movement of the African plate. These movements are due to structural blocks that should be define and limit the boundaries

The present tomographic study focuses on SW Ibero-Maghrebian region. The P and S arrival times at 52 stations located at north of Morocco (National Institute of Geophysics, CNRST, Rabat), south of Portugal (Instituto de Meteorologia, Lisbon) and Spain (Instituto Geografico National, Madrid) are used for the period between 12/1988 and 30/2008. We use a linearized inversion procedure to find a 3D velocity model for the studied region.

The resolution tests indicate that the calculated images give near true structure for the Tanger peninsula, the Alhoceima region and southern Spain at 5km depth. At 15, 30, 45 km depth we observe a near true structure in northern Morocco, and southern Spain. At 60 and 100 km, the southern Spain and SW of Alboran Sea gives a near true structure.

The resulting tomographic image shows that the total crustal thickness varies between 25 and 35 km and contains low-velocity anomalies. Is defined clearly a prominent negative P-wave velocity anomaly with a maximum decrease of approximately 6 per cent, at 15 km depth, in the northern Morocco. This low velocity demarcates a small bloc located between Iberia and African plate. This bloc is presented by a prominent high velocity anomaly that shows a maximum increase in *P*-wave velocity of approximately 6 per cent. The area with high velocity values could represent brittle and competent parts of the crust and lithosphere which sustain seismogenic stress where asperities along the faults could exist and probably more with the Iberia-Africa plate boundary.

Strong ground motions from major earthquakes depend strongly upon the 3D seismic velocity structure of the crust. Moreover the 3D velocity model is crucial for a better comprehension of structures behavior and has important practical applications toward understanding earthquake hazard in the Ibero-Maghrebian region. In particular, we hope to contribute, with this model, for seismic risk mitigation in north of Morocco.