Geophysical Research Abstracts
Vol. 15, EGU2013-5165-2, 2013
EGU General Assembly 2013

Imaging the continental mantle beneath Iberia and Northern Morocco: the contribution of the Topo-Iberia project.

Jordi Diaz and the TopoIberia Scientific Team
ICTJA - CSIC, Barcelona, Spain (jdiaz@ictja.csic.es, 34 934110012)

One of the key assets of the Topo-Iberia research program, aiming to unravel the complex structure and mantle processes in the area of interaction between the African and European continental plates, has been the deploying of a technological observational platform, named IberArray, to provide new seismological, magnetotelluric and geodetical data with unprecedented resolution and coverage. Topo-Iberia has also benefited from the interaction with subsequent projects investigating the same area, as the USA Picasso, the French Pyrope or the Portuguese Wilas. This interaction includes sharing the available data to better assess the key geological questions.

This contribution aims to present the current state of the most significant scientific investigations concerning the lithosphere-asthenosphere system beneath Iberia and Northern Morocco which are arising from the data acquired using the Iberarray platform. The area so far investigated extends from the Variscan Central Iberian Massif in the North to the border of the Sahara Platform in the South and includes areas of complex and still not completely understood geodynamics, as the Alboran domain or the Atlas Mountains. SKS splitting analysis clearly image this complexity; the fast polarization directions (FPD) beneath the Betics-Alboran show a spectacular rotation along the Gibraltar arc following the curvature of the Rif-Betic chain. Beneath the High Atlas and SW Iberia, there are a very significant number of high quality events without evidence for anisotropy, suggesting the presence of a large vertical component of flow in the upper mantle. These observations allow inferring a model of mantle flow at regional scale. New body wave tomographic images have confirmed the presence of a high-velocity slab beneath the Gibraltar Arc and allowed to define more precisely its geometry, appearing as a near-vertical feature extending from 50-75 km to about 600 km. Magnetotelluric profiles acquired using broad-band and long-period instrumentation along different N-S profiles from North Iberia to the Atlas have also provided relevant information along a 1500 km long N-S lithospheric transect. Receiver functions have revealed large crustal thickness variations, including a crustal root beneath the Rif not clearly documented previously. Beneath Iberia, the Variscan domain shows a quite uniform Moho depth, but the areas affected by the Alpine orogeny show significant variations, consistent with the results arising from ambient noise interferometry. Moving to the base of the upper mantle, the geometry of the 410-km and 660-km upper mantle discontinuities have been investigated using novel cross-correlation/stacking techniques, which have allowed to obtain a detailed map of the transition zone thickness variations.