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Progress on the seismic anisotropy knowledge beneath Iberia and northern Morocco: the contribution of the second Topoiberia-Iberarray deployment

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In summer 2009 the dense Iberarray broad-band seismic network deployed in the framework of the large-scale TopoIberia project moved to its second footprint. Up to 55 stations covered the central part of the Iberian Peninsula for roughly 18 months, distributed in a regular grid with a nominal spacing of 60 km. 19 additional stations, active since late 2007 in the Northern part of Morocco, were moved southwards during the summer 2010 to the High Atlas, thus extending the investigated area. Continuous data from all the permanent broad-band networks covering the region have also been gathered to produce a complete database. We focus here in the results constraining the presence of anisotropy as evidenced from the analysis of splitted teleseismic phases. Few anisotropic results in the area covered by this IberArray deployment have been published till now, all of them coming from a scarce number of permanent stations.

The results here presented extend the anisotropic map obtained from the first TopoIberia-Iberarray deployment in the Betics-Alboran zone (Díaz et al, 2010). The inferred fast polarization directions (FPD) clearly document a spectacular rotation along the Gibraltar arc, following the curvature of the Rif-Betic chain, from roughly N65E beneath the Betics to close to N65W beneath the Rif chain. The stations beneath the Central Iberian Massif present a small amount of anisotropy, oriented roughly E-W. Beneath SW Iberia, within the Variscan Ossa-Morena zone, the dominant orientation changes to NNE-SSW, the induced time delays are smaller and a number of good quality measurements show no evidences for anisotropy. Beneath Eastern Iberia, the NE-SW and E-W FPD observed respectively in the Betics and Central Iberia seems to converge, without any indication of an abrupt change similar to that evidenced in the southern part of the Gibraltar arc. The preliminary data of the stations located in the High Atlas show a small degree of anisotropy, with rather unconstrained FPD and a great number of null measurements.

An explanation involving different origins for the observed anisotropy pattern (frozen-in anisotropy above the Alboran fast-velocity slab, mantle flow around it, hypothetical vertical flow..) seems plausible, even if the analysis of more data and further geodynamical discussion is still needed