



Studying sub-crustal reflectors in SW-Spain with wide-angle profiles

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It is nowadays widely accepted that the mantle is highly heterogeneous and has lithologies that are capable of giving impedance enough to be observed in seismic data. Nevertheless, observing those impedance contrasts at mantle depths is a challenging problem. SW Iberia has been sampled by different deep vertical reflection and wide-angle reflection/refraction experiments ILIHA, IBERSEIS, and ALCUDIA, and hence provide a good opportunity to study seismically sub-crustal reflectors. These datasets have imaged a conspicuous sub-crustal reflector. This mantle reflector was first identified on the IBERSEIS wide angle reflection shot-gathers at large offsets (above 180 km). It was modeled as a boundary located between 61-72 km depth with a V_p increase from 8.2 km/s to 8.3 km/s. The fact that this reflector was not identified in the coincident vertical incidence dataset led us to interpret it as a gradient zone. A correlation with the 'Hales gradient zone', i.e. the boundary between spinel and garnet peridotites, was our preferred interpretation. The ALCUDIA experiment also shows prominent sub-crustal arrivals with the same characteristics as those observed in the IBERSEIS wide-angle data. However, these reflections also appear, locally and at 19 s TWT, in the vertical incidence dataset. In addition, the ALCUDIA wide-angle dataset shows a deeper reflector that maybe preliminarily associated with mantle anisotropy or even with the lithosphere-asthenosphere boundary. Both upper mantle reflectors are modeled at 65 km and 100 km depth, respectively, shallowing to the north to 55 km and 90 km depth.

Integration of the information provided by the IBERSEIS and ALCUDIA datasets with older and lower resolution data from the ILIHA project, where three sub-crustal phases were identified in SW Iberia, allows us to conclude that, in this area, mantle reflectivity is outstanding. Also, modeling of all the datasets contributes to map, at a regional scale, the Hales discontinuity or gradient zone in southwest Iberia.

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