Geophysical Research Abstracts
Vol. 13, EGU2011-6157, 2011
EGU General Assembly 2011


# Mapping the Upper Mantle Transition Zone beneath the Iberian Peninsula and North Africa

Luciana Bonatto (1), Martin Schimmel (1), Josep Gallart (1), and José Morales (2)

(1) Institute of Earth Sciences Jaume Almera, CSIC, Barcelona, Spain (lbonatto@ija.csic.es), (2) Andalusian Institute of Geophysics, UGR, Granada, Spain

Upper mantle discontinuities are commonly studied through the detection of waves which have been converted/reflected at these discontinuities. A common technique are P receiver functions. In this work a novel approach which is leaned on receiver functions and which is based on cross-correlation and stacking techniques was implemented to search for weak amplitude upper mantle phases that arrive in the P wave coda, such as P to s conversions. The aim of this work is to map the transition zone boundaries (410-km and 660-km depth discontinuities) beneath the Iberian Peninsula and north Africa.

The method uses the phase cross correlation (pcc) and stacking techniques, such as the phase weighted stack (pws), in order to eliminate the source influence and to enhance coherent signals detected for the different events at individual stations. A pilot wavelet is selected from the vertical component, this wavelet contains the P phase and part of its coda. Converted/reflected phases are then detected by the cross-correlation of this pilot with the vertical and radial component of each recorded event and the stacking of cross-correlograms for common conversion point areas. Stacking enhances the signals which arrive consistently (near receiver conversions and reflections) and attenuates isolated depth phases such as near source reverberations and spurious arrivals. Slant stacks are used to correctly identify the coda signals. Besides the source equalization, pcc provides relative travel times with respect to the P phase through its correlation maxima.

The described process was performed for teleseismic earthquakes registered in the Iberarray seismic network of the TopoIberia project. So far we used 123 broad band seismic stations deployed in Spain, Portugal and north Africa during 3 years. We focus on the converted phases P410s and P660s and map the corresponding discontinuities.