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Wide angle reflection/Refraction seismic data processing and imaging of HG-MEDOC line in southern Tyrrhenian sea: evidences of a transitional Moho boundary?

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In the framework of the interdisciplinary MEDOC (MEDiterràneo OCcidental) project, the crustal structures of the Tyrrehenian basin were explored carrying out the acquisition of five seismic lines. Each line was investigated using both Wide Angle Reflection/Refraction (WARR) and Multichannel Seismic reflection (MCS) techniques. In this presentation the processing of WARR data along the MEDOC-HG line and its results dedicated to the Moho imaging are presented.
The HG line runs quite parallel to 40° latitude direction, between the Sardinian and Campanian margins. The HG seismic acquisition was carried out using 34 marine and land stations. For each common receiver gather the procedure involves the first arrival picking and the global static removal, obtained by the sum of two corrections: long wavelength static corrections due to the difference in the bathymetry/topography of receiver and shot, and the short wavelength static corrections (residual statics) due to the propagation effects in the shallow basins and local topography effects. To obtain the residual corrections we perform a smoothing of first arrival travel times, then we calculate the difference between the travel time smoothing and observed travel time pickings. The optimal travel-time smoothing, which was obtained using a cubic spline smoother, is constituted by the first smoothed travel-times that exhibit a negative second derivative. It is shown that the estimated residual static corrections are in agreement with these obtained using the difference, in two way travel-times, between the basement line drawing derived from MCS HG line and the bathymetry.
After the global correction the data were corrected to obtain the Moho imaging using respectively the linear move out for Pn arrivals and the normal move out for PmP phases.
The Pn and PmP features along the investigated profile allow us to characterize the Moho discontinuity.
-The Pn imaging, is quite continuous for all the profile. The velocity of Pn phases, ranging between 7.8 km/s and 8.3 km/s seems indicate a refraction in upper mantle. The reconstructed intercept time image indicates that the minimum Moho depth of about 10 km is reached between Magnaghi and Vavilov sea mounts. The Moho in the Sardinian and Campanian margins reaches about 22 km and 18 km of depth respectively.
-The PmP image, on the contrary of the Pn image, in the central part of profile, between Vavilov and Magnaghi sea mounts, indicates a lack of PmP reflected signals from the Moho boundary. In the Sardinian and Campanian margins the PmP imaging reveals the existence of reflected signal from the Moho with the same geometrical features of Pn image and similar depth values.
From the geophysical point of view, these results can be interpreted as a lower crust- upper mantle boundary characterized by a layer with a high velocity gradient. This fact is a clear evidence of a transitional Moho boundary. Two preliminar geostructural-petrophysical work hypotheses about the Moho could be made: the first one is a new formation Moho and the second one is a contaminated Moho due to the pre-existing lower crust disgregation.