A new crustal model as input for the European strength map

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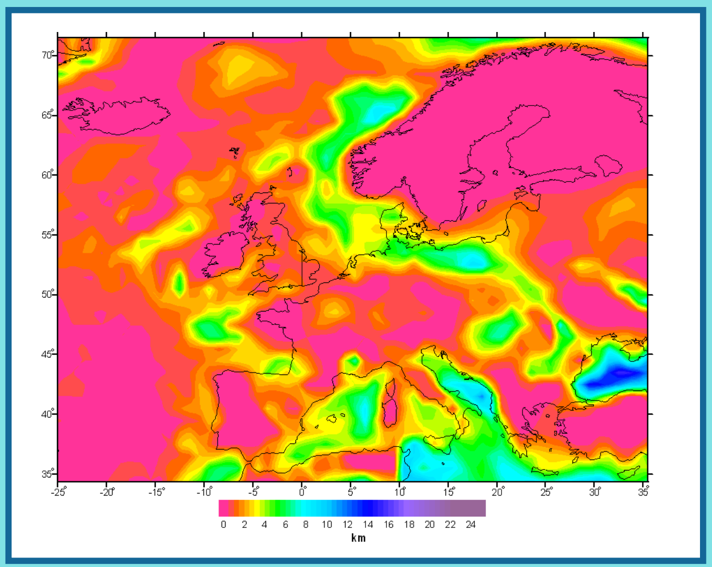

Fig. 1 Thickness of the sediments

Abstract

Tectonic studies made in intraplate Europe have shown that this area is more active than would be expected from its location far away from plate boundaries. Intraplate Europe is characterized by horizontal and vertical motions with deformation rates of the order of 1-2 mm/yr and by diffuse seismicity, with earthquake magnitudes rarely exceeding 4.0, that can be attributed to the existence of old zones of weakness, which are reactivated under the current stress field. The first strength map has lead to a significant understanding of the dynamics of intra-lithospheric deformation processes. The results showed that the European lithosphere is characterized by major spatial mechanical strength variations, with a pronounced contrast between the strong lithosphere of the East-European Platform (EEP) east of the Tesseyre-Tornquist Zone (TTZ) and the relatively weak lithosphere of Western Europe.

In order to improve the results previously obtained and to extend the strength calculations to the southern and western plate boundaries of Eurasia, we propose a new crustal model to use as a part of a compositional model comprehensive of crust and lithospheric mantle. The new crustal model consists for continental realms, of two crustal layers and an overlying sedimentary cover layer, whereas for oceanic areas one crustal layer is used. The results of deep seismic reflection and refraction and/or receiver function studies are used to define the depth of the crustal interfaces and P-wave velocity distribution. The Moho map is reconstructed by merging the most recent maps compiled for the European regions. Strong differences are found in the structure of the Baltica crust of the EEP and the Variscan crust of Western Europe. The first one has an high thickness (42-44 km) and an high velocity of the lowest layer (Vp~7.1km/s). By contrast, the second one is thinner (30-35 km) and is generally characterized by slower P-wave velocity in the lower crust (Vp~6.7 km/s).

In the next future, seismic tomography data are used to get the location of the lithosphere-astenosphere boundary and calculate the temperature distribution. These results, jointly with the new crustal model, will allow us to refine the previous strength map. Furthermore, the gravity effect of our crustal model will be calculated and removed from the observed gravity field in order to get residual mantle anomalies. These anomalies distribution will be compared with the new strength results.

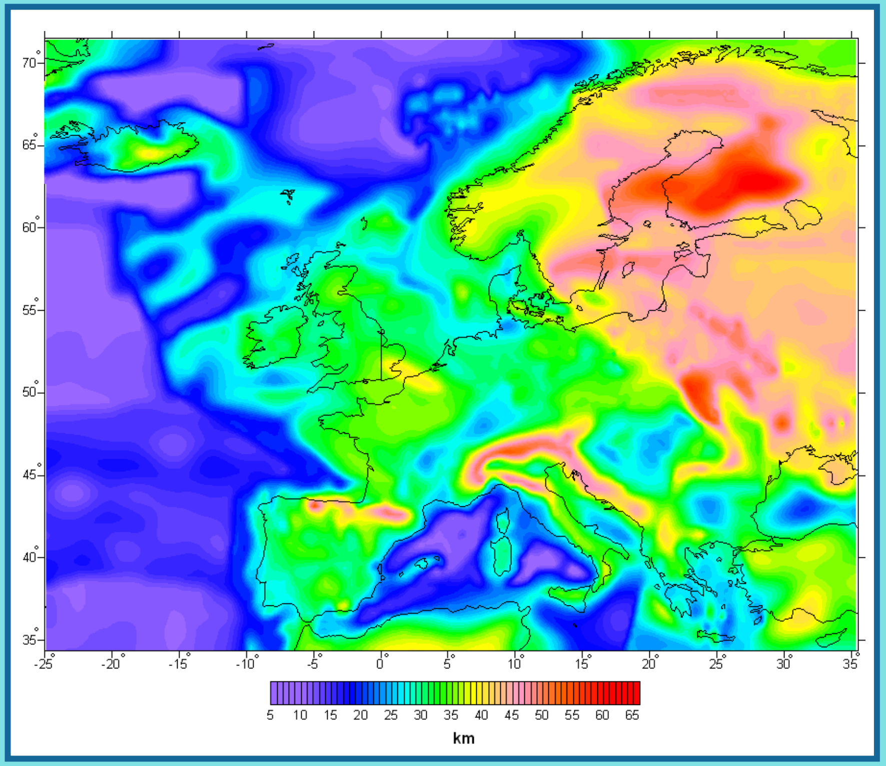

Fig..3 Moho Depth

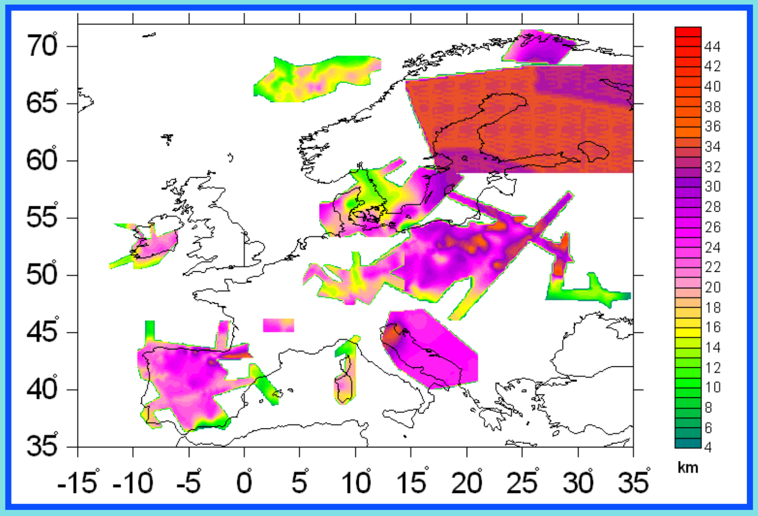

Fig.2 Depth of the upper/lower crust boundary

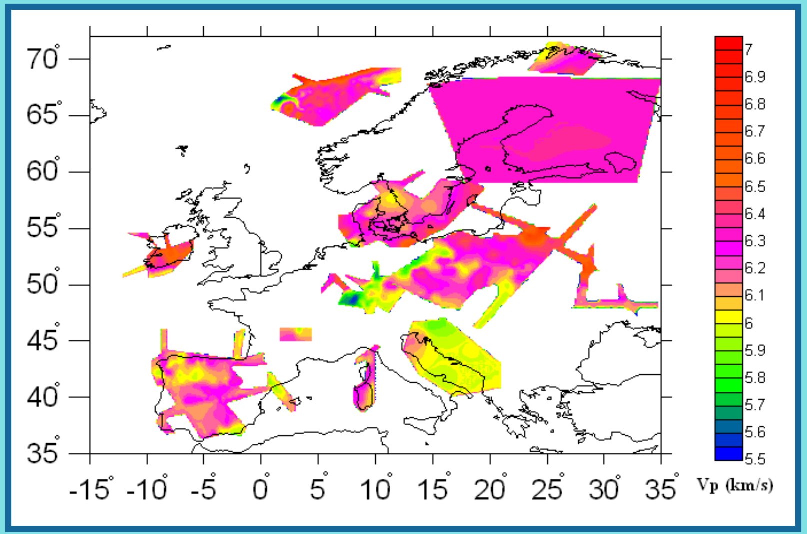

Fig. 4 *P*-wave velocity in the upper-middle crust

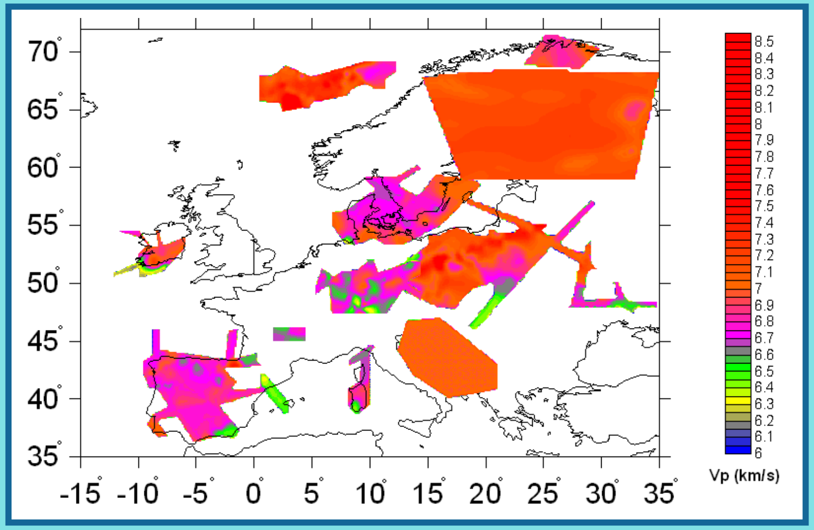

Fig. 5 *P*-wave velocity in the lower crust

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