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Thickness of European seismic lithosphere and its large-scale fabric as a record of tectonic development of the continent

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We have modelled lithosphere thickness and seismic anisotropy of its mantle part from P-wave travel-time deviations and from anisotropic parameters of teleseismic body waves (P-residual spheres, shear-wave splitting) recorded by European networks of temporary and permanent seismic stations. Our models are based on empirically derived relation between static terms of relative P residuals and lithosphere thickness and are in good agreement with estimates of other authors based on surface waves, magnetelluric soundings and xenolith studies. We observe noticeable differences in the lithosphere thickness varying from $\sim$60km beneath the Pannonian Basin, the Po Plain, the southern French Massif Central, the Rhenish Massif and the North-German Platform to about 200km in two roots of the Alps and over 200km beneath large parts of the Baltic Shield. We found lithosphere domains, at scale lengths of a few hundred kilometres, with a consistent large-scale orientation of seismic anisotropy. The mantle lithosphere anisotropy is approximated by hexagonal or orthorhombic symmetry of fossil olivine fabrics with generally plunging symmetry axes, while mostly sub-horizontal anisotropy due to the present-day flow is generally modelled in the asthenosphere. Due to different orientations of seismic anisotropy within the lithosphere and asthenosphere, the velocity contrast at the lithosphere-asthenosphere boundary can be larger than it could be produced by compositional variations and a thermal state. Sharp steps in the thickness (e.g., beneath the TESZ) and changes of the mantle lithosphere fabrics, indicate paleo-sutures, as well as a relative stability of once cre-

ated fabrics of blocks of the mantle lithosphere. Boundaries of domains of the mantle lithosphere, revealed by changes of anisotropy orientation and often by a change of the lithosphere and/or crust thickness, are sometimes rejuvenated by younger tectonic processes. Such deep-seated revitalized boundaries may facilitate channelling of magmatic and gas fluxes from the asthenosphere, and may predestine zones of vertical and horizontal movements of the surface, as well as control a formation of sedimentary basins.