

Upper mantle anisotropy beneath the Western Carpathians and Bohemian Massif

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The lithosphere beneath the Western Carpathians and the Bohemian Massif is highly heterogeneous in terms of age and tectonic evolution, comprising fragments of both the Cenozoic Carpathian orogenic belt and the northeastern part of the Late Palaeozoic Variscan orogen (Bohemian Massif).

To investigate the lithospheric and sublithospheric mantle structure beneath this region, we performed shear-wave splitting and splitting intensity analyses of SKS and SKKS phases. The study was based on data from the PACASE and AdriaArray projects in the Carpathians and the AniMaLS project in the Sudetes, which provided high-quality recordings of teleseismic events over periods of 2–6 years per station.

The shear-wave splitting results reveal similar fast polarization directions (WNW–ESE to NW–SE) beneath both the Western Carpathians and the northeastern Bohemian Massif. In the context of previous mantle anisotropy studies in Central Europe, these directions appear to form part of a large-scale pattern parallel to the margin of the thick lithosphere of the East European Craton (EEC), and seem to be largely independent of tectonic boundaries and present-day plate motion.

Therefore, preliminary results indicate a significant asthenospheric contribution to the observed anisotropy and support the concept of mantle flow reoriented to the ~NW–SE direction by the margin of the thick cratonic lithosphere of the EEC.