



## **The Structure of the Mantle Lithosphere in Central Europe from S-Receiver Functions**

Rainer Kind (1,2), Mark Handy (2), Xiaohui Yuan (1), and Thomas Meier (3)

(1) GFZ Potsdam, Potsdam, Germany (kind@gfz-potsdam.de, yuan@gfz-potsdam.de), (2) FU Berlin, Berlin, Germany (mark.handy@fu-berlin.de), (3) CAU Kiel, Kiel, Germany (meier@geophysik.uni-kiel.de)

Data from about 650 permanent and temporary seismic broadband stations accessed from the open EIDA Archive yielded about 49,000 S-receiver functions. Selection criteria were a signal-to-noise ratio of at least two of the S signal on the SV component, low noise on the P component before the S arrival time and a relatively good approximation of the delta  $\tau$  pulse on the SV component after deconvolution. All traces were checked visually. The time domain traces were migrated to depth domain by back projection along the ray path. Smooth images of major discontinuities in the upper mantle were obtained by applying an eight-seconds low-pass filter. Observations of the Moho and the discontinuity at 410 km depth serve as a check of the quality of the analysis.

We observe two widespread negative (i.e. downward reduction in velocity) discontinuities. The shallower one in about the 50 km to 150 km depth interval occurs everywhere in the study area and is interpreted as the lithosphere-asthenosphere boundary (LAB) in Phanerozoic Europe. According to similar observations in the north American craton, it is interpreted as mid-lithospheric discontinuity (MLD) in the east European craton (EEC). The second negative discontinuity seen beneath the EEC, the Trans-European Suture Zone, the Bohemian Massive, and parts of the Pannonian Basin lies at a depth interval of about 150 km to 300 km. It is interpreted as cratonic LAB reaching well the S and E of the Tornquist-Teisseyre Zone, which is considered the boundary of the EEC at the shallower levels. The deeper cratonic LAB has anomalous topography: Below the Pannonian Basin it shallows to c. 150 km but deepens to c. 300 km below the Bohemian Massif. There is a jump in the cratonic LAB along the northern edge of the Bohemian Massif, where the LAB suddenly changes depth from 200 km in the north to 300 km in the south. We tentatively interpret these observations as a result of overthrusting the EEC mantle lithosphere during the Variscan orogeny, which also lead to partly delimitation of the EEC mantle lithosphere deep underneath the Bohemian Massif.

The subduction below the Alps seems to be confined to about 150-200 km depth, consistent with the previously published results of P-wave tomography. We confirm the south-east subduction direction below the central Alps, but the data below the eastern Alps are less clear concerning subduction direction. We see also indications of northeastward subduction below the Dinarides to about 200 km depth in an area where previous P-wave tomography indicates a slab gap.