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A 3D shear wave velocity model of the Eastern Alpine crust from active source data

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Between 1997 and 2003, several large seismic 3D wide angle and reflection experiments were launched in Central Europe to explore the lithospheric structure. Seismic waves from shot points in boreholes (average charge 300 kg TNT) were recorded on a net of arbitrary oriented seismic profiles, thus enabling to identify inline and crossline wave arrivals (refractions and reflections from the crust and uppermost mantle). Despite that only vertical component geophones were used, good quality shear waves are also regularly observed in the seismic sections, in particular refractions (Sg) from the crust and reflections (SmS) from the Moho.
We focus on a data subset of ~93,000 seismic traces from the CELEBRATION 2000, ALP 2002 and SUDETES 2003 experiments, which covers the area of the Eastern Alps and their transition to the surrounding tectonic provinces (Bohemian Massif, Southern Alps/Dinarides, Pannonian Domain). Sorting and stacking techniques are applied to increase the S/N ratio and to utilise as much 3D information as possible.
As a first result we present a 3D seismic shear-wave velocity model of the crust derived from Sg arrivals. The middle and even lower crust of the Bohemian Massif is covered well by the model. In some parts of the orogenes (Eastern / Southern Alps) the energy loss due to the complicated tectonic structure allows for interpretation of the upper crust only. Based on this and previously determined P-wave velocities, the 3D distribution of Poisson’s ratio is calculated. S-wave velocities and Poisson’s ratio are related to the geological and tectonic structure.