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Analysis of SKS shear-wave splitting to infer mantle anisotropy below Central Europe

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Seismic anisotropy is a characteristic feature of the upper mantle. It may be caused either by present asthenospheric mantle flow or by frozen signatures of former deformation and stress conditions in the lithosphere. Upper mantle anisotropy can be detected and analysed by shear-wave splitting of distinct wave-types, mainly SKS and SKKS phases, of teleseismic earthquakes in the distance range from about 90 to 130 degrees.

In our work we use data from the German Regional Seismic Network (GRSN), the Graefenberg Array (GRF) and networks of Switzerland, Austria and France. By determination of splitting parameters we are able to identify anisotropic regions and their effect on seismic waves and enables us to interprete the results with respect to tectonics.

Several investigations (e.g. Brechner et al. [1998], Vinnik et al. [1994]) based upon data of the first years of the GRSN (up to 1994) or on subsets of stations and small time spans. The authors found considerable splittings for most of the stations. For some of the stations the direction of the fast axis of the anisotropic mantle material is in agreement with directions of tectonic units, boundaries and stress directions. Others show variations in respect to back azimuth indicating more complex anisotropy conditions (e.g. multi-layer) or the influence of heterogeneities.

Now more than 13 years of continuous seismic data registration of GRSN stations and other networks are available. The number of earthquakes between magnitude 5.0 and 8.4 and adequate distance range is higer than 5.000. By using FK-methods and correlation to the Havard moment-tensor database we selected events with sufficient energy at the studied phases. In our poster we will present this method and some new splitting measurements, compare them to the results of former studies and discuss

them with respect to tectonics (mantle flow and stress field of the lithosphere) and two-layer anisotropy models.