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Analysis of SKS shear-wave splitting to infer mantle anisotropy below Germany using GRSN and GRF data

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Seismic anisotropy is a characteristic and important 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, namely SKS and SKKS phases, of teleseismic earthquakes in the distance range mainly from 90 to 130 degrees.

In our studies we investigate the anisotropy of the upper mantle beneath Germany using SKS and SKKS registrations from the German Regional Seismic Network (GRSN) and the Gräfenberg array (GRF) and interprete our results with respect to tectonics. By determination of splitting parameters we are able to identify anisotropic regions and their effect on seismic waves.

Several authors (e.g. Brechner et al. [1998], Vinnik et al. [1994]) have already investigated shear wave splitting of SKS phases, but either only for the first years of the GRSN (up to 1994) or for subsets of stations and small time spans. They 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.

Now more than 13 years of continuous registration of GRSN stations are available. In our studies we started to investigate all events in the SKS distance range from the whole operation period of the GRSN (1991 to present). Therefore we are able to cover larger azimuth ranges of the incoming waves. Some stations show variations in respect to the azimuth of the incoming waves, indicating the existence of more complex anisotropy or influences of heterogeneities. In our poster we will present some new splitting measurements for the GRSN and GRF stations, 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. For the future we intend to put additional emphasis on the depth of the origin of anisotropy and on its depth variations.