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Teleseismic Tomography Using Swedish National Seismological Network (SNSN)

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Seismological observations are well adapted to studying the Earth's interior. In particular, in the last decade three-dimensional teleseismic tomography has become an established method for high resolution investigation of upper mantle structure. This ongoing study will apply non-linear teleseismic P- and S-wave residual travel time tomography to the Baltic Shield area in order to investigate the upper mantle lithosphere-asthenosphere structures. Events at distances of 30 to 90 degrees and with ray paths roughly parallel with major axis of the Swedish National Seismic Network (SNSN) will be used. The geological conditions in Sweden, with sedimentary cover often thin or completely absent, means that very high signal to noise ratios are normal. The SNSN currently consists of 47 (soon to be about 60) three-component broad-band stations (equipped with CMG-3EPS which are flat to velocity in the period range from 0.02 to 30 seconds), and is one of the most modern and advanced systems in the world. A number of international teleseismic projects have recently been carried out in the vicinity of Sweden. One example is the TOR project (1996-7) which was designed to elucidate the deep structure below a SW-NE striking across the geologically very significant Tornquist Zone - probably the most significant well-established deep lithospheric structure in Europe. The SVEKALAPKO project (1998-9) studied the Baltic Shield down to 450 km depth, with the primary aim of investigating the deep structure of boundary between the Archaean and the Proterozoic in Finland. Data from the SNSN can fill in a gap of a few hundred of kilometers between these previous seismic arrays, and also significantly extend westwards the area covered. Our work is at an early stage, and we will present some preliminary analyses including some details regarding earthquake selection, phase picking and synthetic tests.