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Anisotropic Moho of Fennoscandia

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Estimates of azimuthal anisotropy by SKS techniques are informative but insensitive to depth. In our work P receiver functions (PRFs) of 50 seismic events recorded by LAPNET are inverted jointly with SKS waveforms for depth-localized azimuthal anisotropy beneath Fennoscandia. To separate effects of anisotropy from those of small-scale heterogeneity the PRFs are calculated for stacked 3-component LAPNET recordings, and the resulting transverse components of the PRFs are subjected to azimuthal harmonic decomposition. The only robust P-to-SH converted phase thus detected is from the Moho with implication that the anisotropy is at the top of the mantle, immediately under the Moho. Magnitude of this S wave anisotropy is around 3% and the fast direction is 20° clockwise from north, close to the fast direction in SKS. A robust signal from the lithosphere-asthenosphere boundary is missing, most likely owing to a small difference between the fast directions of frozen anisotropy in the lithosphere and active anisotropy in the asthenosphere (not more than about 20°). The anisotropy in the lithosphere could be generated in Precambrian when temperature at the top of the mantle was a few hundred degrees C higher than the present temperature. At that time Fennoscandia and the Canadian craton were parts of one continent. Our analysis suggests that the directions of mantle flow beneath these parts, as memorized by frozen anisotropy, were nearly the same.