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Lithospheric anisotropy beneath the East European Craton

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We present new shear wave splitting measurements made at 18 stations on the East European Craton, and discuss their implications in terms of upper-mantle anisotropy for this poorly-known region. We also compare the results with anisotropy data to the west, in Central Europe that indicated slowly varying fast directions and which, near the craton, align with its margins. There have been various suggestions as to the origin of that anisotropy in central Europe, based on either asthenospheric flow or lithospheric frozen-in deformation. Here we investigate the continuation of this feature further to the East, into the East European craton. For the craton, the interpretation appears to be less ambiguous than for central Europe. Several pieces of evidence that clearly support the presence of lithospheric anisotropy are: 1) Large-scale coherence within either of the 4 constituting blocks but significant variations between the blocks on a small-scale, 2) weak correlation with absolute plate motion vectors, and 3) good correlation between anisotropy with crustal features, for which we use magnetic field alignments as a proxy. Rather good correlation of these magnetic features with seismic fast orientations strongly support the idea of vertically coherent deformation throughout upper mantle and crust. The observed splitting orientations thus reflect the last tectonic events of each block, frozen-in into the lithosphere.