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Search for garnet-spinel transition and LAB in cratons

D. Niehüser (2), S. Klemme (1), and C. Thomas (2)

(1) Universität Münster, Institut für Mineralogie, Münster, Germany (stephan.klemme@uni-muenster.de), (2) Universität Münster, Institut für Geophysik, Münster, Germany

The Earth's upper mantle is characterised by several seismic discontinuities, where the seismic velocity and density change rapidly. These discontinuities are often due to a change in composition (e.g., Moho) or a phase transition (e.g., 410km discontinuity). Several of the lesser known discontinuities are the Hales discontinuity in approx. 130 km depth or the Lehmann discontinuity at 210 km depth. Another important discontinuity is the lithosphere-asthenosphere boundary that is usually found around 80 to 120 km depth in continental settings. One problem with identifying the lithosphere-asthenosphere boundary (LAB) could be that in normal continental settings a phase transition from garnet to spinel could occur in the same depth range, thereby possibly masking the LAB signatures. One way to test this hypothesis is to search for upper mantle discontinuities in a cratonic region where, due to lower temperatures, the garnet-spinel transition should be raised and the LAB lowered. In this study we use PP waves (P waves reflected once at the surface) and their precursors (P waves reflected at the underside of a discontinuity) to search for reflections beneath the Siberian craton. We find reflections in depths ranges of 80 to 130 km but also deeper reflections. Comparing those observations with reflections outside the cratonic region shows differences in the depths and number of seismic reflectors. We are also trying to quantify the widths of the reflectors and the magnitude of the velocity jump