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Investigation of seismic anisotropy in the D" layer and at the CMB underneath Siberia and the North Atlantic

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Within the Priority Program 2404 "*Reconstructing the Deep Dynamics of Planet Earth over Geologic Time*" (DeepDyn, https://www.geo.lmu.de/deepdyn/en/) we investigate possible seismic signatures at magnetic high-latitude flux lobes (HLFLs). The focus is on four target regions on the Northern Hemisphere: Siberia, Canada, the North Atlantic, and Indonesia. While Siberia and Canada show the HLFLs, the North Atlantic should be the location of a third postulated HLFL, but this area does not show an intense-flux signal in the magnetic field. The region beneath Indonesia and the Indian Ocean is characterized by an area of intense magnetic flux that changes direction and moves westwards over time. Our aim is to understand whether mineralogy and seismic structure (i.e., thermal constraints) could be responsible for the different magnetic signatures at the core mantle boundary (CMB). This is done by combining two approaches: seismic anisotropy (KIT) and seismic reflections (University of Münster) near the CMB (https://www.geo.lmu.de/deepdyn/en/projects/ritter-joachim-und-thomas-christine-understanding-the-influence-of-deep/).

To study anisotropy, we measure shear wave splitting (SWS) of SKS, SKKS, and PKS phases. Thereby, we determine the splitting parameters, the fast polarization direction φ and the delay time δt, using both the energy-minimization and the rotation-correlation methods. Especially, we search for phase pair discrepancies based on the observation type (*null* vs. *split*), e.g., between SKS and SKKS phases, as they are a clear indication for a lowermost mantle contribution to the splitting signal. For the target region underneath Siberia, SWS measurements are obtained using earthquakes with epicenters in Southeast Asia recorded at stations in the North of Scandinavia and Svalbard as well as earthquakes with epicenters in Central America recorded at the station ULN in Mongolia. These SWS measurements indicate that for the discrepant pairs the phases with piercing points closer to the center of the HLFL beneath Siberia show splitting while the phases more distant to the HLFL do not show anisotropy. Furthermore, we present first results for the target region North Atlantic. Based on our SWS measurements, we will derive structural and mineralogical anisotropy models using the *MATLAB Seismic Anisotropy Toolbox* (Walker and Wookey 2012). To test these models, we then simulate synthetic seismograms using *AxiSEM3D* (Leng et al. 2016, 2019).