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Lattice preferred orientation of talc and implications for seismic anisotropy

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Strong seismic anisotropy is generally observed in subduction zones. Lattice preferred orientation (LPO) of olivine and elastically anisotropic hydrous minerals has been considered to be an important factor causing anomalous seismic anisotropy. For the first time, we report on measured LPOs of polycrystalline talc. The study comprises subduction-related ultra-high-pressure metamorphic schists from the Makbal Complex in Kyrgyzstan-Kazakhstan and amphibolite-facies metasomatic schists from the Valla Field Block in Unst, Scotland. The here studied talc revealed a strong alignment of [001] axes (sub)normal to the foliation and a girdle distribution of [100] axes and (010) poles (sub)parallel to the foliation. The LPOs of polycrystalline talc produced a significant P–wave anisotropy (AVp = 72%) and a high S–wave anisotropy (AVs = 24%). The results imply that the LPO of talc influence both the strong trench-parallel azimuthal anisotropy and positive/negative radial anisotropy of P–waves, and the trench-parallel seismic anisotropy of S–waves in subduction zones.