

Seismic anisotropy in the uppermost mantle of the northeast Japan back-arc estimated by Ichinomegata peridotite xenoliths

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A dense network of seismic stations has been deployed across the northeast Japan arc to investigate mantle wedge structures. To achieve independent petrophysical constraints, we undertook direct sampling of the uppermost mantle in the back-arc region and determined the seismic properties of Ichinomegata mantle xenoliths brought to the surface by volcanic eruptions. We calculated the seismic properties of the xenoliths from olivine and pyroxene crystal-preferred orientations and single crystal elastic constants. The small magnitude of measured S-wave splitting (delay time of 0.22s in the area where the xenoliths were entrained) can be explained by the average seismic properties of mantle xenoliths for an approximately 20 km thick horizontal anisotropic structure; this structure is possibly related to deformation in the uppermost mantle lithosphere due to back-arc spreading along the northeast Japan arc.