

# Shear-wave polarization anisotropy and upwelling flow in the mantle wedge beneath Hokkaido and Tohoku, Japan

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We investigated shear-wave polarization anisotropy in the mantle wedge beneath northeastern (NE) Japan. Waveforms of intermediate-depth earthquakes recorded by numerous seismic stations were analyzed by the cross-correlation method [e.g., Ando et al., 1983] to obtain splitting parameters, the leading shear-wave polarization direction (fast direction) and delay time between two split waves.

In Hokkaido, obtained results show that most of fast directions observed at stations in the back-arc side are nearly perpendicular to the trench-axis, whereas those at stations in the fore-arc side are sub-parallel to it. A similar pattern of the shear-wave splitting is also observed in Tohoku, which has already reported in previous studies. We infer that the anisotropy caused by lattice-preferred orientation of olivine, which is probably attributable to the upwelling flow portion of the mechanically-induced convection in the mantle wedge [Hasegawa and Nakajima, 2004], is a likely candidate for the shear-wave splitting in the back-arc mantle wedge. If this is the case, the present observations for Hokkaido may indicate that the upwelling flow direction is sub-parallel to the maximum dip-direction of the subducted slab, oblique to the relative plate motion direction. Although it is not clear what causes the anisotropy in the fore-arc side, where the trench-parallel fast directions are observed, similar features have been observed in other areas of Tohoku [Okada et al., 1995; Nakajima and Hasegawa, 2004]. Average delay times between leading and following shear-waves observed at stations in the back-arc side are 0.1–0.5 s, and those at stations in the fore-arc side are smaller (0.05–0.1 s).

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