

Shear-wave polarization anisotropy in the southern part of Tohoku, Japan

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We investigated shear-wave polarization anisotropy in the mantle wedge beneath the southern part of Tohoku, Japan. We analyzed S phase of 675 intermediate-depth earthquakes recorded at 105 stations, in which cross-correlation method [e.g., Ando et al., 1983] was used. As a result, 1918 splitting parameters were obtained.

The obtained results show that most of the leading shear-wave polarization directions (fast directions) at stations in the back-arc side are sub-parallel to the direction of relative plate motion, whereas those at stations in the fore-arc side are nearly perpendicular to it. We infer that the anisotropy caused by lattice-preferred orientation of olivine, which is probably attributable to flow in the mantle wedge, is a likely candidate for the shear-wave splitting in the back-arc mantle wedge. Although it is not clear what causes the anisotropy in the fore-arc side, where the fast directions nearly perpendicular to the relative plate motion direction were observed, similar features have been observed in other areas of Tohoku [Okada et al., 1995; Nakajima, 2002]. Average delay times between leading and following shear-waves observed at stations in the back-arc side are 0.1-0.4 s, and those at stations in the fore-arc side are 0.05-0.1 s. These results are consistent with the results of Okada et al. [1995] and Nakajima [2002].