Mantle anisotropy beneath the eastern Asia

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We made a detailed mapping of shear-wave splitting parameters of multiple ScS phases for the whole Japanese islands and their back-arc region. A set of multiple ScS phases (ScS, sScS, ScS2 and sScS2) has a mutually common source-receiver pair among the three nearby deep shocks and more than 500 stations of the Hi-net tiltmeter network and several IRIS stations situated in eastern Asia. The multiplicity of the ScS phases, three deep shocks with different focal mechanisms and an unprecedented number of stations made it possible to resolve mantle anisotropy into the two parts, anisotropy in the wedge mantle and the subducted Pacific-slab. The anisotropy of the wedge mantle shows a clear distinction of splitting pattern across the volcanic front. Such a distinction persists all along the southern Kuril, northern Honshu and Ryukyu arcs. On the Pacific side of the volcanic front vertically propagating shear wave is polarized with the fast direction approximately parallel to the trench, whereas it is polarized with the fast direction approximately parallel to the plate convergence direction on the marginal sea side of the volcanic front. This anisotropic system with the fast direction parallel to the plate convergence direction appears to extend to the Asian continent across the Japan Sea further away from the volcanic front. The Pacific-slab is anisotropic with the fast direction uniformly in the NNW, closely parallel to the Mesozoic fracture zones and perpendicular to the magnetic lineations on the north-western Pacific seafloor. The NNW alignment extends into the beta-spinel region well beyond the 400-km depth contour of the Wadati-Benioff zone but does not extend to the source region of the Vladivostok event at a depth of 566 km in the presumably oldest part of the subducted slab, where a different anisotropic system is suggested.