Shear wave splitting east off NE Japan based on the S-net data

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We estimated the anisotropy of seismic wave speed by using shear wave splitting data in the offshore area of NE Japan. The analysis was made possible by the deployment of the Seafloor Observation Network for Earthquakes and Tsunamis along the Japan Trench (S-net) by National Research Institute for Earth Science and Disaster Resilience (NIED). We used the waveforms of 421 interplate earthquakes from August 2016 to October 2018 which are selected based on the focal mechanisms of Full Range Seismograph Network of Japan (F-net) operated by NIED and located under the S-net stations (within 35 degree from the vertical). We determined the fast polarization directions and delay times between fast-and slow-shear waves by the cross-correlation method.

The results show that the shear wave splitting tends to have trench parallel fast polarization direction for the region east off Chiba to Hokkaido which is the same with the observations in the land area of the forearc. Since we used earthquakes on the plate boundary, the anisotropy must be located in mantle wedge or forearc crust. The interpretation of the polarization includes the flow-normal fast direction of B-type olivine fabric in the forearc mantle-wedge and cracks aligned in the trench parallel direction due to the present forearc stress-field or fossil structures developed during the formation of the forearc.

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