

Expansive trench-parallel shear-wave fast polarizations above a subducting plate based on S-net cabled ocean bottom seismometers

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Shear-wave splitting observed in cabled ocean bottom seismometers of “Seafloor observation network for earthquake and tsunamis along the Japan Trench” (S-net), provides the first constraints on the shear-wave anisotropy in the offshore forearc area in northeastern Japan. Waveforms of 606 local interplate earthquakes observed by 83 S-net stations are analyzed. They show trench parallel fast direction and delay times of ~ 0.1 seconds for the area above the subducting plate (depths of 0 - 50 km) (Figure). The splitting parameters show no correlation with the source depth (plate boundary depth) and similar to those reported for intraslab earthquakes at on-land forearc stations where the subducting plate is located at ~ 50 - 100 km depth. The offshore shallow (depth < 35 km) earthquakes mainly occurring in the crust of the overlying plate also show similar trends of splitting parameters. These results suggest that the forearc mantle wedge is less anisotropic and most of forearc splitting occurs in the shallow part of the crust in the overlying plate (Figure).

