Po/So波から推定した北西太平洋海洋リソスフェアの異方性
Anisotropy in the Northwest Pacific oceanic lithosphere inferred from Po/So waves

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Po/So waves, which have a high frequency, large amplitude, and long duration, propagate for large distances across oceanic lithosphere. These waves are generated by multiple forward scattering of P- and S-waves due to small-scale heterogeneities in oceanic lithosphere and P-waves trapped in seawater. To study the origin of such small-scale heterogeneities, we analyzed the azimuthal anisotropy of Po/So waves propagating in the Northwest Pacific.

Seismological observations using Broad Band Ocean Bottom Seismometers (BBOBSs) were conducted in the Northwest Pacific from 2010 to 2014 as a part of the Normal Oceanic Mantle Project. During the experiments, high-quality Po/So waves were recorded from earthquakes in the subducting Pacific plate. We determined travel times of the Po/So waves using an auto-picking algorithm based on an AR model, and estimated the average velocities of the Po/So waves between sources and stations. The average velocities of the Po/So waves traveling in the Northwest Pacific show clear variations as a function of azimuth, as follows:
$V_{Po} = 8.25 + 0.20 \cos 2(x - 153)$,
$V_{So} = 4.71 + 0.04 \cos 2(x - 159)$.
The magnitudes of the anisotropy for Po and So waves velocities are 2.4% and 0.8%, respectively, which are smaller than the results of previous studies for Pn and Sn waves [Shimamura, 1984; Shinohara et al., 2008]. The fast direction is parallel to the past spreading direction of oceanic crust as estimated from magnetic anomalies [Nakanishi et al., 1992], which is roughly consistent with the previous studies [Shimamura, 1984; Shinohara et al., 2008].

We investigate the mechanism of the azimuthal anisotropy of Po/So wave propagation, which should be relating to the generation and evolution of the oceanic lithosphere using a Finite Difference Method (FDM) simulation of seismic wave propagation. We compare observed and calculated Po/So waves, and discuss the mechanism of their azimuthal anisotropy.

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