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Seismic anisotropy beneath Philippine Sea inferred from array analysis of surface waves recorded by BBOBS

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Seismic radial anisotropy (RA) exists in the upper-most mantle of one-dimensional Earth models such as PREM. It is often understood that RA is due to averaging of the azimuthally anisotropic structure commonly observed by the surface wave tomography (e.g., Montagner and Anderson, 1 989, PEPI). This view, however, has never been verified from actual observations. For this verification, we need to obtain a reliable local model of seismic anisotropy.

In this study, we use the data recorded by broadband ocean bottom seismometers (BBOBSs) installed in Philippine Sea, and measure Rayleigh wave phase velocities. Isse et al. (2009, EPSL) measured Rayleigh wave phase velocities using a single-station method, and determined a three-dimensional S-wave velocity structure there. Our purpose is, however, to determine one-dimensional structure in a laterally homogeneous area, so we use the array analysis to measure phase velocities within an array. We employ the conventional three-station method for analysis of six BBOBS arrays in northern-most part of West Philippine basin and Shikoku basin. Station distances of each array are 150-300 km.

The preliminary result shows that phase velocities in West Philippine basin appear to be 1-3 percent faster than those in Shikoku basin at a period of about 42 s. This result may reflect the smallest scale anomaly in Rayleigh wave phase velocity model of Isse et al. (2006, JGR). On the other hand, we also obtain azimuthal variation of the phase velocity. After conducting a similar analysis for Love waves, we will apply inversion analysis to obtain local one-dimensional anisotropy structures under the Philippine Sea.