# Correction of ScS–S travel times for 3D mantle structure to reveal shear wave azimuthal anisotropy in the lower mantle

*Satoru Tanaka[1]

1. Department of Deep Earth Structure and Dynamics Research Japan Agency for Marine-Earth Science and Technology

ScS–S differential travel times have contributed to reveal heterogeneity in the lower mantle. However, azimuthal anisotropy has not been fully considered probably due to insufficient azimuthal coverage. Recent increase of large scale seismic arrays and networks improves the coverage. Here we collected the seismograms from NECESSArray (Northeastern China), F-net (Japan), INDEPTH (Tibet), a seismic network in Thailand, whose ScS bounce points are located beneath Philippine with various azimuths.
Observed ScS–S differential travel time residuals with respect to PREM show a large scattering with a standard deviation of about 2.6 s and significant apparent azimuthal variation. When a cos 2*a* (*a* is a propagation azimuth of the seismic ray) curve is fitted by least squares, we find that the fastest azimuth is about 103° measured from the north in clockwise and the amplitude of the azimuthal variation is about ± 1.4 s. However, it is quite difficult to recognize that the azimuthal variation truly reflects the anisotropy in the lower mantle due to the large scatter of the travel time residuals.
To reduce the scattering of the data, we corrected for 3D mantle S-wave velocity structure models (e.g., S16U6L8, SB4L18, SH18CEX, S40RTS, SEMUCB-WM1). Unfortunately, the large scattering is not fully improved by using any models probably due to a poor resolution in the upper and uppermost lower mantle. However, if we use the 3D P-wave velocity model GAP-P4 (Obayashi et al., 2013) with an assumption of dlnVs/dlnVp=1.7, the scattering is significantly reduced (the standard deviation is about 1.3 s). After this mantle correction, the amplitude of the cos 2*a* function becomes ±0.4 s. However, the fastest direction is about 105°, which is almost same as in the case of the original data.

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