Upper mantle structure beneath the Ontong Java Plateau from measurements of body wave differential travel times

*Takumi Kobayashi[1], Daisuke Suetsugu[2], Masayuki Obayashi[2], Hiroko Sugioka[1]

1. KOBE University, 2. Japan Agency for Marine-Earth Science and Technology

The Ontong Java Plateau(OJP) is a single largest oceanic plateau in the world, and thought to emplaced at 120Ma. To reveal the origin of the OJP, we have to know the structure beneath the OJP. Richardson et al. (2000) showed that S-velocities are 2-3 % lower than global average above a depth of 300 km beneath the OJP.
In this study we investigated upper mantle structure beneath the OJP by using PP-P differential travel times for PP waves of which bounce points are located on the OJP and the surrounding region. We analyzed waveform data of events from 2012 to 2013 recorded by IRIS and F-net stations.
We follow a method of Obayashi et al. (2004) to obtain PP-P differential travel time residuals. First a band-pass filter from 5 to 10 second was applied to the waveform data. To calculate PP-P differential residuals, we synthesized PP waves from P waves by applying the Hilbert transform, attenuation operator, and multi reflection/conversion effect in the crust beneath the bounce points. To calculate the multi reflection/conversion effect, we used crust structure model CRUST1.0 (REFERENCE). We then calculated PP-P differential residuals with respect to differential times predicted from the iasp91 model (Kennett and Engdahl, 1991) by cross-correlation of the observed and synthetic PP waves. Distribution of the obtained PP-P differential residuals indicated that the residuals are consistently negative for PP waves of which bounce points are located on the OJP. The average PP-P residual for such PP-waves is -1.6 second, which suggests P-velocities faster than that of iasp91 beneath the OJP, while we cannot constrain a depth range of the fast anomalies from the present study. Assuming that the average residual is due to uniformly fast structure above a depth of 300 km, P-wave velocity beneath the OJP is 1.7% faster than that of the iasp91 model.

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