Radiation Efficiency of Earthquakes in the Philippine Sea slab

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Although the Philippine Sea (PHS) slab beneath Kyushu is subducting to a depth of >400 km, earthquakes in Kyushu are limited to a depth of ~200 km. The termination of intraslab earthquakes may be related to a change in physical or material properties of the PHS slab at a depth of 200 km. This study estimates radiated energy and radiation efficiency of earthquakes occurring in the depth of 60 ~ 200 km beneath Kyushu, and discusses the depth variation in radiation efficiency.
Precise estimates of the static stress drop and radiated energy are essential to calculate the radiation efficiency. Although the static stress drop depends on the corner frequency and the radiated energy depends on the quality factor, there is a strong trade-off between the corner frequency and quality factor and so it is not easy to determine the two parameters simultaneously. Therefore, in this study, the corner frequency is first estimated by the coda wave spectral ratio method, and the quality factor is then obtained from the shape of amplitude spectra for S waves using the pre-estimated corner frequency.
The obtained results show that the radiation efficiency changes little with depth. The average value of the radiation efficiency in the PHS slab beneath Kyushu is ~0.1, which is relatively small compared to that observed at the same depth range in the Pacific slab beneath Tohoku and Hokkaido. We infer that the small radiation efficiency in the PHS slab is due to high temperatures of the slab compared to those in the Pacific slab beneath northern Japan.

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