

## Seismic energy estimation for shallow tremors in the Nankai trough and Japan trench

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After the deployment of wide ocean bottom seismometer networks in the Pacific off Japan, it has been revealed that tectonic tremors have repeatedly occurred on the shallow plate interface. As studies of deep slow earthquakes have shown that characteristics of tremor activities vary along the fault, spatial variations are expected for shallow slow earthquakes as well. As shallow seismic structure can be imaged in detail by seismic reflection surveys compared with deep structure, this study aims to clarify spatial variations of shallow tectonic tremor activities and to compare them with shallow seismic structures. We estimate seismic energy of tectonic tremors in order to characterize their sizes. We also compare the estimated seismic energy of tectonic tremors with the seismic moment of accompanying very low frequency earthquakes (VLFs) to evaluate scaled energy of slow earthquakes.

Yabe et al. (2019, doi: 10.1029/2018JB016815) estimated seismic energy of shallow tectonic tremors in Kumano region off Kii Peninsula. We applied the same method to the entire Nankai trough (DONET) and Japan trench (S-net). In the Nankai trough, we refer shallow VLFE catalog by Nakano et al. (2018, doi:10.1038/s41467-018-03431-5) and estimate seismic energy of shallow tremors accompanying VLFs. In the Japan trench, we refer tremor catalog by Nishikawa et al. (2019, doi:10.1126/science.aax5618) and estimate seismic energy of those tremors. In addition, we also estimate seismic moment of VLFs accompanying tectonic tremors with large seismic energy, which can be observed using onshore F-net stations. We will report the spatial variations of the estimated seismic energy of shallow tremors and the scaled energy of shallow slow earthquakes.

This study used data from NIED F-net (doi:10.17598/NIED.0005), DONET (doi:10.17598/NIED.0008), and S-net (doi:10.17598/NIED.0007).

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