Tectonic tremor catalog in the Tohoku-Hokkaido-Oki region using S-net

*井出 哲[1]、西川 友章[2]、松澤 孝紀[3]、太田 和晃[2]、内田 直希[4]、西村 卓也[2]
*Satoshi Ide[1], Tomoaki Nishikawa[2], Takanori Matsuzawa[3], Kazuaki Ohta[2], Naoki Uchida[4], Takuya NISHIMURA[2]

1. 東京大学大学院理学系研究科地球惑星科学専攻、2. 京都大学防災研究所、3. 防災科学技術研究所、4. 東北大学大学院理学研究科 地震・噴火予知研究観測センター
1. Department of Earth an Planetary Science, University of Tokyo, 2. Disaster Prevention Research Institute, Kyoto University, 3. National Research Institute for Earth Science and Disaster Resilience, 4. Graduate School of Science and International Research Institute of Disaster Science, Tohoku University

Recently, various slow earthquakes have discovered in the subduction zone off Tohoku and Hokkaido regions along the Japan Trench. In this presentation, we report the detection of tectonic tremors using the Seafloor Observation Network for Earthquakes and Tsunamis along the Japan Trench (S-net), operated by The National Research Institute for Earth Science and Disaster Resilience (NIED).

We used continuous seismograms from August 2016 to August 2018 recorded by short-period sensors at 150 S-net stations. The original data were converted to envelope waveforms and analyzed using the envelope correlation method coded by Ide (2010), for each 300 s time windows with 150 s overlap. Since the results included many ordinary earthquakes with short durations, we regarded the events with durations longer than 20 s as tremors. This number is twice longer than that used for deep tremors in western Japan, reflecting the long-lasting waves in ocean bottom observation.

We found that the detection completeness is not high due to the high seismic activity in the Japan Trench, especially after the occurrence of large earthquakes, with numerous aftershocks falsely detected. We therefore divided the study area into 18 overlapping sub-regions that cover the locations of tremor activity to solve this problem. We detected tremors in each sub-region and merged the results into one catalogue by removing one of any two events within 10 s and 1 degree of each other, depending on their root-mean-square errors. Some tremor-like signals were found near the triple junction off the Boso Peninsula at approximately 34.8°N. However, visual inspection revealed these events to be ordinary earthquakes, which we excluded from our tremor catalogue. The resultant tremor catalogue will be available in Slow Earthquake Database (Kano et al., 2018).

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