

Possible tectonic tremor activities near the VLFE epicenters in the Sanriku-Oki region in 2011

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Recently various kind of slow earthquakes have been discovered along the Japan Trench subduction zone. Prior to the occurrence of the 2011 Tohoku-oki earthquake, occurrence of slow slip events associated with migration of small earthquake epicenters and tectonic tremors was reported near the hypocenter of the Tohoku-Oki earthquake (e.g. Kato et al., 2012; Ito et al., 2015; Katakami et al., 2018). As a different type of a slow-earthquake family, Very Low Frequency Earthquakes (VLFEs) have been detected in more broad areas (Matsuzawa et al., 2015). Takahashi et al. (in prep.) detected the seismic signals from the VLFEs by short-period ocean bottom seismograms (OBS) deployed in the vicinity of the VLFE epicenters in the Sanriku-Oki region, just after the Tohoku-Oki earthquake. They further identified a number of VLFE-like events, not recognized by the onshore data. Here, we report on possible tectonic tremor activities in the same area based on the OBS data after the 2011 Tohoku-oki earthquake. We detected four sequences of continuous rises of amplitudes on the OBS records. Each of the sequence has a duration of ~ half a day. The sequences were composed of numerous wave trains with good correlations in their growths and decays in observed amplitudes among the stations, but no distinct P- or S-wave onsets were identified for individual wave trains. Interestingly, the spatial variation of the wave trains amplitudes is similar to those of the previously identified VLFEs. These observations suggest that the sequences were composed of small seismic events closely located each other and to the known VLFEs. It is also notable that some of the VLFE-like events discovered by the OBS data were contained in the sequences. We regard the discovered sequence as a kind of tectonic tremor activity and will inspect their characteristics, such as frequency content and its variability, to clarify their nature and discuss their relevance to slow slip events along the shallow subduction interface, which might promote the activities.

Keywords: tectonic tremor, Sanriku-oki