日向灘で観測されたスロー地震によって放出されたエネルギーの検証

Estimated the apparent released energy of shallow low-frequency tremor occurred Southeastern Kyusyu through frequency scanning at a single station

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Slow earthquakes, such as tectonic tremors and very-low-frequency earthquake (VLFE), share a common mechanism as shear slip on the plate interface and occur at both ends of updip and downdip of coseismic slip areas. Shallow low-frequency tremors have been observed in the subduction zone off southern Kyusyu [Yamashita et al., 2015].

Yamashita et al. (2015) have detected the shallow low-frequency tremors off southern Kyusyu from ocean-bottom seismometer (OBS) data. Although the seismicity has been documented, the released energy of these tremors has not been calculated. Here we calculate the released energy of tremor sequences off southwestern Kyusyu with applying the frequency scanning analysis [Sit et al., 2012] to OBS data.

Sit et al. (2012) proposed “the frequency scanning analysis” to detect tectonic tremors by calculating ratios of the envelope waveforms through different bandpass filters of broadband data at a single station in the Cascadia margin. We apply this method to the seismic data recorded at 12 short-period OBS stations deployed off southeastern Kyusyu, Japan. Three types of bandpass filters with frequencies of 2–4 Hz, 10–20 Hz, and 0.5–1.0 Hz, corresponding to the predominant frequency band of tectonic tremors, local earthquakes, and ocean noises, respectively, are adopted. When ratio value is over the threshold, we define that the tremor signal is detected in the time window. We estimate the apparent released energy as an approximation that is calculated from the squared amplitude of the median of absolute amplitude within the time window.

We have successfully detected the some sequences with large radiated energy, which correspond to the tremor events reported in Yamashita et al. (2015). In addition, we have also identified other possible sequences of tremors, which have occurred at the further southward that has been reported in Yamashita et al. (2015). The most largest released energy of tremors observed around the southern part of the tremor swarm.

