

A New Method to estimate the tremor depth accurately

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To understand the mechanism of tectonic tremors, which have been discovered in many subduction zones and transform faults mainly around Pacific, it is important to determine the precise location of tremors, especially depth to know whether they occur on the plate boundary, in the oceanic crust, or in the upper plate. However, very weak and ambiguous signals of tremors prevent us to detect them and determine their hypocenters by popular location methods used for ordinary earthquakes, i.e., by reading P- and S- wave arrival times for each event. Therefore other methods are applied to detect and locate tremor, such as an envelope correlation method (e.g., Obara, 2002) and a matched filter analysis (e.g., Shelly et al., 2007). However, the accuracy of locations is not sufficient for detailed investigation.

In this study, we develop a new technique to determine tremor depth precisely by obtaining S-P times from tremor signals. S-P times are measured by comparing a vertical velocity seismogram with a synthetic moment rate function. The synthetic moment rate function is approximated by the energy rate function, which is proportional to the squared ground velocity. This technique will also provide us the information about the focal mechanism of tectonic tremors, because this method has a potential to reveal the green function of tectonic signals at each station.

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