

## Local, regional, and teleseismic triggering of non-volcanic tremors

Sachiko Tanaka<sup>1\*</sup>, Kazushige Obara<sup>1</sup>

<sup>1</sup>NIED

Recent studies have shown that non-volcanic tremors can be triggered by surface waves from distant large earthquakes (e.g., Miyazawa and Mori, 2006). In addition, a few cases have been found in which local microearthquakes triggered nearby tremor activities (Obara, 2003). In the present study, we conducted a systematic search of locally, regionally, and teleseismically triggered tremors in southwest Japan, to determine tremor-triggering characteristics in this region.

In our analysis, we used the Hi-net velocity continuous waveforms for the period from 2005 to 2009. From these records, we identified triggered tremors visually, by manually searching for the tremor activities which started within an hour after the arrival of direct waves from the earthquakes. In the five-year investigation period, we identified 36 triggered tremor activities. Most of them started within a few to thirty minutes after the direct wave arrivals, and then terminated within an hour; a few continued for a longer period of time (three hours to four days). The locations of the triggered tremors are not uniformly distributed along the tremor belt (Maeda and Obara, 2009), but are restricted to some localized areas. Especially in west Shikoku, 15 of the triggered activities were identified, all of which lie in the anomalous linear tremor alignment in a direction perpendicular to the tremor belt (Obara et al., 2009).

On the other hand, the earthquakes that we identified as having triggered tremors cover a wide range of magnitudes (1.5 to 8.5) and distances to the tremor sources (a few to a few thousand km). The magnitude-distance relation of these triggering earthquakes reveals magnitude thresholds for tremor triggering. These threshold values, which increase with increasing distance, are one to three smaller than those for microearthquake triggering (Gomberg and Davis, 1996; Stark and Davis, 1996). This suggests that the tremor sources are highly sensitive to small stress perturbations. The estimated stress amplitude required to trigger tremors is a few kPa, which is in the same order as the stress changes induced by the Earth tide.

Keywords: non-volcanic tremor, dynamic triggering