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Short-term slow slip events with tremor activity in southwest Japan from November to December, 2004

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Nonvolcanic deep low-frequency tremor, which occurs in a belt-like zone parallel to the Nankai trough, is thought to be a manifestation of a dehydration process in the subducted Philippine Sea slab[1]. Recently, it has been found that the short-term slow slip events (SSE) occur in correlation with the tremor activity[2]. This coupling phenomenon is one of the key factors for understanding the water and material circulation along with the subduction of oceanic plates and the effects on the generation cycle of shallower mega-thrust earthquakes.

This phenomenon is found in the Cascadia subduction zone[3] and in the western Shikoku region[2]. On the other hand, the subduction tremor activity in southwest Japan is not limited in the western Shikoku, but in the much wider region[1]. Therefore, the similar coupling phenomenon is expected to occur in the other regions in the tremor belt.

In this study, we report the short-term SSE with the active tremors in Nov. and Dec., 2004 which occurred in the northern part of the Kii peninsula and the Aichi prefecture, in the Tokai region. We also report the recurrence of the episode in the western Shikoku region in Dec. 2004, after 8 month interval.

Based on our observation since 2001, the short-term SSEs in southwest Japan have following characteristics[2,4]: (1) Temporal and spatial correlation with the active tremor; (2) Migration of the SSE source region coinciding with the migration of the tremor hypocenter; (3) Released moment in each event is nearly constant (M_w ~ 6.0); (4) Almost constant duration of 3-7 days; (5) The depth of the SSE fault is always 30-45 km; (6) The start of the tremor activity often precedes the beginning of the tilt change.

References

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