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Non-volcanic deep tremors and slow slip events detected in southwest Japan

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Non-volcanic deep low-frequency tremors discovered in southwest Japan (Obara, 2002) occur along the strike of the subducting Philippine Sea plate. Therefore, the tremor may reflect the subduction process with the existence of fluid. Very recently some slow slip events have been detected accompanied by the active stage of tremors in the western part of Shikoku and the Bungo channel area (Obara et al., 2004). For four years from 2001, ten slow slip events were detected by tiltmeters installed at the Hi-net observation well. Nine events are accompanied by active migrating tremor and the duration time of each event is shorter than 1 week. The short-term slow slip events had a constant recurrence interval of approximately six months for two years of 2001 and 2002; however, the recurrence rate was shortened since the occurrence of the long-term slow slip event, which continued for three months from August 2003. The long-term slow slip can be detected by GPS and tiltmeter; however the GPS is not available to detect the short-term slow slip event. Such tilt changes accompanied by active tremor are detected in not only western Shikoku but also eastern Shikoku, and northern part of Kii peninsula. This indicates that the short-term slow slip occurs in some areas on the belt-like distribution of tremors. Moreover, the tremor and slow slip have been detected in the Cascadia margin on the northwest part of the North America (Rogers and Dragert, 2003). The episodic tremor and slip (ETS) have a recurrence interval of 14 – 16 months and the source of the ETS migrates along the strike of the subducting oceanic plate. The time duration of each active stage is a few weeks. There are many common features of ETS in southwest Japan and Cascadia; periodicity, migration, short-term duration, waveform pattern of tremor, etc. Therefore, the ETS might be controlled by subducting young and warm oceanic plates, which characterize both regions.