

Tidal synchronicity of the low-frequency tremors in Shikoku region

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Low-frequency tremors occur in the non-volcanic region of SW Japan. Tremors occur synchronously in each region, and their activities show a long-term periodicity with periods of 2 to 6 month. Tremor activities during their active periods have a short-term periodicity with a period of 12 or 24 hours, which coincides with a dominant period of earth tides at the time. In eastern Shikoku, cross-correlations between the tremor activities and solid earth tides have their maxima at a time lag of 10 hours. Though, tremor activities which have a weak periodicity, cross-correlation don't have a significant value. The 10-hour lag might correspond to the time scale of physical process in tremor occurrence. But we don't know that the 10-hour lag could apply to other tremor region.

Then in this study, we applied the same method for tremors occur in 3 regions in Shikoku to see whether the 10 hour lag shown at eastern Shikoku depend on the magnitude of the short- and the long-term slow slip event or the long-term tremor periodicity or not. In Bungo channel, the short- and the long-term slow slip events have been observed and tremors show quasi-periodicity with the interval of 6 months. In western Shikoku, the slow slip events have been observed and often occur synchronously with Bungo channel. In central Shikoku, no slow slip events have been observed and tremors show quasi-periodicity with the interval of 2-3 months.

We used tremor duration time per hour as tremor activities. And we used volumetric strain depend on theoretical solid earth tide at 30 km depth by using the same method as Tsuruoka et al., (1995). As a result, it seems the similar trend between their periodicity. The cross-correlations have their maxima at a time lag of 6 to 13 hours in more than half of all periods. Tremor shows some small cluster within these regions. If tremors occur synchronously at each cluster, then auto-detected activities might be mixed by each other. So we should detect again tremor activities by visual inspections of waveforms. Furthermore, it is not negligible the ocean tide in Bungo channel. We will consider the effect depend on the ocean tide, and analyze in Bungo channel and western Shikoku by using re-detected tremor activities.