

Low-frequency tremors triggered by the 13 December 2003 Harimanada earthquake

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Low-frequency tremors occurred in the east Shikoku region from 13 to 17 December 2003. In Dec. 13 12:32, a few hours before the first occurrence of the tremors, a relatively large earthquake with a magnitude of 4.6 (JMA) occurred in the Harimanada region, about 80 km away to the northeast of the tremor region. The M4.6 earthquake is the largest in the past 10 years in this region, so that this event might trigger the tremors in the east Shikoku regions. In this study, to elucidate the tremor activity we determined epicenters of the tremors by analyzing Hi-net and J-array short-period data.

The result shows that the tremor source slowly migrates with a speed of the order of ten km/day to the SE direction. Such a slow migration, which usually lasts for a few days, is one of characteristics of tremor activity. However, at the last stage of the activity the tremor source migrates with a speed of the order of ten km/hour to the NW direction, which is in the opposite direction of the preceding slow migration. Such a high-speed migration has not yet been reported, and it might be explained by a fast cascading sequence of shear failures and/or hydrofractures due to aqueous fluid.