

Recent change of the slow slip in the Tokai area detected by continuous tilt observation

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Anomalous ground deformation have been recently detected in dense GPS observation in the Tokai area by GSI (GSI, 2001), which was attributed to a slow slip occurring on the plate boundary beneath Lake Hamana (Ozawa et al, 2002). Continuous tilt observation at MKB station by NIED also has detected the associated change (Yamamoto and Ohkubo, 2004).

NIED has constructed a ground tilt observation network in the Kanto-Tokai area since 1978. MKB is one of observatories composing it. Moreover, focusing on the Tokai area, NIED has enhanced it since 1999. We introduce the strengthened tilt observation network, and report the current tilt change associated with the slow slip in the Tokai area.

1. New tilt observation network

Every year since 1999, one or two tilt stations have been added to the existing network in the assumed focal zone of the Tokai earthquake. To detect anomalous changes efficiently, the stations were arranged linearly along the subducting direction of the Philippine Sea plate. Two groups of linearly aligned stations were constructed, located in the western and central part of Shizuoka prefecture. Those stations of MRI (Mori) and TAT (Tatsuyama) installed on the western line are situated close to the slipping region, where the observation started in 2000 and 2001, respectively.

2. Recent movement related to the slow slip

East-southeast upward tilt change at MKB, corresponding to the slow slip, has started from mid-2000. It continued with constant tilting rate until the end of 2001. From the beginning of 2002, it changed it's direction to east upward and tilting rate decreased. Though the tilt direction was not changed, tilting rate again increased from the beginning of 2003 and lasted until the end of this year. These tilt movement accords well the GPS observation result (GSI, 2004). Both results show that the slip region and the slip amount intermittently change with an interval of roughly one to one-half year.

Since the spring of 2004, tilting rate at MKB turned to be decelerated. Its rate is smaller than that of in 2002. On the tilt records at MRI and TAT, long term changes originating due to drilling and installation still remain. However, we can recognize that tilt are changing at both stations from the spring of 2004. Tilt direction is south upward at MRI and north upward at TAT. It is difficult to treat the current change qualitatively, but we can speculate that slip region may have changed since this time.

Tiltmeters were initially installed at the bottom of 100-m deep observation wells, but the depth was increased to 200 m at some of new stations, where rain effect could be very much decreased. At such stations,

long term drift is gradually decreasing, so tilt changes associated with the slow slip came to be detectable more clearly.