

Changes in tide gauge record at Maisaka and in seismic activity that are related to Tokai slow-slip events

Akio Kobayashi[1]; Akio Yoshida[2]

[1] MRI; [2] Magnetic Observatory

A crustal deformation that is supposedly generated by a slow-slip on the plate interface beneath Lake Hamana has been detected by a dense GPS network of GSI in the Tokai region since the end of 2000 (Ozawa et al., 2002). Recently, it was shown that the crustal deformation have been observed also by a tiltmeter installed at Mikkabi by NIED, and further pointed out that a similar change is seen in the period of 1988-89 (Yamamoto et al., 2003). In this lecture we report a result of investigation on the tide gauge record at Maisaka that is located near the mouth of Hamana Lake where the upheaval of ground level due to the ongoing slow-slip is noticeable.

We analyzed monthly mean sea-level data at Maisaka, Omaezaki and Toba tide gauge stations during the period from January 1961 through October 2003. The latter two stations are located to the east and west of Maisaka, respectively. First, we corrected effects of atmospheric pressure and astronomical tide on the records. Then, we tried to remove influences of oceanic current by taking an average of the data at the three stations. Since it is known that a ground subsidence occurred at Toba in the period from 1961 through 1975 and there had been a construction work near Maisaka during the period from 1946 till 1972, we summarize changes observed after 1976 in the following. (1) Lowering of the sea level (upheaval of the ground) is recognized in the period of 1988-90 and after 2001. These two periods accord with those when crustal deformation has been detected by the GPS network and the tiltmeter. (2) The amount of the change in the sea level during the period from 2001 through 2003 is about 5cm. That is consistent with the result of the GPS observation. (3) Existence of a similar change in the period of 1980-82 suggests that a slow-slip might have occurred at that time.

Although the ongoing crustal deformation has been detected by the dense GPS network, the deformation in the end of 1980s was observed only by a tiltmeter and a tide gauge. However, we would like to note that a noticeable seismic quiescence similar to the lowering of seismicity that was seen in the end of 2000 did appear in that period near Hamana Lake (Yoshida and Maeda, 1990). Further, it is pointed out that characteristics of the seismicity change in the whole Tokai region are analogous between the two periods (Wiemer et al., 2003). Hence, we think it is very probable that there was a slow-slip event in the end of 1980s as well. Unfortunately, it is difficult to confirm whether a similar change of seismicity was observed in the Tokai region in 1980-82 by the JMA earthquake catalog at that time.