

Recent crustal activity in the western Kanagawa Prefecture, Japan

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We present recent crustal deformation in the western Kanagawa region by using the strain data of the Double Coaxial Borehole Strainmeter (DCBS) at Odawara and the strainmeter at Yugawara, and the GPS data. In the fall of 1998, the contraction in the lower sensor of DCBS and the sensor of Yugawara, and the expansion in the upper sensor of DCBS simultaneously stopped. All of them basically show a similar weak expansion since then. On the GPS data some change of tendency in the areal strain appears at the same time. The seismic activity in the region keeps a low level since the fall of 1997, which may correspond to a decrease of compressive stress or an increase of tensile stress in the area.

We present recent crustal deformation in the western Kanagawa region by using the strain data of the Double Coaxial Borehole Strainmeter (DCBS) at Odawara and the conventional strainmeter at Yugawara station of JMA and the GPS data of GSI. By our analysis both data suggest weak expansion in the area.

DCBS is composed of twin strain sensors modified from the Sacks-Evertson type volume strainmeter, installed at different depths (114m and 180m) in a borehole, by which we can distinguish strain changes caused in a broad area from any local phenomena and instrumental origins. About ten years have passed after the installation in the end of 1988 and the recent outputs have been getting stable. In the first stage from 1989 to 1996, the strain records of DCBS have shown unstable behavior due to unidentified origins. In the second stage from 1996 to 1998, they became stable and their characteristic changes due to rainfall became very similar. However, the long term trends in the strain changes for this stage are quite different: the upper sensor shows monotonous expansion, whereas the lower sensor shows relatively steady contraction which resembles the strain change at Yugawara, 10km south from Odawara. And in the last stage from 1998, the contraction in the lower sensor of DCBS and the sensor of Yugawara, and the expansion in the upper sensor of DCBS simultaneously stopped. All of them show almost the same changes in this last stage. This means that the long-term trends represent crustal strain in the comparable area to the distance between Odawara and Yugawara stations. Observing the details of the strain records in the last stage, we can find a weak expansion as a basic tendency of areal strain.

The GPS data for the nearest base lines around Odawara and Yugawara indicate that a remarkable change appears in the area from early 1999 as follows. The areal strain calculated from GPS data indicate a steady contraction from 1996 to 1998, whereas it turns flat or expansive from early 1999. This tendency agrees with the tendency recently observed in the strainmeters. The spatial distribution of the areal strain is contractive in the area before 1998 and then it turns out weakly expansive.

The seismic activity in the western Kanagawa region keeps a low level since the fall of 1997, though two M4 class earthquake occurred in the region after the event of M5.3 in the east of Yamanashi Prefecture in March, 1996. Considering the above-mentioned tendency in crustal deformation, there is a possibility that such low seismic activity may reflect a low compressive stress or increase of tensile stress in the area. However, another possibility should be also noted that a stress heterogeneity can be caused by increase of stress in a broad area.

The GPS data was provided by the Geographical Survey Institute. The PC program of 'Seis-GPS'(Nakamura,1999) was used for the analysis.