

Ocean loading effect on the strain and tilt changes observed at the 800m-deep borehole in Awaji Island

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Strain and tilt changes observed in 1996-2004 at the 800m-deep borehole in Awaji Island show crustal movements in the period of about 3.5 years. We reported about characteristics of the long-term changes of strain in Seismological Society of Japan Autumn Conference 2003, although we could not mention definitely the cause of the strain changes. In this Conference, We indicate that one of the causes is sea level change in the Pacific Ocean nearby the western Japan.

The multi-component borehole instrument installed at the 800m-deep borehole can observe strain changes in the directions of N45W-S45E (Str_U), N75E-S75W (Str_M) and N15E-S15W (Str_D), as well as tilt changes in the directions of N15E (Tilt_X) and S75W (Tilt_Y). Residuals of strain and tilt changes after removal of the tidal changes, the atmospheric effect and the exponential trend showed definite long-term changes in the period of about 3.5 years. The residuals of strain indicated simultaneous expansion or contraction about the order of $1E-7$ in three directions. The residuals of tilt indicated northern or southern uplift about the order of $1E-6$ radian. These crustal movements in the period of about 3.5 years showed expansion of dilatation and southern uplift in 2000-2001.

Meander of the Kuroshio current occurred in 2000-2001. Flow axis of the Kuroshio current departed from Kii Peninsula in the southeast direction by a few tens km during the meander. The meander caused descent of the sea level in the offing of Kii Peninsula. Expansion of strain and southern uplift of tilt observed at the 800m-deep borehole in 2000-2001 can be explained qualitatively by the change of ocean loading due to the sea level change. We calculate strain and tilt changes due to ocean loading by using the sea level data of TOPEX/Poseidon, and explain quantitatively the long-term changes of strain and tilt.