

MIS003-02

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Strain tsunami meter -application of strain and tilt measurements to tsunami study-

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Large mass of water moves with tsunami, and its loading causes surface deformation. Nawa et al. (2007) demonstrated loading effects due to the 2004 Indian Ocean tsunami were observed by broadband seismometers and superconducting gravity-meter at Syowa station, Antarctica. Yuan et al. (2005) also showed loading effects of the tsunami by broadband seismometers installed along the coastal area around the Indian Ocean. Surface deformation data caused by tsunami loading give independent resource besides tide gauge data, and may potentially contribute to improve study on tsunami source mechanisms. In this paper we report the tsunami loading effect observed by borehole strain-meters.

An inter-plate earthquake with M6.9 occurred off Fukushima, northeastern Japan on 19 July, 2008. Soon after the main shock, a tsunami warning was announced by JMA and the small tsunami wave of 23 cm height was observed at Ayukawa tide gauge station in Miyagi Prefecture. Two borehole strain-meters installed in Enoshima and Kinkazan islands off Miyagi, 14 and 7 km away from Ayukawa, respectively, also detected tsunami waves as strain changes caused by loading effect of an excess of water mass.

Based on a tsunami source model constructed by means of sea level data, we calculated synthetic strain change due to tsunami loading to reveal that over all feature of strain change are well explained by the model even with a scale error of 3 ? 4 between observation and calculation. We conclude that strain data can be potential resource for tsunami source modeling together with sea level data.

Keywords: tsunami, borehole strain-meter, borehole tilt-meter