

Groundwater changes related to the 2004 Mid-Niigata Prefecture Earthquake and Niigataken Chuetsu-oki Earthquake in 2007

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Geological Survey of Japan, AIST has been monitoring groundwater in and around the Kinki and Tokai districts for earthquake prediction research since 1970's. Niigata Prefectural Office has also been observing groundwater for monitoring land subsidence in Niigata Prefecture. The 2004 Mid-Niigata Prefecture Earthquake (MJMA6.8) and Niigataken Chuetsu-oki Earthquake in 2007 (MJMA6.8) occurred in Niigata Prefecture, Japan on October 23, 2004 and July 16, 2007, respectively. The two earthquakes have a similar magnitude, epicenter and mechanism (Fig.1). At many of the observation wells, we detected changes in groundwater level or pressure related to the two earthquakes (Fig.1) but no clear precursory changes. At all of our observation wells in Niigata Prefecture, trend changes were observed after coseismic step-like changes for both of the earthquakes. At some of the stations in and around the Kinki and Tokai districts, coseismic trend changes and/or step-like changes were observed. The pattern of the changes were almost similar for the two earthquakes. Those changes were considered to be caused not by the static volumetric strain changes but by the ground shaking.

Fig.1 Coseismic groundwater level or pressure changes in response to the 2004 Mid-Niigata Prefecture Earthquake (left) and to the Niigataken Chuetsu-oki Earthquake in 2007 (right). Contours denote the coseismic static volumetric strain changes calculated from the dislocation model of the Geographical Survey Institute (left:2005; right: 2008). Δ : Increase, ∇ : Decrease, \circ : No change, $*$: Oscillation, \star : Epicenters of the 2004 Mid-Niigata Prefecture Earthquake and the Niigataken Chuetsu-oki Earthquake in 2007. Dotted rectangular is the fault models of them

