Improvement of the response of groundwater level to crustal strain by the sealing of the observation well at the Hokusei observation site

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One of the problems is the lack of high quality crustal deformation/groundwater observation sites in the western part of Aichi prefecture and the northern part of Mie prefecture, in terms of the estimation of short-term SSEs occurring at the plate boundary of the Nankai Trough. In May 2016, the inner pipe of the observation well at the Hokusei observation site located in the northern part of Mie prefecture was sealed with a packer in order to improve the response of groundwater level to crustal deformation.
Because the permeability of the target aquifer at this site is low, the groundwater level before sealing was poor in response to crustal strain changes. After sealing, tidal fluctuation clearly appeared in the groundwater level/pressure, then we found the response of the groundwater level/pressure to crustal deformation to be clearly improved. The response of the groundwater level /pressure to crustal strain after sealing improved about 10 times than before the sealing.
By eliminating the tidal component, barometric pressure response, and rain response from the groundwater level/pressure data, the changes in groundwater level/pressure were detected at the timing of the deep low frequency tremor activities occurred around Ise Bay in July and December 2016. Since it is expected that the changes of groundwater level/pressure are caused by the crustal deformation due to short-term SSEs, we compare the changes in groundwater level/pressure calculated from the fault models of the short-term SSEs with the detected changes.

Keywords: groundwater, strain sensitivity, closed well, slow slip event

