# Groundwater level change at wells associated with the 2008 January unrest of Meakan-dake volcano

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Hokkaido University and Geological Survey of Hokkaido have operated continuous high-sampling groundwater level change observation to monitor the crustal strain related to earthquakes and volcanic activities in Hokkaido. We started new observation at Akanko-spa, about 8km NNE of active Meakan-dake volcano, in April 2006. Pressure sensors with barometer are installed in the three independent hot-spring wells. High-sampling (1Hz) and wide dynamic range data (24bit-AD) are transmitted to Sapporo in real time via IP protocol.

Volcanic unrest which was characterized by earthquake swarm with more than 400 events was observed during 9 to 11 of January 2008. Our observation sites respond to this unrest indicating water level decreasing. This falling fact simultaneously observed at three wells. No coherent signals at another strain and tilt observatories in Hokkaido indicate observed signal at wells is due to the volcanic unrest of Meakan-dake. Coefficients between water level and tidal strain estimated by Saito et al (2007) allow us to treat the changes as the volumetric strain. To isolate the volcanic signals, we eliminate tidal signals and barometric responses using the BAYTAP-G software (Ishiguro et al., 1981, Tamura et al., 1991). Obtained time series of water level indicate following features, (1) changes started in early morning of January 9 , earthquake swarm began in the early evening of same day, (2) duration of deformation is about 2 days, (3) total volumetric strain change is -0.3 to -0.5 microstrain. These facts strongly imply precedent decompression at depth induce seismic activity. If we assume this decompression is due to the deflation of a point source beneath the volcano at 5km depth, estimated volume change is 8-12$*$10ˆ6mˆ3, which is corresponding to 0.9-1.1 of volcanic eruption magnitude index proposed by Takahashi et al (2006). This implies that the eruption size would be small if intruding materials reach to the ground surface. These decompression signals also observed during the 2006 small phereatic eruption. Therefore, we believe these signals at far-field sites are very important for monitoring especially to predict the volcanic eruptions.

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