

## TILT AND VOLUMETRIC STRAIN CHANGE OBSERVED AROUND LAKE AKAN AT NOVEMBER 24, 2016

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Volcanic activities in Akan region showed increase in activity in 2016 and 2017. The activity was first observed as ground deformation by GNSS observation (GEONET, installed by GSI) in fall of 2016. In November, seismicity increased around Mt.Oakan slightly. The seismicity decreased gradually in the succeeding months, however, another seismic activity began observed at eastern flank of Mt.Meakan. SAR Interferometry detected ground deformations which indicate inflation at eastern flank of Mt.Meakan and Mt.Oakan, in this period, though it is difficult to tell exactly when these deformation started, due to low observation frequency of the SAR satellite. These series of activities lowered in the summer of 2017, but not yet stopped completely.

We report tilt/strain change event associated with the felt earthquake at Mt.Oakan in Nov.24, 2016. Two tiltmeters at Mt.Meakan installed by JMA showed tilt change a few minutes before this earthquake. Their magnitude and down-dip direction are in the order of  $10^{-8}$  rad. and northeast (toward Lake Akan and Mt.Oakan). Such changes are also observed simultaneously at groundwater level sensor at Lake Akan (installed by GSH and Hokkaido Univ.), Sacks-Evertson strainmeter at Kussyaro (Hokkaido Univ.) and Accelerometer at Lake Akan (NIED). The groundwater level change can be converted to volumetric strain change (Takahashi et al., 2012).

We then tried to explain these observations by assuming deflating point-source or opening dike. When deflating point-source is assumed, its horizontal location, depth and volume change are estimated to be 3km south of Mt.Oakan, 15km and the order of  $10^6 \text{m}^3$  respectively. For the case of opening dike, the number of observation does not allow us to estimate all the source parameters. Hence we fixed fault size (1km square) and horizontal location (under Mt.Oakan) and estimated the rest of source parameters. As a result of the parameter estimation, we found that opening dike explains the observation better than deflating point-source. We also examined if an opening dike at eastern flank of Mt. Meakan (where the inflation is observed by SAR interferometry) explains the observations, but in vain.

This result shows that the tilt/strain change should be related to the activity of Mt.Oakan rather than Mt.Meakan, where the inflation is detected by SAR Interferometry and GNSS observation at its eastern flank.

### References

Takahashi, H., Shibata, T., Yamaguchi, T., Ikeda, R., Okazaki, N., Akita, F., Volcanic strain change prior to an earthquake swarm observed by groundwater level sensors in Meakan-dake, Hokkaido, Japan, *JVGR*, 215-216, 2012, Pp. 1-7.