Tilt and Volumetric Strain change observed around Lake Akan at November 24, 2016

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Integrated hypocenter database prepared by Japan Meteorological Agency (JMA) shows slight increase in number of earthquakes around Mt.Oakan in November, 2016. On November 24, earthquakes with low frequency component is observed continuously, which is followed by an earthquake felt at Akan region. Two tiltmeters at Mt.Meakan installed by JMA, on the other hand, showed tilt change synchronously with the earthquakes with low frequency component. Their magnitude and down-dip direction are in the order of 10^{-8}rad and northeast (toward Lake Akan and Mt.Oakan).

Such change were also observed at other stations around the region, namely, groundwater level sensor at Lake Akan (AK3: installed by GSH and Hokkaido Univ.), Sacks-Evertson strainmeter at Kussyaro (KUT: installed by Hokkaido Univ.) and Accelerometer at Hi-net station “Akan-Kita” (ANNH: installed by NIED). Takahashi et al. (2012) reports that the groundwater level around Mt.Meakan acts as volumetric strainmetor, hence we converted the groundwater level change to volumetric strain change accordingly. It should be noted that volumetric stain change at AK3 and KUT both show the compressive strain.

We estimated the pressure source from these observations assuming a deflating point source. The source is estimated at the south of Mt.Oakan. Its depth and volume change are estimated to be 15km and 2×10^{6} m^3. Due to the NE-SW-wide distribution of the stations used for the estimation, the error in horizontal position of the source is larger in NW-SE direction. The deep source depth is required to explain the compressive strain at KUT, which is 20km away horizontally from estimated source, for the deflating point source exhibits compressive strain at region where $r<1.4D$ (r and D being horizontal distance from the source and source depth, respectively).

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