

Crustal Deformation of Meakan-Dake Volcano Japan associated with Volcanic Activity

Makoto Murakami[1]

[1] Hokudai

<http://uvo.sci.hokudai.ac.jp/jindex.html>

Mesakan volcano is an active volcano of the east part of Hokkaido located on the southwestern of Akan caldera. The edifice is composed of small volcanic components. In recent years volcanic activity is occurring around Nakamatineshiri and Pommatineshiri craters located in the central part of the volcano. Also small fumaroles and the hot springs are found in the hillside and the foot of a mountain. The formation of the volcano started tens of thousands of years ago. Various types of magma ranging from basalt to dacite have been extruded at different epochs and from different vents. The recent eruptions are dominated by phreatic explosion.

Earthquake swarms and small eruptions have been reported in 1954-1966, 1988, 1996-1998 and 2006. Moreover new eruptions took place in November 2008 at 96-1 vent on the south edge of the Pommatineshiri crater. High seismicity and fumarolic activity continues as of February, 2009.

The magmatic system of this volcano has long been unknown. Continuous monitoring system of deformation such as GPS that have played a major role in the understanding of the magmatic system of Sakurajima and Mt. Asama has been also around Meakan volcano by the Meteorological Agency, Geographical Survey Institute, Hokkaido University, and other organizations. It is interesting to study such continuous geodetic data during the volcanic activity to understand the magmatic system of the volcano.

We compared the GPS continuous data at the nearest station to the volcano with the seismicity and eruptive activity data. It was found that there is a good correlation of both activities during the most recent eruptions i.e. in March 2006 and November 2008. The station moved both vertically and horizontally by about 1-2cm during both eruptions in a similar manner. It is suggested that the movement is caused by the magmatic movement underneath the volcano.

As a preliminary approach, we constructed two models to explain the deformation data derived by continuous GPS. One is a vertical dike located to the east of the central crater at the depth of several kms and the other is a sill which is also located to the east of the volcano but at a slightly larger depth. Other geodetic data seem to support sill model. In any case it is likely volcanic fluid such as boiled hydraulic or volcanic gas warmed by the magma climbs to the surface and causes seismicity and fumarolic activity. In this presentation, we discuss both magmatic models referring to other various data such as seismicity and the deep low frequency seismicity.

We also will discuss a possibility of a triggering of an earthquake in a case where an active fault exists in the vicinity, and its accumulation of elastic strain energy is close to the critical stage.