Japan Geoscience Union Meeting 2011
(May 22-27 2011 at Makuhari, Chiba, Japan)

SGD022-11 Room:201A Time:May 23 17:15-17:30

Hyper-hybrid gravity measurements: case studies on volcanic activities of Asama 2004 and Sakura-jima 2010 events

Shuhei Okubo[1*], Takahito Kazama[2], Keigo Yamamoto[3], Hiroyuki Tanaka[1], Yoshiyuki Tanaka[1], Yuichi Imanishi[1], Yoichi Fukuda[2], Masato Iguchi[3]

[1]Earthquake Res. Inst., Univ. Tokyo, [2]Graduate School of Science, Kyoto Univ., [3]Disaster Prev. Res. Inst., Kyoto Univ.

Recent advance in imaging with cosmic-ray muons provides us with density profiles of the interiors of gigantic bodies. Resultant images enable us to estimate the dimensions and configuration of a volcanic conduit in a quantitative way (Tanaka et al. 2007). The imaging called Muon Radiography also provides us with rough measure of porosity of magma in the conduit.

Once these parameters are predetermined, we may interpret temporal gravity change g(t) in terms of magma head height H(t) based on a line mass model. We apply the idea to two active volcanoes, Mt. Asama and Mt. Sakura-jima. Long term variations of the magma head height H(t) derived from absolute gravity observations g(t) are consistent with the volcanic activity of the two volcanoes: frequent explosions occur when H(t) is high and vice versa. H(t) also explains the temporal variation of SO2 flux well: high SO2 flux when H(t) is high and vice versa.

These results clearly shows that continuous gravity monitoring with geometrical constraint from the Muon Radiography is quite useful to trace the rise and fall of magma in a volcanic conduit.

Keywords: gravity, magma head, muon radiography, Asama, Sakurajima