Measurements of soil CO_2 flux at Asama volcano, Japan before and after minor eruptions in June 2015

*Masaaki Morita[1], Toshiya Mori[1], Ryunosuke Kazahaya[2], Hiroshi Tsuji[3]

1.Geochemical Research Center, Graduate School of Science, The University of Tokyo, 2.Research Institute of Earthquake and Volcano Geology, Geological Survey of Japan, AIST, 3.Earthquake Research Institute, The University of Tokyo

Volcanic degassing is not only from plumes or fumaroles in craters but also from soil emanations on volcano flanks. In this soil degassing, carbon dioxide (CO_2) is an important species because of its high abundance in magmatic volatiles and its low solubility in magma. Many previous studies have reported on variations of soil CO_2 flux and its spatial distribution corresponding to changes of volcanic activity [e.g., Hernández *et al.*, 2001, *Science*; Carapezza *et al.*, 2004, *Geophys. Res. Lett.*; Pérez *et al.*, 2006, *Pure Appl. Geophys.*]. Therefore, it is important to monitoring soil CO_2 flux for understanding relations of volcanic degassing and volcanic activity changes.
At Asama volcano, Japan, minor eruptions occurred on 16th and 19th June 2015 that were the first eruptions since 2009. After these eruptions, a measurement of soil CO_2 flux was conducted on 29th October 2015. Here we compare the data of 2015 to those of inactive period in 2012–2014 [Morita *et al.*, *Bull. Volcanol.*, *accepted*] and discuss on fluid ascent before and after the 2015 eruptions.
Soil CO_2 flux was measured using an accumulation chamber method [Parkinson, 1981, *J. Appl. Ecol.*; Baubron et al., 1990, *Nature*; Chiodini et al., 1998, *Appl. Geochem.*] at 54 sampling points in the eastern side of Kamayama flank and Maekake crater rim. A spatial distribution of measured flux was obtained from an average of 100 realizations by sequential Gaussian simulation [Deutsch and Journel, 1998; Cardellini *et al.*, 2003, *J. Geophys. Res.*].
As a result, a spatial distribution of high soil CO_2 flux anomalies in eastern Kamayama flank and eastern Maekake crater rim is similar to that for the 2012–2014 observations reported in Morita *et al.* [*Bull. Volcanol.*, *accepted*]. Comparing the flux values of the 2015 and the 2012–2014 measurements, an average flux of the 100 realizations was about 5–10 times higher in eastern Maekake crater rim and was not changed or a little lower around Kamayama crater rim. Morita *et al.* [*Bull. Volcanol.*, *accepted*] reported that soil CO_2 emitted from the eastern side of the summit probably ascend from a hydrothermal fluid layer corresponding to a low electrical resistive body that resides in the shallow part of the volcano flank [Aizawa *et al.*, 2008, *J. Volcanol. Geotherm. Res.*]. The increase of soil CO_2 flux in eastern Maekake crater rim likely reflect an increasing supply of magmatic volatiles to the hydrothermal fluid layer from the depth. Different responses of soil CO_2 flux between Kamayama and Maekake crater rims may correspond to differences of fluid pathway and ascent process. To ascertain relations between soil CO_2 flux variations and the fluid ascent process from the depth, further repeated observations of soil CO_2 flux and detailed comparisons to the volcanic activity are necessary.

Keywords: Asama volcano, Soil CO_2 flux, Fluid ascent

