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Measurements of Diffuse Carbon Dioxide Flux around the Summit of Asama Volcano

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Carbon dioxide is one of the volatile species which exsolves in the early stage of magma degassing. Soil CO_2 flux measurements have been conducted at many volcanoes to understand magma degassing conditions and to catch primitive signals of volcanic activities. For example, an increase of CO_2 flux was observed as a precursor of the 2000 eruption at Usu volcano, Japan, followed by a sudden decrease in the flux (Hernandez et al., 2001). Asama volcano is one of the most active volcanoes in Japan with recent eruptions in 2004, 2008 and 2009. We here report results of the first diffuse CO_2 flux measurements at Asama volcano.

The measurements were carried out at 40 sites in the Maekake-yama crater on 26th October, 2012. The data were obtained by the accumulation chamber method using portable flux meter (West Systems, Inc.). The results showed that the soil CO_2 flux values were in the background level (<10 g m^{-2} d^{-1}) in the western half of Maekake-yama crater including western flank of Kama-yama cone. In contrast, the east side of the Kama-yama cone had the fluxes more than several tens g m^{-2} d^{-1} with the highest value of 296 g m^{-2} d^{-1}. This high soil CO_2 flux area corresponds to the shallower highest conductive subsurface zone spreading beneath the eastern flank of Kama-yama cone (Aizawa et al., 2008). They interpreted this conductive zone as a hydrothermal system. Since the high flux area does not show any fumarolic activities or thermal anomalies, vapor in the hydrothermal fluid is probably condensing at subsurface and only dry residual gases including CO_2 are emanating from the area.

References

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