

Flux measurements of carbon dioxide at Beppu geothermal area using a portable non-dispersive infrared (NDIR) gas analyzer

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Degassing mechanisms play an important role for the Earth environment, since the current atmosphere and ocean have formed by release of volatile components from the solid Earth. The mechanisms may be catastrophic or continuous events; the former is a sudden release in a single event and the other is a process occurring throughout geological history of the Earth. A representative continuous degassing is volcanic activities. In the volcanic area, volatile components are released not only from the fumaroles but from the mountain body. Carbon dioxide (CO₂) is one of the volatile components, and its release is affected by the volcanic activity (Hernandez et al., 2001). Degassing mechanisms of soil gases are dependent on underground structures such as geological strata, faults and fissures. Active faults can be good passageways (Dogan et al., 2009). Here, we have measured CO₂ flux in the Beppu geothermal area, and reveal the degassing mechanisms of CO₂ related to volcanic activities.

Beppu geothermal area located on central Kyushu direction, Japan is situated in graben zone formed by tensional stress, and is generated by western active volcanoes of Mt. Tsurumi and Garan. These volcanoes supply geothermal fluids on the area. Allis and Yusa (1989) measured the temperature under 100 m depth in the area, and revealed two parts with high temperature. The high temperature areas are located along the faults of northern and southern parts. Mine (2006) measured CO₂ flux in the northern part and showed high values along the Kannawa fault. Here, we tried to measure CO₂ flux in the southern part around the Horita and Asamigawa faults.

We used a chamber method which is measurement of concentration rate of CO₂ in the vessel covered on the ground, and estimated CO₂ flux at about 200 sites. The obtained CO₂ fluxes range in 0.07-66.1 g/m²-day. High values of 2.71-66.1g/m²-day are observed on hot spring flows underground reported by Yusa and Ohsawa (2000), suggesting that CO₂ gases are released from hot spring flows underground and raise to ground surface.

References

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Keywords: Beppu, hot spring, carbon dioxide