

## CO<sub>2</sub> degassing along the Horita-Asamigawa faults in Beppu geothermal area, Japan

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Flux anomalies along faults indicate the emission through them play an important role for degassing from the Earth, suggesting the running of pore fluid within fault zone. Some studies of degassing measurement have reported that areas of CO<sub>2</sub> discharge coincide with regions on seismic activity (e.g., Irwin and Barnes, 1975; Barnes et al., 1978). Kennedy et al. (1997) presented mantle-derived helium and CO<sub>2</sub> in spring and well fluids on the San Andreas fault. Degassing mechanisms of soil gases are dependent on underground structures such as geological strata, faults and fissures. Here, we have measured fluxes and carbon isotopic compositions of soil CO<sub>2</sub> along the Horita-Asamigawa faults in Beppu geothermal area, Japan. Beppu is located on east end of subsidence of the Beppu-Shimabara Graben in Kyushu Island, southwest Japan (Matsumoto, 1979), and is a famous area as a geothermal system. The geothermal system is situated on the eastern flanks of the Tsurumi-Garandake volcanic center and spread until the coastline to the east. The geothermal activity is mostly concentrated in two areas, on the northern and southern sides of the fan deposit.

CO<sub>2</sub> flux (F, g/m<sup>2</sup>-day) was measured by the chamber method which accumulates emission gas in the chamber placed on the soil. The contained gas was circulated through the chamber and a LI-COR LI820 infrared gas analyzer. Pressure and temperature were coincidentally measured by a pressure transducer and a thermometer, respectively. The gas was desiccated with Mg(ClO<sub>4</sub>)<sub>2</sub> before entering the gas analyzer. The flux is estimated by the gradient of CO<sub>2</sub> concentration in the chamber. Soil gas sample were collected for carbon isotopic analyses at 30-50 cm depth in pre-evacuated 10 ml vials. Stable carbon isotope ratios for CO<sub>2</sub> were measured by continuous-flow mass spectrometry (Finnigan MAT Delta S) at University of Tokyo.

Flux anomalies of soil CO<sub>2</sub> (>5 g/m<sup>2</sup>-day) were observed along the Horita-Asamigawa faults. One mechanism that may explain the flux anomalies is intruding of thermal fluid within the fault zone (Allis and Yusa, 1989), suggesting that CO<sub>2</sub> fluxes released from the thermal fluid and raise through the faults.

Allis and Yusa (1989) *Geothermics*, 18, 743-759., Barnes et al. (1978) *U.S. Geol. Surv. Water Resources Investigations*, 78-38, 12., Irwin and Barnes (1975) *Geology*, 3, 713-716., Kennedy et al. (1997) *Science*, 278, 1278-1281., Matsumoto (1979) *The memoirs of the Geological Society of Japan*, 16, 127-139.

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