

Magmatic Degassing during Mild-Strombolian Activity of Villarrica volcano, Chile

Shinohara H.¹ and J. B. Witter²

1: Geological Survey of Japan, AIST, Higashi 1-1-1, Central 7, Tsukuba 305-8567, Japan, (shinohara-h@aist.go.jp)

2: ARKeX Limited, Newton House, Cambridge, CB4 0WZ, United Kingdom)

A new technique was developed to estimate composition of volcanic gases based on the measurement of plume composition at distance from the vent by the use of a portable multi-sensor system (Shinohara, 2005). We applied this new technique combining with the Alkaline Filter Pack and Gas Detection Tube techniques to measure the volcanic gas composition emitted during mild Strombolian activity at the summit of Villarrica volcano (Chile). The Villarrica Volcano is a continuously degassing volcano with mild-Strombolian activity. The measurements were performed on 17 November, 2004, when intermittent lava spattering was observed at the bottom of the summit crater. The plume measurement was performed at the rim of the summit crater about 100 m downwind of the vent, and the volcanic gas composition, including H₂O, CO₂, SO₂, H₂S, HCl and HF, was calculated. Comparison of the measured volcanic gas composition with volatile contents in a gas-rich melt inclusion indicates that the volcanic gas was transported as dissolved volatiles in the magma and the gas separation from the magma occurs at low pressure. These information supports the idea of the degassing from a convecting magma column, the mechanism proposed to explain the continuous degassing of large amount of volcanic gasses without little magma discharge. The measured H₂O/CO₂ and CO₂/SO₂ ratios of the gas were constant for about two hours during the measurements in spite of intermittent lava spattering from the vent, indicating that the gas emitted with the spattering lava has the same composition as the continuously emitted volcanic gas. This implies the lava spattering is not driven by bubbles supplied at depth but caused by bursting of bubbles formed under equilibrium with the magma.

Shinohara H. (2005) A New Technique to Estimate Volcanic Gas Composition: Plume Measurements with a Portable Multi-Sensor System. *J. Volcanol. Geotherm. Res.*, 143, 319-333.

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