Component ratio of volcanic gases from fumaroles of the 2014 and the 1979 eruptions

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The Japan Meteorological Agency (JMA) installed the automatic Multi-gas station systems at four active volcanoes to monitor concentration of multiple volcanic gases (CO_2 , H_2O , H_2 , H2S, SO_2) since 2015 (Takagi et al., 2016). In Ontakesan volcano, the station was set at Haccho-darumi area 400 m to the south of the summit in September, 2016. This area is located 500 m to the northeast of the nearest crater made by the 1979 eruption.

No components of H_2 and SO_2 have been detected by the station at Ontakesan so far. The molar ratio of CO_2 and H_2S (CO_2/H_2S) has been recorded over a wide range as 5 ~ 25. And time series of the ratios looks splitted more than 17 and less than 17.

So then we done the field survey around the craters in September, 2017, making a hypothesis that various-composition-ratio fumarolic gases are detected by the station. The 1979 eruption produced a chain of craters with orientation of northwest-southeast to the southwest of the station. Only the 79-7 crater, 300m west of the station, have weak fumarolic gas even now. We sampled and analyzed two fumarolic gas of the 1979 eruption crater and 2014 eruption crater.

The 2014 eruption crater below the Mt. Outaki have several vents, and the diameter of the main vent was estimated to be around 3 m. White smoke brew up to 50 m with strong fizz. At the 1979 eruption crater, a weak fumarolic gas flowed up to 1 m without fizz. The 2014 eruption crater's fume and the 1979 eruption crater's fume have the same temperature as 90.1 degrees. By using the gas detector tubes, the CO_2/H_2S molar ratio of the 2014 eruption fume and the 1979 eruption fume was estimated to be 20 and 5.6, respectively.

By these observation and analysis, we revealed that two composition ratios of fumarolic gases from the 2014 eruption crater and the 1979 eruption crater are different clearly. This result analyzed at the 1979 eruption crater is consistent with the preceding studies (Ossaka, 1983, Ohba, 2015). There is a possibility that the hydrothermal system of the 2014 eruption is one of the 1079 eruption.

According to field survey and analysis, it is probable that the automatic Multi-gas station detect two fumarolic gases from different craters. Broad value of CO_2/H_2S ratio, from 5 to 25, may be caused by fumarolic gases from the 2014 eruption crater and/or another fumarolic gases, carried by the regional wind.

We intend to advance the chemical analysis of sampled gases in the laboratory.

Keywords: Ontakesan volcano, volcanic gas, Multi-GAS