MultiGAS survey from low-T° fumaroles in a tropical environment. Effects from internal and external forcing: example from La Soufriere de Guadeloupe (FWI)

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Fumarolic gas survey of dormant volcanoes is fundamental because the compositional and flux changes in gas emissions have actually been recognised as signals of unrest or even precursors of eruptions on several dormant volcanoes in hydrothermal unrest [1-5].

Here we report on the chemical compositions (CO_2, H_2S, SO_2, H_2) and mass fluxes of fumarolic gas emissions from the low-temperature (from 97° to 104°C) volcanic-hydrothermal system of La Soufrière de Guadeloupe (Lesser Antilles). These data, since 2017, are acquired from portable MultiGAS (measurements performed monthly) and two permanent MultiGAS stations (4 automated 20' measurements per day). These MultiGAS data are discussed along with other geochemical and geophysical parameters monitored at OVSG, such as the complete chemical gas composition sampled by Giggenbach bottles, fumarole temperature and volcanic seismicity in order to track the deep-sourced magmatic signal and detect potential signs of unrest [6].

However, dealing with the MultiGAS data in a low-T fumarolic system in a tropical environment is not straightforward due to external forcing. Hence, interpretation of the observed chemical changes must consider the dynamics of (i) scrubbing processes by the hydrothermal system and the perched volcanic pond [7], (ii) rainfall and the groundwater circulation (i.e. rainy vs non-rainy seasons, extreme events), (iii) water-gas-rock interactions [7], (iv) plume condensation, (v) sulphur deposition and remobilization, and (vi) gas-atmosphere chemical interaction.

[1] Giggenbach and Sheppard, 1989; [2] Symonds et al., 1994; [3] Hammouya et al., 1998; [4] De Moor et al., 2016; [5] Allard et al., 2014; [6] Moretti et al., submitted; [7] Symonds et al., 2001