Geophysical Research Abstracts
Vol. 21, EGU2019-5818, 2019
EGU General Assembly 2019

Plume-derived volcanogenic elements in rain at Masaya volcano (Nicaragua)

Marcello Liotta (1), María Martínez Cruz (2), Arnoldo Ferrufino (3), Julian Rüdiger (4), Alexandra Gutmann (5), Kathia Rojas Cerda (6), Nicole Bobrowski (7), and J. Maarten de Moor (2)

(1) Istituto Nazionale di Geofisica e Vulcanologia, Sezione di Palermo, Palermo, Italy (marcello.liotta@ingv.it), (2) Observatorio Vulcanológico y Sismológico de Costa Rica Universidad Nacional (OVSICORI-UNA), (3) Instituto Nicaraguense de Estudios Territoriales, Dirección de Geofísica INETER, Nicaragua, (4) Atmospheric Chemistry, University of Bayreuth, Germany, (5) Institute of Inorganic and Analytical Chemistry, Johannes Gutenberg-University Mainz, Mainz, Germany, (6) Centro de Investigación en Recursos Acuáticos de Nicaragua CIRA UNAN-Managua, Nicaragua, (7) Institute for Environmental Physics, University of Heidelberg, Heidelberg, Germany

In the surroundings of open conduit volcanoes, the emitted gases and particles can influence the chemical composition of precipitations. The processes of interaction between volcanic plumes and falling raindrops impress their signature in water and provide a unique opportunity to retrieve useful information on volcanic emissions. In light of this, the chemical composition of single rainfall events was investigated at Masaya volcano (Nicaragua) with the aim of determining the relative contributions of plume-derived elements. During the campaign in 2016 we sampled rain around the Masaya Santiago crater and from a site not affected by the volcanic plume. Solid particles are highly abundant in the summit area, especially in the form of Pele's hair and tears. The use of bulk collectors to sample rain can result in further modifications in the chemistry of the collected rainwater due to the accumulation of particulate matter and/or direct chemical exchange with gas if the sampling site is in direct contact with plumes. In order to minimize such an effect, we filtered the samples immediately after collection in the field. We also sampled volcanic plume by using active alkaline traps in order to compare the chemical composition of gas emissions with that of the rainwater. Most of the rain samples were very acidic with pH ranging between 2 and 3 for the near crater samples and contain large amount of F and Cl. The average S/Cl molar ratio in rainwater (0.07) is much lower than that measured in plume samples (1.3) providing the evidence that HCl promptly reacts with water and dissolves, while SO_2 reacts with rainwater to a lesser extent. The refractory elements dissolved in rain samples derive from the dissolution of silicate particles. In contrast, semi-volatile elements are enriched relative to the whole-rock composition, suggesting that they are exsolved during magma degassing. The natural acidic leaching of solid particles as well as the direct magma degassing inject large amounts of harmful elements (e.g. F, Al, Be, Pb, As, Cd, Cu) into the surrounding environment of the Masaya volcano.