Strategies to define best practices for geochemical gas monitoring across Volcano Observatories

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In the framework of the EUROVOLC project, Work Package 5 (WPS) consists of a networking activity working towards “consolidation of geochemical gas monitoring across Volcano Observatories”. This activity promotes the collaboration and cooperation among volcanologists belonging to several research infrastructures (RIs) and Volcanological Observatories (VOs) across Europe and in particular among researchers who undertake geochemical monitoring of volcanic emissions. Eight partners from six different European countries are involved: IMO and UI (Iceland) INGV (Italy), UNILEEDS and UMAN (United Kingdom), CSIC (Spain), CIVISA (Portugal), IPGP and UCA-OPGC (France).

The study of magmatic degassing in terms of gas chemistry and flux is essential to understand how, and why, volcanoes erupt. Very often, each research group employs different instruments and applies distinct sampling and analytical procedures and strategies, developed from years of experience. One of the consequences of these diverse approaches is the difficulty in comparison of data between the different research groups.

Based on these challenges, one of the aims of the EUROVOLC project is to define best practices in geochemical gas monitoring for direct sampling of fumaroles, in situ measurements of gas chemistry and remote sensing of volcanic plumes, based on the combined expertise from VOs and RIs, and finalized to optimize the capacity of each VO to monitor the volcanoes they are responsible for. In order to standardize, process, store and share the data collected on volcanic gas emissions, EPOS[BMk1] (European Plate Observing System) project guidelines are applied.

Collective field surveys on different volcanic fumaroles and plumes using direct sampling and remote sensing systems have been planned and constitute powerful tools facilitating knowledge and expertise transfer between project partners. In February 2019, we carried out a joint survey at Furnas Volcano in Azores Islands. There, five research groups performed direct sampling on the same low-T fumarole (~100°C), using the procedures followed at each VO. The collected samples were analysed in four different laboratories and the obtained results have been compared in a round-robin test. At the same time, four research groups acquired real-time data of the fumarolic gas using multi-sensor portable instruments produced by different manufactures.
A second joint field campaign is scheduled in the late spring of 2020 at Vulcano Island (Italy), where a high temperature (T~300°C) fumarolic field exists. The acquired data will be organized, standardized and stored in a data repository, following common standards so that data for volcanic gas emissions will be accessible to the whole community by implementing the already planned activities in EPOS. The final deliverables include the writing of “user manuals” with standardized recommendations for acquisition of high-quality data for the geochemical monitoring of volcanic gas emissions including fumaroles and plumes, as well as the applicability and limitations of the employed methodology/instrument in different case studies.

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