



Continuous monitoring of diffuse H₂ degassing at the summit cone of Teide volcano, Tenerife, Canary Islands

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The chemical composition of volcanic gases provides very important information on the degree of activity of a volcano. The main gaseous components of volcanic emissions are water vapor (H₂O) and carbon dioxide (CO₂), while other species may be found in minor concentrations: hydrogen (H₂), sulfur dioxide (SO₂), hydrogen sulfide (H₂S), hydrochloric acid (HCl), etc.

Hydrogen (H₂) is a trace gas present in most volcanic emissions and is an essential participant in the redox reactions occurring in the magmatic gases. In addition, due to its low molecular weight and low solubility in groundwater and hydrothermal fluids, this gas is an excellent indicator of the processes taking place in the magmatic systems at depth. In the last decades, scientists have made efforts to measure concentrations and fluxes of H₂ in a variety of volcanic fluids. However, studies regarding continuous measurement of H₂ in active volcanoes are very scarce to date.

We hereby present the results of diffuse H₂ emission monitored in a continuous mode, since the installation in November 2017 of a chromatography monitoring station (CMS) in the flanks of Teide volcano (Tenerife, Canary Islands, Spain). The station is equipped with a two-channel Agilent 490 micro-GC provided with a porous layer open tubular (PLOT) Mol Sieve 5Å capillary column of 0.25 mm i.d. x 10 m to analyze He, Ne, H₂, O₂ and N₂, and a PoraPLOT Q column of 0.25 mm i.d. x 10 m to analyze CH₄, CO₂, H₂S and H₂O. An embedded computer connected to the internet (WiFi, UMTS router, etc.) allowed the complete remote control of the instrument, the automatic transmission of data and full automatic sampling of the gas samples. This CMS constitutes a very powerful system in the field of volcanic surveillance able to determine low concentrations of H₂ (1 ppmV), allowing at the same time to correlate variations in time of all natural gases measured. We describe in this work the results of continuous time series of collected data on soil gas at Teide volcano, discussing their geochemical and hazard implications.