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Diffuse H_2S emission from active volcanic-hydrothermal systems

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Few studies on diffuse H_2S degassing have been carried out at volcanoes since most of the work have been focused on the CO_2, the second major component in volcanic gases and one of the most less soluble gas specie in magmas. Quantifying and monitoring H_2S flux from volcanoes will be tremendously useful not only for volcano surveillance but also to estimate directly the input of this gas component into the atmosphere. In this work we present an attempt to improve our estimates on diffuse H_2S emission from the summit cone of Teide volcano, Tenerife, Canary Islands. During the summer of 2004, a new diffuse degassing survey was carried out at the summit cone of Teide volcano covering an the area of 0,5 km^2. H_2S efflux measurements were performed by direct and indirect procedures. Direct H_2S efflux measurements were performed by a portable Dragüer electrochemical H_2S sensor and according to the accumulation chamber method. Indirect H_2S efflux measurements were performed by multiplying soil CO_2 efflux value times soil H_2S/CO_2 weight ratio at each sampling site. For these indirect measurements, soil H_2S/CO_2 ratios were obtained by analyzing soil H_2S and CO_2 contents at 40 cm depth by means of a metallic probe and at the surface environment by means of an accumulation chamber. Soil H_2S concentration was measured in situ using a Jerome 431-X portable analyzer, and the soil CO_2 concentration was measured at the lab by microGC. Soil CO_2 efflux measurements were performed by means of a portable NDIR sensor according to the accumulation chamber method. H_2S efflux data from direct measurements ranged from non detectable values to 3.583 mg m^{-2} d^{-1}. In the case of H_2S efflux data from indirect

measurements ranged from non detectable values to 313 mg m^{-2} d^{-1} after collecting soil gas from 40 cm depth and from non detectable values to 1.626 mg m^{-2} d^{-1} after collecting soil gas from the accumulation chamber in the surface environment. Direct and indirect H_2S efflux data showed a similar spatial distribution. Most of the study area showed background values of H_2S efflux, lower than 10 mg m^{-2} d^{-1}, whereas peak values of H_2S efflux, higher than 200 mg m^{-2} d^{-1} were mainly observed inside the crater of the summit cone of Teide volcano where occurs the most intense fumaroles discharges. These data implies that the total output of diffuse H2S emission from the summit cone of Teide volcano was estimated about 5,5 kg d^{-1} following the direct method, whereas 0,7 and 1,5 Kg d^{-1} were estimated for the total output of diffuse H_2S emission following the indirect procedures after collecting soil gas from the accumulation chamber and at 40 cm. depth, respectively.