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Diffuse CO_2 flux emissions from the soil in Las Cañadas caldera (Tenerife, Canary Islands)

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Starting in April 2004, unusual seismic activity was observed in the interior of the island of Tenerife (Canary Islands, Spain) with much evidence pointing to a reawakening of volcanic activity. During this seismic crisis, several events were felt by the population. Since then, a dense multiparametric monitoring network has been deployed all over the island by Instituto Geográfico Nacional (IGN). In the framework of this volcanic surveillance project, several geochemical studies have been accomplished.

Measurements of diffuse CO_2 flux from the soil have been carried out in some zones inside Las Cañadas caldera. This study has been performed during three different field campaigns in November 2012 and June and November 2013.

The studied area includes two different zones known as Roques de García and Los Azulejos. Since several authors have reported the existence of fractures and faults all along both structures, the objectives of this work were to find anomalous CO_2 fluxes from the soil and preferential degassing areas, identify possible hidden faults and study the origin of gas emanations in order to detect the presence of magmatic sources.

More than 600 sampling sites have been measured with the accumulation chamber method in an area of about 1 km2. Soil gas has been sampled in points where high CO_2 fluxes were detected for the determination of chemical and isotopic composition.

The results of the gas prospection confirm the existence of CO_2 degassing in the area. Some anomalous fluxes have been measured along previously inferred volcano-tectonic structures. The highest anomalies were found in Los Azulejos with values up to 1774 g/m2.d.

Chemical analysis did not reveal significant concentrations of magmatic or geothermal gases except CO_2. The latter showed concentrations at 50 cm depth within the soils up to 48% and a C-isotopic composition between -4.72 and -3.67 ‰ indicating a prevailing magmatic origin.