Geophysical Research Abstracts
Vol. 18, EGU2016-8451, 2016
EGU General Assembly 2016

Monitoring the NW volcanic rift-zone of Tenerife, Canary Islands, Spain: sixteen years of diffuse CO_2 degassing surveys

Fátima Rodríguez (1), Simon Halliwell (2), Damaris Butters (3), Germán Padilla (1,4), Eleazar Padrón (1,4), Pedro A. Hernández (1,4), Nemesio M. Pérez (1,4)

(1) Instituto Volcanológico de Canarias (INVOLCAN), 38400, Puerto de la Cruz, Santa Cruz de Tenerife, Canary Islands, Spain, (2) Lancaster Environment Centre, Lancaster University, Lancaster, LA1 4YW, United Kingdom, (3) Department of Earth Sciences, University of Bristol, Bristol BS8 1RJ, United Kingdom, (4) Environmental Research Division, Instituto Tecnológico y de Energías Renovables (ITER), 38611, Granadilla de Abona, Santa Cruz de Tenerife, Canary Islands, Spain

Tenerife is the largest of the Canary Islands and, together with Gran Canaria, is the only one that has developed a central volcanic complex characterized by the eruption of differentiated magmas. At present, one of the most active volcanic structures in Tenerife is the North-West Rift-Zone (NWRZ), which has hosted two historical eruptions: Arenas Negras in 1706 and Chinyero in 1909. Since the year 2000, 47 soil CO_2 efflux surveys have been undertaken at the NWRZ of Tenerife Island to evaluate the temporal and spatial variations of CO_2 efflux and their relationships with the volcanic-seismic activity. We report herein the last results of diffuse CO_2 efflux survey at the NWRZ carried out in July 2015 to constrain the total CO_2 output from the studied area. Measurements were performed in accordance with the accumulation chamber method. Spatial distribution maps were constructed following the sequential Gaussian simulation (sGs) procedure. During 2015 survey, soil CO_2 efflux values ranged from non-detectable up to 103 g m^{-2} d^{-1}. The total diffuse CO_2 output released to atmosphere was estimated at 403 $\pm$ 17 t d^{-1}, values higher than the background CO_2 emission estimated on 143 t d^{-1}. For all campaigns, soil CO_2 efflux values ranged from non-detectable up to 141 g m^{-2} d^{-1}, with the highest values measured in May 2005. Total CO_2 output from the studied area ranged between 52 and 867 t d^{-1}. Temporal variations in the total CO_2 output showed a temporal correlation with the onsets of seismic activity, supporting unrest of the volcanic system, as is also suggested by anomalous seismic activity recorded in the area during April 22-29, 2004. Spatial distribution of soil CO_2 efflux values also showed changes in magnitude and amplitude, with higher CO_2 efflux values located along a trending WNW-ESE area. Subsurface magma movement is proposed as a cause for the observed changes in the total output of diffuse CO_2 emission, as well as for the spatial distribution of soil CO_2 efflux. The increasing trend of total CO_2 output suggests increasing pressurization of the volcanic-hydrothermal system; a mechanism capable of triggering dyke intrusion along the NWRZ of Tenerife in the near future.