Geophysical Research Abstracts
Vol. 19, EGU2017-7115, 2017
EGU General Assembly 2017

Geochemical monitoring of the Tenerife North–East Rift Zone (NERZ) volcano (Canary Islands) by means of diffuse CO_2 degassing surveys

José Barrancos (1,2), Ryan O'Neill (3), Catherine E. Gould (4), Germán Padilla (1,2), Fátima Rodríguez (1), Cecilia Amonte (1,5), Eleazar Padrón (1,2,3), Nemesio M. Pérez (1,2,3)

(1) Instituto Volcanológico de Canarias (INVOLCAN), 38400 Puerto de La Cruz, Tenerife, Canary Islands, Spain (german@iter.es), (2) Instituto Tecnológico y de Energías Renovables (ITER), 38600 Granadilla de Abona,Tenerife, Canary Islands, Spain , (3) School of Geoscience, Edinburgh University, Edinburgh, EH9 3FE, United Kingdom, (4) School of Environmental Sciences, University of Liverpool, Liverpool L69 3GP, United Kingdom, (5) Agencia Insular de la Energía de Tenerife (AIET), 38611, Granadilla de Abona, Tenerife, Canary Islands, Spain

Tenerife is the largest of the Canary Islands (2100 km^2) and the North East Rift (NERZ) volcano is one of the three active volcanic rift-zones of the island (210 km^2). The last eruptive activity at NERZ volcano occurred in 1704 and 1705, with three volcanic eruptions: Siete Fuentes, Fasnia and Arafo. In order to provide a multidisciplinary approach to monitor potential volcanic activity changes at the NERZ volcano, diffuse CO_2 emission surveys have been undertaken in a yearly basis since 2001. This study shows the results of the last soil CO_2 efflux survey undertaken in summer 2016, with 600 soil gas sampling sites homogenously distributed. Soil CO_2 efflux measurements were performed at the surface environment by means of a portable non-dispersive infrared spectrophotometer (NDIR) LICOR Li800 following the accumulation chamber method. Soil CO_2 efflux values ranged from non-detectable ($\sim$0.5 g m^{-2} d^{-1}) up to 70 g m^{-2} d^{-1}, with an average value of 8.8 g m^{-2} d^{-1}. In order to distinguish the existence of different geochemical populations on the soil CO_2 efflux data, a Sinclair graphical analysis was done. The average value of background population was 2.9 g m^{-2} d^{-1} and that of peak population was 67.8 g m^{-2} d^{-1}, value that has been increasing since the year 2014. To quantify the total CO_2 emission rate from the NERZ volcano a sequential Gaussian simulation (sGs) was used as interpolation method to construct soil CO_2 emission contour maps. The diffuse CO_2 emission rate for the studied area was estimated in 1,675 $\pm$ 47 t d^{-1}. If we compare the 2016 results with those ones obtained in previous surveys since 2001, two main pulses on diffuse CO_2 emission are identified, the first one in 2007 and the second one between during 2014 and 2016. This long-term variation on the diffuse CO_2 emission doesn't seem to be masked by the external-meteorological variations. However, the first peak precedes the anomalous seismicity recorded in and around Tenerife Island between 2009 and 2011, suggesting changes in strain-stress at depth as a possible cause of the observed changes in the diffuse CO_2 emission rate. On the other hand, the second peak seems to be related to later changes in the seismicity, such as the seismic activity that occurred in Tenerife at the end of 2016. Again, this study demonstrates the importance of studies of soil CO_2 efflux at the NERZ volcano of Tenerife island as an effective volcanic monitoring tool.