



## **Earthquake clusters in the seismicity of Tenerife (Canary Islands, Spain)**

Luca D'Auria (1,2), Oliver Davies (3), Damon B Knowles (4), Brittany M Russo (5), Alec J Tucker (6), Iván Cabrera (1), Asier Madarieta (1), Cecilia Morales (1), Jean Soubestre (1), Pedro A. Hernández (1,2)

(1) Instituto Volcanológico de Canarias, Granadilla de Abona, Spain (ldauria@iter.es), (2) Instituto Tecnológico y de Energías Renovables (ITER), Granadilla de Abona, Spain (phdez@iter.es), (3) Department of Geology, The University of Leicester, University Road, Leicester, LE1 7RH, U.K., (4) Faculty of Engineering, Environment and Computing, University of Coventry, Coventry CV1 2JH, U.K., (5) Civil and Environmental Engineering, University of Waterloo, Waterloo N2L 3G1, Canada, (6) School of Earth and Environment, University of Leeds, Leeds LS2 9JT, U.K.

In quiescent volcanoes the presence of a background seismicity is often linked to the activity of its hydrothermal system. For this reason, the characterization of the spatial and temporal distribution of volcanic seismicity is an important tool to better understand the dynamics of volcanic hydrothermal systems.

One of the most peculiar aspects of volcanic earthquakes is that they are often clustered in space and time. In particular, volcano-tectonic seismicity is often characterized by the occurrence of seismic swarms. In this work we apply various, recently developed, techniques to detect clusters in the seismic catalogue of Tenerife and to characterize their statistical properties.

Since Nov. 2016, Instituto Volcanológico de Canarias is managing a permanent broadband seismic network on the island of Tenerife, Red Sísmica Canaria (C7), which currently consists of 17 broadband stations. Other 13 stations are deployed on other islands of the Canarian Archipelago. Since its deployment, the network has detected and located more than 1500 low magnitude events beneath the island of Tenerife, with many of them belonging to seismic swarms.

Since 2017 we observed a general increase in the seismicity rates in Tenerife mostly due to an increment in the number of seismic swarms rather than to a change of the background seismicity. The swarms are generally located around Mt. Teide, the most prominent volcanic edifice of the island, at depths usually ranging between 6 and 12 km.

The increase in the seismicity of Tenerife, follows a similar trend in the diffuse emission of CO<sub>2</sub> emissions from the crater of Mt. Teide. Furthermore, both parameters started changing after a remarkable swarm of long-period events recorded on Oct. 2nd 2016. This suggests that the causative source of both was a massive injection of magmatic fluids into the hydrothermal system of Tenerife.