

Magma Intrusion as a Driving Mechanism for the Seismic Clustering Following the 9 May 1989 Earthquake Swarms at the Canary Islands

Sergio VINCIGUERRA^{1,2} and Simon DAY³

¹Department of Geology, University of Leicester, Leicester, UK
e-mail: sv127@le.ac.uk

²British Geological Survey, Environmental Science Centre,
Keyworth, Nottingham, UK

³Aon Benfield UCL Hazard Research Centre, Department of Earth Sciences,
University College, London, UK

A b s t r a c t

On 9 May 1989 a $M_L = 5.2$ earthquake struck a region between the islands of Tenerife and Gran Canaria. We investigated the time-spatial evolution of seismic patterns affecting the Canary Islands region during 1989-1995, using a quantitative spatial fractal analysis method. This method allows quantitative investigation of subtle trends in seismicity distribution through time. The fractal analysis indicates that epicenters clustered around a large zone during the May 1989 sequence affected narrow zones during 1991-1993, but then larger zones during 1993-1995 with an overall trend to shallower focal depths. The spatial localisation of seismic data and its time evolution appear to be related to magmatic rather than tectonic activity. Spatial clustering properties of seismicity are consistent with a major intrusive episode in 1989, followed by a period of quiescence and renewed deep intrusive activity from 1993 onwards. This interpretation suggests an increasing probability of future volcanic hazard in the region investigated.

Keywords: seismicity, fractal clustering, Canarian Islands, magma intrusion.