A PROBABILISTIC METHOD TO CALCULATE VOLCANIC SUSCEPTIBILITY

S. Bartolini (1), A. Cappello (2), J. Martí (1), R. Sobradelo (1,3), S. Barde-Cabusson (1)

(1) Group of Volcanology, SIMGEO (UB-CSIC), Institute of Earth Sciences Jaume Almera, CSIC, Barcelona, Spain
(2) Sezione di Catania–Osservatorio Etneo, Istituto Nazionale di Geofisica e Vulcanologia, Catania, Italy
(3) Aon Benfield UCL Hazard Research Centre, Department of Earth Sciences, University College London, London, UK.

In modern volcanology one of the most important aim is to perform hazard maps simulating different eruptive scenarios. The first step is to evaluate the spatial distribution of future vents, based on the past behavior of the studied area. Previous work were done using the kernel density estimation, a probabilistic method to evaluate the susceptibility, based on the priori assumption that new vents will not form far from the existing ones. This method allows to estimate how the density of the opening of new vents varies across a study area, based on a past eruption points pattern. Hence, the importance in choosing an optimal smoothing parameter, well-known bandwidth. The choice of bandwidth depends on the field size and degree of clustering, and it determines the probability distribution far from the structure or vents. Once the bandwidth parameter is obtained, the next step is evaluate the Gaussian kernel to describe the spatial density.

Volcanic hazard assessment is an important step for risk-based decision-making in land use planning and emergency management. The main steps in this work to calculate volcanic susceptibility are the following: (1) Identifing different methods to evaluate the smoothing parameter (bandwidth); (2) Comparing results using differents input parameters and different values of bandwidth in a Gaussian kernel.

Further step consists in building a new plugin in a qGis to create a user friendly evaluation, in a free, multi-platform, and user friendly applicability. It permits to choose the appropriate methods to evaluate bandwidth, depending on the input parameters, depending on the shapefile geometry, and evaluate Gaussian kernel density to obtain susceptibility maps.