



Spatial vent opening probability map of El Hierro Island (Canary Islands, Spain)

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The assessment of the probable spatial distribution of new eruptions is useful to manage and reduce the volcanic risk. It can be achieved in different ways, but it becomes especially hard when dealing with volcanic areas less studied, poorly monitored and characterized by a low frequent activity, as El Hierro. Even though it is the youngest of the Canary Islands, before the 2011 eruption in the “Las Calmas Sea”, El Hierro had been the least studied volcanic Island of the Canaries, with more historically devoted attention to La Palma, Tenerife and Lanzarote. We propose a probabilistic method to build the susceptibility map of El Hierro, i.e. the spatial distribution of vent opening for future eruptions, based on the mathematical analysis of the volcano-structural data collected mostly on the Island and, secondly, on the submerged part of the volcano, up to a distance of ~ 10 -20 km from the coast. The volcano-structural data were collected through new fieldwork measurements, bathymetric information, and analysis of geological maps, orthophotos and aerial photographs. They have been divided in different datasets and converted into separate and weighted probability density functions, which were then included in a non-homogeneous Poisson process to produce the volcanic susceptibility map. Future eruptive events on El Hierro is mainly concentrated on the rifts zones, extending also beyond the shoreline. The major probabilities to host new eruptions are located on the distal parts of the South and West rifts, with the highest probability reached in the south-western area of the West rift. High probabilities are also observed in the Northeast and South rifts, and the submarine parts of the rifts. This map represents the first effort to deal with the volcanic hazard at El Hierro and can be a support tool for decision makers in land planning, emergency plans and civil defence actions.