



Applying geophysical surveys for studying subsurface geology of monogenetic volcanic fields: the example of La Garrotxa Volcanic Field (NE of Iberian Peninsula)

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Improving knowledge of the shallowest part of the feeding system of monogenetic volcanoes and the relationship with the subsurface geology is an important task. We applied high-precision geophysical techniques that are self-potential and electrical resistivity tomography, for the exploration of the uppermost part of the substrate of La Garrotxa Volcanic Field, which is part of the European Cenozoic Rift System. Previous geophysical studies carried out in the same area at a less detailed scale were aimed at identifying deeper structures, and together constitute the basis to establish volcanic susceptibility in La Garrotxa. Self-potential study allowed identifying key areas where electrical resistivity tomography could be conducted. Dykes and faults associated with several monogenetic cones were identified through the generation of resistivity models. The combined results confirm that shallow tectonics controlling the distribution of the foci of eruptive activity in this volcanic zone mainly correspond to NNW–SSE and accessorially by NNE–SSW Neogene extensional fissures and faults and concretely show the associated magmatic intrusions. These studies show that previous alpine tectonic structures played no apparent role in controlling the loci of this volcanism. Furthermore, the results obtained show that the changes in eruption dynamics occurring at different vents located at relatively short distances in this volcanic area can be controlled by shallow stratigraphical, structural, and hydrogeological features underneath these monogenetic volcanoes.

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