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Imaging Tenerife volcanic island from fuzzy logic clustering of electrical resistivity and seismic velocity 3D models

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The volcanic island of Tenerife belongs to Canary Islands archipelago (Spain). Volcanism on Tenerife Island is very heterogeneous encompassing from basaltic eruptions to highly explosive eruptions The most important edifice is located in the center of the island and is formed by Las Cañaadas caldera and Teide-Pico Viejo stratovolcanoes Complex (CTPVC) in its center. Due to the gas exhalation from the active geothermal system beneath Teide, fumaroles can be observed often in its cráter. In this work we have done a 3D joint interpretation of magnetotelluric and seismic tomography model. In this area, magnetotelluric and seismic tomography studies have been done separately. The novelty of the present work is the combination of both techniques in Tenerife Island. For this aim we have applied Fuzzy Clusters Method at different depths obtaining several clusters or classes. The obtained results allowed us to interpret in more detail the complex structure of Tenerife Island. Based on cluster analysis the most relevant result is the presence of a geothermal system below Teide volcano at 600 m (b.s.l). This interpretation has already made by other authors suggesting that the heat source of the fumarolic activity is located around this depth. Moreover, the clay cap, a typical structure for geothermal systems characterize by low resistivity and medium velocity values and observed in several geotermal environments has been also observed at shallower depths. On the other hand, at deeper depths the results from cluster analysis suggests that the observed structures correspond to ancient volcanic edifices (basaltic bodies) as Roque del Conde in the south.