Fuzzy-Logic Clustering of 3D Magnetotelluric and Seismic Velocity Models: Tenerife Island, Spain

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Abstract

We present the joint interpretation of two geophysical models obtained in the Tenerife Island. The geophysical data employed are complementary (seismic velocity and electrical resistivity). The 3D electrical resistivity structure of the island has been obtained trough 3D inversion of 148 magnetotelluric sites in the period range 0.001 to 10 s. Data analysis indicates that a correct inversion of the MT data requires the use of 3D model incorporating the step topography of the island as well as the bathymetry. The 3D seismic velocity model is based on more than 100000 travel times obtained from a 3D active seismic experiment using offshore shots recorded at more than 150 onshore seismic stations. The 3D electrical resistivity model shows a ring shaped low resistivity anomaly that has been interpreted as a hydrothermal clay alteration cap. A low resistivity structure characterizes the main volcanic structure of the Las Cañadas-Teide-Pico Viejo Complex. This structure correlates with a high P-wave velocity body. A new 3D image has been using soft clustering methods (i.e. fuzzy c-means) for combining the independently derived models. This new 3D image allows to better identify the main geological structures and processes on the island.