



## **From 3D to 4D seismic tomography at El Hierro Island (Canary Islands, Spain)**

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In this work we are going to show the advantages of a dynamic tomography 4D, versus a static image 3D related with a volcanic reactivation and eruption at El Hierro island (Canary Islands, Spain). In this process a high number of earthquakes before and during the eruptive processes have been registered. We are going to show a 3D image as an average of the velocity structure and then the characteristics and physical properties on the medium, including the presence or not of magma. This image will be complemented with its evolution along the time, observing its volcanic dynamic and its influence over the medium properties, including its power as an important element on early warnings protocols.

After more than forty years of quiet at Canary Islands, since 1971 with Teneguía eruption at La Palma Island, and more than 200 years on El Hierro Island (The last eruption known at El Hierro took place in 1793, volcán de Lomo Negro), on 19th July on 2011 the Spanish seismic national network, administered by IGN (Instituto Geográfico Nacional), detected an increase of local seismic activity below El Hierro island (Canary Islands, Spain). Since this moment an intense swarm took place, with more than 11000 events, until 11th December, with magnitudes (MLg) from 0.2 to 4.4. In this period two eruptive processes have been declared in front of the South coast of El Hierro island, and they have not finished yet.

This seismic swarm has allowed carrying out a 3D seismic tomography, using P and S waves traveltimes. It has showed a low velocity from the North to the South. On the other hand, we have performed a 4D seismic tomography, taking the events occurred at different intervals of time. We can observe the evolution of the negative anomaly along the time, from the North to the South, where has taken place La Restinga submarine eruption. 4D seismic tomography is an innovative and powerful tool able to show the evolution in time of a volcanic process.