

Cumbre Vieja volcanic eruption (La Palma, Canary Islands): Magnetotelluric monitoring experiment

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SUMMARY

The last volcanic eruption in the Canary Islands took place in La Palma (September 19th - December 14th, 2021). For over 90 days the so-called Cumbre Vieja volcano was active, the longest volcanic eruption ever registered in this island, which represented a unique opportunity to assess the electrical resistivity changes related to this type of activity. On the one hand, the presence of magma generates strong resistivity contrasts with the hosting units, since magmas contain dissolved water in their composition that reduces its resistivity. On the other hand, the whole hydrothermal system which was characterised by the 3-D resistivity model of La Palma Island performed in 2019 will be most likely modified by the strong changes associated to this new geodynamic context. Under these circumstances, several experiments have been performed in the island since the beginning of the volcanic eruption, in order to understand the changes of the electrical resistivity associated to the magma intrusion, as well as the potential of the magnetotelluric method for the volcanic monitoring. Here, we present some preliminary results of this monitoring experiment, where important changes on the electrical properties of the subsoil have been detected and correlated to other information available, such as the seismicity. Additionally, the tests conducted against the 3-D resistivity model of the island (baseline model performed in 2019) help to understand the meaning and implications of such changes. These results remain preliminary, but they are definitely encouraging, as demonstrate the potential of the magnetotelluric method for the volcanic monitoring activities.

Keywords: Magnetotelluric 3D, volcanic monitoring, Canary Islands.
