Contribution institutions:

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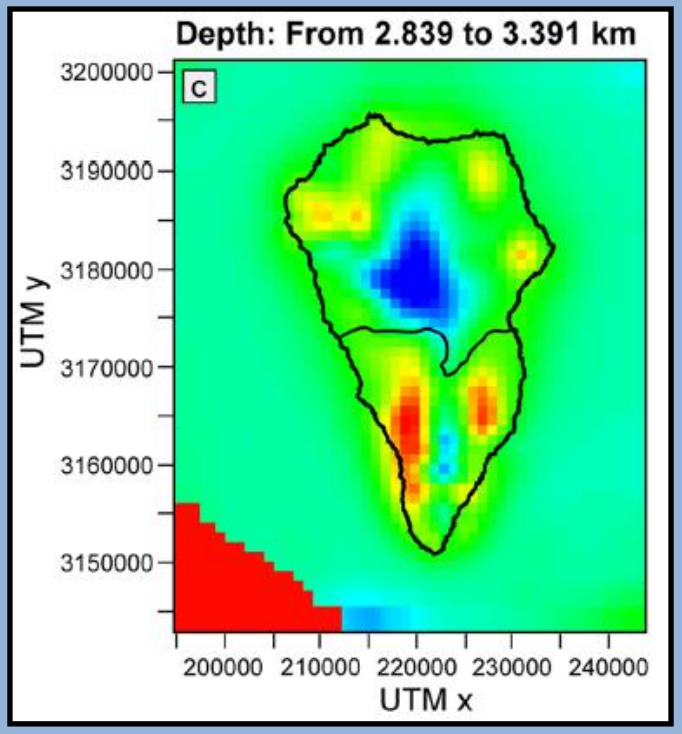
# Electromagnetic monitoring of the Cumbre Vieja eruption (La Palma, Canary Islands)

**David Martínez van Dorth**[1,2], Perla Piña-Varas[3], Iván Cabrera-Pérez[1], Juanjo Ledo[4,3], Luca D'Auria[1,2], and Nemesio Pérez[1,2]

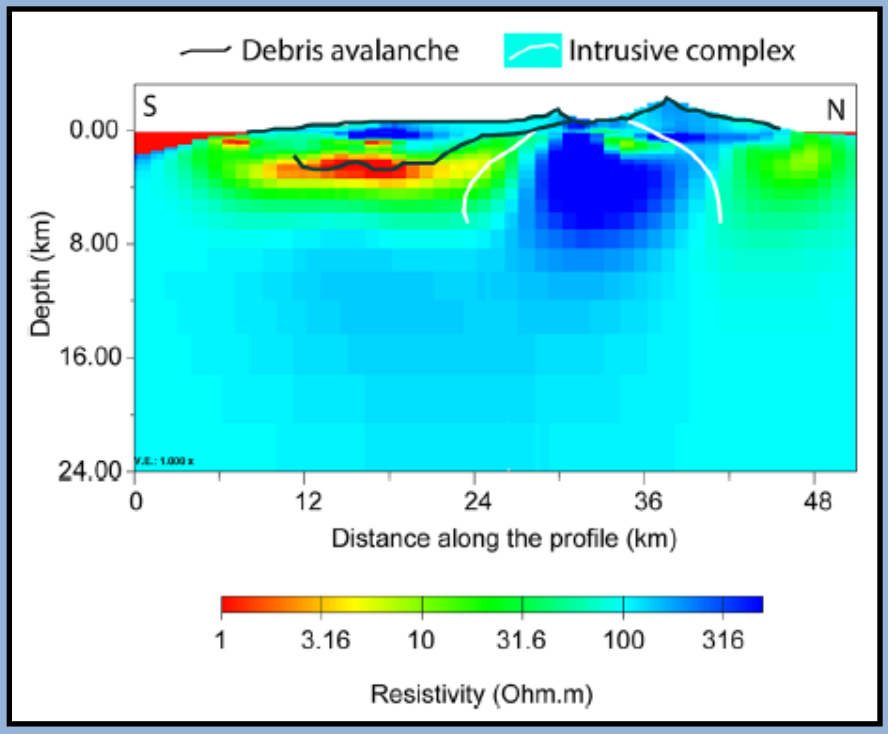
[1] Instituto Volcanológico de Canarias (INVOLCAN), 38320 San Cristóbal de La Laguna, Tenerife, Canary Islands
[2] Instituto Tecnológico y de Energías Renovables (ITER), 38600 Granadilla de Abona, Tenerife, Canary Islands
[3] Department Dinàmica de la Terra i de l'Oceà, Universitat de Barcelona, Barcelona, Spain
[4] Physics of the Earth and Astrophysics Dep., Faculty of Physics, Universidad Complutense de Madrid, Spain

# A brief introduction: Previous 3D resistivity model

**In 2018, a dataset of 44 magnetotellurics (MT) sites were measured. Two years later in 2020, we published the first 3D electrical resistivity model of the island of La Palma (Di Paolo et al., 2020).**

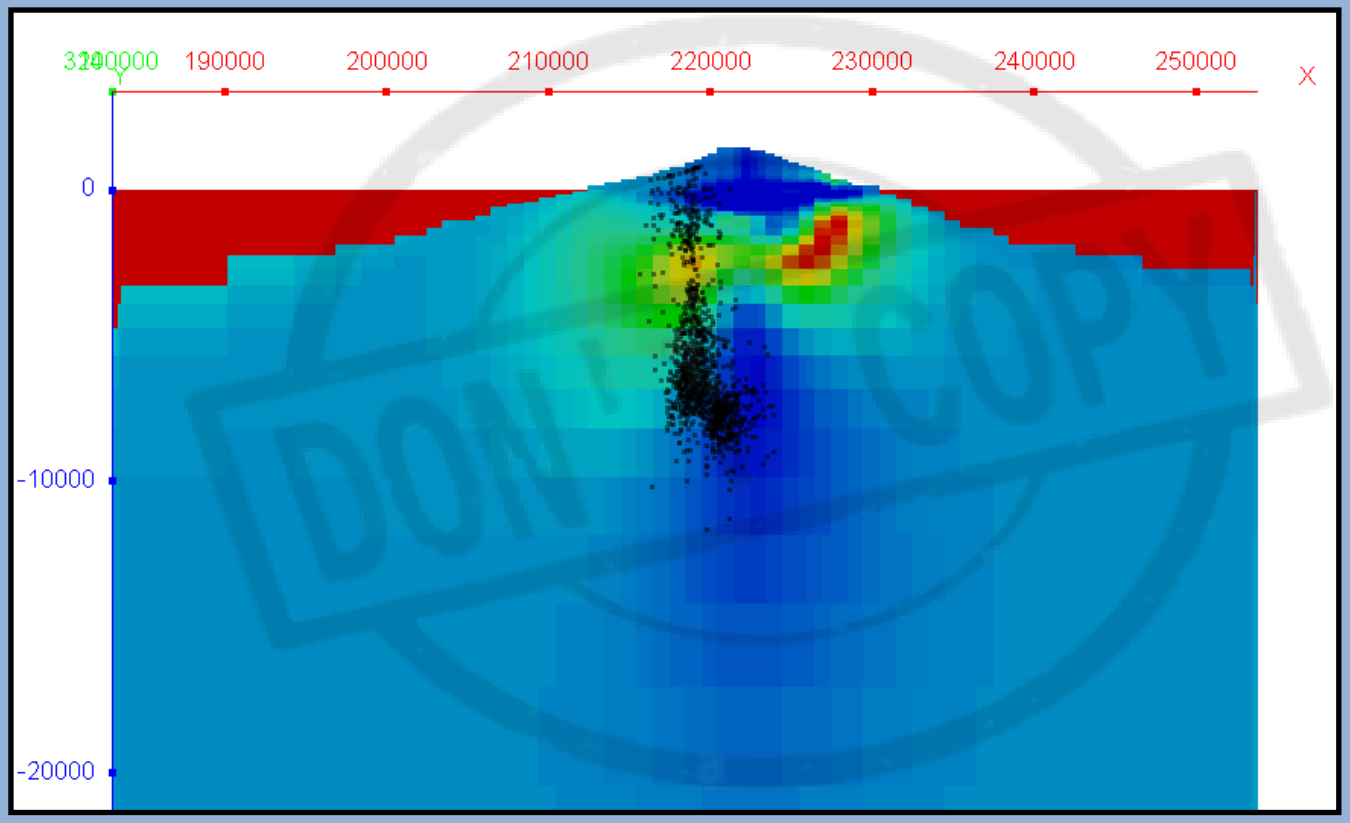



Horizontal section of the 3D resistivity model at a depth of 2.839 – 3.391 km (Di Paolo et al., 2020)



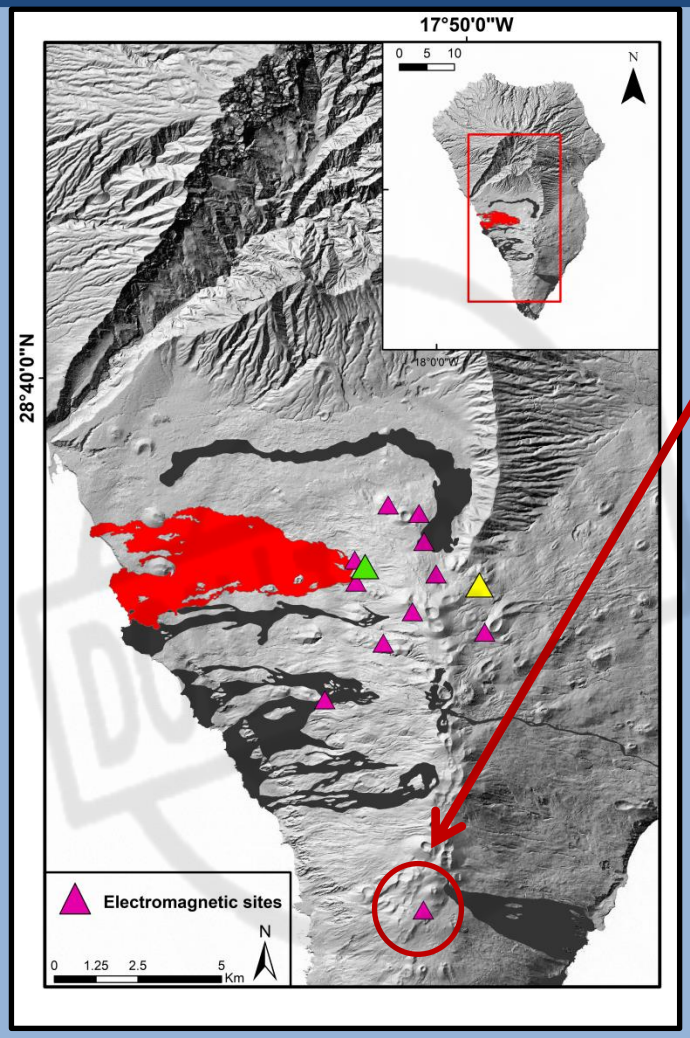

Vertical N – S section obtained from the resistivity model (Di Paolo et al., 2020)

# Ascending seismic swarm compared with the 3D resistivity model




3D electrical resistivity model of La Palma (Di Paolo et al., 2020) with the location of earthquake hypocenters obtained from INVOLCAN's seismic database

# Electromagnetic campaign




Location of the MT sites measured. Yellow triangle, Site 5. Green triangle, Site 13

The eruption began on September 19, 2021, in the west flank of the Cumbre Vieja Volcanic Complex. The first MT station was installed on September 25, 2021.

During the volcanic eruption and post-eruptive process, 13 new magnetotelluric sites were acquired:

- 9 MT sites measured continuously for months (not simultaneously)
- 4 MT sites measured for a few days

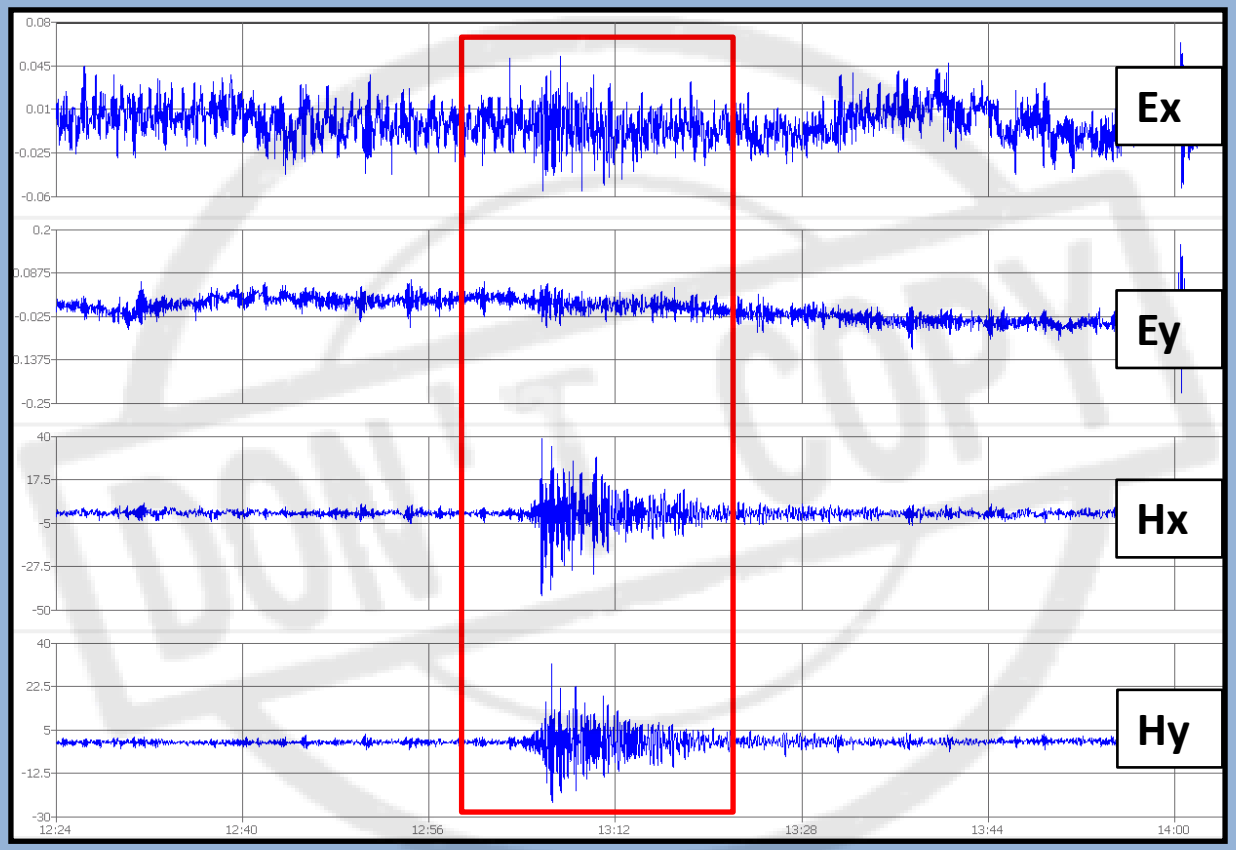
Installation of a magnetotelluric station

# Looking at the data

Regular maintenance was required due to ash fall

**Some earthquakes were observed in the time series affecting the electric and magnetic components.**

Earthquake observed on October 1, 2021, at 14:13:01 local time



# Phase tensor and phases of the impedance tensor determinant pseudosection: Site 5

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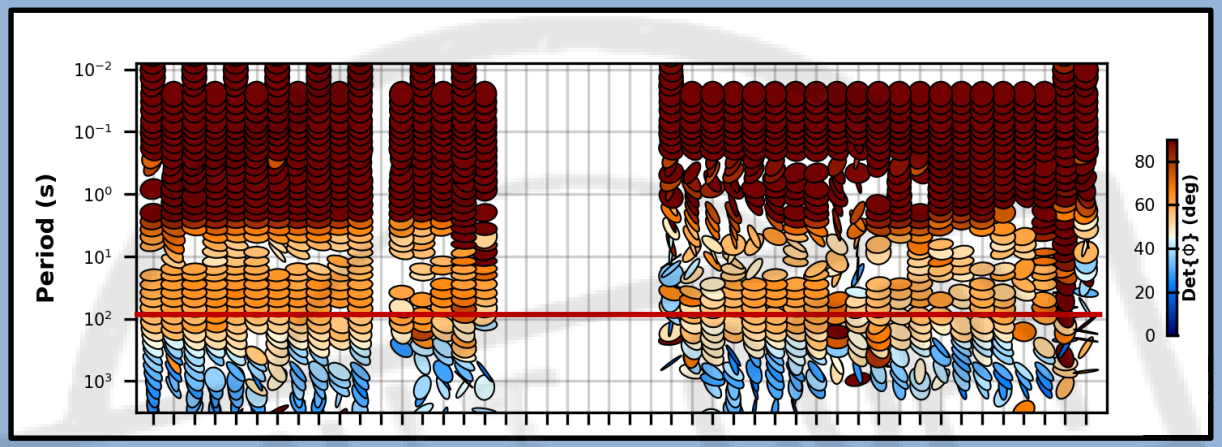
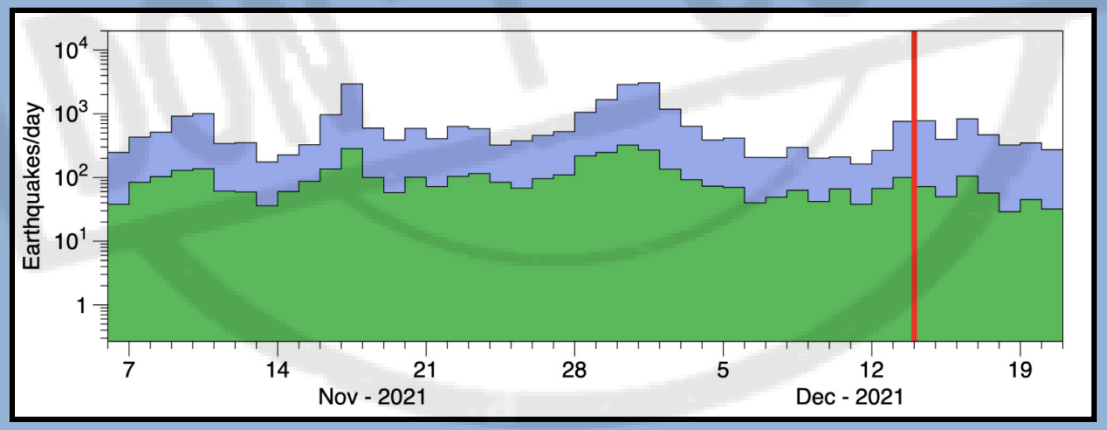


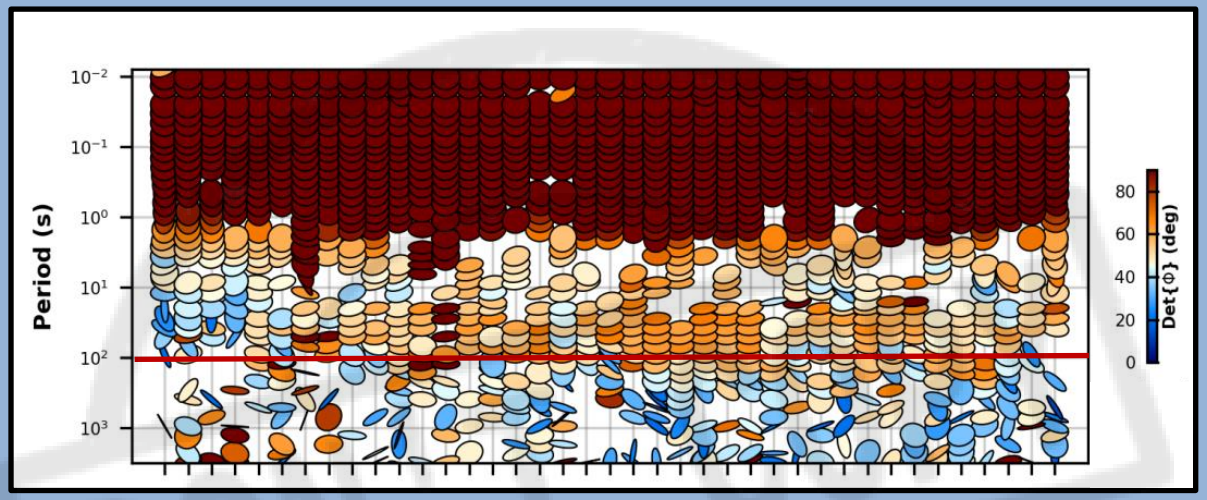



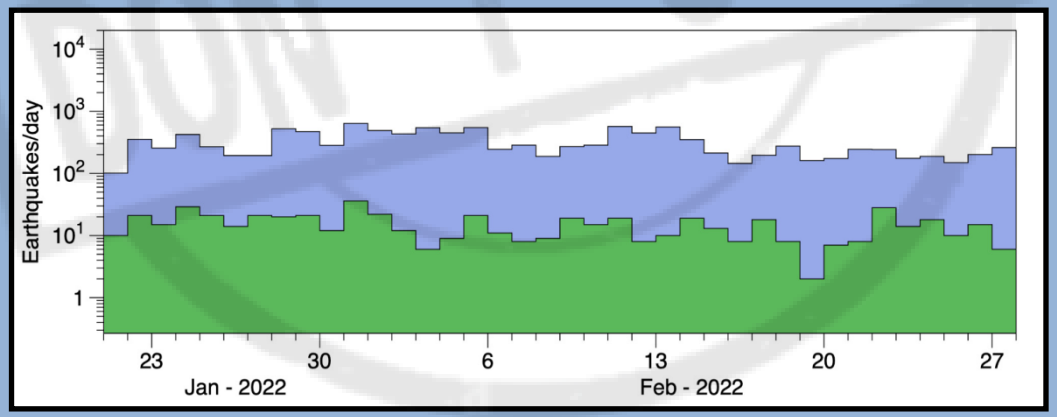

Number of earthquakes between 06/11/2021 – 21/12/2021

Phase tensor and phases of the impedance tensor determinant for the magnetotelluric site nº 5 between 06/11/2021 – 21/12/2021

Volcanic plume ascending

# Phase tensor and phases of the impedance tensor determinant pseudosection: Site 13




Number of earthquakes between 21/01/2022 – 28/02/2022

Phase tensor and phases of the impedance tensor determinant for the magnetotelluric site site nº 13 between 21/01/2022 – 28/02/2022

Degassing of the volcanic edifice

## Ongoing research

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- The comparison between the 3D electrical resistivity model with the earthquake hypocenters reveal that most of them have occurred in resistive bodies.

- Some interesting variations have been observed in the temporal evolution of the magnetotelluric responses in different MT sites.

- The comparison between different electromagnetic stations that were measuring in the same time and the correlation with other geophysical, geodetic and geochemical data could provide information of the behavior of the volcanic system during the eruptive process.

- Synthetic models have been considered with the data collected during the eruption and post-eruptive process to check if the previous 3D electrical resistivity model has changed.

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# Thank you!

Contact: dmartinez@iter.es

**Contribution institutions:**

**Financial support:**