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3-D Electromagnetic Imaging of Furnas Volcano (Azores Archipelago, Portugal): Preliminary results from the Broad-Band Magnetotelluric data

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Hydrothermal systems associated with volcanic structures represent volumes of preferential transfer of fluids and volcanic gas, particularly water vapour and CO_2, towards the surface. The CO_2 emissions can pose serious threats to the population. Moreover, the hydrothermal systems represent a zone of alteration and mechanical weakness subject to flank instabilities, which can be triggered by volcanic activity and rainfalls. Furnas volcano, which is the eastern-most of the three trachytic active central volcanoes of São Miguel Island, hosts hydrothermal CO_2 emissions zones and 60-90% of the houses are built over those zones. 39 Audio-MagnetoTelluric (AMT) and 15 Broad-Band MagnetoTelluric (BBMT) data were acquired in 2015 and 2016, which aims at an improved imaging of subsurface electrical conductivity beneath Furnas volcano. Shallow, fumarole-related features within the Furnas hydrothermal system have been identified by inverting 39 AMT data (10^{-4} s – 1 s). The 3-D inversions were performed including only high-resolution topography data employing the parallel version of the Modular system for Electromagnetic inversion code, ModEM. This study focuses on 3-D forward and inverse modelling of the full dataset including not only high-resolution topography but also the Atlantic Ocean bathymetry data to image the deeper structures (greater than 1 km) beneath the volcano.