



Structure of an unstable, Atlantic Oceanic island volcano (La Palma, Canary Islands) from land magnetotelluric imaging

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Large-scale mass wasting is part of the evolution of volcanic islands, where deformation and indications of flank instability such as large-scale faulting as well as seismic and aseismic slip are common. The Cumbre Vieja volcano in the island of La Palma (Canary islands, Spain), in the eastern central Atlantic, provides an ideal setting to address fundamental questions about the structure, evolution and stability of island volcanoes. The island of La Palma, the youngest of the Canary Archipelago, is still in a shield building stage. It has been postulated that the western side of the island lies over a pre-existing zone of weakness that can nucleate ruptures.

In summer 2007, we realized an AMT survey around the area where the unstable western flank position has been proposed. The goals of this study were to delineate this unstable flank, identify the presence of fluids, and map the structures underneath. The AMT method has been extensively used by mining industry to map the upper 2 km of the crust and thus we deemed it to be the ideal geophysical tool to study the island. A total of 28 sites were recorded in 10 days, which have been divided in three profiles with EW orientation and one NS profile. The results show a 1 km thick top resistive layer that is located where the unstable flank was proposed. This shallow structure lies over a more conductive area that has been interpreted as a fluid bearing layer. The eastern and southern edges of the unstable layer can be delineated from the present data. However, a second leg of the project will provide enough data coverage to map the northern extent of this layer. Marine geophysics will be necessary to map the western extent under the ocean.