

Combining geophysics and structural geology to constrain deformation in the Larderello-Travale geothermal field.

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Context

The Larderello-Travale geothermal field (LTGF) is located in Central Tuscany, Italy. The LTGF is part of the Tuscan Magmatic Province emplaced since the early Miocene during the slab rollback in the collision of the Sardinia-Corsica and the Adria plates [Dini *et al.*, 2005]. The LTGF is marked by extensional tectonics that began in the Pliocene [Brogi *et al.*, 2005]. At approximately 3 km depth the LTGF is characterized by a horizon (more precisely a marked seismic reflector) known as the k horizon [Brogi *et al.*, 2003]. The k-horizon is suggested to be characterized by the presence of supercritical fluids hosted in fractured lithologies [Bertini *et al.*, 2006] and it is thought to represent the brittle-ductile boundary. Natural resources have been exploited from the LTGF since 1904. The region is affected by episodic phreatic explosions driven by superheated fluids near the surface.

Objectives and Methods

Linking structural geology and geophysics is key to understand the kinematic at the large scale of a given geological system. However, until now outcrop scale geological observations and geophysical methods have been challenging to combine. This study proposes to use Deep Electrical Resistivity Tomography (DERT) methods to investigate regions of the LTGF where fault systems may behave differently from the overall large scale kinematic under the effect of elevated pore pressures. The candidate will combine IRIS Fullwaver technology (more info about the instrumentation [here](#)) for the acquisition of DERTies across selected faulted regions with non-unique kinematic indicators. This field-oriented project includes a field survey to acquire 2D and 3D resistive data as well as structural geology data. The combination of DERT and geological information will allow the candidate to derive conceptual model of faulting behaviours under near-lithostatic pore pressure conditions.

Literature

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View of the Larderello-Travale Geothermal Field

Sites WEB

<http://www.unige.ch/sciences/terre/en/research/crustal-deformation-and-fluid-flow/>

Choice of orientation : SERG

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