Because of their velocity, density and temperature, pyroclastic density currents are among the most destructive natural events in terms of human loss and infrastructure damage. The reconstruction of eruptive scenarios, including the possible extent, distribution and thermal structure of pyroclastic flows, is an essential element for mitigation of volcanic risk in densely populated areas. Fundamental factors in understanding the dynamics of explosive eruptions are given by the behaviour of transport and depositional systems and by temperatures at which pyroclastic flows are emplaced.

In this project we propose to apply an integrated and innovative scientific approach for the study of thermal history of pyroclastic flow deposits related to two main eruptions of Sete Cidades and Fogo active volcanoes (Sao Miguel, Azores). Field analyses and paleomagnetism will be the leading methodologies and results will be interpreted in terms of emplacement temperatures and flow directions of the investigated pyroclastic deposits. The estimations of emplacement temperature obtained by paleomagnetism and field work will be integrated by adopting a new innovative strategy. This includes petrographic analyses of charcoal fragments, laboratory experiments on obsidian fragments and geothermometer analysis on juvenile pumice fragments. Each component of pyroclastic density currents will be analysed in order to gain information about their thermal response during an eruption event, from the vent to the depositional area. In this way, for the first time, information on temperatures obtained by different methodologies will be compared, producing a realistic scenario of heat dissipation during the dynamic evolution of pyroclastic flow.