

Title: Lava tube morphology and mechanism of formation at Mt. Vesuvius

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Research program

Lava tube formation is one of the main mechanisms for lava flow propagation in pahoehoe and `a`a flows. The last (A.D. 1631-1944) Mt. Vesuvius interplinian phase was characterized by the emplacement of voluminous lava flow deposits, in some cases accompanied by the formation of lava tubes. The highly explosive nature of the volcano, famous by its Plinian and Subplinian eruptions (e.g. 79 A.D., 472 A.D., 1631 A.D), contributed to deviate the scientific interest from a topic (lava flows and lava tubes) instead deeply treated in basaltic volcanoes, such as Hawaii and Etna. However at Vesuvius we found the presence of at least nine outcropping lava tubes which formed during the eruptions of 1822, 1858-61, 1895-99 and 1906. Besides these eruptive episodes, other three eruptions (i.e. 1751-52, 1891-94 and 1903-04) formed lava tubes, today no longer visible on the surface. The high urbanization in the proximity of the volcano implies a deep understanding of the volcanological, petrological and physical condition responsible for the formation of lava tube. The results from this study are of primary importance for hazard assessment and risk mitigation.

Proposal for a Ph.D. position

The Ph.D. will be focused on a detailed volcanological, petrological and physical (e.g. rheological) investigation of the effusive phase of Vesuvius focusing particularly in the mechanisms behind the formation of lava tube. The start of the Ph.D. will be based on collecting and discussing the information available from the existing literature, followed by a detailed field work aimed at recognizing the lava flow showing evidences of lava tube formation. This will be followed by a detailed mapping and tube morphology analysis. The sampling will be performed on different sections of the lava tube and the collected rock will be studied petrographically, geochemically and rheologically. Most of the analysis will be performed using facilities at the Department of Earth, Environmental, and Resources Sciences (DiSTAR) at the University of Naples, Federico II, where the PhD student will have the possibility to acquire technical skills in numerous different types of analytical approaches. The candidate will collaborate with other institution such as the INGV and the Universities of Perugia and Camerino, for acquiring experience in additional analytical methods. The candidate is expected to have a strong background in volcanology, petrology, rheology and geochemistry, and an affinity to field and laboratory activities. Good knowledge of English, spoken and written, is a fundamental requisite.