Multidisciplinary investigations in the Upper Pisciarelli area, Campi Flegrei, Italy

A. SCIARRA[1]*, C. MEZON[2], A. FINIZOLA[2], T. RICCI[1], C. LUCCHETTI[3], R. ANTOINE[4], B. BEAUCAMP[4], D. GAUDIN[1], P. TUCCIMEI[3], M. PORET[5], F. SANSIVERO[6], G. VILARDO[6]

[1]Istituto Nazionale di Geofisica e Vulcanologia, Roma, Italy (*correspondence: alessandra.sciarra@ingv.it)

[2]Laboratoire GéoSciences Réunion, Université de la Réunion, IPGP, Sorbonne Paris-Cité, CNRS UMR7154, Saint Denis, La Réunion, France

[3]Dipartimento di Scienze, Università Roma Tre, Roma, Italy

[4]Centre d'études et d'expertise sur les risques, l'environnement, la mobilité et l'aménagement, Rouen, France

[5]Istituto Nazionale di Geofisica e Vulcanologia, Bologna, Italy

[6]Istituto Nazionale di Geofisica e Vulcanologia, Osservatorio Vesuviano, Napoli, Italy

A multidisciplinary geochemical-geophysical study was carried out on January-May 2015 in order to identify at metric scale a link between hydrothermal activity and soil permeability in an active volcanic context. The target site named "Pisciarelli", located on the outer eastern flank of Solfatara crater (Campi Flegrei), was chosen because it has shown a marked increase in hydrothermal activity since October 2006. The investigations were performed on a sector (~300m^2) of the upper fumarolic area of Pisciarelli, located 130m west from the 2006 boiling pools and the main fumarolic field. The multidisciplinary approach consisted in measurements of soil degassing, soil gas concentrations, self-potential, soil permeability, and soil temperature, as well as thermal imaging by means of fix and portable thermal cameras and photogrammetric reconstruction of high-resolution DEM. Measurements were carried out over fixed grids of 1*1m (temperature and self-potential; 372 points) and 2*2m (gas and permeability; 98 points and 8 vertical profiles). Results highlight that intrinsic permeability at 80cm depth is inversely correlated with soil temperature, self-potential, CO_2 fluxes and concentration. Low temperatures (<43°C) characterize soils with gas permeability ranging from 14.2 to 93.2 darcy while higher temperatures (48-90°C) showed lower soil permeability values, ranging between 13.2 to 31.4 darcy. We interpret the latter zones as the result of the higher degree of soil minerals alteration that reduces soil porosity.