Changes of heat and fluid release from crater and peripheral areas during solphataric activity

IOLE SERENA DILIBERTO[1], MARCO CAMARDA [2]

[1 1-2]INGV Via Ugo La Malfa 153, 90146 Palermo, Italy [1]iole.diliberto@ingv.it; [2]marco.camarda@ingv.it

At Vulcano (Aeolian Islands, Italy), different measurement methods have been developed for more than 30 years and models were formulated to account for the real time evolution of the actual solphataric activity. The results of a long term monitoring of surface temperature and of CO_2 flux from soil, reviewed in a multidisciplinary framework, are presented here. These two parameters, monitored at the ground surface, highlighted local variations of the hydrothermal release and the time series of data showed in several instances, different range of values. The background and anomalous ranges defined by this long term monitoring are robust by a statistical point of view. The long term data-series offered a useful tool to verify conceptual framework and to better define the natural hazard evaluation integrating "classical" and "new" investigation techniques. Moreover, La Fossa area lays in a geodynamic context with active seismo-tectonic processes, frequently perturbing the pressure field of the hydrothermal system under investigation. Any perturbation in the pressure state variable (P) of the system, results in an excited state of its components and a relevant transfer of energy and mass towards the surface starts to counterbalance the perturbation. The continuous monitoring of surface temperature reveals the effects of the forces guiding the heat flows whereas the space variation of temperature indicates the rising paths of hydrothermal and magmatic fluids. The occurrence of new fumaroles and mofetes, or even changing emission rates of fluids by these vents, rises questions about the evolution of the equilibrium state of buried hydrothermal system, or about changing physical condition of overburden rocks. The conceptual framework suggesting the potential of our time series of field data is that a rock body, can be seen as a multiphase geochemical system where the fluid phases play a crucial role in defining the physical changes of the body and its response to the different forces acting on it. The changes of pore pressure depend on the balance between gas phases production and gas leaked out from a geochemical system. Analyses of fluxes at the system boundaries can give information on the equilibrium of the interacting geo-spheres. Even if playing variables are too many, some specific compounds and parameters can be selected as indicators of the state of the system.#