

Predicting volcanic ash dispersal combining field, experimental and meteorological data into super-computational numerical simulations

The expected outputs of the project will enhance multidisciplinary and collaborative research in volcanology, and will supply new tools for the understanding of physical processes that govern the dispersal of fine particles in the atmosphere. The project is of interest for the improvement of hazard mitigation plans in densely inhabited areas. The project targets women researchers and include collaboration with developing countries

The main target of the present project is to build up a protocol for forecasting the dispersal of fine ash from three selected volcanoes, Somma-Vesuvius (Italy), Fuego de Colima and Popocatepetl (Mexico), in the case of an explosive eruption of any intensity and magnitude. The final products are expected to satisfactorily forecast the concentration at ground level and in the atmosphere of different size ash particles. This is a crucial variable to be used for human and animal health care, assessment of ground and water pollution, and evaluation of expected impact on buildings and infrastructures. To date, this is an issue that has been approached only for very small eruptions and with simplified models valid at scales smaller than few hundreds of km. Moreover, except for the potential impact on air traffic managed by volcanic ash advisory centers (VAACs), effects of fine ash are poorly addressed by present day mitigation plans. In order to achieve the main target and fill the lacks in the knowledge of volcanological parameters we will follow three main cross-integrated research lines: i) collection and collation of field data; ii) laboratory analyses and experiments; and iii) numerical modeling. The results of research lines 1-3 will be merged in large-scale 3D numerical simulations of volcanic ash dispersal using super-computational facilities. The expected outputs will benefit both the current research in volcanology and civil protection strategies in all the three selected areas.