Volcanological and geophysical investigations at Vesuvius

Giovanni Macedonio

Istituto Nazionale di Geofisica e Vulcanologia, Osservatorio Vesuviano, Napoli, Italy, on behalf of the MURAVES collaboration

Vesuvius is considered to be one of the most dangerous volcanoes the world. The main reasons are: its high explosivity and the large number of inhabitants living on its slopes. A lot of studies were carried out for better reconstructing its past history. These include field studies, geophysical surveys, continuous monitoring and modeling. One of the objectives of the geophysical investigations is the detection of the internal magma bodies and its monitoring, in order to forecast the arrival of new magma as a trigger of future eruptions. Actually, the internal structure of the volcano is mostly known from the active and passive seismic tomography carried out in the last years and from gravimetric surveys. In particular, the seismic tomography can explore the deep structure of the volcano up to about 10 km. However, the spatial resolution provided by the seismic tomography (about 1km) is not yet enough for detecting the presence of shallow magma bodies. On the other hand, muon radiography allows a much higher spatial resolution, although the explored volume is restricted to the upper part of the volcano. The use of muon radiography, applied to Vesuvius, is carried out in Italy in the ambit of collaboration between the Istituto Nazionale di Fisica Nucleare (INFN) and the Istituto Nazionale di Geofisica e Vulcanologia (INGV). The recent Italian Project “MURAVES” has the objective to perform a combined exploration of the upper structure of Vesuvius by using muon radiography and gravimetric surveys. MURAVES is based on a team of researchers that actively collaborate for several years and benefits of the experience gained in the ambit of previous INFN projects, such as MU-RAY and MURAY2.