



## **Tephra fallout hazard assessment from a sub-plinian eruption scenario at Vesuvius**

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Volcanic eruptions can produce several hazardous phenomena, such as tephra fallout, pyroclastic density currents, lavas and lahars. Tephra fallout can cause severe damages to buildings, infrastructures, viability, agriculture, livestock and humans. Moreover volcanic particles in the atmosphere may significantly affect air traffic. Forecasting type and size of the next eruption of a given volcano, i.e. the expected eruption scenario, is a very arduous task in volcanic hazard assessment. Such forecasting cannot be performed deterministically, but only via a probabilistic approach.

The reference eruption scenario at Vesuvius volcano, for the emergency planning, is similar to the AD 472 eruption. For this reason a computational model is applied for reconstructing fallout deposits of this eruption with the aim of best estimating governing parameters, such as total erupted mass, column height and bulk granulometry, through best fit.

The model used for simulations, named HAZMAP, is a FORTRAN code which solves the equation of diffusion, transport and sedimentation of volcanic lapilli and ashes. The model uses a semi-analytical computational method that greatly reduces the required computer time and memory. This allowed us to produce: i) ash loading probability maps associated to a statistical set of daily wind profiles, ii) reference deposits relative to the main sectors and, iii) the estimate of the statistical probability of each deposit.

Results show that hazard associated to fallout deposits can affect a densely inhabited area which involves sectors of the city of Naples and several municipalities spreaded around Vesuvius.