ECOLE LEMANIQUE DES SCIENCES DE LA TERRE
DES UNIVERSITES DE GENEVE ET DE LAUSANNE

Master of Sciences in geology

# TITLE: Hazard and risk assessment of lava flows on Vulcano island, Italy

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**Context**

*Volcanic eruptions are large scale natural processes which require immediate action to reduce the destruction they might cause from products such as ash sedimentation and hazardous flows, e.g. lava flows, lahars and pyroclastic flows. In particular, lava flows represent a significant hazard that constitutes risk for urban area located close to active basaltic volcanoes. Lava flows are naturally controlled by the morphology of the terrain over which they flow and as a result, their paths, length and width can be predicted to divert them from getting to inhabited areas. This can be achieved with the use of computer models.*

**Objectives and Methods**

*In this study, we plan to use an existing lava flow model (Connor et al. 2012) to estimate the probability that a lava flow originated from the main volcanic systems on Vulcano island (Italy) will flood a specific site. The eruptive conditions used as input for the model will be based on a dedicated mapping and sampling of existing lava flows in Vulcano from both La Fossa Cone and Vulcanello (see picture below). The hazard analysis will be combined with detailed evaluation of exposure and vulnerability in order to compile a risk assessment. The final results will be the production of lava flow hazard and risk maps that will show the most vulnerable areas and infrastructures. These maps can be used in the long term for territorial planning and risk mitigation.*

**Literature**

- *Connor, L. J., Connor, C. B., Meliksetian, K., and Savov, I. (2012) Probabilistic approach to modeling lava flow inundation: a lava flow hazard assessment for a nuclear facility in Armenia. Journal of Applied Volcanology*
- *Galderisi, A., Bonadonna, C., Delmonaco, G., Ferrara, F.F., Menoni, S., Ceudech, A., Biasse, S., Frischknecht, C., Manzella, I., Minucci, G., and Gregg, C. (2013) Vulnerability Assessment and Risk Mitigation: The Case of Vulcano Island, Italy, in Landslide Science and Practice. Vol 7: Social and Economic Impact and Policies, p. 55-64.*
- *Sheridan MF, Frazzeta G & La Volpe L (1987) Eruptive histories of Lipari and Vulcano, Italy, during the past 22,000 years. In: Fink JH (ed) The emplacement of silicic domes and lava flows. Geological Society of America Special Paper 272: 29-33*

View of the island of Vulcano from Lipari showing the two main volcanic centres: Gran Cratere of the La Fossa Cone and Vulcanello.

**Sites WEB**

http://cms.unige.ch/sciences/terre/research/Groups/physical_volcanology/physical%20volcanology.php

**Choice of orientation :**

*Geological Risks*