

## LAVAFLEX project: LAVA flow pushing capability experiment

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Lava flows represents a major risks for the cities located along the slopes of active volcanoes. To mitigate their impact artificial barriers can be employed for controlling their propagation. In this work we describe an experimental study aimed at evaluating the effectiveness of gabion barrier systems to protect strategic and critical infrastructures as well as valuable sites (Scifoni et al., 2010). The investigated approach was recently applied to design a gabion barrier system to protect from lava flow invasion the touristic infrastructural complex in the south sector of the Etna volcano. In order to correctly estimate the dynamic pressure of a basaltic lava flow impacting on a structure the LAVAFLEX experiment will set up a prototype gabion barrier equipped with a sensor system. The pressure on the barrier will be measured from the first contact with the lava flow, when the high-temperature inner fluid core (typically higher than 1000°C) is exposed, up to its complete solidification in blocky or massive basaltic rocks (below 700°C). The measurement device, namely LAVAFLEX-SK (Sensor Kit), is composed by a set of stress and temperature sensors mounted between two parallel steel plates that will be attached to the side of the gabion barrier facing the approaching lava flow. In addition, a low-cost GNSS-IMU system will be installed on the barrier to track the possible translation and rotation movements. The experiment will be performed in upper portion of volcano where the continuous eruptive activity have produced more than 200 episodes in the last 20 years. The LAVAFLEX-SK will set on the paths of expected lava flows discharged by the summit craters, which have been identified on the basis of a detailed morphological analysis carried out using an updated Digital Elevation Model (DEM) extracted using data from satellite, aerial and terrestrial surveys.