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New methodology for lahar events hazard assessment on the Northern Somma slope

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Several lahar events are recorded on the Somma slope, due to the remobilization of the pyroclastic deposits of Campi Flegrei and Somma-Vesuvio of the last 10,000 y B.P, whose thickness ranges between few centimetres and about 20 meters.

A new methodology has been used to define the Somma lahar hazard map, where a historical archive is missing and where the triggering area and the path followed by the single lahar-induced flows are difficult to reconstruct.

This methodology is mainly based on the spatial analysis, used to study complex natural processes by comparing and synthesizing elementary environmental data (geology, geomorphology, vegetation, hydrogeology).

The main investigated topics were a) the triggering areas, b) the main lahar flow directions, c) the invaded areas.

The Path algorithm has been used to simulate about 400 flow directions, starting from the caldera boundary, which have been lumped in eight main directions that cross the urbanized area of Pollena Trocchia, Somma Vesuviana and S. Giuseppe Vesuviano municipalities.

The triggering areas have been defined taking into account the thickness of pyroclastic deposits, the slope, the rainfalls. The areas displaying high probability of occurrence of new lahar events, in the inter-eruptive phases, like the present, correspond with the deep valleys characterized by high slope and thickness of pyroclastic deposits less than 5 meters. In the syn-eruptive phase or immediately after, the area with the

highest probability of occurrence of new events corresponds to the uppermost part of the Somma slope, where the pyroclastic deposits can be easily eroded by the rainfalls.

The energy line model has been used to delineate the area invaded by the lahar events. Two models have been defined with: a) drop height (H) equal to the height of Somma caldera boundary and reach angle (α) = 0,2 and 0,3; b) H equal to the difference between the height of Somma caldera boundary and the mean height of the areas where the depositional phase of lahar events starts, and reach angle (α) = 0,2 and 0,3.

The invaded area of the first model are larger than those of the second one. The urban centres located at the foot of the Somma slope, in fact, are completely covered in first energy line model simulation, while they are only partially hit by the second one.