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A zonation map for volcaniclastic-flow hazard in the area surrounding the Neapolitan volcanoes (Campania Region, Italy)

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The triggering of destructive volcaniclastic flows is a one of the most recurrent and dangerous natural phenomena that can occur in volcanic areas. They can originate not only during or shortly after an eruption (syn-eruptive) but also during a volcanic quiescence (inter-eruptive), when heavy rains remobilize the loose pyroclastic deposits. One of most important example of inter-eruptive volcaniclastic flow hazard is represented by the Apennine relieves that border the southern Campanian Plain. These steep relieves are covered by variable thickness (from few cm to some m) of volcaniclastic material dispersed by the explosive activity of Somma-Vesuvius and Campi Flegrei volcanoes, located few km to the west. The most recent, large dangerous event is certainly that occurred on May 5, 1998, which caused the death of more than 150 people and considerable damage in the villages at the feet of the Apennine relieves. However, this tragic event was only the last of a number of volcaniclastic flow generation that affected the area in historical and pre-historical times. Historical accounts testify for several previous disastrous episodes, like the 40 volcaniclastic-flow events recorded in the southern Campanian Plain relieves during the last 200 years. These events claimed the life of 40 people in AD 1640, 43 people in AD 1764, 120 people in AD 1823, 120 people in AD 1841, 170 people in AD 1910, 30 people in AD 1924, and 30 people in AD 1954.
These disasters clearly indicate that a volcanic hazard mitigation strategy urges for the area. With the aim to contribute to the improvement of volcaniclastic flow hazard and risk mitigation in the study area, we produced a zonation map that identifies the drainage basins potentially more prone to disruption. This map has been obtained combining few morphological characteristics (concavity and basin shape factor) and mean slope distribution of the drainage basins, derived from a digital elevation model with resolution of 10 m. The analysed parameters allowed the classification of 1069 drainage basins, which have been grouped into four different classes of disruption proneness: low, medium, high and very high. The map was organised in a GIS environment which allows a rapid query of the different information stored in the linked data base.