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Hazardous present emergency plans for volcanic eruptions in Neapolitan area: evidences from volcanic and magmatological history and modeling.

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New evidences from volcanic and magmatological features, archaelogical findings, and modeling provide key constraints on the mechanisms and the effects of the explosive eruptions of Somma-Vesuvius and Campi Flegrei, from the prehistory to the modern times. For both volcanic areas, the probability of plinian events (VEI 5) with their complete range of variability is not negligible, differentiated highly explosive magmas are likely already available at depth, and the associated effects of the possible eruption may affect the whole heavily urbanized metropolitan area. Particularly, results of our numerical simulations consistently with field evidences indicate that tephra accumulation during fallout phase of eruption may preserve critical load for roof collapse up to a distance even exceeding 30 km from the vent, while physical proprieties of PDCs may exceed the threshold for human survival even at distance from the vent in the order of 20 km. These results indicate that the appropriate action for the mitigation of volcanic risk should be the complete evacuation of the whole potentially affected area. In contrast with the single intermediate event (1631 sub-plinian eruption) adopted as reference scenario in the present emergency plan for Vesuvius (at present an emergency plan is not available for Campi Flegrei), the adequate reference scenario should correspond to the worst case (VEI 5, for both volcanoes) that not simply reflects the worst eruption occurred in the past but the entire range of the possible events for that VEI. The adoption, during a volcanic crisis, of any minor scenario that accepts variable levels of risk for the people leaving around the volcano, even with the justification of the cost/benefit approach, always may introduce a false perception of safety that may increase the risk.