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Pyroclastic density current hazard maps at Campi Flegrei caldera (Italy): the effects of event scale, vent location and time forecasts.

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Today hundreds of thousands people live inside the Campi Flegrei caldera (Italy) and in the adjacent part of the city of Naples making a future eruption of such volcano an event with huge consequences. Very high risks are associated with the occurrence of pyroclastic density currents (PDCs). Mapping of background or long-term PDC hazard in the area is a great challenge due to the unknown eruption time, scale and vent location of the next event as well as the complex dynamics of the flow over the caldera topography. This is additionally complicated by the remarkable epistemic uncertainty on the eruptive record, affecting the time of past events, the location of vents as well as the PDCs areal extent estimates. First probability maps of PDC invasion were produced combining a vent-opening probability map, statistical estimates concerning the eruptive scales and a Cox-type temporal model including self-excitement effects, based on the eruptive record of the last 15 kyr. Maps were produced by using a Monte Carlo approach and adopting a simplified inundation model based on the "box model" integral approximation tested with 2D transient numerical simulations of flow dynamics. In this presentation we illustrate the independent effects of eruption scale, vent location and time of forecast of the next event. Specific focus was given to the remarkable differences between the eastern and western sectors of the caldera and their effects on the hazard maps. The analysis allowed to identify areas with elevated probabilities of flow invasion as a function of the diverse assumptions made. With the quantification of some sources of uncertainty in relation to the system, we were also able to provide mean and percentile maps of PDC hazard levels.