

## Mapping long-term vent opening in a caldera setting with uncertainty estimation: application to Campi Flegrei caldera (Italy)

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Campi Flegrei is an active volcanic area located in the Campanian Plain, along the Tyrrhenian margin of the southern Apennines (Italy), dominated by the formation of a 12 km large, resurgent caldera. The great majority of the eruptions have been explosive, variable in magnitude and intensity and characterized by the generation of remarkable ash fallout and pyroclastic density currents deposits. In this study we present results of field work and statistical analysis of past eruptive activity aimed at producing long-term probabilistic maps of vent opening at Campi Flegrei. Field work was focused on the structural and morphological nature of the caldera and particularly on the reconstruction of the location of past eruptive vents as well as of main faults and eruptive fissures formed in the last 15 kyr of activity. The statistical analysis performed accounted for the spatial distribution of past vent locations but was flexible enough to incorporate the heterogeneous geological information available, such as the density of faults/fissures or the clue of possible past vents hidden by the more recent activity. One key objective of the analysis was to directly incorporate into the maps the main uncertainties affecting the system. This was done by adopting appropriate density distributions of the probability of vent opening of the different areas of the caldera and by relying on expert judgement. Results allowed to quantify the influence of the different theoretical assumptions and sources of uncertainty on the long-term mapping of vent opening. The distributions obtained represent the starting point for the production of long-term ash fallout and pyroclastic density hazard maps at Campi Flegrei caldera.