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Improving Eruption Source Parameter characterization for tephra fallout hazard scenarios at Campi Flegrei caldera (Italy)

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Tephra fallout associated with renewal of volcanism at the Campi Flegrei caldera is a serious threat to the Neapolitan area. Previous studies reconstructed probability maps of fall deposits of three different eruption scenarios, representative of past activity: a high-magnitude event similar to the ∼4.5 ka Agnano-Monte Spina eruption, a medium-magnitude event, similar to the ∼4.1 ka Astroni 6 eruption, and a low-magnitude event similar to the ∼4.2 ka Averno2 eruption. A semi-analytical model (HAZMAP) was used to estimate the Eruption Source Parameters (ESP), such as total erupted mass, eruption column height, and Total Grain-Size Distributions (TGSD) associated to these eruptions. ESP were obtained by best-fitting field data of proximal and medial outcrops.
However, sensitivity studies of the dispersion of fall deposit showed that TGSD, fine-ash mass and particle aggregation processes are the main cause of the uncertainty.
Here we integrate the previous works using new field data including samples of medial-distal outcrops to better reconstruct the TGSD of the reference eruptions. Moreover 3D particle shape parameters obtained by microtomographic technics is used to better characterize drag law and hence particle settling velocity. The new data set is used to feed tephra dispersal models in order to produce a series of maps of tephra loading on the ground for the most representative eruptive scenarios accounting for different meteorological data and the eruptive parameters.