



Textures and compositions of pumice and scoria constrain the dynamics of explosive eruptions at Campi Flegrei (Italy)

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Major element glass composition and phenocryst chemistry data suggest almost similar pre-eruptive physico-chemical conditions for the magma stored in the shallow crust beneath Campi Flegrei before the occurrence of eruptions with different magnitude. However, a significant diversity of eruptive styles is sustained by magmas with the same initial volatile content depending, in general, on how volatiles are exsolved, separated from the melt and lost at the magma-free surface. In detail, textural and geochemical measurements on pyroclastic products having groundmass with similar composition suggest that the dynamics of volcanic eruptions at Campi Flegrei is mostly governed by the magma ascent rate, which, in turn, influences closed- versus open-system degassing, magma permeability development, and magma rheology. For the magmas that we have investigated, changes in the ascent rate may arise from the dynamics of roof-rock fracturing, volcanic conduit formation, magma chamber geometry, magma chamber replenishment and magma/water interaction. These variables must be further investigated in future, to be integrated textural and geochemical studies as well as included in the numerical modelling of conduit magma ascent for a better overall understanding and forecasting of silicic explosive volcanic eruptions.