The role of new magma recharges and crystal-mush interaction in the Campanian Ignimbrite activity

S. DI SALVO[1*], R. AVANZINELLI[1], R. ISAIA[2],
T.H. DRUITT[3] AND L. FRANCALANCI[1]

[1] DST, Università degli Studi di Firenze, Italy
*corresponding: sara.disalvo@unifi.it
[2] Osservatorio Vesuviano, INGV sezione di Napoli, Italy
[3] Université Clermont Auvergne, Clermont-Ferrand, France

The Campanian Ignimbrite (CI) eruption (Campi Flegrei, Italy) is associated to a voluminous pyroclastic sequence of trachytic to phonolitic magma emplaced in southern-central Italy, around 39 ka ago. Its proximal deposits are made up by a basal pumice plinian fallout, followed by several distinct crystal-poor ignimbritic flow units and the topmost crystal-rich Upper Pumice Flow Unit (UPFU).

We applied a geochemical and isotopic micro-analytical approach to study in detail matrix glass and crystal compositions of the juvenile components from the proximal-CI deposits, to assess how the distinct components interact with each others and with the crystal-mush of the magmatic reservoir. Samples from all units, with the notable exception of the last erupted UPFU, have *i)* low crystal content, *ii)* evolved matrix glasses, *iii)* negative Eu anomalies (0.2-0.6), *iv)* strong micro-scale geochemical and isotope heterogeneities and *v)* phenocrysts mostly showing disequilibrium textures. On the other hand, the UPFU shows significant differences with respect to the products of the previously erupted units, namely *i)* a marked higher phenocryst content, *ii)* less evolved matrix glass compositions, *iii)* positive Eu anomalies (1.0-1.4), *iv)* less Sr- and Nd-radiogenic signatures and *iv)* high-Or_{83-87} sanidine with equilibrium textures.

The microanalytical data provide new insight on the structure and evolution of the reservoir prior to the CI explosive eruption. An extremely complex scenario is depicted, where the arrival of new batches of fresh “mafic” melt thermally re-activated the crystal-poor evolved magmas stored within the CI reservoir. Isotope data suggest that the new incoming magma is significantly involved in the eruption, directly interacting with the cumulate crystal-mush, at the base of the reservoir. UPFU composition, indeed, is due to variable interaction between the incoming new magmas and melts derived from the crystal-mush (interstitial melts plus *antecryst* melting), associated to fractional crystallisation.