# Inception of mafic, explosive caldera-forming eruptions: the basal fallout deposits of the "villa venni" (355 ka) and "pozzolane nere" (407 ka) eruptions at "colli albani" volcano (italy)

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The Villa Senni Formation (VSN; 355ka, 30 km3 DRE) and the Pozzolane Nere (PNR; 407 ka; 15 km3 DRE) represent the youngest of seven large explosive caldera-forming eruptions of the Colli Albani volcano near Rome, Italy. Both eruption units are characterised by very undersaturated, tephritic to tephri-phonolitic magma compositions and represent a mafic end-member of the spectrum of explosive caldera-forming chemical compositions. Both VSN and PNR eruptions produced a basal sequence of scoria-fall deposits, dispersed mainly to the east and overlain by their main ignimbrites. The minimum area encompassed by the preserved 20 cm isopach line is >500 km2, which indicates a much larger original total dispersal area, and allows the classification of these deposits as Plinian fall deposits.

Petrologic analyses of each fall deposit were performed by a combination of SEM and microprobe techniques. The internal textures and structures of the scoria clasts were analysed to assess the effects of vesicles and microlites on the eruptive style and history. Results from the Vesicle Size Distributions for the PN suggest an uneven distribution of nucleation events. Vesicle Number Densities (VNDs) decrease upward from $10^9$ cm-3 at the base to $10^8$ cm-3 and increase again to $10^9$ cm-3 at the top of the fallout sequence. These values are higher than those reported for mafic explosive eruptions and are more comparable to VNDs in tephra from silicic explosive eruptions. Vesicle Size Distributions for the VSN show lower values more typical of mafic explosive scoria. SEM analysis indicates that magma-water interaction is an important component of the initial fallout phase in both eruptions which, along with textural data, implies that decompression is a key factor for the explosive evolution of mafic eruptions.