

Magma mixing in plumbing systems as key process driving volcanic eruptions: The 1631 CE and 1944 CE eruptions (Mt. Vesuvius, Italy) case studies.

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We present preliminary results obtained on products from the 1631 CE and 1944 CE eruptions occurred at Mt. Vesuvius. Sampling campaign, geochemical and Sr-Nd isotopic investigations on whole rocks, minerals and residual glass have been performed in order to study the pre-eruptive magmatic processes occurred in the plumbing system and their possible relationship with the eruptive dynamics.

The 1631 CE pyroclastic sequence was sampled on the crest and western flank of Mt. Somma. Samples vary in composition from tephri-phonolites and phonolites at the base of the sequence up to phono-tephrite at the top. Sr isotopic composition of the 1631 CE products, including whole rocks, minerals (biotite, leucite, clinopyroxene and feldspar) and groundmass (vesiculated and dense glass) varies from ca. 0.7023 to ca. 0.7077, with the widest variation in the units at the top of the sequence, whereas Nd isotopic ratios of groundmass and whole rocks are fairly constant at ca. 0.51247.

The 1944 CE eruption was characterized by initial effusive activity shifting to a progressively more energetic explosive activity through four phases (I-IV): lava effusions (I), lava fountaining episodes (II), violent Strombolian/sub-Plinian phase (III) to Vulcanian phase (IV). The 1944 CE sequence was collected in a proximal section located 700m East of the crater (Phase II), and on the crater rim (Phase IV). Samples vary in composition from first erupted (Phase II) phono-tephrite to last erupted tephrites up to K-trachybasalts (Phase IV). The ⁸⁷Sr/⁸⁶Sr on whole rock and separated leucite and salite of the 1944 CE eruptive products varies from ca. 0.7072 to ca. 0.7073, whereas the separated diopside has a wider variation from 0.70715 to 0.70740; ¹⁴³Nd/¹⁴⁴Nd ratios of whole rocks are quite homogenous at ca. 0.51247 along the eruptive sequence.

In both case studies the widest ⁸⁷Sr/⁸⁶Sr variability is recorded in the last erupted products.

The new geochemical and isotopic data on 1631 CE and 1944 CE eruptive products highlight the occurrence of mixing processes between different magmas and entrapment of ante-crysts with variable isotopic composition.