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Magma compositions at the Somma-Vesuvius (Italy): open problems and new interpretation approaching to a possible resolution

M. Piochi

Istituto Nazionale di Geofisica e Vulcanologia, Osservatorio Vesuviano, Napoli, Italy, monky5@ov.ingv.it

Somma-Vesuvius is probably the highest risk volcano in the world being located within the densely-populated city of Napoli (Italy). Its products have been the object of numerous volcanological, geochemical and isotopical studies aimed describing erupted magmas and defining and forecasting the behavior of magma supply system. Large mineralogical, geochemical and isotopic variability characterize volcanic rocks both from single and diverse eruption events. When specific dataset is considered, hypotheses on magmatic processes can be easily elaborated. The different degree of potassium enrichment correlates with mineralogy and allows recognizing variable differentiated potassic leucite -free and high-potassium leucite-bearing rocks. By considering rocks with similar degree of potassium enrichment, the variability of major and trace elements content, together with phenocryst abundance and type, suggests the occurrence of low-pressure-levels differentiation processes. Trace elements distribution can be attributed to a mantle source carrying a slab-derived component. Isotope geochemistry also concurs to corroborate hypothesis on super-imposed magmatic processes. Specific petrological models evidence the possibility for the occurrence of the diverse proposed processes. Nevertheless, when data are globally considered the various hypothesized processes appear very difficult to be verified. In fact, the merged dataset can be interpreted in various and, sometimes, contrasting ways also due to the lack of both general knowledge and direct observations about chemico-physical conditions of phenomena acting on magmas and on their surroundings. This is the main cause of scientific debate on the role of source and evolutionary processes at Somma-Vesuvius. At Somma-Vesuvius the variable potassium-enriched mafic rocks show similar a) incompatible elements ratios, b) trace elements distribution, c) volatiles content

and d) isotope ratios. The hypothesized fluid-enriched mantle source does not produce the expected relations among Sr, Nd and O isotope ratios. This contribution evidences that the available mineralogical, geochemical and isotopical data when differently approached gives information on Temperature-Pressure-Composition profiles beneath the volcano and highlight the occurrence of a complex interplay of evolutionary processes acting on magmas during storage and ascent within and through the crust. Based on obtained results, it can be suggested that the possible way to gain insight into the magma supply system and to refine the knowledge of mechanisms of magma production and evolution is to choose new strategy of analyses, possibly including also geophysical data.