

Mineralogy of the soils altered by fumarolic activity at Nisyros volcano, Greece

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Nisyros is the easternmost island of the South Aegean Active Volcanic arc in Greece. It is an active stratovolcano known for its intense hydrothermal activity. In this study we present the results of the mineralogical analyses of 20 soil samples collected in the caldera area. Samples were analysed through X-ray diffraction and the results allow us to divide them in two groups: Lakki Plain and Stefanos Crater. In their majority the soils of Lakki Plain have a main mineralogical assemblage that consists of quartz, feldspar and gismondine ($\text{Ca}_2\text{Al}_4\text{Si}_4\text{O}_{16}\cdot 9\text{H}_2\text{O}$). Gismondine as well as stellerite ($\text{CaAl}_2\text{Si}_7\text{O}_{18}\cdot 7\text{H}_2\text{O}$), which is appearing in some samples, derive from hydrothermal alteration, whilst wollastonite (CaSiO_3) is also found as a product of thermally metamorphosed siliceous carbonates. In the Stefanos Crater soils, due to the acid environment and the relatively high temperatures of the fumaroles (about 100°C), the main assemblages mostly comprises hydrothermal alteration minerals like quartz, sulfur, wollastonite, gypsum and gismondine. The lower amount of feldspars with respect to the Lakki Plain soils can be justified by the high percentage of gismondine, their alteration products. Voltaite ($\text{K}_2\text{Fe}(\text{II})_5\text{Fe}(\text{III})_3\text{Al}(\text{SO}_4)_{12}\cdot 18\text{H}_2\text{O}$) was also found in some of the samples as a product of hydrothermal alteration of Si deposits. Close to the fumaroles, the occurrence of alunogen ($\text{Al}_2(\text{SO}_4)_3\cdot 17\text{H}_2\text{O}$), a sulphide alteration mineral found in fumarolic environments, is also noticeable.