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# Micropedology, Mineralogy and Biology of Soils derived from volcanic Ash on Santorini (Greece)

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Santorini island located in the southern part of the Cyclades Islands, was formed by consecutive volcanic eruptions. The most recent, approximately 3500 years old, resulted in a thick tephra layer mainly composed of pumice. The present climate is Xeric. In the higher parts of the island the shallow soils are covered by a sparse low shrubby vegetation and suffer from degradation and erosion.

In the frame of COST-622 action, 3 representative soils were studied in detail. Thin sections of the A or AC horizons were prepared.

The microstructure is characterised by a loose packing of coarse pyroclasts (up to 1 cm) and mineral grains. The pyroclasts range from holohyaline pumice (sometimes fibrous) to hypocrystalline feldspar rich particles; fresh angular augite and feldspar grains are common. The micromass is greyish brown speckled isotropic clay, with sometimes very small rhyolitic glass fragments, which coat the pyroclasts or form interstitial aggregates, giving rise to chitonic and close enaulic c/f related distribution patterns, with a c/f ratio of 15/1 to 20/1. Weathering is restricted to some brownish stains in the less acid pyroclasts and locally alteration to chlorite. In most pumice grains an internal hypocoating of micromass is observed.

The clay fraction contains, apart from the amorphous constituents, a mixture of expandable and non-expandable 1.4 nm minerals, the former being mainly of a vermiculitic type. The latter can be related to the chloritic alteration observed in thin sections. The important decrease of the amount of 1.0 nm minerals with depth points to its allochthonous origin.

On sites with natural vegetation the enchytraeid population is very low (0 - 300 Ind/$m^2$ prior and after incubation respectively), compared to cultivated soils (2169 and 2735 Ind/$m^2$ respectively). No traces of enchytraeids were found in thin sections, but a few casts of dipteral larvae were recognised. Earthworms were not observed during the field and laboratory investigations, nor their excrements in thin sections.

Conclusion: the soils on 3500 years old ash of Santorini show a very low degree of mineral weathering, and limited biological activity under Xeric conditions. This results in a microstructure characterised mainly by mechanical formation of coatings and angular aggregates of fine material. The formation of internal hypocoatings of fine material in pumices was not yet described. Aeolian inputs of clay and silt have to be considered when evaluating the path of pedogenesis.