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Micromorphological study of Andosols in an active volcanic environment (Lipari, Aeolian Islands)

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The deposits known as Brown Tuffs (BT) are widespread in most of the Aeolian Islands. They are fine-grained, brown earthy tuffs of varying thickness occurring as multiple depositional units in the post Tyrrhenian stratigraphic record (from 81ka BP to the present time). On Lipari they cover an area of about 30km^2: at least twelve units of Brown Tuffs have been identified interbedded with local rhyolitic products belonging to the Valle Muria and Vallone Fiume Bianco synthems and with tephras of exotic provenance (Tranne et al., 2002).

On their origin various interpretations have been made: Bergeat (1899) called them "tuff loess", Pichler (1980) identified them as paleosols, and Keller (1980) considered them to be "wind transported volcanic ash". On the basis of volcanological and petrological data Crisci et al. (1983) suggest that these deposits represent the finer counterpart of hydromagmatic eruption occurred offshore of Vulcano island.

Detailed centimetre-scale measurements and field observations have been made on the BT deposits of Lipari formed between 42 to 20ka BP, during the last glacial period. The results of chemical, micromorphological and SEM studies indicate that the pedogenetic evolution increases along a S-N transect with decreasing of slope. Higher degree of weathering of primary components (glass and crystals) and clay coatings characterise the BT deposits outcropping in the northern part of the island. The presence of clay coatings suggests that major soil development occurred under a humid climate, usually typical of interglacial environments in South Italy and other mid-latitude areas, and therefore in apparent contrast with the chronological constraints of the BT studied. The clay coatings show degenerated fabrics (smooth-banded to grainy extinction pattern) indicating that they are relict features. In southern Lipari SEM analysis

enabled to identify also a coating of presumable non-pedogenetic, sin-eruptive origin, enveloping glass fragments. The absence of A horizons, the occurrence of multiple soil horizons separated by abrupt boundaries or intercalated with unweathered tephra layers, and the low content of organic matter are indicative of high erosive or depositional rates. All these data suggest that in active volcanic environments soil evolution is strongly controlled by relief characteristics and primary sedimentary processes and rates.

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