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Ash turbidites from Southern Italy help understanding the parent eruptions and contributing to geodynamic evolution cadre of the Tyrrhenian sea

Domenico Maria Doronzo

Centro Interdipartimentale di Ricerca sul Rischio Sismico e Vulcanico – c/o Dipartimento Geomineralogico, Università degli Studi di Bari, Bari, Italy (d.doronzo@geomin.uniba.it / +390805442591)

Tephra layers intercalated in sedimentary successions are very interesting since they represent some instants of geodynamic evolution in a sedimentation basin. Furthermore, they can constitute deposits of explosive eruptions whose distal behaviour can be useful for studying the volcanoes activity, especially when pyroclastic deposits in proximal areas are absent.
In the Craco area (Matera, Italy), thick ash turbidites intercalated in marine clays deposits have been recently recognized, which interest is related to the considerable cropping out thickness (1 to 5 m), freshness of the material and absence of sedimentary component. Petrography, sedimentology and chemistry of the deposits have been characterized with the aim of defining genesis and deposition of the material.
The deposits are essentially made up of ashy pyroclasts, dominated by fresh acidic to intermediate glass, mostly in the form of shards, pumice fragments and groundmass fragments with vitrophyric texture. Rare crystals include Pl, Opx, Cpx, Hbl and Bt. 40Ar/39Ar geochronology on the amphibole dated one level to 2.24 $\pm$ 0.06 Ma, indicating the Late Pliocene. The grain size (fine ash) and textural features of the deposits are typical of pyroclastic fall deposits related to explosive eruptions with consequent upward projection of the fragmented material through Plinian columms. The columns turned eastward because of stratospheric winds and the material fell in a marine environment. It deposited on the slope of Pliocene basins in the frontal sector of the Southern Apennine chain. Structural features are the following: fining-upward gradation of the deposits with cross- and convolute laminations at the base and fine-grained massive beds at the top. They suggest that the primary pyroclastic fall deposits were mobilized as volcaniclastic turbidity currents towards a deeper environment.
Glass and crystal compositions were investigated by SEM/EDS analysis. Petrographycal and chemical compositions of the volcaniclastic material is typical of a transitional high-K calc-alkaline series (basaltic andesite to rhyolite for the ash). The age and chemical composition constrain the provenance of the volcaniclastic Craco levels from the Southern Tyrrhenian domain, where a volcanic arc was probably active during the Pliocene. The hypothetical eruptive centres have been located at the northern termination of the arc, exactly in the Pontine islands area. Other neighbouring volcanic centres have been located on land in the Volturno plain.
The integrated approach used in this work can be applied in the future to other tephra layers of Neogene successions for contributing to geodynamic evolution cadre of the Tyrrhenian sea.