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Vesuvian and Phlegraean tephra layers as a tool to reconstruct the evolution of marine and continental sedimentary environments in the area of Naples (Italy)

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It is widely accepted that tephra layers represent a fundamental tool in the chronostratrigraphic analysis of sedimentary successions. Particularly, tephrostratigraphy plays a key role in the integrated study of subaerial environments coupled with subaqueous settings were there is a higher potential for the preservation of the stratigraphic record. Recent studies conducted on the mixed siliciclastic-volcaniclastic environments of the Campania coastal zone suggest that the study of tephra layers is also relevant to the analysis of facies associations and depositional settings.

The comparison between stratigraphic successions exposed on land and cored at sea in the Gulf of Naples, allowed the recognition of isochrone surfaces, marked by the products of explosive volcanic eruptions, which have been useful in making correlations between marine and continental sedimentary basins. These surfaces and the recognized tephra layers also helped to better constrain the palaeoenvironmental conditions that influenced their evolution. In particular it has been highlighted the role played by volcanic activity in determining a strong variability in the sedimentation rate in both marine and sedimentary environments. Volcanic activity affected both the short and long term evolution of these basins as it produced highly dispersed pyroclastic deposits, which instantaneously covered wide areas at sea-land interface, and were reworked for very long times, causing the overloading of the drainage systems and the increasing of sedimentation rates, with repeated flood and mass-deposition episodes.

The time-span investigated with this study includes the past 5 ka, during which volcanism at both Mt. Vesuvius and Campi Flegrei caldera has been characterized by Plinian, sub-Plinian, Ultrastrombolian and Strombolian, intense explosive activity, with pyroclastic fallout deposits widely dispersed in the eastern quadrants of the volcanoes. The investigations carried out on land interested quarried, archaeological excavations and drillings, mainly in the lowlands located between the feet of the Apennine chain and the western border of the Tyrrhenian sea. These lowlands have been the site of both primary deposition of pyroclastic deposits, and very intense re-sedimentation induced by reworking of volcanic products. The recognition of palaeosurfaces with evidence of anthropic frequentation, has been of great relevance in the determination of the age of volcanic and reworking episodes, and in the estimation of sedimentation rates. In the studied time-span, indeed, the Campanian Plain, has been the site of many human settlements that leaved very important archaeological traces.

The datailed integrated stratigraphic study carried out on the volcaniclastic deposits of the Campanian Plain and continental shelf, evidenced: a) the occurrence of at least three Vesuvian and Phegraean Plinian eruptions, already known in the literature; b) the occurrence at Vesuvius of a very intense inter-Plinian volcanic activity, characterized, in many cases, by magnitudes much higher than previously stated; c) the occurrence of flood episodes, which have been more intense in concurrence with, and following volcanic eruptions.