VOLCANICLASTIC DEPOSITION AND MIGRATION OF BASIN DEPOCENTRES AFTER THE ERUPTION OF THE NEAPOLITAN YELLOW TUFF: THE POZZUOLY BAY (NAPLES, ITALY)

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The Campi Flegrei is an active caldera located on the coastal zone of SW Italy (Fig. 1), close to the town of Naples Bay, that has been characterized by explosive activity and unrest throughout the Late Quaternary. This area represents a very active segment of the Eastern Tyrrhenian margin and may be regarded as an ideal laboratory to understand the mechanisms of caldera dynamics and the interplay between volcanism, tectonics and sedimentary processes along a continental back-arc margin. Recent research at Campi Flegrei has shown that a significant part of the offshore volcaniclastic products and structures, the late-stage geodynamic evolution of the inner caldera resurgence and the stratal geometry of the caldera fill are still poorly known. Particularly, high-resolution seismic data highlight the presence of an intra-caldera resurgent dome in the inner sector of the Pozzuoli bay that underwent significant uplift/subsidence after the eruption of the NYT (Sacchi et al., this volume).

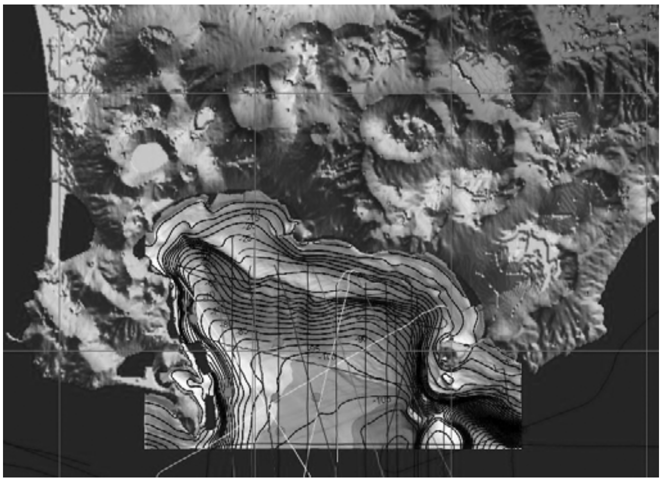

Fig. 1 – Map of the Campi Flegrei active volcanic area and location of seismic profiles and gravity core data

In this study we integrate geophysical data of different resolution/penetration obtained from high-resolution reflection seismic profiles (Chirp and Sparker sources) partly calibrated by gravity core in order to provide a 3D depositional model of density flows and migration of basin depocentres for the Pozzuoli Bay after the eruption of the NYT.

The new data document the occurrence of two distinct layers of resediments, mostly represented by density flow deposits, separated by an interval of hemipelagic sediments. The two density flow units display a remarkable difference in their thickness and internal geometry. Across the bay, the lower unit is ca 5m thick in the western sector and reaches its maximum of ca 10 m in the central sector while it is absent towards the east. The upper unit, on the contrary, displays the minimum thickness of 10m close to the central sector of the bay and increases up to ca 16 and 12m in the western and eastern sector of the bay, respectively. The variation in thickness of the density flow deposits appears to be related with the amount of sediments available. The upper density flow deposits is also internally more chaotic respect to the lower one, suggesting higher energy and/or turbulence (Fig. 2).

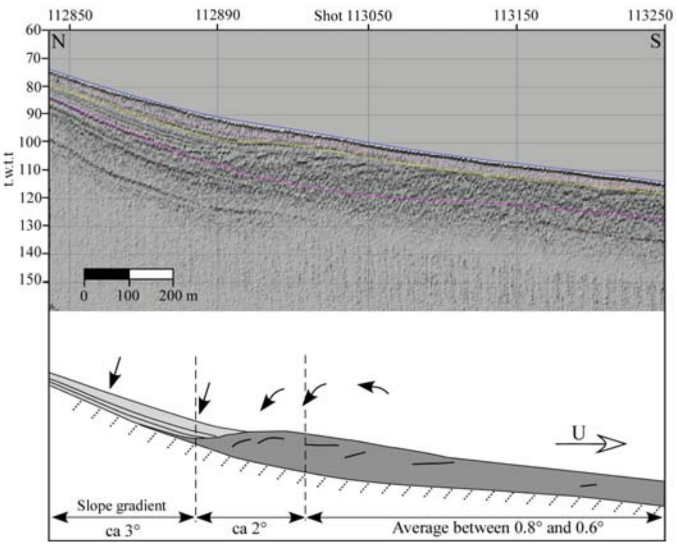

Fig. 2 – Particular of the upper density flow deposits. Dark grey shading indicate the tail and part of the body. Light gray shading indicate sediments deposited by settling of a suspended material. U, vector velocity.

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Sections and isopach maps clearly illustrate that the basin depocentre topography is not fixed at one position but migrates southwards in time (Fig. 3).

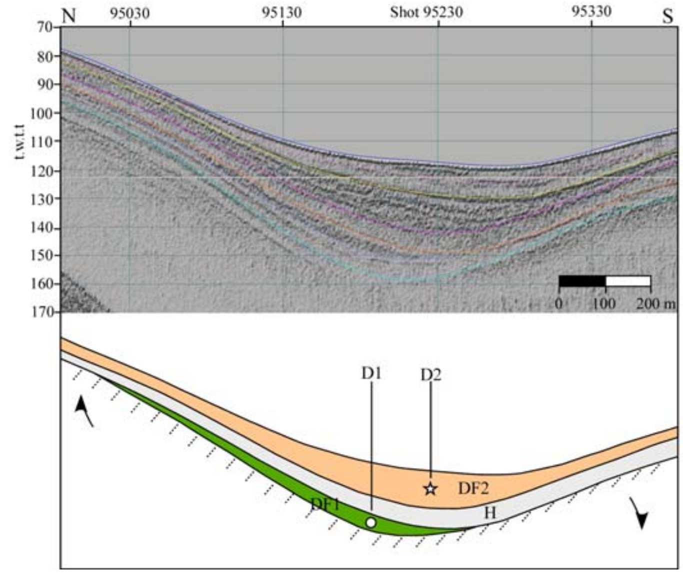

Fig. 3 – Particular of the density flow deposits showing the migration of the depocentre. D1 (circle) and D2 (star), basin depocentres; DF1, lower density flow; D2, upper density flow; H, hemipelagic deposits.

Based on the above observations, we suggest that the uplift of the resurgent dome and subsidence of the southern sector, occurred after the eruption of the Neapolitan Yellow Tuff, acted as a major control in the increase of the sea-floor gradient in the Pozzuoli bay. This may have triggered in turn, the deposition of gravity flow deposits along with a progressive migration of basin depocentres through time.

REFERENCES

Deino AL, Orsi G, de Vita S, Piochi M (2004) The age of the Neapolitan Yellow Tuff caldera-forming eruption (Campi Flegrei caldera—Italy) assessed by 40Ar/39Ar dating method. J. Volcanol. Geotherm. Res. 133, 157–170.

Pappalardo L., Civetta L., D'Antonio M., Deino A., Di Vito M., Orsi G., Carandente A., de Vita S., Isaia R. & Piochi M., 1999. Chemical and Sr-isotopical evolution of the Phlegrean magmatic system before the Campanian Ignimbrite and the Neapolitan Yellow Tuff eruptions J. Volcanol. Geotherm. Res. 91, 141-166.

Sacchi M., Pepe F., Molisso F., Insinga D., 2012. The submerged structure and stratal architecture of the Neapolitan Yellow Tuff (NYT) caldera, offshore the Campi Flegrei, (Eastern Tyrrhenian Margin): new insights from high resolution seismics and gravity core data. Abstract, Convegno Società Geologica Italiana.