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Seismic expression of the shallow structure of The Neapolitan Yellow Tuff (NYT) caldera offshore the Campi Flegrei

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Keywords: Campi Flegrei, Neapolitan Yellow Tuff, Collapse caldera.

In this study we integrate high-resolution swath bathymetry, single-channel reflection seismic data and gravity core data, to provide new insights into the shallow structure and latest Quaternary to Holocene evolution of the submerged sector of the Neapolitan Yellow Tuff (NYT) caldera (Campi Flegrei) in the Pozzuoli Bay. The new data allow for a reconstruction of the offshore geometry of the NYT caldera collapse – ring fault system, along with the style and timing of deformation of the inner caldera resurgence.

Our interpretation shows that the NYT eruption (~15 ka BP) was associated with a caldera collapse bounded by an inward-dipping ring fault system. The ring fault system consists in a 1-2 km wide fault zone that encircles an inner caldera region ~ 5 km in diameter and is often marked by the occurrence of pore fluids ascending through the fault zone, up to the seafloor, particularly in the western sector of the bay. A shallow magmatic intrusion along the ring fault zone was also detected offshore Bagnoli in the eastern part of the Pozzuoli Bay (Sacchi et al., 2014).

Following the NYT eruption, the inner caldera region underwent significant deformation and resurgence with a maximum cumulative uplift of the offshore structure in the order of 180 m. The net uplift rate of the caldera resurgent dome was ~ 9 - 12 mm/year during the period 15.0 – 6.6 ka BP. The style of deformation of the resurgent structure can be described in terms of a broad doming, accompanied by subordinate brittle deformation, mostly concentrated in a small apical graben at the summit of the resurgent dome (Cole et al., 2005).

Chronostratigraphic calibration of seismic profiles obtained by three tephra layers cored in the Pozzuoli Bay indicates 5 to 25 m of post-Roman differential subsidence and tilting towards ESE of the inner caldera resurgence, as recorded by the drowning of the infralittoral prograding wedge below the present-day storm wave base.

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