

## **Probabilistic tsunami hazard assessment related to underwater explosions in the Campi Flegrei caldera: Gulfs of Napoli and Pozzuoli (Tyrrhenian Sea, Italy).**

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Tsunami caused by underwater volcanic explosions are typically characterized by short period waves and greater dispersion compared to tsunami generated by earthquakes, and the impact in the far-field is often limited. However, the effect of dispersion is reduced for underwater explosions occurring in shallow-water environments, as the length-to-depth ratio of the waves rapidly increase, and runup inland can be locally high. This effect was particularly illustrated by the 19 m runup at Karymsky Lake, Kamchatka, in 1996 (Belousov et al., 2010; Ulvrova et al., 2014). Hazards related to underwater volcanic explosions are challenging to evaluate and might be underestimated in some cases. In this study we consider different scenarios of explosions in the offshore part of the Campi Flegrei (Phlegraean Fields) caldera in the Pozzuoli – Naples region (Tyrrhenian Sea, Italy). The onshore eruptive history of the caldera is well documented (e.g. Orsi et al., 2004), but past and future activity offshore has been rarely discussed. The probability for eruptions in the submarine part of the caldera is perhaps low (Selva et al., 2012), but scenarios of tsunamis generated by underwater explosions and their impact in the proximal field (Bay of Pozzuoli) and far field (Bay of Naples) deserve to be considered due to high population density in the adjacent coastal areas. Initial surface displacement is estimated as a function of explosion energy at a given depth. We study 17 different potential vent locations within the Pozzuoli Bay, and 3 different vent radii (200 m, 650 m and 900 m), corresponding to the three representative eruptive scenarios identified in Orsi et al. (2009) and Selva et al. (2010). We then use these sources in a Bayesian Event Tree framework, following the procedure defined in Selva et al. (2010), in order to evaluate a first order Probabilistic Hazard Analysis for this type of tsunami sources for the Gulfs of Napoli and Pozzuoli.

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