

Contemporaneous eruptions at 4.0 ka from 5.4 km apart vents within Campi Flegrei caldera (Southern Italy): a comparison to Rabaul caldera

Celine Formentraux¹, Roberto Isaia², Mauro Rosi³, Alessandro Sbrana³, Antonella Bertagnini¹, Paola Marianelli³

¹Istituto Nazionale di Geofisica e Vulcanologia, Sezione di Pisa, Italy, ²Istituto Nazionale di Geofisica e Vulcanologia, Osservatorio Vesuviano, Italy, ³Dipartimento di Scienze della Terra, Università di Pisa, Italy

E-mail: roberto.isaia@ov.ingv.it

The Campi Flegrei caldera is a collapsed structure mainly resulting from the Campanian Ignimbrite (39ka) and the Neapolitan Yellow Tuff (15ka) eruptions. Post caldera activity has occurred at vents scattered within the caldera with eruptions concentrated in relatively short time periods (volcanic epochs) alternating with millennia-lasting volcanic quiescence. The eruptions at different vents within each epoch have been classically considered to occur in sequence. However, Isaia et al (2009) documented for the first time that the eruption occurred at Averno and Solfatara craters, situated 5.4 km apart, actually occurred, at least in part, simultaneously.

In this study we describe and analyse in detail a key tephra section located about 1.5 km NW of the Solfatara crater where the deposits originated from the two vents are interstratified. The sequence, about 1m thick, consists of almost plane-parallel alternating green and pink colored ash beds that overlie a layer of discontinuous pumice bombs. The green-colored ash beds form more than half of the succession, the pink-colored ash consists of several discrete mm- to cm-thick beds. SEM ash clast characterization coupled with EDS analyses of fresh glass shards and pumice matrix, indicate that the fine-grained green-colored ash, consists of hydrothermally altered materials erupted by the Solfatara crater. In contrast, the pink-colored ash consists of fresh glass shards with composition range similar to the Averno eruption products. In particular the comparison of the glass chemistry with the one made on the proximal eruptive sequence of the Averno eruption (Formentraux et al., 2012) enabled us to assess that the studied section mirrors the entire Averno sequence and that the bomb layer at the base was erupted during the early plinian phase of the eruption.

We conclude that the Averno and Solfatara eruptions started and ended almost contemporaneously. The comparison with the Tavurvur and Vulcan pyroclastic sequences produced during the very recent eruptive vents occurred in 1994 at the Rabaul caldera shows striking similarities suggesting that the occurrence of contemporaneous eruptions at calderas might be more frequent than previously thought. Identifying these type of event can enhance the volcanic hazards assessment and the expected future eruptive scenarios within active calderas.

Formentraux C., Metrich N., Bertagnini A., Rosi M. (2012). *Contrib. Mineral. Petrol.*, DOI 10.1007/s00410-012-0720-1.

Isaia R., Marianelli P., Sbrana A., (2009). *Geoph. Res. Lett.*, 36, L21303, DOI 10.1029/2009GL040513.