A distinct source and differentiation history for Kolumbo submarine volcano, Santorini, Aegean arc

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The Kolumbo submarine volcano is part of the Santorini volcanic field in the Aegean arc, Greece, and is situated ca. 12 km to the northeast of the presently active Nea Kameni cone in the centre of the Santorini caldera. Kolumbo erupted violently in September 1650 AD, leading to the construction of a pumice island that was quickly eroded to below the wave base. Recent multi-channel reflection seismics [1] have revealed at least five distinct volcanic units, suggesting that Kolumbo is a polygenetic structure. Two of these units, the 1650 AD and K2 pumices, and several dikes are exposed in the walls of the 500 m deep crater [2, 3]. We have undertaken a geochemical study of 11 pumice and dike samples collected with an ROV submersible in order to constrain the relation of the volcanic products of Kolumbo to nearby Santorini.

Glass compositions of the Kolumbo pumices are highly silicic (75.5 wt. % SiO_2) and significantly more evolved than the 3.6 ka Minoan eruption of Santorini. The most striking contrast with Santorini, however, is the common presence of biotite and amphibole in the pumices, dikes and comagmatic enclaves. The importance of amphibole in the petrogenesis of the Kolumbo samples is indicated by subchondritic Ho/Lu and low Y contents, which is in sharp contrast with the largely amphibole-free evolution of Santorini volcanic products. High $^{208}Pb/^{206}Pb$ is obtained through preferential assimilation of lower crust and hence supports differentiation in the amphibole-stability field. In addition, Kolumbo has lower $^{206}Pb/^{204}Pb$ (18.735) compared to Santorini (>18.83) that is inherited from the mantle and more closely resembles Nisyros (18.6-18.8) in the eastern part of the Aegean arc [4]. Hence, we conclude that Kolumbo volcano, despite its close proximity to Santorini, samples a distinct mantle source and has a different crustal differentiation history.

[1] Hübscher et al. (2015) *J. Volcanol. Geoth. Res.* **291** 101-111. [2] Nomikou et al. (2012) *Global Planet. Change* **90-91** 135-151. [3] Cantner et al. (2014) *J. Volcanol. Geoth. Res.* **269** 28-43. [4] Elburg et al. (2014) *Geol. Soc. Lon. Sp. Pub.* **385** 137-160.