

Possible effects of Kolumbo submarine volcano emissions (Cyclades, Aegean Sea) on coccolithophore assemblages

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This study presents the species distribution and morphology of coccolithophores in the area of Kolumbo. Kolumbo is situated in the middle part of the Hellenic Volcanic Arc and is the largest submarine volcano in a series of at least 19 volcanic cones (Kolumbo volcanic chain) that trend NE away from Santorini within the extensional, fault-bounded Anhydros Basin (Nomikou *et al.*, 2012, 2013). Sensitivity of the calcification processes to ocean acidification makes coccolithophores one of the first organisms to be affected by increasing CO₂ levels in the ocean. Submarine volcanoes, such as Kolumbo, are well known to emit significant amounts of CO₂, thus locally contributing to the production of this greenhouse gas (Carey *et al.*, 2013). Coccolithophores were collected from 5–90m depths during two sampling periods at three different stations and studied using the scanning electron microscope (SEM). Focus was on the malformation of *Emiliania huxleyi*. Additionally, the pH, the main nutrients, and the total pigment concentrations were counted at the sampled stations. A pigment that is mainly present in coccolithophores, 19^h hexanoloxy fucoxanthin, appeared in significant values, indicating the importance of these organisms in the total phytoplankton makeup of the area. Preliminary results indicated that although malformations were present, they cannot be directly linked to significant changes in the pH values or to limitation of the main nutrients. The Kolumbo

hydrothermal emissions, which consist of more than 99% CO₂, are trapped in a dense lake inside the area of the crater at depths greater than 350m (Carey *et al.*, 2013). Thus, the CO₂ produced by the volcanic field is restricted and does not influence the upper 100m of the water column. Malformed coccoliths have been documented in several locations in the Aegean Sea (Dimiza *et al.*, 2012), and the reason for their common appearance in the Aegean needs further investigation.

References

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