

Coccolithophore assemblage dynamics and *Emiliana huxleyi* morphological patterns during the years 2017–2019 in the Aegean Sea (Greece, NE Mediterranean)

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This study describes the species composition of living coccolithophore communities and the morphological features of *Emiliana huxleyi* from samples collected during expeditions in March 2017, March 2019, and August 2019 in the Aegean Sea. We investigated spatial and temporal variations using samples collected across six sampling stations to monitor the coccolithophore assemblages after the exceptionally cold December 2016, which resulted in winter heat loss and newly produced dense waters that ventilated the Aegean deep basins (Velaoras et al., 2017). Coccolithophores in the area were relatively diverse, and a total of 51 species were identified using the scanning electron microscope (SEM). The recorded total cell density in the 2017 winter sampling (maximum 17.8×10^3 cells/L in mid- to lower water depths) was much lower than the 2019 cold sampling period (up to 27.7×10^3 cells/L documented at 20 m depth). A notable corroded/malformed morphology of many specimens was observed in the studied samples for winter 2017, especially in the deeper parts of the water column. The assemblages displayed distinct seasonality as already documented for the Aegean Sea domain (Dimiza et al., 2015; Karatsolis et al., 2017) with winter periods characterized by the dominance of *Emiliana huxleyi* and *Syracosphaera molischii*. In contrast, the warm period exhibited higher species richness and diversity (maximum of 25 taxa observed at the surface layers) and low dominance indices when compared to the colder season. Summer assemblages featured high absolute abundances of *Rhabdosphaera clavigera*, *Syracosphaera halldalii*, *Umbellosphaera tenuis*, *Algirosphaera robusta*, and various holococcolithophores that were dominated mainly by *Syracosphaera arethusae* HOL, *Calyptosphaera heimdaliae*, and *Helladosphaera cornifera*, which are found primarily in the upper photic zone. In addition, morphometric analyses conducted on well-developed *E. huxleyi* coccoliths showed the characteristic dominance of heavily calcified coccoliths during the cold season in the Aegean Sea (Triantaphyllou et al., 2018) with a slight decrease in the average coccolith length and coccolith width observed between the winter 2017 and winter 2019 sampling periods. This difference is more pronounced in the average tube width and relative tube width, probably suggesting increased calcification rates occurring in the Aegean Sea water column after the exceptional cold event of December 2016.

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