Investigating the size variability and coccolith mass of *Emiliania huxleyi* in the Aegean Sea (NE Mediterranean): 20 years of evidence on modern assemblages compared to the last two thousand years

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The Aegean Sea, particularly its northern sector, is a key area for understanding climate fluctuations due to its importance as a source of deep-water formation in and subsequent ventilation for the entire eastern Mediterranean. A high anthropogenic CO_2 content, which can be detected at intermediate and deep layers of the North Aegean Sea, is considered to reflect the effective transportation of the absorbed atmospheric CO_2 from the surface to deeper waters due to dense water formation (Krassakopoulou et al., 2017).

Variability in the size and mass of *Emiliania huxleyi* from the Aegean Sea (measurements of ~5000 coccoliths) has been studied in water and sediment trap samples collected during the last 20 years. Biometric analyses confirm a consistent pattern of increase in size and calcification degree during winter/springtime with low sea surface temperatures (SST) and moderate productivity, as compared to summertime high temperatures and low productivity, which is consistent with previous observations of Triantaphyllou et al. (2010). Interestingly, the interannual coccolith length (CL) estimate for the entire Aegean area, both on a seasonal and spatial basis, displays an overall decrease during the 20 years of the studied time interval, whereas relative tube width (RTW) values show a generally increasing tendency that is directly associated with a similar pattern in the North Aegean. The estimated coccolith mass (Young et al., 2014) has an overall constant pattern averaging 2.2 pg, although a difference between average values is observed between cold (November–April: 3.2 pg) and warm (May–October: 2.1 pg) intervals. A decreasing tendency in the *E. huxleyi* coccolith mass (-0.6 pg), particularly during the cold season, is recorded in the North Aegean. During the warm months, only the North Aegean *E. huxleyi* coccoliths are featured by RTW and mass increases, although both parameters display consistently lower values with respect to the cold period (average mass: 3.5 pg in the cold vs. 1.5 pg in the warm months).

Within a high resolution North Aegean Sea sediment record that spans the past 1500 years (Gogou et al., 2016), the *E. huxleyi* RTW indicates an overall increase since the beginning of the 19th century, which is similar to the modern bio-calcification signal. Interestingly, the *E. huxleyi* coccolith mass in the Common Era is decreasing when compared to the cooler intervals of the Little Ice Age and the Late Antique Little Ice Age, which is in line with the expected acidification impacts due to increase in SST and anthropogenic CO_2 content in the Aegean water column.

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