Impact of 2023 marine heatwaves on coccolithophores blooms in the North Atlantic Ocean

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In 2023, the majority of the world ocean experienced marine heatwaves. In this global context, the northeastern temperate and polar Atlantic experienced one of the strongest ever recorded since the beginning of the satellite era. Record sea surface temperatures (SSTs) were found with June SST reaching 4°C above the 1991-2020 reference period on the 21^{st} of June 2024 in the North Atlantic ocean. The unique environmental conditions associated with such extreme events have the potential to impact phytoplankton bloom occurrence and phenology. Here we investigate the influence of the 2023 marine heatwave on blooms of the calcifying phytoplankton species *Emiliania huxleyi*. Blooms of *E. huxleyi* commonly occur in these areas in summer, can be easily detected from ocean colour satellites, and play an important role in the ocean's biological carbon pump. In this study we combine long-term remote sensing observations of SST with the concentrations of chlorophyll-a and calcite to evaluate the influence of the unprecedented MHW that occurred in spring-summer 2023 (May-June) on blooms of calcifying and non-calcifying phytoplankton. We focus on two distinct regions, one at the leading and one at the trailing edge of *E. huxleyi*'s biogeographic distribution. Our findings reveal the impact of such extreme events and provide insights into potential long-term variations in the ocean carbon cycle, particularly in response to the warming of the ocean associated with climate change.