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The summer marine heatwaves in the North Sea in 2023

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Marine heatwaves (MHWs) have increased worldwide in recent decades and are considered one of the most pressing challenges of climate change due to their dramatic environmental and socio-economic impacts. This study examines the occurrence of MHW in the North Sea over more than four decades (1982-2023) by analyzing the long-term trends and interannual variations of MHW characteristics. The study also investigates the role of atmospheric and large-scale climate modes on MHW generation. We find that the accelerated SST warming trend (0.38 ± 0.04 °C/decade) was accompanied by an increase in MHW frequency by 1.0 ± 0.3 events/decade and in MHW days by 17 ± 6 days/decade over the entire period. In the summer of 2023, several extreme climate events were observed worldwide, including terrestrial and oceanic heatwaves. This triggered strong media interest and public concern about the causes and links to climate change. In the North Sea, the average SST value broke the record in June and September 2023 with several extreme MHWs. In June 2023, the northwestern part of the North Sea experienced the strongest MHW since 1982, which lasted three weeks (from June 13 to July 4, 2023) and was attributed to changes in atmospheric circulation.

Keywords: North Sea; SST; marine heatwaves; ERA5.