Impact of Marine Heatwaves in the coastal ocean: an open question

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Abstract

Coastal ecosystems are subject to pressures resulting from climate change and human activity. Extreme weather events, such as Marine Heatwaves (MHWs), have a direct impact on the environmental conditions necessary to sustain biodiversity in coastal oceans. Recent findings based on ocean surface temperature observations indicate an increase in the frequency and intensity of MHWs in coastal seas. However, the MHW impact can vary significantly depending on the dynamics and the species in the coastal ecosystem. The methods used to define MHWs are subject to debate. Depending on analyzed impacts, MHWs can be defined in relation to local features of the environment under consideration. For instance, estimating the risk for benthic ecosystems from MHW must consider local ocean dynamics and the nature of impacted ecosystems.

To illustrate these impacts and some approaches, combined satellite and in situ observations with recent high-resolution numerical simulations are used to assess the impact of MHWs on the whole water column and potential impacts on pelagic and benthic ecosystems. In a case study in the Bay of Biscay and the English Channel, special attention is given to the two extreme years, 2022 and 2023, as unprecedented warm years. For this study, the last two decades have been observed (in situ and from satellites) and simulated (using CROCO coastal ocean model with 1km resolution), allowing the identification and the characterization of MHWs (occurrence, duration, intensity, spatial extent). The propagation of the observed heating in the water column is investigated with respect to the local dynamics (*e.g.* tides, constrained shallow waters, river plume dynamics). These initial results should pave the way for an assessment of the impact of MHW on the coastal ecosystem during the last two decades, with a focus on 2022 and 2023.