Future Marine Heatwave drivers in the Mediterranean Sea

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Marine heatwaves (MHWs) have substantially disrupted marine ecosystems in the Mediterranean Sea, contributing to a spectrum of marine extremes, currently affecting the region. Projections pointing to intensified MHWs in the 21st century underscore the need for a deeper understanding of the potential shifts in the mechanisms driving these events in the basin and their seasonality, due to global warming. Currently, our comprehension of these aspects remains limited. In this study, a fully-coupled regional climate system model is employed to identify an ensemble of MHWs and their drivers in the basin, from 1982 to 2100. The model's representation of MHWs is first validated using a hindcast simulation between 1982-2017 and then MHW trends and drivers are assessed under the historical and high-emission SSP5-8.5 scenario run. Specifically, we analyse "online" diagnostics of a mixed layer heat budget, exploring potential changes in the dominant role of atmosphere heat fluxes and oceanic processes on events, within periods corresponding to Global Warming Levels 1 °C and 3 °C, relative to the pre-industrial era (1850-1900). Evaluating changes in the mechanisms governing MHWs is essential to enhance our confidence on model projections in addition to the predictability of extreme events in the context of climate change.