Favorable atmospheric conditions for summer Marine Heatwaves in the Western Mediterranean Sea

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Marine Heat Waves (MHWs) have significant social and ecological consequences. There is a growing need for knowledge about these extreme events to prevent and possibly mitigate their negative impacts and to better inform decision-makers on MHWs-related risks. Taking advantage of the recently released macroevents dataset for MHWs in the Mediterranean Sea by Bonino et al. in 2023, our research focuses on examining the atmospheric conditions during the largest summer MHWs in the western Mediterranean, and in particular before and during their initial phases. Specifically, we investigate composite anomalies of various atmospheric parameters, including 10m winds, Geopotential Height, sea level pressure, and heat fluxes. Our objective is to identify the conditions that favor the development of MHWs. In alignment with prior research findings, we observe a common pattern across all the events, where weaker-than-average winds coincide with elevated sea level pressure, geopotential height, and latent heat in the region affected by these events, thereby promoting the formation of MHWs. In particular, through weather regime analysis, we present initial results showing the role of sporadic but recurring anticyclonic sub-tropical ridges, rather than persistent pre-block ridges or blocks, in the evolution of the MHWs in the western Mediterranean Sea. This analysis aims to shed light on the predictability of MHW macroevents in the Mediterranean Sea.

Bonino, G., Masina, S., Galimberti, G., & Moretti, M. (2023). Southern Europe and western Asian marine heatwaves (SEWA-MHWs): a dataset based on macroevents. Earth System Science Data, 15(3), 1269-1285.