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Mechanisms of heat storage and trend in the Mediterranean Sea in a high emission CMIP6 scenario with the regional climate system model CNRM-RCSM6.

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The Earth's climate is regulated by the ocean, which absorbs, transports and releases heat through continuous exchanges with the atmosphere. In regional climate modelling, an increasing consensus has emerged on the added value of ocean-atmosphere coupled systems to allow for these exchanges, through interactive and realistic air-sea interactions. This coupling is controlled by the Sea Surface Temperature (SST), itself regulated by the capacity for the ocean component to store heat at depth.

We address here the question of heat storage and trend in the different depths of the Mediterranean Sea in a CMIP6 historical and SSP5-8.5 scenario with the Regional Climate System Model CNRM-RCSM6 driven by CNRM-ESM2-1 simulation. CNRM-RCSM6 is composed by ALADIN-Climate at a 12 km resolution for the atmosphere, with the interactive aerosol scheme TACTIC and the multi-surface model SURFEX v8, CTRIP at a 50 km resolution for the river routing with deep drainage, flood plains, and the lake parametrization FLAKE, NEMOMED12 at a 6 km resolution for the ocean, and OASIS3-MCT for a 1hr-coupling of the four models. The simulation begins in 1979 after 79 years of coupled spin-up, and a control simulation also exists.

We investigate the timing, location and magnitude of heat storage by the Mediterranean Sea. In particular, we assess the link between SST warming and vertical heat storage, and its possible seasonality. We illustrate the sensitivity of heat storage to salinity trends by comparing the western and eastern Mediterranean behaviours. Finally, we make use of an online heat trend diagnostic tool to characterize the dominant mechanisms of ocean heat storage in the Mediterranean Sea.