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Heat content distribution of the Eastern Mediterranean abyss: linking mixing processes and climate variability

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Heat contained in the ocean (OHC) represents a fundamental parameter for understanding climate changes. Nevertheless, paucity of observational data hampers our knowledge on OHC variability, particularly in abyssal areas. By using hydrographic data, collected in the last three decades in the abyssal Ionian Sea (Eastern Mediterranean), here we investigate the role of competing convective sources of bottom waters. In particular, we find a heat storage of $\sim$1.6 W/m^2 – twice that assessed globally in the same period – exceptionally well-spread throughout the local abyssal layers. Such an OHC accumulation stems from progressive warming and salinification of the Eastern Mediterranean, producing warmer near-bottom waters. We analyze a new process that involves convectively-generated waters reaching the abyss as well as the triggering of a diapycnal mixing due to rough bathymetry, which brings to a warming and thickening of the bottom layer, also influencing water-column potential vorticity. This may affect the prevailing circulation, altering the local cyclonic/anticyclonic long-term variability and hence precondition future water-masses formation and the redistribution of heat along the entire water-column.