The disappearance of the cold intermediate layer inside the Black Sea

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The Black Sea is of special interest due to its very specific environment and its unique thermohaline structure. There is a strong vertical density gradient caused by the halocline, resulting in a pronounced 2-layers stratification. Between the seasonal thermocline and the permanent halocline, there is a layer of minimum temperature called the cold intermediate layer (CIL). This inversion in temperature is maintained by the strong vertical salinity gradient which significantly reduce the vertical mixing of the CIL with adjacent layers. The CIL is widely detectable over the entire Black Sea and data from profiling floats indicates that climate change leads to the disappearance of the CIL. In this talk, we introduce the theory of Walin, a reliable method to understand the processes that regulate water mass formation. Initial results using numerical outputs show that the year to year fluctuations in the formation rates of the denser part of the CIL is strongly determined by winter atmospheric temperature and that the coastal contribution to the formation of the CIL is not negligible compared to the rest of the basin.