Spatial variations of Antarctic Intermediate Water in the Caribbean Sea due to vertical mixing along its path

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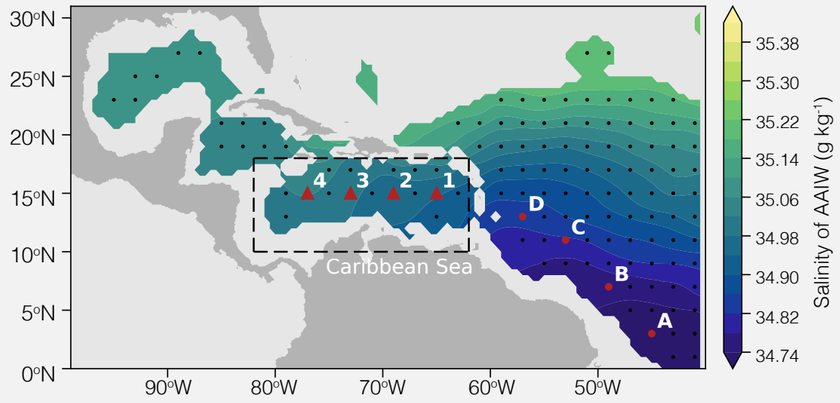
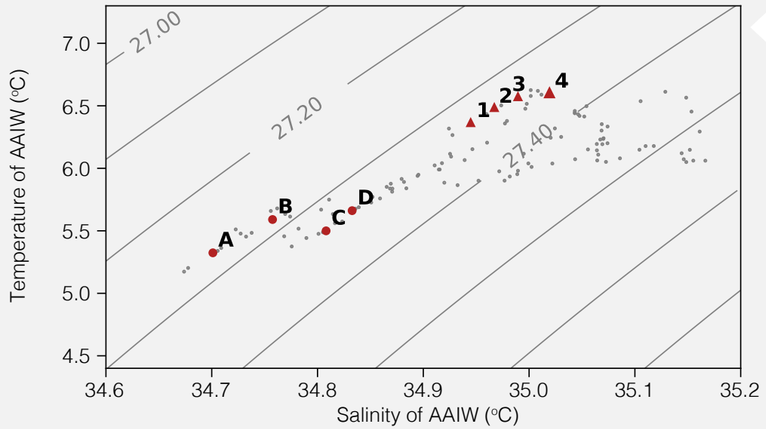
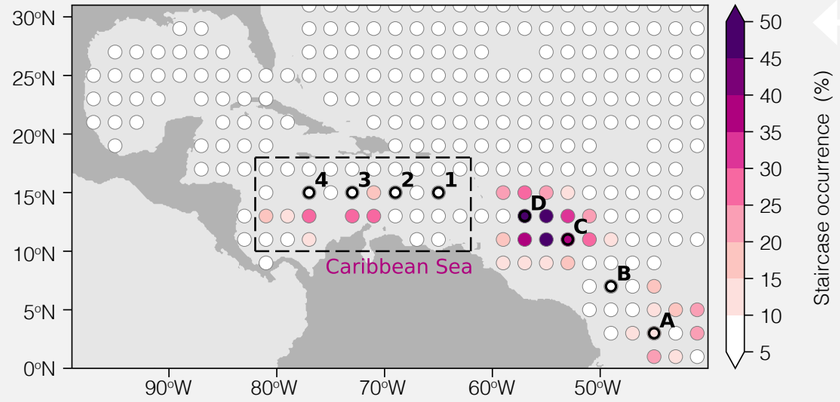






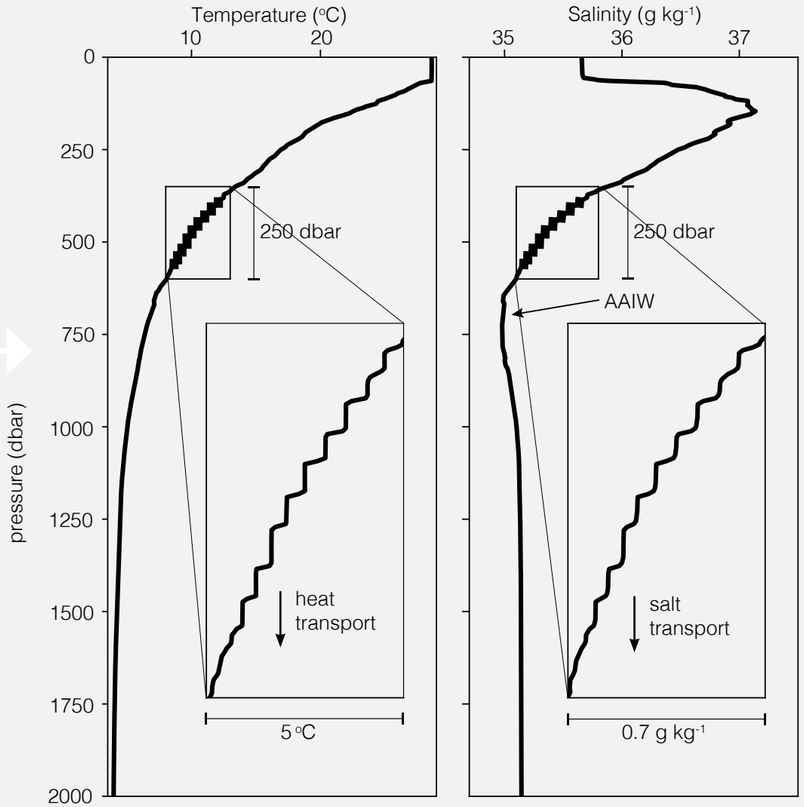
Because of its pronounced fresh signature, the properties of the northward-flowing Antarctic Intermediate Water (AAIW) affect the Atlantic Meridional Overturning Circulation. Hence, understanding modifications of AAIW along its path is important.

Here, we analyze the spatial variation of AAIW along its path in the North Atlantic and Caribbean Sea and assess whether vertical fluxes from background turbulence and from double-diffusive mixing in thermohaline staircases can explain these variations.

We deduce the staircase occurrence at 7% and estimate the flux ratio. In combination with vertical fluxes from background turbulence, these values are used in a steady-state advection-diffusion model to estimate the effective diffusivity of salt that arises from double diffusion.

From our model, we can conclude that the observed modification of AAIW in the Caribbean Sea may be attributable primarily to vertical mixing in the region itself.

A thermohaline staircase in the Caribbean Sea



van der Boog, C. G., Dijkstra, H. A., Pietrzak, J. D., & Katsman, C. A. Spatial variations of Antarctic Intermediate Water in the Caribbean Sea due to vertical mixing along its path. Geophysical Research Letters, doi: 10.1029/2021GL095977

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