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The Influence of Wind and Buoyancy Forcing on Antarctic Bottom Water Export NICOLE NEUMANN, Minnesota State University, Mankato — Ocean circulation plays a key role in the climate system globally. Antarctic bottom water (AABW), the densest water mass, blankets much of the ocean bottom in the southern hemisphere. Formation and export of AABW comprises the deepest limb of the global circulation. Export of AABW in the Southern Ocean is either forced by wind by exchanges of heat and freshwater with the atmosphere. We know that both wind and heat/freshwater forcing are important in setting the mean state of the Southern Ocean overturning circulation and what is poorly understood is their contributions to time-variability of the Southern Ocean overturning circulation. To investigate overturning circulation, we developed a theory that describes the adjustment of AABW export to changes in wind and heat/freshwater forcing and we will be comparing the predictions of this theory with process-oriented simulations of an idealized AABW export subject to time-varying forcing. Currently, a simplified version is being investigated, describing the depth-averaged response in the Southern Ocean. Next, the simulation will be extended to include depth-dependence effects, to account for the overturning circulation response. We will use the theory and simulations to test the hypothesis that wind modifies AABW export on short time scales (up to several years) and that heat/freshwater fluxes do so on longer time scales. These results will inform future observations and predictions of overturning circulation in the Southern Ocean.

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