

How might the ocean react to loss of the WAIS?

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The West Antarctic Ice Sheet (WAIS) has apparently retreated drastically in the past, arguably in response to changing climatic conditions (Naish et al., 2009). It may do so again under anthropogenic forcing. To explore the effect of WAIS retreat on the sea ice/ocean system, I carried out a preliminary set of simulations using the coupled ice sheet/climate model μ UVic ESCM-PSUIø (Fyke et al., 2011). When forced with prescribed increases to sub-ice-shelf melting in an otherwise preindustrial steady-state climate, the simulated AIS retreated due to both direct melting and increased ice discharge, and newly exposed ocean in the Ross and Ronne-Filchener embayments was colonized by sea ice. Subsequent sea ice export from these regions effectively transported the freshwater anomaly signal (and then some) into the open Southern Ocean, such that salinity actually increased in Ross and Ronne-Filchener basins. Because these regions contributed significantly to simulated AABW formation, a long-lived salty AABW anomaly developed synchronously with the main surface-intensified freshwater signal. The experiment described here is necessarily idealized in certain respects. Nonetheless, it demonstrates some potential effects of WAIS retreat, and highlights model development efforts that could be undertaken to better resolve AIS-ocean interactions. Hopefully, more work based on this initial effort will further illuminate AIS influence on regional and global oceanography.