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SUBANTARCTIC MODE WATER (SAMW) FORMATION AND TRANSFORMATION IN AN EDDY-PERMITTING SOUTHERN OCEAN STATE ESTIMATE

The formation, destruction, and transport of SAMW are examined using an eddy-permitting ocean circulation model constrained to a large observational dataset - the Southern Ocean State Estimate. Both a freshwater flux (net precipitation causing freshening) and an air-sea heat flux (which can be of either sign) significantly contribute to buoyancy fluxes in the SAMW density range complicating estimates of formation rates. Transformation occurs both at the surface due to air-sea buoyancy fluxes, and in the interior due to mixing; the relative roles of these two processes varies across different ocean sectors. For the years 2005 and 2006, SAMW ($26.7 < \sigma_{\theta} < 27.0$) was predominantly formed in the Indian Ocean both by the air-sea buoyancy fluxes and by interior mixing. In the Atlantic sector of the Southern Ocean more SAMW was destroyed by interior mixing than was formed at the surface. In the Pacific sector of the Southern Ocean surface formation of SAMW was insignificant and SAMW was destroyed by interior mixing. SAMW is transported northward in all three ocean sectors.

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