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ON THE CIRCULATION AND MIXING OF ATLANTIC WATER IN THE ARCTIC OCEAN

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The warm and salty Atlantic Water that enters the Arctic Ocean through Fram Strait and the Barents Sea provides important contributions to the basin-scale budgets of heat and salt and, by implication, the general circulation and ice cover in the Arctic. Circulation pathways and the regions and mechanisms that lead to mixing of Atlantic Waters are discussed. A theory is developed that considers the combined influences of mixing and wind forcing on the maintenance of the halocline and the cyclonic circulation of Atlantic Water in the western Arctic. Predictions of circulation strength, halocline depth and surface salinity from the theory are compared with an idealized configuration of an eddy-resolving numerical model. Implications for a seasonally ice-free Arctic are discussed.