

The Importance of Oceanic Volume and Heat Fluxes into the Barents Sea on the Regional Sea Ice and Climate

Courtney McDavid & Dr. Wieslaw Maslowski

Abstract

The Barents Sea and its connection to the Arctic Basin is an important region of study with focuses on Arctic climate, its variability, and trends. The majority of heat carried by Atlantic water (AW) traveling northward through the Barents Sea Opening (BSO) is lost within the region due to cooling and melting sea ice before it reaches the central Arctic basin. Understanding the processes and mechanisms involved is crucial to quantifying the amount of heat exchanged over the Barents Sea versus delivered into the Arctic and its impact on the regional climate. Using two simulations (RBR Default and RBR Test 57) of the high-resolution Regional Arctic Systems Model (RASM), we were able to investigate the relative importance and uncertainties of volume and heat flux estimates across the BSO. The RBR Default was found to have a net mean volume flux of 2.51 Sv and a net mean heat flux of 69.9 TW across the BSO section, which is comparable to observational estimates. The RBR Test 57 simulation had higher estimates, with a net mean volume flux of 3.46 Sv and a net mean heat flux of 134.9 TW. These estimates were higher than that of previously published studies, and we examined their significance for both the Arctic climate system and potential effects on the midlatitudes.