

A modeling study on water modification and its interannual variability in the Barents Sea

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The sea ice is not found in the southern half of the Barent Sea even in winter due to the warm Atlantic Water inflow through the Barents Sea Opening. Recent several studies have shown the significant relationship between sea ice extent in the Barents Sea and winter air temperature in some mid latitude regions of northern hemisphere. Therefore, it is important to investigate the inflow and modification of the Atlantic Water in the Barents Sea for getting a better understanding of climate change in mid-latitude regions. In this study, we utilize a high resolution realistically configured ice-ocean general circulation model to examine the mechanism of water modification and its interannual variability.

The modeled routes of the Atlantic Water are affected by the oceanic bottom topography and consistent with observations and previous modeling studies. The cooling and freshening of the Atlantic Water by the atmosphere and sea ice melting, respectively, are also well simulated. Calculated heat flux at the Barents Sea Opening is $\sim 87\text{TW}$ ($1\text{ TW} = 10^{12}\text{ Watt}$) is in range of observational estimates ($73\text{-}103\text{TW}$). The sea ice formation at the coastal polynya, which contributes the increasing of salinity in the Barents Sea, is slightly underestimated compared with satellite observation. The interannual variability of Atlantic Water modification and its mechanism are currently under investigation.

Keywords: Barents Sea, Ice-Ocean General Circulation Model, Sea surface heat flux