



Mesoscale eddies control meridional heat flux variability in the subpolar North Atlantic

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The meridional heat flux in the subpolar North Atlantic is vital to the climate of the high-latitude North Atlantic. For the basinwide heat flux across a section between Greenland and Scotland, much of the variability occurs in the Iceland basin, where the North Atlantic Current (NAC) carries relatively warm and salty water northward. As a component of the Overturning in the Subpolar North Atlantic Program (OSNAP), WHOI and OUC are jointly operating gliders in the Iceland Basin to continuously monitor the circulation and corresponding heat flux in this eddy-rich region. Based on one year of observations, two circulation regimes in the Iceland basin have been identified: a mesoscale eddy like circulation pattern and northward NAC circulation pattern. When a mesoscale eddy is generated, the rotational currents associated with the eddy lead to both northward and southward flow in the Iceland basin. This is quite different from the broad northward flow associated with the NAC when there is no eddy. The transition between the two regimes coupled with the strong temperature front in the Iceland basin can modify the meridional heat flux on the order of 0.3PW, which is the dominant source for the heat flux change the Iceland Basin. According to high-resolution numerical model results, the Iceland Basin has the largest contribution to the meridional heat flux variability along the section between Greenland and Scotland. Therefore, mesoscale eddies in the Iceland Basin provide important dynamics to control the meridional heat flux variability in the subpolar North Atlantic.