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The Two Branches of the Recirculation of Atlantic Water in Fram Strait

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The Fram Strait between Greenland and Svalbard is one of the two gateways by which warm Atlantic Water enters the Arctic Ocean providing oceanic heat. The West Spitsbergen Current advects the warm water northward in the eastern Fram Strait. However, only some of this water stays in the boundary current and enters the Arctic Ocean. Another part leaves the boundary current and flows westward across Fram Strait before turning southward in the East Greenland Current. This recirculation of Atlantic Water corresponds with the ice edge in Fram Strait and the two likely depend on each other. Here we present results from a high resolution regional numerical model that shows the recirculation to consist of two branches. The northern branch depends on eddy fluxes while the southern branch exhibits less high frequency variability. We also present a compilation of different observational data in the center of Fram Strait around 0°EW that give insight into the structure of the southern recirculation branch near the ice edge. A glider section resolves the small horizontal scale over which the geostrophic flow occurs. Several meridional CTD sections capture the differences and similarities between different summers. Moorings and Argo floats provide information in winter as well. These observations are compared to the representation of the recirculation in the numerical model. We show that the southern recirculation occurs over a small horizontal distance of about 20km in the vicinity of 79°N and is significantly stronger in winter than in summer. While there is cold freshwater at the surface north of the front, the temperature down to 500m is much higher in the recirculation than further south.