

Oceanographic processes in Baffin Bay impacting or being impacted by Greenland

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We examine, using both data and numerical models, several processes in Baffin Bay impacting or being impacted by Greenland. Using a set of historical sections collected in Disko Bay during summer, we examine the oceanographic evolution of the region over the last 3 decades. As well as observing the input of Irminger Water reported previously, we also see a significant warming of Polar Water at the same time. The role of circulation changes in Baffin Bay in initiating the observed oceanic changes in Disko Bay will be presented. Using a Lagrangian float tool and numerical model output, we examine pathways of Polar Water and Irminger Water to various major fjords along the coast of Greenland. We then use the same tool to track freshwater pathways from Greenland into the sub-polar gyre. Finally, we investigate the impact of enhanced runoff from west Greenland on Baffin Bay, the transport of the Canadian Arctic Archipelago (CAA) and freshwater fluxes south through Davis Strait into the Labrador Sea. Simple modelling experiments using a regional eddy-permitting ocean/sea-ice general circulation model show a significant storage of the added freshwater in Baffin Bay on inter-annual timescales, with reductions of salinity in the upper water column and increases in freshwater content. The changes in freshwater content raise the dynamic height in Baffin Bay, reducing the height difference across the CAA. This leads to a reduction in volume and freshwater transports through the CAA and leads to enhanced transport at Fram Strait to compensate.