

EGU21-8695

<https://doi.org/10.5194/egusphere-egu21-8695>

EGU General Assembly 2021

© Author(s) 2022. This work is distributed under the Creative Commons Attribution 4.0 License.



## Large-scale connections between Fram Strait recirculation and warm water pathways towards Greenland fjords

**Rebecca McPherson**, Torsten Kanzow, and Claudia Wekerle

Alfred-Wegener Institute for Polar and Marine Research, Physical Oceanography of the Polar Seas, Germany  
(rebecca.mcpherson@awi.de)

In the last two decades, rising ocean temperatures have significantly contributed to the increased melting and retreat of marine-terminating glaciers along the coast of Greenland. Warming subsurface waters have also been shown to interact with the glaciers in Northeast Greenland, which until recently were considered stable, and caused their rapid retreat. The main source of these waters is the westward recirculation of subducted Atlantic Water (AW) in Fram Strait, which has shown a warming of up to 1° C over the past few decades.

In this study, the connection between the subsurface warm Atlantic Intermediate Water (AIW) found on the wide continental shelf of Northeast Greenland and in the fjords, and AW within the West Spitsbergen Current (WSC) is investigated using historical hydrographic observations and high-resolution numerical simulations with the Finite-Element Sea-ice Ocean Model (FESOM). We find that AW from the WSC takes between 10 – 14 months to recirculate across Fram Strait and reach the shelf break where it moves southwards. The pronounced inter-annual variability in the WSC is preserved as the water recirculates. However, the variability of temperature and AIW layer thickness on the shelf at seasonal or inter-annual time scales is at best weakly controlled by the AW temperature in the WSC. There is no significant correlation between AIW and the WSC anywhere on the shelf, suggesting advection from the WSC alone does not control AIW signals. The role of wind-driven, episodic upwelling is then investigated as a driver of transport of AIW from Fram Strait onto the shelf (following an approach by Münchow et al., 2020) where it then may follow the deep trough system towards the glaciers.