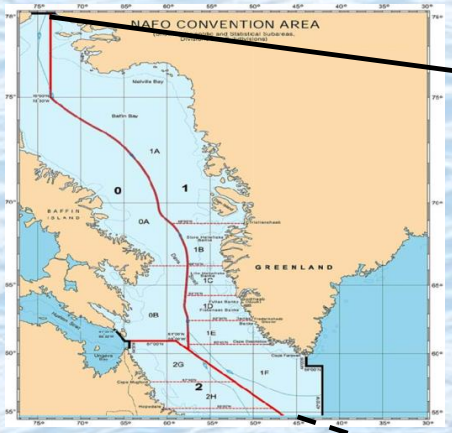
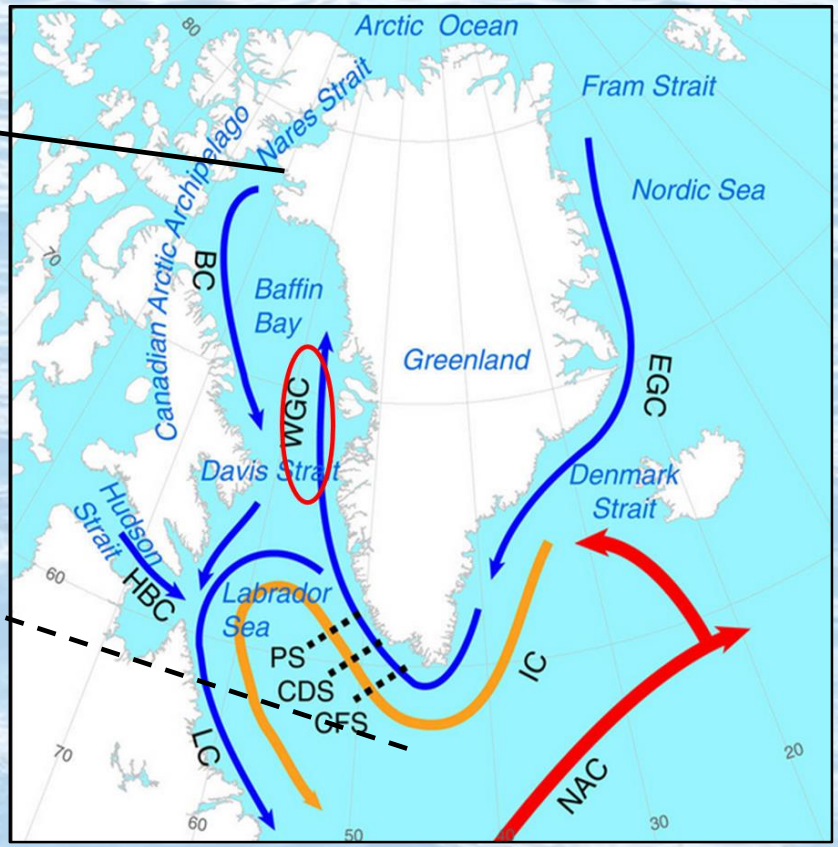
NAFO Northwest Atlantic Fisheries Organization

The 2021 overview of the hydrographic conditions off Southwest Greenland – NAFO Subarea 1

PINNGORTITALERIFFIK
GRØNLANDS NATURINSTITUT GREENLAND INSTITUTE OF NATURAL RESOURCES

NAFO Subarea 1 – Main features and general circulation





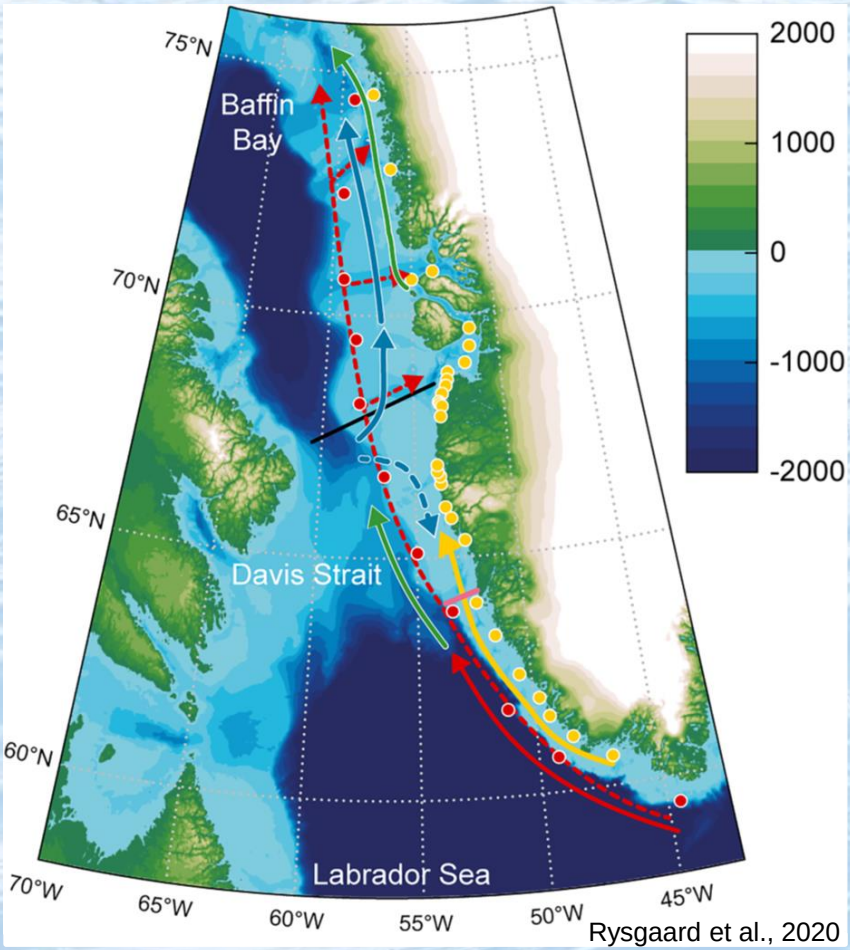
- West Greenland Current (**WGC**) transports warm and saline water from the North Atlantic northward along the west Greenland continental slope.

- Baffin Island current (**BC**) transports cold and fresher water from the Arctic Ocean southward along the continental slope.

CIRCULATION PATTERNS

EGC – East Greenland current transports cold and low-salinity water from the Arctic Ocean
LC – Labrador current transports cold and low-salinity water from polar origin
IC – Irminger Current transport warm and saline waters from the eastern North Atlantic
NAC – North Atlantic current transports warm water to the northern Atlantic
HBC – Hudson Bay current exchanges waters between the Hudson Bay and the Labrador Sea

NAFO Subarea 1: Main features and general circulation

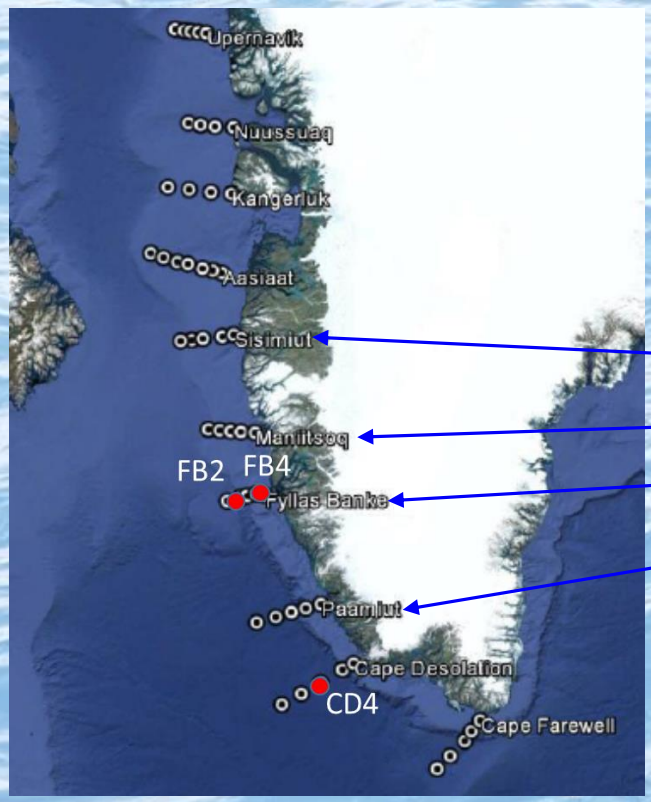


Rysgaard et al., 2020

BBPW – Baffin Bay Polar Water

- West Greenland Current (**WGC**) has 3 components:
  - a cold, fresh and surface near inshore surface coastal waters (**CW**);
  - a saltier, warmer and deeper offshore water – the Subpolar Mode Water (**SPMW**);
  - freshwater runoff from Greenland.

NAFO Subarea 1: Oceanographic sections and main climate variables

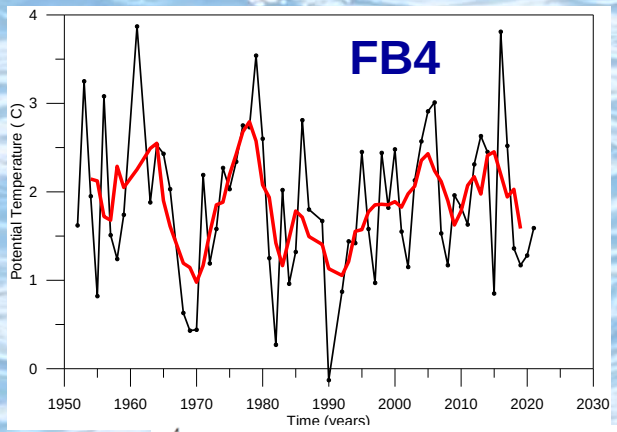


- Location of standard sections in West Greenland waters.
- Oceanographic sections sampled in 2021.
  - Sisimiut
  - Maniitsoq
  - Fyllas Banke
  - Paamiut
  - reference stations FB2, FB4, CD4

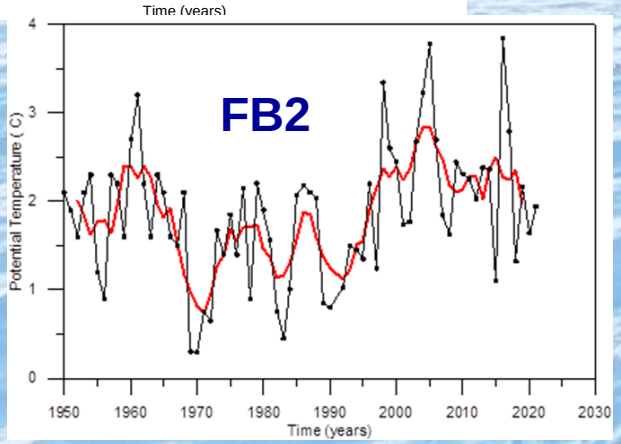
CLIMATE variables

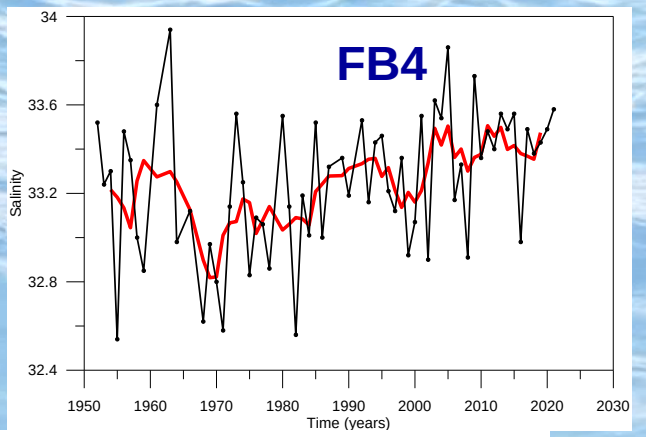
- **Negative** winter **NAO** index (2021)
- Nuuk mean **Air Temperature** (2021) = +0.1 ºC.
  - +1.1 ºC **higher** than the 1981-2010 long-term mean.
  - +0.9 ºC **higher** than in 2020

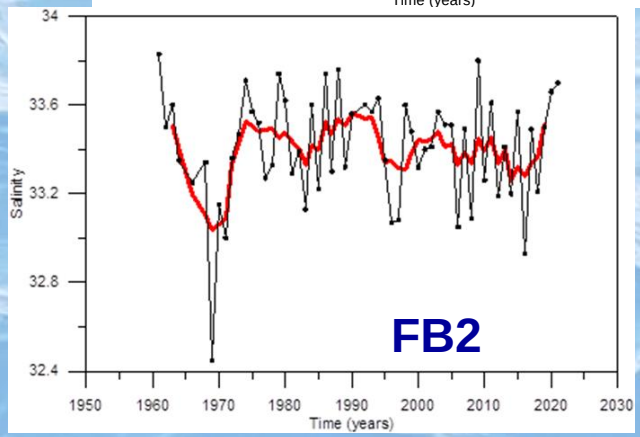
NAFO Subarea 1: Fyllas Banke (FB4 & FB2)



Temperature **increased** to values close to the **long-term means** (+1.69 and +1.90 °C) in **coastal (FB4)** and **offshore (FB2)** waters.





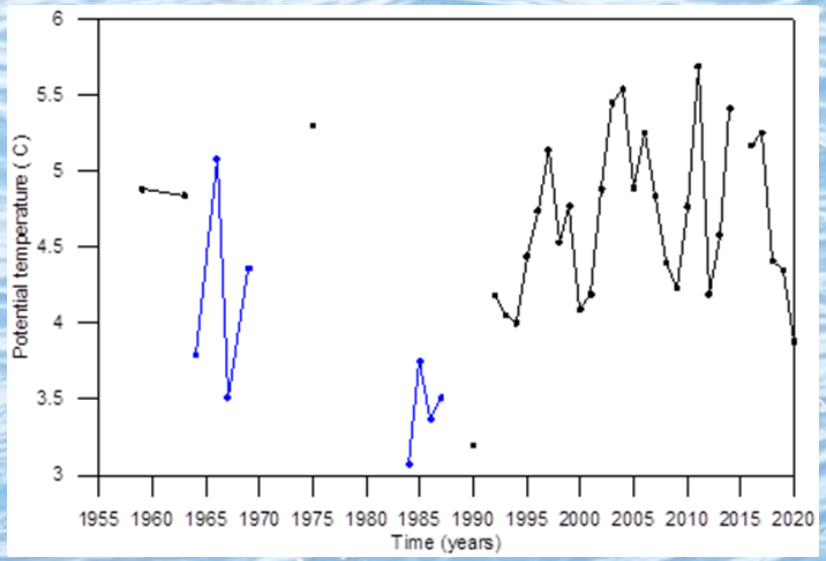


Salinity of the **coastal** waters (**FB2**) **increased** maintaining its **positive trend** starting ~1970.

Offshore waters (**FB4**) showed a **slight increase trend** in opposition to the negative trend from 1970-2016.

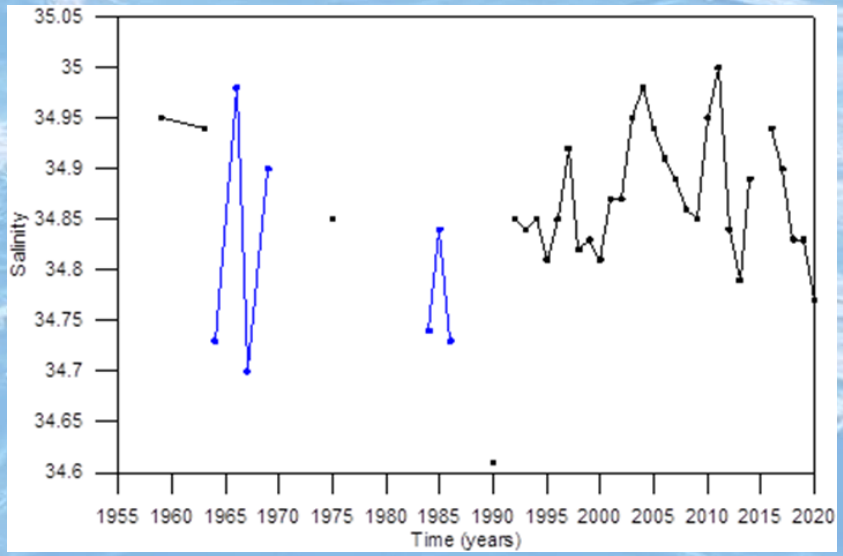
In 2021 salinity was +0.31 and +0.28 **above** its **long-term means** (33.27 and 33.42).

NAFO Subarea 1: Cape Desolation



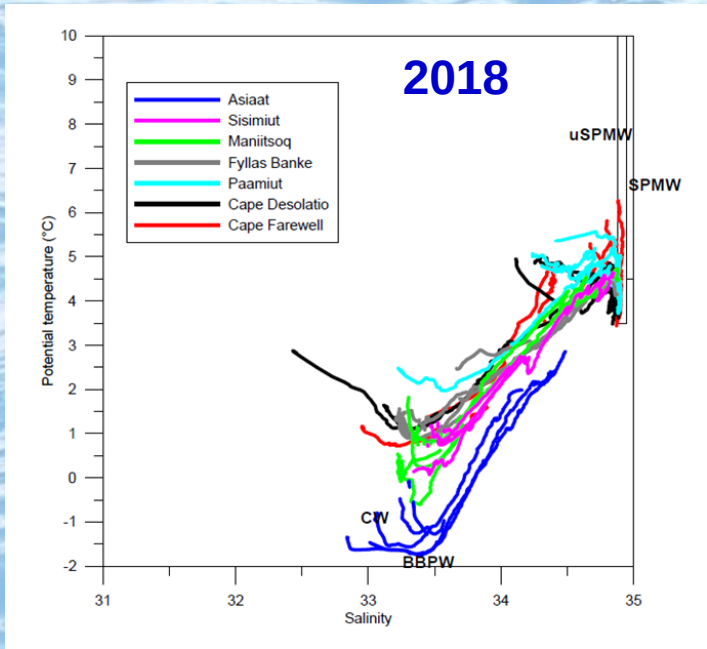
Water temperature (75-200m) maintain a **decreasing trend** since 2017.

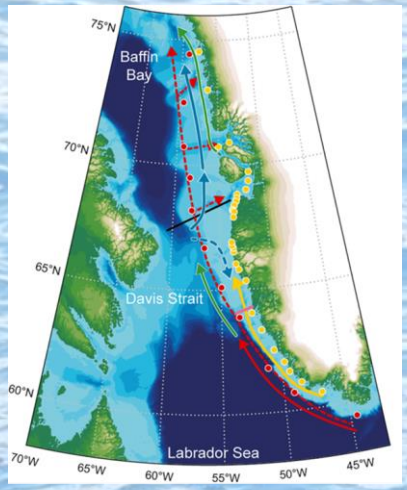
In 2020, salinity was 1.23 ºC below the **long-term mean** (+4.65°C).



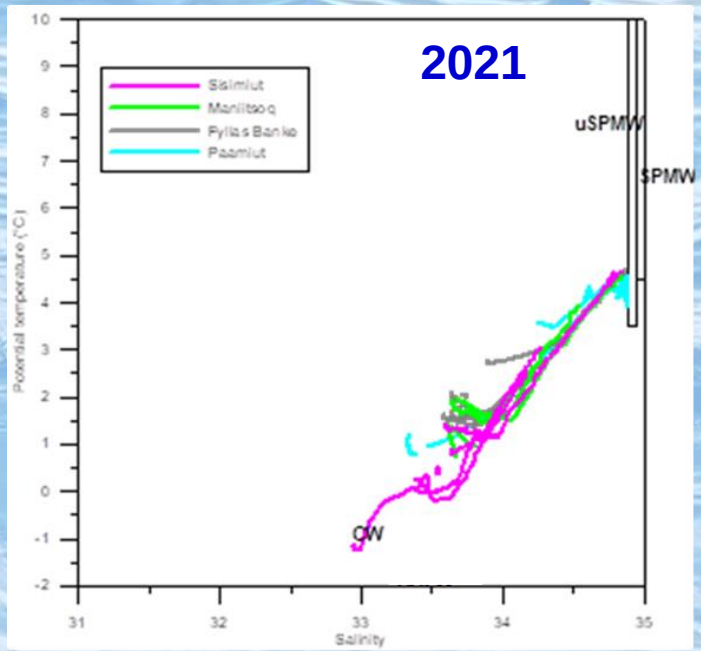
Salinity continues to **decrease** since 2016 reaching values (34.77) below its **long-term mean** (34.88).

NAFO Subarea 1 – West Greenland





3 years



BBPW – Baffin Bay Polar Water
CW – Coastal Water
uSPMW - upper SubPolar Mode Water
SPMW - SubPolar Mode Water

- **SPMW** (salinity > 34.95) **not observed** on **Greenland West Coast**
- From Cape Farewell (southern Greenland section) to the Sisimiut section the salinity varied from 34.88 to 34.95
- **SPMW** becomes **colder** and **fresher** with distance **from South to North**.

Subpolar Mode Water (SPMW) ⇔ Irminger Water

Highlights

- Water **temperature** at **Fyllas Banke** near the coast and offshore **increased** to values close to the long-term mean.
- **Salinity** of water at the **Fyllas Banke** experienced an **increasing trend**.
- **SubPolar Mode Water** (also referred to as Irminger Water) was **not observed** on **Greenland's West coast**
- A cooler and fresher effect was found on the SPMW as progressed towards Nord on the Greenland West coast.

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Source:

Mortensen, J. (2022). Report on hydrographic conditions off Southwest Greenland May 2021, NAFO SCR Doc. 22/006.

Additional information:

Mortensen, J., S. Rysgaard, K. Arendt, T. Juul-Pedersen, D. Søgaard, J. Bendtsen, L. Meire. (2018). Local coastal water masses control heat levels in a West Greenland tidewater outlet glacier fjord. *Journal of Geophysical Research: Oceans*, 123:8068–8083. https://doi.org/10.1029/2018JC014549

Rysgaard, S., W. Boone, D. Carlson, M. Sejr, J. Bendtsen, T. Juul-Pedersen, T. Lund, L. Meire, **J. Mortensen**. (2020). An updated view on water masses on the pan-west Greenland continental shelf and their link to proglacial fjords. *Journal of Geophysical Research: Oceans*, 125:e2019JC015564. https://doi.org/10.1029/2019JC015564