



Northwest Atlantic
Fisheries Organization

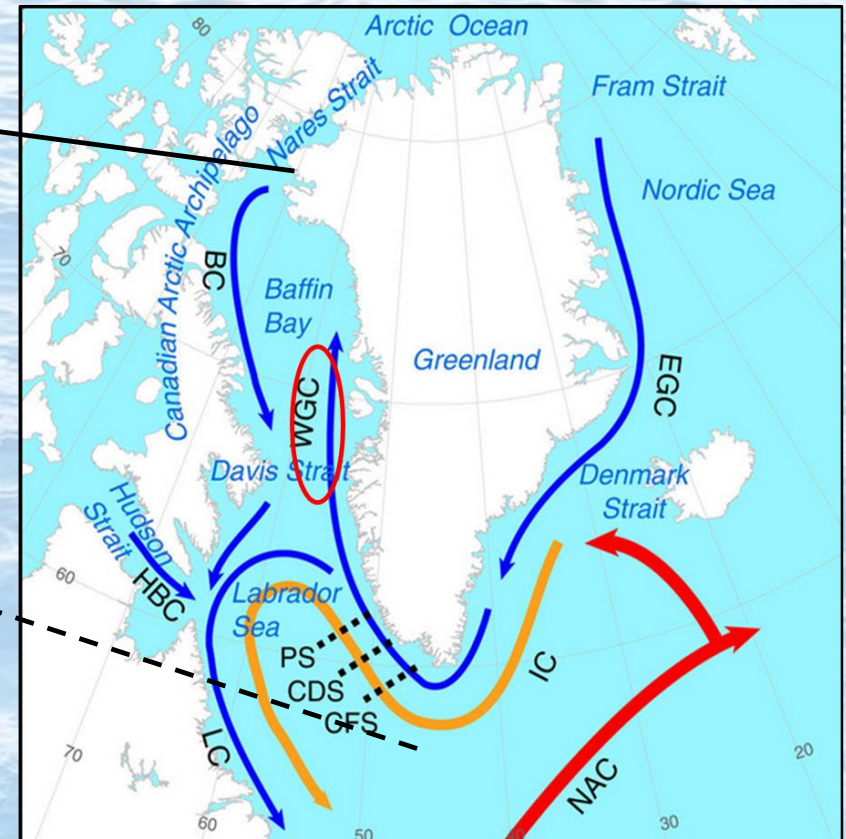
Report on hydrographic conditions off Southwest Greenland May - June 2024 – NAFO Subarea 1



PINNGORTITALERIFFIK

GRØNLANDS NATURINSTITUT GREENLAND INSTITUTE OF NATURAL RESOURCES

NAFO Subarea 1 – Main features and general circulation



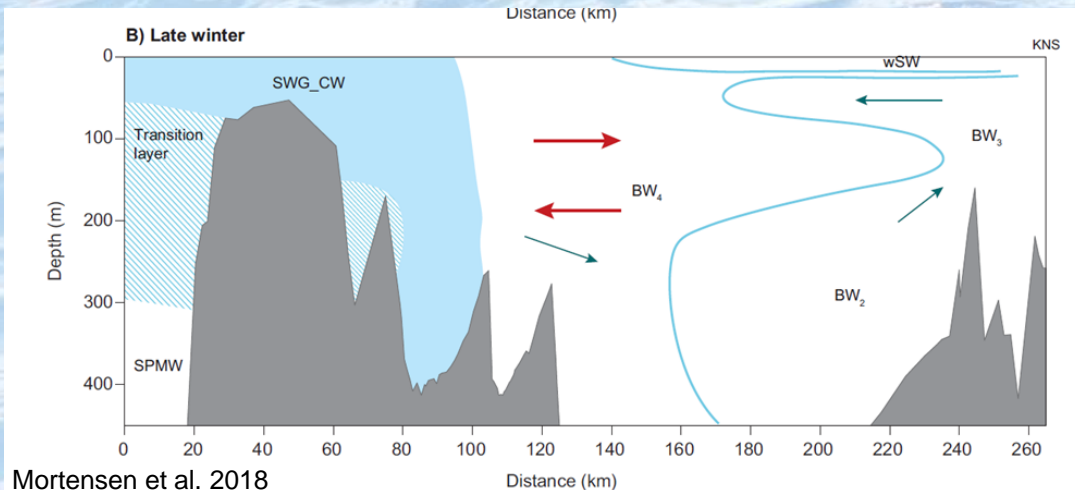
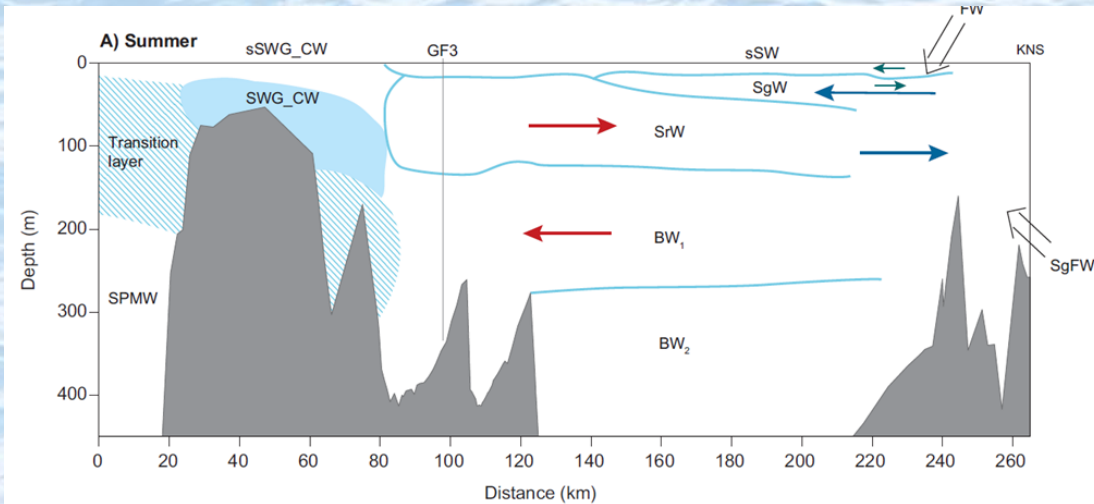
- West Greenland Current (**WGC**) transports warm and saline water from the North Atlantic northward along the west Greenland continental slope.
- Baffin Island current (**BC**) transports cold and fresher water from the Arctic Ocean southward along the continental slope.

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 –General circulation



Mortensen et al. 2018

- During summer the estuarine circulation driven by runoff (→), subglacial circulation driven by **SgFW** discharge (→);
- intermediate baroclinic circulation (→) in summer and late winter;
- Dense coastal inflows (→) in late winter.

CIRCULATION PATTERNS

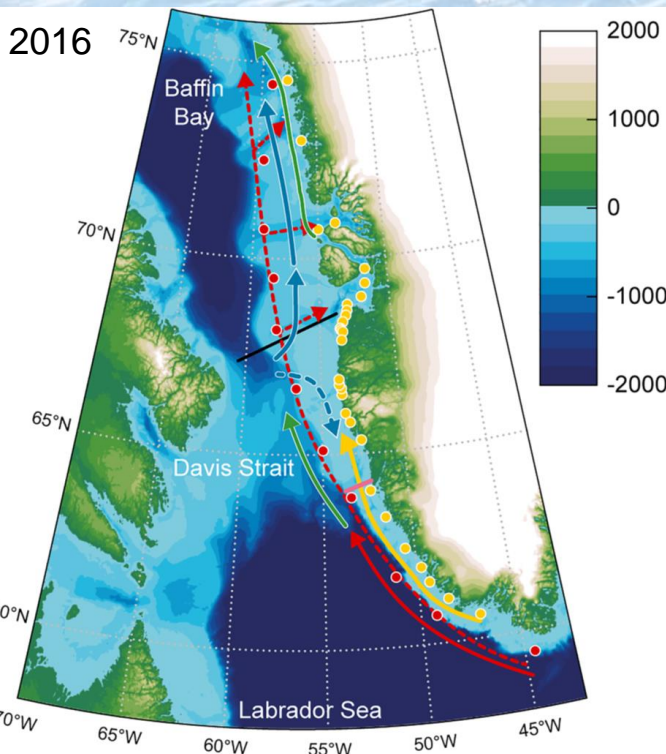
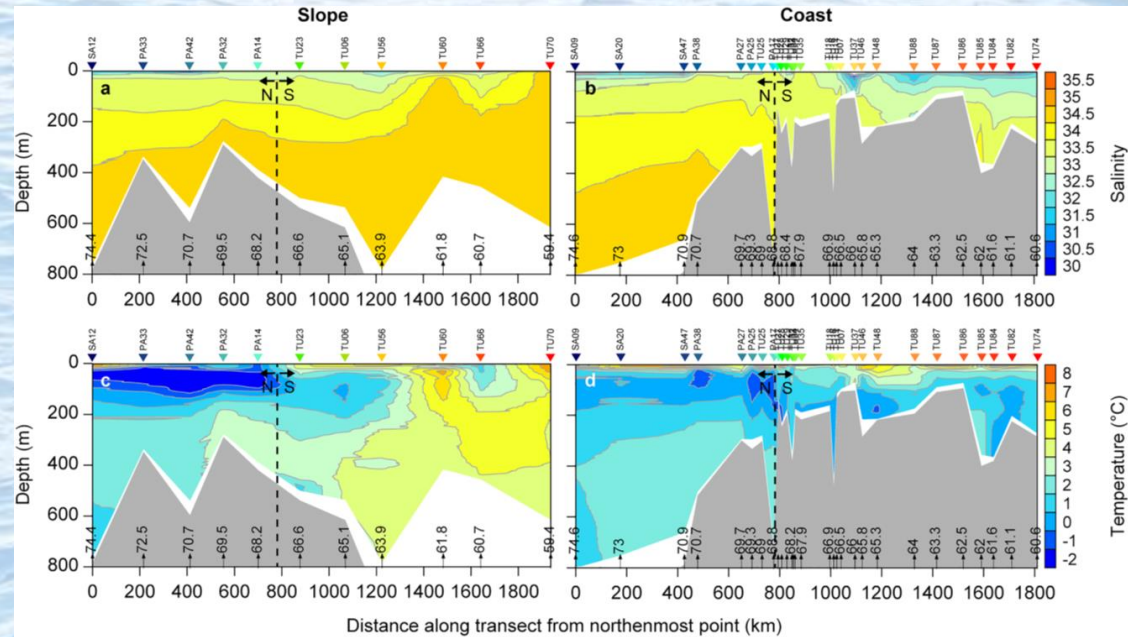
CW, coastal water;
sCW, summer coastal water;
SPMW, subpolar mode water;
BWi, basin water types $i = 1-4$;
SrW, sill region water;

SgW, subglacial water;
sSW, summer surface water;
wSW, winter surface water;
SgFW, subglacial freshwater;
KNS, Kangiata Nuaata Sermia.



NAFO Subarea 1: Main features and general circulation

- Three Key Water Masses:
 - Warm Subpolar Mode Water (**SPMW**);
 - Cold Artic Baffin Bay Polar Water (**BBPW**);
 - Cold and fresh Southwest Greenland Coastal Water (**CW**)



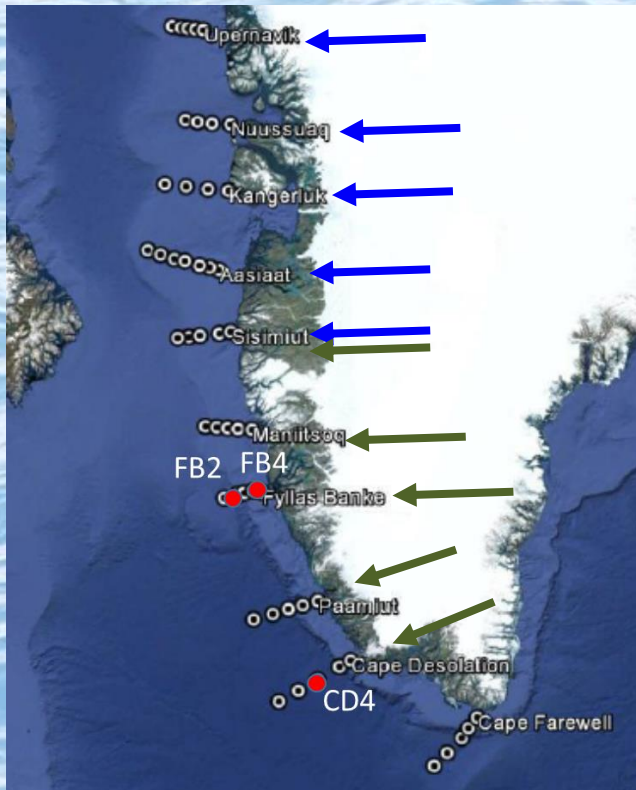
Northern Greenland (North of ~68°N):

- Deep, open pathways (troughs) allow warm **SPMW** to reach fjord entrances and glaciers easily.

Southern Greenland (South of ~68°N):

- A thick layer of cold, fresh **CW** blocks warm **SPMW** from reaching the coast/fjords.
- Shallow troughs (<300m) limit warm water access.

NAFO Subarea 1: Oceanographic sections and main climate variables



RV Tarajoq (May 29th to June 24th)

- Sisimiut 1-5.
- Aasiaat St. 1-7
- Kangerluk St. 1-4
- Nuussuaq St. 1-3(5)
- Upernavik St. 1-2(5)

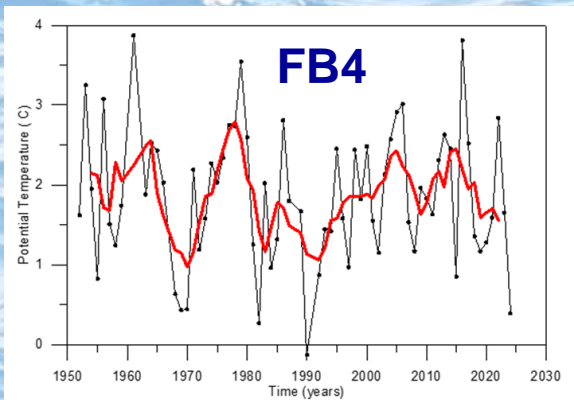
Navy Royal Danish
HDMS Knud Rasmussen
(May 19th to May 23th)

- Maniitsoq st 1-5.
- Fyllas bank st 1-5.
- Paamiut st 1-5.
- Cape desolation st 1-5
- Sisimiut St. 0-5

CLIMATE variables

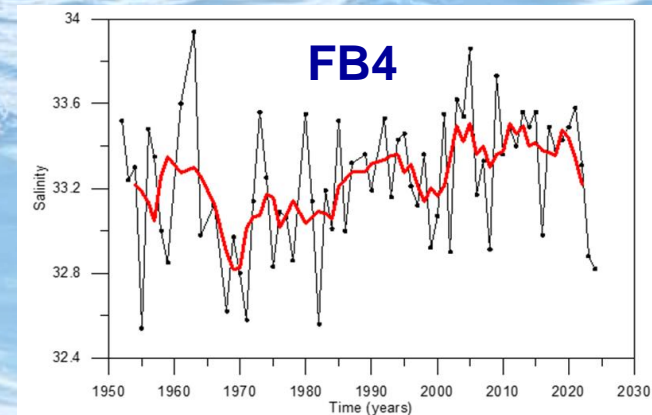
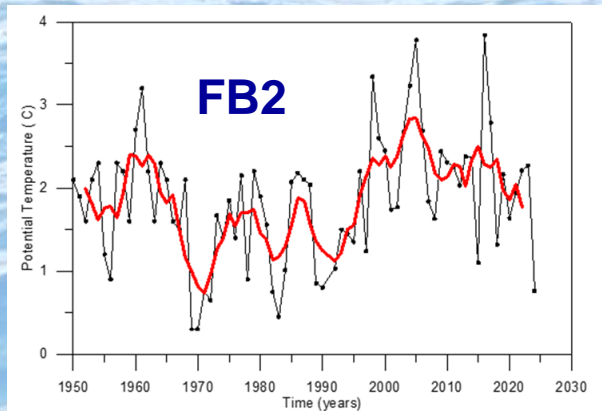
- Winter **NAO** index 2024 = slightly **positive**
- Nuuk mean **Air Temperature** (2024) = -0.8 °C.
 - +0.2 °C **higher** than the 1911-2010 long-term mean.
 - +0.6 °C **lower** than in 2023

NAFO Subarea 1: Fyllas Banke (FB4 & FB2)



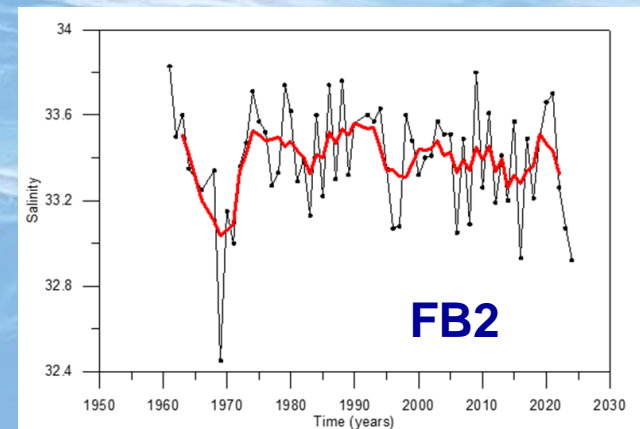
Though the two stations (FB2 and FB4) should have similar **trends** story, **they do not**.

Temperature **lower** than the long term mean (-1.32°C and -1.52°C lower)) in **coastal (FB4)** and **offshore (FB2)** waters.



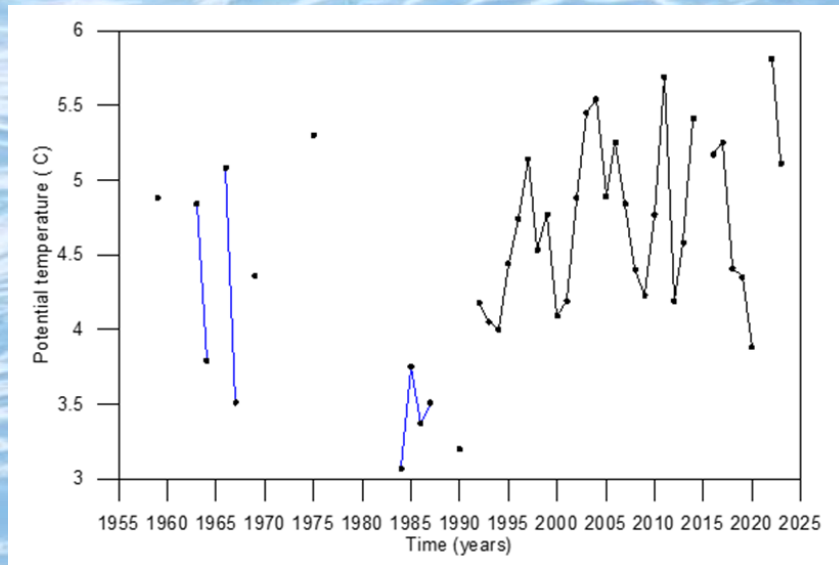
Salinity at FB4 (2024) broke the **positive** trend (-0.54 **below long-term mean**) ($S_{\text{mean}}=33.36$)

Salinity at FB2 (2024) resumed the **negative trend** starting ~1970 (-0.48 **below its long-term mean** $S_{\text{mean}}=33.40$)



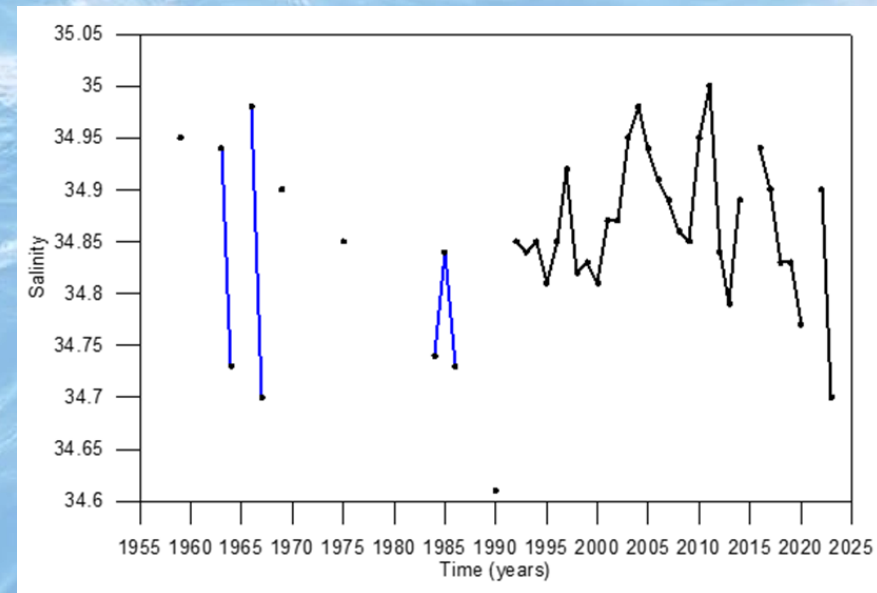
NAFO Subarea 1: Cape Desolation

Average water properties between 75 and 200 m depth are used to **monitor the variability of the Subpolar Mode Water (SPMW)** component of the West Greenland Current

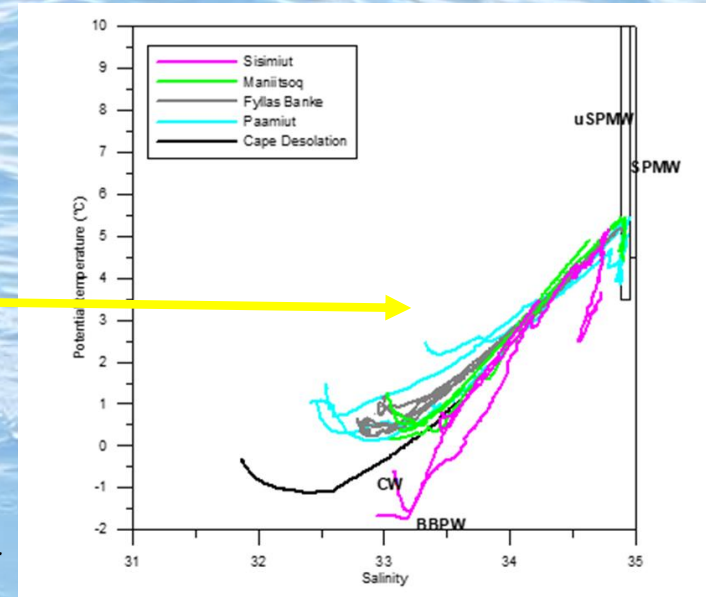
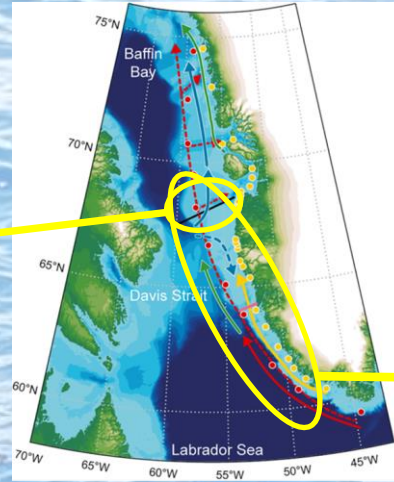
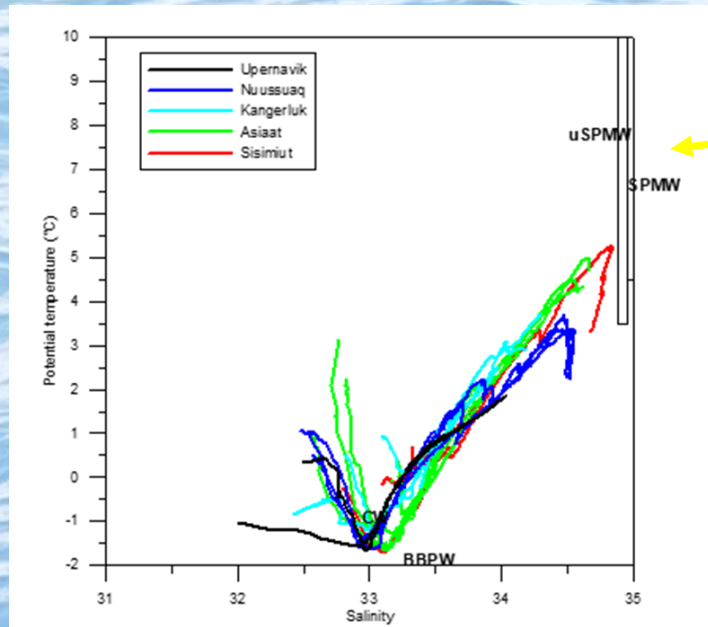


Average water temperature (75-200m) in 2023 was +5.11 °C (0.46 °C **above** the **long-term mean** (1992-2010))

In 2023 salinity was 34.7 (- 0.17 **below** the **long-term mean** (1992-2010))



NAFO Subarea 1 – West Greenland



BBPW – Baffin Bay Polar Water

CW – Coastal Water

uSPMW - upper SubPolar Mode Water

SPMW - SubPolar Mode Water

- salinity > 34.95 (**SPMW** /Atlantic / Irminger water) only observed in the **Paamiut section**
- Salinity between 34.88-34.95 **Paamiut** to **Maniitsoq**
- Highest Temperature measured **Paamiut** section at subsurface **SPMW**
- Lowest Temperature measured **Sisimiut** section (**BBPW**)
- Only deep **SPMW** is observed to enter **Baffin Bay**
- **SPMW** becomes **colder** and **fresher** with distance from south to north



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Source:

Mortensen, J. 2025. Report on hydrographic conditions off West Greenland May-June 2024. Scientific Council Research Document, SCR Doc. 25/007.

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. *JGR 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>