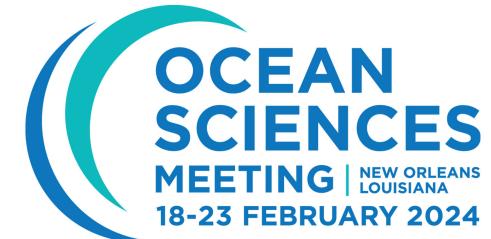
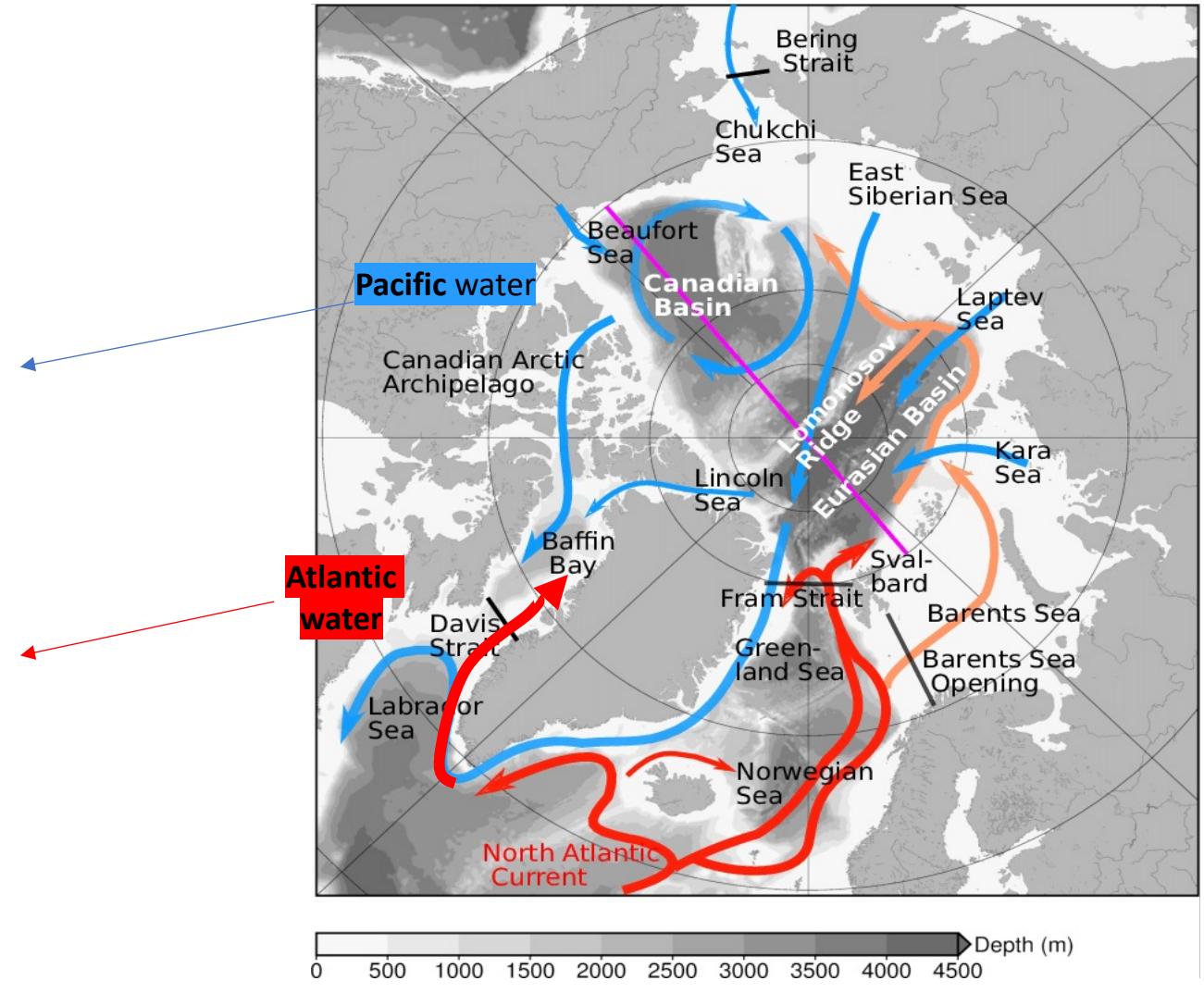
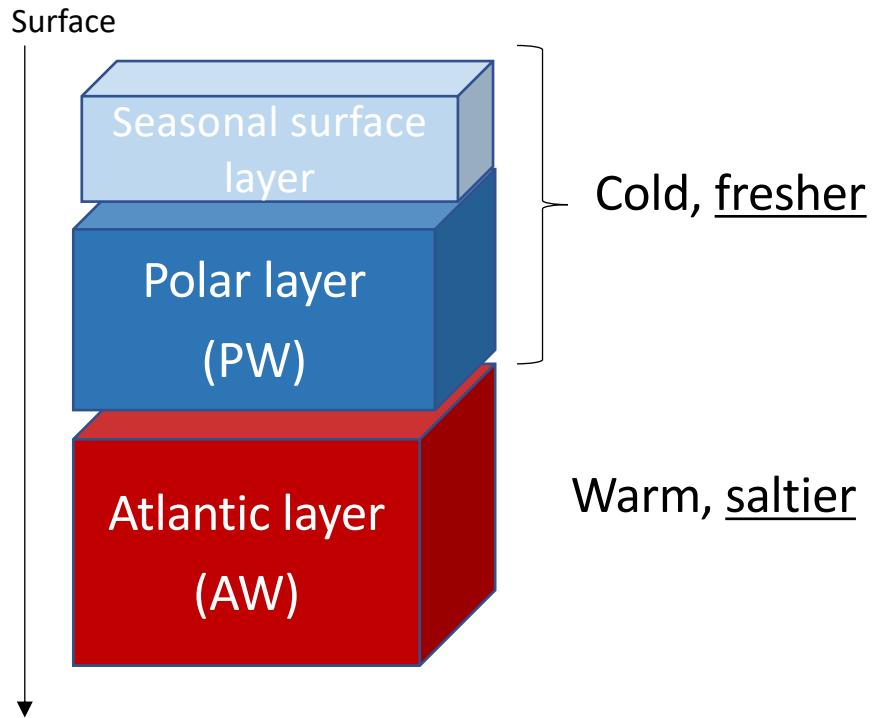


Year-round perspective on marine physical dynamics and sea ice in Jones Sound, Nunavut.

Ana Heras Duran, A Hamilton ,C Parrott , S Waterman, E Bertrand, F Pinczon du Sel, E Brossier, T Noah,
P.G. Myers, M. Bhatia

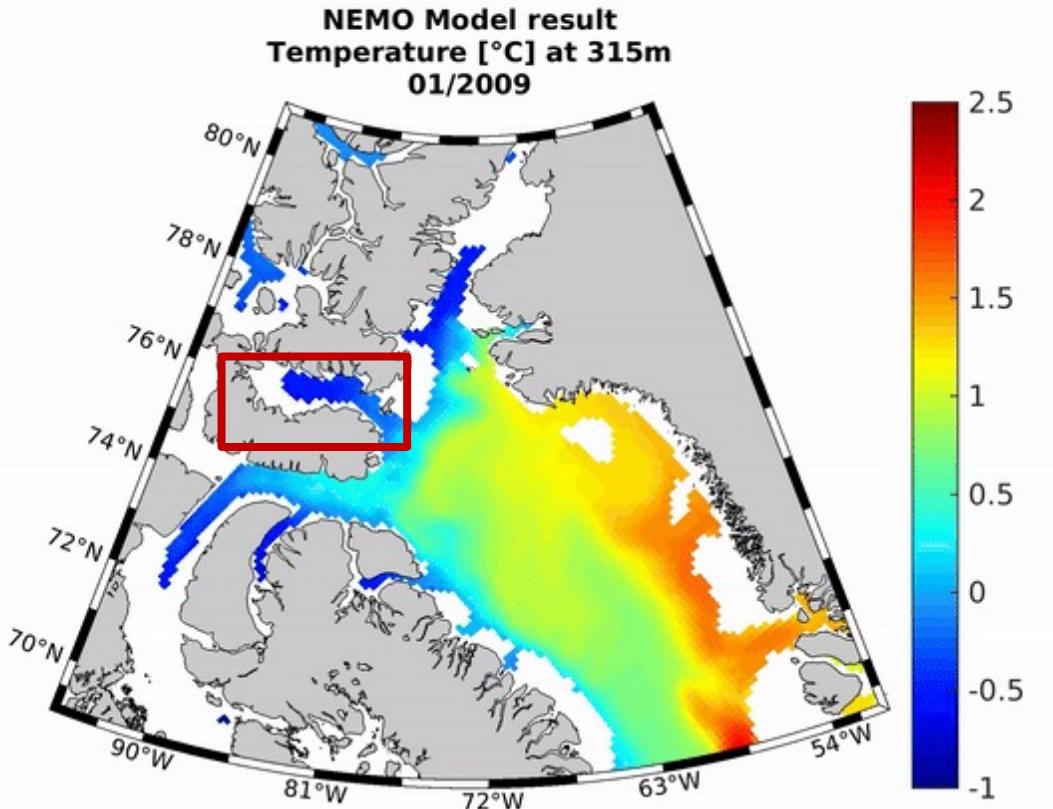


Arctic Ocean water masses



Credit : Wang et al.2018

Atlantic Water (AW)



NEMO v3.4, ANHA 1/4°, GLORYS2v3, CGRF, LIM2.

- Is the AW entering in Jones Sound?
- What could be driving this?

North water polynya

→ deep convection



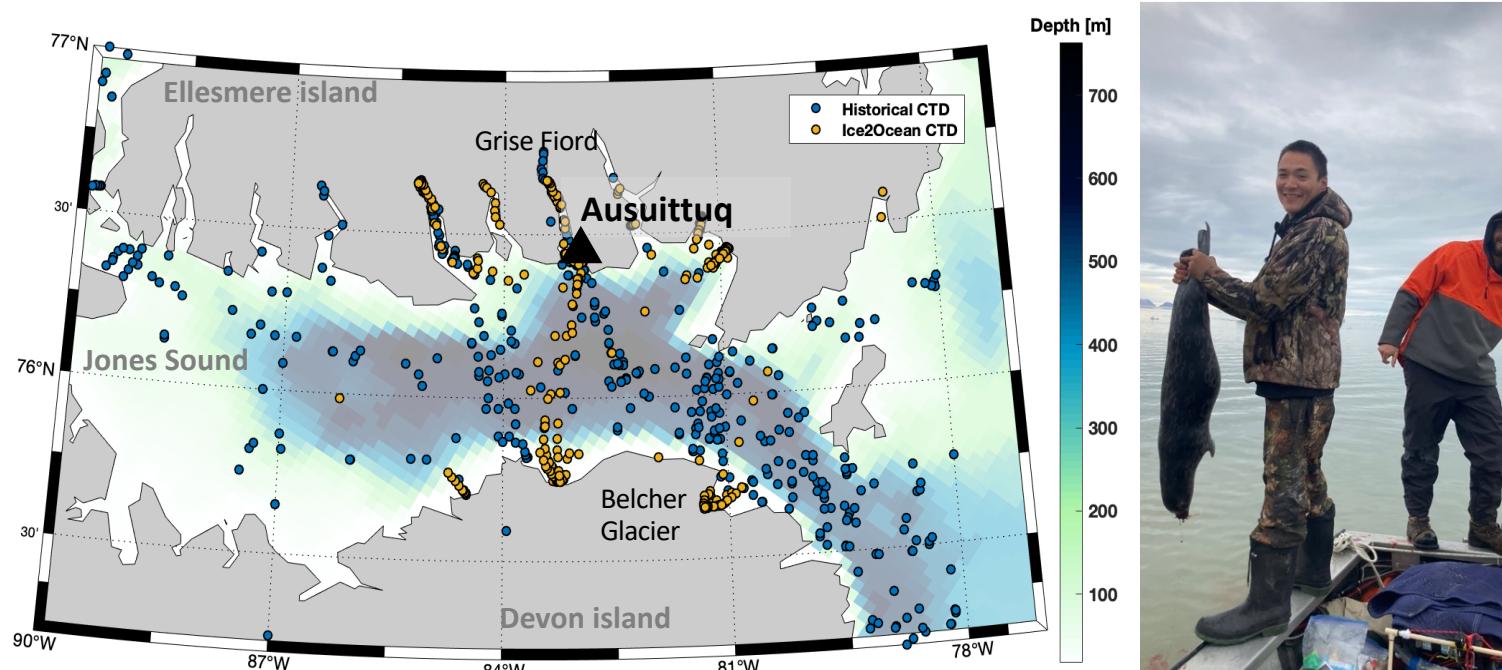
Research Goals

- Investigate the water column structure and its variability in Jones Sound.
- Investigate the seasonal evolution of the upper water column vertical structure.
- Understand the short-term variability of Atlantic Water layer properties, at the Jones Sound entry and what could be driving this variability.



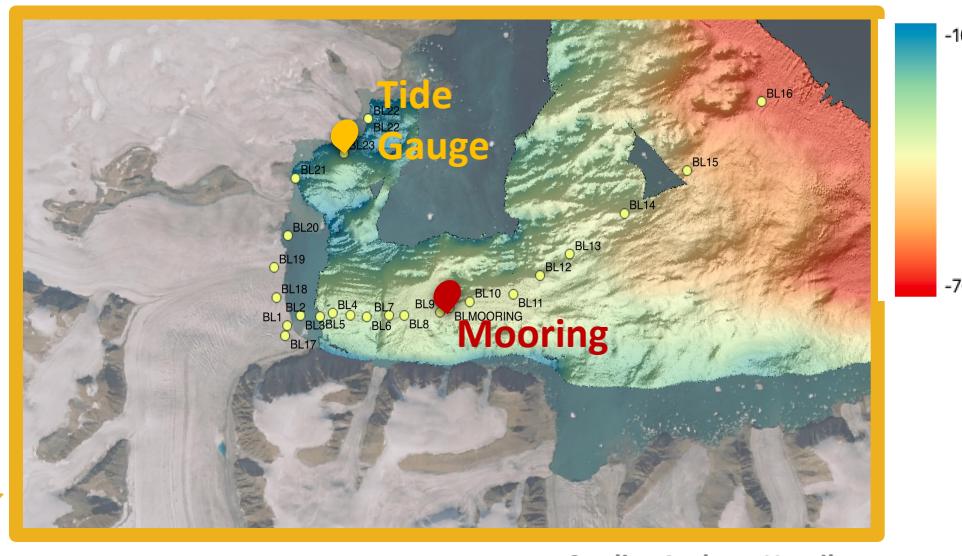
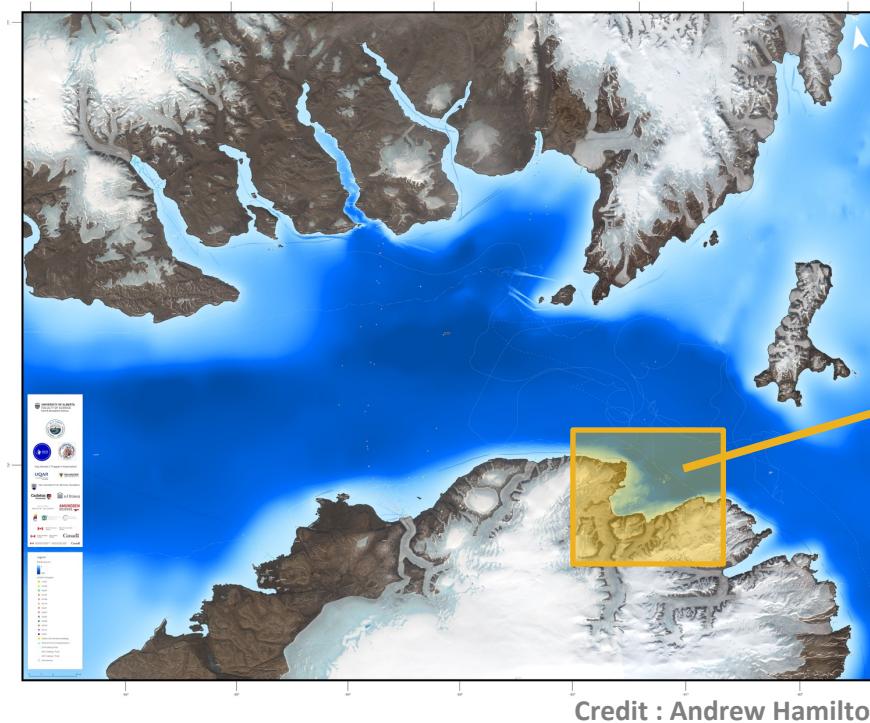
Dataset – CTD profiles

Collaboration with Ausiutuq community from 2019 to date.

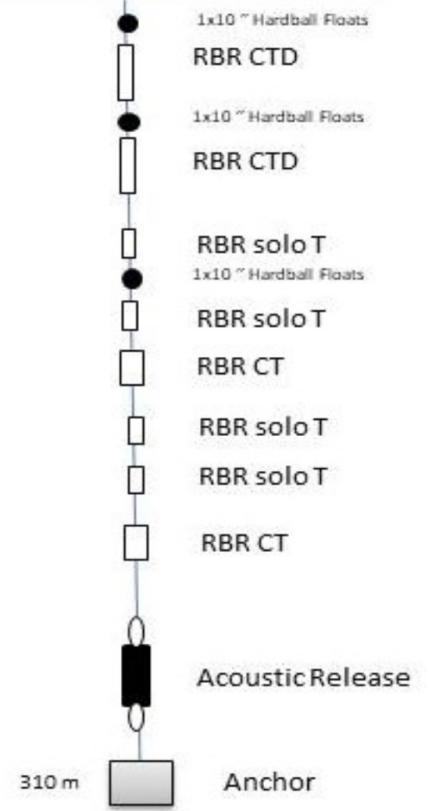


- **Ice2Ocean project** : 445 CTD profiles On board of local boats, and research vessels: Vagabond, Nuliajuk and Amundsen.
- Historical CTD since 1926

Dataset – Belcher mooring



- 1 year of ‘continuous’ data at Belcher Bay (Aug. 2021 - Aug. 2022)
- A tide gauge was also installed for the same period
- Low buoyancy design



Dataset – Belcher mooring

Mooring
deployment : July
2021



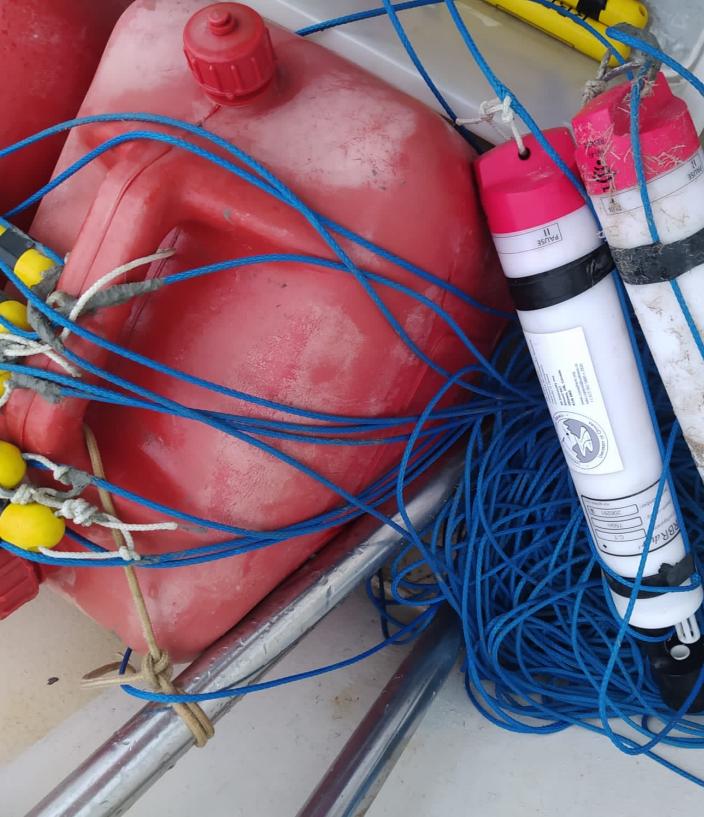
Dataset – Belcher mooring

Mooring recover : August 2022

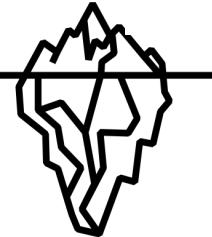


Dataset – Belcher mooring

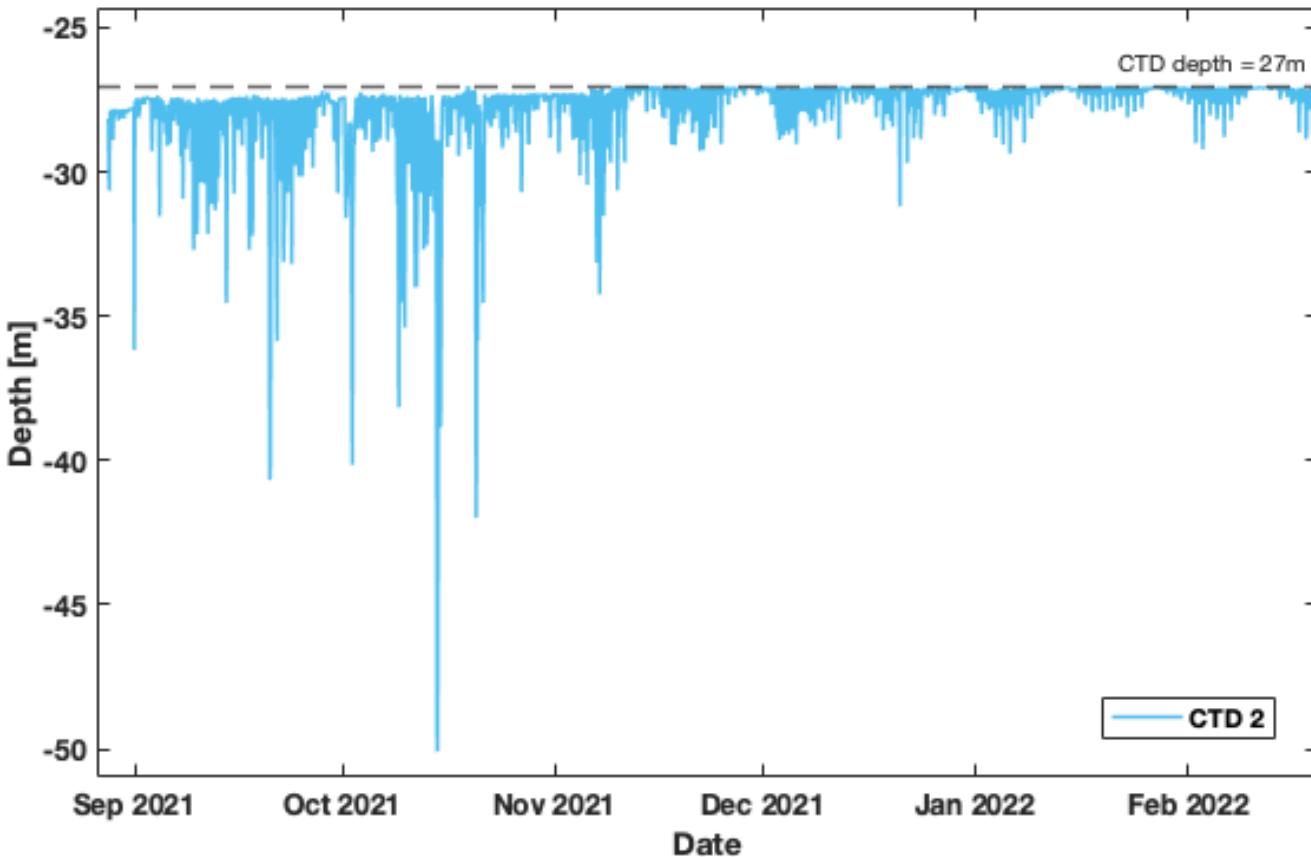
Mooring recover :
August 2022



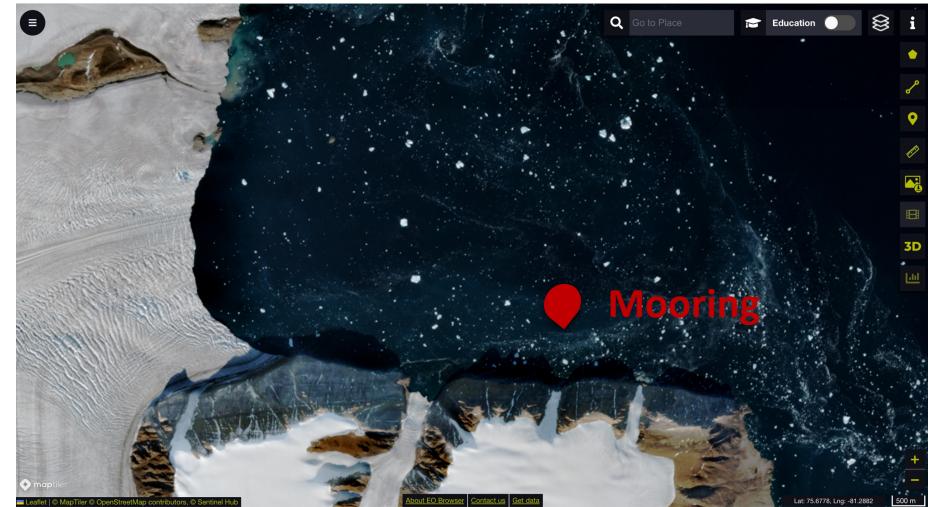
Results



Iceberg strikes at Belcher mooring



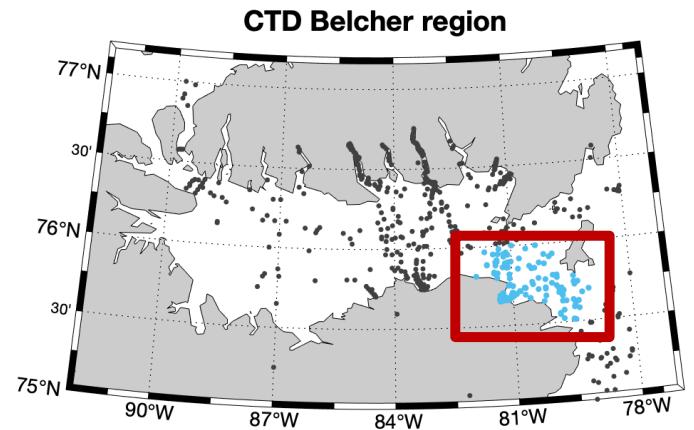
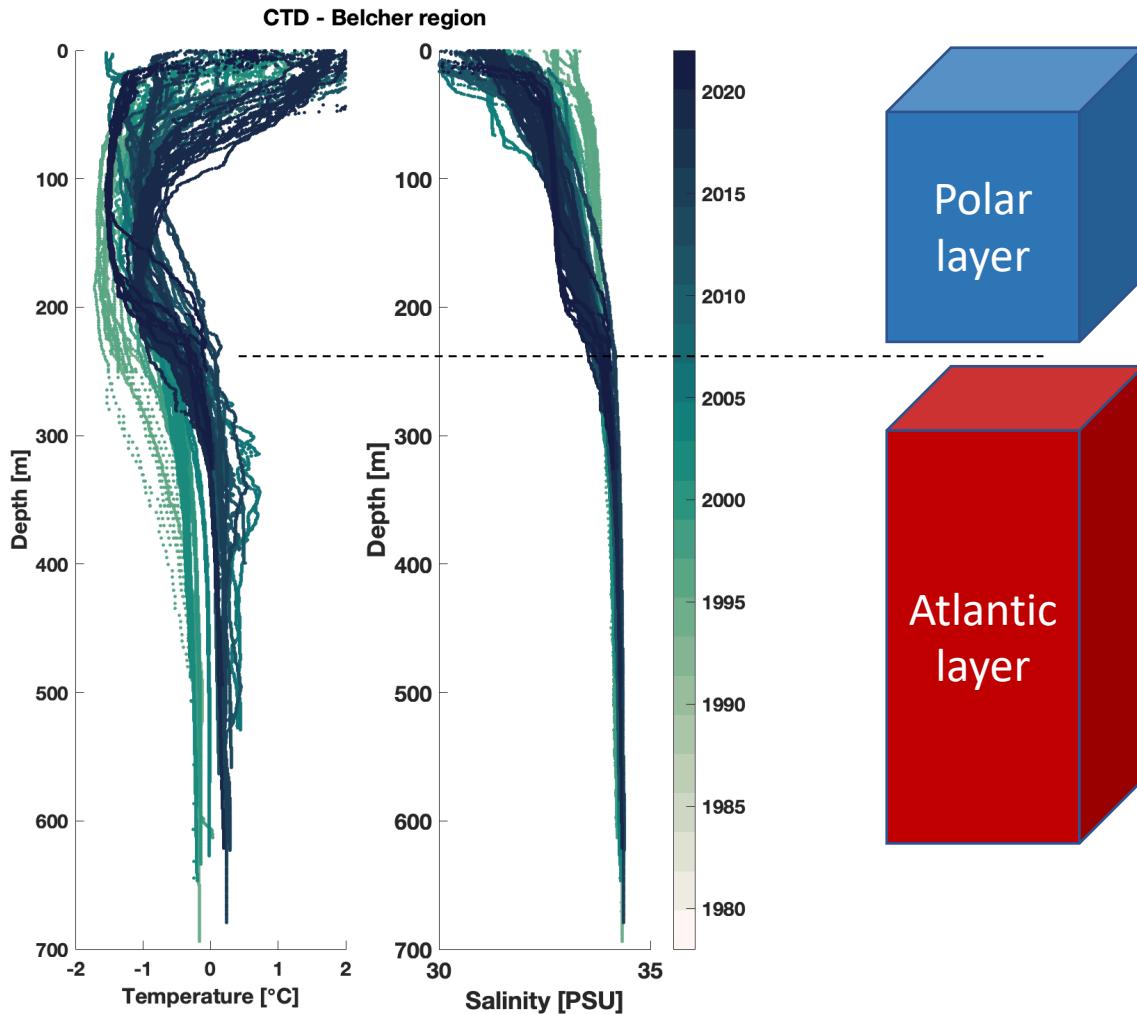
- High number of iceberg impacts, producing changes in depth up to 23 m for the upper sensors. (estimated tilt 24 °)
- Drawdown due to currents (tidal) is only 1-3m



Sentinel 2. August 2022

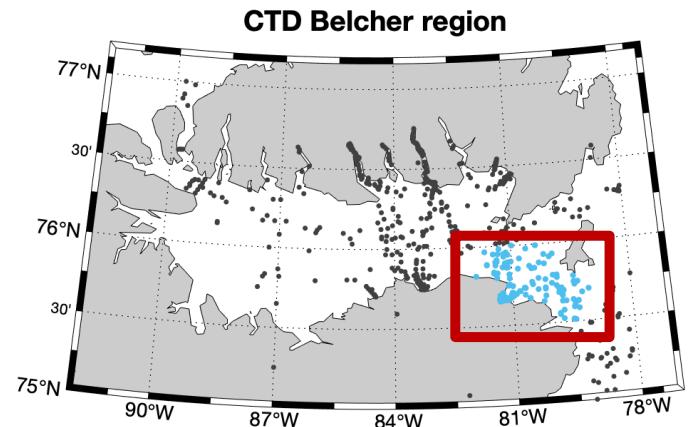
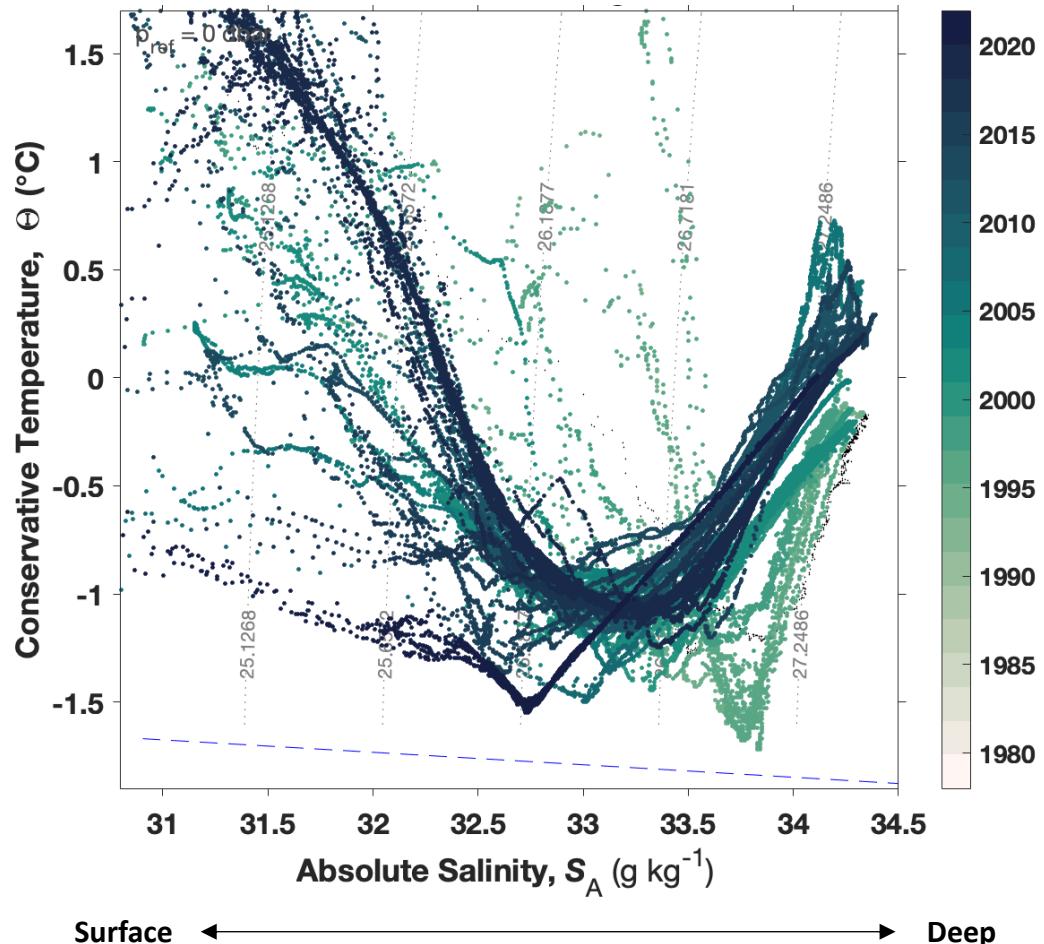
Results

Overview of the water masses at Jones Sounds entry CTD profiles



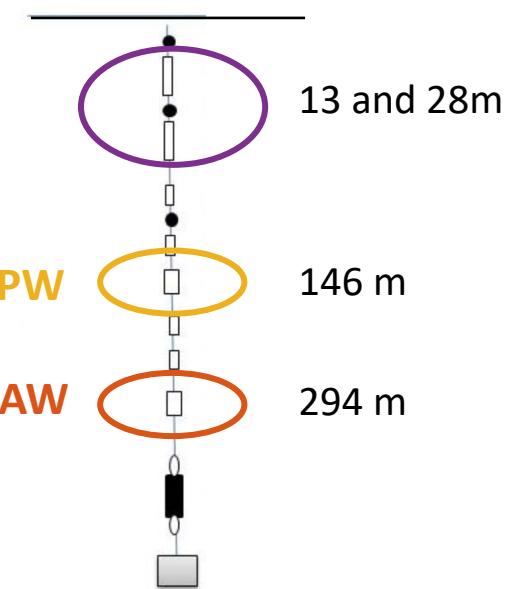
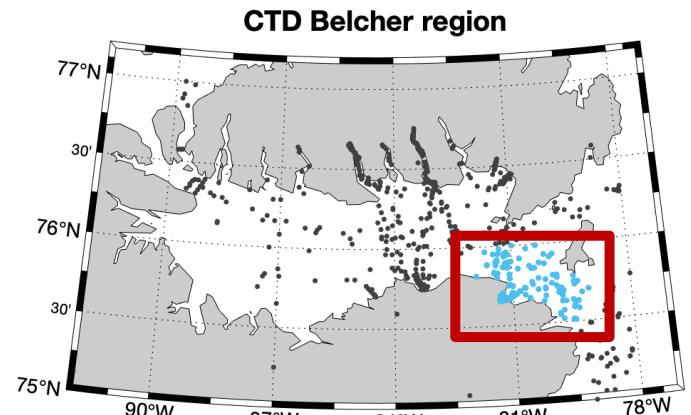
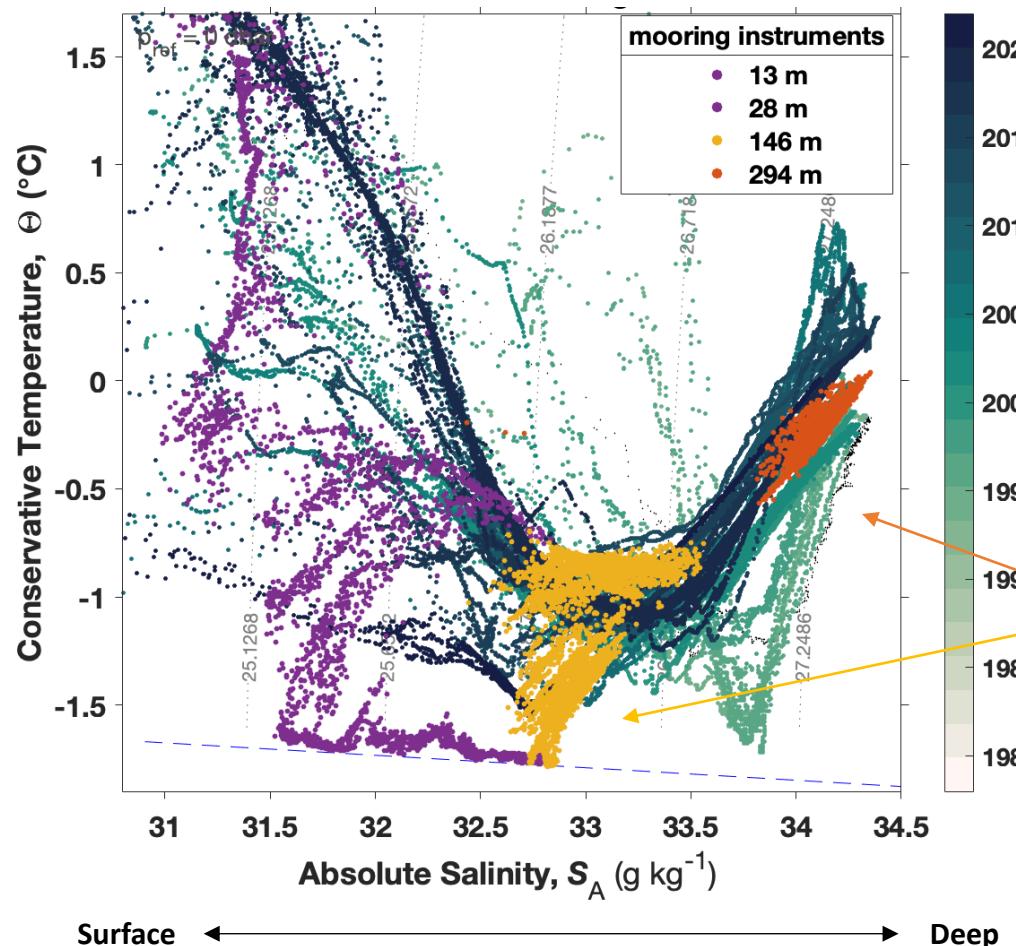
Results

Overview of the water masses at Jones Sounds entry CTD profiles



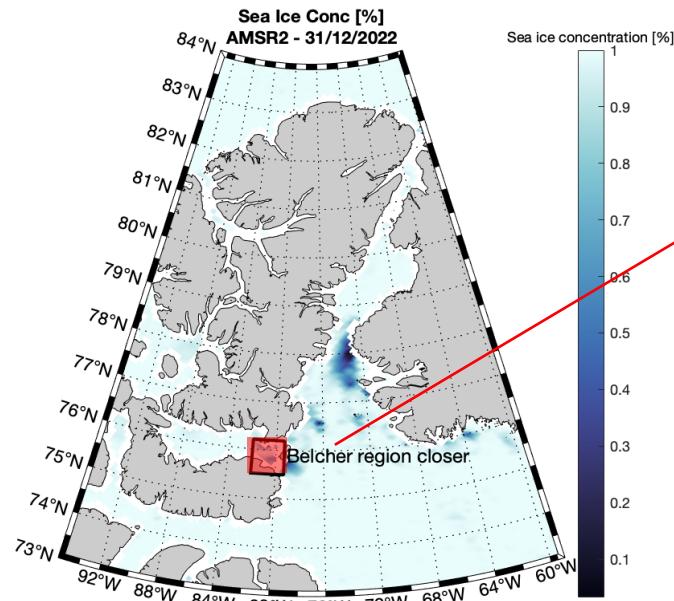
Results

Overview of the water masses at Jones Sounds entry CTD profiles + Mooring data

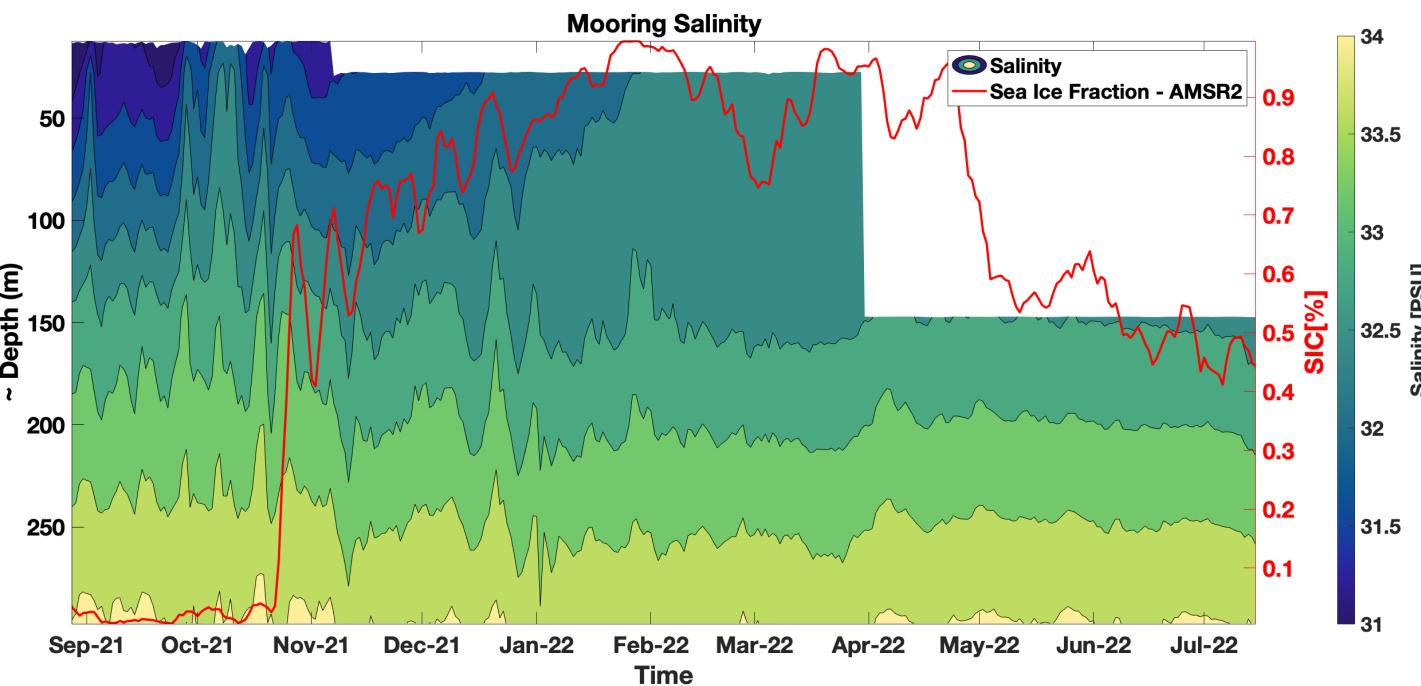
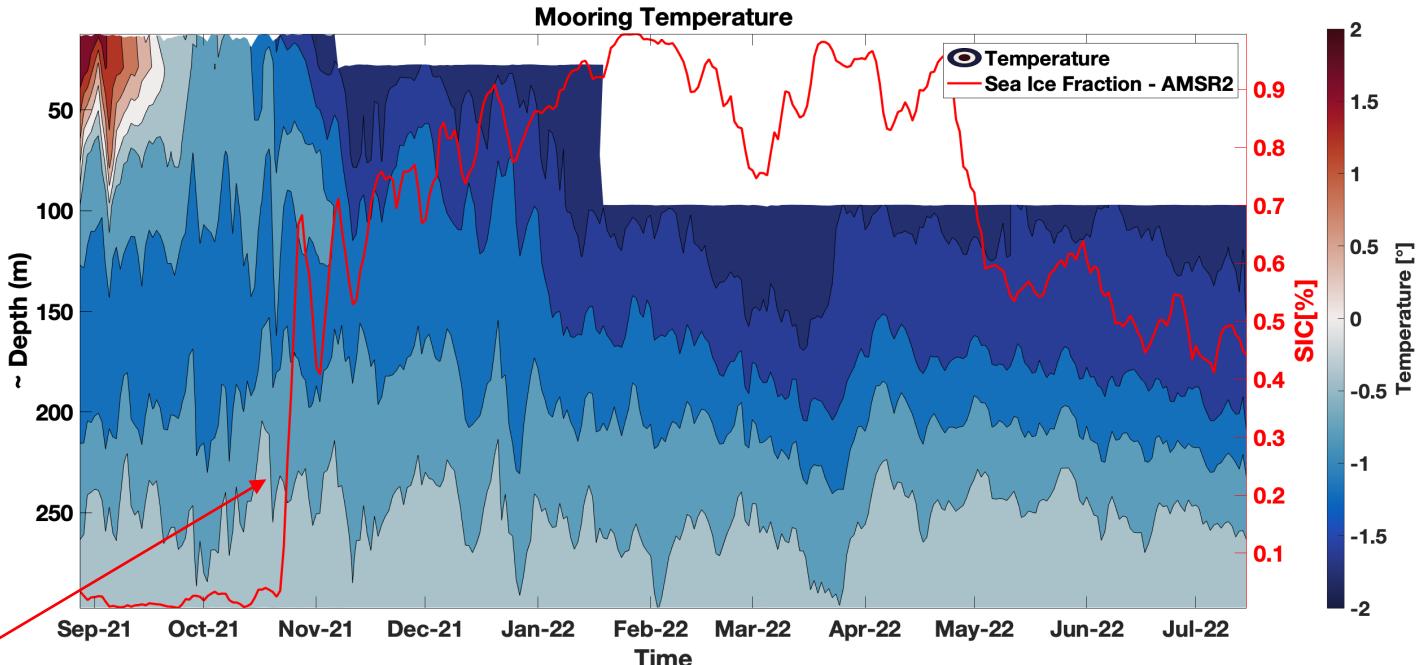


Results

Belcher mooring: Seasonal variations

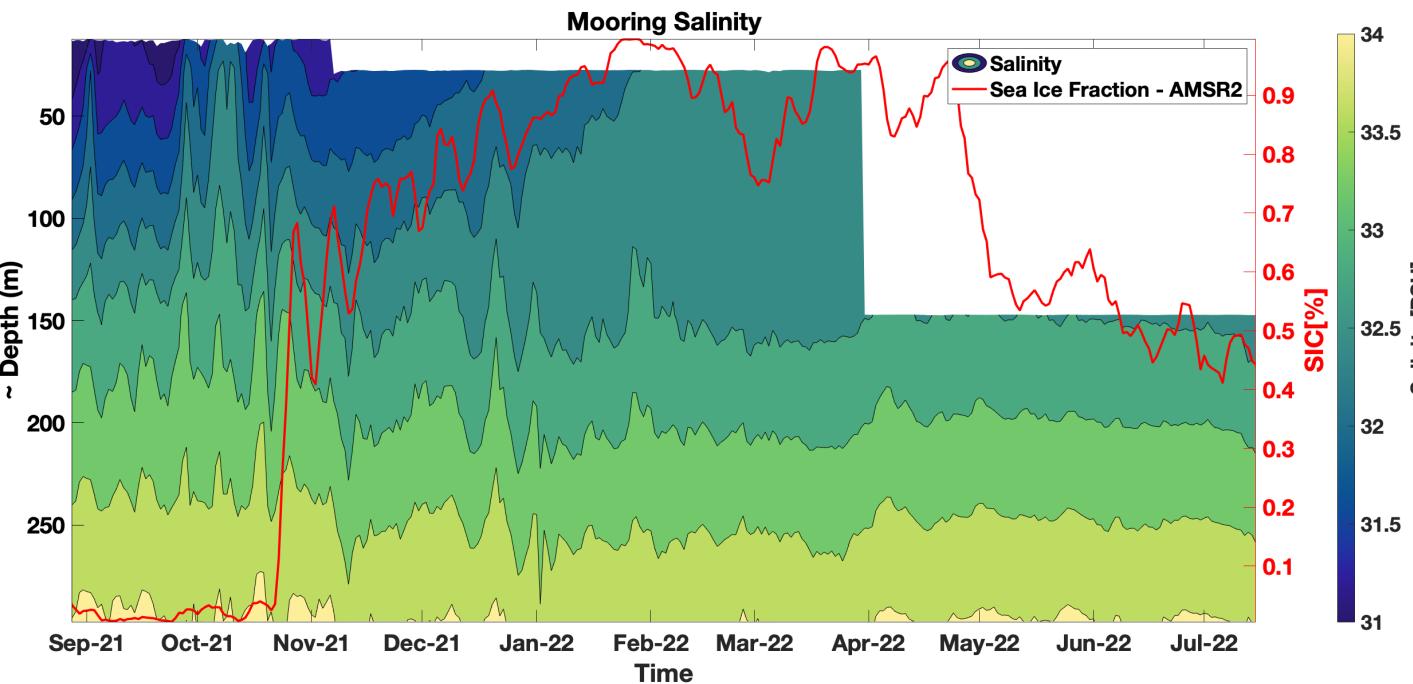
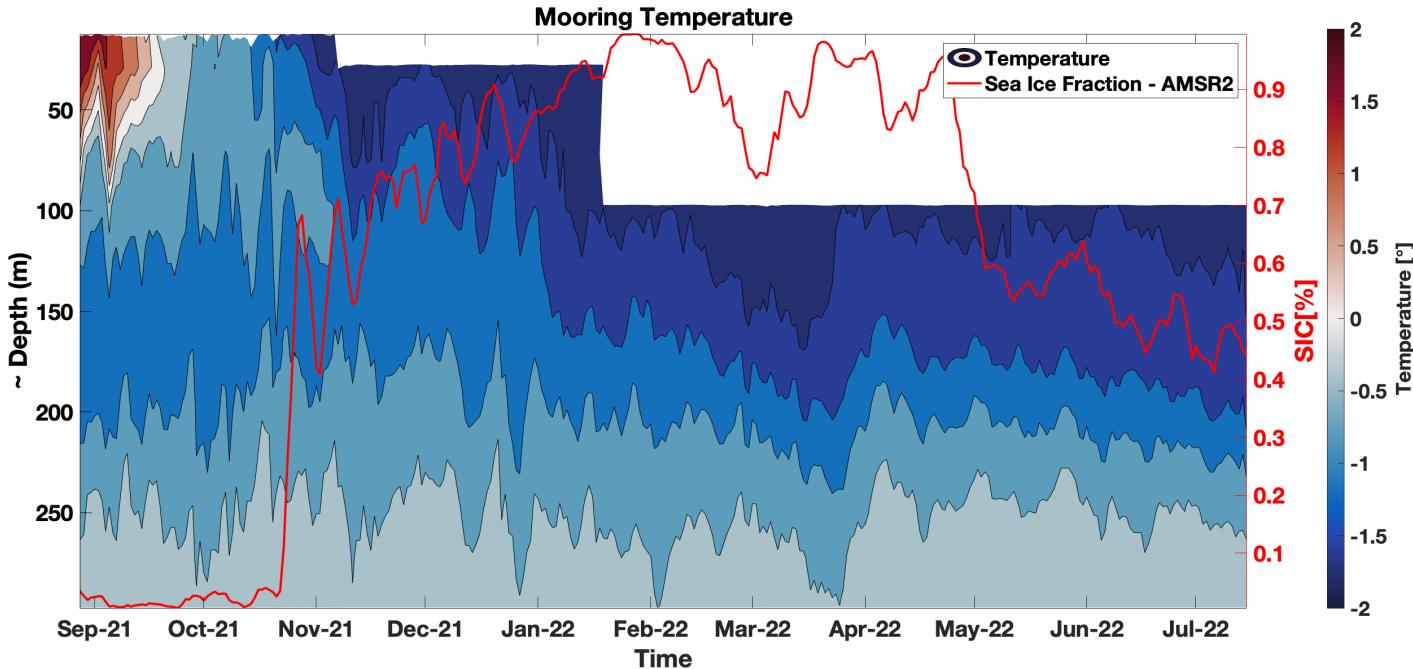


Sea Ice Concentration [%]
From AMSR2 satellite data

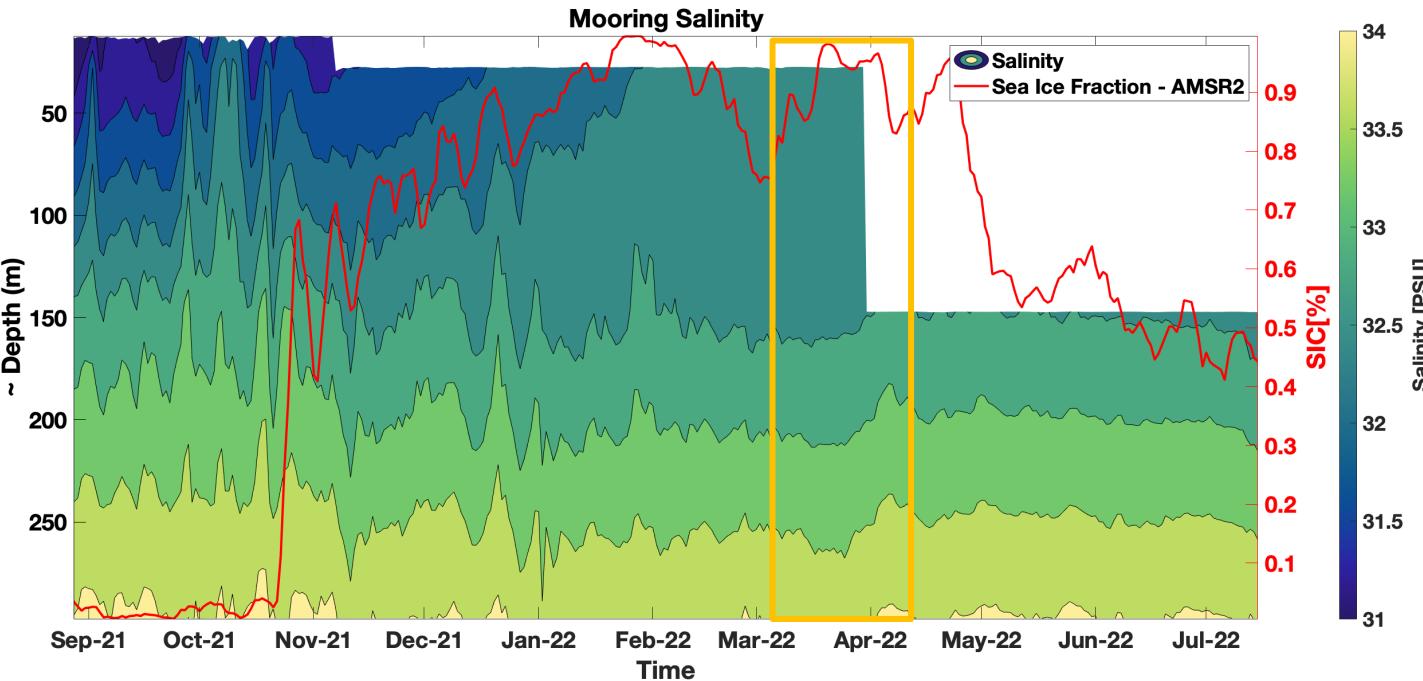
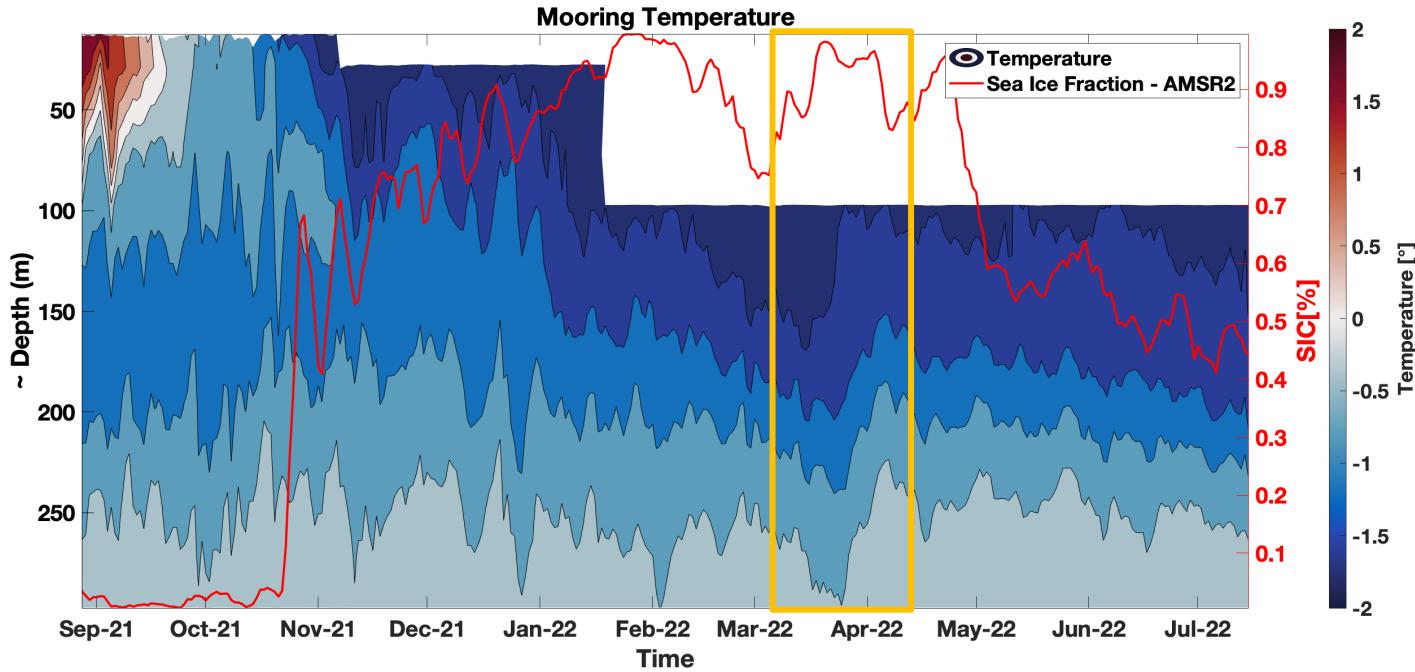


Surface processes

- Changes in stratification
- Sea ice formation : 1st Nov. Upper layers reach freezing point.
- Brine rejection → Deep water convection
- MLD down to 150m

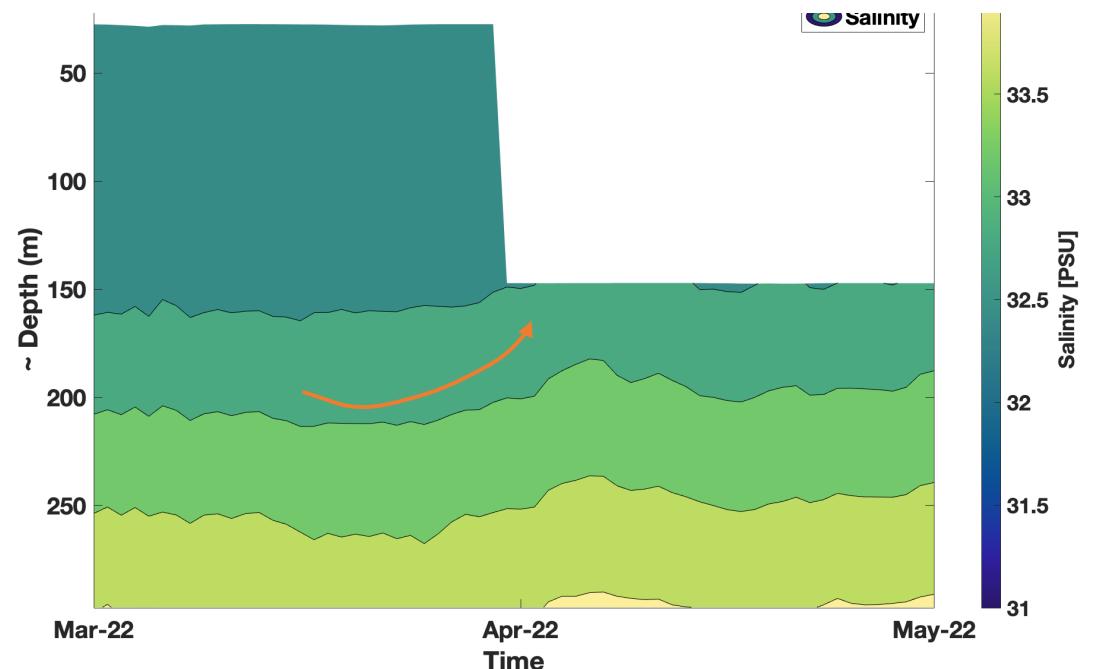
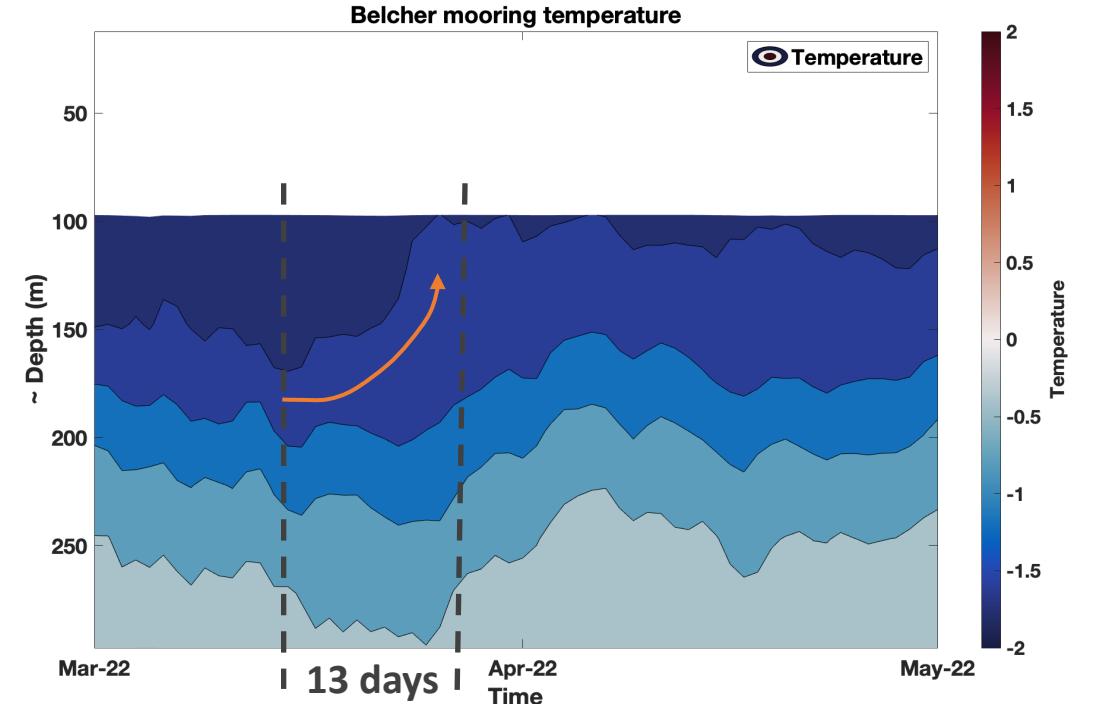


Deep layer processes



Deep layer processes

- Deep warmer water masses are being upwelled? What are the drivers?
 - Polynya influence ?
 - Wind stress ?



Summary and next steps

Further investigation is needed to determinate what is driving the warming events in the deep layers of the mooring and the AW dynamics in Jones Sound.

- **Next steps :**
 - Study if these events are related to surface wind stress, the north water polynya and a possible coastal upwelling - ERA5 data
 - Using numerical simulations with NEMO-LIM2 to assess deep water circulation

Despite the remote location of the region, the installation and recovery of the mooring was a success. Even after having suffered numerous iceberg impacts, and instrument malfunction, we have managed to have quality data.



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Acknowledgement

Maya Bhatia and the Ice2Ocean team.

