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GROCE Greenland Ice sheet Ocean Interaction

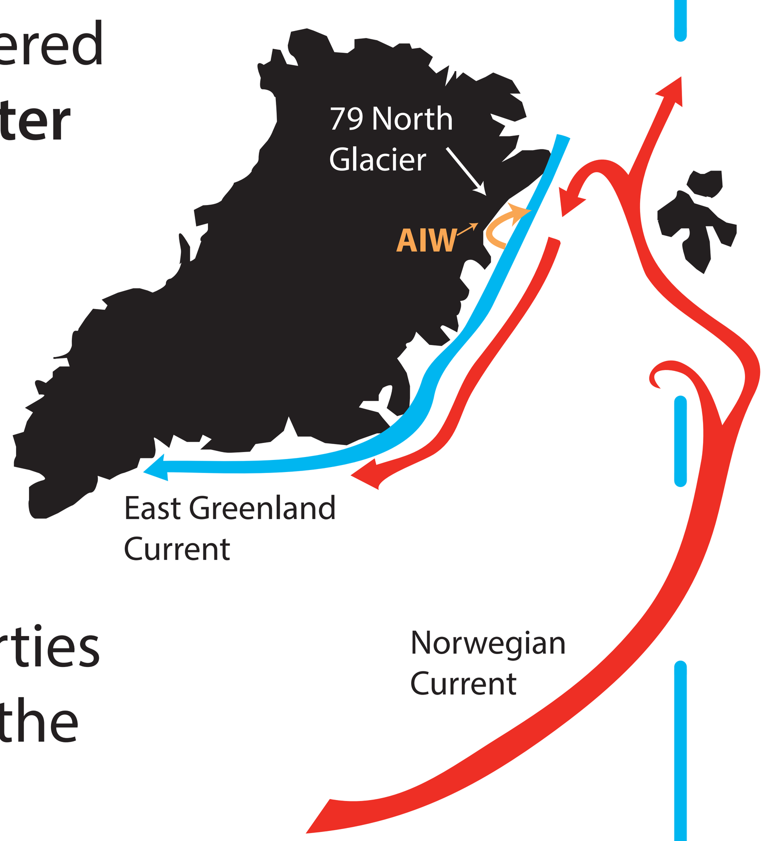
Properties of glacially modified waters at the 79 North Glacier

1. Motivation

The **floating tongue** of the 79 North Glacier experiences significant **thinning**, triggered by **warming Atlantic Intermediate Water** (AIW) in the subglacial cavity[1,2].

AIW is modified by **mixing** with **subglacial runoff** and **basal melt water**[1].

Alternation of the hydrographic properties due to increased melting might **affect** the overall **shelf circulation**[1].



1. What are the properties of the glacially modified waters at the 79 North Glacier?

2. How large is the melt water contribution to the glacially modified waters?

Conclusions

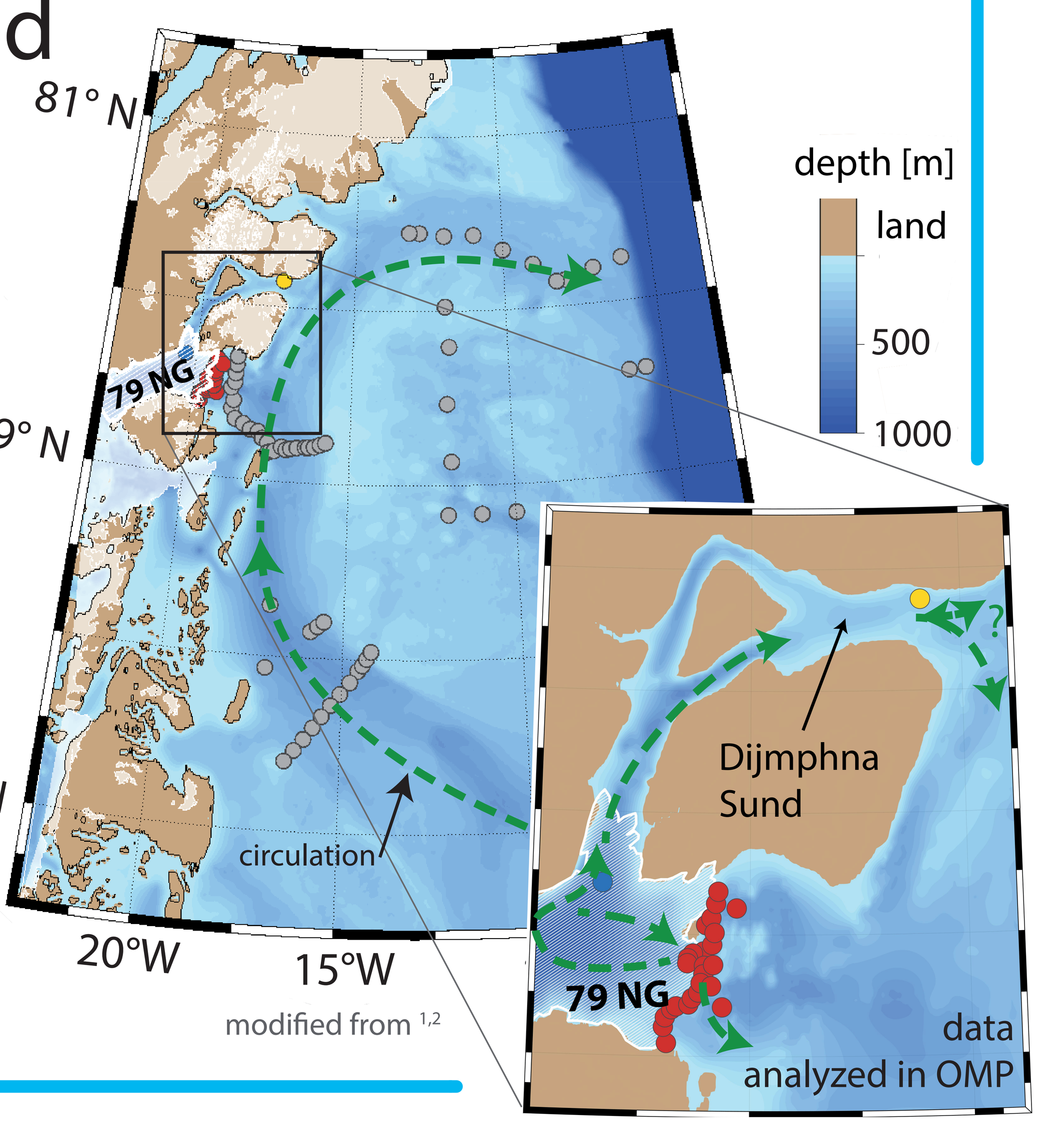
1. Glacially modified waters are characterized by **high potential temperatures, low oxygen concentrations** and is found in a **density** range between **27.0-27.75 kg m^{-3}.**

2. Glacially modified waters consist of approx. **2% glacial melt water**. Three quarters of the melt water is basal melt water.

2. Data and Method

Hydrographic measurements taken during the R/V **Polarstern cruise in 2016** are analysed[3,4].

An **Optimum Multiparameter Analysis**[5] based on potential temperature, salinity and dissolved oxygen quantifies the melt water content.

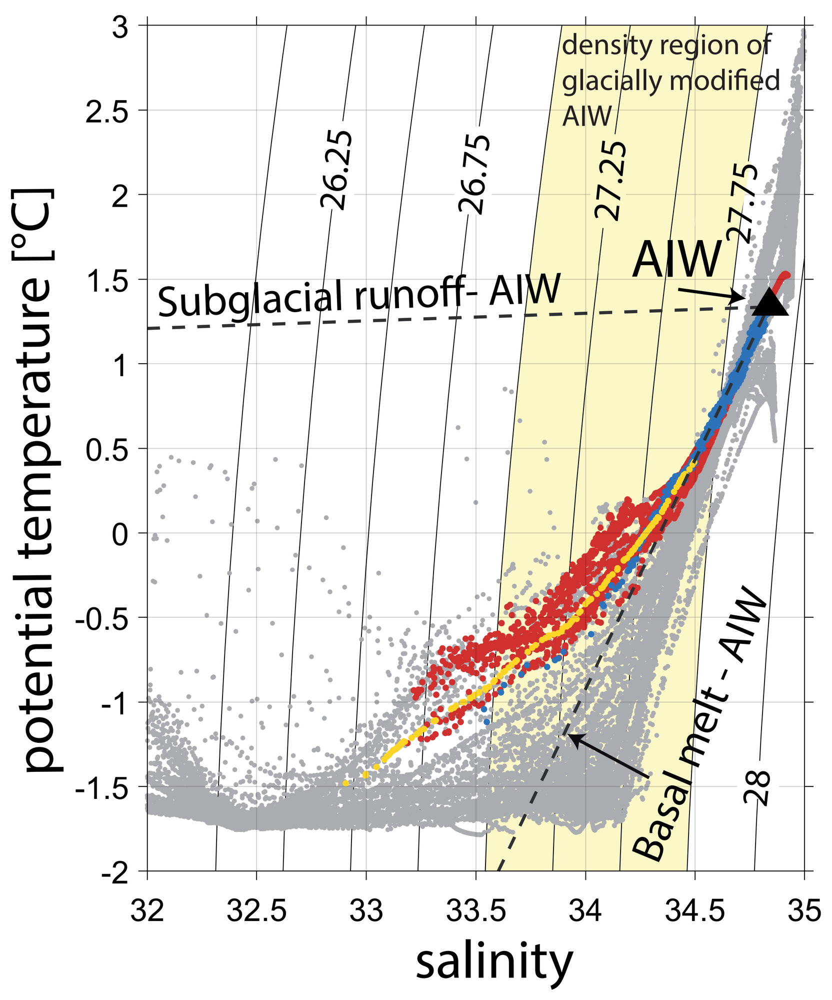


modified from [1,2]

3. Hydrographic Properties

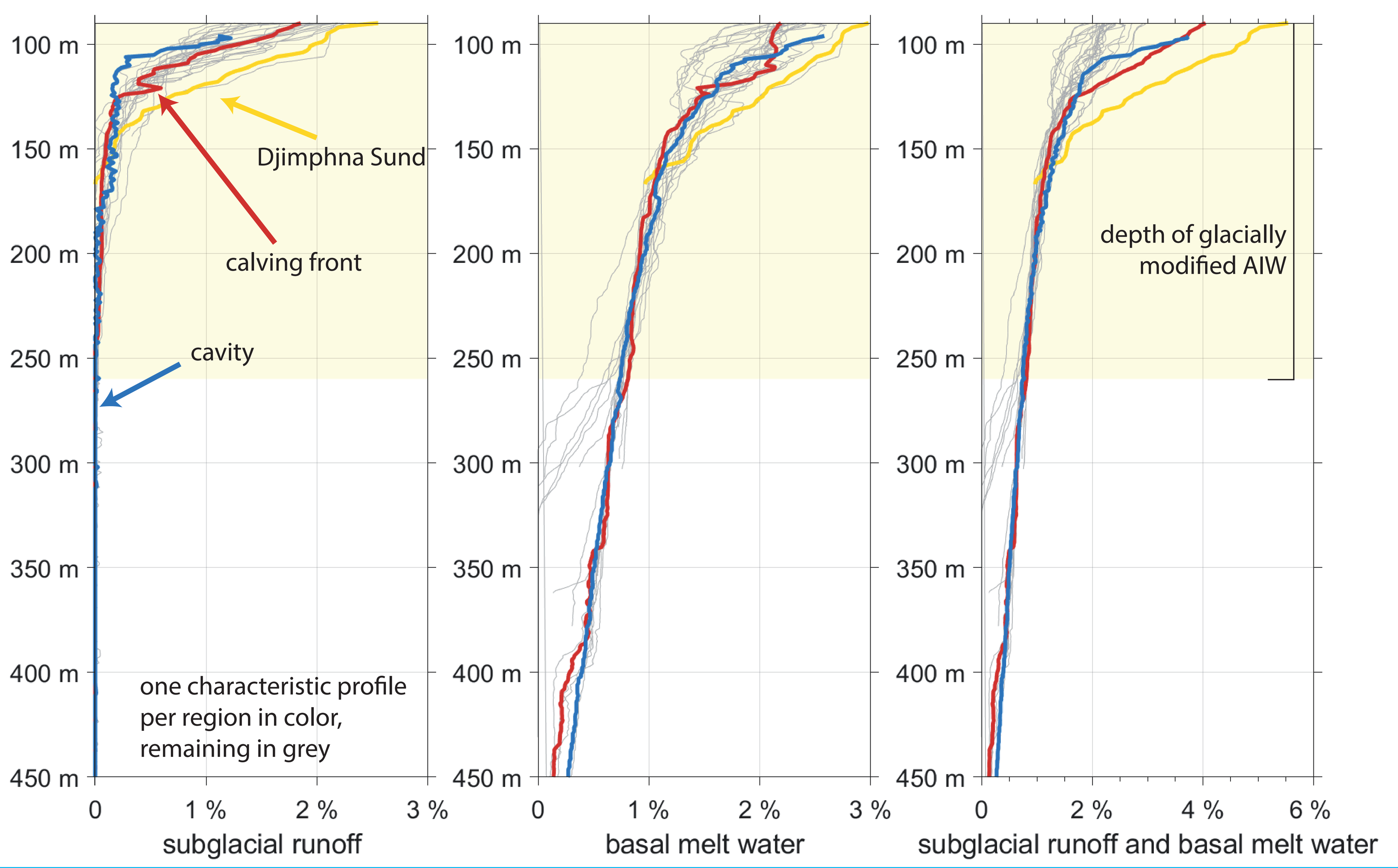
Glacially modified AIW (coloured) differs from other shelf stations (grey) by higher potential temperatures.

All glacially modified AIW measurements fall into a mixing triangle of AIW, subglacial runoff and basal melt water.



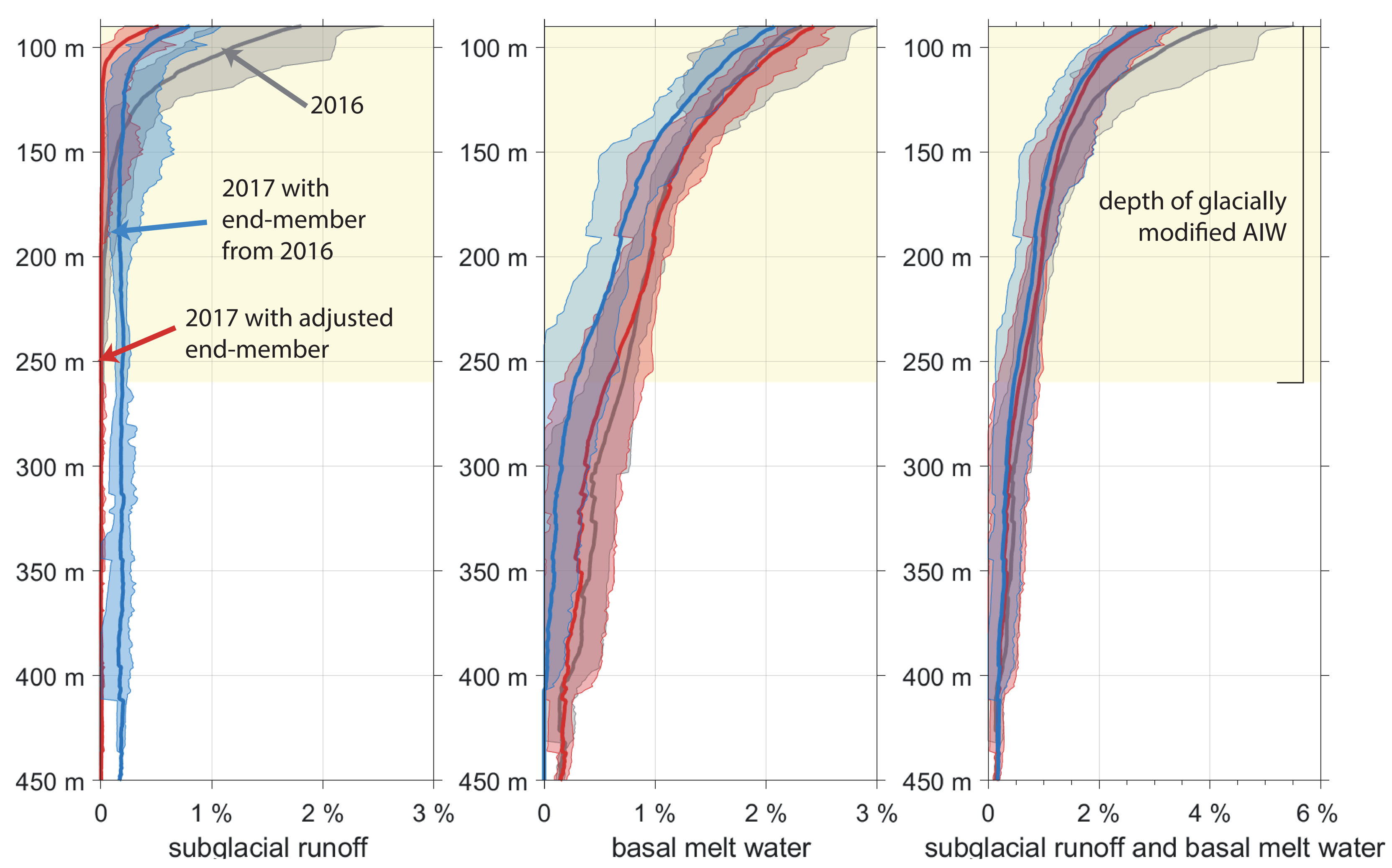
4. Melt water content 2016

Glacial melt water content exceeds **3.6% at 90-100 m** and decreases to **0.73% at 250-260 m** (overall mean 2%). **Highest concentrations** of melt water are found at **Dijmphna Sund**.



5. Outlook: Melt water content 2017

Glacially modified AIW found in **2017** reveals **lower subglacial runoff**. An overall warming of the AIW rises the question how the AIW end-member must be adjusted.



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Acknoledement
I would like to say thank you to Nat Wilson for the XCTD data set from the glacial rift.

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