

Water masses variability in inner Kongsfjorden (Svalbard) in the 2010-2020 decade

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Aim

Inspect the **Atlantification** of Kongsfjorden, Svalbard

Data

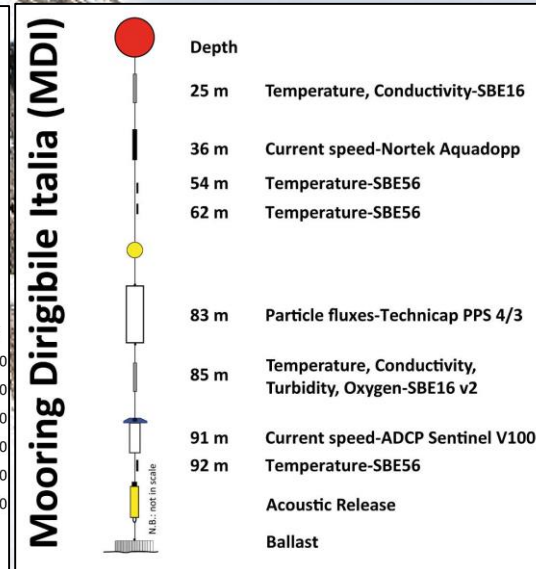
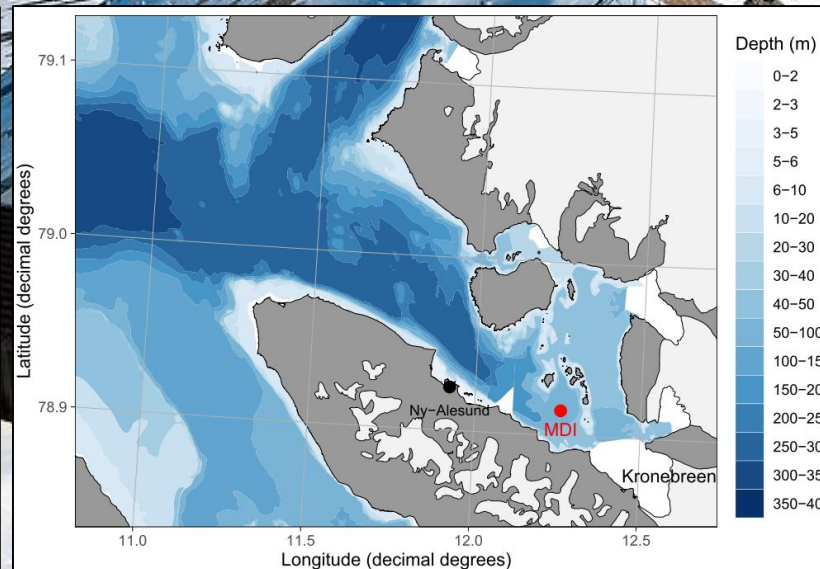
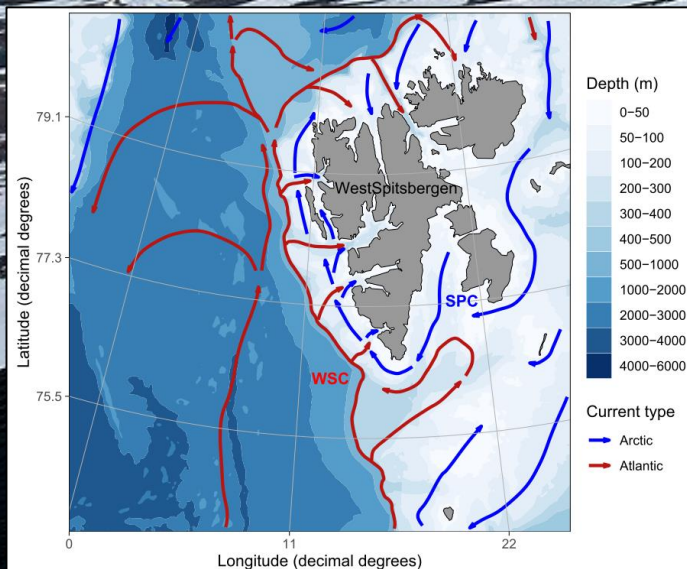
Continuous **temperature** and **salinity** moored observations and summer CTD surveys in 2010-2020

Scientific Questions

What are the **long-term changes** in the water column?

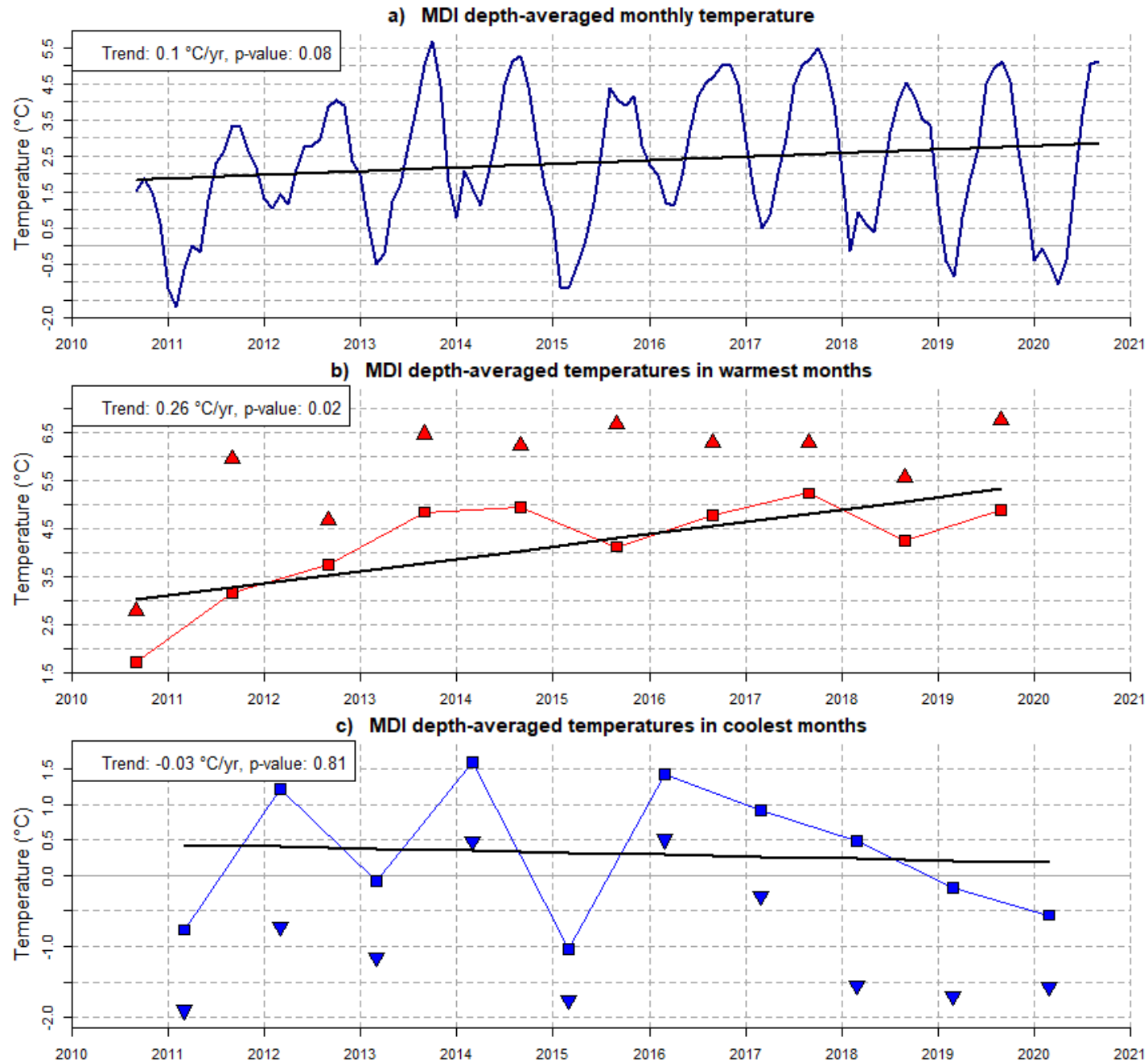
What does the observed **water masses variability** reveal?

What is the link between local variability and **large-scale dynamics**?



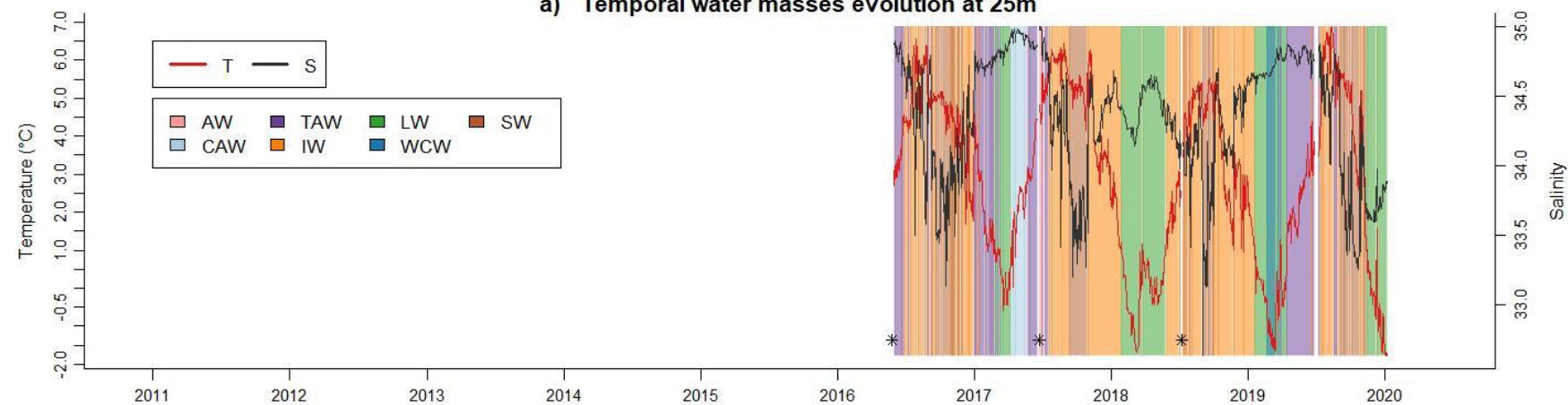
Heat content evolution in Kongsfjorden

Depth-averaged temperatures are obtained by averaging 35 m and 85 m temperature observations at (a) a monthly resolution, in (b) warmest (ASO) and (c) coolest (FMA) months of the year.

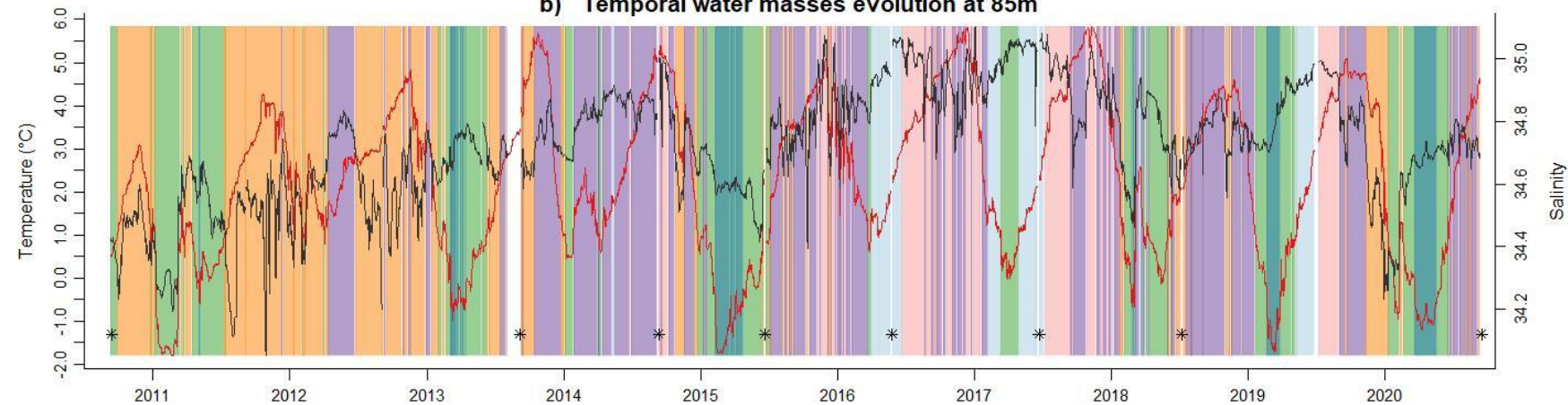


Water masses variability

a) Temporal water masses evolution at 25m



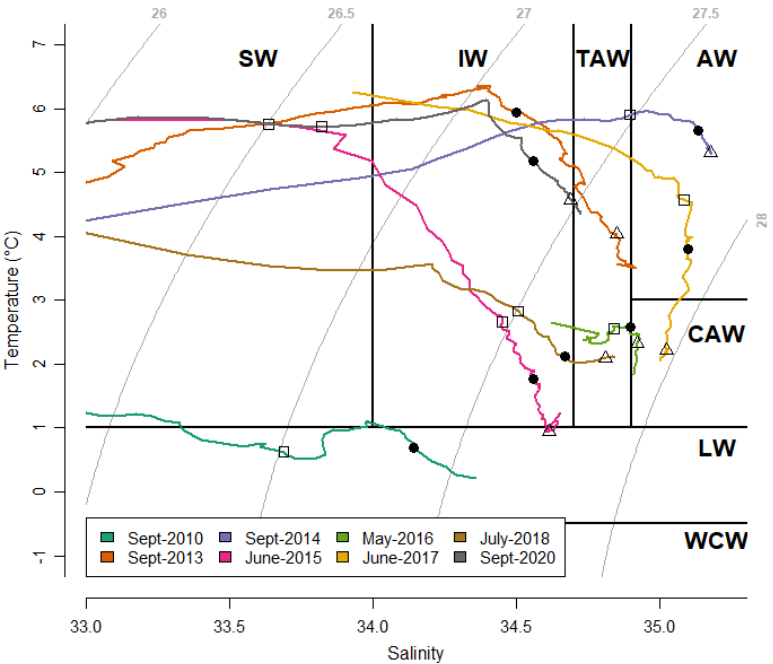
b) Temporal water masses evolution at 85m



Temperature (red) and salinity (black) daily medians at 25 m and 85 m along with observed water masses (see legend)

	Temperature (°C)	Salinity
Atlantic Water (AW)	> 3	> 34.9
Cooled Atlantic Water (CAW)	$1 < T < 3$	> 34.9
Transformed Atlantic Water (TAW)	> 1	$34.7 < S < 34.9$
Intermediate Water (IW)	> 1	$34 < S < 34.7$
Local Water (LW)	< 1	
Winter Cooled Water (WCW)	< -0.5	> 34.4
Surface Water (SW)	> 1	< 34

Classification adapted from Tverberg et al. (2019) and Sundfjord et al., (2017)



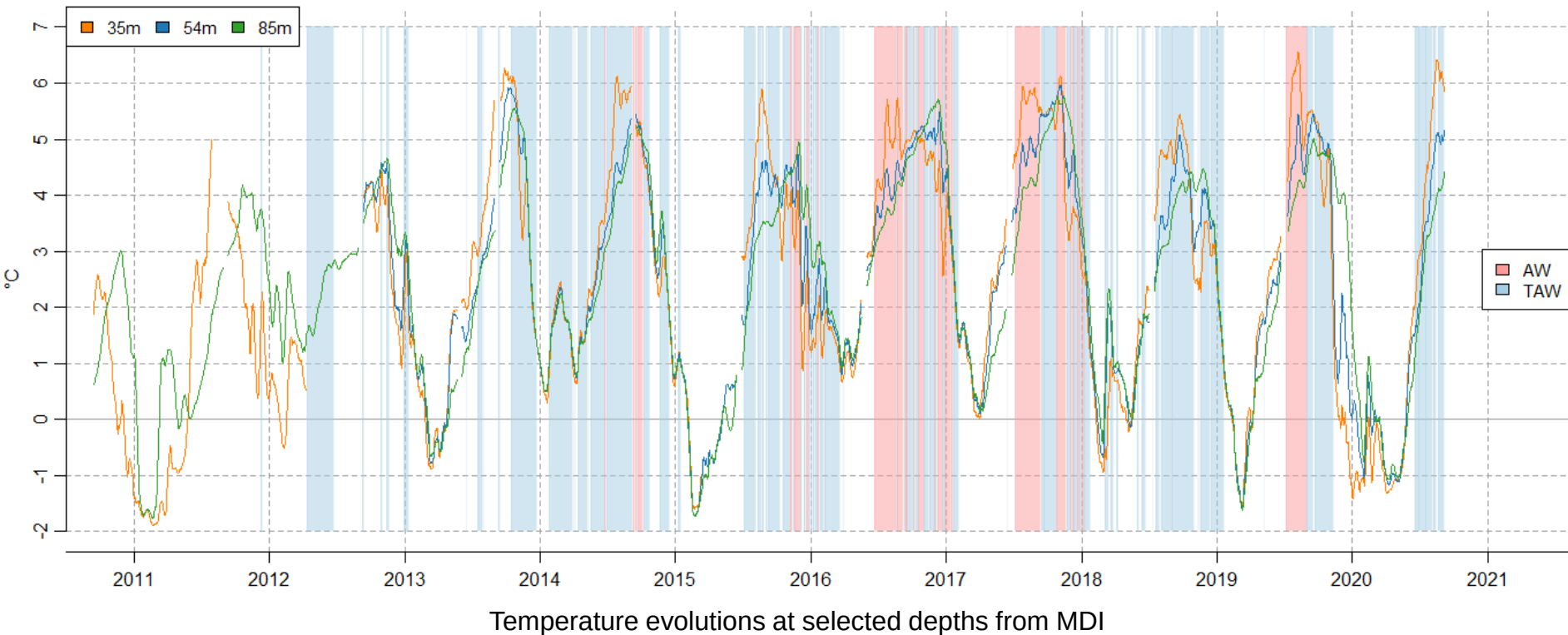
Mean summer CTD profiles in the proximity of MDI

- Intrusions of AW and TAW from 2012 onward
- Long-lasting intrusions of Atlantic-type waters in 2016 and 2017
- Atlantic Waters at 85 m precede the arrival of a large freshwater flux at 25 m

Temperature Time Series

	Sep 2010 - Sep 2020	Sep 2012 - Sep 2020
35 m	0.13 (<i>p-value</i> < 0.01)	-0.07 (<i>p-value</i> < 0.01)
54 m		-0.04 (<i>p-value</i> = 0.02)
85 m	0.06 (<i>p-value</i> < 0.01)	-0.03 (<i>p-value</i> = 0.07)

Linear trends estimated in common observing periods



Biannual winter temperature local maxima indicate winter intrusions of warmer waters from the WSC.

Near-surface and near-bottom waters reach their annual temperature maximum in summer and autumn, respectively.

Local long-term variability and large-scale dynamics

A linear regression break point is found in January 2017 for both MDI deseasoned temperature series and WSC meridional heat transport from CMEMS reanalyses

T1 position superimposed to 92 m depth temperature field in October 2018

