BJERKNES CENTRE for Climate Research

The Atlantic Water boundary current North of Svalbard in 2018-2019: background properties, dynamics and turbulence.

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the Nansen LEGACY

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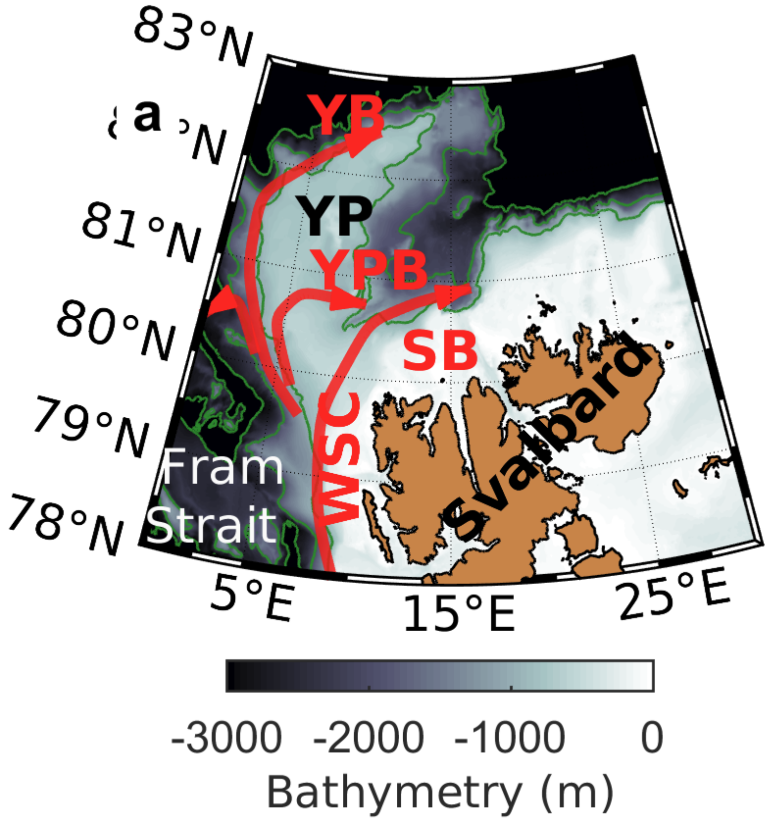
Introduction



North of Svalbard is a key region where currents carry heat and salt into the Arctic Ocean. It is a region with complex topography with some hotspots for mixing.

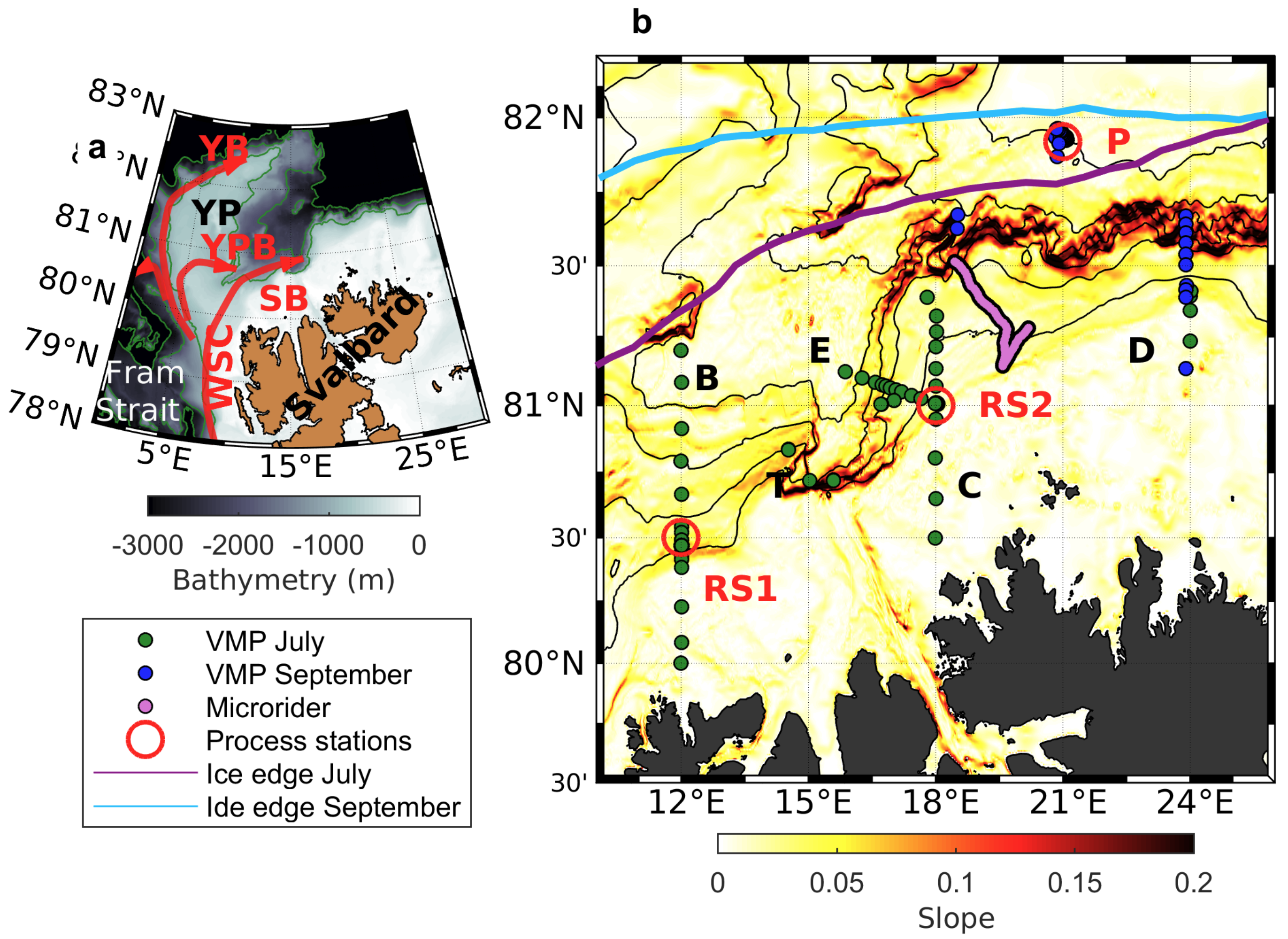
It is also a region that must be monitored to evaluate the change of the Atlantic Water inflow into the Arctic under climate change

The **Nansen Legacy project** is the collective answer of the Norwegian research community to the outstanding changes witnessed in the Barents Sea and the Arctic as a whole.

YB: Yermak Branch
SB: Svalbard Branch
WSC: West Spitsbergen Current
YPB: Yermak Pass Branch
YP: Yermak Plateau

The following slides are work in progress and only preliminary results are shown.

Introduction: data



- July 2018 and September 2018: 2 cruises to look at the dynamics of the Atlantic Water inflow north of Svalbard.

- September 2018-September 2019: 2 mooring arrays across the slope, along section C and D

We look at
1. Mixing North of Svalbard from the cruises data

2. Seasonal variations of the atlantic water inflow from 1-year mooring data

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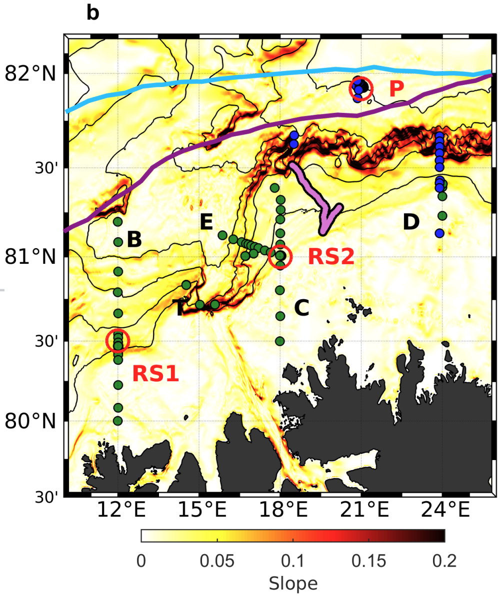
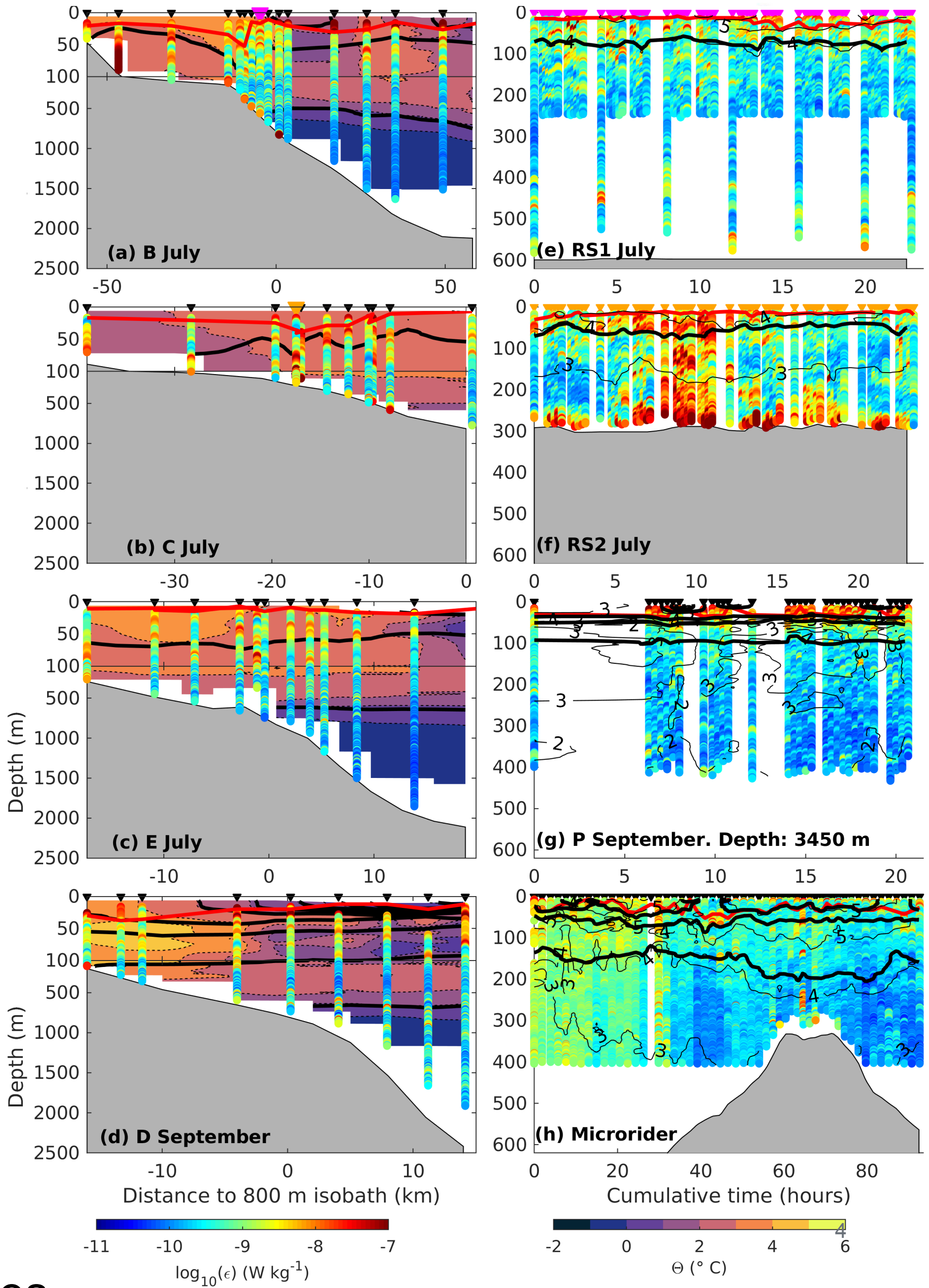
Observations of turbulence

Increased turbulence at the bottom and in the mixed layer.
2 leads are followed: the role of the wind and tidal forcing



At RS2, increased turbulence in the water column: linked to tidally-forced non linear internal waves (Ilker et al:, submitted to GRL).

Station P: surface temperature front with convection and suggestions of forced symmetric instability (Koenig et al., 2020 JGR Oceans).



Mixed layer depth
Isopycnals in black thick lines

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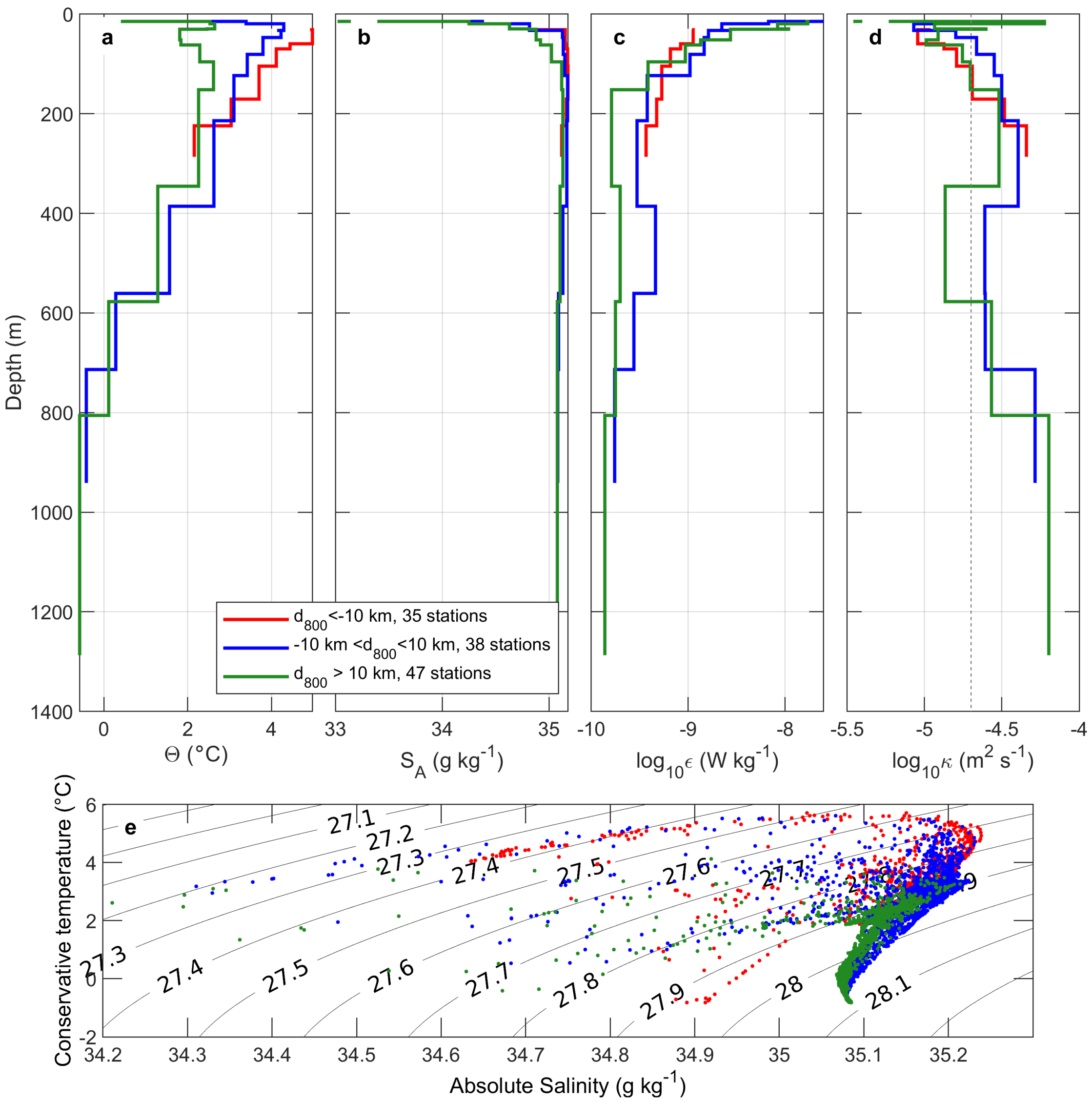
Averaged profiles

800m: estimated location of the core of the Atlantic Water inflow.

Increased turbulence at depth on the shelf (red profiles). At the core location, increased turbulence at the bottom (blue profiles).

Offshore, no turbulence at depth

Next steps: quantify the influence of the wind and of the tidal mixing
role of vertical turbulent mixing on the heat loss in the Atlantic water layer.



Long-term observations

2 mooring arrays were deployed across the Atlantic Water inflow from September 2018 until October 2019: W1 to W3 at 18E and E1 to E3 at 24E.

Current measurements covered almost the entire water column.

Quite high resolution hydrography in the water column, expect at W1 where the upper line was lost (dashed line).

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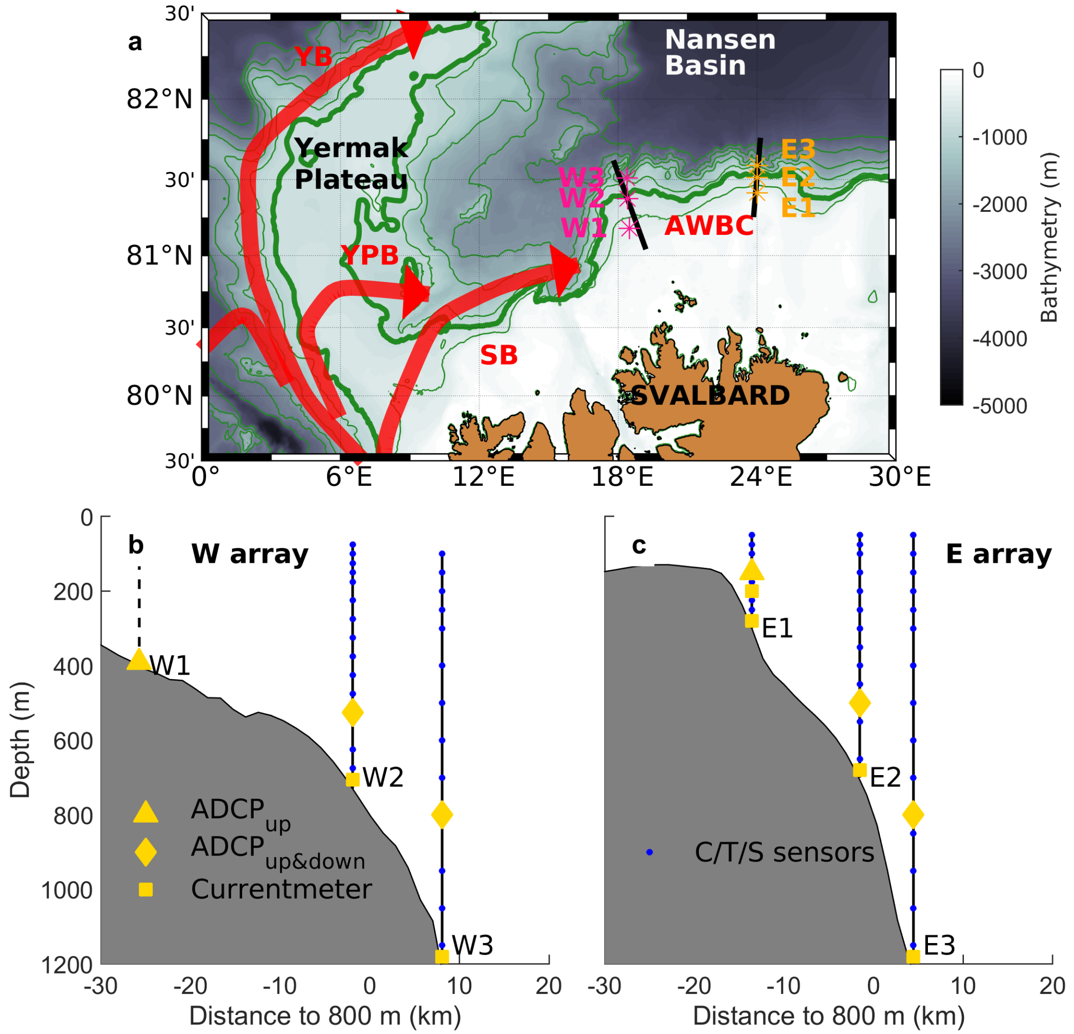

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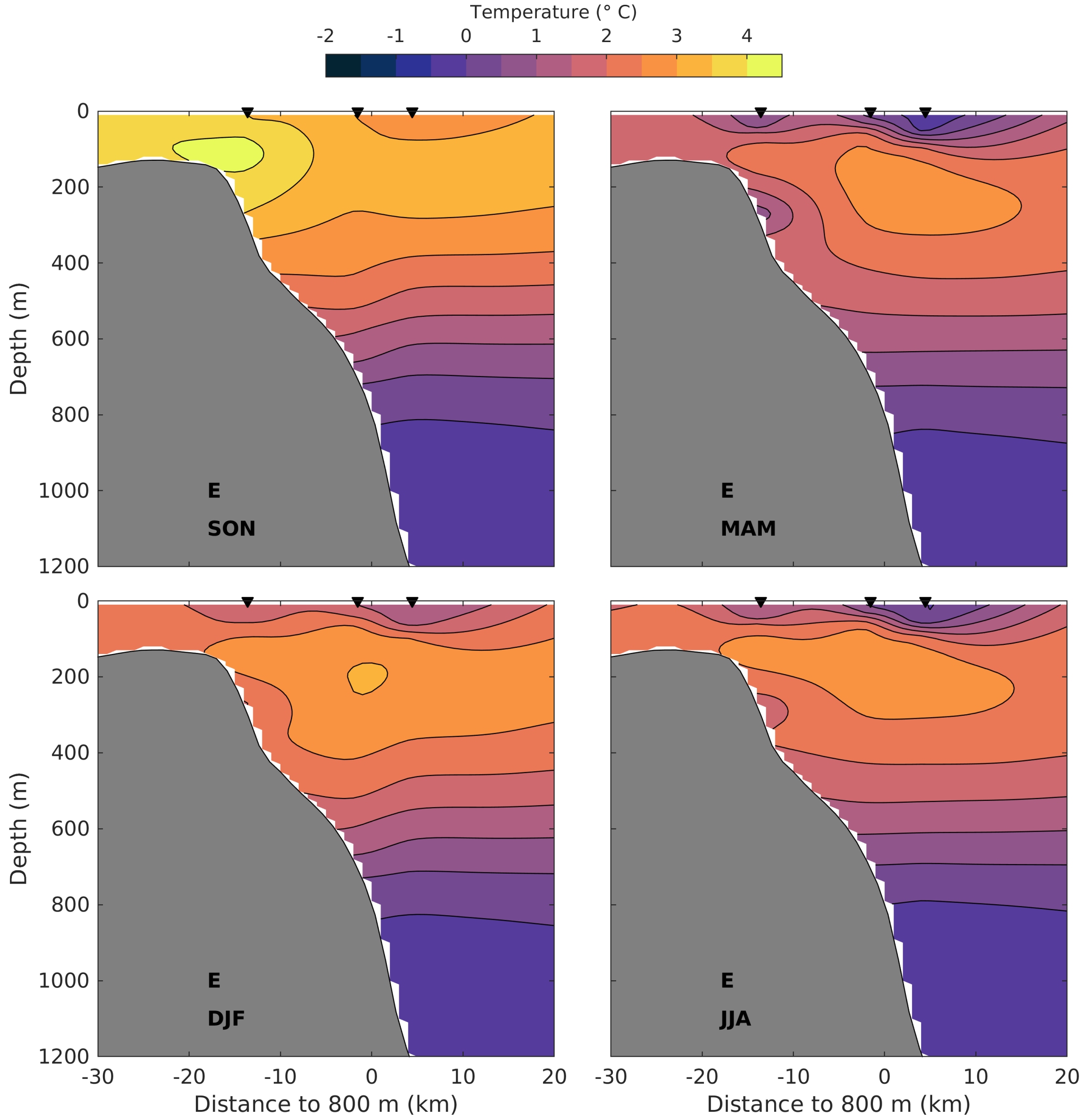
Temperature seasonal variations: focus on the E array

Warmer inflow in fall/winter

Temperature core shifted from 400 to 800 meter from fall to winter.



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Current seasonal variations: focus on the E array

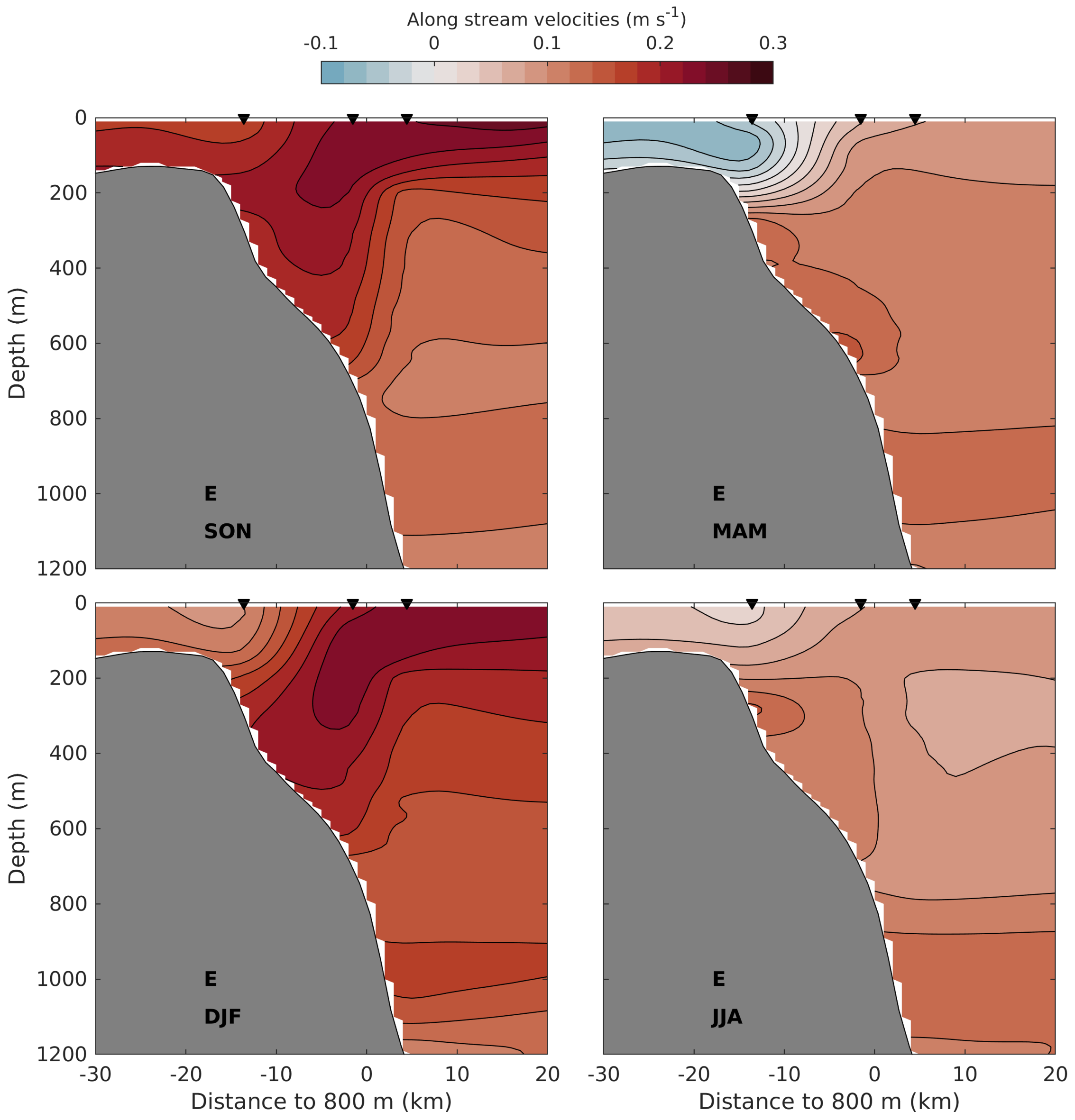
Larger current in fall/winter than in spring

Deep intensified current at about 1200m depth, also observed in the high resolution hydrographic transects performed during the cruises (Kolås et al., submitted to JGR Ocean).

Core of the current at about 800 m depth.

Westward current onslope in MAM: origin?

Next steps: AW transport



These two studies (turbulence and seasonal variations of the Atlantic Water Inflow) are work in progress. Key analysis figures are left out to avoid archiving results that may be revised or changed.

If you want more information on these analysis, you can contact me by email: zoe.koenig@uib.no or during the chat room.