Warm core mesoscale eddies along the boundary current and in the Sofia Deep north of Svalbard

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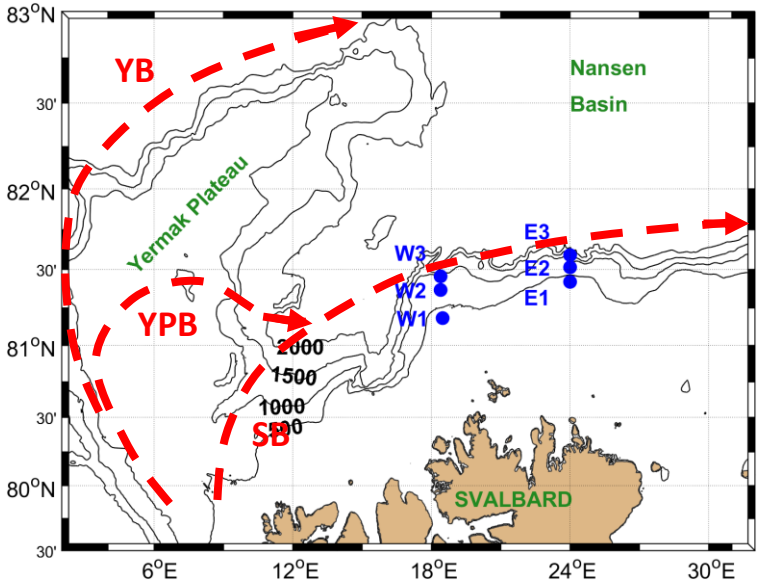
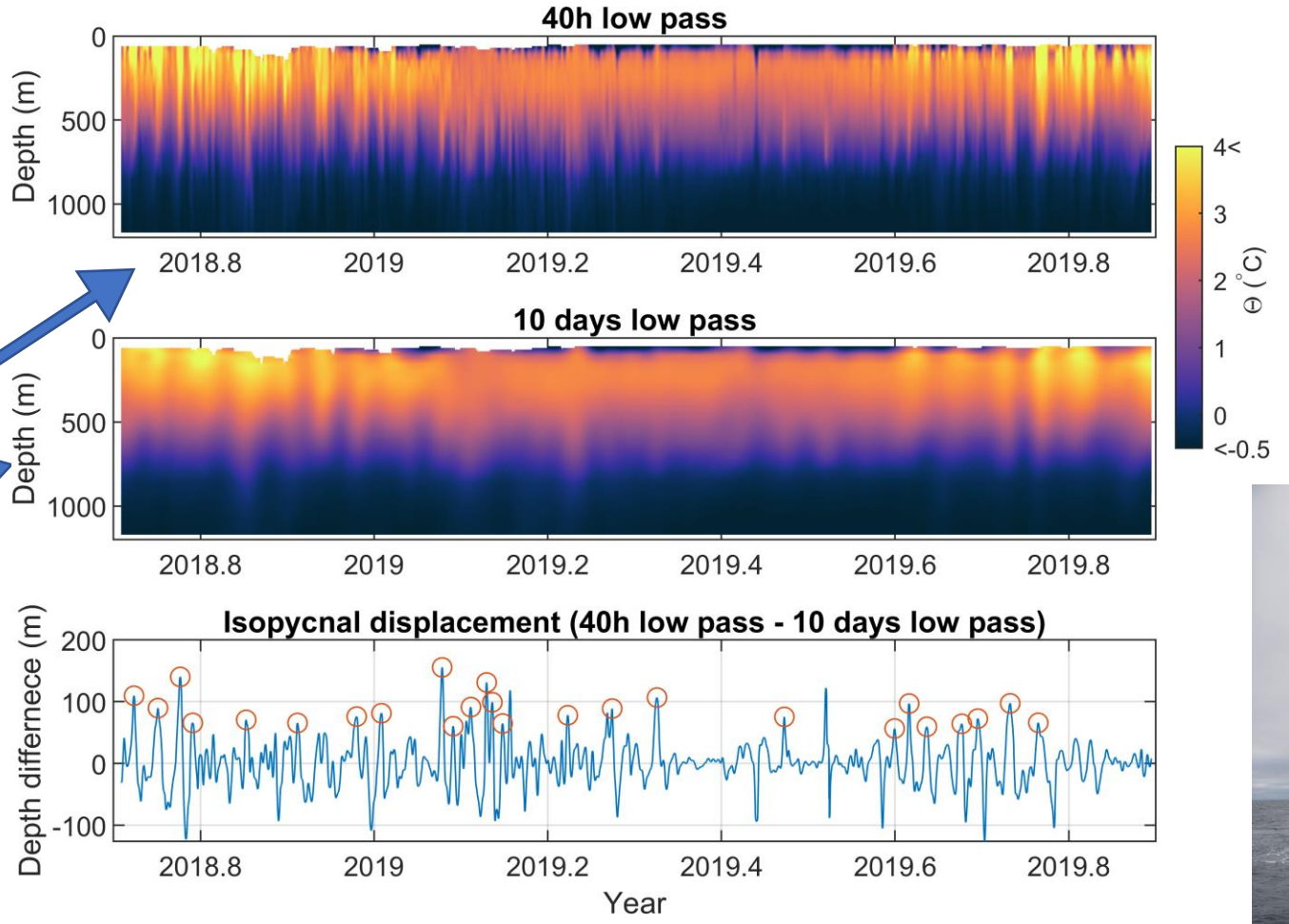


Moorings 2018-2019

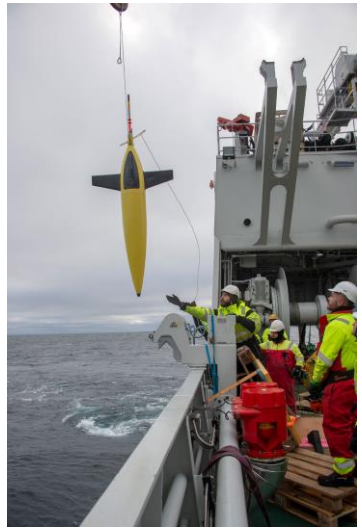


Hourly temperature data at E3

Eddy event:

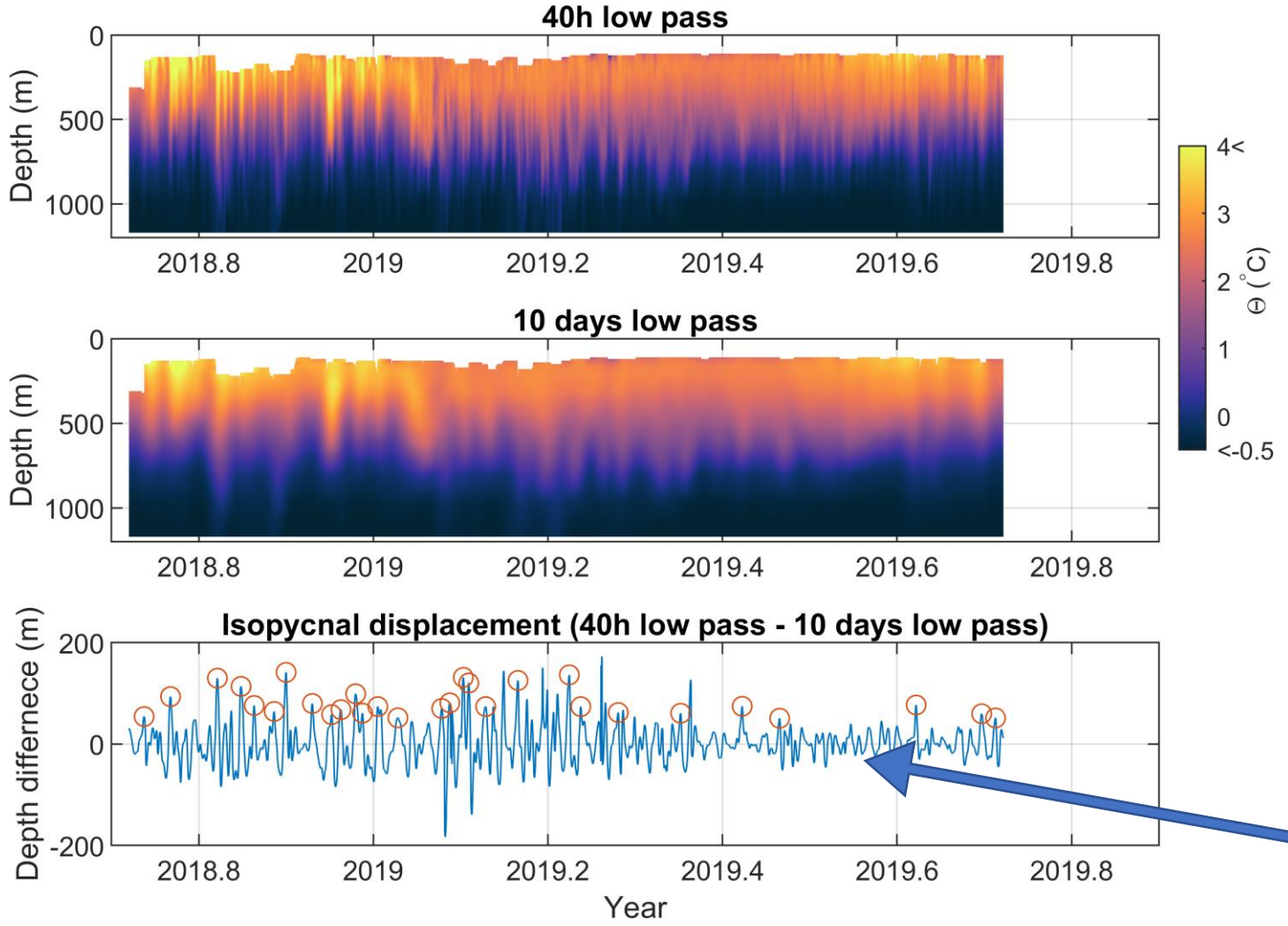
- Min 50 m difference
- Min 24 h duration
- Min 50 h between two events
- Two distinct knockdowns

Combining mooring data with Seaglider data and SLA derived from satellites



Seaglider being deployed from RV Kronprins Haakon. Foto: Rudi Caeyers - UiT / The Nansen Legacy.

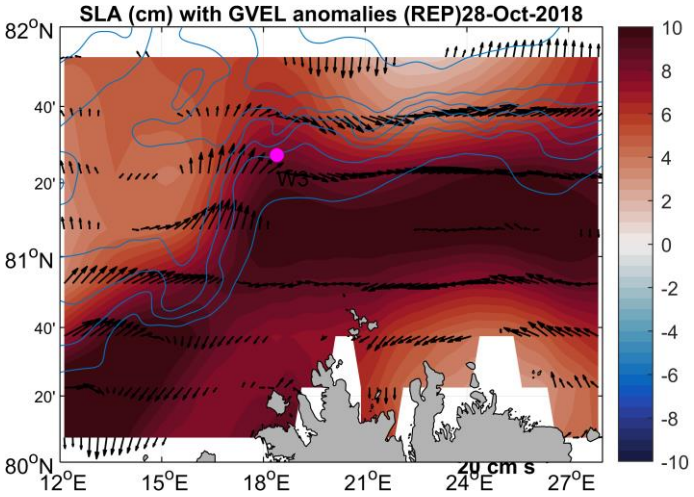
Example from W3

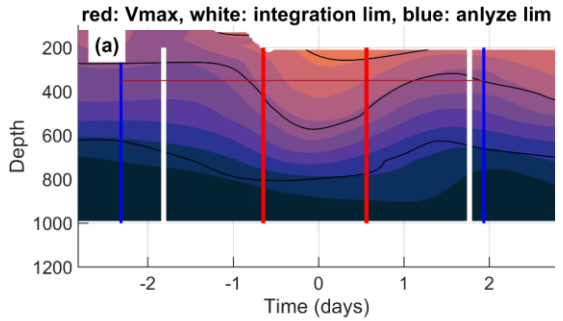


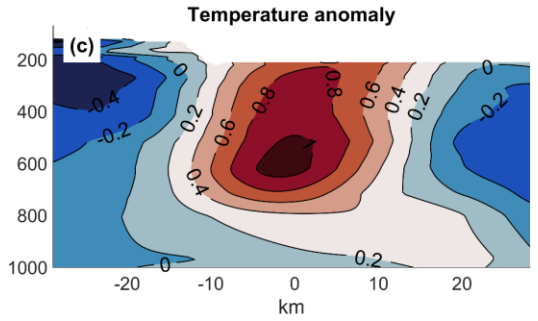
Note, there are fewer events during spring and summer

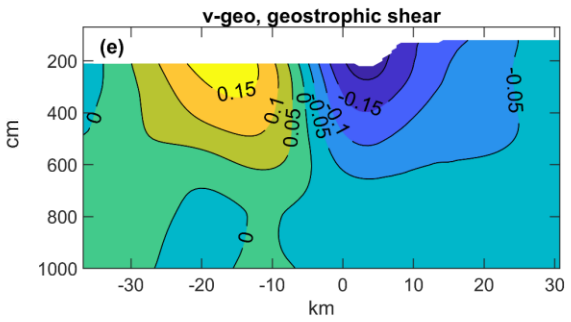
Example of an anticyclone at W3

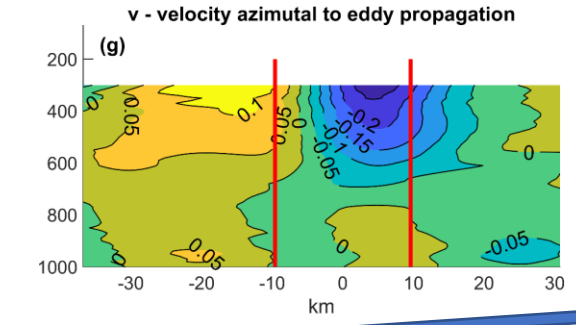
Temperature signal. 0 on the x-axis is the tentative center of the eddy.

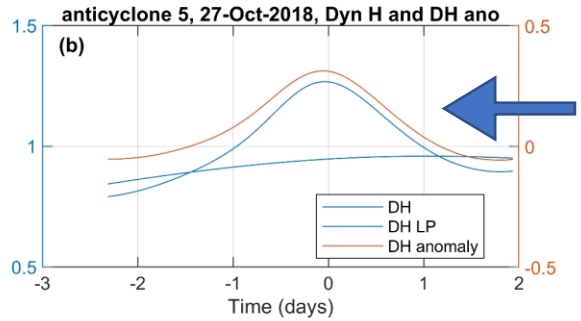




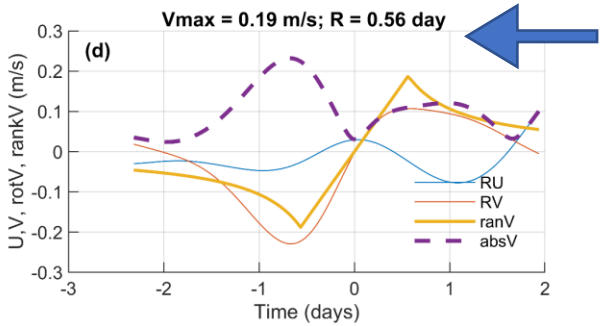




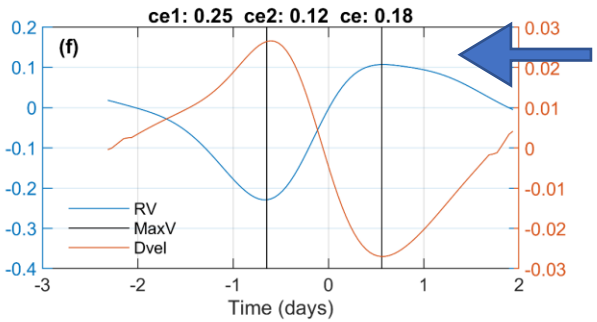




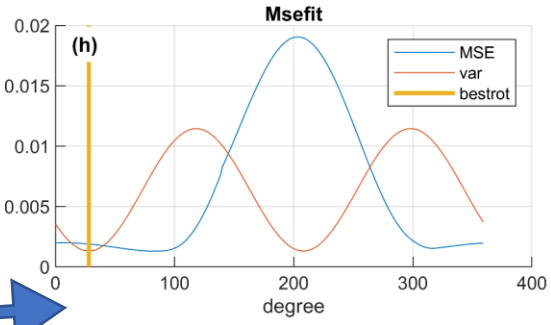
Dynamic height anomaly is indicated by the red line



Fitting the observed currents to an idealized eddy, the Rankine eddy (yellow line) (Lilly and Rhines 2002).



Comparing the observed velocity to geostrophic velocity and indicating the location of maximum velocity. Mean propagation speed (ce) was 0.18 m/s.



When rotating the observed velocity signal to fit the Rankine eddy, we minimize MSE and variance.

Data collected during summer and fall 2018. Note the Seaglider track (white line)

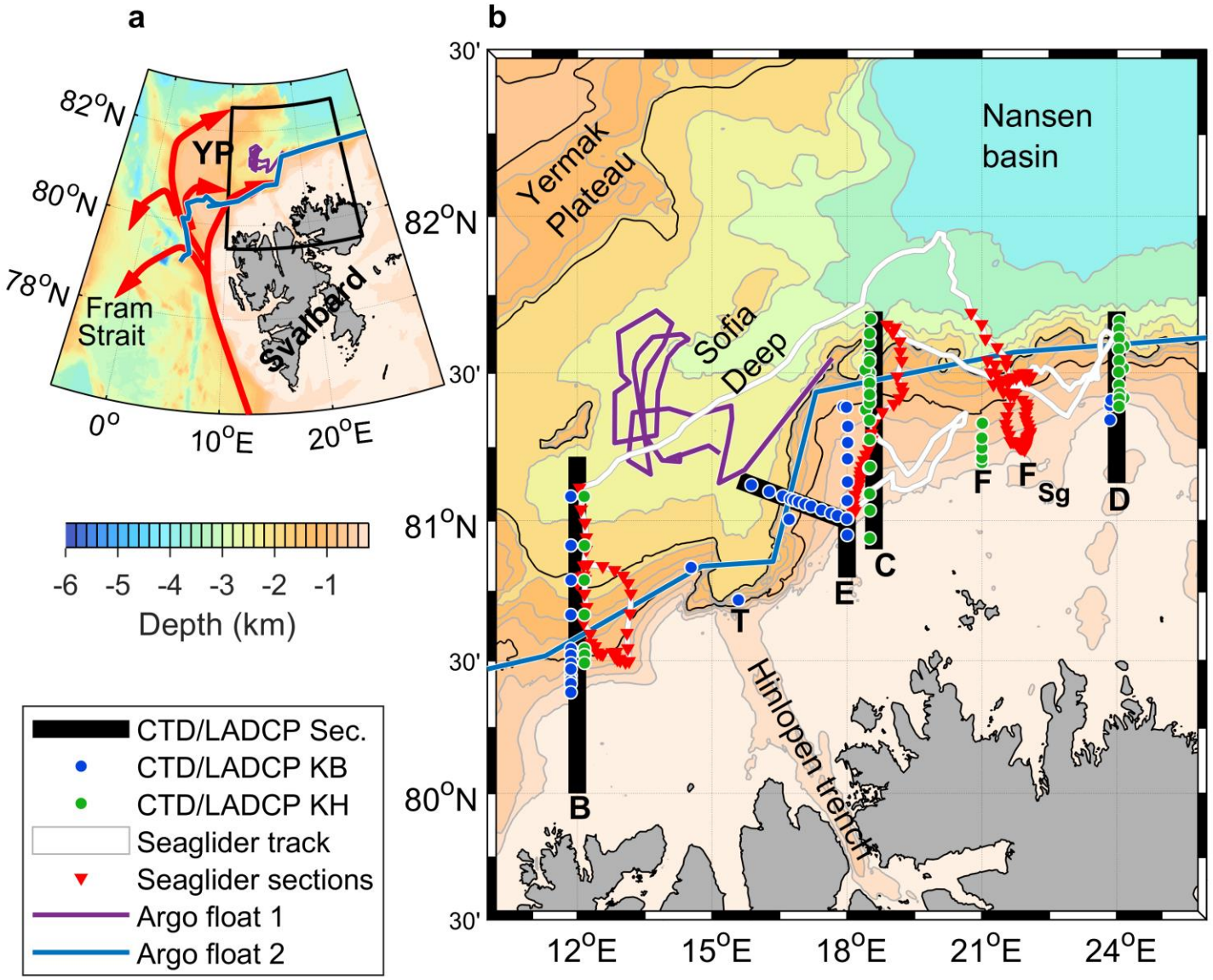
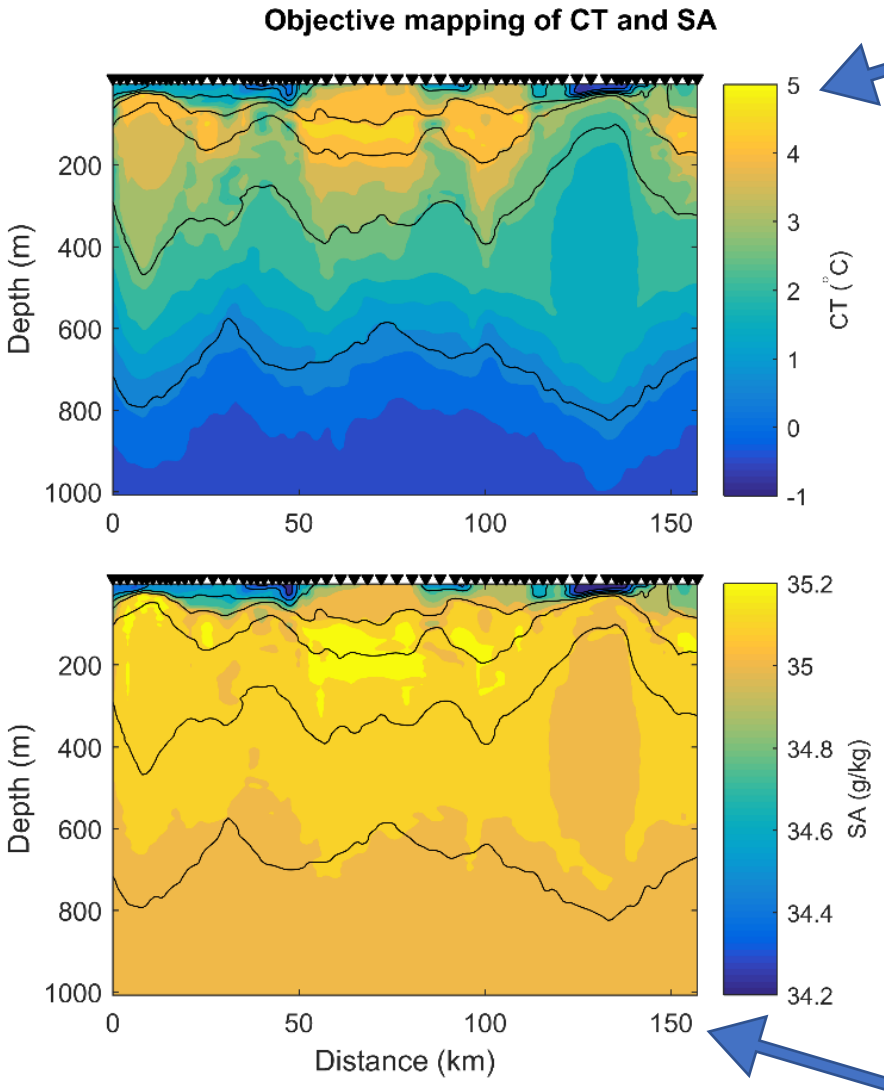
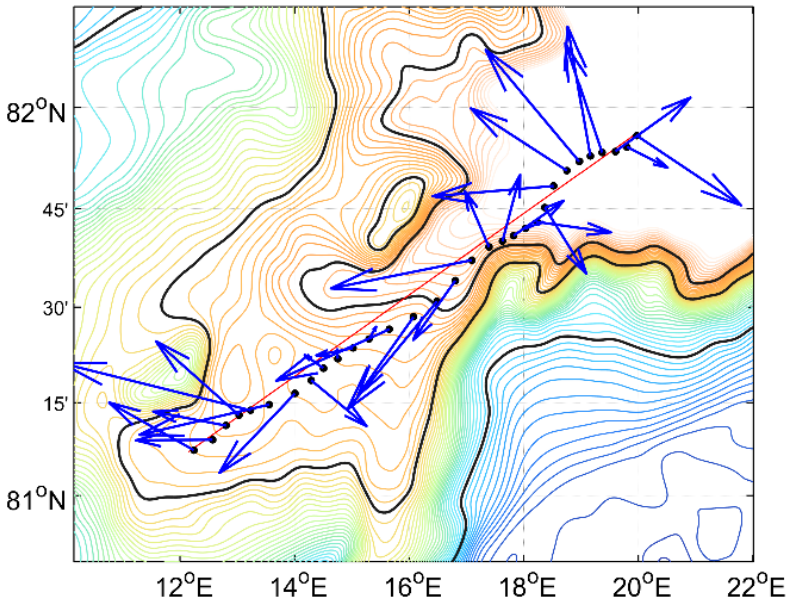


Figure from Kolås et al. (2020)

Seaglider data from the Sofia Deep suggests eddies detach from the boundary current and circulate in the Sofia Deep.



Conservative temperature



Blue arrows show depth average current measured by the Seaglider

Absolute salinity

Large short term variability

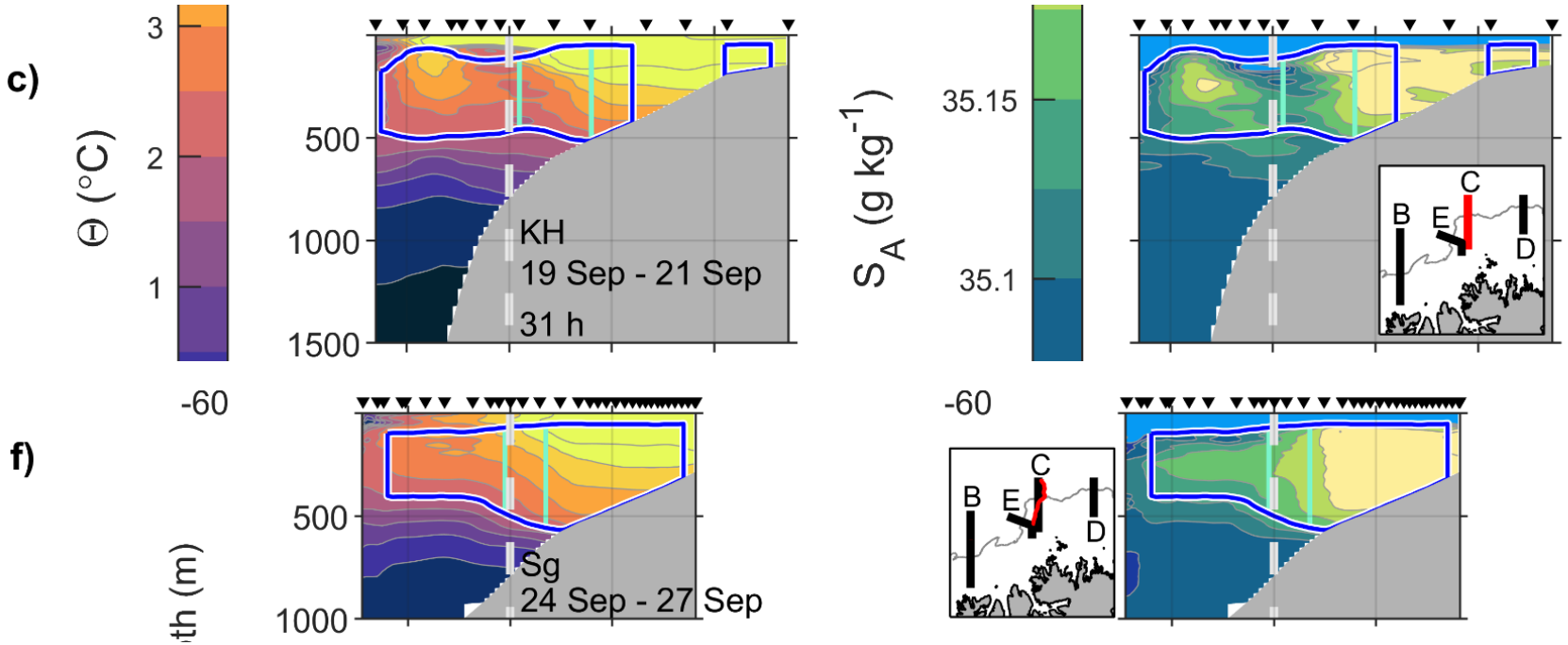


Figure from Kolås et al. (2020)

Figures show two crossings of the same transect across the boundary current north of Svalbard.

The crossings were only a few days apart (date shown in the temperature plots).

An outer warm and saline core is present during the first crossing, and is no longer there during the second crossing, suggesting a warm core eddy has detached from the boundary current.

References:

- Lilly, J. M., and P. B. Rhines, 2002: Coherent eddies in the Labrador Sea observed from a mooring. J. Phys. Oceanogr., 32, 585–598

- Kolås, E. H., Koenig, Z., Fer, I., Nilsen, F., & Marnela, M. (2020). Structure and transport of Atlantic Water north of Svalbard from observations in summer and fall 2018. *Journal of Geophysical Research: Oceans*, *125*, e2020JC016174. https://doi.org/10.1029/2020JC016174

Contact information:

If you have any questions or comments, feel free to contact me through email:

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Note: I’m currently on paternity leave, and don’t read my emails every day.