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Labrador Sea waters export routes in an idealized model and a global high-resolution ocean model

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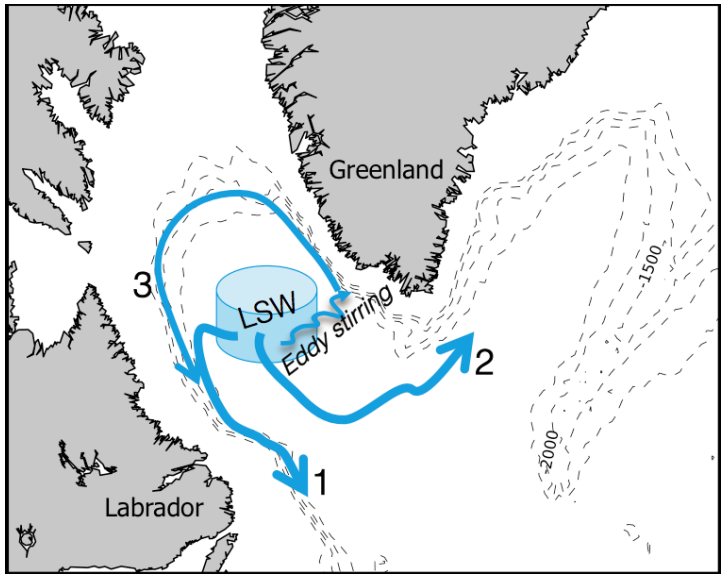
Summary & Highlights



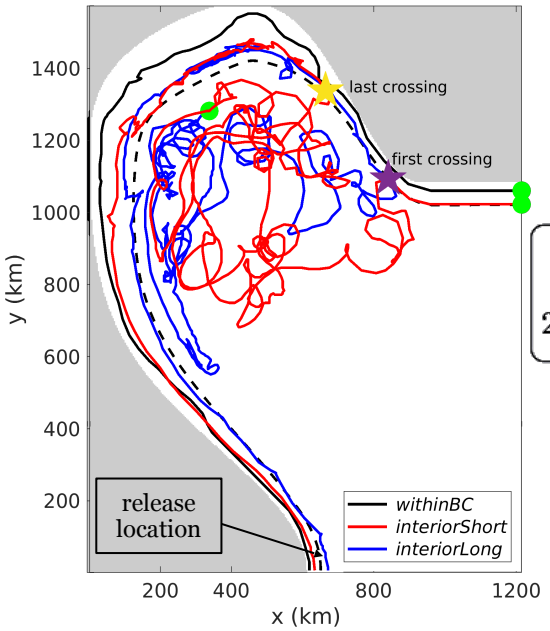
A Lagrangian approach[1] is used to investigate the relative importance of the export routes of the water masses that might result in a complex relation between their formation and their export timescales, and the AMOC variability.

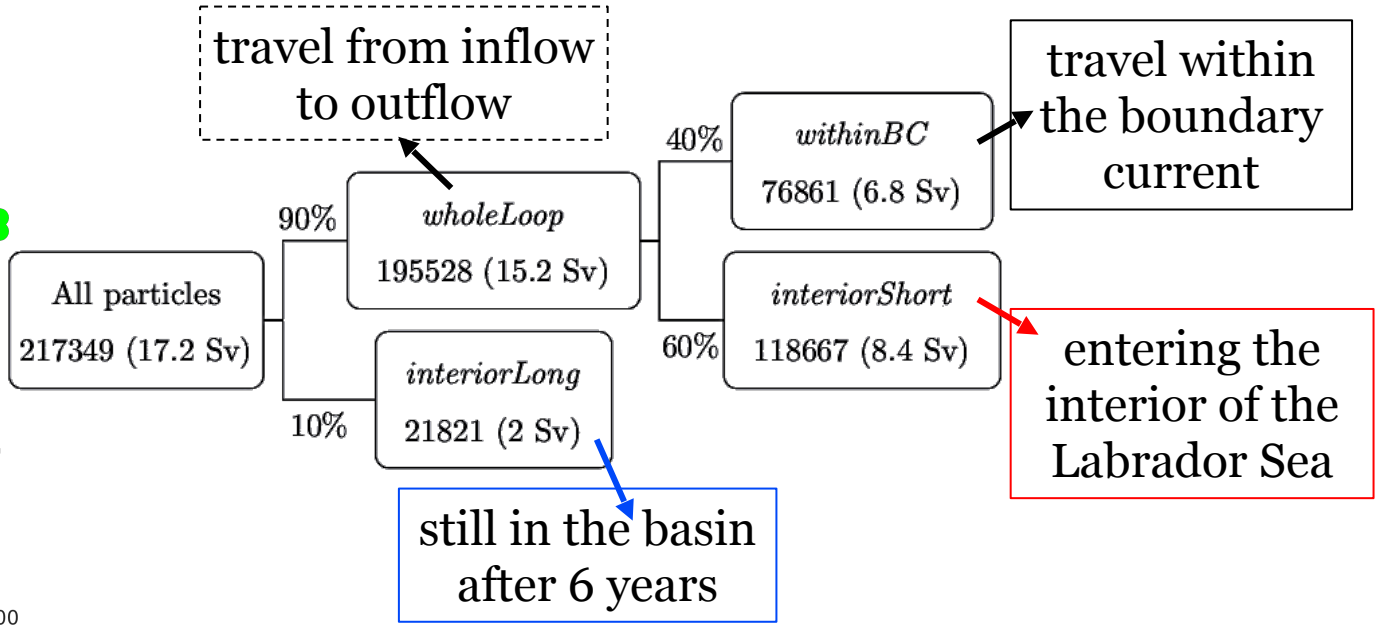
- Lagrangian particles elucidate the paths and transformation of water masses prior to exiting the Labrador Sea.
- Densest water masses follow an indirect route involving boundary-interior exchange.
- Regions of enhanced eddy activity play a significant role in determining the properties and the timescales of the water masses exiting the Labrador Sea.

[1] Lagrangian tools: Connectivity Modeling System (Paris et al., 2013) & Parcels v2.0 (Delandmeter & van Sebille, 2019)

Backtracking of particles using the output of an idealized model[1]

Particle separation





Some of the conclusions from this analysis[2]:

- 60% of the maximum overturning in density space is related to the transport carried by the *interiorShort* particles.
- This analysis highlights the existence of a fast, direct route for relatively lighter water masses and a slower, indirect route (steered by eddies) that the denser water masses follow prior to exit the Labrador Sea via the boundary current.

Click here to find out more!

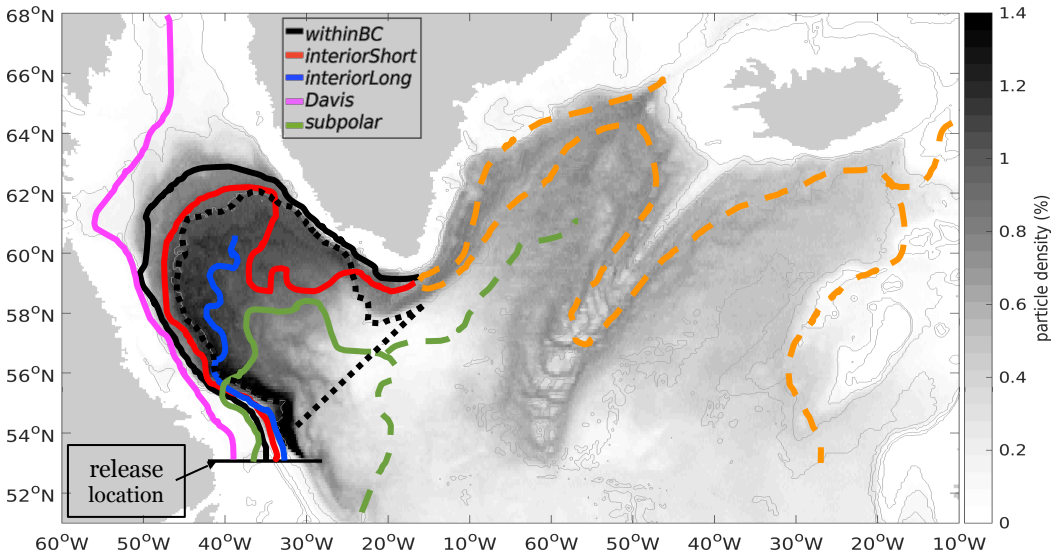
[1] Georgiou et al. (2019)

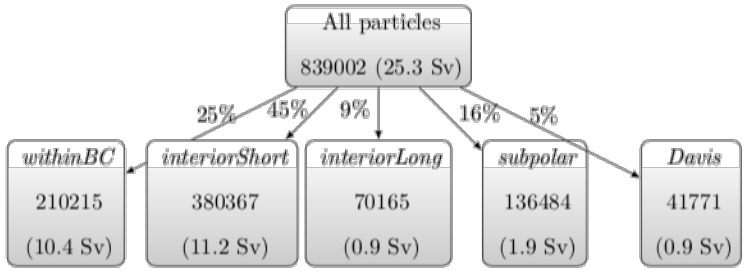
[2] Georgiou et al. (2020)

Backtracking of particles using the output of two realistic ocean models[1,2]

SPOILER ALERT!

Particle separation in MOM

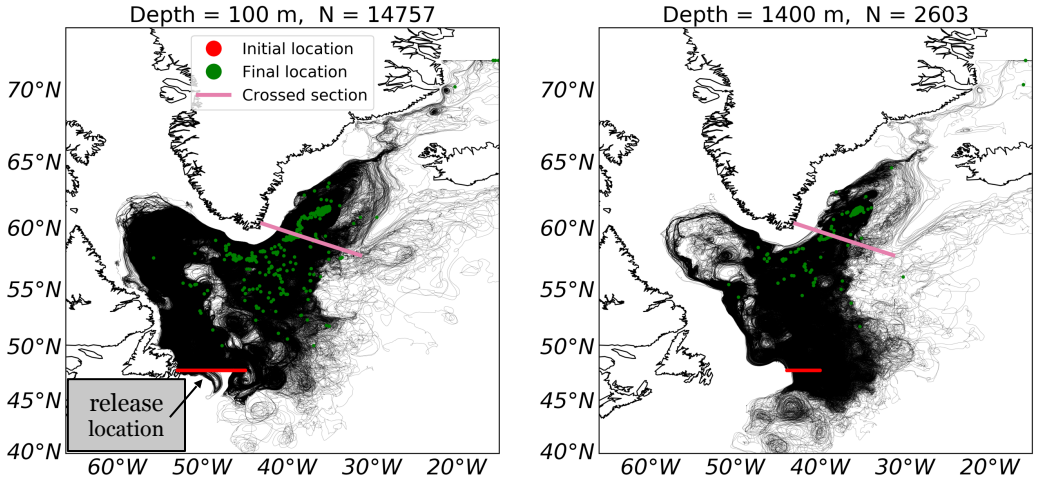




The Lagrangian analysis in MOM&POP:

1. confirms the pathways & outcomes found in the idealized model

Trajectories released at different depths in POP



2. allows the investigation of the pathways connecting the basins of the subpolar North Atlantic.

[1] Modular Ocean Model global ocean-sea ice model (MOM, Spence et al. 2017)

[2] Parallel Ocean Program ocean-only model (POP, Weijer et al. 2012)

Available for discussion @ live chat on Tuesday from 10:45 CET
OS1.7: The North Atlantic : natural variability and global change

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