

# **Can the Irminger Current impact restratification in the Irminger Sea?**

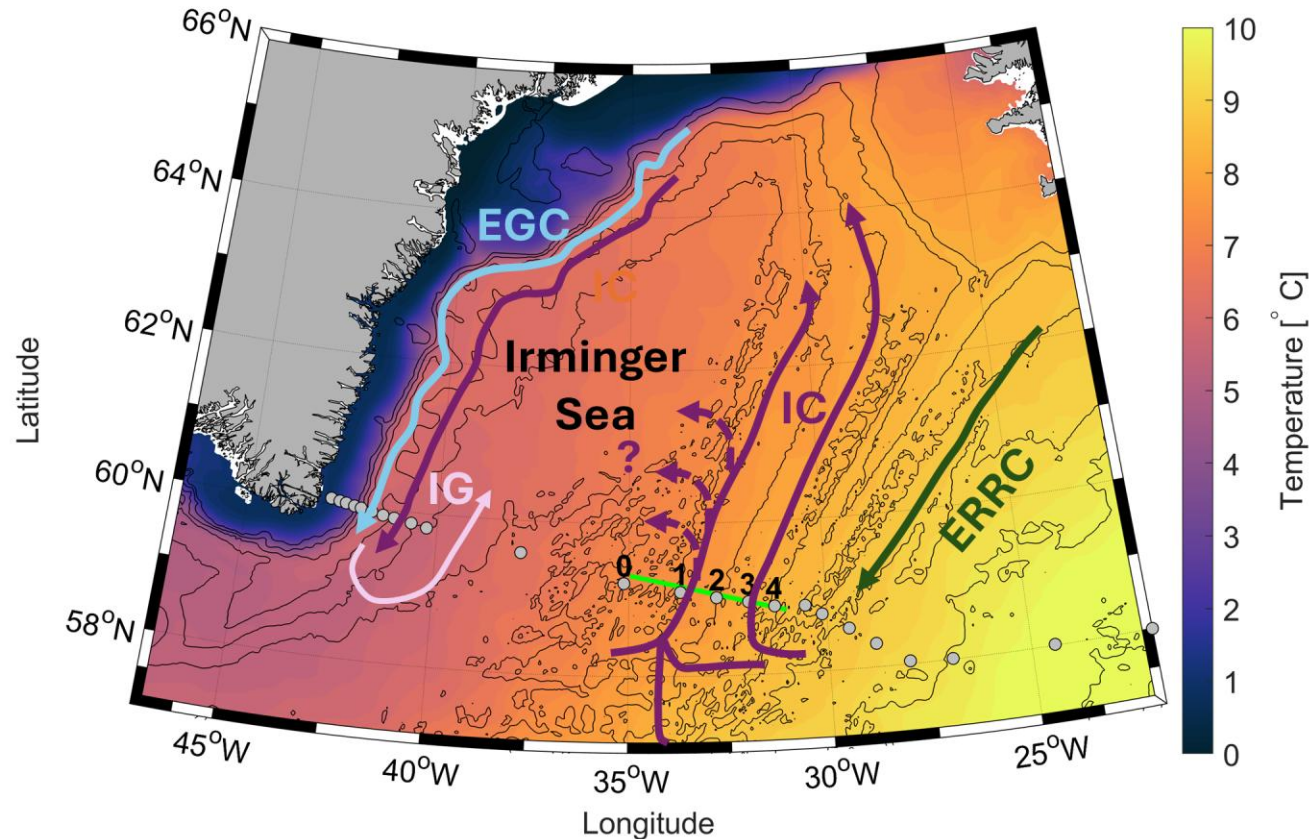
A Lagrangian model study on the fate of the Irminger Current water

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# The circulation the Irminger Sea

- As part of the upper limb of the AMOC the **Irminger Current (IC)** brings warm and saline waters northward along the western flank of the Reykjanes Ridge.
- The two cores of the **IC** are fed by subtropical waters that enter the Irminger Sea from the Iceland Basin and slightly colder waters that recirculated in the Irminger Sea [Fried et al. (2024)].
- The deep convection region is located in Irminger Gyre in the western Irminger Sea.

→ **Aim: Quantify the impact of the Irminger Current on restratification in the Irminger Sea.**



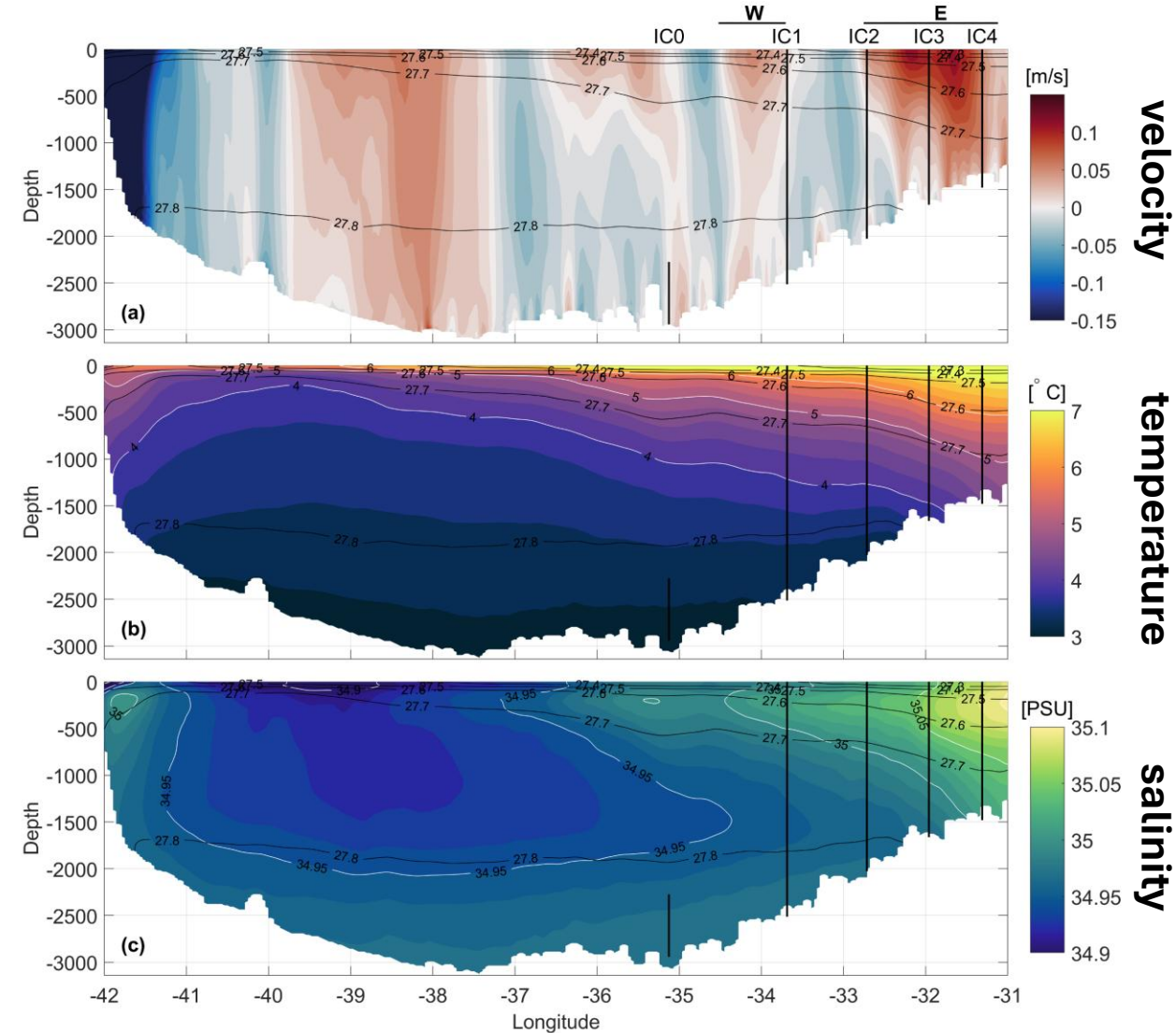
# Model performance at OSNAP East

## Model:

- ✓ MITgcm simulation with a horizontal resolution in the Irminger Sea of 2 km (eddy-resolving).
- ✓ 216 vertical levels
- ✓ Forced by Arctic System Reanalysis data (ASR-2)
- ✓ 1<sup>st</sup> of September 2007 to 31<sup>st</sup> of August 2008

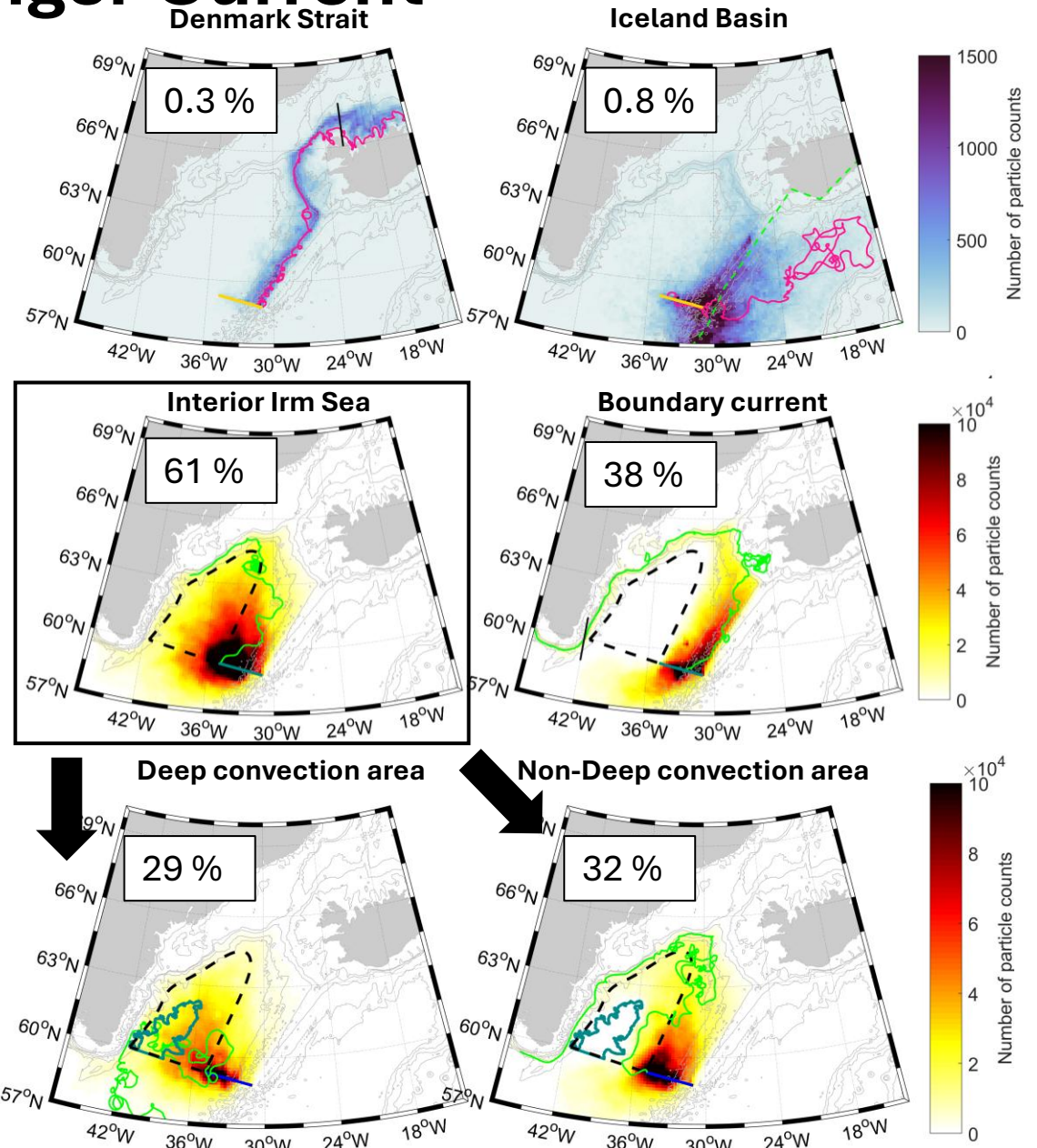
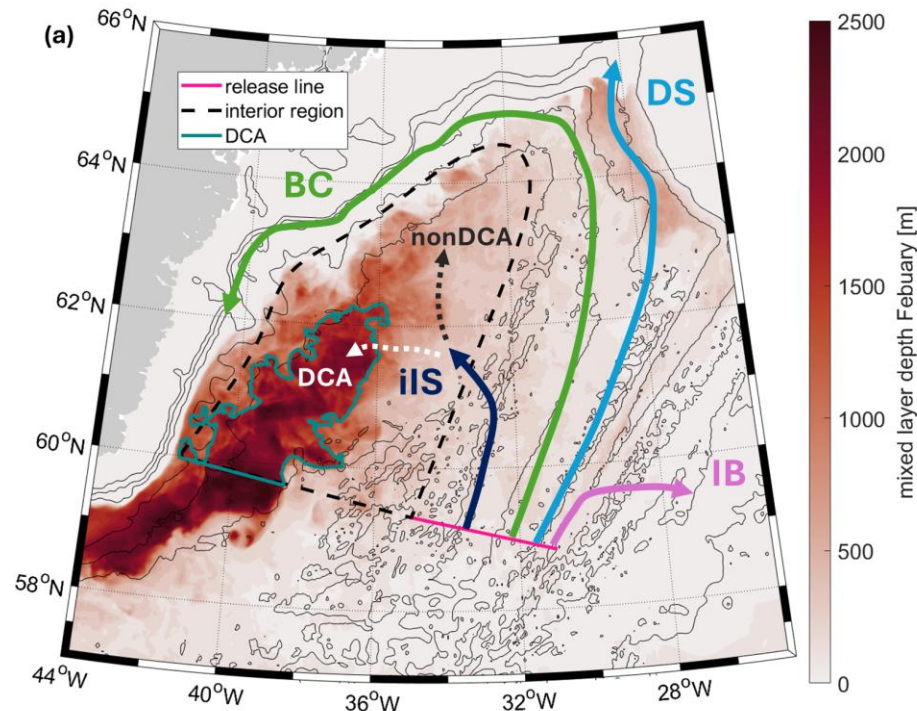
## Lagrangian particle tracking:

- ✓ Particle tracking algorithm after Koszalka et al. (2013) and Gelderloos et al. (2016).
- ✓ Forward-in-time trajectories released in the upper 1500 m of the IC (35° W and 31° W) along OSNAP East.
- ✓ Released every 50 m and 5 times per month.



# Downstream pathways of the Irminger Current

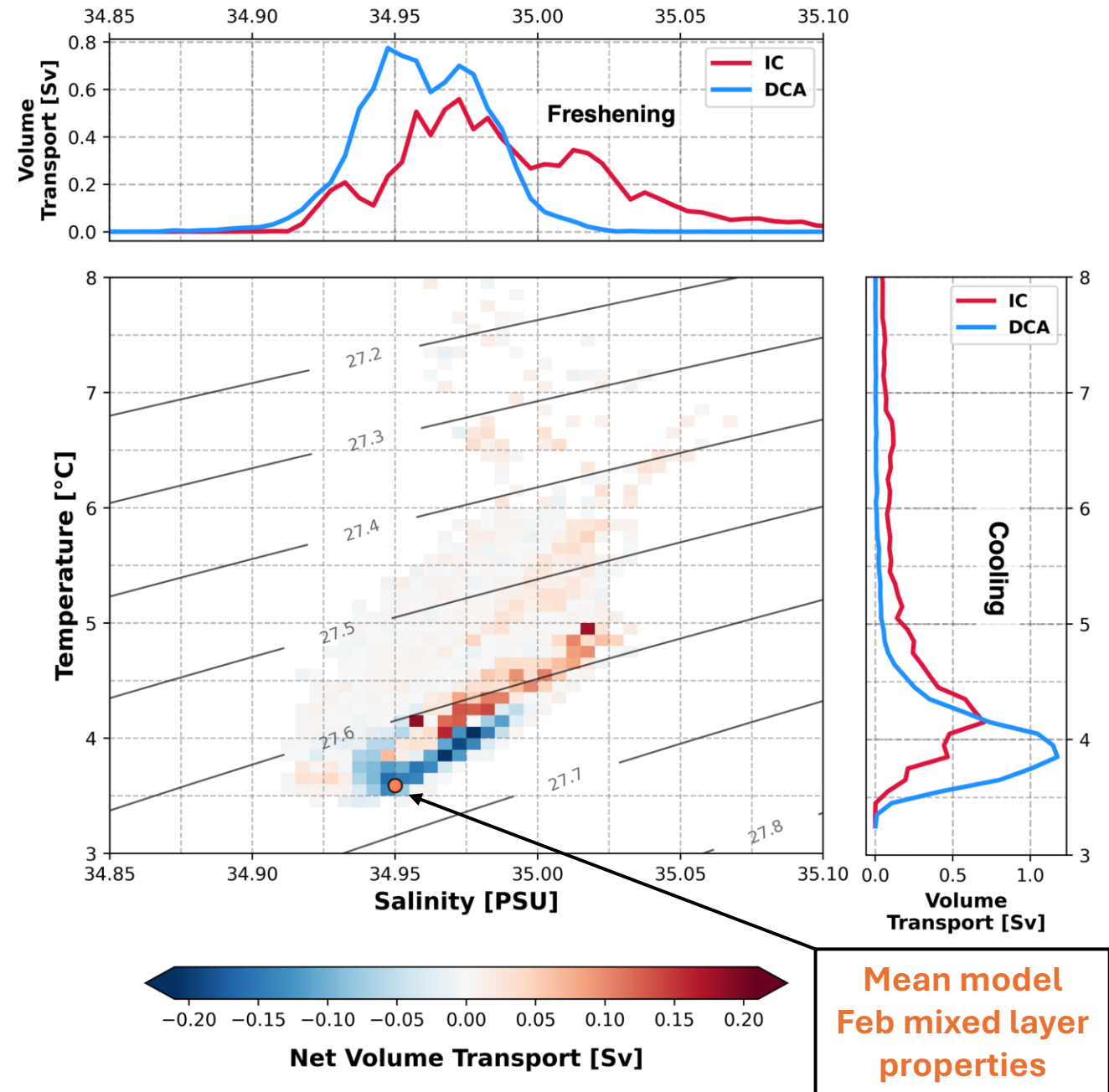
Strong interaction between the boundary current, the interior Irminger Sea and with that the Deep Convection Area (**DCA**) is likely due to **mesoscale eddies**.



Fried et al. (in preparation)

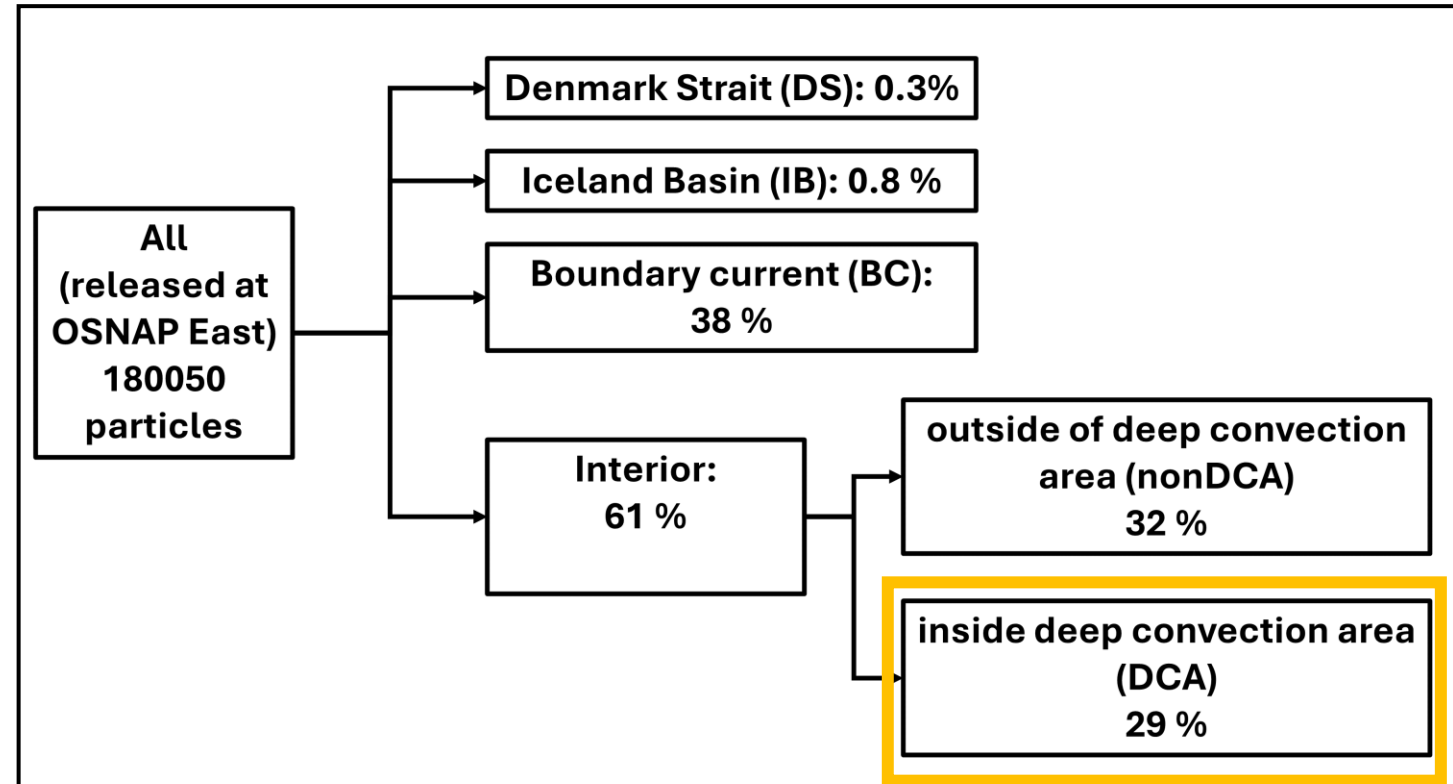
# Heat and salt fluxes

- Limit the analysis to particles that were released between 2007-09-01 and 2008-03-31 for all particles to be able to reach the convection area.
  - Particles at release location (**red colors**) are compared to their entrance position into the deep convection area (**blue colors**)
- From the IC towards the DCA particles cool and freshen.
- When they enter the DCA they are still warmer than the average DCA mixed layer properties (**orange dot**).



# Conclusions

- On their way towards the DCA the IC waters **stratify the eastern Irminger Sea**, thus limiting the area and depth of convection in the Irminger Sea to the western part of the basin.
- **Mesoscale activity** is likely the mechanism to bring warm and saline IC waters into the Irminger Sea interior. Understanding and quantifying the eddy activity in the eastern Irminger Sea is therefore essential.



**Thank you for your attention!**