New results from the Irminger Sea: deep convection and the Irminger Current between 2014-2015

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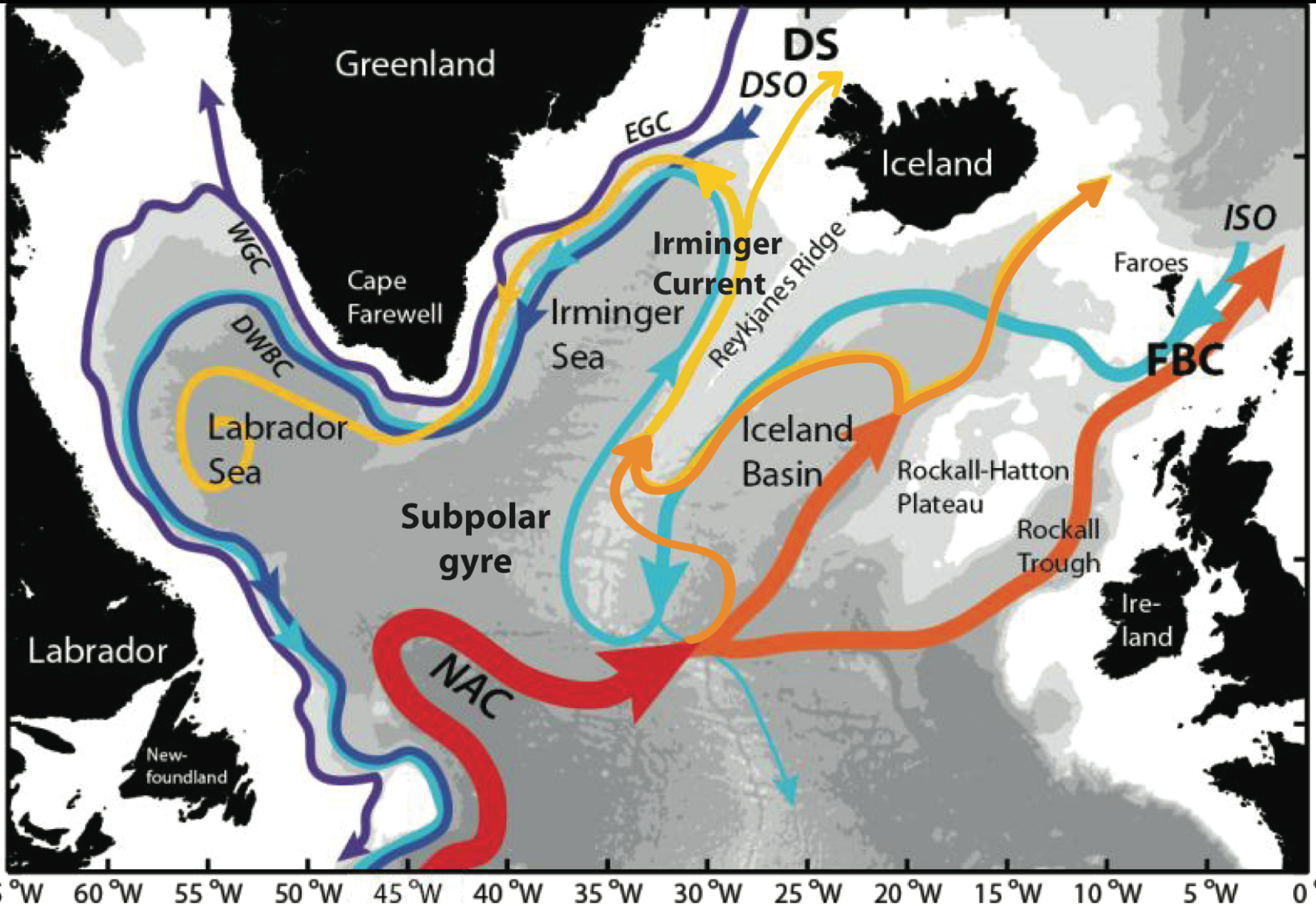
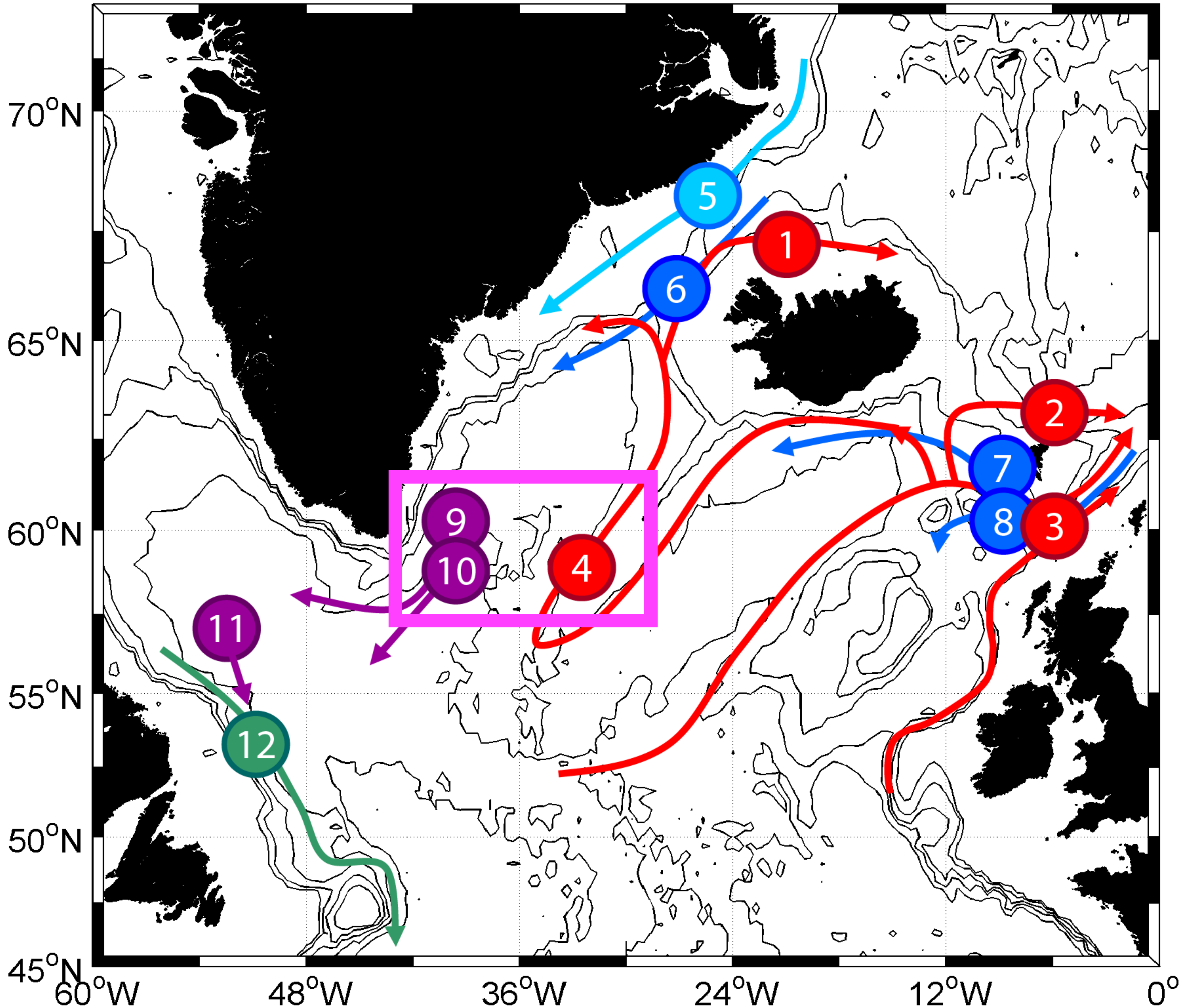
2) Norwegian Polar Institute NPI (Norway), 3) Duke University (USA),
4) Institute for Marine & Atmospheric research Utrecht IMAU (The Netherlands)

The subpolar gyre and the Irminger Sea



Courtesy: Heather Furey (WHOI)

Continuous ocean measurements within NACLIM



Courtesy: Clare Johnson (SAMS)

Atlantic transport arrays # 1-4

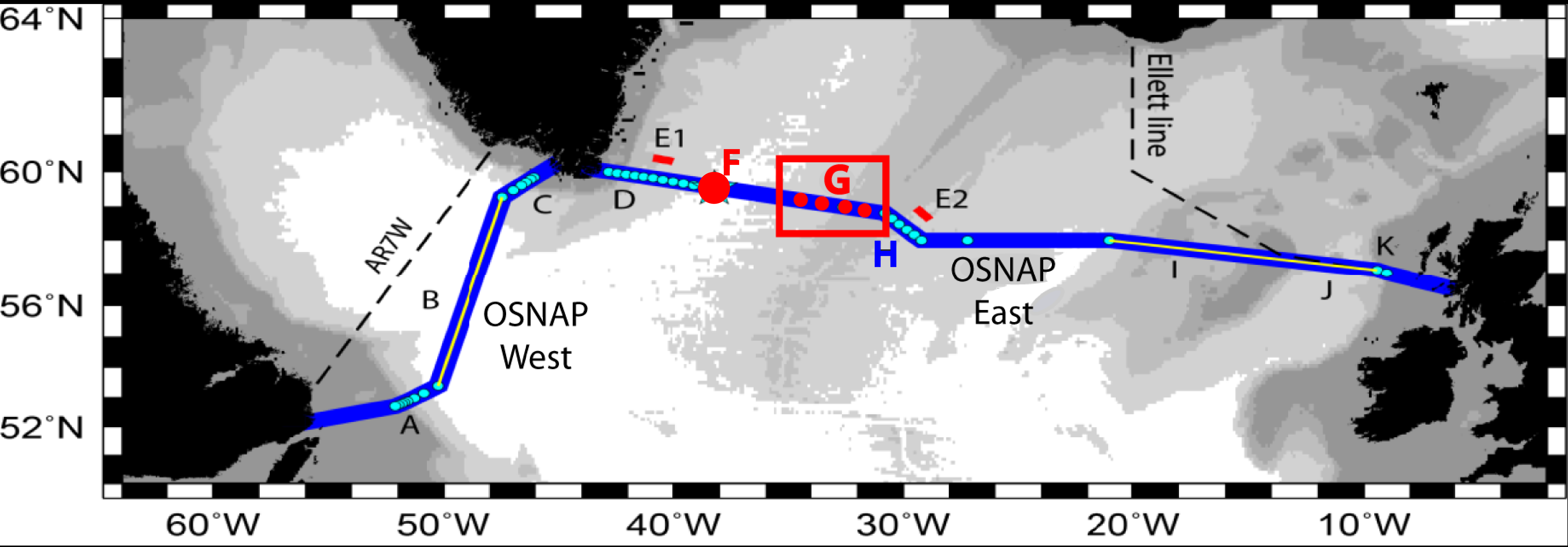
EGC shelf array # 5

Overflow arrays #6-8

Central gyre moorings # 9-11

DWBC array # 12

Overturning of the Subpolar North Atlantic Program (OSNAP)



USA, UK, Canada, Germany, Netherlands, France, China
2014-2018 (www.o-snap.org)

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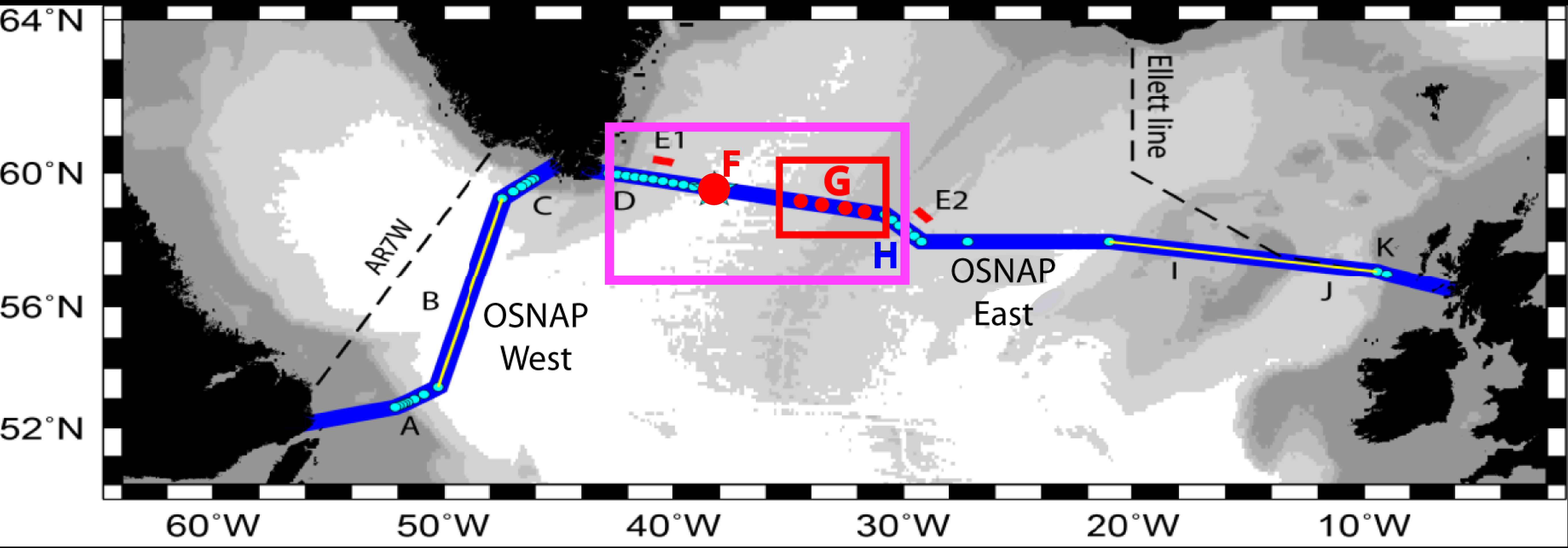

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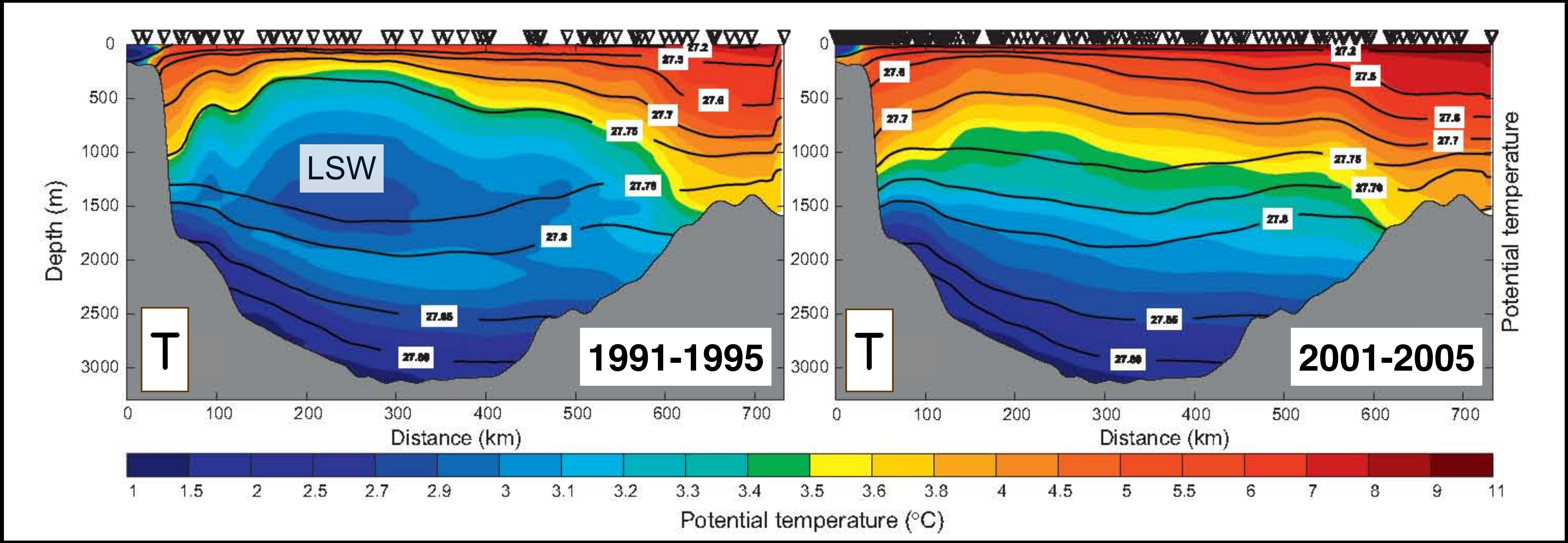
Cruise 64PE400 July 2015

Irminger Sea mean hydrography 1990s vs 2000s



Våge et al., 2011

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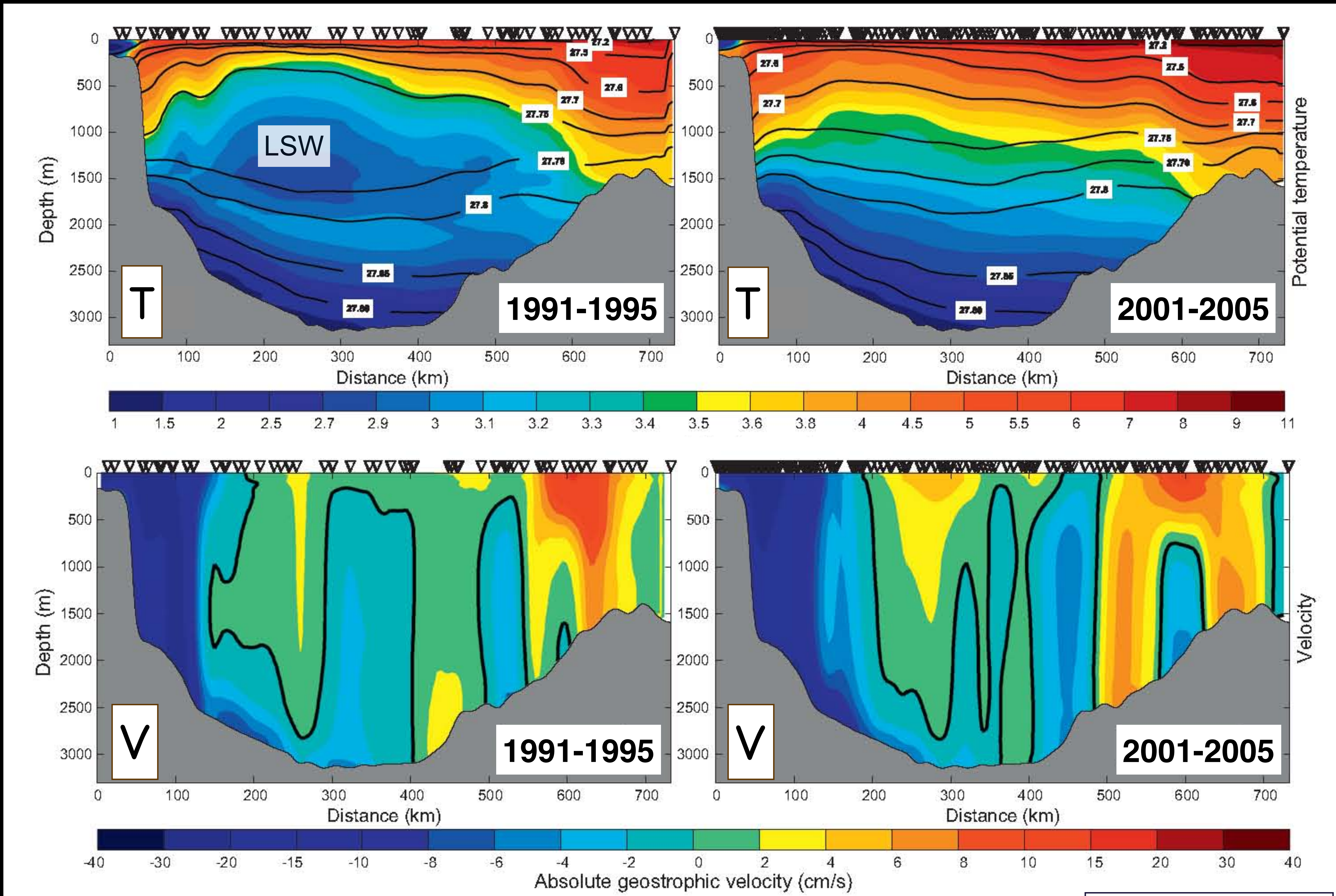

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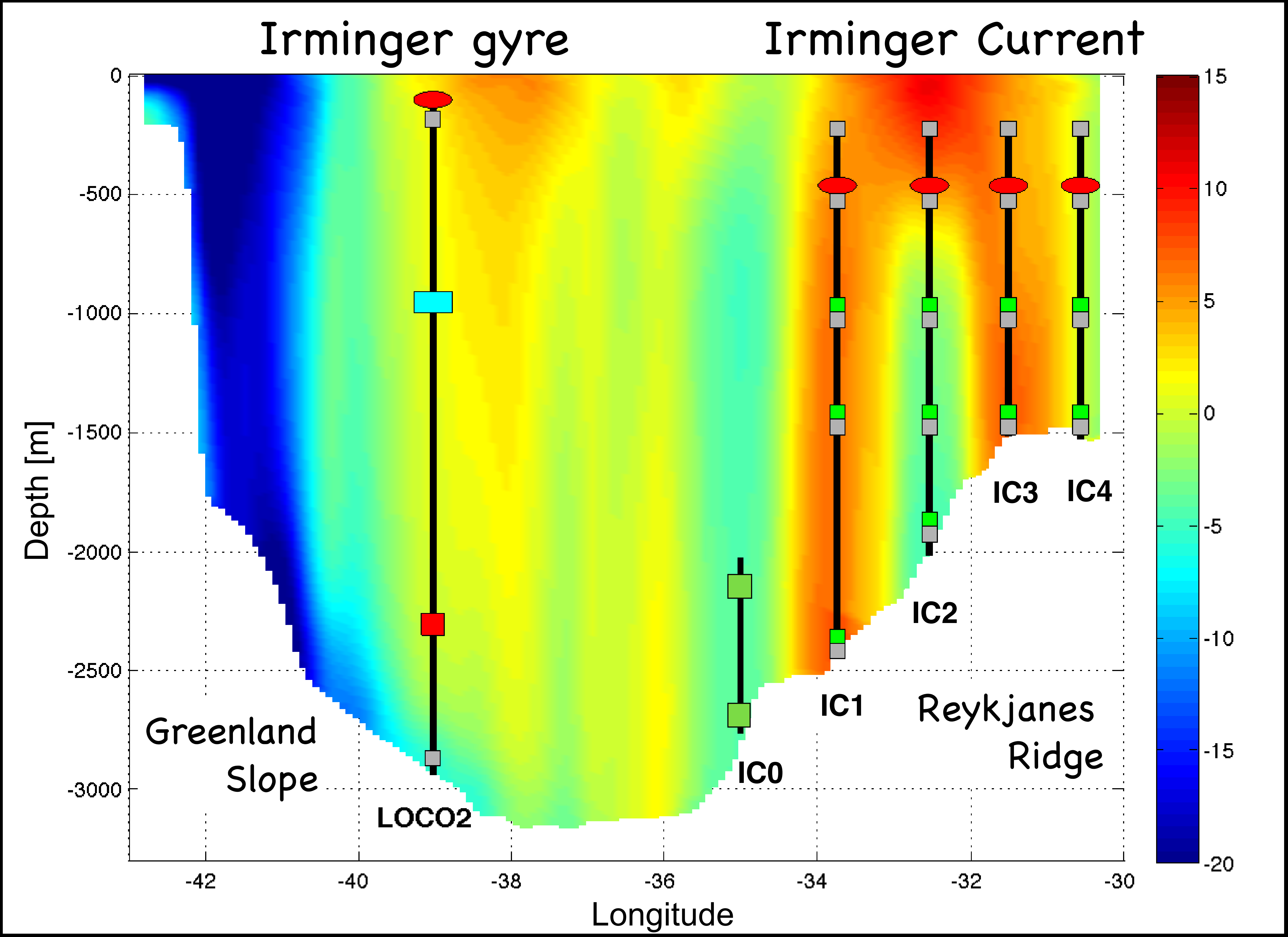
Irminger moorings deployed in 2014



Background: absolute geostrophic velocity (Våge et al., 2011)

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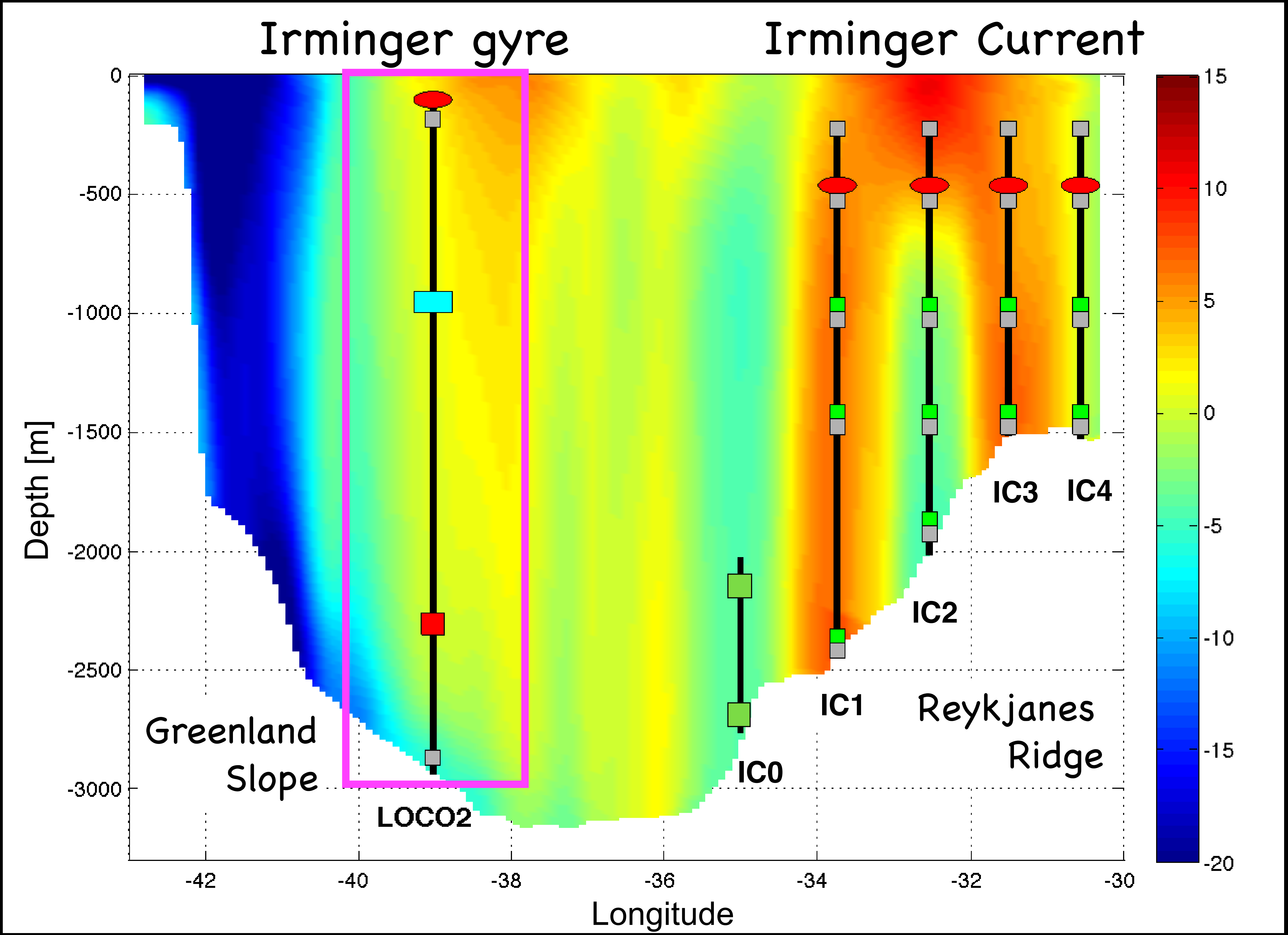

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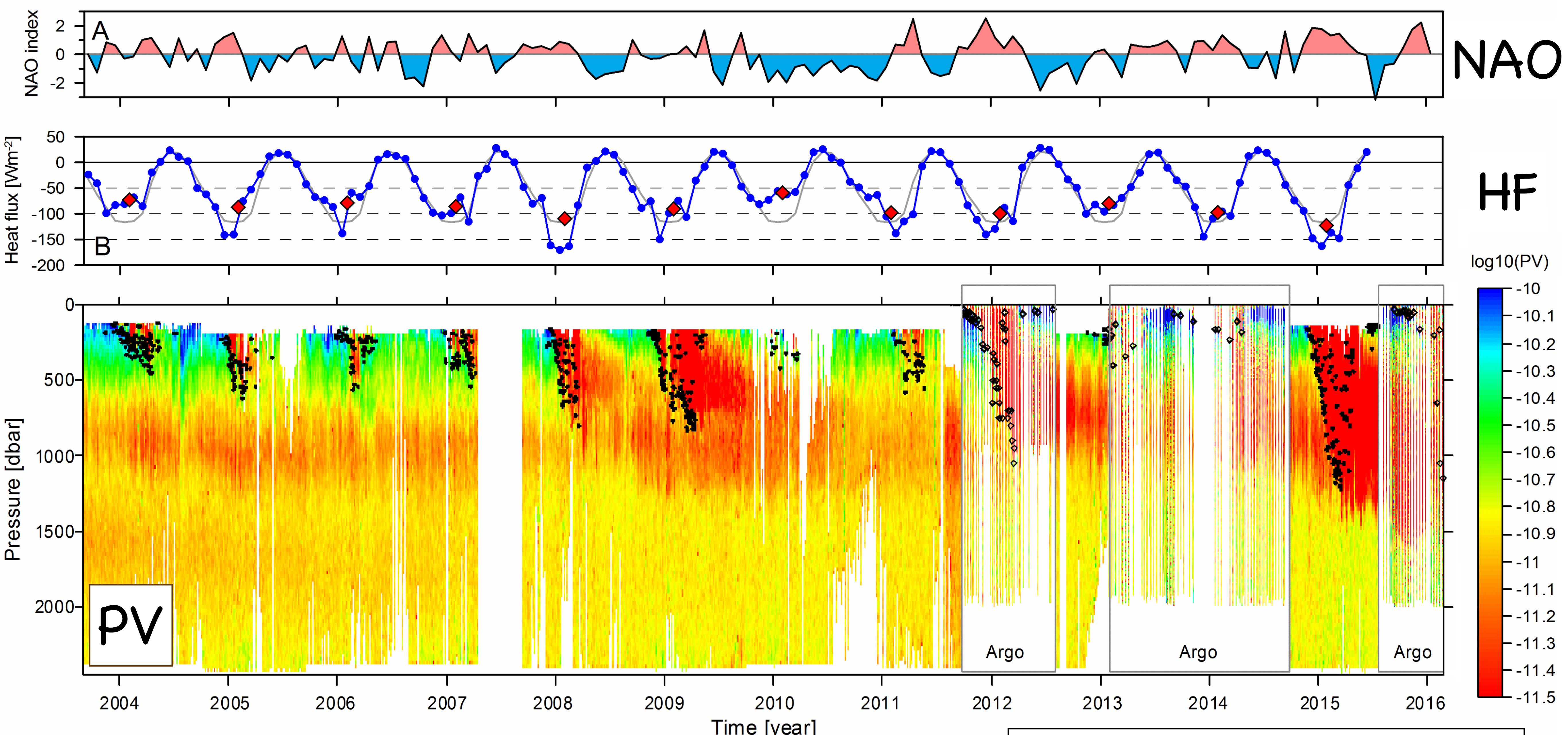
Time series of potential vorticity (PV) and heat flux (HF) in the Irminger Gyre



De Jong & De Steur, GRL 2016

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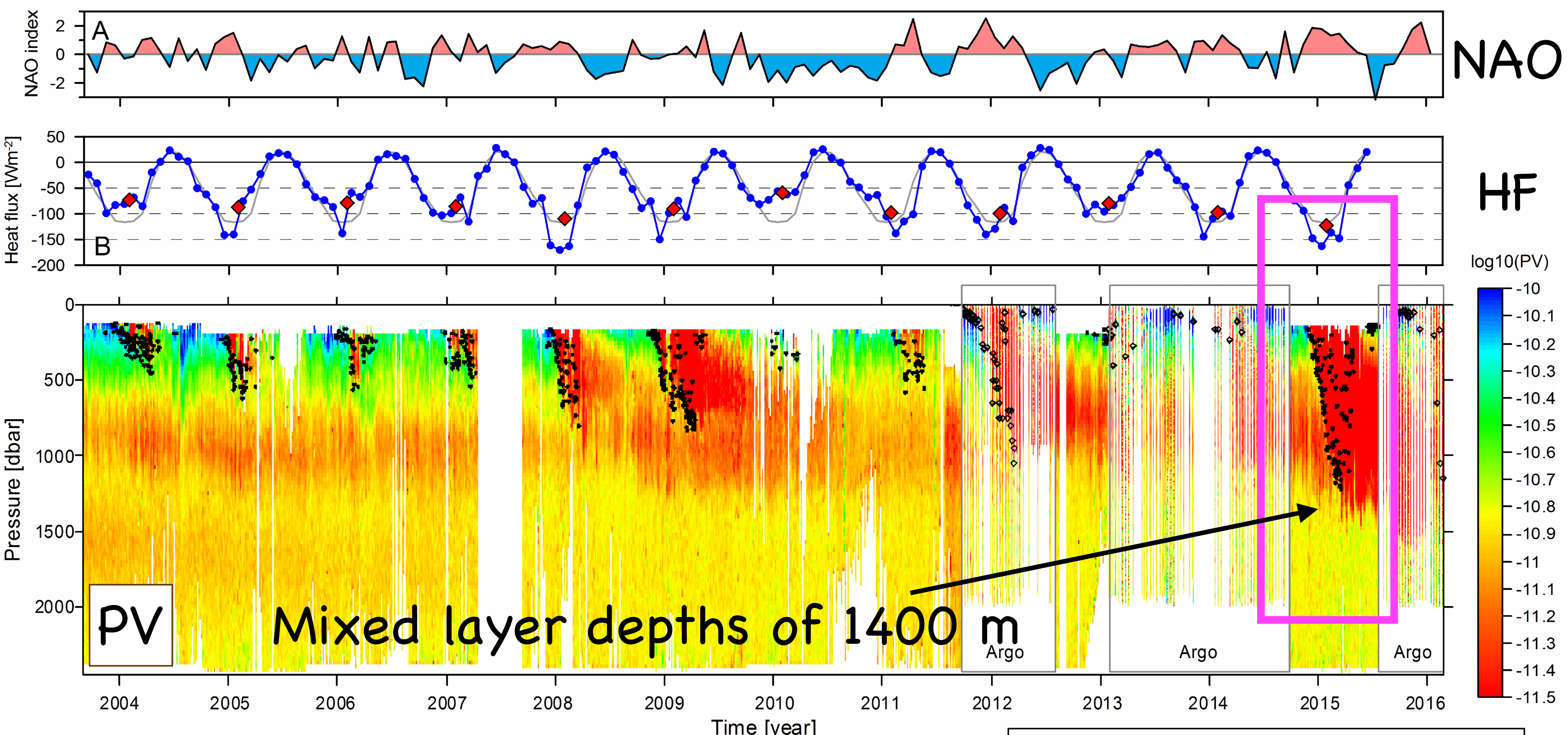
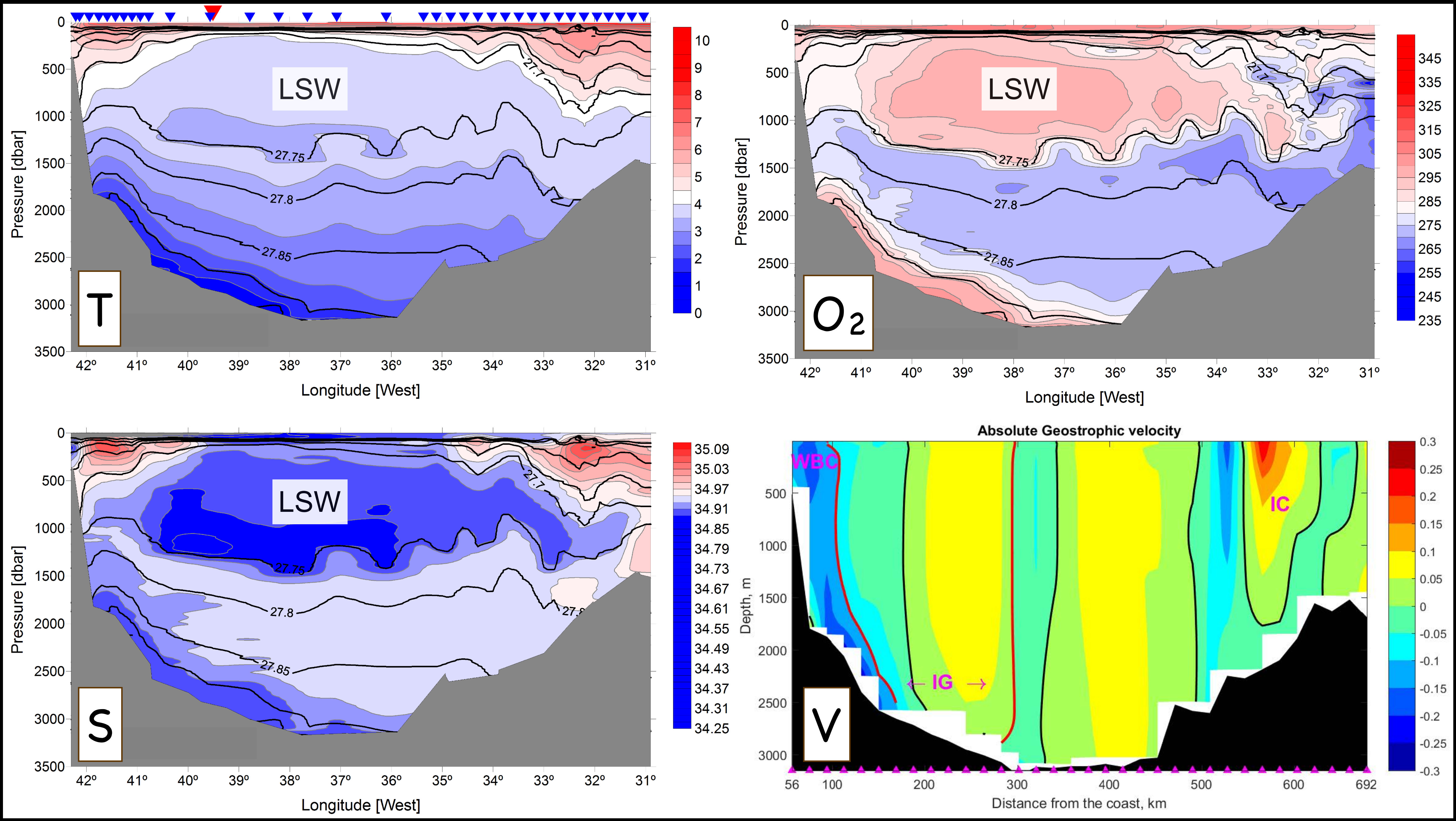


De Jong & De Steur, GRL 2016

Deepest convective MLD since 2003 found in winter 2014-2015

Associated with a large atmospheric heat flux and a positive NAO

Irminger Sea hydrography & velocity 2015



Newly and **locally** formed Labrador Sea Water

A **single** Irminger Current (IC) core

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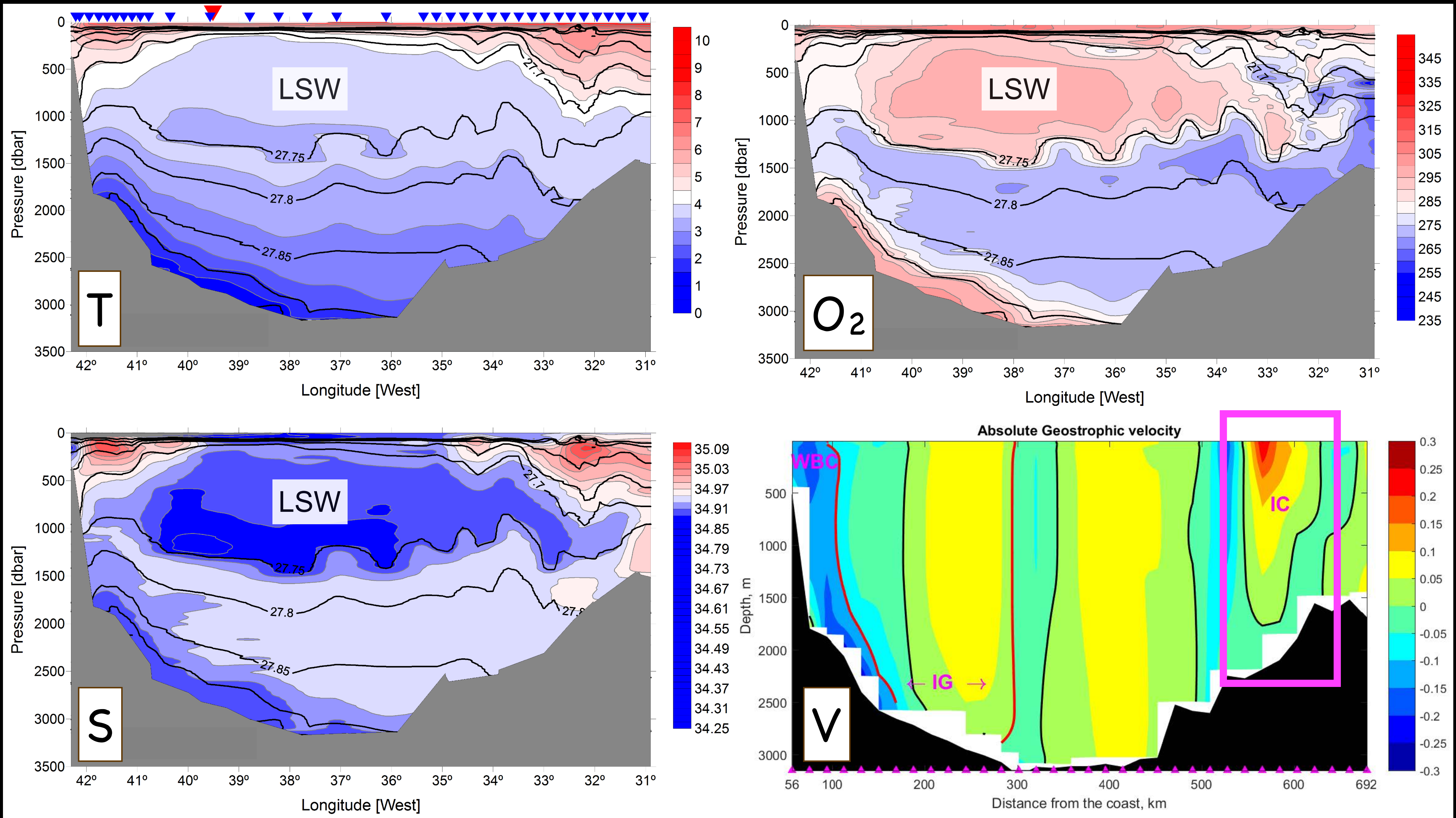

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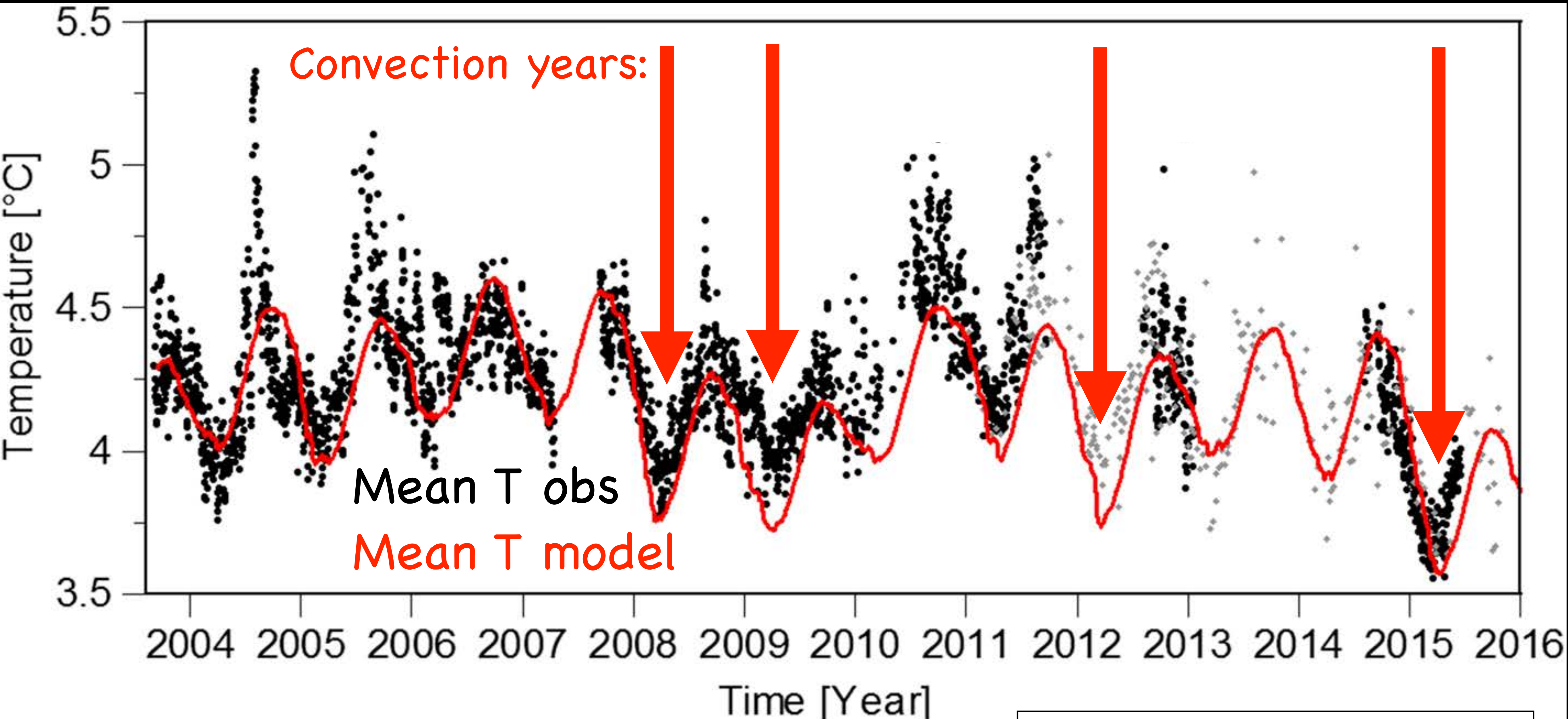
Temperature evolution in the upper 1 km in the Irminger Gyre from a 1-D model



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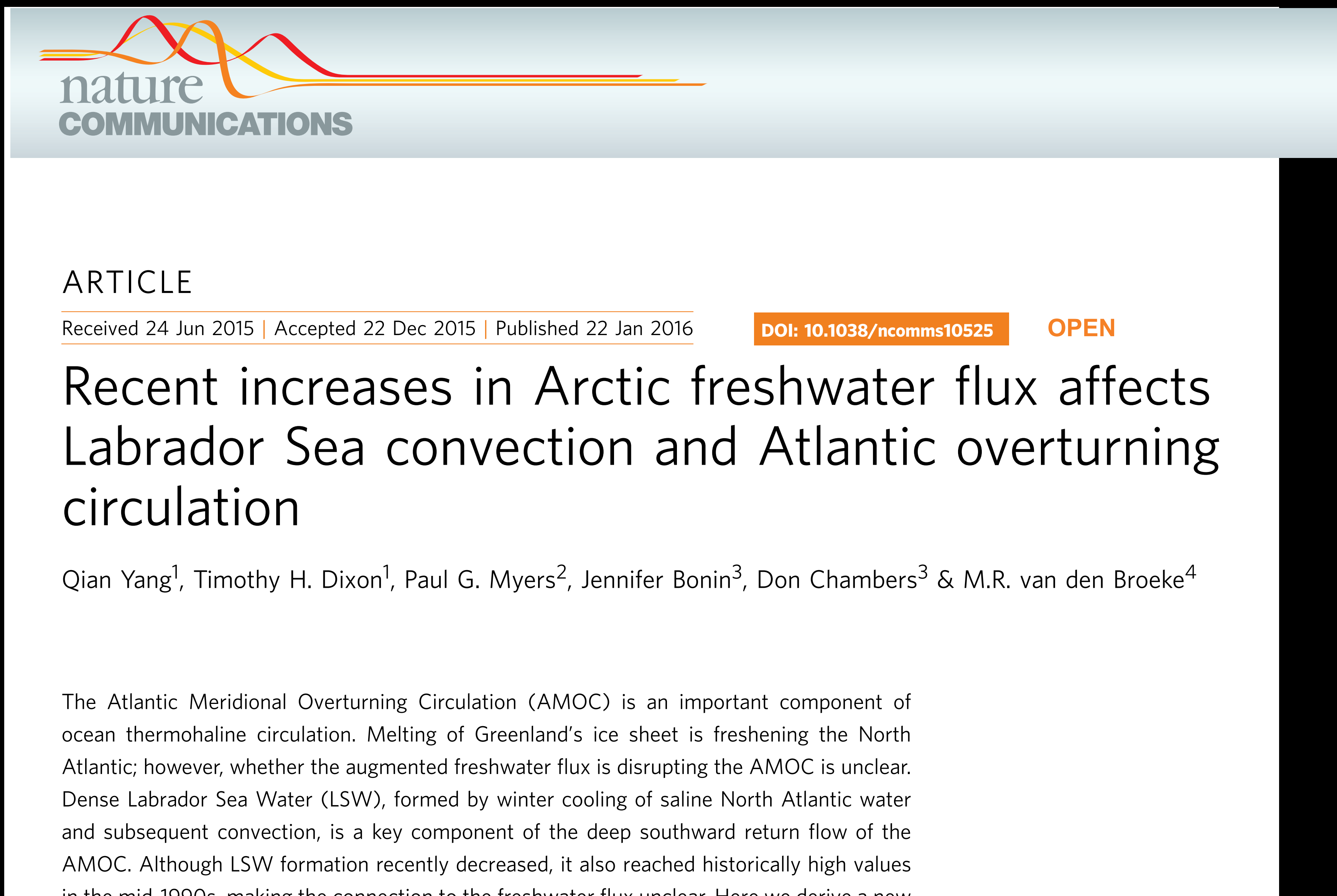
Red: temperature evolution from the 1-D model $H_\rho C_p \, (dT/dt) = Qsfc + Qadv$ using North American Regional Reanalysis (NARR) surface fluxes

GIS ice sheet melt & shut down deep convection?



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Recent increases in Arctic freshwater flux affects Labrador Sea convection and Atlantic overturning circulation

Qian Yang[1], Timothy H. Dixon[1], Paul G. Myers[2], Jennifer Bonin[3], Don Chambers[3] & M.R. van den Broeke[4]

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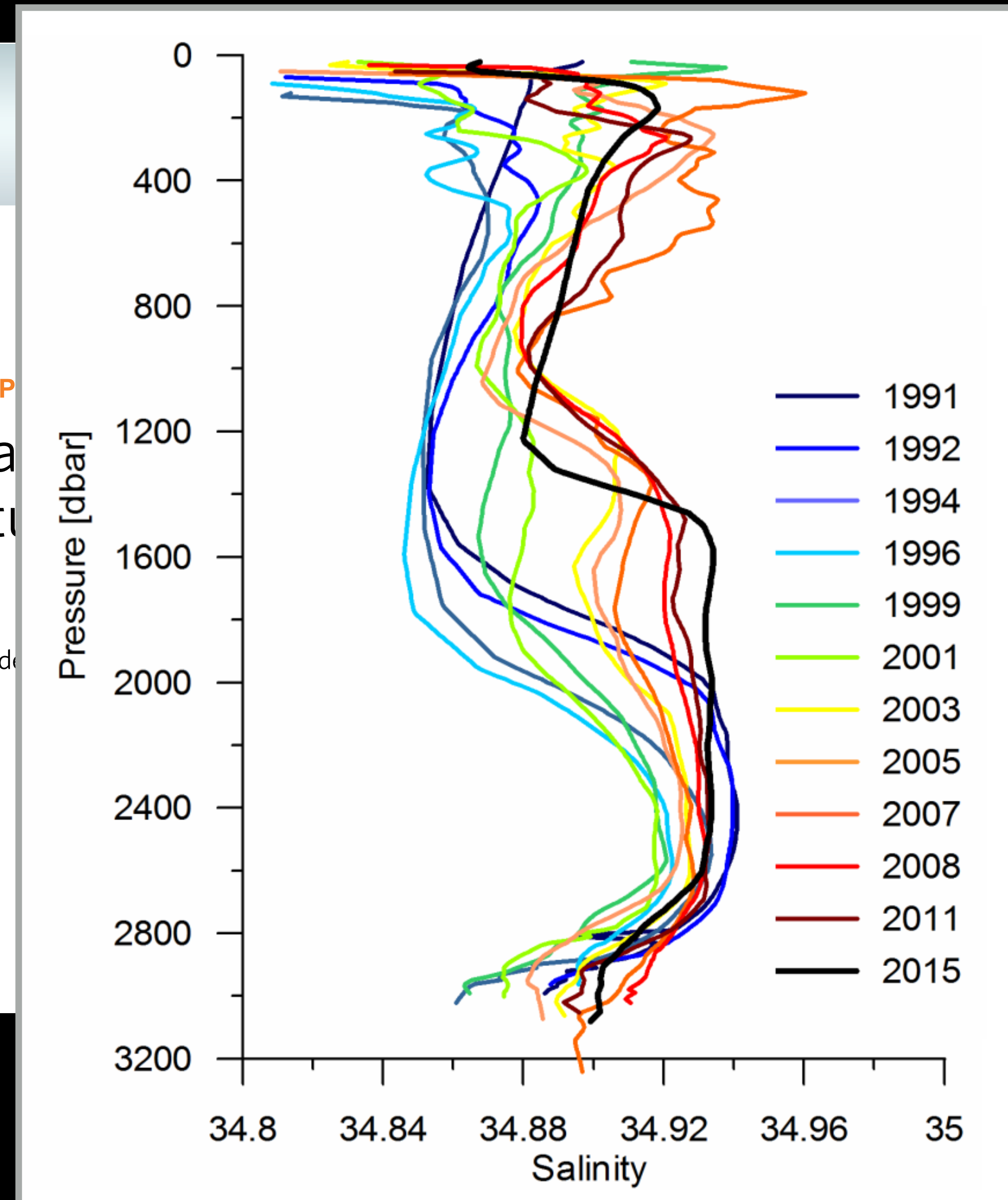

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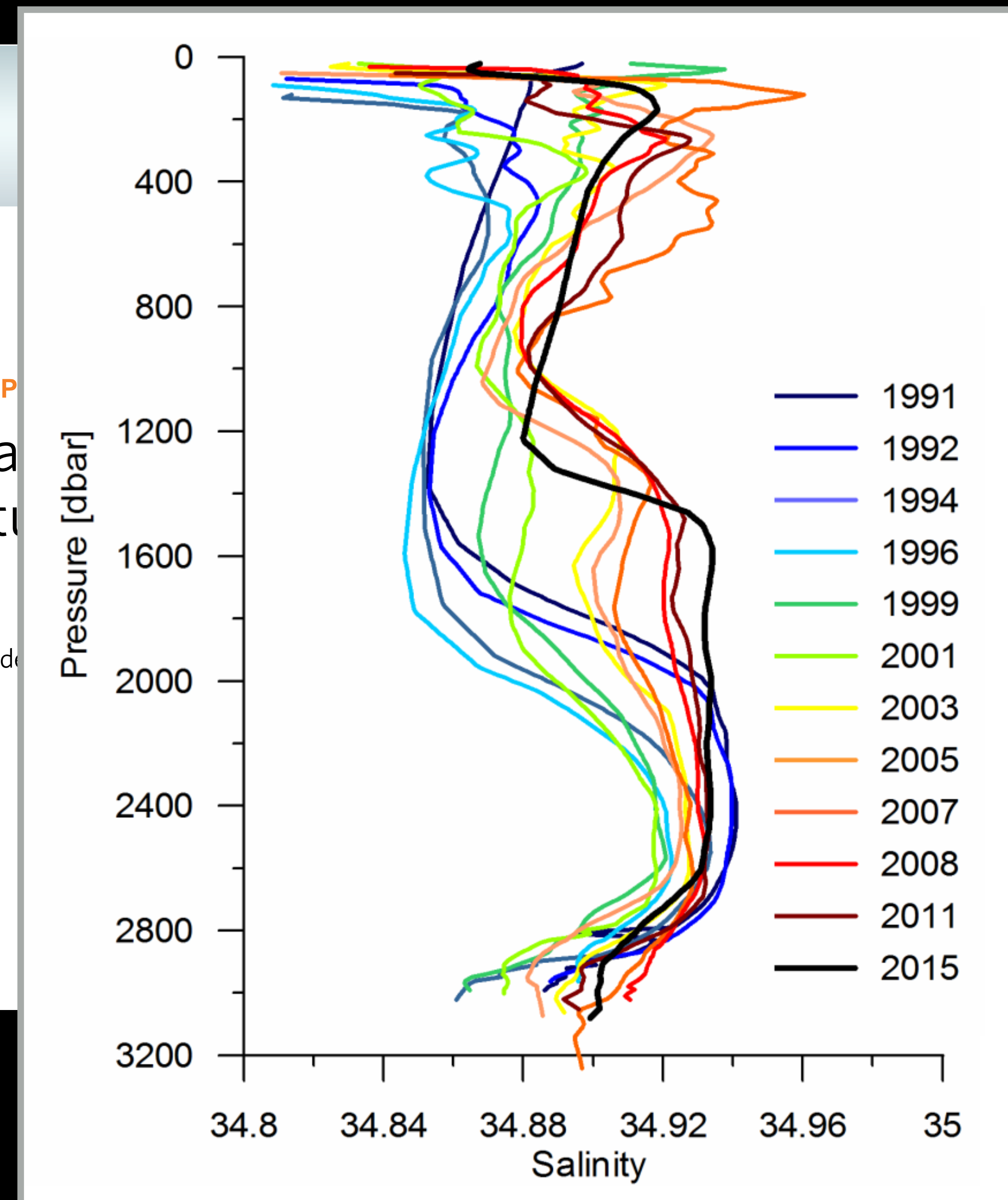
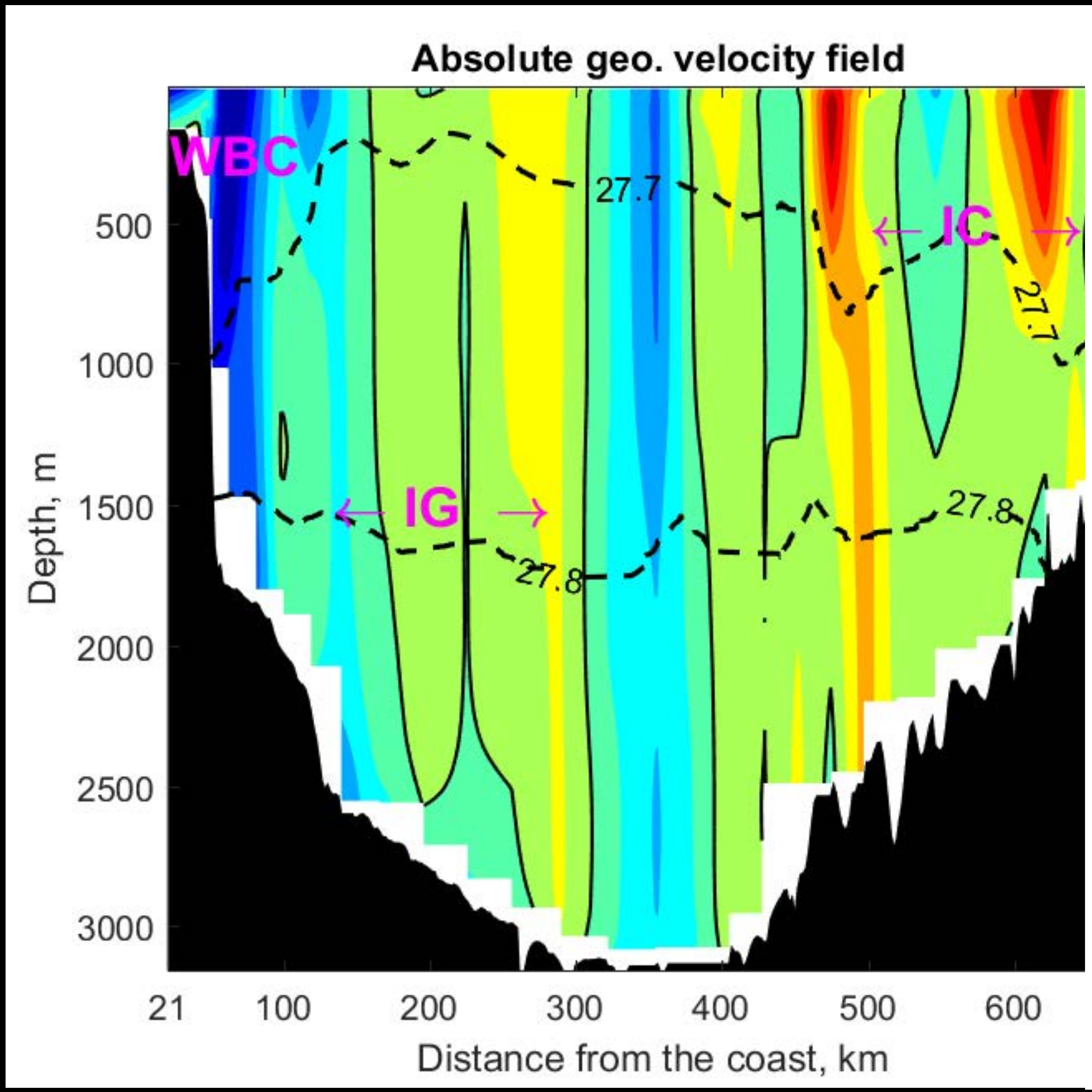


Irminger Sea section 2014 vs 2015

2014



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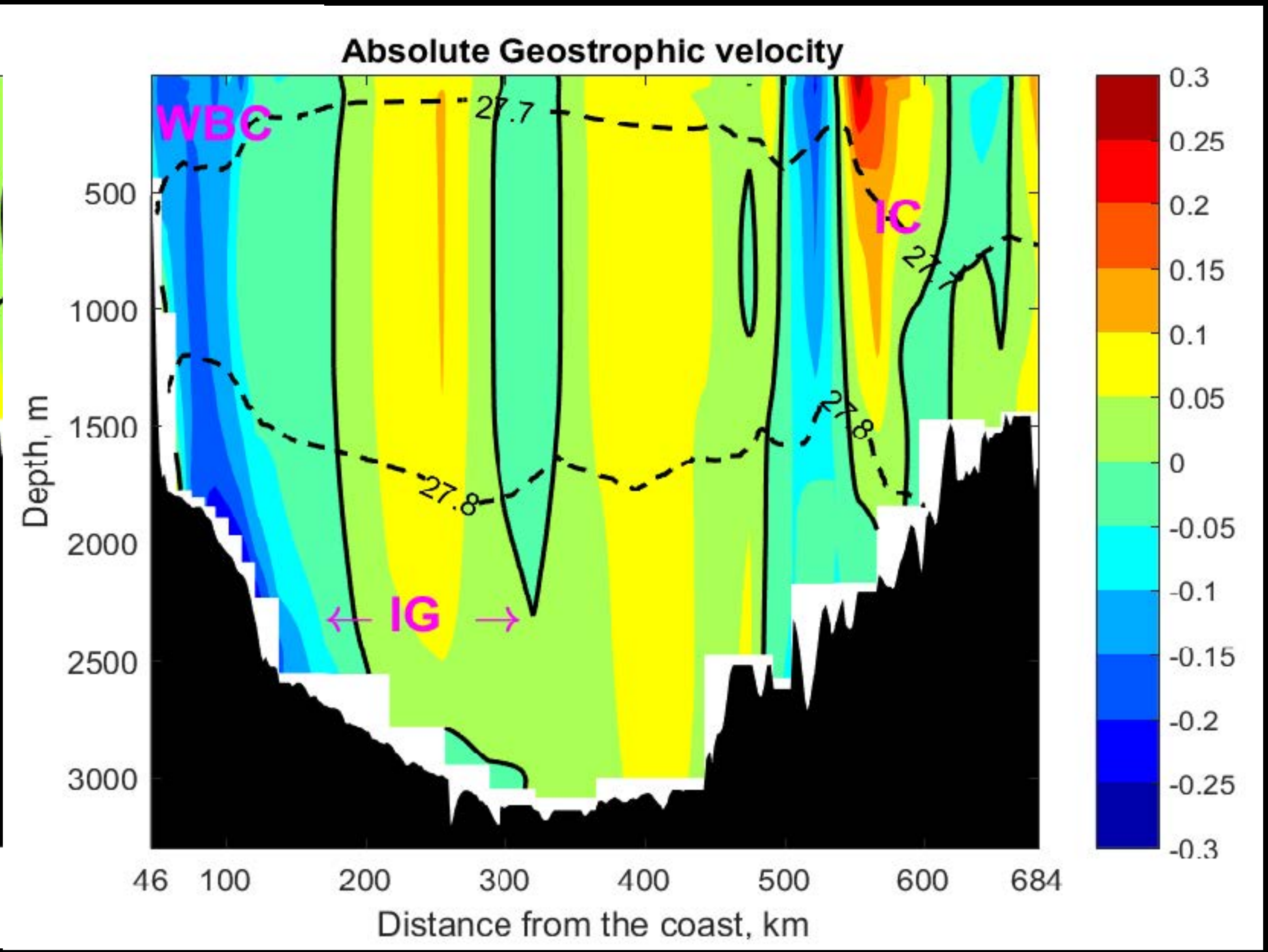

Double Irminger Current core (similar to 2000s)

single Irminger Current core (similar to 1990-1995)

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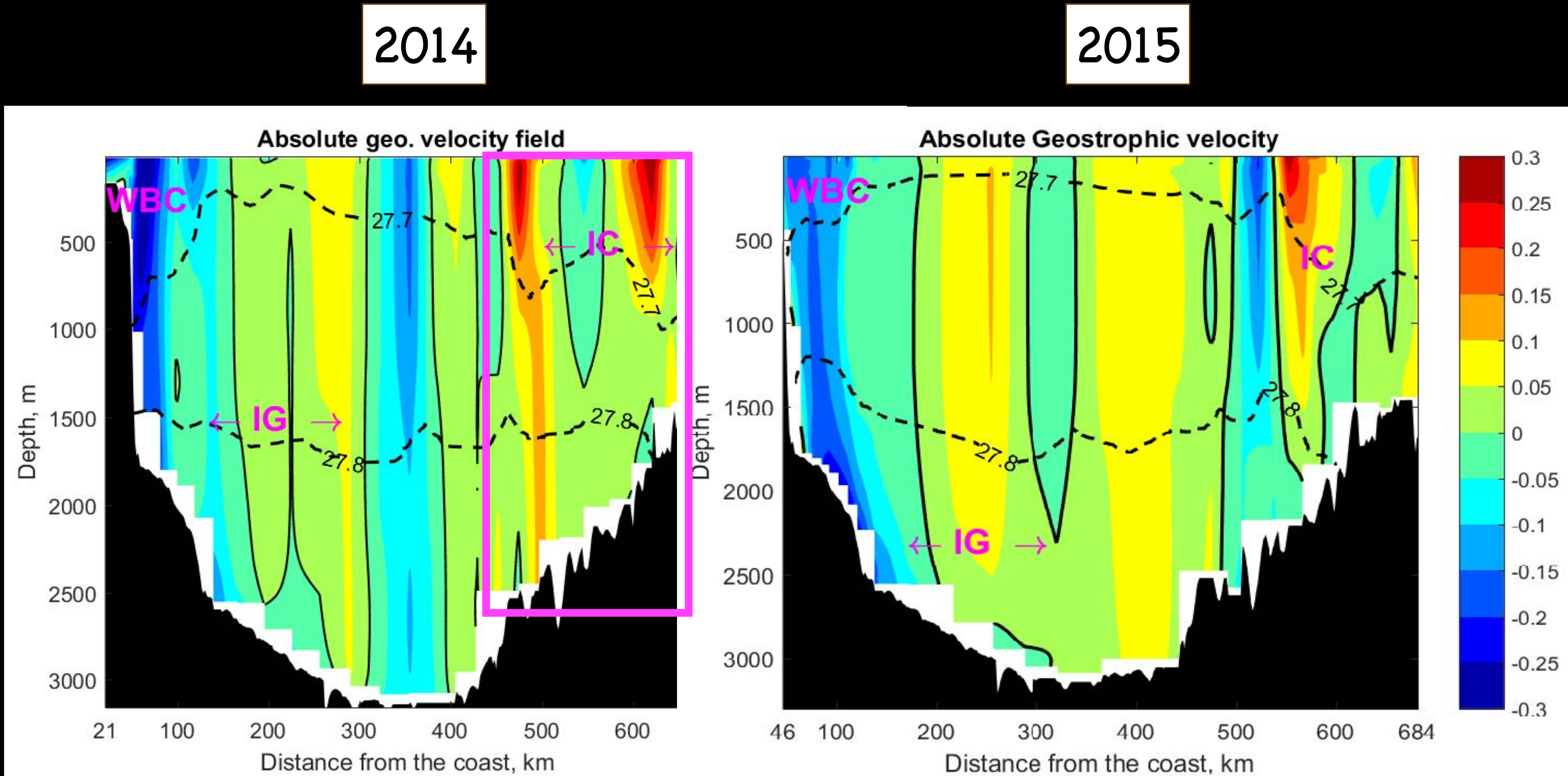

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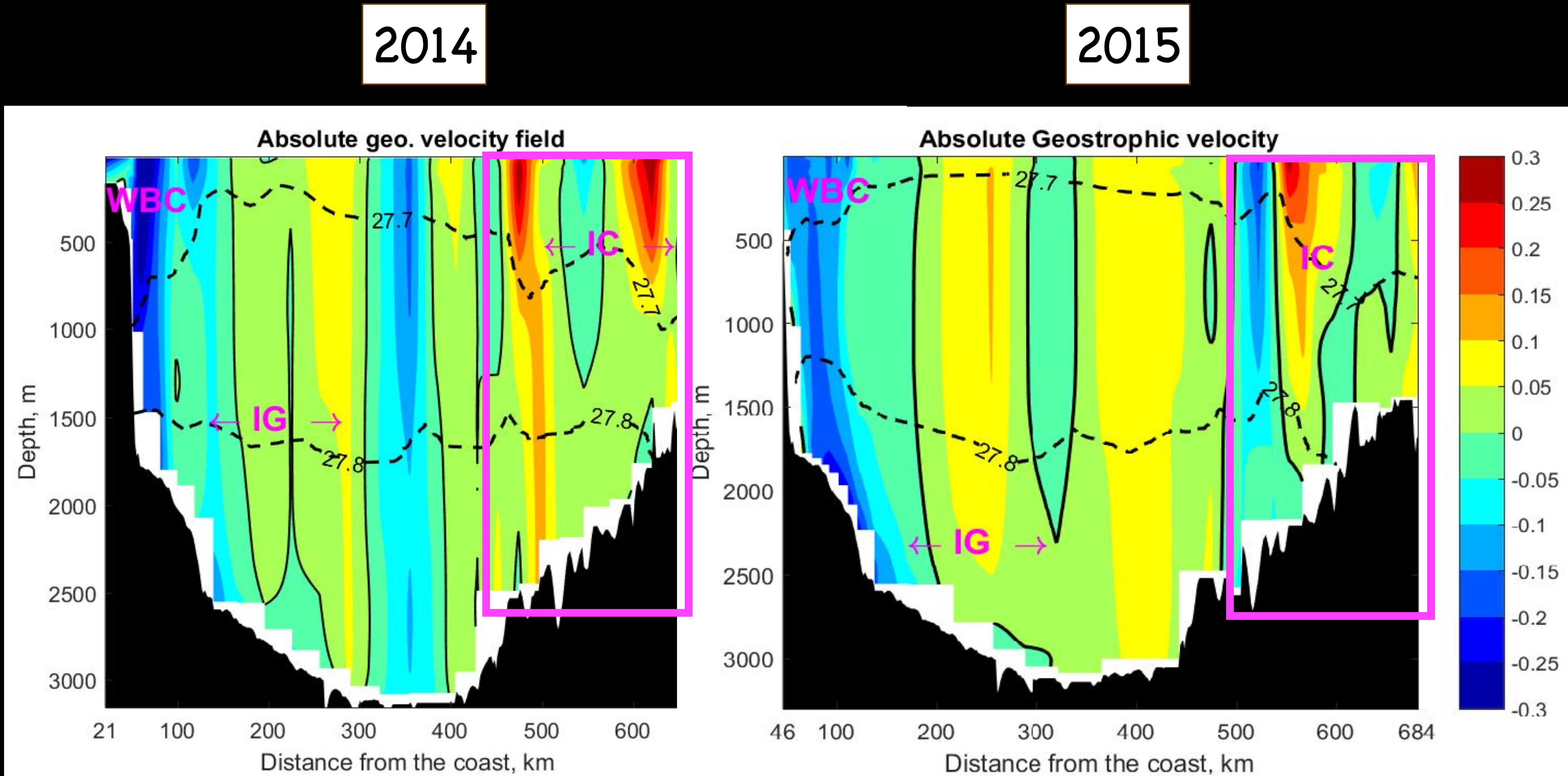

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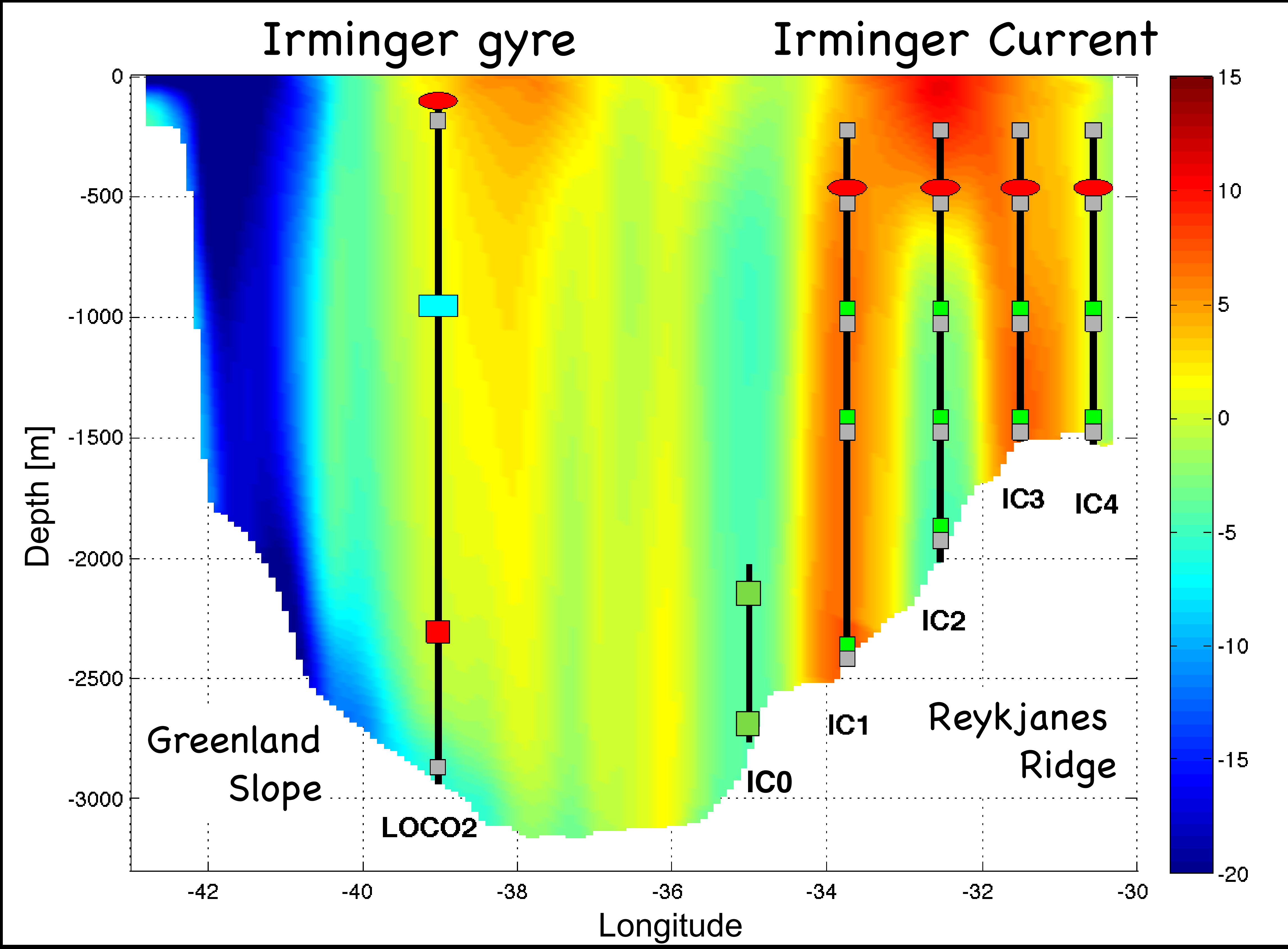

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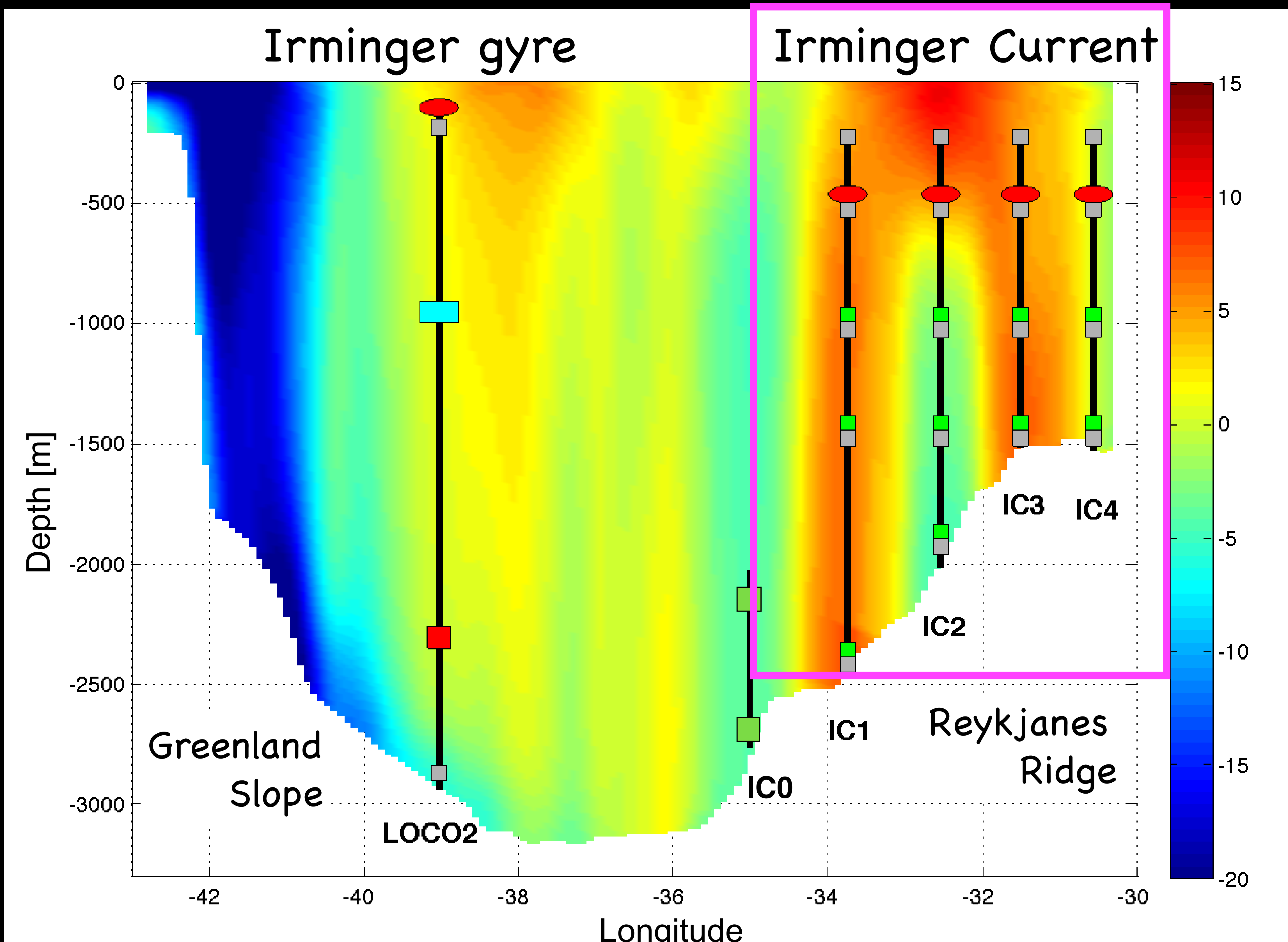

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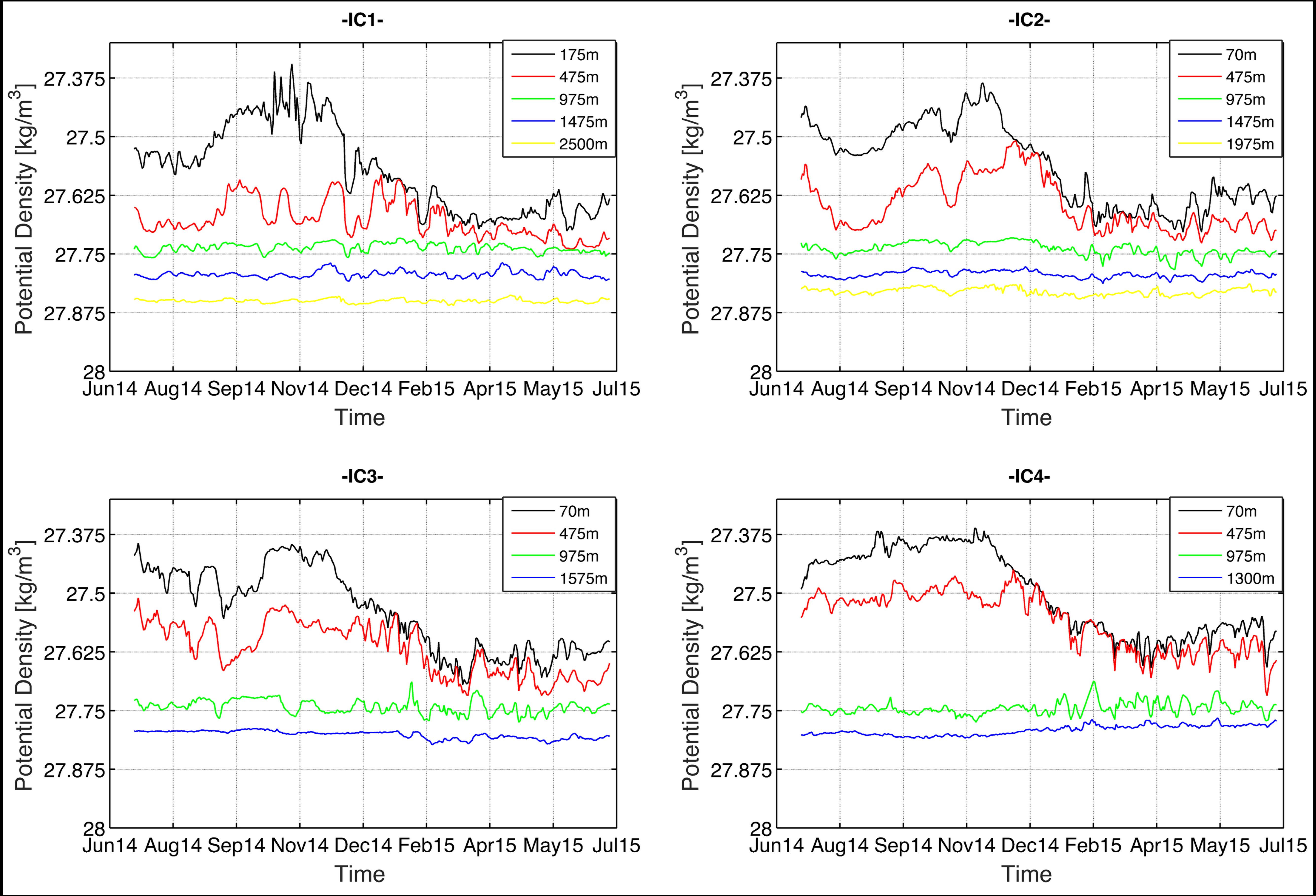
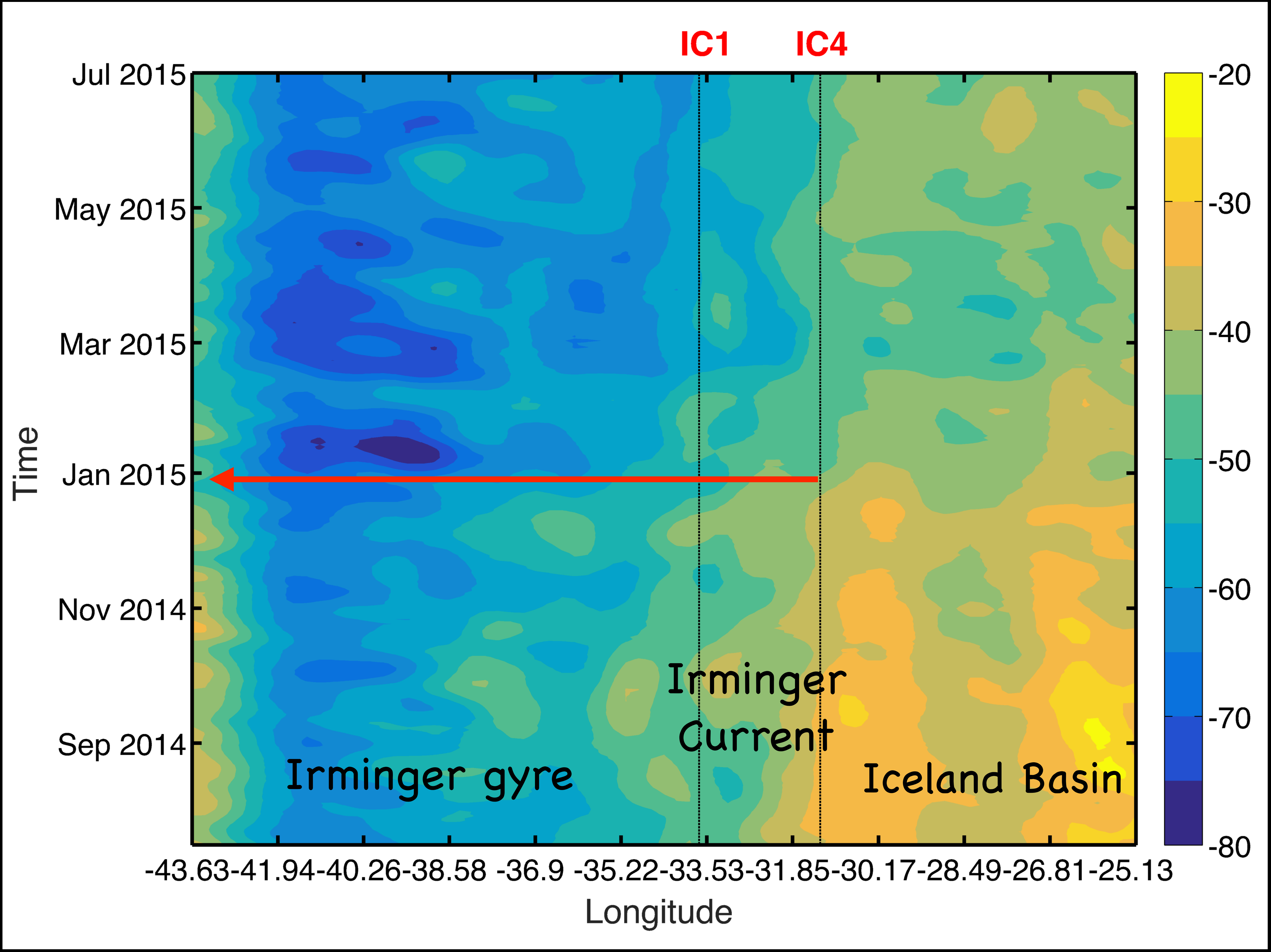
Potential density increase upper ocean Jan 2015

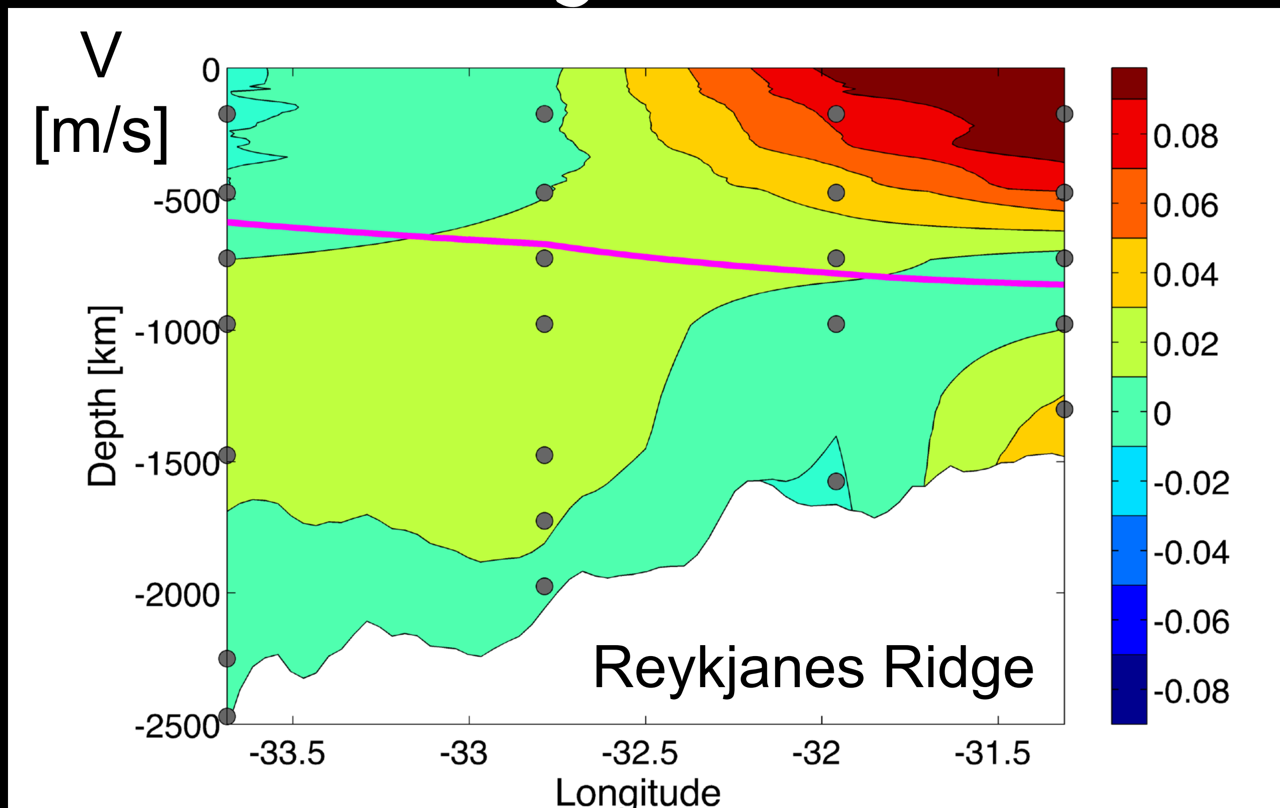


Absolute Dynamic Topography

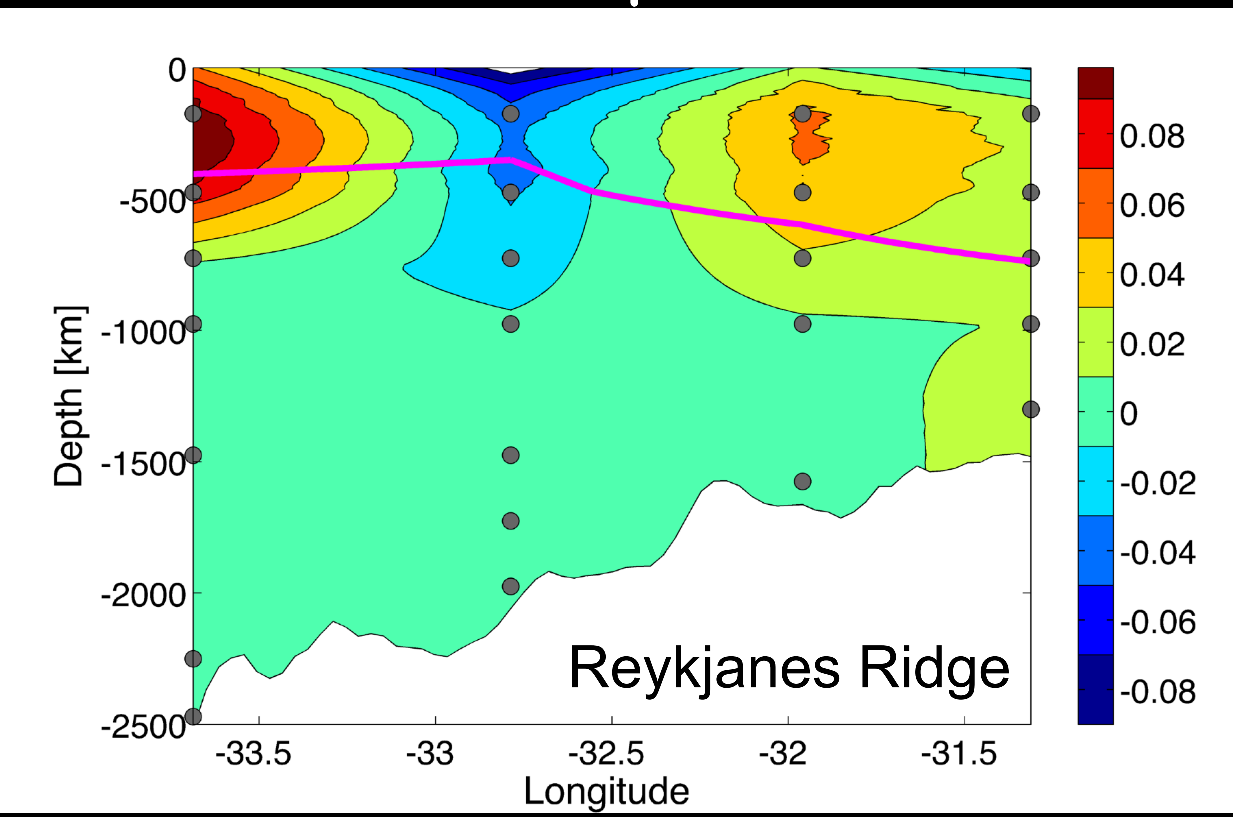


The Irminger Current

Aug-Oct 2014



Feb-Apr 2015



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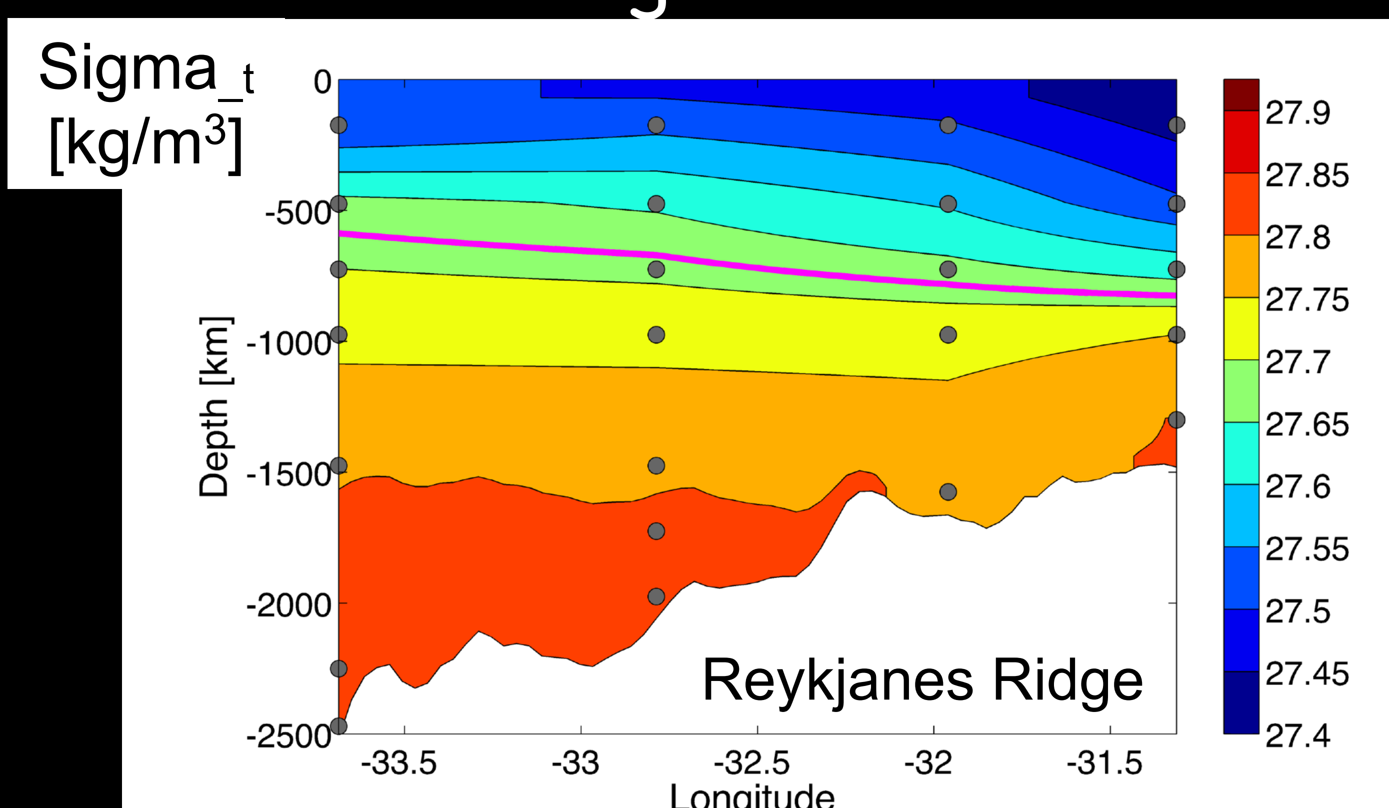

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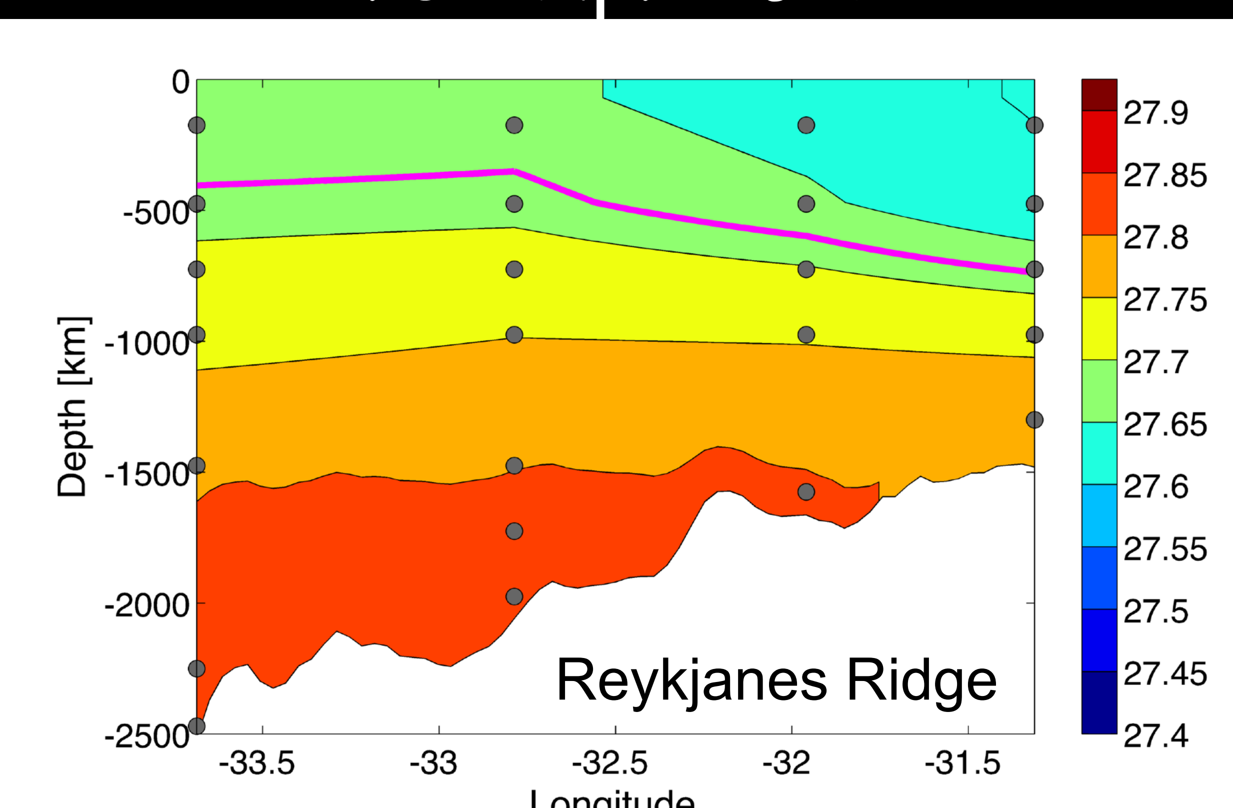

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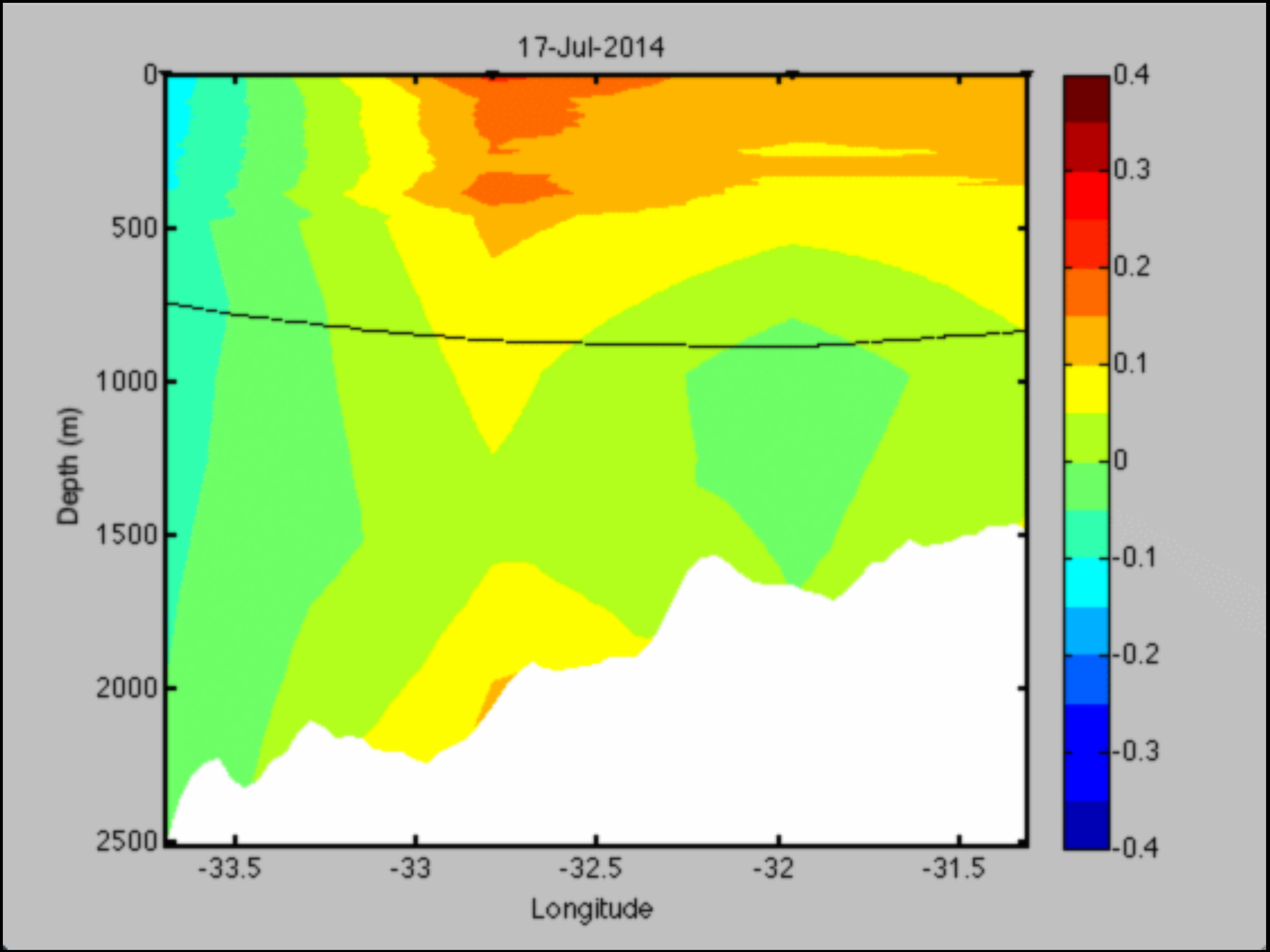

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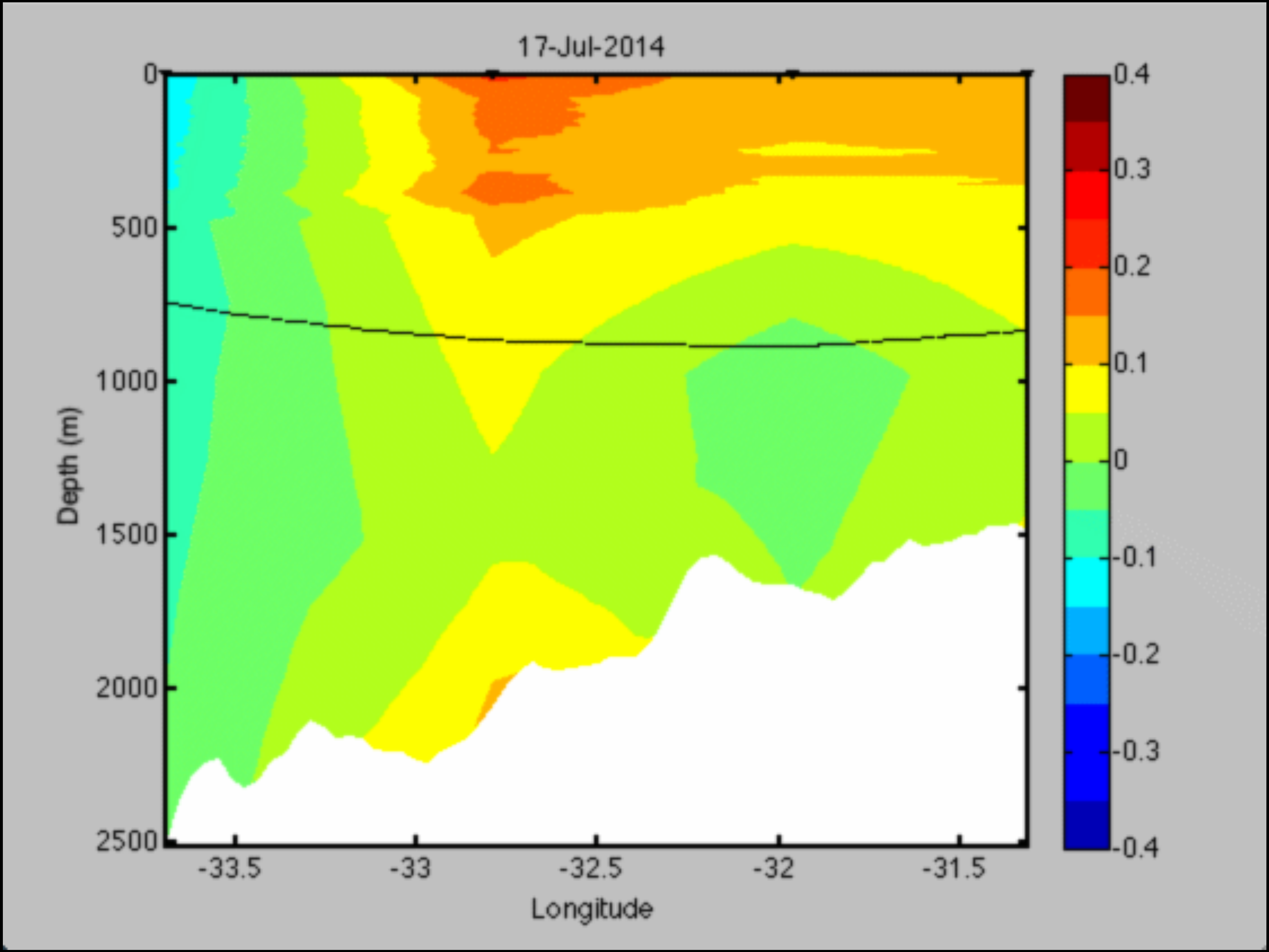
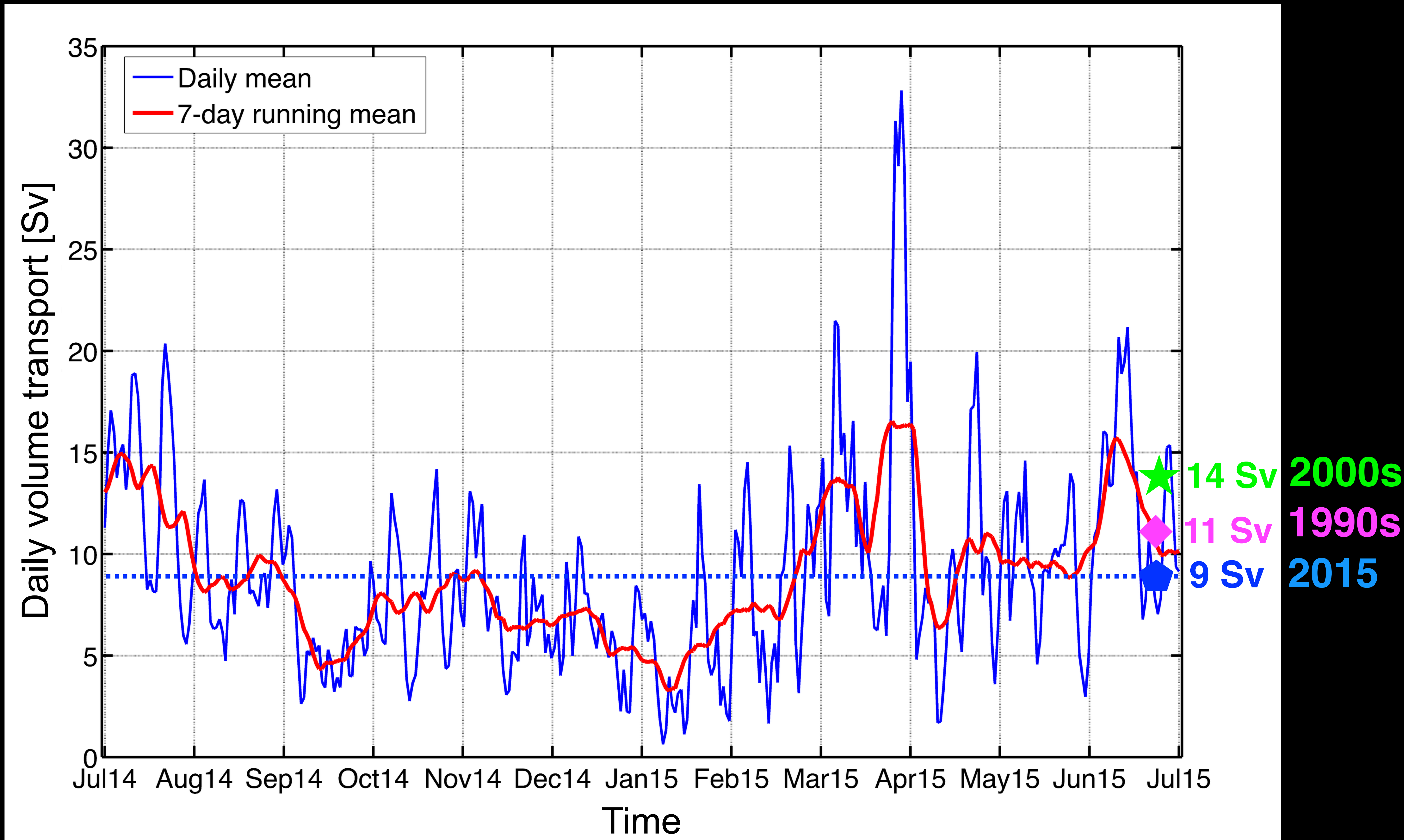


Volume transport Irminger Current 2014-2015



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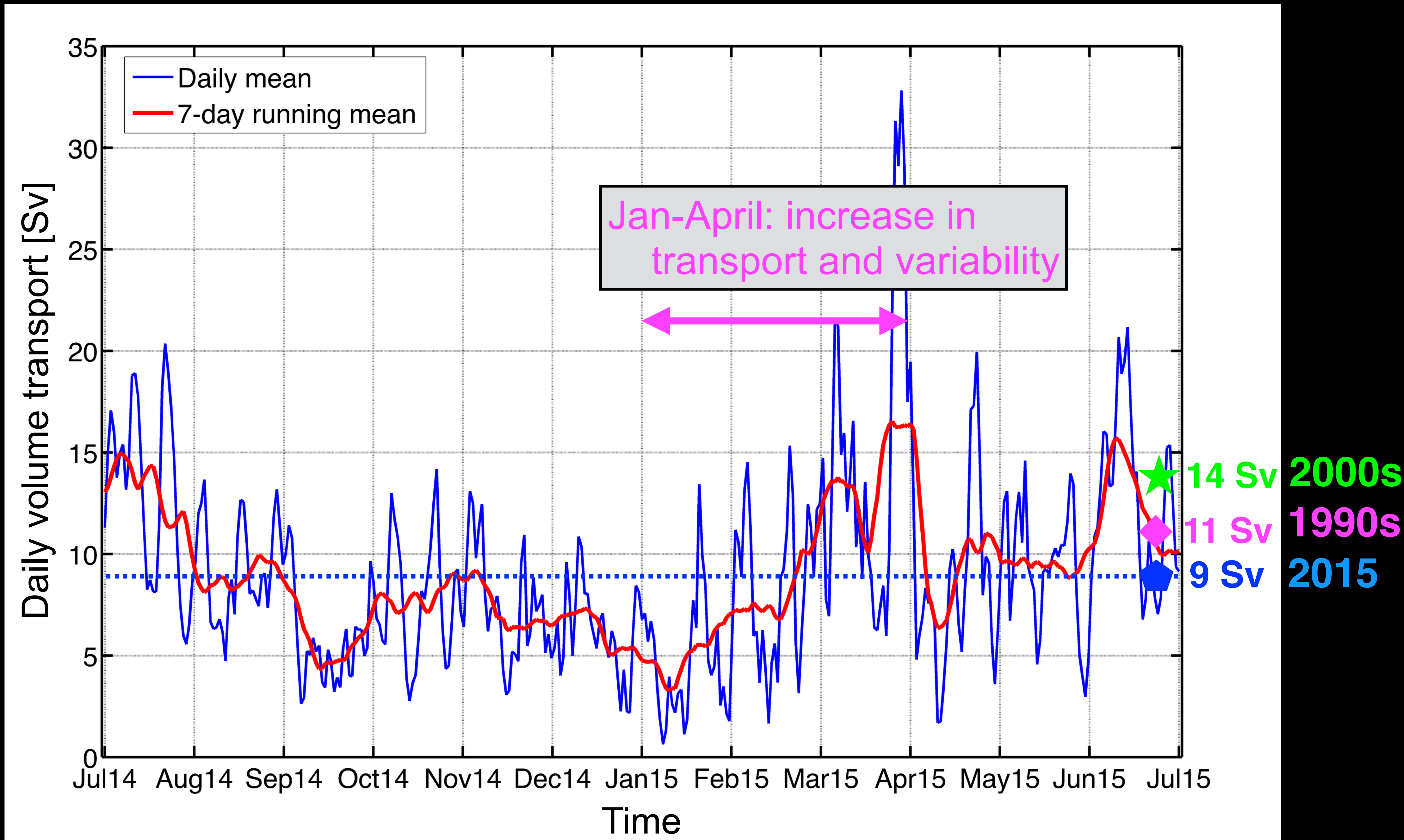

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- The IC displayed a single core in July 2015 similar to the conditions observed in the 1990s
- However, the IC shows very large variability, particularly during winter
- One-year mean transport of IC was 9 Sv, which is lower than earlier estimates from the 90s and 00s

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