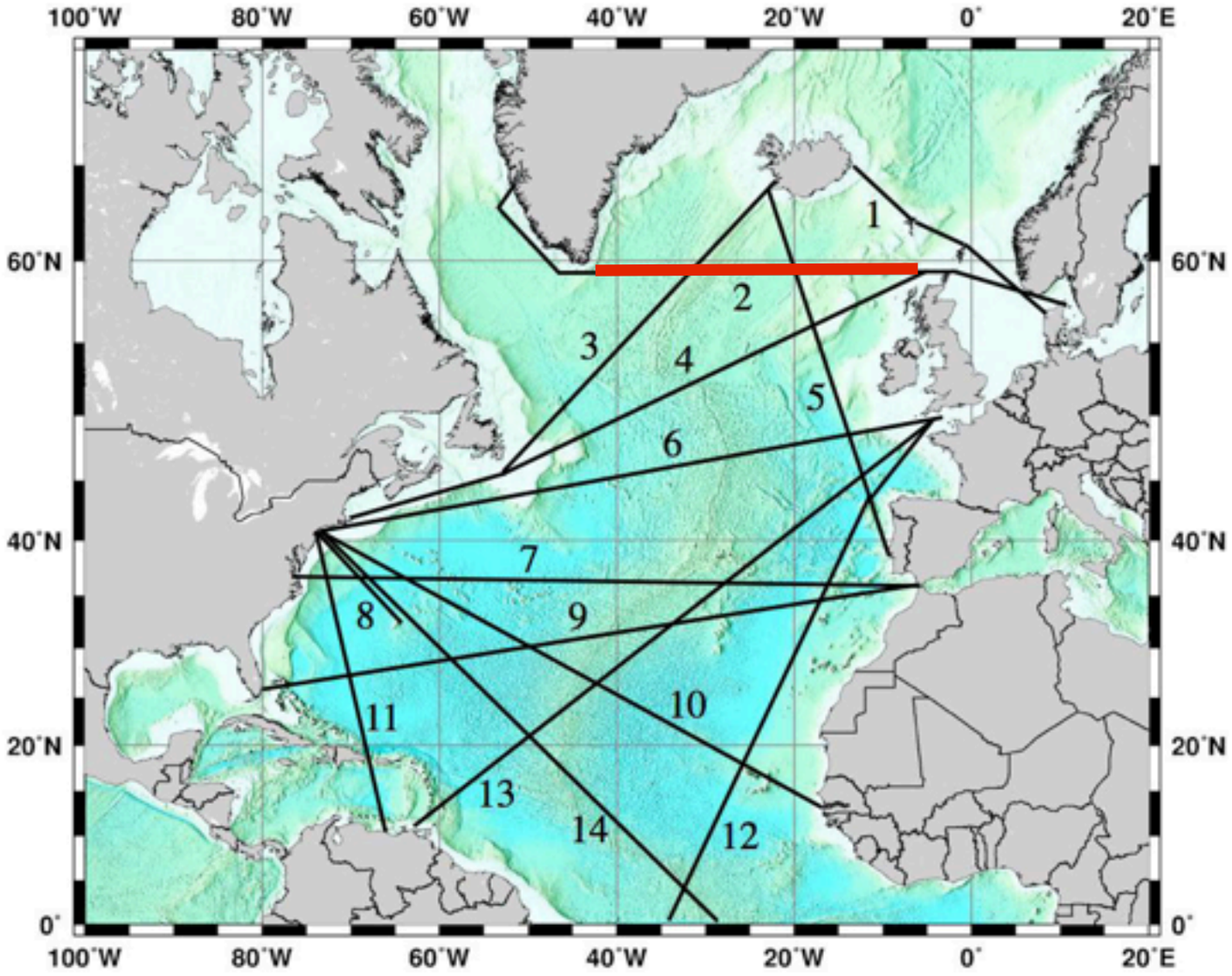
On the spatial and temporal variability of Poleward transport between Scotland and Greenland

Léon Chafik, *T. Rosssby & C. Schrum*

Submitted to JGR

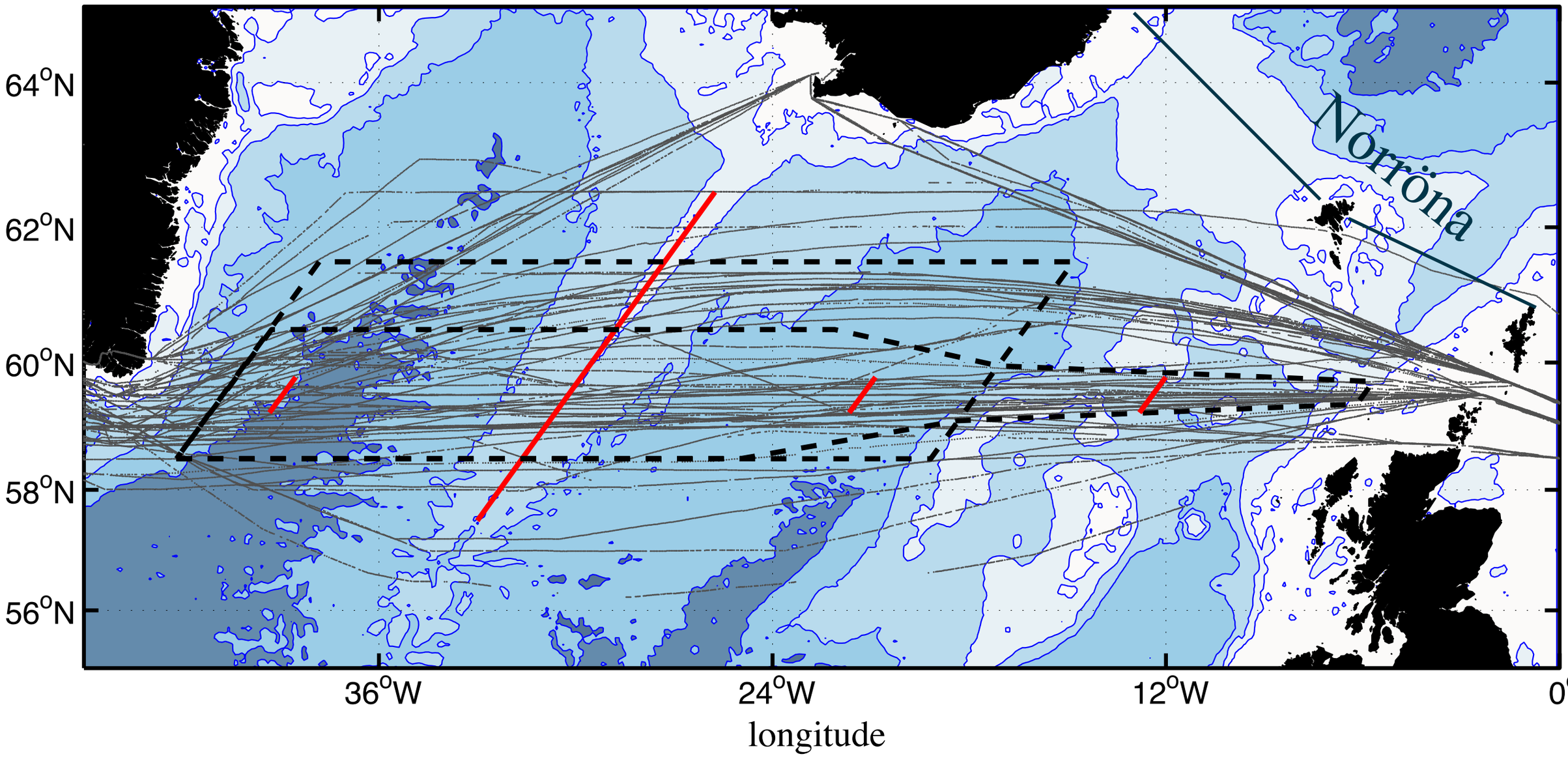


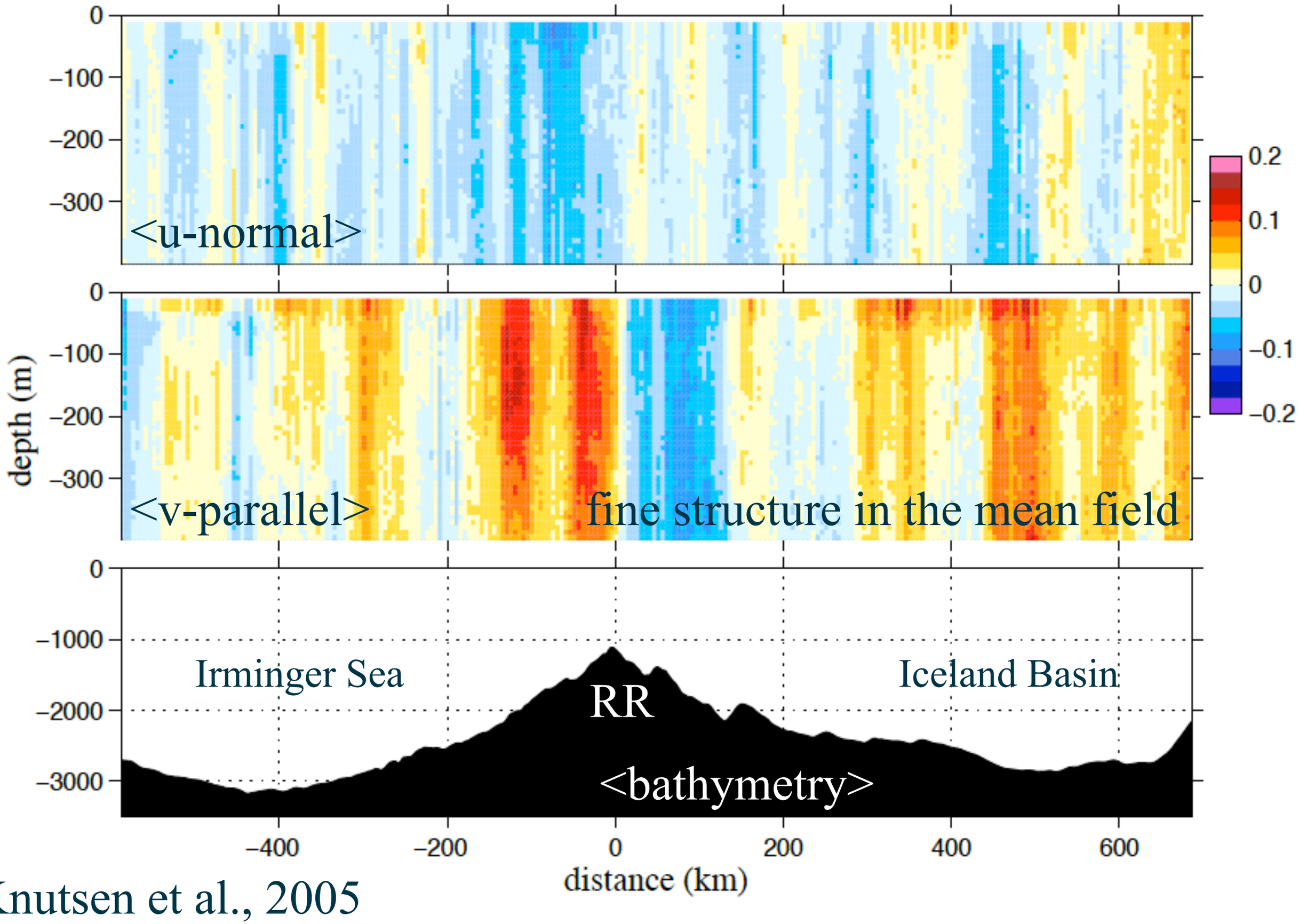
Nuka Arctica

1999-2002
150 kHz
400m
21 days

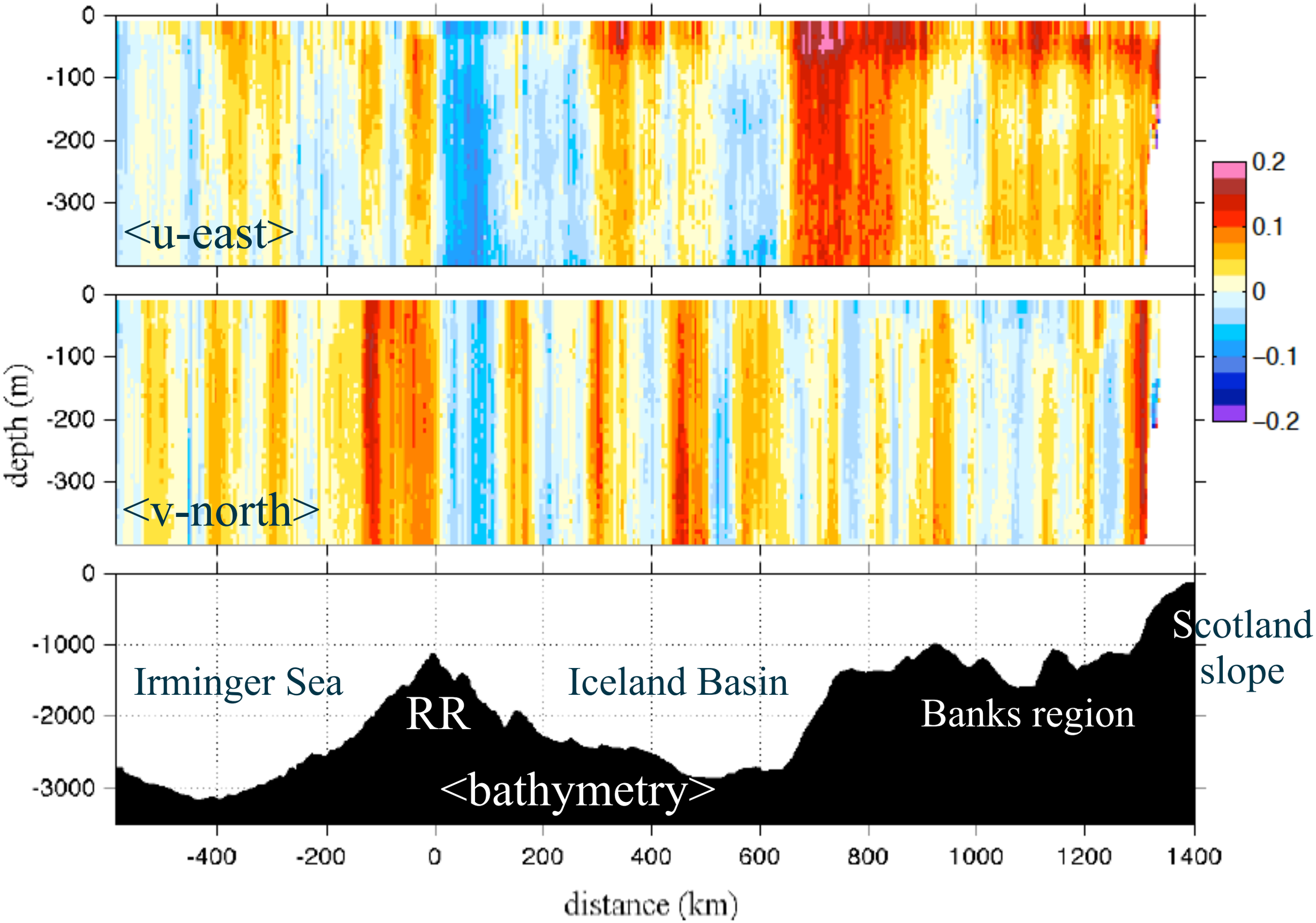
~40 sections big box
~20 in zonal band

Next 2 slides: <u>, <v> for big box and zonal band



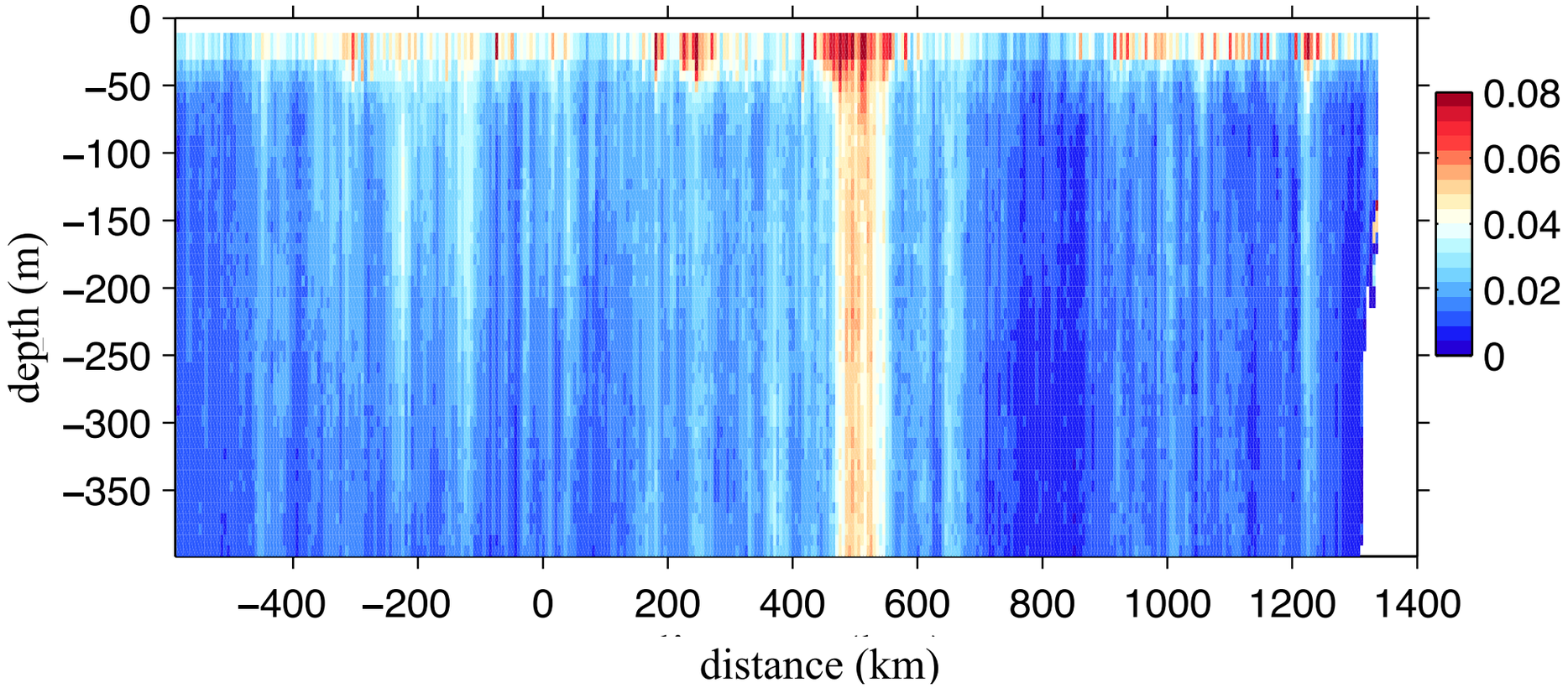


Knutsen et al., 2005


0
-100
-200
-300
<u-east>
0
-100
-200
-300
<v-north>
depth (m)
0.2
0.1
0
−0.1
−0.2
0
-1000
-2000
-3000
Irminger Sea
RR
Iceland Basin
Banks region
Scotland slope
<bathymetry>
-400
-200
0
200
400
600
800
1000
1200
1400
distance (km)

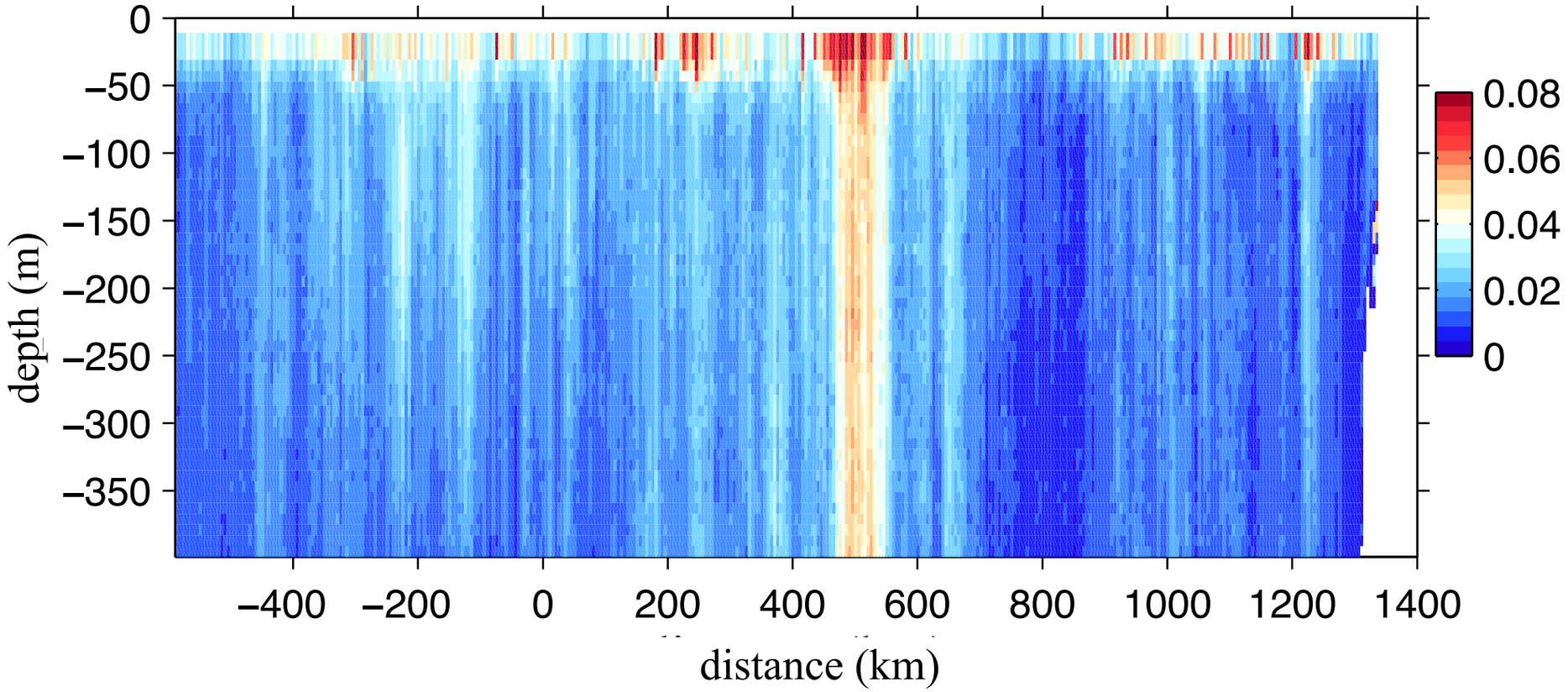
<EKE>

<ADCP>


0
−50
−100
−150
−200
−250
−300
−350
depth (m)
−400
−200
0
200
400
600
800
1000
1200
1400
distance (km)
0.08
0.06
0.04
0.02
0

<EKE>

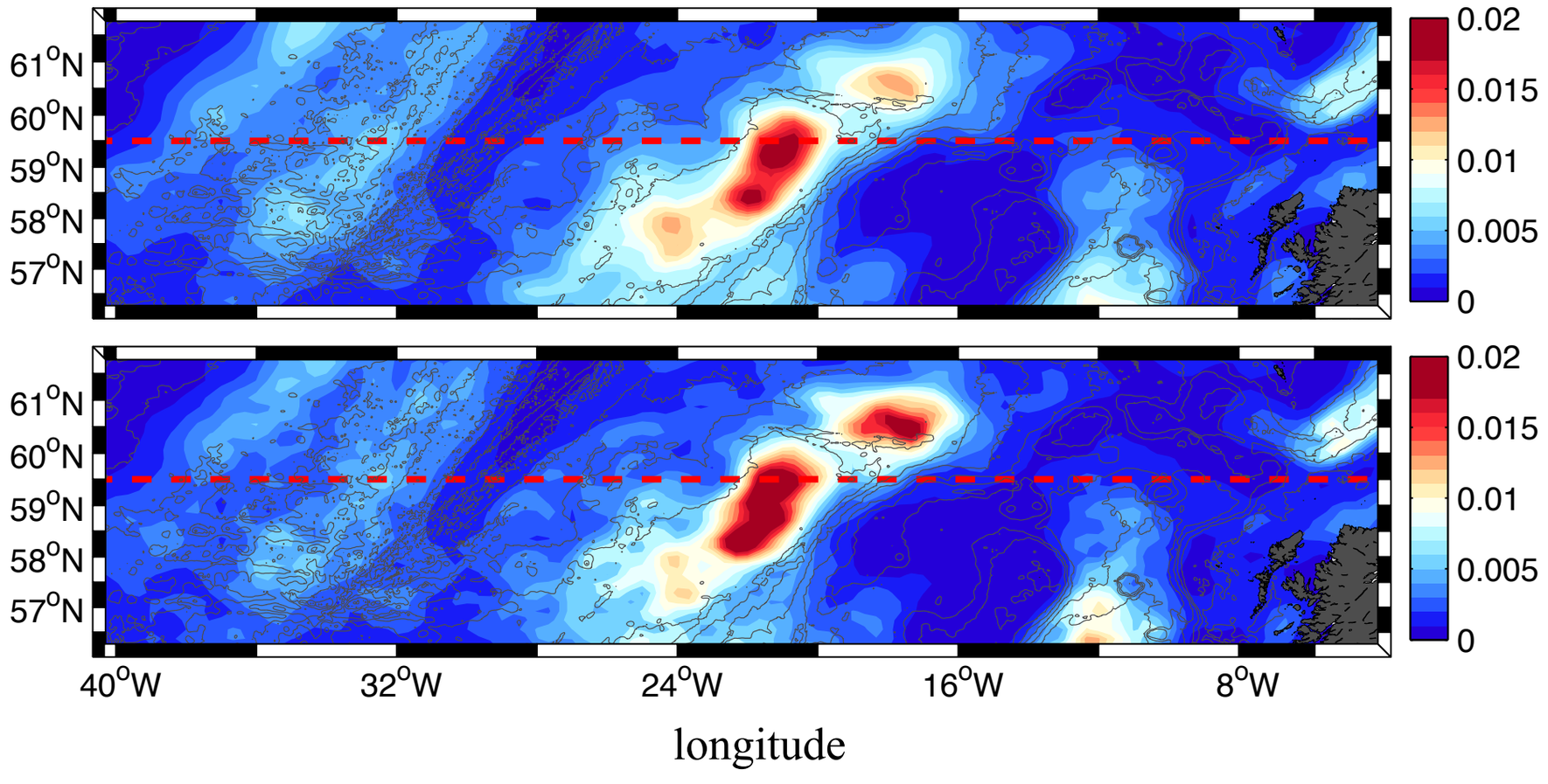
<ADCP>



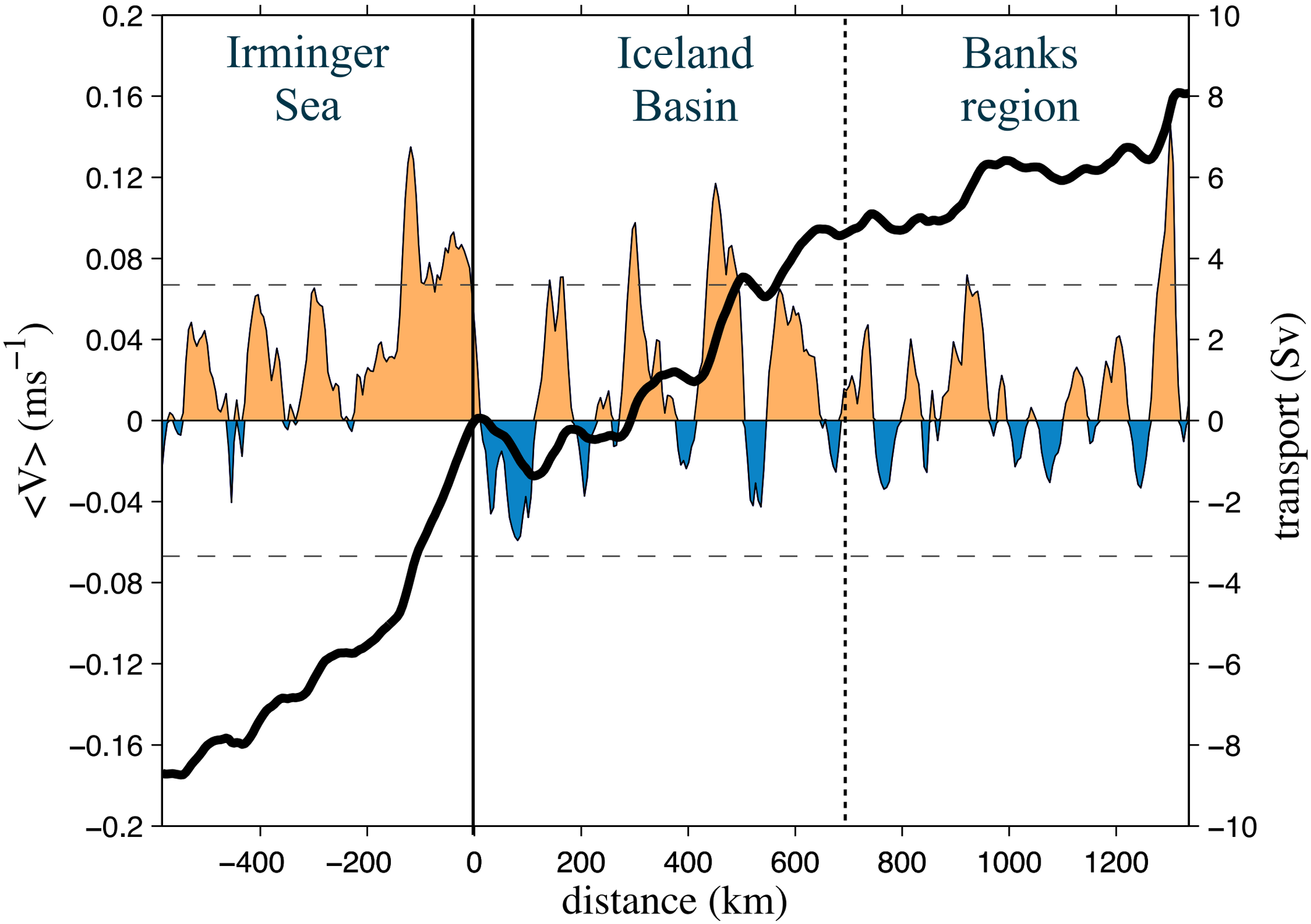
<SSH>

1992-2010

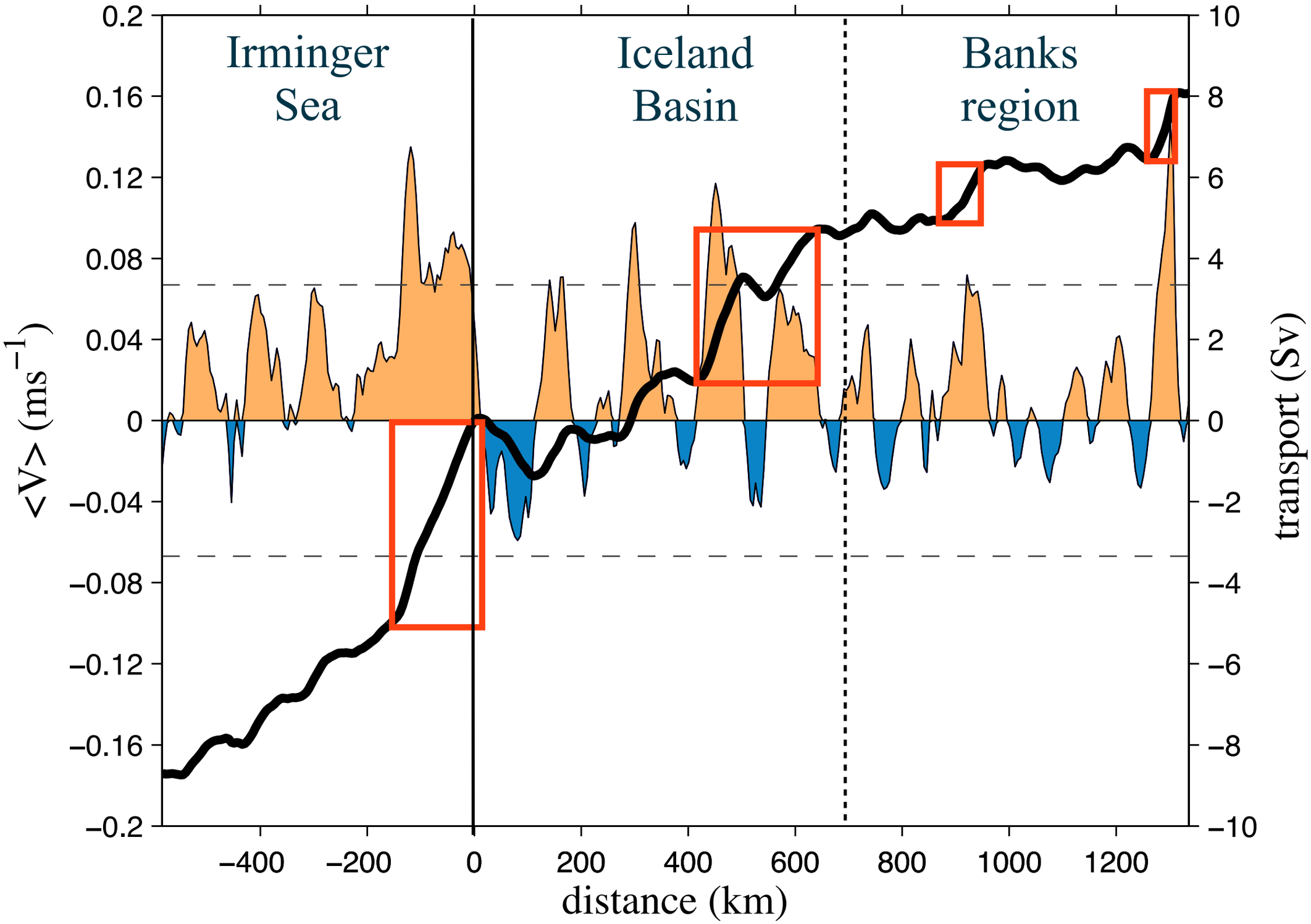
1999-2002



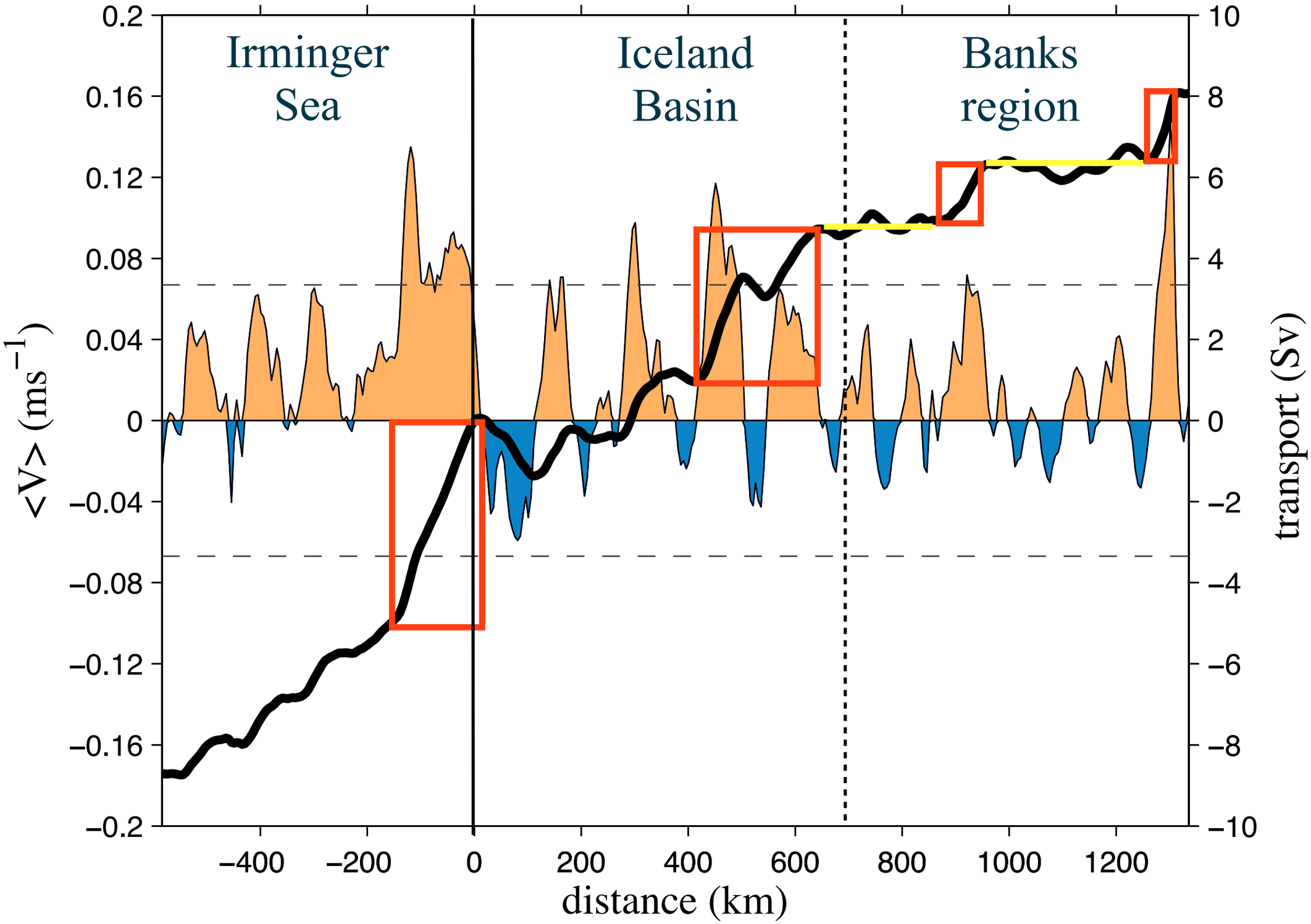
ADCP estimate of transport relative to RR. ~20 DoF



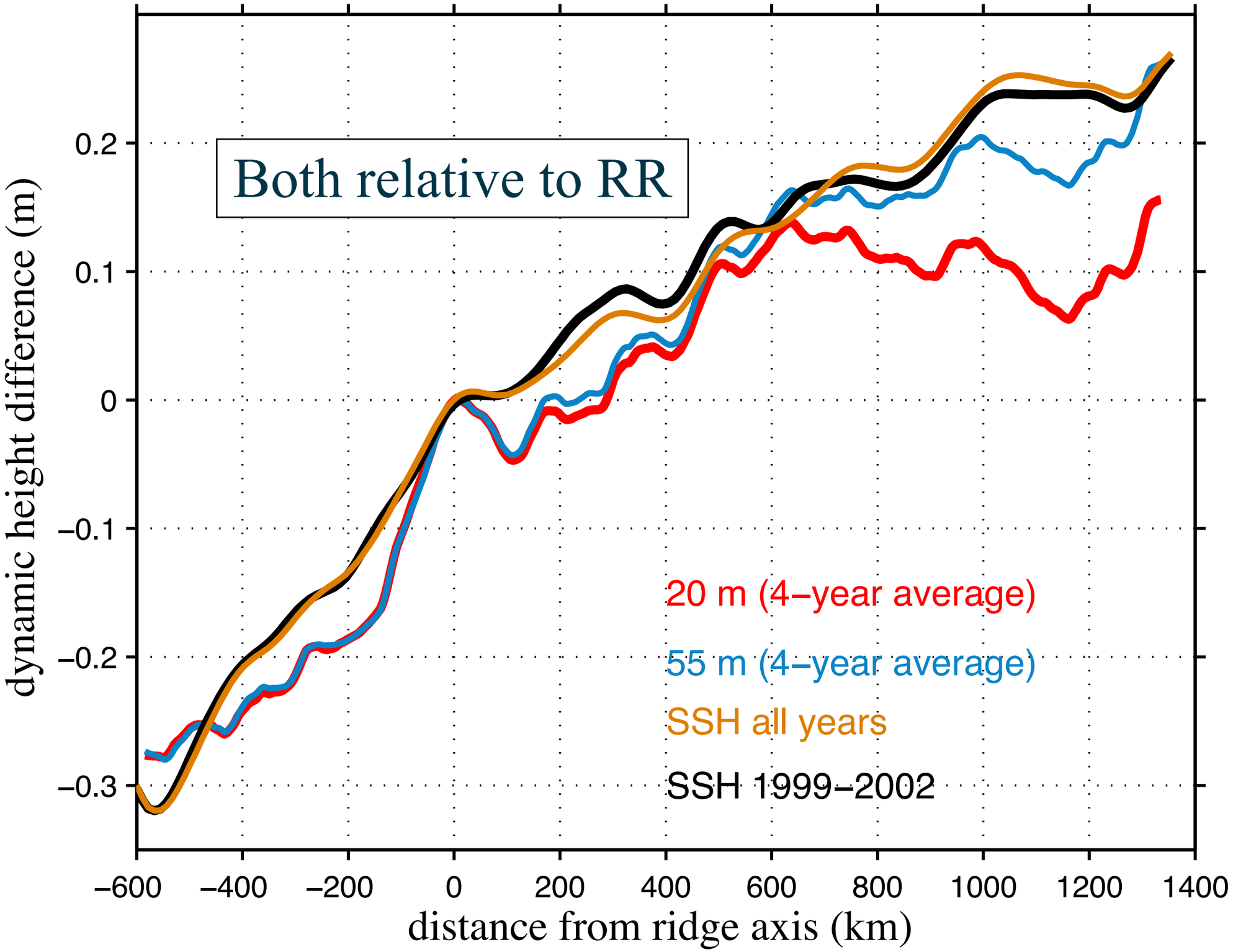
ADCP estimate of transport relative to RR. ~20 DoF



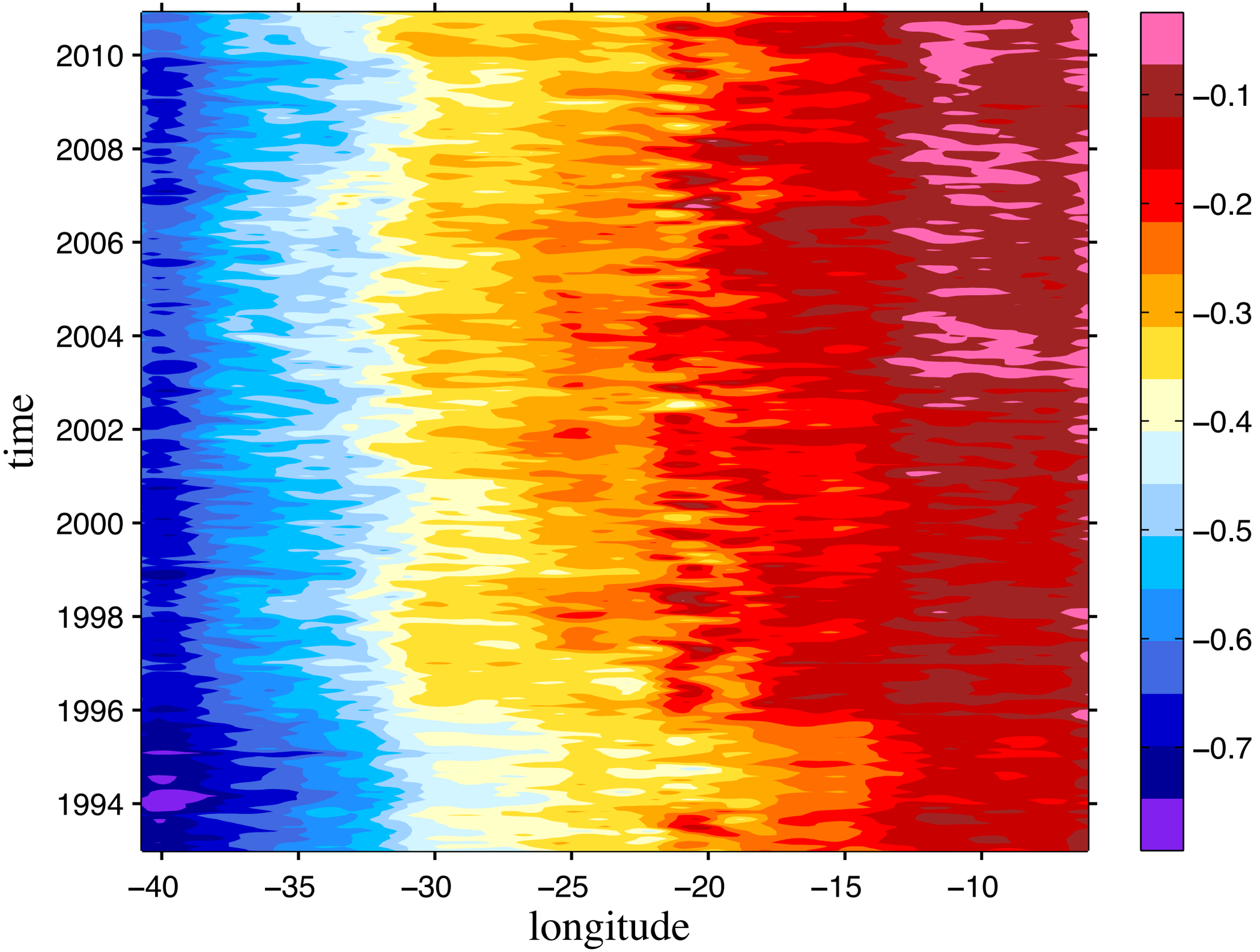
ADCP estimate of transport relative to RR. ~20 DoF



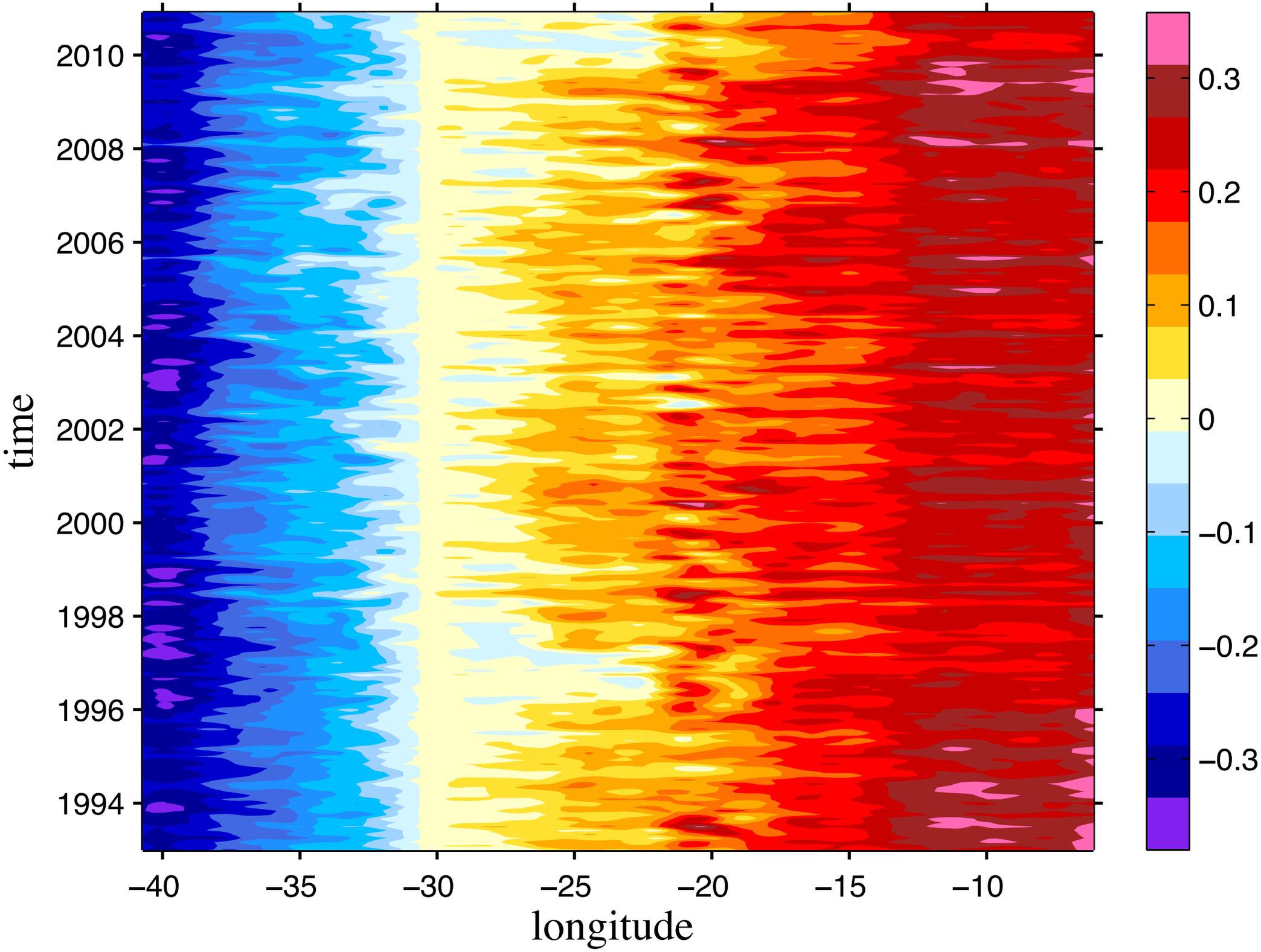
Comparison of dynamic height from ADCP and altimetry

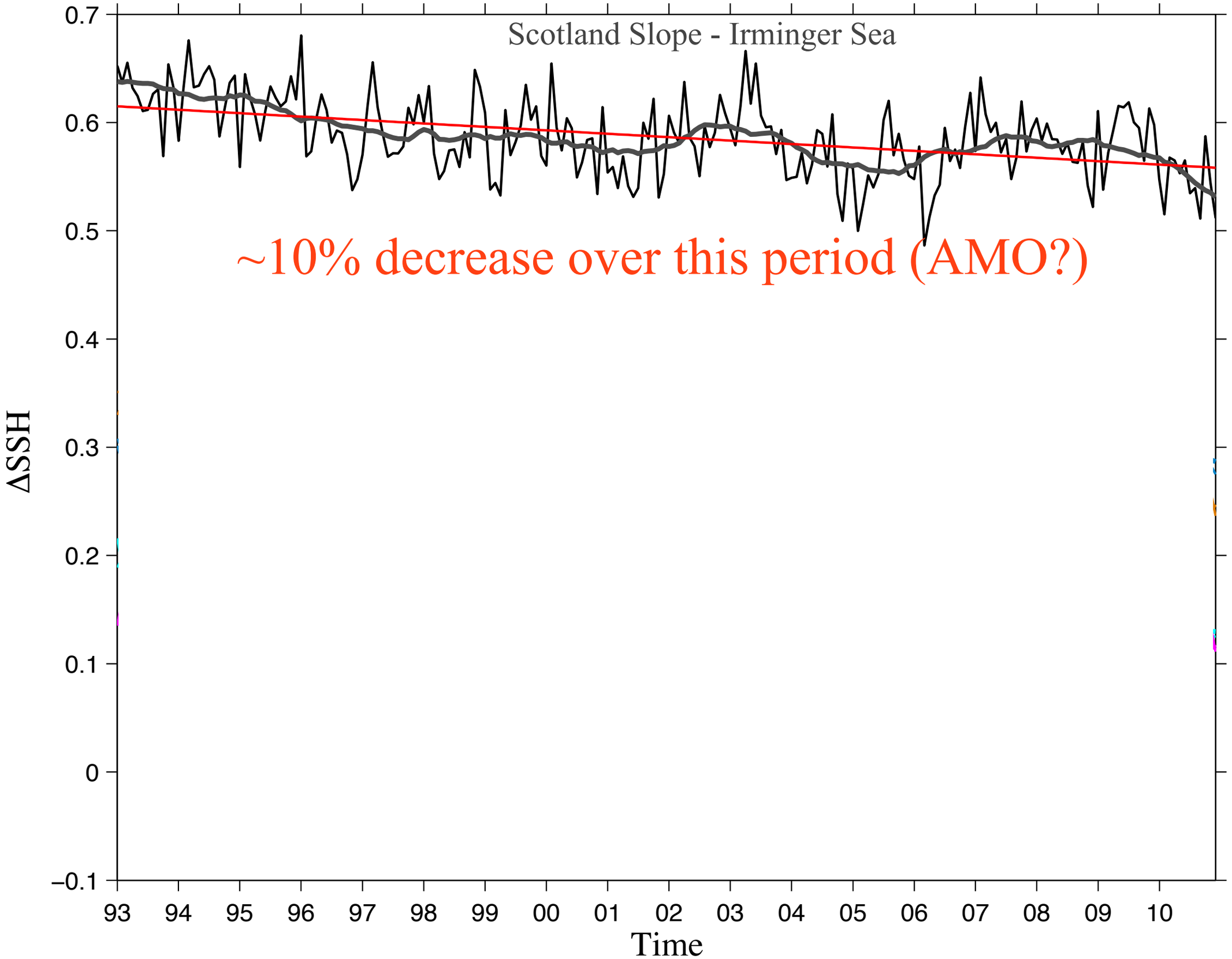


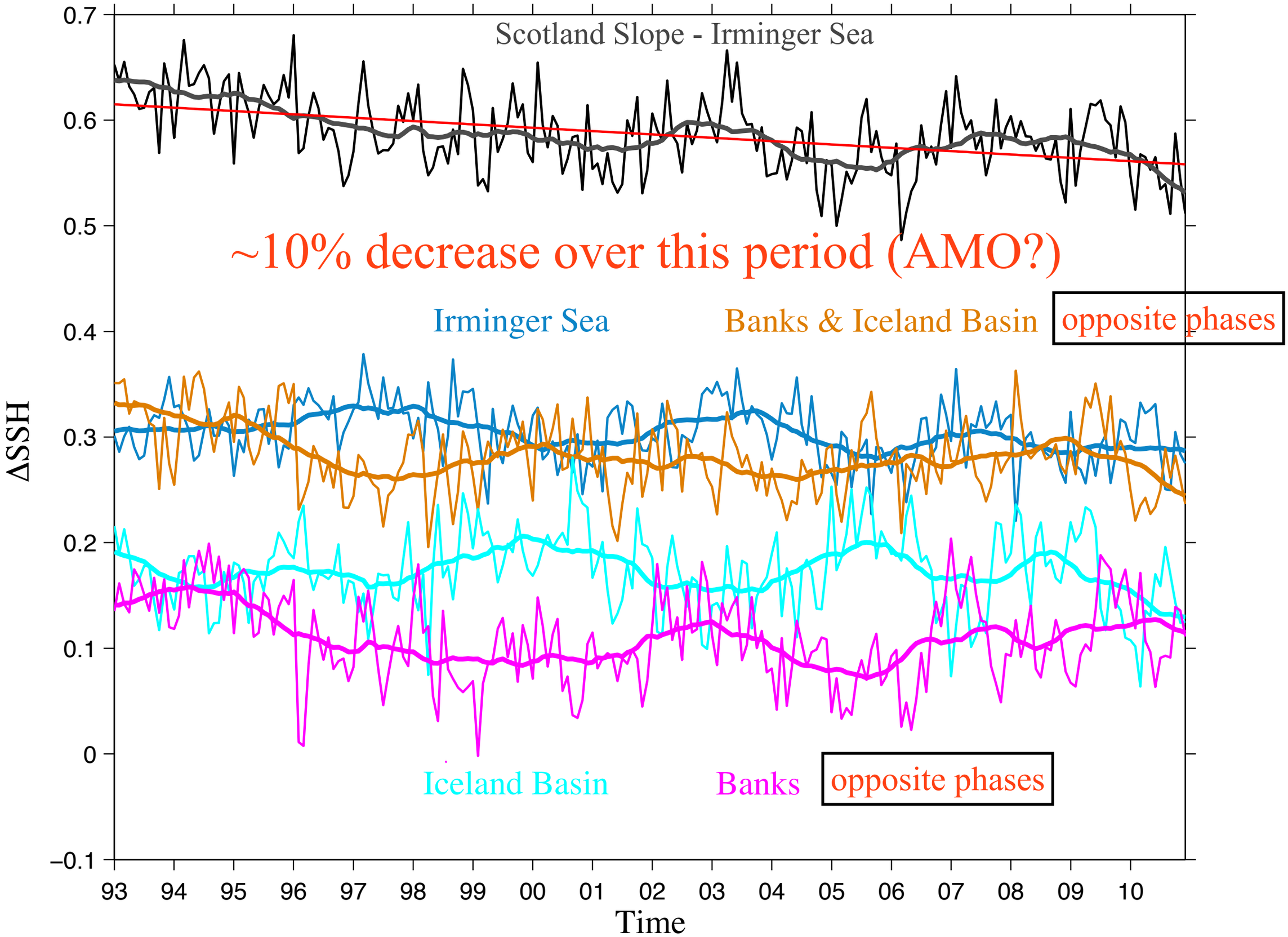
Hovmöller diagram of SSH in zonal band



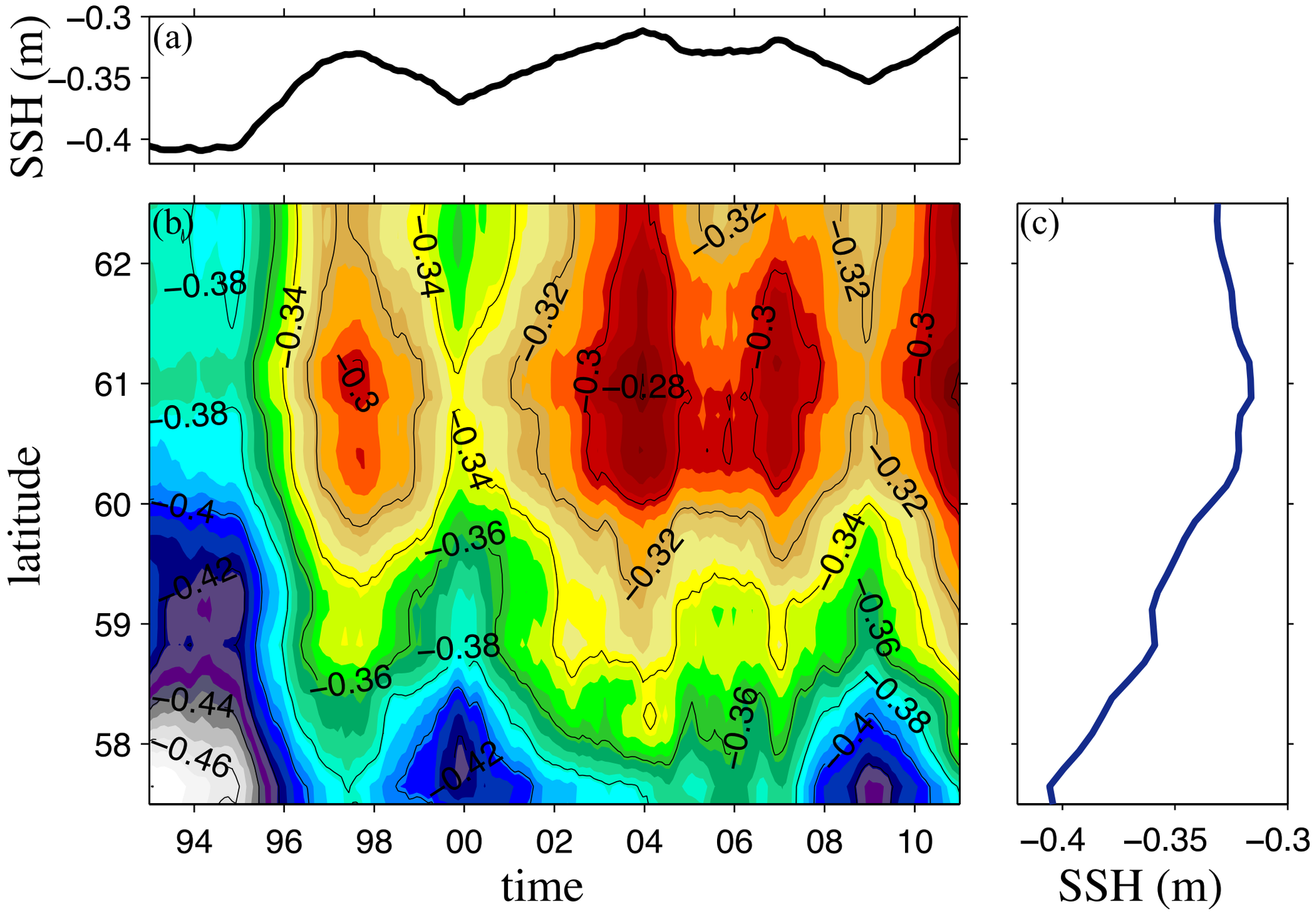
Same SSH, but now relative to RR




Scotland Slope - Irminger Sea
~10% decrease over this period (AMO?)
ΔSSH
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
−0.1
93
94
95
96
97
98
99
00
01
02
03
04
05
06
07
08
09
10
Time


Scotland Slope - Irminger Sea
~10% decrease over this period (AMO?)
Irminger Sea
Banks & Iceland Basin
opposite phases
Iceland Basin
Banks
opposite phases
ΔSSH
Time
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
−0.1
93
94
95
96
97
98
99
00
01
02
03
04
05
06
07
08
09
10

Hovmöller diagram of SSH along the RR-crest illustrating the very strong constraint imposed by the ridge



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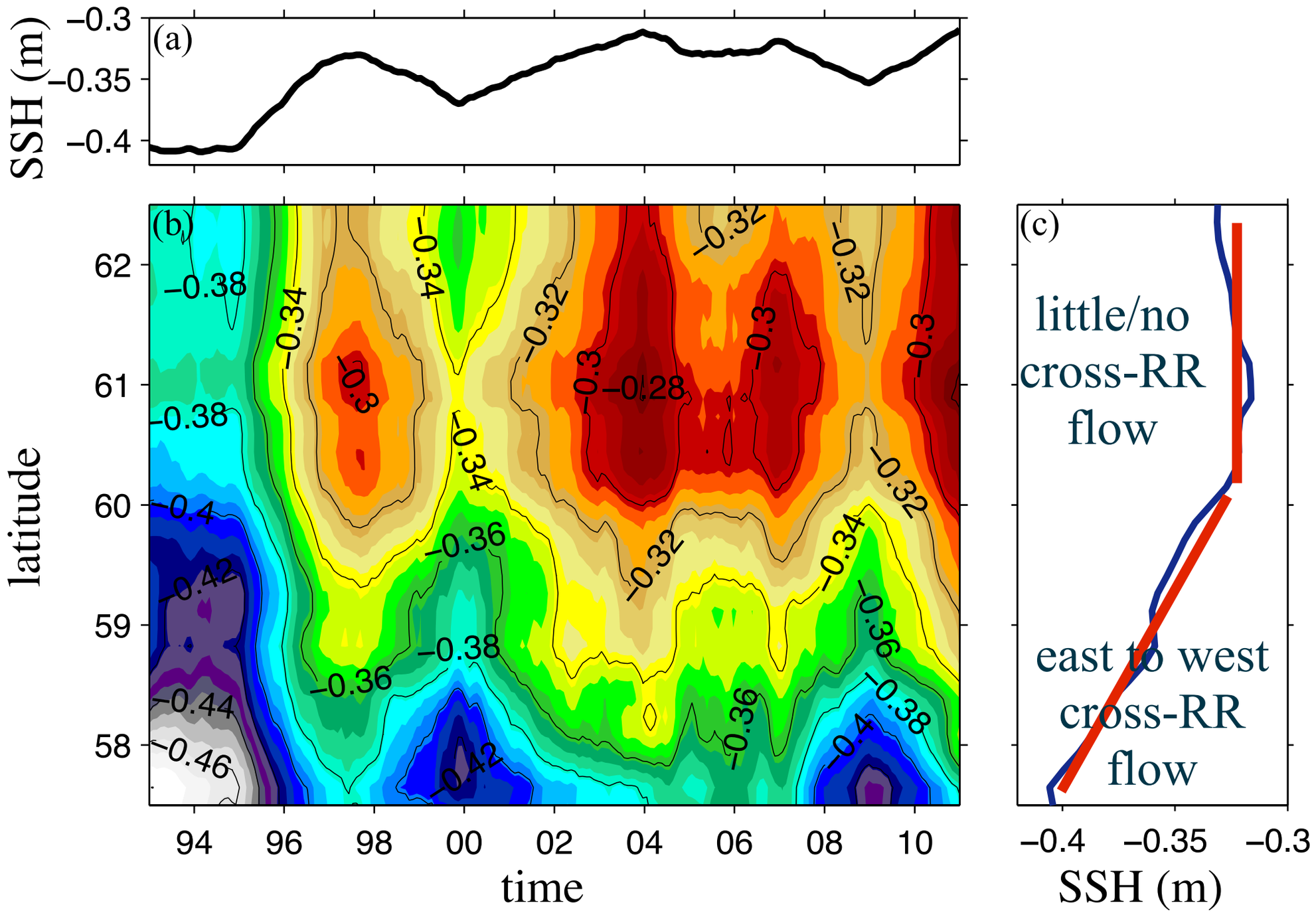
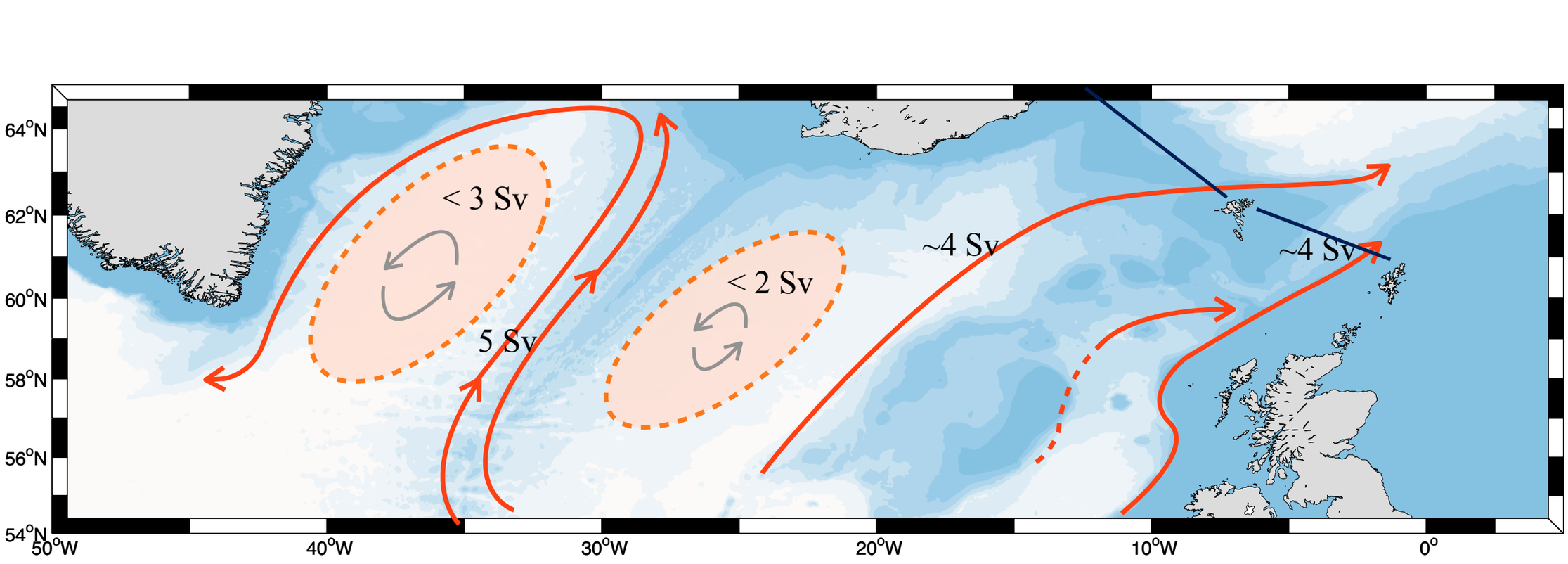


To summarize transport in top 400 m:

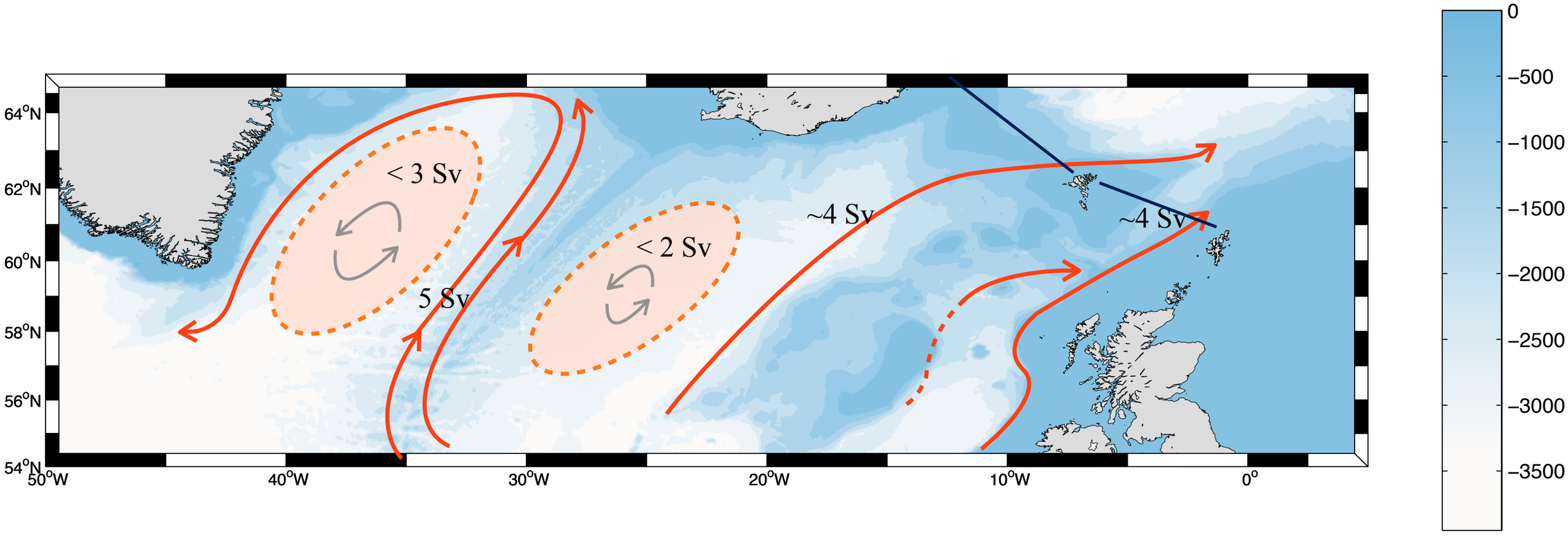
Roughly equal flow toward Nordic and Labrador Seas
The Nordic Sea flow consistent with Norröna measurements



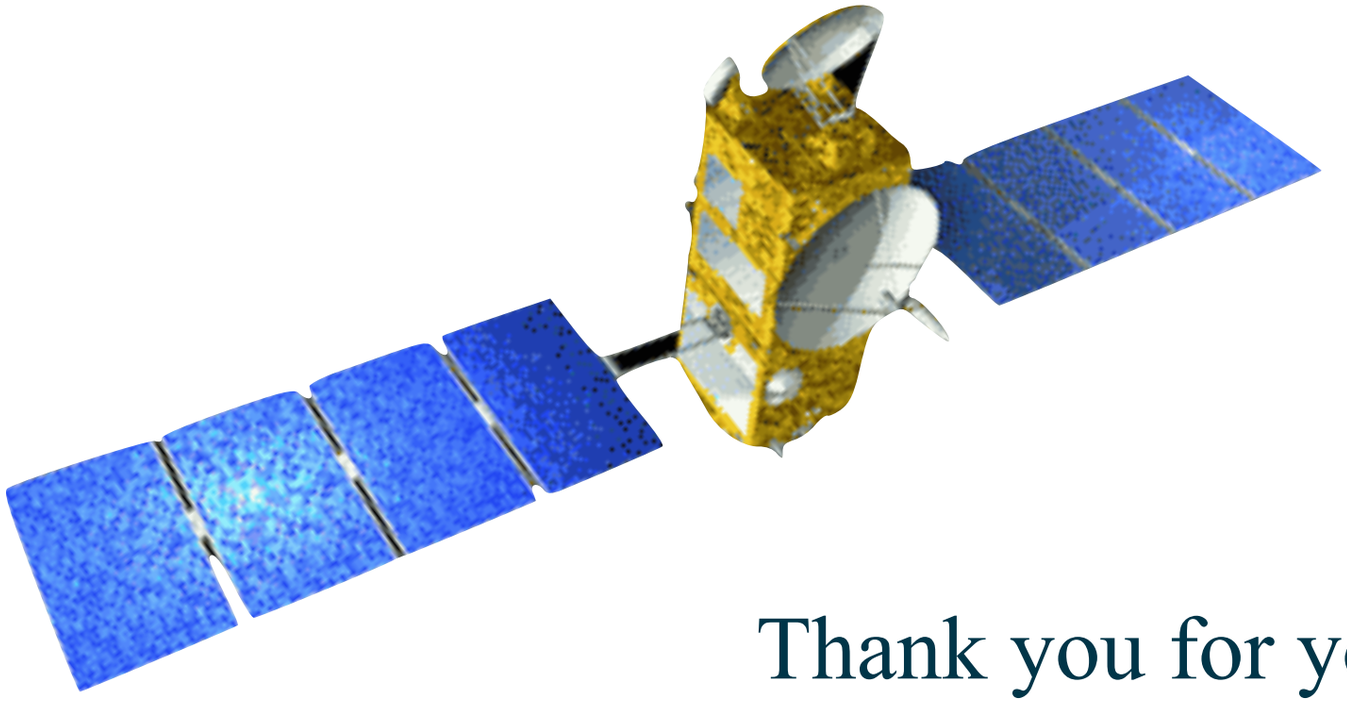
Importance of topography cannot be exaggerated, RR an extraordinary dynamical barrier, and Banks region acts like a labyrinth.

To summarize transport in top 400 m:

Roughly equal flow toward Nordic and Labrador Seas
The Nordic Sea flow consistent with Norröna measurements



Labrador Sea water crosses RR south, not north of Nuka Arctica line
Possible weak cyclonic recirculation in both IS and IB



Thank you for your attention!

We want to thank the Royal Arctic Line for their continued interest in and support of sustained observation of the marine environment.
The ADCP program has been restarted, now with 75 kHz ADCP.