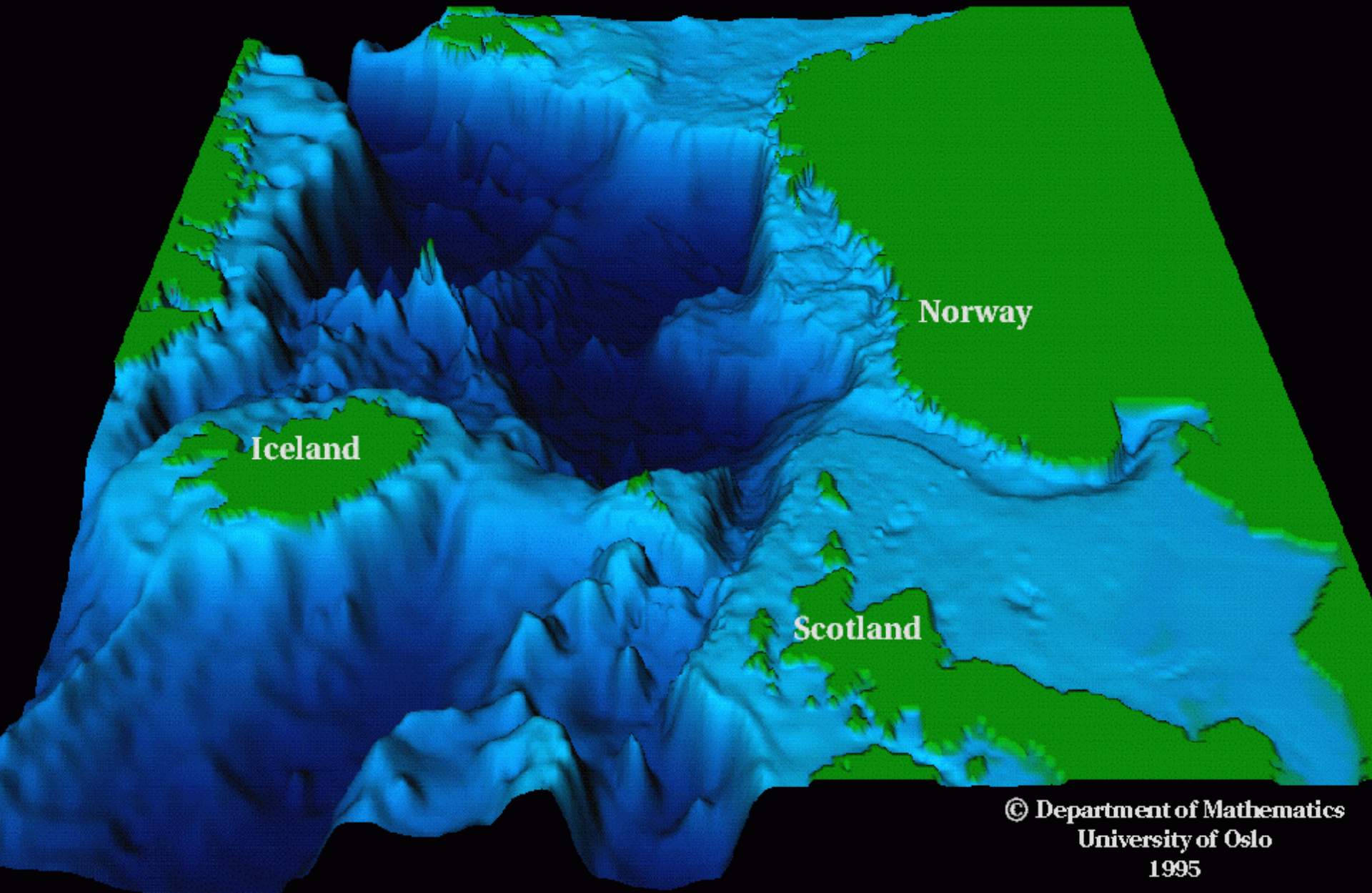
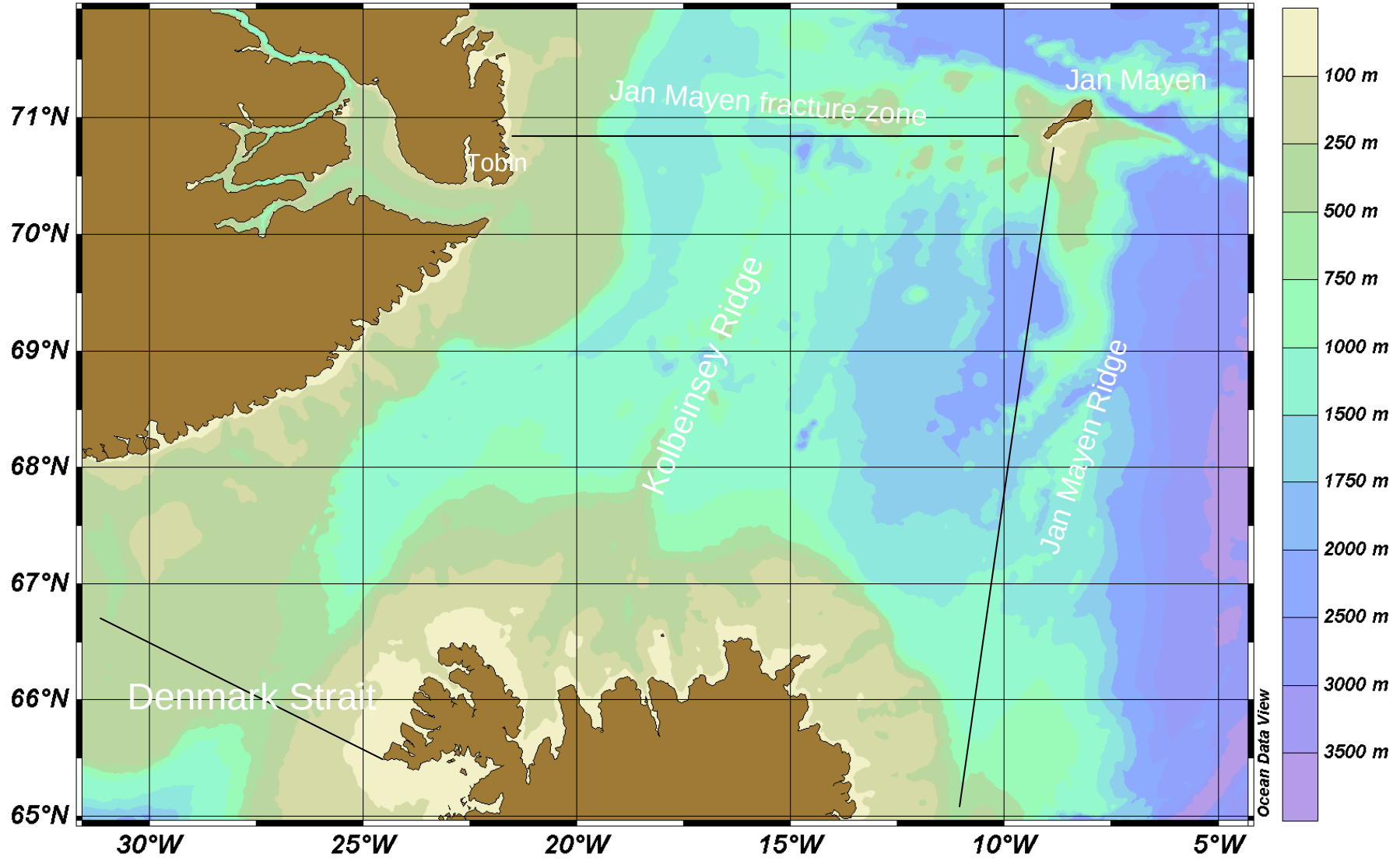
The hydrographic conditions in the Iceland Sea

Héðinn Valdimarsson, MRI

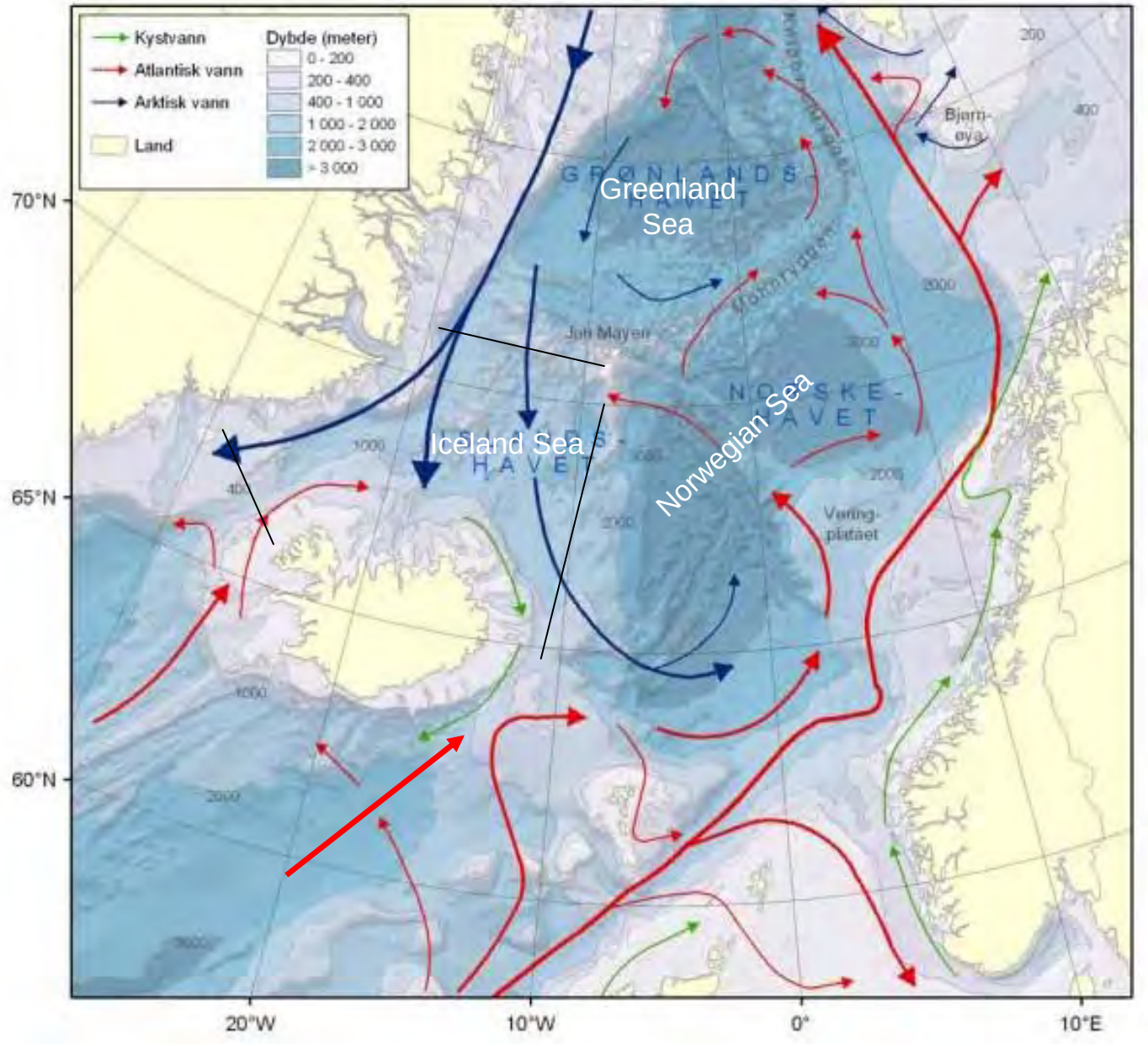
Steingrímur Jónsson,MRI/UNAK

Bathymetry Nordic Seas



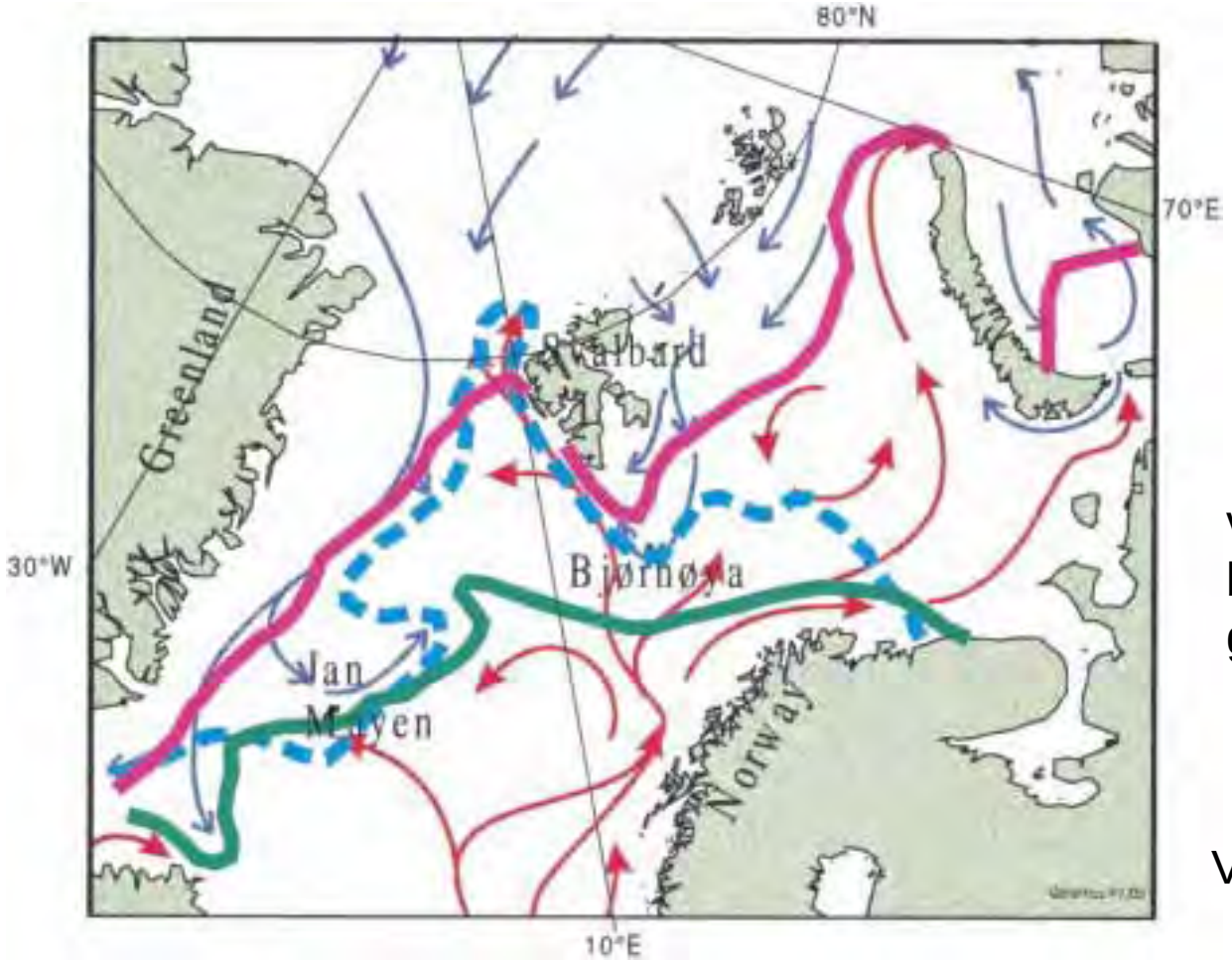

Jan Mayen fracture zone
Jan Mayen
Tobin
Kolbeinsey Ridge
Jan Mayen Ridge
Denmark Strait
71°N
70°N
69°N
68°N
67°N
66°N
65°N
30°W
25°W
20°W
15°W
10°W
5°W
100 m
250 m
500 m
750 m
1000 m
1500 m
1750 m
2000 m
2500 m
3000 m
3500 m
Ocean Data View

Surface currents in the Nordic Seas, reflecting topography
Colder from north, warmer from east and south



K.Mork etal ‘07

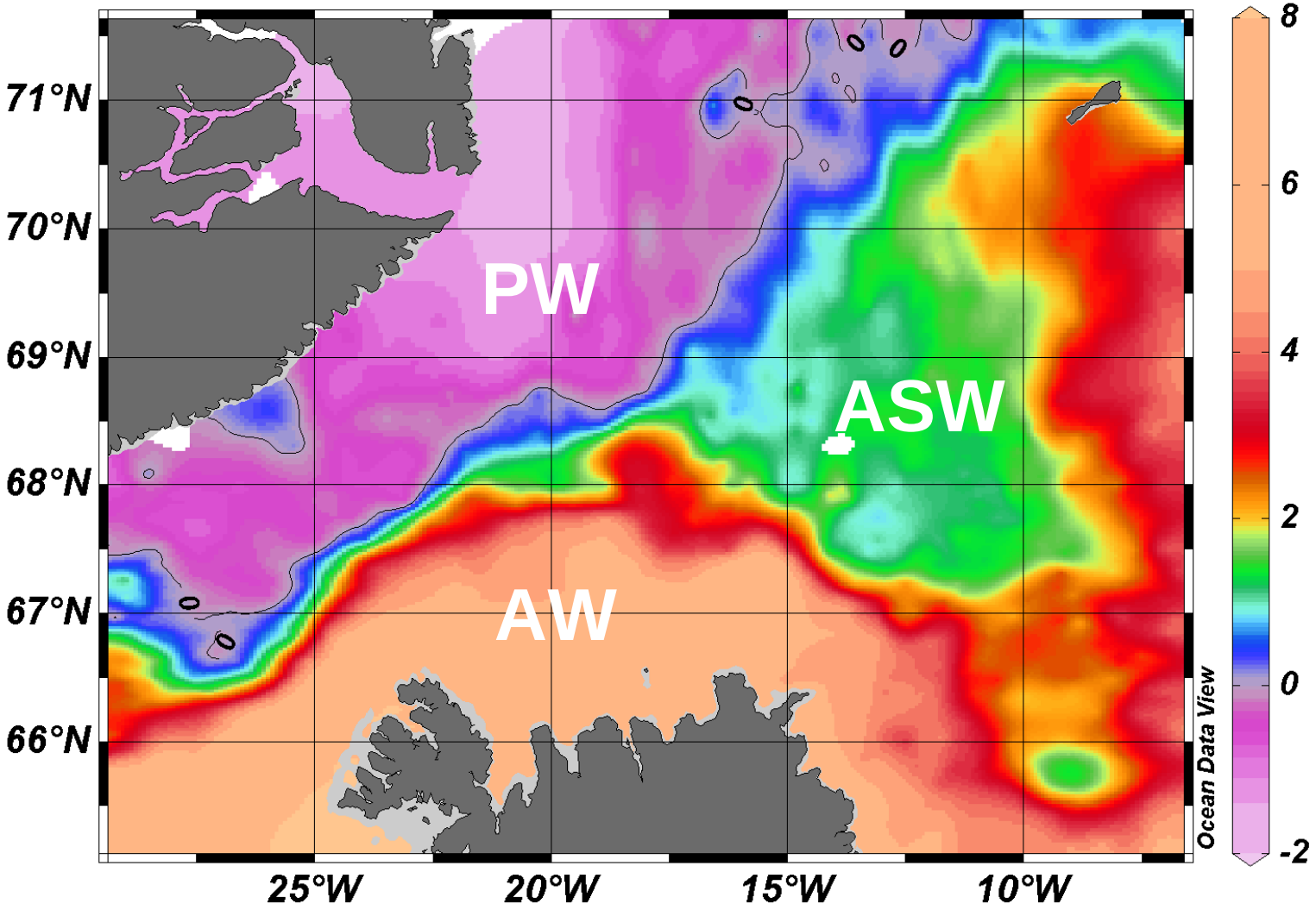
Winter distribution (april) of sea-ice in selected years



violet- 1995
blue – 1966
green - 1866

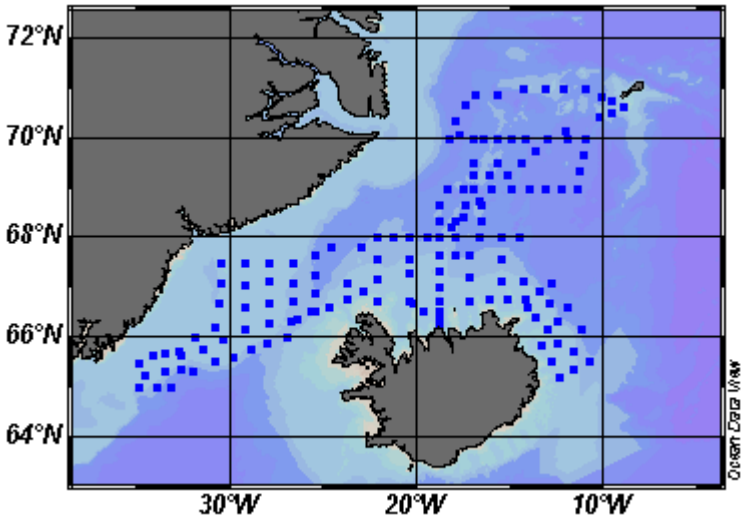
Vinje 2001

Decreasing distribution area the last 150 years in the Nordic Seas

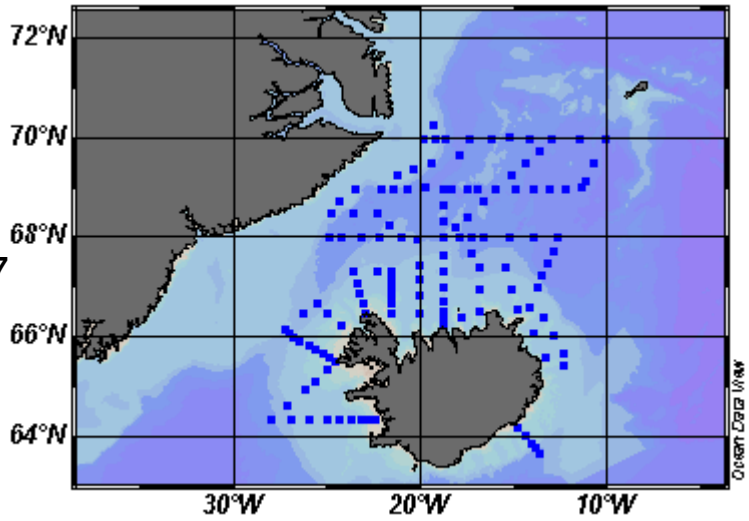


Water masses in surface layers in the area,
Average temperature of all July-September
observation at 50 m depth. NISE and MRI data

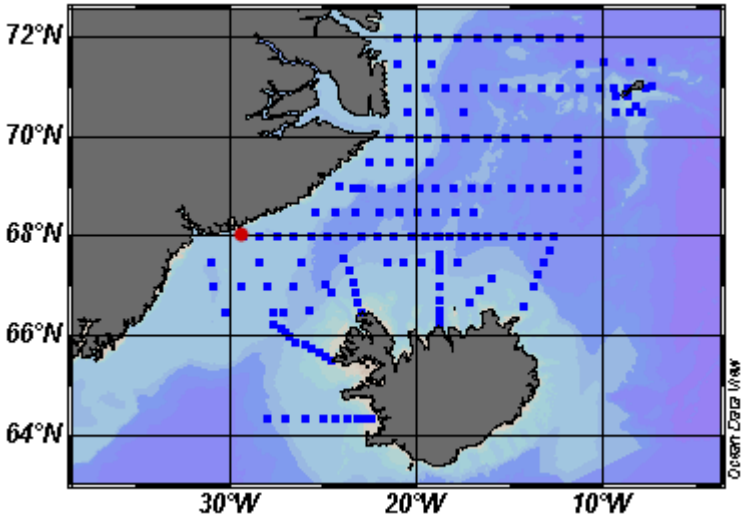
Iceland Sea project
CDT stations in summer cruises



July 2006



August 2007

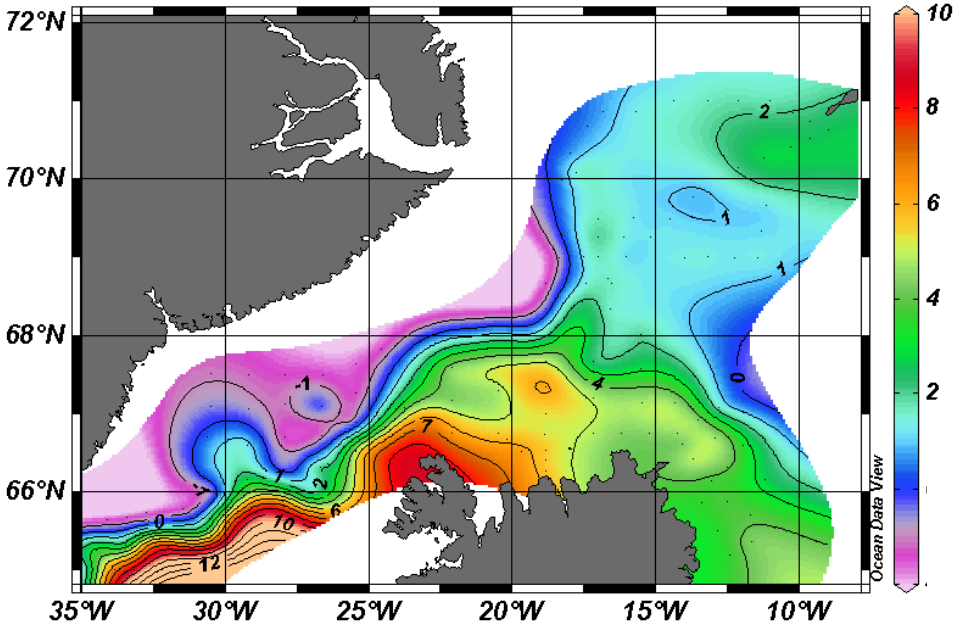


August 2008

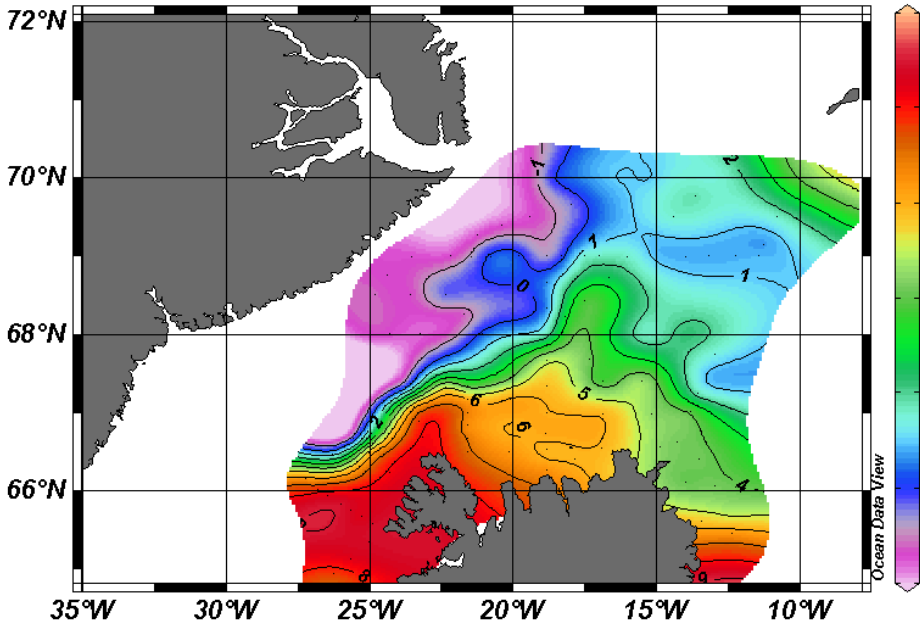
69°N was observed seasonally for a year

Temperature at 50m depth

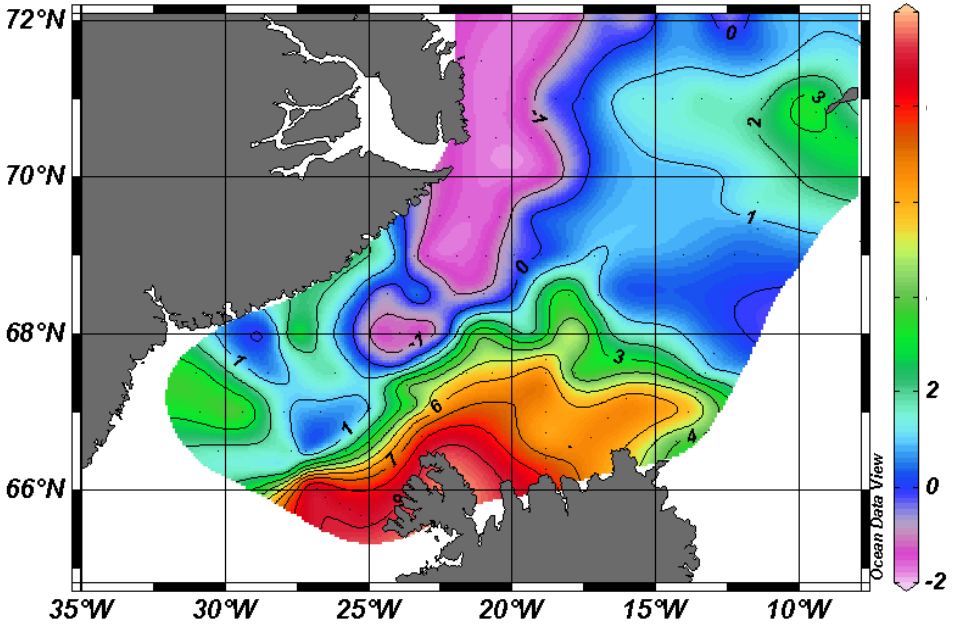
July 2006



August 2007



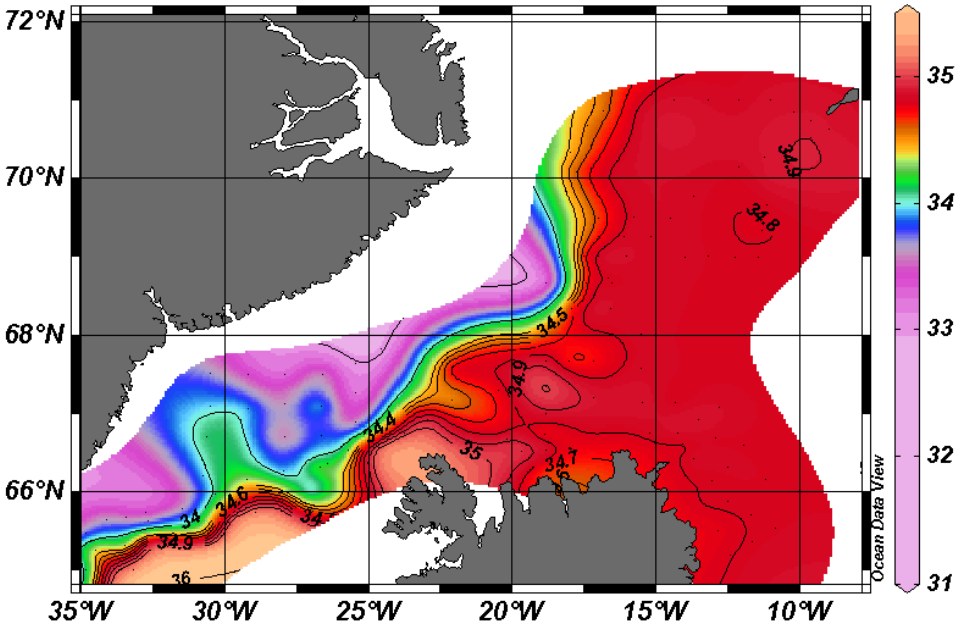
Inflow of Atlantic water north of Iceland and south of Jan Mayen. Extending farthest north in 2007.



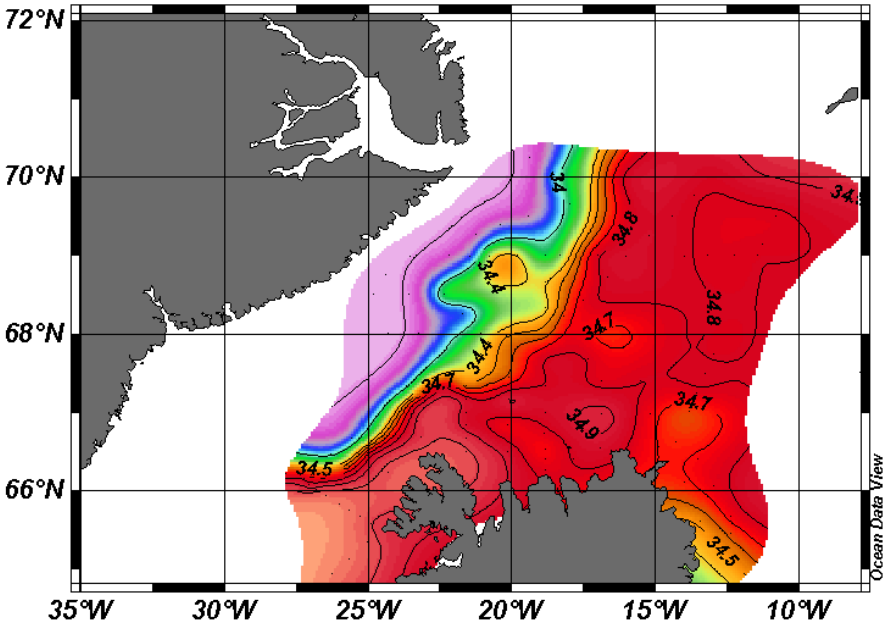
August 2008

Salinity at 50m depth

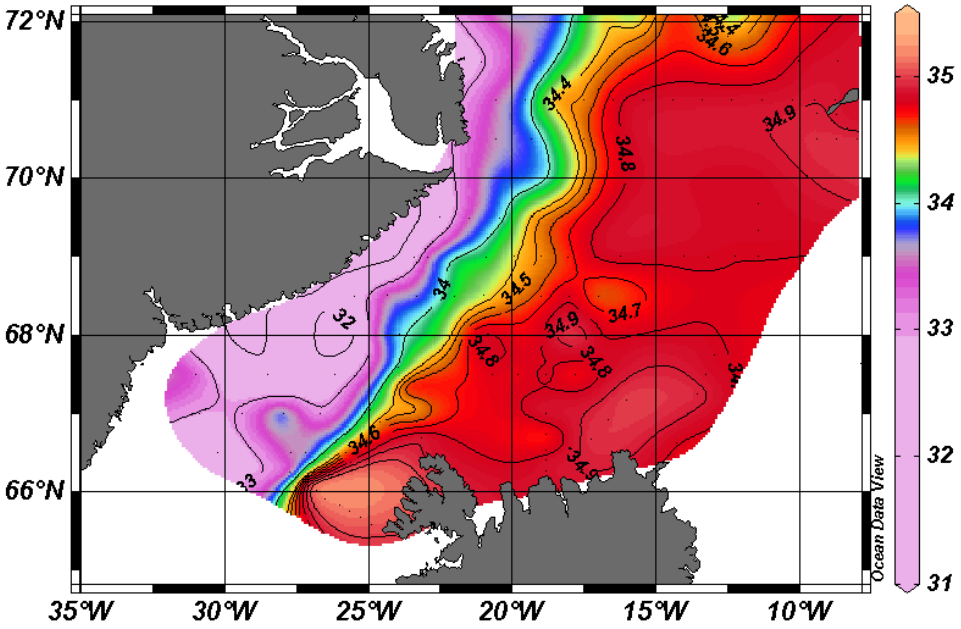
July 2006



August 2007



August 2008



Last decades changes observed from south

Average over 0-200m in winter at station
Fx9 at the shelf brake west of Iceland
Higher temperature and salinity after 1996

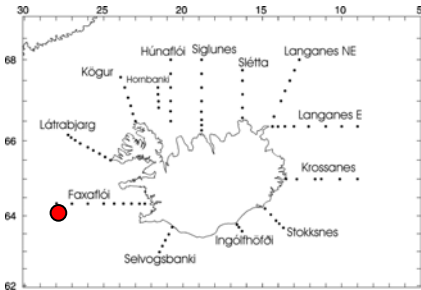
Salinity

Temperature

Temperature C°

Salinity

Reykjanes8/Faxafloi9 Febr. 0-200m
Hiti
Selta



Temperature and salinity average over 50-100m depth
In the core of Atlantic inflow north of Iceland

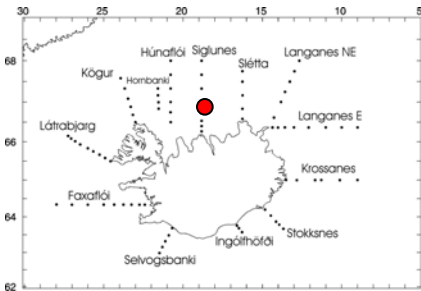
Hiti
Selta
3 ára meðaltal

Hiti °C

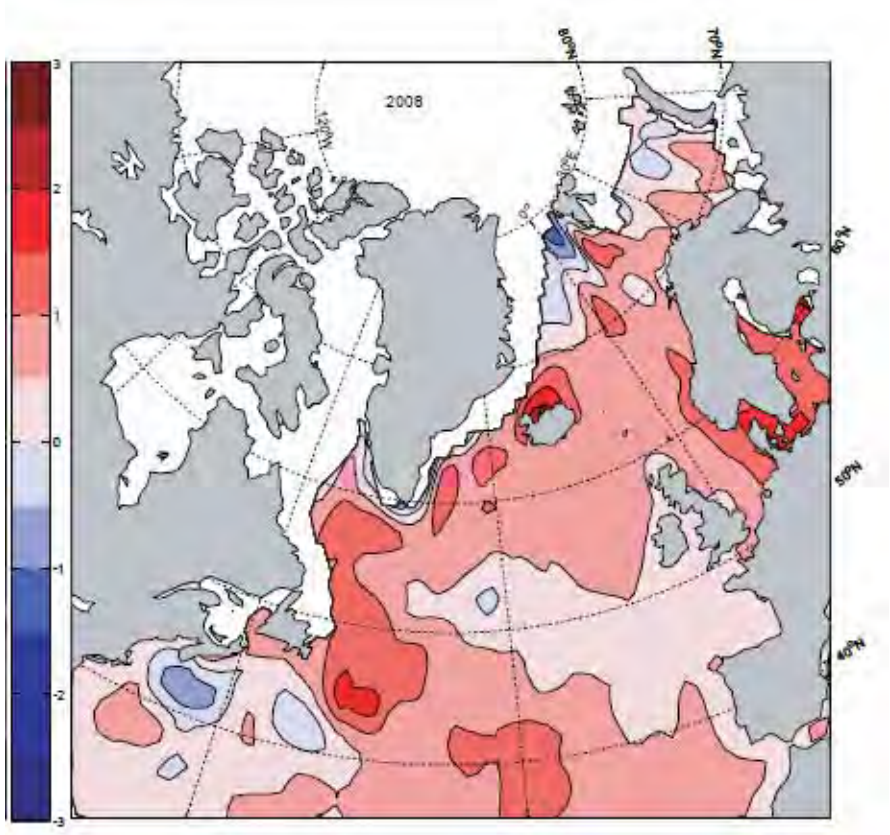
Selta

Ár

Changes have reached northern area as warmer and saltier water in winter



OISST 2008 as deviation from mean for period 1971-2000



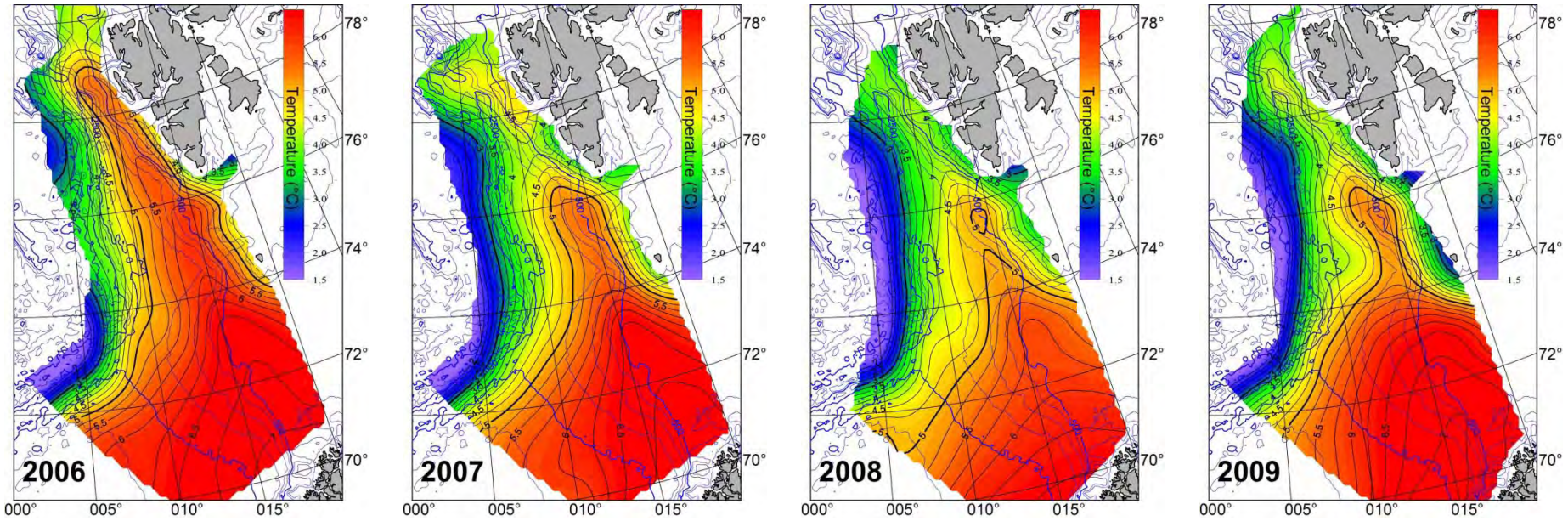
Scale as nr of standard deviations from mean

Observation period for the project in warmer than long term mean regime

ICES Report on Ocean Climate 2008

Changes from north ….

Observationer from Polish Marine Instit. i Sobot í May-June

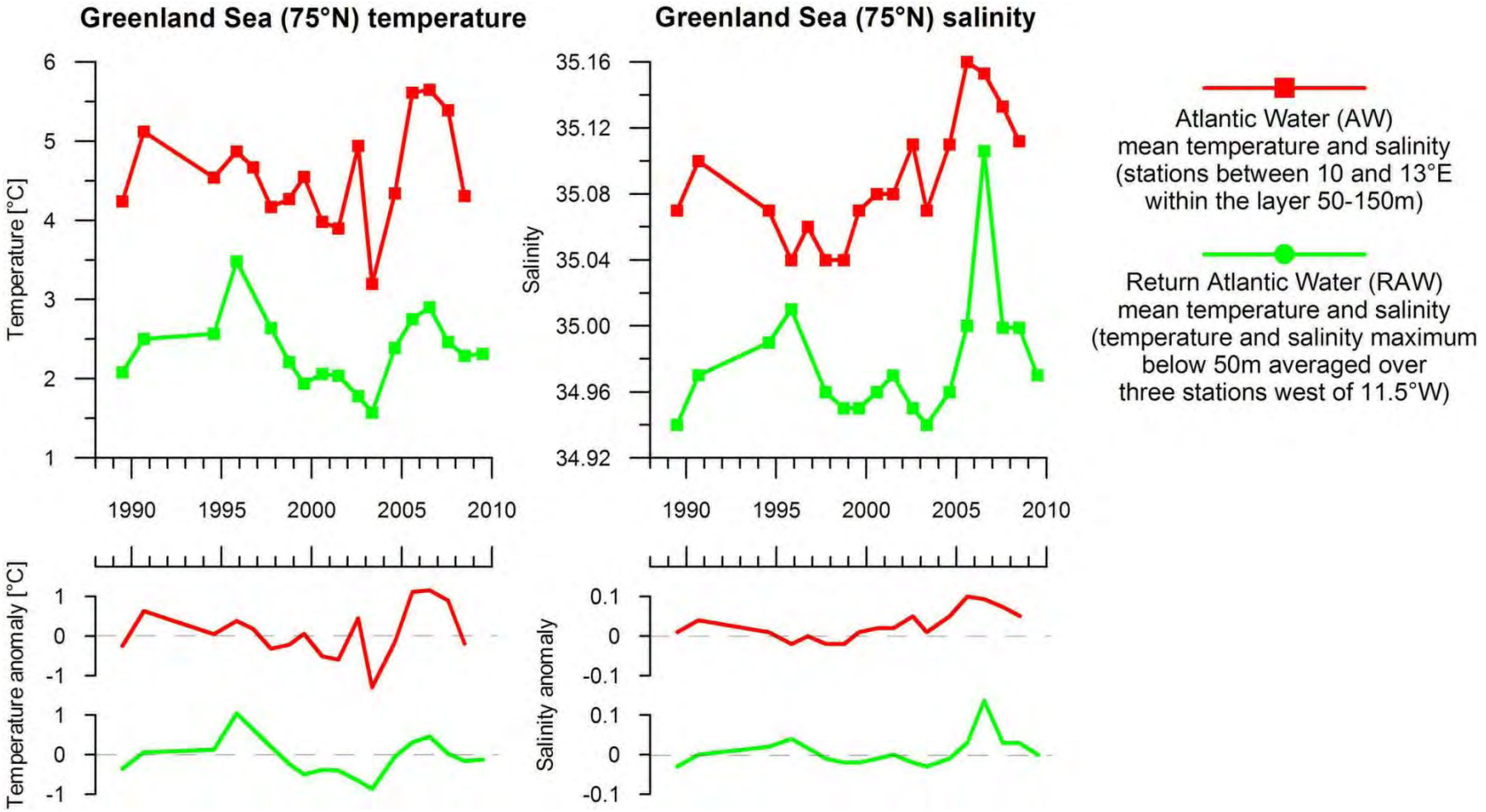


100 m depth

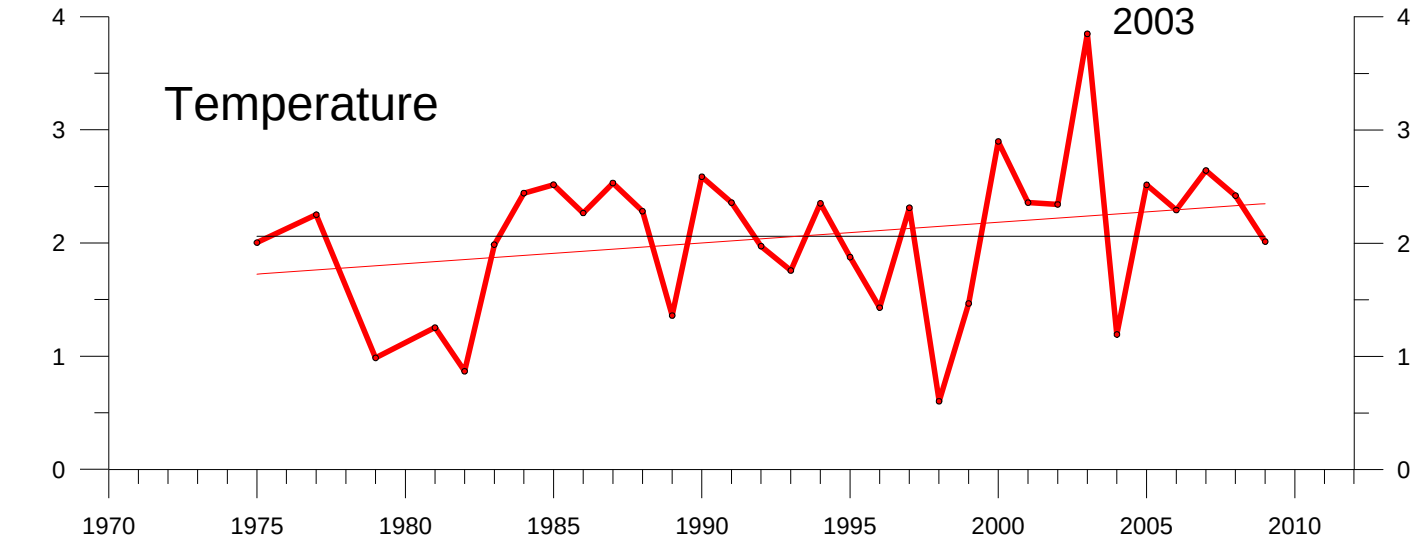
2006 warmest

Picture from
Waldemar Walczowski

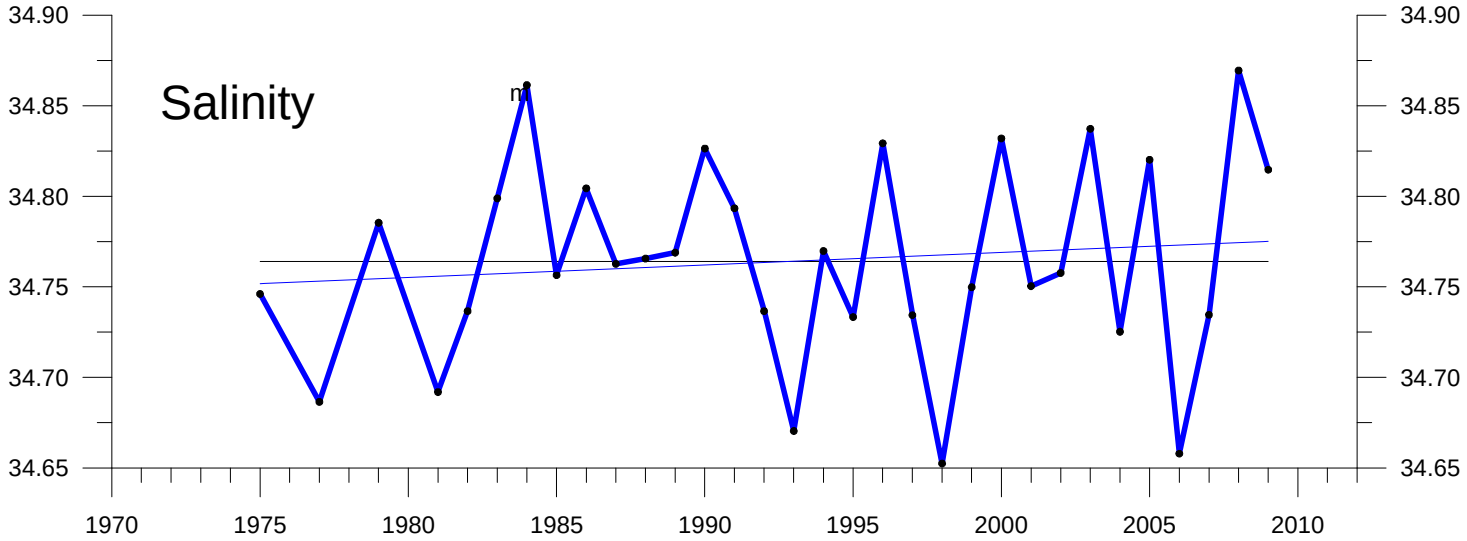
Nordic Seas, temperature and salinity at 75°N, red Atlantic water on east side going north. Green Return Atlantic Water going south on the west side

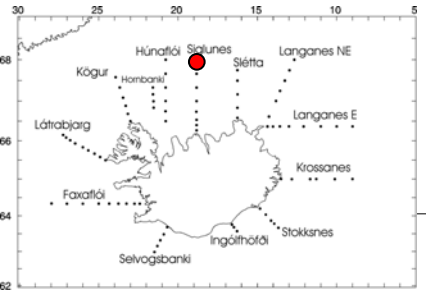


A.Beszczynska-Möller, AWI Bremerhafen



Average
over
50-200m
Si7 & Si8

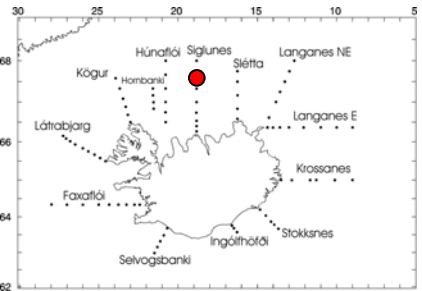




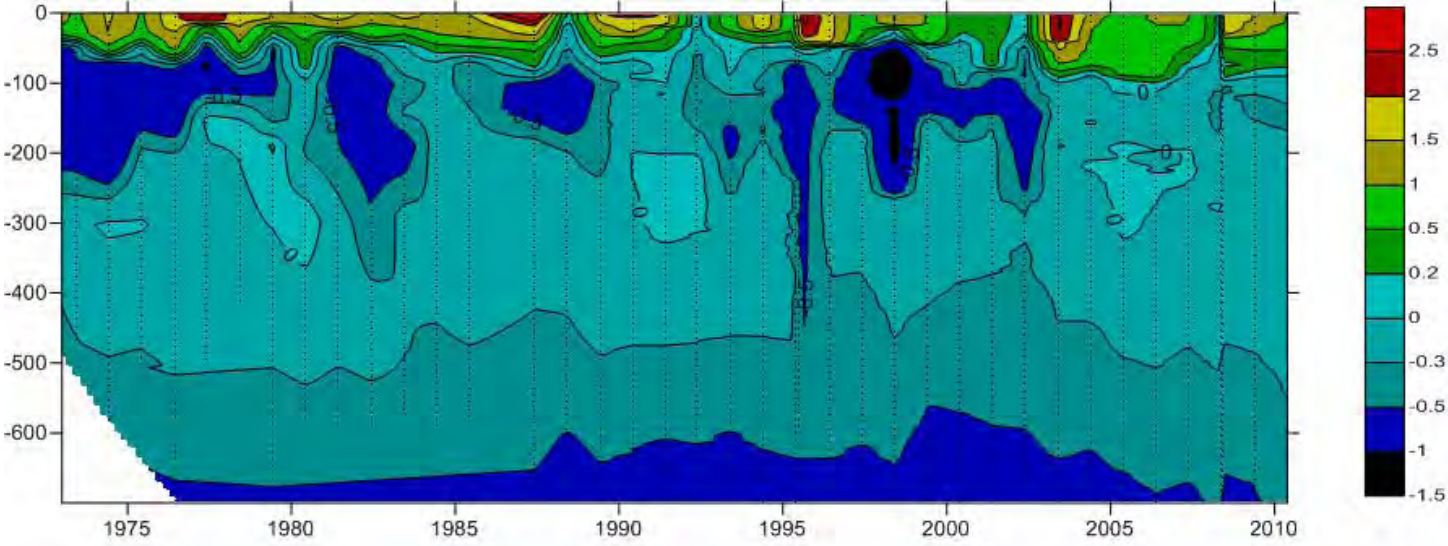
Si 7 og Si8, north of Iceland (67.6-68°N) in Autumn, slightly higher temperatures after 2000. Variability.

Siglunes 7-8, average temperature over 0-50m

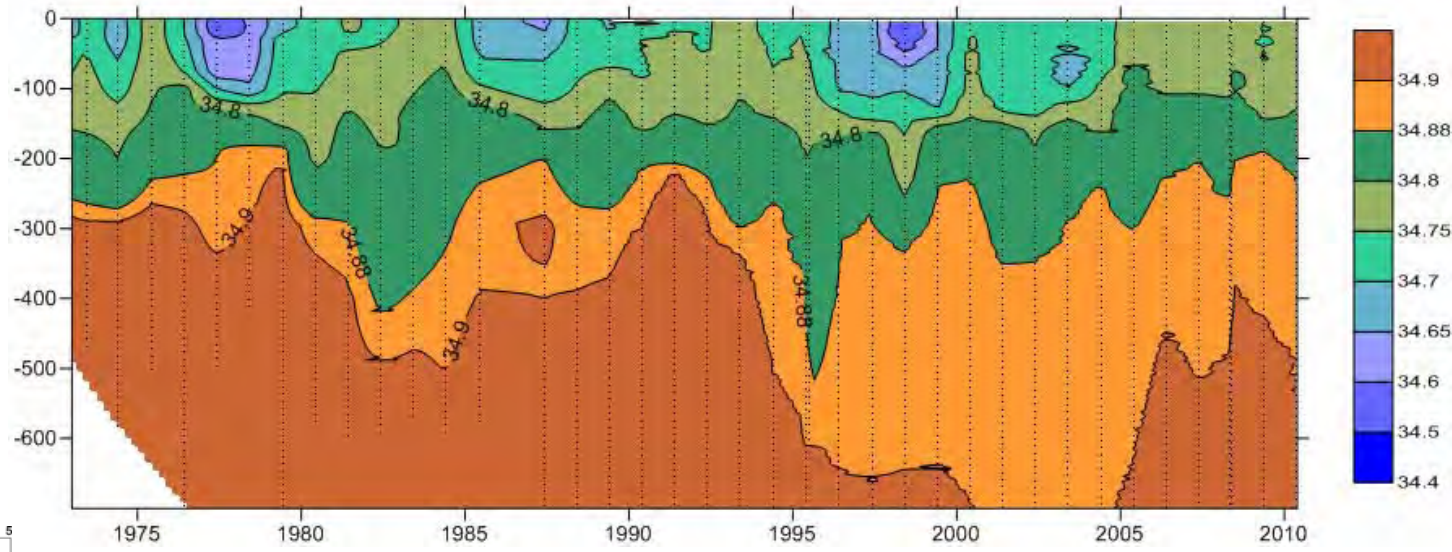
Summer
Spring
Winter
Autumn

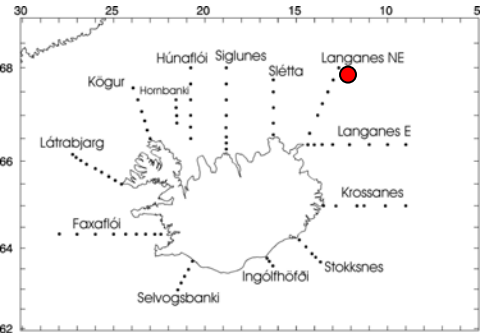


Temperature

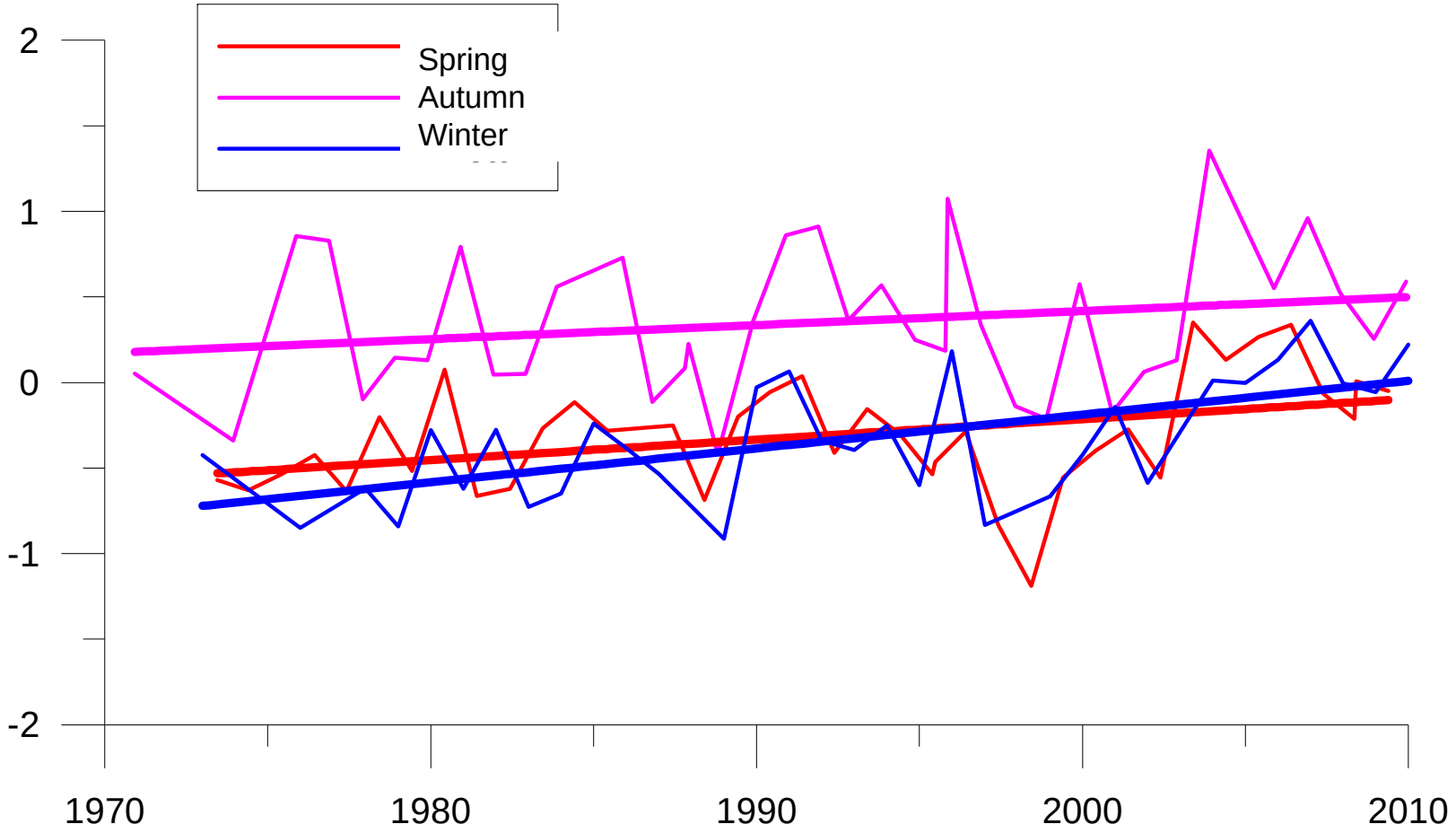


Salinity



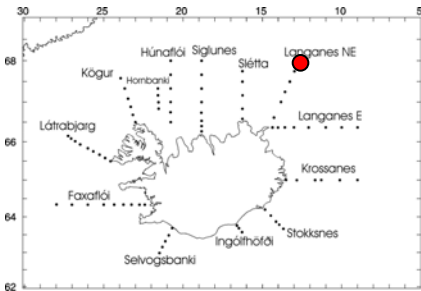


Langanes NE 6, 0-700 m May-June
Warmer & more saline surface >2002



Slight trend to warmer intermediate layers in winter

Temperature at LN6, 68°N,12.7°W, average 50-150 m

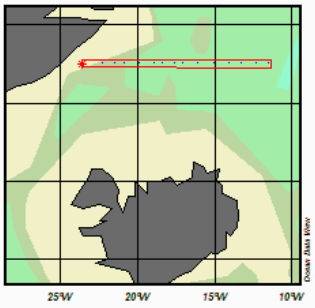


Older Norwegian data from
August- October
exist
Variability in sea-ice distribution
and station density
make comparison difficult
with present data
Large variability observed in surface
and intermediate layers

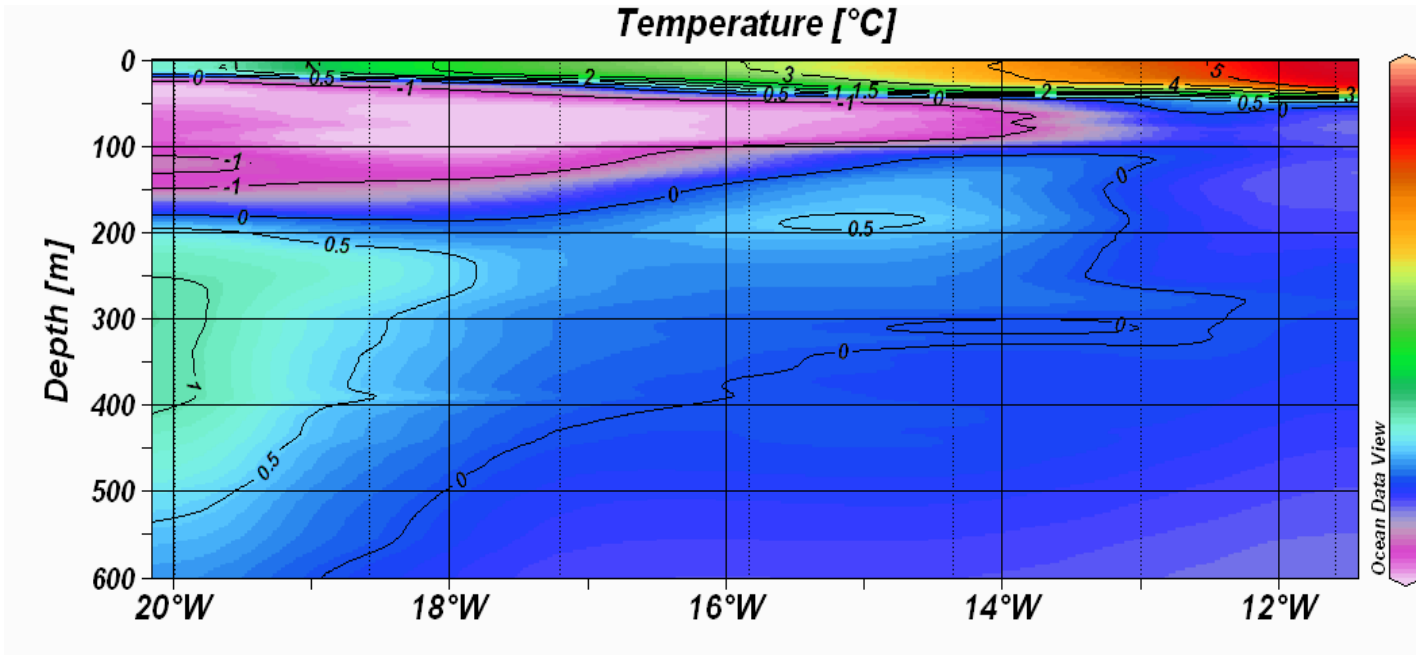
Section on 69°N

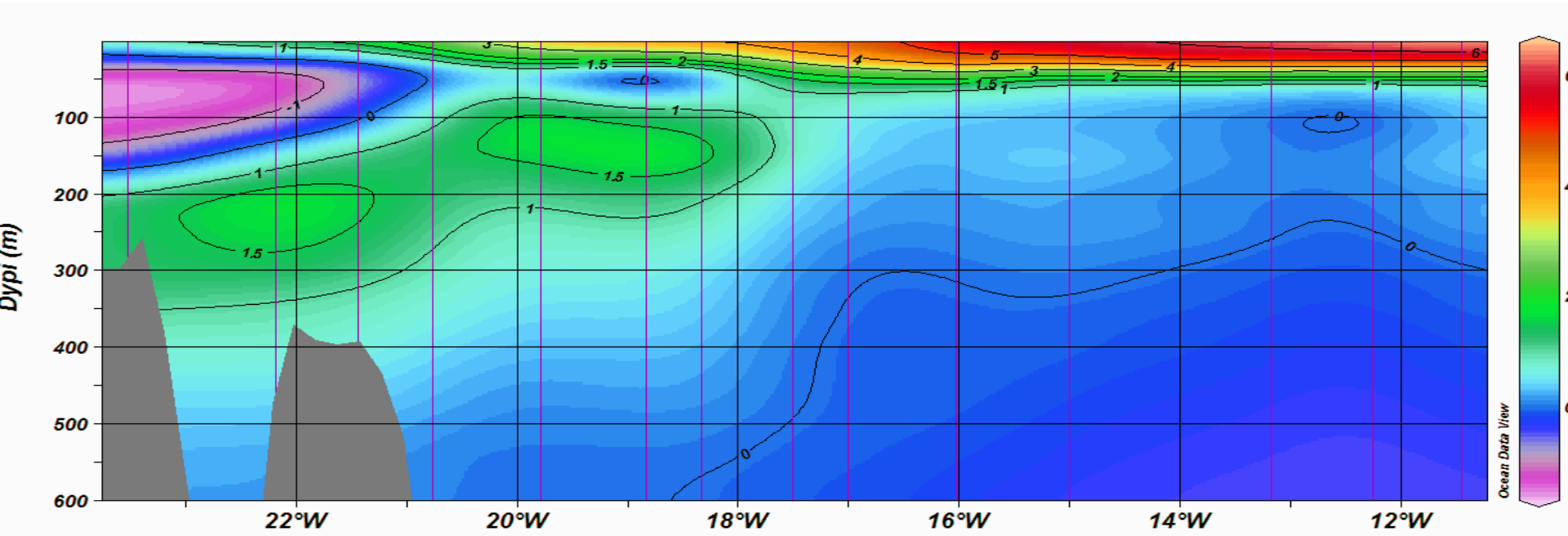
1988

Temperature



2007

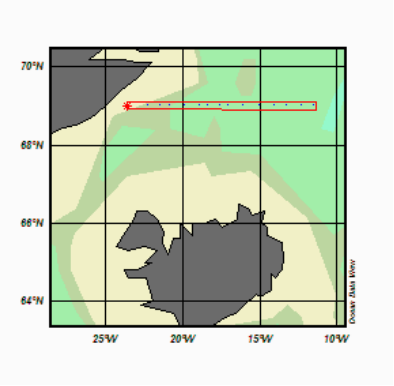


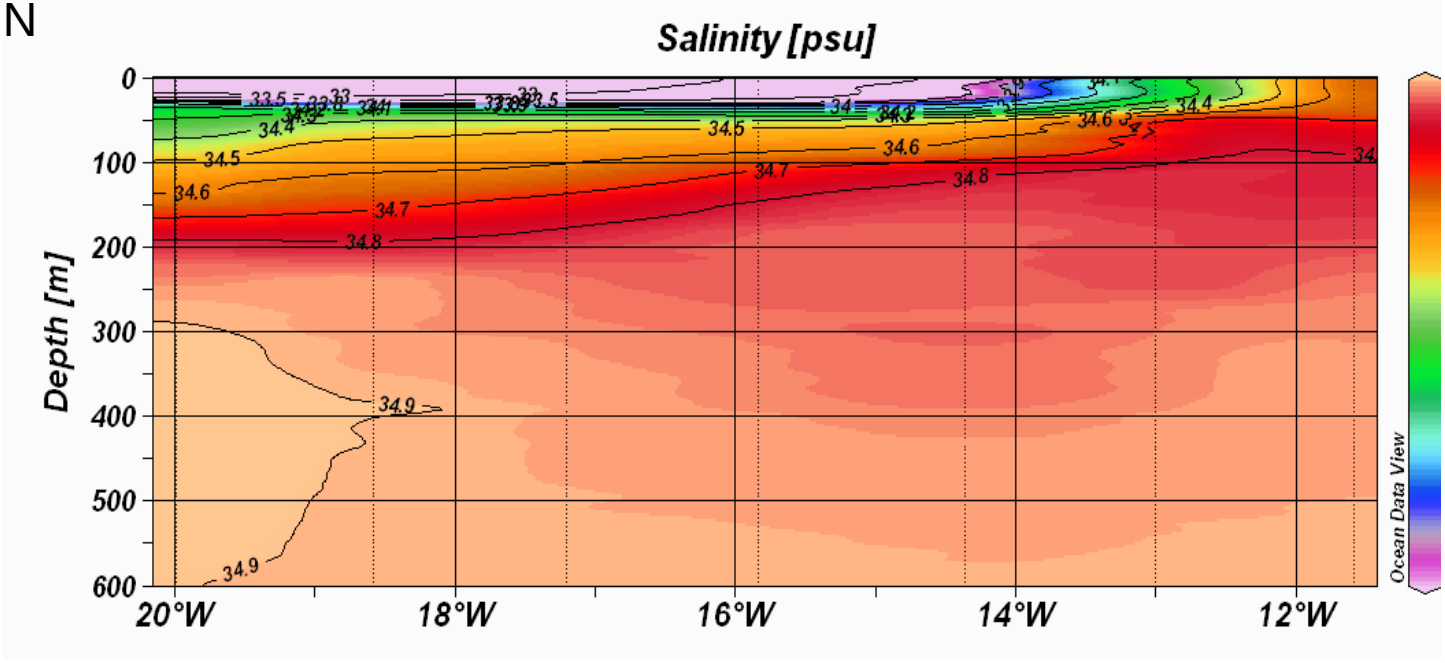


Section on 69°N

1988

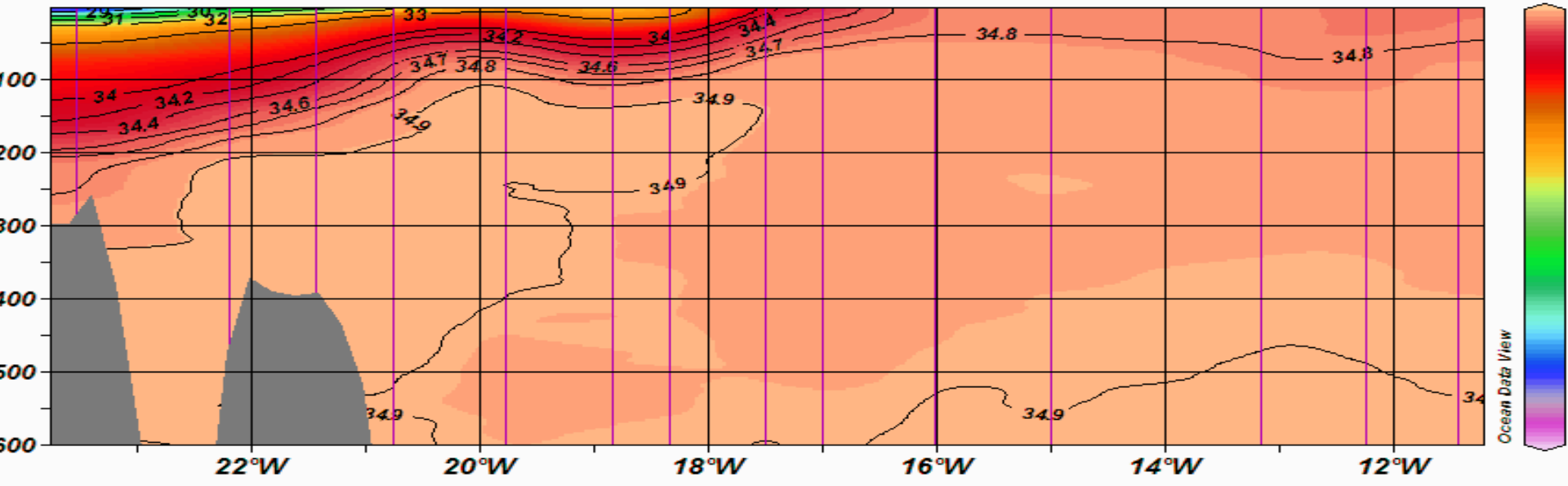
Salinity



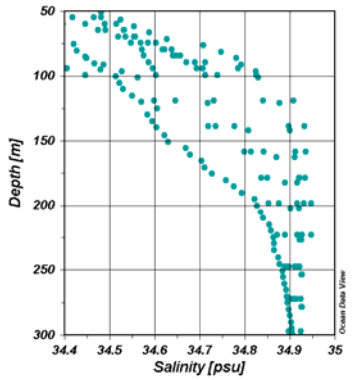


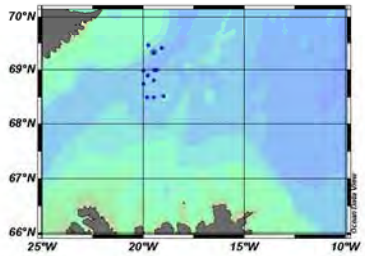
2007

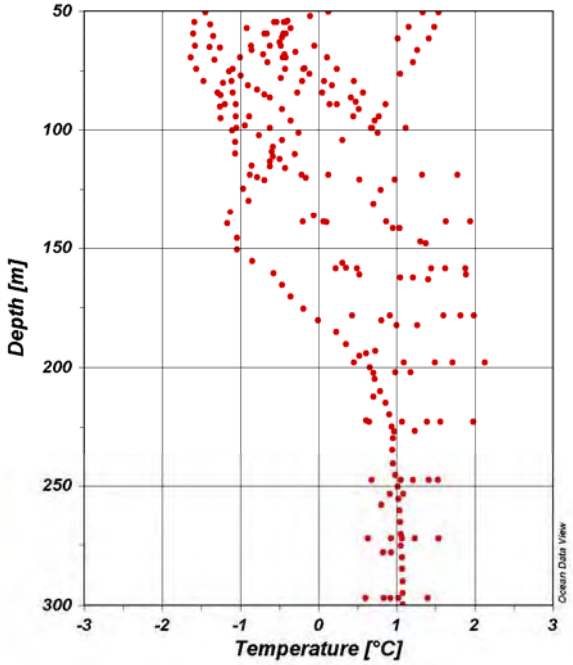
Colder and fresher water to east in 1988



In western Iceland Sea RAW then



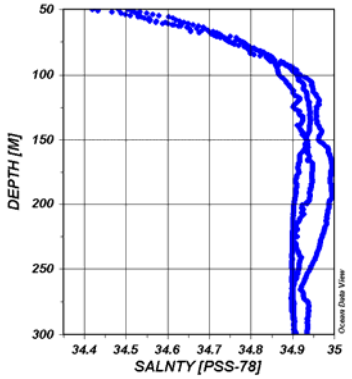


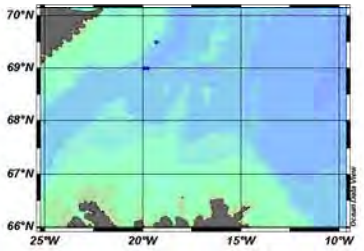


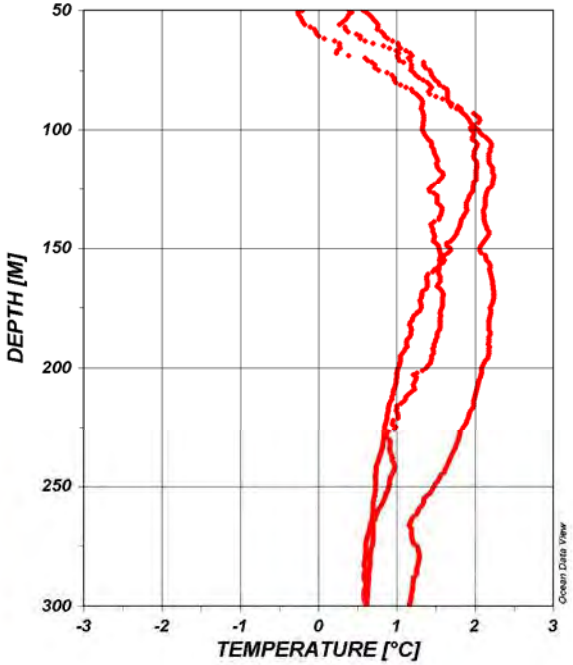
1985-1995
July/ August

NISE data

and “now”





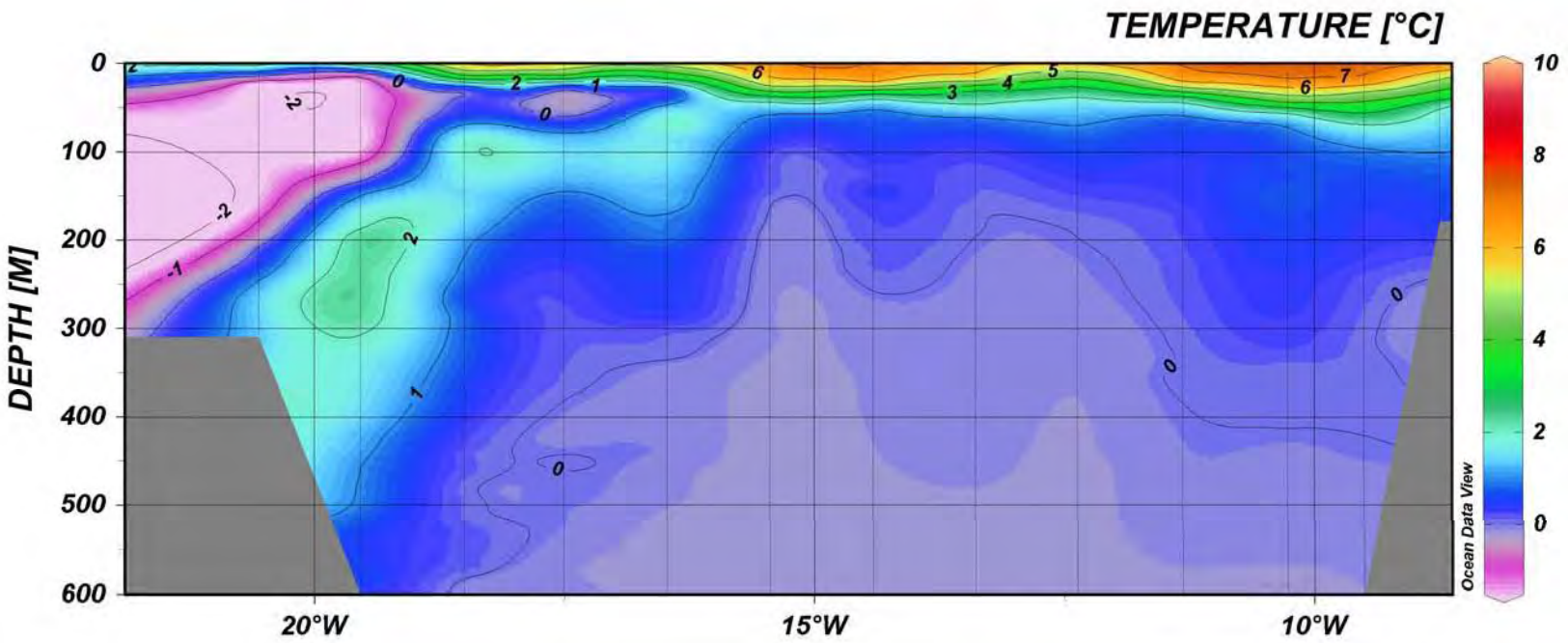


2006-2008
July/ August

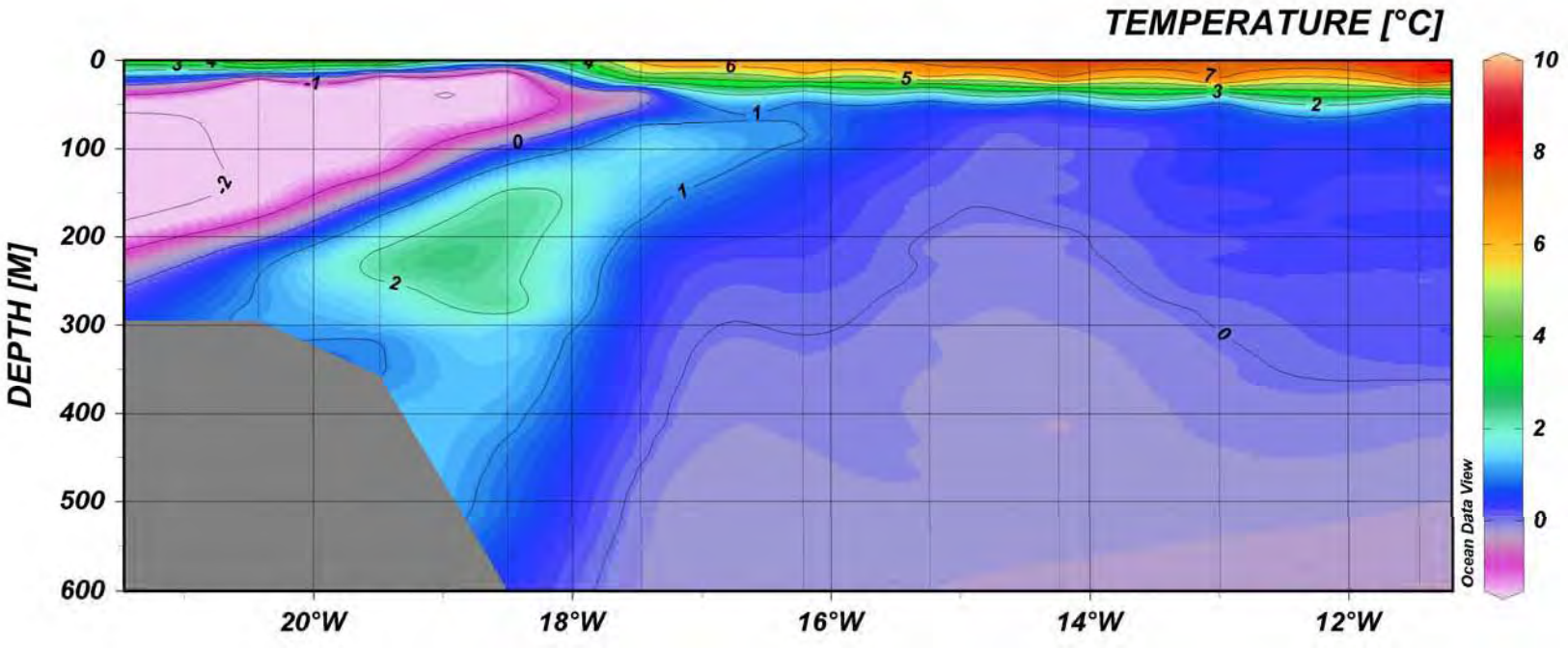
Sligtly warmer and more saline RAW

RAW
2008

71 N



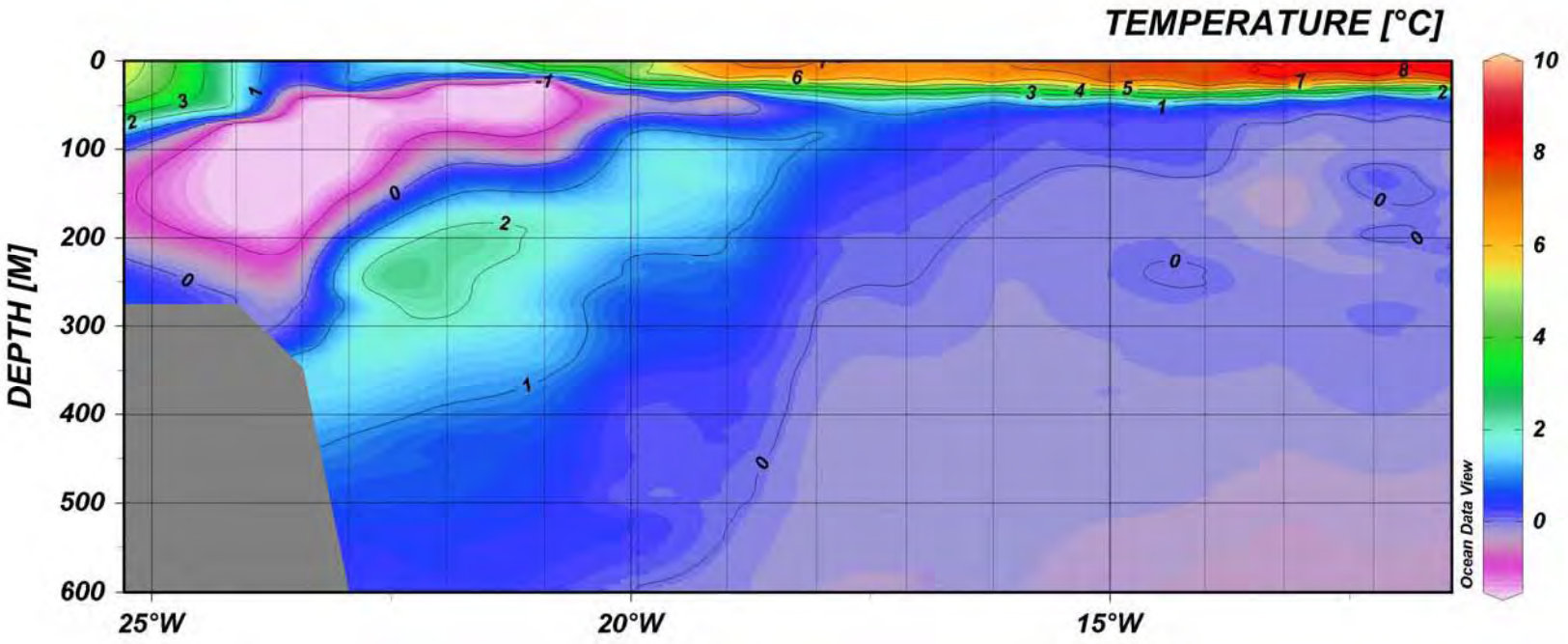
70 N



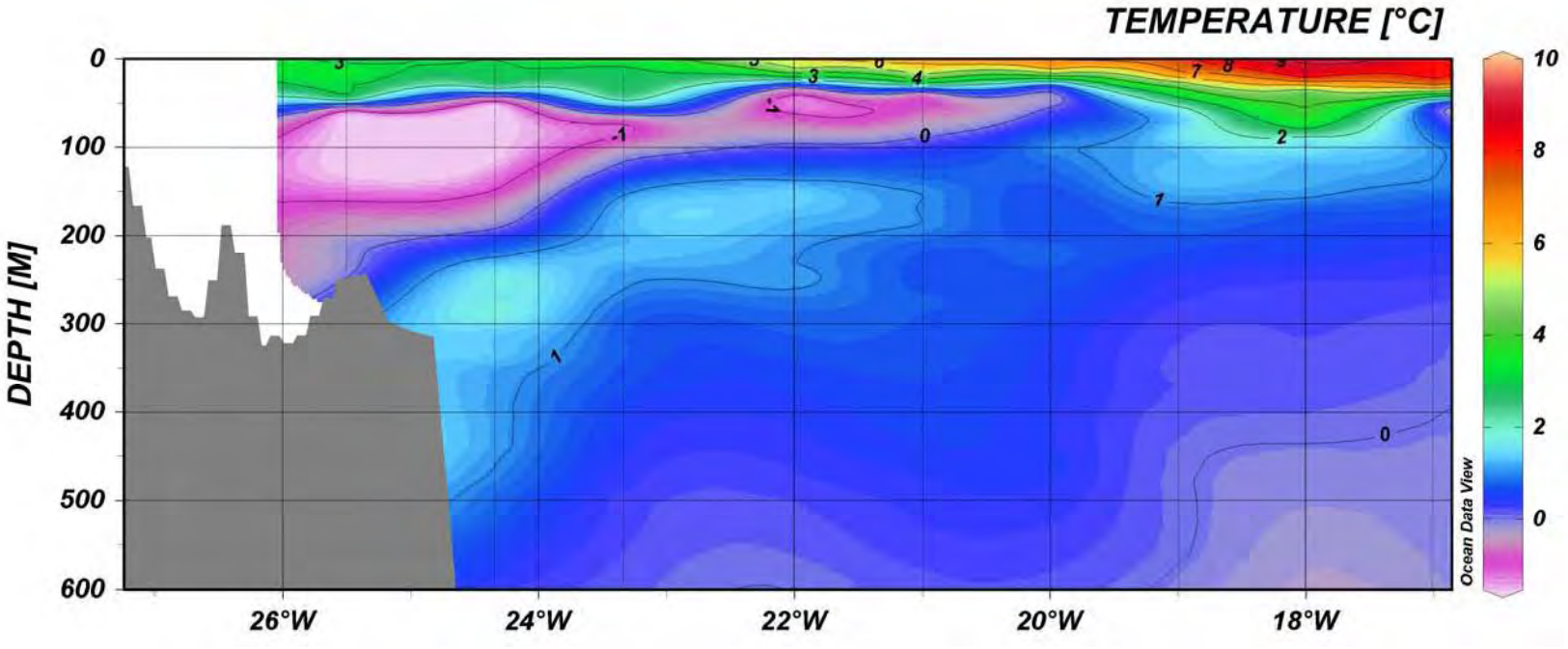
RAW

2008

69 N



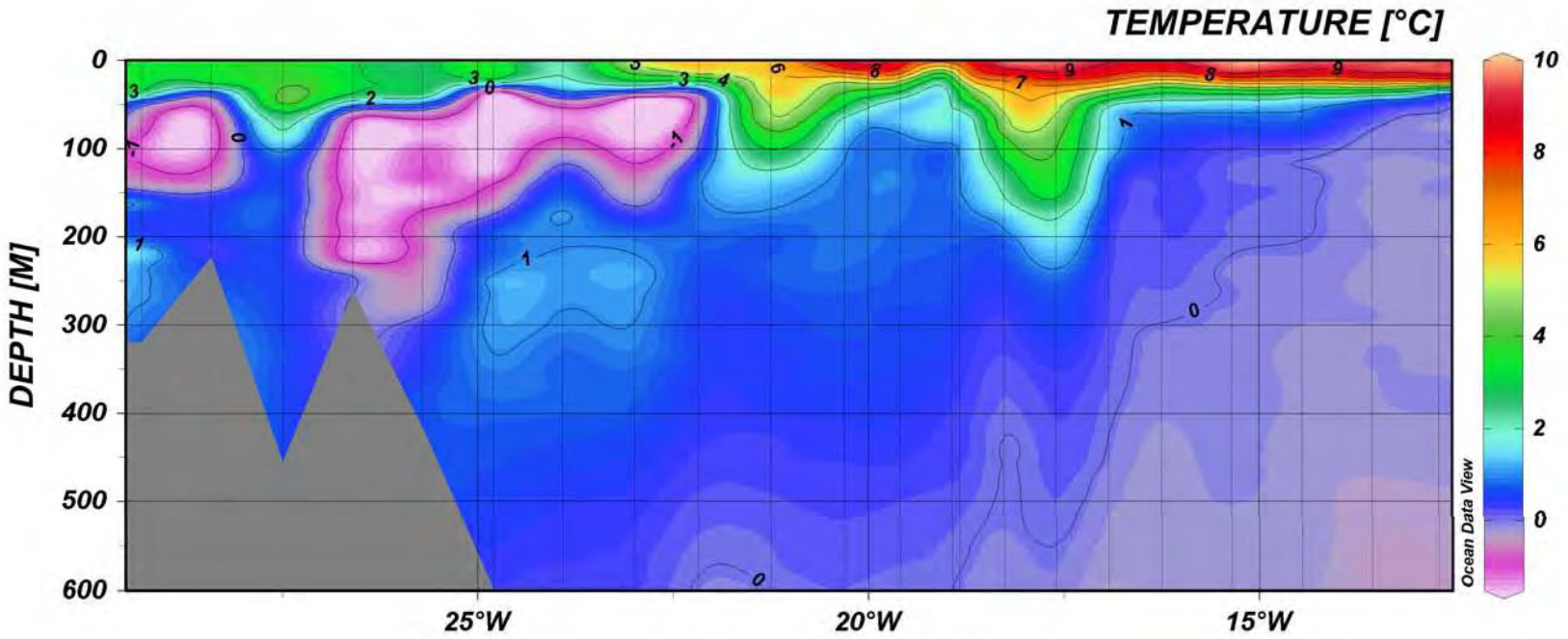
68.5 N



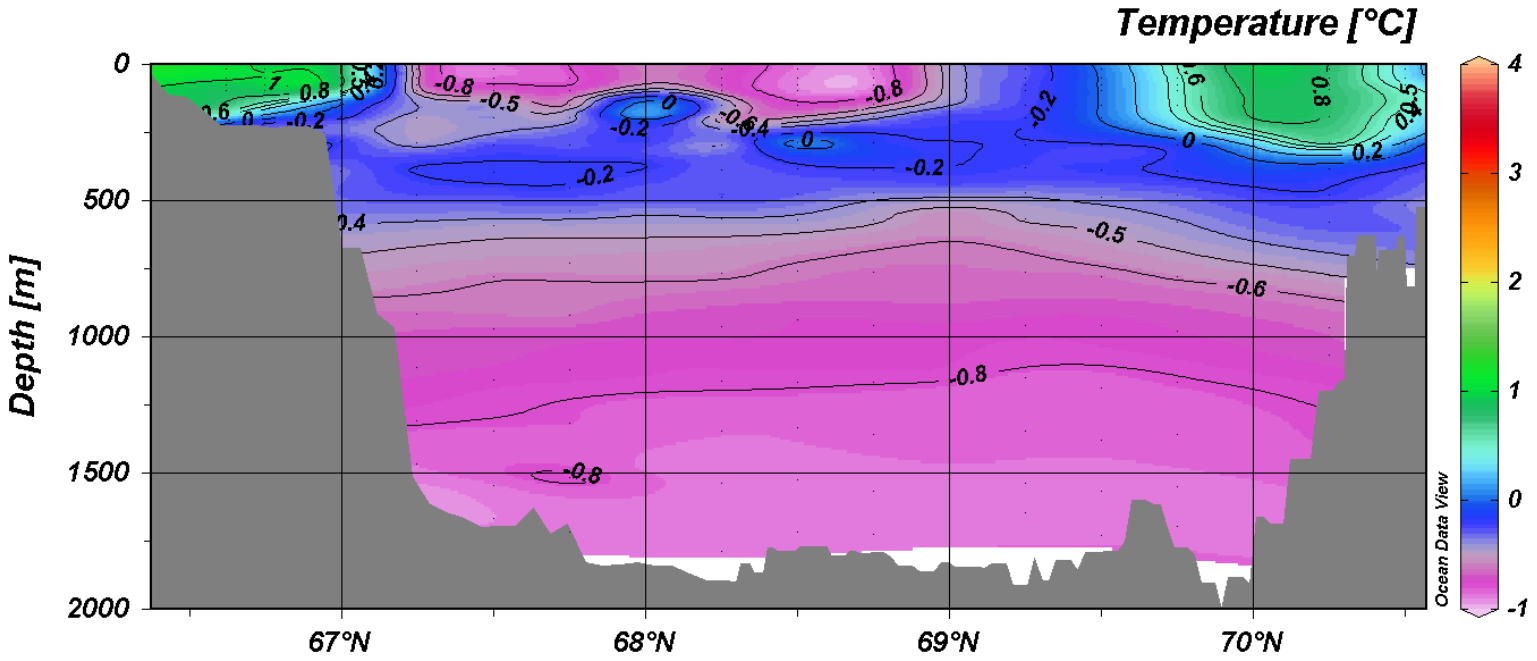
RAW

2008

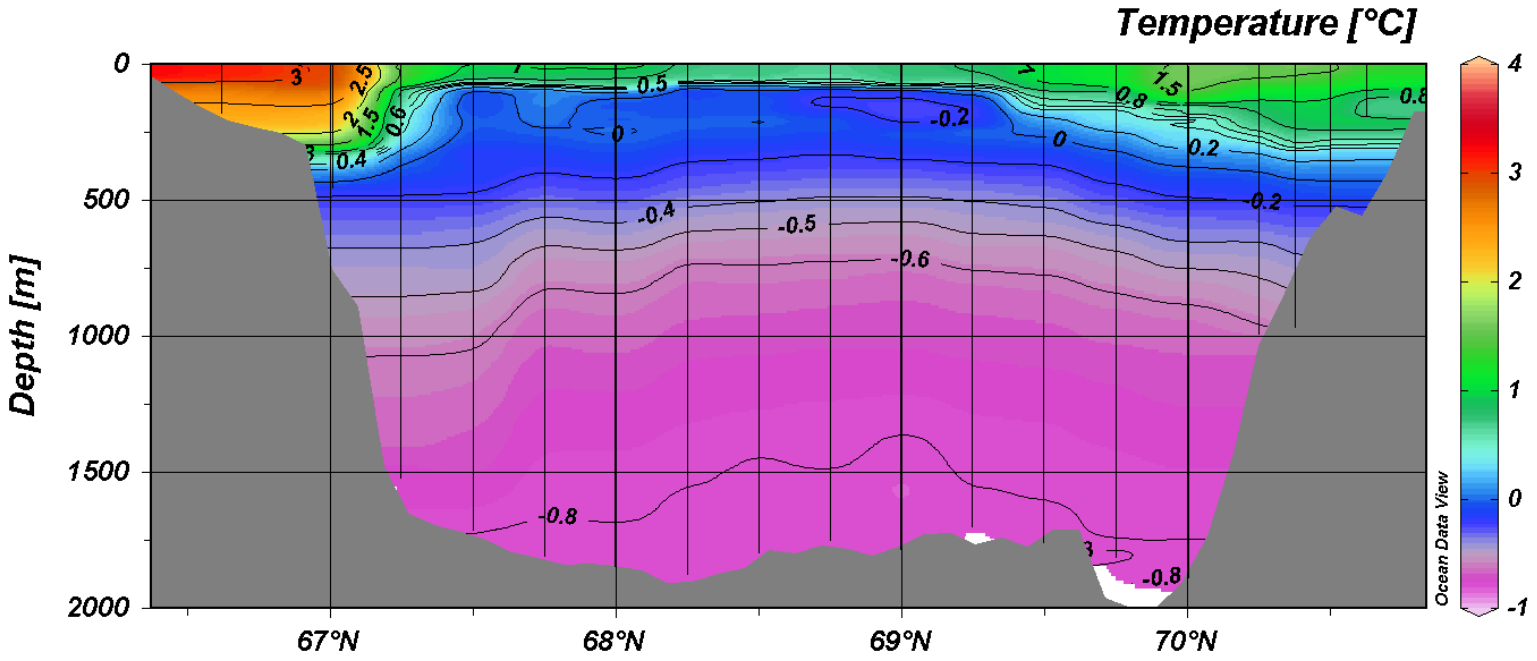
68 N



Return Atlantic Water vanishing signal
as it comes into Iceland Sea



február
1982



maí
2006

Conclusions

- Inflow into the Iceland Sea was observed during the project, from south and east
- This inflow has been warmer and more saline the last one and a half decade
- Surface layers in the eastern and southern part of the Iceland Sea have been warmer during the last decade
- Polar water from the East Greenland Current did not extend far east during the project
- Return Atlantic Water has been warmer and more saline during the project period
- Deep water has warmed

Thank you

Kolbeinsey 2007 (Kolbeins Island)