INSTITUTE OF MARINE RESEARCH

Argo data in the Norwegian Sea

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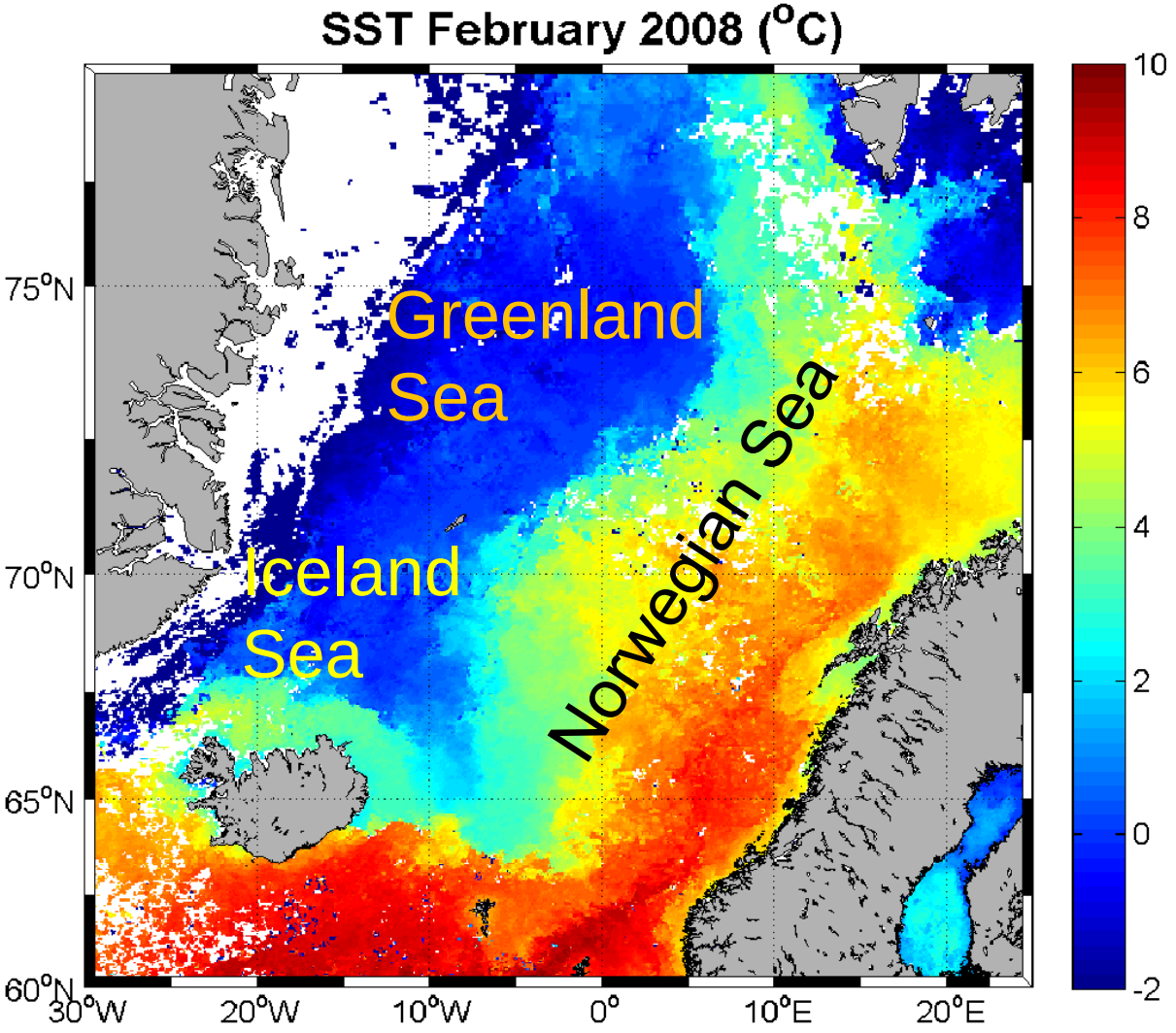
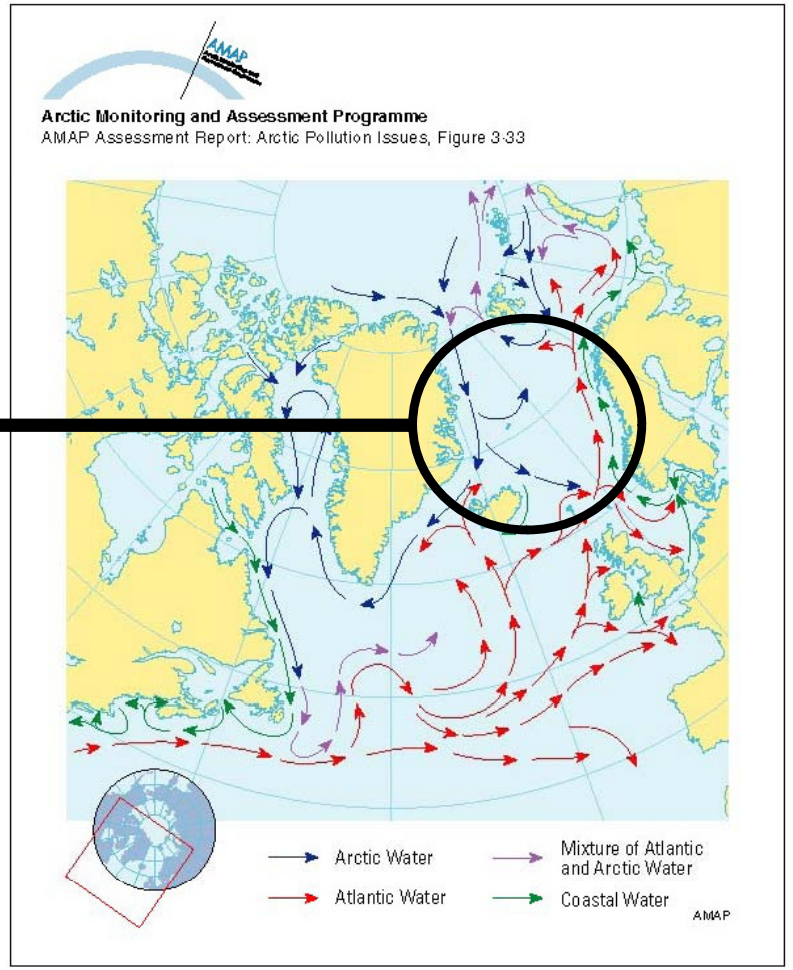
Outline

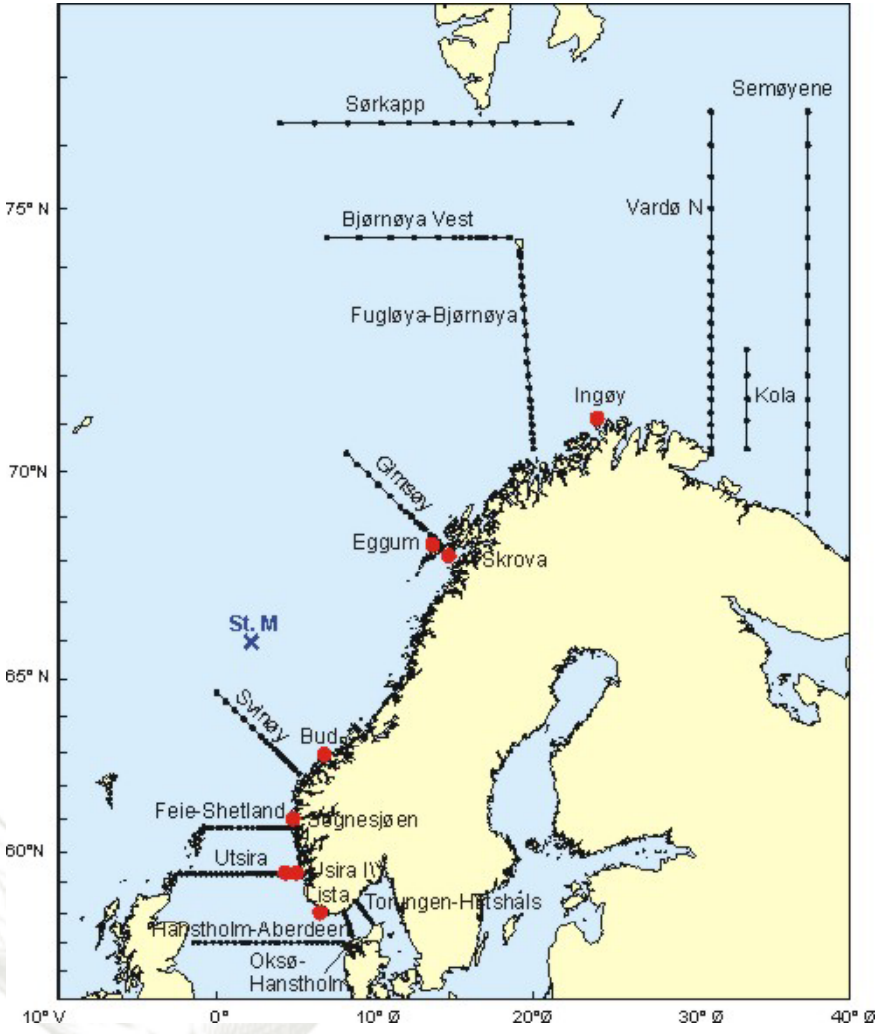
- Institute Marine Research's monitoring program and Argo floats in the Norwegian Sea
- Some results from Argo floats with extra sensors; Oxygen and Chlorophyll
- Mixed layer depth (from Argo floats) and Svedrup's critical depth
- Future plans

Sea Surface Temperature (SST) in the Nordic Seas (Greenland, Norwegian and Iceland Sea)

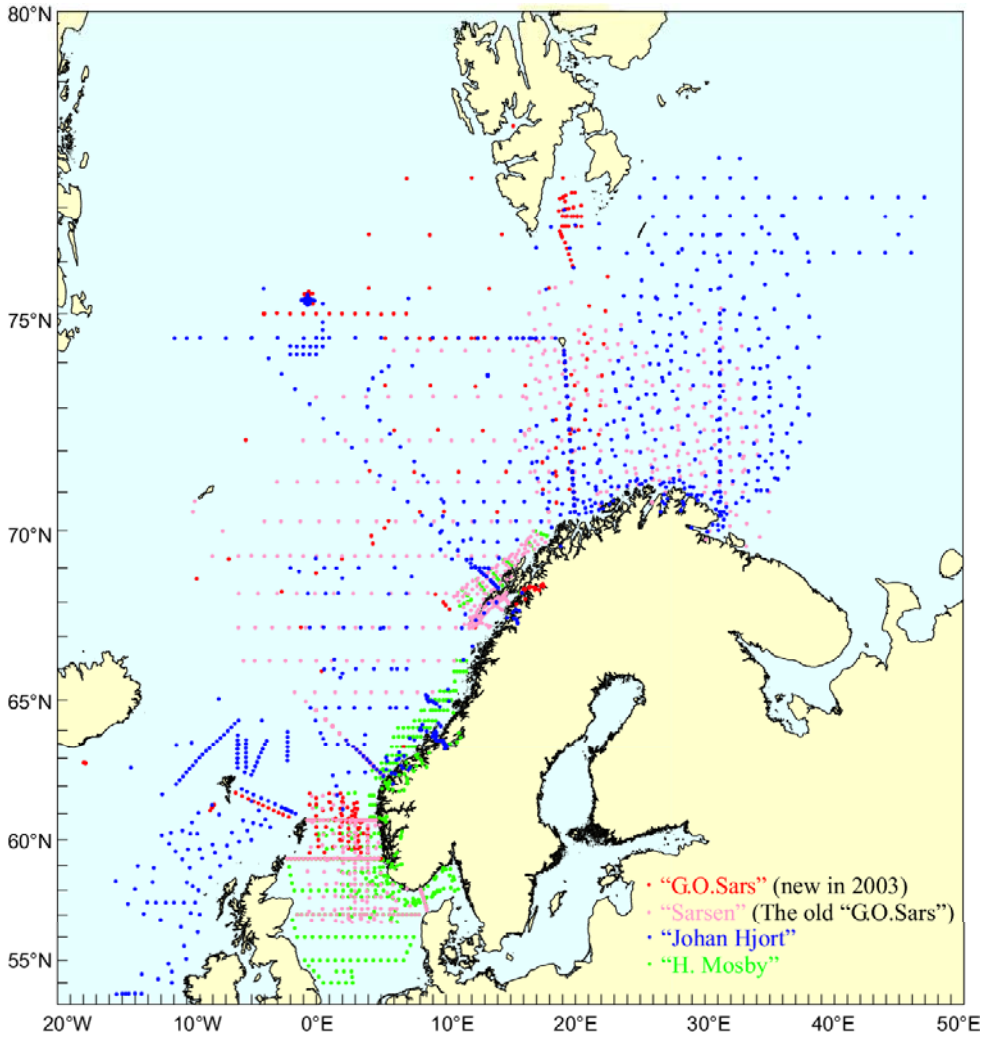




CTD-stations from research vessel

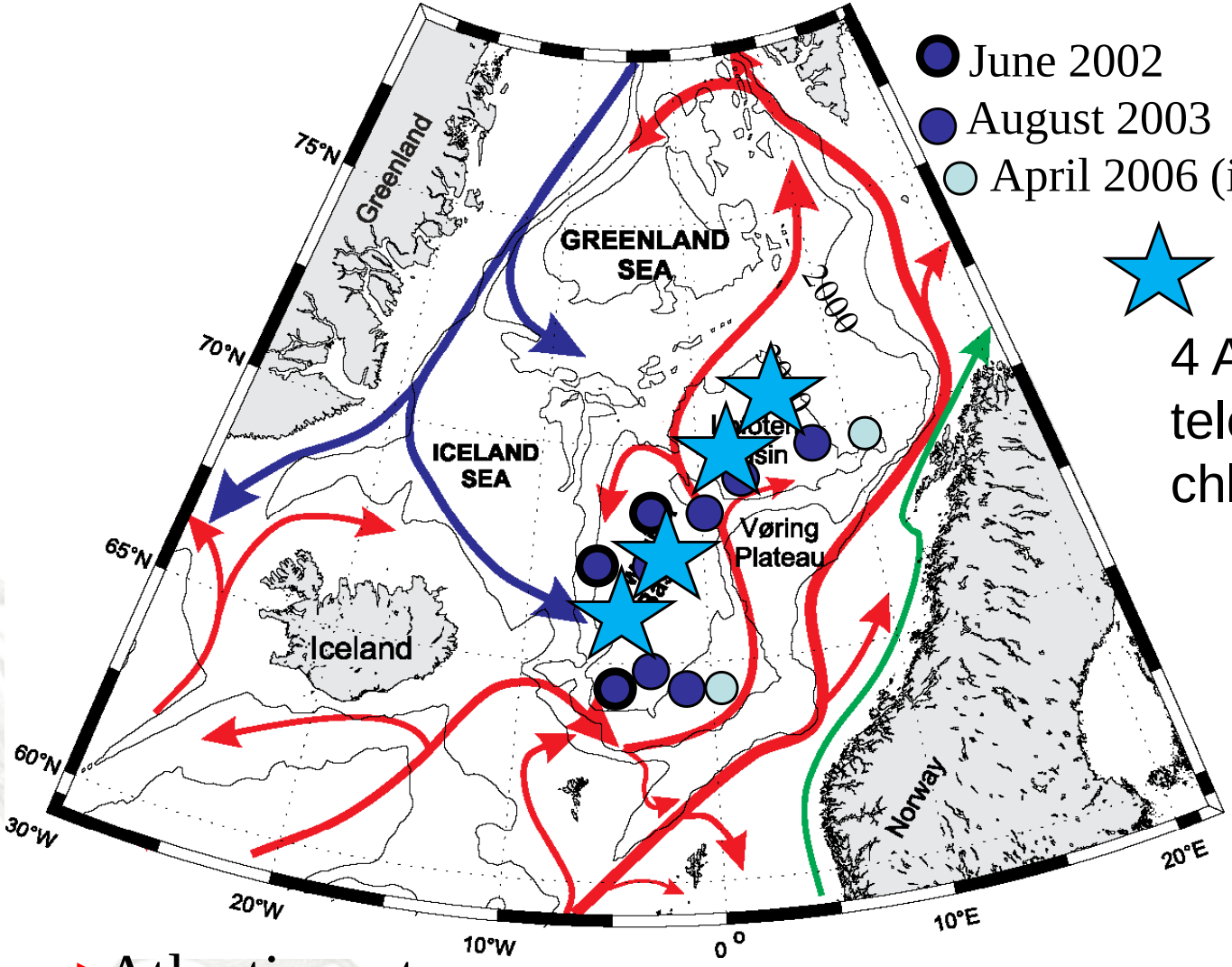


Hydrographic sections (taken few times per year)



CTD-stations taken from from ships in 2003. About 3000 stations are taken yearly.

IMR-Norway deployed 11 floats from 2002 to 2006.
In 2010 4+8 more floats are/will be deployed



June 2002

August 2003

April 2006 (includes oxygen and fluores.)

May-July 2010

4 APEX floats with Iridium telemetry, oxygen and chlorophyll

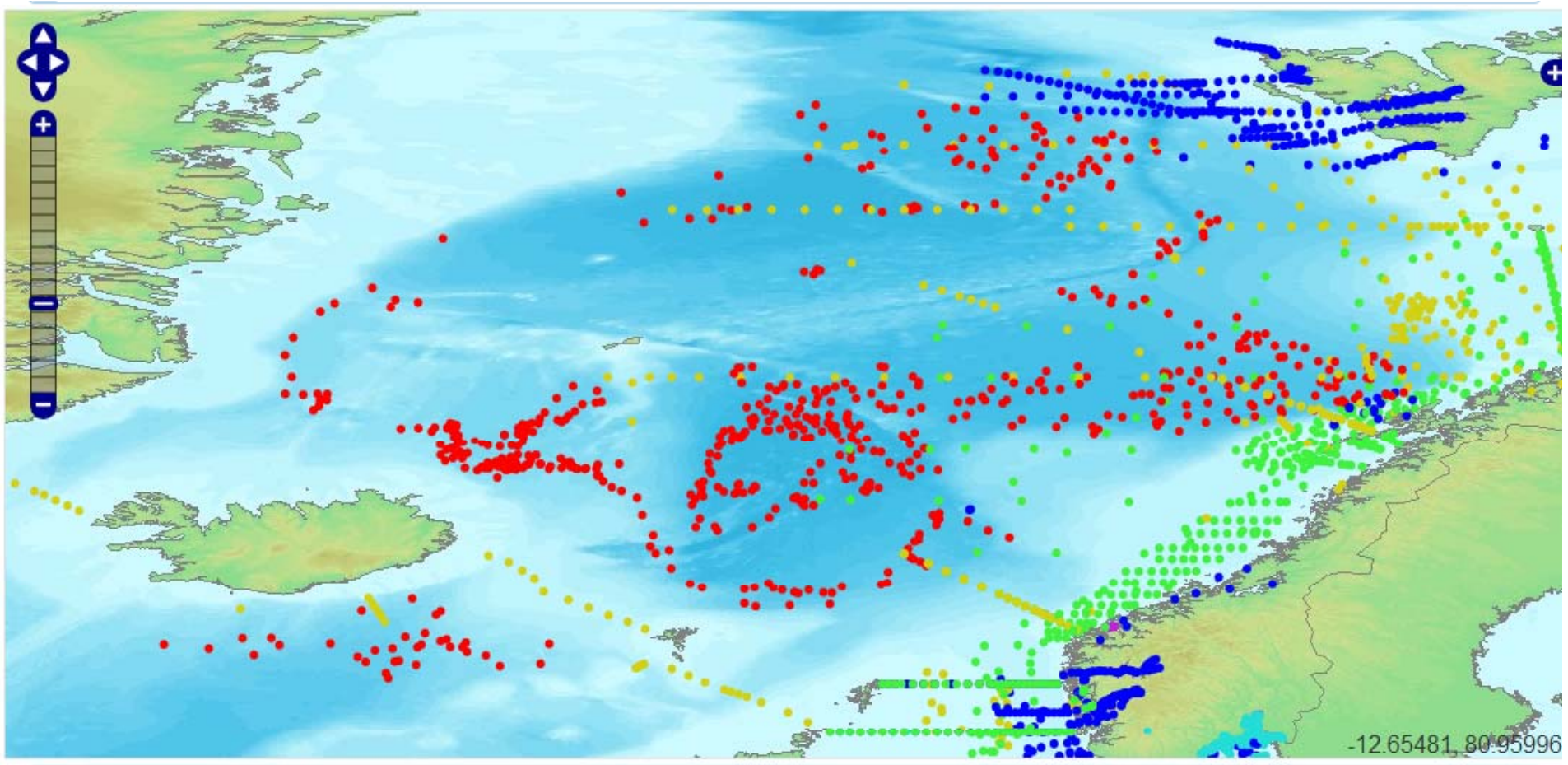
In total more 30 Argo floats have been deployed in the Norwegian Sea, mainly by Germany and Norway

Atlantic water

Arctic water

Coastal water

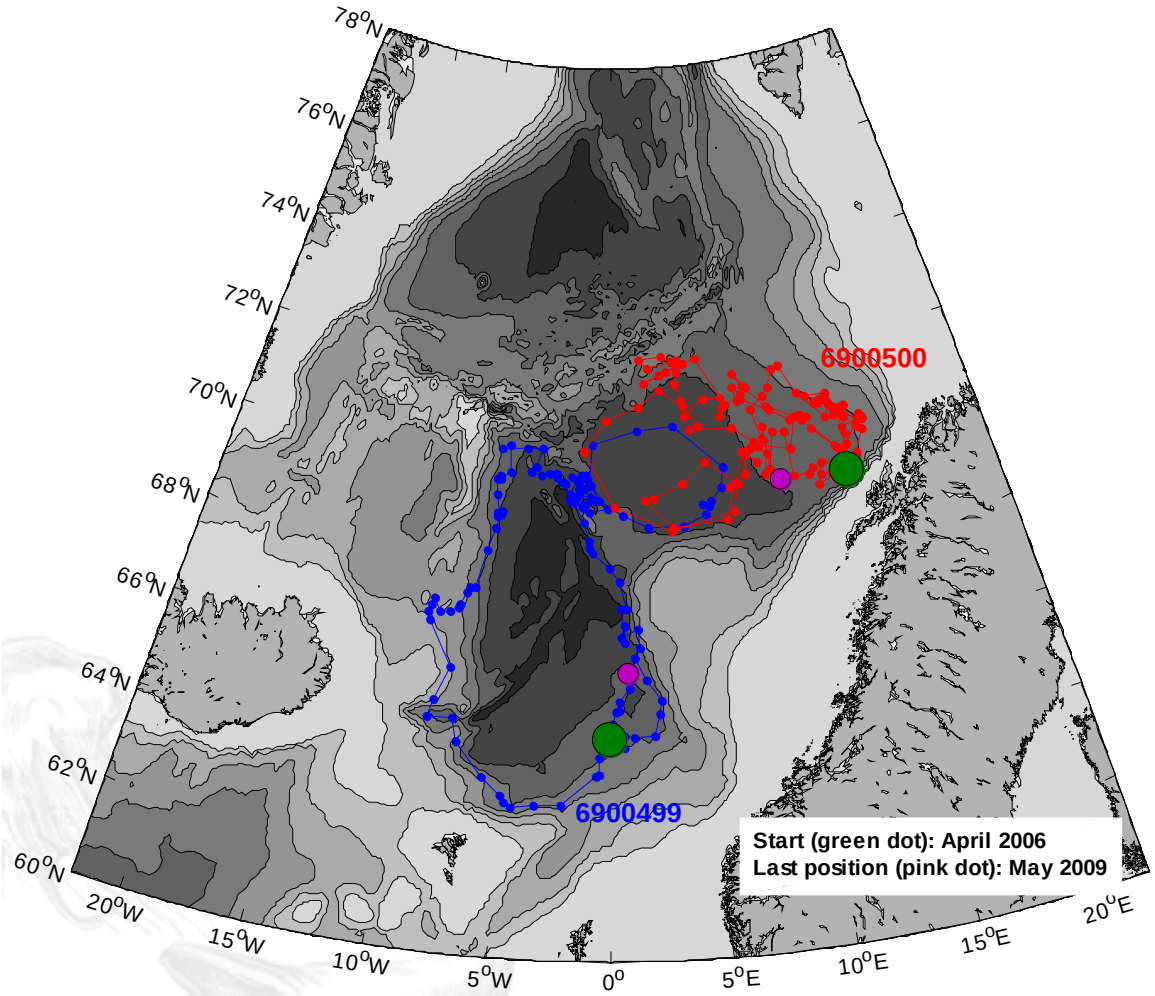
CTD-stations from research vessels and Argo floats in the Nordic Seas during 2009



Argo (red), G.O.Sars (orange), J. Hjort (green), H. Mosby (blue)

http://talos.nodc.no:8080/operasjonelledata/

Two Argo floats with extra sensors

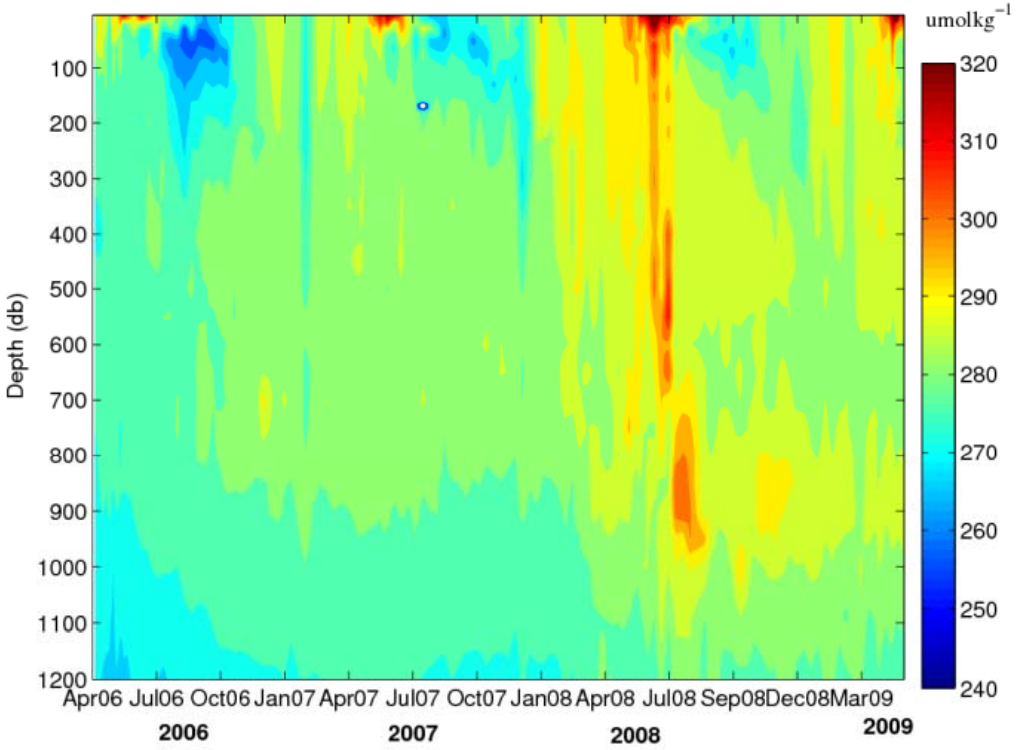


In 2006 two Argo floats were deployed and also equipped with oxygen and chlorophyll (fluoressence) sensors. Parking depth:1200 m

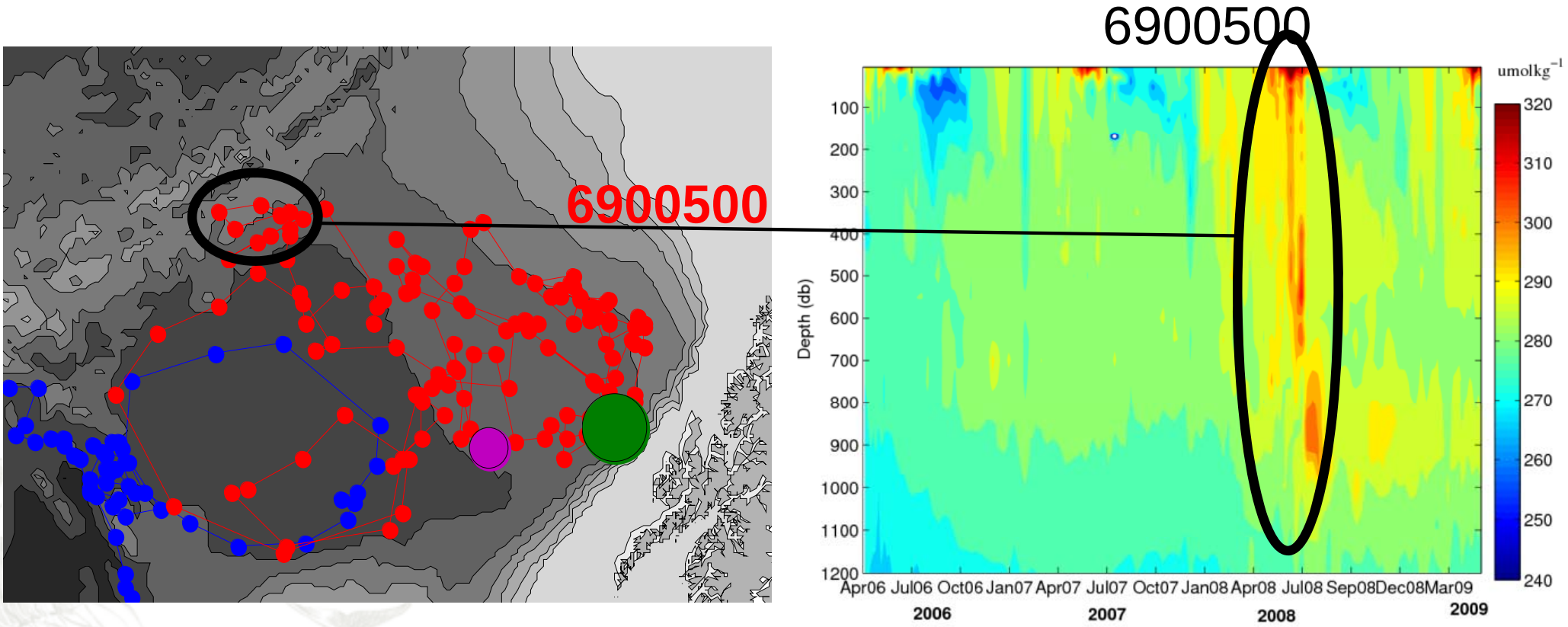
- 5 days cycle during April-May
- Chlorophyll measurements only in the upper 300 m and during March-October to save energy

Oxygen (umol/kg)

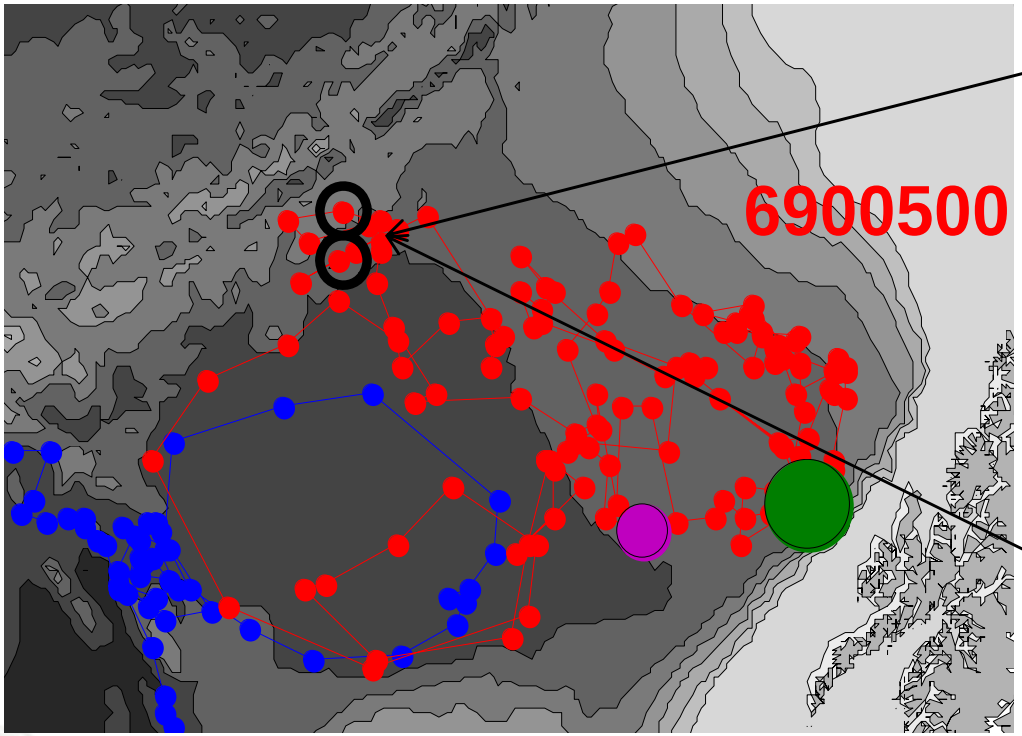
6900500

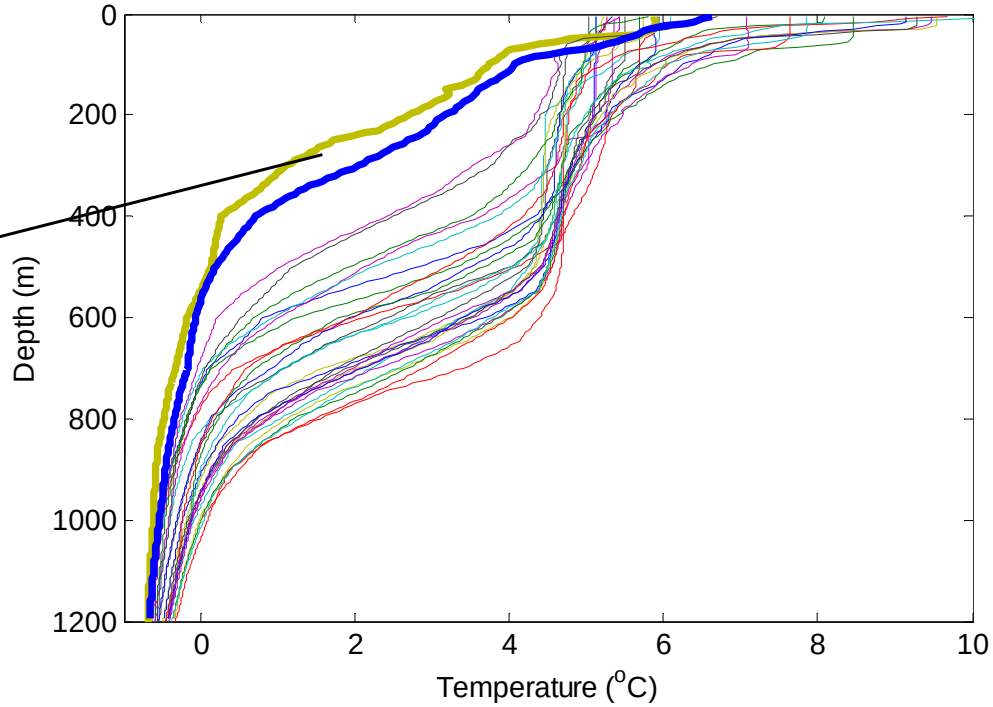


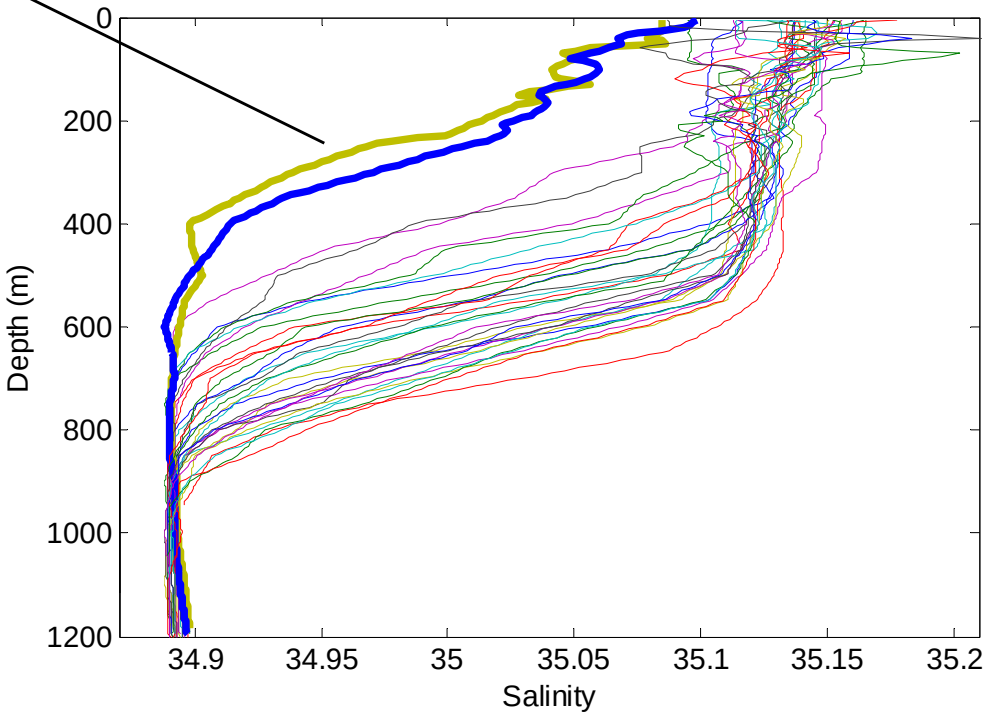
Oxygen (umol/kg)

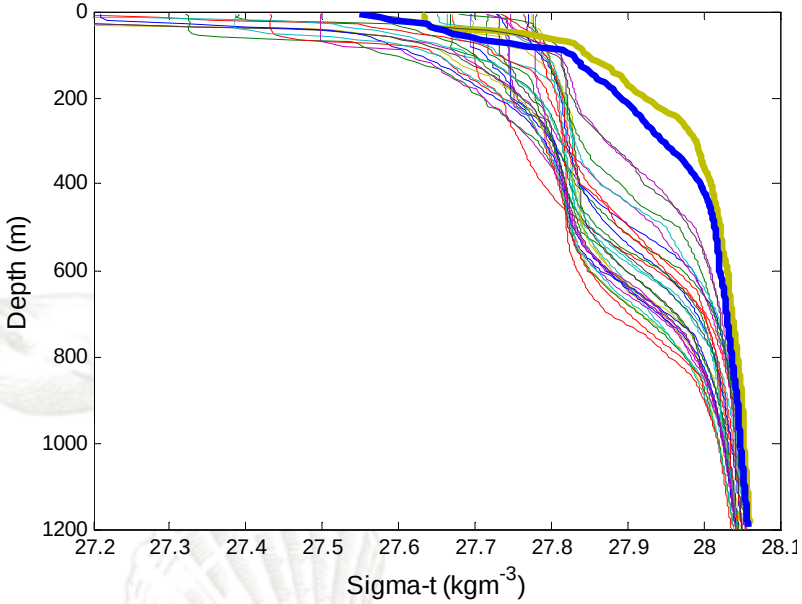


The T/S profiles

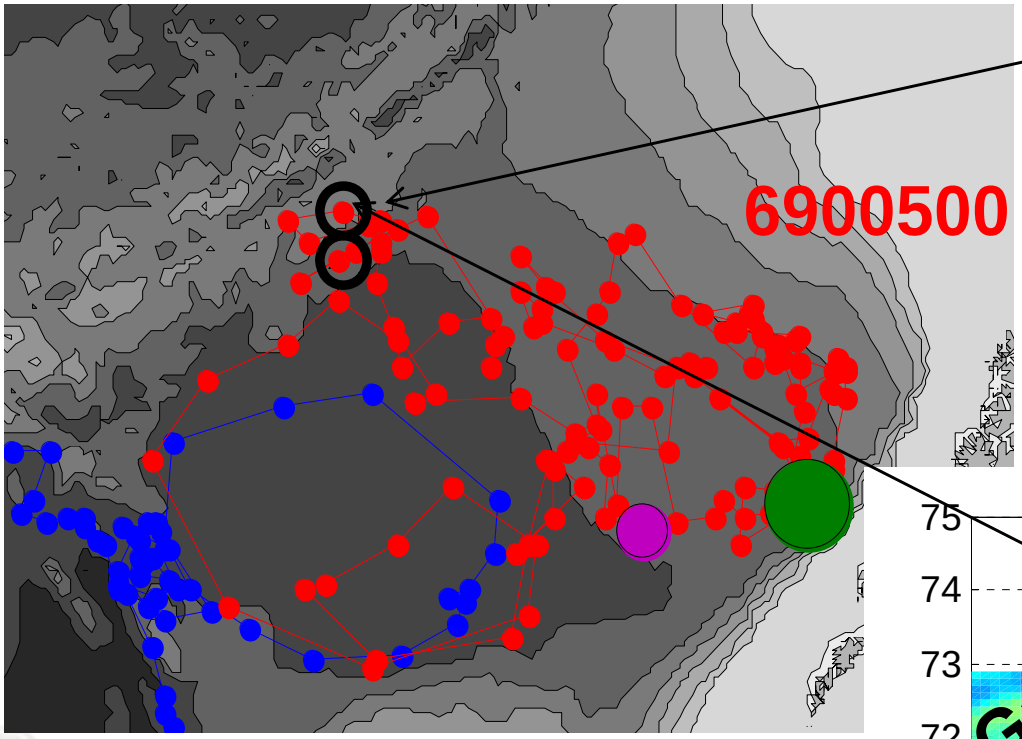


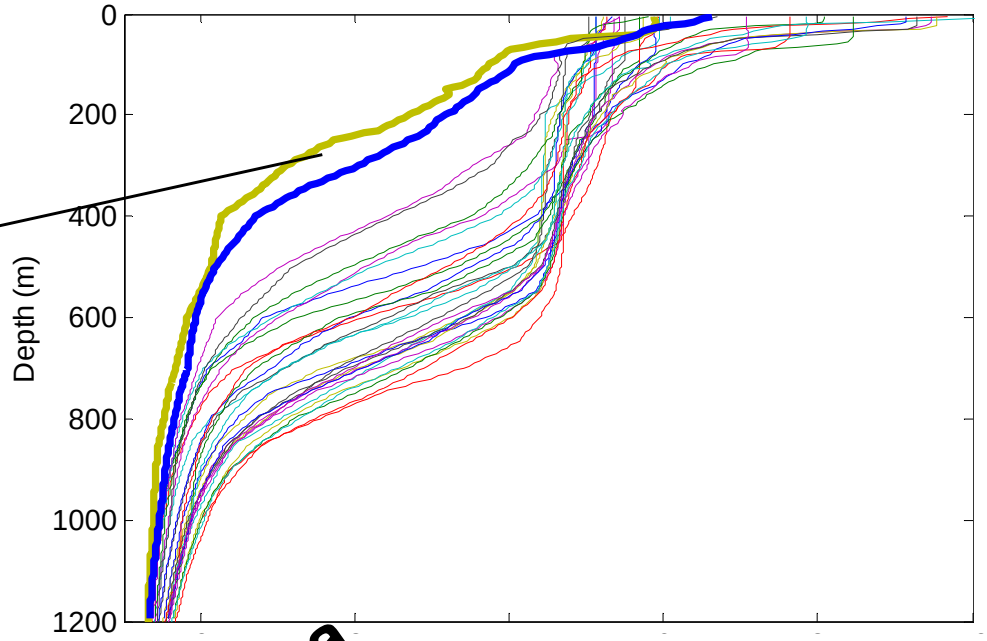


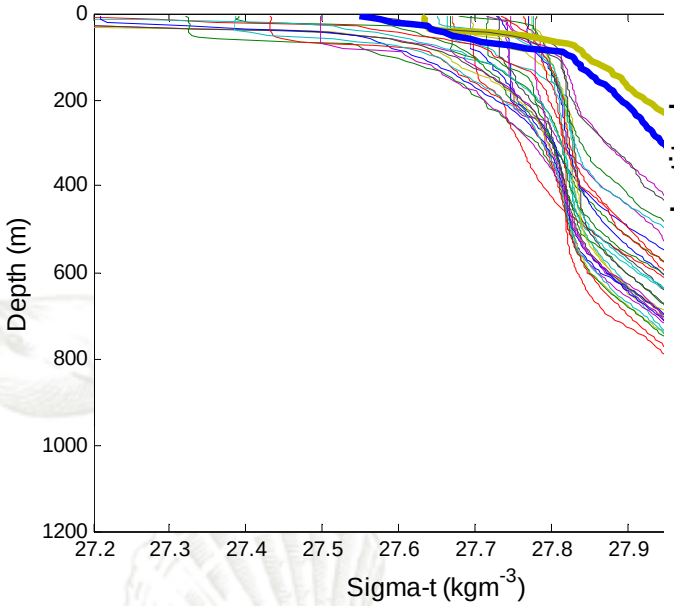


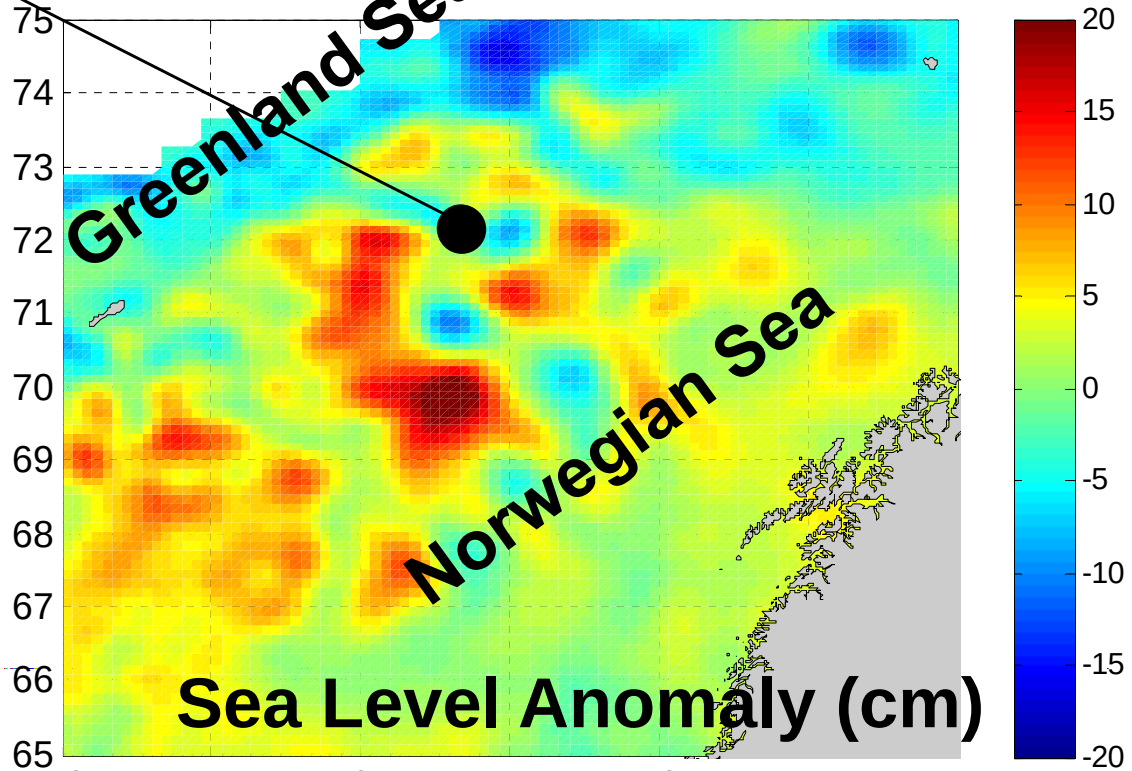


Arctic Intermediate Water from the Greenland Sea?









Use Argo data for ecosystem studies and monitoring

Key factors for plankton productivity:

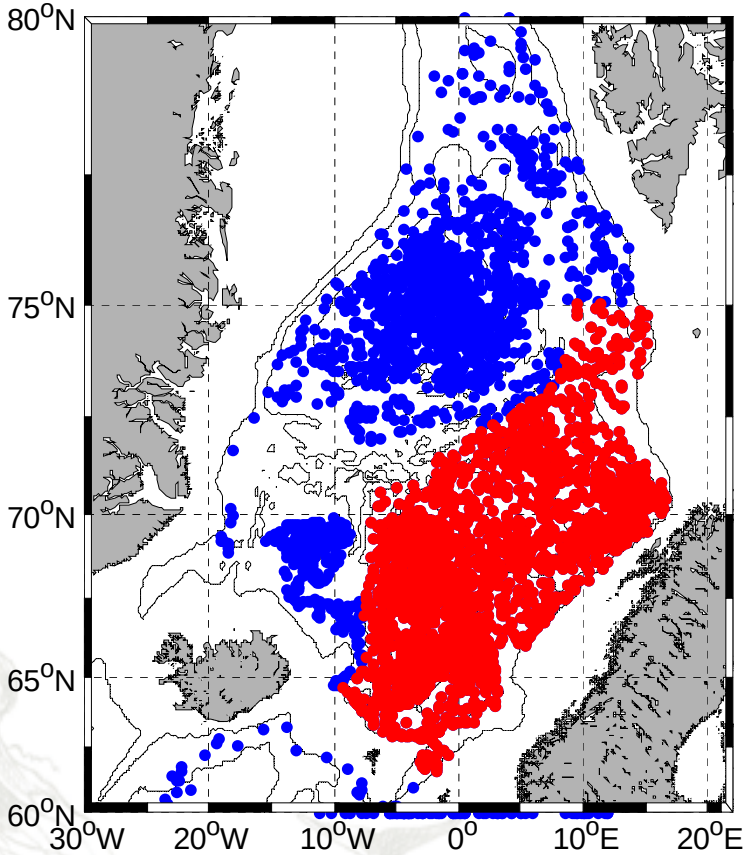
- Mixed layer depth (MLD)
- Sverdrup's Critical Depth (Dcr)

  Dcr: function of light and clarity of the water

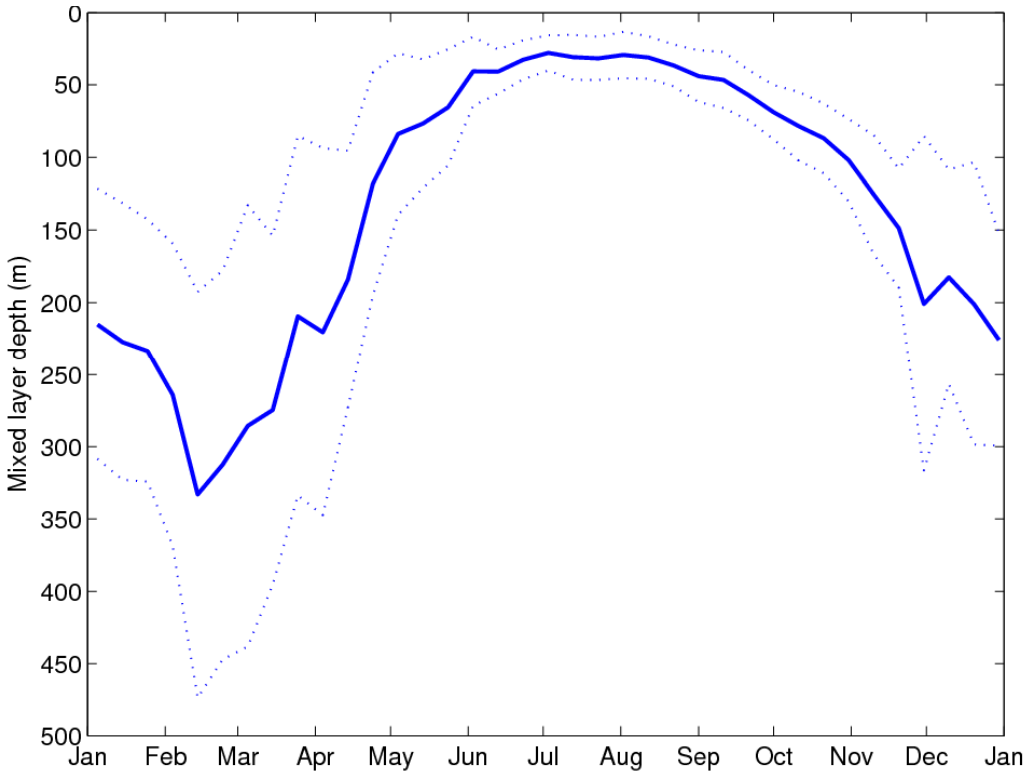
Net production/phytoplankton bloom starts when the mixed layer depth is less than a critical value (Dcr)

The zooplankton migrates upward from the subsurface to the surface or near surface when the phytoplankton bloom starts.

MLD when using all Argo floats



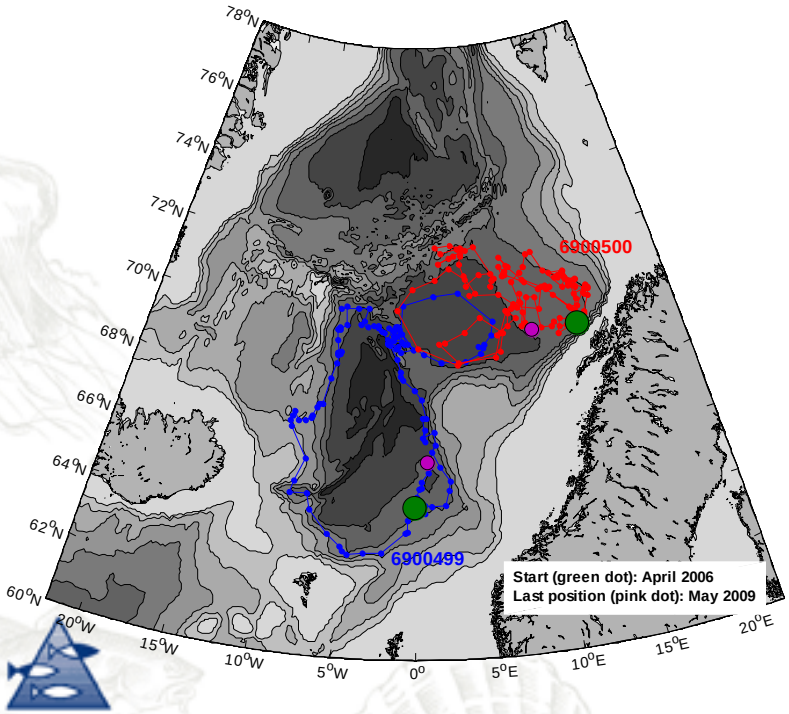
More than 3000 stations in the Norwegian Sea (red dots) during 2002-2008.

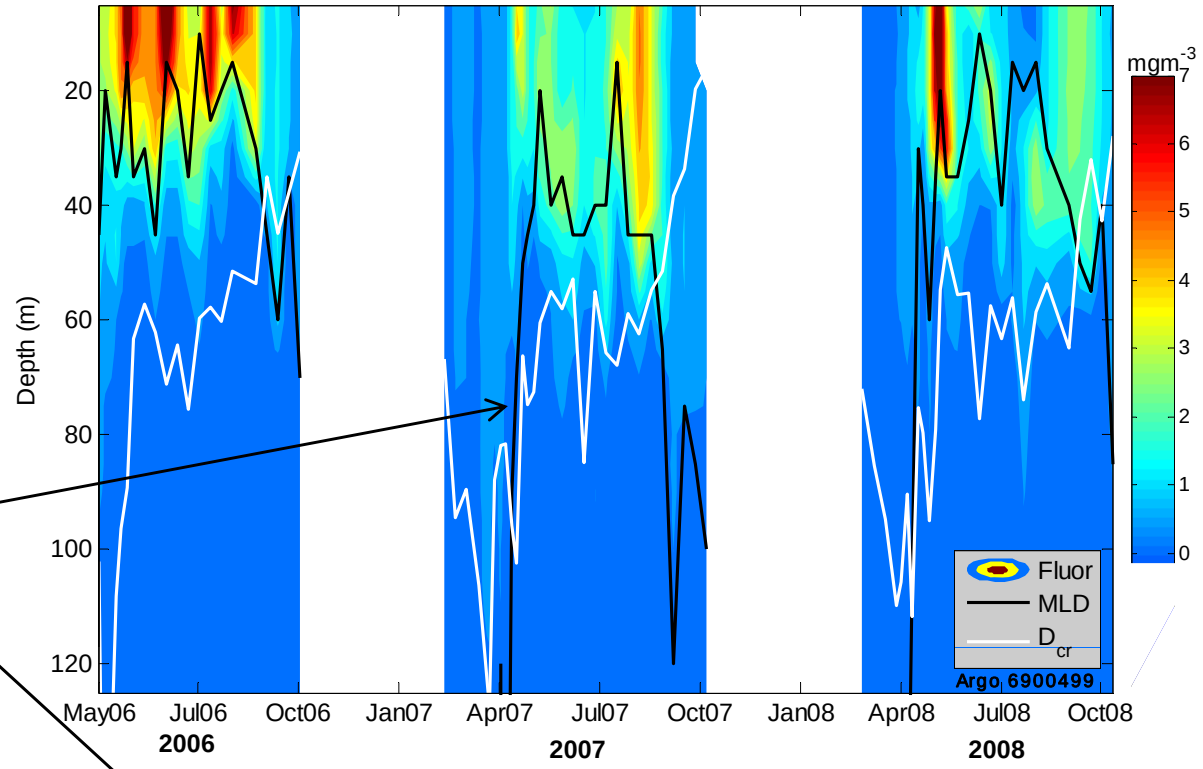


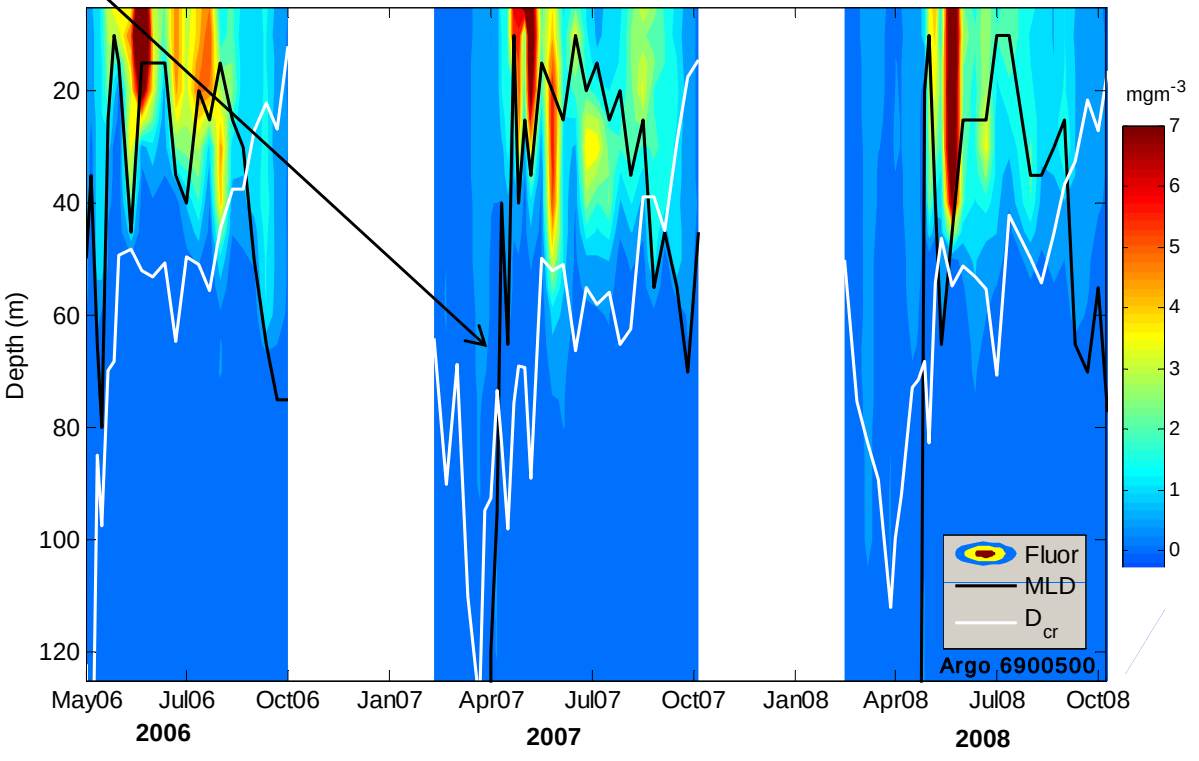
Mixed layer depth during the year (10 days window) with standard deviation

Chlorophyll, MLD, and Dcr

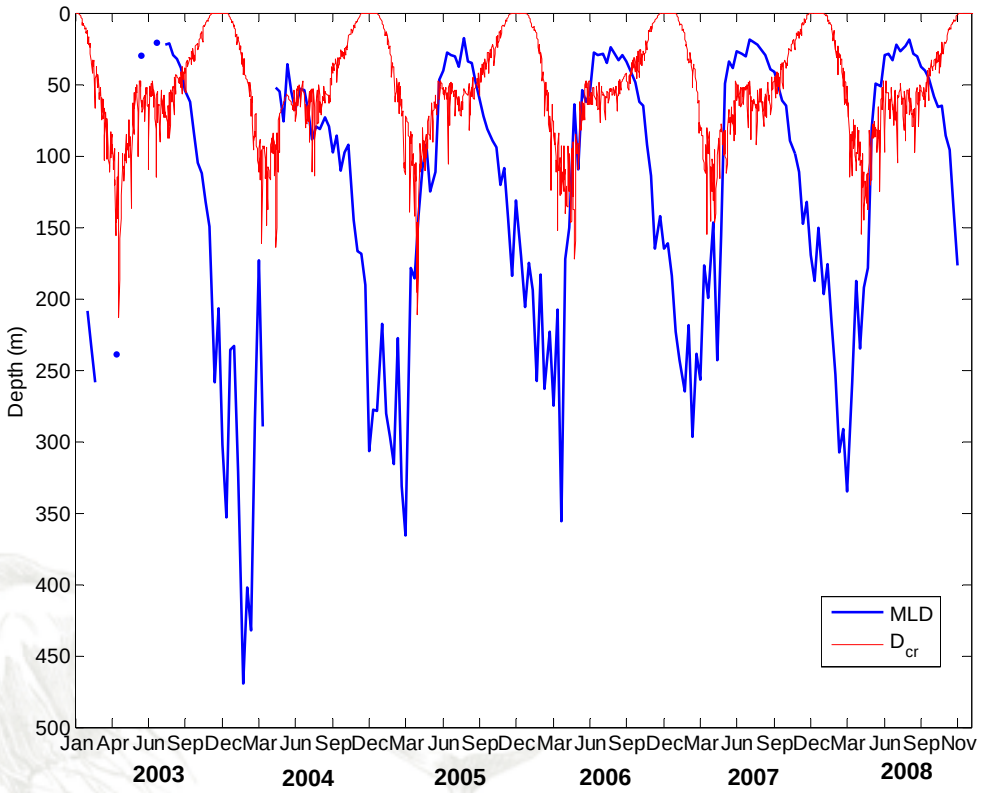
Phytoplankton bloom starts approximately when MLD<Dcr



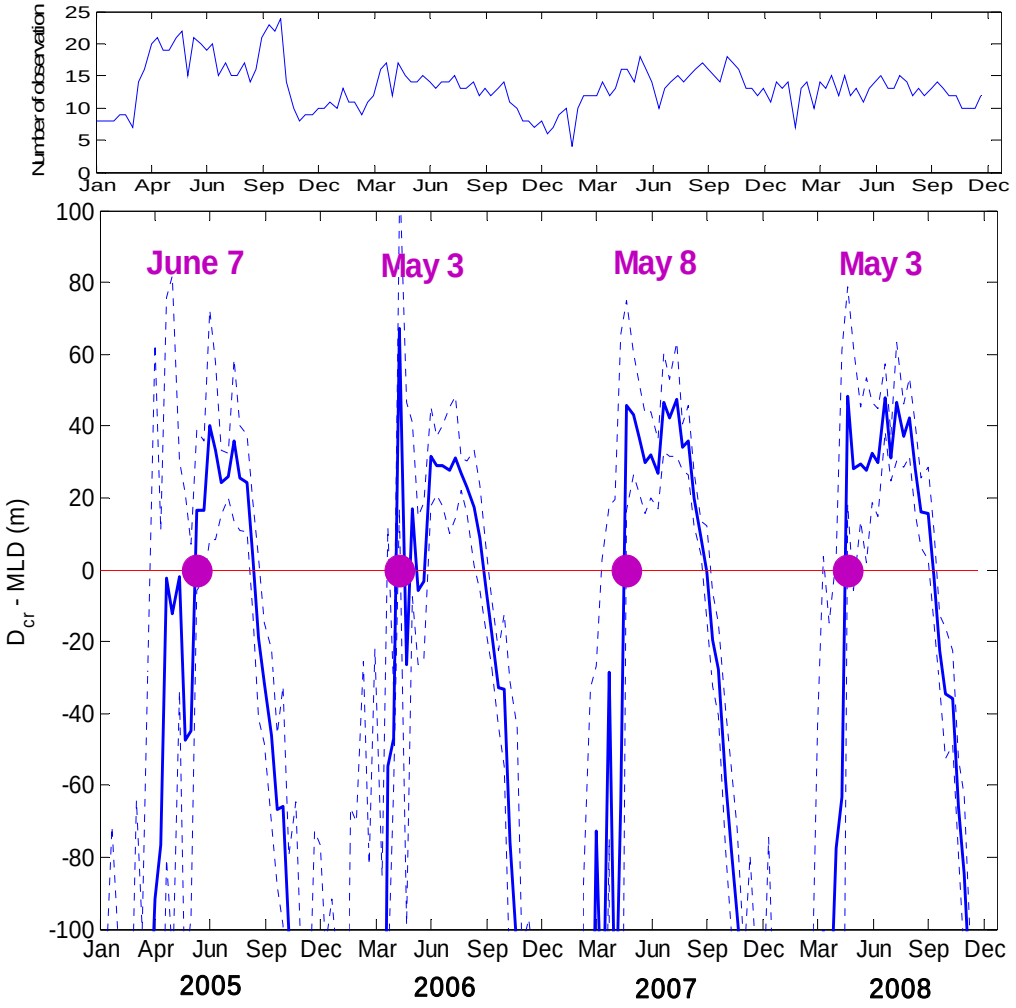




Timing of spring bloom in the Norwegian Sea using all Argo data (MLD) and Sverdrup's Critical Depth

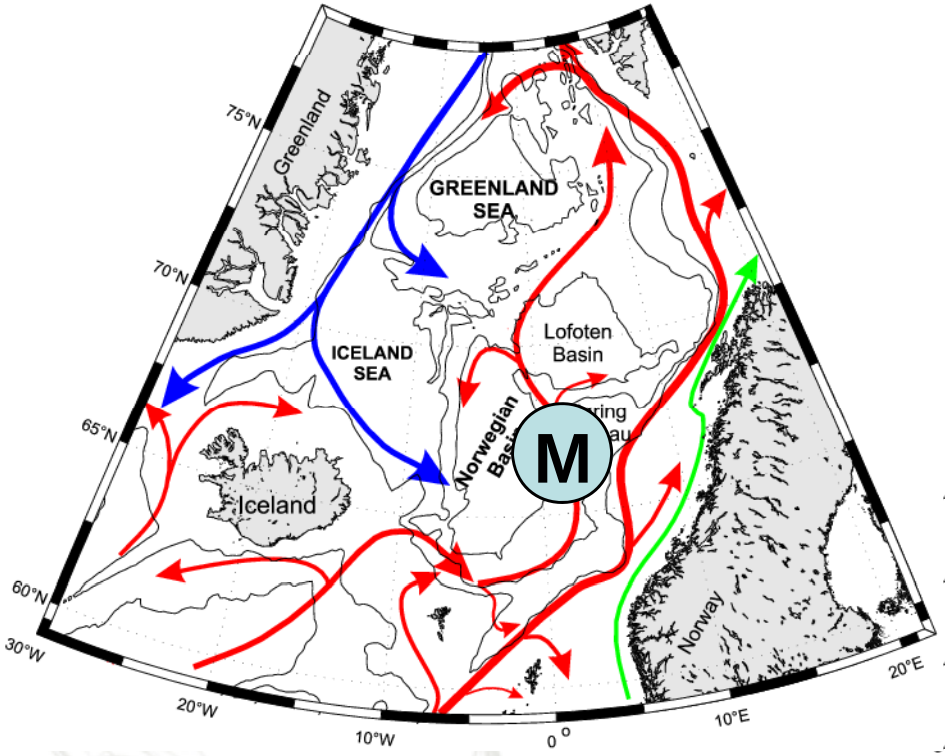


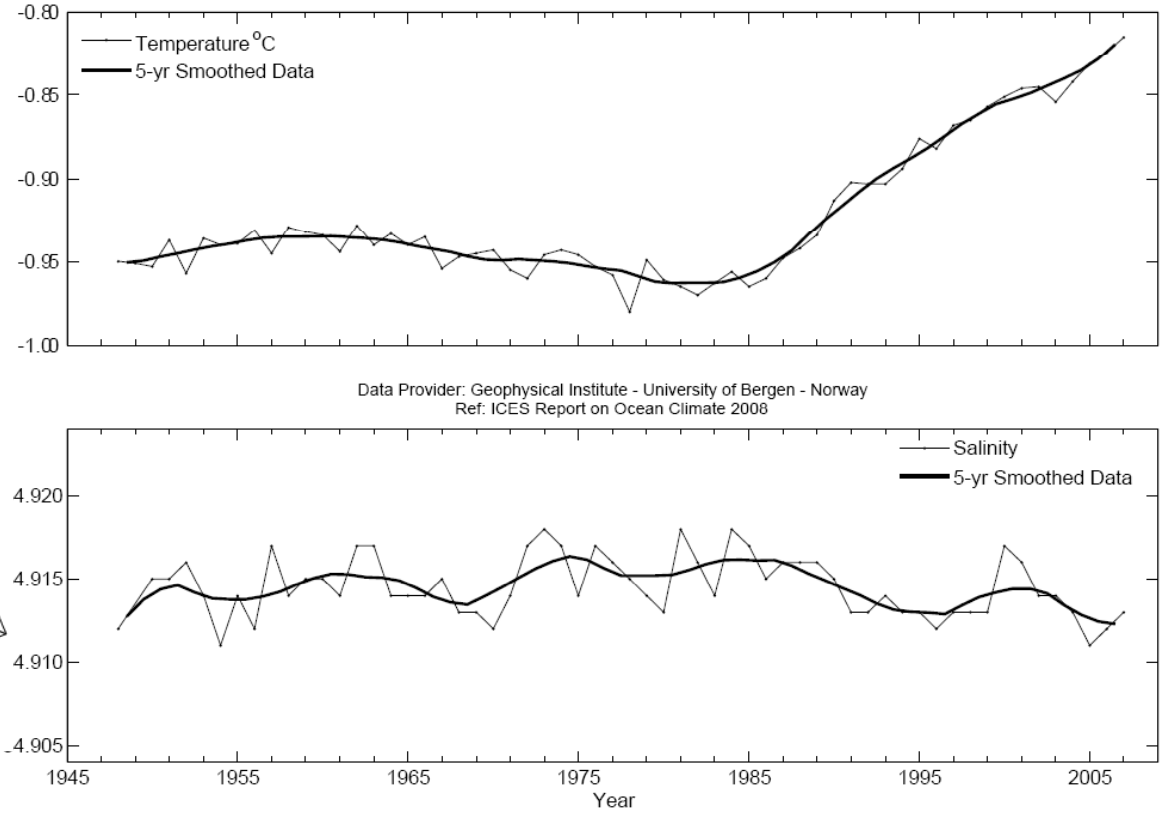
Mixed layer depth and Sverdrup's critical depth (Dcr)



Ocean Weather Station M (1948-2009)

The longest “existing” homogeneous time series from the deep ocean

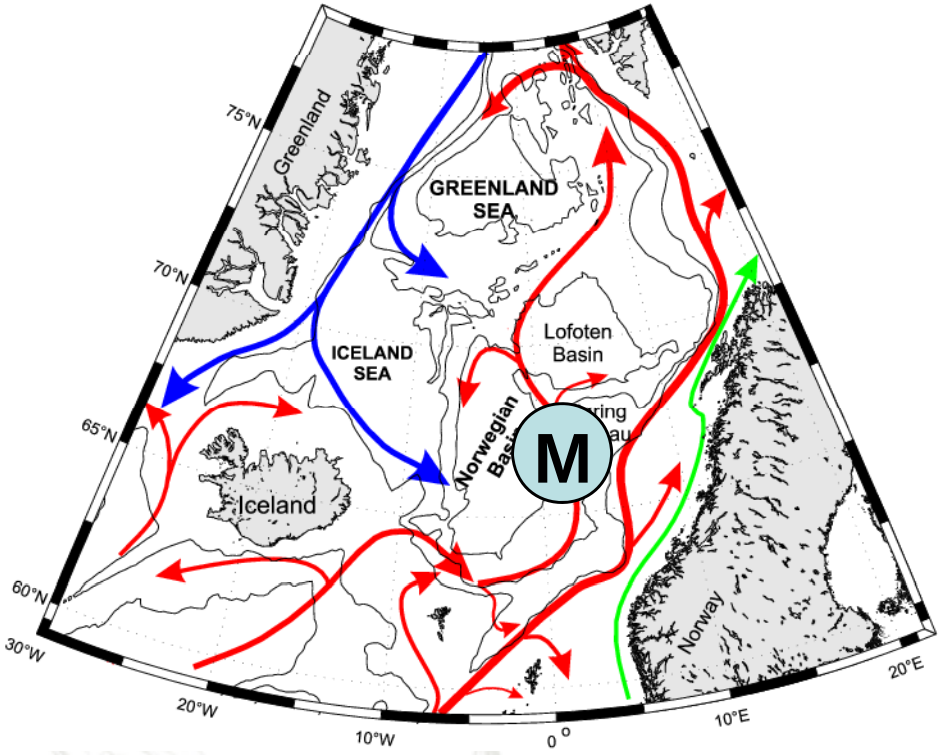


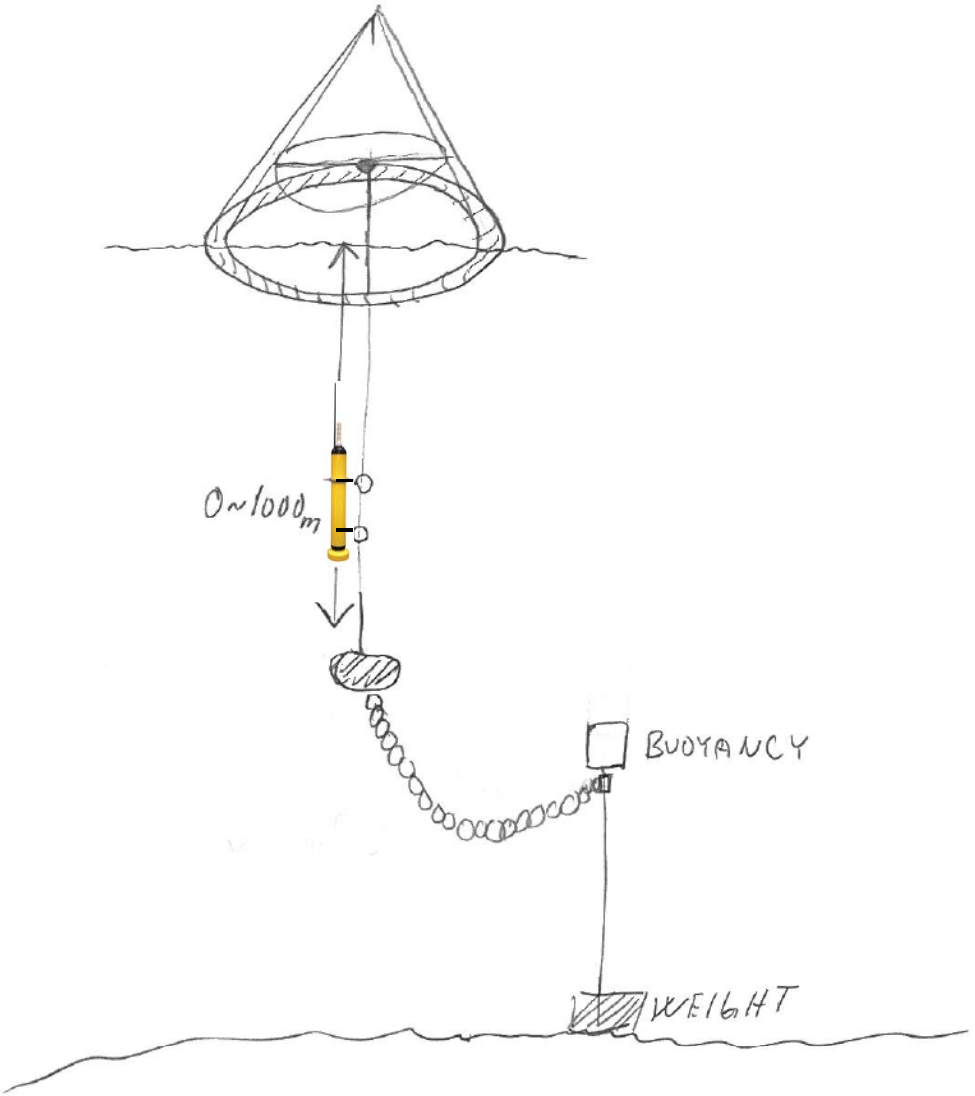


Temperature and Salinity at 2000 m depth

Replace the ship with an Argo float at OWS M?

Argo float at a fix position (OWS M)





Ideas, experience, suggestions are welcome!

Future plans

- **Apply for long-term funding from the Norwegian Research Council for membership to the Euro-Argo ERIC. Deadline for proposal: 13 October 2010.**

Several institutes in Norway are interested in Argo data e.g. IMR, met.no and NERSC in MyOcean, the Norwegian Polar Institute, and the University of Bergen (Use of Argo included in a course ”Operational Oceanography”)

- **Continue to use Argo data in ecosystem studies, and we are interested in using biogeochemical sensors.**

Thank you !