Autonomous Subpolar Atlantic Carbon

What is the ecosystem response to changes in forcing?

Changes in a globally important place

- Circulation changes - Hakkinen & Rhines 2009 - smaller SP gyre
- Carbon system changes - Shuster & Watson, 2007 - less CO_2 sink
- Ecosystem changes - Beaugard, 2005

Forcing

- Global climate change - Arctic outflow +.... - urgent, but difficult
- Seasonal cycle - a tractable time scale
  - Strong signal
  - Not well understood
  - Spatial "fingerprint" within gyre

Ecosystem

- Biogeochemical - plankton, nutrients, gasses etc.
- Important fisheries of rich countries

Response - "What we measure"

- We are still learning how to make autonomous measurements
- This is logistically "easy" , but still open ocean

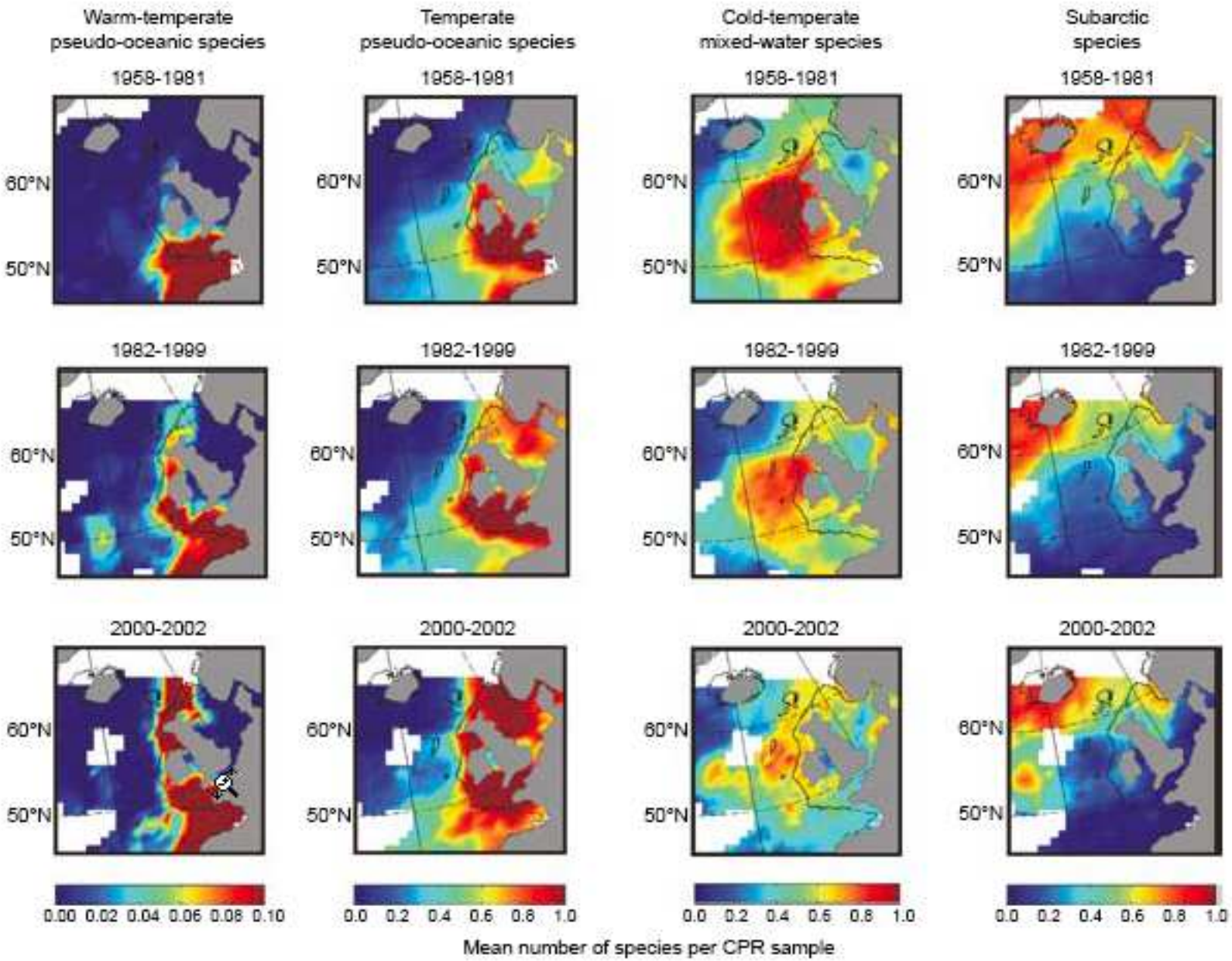
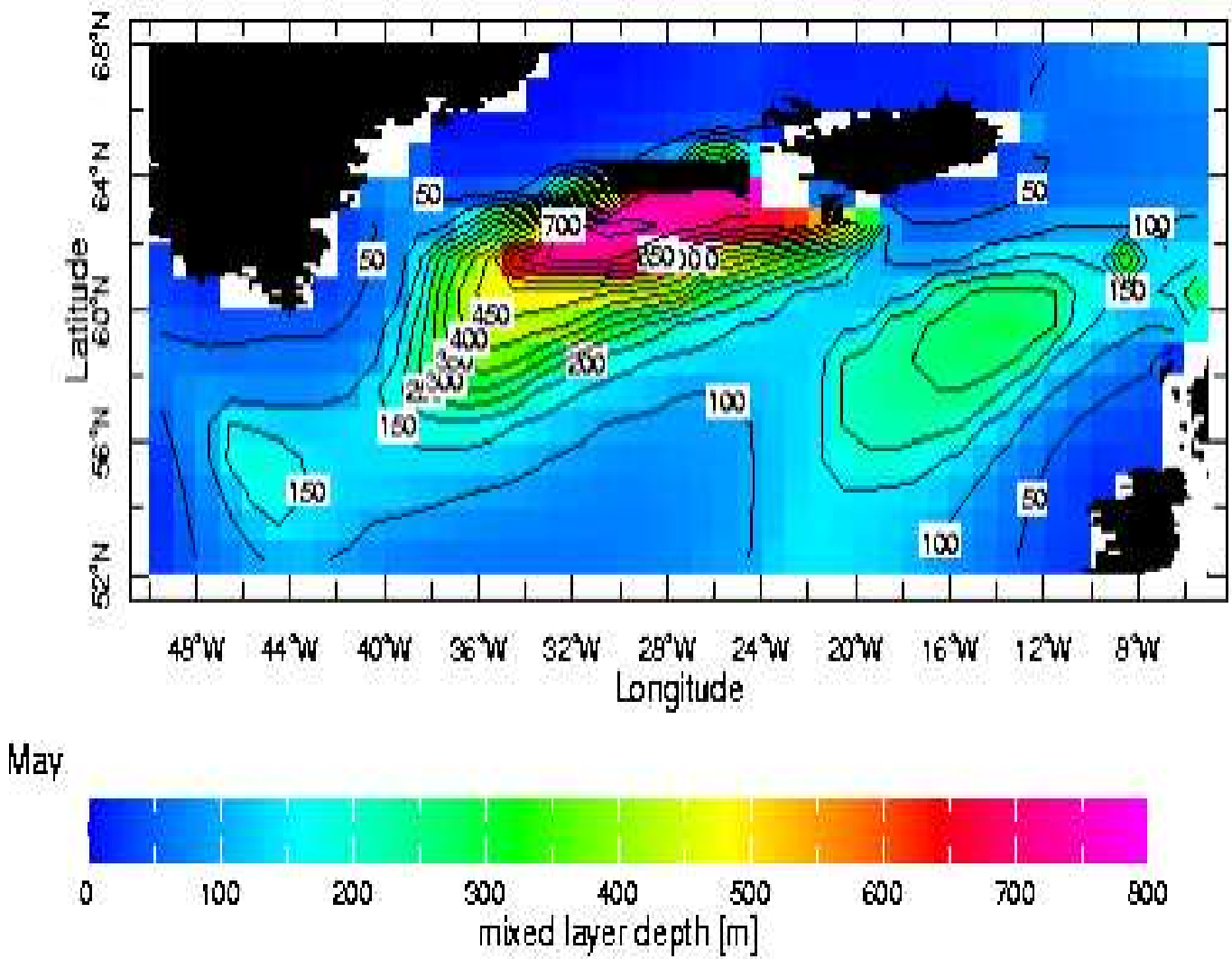
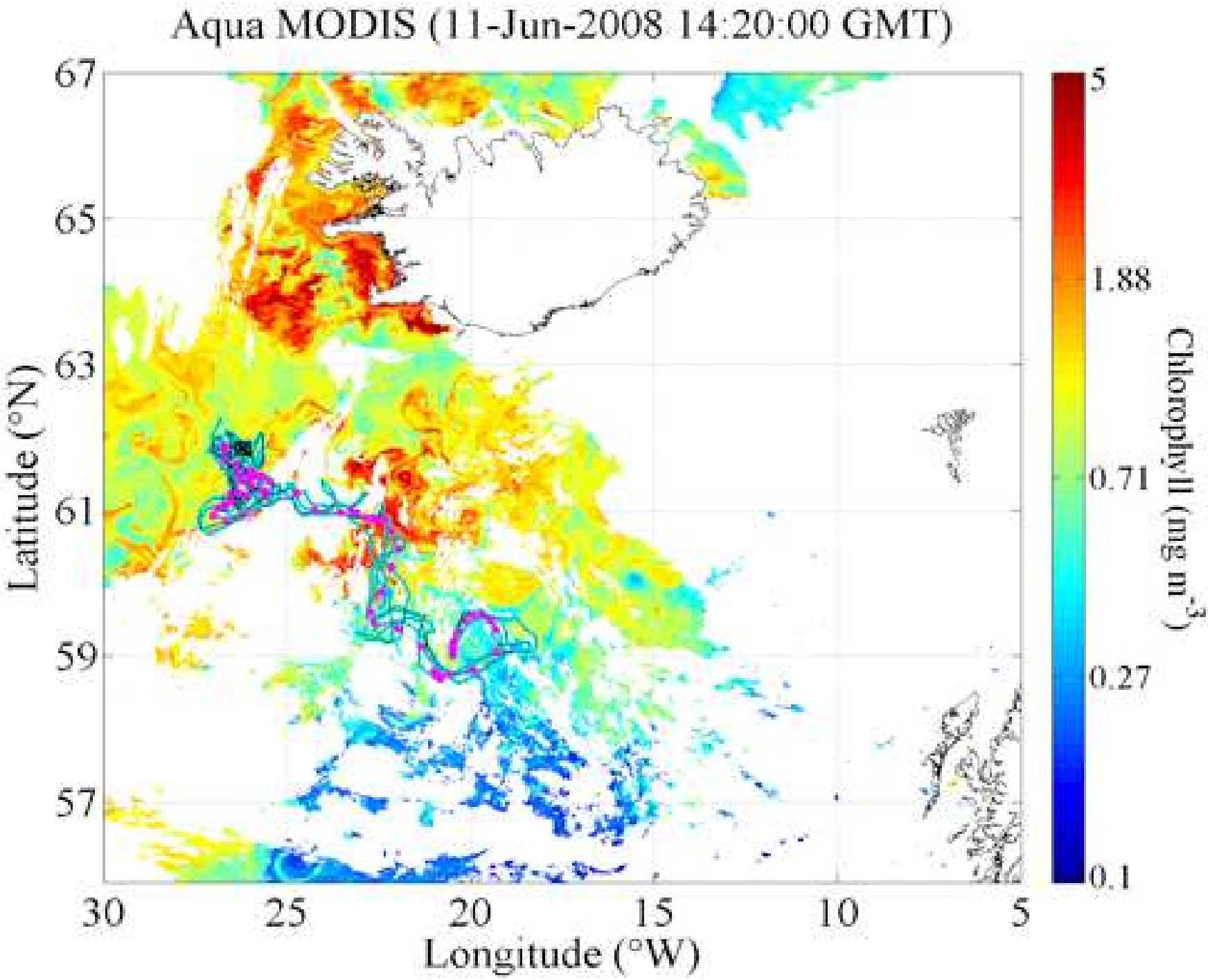


Figure 2. There is evidence that species assemblages have changed extensively during 3 periods over a forty-four year period (from Beaugrand, 2005 - Figure 3). Warm-water species in the northeast Atlantic have extended their distribution northwards by more than 10° of latitude, while cold-water species have decreased in number and extension.



LEVITUS94 MONTHLY mixed layer depth


Aqua MODIS (11-Jun-2008 14:20:00 GMT)
67
65
63
61
59
57
Latitude (°N)
30
25
20
15
10
5
Longitude (°W)
5
1.88
0.71
0.27
0.1
Chlorophyll (mg m-3)

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Subpolar North Atlantic Carbon Experiment

Glider Lines:
30-40 days transit

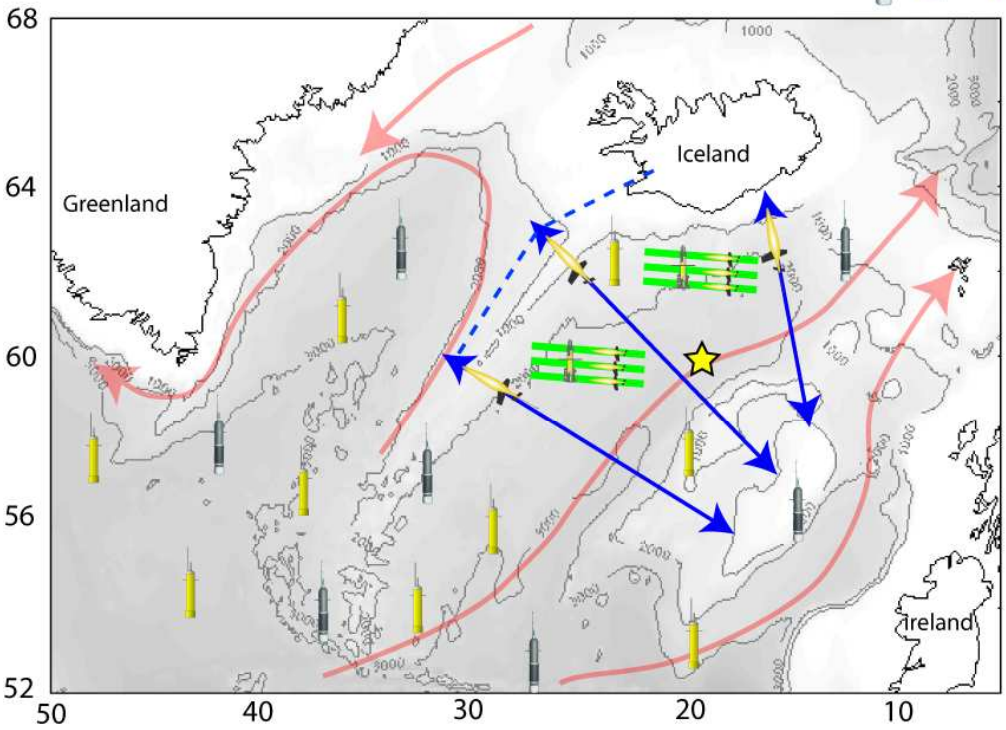
BC-ARGO Array

Lagrangian Array

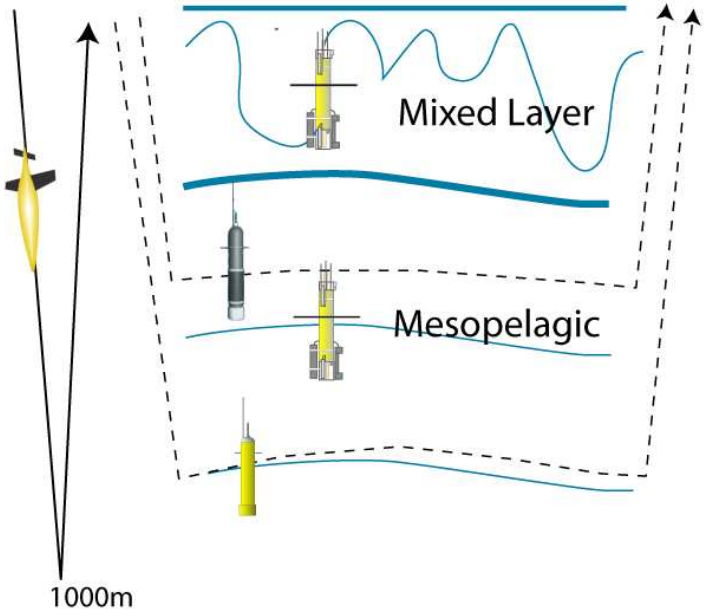
120 day deployments

Ships

Service/Calibration cruises (8)
Process cruises 3



Two year duration - July -> July



Sensors

Now: O_2, NO_3, Chl, Optical POC, Light
New: DIC/CO_2, N_2, Zooplankton, Export

Ties to other programs collaborations ?