The story from the UK

First: The good news

Major NERC Strategy Themes

- Life Support Systems – "…growing understanding of the interactions between the Earth's biological, geological, physical and chemical processes. **More research and observations are needed** before natural and human-induced impacts can be distinguished and environmental predictions improved…

- …target investment to priority areas aimed at understanding the complex interactions and feedbacks within the Earth system over a range of space and time scales…"

NERC Strategic priorities: Science

- Earth's life-support systems
- Climate Change
- Sustainable economies

"More research and observations are needed before natural and human-induced impacts can be distinguished and environmental predictions improved……"

NERC Strategic priorities: Science

- Earth's life-support systems
- Climate Change
- Sustainable economies

"…seek to understand the integrated physical, chemical, geological and biological response to climate variability and the consequent feedback on the climate system, at a range of temporal and spatial scales.…"

NERC Strategic priorities: Science

- Earth's life-support systems
- Climate Change
- Sustainable economies

"Geological processes contribute to the evolution of landscapes, oceans, atmosphere and the biosphere and cause major natural hazards. A fuller understanding of fundamental solid-Earth processes will benefit decision making on a range of important societal issues…"

Initial Ideas SR2004 - NEB

- Rapid Climate Change -- additional research activity and capacity building is required
- Understanding the deep ocean – a major new investment is needed
- Sustained long-term observational systems – environmental observing systems in the sea

B-DEOS

British Dynamics of Earth and Ocean Systems

B-DEOS

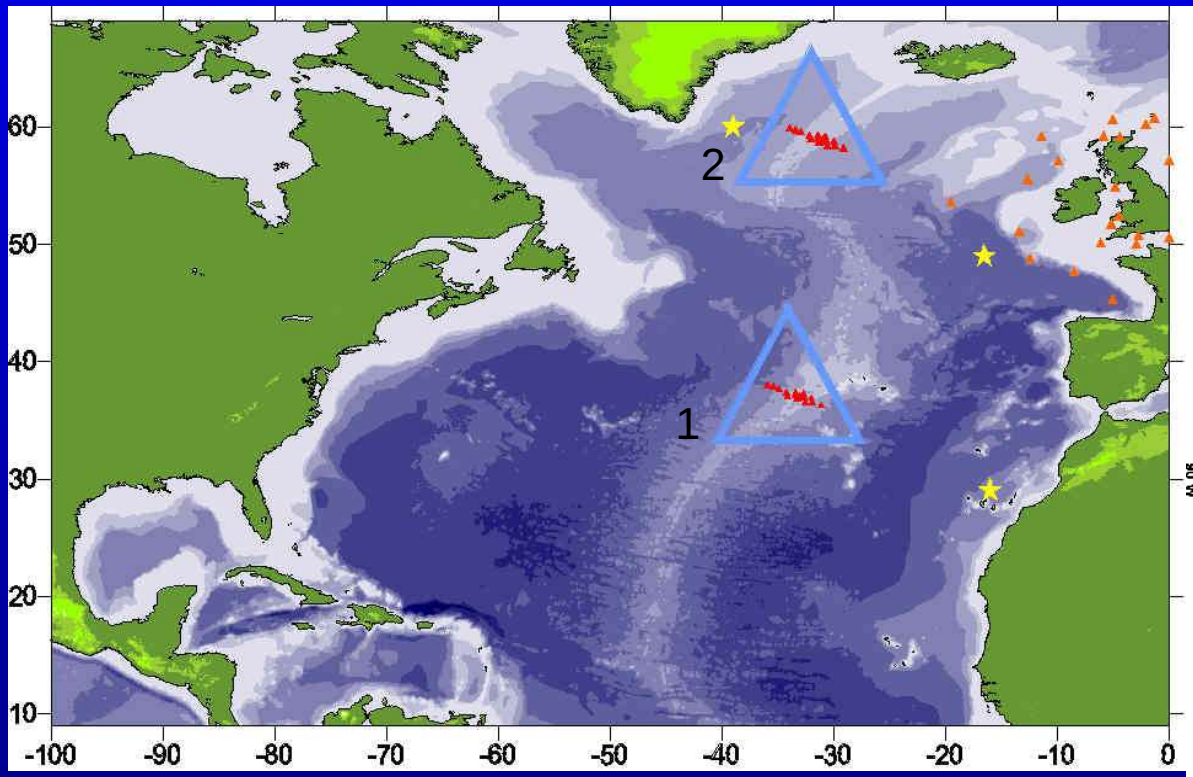
- Town meeting: July 2001
- Submitted to NERC: September 2001
- Feedback - strongly supported but some issues to address (Risk register, costs, international context)
- Resubmitted February 2003

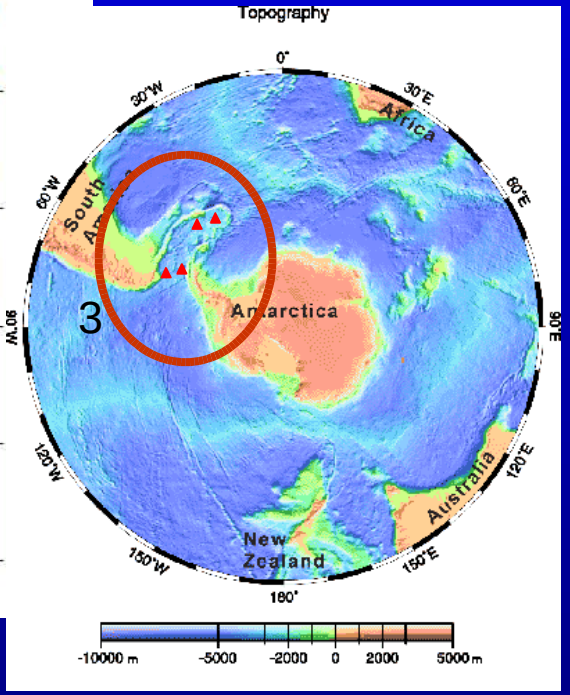
British Dynamics of Earth and Ocean Systems

"To examine the space and time varying properties of the solid earth, ocean, air-sea interface and biosphere;

to explore the causes of their variability and the links between them."

British Dynamics of Earth and Ocean Systems





Then: the bad news

Then: the bad news

Followed by good

Then: the bad news

Followed by good:

1. *RAPID*, a recently started program

2. *QUEST*, a future program.

Rapid Climate Change

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RAPID

the new NERC programme

RAPID: background

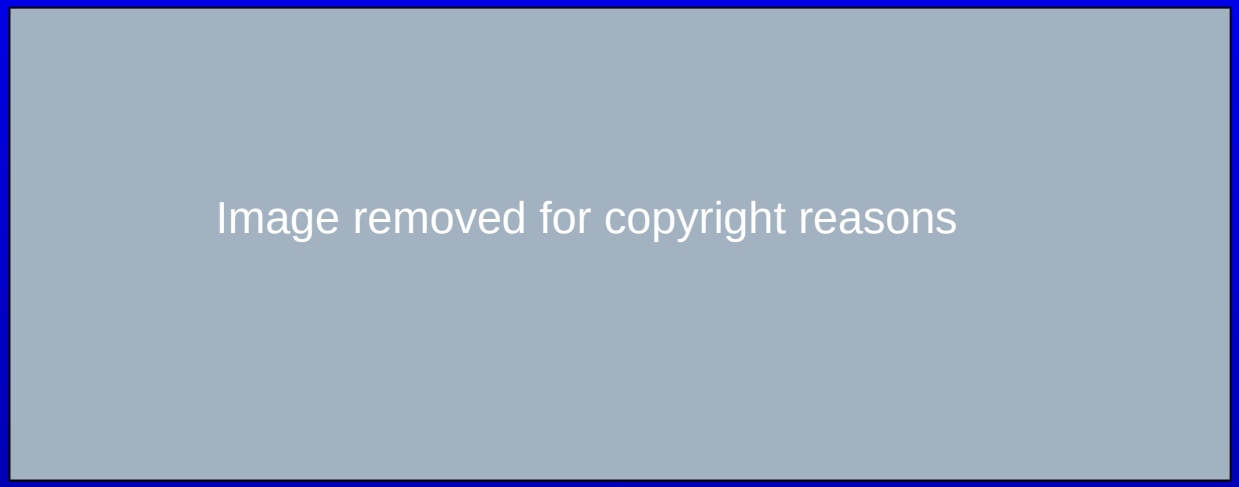
- There is palaeo evidence of past rapid changes in the N. Atlantic THC
- Observations suggests that the N. Atlantic THC may be changing (e.g. deep overflows)
- Model studies of global warming scenarios show range of results

High resolution palaeo data (eg 8.2ky BP cold event)

Rapid cooling event seen in $d^{18}O$, details in strontium and phosphorus record in stalagmite, western Ireland

Baldini J U, McDermott F & Fairchild I J 2002 Structure of the 8200-year cold event revealed by a speleothem trace element record, Science, 296,2203-2206.

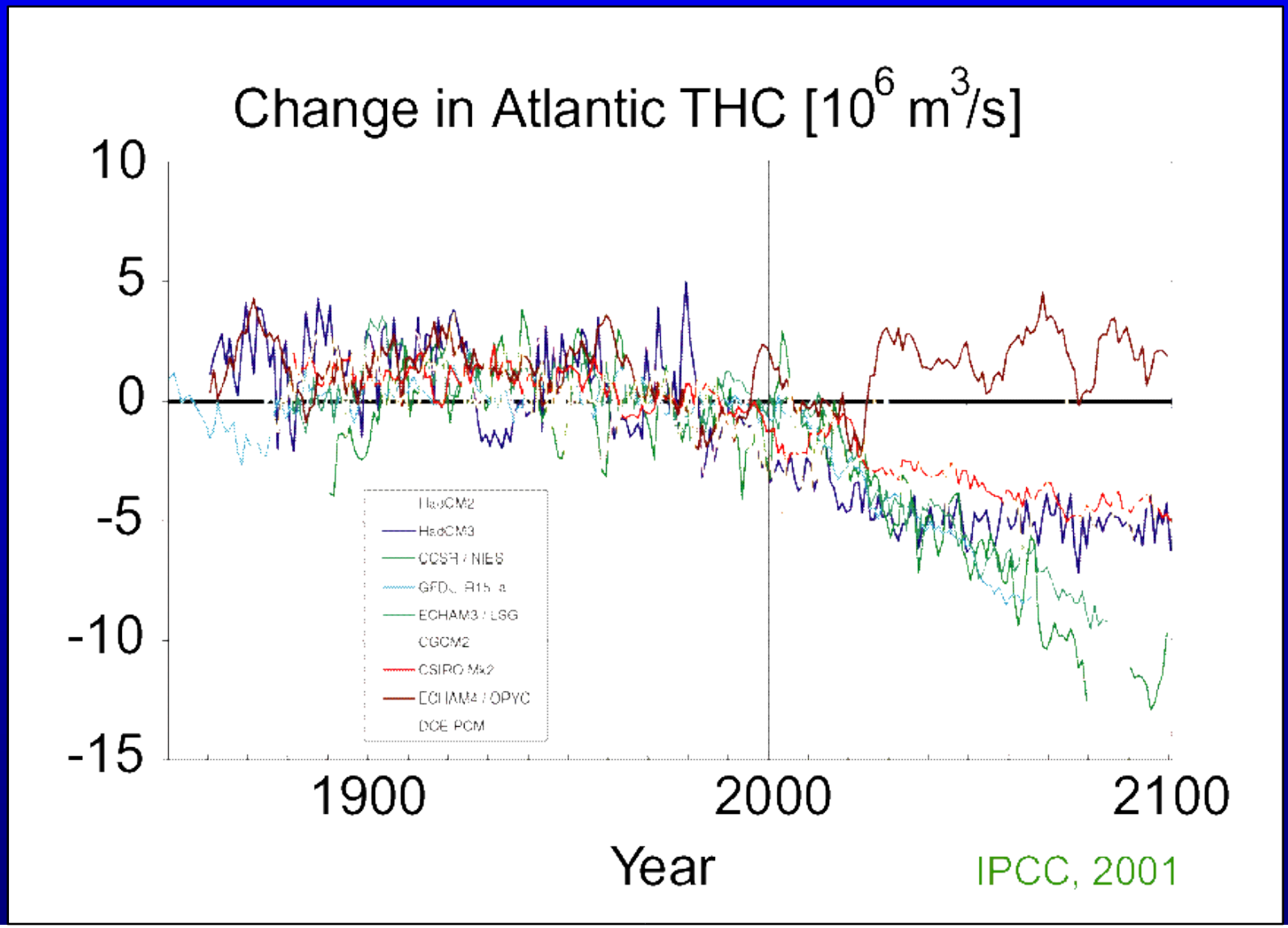
Weakening of deep overflows



Depth of s_t=28 isopycnal at OWS-M above sill at Faroe Bank Channel

Hansen B.; Turrell, W. R. and Østerhus S. 2001 Decreasing overflowfrom the Nordic seas into the Atlantic Ocean through the Faroe BankChannel since 1950. Nature, 411, 927-930.

Model predictions of THC



RAPID

- NERC (Natural Environment Research Council) thematic programme
- NERC has awarded £20M over 6 years
- Started November 2002
- Fieldwork starting January 2004

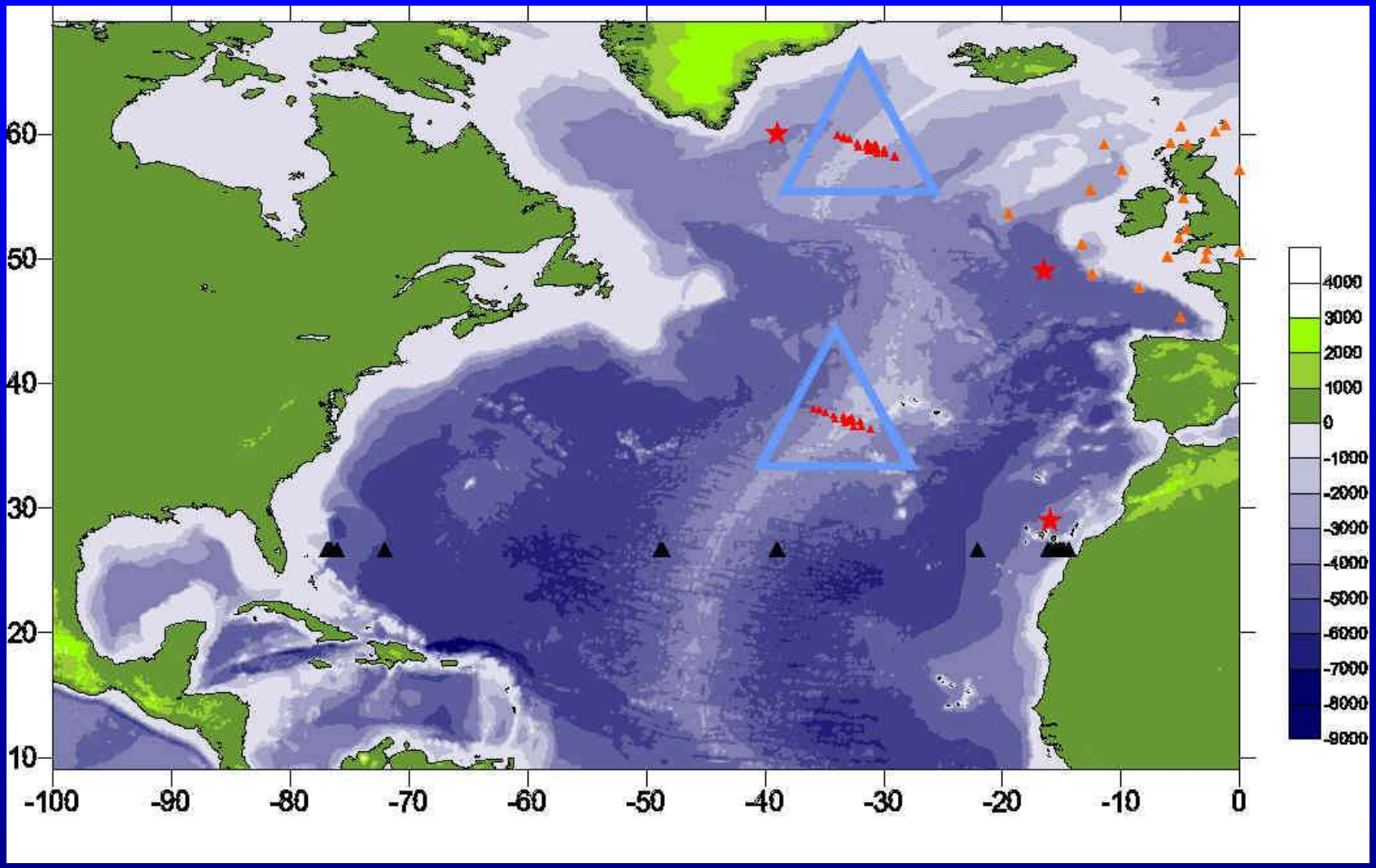
RAPID: aims

Investigate and understand rapid climate change, with a main focus on the role of the Atlantic's thermohaline circulation (THC)

1. Present day observations
2. Palaeo-observations
3. Modelling

International links

- Norway: NOClim programme,
- Holland: LOCO, ASOF
- NSF (USA) complementary projects for MOC monitoring
- CLIVAR (GOALS, DecCen, ACC)
- IGBP (PAGES, IMAGES)



The *RAPID* 26.5N transect (Black triangles)

The 26.5N transect

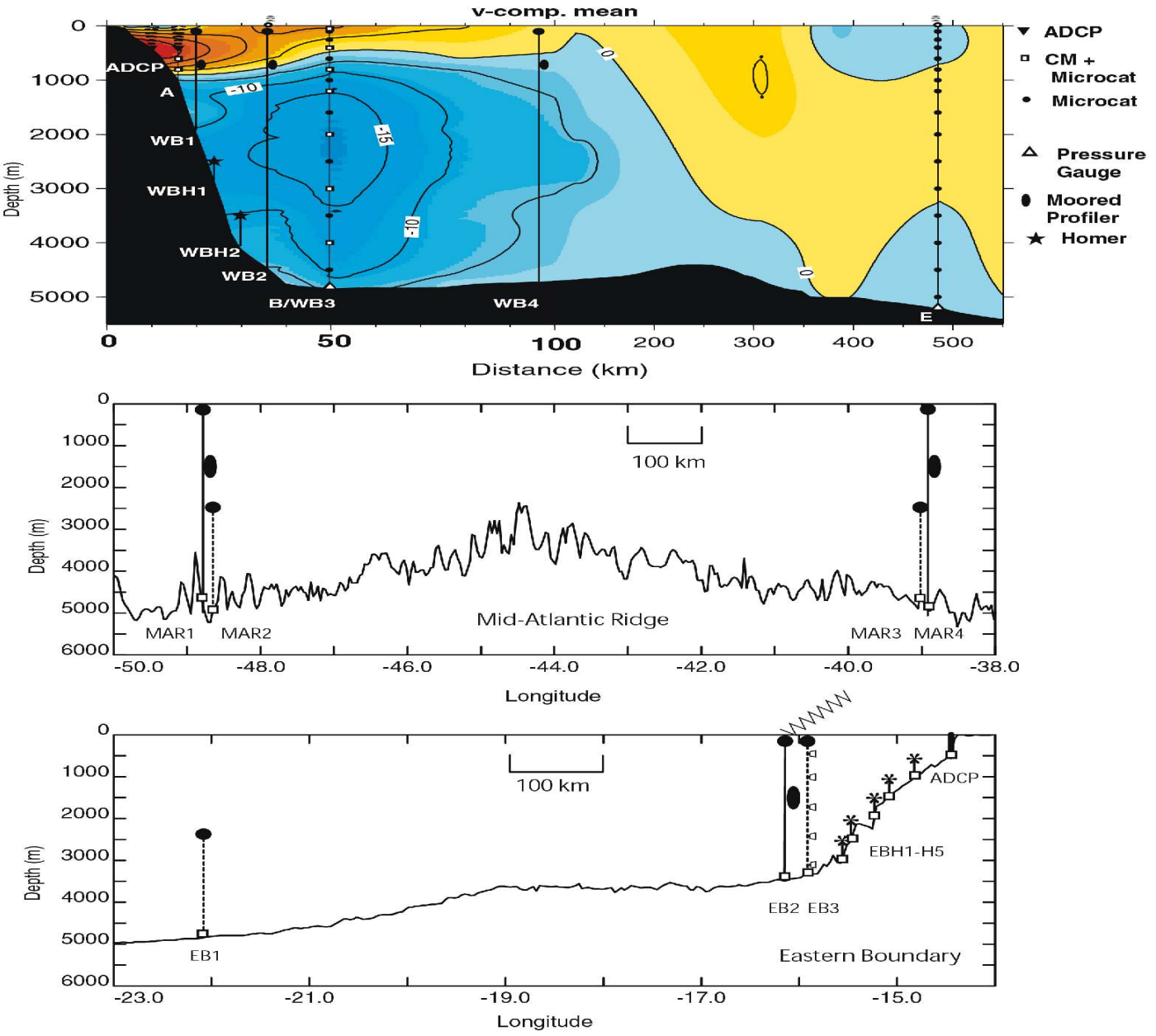
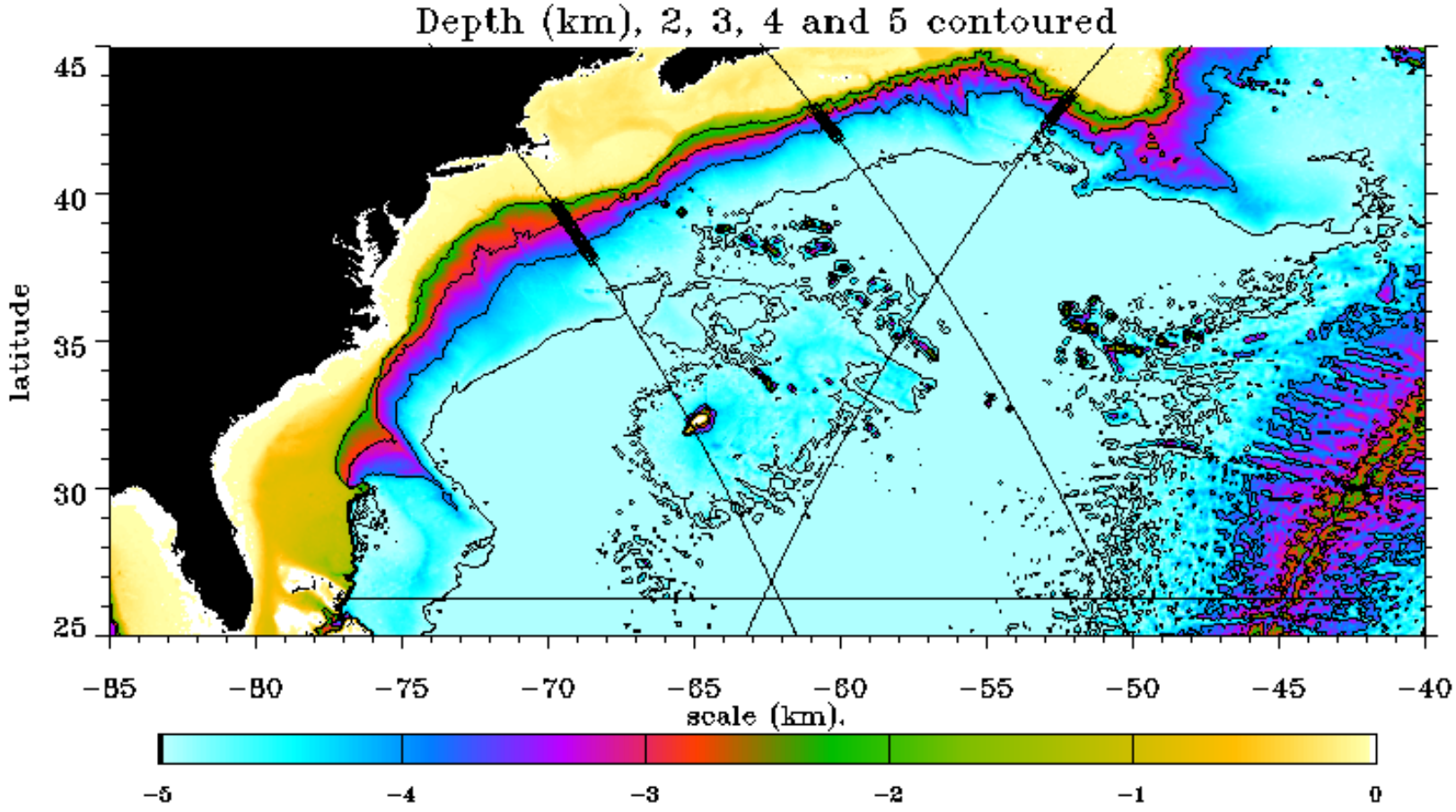
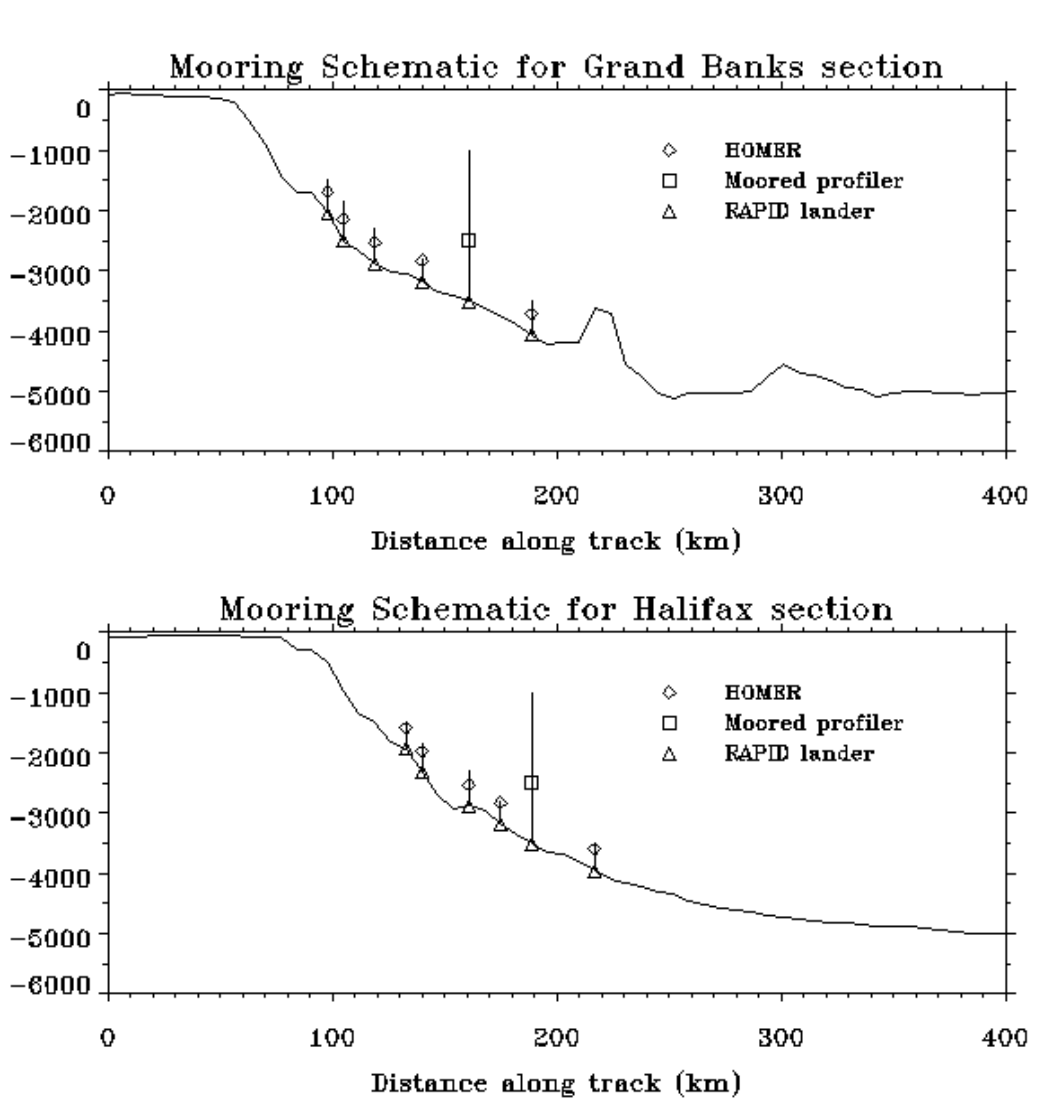


Figure 1: Mooring array for monitoring the Atlantic meridional overturning circulation at 26.5 N. a) Western boundary; b) Mid-Atlantic Ridge; c) Eastern boundary

The western margin sites

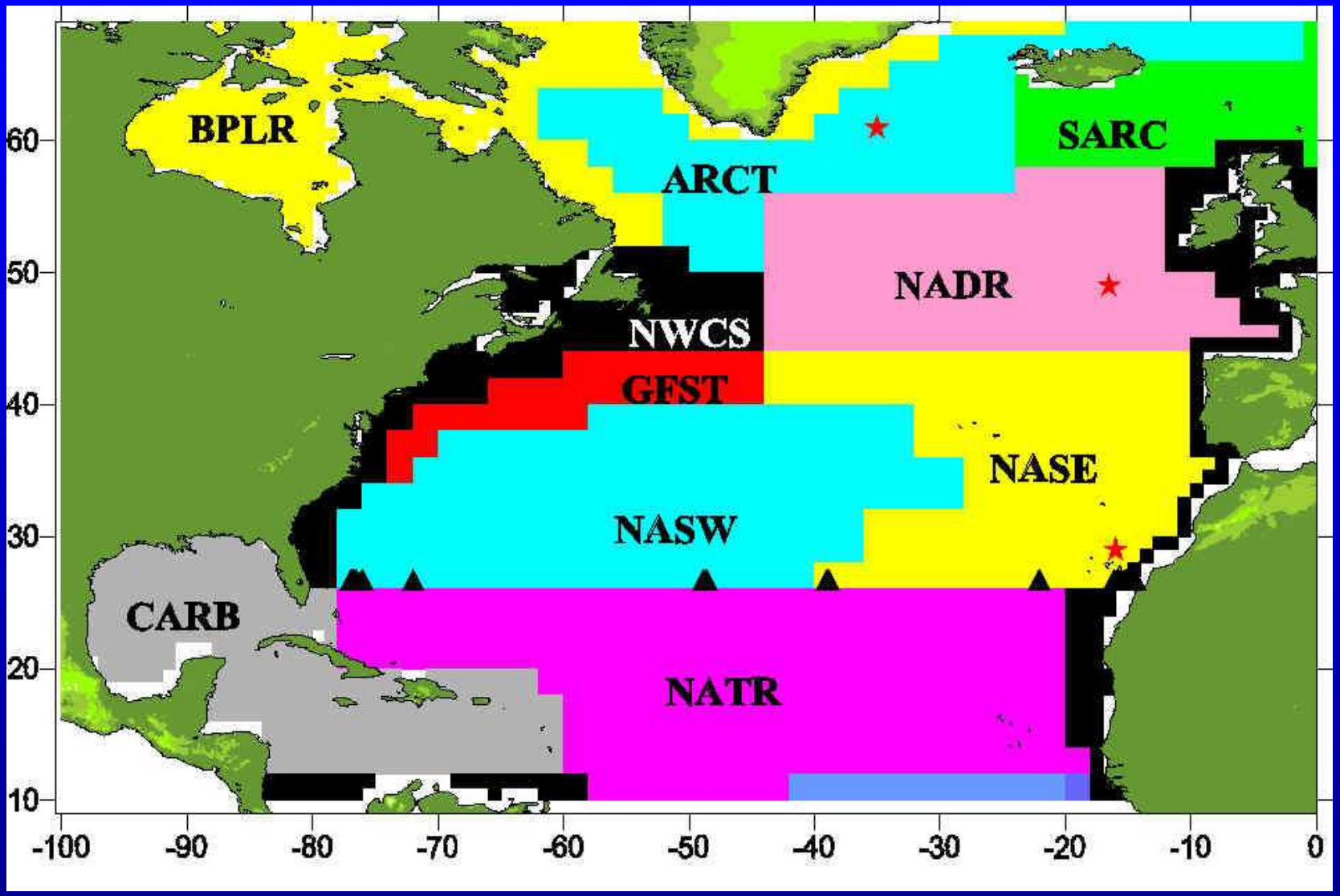


The western margin sites



HOMER = HOMing Environmental Recorder

◇ HOMER
□ Moored profiler
△ RAPID lander



The *RAPID* 26.5N transect (Black triangles)

With Longhurst biogeographical provinces

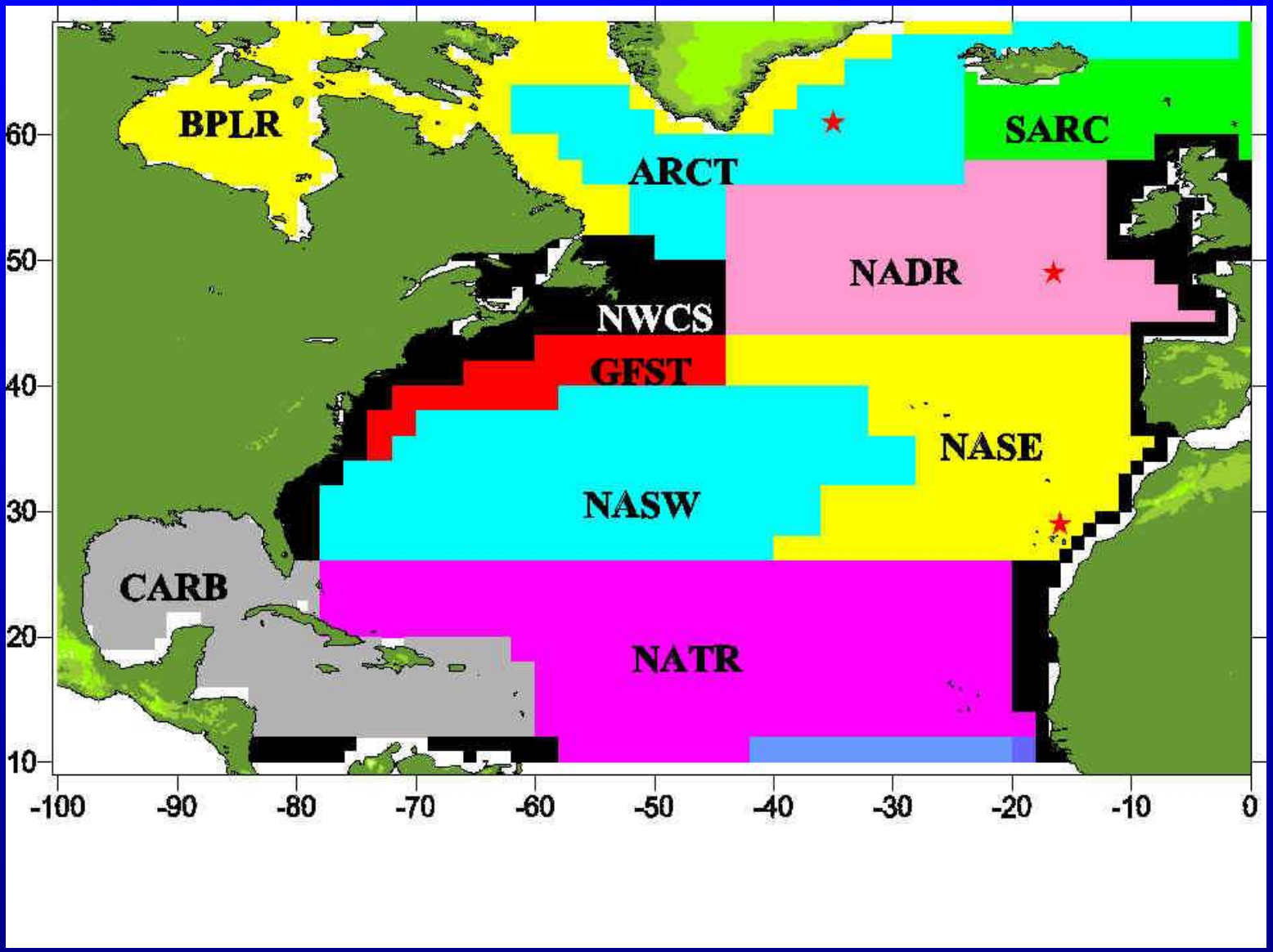
RAPID

http://rapid.nerc.ac.uk/

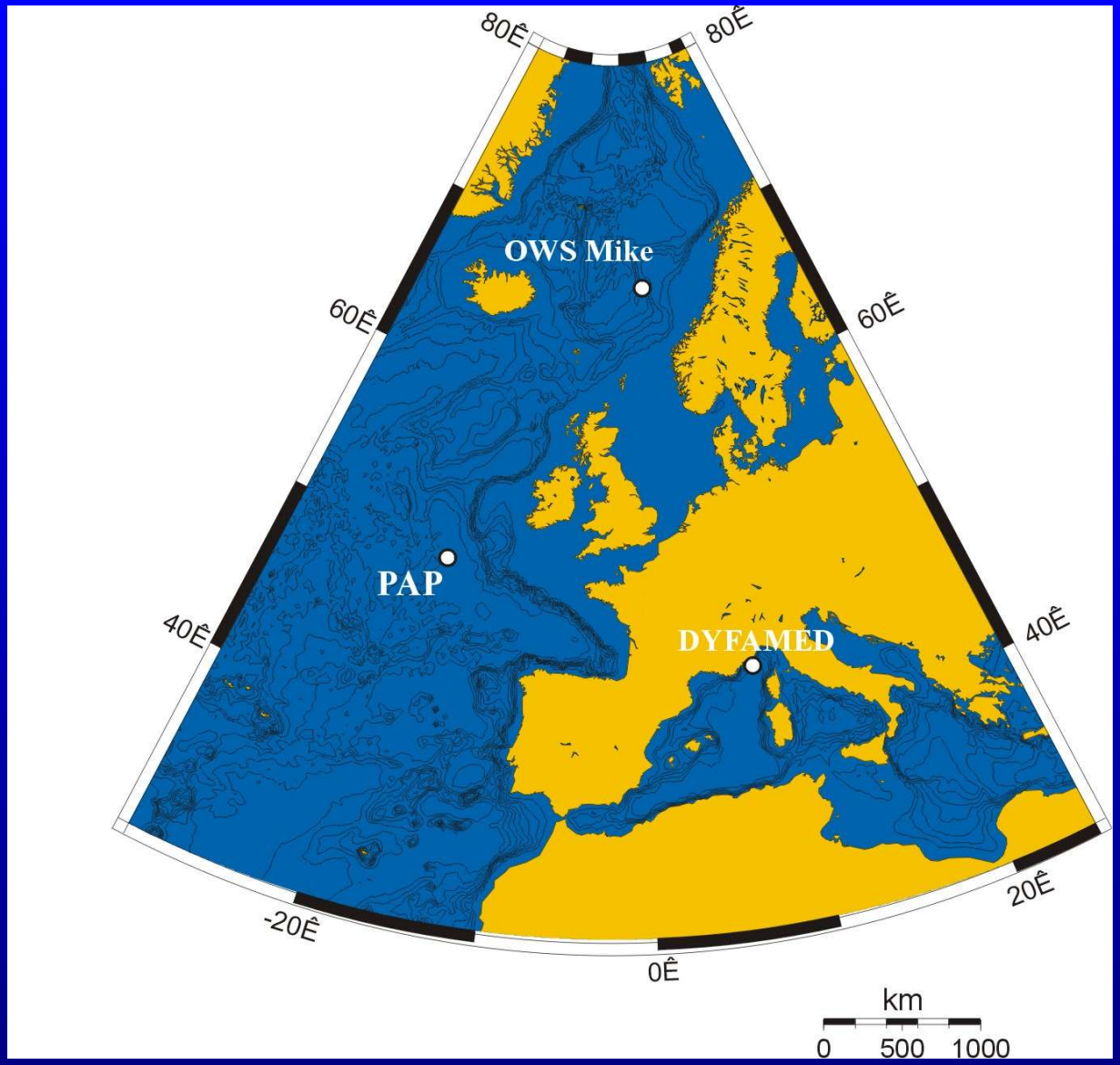
Contact: Merec Srokosz, Scientific coordinator: M.Srokosz@soc.soton.ac.uk

A new NERC Program

- QUEST (Quantifying the Earth System)
- If we are to underpin C-cycle measurements, we must collect interannual-to-decadal, continuous time series data. Delays in launching observational programme will delay meeting QUEST objectives
- Long-term sensor development and performance must be enhanced.



Potential observatory sites in MERSEA FP6 program



Potential observatory sites in EUR-OCEANS FP6 program