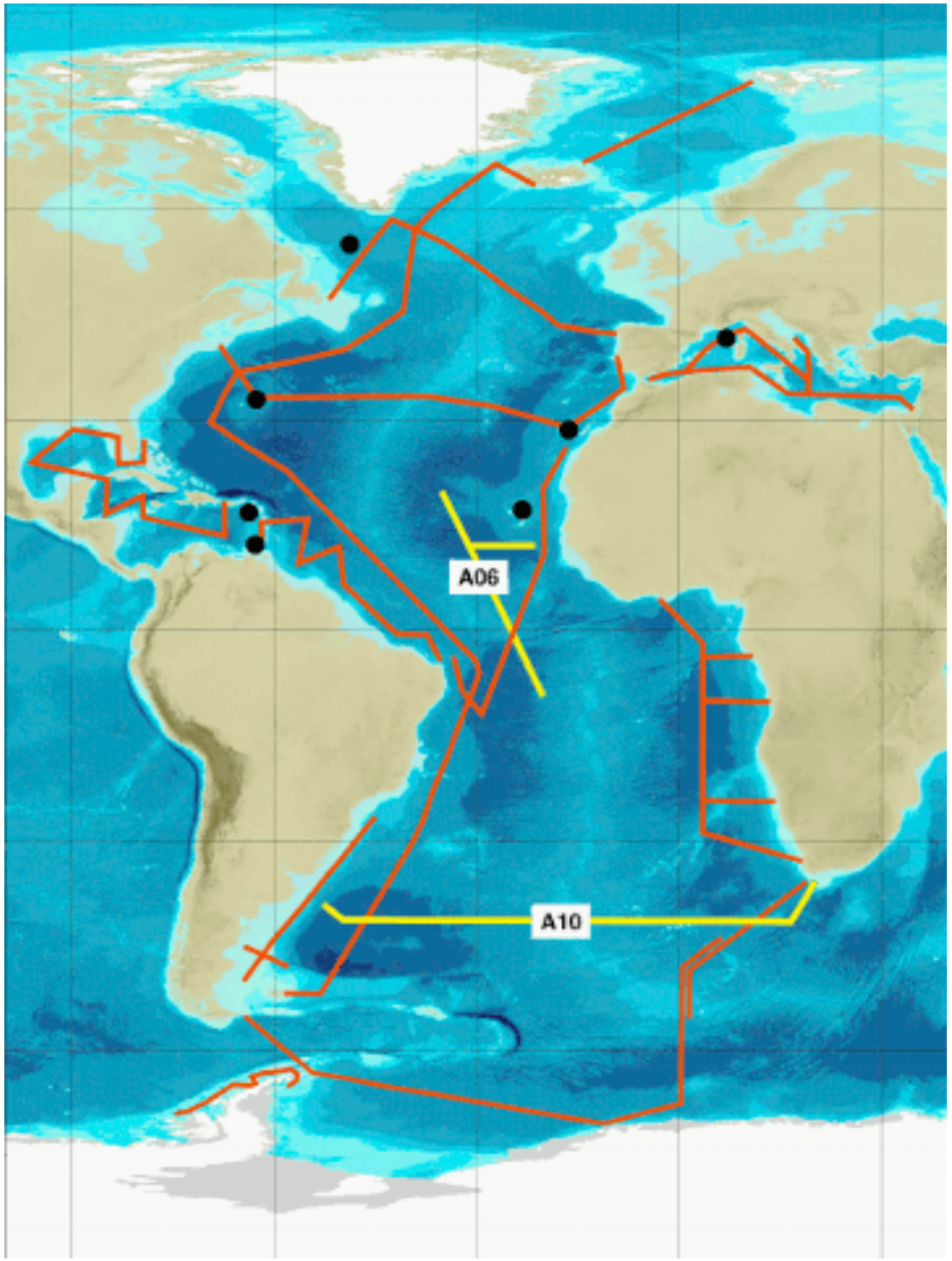
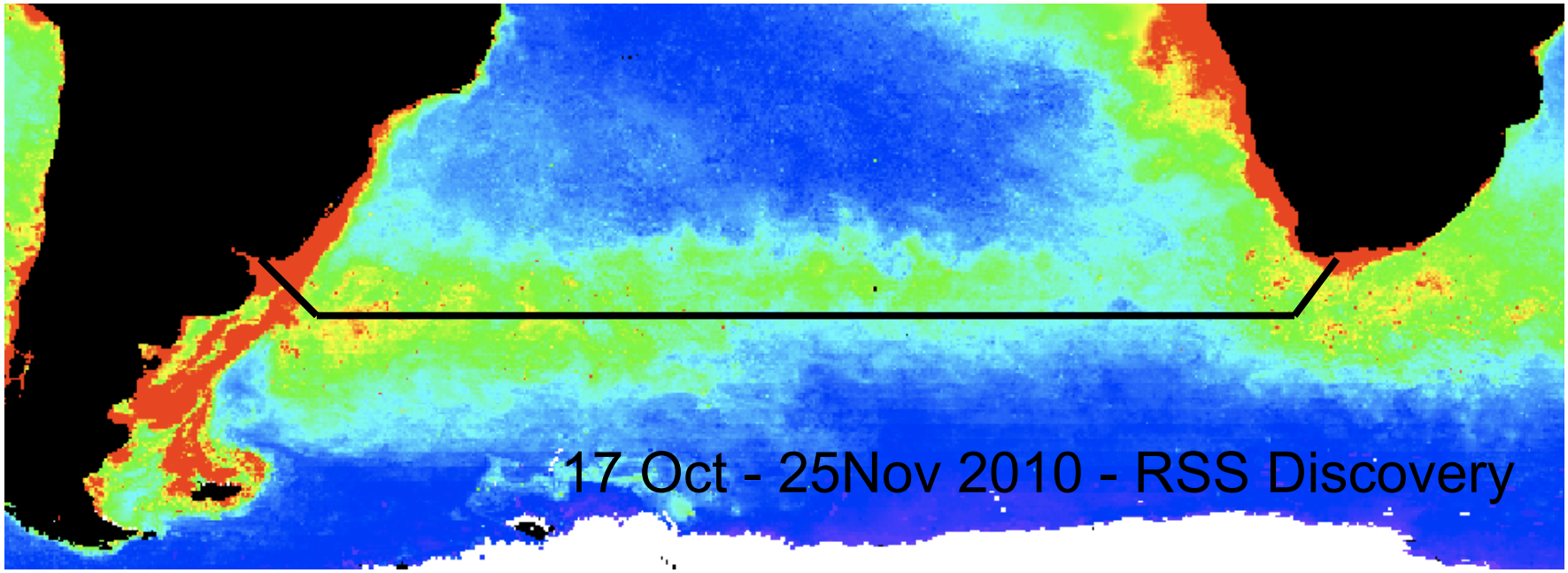
http://www.ukgeotraces.com/


A06
A10

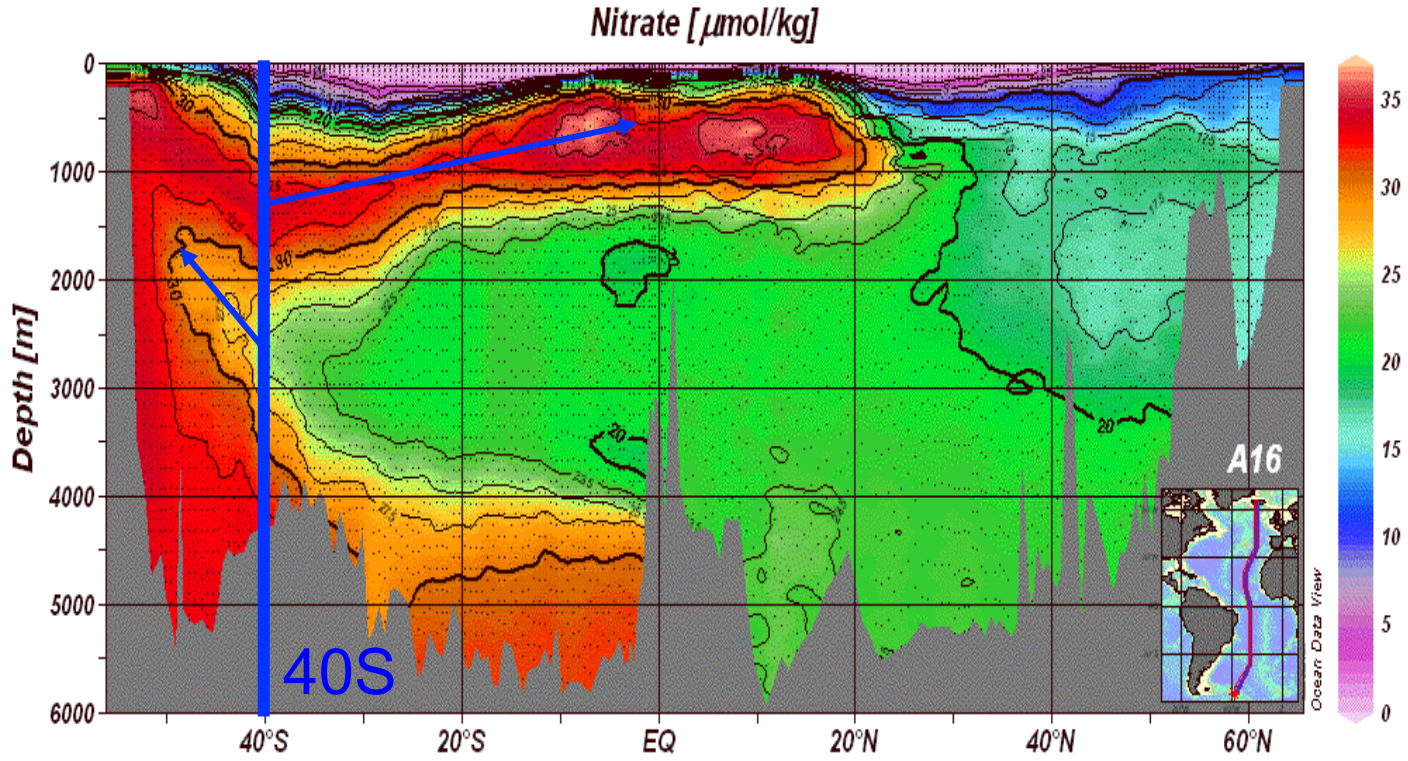
GEOTRACES A10



Initial funding - NERC Standard Grant, 2008 ≈ 0.8M UKP
Focused on calibration of paleoproxies, particularly Pa/Th, Si isotopes, and Cd/Ca (+Cd isotopes)

Subsequent funding - NERC Consortium Grant, 2010, ≈ 3.0M UKP
Focused on micronutrient cycles

One objective: deep-ocean supply to surface



We will constrain the micronutrient fluxes and concentrations in the deep ocean, including in water masses with significant influence on the surface ocean

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A consortium focused on ocean chemistry

WP1: Measures the distribution of the 7 key micronutrients (Co, Cd, Cu, Fe, Mn, Ni, and Zn) - *Lohan, Achterberg*

WP2: Assesses aerosol sources - *Baker, Weiss*

WP3: Assesses sediment fluxes - *Mills*

WP4: Traces sources using other elements/isotopes - *Henderson, Piotrowski, Ballentine*

WP5: ^{234}Th provides downward chemical fluxes - *Bouman, Moore, Sanders*

WP6: Ac and Ra provide information about mixing - *Palmer*, *Geibert*

WP7: Models chemical fluxes - *Marshall*

WP8: Provides critical chemical support measurements (macronutrients, carbonate system, etc.) - *Woodward*

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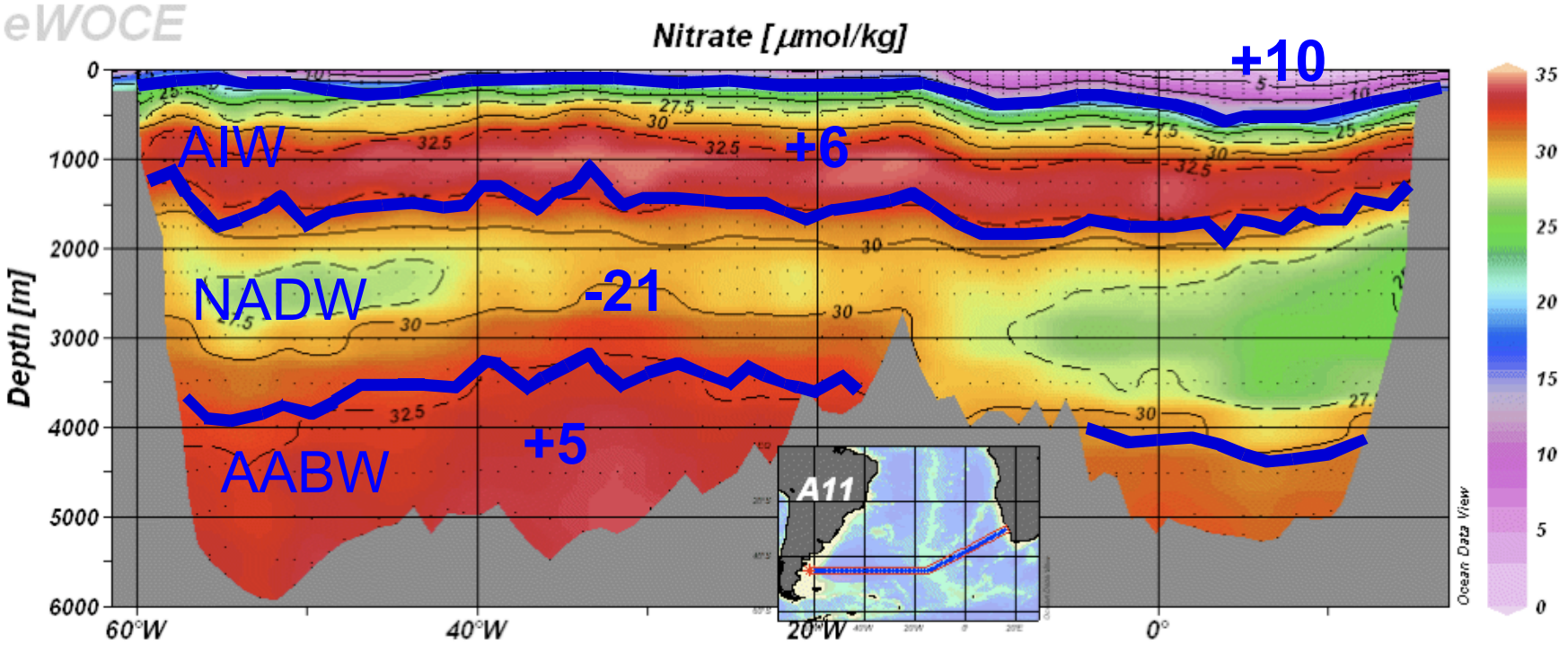
Informed by physical oceanography (WP6)

David Marshall (Oxford); Matt Palmer (NOCS, L)

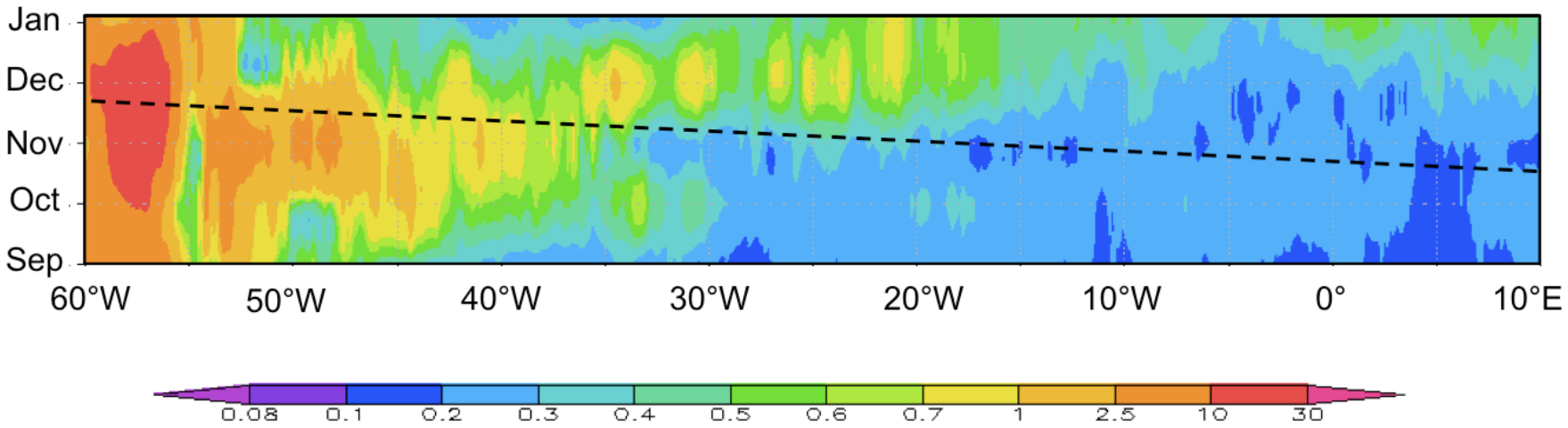


Northward fluxes (Sv)

McDonagh and King 2001

Ocean fluxes of mass and heat well constrained for region

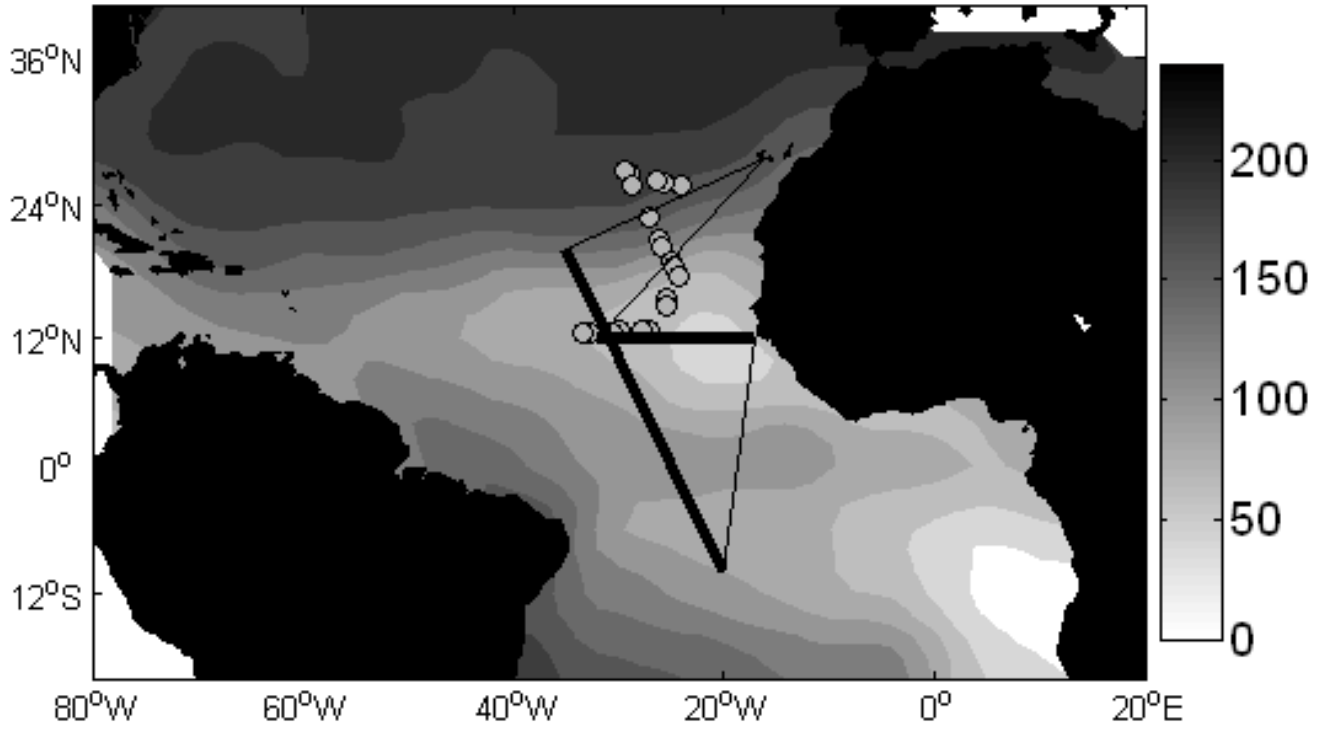
Informed by biological oceanography (WP5)



Chlorophyll-a concentration along 40°S

And new pigment, flow cytometry and FRRF measurements on the cruise to characterize biology
Mark Moore (Southampton); Heather Bouman (Oxford)
+ Samples for BioGEOTRACES

GEOTRACES A06
Cruise: February 7- March 19 on RRS Discovery
Tenerife to Tenerife (41 days)



Track superimposed on dissolved oxygen concentration at 400m (μmol kg^{-1}).
Thick lines indicate transects for intensively surveys (2° sampling).
(D326 stations indicated by gray circles).
Total distance: 6660 nm
Planned stations: 35, station time 10-12 days

PHYSICAL AND CHEMICAL FORCING OF DIAZOTROPHY IN THE (SUB)-TROPICAL ATLANTIC OCEAN; GEOTRACES

Standard NERC grant awarded in 2009

Partners

-University of East Anglia (Jickells/Baker) to undertake atmospheric aerosol work
-University of Plymouth (Lohan) to undertake particulate metal work
-NOCS (SOES-NERC: Moore/Sanders/Achterberg) to undertake nutrient/dissolved metal/Fe-ligand/C/N_2 fixation work
-NOCS (SOES-NERC: Martin/Naveira-Garabato) to undertake physical oceanography and vertical mixing work
-University of Liverpool (Williams) to undertake Fe/nutrient modelling
-University of Liverpool (Mahaffey) to undertake P work
-University of Oxford (Henderson) to undertake REE/Nd work
-IFM-GEOMAR (LaRoche) to undertake Nifh-gene work
-MIT (Follows) to assist with metal-nutrient & ecosystem modelling work
-Dalhousie (Bob Moore) to undertake H_2 sampling and analysis at sea

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PHYSICAL AND CHEMICAL FORCING OF DIAZOTROPHY IN THE (SUB)-TROPICAL ATLANTIC OCEAN; GEOTRACES

Our overall aim is to quantify the supply and determine the biogeochemical cycling of Fe and other nutrients, and relate this to N_2 fixation, diazotroph species distribution and N* fields

Project hypothesis

Hypothesis 1: The subsurface transfer of Fe to the upper ocean can locally exceed the atmospheric supply in the (S)-T North Atlantic.

Hypothesis 2: The different Fe regimes in the (S)-T Atlantic constrain the distribution and activity of diazotrophs, resulting in differences in P cycling.

Hypothesis 3: Basin-scale contrasts in the N* distribution are controlled by the diazotrophic response to contrasting Fe supplies.

Our specific objectives are to:

Objective 1: **Quantify the distribution of nutrients and trace metals:** Quantify surface water and water column distributions of dissolved inorganic/organic N, P, Fe, and DAl, DMn and particulate P, N, Fe, Al, Mn.

Objective 2: **Quantify the rate of Fe, Al, Mn, P and N supply to surface waters:** Assess the source fluxes of the key elements for diazotrophs and source tracers to the surface ocean from atmospheric deposition and internal transport via diapycnal mixing and lateral advection.

Objective 3: **Identify the source of subsurface Fe enrichment:** Identify whether Fe-rich subsurface waters of the tropical North Atlantic thermocline originate from the atmosphere or the shelf using Fe distributions and Al, Mn, and O_2 source tracers.

Objective 4: **Quantify the diazotrophic response to Fe, phosphate, DOP supply**: Relate the spatial distributions of inorganic Fe and organically complexed Fe, and phosphate and DOP to diazotrophy. The specific uptake of Fe, phosphate and DOP by the whole microbial community and *Trichodesmium* will be assessed by shipboard incubations, radiotracer techniques and enzyme bioassays. In addition, we will identify the connection between N_2 fixation rates and diazotroph community structure, by comparing size fractionated $^{15}N_2$-derived rates of N_2 fixation with abundance and diversity of diazotrophs using *nifH* phylogeny.

Objective 5: **Investigate how the large scale transport pathways of Fe and P influence the N* distribution:** Use fine-scale isopycnic model to reveal the large-scale transport pathways of Fe and P in the (S)-T Atlantic, and their effect on the N* distribution.

GEOTRACES

Sampling equipment

UK already had 24 x 12litre OTE bottle fully equipped Ti rosette

Consortium funded dedicated winch and clean cable system

This will NOT be ready for GEOTRACES A10 (and quite probably not for GEOTRACES A06)

Instead we will use a non-conducting cable and depth trigger for these cruises

Loan of kit should be possible but with caveats

Seeking input

GEOTRACES A10: All Key Parameters covered and berths full. Getting late to add anything else

GEOTRACES A06: All Key Parameters covered except $\delta^{13}C$ - any leads welcome. Still possible berth spaces - contact Gideon here, or Eric Achterberg

Future plans

Some UK involvement in Dutch Leg 3 GEOTRACES A02 line

Lohan led EoI to NERC Arctic call will go forward as full proposal. Fiercely competitive, but there is some general UK interest in Arctic.

Southern Indian? Nothing beyond chat yet