

UK GEOTRACES report 2016-2017

Tina van de Flierdt

GEOTRACES SSC meeting
September 18-20 2017
Salvador, Brazil

UK GEOTRACES outputs

Meetings and presentations

- numerous presentations and convening activities at Goldschmidt 2017 (Yokohama, Japan), ICP 2016 (Utrecht, NL), Challenger Society Conference, 2016 (Liverpool, UK) and others

Publications and PhDs

- **27 journal articles** published based on GEOTRACES activities between May 2016 and April 2017
- UK authors contributed to ~10 articles in a **special issue (Phil. Trans. R. Soc. A)** from the Royal Society meeting in December 2015 and co-edited the volume
- **2 PhD completions**

Outreach

- One article for general public in 'Ocean Challenge' and one blog piece aiming to 'hook' new audiences

Science highlights

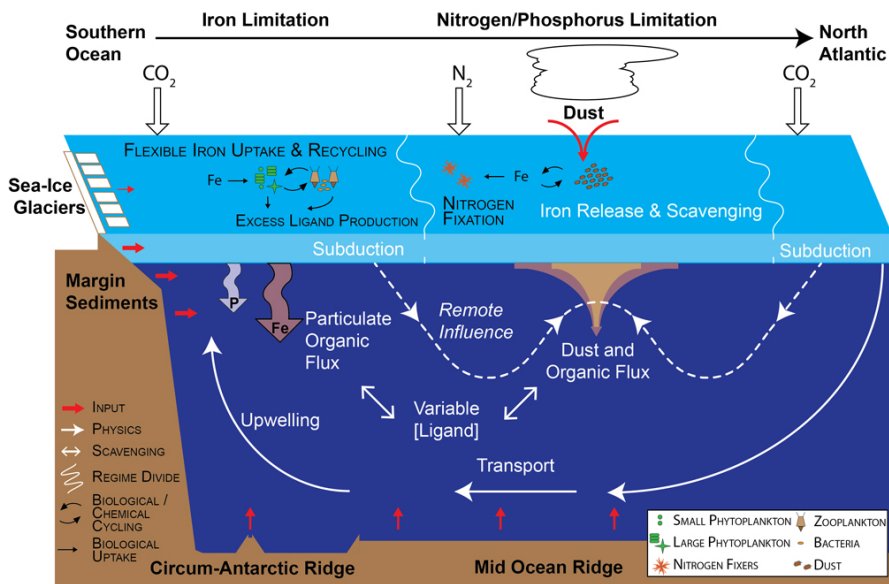
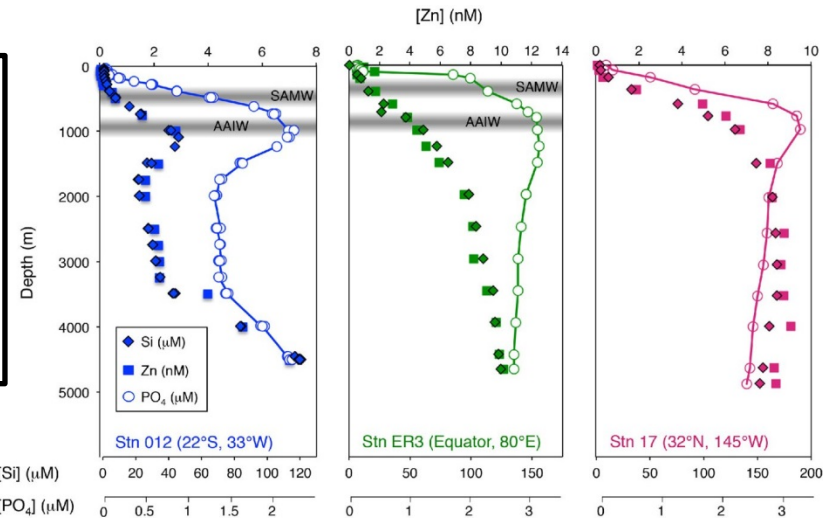
ARTICLES

PUBLISHED ONLINE: 6 FEBRUARY 2017 | DOI: 10.1038/NGEO2890

nature
geoscience

Silicon and zinc biogeochemical cycles coupled through the Southern Ocean

Derek Vance^{1*}, Susan H. Little², Gregory F. de Souza¹, Samar Khatiwala³, Maeve C. Lohan⁴ and Rob Middag⁵



ARTICLE

Received 14 Apr 2016 | Accepted 16 Aug 2016 | Published 28 Sep 2016

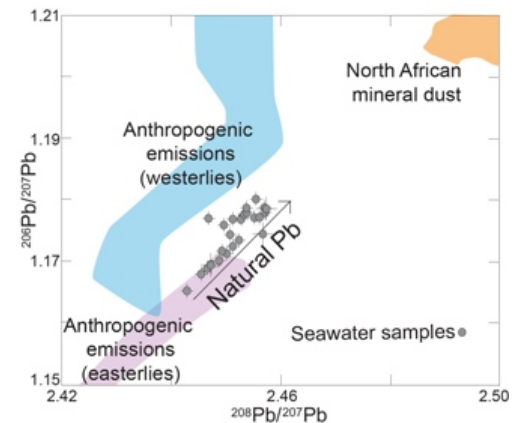
DOI: 10.1038/ncomms12921

OPEN

Return of naturally sourced Pb to Atlantic surface waters

Luke Bridgestock^{1,†}, Tina van de Fliedt¹, Mark Rehkämper¹, Maxence Paul¹, Rob Middag^{2,3}, Angela Milne⁴, Maeve C. Lohan⁵, Alex R. Baker⁶, Rosie Chance^{6,†}, Roulin Khondoker¹, Stanislav Strekopytov⁷, Emma Humphreys-Williams⁷, Eric P. Achterberg⁸, Micha J.A. Rijkenberg⁹, Loes J.A. Gerringa⁹ & Hein J.W. de Baar⁹

**Nature,
Review,
March 2017**



**Nature Communications,
2016**

The integral role of iron in ocean biogeochemistry

Alessandro Tagliabue¹, Andrew R. Bowie², Philip W. Boyd², Kristen N. Buck³, Kenneth S. Johnson⁴ & Mak A. Saito⁵

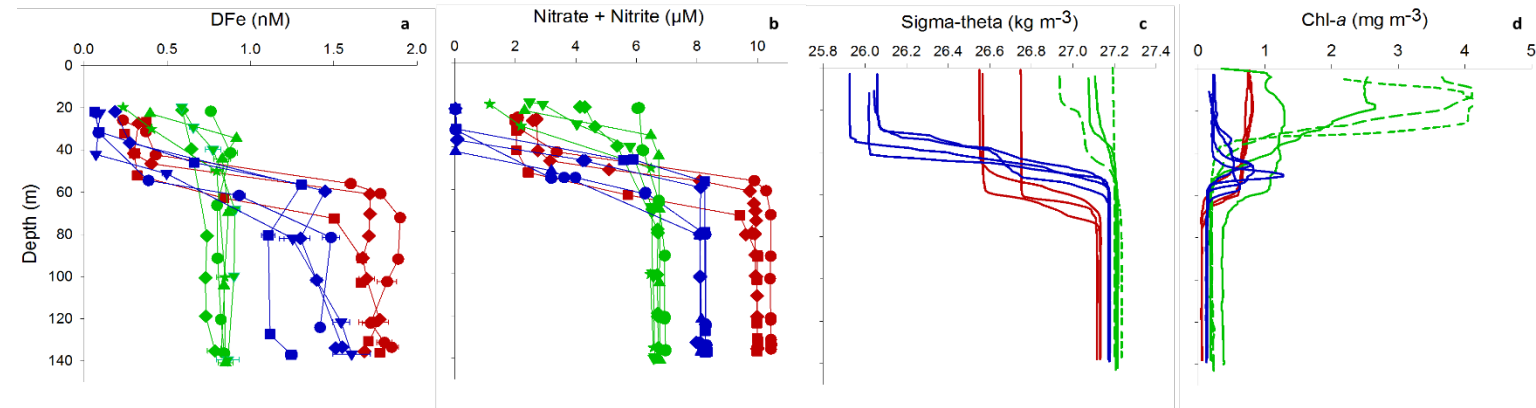
Science highlights – upcoming



Shelf Sea Biogeochemistry – Process Study



Seasonal iron depletion in temperate shelf seas



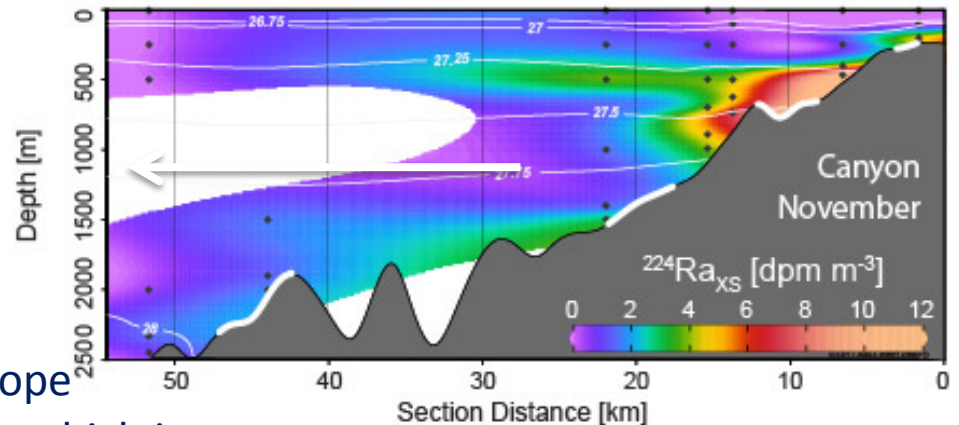
*Birchill et al.
in press with
GRL, DOI:
10.1002/201
7GL073881*

Iron distributions replicate that of the macronutrient nitrate and show for the first time a clear remineralisation signal in dFe.

Radium-derived Fe flux estimates

$170 \pm 155 \mu\text{mol dFe m}^{-2} \text{d}^{-1}$
 $\sim 4\text{-}24 \text{ mmol pFe m}^{-2} \text{d}^{-1}$

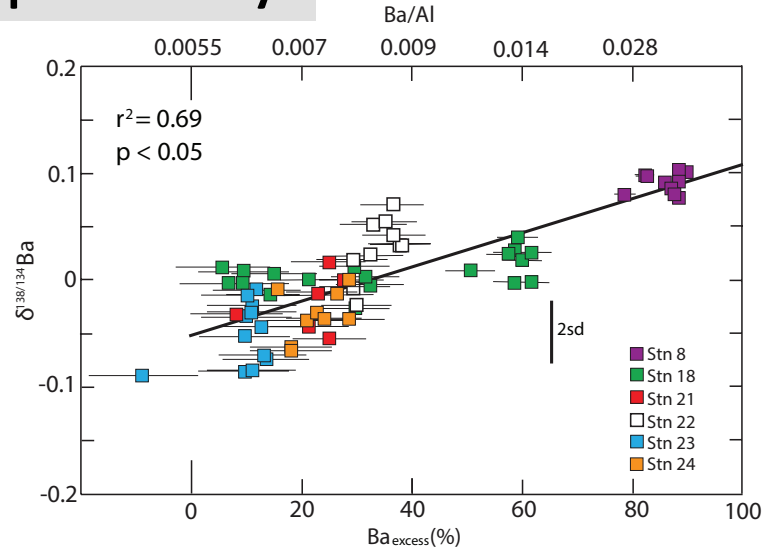
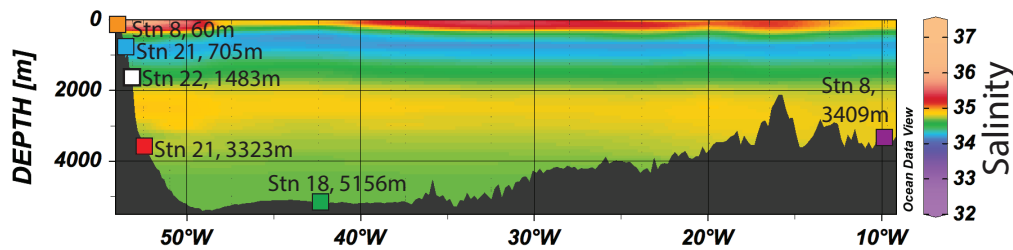
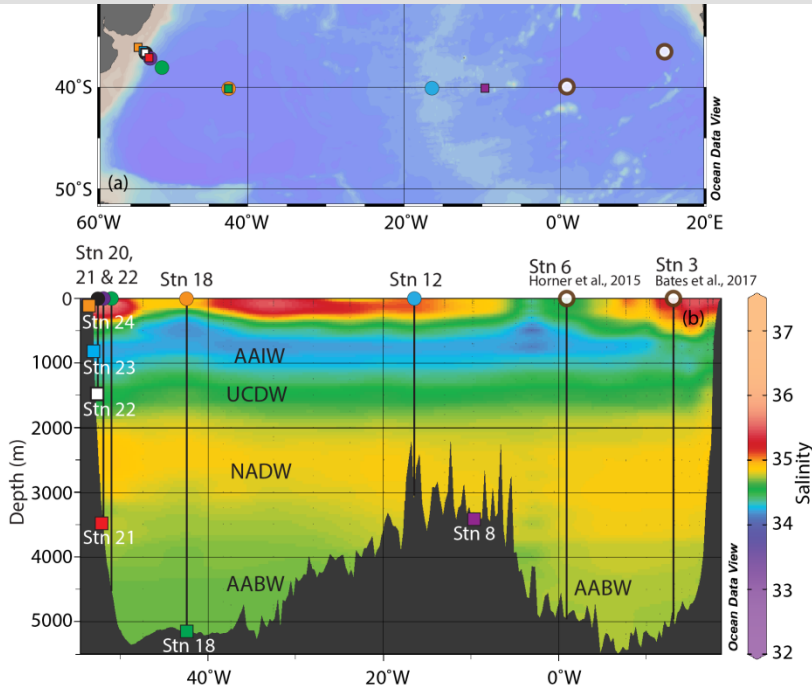
Using novel Ra measurements, fluxes of dissolved and particulate Fe from the Celtic Slope have been estimated. $^{224}\text{Ra}_{\text{XS}}$ based estimates, which integrate exchanges across the benthic boundary layer over day-to-week timescales, are substantially larger than existing continental flux estimates.



*Annett et al. in review with
Nature Geoscience*

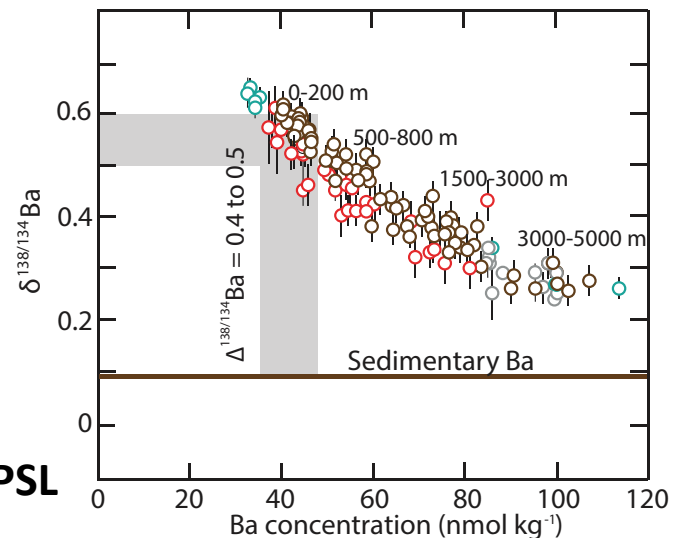
Science highlights – upcoming

GA10 - Ba isotopes as proxy for palaeo productivity



sediments

South Atlantic ○ North Atlantic ○
Southern Ocean ○ North Pacific ○

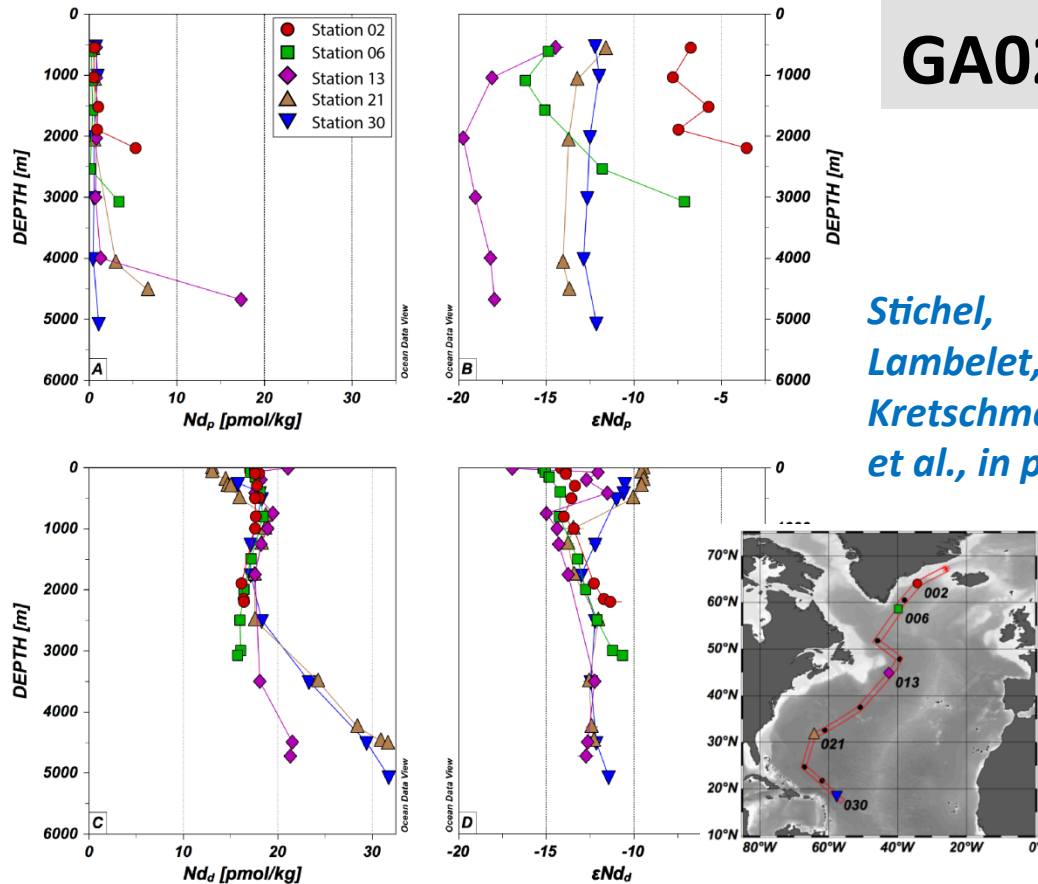


seawater

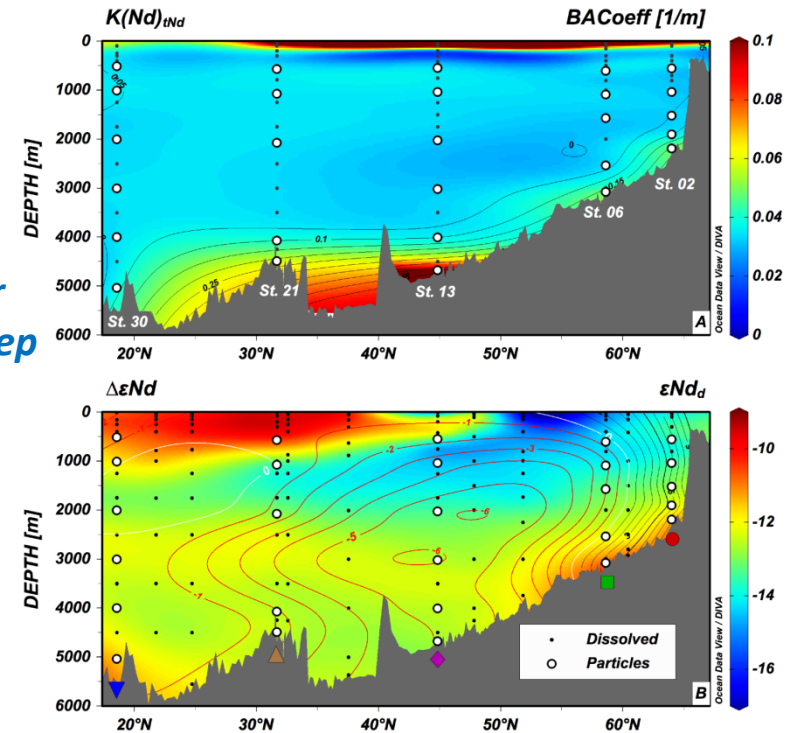
Bridgestock L., Hsieh, Y-T., Porcelli, D., Homoky, W. B., Bryan, A. & Henderson, G. M., in revision, EPSL

Science highlights – upcoming

GA02 – Particulate Nd isotopes



Stichel,
Lambelet,
Kretschmer
et al., in prep



- particulates contain ~5 % of Nd budget except around Stn 13 (BNL)
- isotopic difference (particles vs dissolved) is largest in NW & NE Atlantic
 - particles acquire seawater signature along NADW flow

UK GEOTRACES: cruises/funding



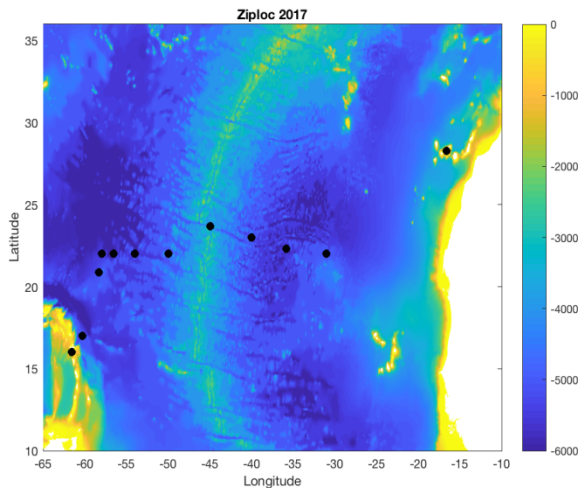
Co-limitation in the ocean OBSERVATIONAL AND MODELLING STUDIES



European Research Council
Established by the European Commission

Zinc, iron and phosphorus co-limitation in the ocean (ZIPLOc)

PIs: Mahaffey, Tagliabue, Lohan, Woodward
Project Partners: Saito (WHOI), Twining (Bigelow)

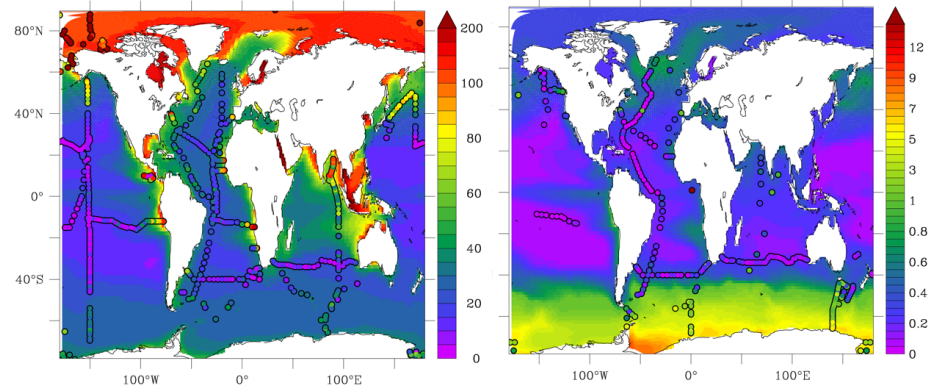


NERC funded
Geotraces
Process
cruise in
summer
2017 (JC150)

Beyond the Iron Curtain (BYONIC)

PI: Tagliabue

ERC consolidator grant



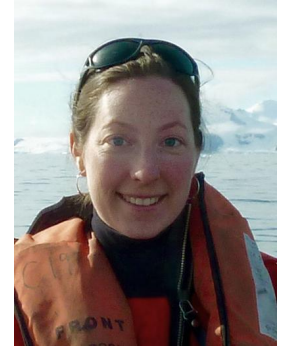
Kinetic and bioassay experiments conducted at 7 stations to investigate Zn-P and Fe-P co-limitation in the ocean

Developing new models to understand the controls on the distributions of micronutrients and quantify the global impact of co-limitation

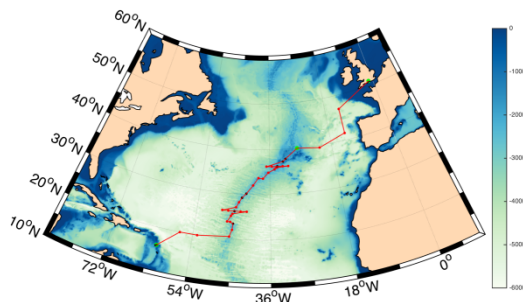
UK GEOTRACES: cruises/funding

NERC Independent Research Fellowships (5 yr funding):

Amber Annett will join the team in Southampton and work on ***'Radium in changing Environments: A novel tracer of iron fluxes at Ocean Margins'***. She will be participating in GA13 and in ORCHESTRA Southern Ocean cruises.



Susan Little will stay at Imperial College London and work on ***'Beyond Iron in the Ocean: Trace metal micronutrients and the carbon cycle (BIOTrace)'***. She will be involved in the upcoming ZIPLOC cruise and in ORCHESTRA Southern Ocean cruises, as well as in other expeditions with international GEOTRACES scientists.

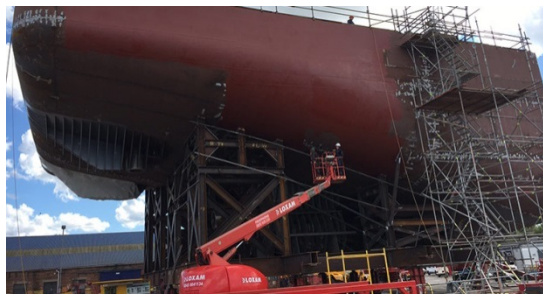


FRidge (The impact of mid-ocean ridges on the ocean's Iron Cycle)

20/12/17 to 2/2/17, Southampton to Guadalupe.
GEOTRACES section cruise, GA13.
Co-I's: Maeve Lohan and Alessandro Tagliabue.

UK GEOTRACES: national capability

All three major research vessels have trace metal clean sampling capabilities.



Stern section of
RRS Sir David Attenborough



RRS Discovery



RRS James Cook