

ANNUAL REPORT ON GEOTRACES ACTIVITIES IN UNITED KINGDOM
JUNE 2013 – JUNE 2014

Meetings and workshops

- GA10 workshop and synthesis of results was held in Oxford University on the 8-9th January 2014. Plans for new publications and synthesis papers were discussed.
- Maeve Lohan (University of Plymouth) attended 2 intercalibration meetings in Stockholm Sweden in May 2013 and Bremerhaven in October 2013 as part of the Standard and Intercalibration Committee.
- Participation in SCOR Working group 139 in Hawaii in February 2014.

- Presentations at Goldschmidt 2013:
 1. Understanding the marine biogeochemical cycle of Pb in the Equatorial Atlantic. Luke J. Bridgestock, Maxence Paul, Tina van de Flierdt, Mark Rehkämper, Eric Achterberg, Maeve Lohan
 2. Iron availability controls phytoplankton ecophysiology in the South Atlantic Subtropical Convergence Zone Thomas J. Browning, Heather Bouman, Gideon Henderson, Mark Moore, Christian Schlosser, Glen A. Tarran and Malcolm Woodward
 3. Assessing the dissolution of marine sediment with ²³⁰Th, and the impact of dissolution on sedimentary ²³¹Pa/²³⁰Th Feifei Deng, Gideon Henderson, Alex Thomas, William Homoky and Rachel Mills
 4. The role of the Mid-Atlantic Ridge for chemical fluxes in the Atlantic: Clues from Ra and Ac isotopes Walter Geibert, Yu-Te Hsieh and Gideon Henderson
 5. Rare Earth Element distributions as tracers of micronutrient input and Nd cycling in the South Atlantic Deborah Hembury, Xinyuan Zheng, Philip Holdship, Peter Scott, Matthew Pointing and Gideon Henderson
 6. Trace metal inputs from river-fed and river-starved margin sediments of the South Atlantic Ocean William Homoky, Rachel Mills, Yu-Te Hsieh, Deborah Hembury, Malcolm Woodward and Gideon Henderson
 7. Suboxic sediments as an oceanic sink of isotopically-light cadmium T. J. Horner, W. B. Homoky, S. V. Georgiev, H. J. Sterin, J. L. Hannah, R. A. Mills, M. Rehkämper and G. M. Henderson
 8. Comparison of ²²⁸Ra and microstructure derived ocean mixing rates and chemical fluxes in the Cape Basin Yu-Te Hsieh, Walter Geibert, Matthew Palmer, Malcolm Woodward and Gideon Henderson
 9. Provenance tracing of aerosols in the South Atlantic ocean using Pb and Nd isotopes and select trace and rare earth elements. Roulin Khondoker, Dominik Weiss, Tina van de Flierdt, Mark Rehkämper, Rosie Chance, Alex Baker, Stanislav Strekopytov, Emma Williams, Jens Najorka
 10. A low blank technique for the measurement of iron isotopes in seawater and results from the tropical Atlantic Ocean Jesscia Klar, Rachel James, I. J. Parkinson, Eric Achterberg and Christain Schlosser
 11. Neodymium isotopic composition and concentration in equatorial to North Atlantic seawater. Myriam Lambelet, Tina van de Flierdt, Kirsty Crocket, Mark Rehkämper, Katharina Kreissig, Barry Coles, Micha J.A. Rijkenberg, Loes Gerringa, Henrik M. van Aaken, Hein J.W. De Baar
 12. Biogeochemical cycle of dissolved zinc and cobalt in the South Atlantic Maeve Lohan, Neil Wyatt, Angela Milne and Malcolm Woodward

13. Lead isotopes and concentrations in the South Atlantic from the UK GEOTRACES transect along 40S Maxence Paul, Tina van De Flierdt, Mark Rehkämper, Dominic Weiss, Maeve Lohan and Gideon Henderson
 14. Modelling scavenged ocean tracers: Rare earth element transport and fractionation Yves Plancherel, Xinyuan Zheng, Peter Scott, Samar Khatiwala and Gideon M. Henderson
 15. Nitrogen isotope biogeochemistry of the South Atlantic R. E. Tuerena, R. S. Ganeshram, A. Fallick, J. Dougans, A. Tait, E. M. S. Woodward
- Presentations at Hawaii 2014
 1. Phytoplankton biogeography and photoacclimatory status revealed from optical signature. Heather Bouman, Tom Browning, Tom Jackson and S. Sathyendranath
 2. Understanding the marine biogeochemical cycle of Pb in the Equatorial Atlantic Luke J. Bridgestock, Maxence Paul, Tina van de Flierdt, Mark Rehkämper, Eric Achterberg
 3. Satellite-detected fluorescence: decoupling non-photochemical quenching from iron stress signals in the South Atlantic and Southern Ocean. Tom Browning Heather Bouman, and Mark Moore.
 4. Controls on ^{232}Th , ^{230}Th and ^{231}Pa in the South Atlantic: Assessing paleo-circulation and dust-flux proxies. Gideon Henderson, Feifei Deng, Peter Scott and Alex Thomas
 5. The neodymium isotopic composition of North Atlantic Deep Water revisited. Myriam Lambelet, Tina van de Flierdt, Kirsty Crocket, Mark Rehkämper, Hein J.W. De Baar
 6. Zinc distributions in the Atlantic Ocean: the use of a new tracer Zn^* . Maeve Lohan, Neil Wyatt, Angie Milne, Malcolm Woodward, Rob Middag and Tim Conway
 7. Identifying the sources of iron to the subtropical North Atlantic: presenting particulate and dissolved data from the UK GEOTRACES A06 cruise. Angela Milne, Maeve Lohan, Christain Schlosser, Jessica Klar, Eric Achterberg
 8. Lead isotope and concentration profiles from the UK-GEOTRACES South Atlantic transect along 40oS Maxence Paul, Tina Van de Flierdt, Mark Rehkämper, Dominik Weiss, and Gideon Henderson
 9. Amino acids along a South Atlantic Transect (40oS) A.J.M. Sabadel, E.M.S. Woodward, R. Van Hale, R.D. Frew and P.W. Boyd
 10. UK GEOTRACES: Coupled Nitrogen and Oxygen isotopes trace nitrate movement within South Atlantic water masses (40°S) Robin Tuerena, R. S. Ganeshram, Walter Geibert, A. E Fallick, A. Tait, J. Dougans and E. M. S. Woodward.
 11. Basin scale distributions and interactions of ammonium. Malcolm Woodward, Tom Browning, Heather Bauman and Amandine Sabadel
 12. Trace metal – nutrient stoichiometries in the Southeast Atlantic: the nutritional role of Zn Co and Cd. Neil Wyatt, Angie Milne, Tom Browning, Christian Schlosser, Jessy Klar and Maeve Lohan
 13. Shelf supply and vertical mixing determine the trace metal content of surface waters in the South Atlantic Ocean along 40oS. Christian Schlosser, Jessy Klar and Maeve Lohan, Mark Moore, Eric Achterberg

National and International service

- The UK continues to host the GEOTRACES Data Assembly Centre (GDAC) at the British Oceanographic Data Centre in Southampton Oceanography centre.
- The UK is represented on the International GEOTRACES SSC and on the International Standards and Intercalibration Committee by Maeve Lohan.

Cruises

- Shelf Sea processes study was delayed until October 2014 due to issues with the new Ship the RSS Discovery and there will now be 3 cruises in 2015.

New funding

- Shelf Sea Biogeochemistry was funded by NERC 2013-2017 which is a processes study within GEOTRACES. The planned research activities involve 4 cruises over a seasonal cycle to the Celtic Sea.

New results

- Results from the GA06 and GA10 cruise are currently being prepared for publication with manuscripts being prepared for submission by September 2014.
- Data from GA10 was submitted for the IDP.

New Publications

- Browning, T.J., Bouman, H.A., Moore, C.M., Schlosser, C., Tarran, G.A., Woodward, E.M.S. and Henderson, G.M. (2014). Nutrient regimes control phytoplankton ecophysiology in the South Atlantic. *Biogeosciences* 11, 463-479. doi:10.5194/bg-11-463-2014.
- Browning, T.J., Bouman, H.A., Henderson, G.M., Mather, T., Pyle, D., Schlosser, C., Woodward, E.M. and Moore, (2014). Nutrient String responses of Southern Ocean phytoplankton communities to volcanic ash. *Geophysical Research Letters*, 41, 2581-2587 doi:10.1002/2014GL059364.
- Deng, F., Thomas, A.L., Rijkenberg, M.J.A. and Henderson, G.M. (2014). Controls on seawater 231Pa, 230Th and 232Th concentrations along the flow paths of deep waters in the Southwest Atlantic. *Earth Planet. Sci. Lett.* 390, 93-102.
- Wyatt, N., Milne, A., Woodward, E.M.S., Rees, A.P., Browning, T.J., Bouman, H.A., Worsfold, P.J. and Lohan, M.C. (2014) Biogeochemical cycling of dissolved zinc along the GEOTRACES South Atlantic transect GA10 at 40oS. *Global Biogeochemical Cycles* doi: 10.1002/2013GB004637.
- Zhao, Y., Vance, D., Abouchami, W. and deBaar, H.J.W. (2014) Biogeochemical cycling of zinc and its isotopes in the Southern Ocean. *Geochimica et Cosmochimica Acta* 125, 653-672 doi: 10.1010/j.cgc.2013.07.045.
- Schlosser, C., Klar, J.K., Wake, B.D., Snow, J., Honey, D.J., Woodward, E.M.S., Lohan, M.C., Achterberg E.P. and Moore, C.M. (2013) Seasonal ITCZ migration dynamically controls the location of the (sub-) tropical Atlantic biogeochemical divide. *PNAS* doi: 10.1073/pnas.1318670111.
- Horner, T.J., Lee, R.B.Y., Henderson, G.M., Rickaby, R.E.M. (2013) Nonspecific uptake and homeostasis drive the oceanic cadmium cycle. *PNAS* 110, 2500-2505. 10.1073/pnas.1213857110.
- Geibert, W., Rodellas, V., Annett, A., van Beek, P., Garcia-Orellana, J., Hsieh, Y.-T., Masque, P. (2013) 226Ra determination via the rate of 222Rn ingrowth with the Radium Delayed Coincidence Counter (RaDeCC). *Limnology and Oceanography: Methods* 11, 2013, 594–603. DOI 10.4319/lom.2013.11.594.
- Xue, Z., Rehkämper, M., Horner, T.J., Abouchami, W., Middag, R., van de Flierdt, T. de Baar, H.J.W. (2013) Cadmium isotope variations in the Southern Ocean. *Earth Planet. Sci. Lett.*, 382, 161-172. doi:10.1016/j.epsl.2013.09.014.

PhD theses

- Neil Wyatt successfully defended his thesis on ‘The biogeochemistry of iron, Zinc and cobalt in the Atlantic Ocean: The Atlantic Meridional Transect and the UK GEOTRACES sections’ in December 2013.

Other Activities

- New UK oceanographic research vessel *RSS Discovery* was delivered to Southampton in March 2013. This ship has improved facilities to undertake GEOTRACES science, including a new clean sampling container, a clean underway supply and a new conducting Kevlar winch system.
- UK announces plans for a new polar oceanographic research vessel for 2017.
- Participation in intercalibration of marine particulates.

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