

ANNUAL REPORT ON GEOTRACES ACTIVITIES IN UNITED KINGDOM  
MAY 2014 – JUNE 2015

***New results***

- 2 process cruises GApr04 Leg 1 and Leg 2- Shows clear offshore Fe transport that can be traced using Ra isotopes, Seasonal drawdown of Fe at the start of the bloom on-shelf, benthic resuspension of Fe.
- Particulate Nd isotopes from GA02- Torben Stichel, Myriam Lambelet & Tina van de Flierdt (Lambelet et al. submitted).
- Modelling- Alessandro Tagliabue demonstrated that you need Fe-binding ligands to stabilise dissolved Fe from Hydrothermal vents-work with US GEOTRACES GP13- Resing et al. accepted in Nature.

***New publications***

- Aumont, O., C. Ethé, A. Tagliabue, L. Bopp, and M. Gehlen, PISCES-v2: an ocean biogeochemical model for carbon and ecosystem studies, Geoscientific Model Development Discussions, 8(2), 1375-1509, doi:10.5194/gmdd-8-1375-2015.
- Boyd, P. W., & A. Tagliabue, Using the L\* concept to explore controls on the relationship between paired ligand and dissolved iron concentrations in the ocean, Marine Chemistry, doi:10.1016/j.marchem.2014.12.003.
- Bridgestock, P.M., L., Rehkamper, M., van de Flierdt, T., Weiss, D. (2015), High-precision measurements of seawater Pb isotope compositions by double spike thermal ionization mass spectrometry. Analytica Chimica Acta, 863, 59-69.
- Dutay, J-C., A. Tagliabue, I Kriest and M. Van Hulst, (2015) Modelling the role of marine particles on large scale <sup>231</sup>Pa, <sup>234</sup>Th, Iron and Aluminium distributions, Progress in Oceanography, doi:10.1016/j.pocean.2015.01.010.
- Ellwood, M.J., Hutchins, D.A., M. Lohan, A. Milne, P. Nasemann, S.D. Nodder, S.G. Sander, R. Strzepak, S.W. Wilhelm, P.W. Boyd (2015). Iron stable isotopes track pelagic iron cycling during a subtropical bloom, Proc. Nat. Acad. Sci., 112: 15-20.
- Henderson, G.M. & O. Marchall (2015) Recommendations for future measurement and modelling of particles in GEOTRACES and other ocean biogeochemistry programmes. Progress in Oceanography, 133: 73-78.
- Lohan, M.C. K.N. Buck, S.G. Sander (2015) Organic ligands – A key Control on trace metal biogeochemistry in the oceans. Marine Chemistry 173: 1-2
- Marsay, C.M., R.J. Sanders, S.A. Henson, K. Pabortsava, E.P. Achterberg, R.S. Lampitt (2015). Attenuation of sinking particulate organic carbon flux through the mesopelagic ocean. Proc. of the Nat. Acad. Sci. 112: 1089-1094
- Mahaffey, C., S. Reynolds, C. Davis, Lohan, M.C. (2014). Alkaline phosphatase activity in the subtropical ocean: insights from nutrient, dust and trace metal addition experiments. Frontiers in Marine Science, 1:73. doi: 10.3389/fmars.2014.00073.
- Resing, J.A., P. N. Sedwick, C. R. German, W. J. Jenkins, J. W. Moffat, B. M. Sohst and Tagliabue, A. (2015) Basin-scale transport of hydrothermal dissolved metals across the South Pacific Ocean, Nature, accepted. May 2015.
- Tagliabue, A. (2014) More to hydrothermal iron input than meets the eye, Proc. of the Nat. Acad. Sci., doi:10.1073/pnas.1419829111
- Tagliabue, A. R. G. Williams, N. Rogan, E. P. Achterberg, and P. W. Boyd (2014) A ventilation-based framework to explain the regeneration - scavenging balance of iron in the Ocean, Geophysical Research Letters, doi:10.1002/2014gl061066

- The GEOTRACES group The GEOTRACES Intermediate Data Product 2014, Marine Chemistry, doi:10.1016/j.marchem.2015.04.005., 2015.
- Van Hulst, M. M. P., Sterl, A., Middag, R., de Baar, H. J. W., Gehlen, M., Dutay, J.-C., and Tagliabue, A. (2014) An improved ocean model of aluminium: the effects of circulation, sediment resuspension and biological incorporation, Biogeosciences, 11(14), 3757-3779, doi: 10.5194/bg-11-3757-2014,
- Völker, C., and A. Tagliabue, (2014) Modelling organic iron-binding ligands in a three-dimensional biogeochemical ocean model, Marine Chemistry, doi:10.1016/j.marchem.2014.11.008.

### **Meetings:**

- Maeve Lohan attended a standards and intercalibration meeting in Jan 2015.
- Final SCOR working group meeting was held in Croatia in April 2015.
- Presentations at DUST 2014:
  - Khonder, R., D. Weiss, T. van de Flierdt, M. Rehkamper, A. Baker, R. Chance, S. Strekopytov, E. Williams, P. Aguero, P. Smichowski, M. Babinski, R. Losono. Assessing the geochemistry of aerosols in the South Atlantic Ocean along the 40oS transect using Pb and Nd isotopes and REE and select trace elements
- Presentations at Goldschmidt 2014
  - Honey, D.J., C. Schlosser, J. Snow, C.M. Moore, E.P. Achterberg, M. Gledhill. Heme b distributions in the tropical Atlantic Ocean are influenced by iron demand for nitrogen fixation.
  - Scott, P.M., X. Zheng, Y. Plancherel, D. J. Hembury, M. Pointing, E.M.S. Woodward, G.M. Henderson. Quantifying the non-conservative behaviour of the rare earth elements in the South Atlantic.
- Presentations at Challenger Society for Marine Sciences 2014
  - Tuerena, R., R. Ganeshram, W. Geibert, A. Fallick, EMS Woodward. An isotopic approach to assessing Nitrogen fixation within the Atlantic (UK GEOTRACES)
  - Homoky, W. S. John, T. Conway, Y-T. Heish, D. Hembury, EMS Woodward, G.M. Henderson, R. Mills. Distinct iron isotope signature of sediment dissolution are widespread in the pore waters across the South Atlantic Ocean
  - Milne, A., C. Schlosser, J. Klar, E. P. Achterberg, R. Chance, A. Baker, M.C. Lohan. Identifying the sources of iron to the sub-tropical North Atlantic
- Presentations at The seasonal Dynamics of Iron supply, biological consumption and cycling in the Southern Ocean
  - Tagliabue, A. The seasonal cycle of Iron Supply
- Presentations at AGU 2014
  - Bratkic, A., M. Bahcic, J. Kotnik, M. Horvat, Hg species distribution in the South Atlantic along 40oS parallel
- Presentations at 3rd International Symposium on “Effects of climate change on the World’s Oceans” 2015
  - Lohan, M.C., N. Wyatt, D. Vance, S. Little, Y. Zhao, R. Middag, H. de Baar. The role of the Southern Ocean export in the biogeochemical cycling of zinc and cobalt in the Atlantic Ocean

### ***Cruises***

- GPpr04: Process Study: The supply of iron from shelf sediments to the ocean.
- GPpr04 leg 1- DY018: 09/11/2014-03/12/2014.
- GPpr04 leg 2- DY029: 1/4/2015-30/04/2015.

### ***New funding***

- Royal Society funding for a coupled meeting ‘The biological and climatic impacts of ocean trace-element chemistry’ and workshop to discuss ocean trace-element and new findings from the GEOTRACES programme.
- Process study ‘The impact of mid-ocean ridges on the ocean’s iron cycle’ was not funded but ranked very highly and will be resubmitted to NERC on 21st of July 2015.

### ***Outreach***

- Royal Society meeting which is open to general public in December 2015.

### ***Other activities (e.g., acquisition of new sampling systems)***

- New conducting Kevlar winch was deployed on the RSS Discovery during Shelf sea Program and worked well.
- Consultation finished for new Polar Ship (due in 2017) and will include a trace metal clean sampling laboratory, conducting Kevlar winch and trace metal clean CTD.

### ***National and International service***

- The UK continues to host the GEOTRACES Data Assembly Centre 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.

Submitted by Maeve Lohan (M.Lohan@soton.ac.uk).