

ANNUAL REPORT ON GEOTRACES ACTIVITIES IN THE NETHERLANDS

May 1st, 2016 to April 30th, 2017

New scientific results

Progress is being made with the interpretation and publication of results from cruises GA02 and GA04N. The data from GA04N has been submitted for consideration to Standards and Intercalibration committee for inclusion into the IDP. No cruises have been done in the past year, but we are optimistic about the outcome of pending funding applications. A Neptune multicollector ICP-MS has been installed at NIOZ and we are starting to set-up the required methods for stable isotope measurements in sea water samples.

Water column samples were collected at 18 stations on a GEOTRACES cruise (process study) with *RV Pelagia* from 28th May to 15th June 2016 in the Baltic Sea. Benthic flux measurements with landers and porewater sampling were carried out a selection of stations. Analyses of Fe and other elements are in progress (flow injection for Fe, SEAFast-ICP-MS analyses).

New publications (published or in press)

- Bridgestock, L., van de Flierdt, T., Rehkämper, M., Paul, M., Middag, R., Milne, A., Lohan, M.C., Baker, A.R., Chance, R., Khondoker, R., Strekopytov, S., Humphreys-Williams, E., Achterberg, E.P., Rijkenberg, M.J.A., Gerringa, L.J.A. and de Baar, H.J.W., 2016. Return of naturally sourced Pb to Atlantic surface waters. *Nature Communications*, 7: 12921.
- Buck K.N., Gerringa L.J.A., Rijkenberg M.J.A., 2016. An Intercomparison of Dissolved Iron Speciation at the Bermuda Atlantic Time-series Study (BATS) Site: Results from GEOTRACES Crossover Station A. *Front. Mar. Sci.* 3:262. doi: 10.3389/fmars.2016.00262
- Caprara, S, Buck, K.N., Gerringa, L.J.A., Rijkenberg, M.J.A., Monticelli, D., 2016. A compilation of iron speciation data for open oceanic waters, a Data report. *Front. Mar. Sci.* 3:221. doi: 10.3389/fmars.2016.00221
- Dulaquais, G.,H. Planquette, S.L 'Helguen, M. J. A. Rijkenberg, and M. Boye (2017), The biogeochemistry of cobalt in the Mediterranean Sea, *Global Biogeochem. Cycles*, 31, 377–399, doi:10.1002/ 2016GB005478.
- Gerringa, L.J.A., Rijkenberg, M.J.A., Bown, J., Margolin, A.R., Laan, P., de Baar, H.J.W., 2016. Fe-binding dissolved organic ligands in the oxic and suboxic waters of the Black Sea. *Front. Mar. Sci.* 3:84. doi: 10.3389/fmars.2016.00084
- Lambelet, M., van de Flierdt, T., Crocket, K., Rehkämper, M., Kreissig, K., Coles, B., Rijkenberg, M.J.A., Gerringa, L.J.A., de Baar, H.J.W., Steinfeldt, R., 2016. Neodymium isotopic composition and concentration in the western North Atlantic Ocean: Results from the GEOTRACES GA02 section. *Geochim. Cosmochim. Acta*, 177: 1–29.
- Margolin, A.R., Gerringa, L.J.A., Hansell, D.A., Rijkenberg, M.J.A., 2016. Net removal of dissolved organic carbon in the anoxic waters of the Black Sea. *Mar. Chem.* 183, 13-24. doi:10.1016/j.marchem.2016.05.003

- Rolison, J.M., Stirling, C.H., Middag, R., Rijkenberg, M.J.A., 2017. Uranium stable isotope fractionation in the Black Sea: Modern calibration of the $^{238}\text{U}/^{235}\text{U}$ paleo-redox proxy. *Geochimica et Cosmochimica Acta* 203: 69-88.
- van Hulst, M., Middag, R., Dutay, J.C., de Baar, H., Roy-Barman, M., Gehlen, M., Tagliabue, A. and Sterl, A., 2017. Manganese in the west Atlantic Ocean in the context of the first global ocean circulation model of manganese. *Biogeosciences*, 14(5): 1123-1152
- Vance, D., Little, S.H., Archer, C., Cameron, V., Andersen, M., Rijkenberg, M.J.A., Lyons, T.W., 2016. The oceanic budgets of nickel and zinc isotopes: the importance of sulphidic environments as illustrated by the Black Sea. *Philosophical Transactions of the Royal Society A*. issue 2081, article ID 20150284
- Vance, D., Little, S.H., de Souza, G.F., Khatiwala, S., Lohan, M.C., Middag, R., 2017 Silicon and zinc biogeochemical cycles coupled through the Southern Ocean. *Nature Geoscience*, DOI: 10.1038/NGEO2890
- Xie, R.C., Galer, S.J.G., Abouchamie, W., Rijkenberg, M.J.A., de Baar, H.J.W., de Jong, J., Andreae, M.O., submitted. Non-Rayleigh control of upper ocean Cd isotope fractionation in the western South Atlantic. (submitted)
- Dijkstra, N., Kraal, P, Seguret, M.J.M., Gonzalez, S., Rijkenberg, M.J.A., Slomp, C.P. submitted. Phosphorus dynamics in and below the redoxcline in the Black Sea and implications for phosphorus burial. (submitted)

Cruises

- Baltic Sea cruise, *RV Pelagia*, 28th May to 15th June 2016: Nynashamn (Sweden) - Texel (Netherlands).

New projects and/or funding

- ‘Iron limitation and viral lysis, phytoplankton caught between a rock and a hard place’. Project funded in the Netherlands polar Programme. PI’s Rob Middag and Corina Brussaard.

PhD theses

- Dijkstra, N. 2017. Phosphorus dynamics in the Black Sea and Baltic Sea. *Utrecht Studies in Earth Sciences* 126. 197p.

Meetings

- Prof. de Baar attended the 2016 GEOTRACES Steering Committee Meeting on behalf of the Dutch GEOTRACES programme.
- Dr. Middag attended the GESAMP workshop ‘Changing Atmospheric Acidity and the Oceanic Solubility of Nutrients’, held at the University of East Anglia, Norwich, United Kingdom from February 27 through March 2, 2017.

Conference attendance

- Middag, R., van Heuven, S., de Baar, H.J.W., Bruland, K.W.. The Relationships of Dissolved Cadmium with Major Nutrient Phosphate along the Ocean Conveyor of the West Atlantic Ocean. Invited oral presentation at the 2016 Goldschmidt meeting – Yokohama, 29-06-2016, Japan.
- Slagter, H.A., Gerringa, L.J.A., de Baar, H.J.W, Rijkenberg, M.J.A.. Iron in the Arctic Ocean: influence of increasing input of yellow substance. Oral presentation at the Netherlands Polar Programme symposium, The Hague, 03-11-2016, Netherlands
- González, A.G., Slagter, H.A.. Long-term observation program via multi-interdisciplinary oceanographic cruises. Poster presentation at the Netherlands Polar Programme symposium, The Hague, 03-11-2016, Netherlands
- Séguret, M.J.M., Dijkstra, N., Anderson, A., Severmann, S., Rijkenberg, M., Laan, P., Slomp, C.P. (2016). Water column iron dynamics along a shelf-to-basin transect in the Black Sea. Nederlands Aardwetenschappelijk Congres, Veldhoven, The Netherlands.

Outreach activities

- Lecture L.J.A. Gerringa at Nassau scholengemeenschap Breda: 4-2-2016. “Bipolair” zee onderzoek.

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