

ANNUAL REPORT ON GEOTRACES ACTIVITIES IN BELGIUM

May 1st, 2016 to April 30th, 2017

New scientific results

- Primary production rates, N₂ fixation rates, ²³⁴Th export fluxes, POC export fluxes, particulate Ba profiles, trace element contents of the large (sinking) particle fraction and isotopic compositions ($\delta^{15}\text{N}$, $\delta^{18}\text{O}$) of nitrate from the GEOVIDE cruise (GA01-GEOTRACES; transect Lisbon to Newfoundland, May-July 2014).
- Isotopic composition ($\delta^{15}\text{N}$, $\delta^{18}\text{O}$) of nitrate from the SWERUS and ARKXXXVIII/3 cruises.
- Primary production, N₂ fixation rates, nitrate isotopic compositions from the Belgica 2014/14 cruise (Bay of Biscay and Iberian Continental margin)
- Dissolved Ba from the Canadian Arctic GEOTRACES cruise (collaboration with H. Thomas, Dalhousie University).
- Trace metal geochemistry in the coastal sediments of the northwestern Black Sea.
- Influence of dissolved iron, phosphate and dust deposition on nitrogen fixation.

New publications (published or in press)

- Fonseca-Batista, D., Dehairs, F., Riou, V., Fripiat, F., Elskens, M., Deman, F., ... Auel, H. (2017). Nitrogen fixation in the eastern Atlantic reaches similar levels in the Southern and Northern Hemisphere. *Journal of Geophysical Research: Oceans*, 122, 4618–4632. <https://doi.org/10.1002/2016JC011775>.
- Lemaitre N., H. Planquette, F. Planchon, F. Dehairs, P. van der Merwe, A. Bowie, T.W. Trull, C. Bollinger, M. Le Goff, E. Grossteffan, 2016. Impact of the natural Fe-fertilization on the magnitude, stoichiometry and efficiency of PN, BSi and PFe export fluxes, *Deep-Sea Research*, I, 117, 11-27.
- Charette M.A., P.J. Lam, M.C. Lohan, E.Y. Kwon, V. Hatje, C. Jeandel, A.M. Shiller, G.A. Cutter, A. Thomas, P.W. Boyd, W.B. Homoky, A. Milne, H. Thomas, P.S. Andersson, D. Porcelli, T. Tanaka, W. Geibert, F. Dehairs, J. Garcia Orellana, 2016. Coastal ocean and shelf-sea biogeochemical cycling of trace elements and isotopes: lessons learned from GEOTRACES 2, *Proceedings of the Royal Society of Sciences*, A, 374:20160076, <http://dx.doi.org/10.1098/rsta.2016.0076>.
- Roukaerts A., A.-J. Cavagna, F. Fripiat, D. Lannuzel, K. Meiners and F. Dehairs, 2016. Sea-ice algal primary production and nitrogen uptake rates off East Antarctica, *Deep Sea Research* II, 131, 140-149, <http://dx.doi.org/10.1016/j.dsr2.2015.08.007>.

New publications (submitted)

Fonseca-Batista D., Riou V., Michotey V., Fripiat F., Li X., Deman F., Guasco S., Brion N., Elskens M., Chou L., Dehairs F. Significant N₂ fixation in productive waters of the temperate Northeast Atlantic, in review for *Frontiers in Marine Sciences*

Cruises

- EMBLAS-II cruise, National Pilot Monitoring Studies and Joint Open Sea Surveys in Georgia, Russian Federation and Ukraine. Leg I, 17-22 May 2016.

New projects and/or funding

- OCeANIC, nitrous Oxide and nitrogen Cycling in Antarctic sea Ice Covered zone, Belgium - China Research Cooperation, The role of the oceans in the climate system (CLIMocean).
- Understanding marine benthic hypoxia and its consequences on benthic-pelagic exchanges, diagenesis and the macrobenthos (BENTHOX), founded by FRS-FNRS (Fund for Scientific Research – FNRS), Wallonia-Brussels Federation.

PhD theses

- Lemaitre Nolwenn: Multi-proxy approach (^{234}Th , Ba_{xs}) of export and remineralization fluxes of carbon and biogenic elements associated with the oceanic biological pump, Joint PhD Université de Bretagne Occidentale, IUEM and Vrije Universiteit Brussel, 2017, 332 pp.
- Arnout Roukaerts: Primary production and nutrient cycling in Antarctic sea-ice and open waters. To be submitted summer 2017.
- Debany Fonseca Batista: Contribution of N_2 fixation to primary and new production in the Atlantic Ocean. Finalized, spring 2017.
- Xu-Feng Li: The marine iron biogeochemistry under a changing climate: impact on the phytoplankton and the diazotroph communities. Joint PhD Université Libre de Bruxelles – Vrije Universiteit Brussel. To be finalized in 2018.
- Florian Deman: Sea ice primary production at the Pan-Antarctic scale and nutrient cycling in the Antarctic sea ice covered areas (both sea ice and water column). Started in Dec 2016.
- Audrey Plante: Study of marine benthic hypoxia and its consequences on the exchange at the sediment-water interface and diagenesis.

Meetings

- Lemaitre N., H. Planquette, F. Dehairs, M. Leermakers, L. Monin, L. André and F. Planchon, 2016. Carbon export fluxes along the GEOVIDE transect in the North Atlantic (GEOTRACES GA01), Ocean Sciences 2016, New Orleans. Feb. 2016
- Dehairs F., N. Lemaitre, H. Planquette, L. Monin, L. André, S. Jacquet and F. Planchon, 2016. Mesopelagic carbon remineralization along the GEOVIDE transect in the North Atlantic (GEOTRACES GA01), Ocean Sciences 2016, New Orleans. Feb 2016
- Fonseca Batista D., F. Fripiat, F. Deman and F. Dehairs, 2016. Nitrate isotopic composition across a North-South transect in the Eastern Atlantic Ocean: Significance of nitrogen input through N_2 fixation, Ocean Sciences 2016, New Orleans. Feb 2016

- Deman F., A. Roukaerts, B. Delille, F. Fripiat, D. Lannuzel, J.-L. Tison and F. Dehairs, 2016. A time-series study during spring transition in the fast ice at Davis Station, Antarctica: Preliminary results, CHINARE Meeting, Wuhan, China, Oct 2016.
- Fripiat F., M. Declercq, C. Sapart, F. Deman, D. Fonseca-Batista, C. Merten, A. Roukaerts, J.-L. Tison, M. Walter and F. Dehairs. Nitrogen cycle inferred from N and O isotopes in a changing Arctic Ocean, JESIUM, Ghent, Belgium, Sept 2016.
- Plante A., N. Røevros, A. Capet, M. Grégoire, N. Fagel and L. Chou (2017) Benthic hypoxia and early diagenesis in the Black Sea shelf sediments. Poster presentation, EGU, 23-28 April 2017, Vienna, Austria.
- Thomas H., F. Dehairs and J. Mol, 2017. Shelf Exchange Processes of CO₂, Ra, and Ba in the Canadian Arctic Archipelago, Geophysical Research Abstracts, Vol. 19, EGU2017-5445, 2017. EGU General Assembly 2017.
- Deman F., D. Fonseca-Batista, F. Fripiat, E. Le Roy, D. Nuwam Thilakarathne, N. Lemaitre, A Roukaerts and F. Dehairs, 2017. N₂-fixation footprint on nitrate isotopic composition in temperate Northeast Atlantic Ocean, Goldschmidt 2017, August 2017, Paris.
- Fonseca-batista D., F. Deman, X. Li, E. Le Roy, R. Inginiero, C. Mariez, S. Roig, N. Lemaitre, F. Fripiat, L. Chou and F. Dehairs, 2017. Patterns of N₂ fixation across the North Atlantic, Goldschmidt 2017, August 2017, Paris.
- Lemaitre N., H. Planquette, F. dehairs, C. Bassoulet, C. Jeandel, M. Castrillejo and F. Planchon, 2017. Particulate trace element export in the North Atlantic, Goldschmidt 2017, August 2017, Paris.
- Fripiat F., M. Declercq, C. Sapart, L. Anderson, V. Bruechert, F. Deman, D. Fonseca-Batista, C. Humborg, A. Roukaerts and F. Dehairs, 2017. Goldschmidt 2017, August 2017, Paris.
- Li X., D. Fonseca-Batista, N. roevros, F. Dehairs and L. Chou, 2017. Environment and nutrient control of nitrogen fixation, Goldschmidt 2017, August 2017, Paris.

Submitted by Frank Dehairs (Vrije Universiteit Brussel) and Lei Chou (Université Libre de Bruxelles).