

## ANNUAL REPORT ON GEOTRACES ACTIVITIES IN BELGIUM

April 1st, 2018 to March 31st, 2019

### *New scientific results*

- Primary production rates, N<sub>2</sub> fixation rates, <sup>234</sup>Th 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).
- Primary production, N<sub>2</sub> 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).
- Reactive iron and sulfur geochemistry in the coastal Black Sea sediments.

### *Cruises*

- 35th Chinese Antarctic cruise (November 2018 – April 2019) to Prydz Bay and Amundsen Sea. Sampling of ice cores near Zhongshan station (Prydz Bay) and water column in the Amundsen Sea collaboration with Zhan Liang, 2nd Institute SIO, Xianmen, China).
- Belgica 2018/16 cruise in the Gotland Basin of the Baltic Sea from 20 June to 4 July 2018 to study the (bio)geochemistry of nutrients and trace metals in relation with coastal hypoxia.

### *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).

### *New GEOTRACES publications*

- Deman, F., Fonseca-Batista, D., Roukaerts, A., García-Ibáñez, M.I., Le Roy, E., Thilakarathne, D.N., Dehairs, F. and Fripiat, F., 2019. Nitrate isotopic composition along the GEOTRACES GA01 (GEOVIDE) section in the North Atlantic, in preparation.
- Fonseca-Batista D., X. Li, V. Riou, V. Michotey, F. Deman, F. Fripiat, S. Guasco, N. Brion, N. Lemaitre, M. Tonnard, M. Gallinari, H. Planquette, F. Planchon, G. Sarthou, M. Elskens, J. LaRoche, L. Chou and F. Dehairs, 2019. Evidence of high N<sub>2</sub> fixation rates in the temperate Northeast Atlantic, *Biogeosciences*, 16, 999-1017, <https://doi.org/10.5194/bg-16-999-2019>.
- Tang W., S. Wang, D. Fonseca Batista, F. Dehairs, S. Gifford, A. Gonzalez, H. Planquette, G. Sarthou, M. Gallinari and N. Cassar, 2019. Revisiting the distribution of N<sub>2</sub> fixation and contribution to marine production in the world's oceans, *Nature Communications*, doi:10.1038/s41467-019-08640-0.

- Sarthou, G., Lherminier, P., Achterberg, E. P., Alonso-Pérez, F., Bucciarelli, E., Boutorh, J., ... & Casacuberta, N. (2018). Introduction to the French GEOTRACES North Atlantic transect (GA01): GEOVIDE cruise. *Biogeosciences*, 15(23), 7097-7109.
- Fripiat F., M. Declercq, C.J. Sapart, L.G. Anderson, V. Bruechert, F. Deman, D. Fonseca-Batista, C. Humborg, A. Roukaerts, I.P. Semiletov and F. Dehairs, 2018. Influence of the bordering shelves on nutrient distribution in the Arctic halocline inferred from water column nitrate isotopes, *Limnology and Oceanography*, 63, 2154-2170, <https://doi.org/10.1002/lno.10930>, <https://doi.org/10.1002/lno.10930>.
- Li X., D. Fonseca-Batista, N. Roevros, F. Dehairs, L. Chou, 2018. Environmental and nutrient controls of marine nitrogen fixation, *Progress in Oceanography*, 167, 125-137.
- Lemaitre, N., Planchon, F., Planquette, H., Dehairs, F., Fonseca-Batista, D., Roukaerts, A., ... & Sarthou, G. (2018). High variability of particulate organic carbon export along the North Atlantic GEOTRACES section GA01 as deduced from <sup>234</sup>Th fluxes. *Biogeosciences*, 15(21), 6417-6437.
- Lemaitre N., H. Planquette, F. Planchon, G. Sarthou, S. Jacquet, M. I. García-Ibáñez, A. Gourain, M. Cheize, L. Monin, L. André, P. Laha, H. Terryn, and F. Dehairs, 2018. Particulate barium tracing significant mesopelagic carbon remineralisation in the North Atlantic, *Biogeosciences*, 15, 2289-2307.
- Rembauville M., I. Salter, F. Dehairs, J.-C. Miquel and S. Blain, 2018. Annual particulate matter and diatom export in a high nutrient, low chlorophyll area of the Southern Ocean, *Polar Biology*, 41, 25-40, DOI 10.1007/s00300-017-2167-3.

#### ***Completed GEOTRACES PhD or Master theses***

- Arnout Roukaerts: Novel insights in nitrogen and carbon biogeochemistry of Antarctic sea ice: the potential role of ta microbial biofilm, Vrije Universiteit Brussel, Nov. 2018, 198pp.
- Florian Deman: Sea ice primary production at the Pan-Antarctic scale and nutrient cycling in the Antarctic sea ice covered areas (sea ice and water column), Vrije Universiteit Brussel & Université de Liège, In progress.
- Audrey Plante: Study of marine benthic hypoxia and its consequences on the exchange at the sediment-water interface and diagenesis, Université libre de Bruxelles & Université de Liège, In progress.

#### ***GEOTRACES presentations in international conferences***

- Deman F., Roukaerts A., Tison J.-L., Delille B., Dehairs F. and Fripiat F. (2019) High production going along with high respiration: impact of biofilm formation for sea ice biogeochemistry, IGS, Sea Ice at the Interface, Winnipeg, Canada, August 2019.
- Deman F., Roukaerts A., Vancoppenolle M., Tison J.-L., Delille B., Dehairs F. and Fripiat F. (2019) Using biomass accumulation to estimate Antarctic sea ice primary production, IGS, Sea Ice at the Interface, Winnipeg, Canada, August 2019.
- Deman F., Roukaerts A., Tison J.-L., Delille B., Dehairs F. and Fripiat F. (2019) Estimation of Antarctic sea ice primary production inferred from biomass accumulation, 51st International Liege Colloquium on Ocean Dynamics, Polar Ocean facing changes, Liège, Belgium, May 2019.

- N. Lemaitre, H. Planquette, F. Dehairs, F. Planchon, G. Sarthou, P. Lherminier, D. Vance, Trace element cycling in the North Atlantic, Goldschmidt, August 2019, Barcelona.
- Li X., D. Fonseca-Batista, N. Roevros, F. Dehairs and L. Chou (2019) Marine nitrogen fixation: Environmental and nutrient controls. Fourth Xiamen Symposium on Marine Environmental Sciences. Xiamen, China, 6-10 January 2019. Oral presentation given by L. Chou.
- Plante A., N. Roevros, A. Capet, M. Grégoire, N. Fagel and L. Chou (2018) Black Sea north-western shelf hypoxia: a study based on diagenetic processes and sedimentary proxies. European Geosciences Union (EGU) General Assembly 2018, Vienna, Austria, 8–13 April 2018, EGU2018-11782. Poster.
- Plante A., N. Ahmed Butt, N. Roevros, A. Capet, M. Grégoire, N. Fagel and L. Chou (2018) Coastal hypoxia in the Black Sea: Effects on diagenetic pathways and benthic fluxes. Ocean Deoxygenation Conference 2018, Kiel, Germany, 02-08 September 2018. Poster.

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