

**Science highlights**

The KEOPS2 (Process study GIpr01), 2011, PI S. Blain (LOMIC, Banyuls, France)

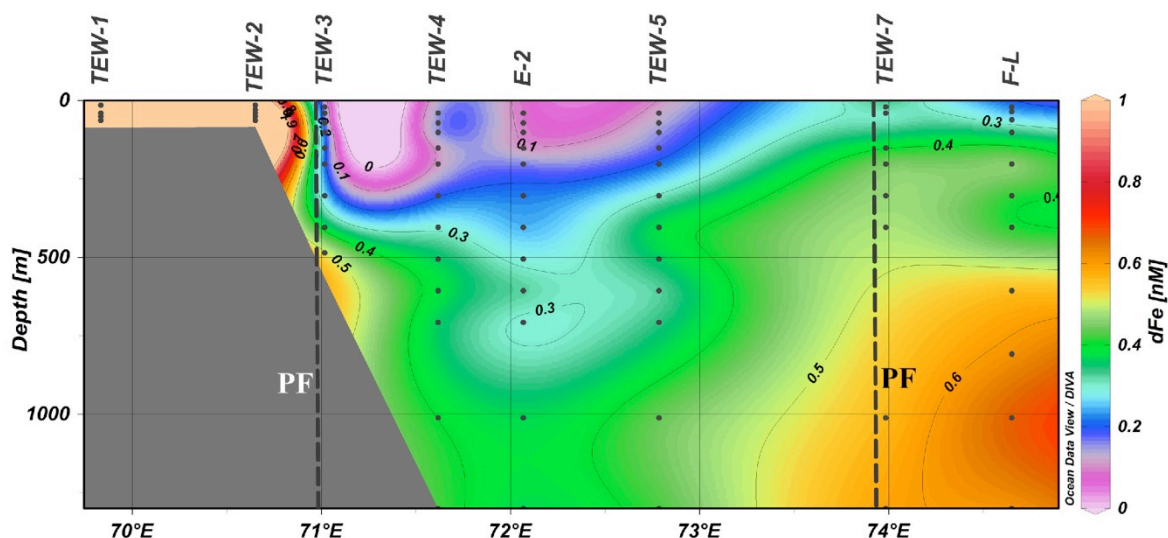


Figure 1: Concentrations of  $dFe$  ( $nmol L^{-1}$ ) over an East-West transect carried out during the KEOPS2 cruise (Qu erou  et al., 2015). The PF position is indicated with black dashed lines. One of the challenges proposed by KEOPS2 was to investigate the sources and fate of iron in the highly dynamic region east of Kerguelen Islands. Combining the dissolved iron concentrations measured in the water column and the new knowledge gathered on the circulation (including mesoscale features) by in situ and satellite observations, we demonstrated that the properties of the chlorophyll plume extending eastward of the plateau is well explained, qualitatively and quantitatively, by a source of iron located on the Kerguelen Plateau and a Lagrangien transport offshore.

A total of 44 articles were published related to the KEOPS2 process study, including a special issue in Biogeosciences (2014-2015) with 33 papers.

[http://www.biogeosciences-discuss.net/special\\_issue133.html](http://www.biogeosciences-discuss.net/special_issue133.html)

The GEOTRACES-Mediterranean & Black Seas (GA04N), 2013, PI M. Rijkenberg (NIOZ, NL)

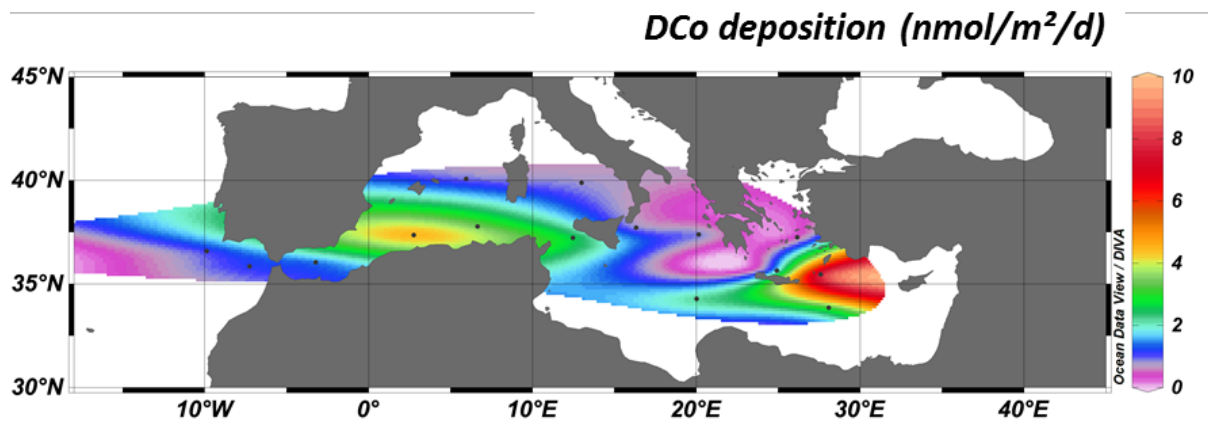


Figure 2: A new dust deposition model was developed using the particulate aluminium data as a tracer of dust deposition. Using this model together with dissolved and particulate cobalt concentrations showed the predominance for Co of high Saharan inputs in the Eastern and Central basins and of anthropogenic inputs in the North (Dulaquais, Boye, et al.).

The GEOVIDE cruise (GA01), 2014, PIs G. Sarthou (LEMAR, France) and P. Lherminier (LPO, France)

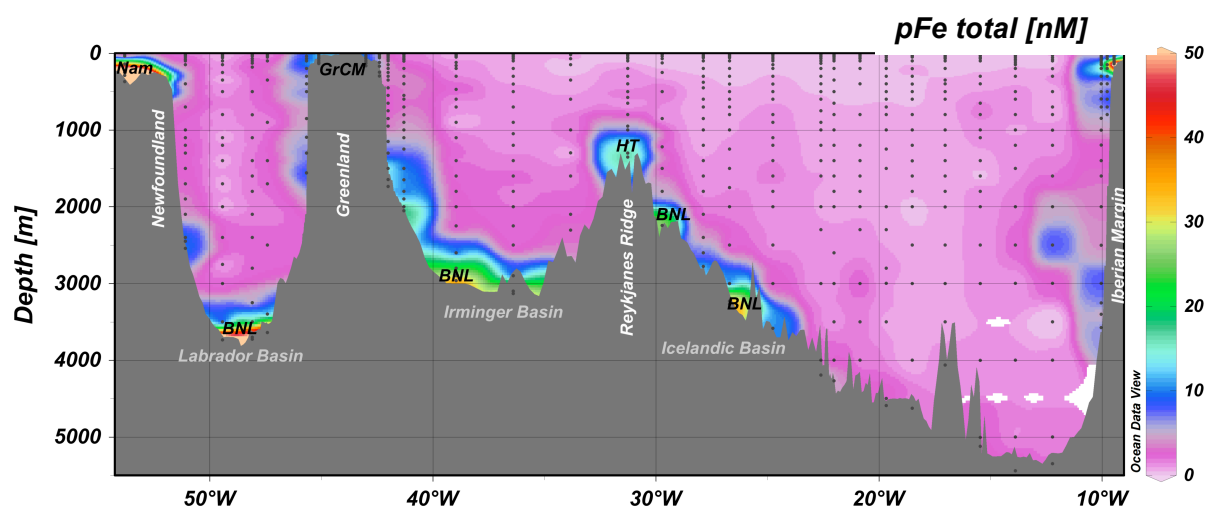


Figure 3: Distribution of total particulate Fe along the GEOVIDE section (Planquette, Gourain, Cheize, et al.). Concentrations ranged from 9 pM to 304 nM (median concentration 1.15 nM). Inputs from Benthic Nepheloid Layers (BNL) and Hydrothermal activity (HT) are clearly seen on the figure.

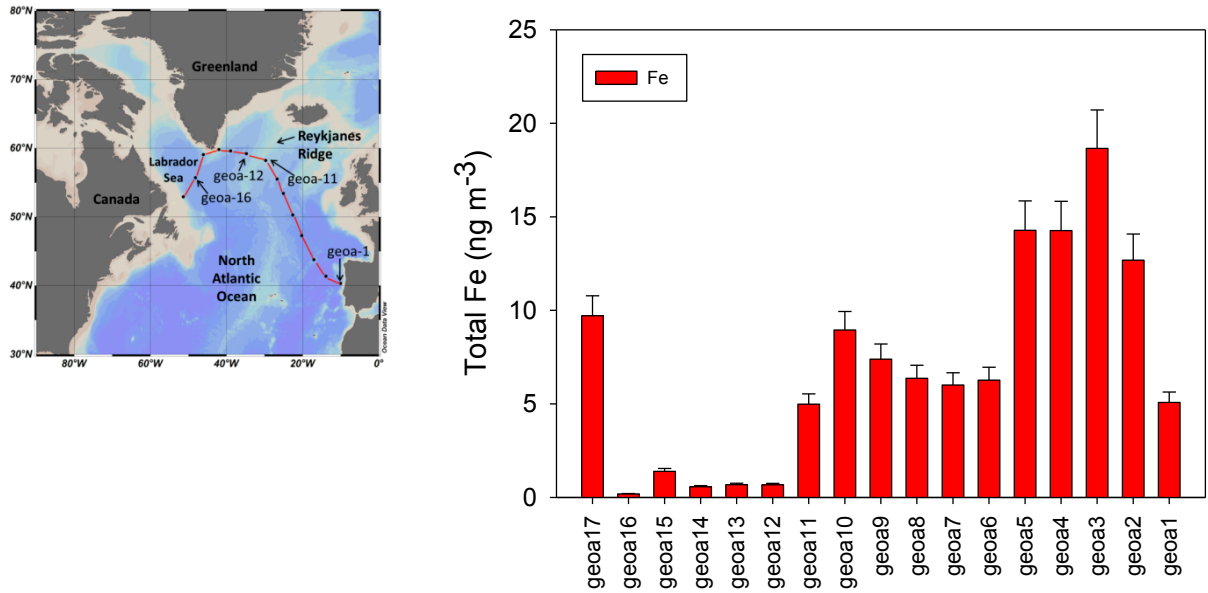


Figure 4: Distribution of total aerosol Fe along the GEOVIDE section (Shelley and Sarthou). Concentrations are low ( $0.19\text{--}18.7\text{ ng m}^{-3}$ ) and are correlated to total aerosol Al, suggesting a common lithogenic source.

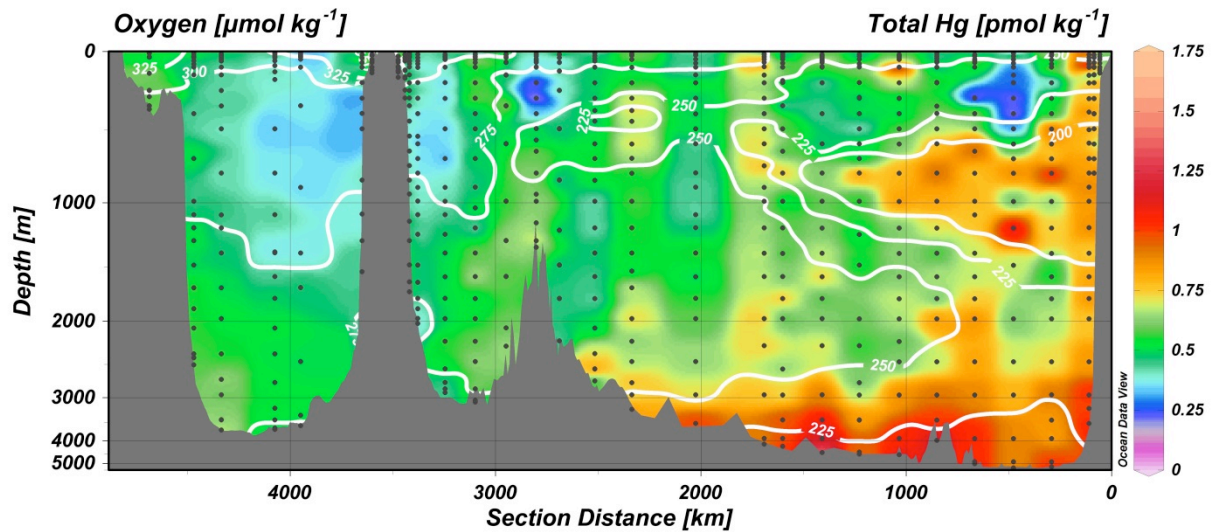


Figure 5: Distribution of total Hg along the GEOVIDE section (Cossa, Heimbürger et al.). Extremely low concentrations ( $<0.5\text{ pM}$ ) were observed in the convection zone, highlighting the efficiency of the implementation of global anti-pollution policies around the North Atlantic Ocean.

## *Peer-review publications*

2014

- Bowie A.R., van der Merwe, P., Qu  rou  , F., Trull, T., Fourquez, M., Planchon, F., Sarthou, G., Chever, F., Townsend, A.T., Obernosterer, I., Sall  e, J.-B., Blain, S., 2014, Iron budgets for three distinct biogeochemical sites around the Kerguelen plateau (Southern Ocean) during the natural fertilization experiment KEOPS-2. *Biogeosciences Discussions KEOPS 2 special issue*, 11, 17861-17923.
- Christaki U., Lef  vre D., Georges C., Colombet J., Catala P., Courties C., Sime-Ngando T., Blain S., Obernosterer I. 2014. Microbial food web dynamics during spring phytoplankton blooms in the naturally iron-fertilized Kerguelen area (South-ern Ocean). *Biogeosciences*, 11, 6739-6753, doi:10.5194/bg-11-6739-2014.
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- Cossa D., Garnier C., Buscail R., Elbaz-Poulichet F., Mikac N., Patel-Sorrentino N., Tessier E., Rigaud S., Lenoble V., Gobeil C., 2014. A Michaelis–Menten type equation for describing methylmercury dependence on inorganic mercury in aquatic sediments, *Biogeochemistry* 119, 35-43
- Dang D. H., Tessier E., Lenoble V., Durrieu G., Omanovic D., Mullot J.-U., Pfeifer H.R., Mounier S., Garnier C., 2014. Key parameters controlling arsenic dynamics in coastal sediments: an analytical and modelling approach, *Marine Chemistry* 161, 34-46
- Dulaquais, G., Boye, M., Rijkenberg, M.J.A., and Xavier Carton (2014) Physical and remineralization processes govern the cobalt distribution in the deep western Atlantic Ocean. *BIOGEOSCIENCES*, 11, 1561-1580, doi:10.5194/bg-11-1561-2014.
- Dulaquais, G., Boye, M., Middag, R., Owens, S., Puigcorbe, V., Buesseler, K., Masqu  , P., de Baar, H.J.W., Carton, X. (2014) Contrasting biogeochemical cycles of cobalt in the surface western Atlantic Ocean. *GLOBAL BIOGEOCHEMICAL CYCLES*, 28(12), 1387-1412, doi:10.1002/2014GB004903.
- Georges C., Monchy S., Genitsaris S., Christaki U. 2014. Protist community composition during early phytoplankton blooms in the naturally iron-fertilized Kerguelen area (Southern Ocean). *Biogeosciences*, 11, 5847-5863, doi:10.5194/bg-11-5847-2014.
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- Jouandet M.-P., Jackson G.A., Carlotti F., Picheral M., Stemmann L., Blain S. 2014. Rapid formation of large aggregates during the spring bloom of Kerguelen Island: observations and model comparisons, *Biogeosciences*, 11, 4393-4406, doi:10.5194/bg-11-4393-2014.
- Lasbleiz M., Leblanc K., Blain S., Ras J., Cornet-Barthaux V., H  lias Nunige S., Qu  guiner B. 2014. Pigments, elemental composition (C, N, P, and Si), and stoichiometry of particulate matter in the naturally iron fertilized region of Kerguelen in the Southern Ocean. *Biogeosciences*, 11, 5931-5955, doi:10.5194/bg-11-5931-2014.
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## 2015

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  - Planchon, F., Ballas, D., Cavagna, A.J., Bowie, A.R., Davies, D., Trull, T., Laurenceau-Cornec, E.C., Van Der Merwe, P., Dehairs, F., 2015. Carbon export in the naturally iron-fertilized Kerguelen area of the Southern Ocean based on the <sup>234</sup>Th approach. *Biogeosciences* 12, 3831-3848.

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- Sanial, V., van Beek, P., Lansard, B., Souhaut, M., Kestenare, E., d' Ovidio, F., Zhou, M. and Blain, S.: Use of Ra isotopes to deduce rapid transfer of sediment-derived inputs off Kerguelen, *Biogeosciences*, 12(5), 1415–1430, doi:10.5194/bg-12-1415-2015, 2015.
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#### Other publications

- d'Ovidio F., Nencioli F., Pujol I., Rio M.H., Park Y.-H., Qu guiner B., Blain S. 2014, The multisatellite-based adaptive strategy of the KEOPS2 cruise. In 'Space research in France', Rapport au COSPAR 40th Scientific Assembly, CNES ed., Ch. 'Oceanography', pp. 84–85.
- Jeandel C., van Beek P., Lacan F. 2014. Chemical Elements and Isotopes, Tracers of Land–Sea Exchanges; in *The Land-Sea Interactions* (eds A. Monaco and P. Prouzet), Oct. 2014, John Wiley & Sons, Inc., Hoboken, NJ, USA. doi: 10.1002/9781119007647.ch2
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#### PhD

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- Labatut M., 2014, Continental inputs of iron to the ocean, isotopic insights - Equatorial Pacific. Apports Continentaux de Fer   l'oc an : Approche isotopique – Oc an Pacifique  quatorial. , PhD, Ecole doctorale SDU2E Sciences de l'Univers, de l'Environnement et de l'Espace", Universit  de Toulouse. Supervision F. Lacan and F. Poitrasson. Obtained 10 October 2014.
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- Llorc Joan, 2015, LOCEAN, Université Pierre & Marie Curie. Influence des apports de Fer sur la variabilité de la production primaire et des flux de CO<sub>2</sub> dans l'Océan Austral, PhD, 9 janvier 2015.
- Quéroùé F., 2014, Trace metals distributions in the Southern Ocean: Kerguelen Plateau process study, PhD, co-tutelle University of Brest and University of Tasmania. Supervision G. Sarthou, A. Bowie, E. Bucciarelli, and D. Lannuzel.

### *International conferences*

#### 2014

- Boye, M., Delebecque, N., Sicre, M.-A., Diadhiou, H.D., Schmidt, S., Ndiaye, D., de la Broise, D., Brehmer, P. (2014) Development of new proxies to assess the 20th century variability of the North West African upwelling. 1st International Conference AWA, 9-11 December 2014, Dakar, Senegal.
- Boye, M., Giraud, M., Garçon, V., Donval, A., de la Broise, D. (2014) Assessing the impact on microphytoplankton of an artificial upwelling. 1st International Conference AWA, 9-11 December 2014, Dakar, Senegal.
- Heimbürger LE, D Cossa, JE Sonke, F Lacan, P Lherminier, G Sarthou, Mercury in the North Atlantic - results of the 2014 GEOTRACES GEOVIDE cruise, AGU Fall Meeting 2014, San Francisco, USA, (12/2014), Invited talk
- Heimbürger LE, JE Sonke, MJA Rijkenberg, L Gerringa, HJW de Baar, Mercury in the Black Sea - results of the 2013 GEOTRACES MEDBlack cruise, AGU Fall Meeting 2014, San Francisco, USA, (12/2014)
- Heimbürger LE, Current status and future needs in Hg research & management, 2014 International Mercury Symposium, Jeju, South Korea (02/2014)
- Landa M., S. Blain, U. Christaki, S. Monchy, I. Obernosterer. Link between bacterial diversity and productivity in a mosaic of phytoplankton blooms. IMBER Open Science Conference 'Future Oceans', Bergen, May 2014.
- Lemaitre, N. Bayon, G., Ondréas, H, Freslon, N., Bollinger, C., Rouget, M.L., De prunelé, A., Ruffine, L., Olu, K., Sarthou, G., Trace element behaviour and the export of organically-bound dissolved iron at cold seeps, 2014, Goldschmidt meeting, Sacramento, 8-13 June.
- Sanial V., Charette M., Moore W., Henderson P., Kipp L. and van Beek P. "Radium as a tracer of benthic trace element inputs from the Peruvian continental margin (2013 U.S. Pacific GEOATRCES cruise)". AGU Fall meeting, San Francisco (California, USA), December 2014
- Sanial V., van Beek P., Lansard B., Kestenare E., Souhaut M., d'Ovidio F., Zhou M. and Blain S. Use of Ra isotopes to track sediment derived-inputs from Crozet and Kerguelen Islands. 5th international Ra-Rn Workshop. Arraial do Cabo, Brazil, August 2014
- Shelley, R., Sarthou, G., Machu, E., Tymen, G., Messenger, C., Gorgues, T., Diadhiou, H., and Brehmer, P., 2014, Towards quantifying the aerosol flux of trace and major elements: a case study of the West African Eastern Boundary Upwelling System, International conference "Ecosystem Approach to the Management of Fisheries and the Marine Environment in West African Waters" (AWA), 9-11 Dec., Dakar, Senegal.
- Sutton, J.N., Boye, M., de la Broise, D., Probert, I. (2014) Influence of Cd, Co, Zn on specific growth rate, elemental quota, and inorganic carbon acquisition in *Emiliania huxleyi*. AGU 2014, 15-19 December 2014, San Francisco, USA.



## 2015

- Cheize, M.; Planquette, H. F.; Fitzsimmons, J.; Sherrell, R. M.; Sarthou, G.; Bucciarelli, E.; Lambert, C.; Le Goff, M.; Viollier, E., 2015 Contribution of suspended marine particles to the dissolved trace metals pool: an experimental study with sediments from contrasting environments, ASLO meeting, Granada, Spain, Feb. 2015
- Cindrić A.-M., Garnier C., Oursel B., Pižeta I., Omanović D. 2015. Natural and anthropogenic processes controlling trace metals dynamic in a highly stratified estuary: the Krka River estuary (Adriatic, Croatia), 13th International symposium on Estuarine Biogeochemistry (IEBS 2015), Bordeaux, 7-10 Jun 2015
- Cossa, LE Heimbürger, JE Sonke, Y Zhang, F Lacan, P Lherminier, G Sarthou, Mercury in the North Atlantic Ocean - results of the 2014 GEOTRACES GEOVIDE cruise, 12th International Conference on Mercury as a Global Pollutant, Jeju, South Korea (06/2015)
- Garnier C., Omanović D., Mounier S., Pižeta I., Seppecher P. 2015. PROSECE – a flexible fitting tool to investigate binding interactions, Workshop "Organic Ligands - A Key Control of Trace Metal Biogeochemistry in the Oceans", Sibenik, Croatie, 7-11 avril 2015
- Giraud, M., Boye, M., Garçon, V., Auvray, C., Lejart, M., de la Broise D. (2015) Ocean Thermal Energy Conversion: Potential Impact on Microplankton of Bottom Water Discharge at Subsurface. ASLO 2015, 22-27 February 2015, Granada, Spain.
- Godrant, A.; Bucciarelli, E.; Sarthou, G.; Le Grand, F.; Long, M.; Soudant, P.; Pichereau, V.; Otero-Ferrer, J. L.; Scharek, R., 2015, Iron limitation and Fe/Cu co-limitation driving photosynthesis and lipid strategies of the marine diatom *T. pseudonana*: a pluridisciplinary approach, ASLO meeting, Granada, Spain, Feb. 2015
- Gourain, A., Planquette, H., Cheize M., Menzel, J.-L., Boutorh J., Shelley R., Pereira Contreira L., Bucciarelli E., Sarthou G., Bassoullet, C., 2015, Size fractionated particulate iron along the GEOVIDE section (GEOTRACES section GA01), ASLO meeting, Granada, Spain, Feb. 2015.
- Heimbürger LE, C Lagane, L Laffont, D Cossa, JE Sonke, Mercury measurements in the oceans - results of the 2013 and 2014 GEOTRACES intercalibration exercises, 12th International Conference on Mercury as a Global Pollutant, Jeju, South Korea (06/2015). Invited talk
- Heimbürger LE, D Cossa, A Schartup, C Lagane, L Laffont, JE Sonke, Methylmercury production in the oceans: links to physics, chemistry and biology, 12th International Conference on Mercury as a Global Pollutant, Jeju, South Korea (06/2015). Invited talk
- Lherminier, P., Mercier, H., Sarthou, G., Perez, F., and García, M., Circulation and water masses across the GEOVIDE section, Geophysical Research Abstracts, Vol. 17, EGU2015-14216, 2015, EGU General Assembly 2015
- Menzel, J. L.; Schlosser, C.; Planquette, H.; Cheize, M.; Boutorh, J.; Shelley, R.; Contreira, L.; Gledhill, M.; Sarthou, G.; Achterberg, E. P.: High resolution dissolved aluminum (dAl) measurements along the GEOVIDE section (geotraces section GA01) and aerosol deposition rates to the north Atlantic, ASLO meeting, Granada, Spain, Feb. 2015
- Rosati G, LE Heimbürger, JE Sonke, MJA Rijkenberg, L Gerringa, HJW de Baar, Developing a methylmercury dynamic model for the Black Sea, 12th International Conference on Mercury as a Global Pollutant, Jeju, South Korea (06/2015)
- Sarthou, G., Quéroué, F., Chever, F., van der Merwe, P., Lannuzel, D., Townsend, A.T., Bucciarelli, E., Planquette, H.F., Cheize, M., Blain, S., d'Ovidio, F. and Bowie, A.R., High variability of dissolved iron concentrations in the vicinity of the Kerguelen Island (Southern Ocean), 3rd International Symposium on the Effects of Climate Change on the World's Oceans, Santos, Brazil, March 23-27

- Shelley, R. and Sarthou, G. 2015, Elemental composition of atmospheric deposition during the GEOVIDE campaign (Lisbon, Portugal-St John's, Canada; GEOTRACES GA01), Aquatic Sciences Meeting, Granada, Spain. 22-26 Feb.
- Soerensen AL, DJ Jacob, A Schartup, JA Fisher, I Lehnerr, VI StLouis, LE Heimbürger, JE Sonke, An evaluation of internal production and external sources of methylmercury in the Arctic Ocean, 12th International Conference on Mercury as a Global Pollutant, Jeju, South Korea (06/2015)
- van Beek P., Stieglitz T., Souhaut M., Study of SGD along the French Mediterranean coastline using airborne TIR images and in situ analyses, European Geosciences Union General Assembly 2015 Vienne, Autriche, 12-17 avril 2015
- Zhang Y, LE Heimbürger, D Cossa, JE Sonke, F Lacan, P Lherminier, G Sarthou, Mercury in the North Atlantic Ocean - direct comparison of model and observations along the 2014 GEOTRACES GEOVIDE cruise transect, 12th International Conference on Mercury as a Global Pollutant, Jeju, South Korea (06/2015)

### ***National conferences***

#### 2014

- Heimbürger LE, Mercury in the Oceans, Réunion des Sciences de la Terre, Pau, France (10/2014). Keynote talk
- Cossa D, LE Heimbürger, JE Sonke, F Lacan, P Lherminier, G Sarthou, Mercury distribution in the North Atlantic Ocean - results of the 2014 GEOTRACES GEOVIDE cruise, Réunion des Sciences de la Terre, Pau, France (10/2014)

#### 2015

- Delebecque, N., Sicre, M.-A., Boye, M. (2015) Development of new proxies of pH and SST in coccoliths to assess the 20th century variability in semi-enclosed seas. Journées de la Paléocéanographie, Paleocean 2015, 4-6 Février 2015, IUEM/IPEV/IFREMER, Brest, France.

### ***Cruises***

#### 2014

- GEOVIDE (15 May-30 June, PIs G. Sarthou and P. Lherminier): <http://geovide.tumblr.com/>, <http://www.geovide.obs-vlfr.fr/>
- L.-E. Heimbürger and D. Cossa coordinated the 2014 GEOTRACES intercalibration exercise for total mercury and methylmercury in sea water on the GEOVIDE cruise.

#### 2015

- TransArc II coordination of the 2015 GEOTRACES intercalibration exercise for total mercury and methylmercury in sea water (LE Heimbürger)
- CIO-CALHIS, Peru upwelling, 22-28 April 2015, Peruvian *R/V Olaya* (M. Boye, related to theme 3 of GEOTRACES).

### ***New funding***

- proCOCA project (Calibration of proxies (pH and SSTs) in coccoliths, PI M. Boye) supported by CNRS/INSU LEFE-CYBER - Related to theme 3 of GEOTRACES.
- GEOBRAMA : a GEOTRACES trial study within the BRAZIL-MALVINAS convergence, H. Planquette and G. Sarthou. Coll. L.F. Niencheski and L. Contreira (FURG, Brazil).
- MERMEX C3A action: MISTRALS
- MEBTRACE project: Croatian National Research Foundation (HR NZZ)

## ***Other activities***

### Special session, theme organizers/chairs or co-convenors:

- 3rd International Symposium on the Effects of Climate Change on the World's Oceans, Santos, Brazil, March 23-27 2014, S3. Changing Ocean Chemistry: From Trace Elements and Isotopes to Radiochemistry and Organic Chemicals of Environmental Concern (G. Sarthou and A. Peña)
- European Geophysical Union EGU, session “Hydrogeology of coastal zones: processes, consequences and potentials, G. Houben, E. Zechner, G.H.P. Oude Essink , T. Graf, P. de Louw , U. Mallast , P. Van-Beek , and C. Siebert”, Avril 2015, Vienne, Asutria
- 12th International Conference on Mercury as a Global Pollutant, Integrating marine observational studies and model development, AL Soerensen & LE Heimbürger, , Jeju, South Korea (06/2015)
- Goldschmidt 2015, Prague; CZ, August 16-21 2015, Theme 2: Ocean Geochemistry. Present Conditions and Past Variation: Fluxes, reservoirs and processes. G.Sarthou and A. Bowie
- Goldschmidt 2015, Prague; CZ, August 16-21 2015, Theme 2, Session 02a Trace Metals in the Ocean: Distributions, Isotopic Variation and Speciation, K. Barbeau, A. Bowie, K. Buck, R. Middag, C. Pearce, P. Pogge von Strandmann, and G. Sarthou.
- Ocean Science meeting, 21-26 February 2016, New Orleans, USA, The role of particles in the cycling of trace elements and their isotopes in the ocean, H. Planquette, P. Lam, B. Twining. Session Proposal
- Ocean Science meeting, 21-26 February 2016, New Orleans, USA, Trace Elements and Isotopes at the Interfaces of the Atlantic Ocean, G. Sarthou, E. Boyle, G. Henderson, M. Rijkenberg. Session Proposal.
- Coupled meeting and workshop: “The biological and climatic impacts of ocean trace-element chemistry” and “Quantifying fluxes and processes of trace-metal cycling at ocean boundaries”, 7-9 December 2015, London, G. Henderson, E. Boyle, M. Lohan, M. Rijkenberg and G. Sarthou
- Ocean Science meeting, 21-26 February 2016, New Orleans, USA, Integrating approaches to understanding the distribution and transfer of trace elements in the upper water column, R. Shelley, P. Morton, S. Kumar Singh. Session Proposal.

### Workshop organization:

- 12th International Conference on Mercury as a Global Pollutant, water & sediment sampling, Jim Hurley, Seunghee Han, LE Heimbürger, Brooks Rand Labs, Jeju, South Korea (06/2015)
- 12th International Conference on Mercury as a Global Pollutant, GEOTRACES Intercalibration exercises for Hg species in seawater discussion forum, LE Heimbürger, Jeju, South Korea (06/2015). [http://mercury2015.com/sub/sub02\\_05\\_pop16.asp](http://mercury2015.com/sub/sub02_05_pop16.asp)
- GEOVIDE post-cruise meeting, 26-27 May 2015, Plouzané Brest, G. Sarthou and P. Lherminier. <http://www.geovide.obs-vlfr.fr/meetings/>

## ***Public outreach***

### GEOVIDE Cruise:

- Novela, Toulouse, Oct. 2014 (interviews and movie)  
<http://www.geotraces.org/outreach/other-outreach-materials/videos>
- Sea Tech Week, Brest, Oct 2014 (photo exhibition)

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