**Fe\_D\_CONC\_BOTTLE::u9qurw nmol/kg**

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**Sampling** – Cleaning and sampling methods followed the Geotraces recommendations. Briefly, samples were collected using a Titanium Rosette mounted with Go-Flo bottles deployed on a Kevlar cable. After recovery, the bottles were directly transferred inside a class-100 clean laboratory container. Seawater samples were directly filtered from the pressurized (N2) Go-Flo bottles through acid-cleaned 0.2 µm capsule filters (Sartorius Sartobran-P-capsule 0.45/0.2 µm). Dissolved Fe samples were stored in acid-cleaned LDPE bottles and acidified to pH 1.8 (quartz-distilled HCl).

**Analysis** – The dissolved iron concentrations were measured (mostly on board) by flow injection with online preconcentration and chemiluminescence detection using the exact protocol and instrument as described by Bonnet and Guieu (2006) and Guieu et al. (2018). First, the pH of the acidified samples is adjusted to 5 using Ultrapur ammonia and a 3 times purified ammonium acetate buffer before loading on the 8 hydroxyquinoline (8-HQ) preconcentration column. Calibration of the method was realized with standard additions of iron standard solution in Fe-poor seawater. Each sample were analyzed in triplicate.

**References**

* Bonnet, S., and C. Guieu (2006). Atmospheric forcing on the annual iron cycle in the western Mediterranean Sea: A 1-year survey. J. Geophys. Res., 111, C9010.
* Guieu, C., et al. (2018). Iron from a submarine source impacts the productive layer of the Western Tropical South Pacific (WTSP). Scientific reports, 8(1), 1-9.

**Al\_D\_CONC\_BOTTLE::dixmqz nmol/kg**

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**Sampling** – Cleaning and sampling methods followed the Geotraces recommendations. Briefly, samples were collected using a Titanium Rosette mounted with Go-Flo bottles deployed on a Kevlar cable. After recovery, the bottles were directly transferred inside a class-100 clean laboratory container. Seawater samples were directly filtered from the pressurized (N2) Go-Flo bottles through acid-cleaned 0.2 µm capsule filters (Sartorius Sartobran-P-capsule 0.45/0.2 µm). Dissolved Al samples were stored in acid-cleaned LDPE bottles and acidified to pH 1.8 (quartz-distilled HCl).

**Analysis** – The dissolved aluminum concentration determination were conducted on board using the fluorometric method described by Hydes and Liss (1976). After at least 24 hours, the sample was buffered to pH 5 with ammonium-acetate and lumogallion reagent was added. The sample was then heated to 80°C for 1.5 h to accelerate the complex formation. The fluorescence of the sample was measured with a Jasco FP 2020 + spectrofluorometer (excitation wavelength 495 nm, emission wavelength 565 nm). Calibration of the method was realized with standard additions of aluminum standard solution in seawater.

**Reference**

* Hydes, D.J., and P. S. Liss (1976). Fluorimetric method for the determination of low concentrations of dissolved aluminum in natural waters. Analyst, 101, 922–931, doi:10.1039/an9760100922.

**NITRITE\_D\_CONC\_BOTTLE::3uwtnn umol/kgSILICATE\_D\_CONC\_BOTTLE::onj5ps umol/kgPHOSPHATE\_D\_CONC\_BOTTLE::hrxfoi umol/kgNITRATE\_D\_CONC\_BOTTLE::r9vd5e umol/kg**

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**Sampling** – Cleaning and sampling methods followed the Geotraces recommendations. Briefly, samples were collected using a Titanium Rosette mounted with Go-Flo bottles deployed on a Kevlar cable. After recovery, the bottles were directly transferred inside a class-100 clean laboratory container. Bottles were put under N2 pressure.

Water samples for inorganic nutrients were collected in polyethylene flasks after filtration on a 0.2-µm PES membrane (millipore ref SE2M228I04). Replicas were poisoned with 50 µL HgCl2 to final concentration at 20 µg L-1 and stored for eventually re-analyse at the return of the cruise.

**Analysis** – Dissolved nutrients were analyzed onboard with a segmented flow analyser (SEAL Analytical AA3 HR) using an automated colorimetric procedure (Aminot and Kerouel, 2007).

**Reference**

* Aminot, A., and K. Kérouel (2007). Dosage automatique des nutriments dans les eaux marines : méthodes en flux continu. Ed. Ifremer, Méthodes d’analyse en milieu marin 188 pp.

**Ti\_TP\_CONC\_BOTTLE::s941dl nmol/kgBa\_TP\_CONC\_BOTTLE::hk3pq1 pmol/kgAl\_TP\_CONC\_BOTTLE::nlbq4g nmol/kgSr\_TP\_CONC\_BOTTLE::gf26lh pmol/kgNi\_TP\_CONC\_BOTTLE::wuii96 pmol/kgZn\_TP\_CONC\_BOTTLE::1jnznv pmol/kgCu\_TP\_CONC\_BOTTLE::veiaff pmol/kgMn\_TP\_CONC\_BOTTLE::lcwioa nmol/kgFe\_TP\_CONC\_BOTTLE::jnbqgg nmol/kgP\_TP\_CONC\_BOTTLE::bmagbg nmol/kg**

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**Sampling** – Cleaning and sampling methods followed the Geotraces recommendations. Briefly, samples were collected using a Titanium Rosette mounted with GO-FLO bottles deployed on a Kevlar cable. After recovery, the bottles were directly transferred inside a class-100 clean laboratory container. Just prior to sampling, the GO-FLO bottles were gently mixed and particulate trace elements were sampled directly on-line from the pressurized (N2) GO-FLO bottles on acid-cleaned 25 mm diameter Supor 0.45-um polyethersulfone filters mounted on Millipore Swinnex polypropylene 25 mm filter holders. 4.8 L were filtered on average.

**Analysis** – Particulate trace element samples were digested (10% HF/50% HNO3 (v/v)) following the protocol described in the ‘GEOTRACES Cookbook’ and Planquette and Sherrell (2012). Procedural blanks consisted of unused acid-cleaned filters. Analyses were performed on a high-resolution inductively coupled plasma mass spectrometry (Element XR, Thermo-Fisher Scientific).

**Reference**

* Planquette, H. & Sherrell, R. M. Sampling for particulate trace element determination using water sampling bottles: methodology and comparison to in situ pumps. Limnol. Oceanogr. Methods 10, 367–388 (2012).

**NO2+NO3\_LL\_D\_CONC\_BOTTLE::fq2zia umol/kg**

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**Sampling** – Cleaning and sampling methods followed the Geotraces recommendations. Briefly, samples were collected using a Titanium Rosette mounted with Go-Flo bottles deployed on a Kevlar cable. After recovery, the bottles were directly transferred inside a class-100 clean laboratory container. Bottles were put under N2 pressure. Seawater samples were directly filtered from the bottles through acid-cleaned 0.2 µm capsule filters (Sartorius Sartobran-P-capsule 0.45/0.2 µm). Filtrates collected into acid-cleaned 60mL HDPE bottles Nalgene were acidified with 1% HCl Ultrapur and placed inside double plastic bags until analyses. Most of the samples were analysed at sea shortly after the sampling.

**Analysis** – Dissolved inorganic nitrogen (DIN) (sum of nitrate (NO3) plus nitrite (NO2)) was measured using a 1-m long LWCC. The setup on board and in the lab was the same as described in Louis et al. (2015) adapted from Yao et al. (1998), Zhang (2000), Adornato et al. (2007) and Li et al. (2008). The analysis of NO3- + NO2- is based on the spectrophotometric Griess method (Chen et al., 2008). NO2- absorbance was measured at 540 nm. A further reduction of NO3- to NO2- by a copperized cadmium column (Gal et al., 2004) was necessary to quantify NO3- present in the sample. Materil used: a Liquid Waveguide Capillary Cells (LWCC) made of quartz capillary tubing (length = 1 m), a spectrophotometer (USB4000 Preconfigured for General Lab Use, 200-850 nm, Ocean Optics) and the lamp (Deuterium Tungsten Source, 210-1700 nm).

**References**

* Adornato, Lori R., Eric A. Kaltenbacher, Danielle R. Greenhow, et Robert H. Byrne. (2007). High-resolution in situ analysis of nitrate and phosphate in the oligotrophic ocean. Environmental science & technology 41, no 11: 4045‑52.
* Chen, G., D. Yuan, Y. Huang, M. Zhang, et M. Bergman. (2008). In-Field Determination of Nanomolar Nitrite in Seawater Using a Sequential Injection Technique Combined with Solid Phase Enrichment and Colorimetric Detection. Analytica Chimica Acta, 620, no 1‑2: 82‑88. doi:10.1016/j.aca.2008.05.019.
* Gal, C., W. Frenzel, et J. Möller. (2004). Re-Examination of the Cadmium Reduction Method and Optimisation of Conditions for the Determination of Nitrate by Flow Injection Analysis. Microchimica Acta 146, no 2: 155‑64. doi:10.1007/s00604-004-0193-7.
* Li, Q.P., D. A. Hansell, et J.-Z. Zhang. (2008). Underway monitoring of nanomolar nitrate plus nitrite and phosphate in oligotrophic seawater. Limnology and Oceanography: Methods 6, no 7: 319‑26.
* Louis, J., Bressac, M., Pedrotti, M. L., & Guieu, C. (2015). Dissolved inorganic nitrogen and phosphorus dynamics in seawater following an artificial Saharan dust deposition event. Frontiers in Marine Science, 2, 27.
* Yao, W., R. H. Byrne, et R. D. Waterbury. (1998). Determination of nanomolar concentrations of nitrite and nitrate in natural waters using long path length absorbance spectroscopy. Environmental science & technology 32, no 17: 2646‑49.
* Zhang, J.-Z. (2000). Shipboard automated determination of trace concentrations of nitrite and nitrate in oligotrophic water by gas-segmented continuous flow analysis with a liquid waveguide capillary flow cell. Deep Sea Research Part I: Oceanographic Research, 47 (6): 1157‑71. doi:10.1016/S0967-0637(99)00085-0.

**PHOSPHATE\_LL\_D\_CONC\_BOTTLE::mjcbgl umol/kg**

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**Sampling** – Cleaning and sampling methods followed the Geotraces recommendations. Briefly, samples were collected using a Titanium Rosette mounted with Go-Flo bottles deployed on a Kevlar cable. After recovery, the bottles were directly transferred inside a class-100 clean laboratory container. Bottles were put under N2 pressure. Seawater samples were directly filtered from the bottles through acid-cleaned 0.2 µm capsule filters (Sartorius Sartobran-P-capsule 0.45/0.2 µm). Filtrates were collected into acid-cleaned 60 mL HDPE bottles (Nalgene). All samples were analysed at sea shortly after the sampling.

**Analysis** – Dissolved inorganic phosphate (DIP) was measured using a technique based on the reaction of phosphate with molibdate in an acidic solution to form a 12-molybdophosphoric acid. Subsequent reduction to the phosphomolybdenum blue complex. Absorbance is measured at 710 nm. To increase absorbance, a 2.5 m length LWCC is connected to a USB-4000 spectrophotometer. The protocol is based on Pulido-Villena et al. (2010), modified from Zhang and Chi (2002). Material used: a Liquid Waveguide Capillary Cells (LWCC) made of quartz capillary tubing (length = 2.5 m), a spectrophotometer (USB4000 Preconfigured for General Lab Use, 200 -850 nm, Ocean Optics), and the lamp (Deuterium Tungsten Source, 210-1700 nm).

**References**

* Pulido-Villena, E., Rerolle, V., Guieu, C. (2010). Transient fertilizing effect of dust in P-deficient LNLC Surface Ocean. Geophysical Research Letters, 37, 1-5.
* Zhang JZ, Chi J. (2002). Automated analysis of nanomolar concentrations of phosphate in natural waters with liquid waveguide. Environ, Sci. Tech. 36.