

## **Netherlands**

### 1) IPY GEOTRACES

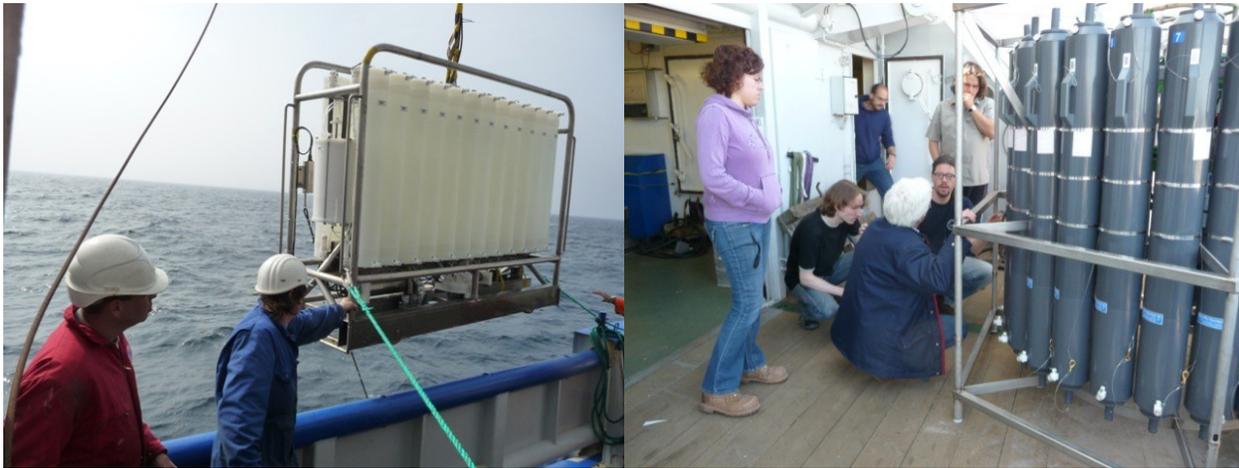
Throughout 2009 and 2010 much progress was made in writing, submitting and publishing articles based on the 2007 Arctic and 2008 Antarctic IPY-GEOTRACES cruises aboard Polarstern. Rob Middag completed his PhD thesis comprising nine research articles on Al and Mn in the Polar Oceans. One article on Al in the Arctic Ocean is published in Marine Chemistry (2009). Similarly several manuscripts/chapters are completed of the theses in progress of Maarten Klunder on Fe in Polar Oceans and Charles-Edouard Thuroczy on Fe Physical-Chemical Speciation in Polar Oceans. Several articles of the Antarctic Polarstern expedition ANT XXIV/3 will appear in a special issue of Deep-Sea Research II.

### 2) WEST-ATLANTIC GEOTRACES

**PELAGIA 64PE318**, 23-27 April 2010, Texel (Netherlands) to Scrabster (Scotland), chief scientist Dr. Loes Gerringa (loes.gerringa@nioz.nl).

In the preceding months RV PELAGIA had undergone mid-life refit including new main engine at Santander (Spain) and returned home at Sunday 18 April 2010. Throughout 19-22 April there was intensive completion and testing of electronic, hydraulic and mechanical systems of the vessel, and installation of winches and other scientific equipment. Participation of two GEOTRACES guest scientists of China and India for observing our new clean sampling system was cancelled due to general airline flights cancellations (due to volcanic ash plume from Iceland). Similarly 3 junior scientist observers of Europe could not reach The Netherlands either, yet two others Ana-Maria Blataric (Croatia) and Gregory de Souza (Switzerland) were able to reach Texel and join this brief test and transit cruise. At the Friday 23 April departure news came that the Reykjavik airport was closed and the ship was diverted to Scrabster Harbour (Scotland). Similarly the 9 scientists scheduled to join in Reykjavik were diverted by train, ferryboat or occasional airline to Scotland, and the itinerary of 5 leaving the ship at Scrabster diverted via Aberdeen to home.

After 2 days transit to deeper waters west of Scotland several tests were done. The 24 novel ultraclean PVDF-plastic butterfly valve samplers of 27L each mounted on the Titanium CTD frame (Fig. 1) functioned perfectly, as did the 24 new Niskin-type samplers of 25L each on a new stainless steel CTD frame. Both sampling systems are deployed alternately, using a new 9800m length, 22mm diameter super-aramide (Kevlar) hydrowire with internal copper conducting cables plus glassfibre communication cable, spooled on the completely overhauled KleyFrance winch.

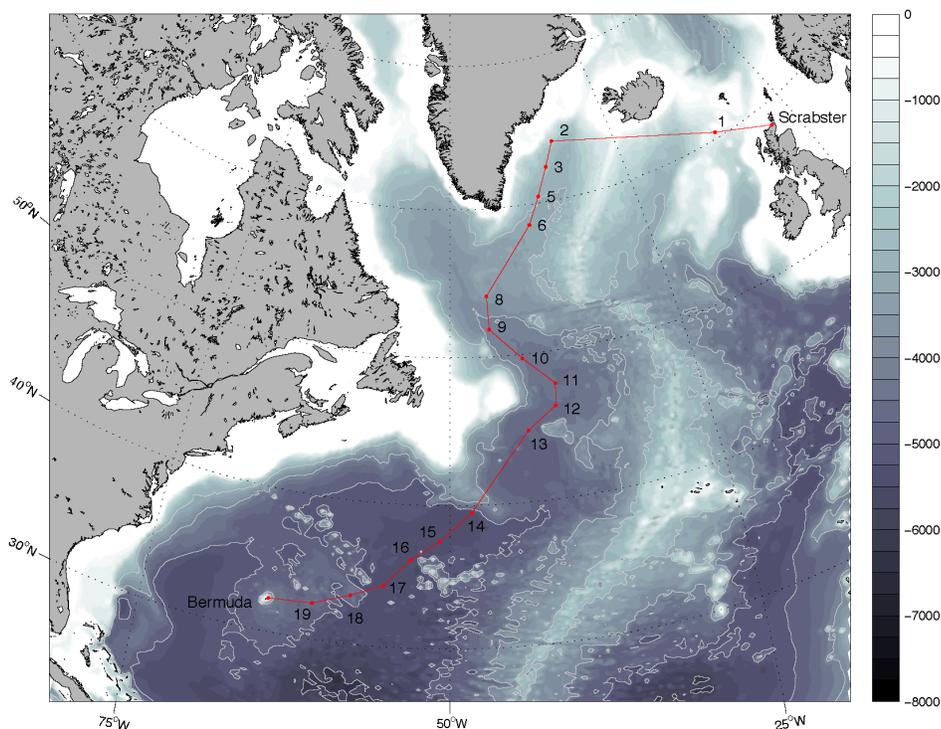


**Fig 1.** Left is the Titanium frame with new white PVDF 27L butterfly-valve samplers; right is the new set of 25L Niskin-type samplers on new stainless steel CTD frame, Ana-Maria Blataric standing in purple sweater, Gregory de Souza in behind doorway.

The isotope studies of trace metals (Fe, Zn, Cd, Pb) require the larger volume clean samplers (27L), similarly for the suite of non-contamination-prone isotopes large volume samples (25L) were chosen. Silicate increases steadily with depth, and comparison of silicate analyses showed that all samplers of the two independent frames close perfectly at intended depth. Moreover the PVDF samplers were found to be very trace-metal clean at first use, hence superior than the internal teflon-sprayed PVC of GO-FLO samplers thus far used. Upon several convincing tests and analyses of Fe, Al and nutrients, the ship returned eastward to arrive at 27 April at Scrabster, Scotland, for exchanging several staff and fuel bunkering and supplies.

**PELAGIA 64PE319**, 28 April through 25 May 2010, Scrabster (Scotland) to Bermuda, chief scientist Dr. Loes Gerringa (loes.gerringa@nioz.nl).

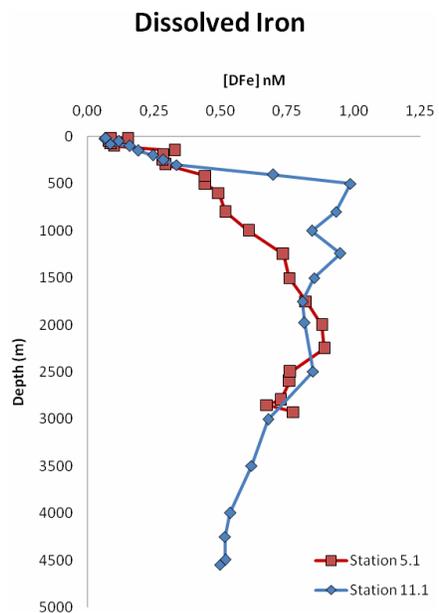
Overall 18 stations (Fig. 2) were occupied very successfully according to plan along the West Atlantic transect. Due to 2 days time loss as result of diversion to Scrabster (due to volcanic ash causing airline cancellations) and very heavy storms several other stations had to be cancelled. Intense storms were encountered off the south tip of Greenland and off Newfoundland, headwinds also affecting ship velocity down from normal 10 knots to merely 2 knots. Even the intended final Bermuda Atlantic Time Series intercalibration site had to be cancelled due to a nasty small storm exactly there and then.



**Fig. 2** Cruise track with stations 2-19 at the West Atlantic transect of cruise 64PE319.

Each station comprised 1 ultraclean and 1 regular hydrocast. At selected 6 super- and 3 hyper-stations additional hydrocasts as well as deep pump sampling were undertaken. Upon recovery the ultraclean Titan frame with PVDF samplers was immediately placed inside its clean laboratory container, where sub-sampling of a large variety of filtered or unfiltered seawater was done for (shipboard or afterwards) determinations of concentrations of Fe, Mn, Al, Co, Cu, Ni, Zn, Ag, Cd, Lanthanides, Pt, Pb; physical-chemical speciation of Fe; large volumes for natural isotope systematics of Si, Fe, Zn, Cd, Pb; major nutrients;  $^{14}\text{CO}_2$  and  $^{13}\text{CO}_2$ . Underway clean sampling was done for aerosols with air filter units, and for surface waters for extra samples for Fe speciation and natural Pt, Pb with a torpedo towed alongside the ship from which water is pumped through a tube entering inside one of the shipboard clean laboratory vans.

The regular Niskin-type samplers and the submersible pumps provided the often required large volumes for natural or anthropogenic (radio)-isotopes systematics of  $^{15}\text{N}$ ,  $^{99}\text{Tc}$ ,  $^{129}\text{I}$ ,  $^{137}\text{Cs}$ ,  $^{143}\text{Nd}/^{144}\text{Nd}$ , Hf,  $^{210}\text{Pb}$ ,  $^{210}\text{Po}$ ,  $^{223}\text{Ra}$ ,  $^{224}\text{Ra}$ ,  $^{226}\text{Ra}$ ,  $^{228}\text{Ra}$ ,  $^{227}\text{Ac}$ ,  $^{230}\text{Th}$ ,  $^{234}\text{Th}$ ,  $^{231}\text{Pa}$ , Np,  $^{239,240}\text{Pu}$ ,  $^{238}\text{Pu}$  and supporting parameter Dissolved Organic Matter (DOM). Complementary to GEOTRACES, many samples were collected for a transient tracers program comprising DIC, ALK,  $\text{O}_2$ , nutrients, CFC's,  $\text{SF}_6$ ,  $^3\text{H}/^3\text{He}$  and above mentioned  $^{14}\text{CO}_2$  and  $^{13}\text{CO}_2$ , and for a microbial oceanography program comprising DOC, DON, bacterial and viral abundance, bacterial and archaeal and viral production,  $^3\text{H}$ -FISH,  $^{14}\text{C}$ -FISH and DNA microbial biodiversity and POC,  $^{13}\text{C}$  plus  $^{15}\text{N}$  by NanoSims, Nitrification, qPCR. We reckon some of these complementary transient tracers and microbial oceanography variables to support unraveling the processes controlling the GEOTRACES variables, and vice-versa.



**Fig. 3.** Dissolved Fe at stations 5 and 11 (see above Fig. 2) of cruise 64PE319.

**PELAGIA 64PE321**, 11 June through 8 July 2010, Bermuda to Fortaleza (Brazil), chief scientist Dr. Micha Rijkenberg ([micha.rijkenberg@nioz.nl](mailto:micha.rijkenberg@nioz.nl)). Weather permitting this cruise intends first another effort to occupy the Bermuda Atlantic Time Series intercalibration station. Next a similar program as above 64PE319 is pursued, where it is hoped some 20-25 stations can be done on a transect extending just across the equator.

Finally in 2011 the West Atlantic section will be completed in the South Atlantic from about 55°S to the equator aboard RV COOK departing 2 March 2011 from Punta Arenas and arriving 7 April 2011 at Las Palmas (Canary Islands).

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