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## The Expedition PS94 of the Research Vessel POLARSTERN to the central Arctic Ocean in 2015

Edited by

Ursula Schauer

with contributions of the participants

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*Titel: Rückkehr zum Schiff nach der Installation von Atmosphären-, Eis- und Ozeanobservatorien auf einer Eisscholle (Foto: Mario Hoppmann, AWI)*

*Cover: Return to the ship after installing atmosphere, sea ice, and ocean observatories on an ice floe (Photo: Mario Hoppmann, AWI)*

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Xie RC, Galer SJG, Abouchami W, Rijkenberg M, de Jong J (2014) Cadmium isotope distribution along the western boundary of the South Atlantic. Ocean Sciences Meeting, Honolulu.

Yang SC, Lee DC, Ho TY (2012) The isotopic composition of cadmium in the water column of the South China Sea. *Geochim. Cosmochim. Acta*, 98, 66–77.

## 6.10 Particulate trace metals

Aridane G. Gonzalez

IUEM

H. Planquette (not on board)

### Objective

The main sources of particulate trace metal to the ocean are the atmospheric deposition (Jickells et al., 2005; Sarthou et al., 2003; Mahowald et al., 2009), rivers (Lam et al., 2006; 2012), hydrothermal (Tagliabue et al., 2010), sediments (Kalnejais et al., 2007), ice and sea-ice (Raiswell et al., 2008).

The distribution of particulate trace metals in the Arctic Ocean will help to understand the sources and the scavenging process (Venchiarutti and Rutgers Van Der Loeff, 2011), the mixing process in the deep ocean (Charette et al., 2007) and the transport from the shelf (Lacan et al., 2012). On the other hand, chemical speciation of particulate trace metals will help to understand the bioavailability of these particles to the phytoplankton community.

The goal in this cruise is to study the vertical and spatial distribution of particulate trace metals along the Arctic Ocean, quantify the lateral transport of particulate trace metals from the Russian rivers by the Transpolar Drift. The Arctic Ocean is one of the most sensible oceans to the thermohaline circulation and physico-chemical properties. In this work, we will examine both vertical and spatial distribution of particulate trace metals along 6 transects across the Arctic Ocean (North Pole included). This work is conducted in the GEOTRACES programme ([www.geotraces.org](http://www.geotraces.org)) during the expedition PS94 on the German icebreaker *Polarstern* began 17th August (Tromsø) to 15th October 2015 (Bremenhaven).

### Work at sea

Particulate trace metal were collected in the ultra clean CTD system from NIOZ, filtered over a 0.45 µm filter size using N<sub>2</sub> overpressure until an optimal volume between 6-10 L during at least 5 hours.

On the other hand, ice-cores and surface seawater in the ice-stations were collected to determine the concentration of particulate trace metals. In addition, ice-rafted sediment samples were collected in two different locations, which will be used to measure the concentration of metals both in particles (sediments) and solution (after filtering).

### Expected results

These samples will be analyzed in a clean laboratory facilities in Brest (LEMAR-IUEM). The concentration of metals will be carried out by using an Elemental Scientific Sector-Field Inductively Coupled Plasma Mass Spectrometry (SF-ICP-MS) with a detection limit of: Al = 0.496 nM; P = 2.55 nM; Mn = 0.014 nM; Fe = 0.063 nM; Co = 0.003 nM; Cu = 0.089 nM; Zn = 0.051 nM, Cd = 0.002 nM and Ba = 0.006 nM; Planquette and Sherrell, 2012).

### Data management

See introduction of chapter 6 for details on GEOTRACES data management.

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