

The behaviour of dissolved Pt in the North Atlantic Ocean

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Rationale

The behavior of Pt in the oceans is still controversial since the data presently available for Pt are not oceanographically consistent with respect to their basin-to-basin variation [1]. Accordingly, a recycled-type behavior in the Pacific [2], a scavenged-type profile in the Indian [3] and concentrations invariant with depth in the North Atlantic [4] were reported.

Besides, the environmental emission and long range transport of Pt due to its use in catalytic converters in cars for more than two decades now Pt [5] indicated the need for a new insight on the distribution of dissolved Pt in the North Atlantic Ocean.

Results and Discussion

Water column samples at Bermuda BATS station (31°45.92' N; 64°04.95' W) were taken during the GEOTRACES intercalibration cruise in June 2008 [6]; Pt was analyzed by means of catalytic DPCSV, and was in the range of 0.1-0.4 pM and showing no trend with depth. These results support the invariant depth profile concentrations (0.28 ± 0.07 pM) reported around two decades ago near Bermuda [4]. Also, the impact of the use of Pt in the catalytic converters in cars seems to be negligible on dissolved Pt in the North Atlantic.

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[1] Donat & Bruland (1995) in *Trace Elements in Natural Waters*, CRC Press, p260. [2] Goldberg (1987) *Pure & Appl. Chem.* **59**, 565. [3] Jacinto & van den Berg (1989) *Science* **338**, 332. [4] Colodner, Boyle & Edmond (1993) *Anal. Chem.* **65**, 1419. [5] Barbante *et al.* (2001) *Environ. Sci. Technol.* **35**, 835. [6] www.geotraces.org

Microbially-mediated anaerobic redox cycling of iron and nitrogen in sediments

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The ability of some dissimilatory NO_3^- and Fe(III) reducing microorganisms to catalyze the oxidation of Fe(II) with NO_3^- expands the potential for coupled Fe-N redox interactions in sediments. Microbial redox metabolism and community structure associated with either NO_3^- reduction, Fe(III) reduction, or multiple cycles of Fe(III) reduction and NO_3^- dependent Fe(II) oxidation were examined in three fed-batch reactor systems inoculated with iron-bearing, river floodplain sediment. NO_3^- and acetate were strategically added to the Fe redox cycling systems to facilitate four complete cycles of reduction and oxidation.

NO_3^- , Fe(II), NH_4^+ , and acetate concentrations were monitored to follow biogeochemical redox processes. Addition of NO_3^- under low-carbon conditions resulted in rapid Fe(II) oxidation and accumulation of NH_4^+ . Examination of sediment from Fe redox cycling reactors using selected-area electron diffraction and high-resolution TEM revealed the formation of amorphous coatings on the goethite nanocrystals that was not observed in reactors operated under either sustained nitrate- or iron-reducing conditions.

Microbial community dynamics associated with NO_3^- reduction, Fe(III) reduction, and Fe redox cycling systems were assessed using a combination of culture-based and molecular phylogenetic techniques. Results indicate that the NO_3^- -reducing cultures were dominated by *Betaproteobacteria*, Fe(III)-reducing cultures were dominated by *Deltaproteobacteria*, and the Fe redox cycling cultures were more diversely populated than anticipated including members of the *Alpha*-, *Beta*-, *Gammaproteobacteria* and *Clostridia*. The results suggest that sediments where repeated iron-cycling occurs will develop a diverse and well-adapted microbial community to take advantage of the energy available. Such cycling may also notably affect the surface area and crystallinity of sediment (oxy)hydroxides.