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Environmental impact of Al-contamination sediments

LELEYTER LYDIA[1], BARAUD FABIENNE[1], GIL OTAVIO[1], GOUALI SOUHILA[1], LEMOINE MELANIE[1], ORVAIN FRANCIS[2]

[1] UR ABTE EA3914 Université de Caen Normandie Bd du Maréchal Juin 14032 CAEN Cedex FRANCE, [2] UMR BOREA Université de Caen Normandie
[1]lydia.leleyter@unicaen.fr

ABSTRACT

Natural aluminium is known as a refractory element, typically not diagenetically labile, whereas anthropological aluminum (from aluminium industry, water treatments, steel protection with aluminium sacrificial anodes, ...) poured in marine waters is sorbed onto surrounding sediments and could act as a sink of aluminium to biota. Partial extractions seem provide more sensitive indication of aluminium contamination, as the first tests on natural sediments (Gabelle *et al.*, 2012; Leleyter *et al.*, 2012) highlighted some differences in the mineralogical partitioning of natural or anthropological aluminium. Benthic diatoms can too be used as bioindicators of metallic contamination, because of their sensitivity to changes in water quality, and their fundamental role in the food webs.

A laboratory experiment was performed, in tidal artificial conditions, with natural sediments that were artificially contaminated with aluminium salts. Benthic diatoms were cultivated on these contaminated sediments, in order to assess the aluminium impact on the growth of benthic diatom. The sediments were also leached by HCl (1M) to estimate the available/mobile part of the aluminium in the sediment.

This experiment highlighted that Al-contamination sediments had a strong effect on diatom communities growing at sediments surface. Drastic negative effect is perceptible beyond 10 mg of aluminium salts added by kg of natural sediment (which is a low contamination stress with regard to the Al initial content). The 1M HCl-extraction, widely used in the literature for metals mobility evaluation in marine sediments seems to underestimate aluminium availabilities for phytobenthic communities.

Gabelle C., Baraud F., Biree L., Gouali S., Hamdoun H., Rousseau C., Van Veen E. and Leleyter L, 2012, Applied Geochemistry, 27; 2088-2095

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