# Ocean sections and stoichiometry of dissolved bioactive trace metals in the North Pacific Ocean

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Bioactive trace metals have strong influence on production and community structure of phytoplankton. In turn, such biological processes affect the distribution of bioactive trace metals. So it is clear that bioactive trace metals have interactive influence with biological processes in the ocean.

The Subarctic North Pacific Ocean is an important area sensitive to the effects from the Asian continent, where the Subpolar Gyre, consisting of the Kamchatka Current and North Pacific Current, makes the southern boundary.

We report the distribution of dissolved bioactive trace metals from the subtropic to subarctic region in the North Pacific Ocean. In this study, we used of a new automated preconcentration system and determined the concentration of nine elements.

Sea water samples were collected using clean technique in accordance with the GEOTRACES protocol. The bioactive trace metals were preconcentrated by solid extraction using NOBIAS CHELATE-PA1 chelating resin (Sohrin *et al*., 2008) in an automated preconcentration system and determined by HR-ICP-MS.

The blank value of a procedure with the automated preconcentration system was low enough. In recovery tests, target metals were quantitatively recovered at 90-110% from seawater. The measured values of them in seawater reference material NASS-5 agreed with the certified values. We are going to report the results on ocean sections along 47°N and 165°E.

# Heavy metal attenuation and mobility in the Wood Creek Sand Channel aquifer: Correlation of experimental and field study

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The storage of process affected (PA) water in tailings ponds over glacial till formations in the oil sands region in Alberta (Canada) has the potential to cause contamination of groundwater and surface water with trace metals and dissolved major ions. To predict the fate of contaminants in the aquifers underlying and adjacent to tailings impoundments, a detailed understanding of the processes controlling metal release and attenuation is required. In this study, column experiments were performed under anaerobic conditions to simulate interactions between aquifer soils and PA water. Experimental results were compared with and correlated to field observations obtained from monitoring of groundwater wells located in an oil sands facility over a time period of 6 years.

Results from the column experiments indicated that Fe, Mn, Ba, and Si were released from the sediments while other trace metals present in PA water (Zn, Cr, Ni, U, Mo, As, B, etc.) were either weakly attenuated or completely retained by the soils. A DNA extraction performed on the columns sediments identified iron and sulphate reducers suggesting that microbial reductive dissolution of Mn(IV) and Fe(III) is likely the geochemical process by which the metals were released and mobilized into the effluent solution. The groundwater monitoring results are in agreement with those from the columns. However, observed metal concentrations are much higher in the field than in the columns. Variation in the released amounts may be attributed to different materials characteristics, but are most likely due to longer residence times, and longer flow paths. Results also demonstrate that microbial reduction of Mn(IV) and Fe(III) may have important environmental implications on water quality. Potential metals of concerns include Fe, Mn, Zn, Cr and B. Concentrations of these elements measured in both the column effluent and the groundwater were above environmental standards.

These results have important applications in the prediction, protection and potential evaluation of remedial technologies for the immobilization of metals.


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