Sciences of Limnology and Oceanography





Home Members Libraries Publications Meetings Employment Activities Search

Iron and zinc enrichments in the northeastern subarctic Pacific: Ligand production and zinc availability in response to phytoplankton growth

Lohan, Maeve C., David W. Crawford, Duncan A. Purdie, Peter J. Statham

Limnol. Oceanogr., 50(5), 2005, 1427-1437 | DOI: 10.4319/lo.2005.50.5.1427

ABSTRACT: Iron- and zinc-enrichment experiments were carried out at Ocean Station Papa in the subarctic North Pacific. In iron-enriched treatments, phytoplankton chlorophyll a (Chl a) increased 20-fold (9.7 µg L") above the concentration on day zero. No stimulation of Chl a production or nitrate drawdown was observed on addition of zinc alone compared to the control. In the iron-enriched treatment, bioavailable zinc concentration decreased to 0.2 pmol L" lower than that which is known in culture experiments to limit some phytoplankton growth. Theoretical analyses suggest that this zinc concentration would cause diffusion-limited growth of large diatom cells present at the end of the incubation. Direct measurements of zinc-binding ligands indicate that the natural microbial planktonic assemblages have the ability to respond rapidly to conditions of high dissolved zinc concentrations. Rapid ligand production may be a mechanism by which certain phytoplankton reduce zinc toxicity or for maintaining zinc concentrations in the upper water column. Zinc-binding ligands were observed to be both produced and removed on the timescale of 1 d. We suggest that these zinc-binding ligands are produced to assist assimilation, particularly under iron-enriched conditions when concentrations of bioavailable zinc were extremely low, thereby alleviating the effects of zinc limitation.

## Article Links

Download Full-text PDF

Return to Table of Contents

## Please Note

Articles in L&O appear in PDF format. Open access articles may be freely downloaded by anyone. Other articles are available for download to subscribers only, or may be purchased for \$10 per article. All L&O articles