

**ALUMINUM AND IRON DISTRIBUTIONS IN THE CENTRAL AND
WESTERN NORTH PACIFIC OCEAN: RESULTS FROM THE 2002
INTERGOVERNMENTAL OCEANOGRAPHIC COMMISSION
CRUISE**

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ABSTRACT

Specifically, the goal of this thesis research was to examine the effects of Asian dust deposition to the waters of the NW Pacific on both surface and deep-water biogeochemistry, particularly trace metal cycling. The elements of interest to this research were Al, as a tracer of atmospheric dust input to the surface ocean, and Fe, as the flux of this biologically required trace element is largely regulated by transport and deposition of mineral aerosols.

Samples were collected during the Intergovernmental Oceanographic Commission NW Pacific Cruise of May-June 2002. Both continuous surface water sampling while the ship is underway and station vertical profile sampling were performed using trace-metal clean techniques. Both Al and Fe were determined on-board using flow injection analysis utilizing in-line 8-hydroxyquinoline pre-concentration. In addition, ancillary parameters such as nutrients, temperature, and salinity were also measured.

Surface water Al over the cruise track ranged from less than 0.1 nM to greater than 10 nM with maximum values appearing near the Hawaiian Islands. Surface water Fe concentrations ranged from approximately 0.15 nM in waters of the subarctic N. Pacific to values greater than 1.2 nM. Al and Fe vertical profile results showed significant variability among stations with features observed such as a subsurface Al

maximum at select stations and a Fe minimum in the suboxic intermediate waters of the subarctic N. Pacific.

The surface water Al results are used to estimate atmospheric dust fluxes to the waters of the central and western N. Pacific and these fluxes are compared with contemporary dust flux models. In addition, Fe surface and vertical profile data are used to assess biological limitation in the subarctic N. Pacific and explore the relationships between biological limitation and atmospheric dust flux to the surface ocean. Finally, vertical profiles are discussed in terms of geochemical processes and possible signals of atmospheric dust flux in the deep ocean.