A NOVEL METHOD FOR THE DETERMINATION OF PHOSPHATE AND DISSOLVED ORGANIC PHOSPHORUS CONCENTRATIONS IN SEAWATER

A THESIS SUBMITTED TO THE GRADUATE DIVISION OF THE UNIVERSITY OF HAWAII IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE DEGREE OF

MASTER OF SCIENCE

IN

OCEANOGRAPHY

DECEMBER 1997

By

Angie L. Thomson-Bulldis

Thesis Committee:

David M. Karl, Chairperson
Edward A. Laws
Yuan-Hui Li

ABSTRACT

Phosphorus is an essential macronutrient in the oceans, and in the dissolved phase is present in seawater as both inorganic (primarily orthophosphate, PO_4^{3-}) and organic forms. Current analytical techniques measure soluble reactive phosphorus (SRP) as a surrogate for PO_4 and soluble non-reactive phosphorus (SNP) as a surrogate for dissolved organic phosphorus (DOP). The method presented here provides a means to measure PO_4 concentrations and eliminate interference from other soluble reactive compounds, as well as make direct measurements of DOP concentrations with greater precision. With this new method, PO_4 concentrations in the North Pacific surface waters were found to be up to 50% less than SRP concentrations measured with standard autoanalyzer techniques, and DOP concentrations in the deep North Pacific were determined to be 16.2 ± 12.5 nM. These results have significant implications for turnover and residence times of phosphorus pools, as well as for the utilization of DOP in the deep sea.