

Biological fractionation between Cd and PO₄ in the surface layer of the equatorial Pacific

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Biological fractionation between cadmium (Cd) and phosphate (PO₄) in seawater down to 200 m in the western and central equatorial Pacific was investigated in January 2003 at nine stations. In this study period, a surface-salinity front existed at approximately 175W, dividing oceanographic conditions into two types, Western Pacific Worm Pool (WPWP) (westward) and eastern upwelling zone (eastward), and at a depth of approximately 100 - 120 m, a thermocline developed, separating surface and nutrient-rich deep water from each other. Three layers were defined based on the PO₄ distribution, generally corresponding to the water mass within the WPWP, outside the WPWP above the bottom of the thermocline, and below the thermocline down to 200 m, respectively. The fractionation coefficient values were determined to be 0.38, 1.31, and 1.86 for the defined three layers, respectively on the assumption that the uptake and regeneration process of Cd and PO₄ by the planktonic organisms were obeyed by the first order reaction. In this study area, planktonic organisms show hydrographically controlled distributions (discrimination of their habitat corresponding to the three layers). The fractionation between the two constituents varies according to the species and populations of primary producers (and grazers), and environmental conditions, so the discrimination of the habitat of the living planktonic organisms was considered to be the important factor that regulated the difference in the obtained fractionation coefficient values.