Annual particulate element fluxes in the central North Pacific Ocean from 30º to 46ºN along 175ºE

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Settling particles play an important role in the vertical export of elements from surface to deep water and affect water cloumn chemistry. In this study, we determined elemental composition of sinking particles collectedat from 1993 to 1994 at three sediment trap stations, Site 6 (30ºN, subtropical region, 3,873 m trap depth), Site 7 (37ºN, transition zone, 1,482 and 4,588 m trap depths), Site 8 (46ºN, subarctic region, 1,412 m trap depth) along a transect at 175ºE. Annual mean total mass fluxes varied from 47.4 mg m-2 day-1 at Site 6 to 207.7 mg m-2 day-1 at Site 8, and dominant constituents of the settling particles were carbonate (~60%) at Site 6, carbonate (~40%) and lithogenic (~30%) at Site 7, and biogenic opal (~20%) at Site 8, reflecting significant defferences in oceanographic condition and primary productivity (Kawahata, 2002). We demonstrated that four major processes controled the particuate elemental fluxes, that is, lithogenic (Al, Ti, and Fe), carbonate (Mg, Ca, and Sr), biogenic(+scavenging) (Ni, Zn, Cd, and Pb), and scavenging (V, Mn, Co, Cu, and Ba) processes. The estimated excess elemental fluxes based on the element/Al ratio of upper continental crust showed that 43–79% of V, 40–88% of Mn, 7–33% of Fe, 57–82% of Co, and >80% of Ni, Cu, Zn, Cd, Ba, and Pb were attributed to scavenging(+biogenic uptake) processes. At Site 7, the excess fluxes of Mn, Co, and Cu in the deeper trap were greater than those in shallower trap, suggesting large contribution of long-term suspended particles enriched in Mn oxides.