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Possible effect of eolian flux on biogenic production in the mid-latitude of the North Pacific

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Sediment trap experiments were conducted in order to understand the characteristics of settling particles related to biological pump from the subtropical to the subarctic water mass (30-46 degree N) in the central North Pacific. Fluxes of total, organic matter, carbonate, biogenic opal and lithogenics showed definite seasonal change. Especially there is a steep gradient in export production along the transect of 175oN from June to December while it was quite uniform from January to April at studied sites. Therefore annual mean total mass flux varied from 47 mg/squre m/day at the southernmost station (Site 6; 30 degree N) in the subtropical water mass to 208 mg/squre m/day at the subarctic station (Site 8; 46 degree N). The transition zone showed intermediate fluxes of 41 and 95 mg/squre m/day (Sites 5 and 7; 34 and 37 degree N, respectively). Correlations between organic matter (OM), carbonate and biogenic opal fluxes suggested that that diatom was mainly responsible for OM flux to the settling particles at the subarctic station (Site 8) while carbonate flux was highly correlated with OM flux at the subtropical station (Site 6). Compared with the mean particle flux at the mid-latitude in the Atlantic, the Pacific showed significantly high biogenic opal flux due to enriched nutrients in the upper ocean of the Pacific. The injection of aerosol-derived iron from Asian has played a potential role in enhancing primary and export production in this area unless other nutrients such phosphate and nitrate become limiting. An interesting feature is that significant time lag between the peaks of dust storm in the source region of Asian continent and of lithogenic flux at Site 7, which suggested the following transportation process of eolian dust: it was brought from the source region into the ocean through the air by wind, remained suspended in the upper layer of the Kuroshio Current and Kuroshio Extension for up to 2 months, and then removed by incorporation with biogenic pellets and/or amorphous aggregates when primary production was activated.