

A study of nitrogen cycle in the Western and the Central Equatorial Pacific using nitrogen isotope ratio

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To investigate the mechanism of nitrogen cycle in the Western and the Central Equatorial Pacific, we collected seawater samples at twelve stations in November and December 1999 and time-series samples of sinking particles at four stations from January to November 1999 on the equator, and analyzed the seawater samples for the nitrogen isotope ratios ($\delta^{15}\text{N}$) of nitrate and the sinking particles for total nitrogen fluxes and their $\delta^{15}\text{N}$.

In the Central Equatorial Pacific, the nitrate in the surface water show $\delta^{15}\text{N}$ values of about 12‰, which are higher than those of about 6‰ in the subsurface water due to the isotope fractionation during nitrate uptake by phytoplankton. However, in the Western Equatorial Pacific, the nitrate just below the surface water show $\delta^{15}\text{N}$ values of about 5‰, which are lower than those of about 6‰ in the subsurface water suggesting a supply of nitrogen from different sources such as nitrogen fixation into the surface layer of this area. The sinking particles in the western sites show low $\delta^{15}\text{N}$ values of about 4‰ during the year, too. We can conclude that nitrogen fixation introduces isotopically light nitrogen in the Western Equatorial Pacific and affects the export production there.