Particle fluxes in the twillight zone: Application of Th-230 normalization in the Northeast Pacific water column

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The depth where particulate organic matter (POM) respired in the water column determines the time scale of carbon storage in the ocean after carbon dioxide is sequestrated from the atmosphere to the ocean by biological pump. Over past 40 years, POM remineralization in the water column have been intensively studied with sediment traps[1], but the details are still difficult to constrain mainly due to cost and accuracy problems with the use of sediment traps[2]. High-resolution sampling and results are essential for us to understand the controlling mechanisms of different particle dynamics issues in the water column, e.g., calcium carbonate dissolution, POM remineralization and oxygen consumption. We applied the Th-230 normalization method in Ocean Station P (OSP) in the Alaska Gyre in the Northeast Pacific Ocean to derive particle fluxes in the twillight zone, and the results are consistent with particle fluxes in the upper ocean column derived from Th-234:U-238 disequilibrium, and comparable with records from sediment traps. Application of both Th-234:U-238 method and Th-230 normalization at the same ocean site could help us to achieve detailed particle-flux profiles in the entire water column, and this method could be used in the future to study particle dynamics issues at different water depth in different regions of the global ocean.

[1] Honjo S. et al., 2008. Prog. Oceanogr.76, 217-265.

[2] Yu E.-F. et al., 2001. Deep Sea Res. I 48, 865-889.