



## Pelagic-benthic coupling in the abyssal eastern North Pacific: An eight-year time-series study of food supply and demand

Smith, Kenneth L., Ronald S. Kaufmann, Roberta J. Baldwin, A. F. Carlucci

Limnol. Oceanogr., 46(3), 2001, 543-556 | DOI: 10.4319/lo.2001.46.3.0543

**ABSTRACT:** An 8-yr time-series study of the trophic coupling between a pelagic food supply and its utilization by the sediment community was conducted at 4,100-m depth in the eastern North Pacific between 1989 and 1998. Supply of sinking particulate organic carbon (POC) and particulate total nitrogen (PTN) was estimated from collections made with sediment traps moored at 3,500- and 4,050-m depth (600 and 50 m above bottom). Sediment community oxygen consumption (SCOC), an estimate of aerobic utilization of organic matter, was measured in situ. POC and PTN fluxes at both depths declined significantly from October 1989 through 1996 then increased in 1998. Organic carbon : total nitrogen (C : N) of the sinking particulate matter fluctuated ~10 throughout the study, except for a major peak (84.8) at 50 m above bottom in summer 1995, indicating lateral advection of organic material of terrestrial origin. POC: SCOC declined progressively over the first 7 yr, from a high of 0.99 in 1989-1990 to 0.22 in 1995-1996. In 1998, there was an increase in POC: SCOC to 0.43, suggesting that the food deficit was reduced by an increase in sinking flux. A continuing deficit in food supply cannot be sustained without ultimately affecting the structural and functional characteristics of the sediment community. The importance of undersampling by sediment traps, lateral advection of marine and terrestrial organic matter from the continental slope and shelf, and dissolved organic matter is evaluated. These other sources of nutrients for benthic organisms may be important in explaining some of the observed discrepancy between supply and demand in the abyssal Pacific. Decadal-scale climate variations that influence marine primary production and terrestrial discharges into the ocean may be extremely important in understanding biogeochemical processes in the deep sea.

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