



Focusing of phytodetritus deposition beneath a deep-ocean front, Chatham Rise, New Zealand

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Limnol. Oceanogr., 52(1), 2007, 299-314 | DOI: 10.4319/lo.2007.52.1.0299

ABSTRACT: In October 2001, we observed a deep-ocean phytodetritus deposition event on Chatham Rise beneath the Subtropical Front (STF). The origin of this phytodetritus was probably an extensive phytoplankton bloom that occurred in the STF in the preceding weeks. We assessed the spatial distribution of the deposition event using video images from benthic lander and epibenthic trawl deployments and sediment pigment analyses at six sites on a north-south transect across Chatham Rise. High surficial sediment chlorophyll *a* concentrations were restricted spatially to the southern flank of Chatham Rise (350-1,200-m depth) with the highest values centered at ~750-m water depth (750 S). This southern 750 S site was also the only site where macroscopic phytodetritus was observed, coincident with elevated benthic biomass and sediment community respiration rates. At 750 S, phytodetritus resuspension was observed on video and corroborated by current meter, sediment trap, and optical backscatter measurements, suggesting a threshold erosion current speed for phytodetritus of ~10 cm s⁻¹, equivalent to a shear velocity of 0.5 cm s⁻¹ and similar to other deep-ocean studies elsewhere. The restriction of macroscopic phytodetritus deposition to 750 S was related to a zone of current convergence within the STF and lower near-bed current speeds observed across ~1-day that promoted deposition. Observations of high benthic biomass and respiration on the southern flank of Chatham Rise suggest that this focusing process is important in fueling the energy demands of benthic communities, in association with the general west-east advection of organic matter within the STF itself. Such physical focusing of labile organic matter deposition may be an important process in other highly productive frontal systems.

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