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Predator-prey relationship in microbial food web in the deep North Pacific

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Microbial activity below the euphotic zone is a key process that controls the biogeochemical process in the ocean ' s interior by transforming dissolved organic carbon into protozoan food particle. However, knowledge about the features of the microbial food web below the euphotic zone, especially bathy- and abyssopelagic layers is limited. A comparative study was conducted to determine prokaryote production and the abundances of microbial producer (prokaryotes) and predator (viruses and heterotrophic nanoflagellates [HNFs]) from the surface to the bottom at two time-series stations in the subarctic and subtropical North Pacific over a period of 2 years to understand the structure and dynamics of the microbial food web in dark realm and their regional variabilities. Microbial and virus variables changed continuously from the surface to near the bottom by more than one order of magnitude, suggesting close coupling with settling flux of particulate organic carbon (POC). No significant difference in prokaryote productivity was observed between two regions, whereas depth integrated prokaryote production in the bathypelagic layer (1,000-4,000 m) in the subarctic region was 2.4 times higher than that in the subtropical region. Predator-to-prey abundance ratio in the bathypelagic layer differed from the epipelagic zone (0-200 m) in both regions except for virus-to-prokaryote abundance ratio (VPR) in the subarctic region. High VPRs (more than 20) and a low contribution of HNF grazing to prokaryote mortality was observed in the bathypelagic layer in the subtropical region, suggesting that carbon flow induced by viral lysis may be much more important than that due to HNF grazing at a higher trophic level. The above results suggests that transport efficiency of settling organic matter from the euphotic layer to the ocean floor could alter the structure of microbial food web and fate of organic carbon in the ocean ' s interior.

keywords:Microbial food web,HNF,Virus,Prokaryote,Mesopelagic layer,Bathypelagic layer
