Shedding Light on Microbial Community in the Dark Ocean

RUMI SOHRIN AND YOSHIMI SUZUKI
Institute of Geosciences, Shizuoka University

Studies in epipelagic waters report higher heterotrophic microbial biomass in the productive high latitudes than in the oligotrophic low latitudes, however, biogeographical data are scarce in the deep ocean. To examine the hypothesis that the observed latitudinal differences in heterotrophic microbial biomass in the epipelagic zone also occur at depth, abundance and biomass of heterotrophic prokaryotes, nanoflagellates (HNF), and ciliates were determined at depths of 5–5000 m in the central Pacific in summer, 2005.

Heterotrophic microbial biomass increased from the tropical to the subarctic region over the full water column, with latitudinal differences in prokaryotic biomass increasing from 2.3-fold in the epipelagic zone to 4.4-fold in the bathypelagic zone. However, the latitudinal difference in HNF and ciliate biomass decreased with depth. In the mesopelagic zone, the vertical attenuation rate of prokaryotic abundance, which was calculated as the linear regression slope of log-log plot of abundance versus depth, ranged from –0.55 to –1.26 and was more pronounced (steeper slope) in the lower latitudes in accordance with the latitudinal differences in the attenuation of sinking flux of particulate organic carbon. In contrast, the vertical attenuation rate of HNF in the mesopelagic zone (–1.06 to –1.27) did not differ with latitude, but it was 1.7 times steeper than that for prokaryotes in the subarctic. These results indicate the accumulation of prokaryotes in the deep subarctic Pacific, possibly due to low grazing pressure. Although ciliates decreased sharply at depths below 1000 m, HNF did not further decrease, with the exception of exhibiting a minimum at 2000 m. From these profiles and the correlation of depth-integrated biomass, it is inferred that ciliates might graze on prokaryotes rather than on HNF in the meso- and bathypelagic zones, and that HNF in the bathypelagic zone might gain their nutrition from sources other than prokaryotes, such as organic colloids.