

The relative importance of microbial and classical food webs in a highly productive coastal upwelling area

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Abstract

We present an analysis of seasonal variations in the trophic pathways of carbon in a highly productive coastal upwelling region in the Humboldt current system off Chile. Seasonal changes in phytoplankton, protozooplankton, and bacteria biomass, along with rates of primary production (PP), bacterial growth, secondary production, vertical particle fluxes, and feeding by protozooplankton, omnivorous mesozooplankton, and carnivorous gelatinous zooplankton were determined from July 2004 to June 2005. Phytoplankton biomass and PP were maximal during spring/summer months, associated with upwelling episodes. Heterotrophic nanoflagellates (HNF) were the principal consumers of bacteria, removing >100% of their biomass daily. During autumn/winter, the protozooplankton grazed down a large fraction of HNF production (56% to 96% d⁻¹). The mesozooplankton consumed 1–6% of the PP d⁻¹; the different size fractions of copepods were omnivorous mostly during autumn/winter months, and ctenophores preyed most strongly on small copepods (0.5% to 5% d⁻¹). A large part of the PP was channeled through the microbial food web, and only a small part

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