



Mesozooplankton grazing impact on primary production: A global comparative analysis in marine ecosystems

Calbet, Albert

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ABSTRACT: A comparative analysis of the importance of mesozooplankton (200-20,000 μm) as grazers of the phytoplanktonic primary production (PP) across a wide spectrum of marine ecosystems revealed mesozooplankton ingestion rates to increase nonlinearly with increasing PP. The slope of the log-log relationship between ingestion rates and PP was significantly < 1 , indicating a decline of relative importance of mesozooplankton grazing with increasing PP. The effect of mesozooplankton on PP (as the percent PP consumed per day) is moderate in most of the studies (mode 6%, mean 22.6%) and decreases exponentially with increasing productivity. Contrary to the common assumption, the size barrier imposed by dominant picoplankton does not always result in a lower grazing pressure in unproductive communities (we consider here those with $\text{PP} < 250 \text{ mg C m}^{-2} \text{ d}^{-1}$). Yet, the amount of phytoplanktonic carbon ingested per unit of mesozooplankton biomass is lower in unproductive than in moderate (250 to $1,000 \text{ mg C m}^{-2} \text{ d}^{-1}$) and highly productive communities ($> 1,000 \text{ mg C m}^{-2} \text{ d}^{-1}$). This observation, together with the generally low values of daily biomass-specific ingestions, suggests that alternative food sources (e.g., protozoans) must represent an important component of mesozooplankton diet in unproductive ecosystems. The relationships obtained in the study yield an estimate of 5.5 Gt phytoplanktonic C consumed per year in the global ocean, which represents $\sim 12\%$ of the oceanic PP.

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