Seasonal and year-on-year variations in primary production and mesozooplankton secondary and tertiary production for 9 years (2006–2014) in the neritic area of Sagami Bay, Japan

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Abstract

Seasonal and year-on-year variations in phytoplankton primary production and in abundance, biomass, and daily production rate of the metazoan mesozooplankton community were investigated fortnightly in the neritic area of Sagami Bay, Kanagawa, Japan, from January 2006 to December 2014. Primary production determined by the *in situ* ^{13}C tracer method was ca. 0–1,602.6 μg C L^{-1} d^{-1}, and the depth-integrated primary production in the euphotic zone (*PP*) was 0.029–6.57 g C m^{-2} d^{-1}. Mesozooplankton abundance, biomass and production rate showed remarkable seasonal and year-on-year variations, with an overall mean of 3.03×10^3 ind. m^{-3}, 12.60 mg C m^{-3} and 1.99 mg C m^{-3} d^{-1}, respectively. These were lower in November–February, and were higher in April–October, except in June, although their higher values appeared in different months and years. The depth-integrated production rate of mesozooplankton secondary (*MSP*) and tertiary producers (*MTP*) was estimated to be 0.0053–0.78 and 0.0010–0.11 g C m^{-2} day^{-1}, respectively. Transfer efficiency from *PP* to *MSP* and *MTP* was 0.13–315.6% (mean: 7.1%; copepods: 2.8%; non-copepods: 4.3%) and 0.04–102.9% (mean: 1.5%; copepods: 0.5%; non-copepods: 1.0%), respectively. The depth-integrated food requirement of *MSP* and *MTP* was estimated to be 0.015–2.14 and 0.0036–0.38 g C m^{-2} d^{-1}, corresponding to 0.36–970.6% (mean: 21.4%; copepods: 9.8%; non-copepods: 11.6%) and 0.12–354.7% (mean: 4.7%; copepods: 1.6%; non-copepods: 3.6%) of *PP*, respectively.

Key words: Mesozooplankton, secondary and tertiary production, transfer efficiency, food requirement

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