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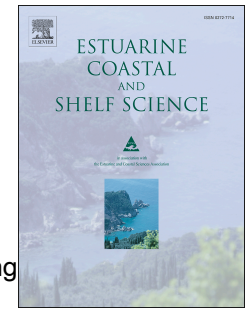

Study on chemical hydrography, chlorophyll-*a* and primary productivity in Liaodong Bay, China

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Study on chemical hydrography, chlorophyll-*a* and primary productivity in Liaodong Bay, China

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Abstract

A field study was carried out during the summer of 2013 in Liaodong Bay, China to determine the dynamics of the phytoplankton in the bay and the extent to which primary production in the bay was constrained by environmental factors. There was little or no evidence of limitation of phytoplankton production by nutrient concentrations at any of the sampling stations, with the possible exception of a few offshore stations where phosphate concentrations were less than 30 nM. This assessment was consistent with the results of nutrient enrichment experiments and the values of light-saturated photosynthetic rates and areal photosynthetic rates. To examine the effects of irradiance and temperature on light-saturated photosynthetic rates normalized to chlorophyll *a* concentrations (P^b_{opt}) at twelve stations where photosynthetic rates were measured by ^{14}C method, light-conditioned P^b_{opt} values were modeled as a function of the temperature with a satisfactory fit to our field data (R^2 = 0.60, p = 0.003). According to this model, the light-conditioned P^b_{opt} values increased with temperatures from 22°C to roughly 25°C but declined precipitously at higher temperatures, and P^b_{opt} values and corresponding areal photosynthetic rates at all 66 stations were estimated to be 7.63 ± 2.42 g C g^{-1} Chl *a* h^{-1} and 531.58 ± 428.51 gC m^{-2} d^{-1} in average, respectively. The relatively high P^b_{opt} values and low ratios of light absorbed to photosynthesis at coastal stations suggest the highly efficient usage of absorbed light by phytoplankton under replete nutrient levels and favorable temperatures.

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