

國立臺灣海洋大學
海洋環境與生態研究所 專題討論

題目：西北太平洋熱帶海域夏季基礎生產力對海洋生物幫浦的貢獻

The contribution of summer primary production in the tropical Northwest Pacific Ocean

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報告日期：12/29/2021

Abstract

Ocean primary production (PP) is an ability of phytoplankton to transform inorganic carbon into organic carbon by photosynthesis, primary production not only be used as an indicator of fisheries because of providing energy and nutrient to food chain, but also fix carbon dioxide from the atmosphere and store in the deep ocean through biological pump to regulate global climate. Basically, all the tropical ocean areas around the world are oligotrophic ocean. Physical mechanisms such as eddies and typhoons would affect primary production and the flux of sinking particles, in order to understand the influence of physical mechanisms, we are planned to reference a simple food-web model that are established by Siegel et al. in 2014 to calculate our observation. In the summer of 2021 (8/28-9/03), we conducted a survey of primary production and the productivity ratio of large and small phytoplankton distinguished by 20 μ m size in the tropical Northwest Pacific Ocean which often occurs eddies and typhoons. According to the results, if we remove the influence of cloudy days and calculate by the average luminous intensity of sunny days, the total primary production in the euphotic zone is between 142.95 and 245.98 mgC m⁻² d⁻¹, with an average of 182.65 \pm 39.27 mgC m⁻² d⁻¹, and the average production of small phytoplankton is 155.98 \pm 41.26 mgC m⁻² d⁻¹, accounting for about 85% of the total production, while the average production of large phytoplankton is 26.67 \pm 8.56 mgC m⁻² d⁻¹, the experiment consistents that small phytoplankton occupy a large proportion in the oligotrophic ocean. According to the model established by Siegel et al. in 2014, we estimate the average of the flux of sinking algal cells and associated aggregates (AlgEZ) is about 2.67 \pm 0.86 mgC m⁻² d⁻¹, the average of the flux of fecal matter from zooplankton grazing (FecEZ) is about 18.45 \pm 3.09 mgC m⁻² d⁻¹, and the average of the total flux of the sinking particles from the euphotic zone is about 21.12 \pm 3.62 mgC m⁻² d⁻¹.

Reference

Siegel, D. A., K. O. Buesseler, S. C. Doney, S. F. Sailley, M. J. Behrenfeld, and P. W. Boyd (2014) Global assessment of ocean carbon export by combining satellite observations and food-web models. *Global Biogeochemical Cycles*, 28, 181-196.