國 立 臺 灣 海 洋 大 學
海洋環境與生態研究所 專題討論

題目：在西班牙西北 Ría de Vigo 的中觀實驗觀察藻種組合之顆粒態與溶解態的的基礎生產力

Particulate and dissolved primary production by contrasting phytoplankton assemblages during mesocosm experiments in the Ría de Vigo (NW Spain)

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出處：Journal of Plankton Research, 2010, 32: 9: 1231-1240

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報告日期：11/18/2020

中文摘要

此篇報告研究了溶解態基礎生產力(Dissolved primary production; DOCp) 在沿岸高生產力生態系統與植物性浮游生物量、組成和生產率的關係。藉由中觀實驗，觀察了在 Ría de Vigo 比較了四個不同水文環境下的溶解態基礎生產力和顆粒態基礎生產力 (Particulate primary production; POCp)。此研究也透過過濾孔徑大小區分的方法，研究了葉綠素濃度、基礎生產力、藻種組成和細菌生產力。研究結果顯示大部分時候，Diatoms(>20μm)為主要藻種；冬天時，較小的藻種如 Flagellates and Picophytoplankton(2-20μm, <2μm)重要性則增加。胞外釋放百分比(Percentage of extracellular release; PER) 的平均值為 19%，其變化與植物性浮游生物量、藻種組成和大小分布比例無關。胞外釋放百分比在中關的藻華實驗過程，由指數生長期的 14%，至藻華衰退時上升到 23%。細菌碳需求與溶解態基礎生產力並無很好耦合度，顯示有其他有機碳的來源供應細菌的生長。儘管與藻類大小和藻種組成無直接相關，溶解態基礎生產力在沿岸地區，在藻華時依然有顯著的重要性。

Abstract

We studied the importance of dissolved primary production in a coastal, productive ecosystem in relation to phytoplankton biomass, community structure and productivity. The photosynthetic production of dissolved organic carbon (DOCp) and particulate organic carbon was determined in mesocosm experiments during four contrasting oceanographic periods in the Ría de Vigo (NW Iberian Peninsula). We also determined the size-fractionated chlorophyll a concentration and primary production, phytoplankton taxonomic composition and bacterial production. Phytoplankton biomass was dominated by the <20 μm size fraction (mostly diatoms), except in winter, when the 2–20 and >2 μm size fractions (flagellates and picophytoplankton) increased in importance. The percentage of extracellular release (PER) had an average value of

19% and was independent of oceanographic period, phytoplankton biomass and production, taxonomic composition and size structure. During phytoplankton blooms, PER increased significantly from 14% in the exponential growth phase to 23% in the senescent phase. Bacterial carbon demand and DOCp were uncoupled, suggesting that other processes in addition to photosynthate exudation contribute most of the labile carbon to fuel bacterial metabolism. Dissolved primary production remains an important process in coastal phytoplankton assemblages throughout the year, irrespective of size-structure and community composition, but attaining higher significance during the decaying phase of blooms.