# 國 立 臺 灣 海 洋 大 學
# 海洋環境與生態研究所 專題討論

中文題目:海洋微膠:微膠顆粒在海洋水體中的分佈與影響

英文題目: Marvelous Marine Microgels: On the Distribution and Impact of Gel-Like Particles in the Oceanic Water-Column

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英文摘要

Three-dimensional hydrogels of organic polymers have been suggested to affect a variety of processes in the ocean, including element cycling, microbial ecology, food-web dynamics, and air-sea exchange. However, their abundance and distribution in the ocean are hardly known, strongly limiting an assessment of their global significance. As a consequence, marine gels are often disregarded in biogeochemical or ecosystem models. Here, we demonstrate the widespread abundance of microgels in the ocean, from the surface to the deep sea. We exhibit size spectra of two major classes of marine gels, transparent exopolymer particles (TEP) and Coomassie stainable particles (CSP) for three different ocean regimes: (a) Polar Seas, (b) Eastern Boundary Upwelling Systems, and (c) the oligotrophic open ocean. We show the variations of TEP and CSP over the water-column, and compare them to dissolved organic carbon (DOC). We also discuss how the observed distributional patterns inform about productivity and particle dynamics of these distinct oceanic regimes. Finally, we exploit current research topics, where consideration of microgels may give new insight into the role of organic matter for marine biogeochemical processes.

中文摘要

具有三維凝膠結構的有機聚合物已被認為會影響海洋中的多種過程，包含元素循環、微生物生態系統、食物網動態以及海氣交換。然而，以往關於有機聚合體在海洋中的豐富度與分佈情形的研究較少，使得評估有機聚合體在全球的重要性受到限制。因此，海洋微膠在生物地球化學與生態系統模型經常被忽視。本研究證明微膠廣泛存在於表水至深海中。研究樣點從(a)極地海洋、(b)東部邊界湧升流系統以及(c)貧營養之開放海域表水層至深海，針對海洋中的兩類主要微膠之尺寸特性進行研究如透明外聚合物顆粒（TEP）與考馬斯可染顆粒（CSP），並探討 TEP 及 CSP 兩類微膠顆粒在不同水體上的變化，並進一步比較微膠與溶解有機碳(DOC)之關係。本研究亦討論到不同海洋情境的生產力和粒子動力學是如何影響的有機體分佈。最後，本研究利用實驗結果來說明微膠可能可提供一種新有機物在海洋生物地質化學過程的角色。