Carbon Biogeochemistry of the South China Sea – Current Understanding and Potential Changes in the Context of Global Change

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ABSTRACT

There remain many uncertainties in the ocean component of the global C cycle. Among others, ocean margins add in more complexicity in our understating of the ocean carbon cycle. Ocean margins are the most heterogeneous areas of the world's oceans, and thus it is extremely difficult to constrain the carbon transport fluxes, including the air-sea CO_2 fluxes and the interior carbon fluxes within the ocean margin. In addition, because of the diversity of the ecosystems and/or physical regimes (e.g., coral, upwelling, mesoscale eddies) coexisting in marginal seas, processes that modulate the carbon cycle therein remain poorly understood.

Moreover, this presentation will take the South China Sea, a largest low-latitude marginal sea as an example to examine the dynamics of carbon fluxes and processes based upon our field observations in the past 10 years. While our primary focuses will be on the air-sea CO_2 and export fluxes and their controls at a seasonal base, diurnal and longer term variability will also be examined. In addition, the river-ocean carbon connection will also be investigated to see how the riverine input will affect the carbon transport and transformation in the marginal systems. In addition, we will examine the potential the carbon exchanges between the South China Sea and the Pacific ocean.

With the attempt to shape the current understanding the carbon biogeochemistry in the South China Sea, this presentation will also touch the potential changes of the South China Sea biogeochemistry in the context of global changes.

南海的碳生物地球化學：
在全球變遷的範圍內談目前的瞭解與潛在的變化

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摘 要

我們對於全球碳循環中海洋的角色仍有許多未知。其中，海洋邊緣（ocean margins）又為我們對於海洋碳循環的瞭解更添複雜度。海洋邊緣是全世界海洋中成分最多元複雜的區域，因此很難限制碳通量，包括海空二氧化碳流量以及海洋邊緣區內的碳通量。另外，因為生態系統的多樣性、陸緣海的物理環境（如珊瑚、上升流、中尺度渦旋），我們對於影響碳循環的過程仍瞭解甚少。

本簡報將會以地球上最大的低緯陸緣海，南海為例，根據我們過去十年來累積的實地觀察檢視碳的流量與流程。我們將重點置於海空二氧化碳、輸出通量（export fluxes），並檢視季節控制、日間變異性、長期變異性。另外，我們也調查河流與海洋之間的碳連結，以瞭解河川流入如何影響陸緣系統的碳傳輸與轉型。除此之外，我們還會檢視南海與太平洋之間潛在碳交易量。

為建構目前對南海碳生物地球化學（the carbon biogeochemistry）的瞭解，本報告將會在全球變遷的範圍內簡述南海生物地球化學的潛在變化。