海洋年會成果發表

Achievements from the Annual Ocean Conference

著者／廖紫馨 Zi-Xin, Liao
海軍官校正期 116 年班 Naval Academy, Class 116

學生專欄

研究團隊的付出

首先，我要感謝我的教官、學長、學姐及同學們對研究團隊的付出，在研究過程中的無私奉獻及團隊合作中，每一份資料的蒐集、每一次實驗的調整都是結果呈現的結晶，使我有這個機會能夠發表海報向大家進行學術交流及分享。

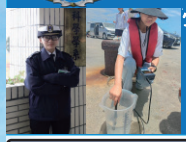
實驗內容及成果

近年來，全球藍碳的碳循環及碳匯量是非常熱門的議題，透過光合作用固定大氣中的二氧化碳，形成碳匯，減緩氣候變遷，因此藍碳在全球碳循環中扮演了關鍵的角色，針對這次的海報內容，我所做的題目是「臺灣周遭海域海洋沉積物碳匯在海洋藍碳中扮演的角色」，透過我們研究

2025 臺灣地球科學聯合學術研討會

臺灣周遭海域海洋沉積物碳匯在海洋藍碳中扮演的角色

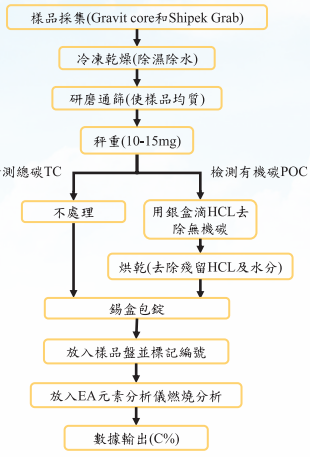
廖紫馨[1] 洪湘晴[1] 施詠嚴[1] 洪慶章[2]
1. 海軍軍官學校應用科學系
2. 國立中山大學海洋科學院



摘要

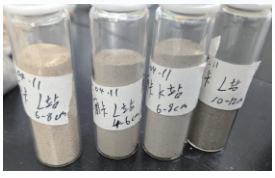
海洋沉積物碳匯量（Marine Sediment Carbon Sink）是海洋藍碳中重要的一環，利用海洋沉積物的碳含量（Carbon Content）及沉積速率（Sedimentation Rate）來估計每年的海底沉積物碳封存，被認為在海洋藍碳中不可或缺且極具潛力的一環。過去的研究中，有許多相關沉積物碳含量及沉降速率的報導或研究，因此本研究希望透過有系統性的整理過去發表的文獻或研究數據，以進一步理解我國周邊海域海洋沉積物碳匯量。在我們初步整理的文獻中，北部(東海南部）、東部(北太平洋西側)、南部海域(南海北部)及西部(台灣海峽)的碳含量分別是0.63、0.54、0.46 及0.37 %；沉降速率則分別為4240、2500、223及1200 g m^{-2} yr^{-1}。經過轉換，北部、東部、南部及西部海域海洋沉積物的碳匯量則分別是0.57、 0.38、 0.01及 0.08 Mt-C y^{-1}，透過本研究所獲得的數據分析，得以對海洋沉積物中碳匯量進行初步量化，並有助於強化對其碳儲存功能的科學理解，進而增進對其在全球碳循環中角色之認識。

研究方法

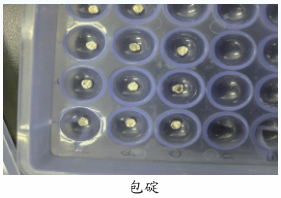


表層抓泥器（Shipek Grab ）

重力採泥器（Gravity Corer）



樣品凍乾研磨後



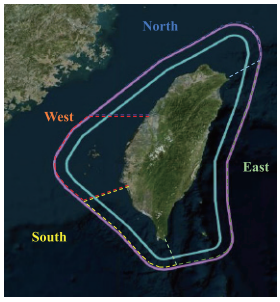
包碇

・沉積物碳匯量 (g-C y^{-1}) = 碳含量 (%) ×沉積速率 (g m^{-2} y^{-1}) ×面積 (m^2)

研究結果

北部

面積(m^2)	沉積速率 (g m^{-2} y^{-1})	C%	(Mt-C y^{-1})
2.17×10^{10}	4.24×10^3	0.63	0.57



東部

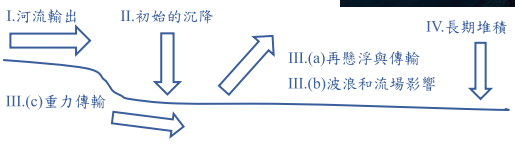
面積(m^2)	沉積速率 (g m^{-2} y^{-1})	C%	(Mt-C y^{-1})
2.85×10^{10}	2.50×10^3	0.54	0.38

西部

面積(m^2)	沉積速率 (g m^{-2} y^{-1})	C%	(Mt-C y^{-1})
1.85×10^{10}	1.20×10^3	0.37	0.2

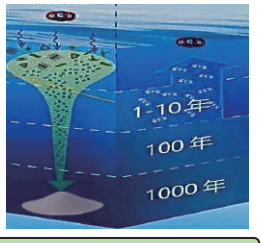
南部

面積(m^2)	沉積速率 (g m^{-2} y^{-1})	C%	(Mt-C y^{-1})
1.17×10^{10}	0.22×10^3	0.46	0.02



此圖為陸源沉積物傳輸過程的四個階段，由此顯現出海洋沉積物有可能受到陸地傳輸而影響海底沉積物的數據在未來的研究中值得探討 (修改自 Wright and Nittrrouer,1995) 。

生物幫浦是透過浮游植物進行光合作用將溶解於水中的二氧化碳轉化為顆粒態有機碳沉入深海，而掉落的有機碳沉降到海底被長期保存於海洋沉積物中，為海洋藍碳中扮演重要的角色 (修改自 Revisiting Oceanic Carbon Sequestration:Evidence for Enhanced CO_2 Uptake Capacity,2023) 。



參考文獻

Sheehy, J., Porter, J., Bell, M., & Kerr, S. (2024). Redefining blue carbon with adaptive valuation for global policy. *Science of The Total Environment, 908*, 168253.
Wang, F., Liu, J., Qin, G., Zhang, J., Zhou, J., Wu, J., Zhang, L., Thapa, P., Sanders, C. J., Santos, I. R., Li, X., Lin, G., Weng, Q., Tang, J., Jiao, N., & Ren, H. (2023). Coastal blue carbon in China as a nature-based solution toward carbon neutrality. *The Innovation, 4*(6), 100481.
Hung, C.-C., Hsieh, H.-H., Chou, W.-C., Liu, E.-C., Chow, C. H., Chang, Y., Lee, T.-M., Santschi, P. H., Ranatunga, R. R. M. K. P., Bacosa, H. P., & Shih, Y.-Y. (2024). Assessing CO_2 sources and sinks in and around Taiwan: Implication for achieving regional carbon neutrality by 2050. *Marine Pollution Bulletin, 198*, 116664.
Hung, C.-C. (2024). Oceanic blue carbon in seas around Taiwan. *Marine Research, 3*(2), Article 0002.

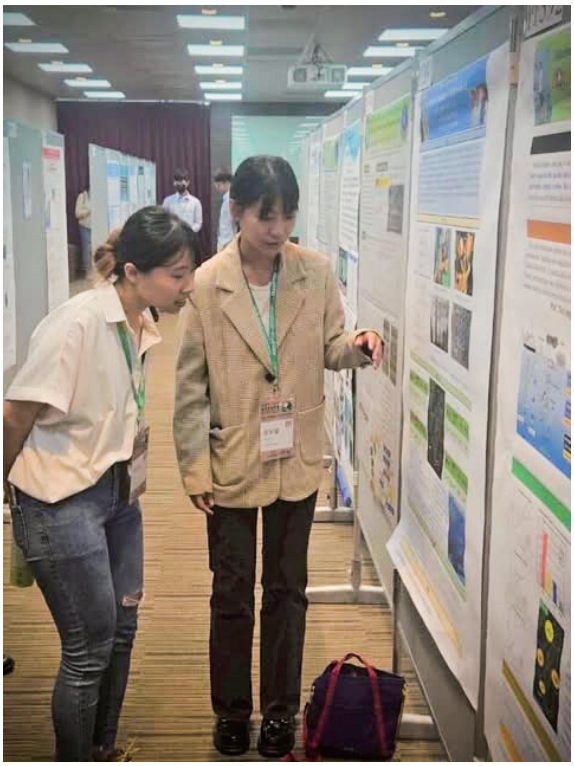
致謝

感謝農業部漁業署及國立中山大學洪慶章教授研究室團隊對本研究的支持與協助。

團隊採樣後的結果進行數據分析後，並將海洋碳循環做了一個系統性的統整，量化出臺灣周遭海洋藍碳的碳匯量分別是多少。

海報展示及介紹

能夠有機會在此次活動中發表海報，對我而言是莫大的榮幸，這不僅是對研究成果的一種肯定，更是一個難得的學習與交流機會，透過海報展示，能與來自各領域的專家學者分享想法、獲得寶貴的回饋，



對於未來的研究方向有很大的啟發與幫助，也感謝主辦單位提供這個活動，讓我能夠呈現自己的研究成果，也感謝一路上指導與協助我的師長與夥伴們，使我能夠成功的站在舞台上向大家發表我的成果。

學術交流

參與這次的學術交流活動，讓我受益匪淺，能與來自不同領域的學者與研究人員互動，不僅拓展了我的視野，也激發了我對研究議題更深入的思考，在交流過程中，我有機會介紹自己的研究成果，並獲得許多不同的建議與回饋，讓我重新思考研究的方向與方法，特別是在討論中，看到他人如何應用不同的理論與技術解決問題，對我而言是一種全新的啟發，除此之外，也認識到了世界各地的學者們，並且

在交流中訓練自己的台風及自信，促進了世界交流及跨領域的合作。

心得與反思

這次的經驗使我得到了許多寶貴的經驗，與來自不同學術背景的研究者互動，我不僅有機會展示自己的研究成果，也聽取了他人寶貴的意見與建議，這樣的交流過程讓我意識到，學術研究不應只是封閉地進行，更需要透過討論與合作來激盪出新的想法，此外，從其他參與者的研究中，我學習到不同的研究方法與視角，這對我未來的研究設計有很大啟發，整體而言，這次經驗不僅豐富了我的學術視野，也提升了我對研究議題的理解與反思能力，我相信這樣的經驗對個人的專業成長極為重要，也期待未來能有更多機會參與類似的交流活動，持續精進自我，拓展學術人脈與合作機會。

Contributions of the Research Team

First of all, I would like to express my gratitude to my advisor, seniors, and fellow classmates for their dedication to our research team. Every piece of data collected and every adjustment made during the experiments represents the crystallization of teamwork and selfless contribution. Their efforts have made it possible for me to present this poster, share our findings, and engage in academic exchange with others.

Research Content and Results

In recent years, the global carbon cycle and carbon storage of blue carbon have become highly significant topics. Through photosynthesis, atmospheric carbon dioxide is fixed and stored as carbon sinks, helping to mitigate climate change. Thus, blue carbon plays a crucial role in the global carbon cycle. The topic of my poster presentation is "The Role of Marine Sediment Carbon Storage in Taiwan's Surrounding Waters within the Oceanic Blue Carbon Cycle." By analyzing the data obtained from our team's sampling efforts, we systematically integrated the processes of marine carbon cycling and quantified the amount of blue carbon stored in the

sediments around Taiwan.

Poster Presentation and Introduction

It is a great honor for me to present my poster at this event. This opportunity not only serves as recognition of our research results but also provides a rare platform for learning and exchanging ideas. Through the poster presentation, I was able to share my research with experts and scholars from different fields, receive valuable feedback, and gain inspiration for future research directions. I am also deeply thankful to the organizers for providing this opportunity to showcase our work, as well as to the mentors and teammates who guided and supported me along the way, enabling me to confidently present our result on this stage.

Academic Exchange

Participating in this academic exchange has been an immensely rewarding experience. Interacting with scholars and researchers from diverse disciplines broadened my horizons and stimulated deeper reflection on my own research topic. I had the chance to introduce my work, receive a wide range of feedback, and rethink both the direction and methodology of my research. Particularly during discussions, observing how others applied different theories and techniques to address challenges was a completely new source of inspiration for me. Moreover, meeting researchers from around the world helped me improve my presentation skills and confidence, while fostering international exchange and interdisciplinary collaboration.

Reflections and Insights

This experience has provided me with many valuable lessons. Engaging with researchers from different academic backgrounds gave me the opportunity not only to present my own work but also to learn from the insights and suggestions of others. I realized that academic research

should not be conducted in isolation; rather, it is through discussion and collaboration that new ideas emerge. Additionally, learning about the diverse research methods and perspectives of other participants offered meaningful inspiration for the design of my future studies. Overall, this experience enriched my academic vision, deepened my understanding of research issues, and strengthened my ability to reflect critically. I believe such experiences are crucial for personal and professional growth, and I look forward to participating in more exchanges of this kind in the future to continue improving myself and expanding academic networks and collaborative opportunities.