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Reconstruction of Carbon Export during the Early Miocene to Investigate Drivers of Major Biotic Shifts

BATOUL SAAD[1], ALEXANDRA AUDERSET[2], JESSE R FARMER[3], XINGCHEN TONY WANG[4] AND ELIZABETH M. GRIFFITH[1]

[1]The Ohio State University
[2]University of Southampton
[3]University of Massachusetts Boston
[4]Boston College

Recent studies highlight major ecological and environmental shifts in the Early Miocene around ~19 Ma, such as a recorded shark extinction event in the Pacific Ocean [1] and foraminifera diversity shifts [2]. These ecological shifts coincide with a contraction of oxygen deficient zones in the Pacific [3] and a reduction of global ocean organic carbon burial [4], which both may be explained by a decrease in ocean productivity and/or a change in ocean circulation. To address these options, we will present a preliminary reconstruction of Early Miocene (21-17 Ma) carbon export from the Pacific (Sites U1337 and 872) and Atlantic (Sites 1264 and 516) Oceans using the accumulation of pelagic marine barite ($BaSO_4$) and excess barium (Bio-Ba) in deep sea sediments. As these proxies are linked to the decomposition of organic matter in the upper water column, their accumulation serves as a proxy of carbon export.

Our preliminary results suggest differences in carbon export within different regions. Across the Early Miocene, carbon export declined in the equatorial Pacific and southeast Atlantic, was stable in the southwest Atlantic, and increased in the western tropical Pacific. These records support the hypothesis that shifts in ocean circulation patterns, such as enhanced deep-water Southern Ocean ventilation, may have driven changes in carbon export in the Early Miocene. Future work will combine carbon export with foraminifera-bound organic $\delta^{15}N$, a tracer of ocean oxygen deficiency, on the same samples to further investigate shifts in carbon cycling and oxygenation between different oceanic regions in the Early Miocene.

[1] Sibert, E. C., & Rubin, L. D. (2021). Science, 372(6546), 1105–1107.

[2] Swain, A., et al. (2024). Nature, 629(8012), 616–623.

[3] Auderset, A., et al. (2022). Nature, 609(7925), 77–82.

[4] Li, Z., et al. (2023). Nature, 613(7942), 90–95.