Goldschmidt 2023 Abstract
https://doi.org/10.7185/gold2023.15078

Productivity proxies in surface sediment of the East Antarctic margin: a focus on xsBa

LAYLA CREACH[1], TARYN NOBLE[1], ZANNA CHASE[2] AND ASHLEY TOWNSEND[3]

[1]Institute for Marine and Antarctic Studies, University of Tasmania

[2]University of Tasmania

[3]Central Science Laboratory, University of Tasmania

Presenting Author: layla.creach@utas.edu.au

Components such as organic carbon, carbonate, opal or barite ($BaSO_4$) are valuable palaeoceanographic proxies, enabling the reconstruction of past changes in biological productivity under various climate regimes, particularly when Th-230 normalisation is used to reconstruct vertical rain rates. However, these components can be affected by poor preservation in the sediment. Barite is generally better preserved in the sediment compared to other productivity proxies, but its estimation using Ba/Al ratios or 'excess Ba' (xsBa) calculations may not always be reliable. This study presents a multi-proxy investigation of surface sediment cores from the East Antarctic margin to assess which component(s) may effectively track paleo-productivity. Th-230 normalised fluxes indicate that chlorin, organic carbon and opal record consistent depth profiles, while xsBa appears to be affected by different processes. A lack of authigenic uranium enrichment suggests the sediments are well oxygenated and therefore rules out poor barite preservation. Results suggest that xsBa may not robustly reflect marine barite (the fraction of Ba associated with productivity) in sediment from the East Antarctic margin, likely because other mineral phases – possibly Fe-Mn oxides - may be important Ba carrier phases in the region. Th-230 normalised Ba concentrations in the operationally defined sediment residue, which was reductively leached to remove Fe-Mn oxides, aligns with the other biogenic fluxes, implying that specific leaching for barite isolation might be required in East Antarctic sediment, rather than using the standard 'xsBa' calculation. This study gives new insights into the sedimentary cycle of Ba in East Antarctic sediment and confirms the importance of using multi-proxy records to perform paleo-reconstructions.