Goldschmidt 2026 Abstract
https://doi.org/10.46427/gold2026.36343

Uranium-series isotopes and trace elements in pteropod aragonite: primary vs. secondary uptake and potential for absolute dating of marine sediments

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Aragonitic pteropod fossils are found in marine sediments worldwide, particularly in shallow to mid-depth locations bathed in waters with high carbonate ion concentrations. Outside of a few stable isotope studies, little work has been done to investigate the trace element contents of pteropod shells and their sensitivity to environmental variables. In comparison to calcite, which tends to have low concentration of uranium (U) and is open-system with respect to U decay products, aragonite is typically higher U and a more closed system, making it a high-potential target for absolute U-series dating of marine sediment layers. We have performed exploratory analyses of trace elements and U-series isotopes in pteropods collected in sediment traps as well as marine sediments. Our results suggest that U uptake in pteropods is primary, rather than post-depositional, and that the U isotopic composition of seawater is preserved in pteropod aragonite even after burial. Initial U-series dates of core top pteropods agree within error with ^{14}C dates. We will discuss additional tests and ongoing work to evaluate and eventually apply U-series dates of pteropods to generate absolute chronologies of marine sediments.