Goldschmidt 2025 Abstract
https://doi.org/10.7185/gold2025.29886

Deep Sulfur Cycling Identified using $\delta^{34}S$ of Pyrite on the Southern Campbell Plateau

ALEX REIS[1], VANESSA FICHTNER[2] AND **ANDREA M ERHARDT**[1]

[1]University of Kentucky
[2]University of Göttingen

Sulfur is a key component in the reduction of organic carbon in marine sediments. Sulfate-driven anaerobic oxidation of methane and microbial sulfate reduction are the leading processes driving the removal of organic carbon and sulfur from the environment. Microbial sulfate reduction has been well studied in most marine depositional environments, however, studies examining sulfate-driven anaerobic oxidation of methane are primarily limited to shallow, methane seep environments. Sediments recovered from IODP site U1553 on the southern Campbell Plateau demonstrate evidence of a deep sulfate-methane transition zone, providing insight into a relatively understudied process. In this study, we identified a deep (>500mbsf) sulfate-methane transition zone through the analysis of sulfur isotopes in sulfide minerals ($d^{34}S_{CRS}$). Two paleo-SMTZs were also identified as peaks in $d^{34}S_{CRS}$ below the modern SMTZ, suggesting a change in conditions led to the upward migration of the SMTZ over time. We hypothesize that SMTZ changes may relate to changes in overlying paleogeography and the resulting ocean chemistry. Understanding the evolution of deep SMTZs and the processes associated with them will help further constrain how the sulfur and carbon cycles interact and drive carbon storage in marine sediments.