Goldschmidt 2026 Abstract
https://doi.org/10.46427/gold2026.38029

Isotopic clues to understanding the biogeochemical cycling of calcium in the ocean - *Endowed Biogeochemistry Lecture*

ELIZABETH M. GRIFFITH

The Ohio State University

Calcium (Ca) is an abundant element in seawater, biologically essential, and a key component of the dominant sink for carbon on long geological timescales ($CaCO_3$). In the ocean, Ca is primarily removed via carbonate formation which shifts the isotopic composition of Ca in seawater away from its sources. The sources and sinks of Ca in the ocean appear to be in steady state today, but has the biogeochemical cycling of Ca in the oceans created imbalances in the past? And can we trace these changes using the Ca isotopic of seawater? To try and answer these questions, my research uses field samples collected by the international scientific ocean drilling community.

I will revisit existing records from different sedimentary components used to reconstruct the Ca isotopic composition of seawater and stress the importance of studying both passive and active recorders of seawater chemistry. Although it is expected that any potential change in the isotopic composition of Ca in seawater will be gradual due to the long residence time of Ca in seawater (approximately 1 million years), some records suggest a more dynamic system and warrant further investigation. I will focus on intervals of time where existing records suggest relatively rapid changes in the isotopic composition of seawater. However, these changes can only be interpreted when the isotopic composition of the major sources and sinks of Ca are also known or assumed. I will share new exploratory data that suggests that the isotopic composition of Ca in seawater might have varied on glacial-interglacial timescales using marine barite, a passive recorder of Ca isotopes in seawater, and highlight potential mechanisms resulting in variations in the isotopic composition of Ca in seawater on different timescales.