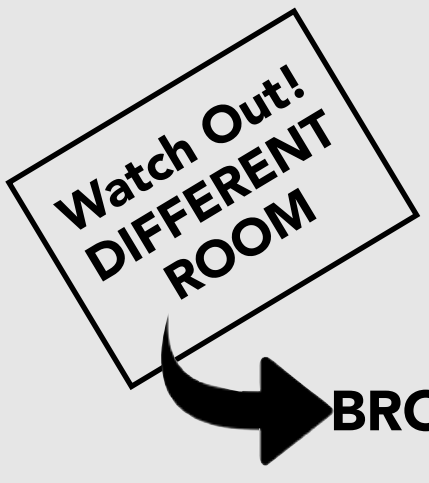

UC **SANTA BARBARA**

Department of Earth Science

Speakers Club

BROIDA 1640 • THURSDAY OCT 11th.• 2:00 PM

The chemistry of shallow-marine carbonate sediments and the history of the global carbon cycle

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Marine carbonate sediments are one of the most complete geological archives. The chemistry of these sediments has been used to reconstruct the evolution of global biogeochemical cycles for a wide range of elements throughout the entirety of Earth history. However, one of the main challenges to understanding this archive is the susceptibility of carbonate sediments to diagenesis – the suite of reactions that occur as unlithified sediments are transformed into rocks. Diagenetic reactions can alter the original geochemical composition of sediments, adding complexity to the geochemical record of the past. This talk will focus on extracting the primary chemical information from ancient carbonate sediments by improving our understanding of the diagenetic process. By using a combination of numerical models and measurements of stable calcium and magnesium isotopes, I will outline a new geochemical framework that can be used to identify and see through diagenesis. First, I will show how the variability in the chemical composition of shallow-mariner carbonates sediments from the Bahamas can be explained by the combined effects of carbonate mineralogy (aragonite, calcite, dolomite) and early marine diagenesis. Second, I will show how we can use this geochemical framework to reinterpret the chemistry of ancient carbonate sediments during periods in Earth history where geochemical changes have been attributed to extreme perturbations in the global carbon and oxygen cycles. Finally, when applied to a wide range of geochemical proxies in ancient shallow-marine carbonate sediments (e.g., lithium, strontium, and sulfur isotopes), this geochemical framework can be used to create more robust records of past seawater chemistry.