Calibrating geological $S$ isotope records

The sedimentary sulfur isotope record is one of the most information-rich proxies of environmental change over the course of Earth history. Like many biogeochemical cycles, extracting precise environmental information from marine sulfur isotope records carries a necessary component of both biological and physical processes. For the former, microorganisms are the main vehicle through which sulfur cycling is facilitated and isotope effects generated. Here, sulfate-reducing bacteria play a central role. In the case of physical processes, understanding the consequences of marine sediment diagenesis — the process that fundamentally translates biogeochemical signals to the rock record — must be included. Thus, this work aims to isolate and quantify key biological isotope effects using a range of techniques and approaches, and then apply these constraints to models of sediment diagenesis in order to revisit geological records and storylines.