

## **Controls on barium isotopes in seep barites from the northern Gulf of Mexico continental slope**

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Barite ( $\text{BaSO}_4$ ) has frequently been observed at cold seeps along the Gulf of Mexico continental slope. In these locations  $\text{BaSO}_4$  forms through the interaction of Barium (Ba)-rich seep fluids with dissolved  $\text{SO}_4$  of pore waters near the seafloor. However, questions remain about the controls on Ba isotope signatures in seep barites which prevents the identification of such signatures in the sedimentary record resolving the processes that underlie them. Here, we report Ba isotope signatures of barite precipitates at eight well studied seep sites from the northern Gulf of Mexico continental slope. We find large  $\delta^{138/134}\text{Ba}$  variations, ranging from  $\sim -0.20\%$  to  $+0.30\%$ , either within individual study sites or across multiple geographic areas, demonstrating the geochemical complexity of the system. We also observe that barites with higher  $\delta^{138/134}\text{Ba}$  values typically occur with extremely positive  $\delta^{34}\text{S}$  and  $\delta^{18}\text{O}$  values. We interpret this trend as suggestive of barite formation from seawater sulfate that has undergone significant microbial sulfur cycling. In this presentation we will further interrogate this data set along with the analysis of Ba isotopes of co-occurring authigenic carbonates from these study sites.