

Estimating Seawater Boron Isotope Ratios from Marine Evaporites

Friday, Nov 3
3:15 pm
Room 310
Donuts will be provided

Chemistry Seminar

Boron isotopes incorporated in marine carbonates are widely used to determine the pH of ancient seawater, which can be used to understand past concentrations of atmospheric CO₂. However, conversion of boron isotope measurements in carbonates (typically the shells of foraminifera) to past pH depends on the accurate knowledge of the boron isotopic composition of seawater, which remains uncertain. One promising technique for reconstructing this parameter is the measurement of boron in halite (NaCl) fluid inclusions. This approach proved successful for reconstructing modern seawater boron isotope values from modern marine halites. However, discrepancies emerged in ancient salt deposits which were lower than the anticipated range. To explain these discrepancies, we conducted seawater evaporation experiments and measured boron in the brines and co-precipitated minerals (carbonate, gypsum, and halite). Preliminary results show that bulk halite boron isotope ratios are consistently lower than that of the brine, suggesting contributions of boron from other mineral phases within the halite. These results show that minor contributions of boron from carbonate and gypsum could explain the lower boron isotope values observed in ancient halites and provide a potential opportunity for arriving at more accurate estimates of ancient seawater boron isotope composition, pH, and CO₂ concentrations.



Chiza N. Mwinde

Chiza is a PhD Candidate at the University of Chicago. She received her bachelor's degree in Geosciences from Smith College. Her main research interest is in solving problems related to Earth's past climate through studying geochemical signatures preserved in minerals and rocks. Prior to starting graduate school, she spent 2 years in the Bridge to the PhD program at Columbia University where she did research on Southern African climate. Her current research is focused on using fluid inclusions trapped in marine salt minerals to reconstruct the chemical composition of ancient seawater. When she is not pipetting samples in the lab, Chiza enjoys exploring pastry shops and learning new things.