Iron isotope fractionation in a seafloor hydrothermal system: Variations in end-member vent fluids and changes throughout the buoyant plume

Sarah A. Bennett[*], Olivier J. Rouxel, Dieter Garbe-Schönberg, Christopher R. German

Fe isotopes are potentially a powerful tool to help us understand various processes in natural systems. In nature, Fe isotopic variations are controlled by abiotic redox reactions (Fe^{3+} and Fe^{2+}), mineral precipitation and metabolic processing by bacteria. The hydrothermal system therefore provides an ideal natural laboratory for studying redox and precipitation effects.

Here we address the variations in Fe isotope compositions of end-member vent fluids from four high temperature chimneys within a 2 km section of Mid Atlantic Ridge (MAR) and the Fe isotope fractionation that occurs in the rising buoyant plume above one of the vent fields. The $\delta^{56}Fe$ values range from –0.3 to -0.7‰ and we conclude that the major parameters controlling Fe-isotope fractionation in hydrothermal plumes are oxygen concentration, Fe/sulfide ratios and the mixing ratio between the hydrothermal fluid and the surrounding seawater.

**Presenting Author: National Oceanography Centre, Southampton, SO14 3ZH, UK*