GFZ Helmholtz Centre Potsdam

Interface Geochemistry Seminar Series

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How fluids move through mudstones to form earth's largest Zn deposits

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Abstract

A number of important sediment hosted mineral resources (e.g. Cu, Zn, U) have formed via the migration of metal bearing fluids through siliciclastic rocks. Our largest Zn deposits are typically stratabound in fine-grained carbonaceous mudstones, although precisely how hydrothermal fluids moved through low permeability rocks is not well constrained. In this talk I will present transmission electron microscopy (TEM) data generated on a drill-core sample from a Proterozoic (1.64 Ga) Zn deposit. The sample has a remarkably well preserved reaction front between mineralized and un-mineralized host rock. A comparison of the silicate matrix and sulfide assemblages either side of this interface help to constrain the mineral replacement reactions and geochemical conditions that resulted in the development of transient reaction permeability. Similar to other sediment hosted deposits, in situ acid generation was likely an important factor for the propagation of the reaction front, which helps to reveal potential feedbacks and self organization at the larger scale.