# Fate of organic carbon and primary iron minerals during simulated diagenesis of banded iron formations

M. HALAMA, E.D. SWANNER AND A. KAPPLER*

Geomicrobiology, Center for Applied Geoscience, University of Tuebingen, Tuebingen, Germany (*correspondence: andreas.kappler@uni-tuebingen.de)

Precambrian banded iron formations (BIFs) provide unique archives of the early Earth. However, post-depositional alteration and metamorphic processes influence the chemistry and mineralogy of BIFs and make the interpretation of primary sedimentary processes challenging. Anoxygenic phototrophic or microaerophilic Fe(II)-oxidizers were suggested to have played a key role in the precipitation of the primary BIF precipitates, i.e. Fe(III) (oxyhydr)oxides [1]. It is unknown whether BIF mineral assemblages are formed when cell-mineral aggregates are reacted at relevant temperature and pressure (P/T) conditions that simulate BIF diagenesis.

We simulated diagenesis experimentally in gold capsules at 1.2 kbar and 170 °C with ferrihydrite or hematite mixed with either untreated or P/T-pretreated bacterial biomass, which simulates partially degraded sedimented organic carbon. We identified and quantified the gases and minerals formed, quantified the extent of thermogenic Fe(III) reduction, and characterized the maturity of organic carbon at the end of P/T incubation.

We found that BIF-like mineral assemblages including hematite, siderite and magnetite were formed. CO, $CO_2$, and $CH_4$ among other hydrocarbons were produced during simulated diagenesis, implying a possible sink for electrons and carbon out of BIF.

[1] Posth *et al* (2013) *Sedimentology* **60** (7), 1733-1754