



Isotope biogeochemistry of sedimentary sulfur in deep hypersulfidic carbonates (GAB, ODP Leg 182)

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Carbonates with hypersulfidic pore waters from the Great Australian Bight were recovered during ODP Leg 182 [1, 2]. In the present study, total reduced inorganic sulfur (TRIS; essentially pyrite) as a product of microbial sulfate reduction was quantified and isotopically characterized for 9 sites (1126 to 1134). POC and PIC contents were measured, too. Stable isotope measurements gave $\delta^{34}\text{S}$ values between -12 and -51% , similar to results of [3] without a relation to the isotopic composition of coexisting dissolved sulfide [2]. This indicates pyrite formation close to the sediment-water interface without further significant later diagenetic contributions or isotope exchange reactions under iron-limited conditions of the carbonate sediments. Maximum isotope fractionation between TRIS and modern seawater sulfate range up to 72 per mil. This indicates that a near-surface sulfur cycle responsible for pyrite formation including oxidative reactions leads to a similar overall maximum isotope discrimination as the single-step *in-situ* sulfate reduction by a deep biosphere in the hypersulfidic pore water system as reported by [2]. Both cycles are decoupled through space and time. Higher variabilities in the isotopic composition of sedimentary pyrite record are only observed in sediments younger than about 7 million years.

[1] Swart P. et al. (2000) *Geology* 28; [2] Wortmann U., Bernasconi S.M. & Böttcher M.E. (2001) *Geology* 29; [3] Böttcher M.E. et al. (2004) *Marine Geology*

The authors acknowledge financial support by Deutsche Forschungsgemeinschaft, Max Planck Society, and IOW.