EGU2020-3952
https://doi.org/10.5194/egusphere-egu2020-3952
EGU General Assembly 2020

Exploring the Affinity and Selectivity of Sedimentary Mackinawite (FeS) Towards Natural Organic Matter

Alexandre Tétrault[1] and Yves Gélinas[2]
[1]Concordia University, Montreal, Canada (al_tetra@live.concordia.ca)
[2]Concordia University, Montreal, Canada (yves.gelinas@concordia.ca)

Marine sediments represent the most important sink for organic matter across geological time spans, in which carbon-containing molecules are sequestered away and can escape remineralization to CO_2 by microbial degradation. Strong associations between minerals such as iron oxides and organic matter reaching the seafloor play a fundamental role in this preservation and have been known for some decades. Despite the importance of this protective mechanism in the balances of the global carbon budget, very little is known of the fate of bound organic matter as it is shuttled across the redox gradient into the reducing layers of sediment, particularly with respect to the Fe-OM associations. This study focuses on measuring the selective affinity of ferric and ferrous iron species for various functional groups commonly associated with the degradation products of organic molecules in marine systems as the iron cycles from +3 (oxides: goethite, lepidocrocite and ferrihydrite) to +2 (sulfides: mackinawite) oxidation states. This approach involves following model compounds across an artificial iron redox shuttle while probing Fe-OM bonding via quantitative FTIR and calculating mass balances using elemental analysis. A predicted outcome of this study will be a greater understanding of the fate of mineral-bound organic matter as it traverses the sedimentary redox gradient and the importance of iron sulfides such as mackinawite in their preservation.

How to cite: Tétrault, A. and Gélinas, Y.: Exploring the Affinity and Selectivity of Sedimentary Mackinawite (FeS) Towards Natural Organic Matter, EGU General Assembly 2020, Online, 4–8 May 2020, EGU2020-3952, https://doi.org/10.5194/egusphere-egu2020-3952, 2020