

Microbial iron(II) oxidation under anoxic and microoxic conditions - ecology and biomineral formation

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Before the evolution of oxygenic photosynthesis, ancient oceans were anoxic and Fe(II)-rich, thus providing a habitat for anoxygenic phototrophic and potentially also for nitrate-reducing Fe(II)-oxidizing bacteria. With the invention of oxygenic photosynthesis and the presence of low concentrations of O₂, microaerophilic Fe(II)-oxidizers could also have competed for Fe(II) and contributed to Fe(II) oxidation. Here we will present data from modern habitats including marine sediments and an iron(II)- and sulfide-rich spring studying the distribution, identity and abundance of the different types of Fe(II)-oxidizers under various geochemical conditions. This allows us to better understand the ecological distribution of such microorganisms on modern and ancient Earth. Additionally, we will present data on the cell-mineral aggregates formed during microbial Fe(II) oxidation and on the identity and reactivity of the minerals formed by such Fe(II)-oxidizing microorganisms and discuss the potential implications for the fate of nutrients and trace metals in ancient oceans.