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Role of biogenic iron sulfide minerals in the preservation of organic carbon

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The long-term burial of organic carbon and iron sulfide minerals controls oxygen and carbon dioxide concentrations at the surface of the Earth. Microbial sulfate reduction contributes to the oxidation of most organic carbon in anoxic sedimentary environments. This process leads to the production of sulfide, which can react with Fe(II) to precipitate iron sulfide minerals. It was long assumed that sulfate-reducing microorganisms only provide sulfide for the formation of the minerals. However, they also influence the physical properties and composition of iron sulfide minerals, by acting as templates for mineral nucleation and growth [1]. Biogenic iron sulfide minerals also incorporate significant amounts of organic molecules that derive from microbial biomass [2-4]. I will discuss iron sulfide mineral formation in the presence of sulfate-reducing microorganisms and how it produces strong organo-mineral interactions between microbial labile organic carbon and iron sulfide minerals that have the potential to preserve OC for long periods of time.

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