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Hydroxyl radicals form in natural sediments – effects on sedimentary organic matter

Annelie Skoog and Victor Alejandro Arias-Esquivel
University of Conneticut, Marine sciences, Groton, United States (annelie.skoog@uconn.edu)

We show that hydroxyl radicals form at the oxic anoxic interface in marine sediments from ferrous iron reacting with hydrogen peroxide in the Fenton reaction. The aggressive nature of hydroxyl radicals makes it likely that they participate in degradation of sedimentary organic matter (SOM). We used terephthalic acid (TPA) to trap the hydroxyl radicals in sediment cores - TPA reacts with hydroxyl radicals to form the highly fluorescent product TPAOH. Results indicated formation of TPAOH at high concentrations at the oxic-anoxic interface. We also subjected SOM to hydroxyl radicals formed by the Fenton reaction, which resulted in changes in fluorescence properties and chemical composition. This is the first study showing formation of hydroxyl radicals and their effect on SOM, which is a previously unknown mechanism in the global carbon cycle.