

1. Record Nr.	UNINA9910345964203321
Autore	Alexandra V. Turchyn
Titolo	Microbial Connections Between the Subsurface Sulfur Cycle and Other Elemental Cycles
Pubbl/distr/stampa	Frontiers Media SA, 2018
Descrizione fisica	1 online resource (213 p.)
Collana	Frontiers Research Topics
Lingua di pubblicazione	Inglese
Formato	Materiale a stampa
Livello bibliografico	Monografia
Sommario/riassunto	<p>Sulfur has many redox states and is a major metabolite in suboxic and anaerobic environments including, but not restricted to, marine and marginal marine sediments, the water column of oxygen minimum zones, salt marshes and oil wells. Microbially mediated redox cycling of sulfur typically comprises dissimilatory sulfate reduction (MSR), sulfide reoxidation, disproportionation and the oxidation and reduction of sulfur redox intermediates. These processes contribute to the degradation of organic matter, link the cycles of sulfur and carbon, control the production and consumption of methane and are critical for the long term budget of O<sub>2</sub> in the atmosphere. Microbial and abiotic processes at redox interfaces also connect the sulfur cycle to the redox cycles of nitrogen, iron and other elements, producing distinctive geochemical and molecular signatures. Studies that couple microbiology with stable isotope geochemistry have informed interpretations of microbial sulfur cycling in modern and past environments. Laboratory-based studies and models of MSR have sought to understand the physiological and environmental controls of the magnitude of sulfur isotope fractionation. The fractionations of stable sulfur and oxygen isotopes during MSR are also used to track enzymatic activity during MSR and processes that oxidize sulfide in the presence of environmental oxidants. Outstanding questions in the field concern the importance of oxidative processes within the natural environment, the delivery of oxidants and carbon sources to the zones</p>

of sulfate reduction and the ability to detect or reconstruct oxidative processes from the chemical, isotopic, metagenomic, transcriptomic, proteomic and metabolomics profiles in the environment. Recent studies have emphasized the complex connections between sulfur and methane, iron, nitrogen and other elements. These links may involve the redox cycling of species that occur at concentrations difficult to detect by standard geochemical techniques or that are cycled at very rapid rates (cryptic cycles). Of particular interest is the use of isotope geochemistry to quantify links among various electron acceptors, including sulfate, ferric iron, and nitrate, during the anaerobic methane oxidation. For example, recent geochemical measurements have hinted that microbial sulfate reduction coupled to organic matter oxidation is mechanistically different to when sulfate reduction is coupled to methane oxidation. Recent studies have also suggested a possible contribution of a number of previously uncultured microbial groups in sulfur cycling in sulfidic environments, inspiring further studies of these organisms and their partnerships in anaerobic environments. This Research Topic highlights studies of microbial interactions, processes and communities that couple the sulfur cycle to the cycles of other elements in aphotic environments.

---