

## **Sulphide oxidation and intermediate turnover in the environment: Moving towards a more complete description of the environmental sulphur cycle**

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The microbial reduction of sulphate to sulphide coupled to organic matter oxidation followed by the transformation of sulphide back to sulphate drives a dynamic sulphur cycle in a variety of environments. The eight-electron oxidation of sulphide to sulphate occurs stepwise, forming a wide variety of intermediates ( $S_2^{2-}$ ,  $S^0$ ,  $S_2O_3^{2-}$ ,  $S_2O_4^{2-}$  and  $SO_3^{2-}$ ), which may themselves be oxidized, reduced or disproportionated. The result of this complex web of possible biological and chemical transformations is that often processes appear to be cryptic, that is they occur via unknown intermediates and are not readily distinguishable based on geochemical measurements alone. The existence of such an intricate sulphur cycle has far-reaching consequences for our understanding of biogeochemical transformations in a particular system as they may mask true process rates and belie the magnitude of sulphur cycling.

Here, I will present work using a combination of field, experimental and modelling approaches in order to quantitatively investigate the magnitude of sulphide oxidation and intermediate turnover in aqueous and sedimentary environments. Particular emphasis will be given to determining biological and chemical contributions to the observed rates and transformations. The implications of this work for estimating biogeochemical fluxes on both an ecosystem and global scale will be discussed.