



# Wednesday 29 November 2023

4pm (Rome time) - Aula Pognante, Dip. di Scienze della Terra, Torino

Or: [via webex at this LINK](#)



## Sulfur cycle and its implication for Earth surface biogeochemistry: insights from isotope geochemistry

**Laetitia Guibourdenche**

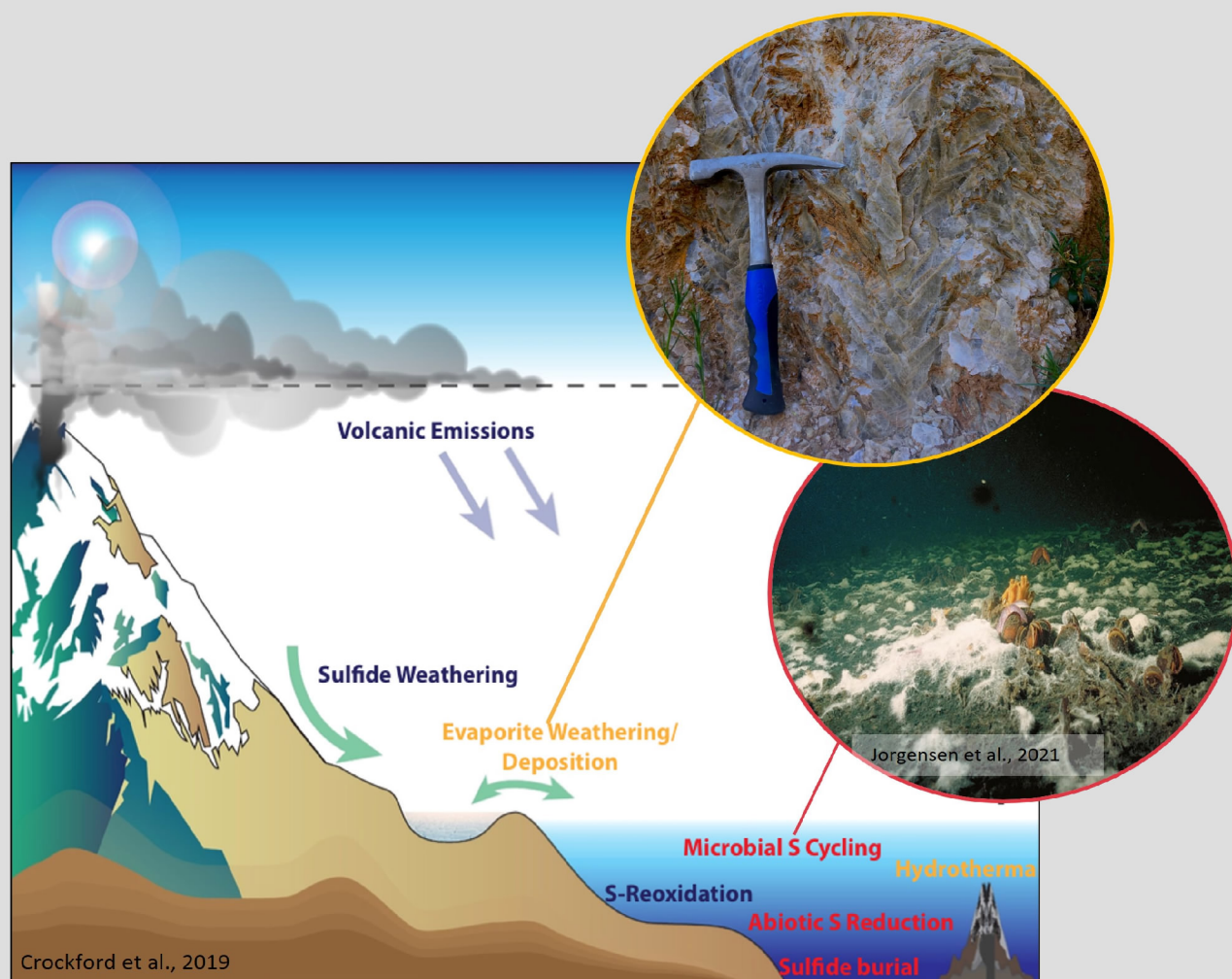
*Institut de Physique du Globe, Paris*



Sulfur, in its most oxidized form - sulfate ( $\text{SO}_4^{2-}$ )- stands as the second most prevalent anion in seawater, surpassing oxygen concentration by about 150 times. This abundance establishes sulfate as the largest oxidant reservoir, crucial for decomposing organic matter sinking to the ocean floor. Microbial sulfate reduction, thermodynamically favorable over methanogenesis in organic carbon respiration, and its involvement in anaerobic methane oxidation collectively contribute to the mitigation of methane emissions into the atmosphere.

The concentration of sulfate in the ocean holds paramount implications for Earth's oxidation state and carbon cycle. This concentration is intricately regulated by the fluxes of sulfur-bearing minerals from weathering and burial, volcanic degassing, and hydrothermal activity, all of which exert feedback on ocean biogeochemistry. Finally, sulfate bearing minerals often buried in association with organic matter can fuel microbial activity leading to the degradation of hydrocarbon and to the diagenetic formation of authigenic carbonate and native sulfur.

In this seminar, I will elucidate the potential of isotopic measurements of sulfate and sulfide-bearing minerals. These measurements serve as a powerful tool to investigate both global and local shifts in the sedimentary sulfur cycle, spanning modern to ancient environments. I will outline how sulfur isotopes aid in highlighting Earth's oxygenation events, offer stringent constraints on ocean biogeochemistry across geological epochs, and provide insights into intricate redox cycling processes in contemporary settings sensitive to anthropogenic influences.



### The Speaker

Laetitia Guibourdenche is a researcher in isotope geochemistry specialized in the study of biogeochemical cycling in past and present marine environments. During her PhD she studied the Messinian Salinity Crisis with a primary focus on the formation of gypsum evaporitic minerals. Her research linked this significant environmental crisis to profound changes in the sulfur and carbon cycles, providing insight into the dynamic biogeochemical interactions shaping the Mediterranean sea basins toward the end of the Miocene.

