

Diagenetic fate of greigite in sediment from Lake St. Moritz, Switzerland

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Biogeochemical processes in lake systems are recorded in their sediments, leaving a legacy that continues to influence water chemistry, create ecological niches for microbial communities, and control sediment chemistry throughout diagenesis. With respect to Fe and S, microbial activity facilitates the formation of iron-sulfur minerals, first through the precipitation of metastable minerals such as greigite (Fe₃S₄), which are then preserved in sediment and sedimentary rocks as pyrite (FeS₂). Here, we re-investigate Lake St. Moritz (Switzerland), an organic-rich freshwater lake influenced by ferruginous groundwater, where greigite was first described nearly 30 years ago (Ariztegui & Dopson, 1996). Our goal is to better understand the local conditions leading to greigite formation, its preservation, and potential transformation during early diagenesis. Contrary to previous observations, we did not detect greigite in the lake's modern sediments. Based on preliminary downcore data—including bulk S-C-N isotopes and porewater physico-chemical properties—we propose that the absence of greigite could result from changes in the lake water and/or sediment redox conditions over recent decades. Ongoing microscale morphological analyses aim to determine whether greigite has transformed into pyrite.

Ariztegui, D., & Dobson, J. (1996). Magnetic investigations of framboidal greigite formation: a record of anthropogenic environmental changes in eutrophic Lake St Moritz, Switzerland. *The Holocene*, 6(2), 235-241.