EGU21-825
https://doi.org/10.5194/egusphere-egu21-825
EGU General Assembly 2021

Status-quo of carbonate cadmium isotope compositions as a paleo-productivity proxy

Simon V. Hohl
State Key Laboratory of Marine Geology, Tongji University, Shanghai, China (sv_hohl@tongji.edu.cn)

Cadmium (Cd) and isotope systematics are emerging tools for studying the biogeochemical cycling of micronutrients in the oceans, and sedimentary archives, as Cd concentrations in seawater show a nutrient-like behaviour, with surface depletion and deep water enrichments. However, the underlying processes are yet to be fully understood. The Cd concentration and isotopic composition of seawater are set by the balance of Cd inputs (and their isotopic composition) and the fractionation on removal to sedimentary sinks. The most favoured explanation is the Cd utilisation by marine phototrophic biomass, causing the surface water's dissolved Cd pool depletion creating a depth gradient of increasing Cd concentrations and lighter isotopic compositions. Under incomplete oxidative recycling, organic matter may act as an effective Cd sink and authigenic minerals may store the ambient seawater's Cd isotope composition.

Consequently, stable Cd isotope compositions in marine carbonates show broad variations linked to paleo-productivity and redox state changes. Additional fractionation processes govern the Cd isotopic compositions of marine sediments. Besides biological utilisation, experimental Cd partitioning into authigenic calcites or sulphides under variable redox and salinity conditions has been shown. Therefore, when applying Cd isotopes in carbonates, other geochemical proxies must be evaluated very carefully to understand the involved Cd fractionation processes. This presentation aims to present the status quo of research done on authigenic and biologic carbonates and carbonate leachates in carbonatic shales to show the strengths and pitfalls of this new emerging bio-geoscience isotope proxy and its use for paleoenvironmental reconstructions on Earth and beyond.