

Early diagenetic control on cadmium isotope variation in modern marine sediments

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Marine sediments serve as a natural archive that record Earth's past climate

conditions, and the development of isotope proxies in marine sedimentary records

helps us to unfold paleoclimate and paleoenvironmental conditions. Among these

isotopic proxies, stable cadmium isotopes ($\delta^{114/110}\text{Cd}$) have emerged as a promising

indicator of large-scale changes in ocean chemistry over geological time, such as

redox conditions and marine primary productivity.

The accumulation of cadmium in marine sediments is fundamentally linked to early

diagenetic processes that govern its burial, precipitation and redistribution within the

sediment. These processes also shape the cadmium isotope signatures preserved in

these sediments. Therefore, understanding cadmium isotopic fractionation during

burial in modern sediments is pivotal to utilise this proxy for reconstructing paleo-

oceanographic conditions.

Here we present stable cadmium isotope data for modern sediments collected from

marine Lake Grevelingen in the Netherlands, across two seasons with contrasting

bottom water redox conditions. We present analyses of cadmium concentrations for

the pore waters and both concentrations and isotopes for the sediments. Our results

show how $\delta^{114/110}\text{Cd}$ values vary downcore and how they respond to seasonal

changes in bottom water redox conditions. These findings provide crucial insights

into the mechanisms controlling the cadmium distribution in marine sediments,

thereby contributing to our understanding of diagenetic effects