δ^{66}Zn and δ^{114}Cd as paleoproductivity proxies: where do they fit on the 'Elderfield' proxy curve? An asssessment with insight from GEOTRACES datasets.

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In recent years, facilitated by developments in chemical and analytical technique, and spurred on by the international GEOTRACES programme[1], the measurement of trace metal isotopes has begun to be deployed as a semi-routine tool in chemical oceanography. The promise of tracers such as δ^{66}Zn and δ^{114}Cd has been clear since the first measurements of dissolved Cd and Zn stable isotope ratios were made in seawater, and the first culture experiments showed that phytoplankton encorporate light isotopes preferentially[2–4].

Such observations have led to the suggestion that these tracers may be useful paleoproductivity proxies in the geologic past, potentially preserved in different sedimentary phases, and a number of studies are beginning to use them in this way. However, such works rely on a complete understanding of the modern processes which fractionate these isotope systems, something that is becoming clearer with the relative explosion of GEOTRACES data in the last few years. These data show that the picture is in fact much more complicated, with particle scavenging, sulfide and organic sedimentary interactions complicating interpretation of such tracers[5–7].

Here, I present a review of recently published GEOTRACES datasets and ideas on the isotope cycling of Zn and Cd in the modern ocean and earth systems, in order to assess where on the 'Elderfield' proxy curve such tracers are, the continuining complexities and directions for the future.

References

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