New perspectives on the Cenozoic δ^7Li record

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The driving mechanisms behind light lithium isotope ratios (δ^7Li) in early Cenozoic seawater, and their subsequent rise to heavy values today[1], have been the focus of intense debate and scientific investigation. Much of this work has focussed on the input fluxes from land [e.g. 2-5]. However, relatively little attention has been paid to the fidelity of the seawater signal in the archive used to construct these records: the planktic foraminifera. In the modern ocean alone, planktonic foraminifera reveal δ^7Li values of between 25 and 31‰[6], but the drivers of this interspecific variation are largely unknown.

Here we present results from Holocene core-tops that span a wide range of hydrographic settings, also revealing considerable variability in δ^7Li across species and between sites. By combining these data with new laboratory culture experiments and downcore measurements, we identify some of the key controlling factors that influence foraminiferal δ^7Li. We interrogate the physiological basis for these geochemical differences, and discuss the potential influence of these vital effects on interpreting published Cenozoic marine records.

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