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Interrogating the Cretaceous-Palaeogene Li isotope crash with new records of foraminiferal δ^7Li

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The dramatic drop in foraminiferal δ^7Li across the Cretaceous-Palaeogene (K-Pg) boundary has puzzled geochemists since it was first observed by Misra and Froelich[1]. Specifically, South Atlantic planktic foraminifera record a geologically-rapid drop of ~5 ‰, from ~28 ‰ in the latest Cretaceous to about ~23 ‰ in the earliest Paleocene, remaining at these values for ~ 10 Myr thereafter. Such a precipitous decline and sustained shift in the Li isotope composition of seawater (δ^7Li_{sw}) is difficult to explain by any conventional invocation of changing sources and sinks. Fundamentally though, if we cannot explain the drop at the K-Pg within a conventional Li-cycling framework, why then should we place faith in early Cenozoic light δ^7Li_{sw} values as reflecting the global weathering regime?

Here we present new Li isotope measurements from multiple species of planktic and benthic foraminifera across the K-Pg boundary, and through the Paleocene, to further interrogate this problem. While our planktic foraminiferal δ^7Li values show a shift in δ^7Li across the K-Pg (albeit smaller in magnitude than was seen by ref. [1]), benthic foraminiferal δ^7Li shows very little change. Indeed, Paleocene benthic δ^7Li values are similar to those recorded in Holocene epifaunal benthic foraminifera[2], and are 2-3 ‰ heavier than coeval planktic foraminifera. We discuss the possible reasons for this mismatch between planktic and benthic foraminifera in the context of non-seawater controls on carbonate δ^7Li, and the implications of these new data for our understanding of Cenozoic geochemical cycling.

[1] Misra & Froelich (2012), *Science* **335**, 818–823.

[2] Roberts *et al. (2018), Geochim. Cosmochim. Acta* **236**, 336–350.