Strontium and Lithium Isotope Variations from Bulk Carbonates across the Permian Period

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The Permian is a key interval of Earth's history marked by major climatic and biological transitions. The strontium (Sr) isotope ratio in seawater of the Permian period displays sharp variations suggesting major changes in the marine Sr isotope budget and biogeochemical cycles. However, interpreting this isotopic record for paleoenvironmental reconstruction remains challenging because several tectonic and climatic events could have modulated the marine Sr budget concomitantly. In this work, we combine Sr and lithium (Li) isotope geochemistry of bulk carbonates to investigate the potential changes in chemical weathering processes during the Permian period. We gathered a collection of bulk carbonate samples from South China and Nevada (n=100) covering the entire Permian period. We combined mineralogical, petrographic, and geochemistry screening procedures with microdilling and gentle leaching approaches to limit the impact of diagenesis and non-carbonate phases contamination on the isotope records. The Sr isotope values from samples passing the screening criteria (n=78) closely resembled the Sr isotope variations from reference substrates (i.e., brachiopods and conodonts) and were further analysed for Li isotope values (δ^7Li). Preliminary δ^7Li values display two significant drops across the Permian period coinciding with large shifts in the Sr isotope variations in seawater. This covariation is encouraging as it suggests that a potentially common environmental mechanism might influence both isotopic systems.