

Mg and Li isotope geochemistry at the Permo-Triassic boundary: evidence for carbonate diagenesis and continental weathering

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The isotopic composition of lithium (Li) and magnesium (Mg) in carbonate rocks has the potential to track changes in continental weathering, but diagenetic processes can reset this information. To document changes in weathering conditions at the Permian-Triassic boundary and decipher environmental conditions during this critical extinction event, we analyzed the Li and Mg isotopic composition of a marine carbonate section from the continental slope of the Arabian Shelf.

Cathodoluminescence and SEM images show different preservation characteristics in the mixed dolostone and limestone section. Carbonate rocks with early diagenetic to penecontemporaneous dolomitization, which likely occurred under sediment-buffered conditions, exhibit a consistent and uniform isotopic trend that may record the evolution of seawater chemistry during the PTB and provide important information about environmental changes during this time. In contrast, late-diagenetic dolomites and dolostones with calcite veins and calcite recrystallization exhibit large variations in isotopic composition, suggesting that late-diagenetic alteration has the potential to overwrite the primary isotopic information of ancient rocks.