

Continental weathering during the Permo-Triassic boundary: Mg and Li isotopes from carbonates of the Neo-Tethys Ocean

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Strong disturbances in marine ecosystems occurred during the Permo-Triassic boundary (PTB), causing the largest biotic crisis of the Phanerozoic. One of the possible drivers of such disturbances was variations in continental weathering regimes that can be traced by analyzing Mg and Li isotopes of marine carbonates. To ensure that these isotope signatures record seawater conditions, overprinting diagenetic processes have to be investigated.

We measured Mg and Li isotopic composition in carbonates of the Wadi Maqam (Oman) and Zal (Iran) sections, located on opposite margins of the ancient Neo-Tethys Ocean. Limestones and dolostones have been characterized using cathodoluminescence and SEM images in combination with trace element data to recognize diagenetic processes. The results suggest that samples with micro-veining, calcite recrystallization, and late dolomitization have their original isotopic compositions modified by diagenesis. On the other hand, carbonates with primary features (e. g. clotted fabrics) or syn-depositional/early dolomitization show consistent isotopic values that may reflect the chemical composition of seawater during its deposition. The observed variations in the Mg and Li isotope compositions suggest an enhanced continental weathering during the PTB. This can provide valuable information about the Earth system during this mass extinction event.