# Preservation potential of $\delta^7$Li values in Mesozoic calcite fossils

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Lithium isotopes of fossil carbonates are a promising proxy for determining the intensity of silicate weathering. Here we use elemental and isotopic trends in diagenetically altered Late Jurassic belemnites (*Belemnopsis* sp. and *Hibolithes* sp.) from New Zealand to see if meaningful $\delta^7$Li values are preserved in fossil calcites over time spans of > 100 m.y.

The parts of the belemnite rostra that are most altered are characterized by low $\delta^{18}$O reaching -12 ‰ and moderate decreases in $\delta^{13}$C (down to -2 ‰), coupled with high Mn/Ca ratios reaching 4.6 mmol/mol. Both, Sr/Ca ratios and $^{87}$Sr/$^{86}$Sr ratios were found to decrease with progressive alteration. The direction and magni-tude of the trends indicate one main diagenetic phase.

Altered materials show variable $\delta^7$Li values between +24 and +40 ‰, while $\delta^7$Li values of the sedimentary matrix are -5 ‰. $\delta^7$Li values of best preserved belemnites are +27 ± 1 ‰ (2 sd, n = 5), pointing to a Late Jurassic seawater $\delta^7$Li of ~29-32 ‰, compatible with the modern value of 31 ‰. Despite burial down to ~4 km, and thus elevated temperatures, uniform $\delta^7$Li values in the well-preserved fossil calcites, and strong isotopic gradients between fossil calcite and sediments have been maintained. This suggests that primary $\delta^7$Li values can be preserved over geological timescales.

# Recent views on lamprophyric melilitic rocks (polzenites) of the Bohemian Massif

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The easternmost part of the Cenozoic Volcanic Province of western and central Europe includes rare occurrences of Late Cretaceous to Paleocene (70 to 59 Ma) ultramafic melilitic and melilite-bearing rocks. These rock suites, related to the initial stage of rifting of the Bohemian Massif, occur in the shoulder blocks of the Ohře/Eger Rift zone. Here, in the Ploučnice (Polzen) River area, a group of clinopyroxene-free melilitic rocks - polzenites - was defined by K.H. Scheumann in 1913. He recognized three principal petrographic types of polzenite: Vesec, Modlibohov and Luhov type. Inspecting the petrography of the separate types we find that the Vesec type is represented by polzenite s.s. only (olivine + melilite + nepheline + phlogopite + spinels + calcite ± monticellite, hauyne, perovskite, apatite mineral associations), whereas the Modlibohov type is transitional to the Luhov type representing a clinopyroxene-bearing melilitic rock – alnöite, as defined by H. Rosenbusch in 1887.

Regarding the classification of polzenites, there are currently two petrographic approaches. According to the first view polzenites represent only lamprophyric, i.e. volatile-rich, facies [1] of melilite-bearing group of rocks and can be added as a special petrographic type into this group. According to the second view, polzenites belong to an individual group of ultramafic lamprophyres, however they are considered by some scientists as a more felsic variant of alnöite [2]. With respect to the petrography of clinopyroxene-free polzenite (the Vesec type) for which values of Mg# between 74 and 78 are typical, polzenite can be considered a valid end-member of the ultramafic lamprophyre group.

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[1] Mitchell (1994) *Miner. Petrol.* **51**, 137–146. [2] Tappe *et al.* (2005) *J. Petrol.* **46**, 1893–1900.


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