

Plešovice zircon reference material revisited

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Zircon crystals from a garnetiferous, hyperpotassic granulite (HPG) dyke from Plešovice are commonly used as a natural reference material for U-Pb geochronology (Sláma et al., 2008). However, recent chemical abrasion-isotope dilution-thermal ionization mass spectrometry (CA-ID-TIMS) high-precision U-Pb geochronology yielded two distinct clusters of dates, one at 337.21 and the other at 336.37 Ma, thus differing by 840 kyr (Widmann et al., 2019). To test if the Widmann et al. (2019) data indicate two distinct periods of zircon crystallization, we carried out new geochronological dating and detailed micro-textural analysis of the HPG, and characterized internal zircon textures and trace element variability. New zircon CA-ID-TIMS U-Pb dates converge at the originally accepted 337.1 Ma reference age and do not replicate the younger age cluster, while new monazite ²⁰⁷Pb/²³⁵U dates range between 337.3 and 335.2 Ma. Zircon inclusions in garnet (ZI) are spatially associated with large apatite and commonly show euhedral crystal shape and regular oscillatory and/or sector zoning. By contrast, zircons in the matrix (ZM) have irregular anhedral shapes and truncated internal growth textures apparently resulting from resorption. In addition, many ZM and some ZI feature an outer, high-CL domain with concentric or oscillatory zoning, suggesting new zircon growth following the resorption event, supposedly from a late fluid. Abundant biotite, small secondary apatite and monazite within these samples may possibly reflect this fluid event. The chondrite-normalized HREE patterns reported by Sláma et al. (2008) are relatively flat, as typical of zircon coexisting with garnet. Preliminary new trace element analyses confirm strong and rather small-scale variability within Plešovice zircon, especially pronounced in U and Nb concentrations. Based on detailed CL imaging and petrographic evidence, we suggest that initial magmatic zircon crystallization was followed by resorption, and subsequently by new zircon growth from a fluid or volatile and K-rich melt. The documented temporal heterogeneity retrieved by CA ID-TIMS does not exceed that of other zircon standards for LA-ICP-MS analysis. The textural and compositional variability though indicates that presence of fluid induced a later zircon growth.

Sláma J. et al. (2008), *Chem Geol*, 249, 1–35.

Widmann P. et al. (2019), *Chem Geol*, 511, 1–10.