

Minimizing errors of U-Pb laser ablation ICPMS measurements for zircons with variable U-Pb fractionation: A tribute to Professor Jan Kosler's research contributions to LA-ICPMS

A. KATE SOUDERS¹ AND PAUL J. SYLVESTER²

¹Department of Earth and Planetary Science, University of California – Davis, Davis, CA 95616, USA
(souders@ucdavis.edu)

²Department of Geosciences, Texas Tech University, Lubbock, TX 79409-1053, USA (paul.sylvester.ttu.edu)

External standardization using matrix-matched standards is a common approach used in most U-Pb zircon geochronology laser ablation inductively coupled plasma mass spectrometry (LA-ICPMS) analyses to correct for mass bias, instrumental drift, and laser induced elemental fractionation. When using this approach, the assumption is made that zircon reference materials and sample unknowns behave in an identical manner during the ablation process. Even with recommended strategies for increasing sensitivity, minimizing laser-induced elemental fractionation and decreasing the particle size of ablated materials, precision of LA-ICPMS zircon geochronology method has plateaued at ~2% (2s) for ²⁰⁶Pb/²³⁸U and ~1% (2s) for ²⁰⁷Pb/²⁰⁶Pb [1].

U-Pb elemental fractionation during laser ablation analysis limits the precision and accuracy of LA-ICPMS U-Pb geochronology [2] [3]. Subtle differences in U-Pb fractionation behavior during laser ablation analysis have been identified for various zircon reference materials yet it is unclear how various data reduction software compare in handling the differences in U-Pb elemental fractionation between zircon standards and zircon unknowns. A set of zircon standards that demonstrate variable fractionation behavior was processed through 3 commonly used data reduction programs in order to evaluate differences in the errors reported by each program.

The effect of U-Pb elemental fractionation on precision and accuracy of LA-ICPMS U-Pb geochronology was an issue of interest to the late Professor Jan Košler. His productive research career highlighted fundamental problems in laser ablation and practical solutions to these issues.

- [1] Košler et al. (2013) *Geostand. Geoanal. Res.*, **37**, 243-259.
[2] Košler et al. (2005) *JAAS*, **20**, 402-409. [3] Košler et al. (2014) *JAAS*, **29**, 832-840.