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Interlaboratory comparison of reference materials for *in situ* Rb-Sr geochronology

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The advent of commercial ICP-source tandem mass spectrometers in 2012 enabled the first *in situ* Rb-Sr isotope analyses. With the growing demand for *in situ* Rb-Sr geochronology, the need for well-characterized reference materials and data processing tools has increased. To this end, we have undertaken the first interlaboratory comparison of mica and feldspar reference materials for Rb-Sr geochronology. Samples of eight micas (biotite and muscovite), three feldspars, and one synthetic phlogopite glass were prepared in polished epoxy mounts and sent to twenty-six LA-ICP-MS/MS laboratories worldwide. Participating laboratories employ a wide variety of the available instruments, including laser ablation systems from the major manufacturers and quadrupole- and multicollector-based tandem mass spectrometers. Most distributed materials are of known age, based on previous geochronologic constraints by independent techniques (Ar-Ar, TIMS Rb-Sr, Re-Os in cogenetic minerals). Potential new reference materials measured by LA-ICP-MS/MS were sent to test their suitability for widespread use as secondary reference materials. The ease of collecting large quantities of data also necessitates the development of new data processing tools to maximize efficiency and consistency. To address these needs, data reduction schemes (DRS) for iolite4 have been written for both quadrupole and multicollector Rb-Sr data. In addition to standard functions of iolite4, both DRSs incorporate direct correction of $^{87}Rb/^{86}Sr$ ratios to an isochronous matrix-matched reference material [1] to correct for differences in interelement fractionation between matrices. The Rb-Sr Isochron Tool for iolite4 incorporates the three model fits of IsoplotR [2] including free and fixed intercepts, inverse isochrons, and correlated uncertainties. The Isochron Tool has an expanded GUI that allows the user to plot multiple samples in one or more plots directly within the iolite4 environment. Other features include single integration plotting, a color-by-channel function, a hover function, and others; these tools are available on Github and will be updated regularly [3]. In this presentation we will show the results of the Rb-Sr interlaboratory comparison as well as the Data Reduction Schemes and Rb-Sr Isochron Tools for iolite4.

[1] Giuliani et al. (2024), *Chem Geol 649,* 121982.
[2] Vermeesch (2018), *Geosci Front 5,* 1479-1493
[3] Cruz-Uribe (2026) 10.5281/zenodo.18548873.