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Development and application of *in-situ* K-Ca + Rb-Sr single-spot dual-system geochronology

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K-Ca geochronology, based on the beta decay of ^{40}K to ^{40}Ca, has been historically limited by the difficulty in distinguishing ^{40}K from ^{40}Ca via mass spectrometry. Through the utilization of a reaction cell with tandem mass spectrometry, Hogmalm et al. (2017) demonstrated proof of concept *in-situ* LA-ICP-MS K-Ca geochronology on muscovite. Since that study, however, there has been little movement toward a scalable analytical methodology. The barriers to routine K-Ca geochronology are multi-fold, including overcoming complicated interferences through the insertion and flow optimization of multiple gases, specimen preparation procedures, detector cross calibration and non-linearity, finding appropriate reference materials, developing viable secondary reference materials, and even understanding the effect of using the ratio of means versus the mean of ratios for data reduction. Through trial and error we have developed a robust methodology that allows simultaneous K-Ca and Rb-Sr geochronology from single spots. Critically, we also have developed a complete toolset, including a data reduction scheme, post-processing software to help enable the expansion of the method to other laboratories and its utilization in addressing geological problems.

Hogmalm J.K., Zack T., Karlsson A.-K.-O, Sjöqvist A.S.L., Garbe-Schönberg D. (2017) In situ Rb–Sr and K–Ca dating by LA-ICP-MS/MS: an evaluation of N_2O and SF_6 as reaction gases. Journal Of Analytical Atomic Spectrometry, 32, 305–13