Approach to developing accurate methods for LA-ICPMS using non-matched reference materials

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The well-documented matrix effects in LA-ICPMS [1][2][3] require development of approaches for accurate qunatification, as matrix-matrched reference materials (RM) [4] are only available for a very limited range of applications such as U/Pb dating.

The approach builds on previous work [5] and involves using mineral stoichiometry as a criterium for establishing the appropriate analytical conditions for mineral analysis using non-matrix matched calibration and secondary RMs. Quantification [6] is performed using normalisation to a specified total. A single calibration RM is analysed throughout the session under fixed laser conditions, selected to minimise measurement uncertainty. During the same analysis session, secondary RMs are measured using the established laser conditions (e.g. beam diameter, fluence, ablation mode: spot or line) required for accurate quantification of the unknowns. This approach allows for analysis of different matrices in a single session using a single proimary calibration

Results from the secondary RMs are used for quality control during the session and to estimate separate correction coefficient values for each set of laser conditions required for accurate quantification of the unknowns. Measurement of multiple secondary RMs under the same conditions allows the uncertainty in the corrections to be estimated.

We will present the results of LA-ICPMS analyses of plagioclase using the above approach.

To facilitate adoption of this protocol, new software has been written for reduction of LA-ICPMS data. The software package “LADR” (pronounced “ladder”) is available for download from the authors' website [7]

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