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Improvement of data processing for Time-Resolved-Analyses (TRA) using LA-ICPMS

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Laser-Ablation Inductively Coupled Plasma Mass Spectrometer (LA-ICPMS) is commonly used for in-situ analyses of isotope ratios and elemental abundance. Laser-ablation sample introduction is destructive method, and the spatial resolution of an analysis is inversely related to total signal-intensity. It means that observed signal-intensity is never satisfied and unstable, because space-resolution of the analyses is always optimized as high as possible. Furthermore, a natural rock sample often contains mineral inclusions, and signal-intensities can be disturbed by them. Therefore, Time-Resolved-Analysis (TRA) mode is commonly used for most LA-ICPMS analyses.

Using TRA mode, we can estimate the preciseness of each run. However, the way of data processing has not been made enough discussions yet. For the data processing, most researchers regard flatness of the signal intensity as important. Integration time of each runs were decided based on flatten signal and/or signal ratio. Signals of the beginning and the end of ablation were not used for the calculation. However, this processing method has several problems. One of the problems was, signal intensity was not always flatten shape, because analyzed samples were usually limited. Furthermore, flatness of the signal was not commonly determined and different researchers use different criteria. In this study, we applied several calculation method for the same TRA dataset, and estimate the preciseness for each calculation method.

Keywords: LA-ICPMS, time resolved analyses, TRA, femtosecond laser, data processing