Goldschmidt 2021 Abstract
https://doi.org/10.7185/gold2021.7780

A high-sensitivity *in situ* ^{230}Th-^{232}Th-^{234}U-^{238}U age determination approach using LA-ICPMS

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U-Th dating is frequently used to determine the timing of Earth's geological, environmental, and biotic processes from materials formed a few years in the past to over 800 thousand years (kys) ago. Here we present a highly-sensitive and quantitative method for the determination of Th and U isotope ratios via laser ablation-inductively coupled plasma-mass spectrometry (LA-ICP-MS). A well characterized ^{229}Th-^{233}U-^{236}U spike is added to the laser generated aerosol by means of a desolvating nebulizer to monitor and correct for mass discrimination and elemental fractionation of U and Th. The efficacy of inter-element, mass discrimination, and peak tailing baseline corrections were critically evaluated and optimized. Using a "jet-interface" ICPMS setup improved the detection efficiency to a yield of 1-2%. Thereby sufficiently high signal intensities can be achieved even for the low abundant isotope ^{230}Th in a real fossil stalagmite with reported ages of 200 kys. This approach allows for the revelation of accurate age profiles in various materials and carbonates in particular, and will be applicable to various research areas such as paleoclimatology, oceanograpgy, geomagnetics, and archaeology.