ECOLE LEMANIQUE DES SCIENCES DE LA TERRE
DES UNIVERSITES DE GENEVE ET DE LAUSANNE

Master ès Sciences in Earth sciences

In search of new carbonate reference materials for high-precision U-Pb geochronology

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Context

Latest advances and analytical developments allow for accurate in-situ U-Pb dating of carbonate material (e.g. LA-ICPMS). Cross-laboratory reference materials (RMs) used for sample-bracketing are currently limited to WC1 with an age of 254.4 ± 6.5 (2σ), JT2 with an age of 13.797 ± 0.031 (2σ), and ASH153 with an age of 2.965 ± 0.011 (2σ) Ma. The minimum uncertainty on any age determination depends on the age uncertainties of the RMs and is therefore between 2.5-0.22 %. Because of the limited availability of RMs, validation by secondary RMs is usually performed on in-house standards or is not performed at all. Reference materials with high Pb and low U, or both low U and Pb compositions are still needed to fully cover the compositional range of carbonate material. This project will explore some new candidate samples for reference materials to be dated by high-precision dating technique (ID-TIMS). Including samples from the Muséum d'histoire naturelle (MHN) catalogue. The results of this study will provide new reference materials to be used as primary and secondary RMs by these fast-growing scientific community around the world. Outcomes of this project will be published in specialized journal such as *Geochronology*.

Aims and Methods

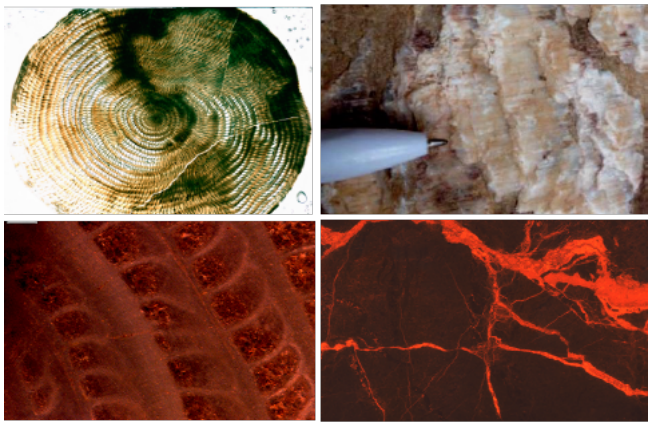
Aims: dating carbonate reference materials with high-precision and high-resolution methods.
Methods: high-precision TIMS analysis at UNIGE, high-resolution LA-MC-ICPMS analysis at ETHZ, Cathodoluminescence microscopy

References

[1] *Roberts, Nick MW, E. Troy Rasbury, Randall R. Parrish, Christopher J. Smith, Matthew SA Horstwood, and Daniel J. Condon. "A calcite reference material for LA-ICP-MS U-Pb geochronology." Geochemistry, Geophysics, Geosystems 18, no. 7 (2017): 2807-2814.*

[2] *Guillong, M., Wotzlaw, J. F., Looser, N., & Laurent, O. (2020). Evaluating the reliability of U–Pb laser ablation inductively coupled plasma mass spectrometry (LA-ICP-MS) carbonate geochronology: matrix issues and a potential calcite validation reference material. Geochronology, 2(1), 155-167.*

[3] *Nuriel, Perach, Jörn-Frederik Wotzlaw, Maria Ovtcharova, Anton Vaks, Ciprian Stremtan, Martin Šala, Nick MW Roberts, and Andrew RC Kylander-Clark. "The use of ASH-15 flowstone as a matrix-matched reference material for laser-ablation U– Pb geochronology of calcite." Geochronology 3, no. 1 (2021): 35-47.*



Website

https://www.unige.ch/sciences/terre/en/groups/isotope-geochemistry-geochronology-and-thermochronology/projects/

Prerequiste:

Recommended: Methods of isotope analysis - M3, Geochemical cycles and rates of geological processes – M4b