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# U-Pb dating of carbonates from LA-ICP-MS isotope ratio maps: comparison between different data processing methods

**GUILHEM HOAREAU**[1], FANNY CLAVERIE[2], CHRISTOPHE PECHEYRAN[3], CHRISTIAN PAROISSIN[4], PIERRE-ALEXANDRE GRIGNARD[1], GEOFFREY MOTTE[1], OLIVIER CHAILAN[5] AND JEAN-PIERRE GIRARD[6]

[1]Universite de Pau et des Pays de l'Adour, E2S UPPA, CNRS, TOTAL, LFCR, UMR5150
[2]Universite de Pau et des Pays de l'Adour, E2S UPPA, CNRS, IPREM, UMR5254
[3]Universite de Pau et des Pays de l'Adour, E2S UPPA, CNRS, LMAP, UMR5142
[4]LMAP - UMR 5142 - CNRS - E2S - UPPA
[5]TOTAL, Centre Scientifique et Technique Jean Féger (CSTJF)
[6]TOTALENERGIES

Presenting Author: guilhem.hoareau@univ-pau.fr

U-Pb dating of carbonates by LA-ICP-MS spot analysis is an increasingly used method in the field of geosciences, as it brings very strong constraints over the geological history of basins, faults or reservoirs. Most ages currently published are based on the measurement of U and Pb ratios on spot ablations, using nanosecond lasers coupled to sector-field or multi-collector ICP-MS (Roberts et al., 2020). Recent advances have also made it possible to obtain reliable ages directly from pixels extracted from 2D LA-ICP-MS ratio maps, either from a pixel-pooling approach (Drost et al., 2018) or from a robust regression one (Hoareau et al., 2021). In this contribution, we present age results recently obtained from various samples using 2D isotopic ratio maps of high spatial resolution (13x25 µm pixels), obtained using a 257 nm femtosecond laser ablation system coupled to a High Resolution ICP-MS (Element XR). The maps commonly show significant variations in isotope ratios at the pixel scale, allowing the calculation of precise U-Pb ages. Comparison between the pixel pooling and the robust regression approaches show that the former is generally more accurate, especially where the U concentrations are below few hundred ppb. Using the pixel pooling approach with the recent the new total−Pb/U−Th isochron regression of Vermeesch (2020), which combines U and Th decay systems, further reinforces precision of determined ages. Therefore, carbonate U-Pb dating from LA-ICP-MS ratio maps is a very promising approach, as both multi-elemental concentrations and U-Th-Pb ages can be obtained at once. However, as outlined by Drost et al. (2018), a careful initial data treatment based on the rejection of pixels representative of alterations or detrital contamination, is necessary beforehand.

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