

# Geochronology on Precambrian zircon and titanite: Comparing methods, difficulties and new data from northern Quebec

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During an ongoing project founded by the ministry of energy and natural resources (Ministère de l'Énergie et des Ressources naturelles) of Quebec, areas around the towns of Lebel-sur Quévillon and Chibougamau were mapped. Several plutonic and volcanic samples with various degrees of metamorphism were selected for geochronology.

Samples were measured by ID-TIMS for a precise age of formation but also by laser ablation ICPMS for comparison and spot analyses of metamorphic rims. For ID-TIMS measurements zircon single grains were chemically abraded after it was experimentally determined that a 6h partial dissolution period was the maximum these Precambrian metamict zircons were able to sustain. A migmatite sample from the Opatica subprovince revealed the oldest age of formation found in this area so far,  $2774 \pm 17$  Ma. The sample was particularly interesting due to the strong metamorphic overprint of the zircons. A first metamorphic event was dated with an upper intercept age of metamorphic zircons at  $2723 \pm 1$  Ma. A second metamorphic event is revealed by titanite at  $2688 \pm 2$  Ma. Comparison to laser ablation data on this sample reveals that the laser was not able to detect the original age but dated the metamorphic overprint with an upper intercept age of  $2716 \pm 12$  Ma. A similar example is found at a tonalite in the Laganière Complex. ID-TIMS data on zircon cores reveals an age of formation of  $2692 \pm 5$  Ma, rims of grains give a metamorphic overprint at  $2675 \pm 4$  Ma. Laser ablation data only shows the metamorphism with an age of  $2671 \pm 13$  Ma. On the other hand, two samples with no visible metamorphic overprint reveal the same ages on both methods. A tonalite in the Holmes Pluton gives an ID-TIMS age of formation of  $2727 \pm 7$  Ma and an laser ablation age of  $2730 \pm 34$  Ma; the Tonnancourt granite reveals a  $2683 \pm 4$  Ma TIMS age and a  $2684 \pm 20$  Ma laser age.

It appears that a metamorphic overprint obscures the age of formation for the laser ablation method on these samples. It is up for discussion if that is an effect of mixing ages or varying spot depth.