# Decoupling of U-Pb zircon and Lu-Hf garnet dates during high-pressure metamorphism in the Snowbird Tectonic Zone, Northwest Territories, Canada

ERIC J. THIESSEN[1], DANIEL H. GIBSON[1], DANIELE REGIS[2], SALLY J. PEHRSSON[2], MATTHIJS A. SMIT[3]

[1]Department of Earth Sciences, Simon Fraser University, Burnaby, British Columbia
[2]Geological Survey of Canada, Ottawa, Ontario
[3]Department of Earth, Ocean and Atmospheric Sciences, University of British Columbia, Vancouver, British Columbia

The southeast margin of the south Rae craton is characterized by highly strained gneiss and mylonite of the Snowbird Tectonic Zone (STZ). Paleopressures of 8-16 kbar therein are thought to represent collisional tectonics in either the Archean (2.55 Ga) or Paleoproterozoic (1.9 Ga) even though additional regional metamorphic events are recognized at 2.5-2.3 Ga and 2.0-1.9 Ga. Our recent work along the STZ (regional mapping, geochronology, petrology) has demonstrated crustal thickening and heating from 1.94-1.92 Ga, and cooling and partial exhumation associated with ductile structures from 1.92-1.85 Ga. The interval 1.94-1.92 Ga likely corresponds with collisional orogenesis followed subsequent exhumation-related deformation.

However, older high-pressure assemblages indirectly dated by zircon and monazite are also argued to represent continental collision at 2.55 Ga, yet these assemblages have never been directly dated. We utilized Lu-Hf garnet dating within a granulite mafic gneiss of a relict high-pressure assemblage (>10 kbar) containing Grt-Cpx-Pl-Qz-Ilm and obtained a date of 2111 ± 3.2 Ma. Trace element analyses and petrological modelling of this assemblage validate the age of 2111 ± 3.2 Ma as a significant, yet cryptic high-pressure event not yet identified elsewhere in the south Rae craton. Importantly, these results illustrate that high-pressure assemblage growth can be completely decoupled from zircon and monazite crystallization, which can lead to erroneous petrochronological or tectonic interpretations. These results highlight that in poly-orogenic terranes it is critical that accessory mineral growth be unequivocally linked to metamorphic assemblage formation beyond traditional chemical and microtextural linkages, otherwise the timing of significant tectonic events may be misinterpreted or missed altogether.