

Mapping regional metamorphic events in poly-metamorphosed plutonic domains using recrystallized zircon: An example from the Paleoproterozoic Thelon tectonic zone and adjacent Queen Maud block, northwestern Canada

DAVIS, W. J.*¹, BERMAN, R. G.¹ AND NADEAU, L.¹

¹Geological Survey of Canada, Natural Resources Canada, 601 Booth St., Ottawa, ON, Canada.

(*correspondence:bill.davis@nrcan.gc.ca)

The western margin of the Archean Rae craton comprises a complex collage of dominantly plutonic domains including the Thelon tectonic zone and Queen Maud block (QMB) that were involved in a series of Paleoproterozoic tectono-magmatic events between 2.5 Ga and 1.9 Ga, culminating with the Slave–Rae collision at 1.97 Ga. Originally interpreted to be an exhumed ca 1.97 Ga orogenic plateau related to the Slave-Rae collision [1], the QMB preserves ca. 2.5-2.35 Ga plutonism and a broad and complex record of amphibolite to granulite-grade metamorphism between 2.5 and 1.9 Ga. Samples from a 300 km transect of the area delineate distinct, mostly north-striking crustal blocks ranging in age from 3.2 Ga to 1.9 Ga. Zircon from the majority of igneous samples along the transect record single or multiple episodes of recrystallization related to regional metamorphic events at 2.35 and 1.91 Ga. The recrystallized zones are generally brighter in BSE and have flat, homogenous response in BSE and CL images. The recrystallized areas may be annular but are commonly transgressive and utilize fractures and or growth zones to penetrate to grain interiors. Recrystallization is not isochemical and most commonly demonstrates increases in the Hf/Zr ratio, and decreases in HREE. Th/U ratios are variable with values similar to those of the original igneous compositions. Pb-loss correlates with the extent of recrystallization as indicated by changes in zircon chemistry. Recrystallized zircon domains preserve evidence of earlier metamorphic events and are not destroyed by younger overprints. This allows a polymetamorphic history to be established from a single rock, and delineation of the regional extent of different metamorphic events over broad areas dominated by plutonic rocks.

[1] Hoffman (1988) *Ann. Rev. Earth Planetary Sciences*, **16**: 543-603.