

## U-Pb geochronology of authigenic xenotimes from Huronian Supergroup, Canada

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U-rich diagenetic xenotime overgrowths on zircons can be dated to yield minimum depositional ages of non-fossiliferous siliciclastic sedimentary rocks [1, 2]. The Huronian Supergroup was deposited during a key interval of Earth history marked by increasing oxygenation of the atmosphere, and deposition of three separate glaciogenic deposits (e.g., Gowganda Formation) [3]. The Huronian is poorly constrained between 2.45 Ga and 2.22 Ga. To better constrain its age, the age of the glaciations and to explore a possible link with oxygenation of the atmosphere, diagenetic xenotime was dated from samples of the McKim, Mississagi, Gowganda, Gordon Lake and Bar River formations.

The <sup>207</sup>Pb-<sup>206</sup>Pb age of the majority of xenotime growths, irrespective of their stratigraphic position, can be attributed to large-scale basinal fluid-flow events that significantly post-dated deposition. Prominent age peaks at 2.2 Ga and ~1.7 Ga, correlate with intrusion of Nippising diabase sills and orogenic activity to the south, respectively. However, two xenotimes (seven analyses) from the Gordon Lake Formation, stratigraphically above the Gowganda glaciogenic deposits, yield an older age of 2376±13 (2σ) Ma. Although there is a remote possibility that these overgrowths are detrital, their irregular habit and sharp edges support an interpretation in favour of authigenic growth. If this date represents the minimum depositional age for the Gordon Lake Formation, the Gowganda glaciation is older than potentially correlative glaciogenic deposits in southern Africa and therefore cannot be related to a single Paleoproterozoic “Snowball Earth” scenario.

[1] McNaughton *et al.* (1999) *Science* **285**, 78-80.

[2] Rasmussen (2005) *Earth Sci. Rev.* **68**, 197-243. [3] Young *et al.* (2001) *Sed. Geol.* **141-142**, 233-254.

## Polyphase tectonometamorphic history in the upper plate of Trans-Hudson orogen (southern Baffin Is.)

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A combined petrographic, thermobarometric and geochronological study of protolith and metamorphic mineral ages documents plutonism, deformation and metamorphism over 100 Ma related to the accretionary and collisional history of an upper plate segment of the Trans-Hudson orogen in southern Baffin Island. The polyphase thermal and deformation history includes penetrative fabric development during southwest-directed D<sub>1</sub> deformation, and southwest- to south-directed D<sub>2</sub> folding. Non-penetrative strain events include thrust imbrication and localized dextral transcurent shearing (D<sub>3</sub>), and open crossfolding (D<sub>4</sub>). Igneous crystallization ages of variably deformed plutonic rocks provide independent evidence that penetrative strain across the southern Baffin area had ended by about 1.83 Ga, after which thrusting, localized shearing and crossfolding became the dominant deformational style.

Ages of metamorphism and deformation were determined on SW Baffin Island by *in situ* SHRIMP analysis of monazite grains with a variety of textural relationships to fabrics and porphyroblasts. The oldest metamorphic event (M<sub>1</sub> = 1873±5 Ma) is not clearly linked to deformation fabrics. Samples containing elongate monazites aligned parallel to the regional S<sub>2</sub> fabric and within elongate garnets in the same orientation link metamorphism (M<sub>2</sub>) with regional D<sub>2</sub> deformation. These constrain D<sub>2</sub>/M<sub>2</sub> between 1852 ±9 Ma to ca. 1835 Ma. Peak conditions of 675°C-4.8 kbar to 740°C-5.6 kbar were attained on clockwise P-T-t paths consistent with crustal thickening during M<sub>2</sub>. Post-D<sub>2</sub> metamorphic events at ca. 1.83 Ga and at ca. 1.82 Ga likely coincided with plutonism and localized dextral shearing respectively. Monazite ages of ca. 1.77 Ga are inferred to be related to fluid infiltration. This dataset corresponds exceptionally well to the tectonometamorphic history determined by ID-TIMS further east on southern Baffin Island demonstrating along strike-continuity for at least 600 km.

The protracted record of deformation and metamorphism in the Trans-Hudson orogen on Baffin Island is similar in size, duration and character to that of the upper plate of other orogenic belts, in particular that of the Himalaya-Karakoram-Tibetan orogen of SE Asia.