



## **Accretion of arc and backarc crust to continental margins: Inferences from the Annieopsquotch accretionary tract, Newfoundland Appalachians**

Alexandre Zagorevski (1), Cees R. van Staal (2), and Johan C. Lissenberg (3)

(1) Geological Survey of Canada, 601 Booth St., Ottawa, ON, Canada (azagorev@nrcan.gc.ca), (2) Geological Survey of Canada, 625 Robson St., Vancouver, BC, Canada, (3) School of Earth, Ocean and Planetary Sciences, Cardiff University, Main Building, Park Place, Cardiff, CF10 3YE, United Kingdom

The Ordovician Annieopsquotch accretionary tract (AAT) marks the easternmost peri-Laurentian realm along the Red Indian Line, the main Iapetus suture zone in the Northern Appalachians. It comprises a thrust stack of Lower to Middle Ordovician arc and backarc terranes. The AAT initially formed outboard of a peri-Laurentian Dashwoods following a collision along the Laurentian margin followed by subduction flip and formation of a nascent arc represented by supra-subduction zone Annieopsquotch ophiolite belt (c. 480 Ma). Continued development and rifting of this outboard arc is represented by the backarc Lloyd's River ophiolite belt and coeval Robert's Arm arc (c. 473 Ma). These terranes were accreted to the composite Laurentian margin of Iapetus within c. 5 Ma of their formation as a result initiation of subduction in the Lloyds River marginal basin. Hence, the AAT terranes occupied a lower plate setting with respect to composite Laurentian margin during accretion, analogous to modern collision of the Izu arc with the Ryukyu trench. Metamorphic mineral assemblages indicate that the terranes were underplated at depths ranging from  $\sim 3$  km up to  $> 18$  km. We infer the accretion of the terranes to be controlled by the brittle–ductile transition in the hydrated crust. The decoupling of brittle from ductile crust resulted in very high aspect ratios of the terranes, which comprise thin ( $< 5$  km) but very large (up to  $25 \times 250$  km) slabs of supracrustal arc rocks and ophiolite crust. Arc basement and ophiolitic mantle are not preserved and were either underplated at a greater depth or subducted and recycled back in the mantle. The accreted crust forms a reasonable approximation to bulk continental crust requiring little post-accretionary modification; hence, the accretion of arc–backarc complexes which occupy a lower plate setting can form an important mechanism for balancing crustal loss at convergent margins.