Trench parallel translation of accreted terranes along the Laurentian margin, Newfoundland: implications for timing and distribution of mineral deposits

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The easternmost unit of the peri-Laurentian Notre Dame Subzone, the Buchans-Robert's Arm belt, is host to numerous volcanic-hosted massive sulphide deposits deposited and deformed during the Middle Ordovician closure of the Iapetus Ocean and intervening marginal basins. Distinction between the peri-Laurentian and the accreted peri-Gondwanan arc complexes has been well constrained in previous studies on the basis of stratigraphic, isotopic and structural contrasts. However, the evaluation of the along-strike variability within the Buchans- Robert's Arm belt has not been well documented, as the resolution of the data was insufficient. Very detailed stratigraphy, Sm/Nd isotopes and zircon inheritance have allowed us to recognize two distinct, but coeval and kinematically-related, peri-Laurentian arc sequences in central

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Newfoundland, namely the Buchans Group (ca. 467–462 Ma) and Red Indian Lake Group (ca. 466 to 460 Ma). Thus, we are now able to resolve for the first time how the peri-Laurentian margin responded laterally both during development and subsequent accretion of the peri-Gondwanan terranes.

The Buchans Group is characterized by calc-alkaline arc basalt, rhyolite and granodiorite at its lowest stratigraphic levels. These are overlain by a sequence of calc-alkaline basalt and rhyolite which contain a key stratigraphic horizon characterized by a volcanogenic and granitoid boulder conglomerate and significant VMS mineralization. In contrast, the coeval Red Indian Lake Group is characterized by a tholeiitic, back-arc basin-like basalt sequence at its base overlain by a volcanogenic breccia-conglomerate and calc-alkaline bimodal arc sequence. The differences in Sm/Nd isotopic characteristics, zircon inheritance, and stratigraphic relationships suggest that the Buchans and Red Indian Lake groups formed upon distinctly different peri-Laurentian basement sequences; however the tectonic history of the groups inferred from these and geochemical data suggest kinematically complimentary development. We propose that the Red Indian Lake and Buchans groups were originally along strike equivalents. The reconstruction of original relationships between the arc systems has important implications for the development of the Laurentian margin and for the prospectivity of terranes and distribution of mineral deposits.