

---

**Timing of mineralization and distribution of  
VMS in accreted peri-Laurentian terranes,  
central Newfoundland Appalachians**

---

ALEX ZAGOREVSKI<sup>1</sup>, NEIL ROGERS<sup>1</sup>, CEES VAN STAAL<sup>2</sup>,  
VICKI MCNICOLL<sup>1</sup>, AND NANCY JOYCE<sup>1</sup>

1. *Geological Survey of Canada, 601 Booth St., Ottawa, Ontario  
K1A 0E8, Canada* 2. *Geological Survey of Canada, 625 Robson St.,  
Vancouver, British Columbia V6B 5J3, Canada*

The tectonic history of the central mobile belt in the Newfoundland Appalachians (Dunnage Zone) is paramount to understanding the distribution and tectonic setting of mineral deposits and, by extension, to determining the prospectivity of the various terranes. On a broad scale, the distinction between the coeval peri-Laurentian and peri-Gondwanan arc complexes in the Dunnage Zone has been well constrained in previous studies on the basis of stratigraphic, isotopic and structural contrasts. This eventually led to the recognition of multiple volcanic terranes developed by several accretionary episodes, with a complexity similar to that of the modern Southwest Pacific. On a finer scale, the along-strike variability within terranes has not been well constrained, as the resolution of the data was generally insufficient.

Recent detailed mapping and sampling allowed recognition of two distinct, but coeval and kinematically-related

Darriwilian arc sequences in the Annieopsquotch Accretionary Tract of central Newfoundland, namely the Buchans (ca. 467–462 Ma) and Red Indian Lake (ca. 466–460 Ma) groups. The Buchans Group likely represents an incipient rift, while the Red Indian Lake Group preserves a much more advanced stage of arc rifting, locally indicated by eruption of non-arc volcanic rocks similar to modern advanced backarc systems. The majority of the VMS mineralization in the Buchans-Robert's Arm belt occurs in the ca. 465 Ma volcanic rocks (i.e., Buchans Group and Crescent Lake formation, Roberts Arm Group). The Darriwilian volcanic rocks are locally built on sporadically exposed Early to pre-Darriwilian arc basement comprised of plutonic and volcano-sedimentary rocks (ca. 467 to 473 Ma) that also locally host important VMS mineralization. The Red Indian Lake and Buchans groups are interpreted as along-strike equivalents, formed upon distinct peri-Laurentian basement blocks. The current arrangement of these terranes is likely due to lateral juxtaposition during the middle Ordovician closure of the main tract of the Iapetus Ocean and the Early Silurian closure of the Exploits-Tetagouche back-arc basin. The recognition of significant strike-slip displacements in this and previous studies allows an improved understanding of how the Laurentian margin responded laterally both during its development and subsequent accretion of the peri-Gondwanan terranes.