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**Chemical and Sm-Nd isotopic constraints on the  
provenance and tectonic setting of late Neoproterozoic  
and Cambrian sedimentary and metasedimentary  
rocks in Avalonia of southern New Brunswick**

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Neoproterozoic though Cambrian clastic sedimentary and/or metasedimentary rocks occur in the Hammondvale Metamorphic Suite (> ca. 620 to <680 Ma) and Broad River (ca. 620 Ma), Coldbrook (ca. 560–542 Ma) and Saint John (ca. 540–490 Ma) groups in the Avalonian Caledonia terrane of southern New Brunswick. The petrographic, major and trace element chemical, and Nd isotopic compositions of the sedimentary rocks provide constraints on the provenance and tectonic setting of these units and hence on the tectonic evolution of this typical part of Avalonia.

Nd isotopic and whole-rock chemical data show that the Hammondvale Metamorphic Suite and metasedimentary rocks of the Broad River Group have negative  $\epsilon_{Nd}$  values, were derived from recycled sedimentary and mafic igneous sources, and were deposited in intra-arc basins as part of the ca. 620 volcanic-arc complex. In contrast, sedimentary rocks of the Coldbrook Group show generally positive  $\epsilon_{Nd}$  values and likely were derived from Avalonian felsic to intermediate igneous sources and deposited in rift basins associated with 560–550 Ma arc extension. Samples from the overlying Saint John Group have felsic to mafic igneous sources, but are characterized by negative  $\epsilon_{Nd}$  values and likely were deposited as part of a newly forming passive margin sequence.

Many metasedimentary and sedimentary samples from the Hammondvale Metamorphic Suite, Broad River Group, and Saint John Group fall outside the normal Nd isotopic range for Avalonian igneous rocks, whereas Coldbrook Group samples fall mainly in the typical Avalonian igneous Nd isotopic range, suggesting a substantially larger Avalonian crustal component in their evolution. Based on their mostly positive  $\epsilon_{Nd}$  values, the sedimentary units in the Coldbrook Group were most likely derived from associated volcanic units as well as the older Broad River Group igneous units. The more negative  $\epsilon_{Nd}$  values for samples from the Hammondvale Metamorphic Suite and Broad River Group indicate a large, isotopically mature source from more interior locations in Gondwana. Based on overlapping detrital muscovite ages and similar Nd isotopic values, the lower Saint John Group units were derived from the Hammondvale Metamorphic Suite, whereas the middle to upper units, which have more evolved Nd isotopic values, appear to require a source outside of the Caledonia terrane.