
**Geochemistry of late Neoproterozoic and Cambrian
sedimentary and metasedimentary rocks in the
Caledonian Highlands, southern New Brunswick**

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Neoproterozoic though Cambrian clastic sedimentary and/or metasedimentary rocks occur in the Hammondvale Metamorphic Suite (>ca. 620 Ma) and Broad River (ca. 620 Ma), Coldbrook (ca. 560–542 Ma), and Saint John (ca. 540–490 Ma) groups in the Caledonia terrane (Avalonia) of southern New Brunswick. Petrography, whole-rock chemical data (major and trace elements), and Nd isotopic compositions are used to compare and contrast the units and to investigate their provenance and tectonic setting during deposition.

Petrographic study indicates that many of the samples are mechanically mature but chemically immature, suggesting that the amount of chemical weathering was low and/or that the sediments were deposited relatively close to their source area(s). The presence of microcline and perthite orthoclase in many of the Broad River Group metasedimentary rock samples suggests they are not derived from the associated volcanic rocks, but have a plutonic source. The oldest plutons in the Caledonian Highlands are 620 Ma in age, and thus these rocks were not derived from local Avalonian plutons. Samples from the younger Coldbrook and Saint John groups have less K-feldspar and more plagioclase, suggesting that the source rocks had changed.

Samples from the high-grade Hammondvale Metamorphic Suite are chemically most similar to phyllite samples from the Broad River Group, suggesting that they were derived from similar sources. The Coldbrook Group samples have major element patterns similar to those of the Hammondvale Metamorphic Suite and the Broad River Group metawacke samples, but have more varied trace element patterns, indi-

cating more varied sediment sources. The Saint John Group, sedimentary rocks have varied geochemical patterns that overlap all of the older groups. They had varied source rocks and may have been derived from a mix of Broad River Group, Hammondvale Metamorphic Suite, and Coldbrook Group sources.

Preliminary Nd isotopic results from this study combined with previously published data show that the Hammondvale Metamorphic Suite and Broad River Group metasedimentary rocks, as well as sedimentary rocks of the Saint John Group have mostly negative ϵ_{Nd} values, falling outside the Avalonian isotopic window established from igneous rocks. In contrast, sedimentary rocks of the Coldbrook Group show more positive ϵ_{Nd} values, falling within the Avalonian isotopic window. Previously published Nd isotopic data from igneous units in the Broad River and Coldbrook groups have mostly positive ϵ_{Nd} values, consistent with sedimentary rocks in the Coldbrook Group having been derived from those rocks. The positive values from the igneous units are not consistent with the more negative values for the Hammondvale Metamorphic Suite and Broad River Group metasedimentary rocks and the Saint John Group sedimentary rocks. The Hammondvale and Broad River sedimentary rocks must have had an isotopically mature source, likely outside Avalonia. The Saint John Group sedimentary rocks may have been derived from a mix of Broad River metasedimentary rocks and Broad River Group and Coldbrook Group igneous rocks.