Stratigraphic and petrochemical contrasts between the northern and southern parts of the Bathurst camp, New Brunswick: investigations in the Big Bald Mountain area

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The Big Bald Mountain area is underlain by siliciclastic sedimentary rocks of the Cambro-Ordovician Miramichi Group, volcanic and sedimentary rocks of the Middle Ordovician Tetagouche Group, and Ordovician to Siluro-Devonian granitoid rocks. A broad dextral shear zone (Pringle Brook Fault) strikes east-west through Tetagouche Group stratigraphy and divides the area into two domains characterized by contrasting volcanic rock lithology and petrochemistry. North of the shear zone, the Tetagouche Group comprises the Patrick Brook, Nepisiguit Falls, Flat Landing Brook, and Boucher Brook formations, whereas to the south, the Clearwater Stream Formation and Stony Brook volcano-plutonic complex occupy the stratigraphic positions of the Nepisiguit Falls and Flat Landing Brook formations, respectively. North of the Pringle Brook Fault, quartz-feldspar-phyric rocks ("porphyry") typical of the Nepisiguit Falls Formation locally host massive sulphide deposits and associated laterally-extensive iron formation. However, to the south of the Pringle Brook Fault, quartz phenocrysts are absent in the stratigraphically equivalent felsic pyroclastic rocks of the Clearwater Stream Formation, and massive sulphides (Chester deposit) lack an associated iron formation. Relict glassy textures and flow-margin hyaloclastic breccias typical of felsic volcanic rocks in the Flat Landing Brook Formation are absent in the Stony Brook Complex, which contains a large proportion of hypabyssal intrusive rocks. South of the fault, mafic volcanic rocks of the Boucher Brook Formation are almost exclusively massive, unlike the pillowed flows that dominate farther north.

All felsic volcanic rocks are subalkaline and range in composition from dacite to rhyolite on a SiO_2 vs. Zr/TiO_2 diagram. However, felsic volcanic rocks in the southern domain contain higher abundances of high field strength elements (HFSE) and rare-earth elements (REE), have higher Zr/TiO_2 ratios and more prominent negative Eu anomalies. North of the Pringle Brook Fault, felsic volcanic rocks of the Flat Landing Brook Formation can be distinguished from those of the Nepisiguit Falls Formation by higher abundances of HFSE (Ti, Th, Hf, Sc, Nb, Y, Zr) and REE. South of the fault, the Stony Brook Complex felsic rocks can be distinguished from the Clearwater Stream Formation mainly by their very high K_2O/Na_2O ratios, but also by higher REE and a larger negative Eu anomaly. Mafic volcanic rocks of the Boucher Brook Formation exhibit both alkalic and tholeiitic affinities. Alkalic basalts and trachyandesites have sloping REE profiles, whereas tholeiitic basalts that are locally interbedded with the alkalic variety, are characterized by flat, MORB-like REE profiles, as well as lower HFSE and REE, and higher V, Sc, and Cr than alkalic basalts.