A geological map of the Jurassic North Mountain Basalt, southern Nova Scotia: a 200 km transect from Cape Split to Brier Island

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The first regional map showing the distribution of the three flow units comprising the Jurassic North Mountain Basalt from Cape Split southwestward to Brier Island is presented. Along this 200 km traverse the NMB is divided into three continuous volcanological flow units that have a ca. 500 m aggregate thickness and are referred to as the lower- (LFU), middle- (MFU) and upper- (UFU) units. Exceptional volcanological features of the units are displayed along continuous cliff faces bordering the Bay of Fundy and in numerous quarries. The LFU (≤180 m) is a massive, medium-grained, dominantly holocrystalline basalt with well-developed polygonal jointing (i.e., columnar joints ≤2 m) of colonnade and complex entablature patterns. Several features distinguish the upper part of the flow: (1) the upper 5–10 m is finer grained and rarely red-brown; (2) the upper 5–10 m may be amygdaloidal; and (3) layered pegmatites locally occur in the upper 30–40 m. These sheet-like layers (≤2–5 cm to ≤1–3 m) are comb-textured and pyroxene-rich with a granophyric matrix and concordant or discordant rhyolite or granophyre seams (≤3 cm) occur. The presence of circular structures, now water-filled in some cases, along the central and western parts of the map area may reflect outpouring of the LFU over water-rich surfaces resulting in formation of rootless cones. The MFU (≤165 m) contains multiple (≤15–20), thin (≤15–20 m), geometrically-complex flow sheets with abundant, zonally-arranged vesicles, now zeolite occluded (i.e., amygdules). Abundant field evidence (e.g, flow lobes, stacked lobes, vesicle zonation, tumulis) indicate the MFU consists of inflated pahoehoe flow sheets that formed over days to a few months, but red-brown oxidized tops and "neptunian" dykes in the upper half of flows indicate a time hiatus between flows. The UFU (≤150 m) contains ≤30–40% mesostasis in a medium-grained, ophitic-textured host. This unit consists of 1 or 2 flow sheets and also has colonnade style, polygonal jointing (≤1 m). The lower 10–20 m of the UFU locally contains felsic material (ca. 65–74 wt. % SiO_2) in the form of dykes, amoeboid masses and spectacular segregation pipes (3–60 cm; ≤10–15/m^2) that are sometimes cored by agate and crystalline silica. The distribution on the flow units shows several notable features: (1) the surface exposure of the LFU broads to three times its width in the western part of the map to 3 km; (2) coincident with the latter is a change in thickness (20–35 m to 165 m), number of flow sheets (4–6 to 15–20) and

surface outcrop area of the MFU from west to east; (3) gradual progression of outcrop exposure of the UFU towards the Bay of Fundy from west to east; (4) consistent dextral offsets of the flow units along prominent N-S faults. These features are considered to reflect a change in the structural evolution of the Fundy Basin, with maximum subsidence occurring in the central and eastern part during deposition of the MFU. Finally, the new map can be used for assessing the resource potential of the NMB. The LFU and UFU are preferred for high-quality aggregate, whereas the zeolites are constrained to the MFU and are most abundant in the central and eastern parts where the flow unit is thickest with the most individual flow sheets.