Field relations, petrology, and age of mafic rocks in the northwestern Aspy terrane, Cape Breton Island, Nova Scotia, Canada

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Mafic rocks including metabasalt, amphibolite, diorite, and gabbro are major components of the northwestern Aspy terrane. Mapping in 2015–2016 has better defined the distribution of these rocks, and new U-Pb (zircon) dating has clarified their ages. The "George Brook amphibolite" of earlier workers consists of components of at least four different ages and compositions, including: (1) low- to high-grade mafic metavolcanic rocks of the Faribault Brook Formation of the Jumping Brook Metamorphic Suite (JBMS); (2) low-grade metaplutonic bodies, including the newly named Georges Brook metadiorite; (3) gabbroic rocks associated and locally mingled with granitic rocks of the Salmon Pool pluton; and (4) amphibolitic sheets in highgrade metamorphic rocks of the Pleasant Bay complex.

The age of the JBMS, for which previous interpretations ranged from Precambrian to Silurian, is now constrained to the Cambrian, based on U-Pb dating of detrital zircon and ca. 490–480 Ma dates from cross-cutting plutons. The metavolcanic rocks are mainly mafic flows and tuffs. The flows locally preserve pillow structures, consistent with the turbiditic character of interbedded and overlying metasedimentary rocks. Metamorphic grade ranges from lower greenschist to amphibolite facies, and some of the latter rocks were previously included in the "George Brook amphibolite". Distinctive Nb and light REE depletion indicates N-MORB affinity, and the JBMS likely formed in a back-arc basin.

The Georges Brook metadiorite intruded mainly metasedimentary rocks in the northern part of the JBMS. In many outcrops the rocks are foliated. Two preliminary U-Pb (zircon) ages indicate emplacement at ca. 475–488 Ma, similar to ages of tonalitic and dioritic plutons to the south. The gabbroic (to dioritic) rocks of the Salmon Pool Pluton are more widespread than previously recognized. In shear zones they are foliated and resemble amphibolite, but elsewhere they are undeformed and mingled with ca. 375 Ma syenogranite. Petrological features indicate that these rocks formed in a within-plate extensional setting, and they may be related to bimodal volcanic rocks of the Fisset Brook Formation.

A major shear zone separates these rocks from high-grade schist, amphibolite, and orthogneiss of the Pleasant Bay Complex to the east. An amphibolite sheet in the Pleasant Bay Complex yielded a preliminary U-Pb (zircon) age of 426 Ma, indicating that it is not directly related to the older amphibolitic rocks to the west.

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