A new geological bedrock compilation map of Cape Breton Island, Nova Scotia, Canada: insights and challenges

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Cape Breton Island contains both the oldest and youngest geological units in Nova Scotia, spread over the remnants of six (or more!) Appalachian geological terranes. This geological complexity has been captured on twenty-five new 1:50 000 scale geological maps compiled by the authors and scheduled to be released in early 2017 by the government of Nova Scotia. Accompanying the maps is a 1:220 000 scale overview map of the entire island and a detailed legend with over 350 units from the member to terrane level. The data have been compiled in ARCGIS, and will ultimately be supported by a searchable digital database including outcrop locations, structural information, samples, and geochemical, geochronological, and magnetic susceptibility data. Both printed and digital maps will include geological units draped over a shaded digital elevation model. Other digital products such as aeromagnetic and radiometric maps will also be included in the ARCGIS database. These map products will be fully digital, easy to update and freely available on the NSDNR website.

These maps are the culmination of decades of field mapping, as well as detailed stratigraphic, petrological, geochemical, and geochronological studies. However, this work has tended to focus on either pre-Carboniferous “basement” rocks or on Carboniferous and younger “cover” sequences, with relatively few studies that focused on the relationships between the two age assemblages. By capturing all the details from both older and younger assemblages, these maps provide new insights about terranes, terrane boundaries, and geological history, and clarify some longstanding controversies about stratigraphic relations and age. They will likely encourage mineral exploration that could have long-term benefits for the province of Nova Scotia and aid in the understanding of the northern Appalachian orogen. However, the maps also reveal challenging problems that need to be addressed by additional studies. Clear disconnects are apparent between stratigraphy and structure in Carboniferous rocks compared to pre-Carboniferous rock units, and some of the geological relations displayed or implied on the maps are improbable or impossible. It is also clear that the number of precise ages for pre-Carboniferous units is small and that the ages of many units remain uncertain. The maps also show that Carboniferous stratigraphic units need to be rationalized across the island.

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