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**The Northumberland Phase: the Illinoian  
glaciation of the Canadian Maritime Provinces**

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Evidence for an early east-trending glaciation has long been known from New Brunswick, Nova Scotia, and Prince Edward Island. In New Brunswick this was initially inferred from erosional stratigraphy, i.e., cross-cutting relationships between subglacial erosion marks. Subsequently it was identified in stratigraphic section, with till with a west-east fabric or evidence for eastward dispersal identified beneath younger till(s).

In several sections, the deposits overlying these older tills contained organic materials. Bulk radiocarbon dates for organic materials from the Half Moon Pit and McGregor Brook sites in New Brunswick returned non-finite ages of >36 and >35 ka, respectively. Therefore the organics were interpreted to represent Mid-Wisconsinan depositional environments, and deposition of the underlying till was assigned to the Early Wisconsinan. The main Early Wisconsinan ice flow was the southeast flow of the Caledonia Phase. Therefore, the earlier eastward flow was informally attributed to the “early Caledonia Phase” in New Brunswick, or “Caledonia Phase 1a” in Nova Scotia.

Based on recent investigations at the Half Moon Pit and McGregor Brook sites, including new AMS  $^{14}\text{C}$  dates for charcoal fragments, the organic materials are now interpreted to be of Sangamonian Interglacial age. The underlying till must therefore belong to an entirely separate glacial phase that is of at least Illinoian age. This phase has been named the “Northumberland Phase”, to honour the concept of an eastward flowing “Northumberland glacier” originally proposed by Robert Chalmers in 1895.

The geologic record for the Northumberland Phase begins with eastward flow that subsequently transitioned to east-southeastward flow. This is observed in both the erosional and the depositional stratigraphy. At Flume Ridge in southwestern New Brunswick large east-trending grooves with rat-tails are cross-cut by east-southeast trending striae (plus later Wisconsinan striae). In west-central New Brunswick, at a site within the east-southeast trending Carlisle dispersal train, the change in pebble lithology of the till from bottom to top indicates a transition from eastward flow to east-southeastward flow.

The Carlisle dispersal train comprises reddish till, grading to brown near the margins, extending approximately 15 km east-southeast from the reddish clastic sedimentary rocks of the Carboniferous Carlisle Formation. Glacially streamlined bedrock landforms of parallel trend lie within its limits. The relative age of the dispersal train is indicated by the observation of ‘pebbles’ of brown till reworked into the regional Wisconsinan yellowish brown till at a site several kilometres farther to the east. Till fabric measurements at several sites within the dispersal train indicate that the upper 1 to 2 m is a hybrid till, with a Wisconsinan fabric but otherwise Northumberland characteristics. At depth the till exhibits an east to east-southeast fabric. The presence of hybrid Northumberland till at the surface in this area indicates the relative inefficiency of subsequent Wisconsinan glacial processes.