Ice Stream Tills, Ice Divide Tills, and Reworked Tills in Nova Scotia, Canada

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In Maritime Canada a succession of local ice caps called the Appalachian Ice Complex developed during the Wisconsinan glaciation. These glaciers were drained by ice streams into the submarine channels bordering the region. The migration of these ice centres throughout the Wisconsinan produced areas with widely differing flow patterns, landform assemblages and deposits. Early regional phases of ice flow were characterized by wide, rapidly flowing ice streams that formed thick allochthonous, silty tills in some areas restricted to drumlin fields. In later phases, ice divides shifted over coastal upland areas underlain by metamorphic and igneous rocks, forming stony, locally-derived tills. Terrain zones characterized by distinct transport histories and depositional sequences were produced by the interplay and migration of ice divides in the region. The interaction of newly-formed ice divides and previously deposited tills produced hybrid tills through two reworking processes: inheritance and overprinting. Inheritance is the incorporation of till components and/or fabric into a younger till by erosion and entrainment of material from an older till. Overprinting is the injection or imprint of matrix, clasts or fabric on older tills by overriding ice. Glacial dispersal of rocks, minerals and trace elements in this complex glaciated terrain is largely controlled by the location and persistence of former ice divides. Simple unidirectional dispersal trains are preserved in relict terrains under areas of former ice divides and in "by-passed" terrains such as ice rises between ice streams. In ice marginal areas and along ice stream paths (drumlin fields), reworking processes were enhanced, resulting in complex dispersal fans by smearing and widening of previously formed trains and fans. These dispersal fans can be modeled by vector addition of the discrete flow events within each dispersal zone.