

### **Regional structures outlined from Natmap 1:250 000 compilation of Cape Breton Island (11F, 11K)**

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A primary objective of the Magdalen Basin NATMAP program is the digital compilation of new and existing geological maps encompassing northern Nova Scotia and southeastern New Brunswick, for the production of the first 1:250 000 scale maps of this region. Broad stratigraphic correlations are effectively outlined at this scale, and the large scale nature of important

structures becomes evident, while many of the details established at 1:50 000 are still preserved. On Cape Breton Island (11F, 11K) four new regional scale structures are now recognized which are responsible for a range of tectonic features which characterize pre-Acadian, Acadian, and post-Acadian orogenic events and subsequent Carboniferous basin evolution: (1) an

extensive late Silurian thrust system extends from the Cheticamp area in northwestern Cape Breton down to the Mabou and Middle River areas, and features imbrication of Cambrian-Precambrian basement rocks of Gondwana derivation with Ordovician-Silurian volcanic arc cover sequences, including the Sarah Brook volcanics and correlative units. High grade metamorphism and thick mylonite zones indicate significant tectonic burial and crustal thickening during south-directed transport; (2) early Devonian contraction features the thrust emplacement of the Cabot nappe along the Highland Shear Zone (HSZ) which rims the south, east, and west margins of the Cape Breton Highlands separating gneissic and non-gneissic domains. The HSZ is a deeply rooted crustal-scale fault characterized by the juxtaposition of highly contrasting metamorphic assemblages, with the thrust emplacement of the main gneissic nappe resulting in dynamothermal metamorphism of footwall rocks and regional development of inverted isograds. Units within the nappe include Precambrian marble, quartzite, and amphibolite, as well

as large granitic, dioritic, and tonalitic intrusions and Silurian to Devonian orthogneiss of the Belle Cote and Pleasant bay complexes. The Cabot nappe is overprinted by folding and is preserved as a broad klippe within a regional synclinorium; (3) late Devonian extensional denudation of the Cabot nappe was in part accommodated in the footwall of the low-angle Margaree Shear Zone during the initiation of the Maritimes Basin. The Margaree Shear Zone is a large scale retrogressive extensional mylonite zone which is now mapped along and adjacent to the western and southern margins of the Cabot nappe, and occurs immediately beneath Late Devonian volcanic units at the base of the Maritimes Basin; and (4) within the Viséan Windsor Group, the Ainslie Detachment is a bedding-parallel extensional fault occurring at the evaporite-carbonate interface at the top of the Macumber limestone. The Ainslie Detachment is responsible for significant stratigraphic gaps within the Windsor Group and appears to have controlled early Westphalian clastic sedimentation in association with listric faulting.