## DESCRIPTIVE NOTES

The Sunneshine Fiord map sheet, eastern Cumberland Peninsula, Baffin Island, exposes primarily supracrustal rocks of the Hoare Bay group (Jackson 1971), which here are dominated by clastic metasedimentary rocks with notable, continuous islands of metavolcanic rocks. The supracrustal succession is structurally underlain by tonalitic rocks, exposed in the northwest and southeast parts of the map sheet, and is cut by several monzogranitic-charnockitic plutons.

In contrast to elsewhere on Cumberland Peninsula, much of this map sheet exposes relatively homogeneous semipelite and psammite. Semipelite (unit $Psp_{sp}$) is rusty-brown weathering with 15-25% biotite and up to 20% garnet. Psammite (unit $Psp_{ss}$) is light grey weathering with 5-10% biotite and rare (<2%) garnet, with calcareous layers or concretions locally. These clastic rocks have a low magnetic expression that is punctuated by linear magnetic highs (Figure 2), the latter corresponding to magnetite-rich iron formation (unit $PAfe_m$). Mafic volcanic rocks (unit $PAmv$) are the most abundant rock type in the supracrustal succession. Metavolcanic rocks (unit $PAmv_u$) include bright green weathering, komatiitic fragmental volcanics best exposed on Totnes Road peninsula (Keim et al., 2011), and black weathering, massive to fragmental rocks exposed discontinuously along the strike-length of this corridor. Geochemical analyses reveal a mid-ocean ridge basalt (MORB) or enriched-MORB signature for the komatiitic sequence, in contrast to rift-alkali basalt affinity for the stratigraphically higher basaltic sequence. Ultramafic sills (unit Pum) with cm-scale, rusty weathering porphyroblasts of olivine ± clinopyroxene are spatially associated with komatiitic rocks and locally appear to be transitional. Their spatial association, stratigraphic position and rare, preserved igneous textures suggest that the ultramafic sills may be genetically related to the komatiitic rocks. Similar major and trace element geochemistry (Whalen et al., 2012). Quartzite (unit $Pqz_{ss}$), and marble (unit $Pc_{ls}$) are minor lithological components, consistent with a basinal depositional setting for this volcanosedimentary succession, whose Paleoproterozoic age is established by a maximum age of 1.99 Ga for psammite (N. Wodicka, unpublished data, 2011) underlying black metavolcanics at the head of Sunneshine Fiord. Contacts between cover rocks and structurally underlying tonalitic-granodiorite rocks are generally poorly exposed; however, a section southwest of Boas Fiord exposes ~40m of strongly lineated, straight mylonitic plutonic gneiss in contact with structurally overlying quartzite and psammite, indicating a tectonic contact relationship.

A topographically high, largely ice-covered felsic pluton in the southwest corner of the map is best accessed along its northern margin from a helicopter-supported camp on the Coronation Glacier. Rocks from this pluton, informally called the Nelson plutonic rocks contain up to 15% orthopyroxene in various stages of retrogression to biotite, and display greasy green-fresh surfaces reflecting high-temperature modification of feldspar crystal structure, attributed to post-emplacement, high-grade metamorphism. This pluton yielded a U-Pb zircon age of ca. 1894 Ma (N. Rayner, unpublished data, 2011) establishing it as part of the Qikiqtarjuaq plutonic suite, which extends more than 300 km from Pangnirtung to Qikiqtarjuaq (Figure 1). Aerial observations support the presence of similar charnockitic plutonic rocks across the southern part of Sunneshine Fiord.

Variably foliated to gneissic tonalitic-granodioritic rocks (units $Atn$, $Atg$, $PAtn$) are exposed northwest of the supracrustal succession and along the coast of Sunneshine Fiord, southeast of the map area. The tonalitic rocks are typically quartz-biotite-bearing rocks commonly contain mafic plutonic layers and lenses and are typically cut by cm-scale granitic veins that are concordant to tectonic foliation. Although not dated in this map sheet, rocks similar in composition and texture from elsewhere on the peninsula yield ages of 2.99 Ga and 2.79 Ga (Rayner et al., 2012). The age of granodioritic rocks (unit $PAgd$) composed across Mooneshine Fiord is less certain. North of Cape Dyer, panels of metasedimentary rocks (unit $PAsp$) and amphibolite (unit $PAgb$) exhibit an apparent intrusive contact with tonalite and are suspected to be Archean.

As established elsewhere across southern Cumberland Peninsula (Sanborn-Barrie et al., 2011a, b), fabrics and structures throughout the basement complex provide evidence of two regionally developed deformation events, the youngest of which is penetratively recorded by fabrics and structures in the cover sequence. Unconformably overlying the deformed Precambrian rocks are flat-lying basaltic strata and associated clastic rocks (unit $Crv$).


### Abstract

Cumberland Peninsula, eastern Baffin Island, is an under-explored, frontier region with significant diamond, base- and precious-metal potential. Archean (2.91–2.77 Ga) foliated to gneissic tonalitic plutonic rocks with enclaves of ~2.77 Ga semipelite, ca. 2.68 Ga gabbro and rare ca. 2.92 Ga metasedimentary rocks comprise the basement complex in the south and north. Metasedimentary cover rocks of the Paleoproterozoic Hoare Bay group, exposed from the central to the northeast part of the peninsula, unconformably overlie with the basement gneisses. The cover sequence includes widespread semipelite-psammite with minor quartzite, marble, silicate- and oxide-facies iron-formation, chert and graphitic-pyritiferous shale, and two geochemically-distinct strands of mafic metavolcanic rocks, one with MORB and the other with Basement and cover rocks are cut by 1.9–1.88 Ga charnockite, biotite-garnet granodiorite and lesser quartz diorite of the Qikiqtarjuaq plutonic suite. Major structures and medium to high-grade metamorphic assemblages are attributed to the Paleoproterozoic Trans-Hudsonian orogenic between ca. 1.90–1.84 Ga.



### Résumé

La péninsule Cumberland, dans l'est de l'île de Baffin, est une région pionnière sous-explorée qui recèle un important potentiel en diamants, métaux usuels et métaux précieux. Des roches plutoniques foliées à gneissiques de composition tonalitique de l'Archéen (2,91-2,77 Ga), renfermant des enclaves de semipélite d'environ 2,77 Ga, ainsi qu'une roche de ~2,68 Ga et des roches métavolcaniques d'environ 2,92 Ga, forment un socle structural exposé au sud et au nord. Les roches métasédimentaires de couverture du Paléoproterozoique, qui affleurent du centre jusqu'à la partie nord-est de la péninsule, sont en contact tectonique avec les gneiss du socle. La séquence de couverture se compose d'une abondance de semipélite-psammite et de quantité mineure de quartzite, de marbre, de formation de fer à faciès silicaté et à faciès oxyde, de chert, de shale graphitique-pyriteux ainsi que de deux lignées géochimiquement distinctes de roches métavolcaniques ultramafiques-mafiques d'origine purcoladique. Les roches du socle et de la couverture sont recoupées par des plutons variés, unités de 1,9 à 1,88 Ga de la suite plutonique de Qikiqtarjuaq, formées de charnockite, de granodiorite à biotite-grenat et, en moindre quantité, de diorite à quartz. Des structures et principales aires que les paragenèses métamorphiques du degré intermédiaire à élevé sont attribuées au tectonométamorphisme polyphasé qui s'est déroulé approximativement entre 1,90 et 1,84 Ga.

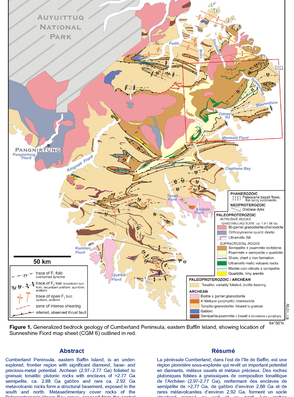
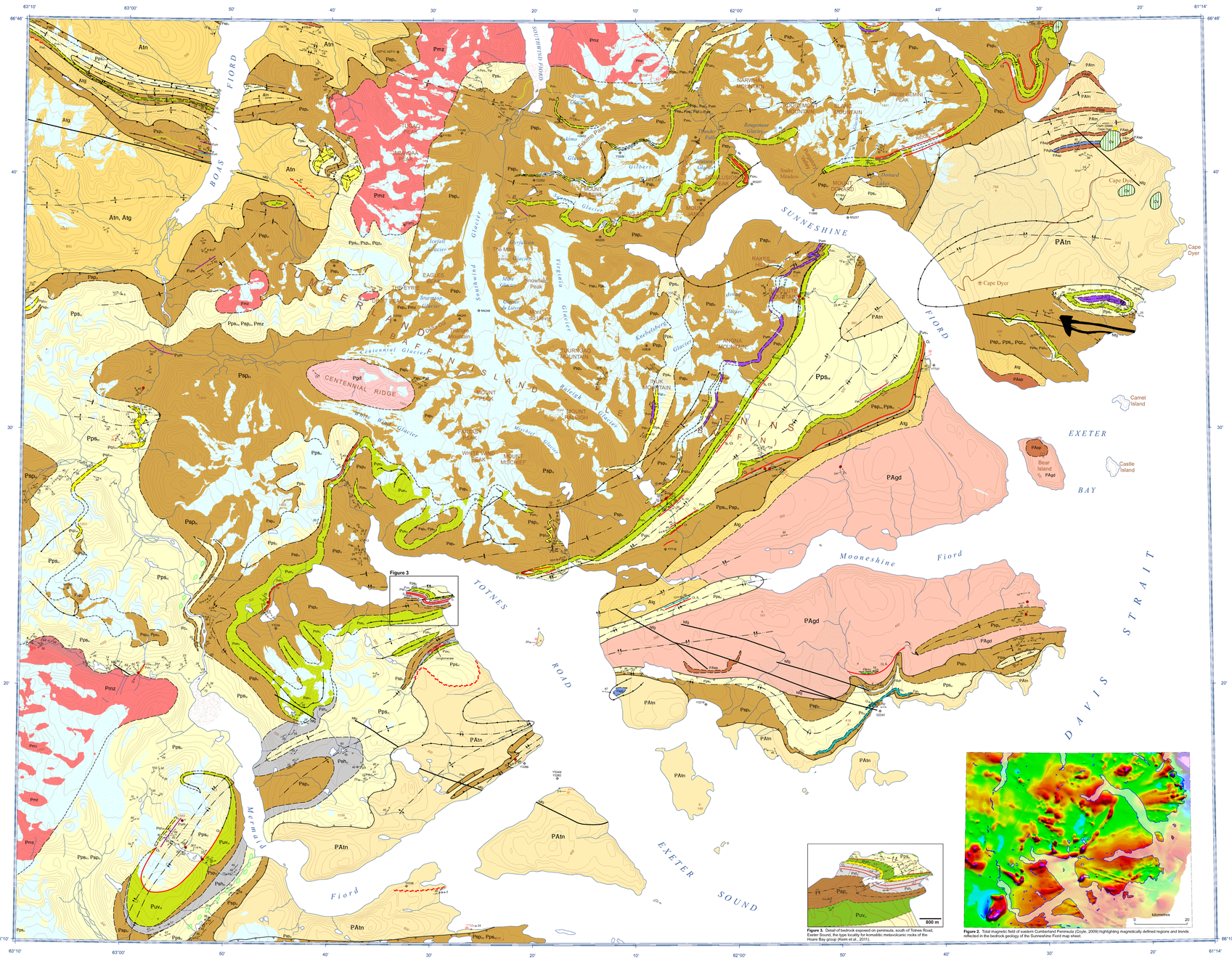




**Figure 1.** Generalized bedrock geology of Cumberland Peninsula, eastern Baffin Island, showing location of Sunneshine Fiord map sheet (CGM 6) outlined in red.


63°10'
63°00'
50'
40'
30'
20'
10'
62°00'
50'
40'
30'
20'
61°14'
66°46'
66°40'
40'
30'
20'
66°10'
Atn, Atg
Pmz
Pmz, Psp
Psp, Pmz
Psp, Psp, Pmz
Psp, Psp, Pgd
Psp, Psp, Pgd
Psp, Psp, Pgd