

Gold potential of the northeastern Archean Ashuanipi Complex, Superior Province, western Labrador (parts of NTS 23J and 23O).



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The Archean Ashuanipi Complex is the easternmost subprovince of the Superior Province (Figure 1) and consists of ca. 2.75 to 2.65 Ga. granulite facies migmatitic granitoid and metasedimentary gneiss, diatexite migmatite, foliated granitoid plutons and subordinate mafic and ultramafic intrusions. The discovery of gold mineralization hosted in Algoma-type iron formation and metasedimentary gneiss, northwest of Schefferville in the mid-1980s has led to numerous exploration ventures in the region. The most advanced prospects are located 30 km northwest of the study area at the Shefor Au Project (Figure 2) and consist of several significant gold occurrences in iron formation layers and in the surrounding metasedimentary gneiss. The gold is associated primarily with arsenopyrite, loellingite and pyrrhotite hosted in pyroxene-amphibole-garnet silicate facies iron formation layers (pyrgarnite), migmatitic gneiss and in related quartz veins. Anomalous gold in bedrock is associated with enrichment in antimony, uranium and tungsten and both elevated and background arsenic contents. The presence of local shear zones and an amphibolite - granulite facies transition of the rocks, are interpreted as the main controls on gold distribution (Ivanov, 2012). The results of exploration suggest that there is the potential in this area for disseminated gold deposits in metasedimentary gneiss in addition to gold-rich zones associated with iron formation. Several early-stage prospects in Quebec including the Lac Lillois - Lac Guillaume occurrences, are located adjacent to gold showings in Labrador in the northern study area (Figures 3 and 4; MODS No. NTS 23J/14/Au001, 23J/14/Au002 and '228'). These occurrences in Quebec and the Labrador showings are associated with similar rock types, a NNE-striking fault and a common aeromagnetic high, suggesting a spatial relationship.

Gold, arsenic and locally antimony anomalies in lake sediment within Labrador are locally coincident with sulphide-bearing gossan zones with and without iron formation. Some of these zones yield elevated gold values in bedrock and are also associated with aeromagnetic highs in some areas (Figure 4). Several auriferous zones have been identified in this region through reconnaissance surveys and local prospecting, although most of these areas have seen only limited exploration work, including seven short drill holes and local geophysical and rock and soil sampling surveys. The predominant host rocks are migmatitic garnet ± orthopyroxene metasedimentary gneiss containing local, cm- to m-thick pyroxene-rich lenses which are interpreted as boudinaged iron formation layers (Plate 1). Recognition of these rocks within the migmatitic gneiss is problematic due to the sporadic distribution and small dimensions. A systematic examination of these auriferous zones has yet to be carried out in detail. Locating conductive features (i.e. iron formation layers) within potential auriferous zones through conductivity surveys and detailed mapping of lithological and structural relationships would facilitate a better understanding of the potential for gold mineralization associated with these rocks.

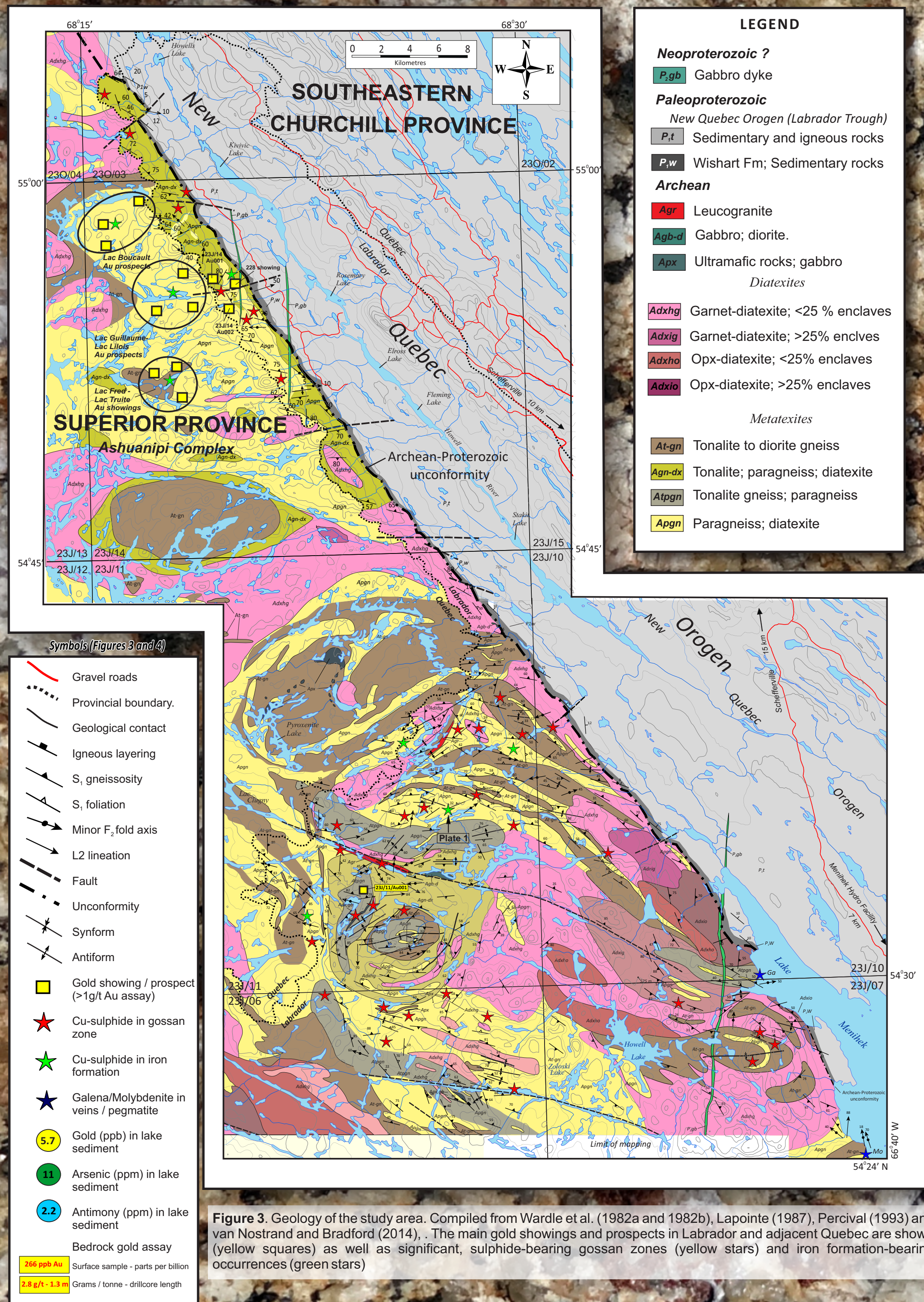


Figure 3. Geology of the study area. Compiled from Wardle et al. (1982a and 1982b), Lapointe (1987), Percival (1993) and van Nostrand and Bradford (2014). The main gold showings and prospects in Labrador and adjacent Quebec are shown (yellow squares) as well as significant, sulphide-bearing gossan zones (yellow stars) and iron formation-bearing occurrences (green stars)

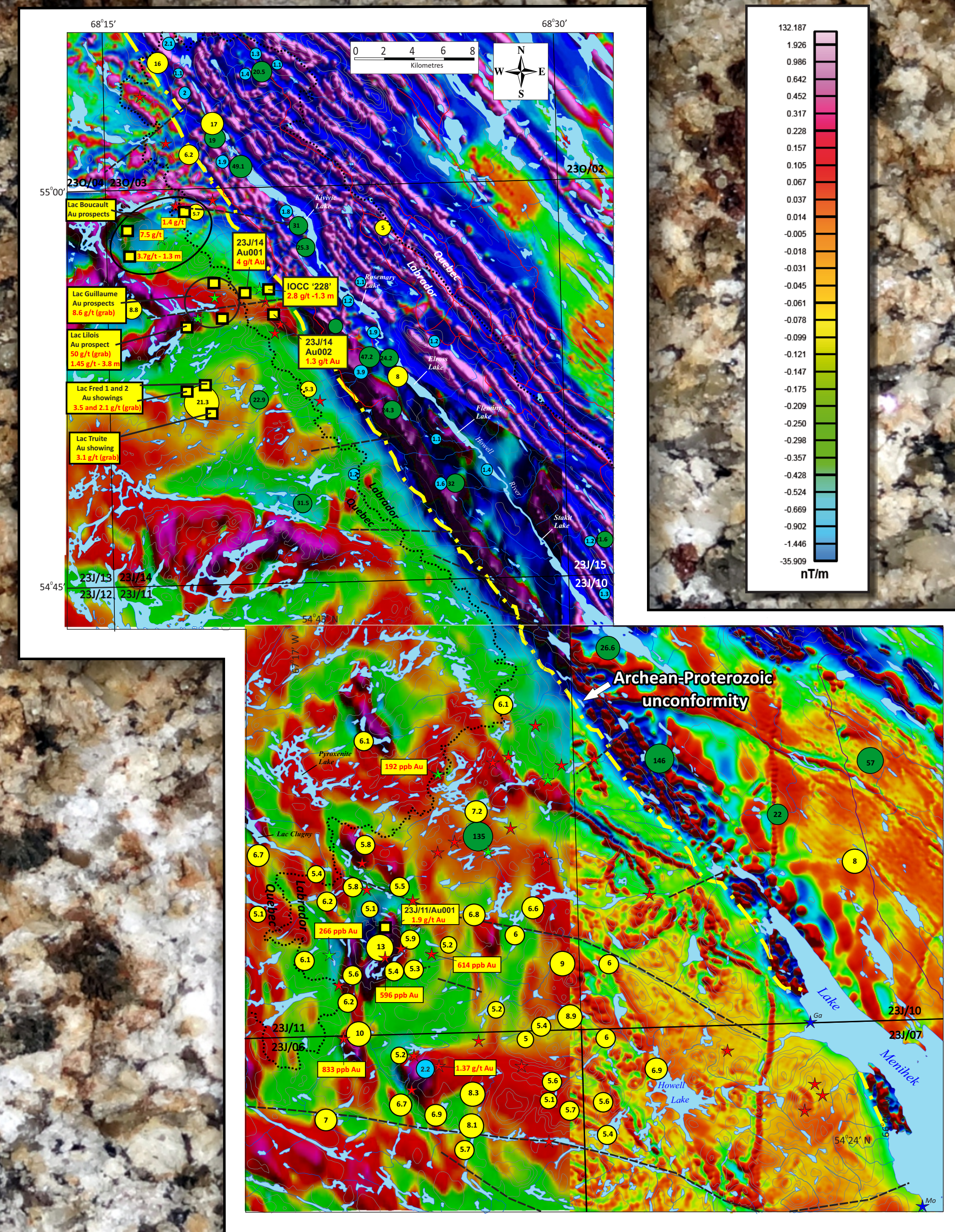


Figure 4. Aeromagnetic compilation of the map area. Anomalous gold (> 5 ppb, yellow circles), arsenic (> 20 ppm, green circles) and antimony (> 1 ppm, blue circles) values in lake sediment. The main gold showings in Labrador and Quebec (yellow squares), iron formation occurrences (green stars) and sulphide-bearing gossan zones without visible iron formation, some containing elevated gold (ppb) in bedrock, are also shown (red stars).

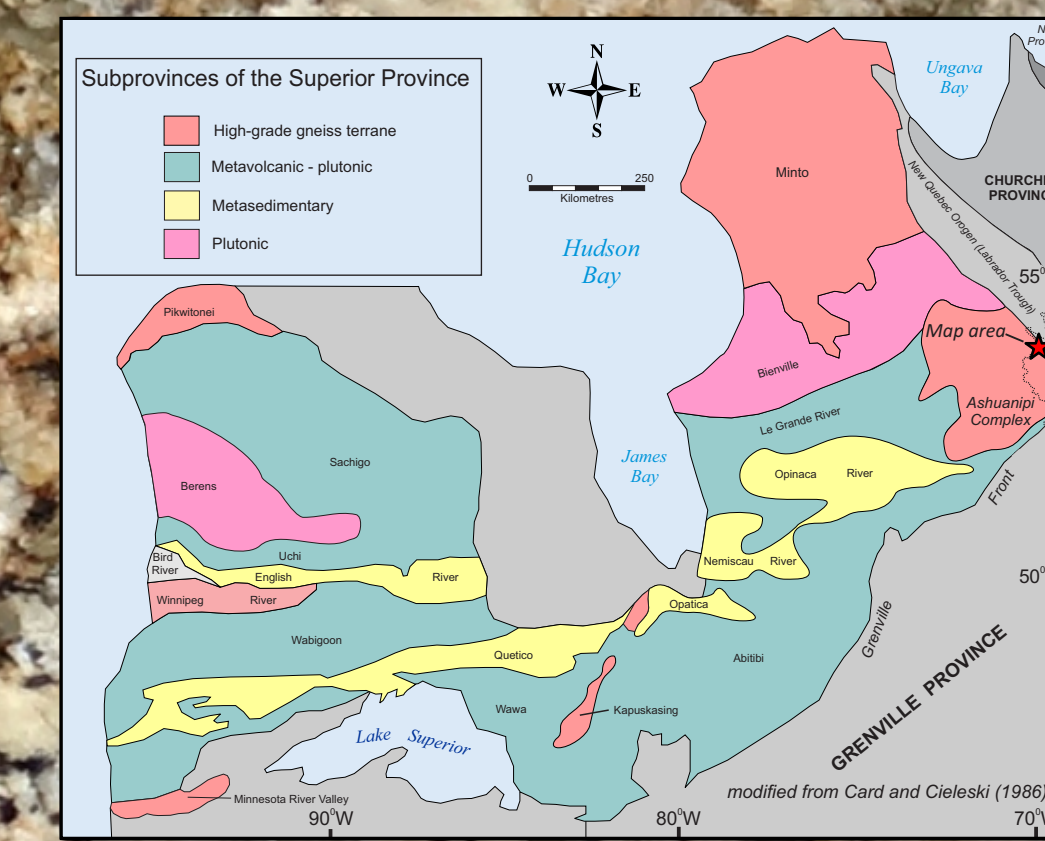


Figure 1. Subprovinces of the Archean Superior Province showing location of the Ashuanipi Complex and the map area. (Modified after Card and Ciesielski, 1986).

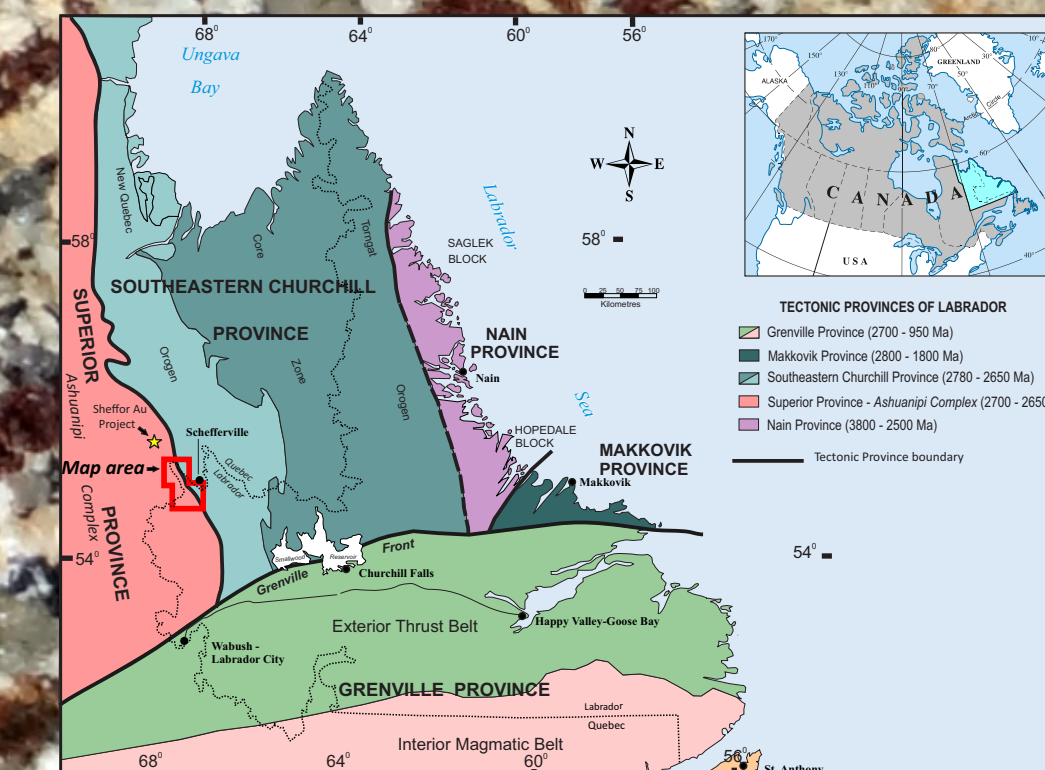


Figure 2. Location of the map area with respect to the structural provinces and tectonic features of Labrador and surrounding region (modified after Wardle et al., 1997).



Plate 1. Gossan zone in migmatitic, garnet + orthopyroxene metasedimentary gneiss (Unit Agpn) which hosts local pyrrhotite and arsenopyrite mineralization. Area outlined by white dashed line is a 50 to 75 cm-wide lens consisting of pyroxene + amphibole ± minor garnet and is interpreted as a silicate facies of iron formation. (see Figure 3 for location)

DATA SOURCES

Mineral occurrence and assay data:
 Labrador - Campbell (1987)
 Dimmel (1989)
 Geological Survey MODS database (Oct. 2014)
 van Nostrand (2014)

Québec - Energie et Ressources naturelles Québec - SIGEOM
 Ivanov (2012)
 Rockland Minerals website, October 2014.
 Percival (1993)

Geophysical maps:

1:250 000-scale aeromagnetic compilation (NTS 23J) - (Kilfoil, 2013).
 1:50 000-scale compilation (NTS 23J/07.11 and parts of 23J/14 and 23O/03) from Dumont et al. (2010a and 2010b).
 1:50 000-scale compilation (parts of NTS 23O/03 and 23O/04) from D'Amours and Intissar (2013)

Geology

Labrador geology compiled from Wardle et al. (1982a and 1982b); Percival (1993) and van Nostrand and Bradford (2014).

Québec geology: NTS 23J/06, 10 and 11 compiled from Percival (1993); NTS 23J/13 and 14 from Lapointe (1986); 23O/03 and 23O/04 compiled from Energie et Ressources naturelles Québec - SIGEOM (October 2014).

Lake Sediment Geochemistry Data:

Labrador lake sediment data compiled from:
 McConnell, J.W. (2012) and Geological Survey Resource Atlas.

Québec lake sediment data compiled from:
 Energie et Ressources naturelles Québec - SIGEOM (October 2014).

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Geological Survey Resource Atlas (October 2014) <http://geotlas.gov.nl.ca/Default.htm>

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Wardle et al. (1982a and 1982b): Geology of the south-central Labrador Trough, Government of Newfoundland and Labrador, Department of Mines and Energy, Mineral Development Division, Maps 82-5 and 82-6, 1:100 000-scale, Geofile Nos. 0603a and 0603b.