Maniitsoq 1:100 000 geological map sheet project

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overview

• Why mapping?
• Digital map data
• Research partners and key goals
• Geology of the Maniitsoq area
• New data and insights
Why?

Government agencies have a crucial role in making regional scale geological maps to reduce exploration risk and promote investment


“The geoscience knowledge provided by federal, provincial and territorial governments as a public good is widely acknowledged to be one of Canada’s competitive advantages in attracting mineral exploration and to have contributed to this country’s standing as a leading mineral producer”.

Digital map data
Digital map data
Digital map data
Digital map data – stratigraphic database
Digital map data – stratigraphic database
Research partners

Ministry geologists + research partners from

• University of Waterloo – Dr Chris Yakymchuk
• Stanford University – Dr Kristoffer Szilas
• Curtin University (CET) – Prof. Chris Kirkland
Key goals

Using:

– Field relationships
– Metamorphic petrology
– Structural geology
– Geochemistry and isotope geology
– Geochronology

• Identify and map lithostratigraphic units at 1:100 000 scale
• Define regional structures important for understanding mineral prospectivity
• Assess mineral prospectivity in relation to lithostratigraphy, metamorphic grade, age, geological environment
Geology of the Maniitsoq area
Geology of the Maniitsoq area

Existing 500k geology
Geology of the Maniitsoq area

• Dominated by Mesoarchean TTGs
• Distinct Neoarchean TTGS terrane to the NW
• All at upper amphibolite to granulite facies with multiple high grade metamorphic and deformation events
• Probably > 1 age of supracrustal belts with unknown relationship to the enclosing TTGs
• Limited publically available geochemical, geochronological, metamorphic, structural data
Geology of the Maniitsoq area

Long-lived mantle tapping structures/events

• World’s oldest carbonatite (3.0 Ga)
• Abundance of peridotitic rocks
New data and insights

Worldview3 multispectral satellite imagery
Down to 0.31 m resolution. Excellent resolution of ultramafic rocks from Fe-oxide ratios image – abundance of peridotitic rocks in this region: preserve oldest structures and probably important in understanding crustal evolution
Geology of the Maniitsoq area

Long-lived mantle tapping structures/events

- Mesoarchean TTGs with geochem consistent with partial melting of mantle affected by carbonatite metasomatism
Geology of the Maniitsoq area
Long-lived mantle tapping structures/events

- Widespread Ni sulfide mineralisation hosted by Mesoarchean or older norites and gabbros
Geology of the Maniitsoq area
Long-lived mantle tapping structures/events

- Widespread Ni sulfide mineralisation hosted by Mesoarchean or older norites/gabbros

Drilling Highlights: From Nickel Prospects to Zones

**Imiak Hill Complex:**
- Imiak Hill
  - MQ-13-028: 24.75m @ 3.19% Ni, 1.14% Cu
- Spotty Hill
  - MQ-15-075: 7.55m @ 1.60% Ni, 0.31% Cu, 0.43 g/t TPM
- Mikissoq
  - MQ-13-029: 9.99m @ 4.65% Ni, 0.33% Cu, 0.14 g/t TPM

**Fossilik:**
- P-004
  - MQ-13-018: 32.19m @ 0.59% Ni, 0.18% Cu, 0.21 g/t TPM incl.
  - 4.53m @ 1.06% Ni, 0.33% Cu, 0.33 g/t TPM
- P-058
  - MQ-15-077: 21.50m @ 0.55% Ni, 0.27% Cu, 0.06 g/t TPM
- P-059
  - MQ-15-078: 12.15m @ 1.16% Ni, 1.00% Cu, 0.27 g/t TPM

**Regional:**
- P-013
  - MQ-14-066: 11.00m @ 1.31% Ni, 0.15% Cu, 0.07 g/t TPM incl.
  - 5.85m @ 2.07% Ni, 0.12% Cu, 0.07 g/t TPM
- P-030
  - MQ-14-070: 20.10m @ 0.63% Ni, 0.20% Cu, 0.18 g/t TPM
- P-032
  - MQ-15-090: 13.60m @ 0.79% Ni, 0.27% Cu, 0.07 g/t TPM incl.
  - 5.10m @ 1.06% Ni, 0.37% Cu, 0.09 g/t TPM
- P-053
  - MQ-15-082: 23.70m @ 1.98% Ni, 0.62% Cu, 0.19 g/t TPM incl.
  - 12.20m @ 2.78% Ni, 0.36% Cu, 0.26 g/t TPM

Notes:
- TPM - Total Precious Metals (Au+Pt+Pd)
- Intervals listed on this slide and all proceeding slides are core lengths, not true widths.
Geology of the Maniitsoq area
Long-lived mantle tapping structures/events

• Neoarchean suture between distinct Meso- and Neoarchean terranes

The Majorqaq Belt: A record of Neoarchaean orogenesis during final assembly of the North Atlantic Craton, southern West Greenland

Brendan Dyck \textsuperscript{a,b,\*}, Barry L. Reno \textsuperscript{a,c}, Thomas F. Kokfelt \textsuperscript{a}
Geology of the Maniitsoq area

Long-lived mantle tapping structures/events

• ≤ Neoarchean (?) REE-rich pegmatites
Long-lived mantle tapping structures/events

• Gold-bearing supracrustal rocks
• Neoproterozoic and Jurassic kimberlites
• Jurassic carbonatite (Qeqertaasaaq/Qaqarssuk)
Geology of the Maniitsoq area
New data and insights

New DEM, coastline, and topographic basemap
New data and insights
New data and insights

Established sequence of high-grade metamorphic and magmatic events related to structural evolution – mapped at outcrop to regional scale
New data and insights

- Structural-metamorphic evolution: Meso- to Neoarchean
- Timing of Ni sulfide mineralisation
- Characterisation and timing of supracrustal belts – relationship to host TTGs
- Crustal evolution studies of the TTGs and related mafic and ultramafic rocks: geochemical and isotopic studies
- mineral systems and mineral potential
- MAP, analytical data, explanatory notes
Thanks to North American Nickel

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