Bedrock geology of the Duluth Heights and eastern portion of the Adolph quadrangles, St. Louis County, Minnesota

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MAP SYMBOLS
- Geological contacts: intrusive contacts, including diabase sills, dunites, and gabbroic dikes. Kimberlites, carbonatites, and other diatremes. Differentiation of layered intrusions and other igneous formations.
- Mafic dikes, normal polarity: thin, mafic dikes that are probably related to the Midcontinent rift system.
- Tuff and the volcaniclastic rock: tuff and pyroclastic deposits.
- Mafic dikes, reversed polarity: mafic dikes that are probably related to the East African Rift System.
- Magnetic anomaly contours: magnetic anomaly contours that indicate the presence of magnetic rocks.
- Bedrock surface: geological contacts, cumulate rock textures, and compositional layering indicative of the Duluth Complex.

DESCRIPTION OF MAP UNITS
- Duluth Complex: a layered igneous complex that is composed of mafic and ultramafic rocks. It is one of the largest and most extensive layered igneous complexes on Earth.
- Meso-Proterozoic (Keweenawan) anorthositic series:
  - Anorthosite: a plutonic rock composed of plagioclase feldspar.
  - U-Pb ages of 1,099.1 ± 0.3 Ma (sample DG257, T. 50 N., R. 14 W., sec. 29; Green, J.C., and Miller, J.D., Jr., 2008, Bedrock geology of the Duluth quadrangle, Minnesota Geological Survey Report of Investigations 58, p. 94-105).
- Meso-Proterozoic (Keweenawan) basal contact zone:
  - Hesperian-aged basal contact zone: the basal contact zone of the Duluth Complex.
  - Overlying the anorthositic series, it is composed of mafic and ultramafic rocks.
- Upper contact zone:
  - The upper contact zone of the layered series, being accreted to the roof during crystallization.
  - Possible that this rock may be comagmatic with the troctolite zone.
- Troctolite:
  - A rock type that is composed of olivine and plagioclase.
  - Its relationship to the main mass of anorthositic series rocks.
- F/Fe oxide:
  - Mafic dikes, normal polarity:
  - Mafic dikes, reversed polarity:
  - Tuff and the volcaniclastic rock:
  - Magnetic anomaly contours:
  - Bedrock surface:

REFERENCES: