

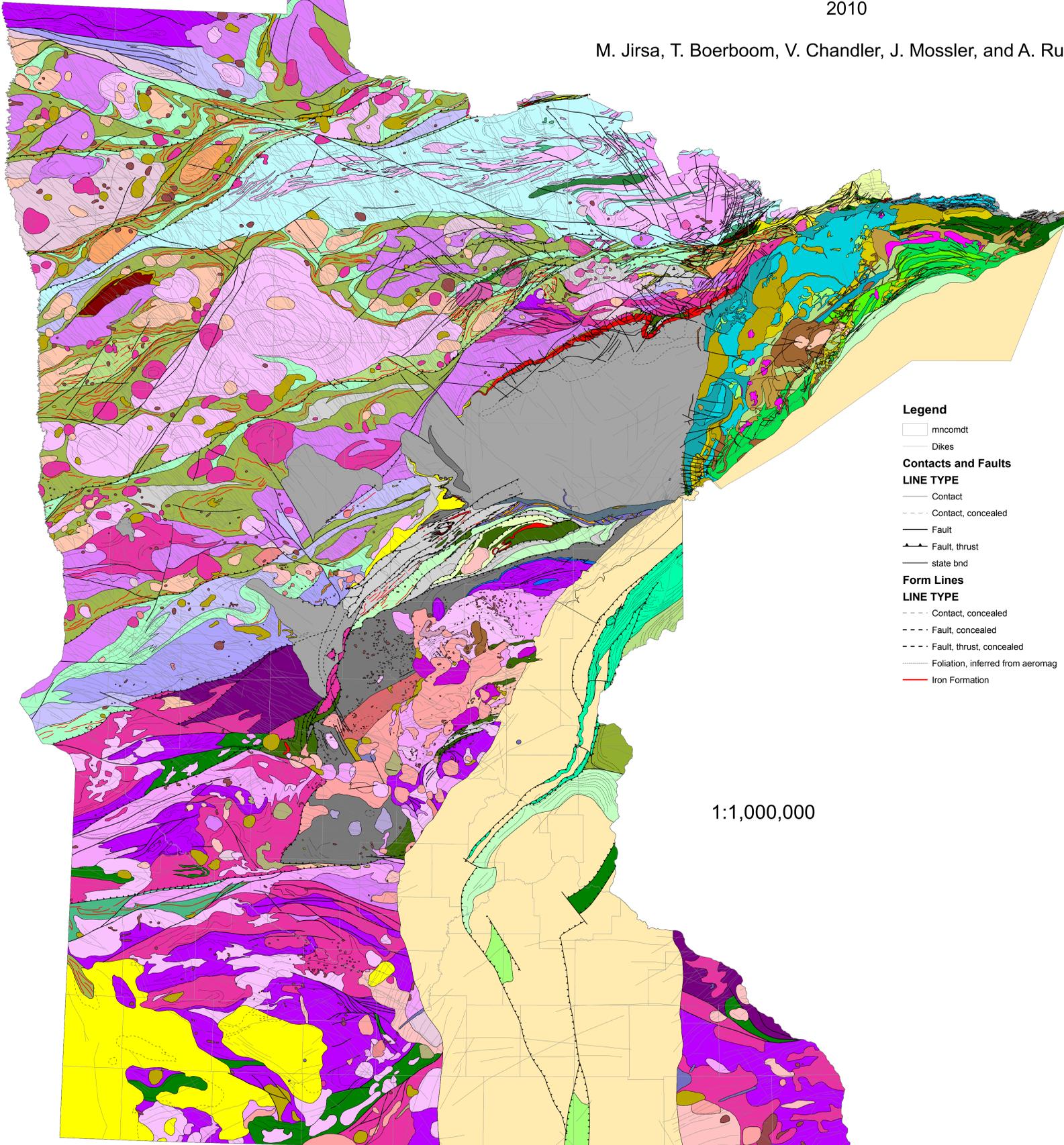
Preliminary Precambrian Geologic Map of Minnesota

Minnesota Geological Survey

Open-File Report OFR10_02

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Legend

- mncomdt
- Dikes
- Contacts and Faults**
- LINE TYPE**
- Contact
- Contact, concealed
- Fault
- Fault, thrust
- state bnd
- Form Lines**
- LINE TYPE**
- Contact, concealed
- Fault, concealed
- Fault, thrust, concealed
- Foliation, inferred from aeromag
- Iron Formation

1:1,000,000

PRECAMBRIAN UNITS

- | | | |
|--|-----|---|
| | APd | APdDioritic to granodioritic intrusion of uncertain age |
| | APg | APgGranitic intrusion of uncertain age |
| | APm | APmGabbroic to dioritic intrusion and metamorphic equivalent |
| | APv | APvMafic volcanic and hypabyssal intrusive rocks of uncertain age |
| | Aag | AagMafic to ultramafic hypabyssal intrusive complexes, gabbro, anorthosite, and related |
| | Acv | AcvCalc-alkalic volcanic, hypabyssal intrusive, and volcanoclastic rock |
| | Adt | AdtDioritic to tonalitic pluton |
| | Agd | AgdGranodioritic intrusion, locally foliated |
| | Agl | AglLeucogranite, variably foliated |
| | Agm | AgmGranite to granodiorite, variably magnetic, locally magmatically foliated |
| | Agn | AgnGranitic to granodioritic orthogneiss |
| | Agp | AgpGabbro, pyroxenite, peridotite, and lamprophyre intrusions, variably metamorphosed |
| | Agr | AgrGranitic intrusion |
| | Ags | AgsSchist and tonalite to granodiorite paragneiss |
| | Agt | AgtFoliated to gneissic tonalite, diorite and granodiorite |
| | Agu | AguGranitoid intrusion, undifferentiated or poorly constrained by core and outcrop |
| | Aif | AifIron-formation |
| | Akc | AkcKnife Lake Group volcanic conglomerate and breccia, alkalic, hornblende-bearing |
| | Aks | AksKnife Lake Group, volcanogenic lithic sandstone, siltstone, conglomerate, and slate |
| | Akv | AkvKnife Lake Group, volcanic flows, breccia, and tuff, typically hornblende-bearing |
| | Amd | AmdMRV subprovince granitoid gneiss with amphibolitic to dioritic enclaves |
| | Amg | AmgMRV subprovince granitic orthogneiss and migmatite |
| | Ami | AmiMafic plug-like intrusions; typically magnetic, gravity expression unknown due to size |
| | Amm | AmmInterlayered mixed volcanic rocks, typically amphibolite grade metamorphism |
| | Amn | AmnMRV intermediate to mafic gneiss (tonalitic, dioritic, amphibolitic) |
| | Ams | AmsSchist of sedimentary protolith |
| | Amt | AmtMRV subprovince foliated to gneissic granodiorite to tonalite |
| | Amv | AmvMafic metavolcanic rocks, undiff. minor volcanoclastic and hypabyssal intrusions |
| | Amy | AmyMylonite |
| | Aqa | AqaAmphibolite, schistose to gneissic, Quetico subprovince |
| | Aqq | AqqGranite-rich migmatite, locally magnetic, Quetico subprovince |
| | Aql | AqlLa Croix Granite, locally pegmatitic, Quetico subprovince |
| | Aqm | AqmQuartz monzonite, monzonite, and granodiorite, non-magnetic |
| | Aqp | AqpPorphyritic quartzfeldspathic intrusion |
| | Aqs | AqsBiotite schist, paragneiss, and schist-rich migmatite, Quetico subprovince |
| | Aqt | AqtTonalite-granodiorite-rich migmatite, Quetico subprovince |
| | Asc | AscConglomerate and lithic sandstone |
| | Asd | AsdSyenitic, monzodioritic, and dioritic plutons; typically amphibole- and pyroxene-bearing |
| | Asg | AsgGraywacke and slate; typically greenschist facies metamorphism |
| | Ast | AstSaganaga Tonalite |
| | Auv | AuvUltramafic to mafic volcanic and hypabyssal intrusive rocks |
| | Avs | AvsVolcanic and volcanoclastic rocks, typically calc-alkalic affinity |
| | Mau | MauDuluth Complex, anorthositic intrusions and inclusions, undifferentiated |
| | Mbd | MbdBeaver Bay and other hypabyssal intrusions, diabasic and ferrodiorite |
| | Mbf | MbfBeaver Bay and other hypabyssal intrusions, granophyre and granite |
| | Mbg | MbgBeaver Bay and other hypabyssal intrusions, gabbro, ferrogabbro, gabbrointrusion |
| | Mbt | MbtBeaver Bay and other hypabyssal intrusions, troctolite |
| | Mbv | MbvNorth Branch mafic volcanic rocks |
| | Mcv | McvChengwatana volcanics, primarily mafic flows |
| | Mdg | MdgDiabase to gabbro intrusion, defined largely from geophysical maps |
| | Meg | MegDuluth Complex, Early gabbro series, gabbroic cumulates |
| | Mfg | MfgDuluth Complex, Felsic series, granophyre, ferromonzodiorite, leucogabbro |
| | Mfv | MfvClam Falls volcanics |
| | Mlc | MlcDuluth Complex, Layered series, cyclic zone, gabbro to troctolite |
| | Mld | MldLogan Intrusions, diabase and gabbro sills and dikes |
| | Mlf | MlfDuluth Complex, Layered series, upper contact zone, ferromonzodiorite |
| | Mlg | MlgDuluth Complex, Layered series, lower contact zone, gabbro |
| | Mit | MitDuluth Complex, Layered series, troctolitic zone, troctolite |
| | Mmd | MmdDuluth Complex, miscellaneous intrusions, diabase, gabbro, ferromonzodiorite sills, dikes |
| | Mmf | MmfDuluth Complex, miscellaneous intrusions, felsic rocks, granophyre, granodiorite |
| | Mmg | MmgDuluth Complex, miscellaneous intrusions, gabbro |
| | Mmi | MmiMafic intrusion, most are reversely polarized |
| | Mms | MmsNopeming and Puckwunge Sandstones |
| | Mmv | MmvMinong Volcanic rocks |
| | Mnb | MnbNorth Shore Volcanic Group-upper sequences, primarily mafic volcanic rocks |
| | Mnl | MnlNorth Shore Volcanic Group-lower sequences, primarily mafic volcanic rocks |
| | Mnr | MnrNorth Shore Volcanic Group-upper sequences, rhyolite and icelandite |
| | Mns | MnsInterflow sandstone, siltstone, and conglomerate |
| | Mnu | MnuNorth Shore Volcanic Group-upper sequences, undifferentiated mafic to felsic lavas |
| | Mpv | MpvPowder Mill volcanic rocks |
| | Msl | MslSchroeder-Lutsen basalts |
| | Mss | MssSandstone, siltstone, conglomerate; Fond du Lac Fm., Hinckley Ss, and other rift-flanking* |
| | Mvu | MvuUndifferentiated volcanic rocks and volcanic hornfels |
| | PMm | PMmGabbro and diabase intrusions of uncertain age |
| | Pac | PacAnimikie Group, Virginia Formation slate with thin limestone interbeds |
| | Pag | PagSlate and graywacke, twice deformed |
| | Pai | PaiAnimikie Group, iron-formation, locally includes basal conglomerate |
| | Paq | PaqAnimikie Group, Pokegama Quartzite, local conglomerate and siliceous mudstone |
| | Pas | PasAnimikie Group, Virginia, Thompson, and Rove Formations, mudstone and graywacke |
| | Pdg | PdgGranodiorite; variably foliated |
| | Pdt | PdtHillman tonalite |
| | Pga | PgaGabbroic, noritic, and anorthositic intrusion |
| | Pgd | PgdGray granodioritic to dioritic intrusion |
| | Pgm | PgmGranitic intrusions, variably magnetic |
| | Pgn | PgnSartell granitoid gneiss |
| | Pgp | PgpGabbro, pyroxenite, diorite, and lamprophyre intrusion |
| | Pgr | PgrGranite, red to pink, variably porphyritic, massive |
| | Pgs | PgsGraywacke and slate with graphitic and sulfidic zones, twice deformed |
| | Pgt | PgtHillman tonalite with abundant biotite schist of graywacke protolith |
| | Pgu | PguGranite, undifferentiated |
| | Pif | PifIron-formation, interbedded locally with mafic volcanic and hypabyssal intrusive rocks |
| | Pls | PlsLittle Falls Formation, graywacke, mudstone, and schist and slate |
| | Pmd | PmdMille Lacs Group, Denham Formation; sandstone, marble, schist |
| | Pmi | PmiMafic intrusions; pyroxenite, peridotite, gabbro, lamprophyre; mainly via aeromag |
| | Pml | PmlMille Lacs granite |
| | Pmq | PmqMille Lacs Group; Dam Lake Quartzite |
| | Pms | PmsSedimentary rocks, mudstone, quartzite, graywacke, phyllite, graphitic argillite |
| | Pmv | PmvMafic metavolcanic and hypabyssal intrusive rocks interbedded with argillite, slate, gray* |
| | Pmy | PmyMylonitic, gneissic and schistose rocks of plutonic and volcanic protolith |
| | Psi | PsiSulfidic iron formation associated with graphitic argillite and slate, twice-deformed |
| | Psq | PsqSioux quartzite |
| | Pvs | PvsInterlayered metasedimentary and metavolcanic rocks of Mille Lacs Group |