

Preliminary* Bedrock Geologic Map of Minnesota

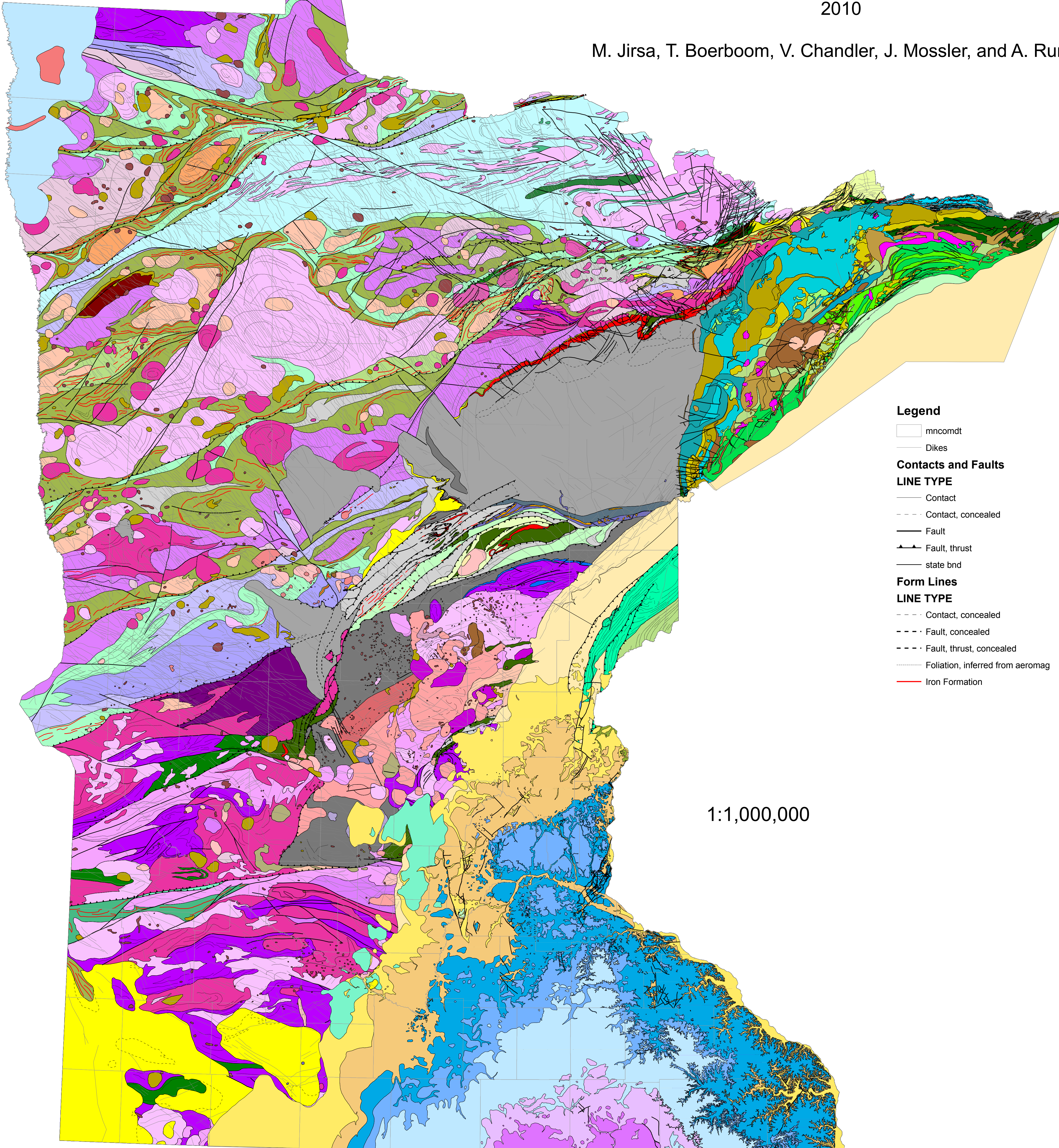
Minnesota Geological Survey

Open-File Report OFR10_02

*These maps have not been reviewed or edited to conform with Minnesota Geological Survey publication standards.

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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

PHANEROZOIC UNITS

- PhuPhanerozoic undifferentiated; sandstone and siltstone
- JuHallock Red Beds; shale, mudstone, limestone, dolomite, and sandstone
- DmuDevonian-middle and upper
- DmDevonian-middle
- OuOrdovician-upper; includes Winnipeg and Red River Fms in NW MN
- OmuOrdovician-middle and upper; Decorah, Plattville, Glenwood, St Peter
- OIOrdovician-lower; Prairie du Chien Group
- CuCambrian-upper
- CmuCambrian-middle and upper

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
- 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
- Mic MicDuluth Complex, Layered series, cyclic zone, gabbro to troctolite
- Mid MidLogan Intrusions, diabase and gabbro sills and dikes
- Mif MifDuluth 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
- Mni MniNorth 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