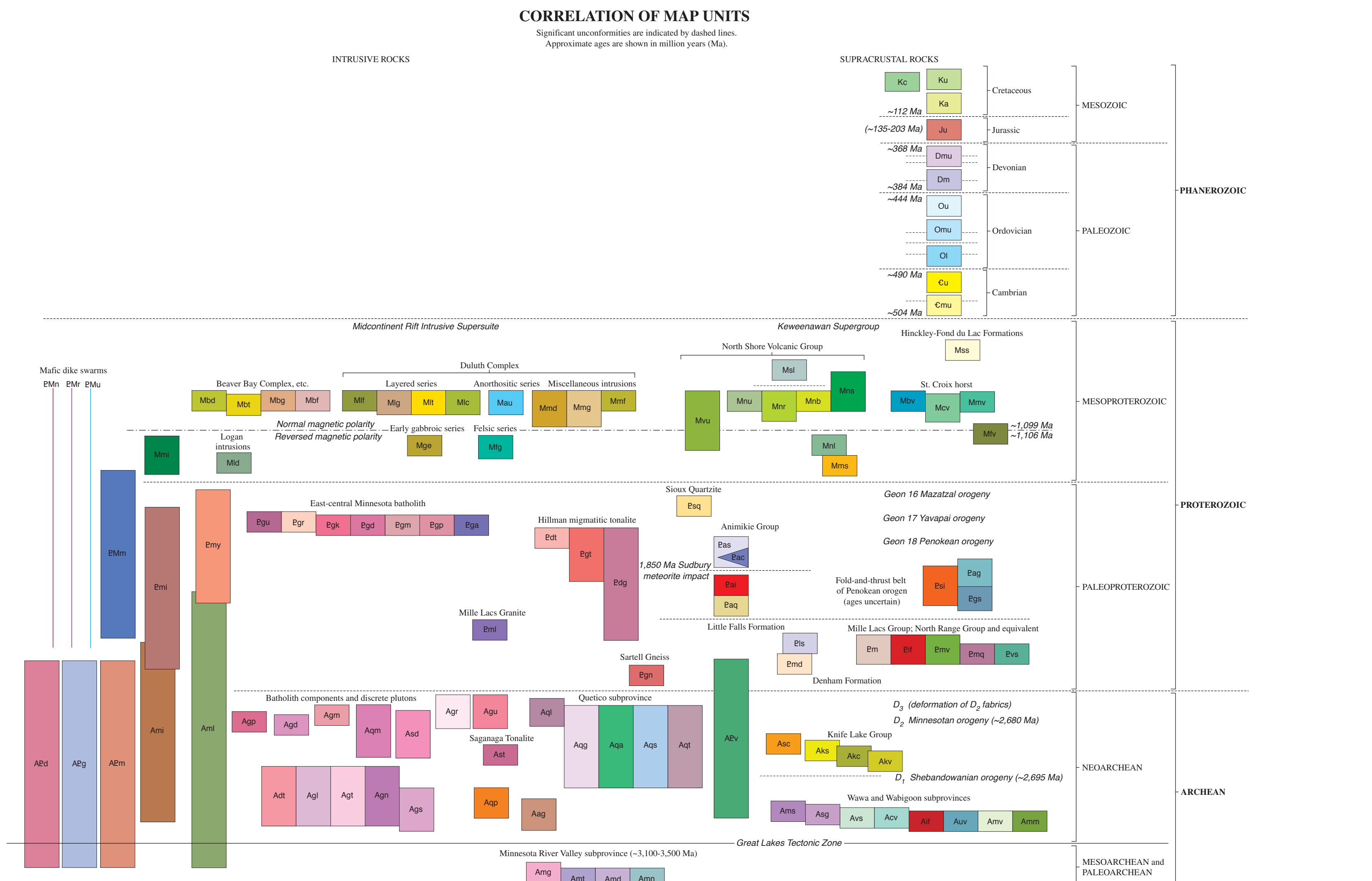
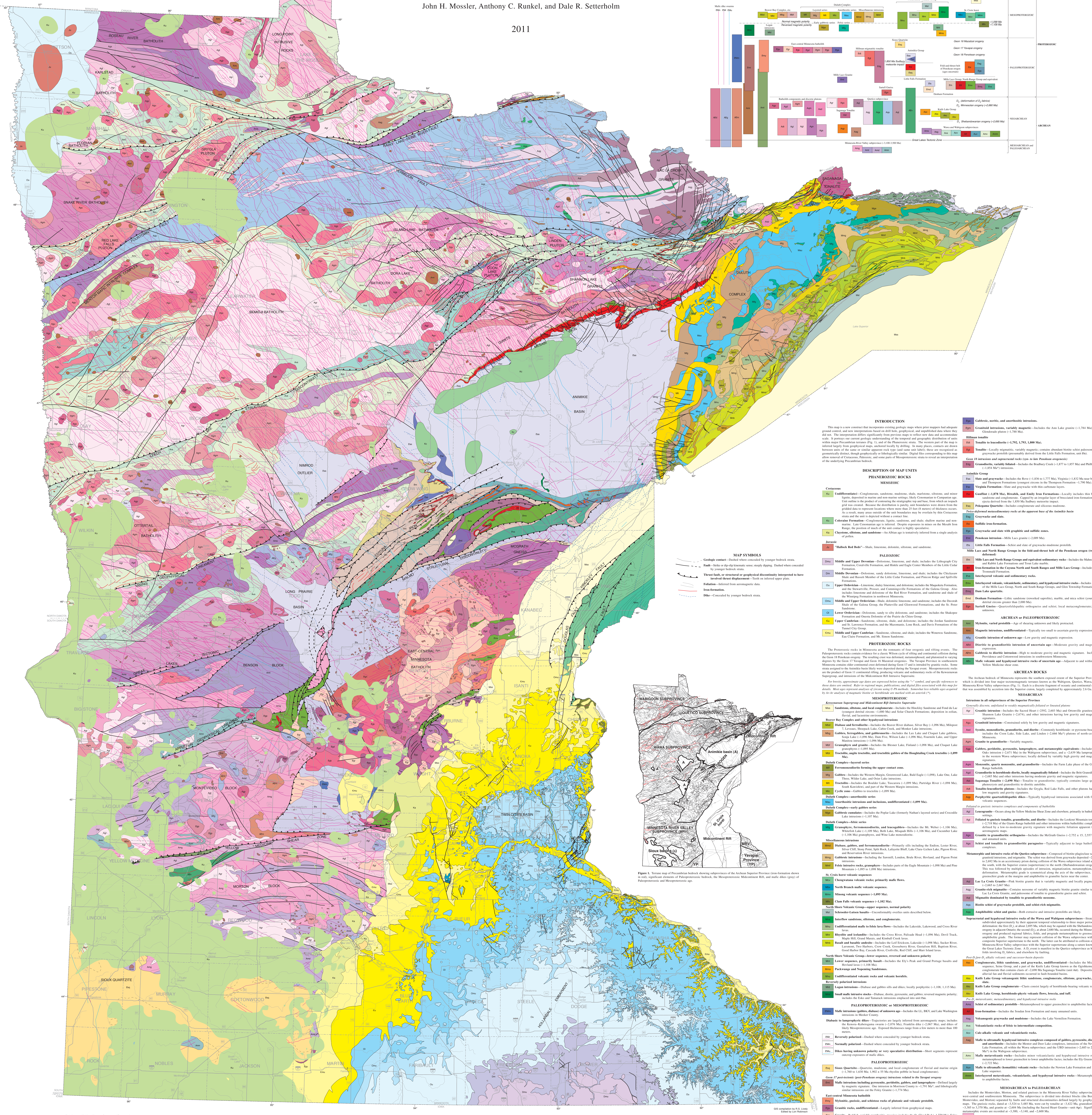


GEOLOGIC MAP OF MINNESOTA BEDROCK GEOLOGY

Compiled by

Mark A. Jirsa, Terrence J. Boerboom, V.W. Chandler,
John H. Mossler, Anthony C. Runkel, and Dale R. Setterholm

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INTRODUCTION

This map is a new revision that incorporates existing geologic maps whose prior purposes had adequate general content, and new interpretations based on field data, geophysical, and stratigraphic data where they did not. The interpretation differs significantly from previous maps in that it reflects new data and accommodates scale. It portrays our current geologic understanding of the state and its geologic history, and provides a basis for future maps. The map is intended largely for geophysical maps, and is not intended to be used for engineering or other purposes. It is intended to be used for general reference, and to provide a basis for future maps. It is intended to be used for general reference, and to provide a basis for future maps.

DESCRIPTION OF MAP UNITS

PHANEROZOIC ROCKS

MESOZOIC

Cretaceous
Unconformities—Conglomerate, sandstone, and shale, deposited in marine and non-marine settings. They characterize the Campanian age. Low relief in the province of connecting the stratigraphic unit and basin, which in some places is a result of erosion of the unit boundaries may be overthrust by the Cretaceous and the unit is deposited within a basin.

Calcareous sandstone—Conglomerate, light, sandstone, and shale, shallow marine and non-marine. Late Cretaceous age is inferred. Despite exposures in some of the Mesozoic Range, the position of much of the unit is highly speculative.

Chert, siltstone, and sandstone—An Alton age unit consisting of a single stratigraphic unit.

Jerome
"Black Red Bed"—Shale, limestone, dolomite, siltstone, and sandstone.

PALEOZOIC

Middle and Upper Devonian—Sandstone, limestone, and shale, includes the Lighthouse City Formation, Carleton Formation, and Middle and Upper Devonian of the Little Lake Group.

Middle Devonian—Sandstone, siltstone, and shale, includes the Chickadee, Shaw, and Boston Members of the Little Lake Group, and Pigeon Ridge and Spillville.

Lower Devonian—Sandstone, siltstone, and shale, includes the Mendota Formation, and the Onondaga and Onondaga Members of the Little Lake Group.

Upper Ordovician—Sandstone, siltstone, and shale, includes the Mendota Formation, and the Onondaga and Onondaga Members of the Little Lake Group.

Middle and Upper Ordovician—Shale, siltstone, and sandstone, includes the Detroit Shale of the Galena Group, the Plattville and Onondaga Formations, and the St. Peter.

Lower Ordovician—Sandstone, siltstone, and shale, includes the Shakopee Formation and Onondaga Member of the Prairie du Chien Group.

Upper Cambrian—Sandstone, siltstone, and shale, includes the Fort Snelling and St. Louis Formations, and the Monticello, Lower Rock, and Dufferin Formations of the Little Lake Group.

Middle and Upper Cambrian—Sandstone, siltstone, and shale, includes the Wisconsin Sandstone, Eau Claire Formation, and St. Louis Sandstone.

ARCHAIC OR PALEOPROTEROZOIC

Mylonite, varied protomylonite—Age of clearing unroofed and highly protomylonite.

Mylonite, unroofed—Typically low relief and magnetic expression.

Granitic intrusion of unknown age—Low gravity and magnetic expression.

Granite to granodioritic intrusion of uncertain age—Moderate gravity and magnetic expression.

Gabbro, peridotite, pyroxenite, lamprophyre, and metamorphic equivalents—Includes the Duluth intrusion (2.21 Ma) in the Mesozoic or Paleoproterozoic, and the Mesozoic or Paleoproterozoic gabbro, peridotite, pyroxenite, lamprophyre, and metamorphic equivalents.

Mafic, volcanic, and hypabyssal intrusions of uncertain age—Adapted to and within the Mesozoic or Paleoproterozoic.

ARCHAIC ROCKS

Granite to granodioritic intrusion of uncertain age—Moderate gravity and magnetic expression.

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NEOARCHAIC

Intrusions in all subdivisions of the Superior Province
 Generally diverse, unroofed, and mostly unroofed, and in some cases unroofed.

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Gabbro, peridotite, pyroxenite, lamprophyre, and metamorphic equivalents—Includes the Duluth intrusion (2.21 Ma) in the Mesozoic or Paleoproterozoic, and the Mesozoic or Paleoproterozoic gabbro, peridotite, pyroxenite, lamprophyre, and metamorphic equivalents.

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PROTEROZOIC ROCKS

Granite to granodioritic intrusion of uncertain age—Moderate gravity and magnetic expression.

Gabbro, peridotite, pyroxenite, lamprophyre, and metamorphic equivalents—Includes the Duluth intrusion (2.21 Ma) in the Mesozoic or Paleoproterozoic, and the Mesozoic or Paleoproterozoic gabbro, peridotite, pyroxenite, lamprophyre, and metamorphic equivalents.

Mylonite, varied protomylonite—Age of clearing unroofed and highly protomylonite.

Mylonite, unroofed—Typically low relief and magnetic expression.

Granite to granodioritic intrusion of uncertain age—Moderate gravity and magnetic expression.

Gabbro, peridotite, pyroxenite, lamprophyre, and metamorphic equivalents—Includes the Duluth intrusion (2.21 Ma) in the Mesozoic or Paleoproterozoic, and the Mesozoic or Paleoproterozoic gabbro, peridotite, pyroxenite, lamprophyre, and metamorphic equivalents.

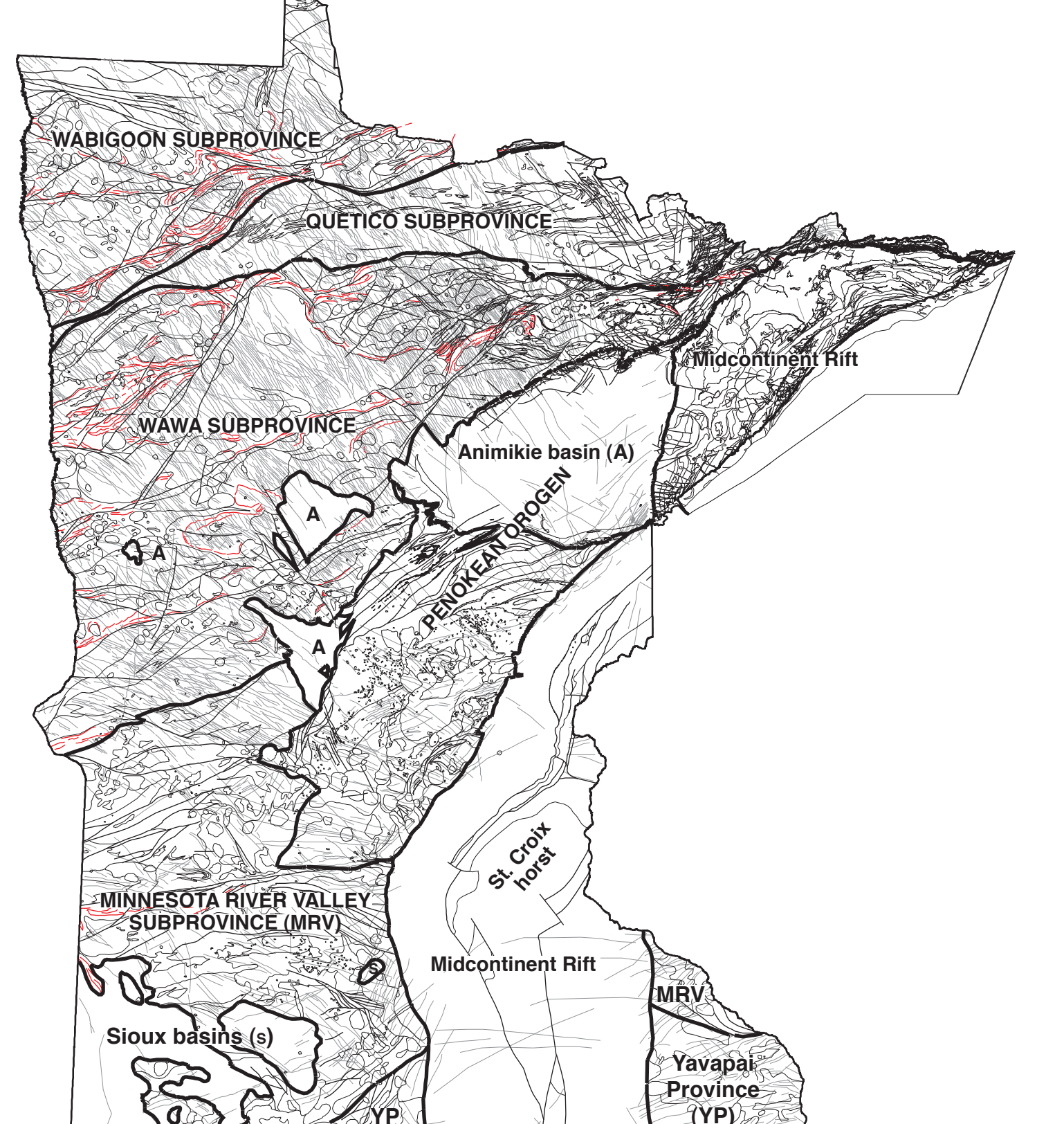


Figure 1. Terrain map of Precambrian bedrock showing subprovinces of the Archaean Superior Province (from Minnesota down to rock, significant elements of Paleoproterozoic bedrock, the Mesoproterozoic-Mesozoic Belt, and mafic dikes (gray) of Paleoproterozoic and Mesoproterozoic age.