Minnesota Geological Survey
Information Systems

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Some of us look up, to construct meteorological charts
Much of our effort is in depicting land-surface features
The first subsurface layer is bathymetry
Next, soil mapping by agricultural agencies
Then, geology
Geological mapping, like all of the mapping we do, is an essential service
Geological mapping, like all of the mapping we do, saves money

- lives saved
- resources discovered
- costs avoided
- increased efficiency
- fundamental understanding

Schematic cross section across the South Galien sub basin
We need to accelerate in response to societal needs

Content
Collaboration
Administration
Infrastructure
Formats
Accessibility
Resolution
Global
National
State
County
Future geological mapping needs to be

Regularly updated
Zoomable
Queryable
Complete
Seamless
3D

Onshore to offshore
Accessible
The Association of American State Geologists (AASG) represents the State Geologists of the 50 United States and Puerto Rico. Founded in 1908, AASG seeks to advance the science and practical application of geology and related earth sciences in the United States and its territories, commonwealths, and possessions.

Click on each state to go to its geological survey!

Other selection options...

This server is run by the Alaska Division of Geological & Geophysical Surveys (DGGS).
Last updated 05/25/2007 10:32:42.
Comments to the DGGS Webmaster.
Trend in Revenue to State Geological Surveys
(nominal dollars; 2015 revenue estimated)
3D geology
We are heading toward a 2-resolution, layered set of databases that will include the offshore, that will underly bathymetric and soil mapping, and that will be as compatible as possible with neighbors.
The geological mapping database will be underpinned by authored and peer-reviewed geological maps, while efforts to refine stratigraphic nomenclature are ongoing.
Progressively more seamless geological polygons, at 1:500,000 and 1:100,000, are tending to have thickness indicated, while properties, heterogeneity, and uncertainty will gradually be more specified. Parsing of legends, to facilitate queries, is using broadly accepted, well-defined terminology, to facilitate inference of properties.
A layered 1:500,000 state bedrock geologic map is largely complete, while a new state surficial geology map is in development.
Preliminary Bedrock Geologic Map of Minnesota

Minnesota Geological Survey
Open-File Report OFR10_02

2010

M. Jirsa, T. Boerboom, V. Chandler, J. Mossiler, and A. Runkel

Legend

- Intrusive
- Dikes
- Contacts and Faults

LINE TYPE
- Contact
- Fault, concealed
- Fault, exposed

Form Lines
- Contact, concealed
- Fault, concealed
- Fault, exposed
- Paleozoic, indicated from map
- Iron Formation

1:1,000,000
New 1:100,000 mapping is county-based, is meant to be complete statewide within a decade or two, and is focused on societal needs, with an emphasis on groundwater protection and management, while taking a broad approach. Where required to resolve issues, 1:24,000 mapping is conducted.
COUNTY GEOLOGIC ATLAS
Part A

Database
Bedrock Geology
Surficial Geology
Quaternary Stratigraphy
Depth to Bedrock/Sand Distribution Model

Available for ~ half of Minnesota’s 87 counties via:
http://www.mngs.umn.edu
The geological mapping is meant to be linked to associated spatial databases.
Minnesota Geological Survey

Databases

- Geological Survey Publications
- Geological Mapping; 1:0.5M & 1:100K
- Geological data
- Geological collections
- Geophysical data
- Geochemical data
The publication database, which is spatial through publication footprints, includes nearly 50,000 pages, and 700 scanned maps, both searchable and fully web accessible.
road cut shows a mixture of Cretaceous clay with the Cambrian, the top of the whole being thinly and irregularly covered over and chinked up with course drift. The Cambrian is more or less broken and tilled, at least the bedding seems to have been cut into huge blocks by divisional planes, which, either by weathering or water-wearing, were widened, the blocks themselves being subsequently thrown to some extent from their horizontality, tipping in all directions. The opened cracks and seams were then filled with the Cretaceous clay, which is deposited between these lecanced masses, and sometimes even to the depth of twenty feet below the general surface of the top of the rock. The clay sometimes occupies rocks and rounded angles, sometimes sheltered below heavy masses of the Cambrian beds. The clay is uniformly bedded, about horizontally, with some slope in accordance with the surface on which the sedimentation took place. But the most interesting and important feature is the condition of these old Cambrian surfaces. They are rounded by the action of water, evidently waves. The cavities and porous spots are more deeply eroded, making little pits on the face of the rock; or along the lines of section of the sedimentation planes with the eroded surface, there are furrows due to the greater effect of water. The rounded surface of these huge masses of limestone is coated with a thickness of about a half inch, or an inch and a half, of iron ore, which scales off easily, and is easily broken by the hammer. While this scale of iron ore is thicker near the top and on the upper surface of the blocks, yet it subsides down between the Cretaceous clay and the body of the rock."

Another deposit of greenish clay (Fig. 25) similar to the two last described, enclosed in a cavity of the Shakopee limestone and in part appearing to be a stratum overlain by it, was noted beside the carriage road from South Bend to Mankato close east of its bridge over the Blue Earth river.

**FIG. 25. CRETACEOUS CLAY BENEATH THE SHAKOPEE LIMESTONE, MANKATO.**


In the S. W. 1 of section 30, Lime, the quarry of J. R. Beatty & Co. exhibits a thickness of twenty to twenty-five feet of the Shakopee limestones. The top of this ledge is weathered and hollowed in shallow pockets. Near the middle of the quarry face, as it was at the time of examination, these weathered cavities reach to a depth of fifteen feet, their sides being in part encrusted with an iron-rusty scale, an eighth to a half of an inch thick. They are filled with very coarse ferruginous gravel, much weathered, so that sometimes its pebbles up to three or four inches in diameter are almost perfectly spherical. In some of these crevices scanty traces of white clay occur with the gravel, the former being probably Cretaceous, while the latter seems to be older than the glacial drift, and may be Cretaceous or of earlier date, possibly representing the period in which these hollows were eroded. Close west of this quarry is found a thick bed of whitish, very fine earth (analysis 2, page 480), containing too little clay for brick-making.

Professor Winchell writes as follows respecting these probably Cretaceous deposits at localities recently examined by him near Mankato. "At the quarry of the Standard Cement company, lately opened in the east bank of the Blue Earth river about a third of a mile south of the railroad bridge, the Shakopee limestones is separated from the Jordan sandstone by a course of light green or often nearly white shale or clay, highly silicious and alumimous, having a thickness of about three feet. The Hydraulic qualities of the Shakopee limestone seem to be associated with the presence of this bed of shale, and to be altogether an accidental and local character. The formation has before been known to be somewhat hydraulic, but here this quality is so far extended as to make a valuable source of hydraulic lime. In the Shakopee limestones here are also numerous pits and gorges, rounded off with age and crusted over with a ferruginous scale
Publications

- Scanned maps
- 700 maps
Minnesota Geological Survey - Digital Data

The Minnesota Geological Survey (MGS) has published over 660 maps and reports. The MGS Publication Footprints display the time and location of each project.

How to use this map

- Click on the map to the right in the location of interest.
- Browse thru the pop-up window using the small arrows located in the upper right of the pop-up.
- Scroll down to find MORE INFO on a particular publication. You can download data through this link.

To find out more information during a particular time select the tab that displays the year of publication.

Enjoy the 16+ decades of publication
Geological databases include field observations, geotechnical data, hydrogeological data, images, karst database, the mineral exploration document archive maintained by the natural resources department (DNR), sediment texture and lithology, as well as the largest and most important database in this group – the half-million site water well database.
Geological data

- Geological observations
  - MGS – 40,000 sites
  - DNR Aggregate
Geological data

- Geotechnical data
Geological data

- Hydrogeological data
Geological data

• Images
Geological data

- Karst database
- 12,164 sites
Geological data

- Sediment texture and lithology
- 12,000 analyses
Databases

- Water well data
482,680 wells
266,675 located
82,773 located bedrock
4,783 located cuttings
6,034 located geophysics
Geological collection databases include cuttings, the million-meter DNR drill core library, fossils at the Bell Museum, geochemical samples, hand samples, sediment samples, and thin sections.
Collections

- Cuttings
  - 4800 sites
Collections

- DNR drill core library
- 3 million feet
Collections

- Fossils
- 16,242 specimens
Collections

- Geochemical samples
Collections

- Hand samples

~40,000 specimens
Collections

- Sediment samples
  - ~25,000 samples
Collections

• Thin sections
Geophysical databases include borehole geophysics, gravity, magnetic, rock properties, and soundings.
Geophysical data

- Aeromagnetic data
Geophysical data

- Gravity
Geophysical data

- Borehole geophysical log index
- 5500 logs
- Average depth 336’
Databases

- Rock Properties
  - 4000 values
Geophysical data

- Soundings
Statewide geochemical databases include groundwater, soil, and soil parent material; while geochronological databases are in varying states.
Geochemical data

- Soil geochemical data
- Till geochemical data
- Groundwater geochemical data
Many elements of this emerging MGS information system exist, some are in preparation, and some are aspirational. The mapping will never be finished, but rather will be regularly-updated.
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