

The following was presented at DMT'10  
(May 16-19, 2010).

The contents are provisional and will be  
superseded by a paper in the  
DMT'10 Proceedings.

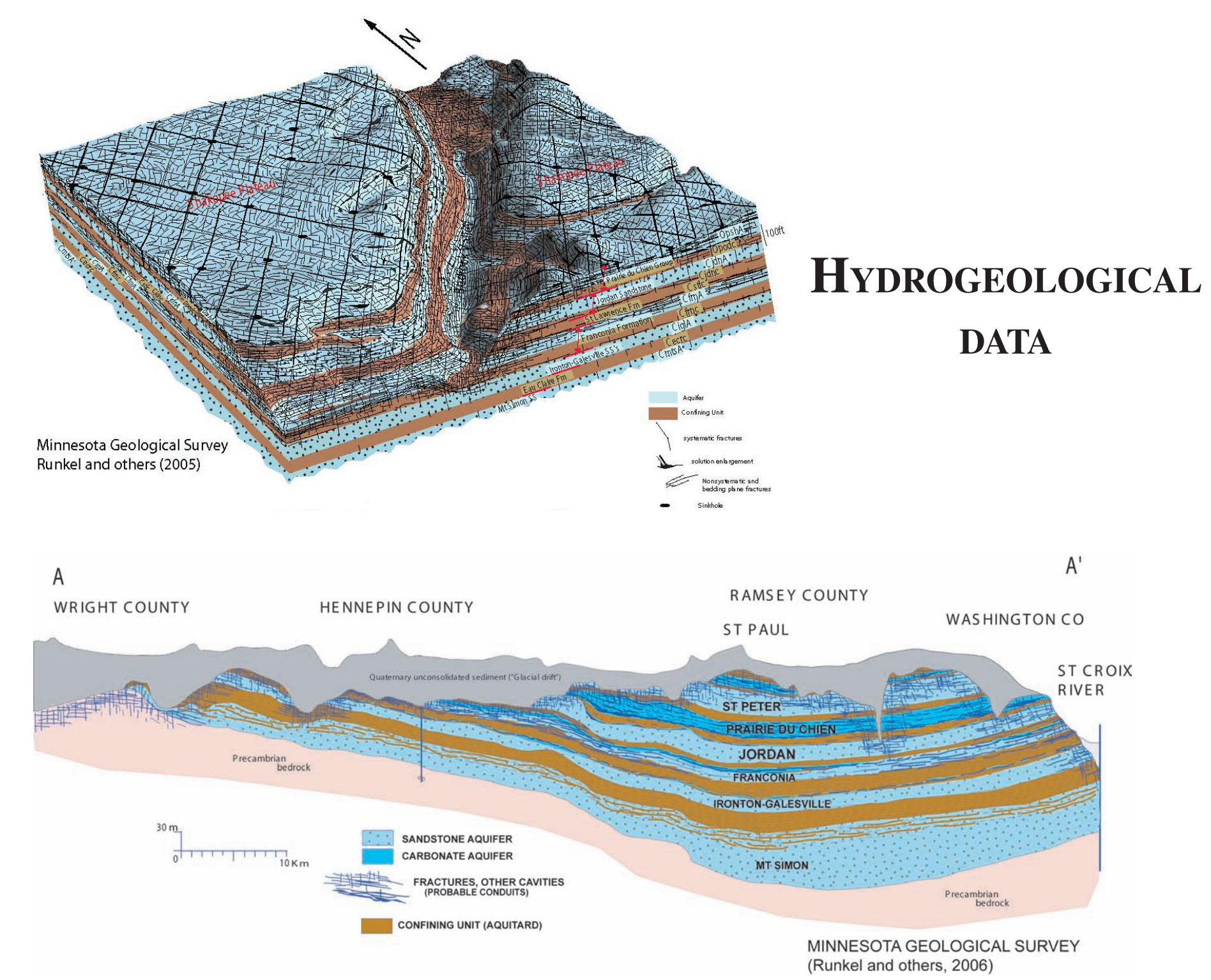
See also earlier Proceedings (1997-2009)  
<http://ngmdb.usgs.gov/info/dmt/>

# A Draft Structure for Minnesota Geological Survey Information Systems

by

Harvey Thorleifson, Rich Lively, and Tim Wahl

Minnesota Geological Survey  
2010



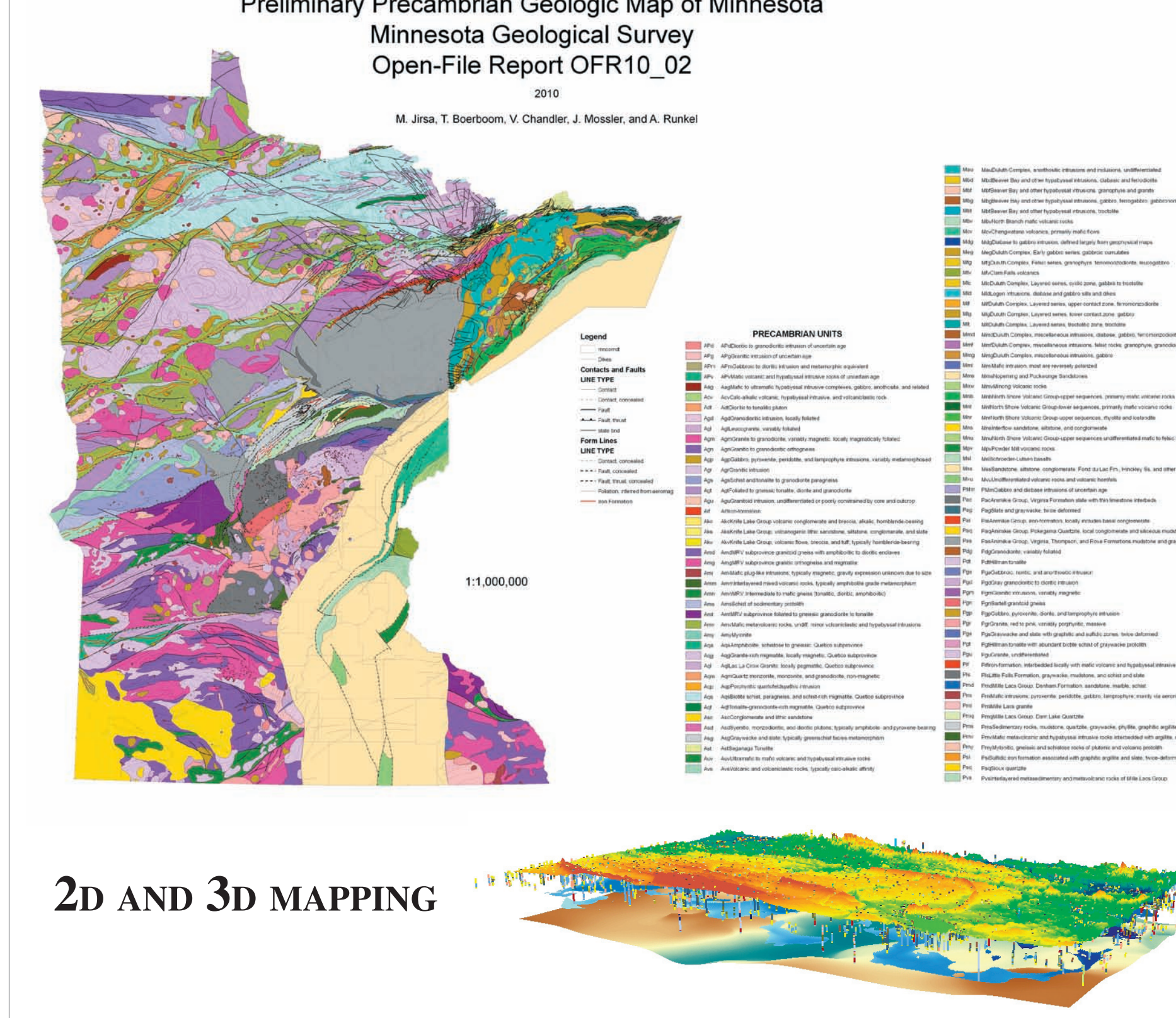
We foresee the need to initiate a database that will compile hydrogeological measurements, such as hydraulic conductivity values, to be progressively linked to geology and groundwater systems.



Of fundamental importance to everything we do is the 500,000-site water well database that we steadily augment in partnership with the Health Department.



Scans of 40,000 pages and 600 maps are done, and our intention is to bring publication metadata together with pdfs and digital books in a content management database, with each publication having a spatial footprint.



In 2010, we will initiate web services coverages meant to eventually stitch together 2D and 3D surficial and bedrock geological mapping at two scales, 1:100,000 and 1:500,000, supported by an archive of GIS files.



Our collection of 15,000 rocks has been re-cataloged at the project level, and over the long term will be more fully cataloged and georeferenced at the item level.

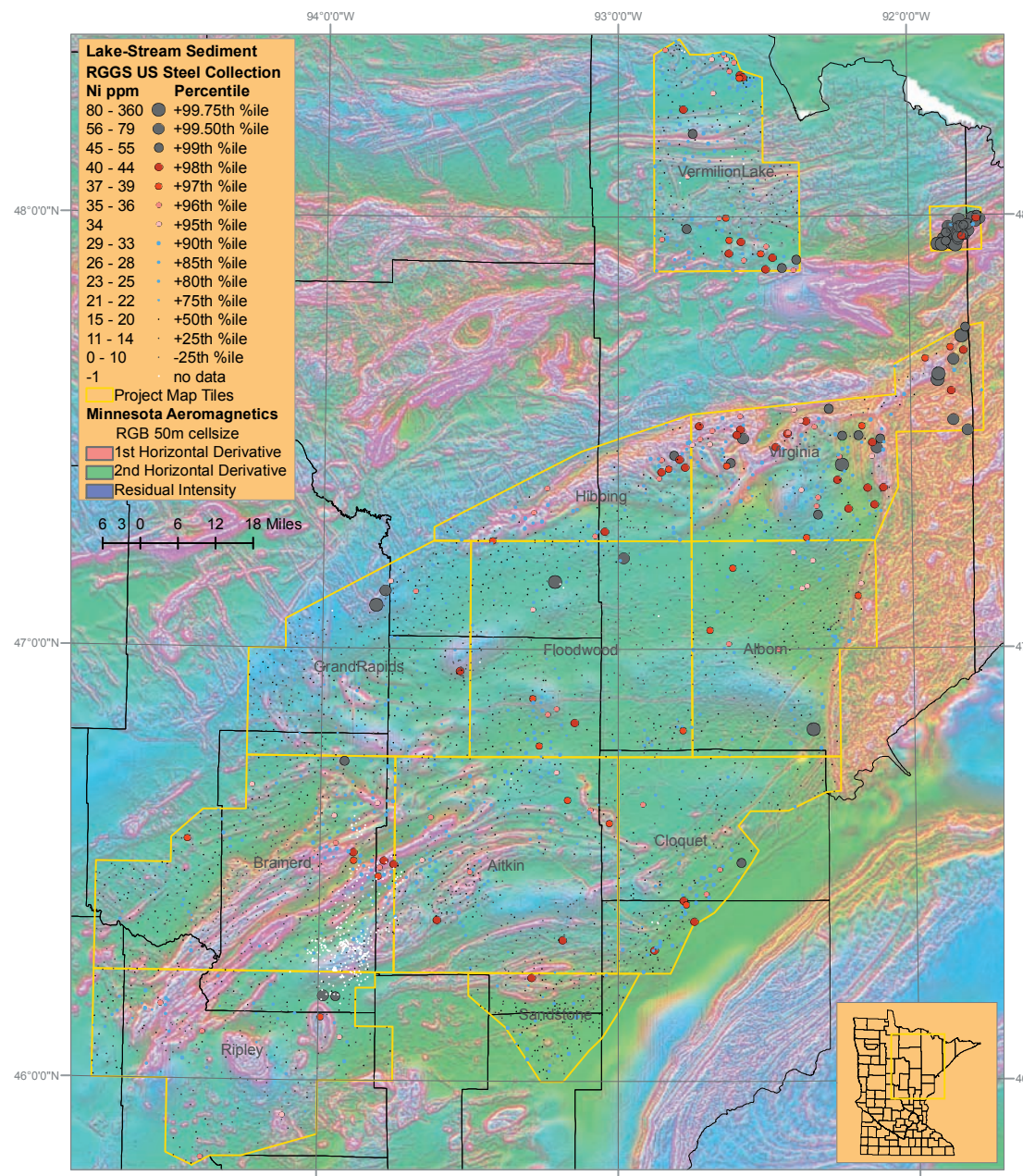


Our collection of 7000 thin sections has been cataloged at the item level, and over the long term, will be more fully georeferenced.

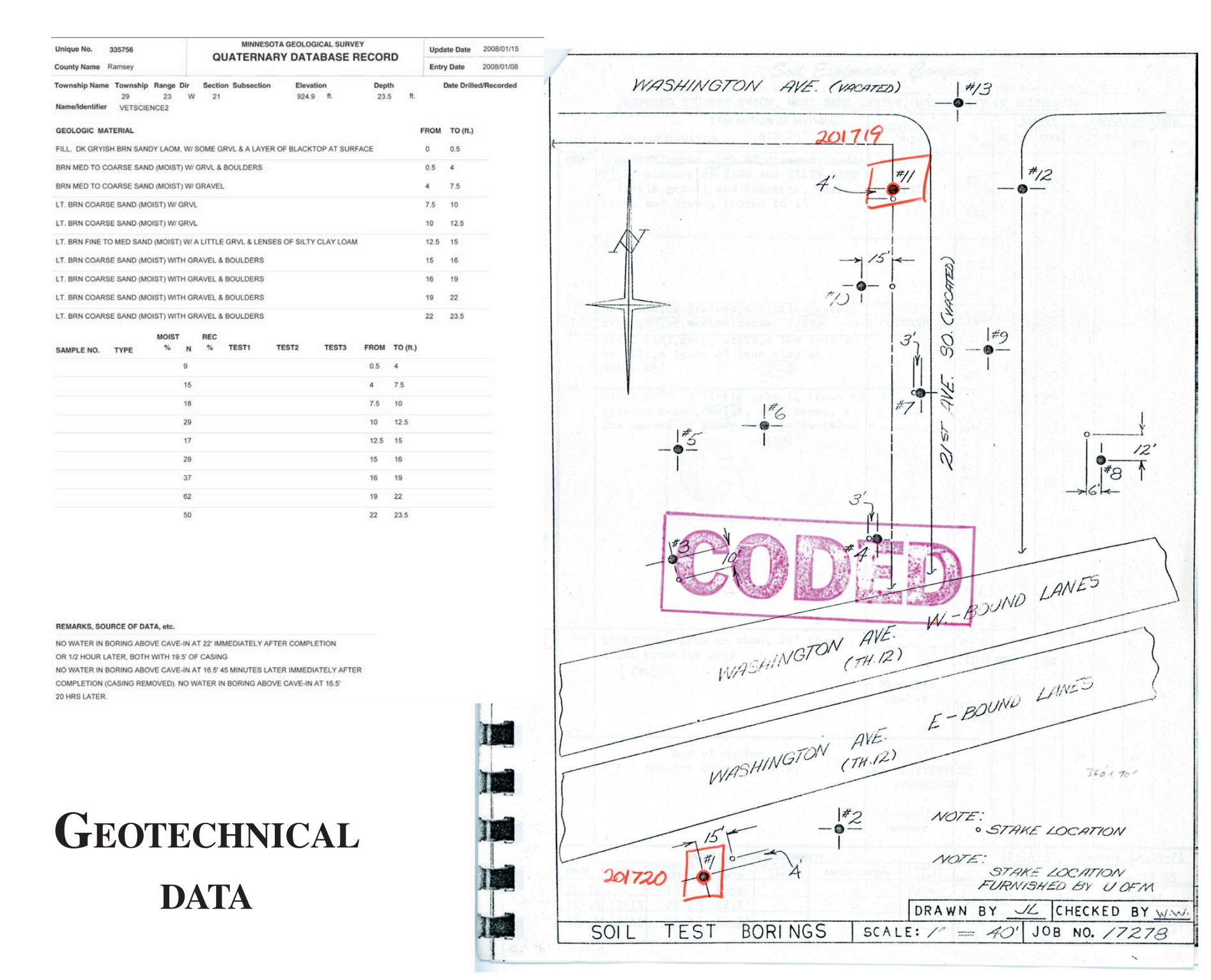
## ABSTRACT

Minnesota Geological Survey staff are working in cooperation with partners to develop a database structure that will accommodate all Minnesota geological information systems - encompassing publications, including scans of all reports and maps, statewide 2D & 3D geological mapping - including all GIS files, images, geological observations, karst, sediment texture and lithology, geochemical data, aeromagnetic data, gravity observations, rock properties, borehole geophysical profiles, water well data, geotechnical data, hydrogeological data, hand samples, thin sections, sediment samples, geochemical samples, cuttings, drill core, fossils, geochronology, and outcrops. The entry point for each component database will be spatial. The plan is being developed so that day to day database augmentation and enhancement will be guided by a medium to long term plan.

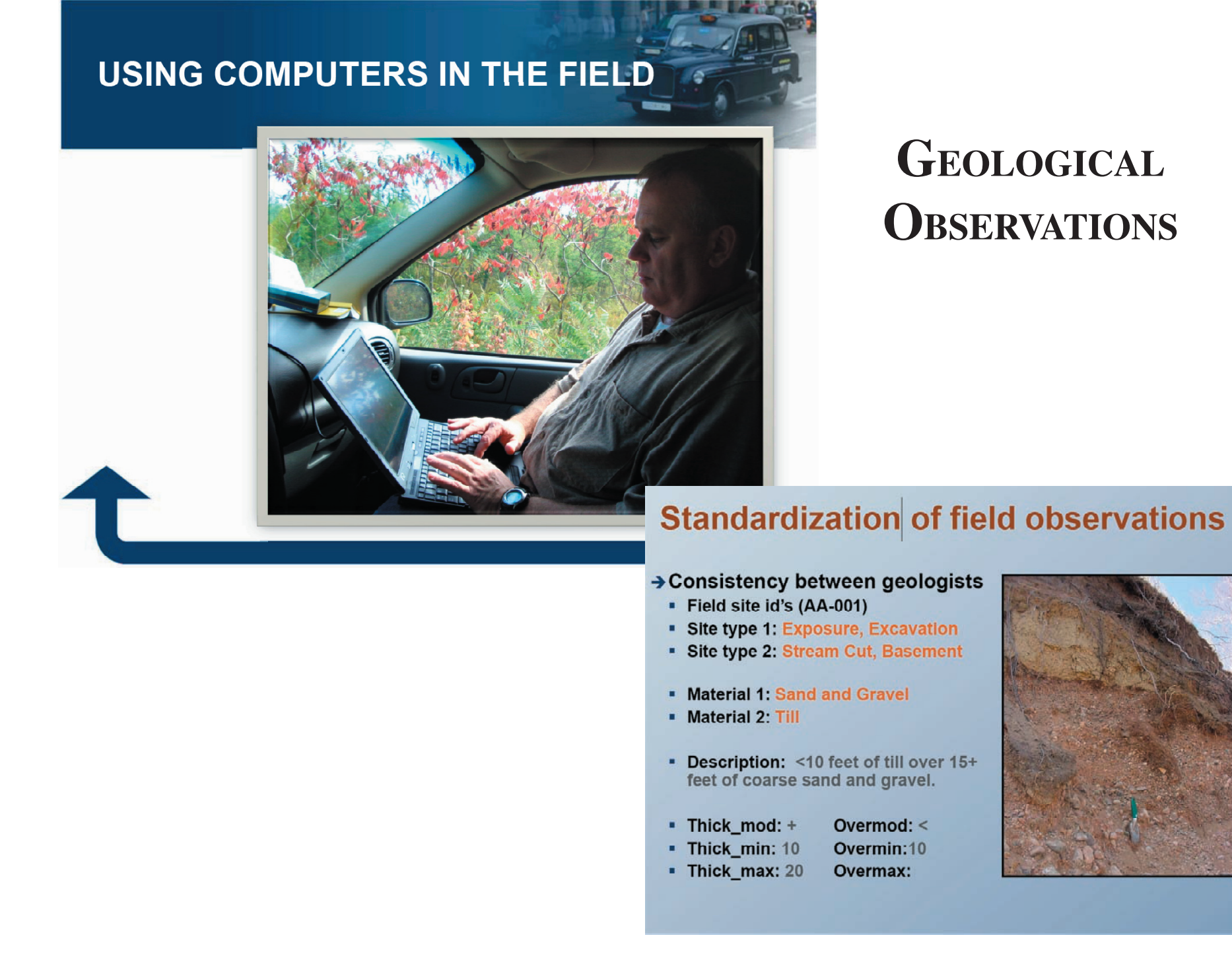
## MINERAL EXPLORATION DOCUMENT ARCHIVE



DNR maintains an important archive of 100,000 mineral exploration documents that is being progressively scanned and cataloged.



We have initiated a database of geotechnical engineering drillhole results, presently 7500 sites, and we are examining options for the manageable augmentation of this database in coordination with partners.



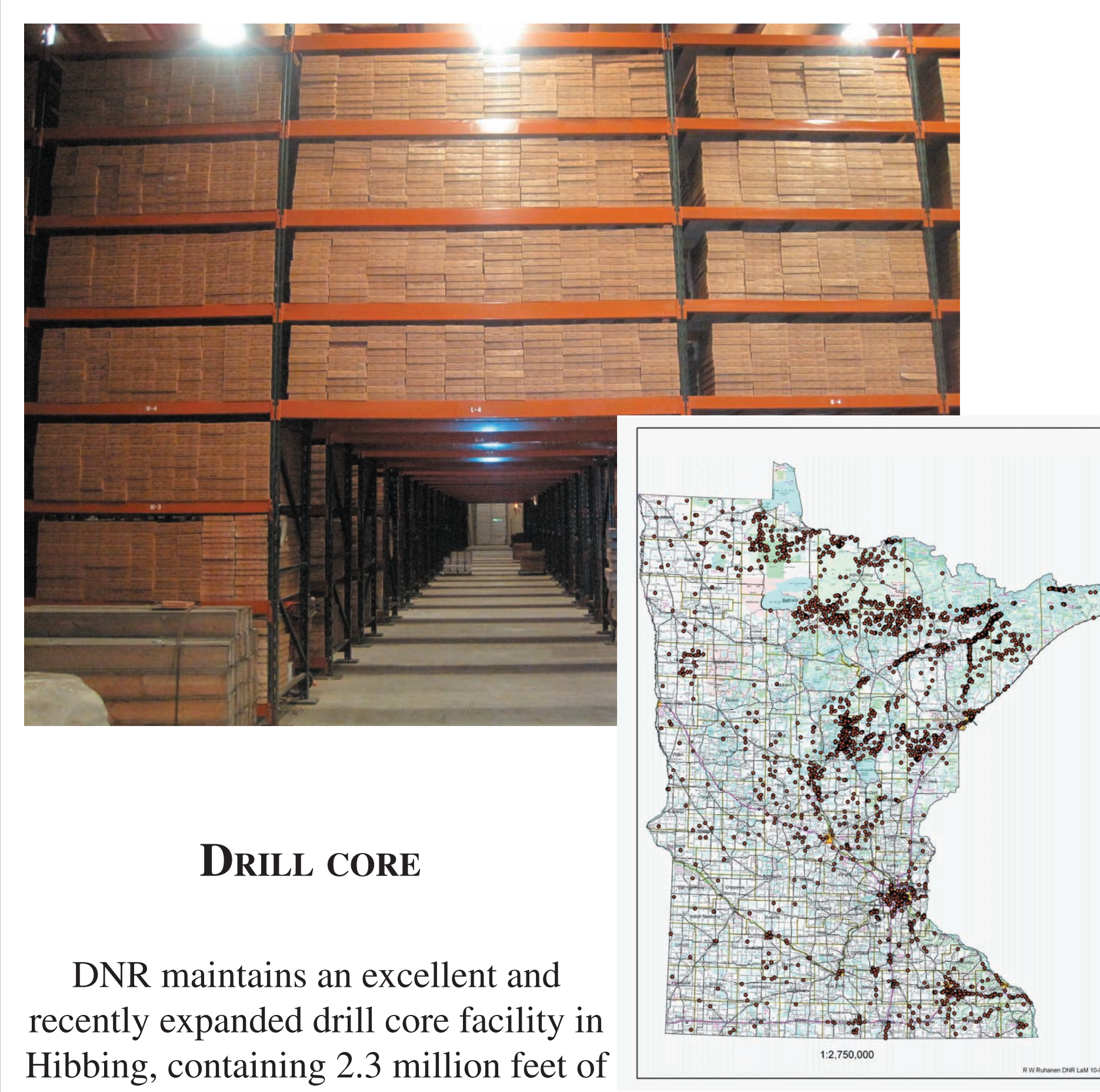
We have various databases of geological field observations that will gradually be brought together, and we are working in cooperation with the DNR Aggregate group, which has done much to standardize their field work.



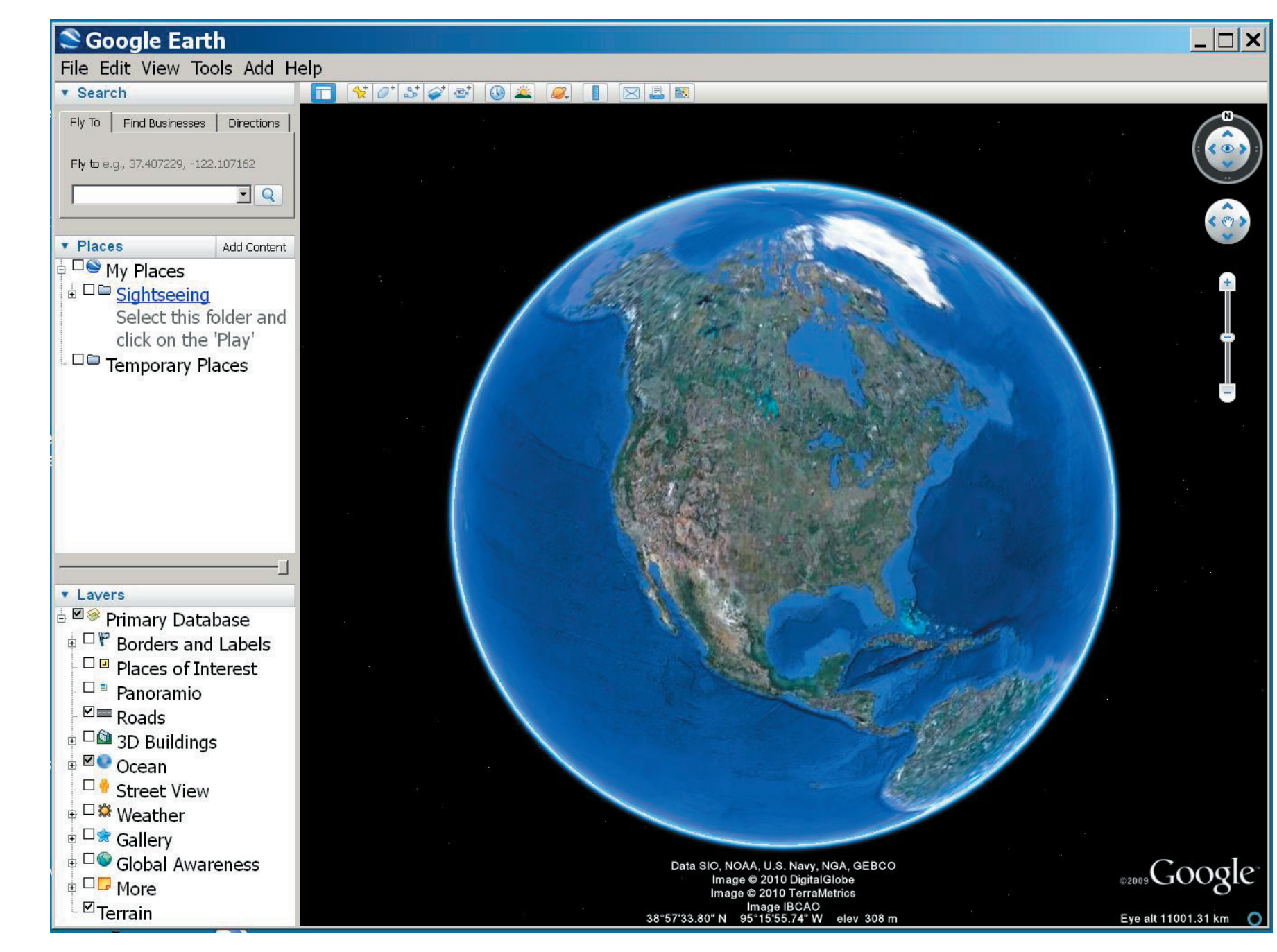
We have scanned hundreds of slides, which will be brought together with born-digital images, and will progressively catalog and georeference them.



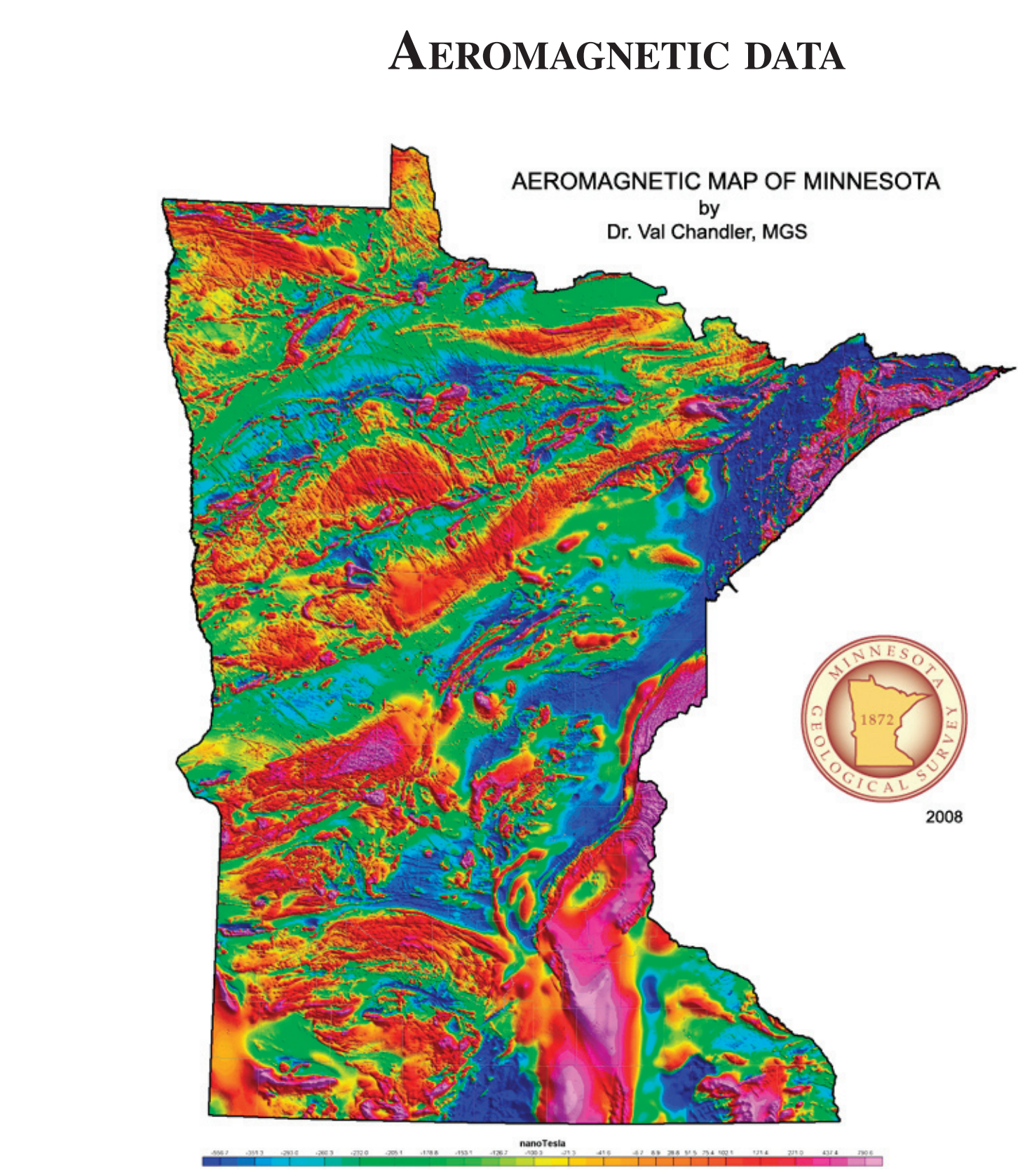
Our collection of 5000 cutting sets is a crucially important reference that is heavily used in mapping, research, and in water well management applications.



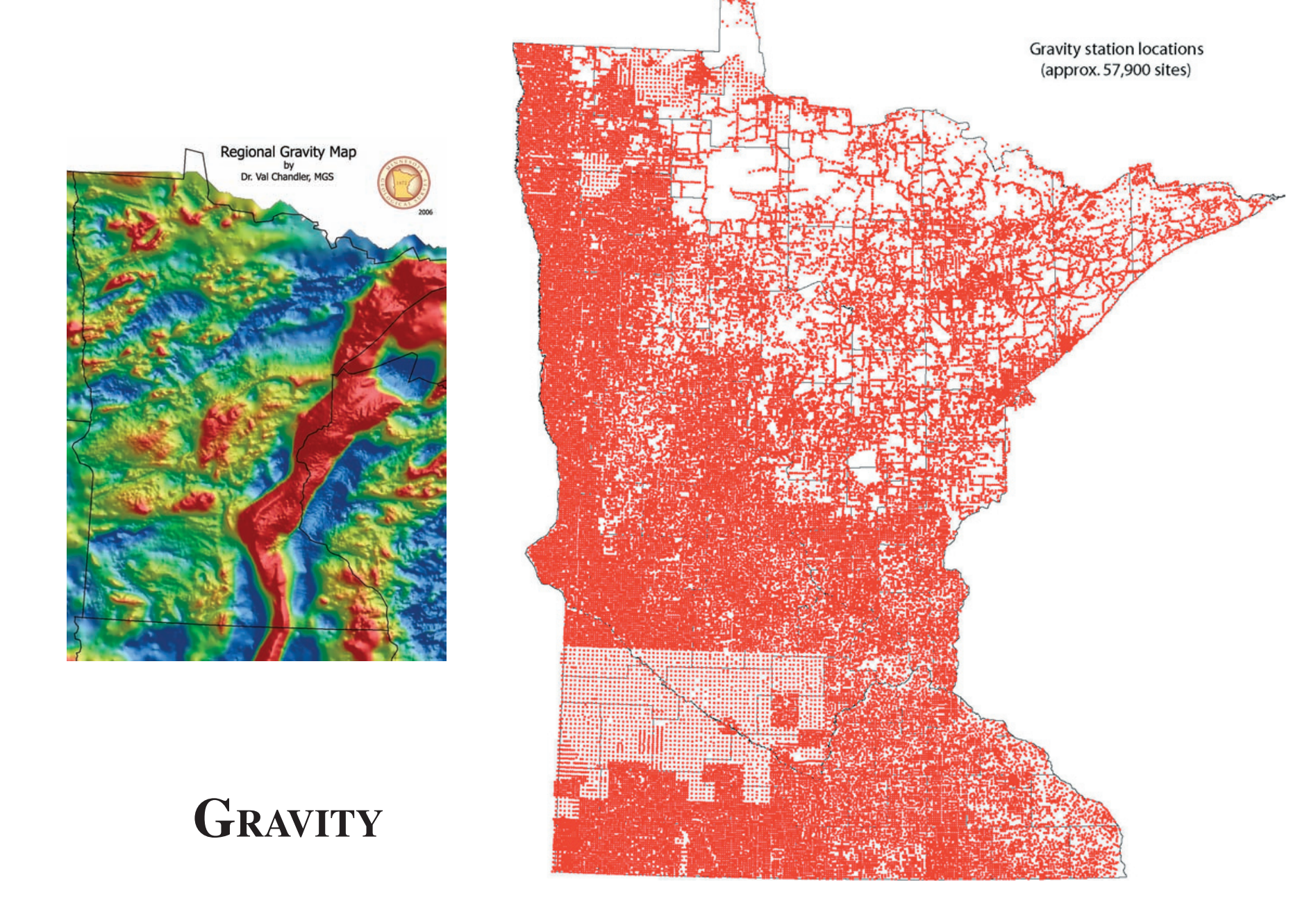
DNR maintains an excellent and recently expanded drill core facility in Hibbing, containing 2.3 million feet of well cataloged and well stored core.



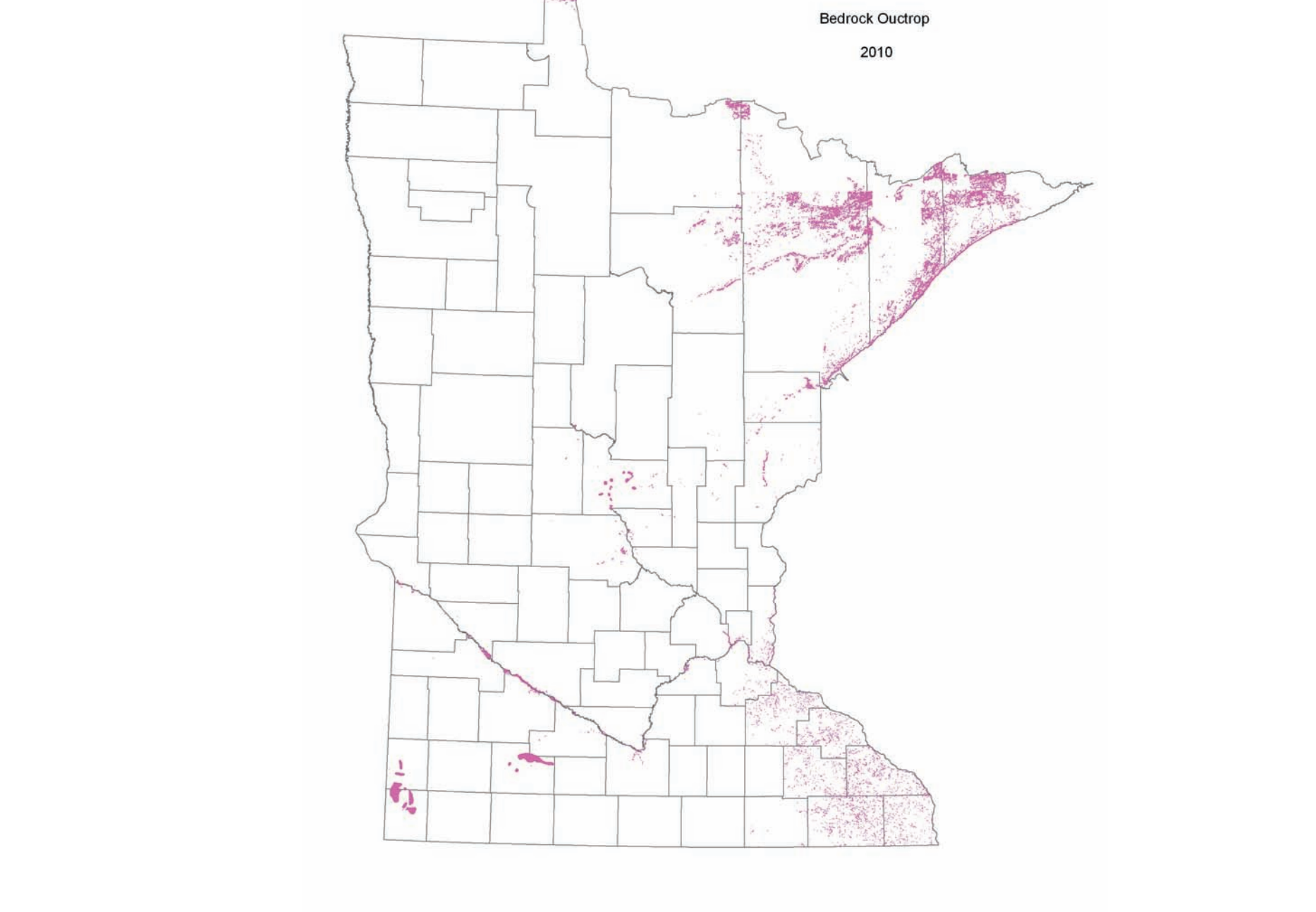
The vision is a structure for everything that Minnesota Geological Survey and its partners have to offer regarding Minnesota geology, geophysics, and geochemistry that will be as accessible as the Google Earth menu.



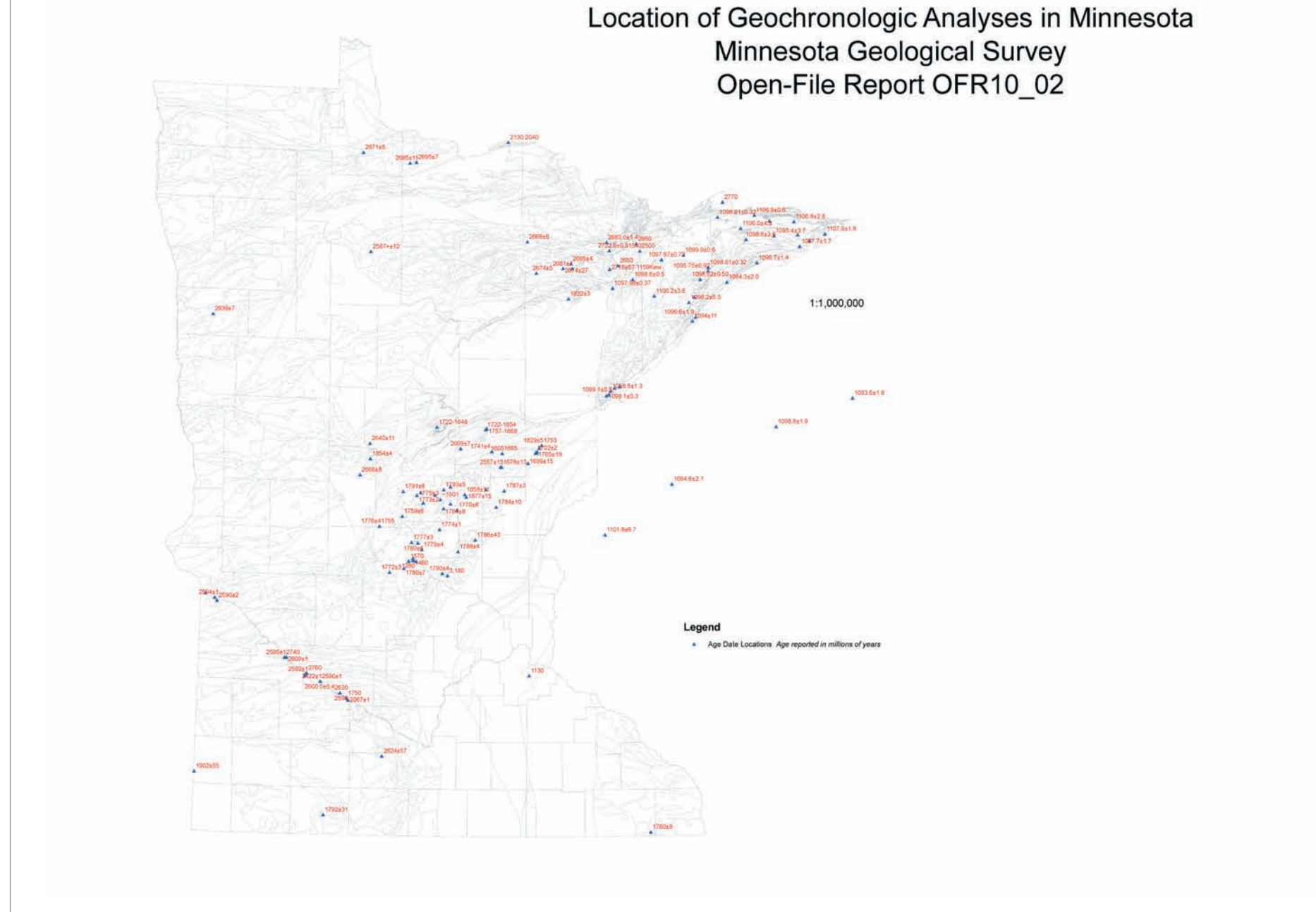
Support from the State enabled a \$200k reprocessing of the entire aeromagnetic database, resulting in greatly enhanced feature resolution.



In 2010/2012, support from the State will permit a comprehensive upgrade of the 58,000-site gravity database, based on enhanced location precision for every site.



We have recently completed a georeferenced index of over 150,000 outcrop point and polygon locations.



As part of a statewide revision of the Bedrock Geology map of Minnesota the MGS has compiled a geo-referenced database of geochronologic analyses



Our archive of 25,000 sediment samples collected for geological mapping and till characterization is well cataloged, well georeferenced, and well stored.



Working with USGS, an archive of soil and sediment samples representative of the entire state on the regional scale is in storage, for potential future reanalysis.

Project Files

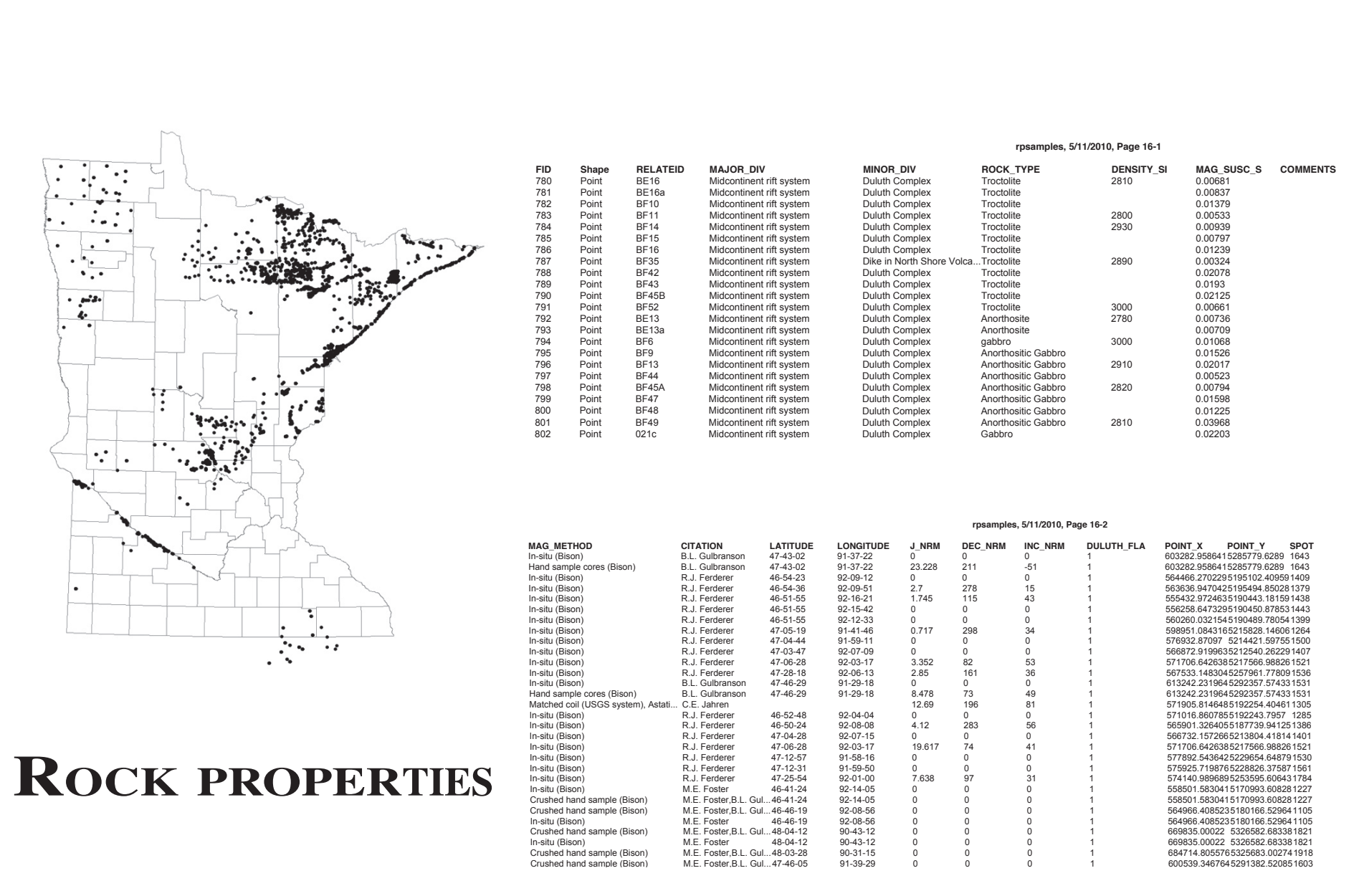
Databases

Publicly available Web, FTP, and Web Services

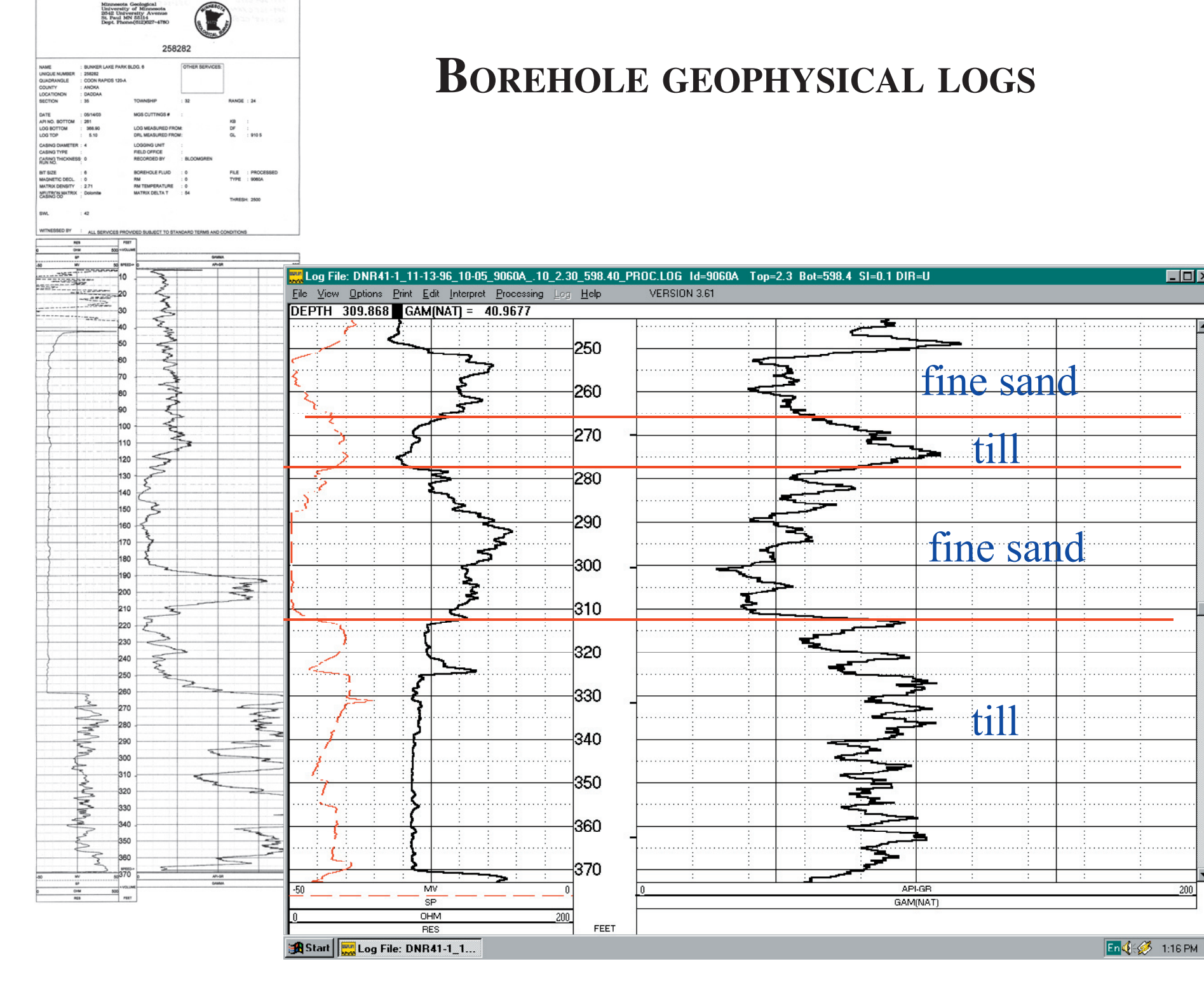
The Minnesota Geological Survey is partitioning its digital holdings into:

- project files, the digital equivalent of filing cabinets and which are not for public use;
- a secure set of databases that are iterated and augmented as often as necessary, and;
- a set of databases that are accessible to the public through the Web and FTP, and more and more, via Web Services.

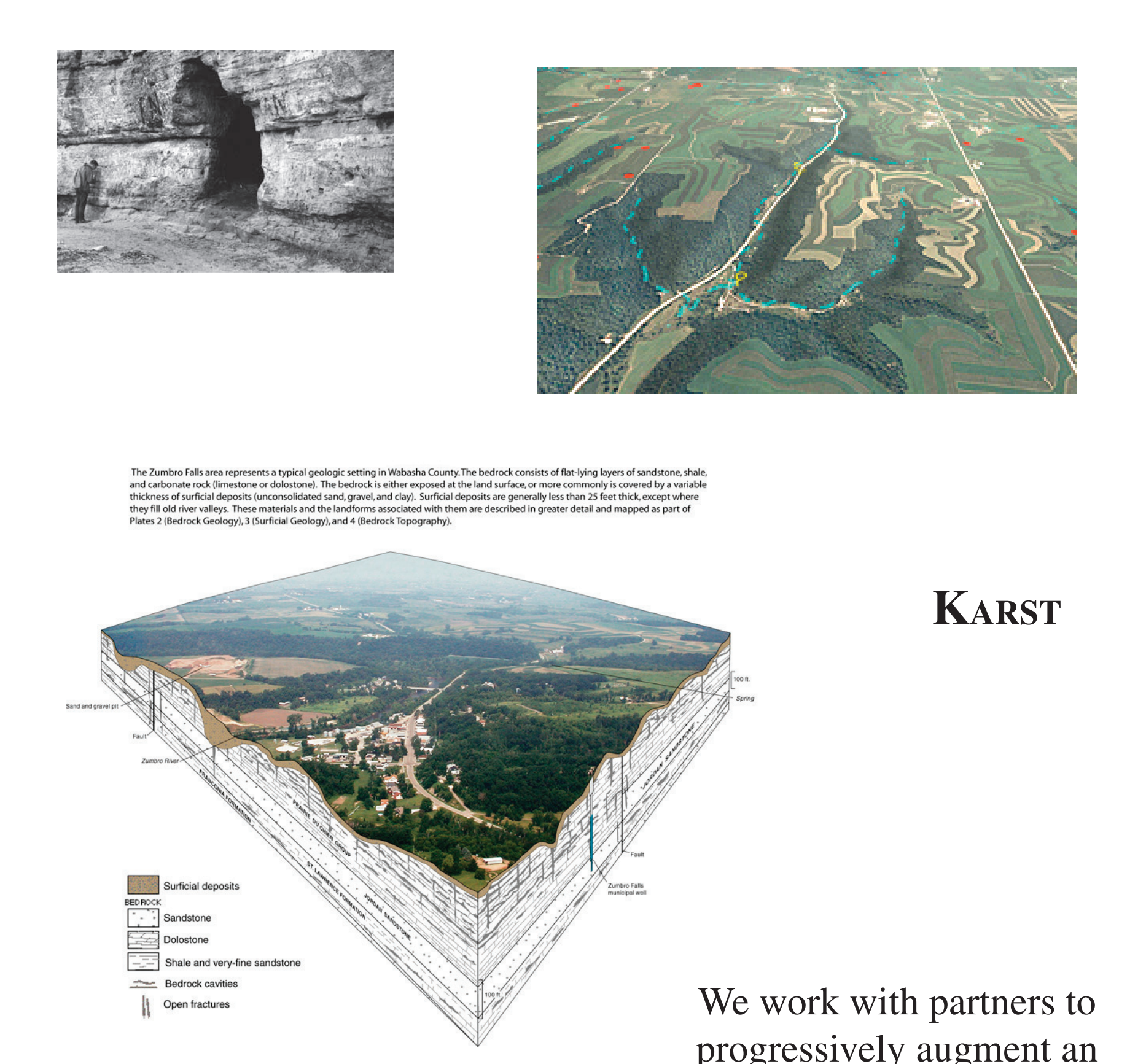
Presently, the focus is on 24 separate databases, illustrated on this poster.



In 2010/2012, support from the State will permit a comprehensive upgrade of the 4,000-site rock properties database, based on incorporation of vertical georeferencing.



We maintain a georeferenced index of our 5500 borehole geophysical logs.



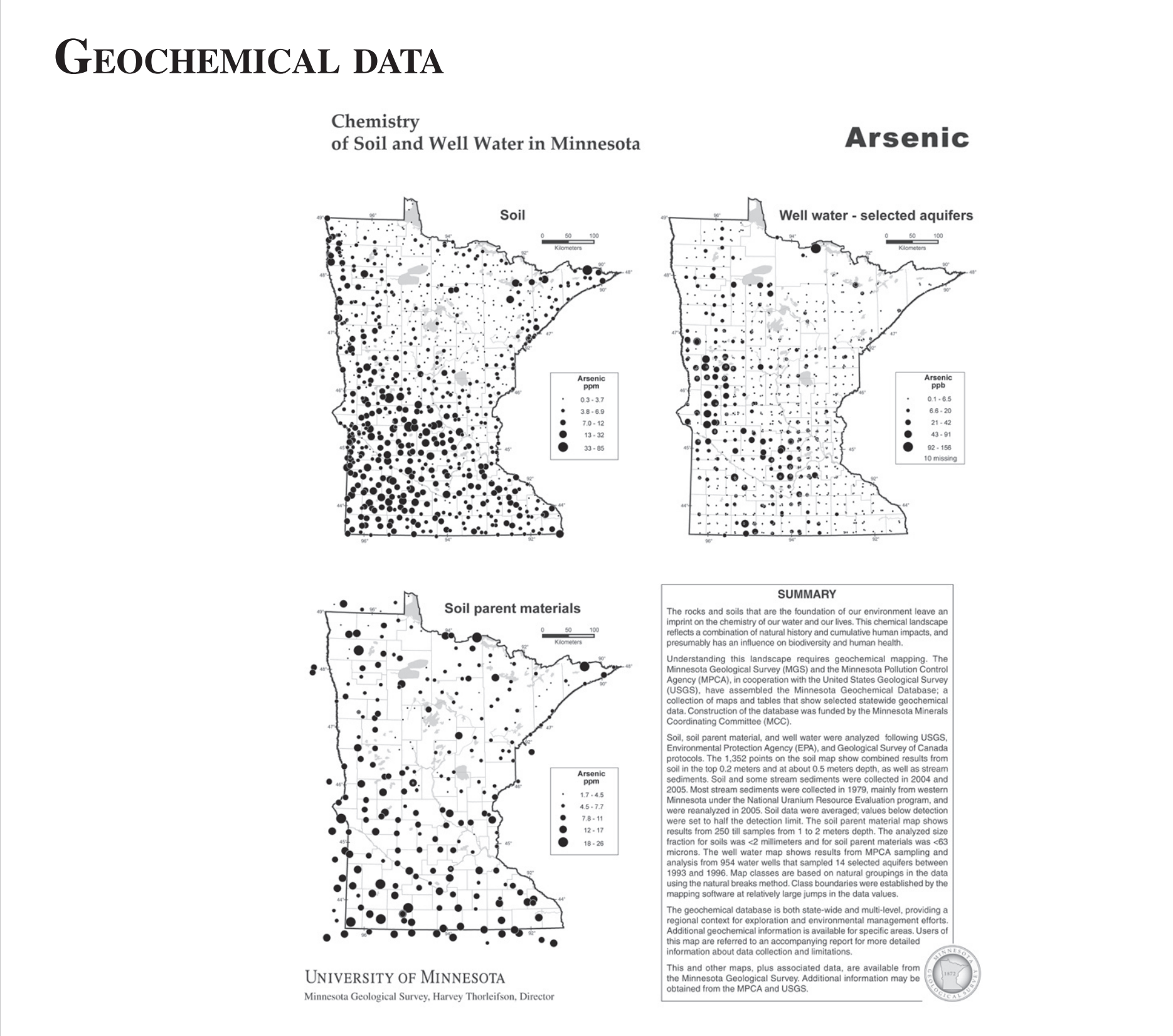
We work with partners to progressively augment an important database regarding 12,000 karst features.



The University maintains a well cataloged collection of 16,000 Minnesota fossils.



We have a well georeferenced database of 12,000 sediment analyses, mostly till compositional analyses for geological mapping and till correlation, and we are seeking support to incorporate many analyses not yet in the database.



In cooperation with USGS and the Minnesota Pollution Control Agency, we have built a statewide database of regularly distributed multi-element geochemical analyses of soil, till, and groundwater.