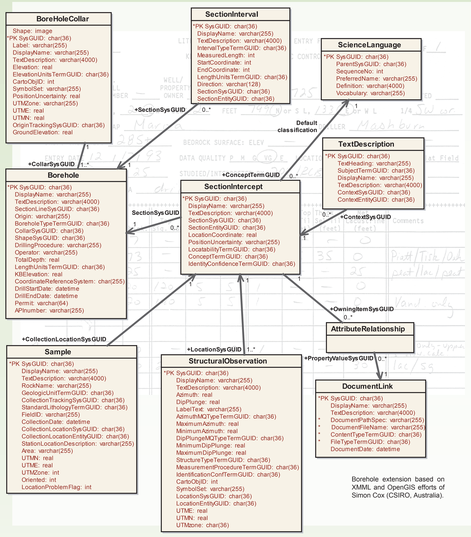
THE NATIONAL GEOLOGIC MAP DATABASE PROJECT

ngmdb.usgs.gov

ADDING DEPTH TO NADM C1

We are extending the NADM to include station and borehole data (e.g., field notes, photos, outcrop and well descriptions, lab analyses).

SHOWN: SectionIntercept part of the borehole extension



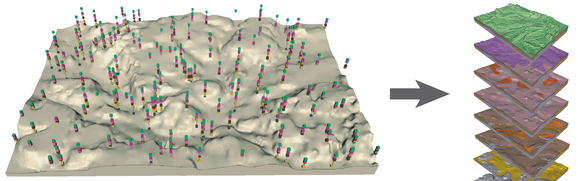
Borehole extension based on XMML and OpenGIS efforts of Simon Cox (CSIRO, Australia).

Physical data model for Borehole (uses UML data model profile by IBM). Boreholes have zero to many intercepts or intervals, each with a default classification, and each of which may have associated samples, structure measurements, text descriptions, and associated documents (only links for SectionIntercept are explicitly shown here). A borehole has exactly one associated BoreholeCollar point from which the hole was started.

For information on this aspect of the project, contact:

Dave Soller, USGS, drsoller@usgs.gov
Steve Richard, USGS / AZ Geol. Survey, steve.richard@azgs.az.gov

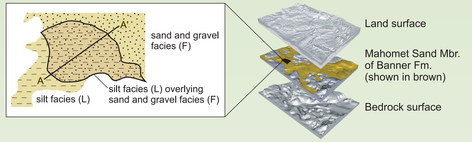
This is a collaborative project managed by the AASG and the USGS.



Boreholes can be used to create a 3D model that shows vertical and lateral variations in geology. How can we manage this in a database?

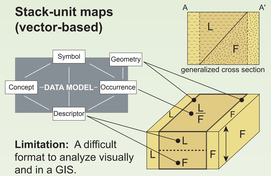
SHOWN:
Subsurface exposure of lacustrine (L) and fluvial (F) facies of Mahomet Sand Member of Banner Formation in Macon, De Witt, and Logan Cos., east-central IL.

adapted from Soller and others (1999)



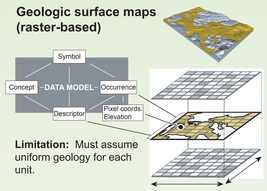
Traditional approaches

Stack-unit maps (vector-based)



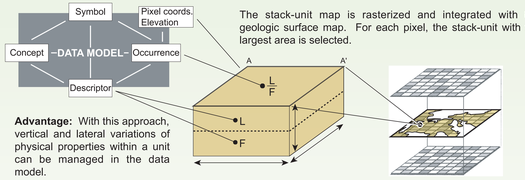
Limitation: A difficult format to analyze visually and in a GIS.

Geologic surface maps (raster-based)



Limitation: Must assume uniform geology for each unit.

An integrated approach

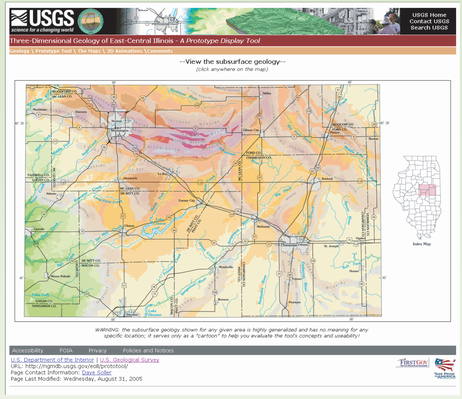


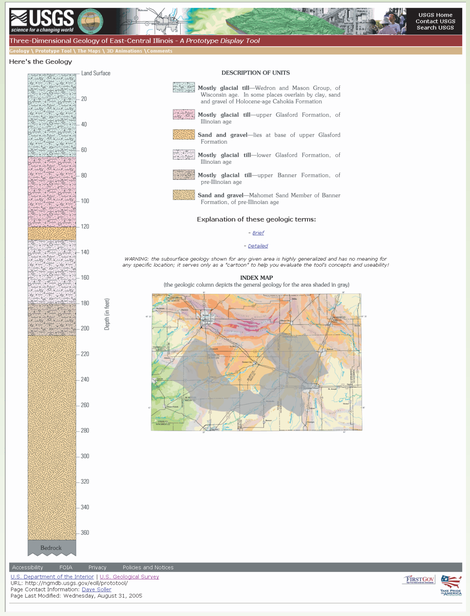
The stack-unit map is rasterized and integrated with the geologic surface map. For each pixel, the stack-unit with the largest area is selected.

Advantage: With this approach, vertical and lateral variations of physical properties within a unit can be managed in the data model.

GENERATING A "BOREHOLE" AT ANY LOCATION

The information on 3D maps is not always easy to visualize and use. For example, it can be difficult to integrate all the information in order to characterize the entire column of geologic units at a specific location. In the prototype shown below, for any map location that the user selects by a mouse-click (on the left-hand image), the tool will dynamically generate a log showing all geologic units beneath that point (right-hand image).





This is a prototype, intended only to show the general concepts. When operational, the web-based tool will be standards-based, operating against a NADM-compliant database, thereby enabling it to be implemented by other projects and agencies. We welcome your comments!

For information on this aspect of the project, contact:

Dave Soller, USGS, drsoller@usgs.gov
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Richard Berg, ISGS, berg@isgs.uiuc.edu

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