Data and Map Delivery of Geologic Maps of Ohio

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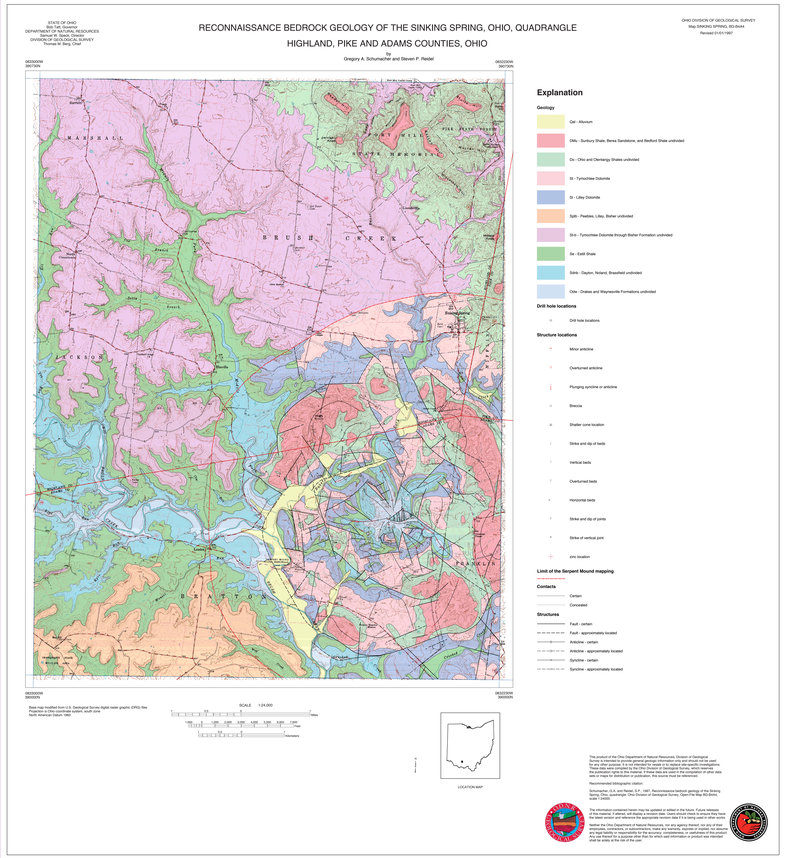


The Ohio Division of Geological Survey (ODGS) recently completed the mapping and conversion of 5 major geographic-information-systems (GIS) data sets at 1:24,000 scale: bedrock geology, bedrock topography, structure-contour maps of the mappable units of the bedrock geology, karst geology, and the abandoned-underground mines. These GIS data sets represent a major advance in the availability of digital geologic information for the state of Ohio.

In 1991, a new program was initiated at the ODGS to perform more rapid reconnaissance geologic mapping at 1:24,000 scale. This program created 788 bedrock-geology maps, 787 bedrock-topography maps, and 1840 structure-contour maps of the mappable units in support of the bedrock-geology maps. These maps were converted to a GIS between 1992 and 2002.

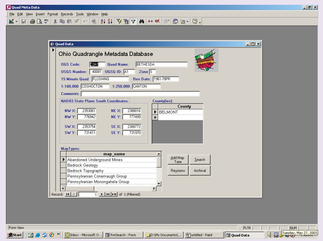
In addition to the bedrock-geology and bedrock-topography maps, the karst geology and the abandoned-underground mines were also mapped at 1:24,000 scale. The karst-geology mapping was mapped in a reconnaissance manner, at 1:24,000 scale, in 1996 and conversion to GIS data layers in 1997. Mapping of the abandoned-underground mines has been ongoing since 1979. These maps were converted to a GIS in 1996, with significant updates 2003. Over the last 12 years, over 3000 maps at 1:24,000-scale have been created.

Above is an example of one of the bedrock-geology maps generated from the GIS data sets created in the last 12 years.

ABSTRACT

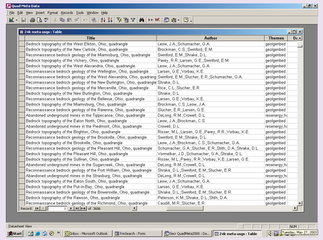
The Ohio Division of Geological Survey is developing digital databases that can eventually be accessed through the National Geologic Map Database. These digital databases include the bedrock-geology at 1:24,000 and 1:500,000 scales, the bedrock-topography at 1:24,000 and 1:500,000 scales, the three-dimensional surficial-geology at 1:24,000 and 1:100,000 scales, and the abandoned-underground mines at 1:24,000 scale.

One method of accessing data is by examining the map catalog of the National Geologic Map Database. The Ohio Division of Geological Survey has compiled a metadata database of all open-file geologic maps created at 1:24,000 scale. The metadata database is used for a number of different applications. Software applications have developed for the extraction and plotting of 1:24,000-scale bedrock- and bedrock-topography maps for the entire state. The during the extraction process, the title, revision dates, and authors are extracted from the metadata database and placed onto the newly composed map. The metadata database can be used to populate and update the map catalog of the National Geologic Map Database. So far, the Ohio Division of Geological Survey has contributed over 3700 citations to the map catalog at 1:24,000 scale. Once a customer has identified a map using the map catalog, a request can be made to the Geologic Records Center at the Ohio Division of Geological Survey for either a printed map or the digital data. Future methods of access can involve on-line access through a map server.



In order to manage the quadrangle-map information for these 3000 maps, a quadrangle metadata database was created. The metadata database was created to serve a number of different needs. Public service requests, inventory control, bibliographic citations, and GIS metadata are just some of the uses of this database.

A user can view simple metadata on each quadrangle, by selecting an individual quadrangle name. Once the individual quadrangle has been selected, the user can view general information concerning the quadrangle, such as the counties and the 15-minute quadrangle the 7.5-minute quadrangle is located within, and map themes that the quadrangle contains.

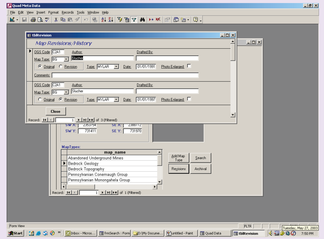


The quadrangle-metadata database is used for other applications. Here is a example of the database table containing the theme, title, authors, and revision dates of all the quadrangle-map themes. This table is used to export citations to the National Geologic Map Data Base (NGMDB) Geologic Map Catalog. The Geologic Map Catalog portion of the NGMDB is a national, electronic listing of available paper and digital geologic maps in the United States. All the published maps, including maps within text publications, and the majority of the open-file maps of the ODGS have been entered into the NGMDB.

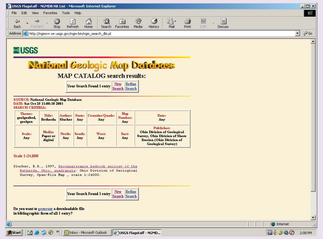
SUMMARY

ODGS has created the 1:24,000-scale bedrock-geology and bedrock-topography GIS data sets. An application for the bedrock-geology and bedrock-topography maps has been created for plot-on demand and data distribution. 1575 individual 7.5-minute quadrangle maps can be extracted from the 1:24,000-scale bedrock-geology and bedrock-topography data layers. The maps can be set up for printing and the data for can also be exported to a zip file and distributed to the public. ODGS plans to extend the application for the extraction and plotting of 1840 structure-contour maps, over 220 abandoned-underground-mine maps, and 120 karst-geology maps.

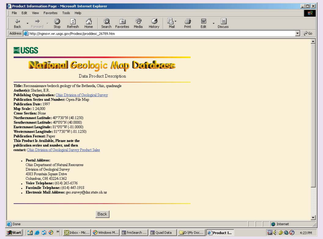
A quadrangle-metadata database has been created with over 3635 records of geologic maps. It is used to extract the titles, authors, and revision dates for the plotted 1:24,000-scale bedrock-geology and bedrock-topography maps, and to populate the NGMDB. Future implementations could include creating unique metadata records for all the extracted digital data and also creating unique bibliographic citations for all the plotted maps.



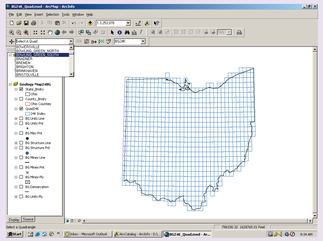
User can view the revision history of any map type in any particluar quadrangle. Here, a user has selected the bedrock-geology-map type for the Bethesda 7.5-minute quadrangle. Once selected, the user is presented with information on the original-map author and publication date, the person who performed the GIS conversion, the revision dates, and the person who perform the updates to the map theme. This allows the ODGS a method for both managing the published versions of the map for map sales and GIS revisions.



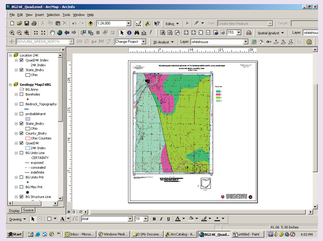
The public can either determine the availability of geologic maps either by contacting the Geologic Records Center of the ODGS or by accessing the Geologic Map Catalog of the NGMDB through the Internet. Accessing the Geologic Map Catalog allows the public the freedom to query by a number of different attributes, such as theme, title, author, quadrangle, and publisher. In the figure above, a query was performed by quadrangle and theme, searching for bedrock-geology maps for the Bethesda, Ohio 7.5-minute quadrangle.



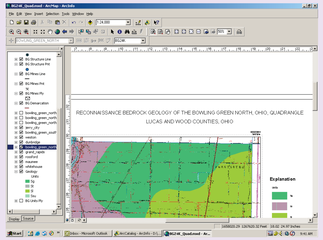
Once a user has the specific geologic-ma information that they want, the user can click on the citation link to find the availability and contact information for that geologic map. In the figure above, a user has clicked on the citation from the previous page and has obtained the availability and contact information for the Bedrock-geology Map of the Bethesda, Ohio, Quadrangle.



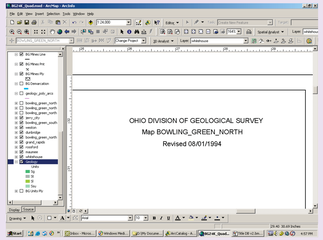
An application was created to assist with the management and distribution of the new bedrock-geology and bedrock-topography GIS data. The application was designed with a number of different goals in mind. It had to be able to extract and set up individual quadrangles for plotting, in addition to extracting digital data for public distribution. Finally, the application had to be able to update and edit data. In the figure above, a user is selecting the Bowling Green North, Ohio, Quadrangle for extraction.



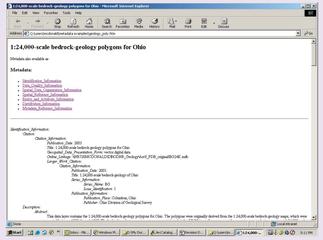
In this figure, the Bowling Green North, Ohio, Quadrangle has been extracted from the 1:24,000-scale bedrock-geology GIS data set. A standardized map layout has been created, with the title, authors, revision date, and inset map placed on the map layout.



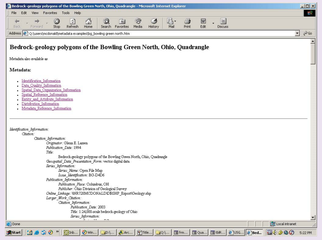
In this example, the title has been extracted from the quadrangle-metadata database.



In this example, the revision date has been extracted from the quadrangle-metadata database.



Currently, all the quadrangles extracted from the 1:24,000 scale bedrock-geology and bedrock-topography GIS data sets have the same generic metadata records.



Future enhancements to the application will be to create unique metadata records for each extracted 7.5-minute quadrangle. The information would come from the quadrangle-metadata database. Another enhancement would be to create a unique recommended bibliographic citation, which again would be extracted from the quadrangle-metadata database.