

Thirteen years of progress in 3-D geologic mapping: A view from North America

Don Keefer, Illinois State Geological Survey

In Normal, Illinois, on April 22, 2001, at a meeting of the North-Central Section of the Geological Society of America, a special session was held on 3-D geologic mapping. The focus was on sharing of experiences, primarily from within Geological Surveys, related to issues encountered and workflows used in 3-D geologic mapping projects. From that modest beginning, a 13-year succession of biennial workshops have recorded the progress and issues addressed within 3-D geological mapping projects at Surveys largely across the US and Canada.

Looking for greater insight and collaborative benefits, the group expanded globally. Over the years, representatives have attended from 7 European countries, Australia, and New Zealand. The focus of the workshops quickly evolved to emphasize 3-D mapping in support of shallow groundwater applications, usually predicting the distribution and character of Quaternary sediments. Early workshops emphasized data cleaning and standardization efforts, often documenting methods each institution used to squeeze meaningful insight from the often-dubious lithologic descriptions within water supply well reports. Over the years, discussions of workflow strategies evolved into progress reports and final presentations on large mapping projects. Representation by groundwater hydrologists was frequent throughout, with many presenting innovative methods for estimating hydraulic conductivity distributions based on geologic maps and insights. Evolution of expertise, software, methods and applications have continued.

Recent workshops have had an increasing emphasis on the utilization of high-resolution lidar elevation models, collection of large amounts of geophysical profile data, preferably from aerial electromagnetic methods, and the integration of novel geostatistical methods for creating more realistic geometries and for estimating uncertainties within resultant interpretations. Many of the Surveys that have been mapping in 3D for over a decade have provided status reports, retrospective assessments and even evaluations of current needs and future directions. As the North American mapping efforts continue, we look forward to continued collaboration with our European colleagues as we all work to advance the state-of-the-art in shallow 3-D geologic mapping.

The screenshot shows the website for the Illinois State Geological Survey (ISGS) at the URL <https://www.isgs.illinois.edu/three-dimensional-geological-mapping>. The page features a header with the ISGS logo and navigation links: Home, About ISGS, Research, Data, Publications, Maps, Hazard Response, Outreach, Services, Shop ISGS, and Library. The main content area is titled "Three-Dimensional Geological Mapping" and includes a 3D visualization of geological data. A search bar is located in the top right corner. On the right side, there is a vertical menu with various categories, including "Mapping" which is expanded to show "3-D Mapping Workshops". Below this, a list of workshop abstracts is displayed, including "Abstract Ordering Information", "Workshop Contact Information", "Workshop Extended Abstracts", "3-D Modeling in McHenry County", "Kentucky Mapping Program", "Mapping Advisory Committee", "Mapping Resources", "Society for Sedimentary Geology", "Villa Grove 3-D Movies", and "Villa Grove 3-D Units".

Figure 1. ISGS website containing workshop abstracts dating back to 2001