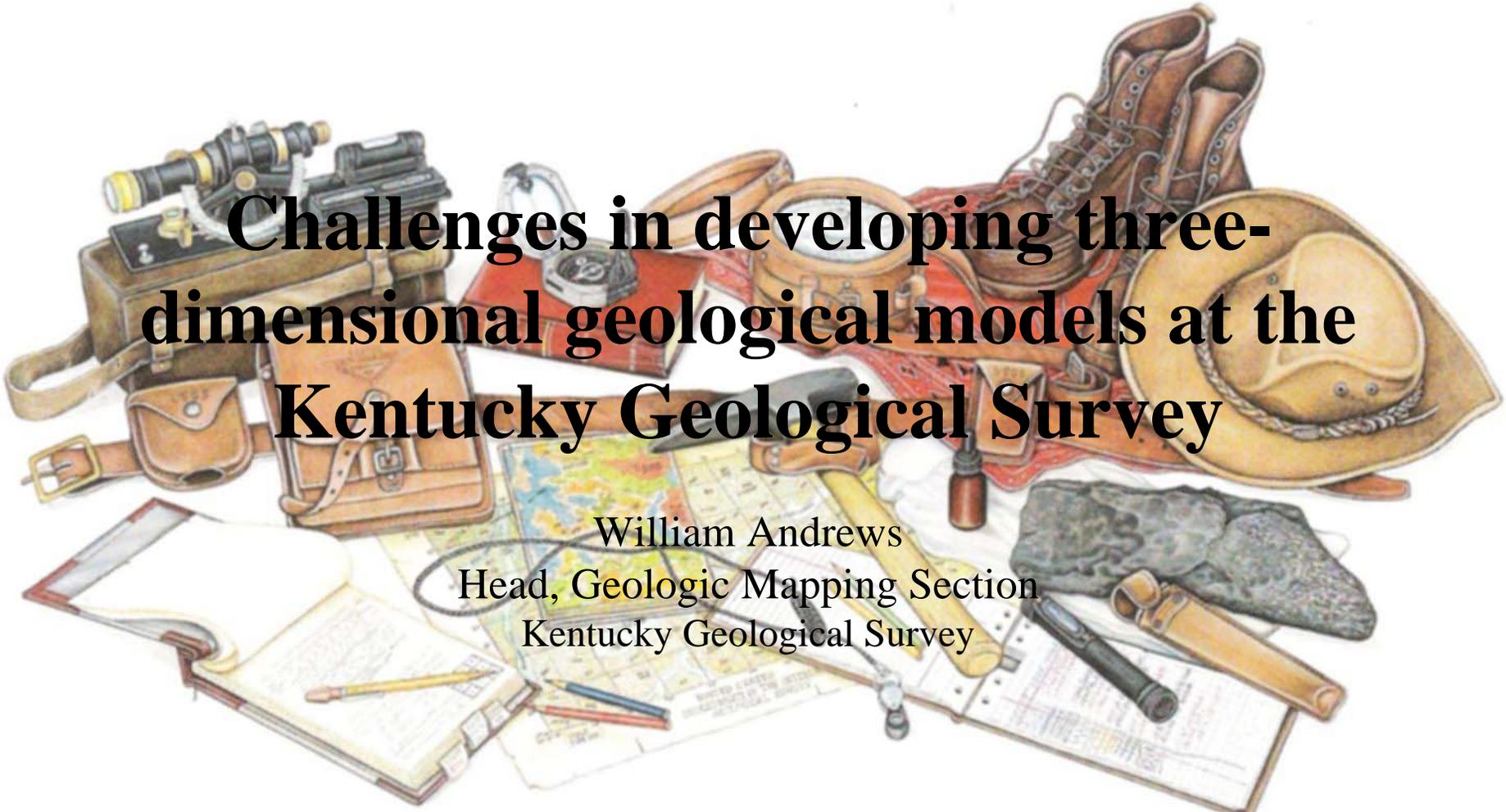


The following was presented at DMT'11  
(May 22-25, 2011).

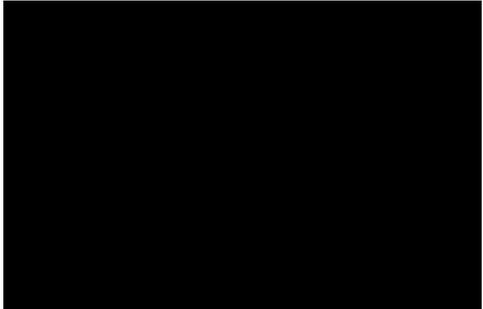
The contents are provisional and will be  
superseded by a paper in the  
DMT'11 Proceedings.

See also earlier Proceedings (1997-2010)  
<http://ngmdb.usgs.gov/info/dmt/>

A detailed illustration of various pieces of vintage geological field equipment. In the upper left, there is a theodolite mounted on a wooden box. To its right is a wide-brimmed tan hat. Further right are a pair of brown leather boots. In the center, a geological map is spread out, showing various colored regions. Below the map are several tools, including a hammer, a pickaxe, and various hand tools. There are also several notebooks and papers scattered around, some with handwritten notes and diagrams. The entire scene is set against a plain white background.

# Challenges in developing three-dimensional geological models at the Kentucky Geological Survey

William Andrews  
Head, Geologic Mapping Section  
Kentucky Geological Survey



# Legacy:

KGS has a long history of talented staff





# Legacy:

## Geologic map data served free online

### Maps, descriptions, columns, strat figures

text search:

**Kentucky Geological Survey**  
**Geologic Map Service**  
 Geologic and feature descriptions for visible themes

- [Print This Page](#)
- [Hide Clipped Stratigraphic Column Images](#)

**Description Source:**  
 Geologic map of the Little Hickman quadrangle, central Kentucky  
 • [view stratigraphic column \(.pdf\) for this quadrangle: GQ-792](#)

**Olu** **Upper part of Lexington Limestone**  
 (Lower Ordovician - Middle Ordovician)

Mapped or described as these unit(s) on the original GG:

**BRANNON MEMBER**  
**Primary Lithology:** Limestone and shale  
 Limestone and shale: Limestone, greenish-gray to medium-bluish-gray, weathers grayish orange; micrograined, in even beds a few inches thick, interbedded with gray shale; some limestone beds contorted; sparse fossils. Present only in southwestern part of quadrangle.

**SULPHUR WELL MEMBER**  
**Primary Lithology:** Limestone  
 Limestone, light-olive- to medium-gray, weathers light to light brownish gray; fossiliferous, partly dolomitic, in lenticular beds a few inches thick; characterized by abundant bryozoans, with few brachiopods and

**Note:** Economic descriptions in this report are historic in nature and may not reflect current conditions

**Upper part of Lexington Limestone (GQ-792):**

**Kentucky Geological Survey**  
**Geologic Information Service (beta)**  
 Note: please disable popup blocking software for full functionality.

**Map Legend** [Map Layers](#) [Geologic Information](#)

**Geologic Units In Current View:**  
 - hide geologic units  
 1:24,000 scale data (detailed geology)

- Qal** Alluvium (Quaternary - Quaternary)
- Qt** Terrace deposits (Quaternary - Tertiary)
- QTf** High-level fluvial deposits (Quaternary - Tertiary)
- Oa** Ashlock Formation (Upper Ordovician - Upper Ordovician)
- Occ** Calloway Creek Limestone (Upper Ordovician - Upper Ordovician)
- Og** Garrard Siltstone (Middle Ordovician - Upper Ordovician)
- Ocf** Clays Ferry Formation (Middle Ordovician - Upper Ordovician)
- Olu** Upper part of Lexington Limestone (Lower Ordovician - Middle Ordovician)
- Olt2** Tanglewood Limestone Member (2) (Lower Ordovician - Middle Ordovician)
- Olb** Brannon Member (Lower Ordovician - Middle Ordovician)
- Olt1** Tanglewood Limestone Member (1) (Lower Ordovician - Middle Ordovician)
- Olr** Lower part of Lexington Limestone (Lower Ordovician - Middle Ordovician)
- Oto** Tyrone Limestone and Oregon Formation (Lower Ordovician - Middle Ordovician)
- Ocn** Camp Nelson Limestone (Lower Ordovician - Middle Ordovician)

**Geologic Symbols:**

Current Scale = 1:48,000  
 Map Scale: choose a map scale  
 Map Size: half page (650 x 450)

**KY MAPS**



# Legacy:

## Online skills have generated online data entry tools

Kentucky Geological Survey  
Field Data Entry Tool

Select A 1:24K Quadrangle:

Login Name - Number:  (a name MUST be selected to proceed)

[Oil & Gas](#) | [Coal](#) | [Water Wells](#) | [Springs](#)

**Oil Well Information:**  
further limit records (map will not refresh) by...

only wells with elogs  
and/or...

\*click KGS Record # for more info about an oil & gas well

DATA ENTRY	PROFILE?	Symbol	KGS Record #	Permit #	Surf. Elevation (ft)	Depth (ft)	Map Zoom
<input type="button" value="view/edit"/>	<input checked="" type="checkbox"/>		<a href="#">8195</a>	36978	415	1928	<input type="button" value="zoom"/>

Map scale = 1:7,815

**Page 1**

**Page 2**

**Page 3**

Davies County, Kentucky  
Harlan Park et al No. 7  
1,675' SL x 150' EL Section  
Comm. 2-5-1957  
Shot 80 Qts, 794-804'

Section 11-Q-30 - Maceo Pool  
R. Kelly  
Elev. 381' "Topo"  
Comp. 3-4-1957  
IPP 14/2/24 Hrs. Tar Spring:

0-5 soil  
135 sand and gravel  
145 shale  
195 sandy shale  
210 sand  
320 sandy shale  
335 shale  
370 sandy shale  
385 shale  
445 sandy shale  
465 shale  
475 sandy shale

Data entry for OIL AND GAS WELL ID #: 21022

Profile ID: 2345  
Login Number (scribe): 1114  
surface elevation (ft):   
depth to bedrock (ft):  footage error:   
depth to bedrock comment:   
profile date:   
profile year:   
profile - upper fmcodes:   
profile - lower fmcodes:   
profile comment:

Row 1: litho type:   
lithology code:   
description:   
from (ft):  to (ft):   
comment:

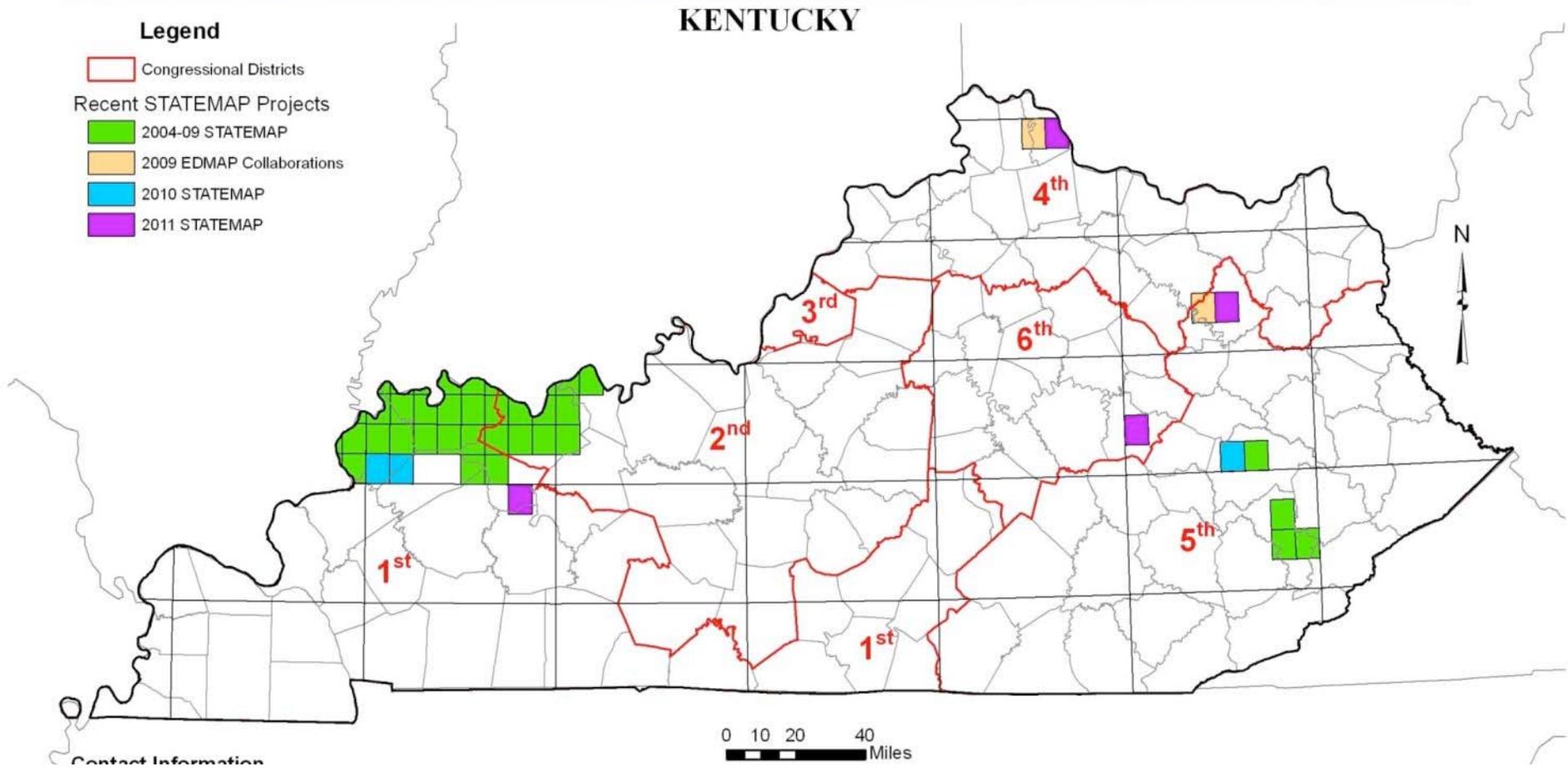
# Today:

## Continuing to produce 2D mapping



### National Cooperative Geologic Mapping Program

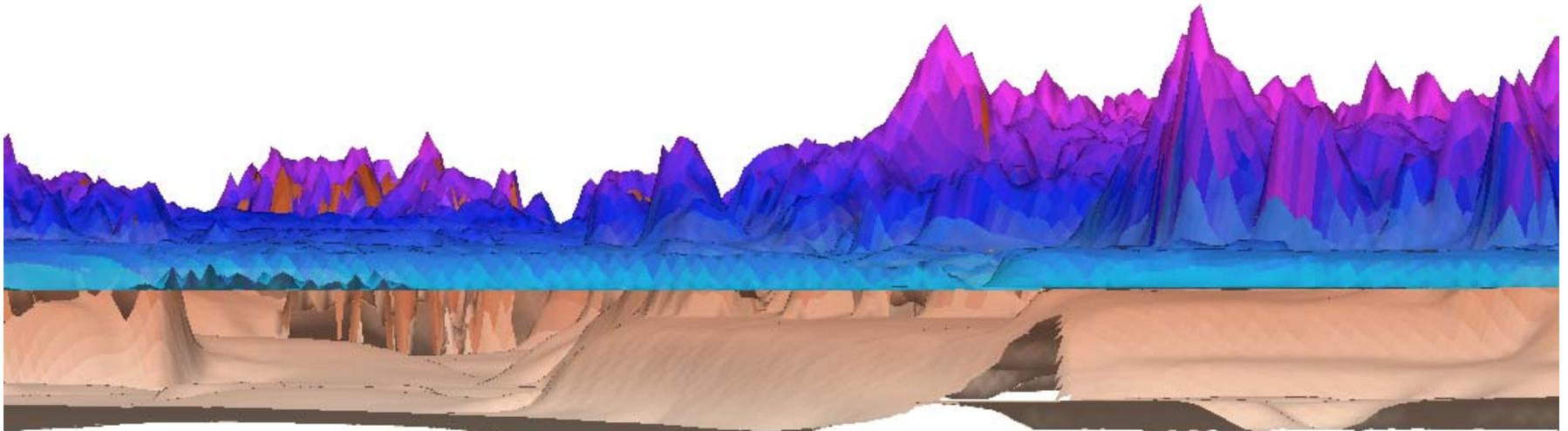
STATEMAP Component: States compete for Federal matching funds for geologic mapping



## Toward 3D:

Sharp distinct surfaces, instead of sharp distinct polygons

But the world doesn't always work that way...



# Toward 3D:

## Dilemma of integrating large and complex databases

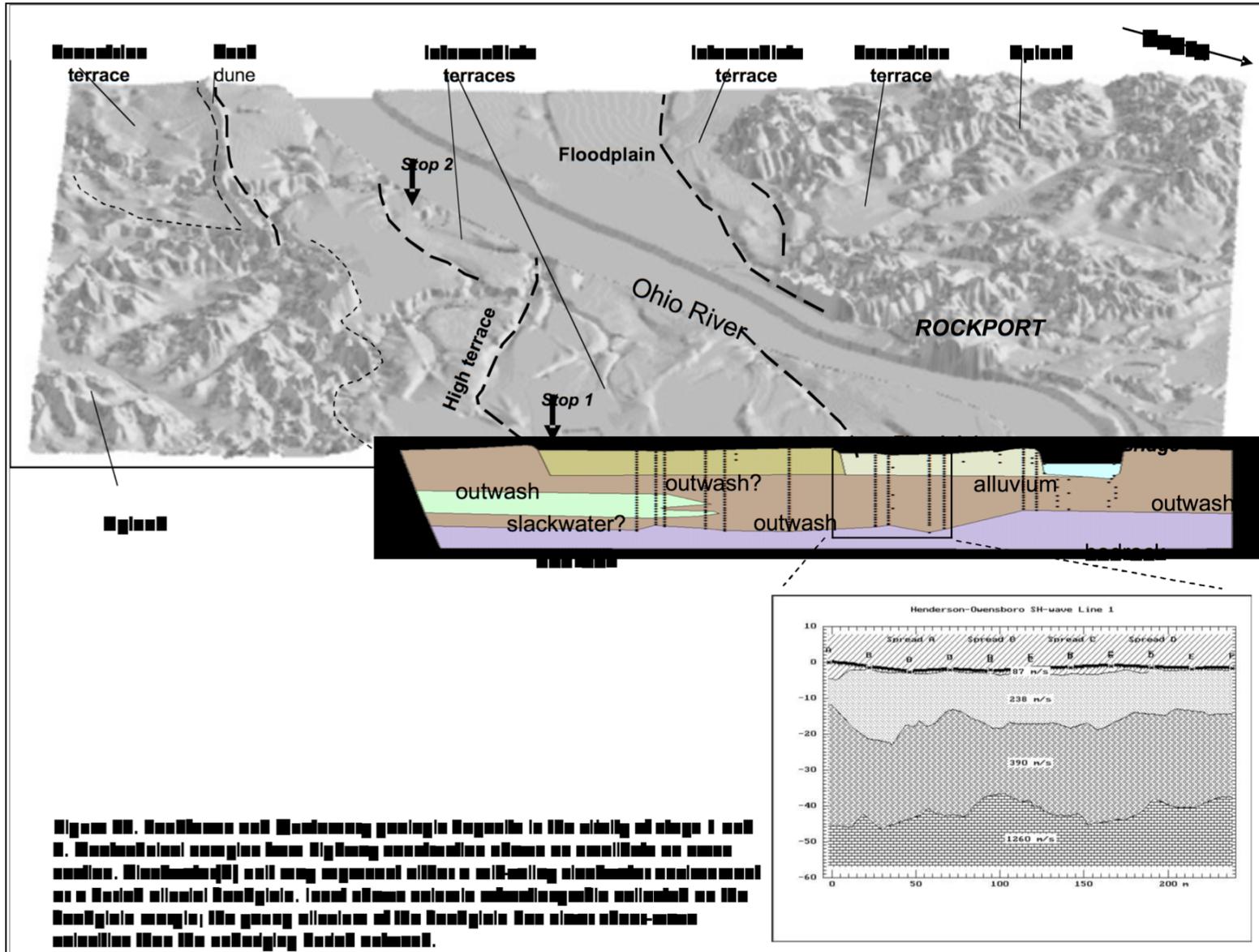


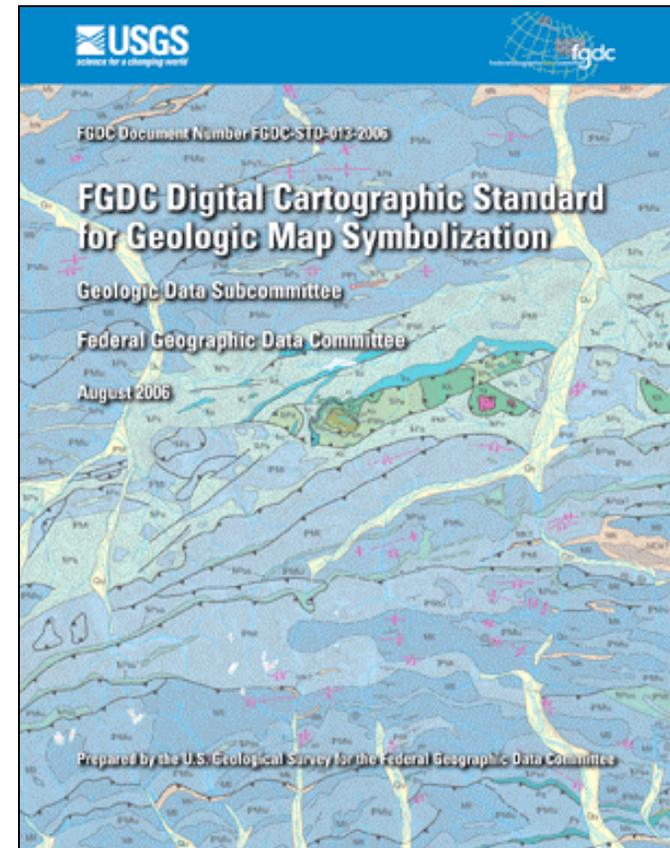
Figure 20. Henderson and Owensboro geologic maps in the vicinity of stops 1 and 2. Stratigraphic correlation lines are shown as dashed lines. Stratigraphic units are color-coded as follows: outwash (yellow), slackwater (green), and alluvium (brown). The geologic map of the Henderson area shows that the outwash units are not continuous across the valley.

# Toward 3D:

How to integrate concepts of feature-level confidence and variability into 3D/raster database?

## NCGMP09

Proposed digital geologic map data-transfer standard



# Toward 3D:

Sharp contacts... ok, this one's easy...



# Toward 3D:

Gradational contacts... how do you attribute/display this in 3D...



Dr. Paul Potter, University of Cincinnati

# Toward 3D:

Faults... ~ tilted sharp contacts... ok... manageable...



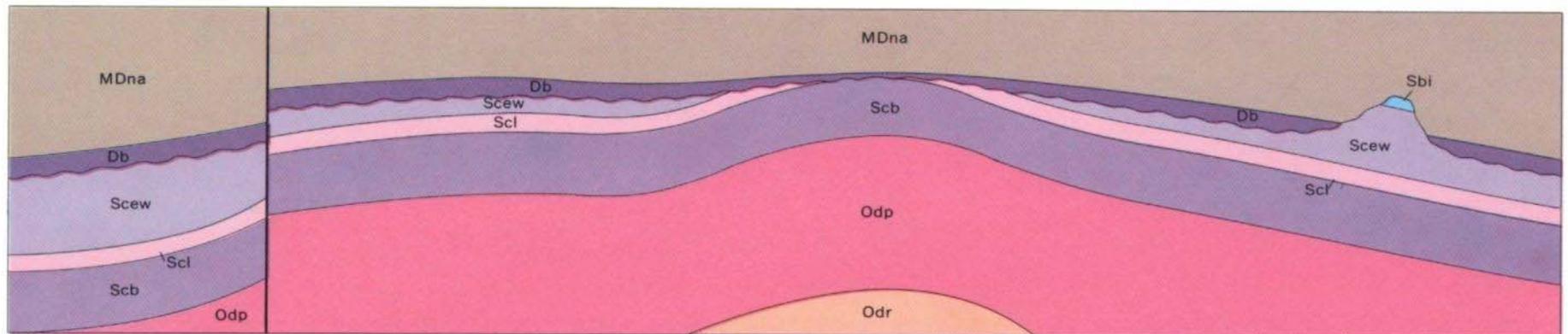
# Toward 3D:

Gradational, lateral facies variation... ummm... how?



# Toward 3D:

Regional variation in surface characteristics... how do you attribute/symbolize this?

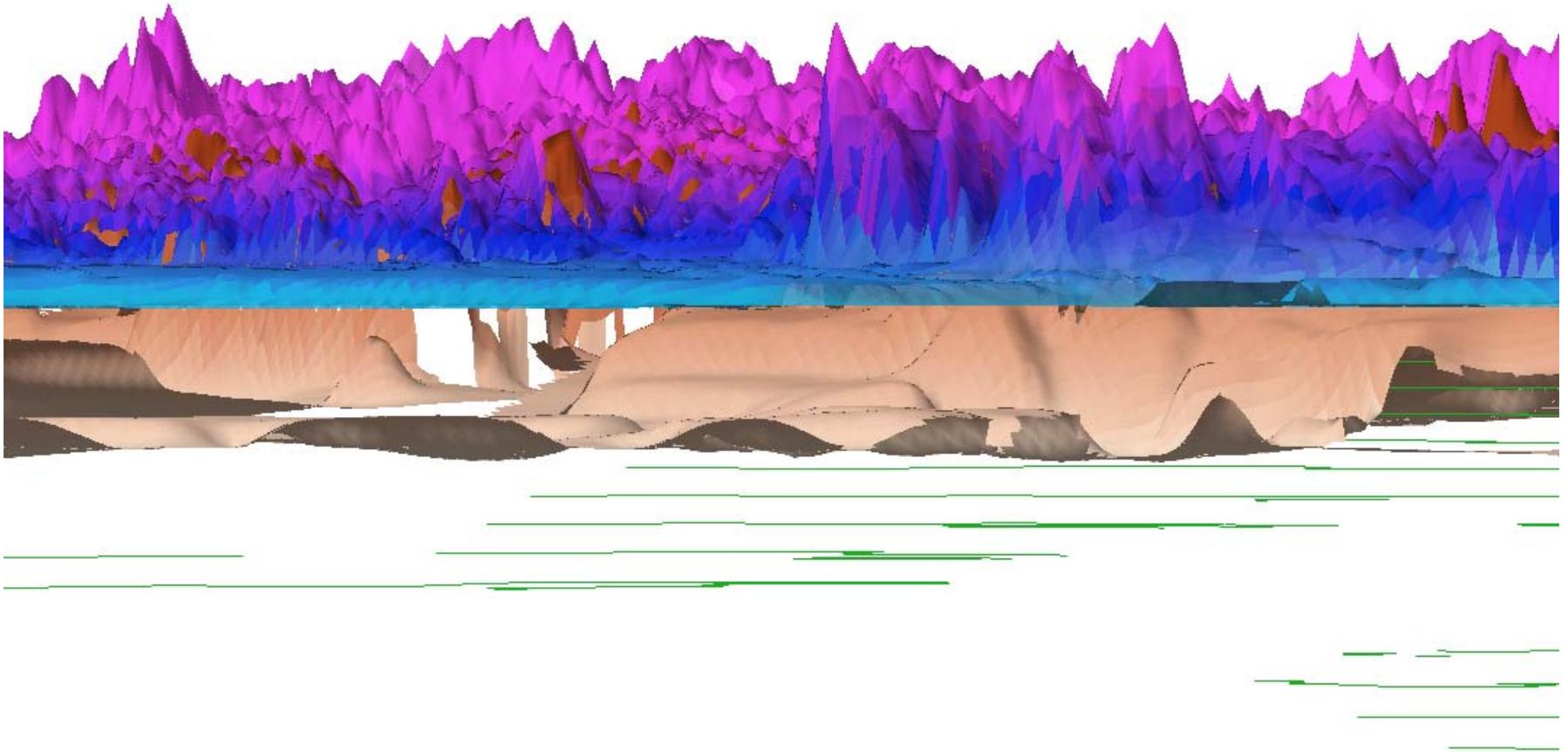


# Toward 3D:

Statewide topography (10-m DEM); LiDAR in progress

Localized projects with bedrock topography

Contacts and structure contours from DVGQs, tops from petroleum database





**I want YOU...**  
**...to provide feedback.**

**William "Drew" Andrews**  
Kentucky Geological Survey  
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