Why does the IGS create custom base maps?

1. Incorporate the latest GIS data
   - LiDAR DEMs / Contours / Shading
   - Centerlines
   - Hydrography
   - Orthophotography

2. Custom field work maps

3. Cartographic appearance

4. Vector base map data can accompany geologic map geodatabases
How are the base maps created?

1. ArcGIS 10.1
   - Custom script to clip individual quads
   - Shading and slope images
   - Contours (including depressions)

2. Adobe Illustrator
   - Styling of map (FGDC Standard)
   - Cartographic type placement

3. Adobe Photoshop
   - Shaded relief creation
   - Final contour placement

4. Adobe InDesign
   - Layout of map
1. Geodatabase of up-to-date base data
2. Elevation data
   • Mosaic Dataset of LiDARDEMs (1.5m)
   • National Elevation Dataset when there is no LiDAR coverage
3. Custom Script (DMT 2012 - “Making the US Topo – A Process Discussion” by Bob Davis)
   • Only input needed from user is:
     1. Location to save new base map geodatabase
     2. Name of the 7.5 minute quad
     3. Contour interval (5ft or 10ft)
4. Image Analysis
   • Creation of shading and slope images
5. Final step is to export parts
   • All vector data is exported to an illustrator file
   • Shading and slope images are exported as tiffs
**Custom Script**  
(Model Builder & Python)

### Main Model

- **IN_24k_Quad_dir**
  - Select
  - %Quad_Name
  - StateMap.gdb
  - Contour Interval
  - Save Geodatabase to
  - Create File GDB
  - Parse Path
  - Path
  - Quad_Name
  - Calculate Value
  - Change Workspace
  - Zoom to Quad
  - StateMap Clip Model
  - QuadName

### Vector Clip Model

- Iterate Feature Classes
- IN_County_Lines
- Clip
- %Name%
- %String%

### DEM Clip & Contour Creation

- Buffer
- %Quad_Name
- UDNRI_DEM
  - Clip
  - Quad DEM
  - Contour
  - Contour Interval
  - Contour No Contour Interval
  - Smooth_DE_M_Filled
  - DepthMap Contours
  - Smooth_DE_M_Filled
  - DepthMap Contours
  - Smooth_DE_M_Filled

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**Semi-Automated Base Map Creation**  
How are the base maps created?

Matt Johnson  
Indiana Geological Survey
Custom Script

(Model Builder & Python)

Python Script

```python
import arcpy
mxd = arcpy.mapping.MapDocument("CURRENT")
old_path = ""
new_path = ""
quad = ""
contour_interval = ""

old_path = arcpy.GetParameterAsText(0)
new_path = arcpy.GetParameterAsText(1)
quad = arcpy.GetParameterAsText(2)
contour_interval = arcpy.GetParameterAsText(4)

arcpy.AddMessage("contour_interval value is " + contour_interval)

mxd.replaceWorkspaces(old_path, "FILEGDB_WORKSPACE", new_path, "FILEGDB_WORKSPACE")
df = arcpy.mapping.ListDataFrames(mxd, "Layers")[0]
lyr = arcpy.mapping.ListLayers(mxd, "N_24k_Quads", df)[0]
arcpy.SelectLayerByAttribute_management(lyr, "NEW_SELECTION", "NAME = 'quad'")
df.zoomToSelectedFeatures()
arcpy.SelectLayerByAttribute_management(lyr, "CLEAR_SELECTION")

contours = new_path + \"\" + contours + \"\" + contour_interval + \"\"
inFeatures = contours

arcpy.AddField_management(inFeatures, "Type", "TEXT", "", "", "10")
addLayer = arcpy.mapping.Layer(contours)
arcpy.mapping.AddLayer(df, addLayer, "BOTTOM")
contourLyr = "\"Contours\" + contour_interval + \""
if contour_interval == "10":
    whereClause = "Contour = 0 OR Contour = 50 OR Contour = 100 OR Contour = 200 OR Contour = 250 OR Contour = 300 OR Contour = 350 OR Contour = 400 OR Contour = 450 OR Contour = 500 OR Contour = 550 OR Contour = 600 OR Contour = 650 OR Contour = 700 OR Contour = 750 OR Contour = 800 OR Contour = 850 OR Contour = 900 OR Contour = 950 OR Contour = 1000 OR Contour = 1050 OR Contour = 1100 OR Contour = 1150 OR Contour = 1200 OR Contour = 1250 OR Contour = 1300 OR Contour = 1350 OR Contour = 1400 OR Contour = 1450 OR Contour = 1500 OR Contour = 1550 OR Contour = 1600 OR Contour = 1650 OR Contour = 1700 OR Contour = 1750 OR Contour = 1800 OR Contour = 1850 OR Contour = 1900 OR Contour = 1950 OR Contour = 2000 OR Contour = 2050 OR Contour = 2100 OR Contour = 2150 OR Contour = 2200 OR Contour = 2250 OR Contour = 2300 OR Contour = 2350 OR Contour = 2400 OR Contour = 2450 OR Contour = 2500"
if contour_interval == "5":
    whereClause = "Contour = 25 OR Contour = 50 OR Contour = 75 OR Contour = 100 OR Contour = 125 OR Contour = 150 OR Contour = 175 OR Contour = 200 OR Contour = 225 OR Contour = 250 OR Contour = 275 OR Contour = 300 OR Contour = 325 OR Contour = 350 OR Contour = 375 OR Contour = 400 OR Contour = 425 OR Contour = 450 OR Contour = 475 OR Contour = 500 OR Contour = 525 OR Contour = 550 OR Contour = 575 OR Contour = 600 OR Contour = 625 OR Contour = 650 OR Contour = 675 OR Contour = 700 OR Contour = 725 OR Contour = 750 OR Contour = 775 OR Contour = 800 OR Contour = 825 OR Contour = 850 OR Contour = 875 OR Contour = 900 OR Contour = 925 OR Contour = 950 OR Contour = 975 OR Contour = 1000 OR Contour = 1025 OR Contour = 1050 OR Contour = 1075 OR Contour = 1100 OR Contour = 1125 OR Contour = 1150 OR Contour = 1175 OR Contour = 1200 OR Contour = 1225 OR Contour = 1250 OR Contour = 1275 OR Contour = 1300 OR Contour = 1325 OR Contour = 1350 OR Contour = 1375 OR Contour = 1400 OR Contour = 1425 OR Contour = 1450 OR Contour = 1475 OR Contour = 1500 OR Contour = 1525 OR Contour = 1550 OR Contour = 1575 OR Contour = 1600 OR Contour = 1625 OR Contour = 1650 OR Contour = 1675 OR Contour = 1700 OR Contour = 1725 OR Contour = 1750 OR Contour = 1775 OR Contour = 1800 OR Contour = 1825 OR Contour = 1850 OR Contour = 1875 OR Contour = 1900 OR Contour = 1925 OR Contour = 1950 OR Contour = 1975 OR Contour = 2000 OR Contour = 2025 OR Contour = 2050 OR Contour = 2075 OR Contour = 2100 OR Contour = 2125 OR Contour = 2150 OR Contour = 2175 OR Contour = 2200 OR Contour = 2225 OR Contour = 2250 OR Contour = 2275 OR Contour = 2300 OR Contour = 2325 OR Contour = 2350 OR Contour = 2375 OR Contour = 2400 OR Contour = 2425 OR Contour = 2450 OR Contour = 2475 OR Contour = 2500"

arcpy.AddMessage("WhereClause = " + whereClause)
arcpy.AddMessage("Selecting all Index contours."")
arcpy.SelectLayerByAttribute_management(contourLyr, "NEW_SELECTION", whereClause)
arcpy.AddField_management(contourLyr, "Type", "TEXT", "", "", "10")
arcpy.CalculateField_management(contourLyr, "Type", "'Index'"", "PYTHON")
arcpy.SelectLayerByAttribute_management(contourLyr, "SWITCH_SELECTION")
arcpy.AddField_management(contourLyr, "Regular", "TEXT", "", "", "10")
arcpy.CalculateField_management(contourLyr, "Regular", "'Regular'"", "PYTHON")
arcpy.SelectLayerByAttribute_management(contourLyr, "SWITCH_SELECTION")
arcpy.AddField_management(contourLyr, "NoDepress", "TEXT", "", "", "10")
arcpy.CalculateField_management(contourLyr, "NoDepress", "'NoDepress'"", "PYTHON")
arcpy.SelectLayerByAttribute_management(contourLyr, "SWITCH_SELECTION")
arcpy.AddField_management(contourLyr, "Depress", "TEXT", "", "", "10")
arcpy.CalculateField_management(contourLyr, "Depress", "'Depress'"", "PYTHON")
arcpy.SelectLayerByAttribute_management(contourLyr, "SWITCH_SELECTION")
arcpy.AddField_management(contourLyr, "Index", "TEXT", "", "", "10")
arcpy.CalculateField_management(contourLyr, "Index", "'Index'"", "PYTHON")
arcpy.SelectLayerByAttribute_management(contourLyr, "SWITCH_SELECTION")
arcpy.AddField_management(contourLyr, "DepressIndex", "TEXT", "", "", "10")
arcpy.CalculateField_management(contourLyr, "DepressIndex", "'DepressIndex'"", "PYTHON")
arcpy.SelectLayerByAttribute_management(contourLyr, "SWITCH_SELECTION")
arcpy.AddField_management(contourLyr, "DepressNoIndex", "TEXT", "", "", "10")
arcpy.CalculateField_management(contourLyr, "DepressNoIndex", "'DepressNoIndex'"", "PYTHON")
arcpy.SelectLayerByAttribute_management(contourLyr, "SWITCH_SELECTION")
arcpy.AddField_management(contourLyr, "DepressIndexNoDepress", "TEXT", "", "", "10")
arcpy.CalculateField_management(contourLyr, "DepressIndexNoDepress", "'DepressIndexNoDepress'"", "PYTHON")
```

Semi-Automated Base Map Creation

How are the base maps created?
**Custom Script (Explained)**

1. **Base Map Template MXD**
   - Labeling and classifications preset

2. **Custom script user input**
   - Geodatabase location
   - 7.5-minute quad name
   - Contour Interval

3. **Geodatabase created**
   - Named same as 7.5-minute quad
   - Placed where user specified

4. **7.5 quad clip**
   - 7.5-minute quad is selected from base data and exported to new base map database

5. **Zoom to map area**
   - Python script
   - Selects the 7.5-minute quad and zooms to the selection

6. **Change workspace**
   - Python script
   - Changes the base map template MXD to look at the new database for source data

7. **DEM clip and contours**
   - 7.5-minute quad is buffered 1/4 mi
   - Buffer extent used to clip DEM for the map area
   - Create contours

8. **Data clip**
   - Data within base map database clipped to 7.5-minute quad and added to new geodatabase

9. **Add contour type field**
   - Python script adds field for adding “Index” or “Regular” contour attribute and depression field

10. **Add contour layer to map**
    - Python script adds data to map document

11. **Update contour type attributes**
    - Python script adds “Index” or “Regular”
    - Contour interval is used to calculate
    - Depression-Y or N

12. **Sets map scale**
    - Python script switches to Page Layout view and sets the scale to 1:24k
    - Map is ready for export (vector)

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**Semi-Automated Base Map Creation**

**How are the base maps created?**

**Matt Johnson**

**Indiana Geological Survey**
Demo

Custom Script

Image Analysis Window
Semi-Automated Base Map Creation
How are the base maps created?

Matt Johnson
Indiana Geological Survey
Adobe Illustrator – Before & After Styling

Semi-Automated Base Map Creation
How are the base maps created?

Matt Johnson
Indiana Geological Survey
Adobe Illustrator – Layer & Style Structure

Semi-Automated Base Map Creation
How are the base maps created?

Matt Johnson
Indiana Geological Survey
Adobe Photoshop

Shading

Slope

Final Shading

Contours

Labels

Semi-Automated Base Map Creation

How are the base maps created?

Matt Johnson
Indiana Geological Survey
Adobe Illustrator – Add geologic data

Semi-Automated Base Map Creation
How are the base maps created?

Matt Johnson
Indiana Geological Survey
INTRODUCTION

This preliminary geologic map of the New Belleville 7.5 minute quadrangle is an interim geologic map product prepared to document geologic processes occurring during the year. It is a three-dimensional project to map bedrock geology in the New Belleville quadrangle. The map was created using the most recent data available. The New Belleville quadrangle is located on the western edge of the county (see inset map below) where the youngest rock units are found. The map area is located in the northeast corner of the Vincennes Upland Division of the Vincennes Upland. The map area includes parts of the eastern and northern boundaries of the New Belleville quadrangle. The New Belleville quadrangle is located on the western edge of the county (see inset map below) where the youngest rock units are found. The map area is located in the northeast corner of the Vincennes Upland Division of the Vincennes Upland. The map area includes parts of the eastern and northern boundaries of the New Belleville quadrangle.

REFERENCES


CORRELATION OF MAP UNITS

Sparkea Knob Formation (Mississippian, Lower)—Dark gray and yellowish-brownish siltstone and argillaceous siltstone with lesser amounts of gray shale. Typically found on the sparsely vegetated areas in the upland (western) portion of the map area. Only the upper part of the Sparkea Knob is present in the map area.

New Providence Shale, upper unit (Mississippian, Lower)—Medium-to-dark gray, soft claystone, shale, and mudstone. Forms low slopes. Typically covered with talcose or glacial sediments, especially the lower part. Reservoirs are limited to a few stream units and recent accumulations. Approximately 50 ft. thick in map area.

New Providence Shale, lower unit (Mississippian, Lower)—Gray to greenish, clayey, and argillaceous shale with lesser amounts of gray shale. Overlain by thick glacial deposits; throughout the map area. Approximately 50 ft. thick in map area.

New Albany Shale and Rockford Limestone undifferentiated (Mississippian, Lower and Devonian, Upper and Middle)—The New Albany Shale is a dark brownish gray to black carbonaceous shale with lesser amounts of olive-gray shale. The New Albany Shale is approximately 30-150 ft. thick in the map area. The Rockford Limestone is a thin (less than 5 ft.) shaly bed that conformably overlies the New Albany Shale. The Rockford is a gray, fine-grained, argillaceous limestone.

Contacts:

Identification and existence certain, location approximate

Identification and existence certain, location concealed

Data Points:

- Fossil Observation
- Water Well
- Petroleum Well
- Drill test hole

Preliminary Bedrock Geologic Map of the New Belleville 7.5-Minute Quadrangle, Indiana

By

Walter A. Hennek and Robin F. Round

2005
**Base Map Creation Time**

1. Clipping data and prepping for vector export  
   ~30 minutes
2. Creating and exporting shading and slope  
   ~15 minutes
3. Styling and label placement in Illustrator  
   ~2-3 hours
4. Photoshop shading and contour steps  
   ~15 mins

**Base Map Total**  
~ 3-4 hours

5. Adding geologic data and cleanup  
   ~1-2 hours
6. Final layout  
   ~1 hour

**Project Total**  
~ 7 hours
Examples – Local Hydro Available
Examples – NED vs LiDAR
Examples – US Topo vs IGS Base
Examples – US Topo vs IGS Base

Semi-Automated Base Map Creation

Examples

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Questions / Comments

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