

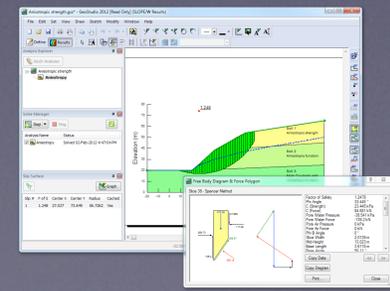
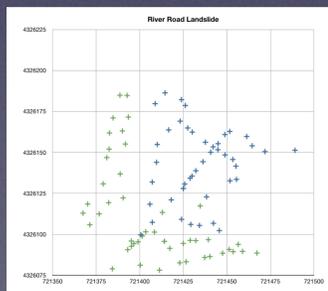
# Incorporating Field Work in Geomorphology in the Ohio River Valley Region

Sarah Johnson, Northern Kentucky University

## Survey & Model Slope Stability of a Landslide in Northern Kentucky



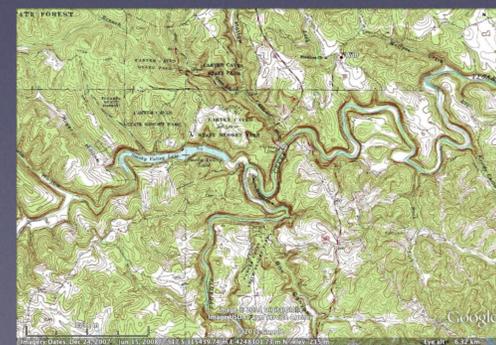
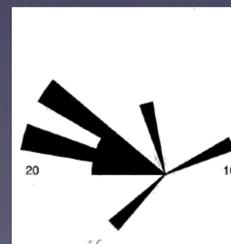
- Students survey a landslide in fill using a total station
- Students map the slide in the field and create their own topo map
- Students use 2 historic topographic maps (pre-fill, and post-fill/pre-landslide) and survey data to draw a cross section
- Students input topographic and soil data into SLOPE/W and model the stability of the slope before and after the fill was added



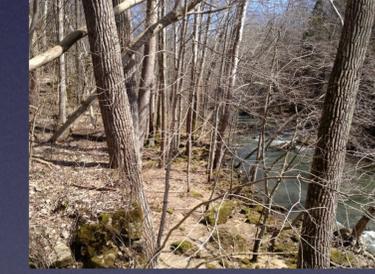
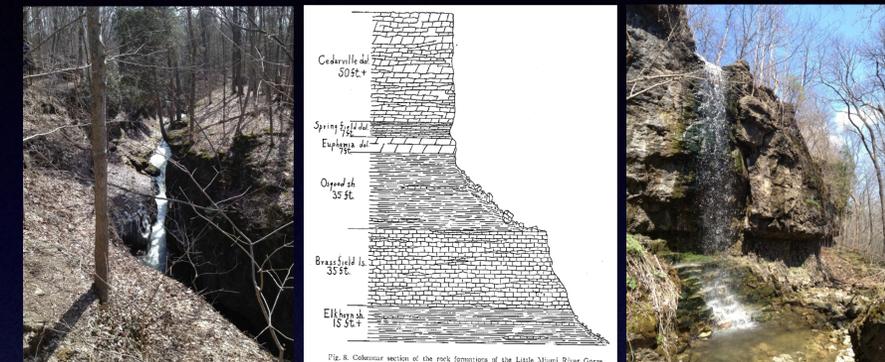
## Compare Orientation of Arches, Joints, Cave Passages & Stream Valleys at Carter Caves, Kentucky



- Students compare the orientation of subsurface and surface features
  - collect orientation data of cave passageways, arches, joints
  - measure orientation of stream valleys
  - use rose diagrams to compare data sets
- Use topographic maps to estimate contact between limestone & sandstone
- Observe karst features in the field
- Write research paper



## Explore Relationship Between Stratigraphy & Valley Morphology, Clifton Gorge, Ohio



- Students recognize different rock units (dolostone & shale)
- Use base map to locate contacts between units
- Interpret how the rock units influence the morphology of the valley
- Place in a regional context
- Observe fluvial features in the field
- Write an educational pamphlet for the general public

### Clifton Gorge Trail Guide To Geologic Features

**Cedarville Dolomite 50ft**

**Springfield Dolomite 7ft**

**Euphemia Dolomite 7ft**

**Osgood Shale 35ft**

**Brassfield Limestone 35ft**

**Elkhorn 15 ft**

**Introduction to the Geology**

There are five formations of rocks seen in Clifton Gorge. They are all Silurian in age, therefore about 420 million years old. They are all sedimentary rocks that were deposited in a long gone sea. The rocks are located on the edge of a bulge of the Earth's crust called the Cincinnati Arch. Clifton Gorge is located along the boundary between two ages of rock called an escarpment.

The contacts between these formations are easily seen along the trail. At the waterfall near Steamship Rock all five dolomites are seen.

The massive Cedarville is undercut by the Springfield because it is less erosion resistant. This causes a void that eventually causes the Cedarville to fall. The large Steamship rock is a large slump block that was formed this way. Further upstream, only the Cedarville and Springfield are seen as in cross section D-D'. Downstream all five formations are seen, but the Osgood is not exposed. It's location is seen in the broad slope that goes from the base of the cliff to the stream, where the Brassfield contact is visible near the footbridge. This is the location of cross section A-A'.

**Introduction to the Stream**

The Little Miami River is responsible for cutting Clifton Gorge. It is seen flowing through the Cedarville formation at the narrow and the Brassfield formation at the footbridge.

Where there is a drop like this the water goes from a fast (supercritical) to slow (subcritical) state. At this change a hydraulic jump is seen. Look for more hydraulic jumps along the trail.

As the river travels through the narrow, the power of running water is revealed. During the ice age, Clifton Gorge was located between two lobes of the ice sheet. As these lobes melted, tremendous amounts of water was funneled through this valley, softening the rocks along the escarpment to severe erosion. This is how the gorge was initially formed.

The river today shows evidence of that erosive power of water. As the water flows down over the contact between the Cedarville formation and Springfield formation, there is a waterfall. This is the first nickpoint of the gorge. A nickpoint is a sudden drop in a stream elevation. This one is due to the differential erosion of the two formations. This is similar to what caused the head scarping seen along the trail. As the trail is followed, look for more nickpoints.

Another example of the power of water is the pothole seen carved into the narrow. Swirling water in the confined area causes a round void to form in the rock. This swirling water is known as an eddy. How many potholes are seen in the narrow? Are eddies seen along the trail?

**Key to Symbols**

C-Cedarville  
S-Springfield  
E-Euphemia  
O-Osgood  
B-Brassfield

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