The Lay of the Land

Introduction to Modern Indiana Topography
Objectives

1. Terms associated with surface geology and geomorphology
2. Processes of weathering, erosion, transport, and deposition
3. Historical thinking about landforms
4. Surface geology of Indiana
Types of Surface Geology

**Topography** - the relief of the Earth’s surface: hills, valleys, mountains, and plains.

**Surficial Deposits** - the landforms and the unconsolidated sediments beneath them. Includes soils, stream and lake sediments, glacial sediments.

**Bedrock** - the consolidated, often older rock that lies at the surface and beneath it. Bedrock is often covered by unconsolidated surficial deposits.

**Physiography** - a descriptive summary of the surface of the Earth, often categorizing regions based on the similarity of their topography, surficial deposits, climate, and vegetation. Physiographic regions are often named after landforms, places, or their topography.

**Geomorphology** - the study of landforms, their history, and the processes that shape them.
Processes that affect surface geology

Surface geology is strongly influenced by:

1. the underlying bedrock geology
2. the geological history of the region
3. and the climate.

Temperature is an important factor in chemical weathering.

Water flow is an important agent of sediment transport, strongly affecting surface geology. Studied in hydrogeology.

Vegetation cover is strongly influenced by climate and surface geology.
The Water Cycle

[Diagram of the water cycle showing the processes of evaporation, condensation, precipitation, infiltration, and storage in various forms: water storage in ice and snow, water storage in the atmosphere, surface runoff, streamflow, ground-water storage, water storage in oceans.]
Basic principles: Weathering, erosion, transport, deposition
Erosion and deposition

Weathering - chemical and physical breakdown of consolidated rock

Erosion - the removal of weathered, unconsolidated material by water, wind, ice, or gravity

Transport - the movement of sediments by the above agents

Deposition - the dropping of sediments in an area of accumulation. Deposits may be eroded and transported again, or they may remain in place and eventually become consolidated

Basic principles - rocks exposed to the atmosphere experience weathering. Weathered material is eroded and transported at rates depending on local relief and water flow. Sediments are ultimately carried to the continental margins, but may be deposited (usually temporarily) before reaching the sea.
Cut and fill

Weathering and erosion cut into the bedrock

Low areas can be filled with sediments if conditions are right.

At continental margins cut and fill are controlled by sea level

In continental interiors cut and fill are controlled by many factors, including local water table, topographic barriers to water flow, elevation and relief.

Boggs, Principles of Sedimentology and Stratigraphy
Topography One
Topography Two
Topography Three
Topography Four
Indiana DEM

Digital Elevation Model of topographic relief, or terrain
Surface elevation (topography)

High
(400 m)

Low
(95 m)
Highest and lowest points

**Highest Point**
383.1 m (1257 ft)
Wayne County, Hoosier Hill

**Lowest Point**
97.5 m (320 ft)
Posey County, Mouth of Wabash
Rivers

Mean Annual Discharge Rates
(cubic feet per second)

Ohio River
132,147  (1928-2009)

Wabash River
29,128  (1928-2009)

White River (West Fork)
2,961  (1926-1971)

White River (East Fork)
2,656  (1928-2009)

Tippecanoe River
1,684  (1940-1987)
Physiographic regions

**North:** morainal complexes and drainage ways, lake plains, till plains
(dominated by glacial age surface deposits)

**South** (from east to west): Dearborn upland, Muskatatuck Plateau, Scottsburg Lowland, Norman Upland, Mitchell Plateau, Crawford Upland, Wabash Lowland
(alternating uplands and lowlands dominated by underlying bedrock)

**Till** - thick unconsolidated rock, gravels, sands, and silts dropped by melting glaciers. Till can be several hundred feet thick in Indiana.

**Moraines** - ridges of glacial till dropped at the former margin of a glacier, carried there to the melting edge like a conveyer belt.
Topography and Physiography

- Moraines and drainages
- Till plains
- Wabash Lowland
- Crawford Upland
- Dearborn Upland
- Muscatatuck Plateau
- Scottsburg Lowland
- Norman Upland
- Mitchell Plateau

Legend:
- National Elevation Database, 1999
- U.S. Geological Survey (USGS), EROS Data Center