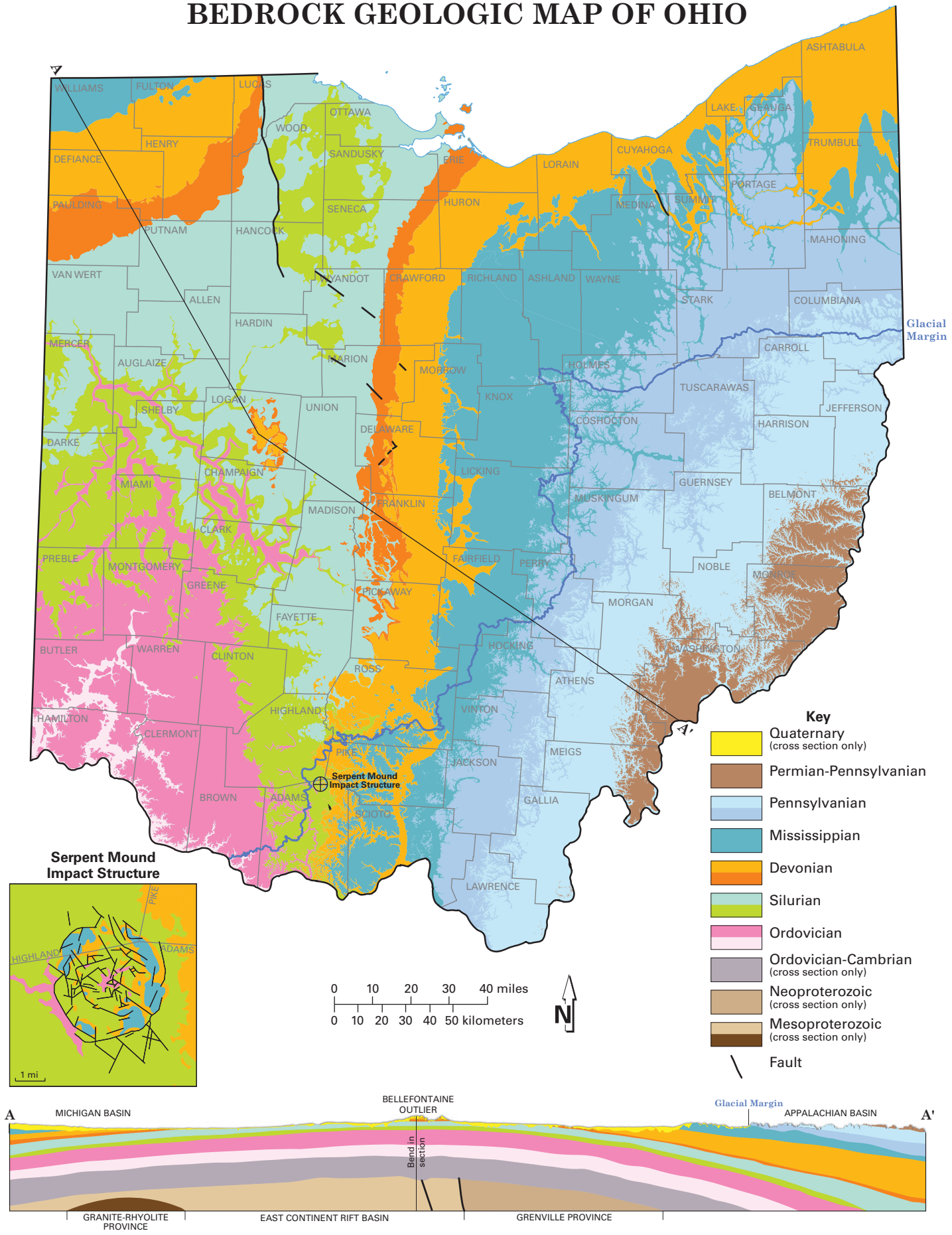
BEDROCK GEOLOGIC MAP OF OHIO



Serpent Mound Impact Structure

Recommended citation: Ohio Division of Geological Survey, 2006, Bedrock geologic map of Ohio: Ohio Department of Natural Resources, Division of Geological Survey Map BG-1, generalized page-size version with text, 2 p., scale 1:2,000,000.

This map is a generalization of the Bedrock Geologic Map of Ohio (Slucher and others, 2006)—the first statewide 1:500,000-scale bedrock-geology map compiled by the Ohio Division of Geological Survey since 1920 and the first to properly portray the bedrock geology that exists beneath the extensive deposits of Quaternary sediments that cover much of the bedrock in the state. Overall, the bedrock geology of Ohio consists of flat lying to gently dipping carbonate, siliciclastic, evaporite, and organoclastic strata of sedimentary origin that range in age from Upper Ordovician to Upper Carboniferous-Lower Permian. At depth, as illustrated in the cross section, older sedimentary, igneous, and metamorphic rocks that range from Lower Ordovician to Mesoproterozoic in age occur. At the surface, an irregular veneer of mainly unconsolidated Quaternary sediments conceal most bedrock units occurring northward and westward of the glacial margin.

Strata of the Ordovician System are the oldest exposed rocks in Ohio and consist mainly of alternating shale and limestone sequences. Silurian System strata are mostly dolomites with lesser amounts of shale. Rocks of the Devonian System consist of two contrasting types. Lower and Middle Devonian-age strata are mainly carbonate rocks whereas Upper Devonian-age rocks consist mostly of clastic rocks. In Champaign and Logan Counties, Devonian rocks occur on a small erosional remnant referred to as the Bellefontaine Outlier by geologists. Coincidentally, the highest topographic point in Ohio (Campbell Hill–1,549 feet above sea level) occurs also in this area.

The Carboniferous System is divided into two Subsystems, the Mississippian and Pennsylvanian. Mississippian strata are mostly shales and sandstones that occur locally in various proportions. Pennsylvanian strata consist mainly of a diverse array of alternating sandstones, siltstones, shales, mudstones, limestones, and underclays; economic coal beds occur also in portions of this sequence. The youngest interval of sedimentary rocks in Ohio, the Dunkard Group, occurs only in southeastern Ohio and consists of strata similar in composition to the underlying Upper Pennsylvanian-age rocks; however, the age of the Dunkard Group has been debated since the late 1800s. Dunkard strata contain a well-studied late Pennsylvanian-age assemblage of plant fossils with infrequent early Permian-age forms. Yet, fossil plant spores found in coal beds in the interval only support a late, but not latest Pennsylvanian age. Thus, until more definitive fossils are found, geologist are unable to determine the exact age of the Dunkard Group beyond a combined Permian-Pennsylvanian age assignment.

In west-central Ohio, the ancient Teays River system extended across much of Ohio during the late Neogene to early Quaternary Periods and sculptured an extensive network of deeply dissected valleys into the bedrock surface. The spatial configuration of many geologic units on this map clearly reflects the major channel networks of these former drainage systems. Also, four major regional structural geology elements affect the spatial distribution of rocks in Ohio: the Appalachian and Michigan basins, and the Cincinnati and Findlay arches which occur between the two basins. Locally, several high-angle normal faults displace rocks in the state.

The Serpent Mound Impact Structure in southern Ohio is a circular area of deformed and broken rocks that is approximately four and one-half miles in diameter. Recent investigations indicate the feature is the result of a meteorite impact believed to have occurred between 256 and 330 million years ago.

Cross section A-A' traverses Ohio from the northwest to the southeast and intersects the southern portion of the Michigan Basin, the area between the Cincinnati and Findlay arches, and the western Appalachian Basin, respectively. The stratigraphic units shown in this profile illustrate the broad, arching geometric distortion to the bedrock in Ohio created mainly by periods of tectonic subsidence within these regional structural basins. For specific details on the various rock units, economic commodities, and geologic hazards within Ohio, see either the printed or digital version of the Bedrock Geologic Map of Ohio (Slucher and others, 2006). Both products are available for purchase by contacting the ODNR Geologic Records Center by calling 614-265-6576 or emailing: geo.survey@dnr.state.oh.us.

Quaternary (about 1.8 million years ago to present)—Unconsolidated sediments: till, gravel, sand, silt, clay, and organic debris. Continental origin. (Shown in cross section only)

Period of widespread erosion

Permian and Pennsylvanian (about 298 to 302 million years ago)—Sedimentary rocks: mainly shale, sandstone, siltstone, mudstone, and minor coal. Continental origin.

Pennsylvanian (about 302 to 307 million years ago) Sedimentary rocks: mainly shale, sandstone, siltstone, mudstone, limestone, and some coal. Continental and marine origin.

Pennsylvanian (about 307 to 318 million years ago)—Sedimentary rocks: mainly sandstone, siltstone, shale, and conglomerate, with some coal and limestone. Deltaic and marine origin.

Period of widespread erosion

Mississippian (about 322 to 359 million years ago)—Sedimentary rocks: sandstone, shale, siltstone, conglomerate, and minor limestone. Marine to marginal marine origin.

Devonian (about 359 to 385 million years ago)—Sedimentary rocks: mainly shale and siltstone with some sandstone. Marine to marginal marine origin.

Devonian (about 385 to 407 million years ago)—Sedimentary rocks: mainly limestone and dolomite with some shale, and minor sandstone. Marine and eolian origin.

Period of widespread erosion

Silurian (about 416 to 423 million years ago)—Sedimentary rocks: dolomite, anhydrite, gypsum, salt, and shale. Marine and restricted marine origin.

Silurian (about 423 to 435 million years ago)—Sedimentary rocks: dolomite and shale with some limestone. Marine origin.

Period of widespread erosion

Ordovician (about 446 to 450 million years ago)—Sedimentary rocks: shale and limestone. Marine origin.

Ordovician (about 450 to 460 million years ago)—Sedimentary rocks: limestone and shale. Marine origin.

Period of widespread erosion

Ordovician and Cambrian (about 486 to 510 million years ago)—Sedimentary rocks: mainly dolomite, sandstone, shale, with minor limestone. Marine origin. (Shown in cross section only)

Period of widespread erosion

Neoproterozoic (between 900 million and 1 billion years ago)—Metamorphic rocks: gneiss, schist, amphibolite, and marble; and igneous rocks: granite. Form during collision of tectonic plates. (Shown in cross section only)

Mesoproterozoic (between 1.0 and 1.2 billion years ago)—Sedimentary rocks: sandstone and siltstone; and igneous rocks: basalt and rhyolite. Form during rifting of continental landmass. (Shown in cross section only)

Period of widespread erosion

Mesoproterozoic (between 1.45 and 1.52 billion years ago)—Igneous rocks: granite and rhyolite. Formed during crustal evolution and differentiation. (Shown in cross section only)