

PLEISTOCENE DEPOSITS

LAKE  
(silt, sand)

LATE WISCONSIN

EARLY WISCONSIN

ILLINOIAN

TERTIARY FORMATIONS  
(silt, sandstone, clay)

UPPER CRETACEOUS FORMATIONS  
(sandstone, clay)

UPPER CRETACEOUS FORMATIONS  
(shale, chalk)

LOWER CRETACEOUS FORMATIONS  
(limestone, shale, sandstone)

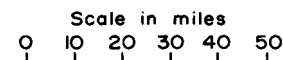
JURASSIC AND TRIASSIC FORMATIONS  
(shale, sandstone, redbeds)

PALEOZOIC FORMATIONS  
(limestone, sandstone, shale)

PRECAMBRIAN FORMATIONS

METAMORPHIC ROCKS  
(schist, slate, quartzite)

IGNEOUS ROCKS  
(granite, rhyolite, phonolite)



GEOLOGIC MAP OF SOUTH DAKOTA

## GEOLOGICAL SUMMARY

Unconsolidated rocks of glacial origin make up much of the surface rock in the area east of the Missouri River in South Dakota. About 1,500,000 years ago, a great ice mass in central Canada began to move southward across part of the Dakotas. This was the first of four ice masses or glaciers that covered the area east of the Missouri River in South Dakota.

Rock particles of many types, shapes, and sizes were left behind by the glaciers, and this material is called glacial drift. The average thickness of drift is about 100 feet, but in places the drift is known to be nearly 900 feet in thickness. Moraines, long rounded ridges, are among the most notable features found in South Dakota made up of glacial drift.

Beneath the glacial drift in eastern South Dakota is bedrock composed chiefly of sandstone and shale. These sedimentary rocks were deposited during a period of time called the Cretaceous. This was a period in earth history when dinosaurs roamed the earth. These ancient beasts, as well as other forms of life, are preserved as fossils in the Cretaceous rocks of South Dakota. Along the Missouri River west of Yankton, South Dakota, can be seen the yellow chalk bluffs deposited during Early Cretaceous time.

Beneath the sedimentary rocks in eastern South Dakota are found the granites and quartzite of Precambrian age. Where the sedimentary rocks have been eroded away, pink quartzite that can be seen near Sioux Falls and varicolored granite as seen near Milbank occur as the surface rock.

West of the Missouri River, bedrock, particularly in the northwest and west-central South Dakota, is of Cretaceous age. The gray to black massive Upper Cretaceous shale that forms a sticky gumbo when wet covers about half of western South Dakota.

Also, in the northwest and south-central parts of the State are shales, sandstone, clays, and lignites that belong to a later geologic period known as the Tertiary.

The Badlands were carved from rocks of Tertiary age. From these rocks many fossils have been extracted, including sabre-toothed tigers, rhinoceros, three-toed horses, giant pigs, camels, and turtles.

The most complete geologic record in South Dakota is to be found in the Black Hills. Nearly an unbroken record of geology is revealed by the rocks found there.

The oldest rocks of the Black Hills are slates and quartzites found in the center of the Hills. These rocks are over a billion and a half years old. It is from these rocks that gold is mined. Somewhat later in geologic time, granite rocks intruded these older slates and quartzites. Mount Rushmore and Harney Peak are composed of granite.

Later in geologic history, Paleozoic age sedimentary rocks were laid down followed by rocks of Triassic, Jurassic, and Cretaceous age. These rocks are seen today surrounding the older slates, quartzites and granites, from the oldest Paleozoic rock outward to the youngest Cretaceous rocks.

At the close of Cretaceous time, a great mountain-making earth movement took place. It was at this time the rocks were bent upward to form the elongated dome, the Black Hills. The erosive powers of running water, wind, and ice have been cutting into the rocks ever since, and have finally exposed the rock that can be seen today.

