

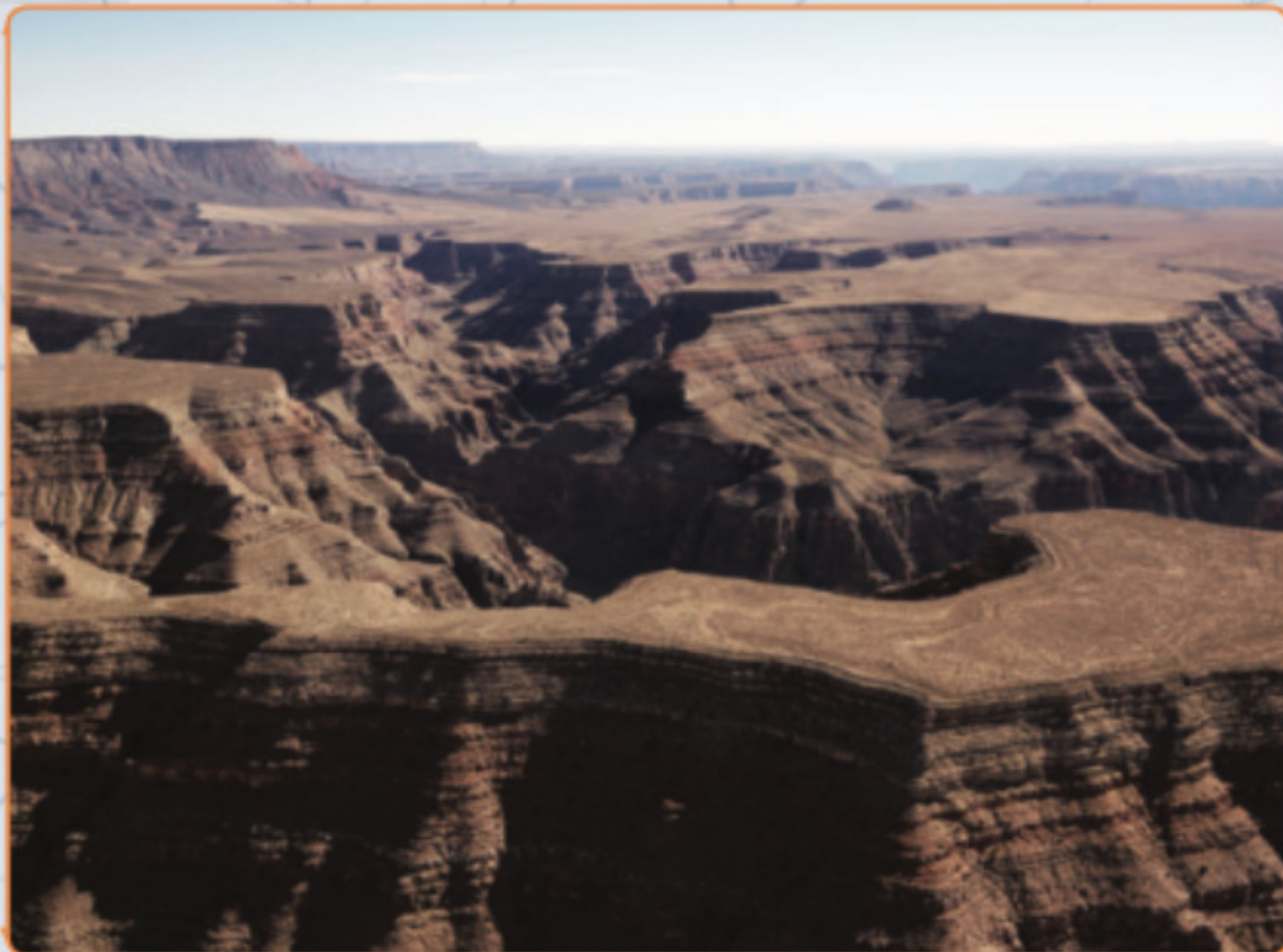
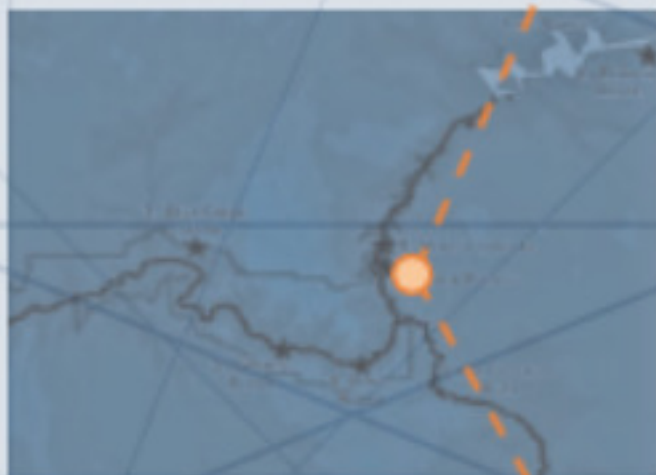
Grand Canyon NATIONAL PARK

Elevation Map



Site 1

Kaibab Plateau



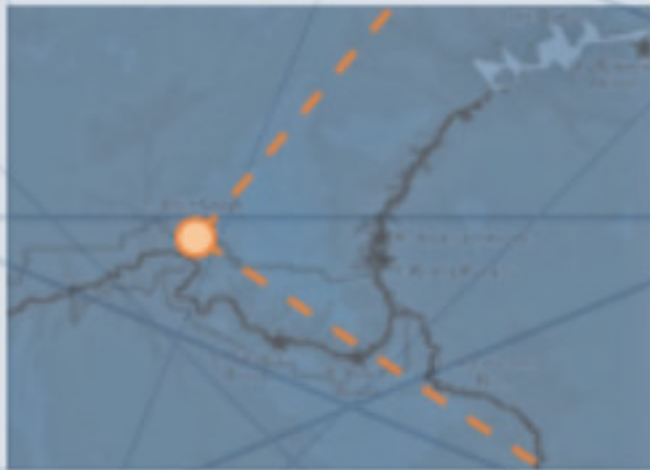
Site 2

Rainbow Bridge



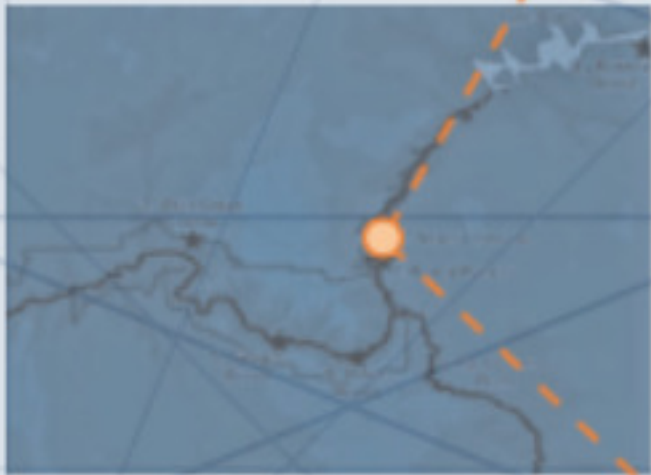
Site 3

Deer Creek Canyon



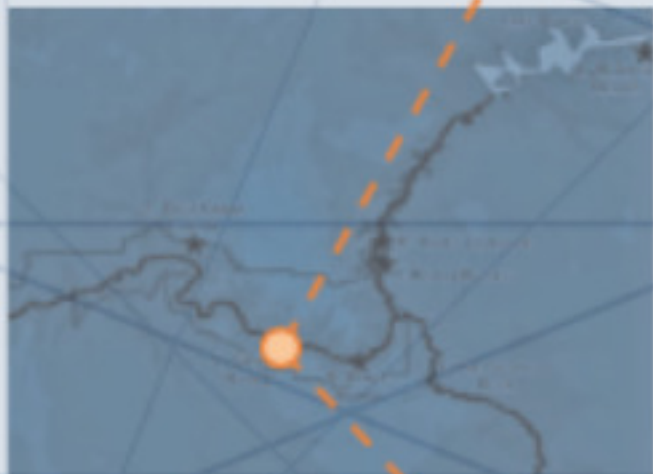
Site 4

Vasey's
Paradise



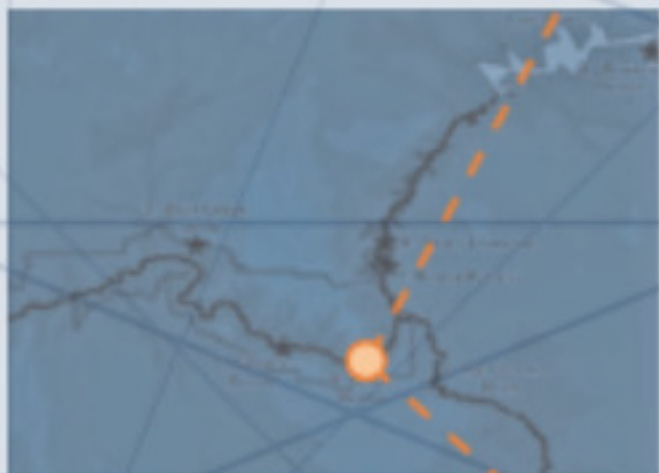
Site 5

Granite Rapids



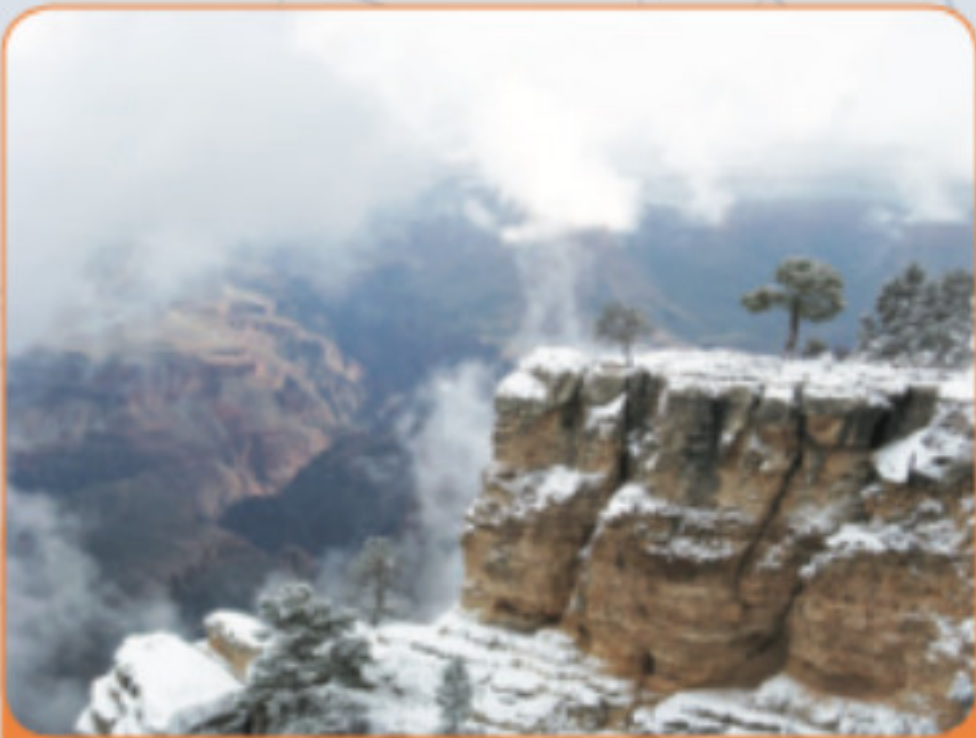
Site 6

Hance Rapids



Water in Grand Canyon National Park

Grand Canyon National Park is a colorful canyon with steep sides located in northern Arizona. The Colorado River flows through the canyon. In the picture on the next page, you can see the brown river at the bottom of the canyon. The canyon formed in the last 5-6 million years. Most of the erosion happened in the last 2 million years. The canyon formed slowly over a very long period of time. The canyon is 277 miles long. At its deepest point it is 8,000 meters from the top of the canyon to the bottom. The tallest building in the world is just over 500 meters tall. That means you could stack 16 of the tallest buildings in the world on top of each other and they would just reach the top of the canyon.



Snow on the Plateau – Even though the Grand Canyon has a desert-like climate, it receives snow on the plateau because it is so high.

Climate and Atmosphere

The climate in the Grand Canyon is like the desert. It is hot and dry. Most of the precipitation happens in the summer. There are often strong storms in the late summer that cause the side canyons to fill up with water and flow very fast. In the winter, there can be heavy snowfall at the top of the plateau. Freezing temperatures followed by thawing ones cause rock to break apart. This kind of weathering is called freeze-thaw weathering.

Glaciers

There are no glaciers in the park today nor were there any during the last glaciation.

Lakes and Oceans

There are no natural lakes in the canyon, but there are two very large man-made lakes. A dam built upstream of the canyon created Lake Powell. Downstream of the canyon another dam forms Lake Mead.

These dams are used to control flooding along the river. The lakes also provide recreation like boating and swimming. The water in the lakes can also be used to irrigate farms in the area. Because the air is so hot and dry, large amounts of liquid water are lost from the lakes to the atmosphere through evaporation.



Lake Powell – Many side canyons upstream of the Grand Canyon are underwater because Lake Powell was created.

The Grand Canyon is not near the ocean. However, water from the Colorado River does eventually flow into the Pacific Ocean.



Erosion – The Colorado River is wide and the canyon walls are steep. The cliffs are made of solid rock with sediment sitting at the base. The fast moving river will later move this sediment downstream.

When the river is bigger and more powerful, it erodes more rock from the canyon.

Rivers and Streams

The Colorado River is the most important body of water in the region. The river begins in the Rocky Mountains in Colorado and flows to the Gulf of California. The snow that melts in the mountains in the spring flows into the river. The flowing river is the biggest reason for the very steep cliffs and fast erosion.

The river carries a lot of sediment. Only a small amount of the sediment gets deposited on the banks because of how quickly the river flows. When there are heavy rains or a lot of melting snow upstream, there is more water in the river.

This causes the river to swell and increase in power.

Groundwater

Most of the groundwater in the park comes from precipitation, which infiltrates the rock on the Cococino and Kaibab Plateaus. There are no lakes or streams on the plateau because the groundwater infiltrates the plateau easily.

The photo on the right shows what happens when flowing groundwater reaches the surface (e.g. a cliff). The water flows to the surface of the steep canyon walls, and springs form on the sides of the canyon. The water flows down the sides of the canyon and into the river below. Sometimes there is so little water flowing from the spring that it evaporates before it reaches the river.

Soil, Plants, and Animals

There is very little soil on the sides of the canyons. At the top of the plateau the soil is not very deep.

This means that plants cannot put their roots deep into the ground. There are not many plants growing on the plateau. Roots are very good at slowing erosion because they hold the soil and rock together. Because there is not much soil and plant life, it is easier for the rocks to be weathered and eroded.



Colorado River Erosion – Groundwater can flow out of cliff walls. If the water has eroded a large cave in the cliff, the amount of water that flows out can be very large like in this photograph.

Rock in Grand Canyon National Park

Grand Canyon National Park is known for the rock that makes up the landforms in the park. It is also famous because of its unusual shape and huge size.

Sedimentary Rock

The Grand Canyon has many layers of sedimentary rock of different ages. The rock at the bottom of the canyon is older than the rock at the top of the canyon.

There are many kinds of sedimentary rock including limestone, sandstone, and shale. The differences in the rock come from the environment in which they were formed. For instance, many of the sediments were deposited in an ocean that once covered the area. Scientists use fossils, what the rock is made of, and other structures preserved in the rock to describe the different kinds of sedimentary rock. Most sedimentary rock in the region shows evidence that the sediment was deposited in shallow seas and ancient rivers.



Ripple Marks – These ripples preserved in the rock show that this rock formed in a shallow ocean or coastal environment.

Igneous Rock

At the bottom of the canyon, there is another type of rock called basalt next to sedimentary rock. This rock is a volcanic rock that is found in the canyon between some of the sedimentary rock. Even though there aren't any active volcanoes in the Grand Canyon today, the basalt is evidence that at one time there was volcanic activity in the area.

In the following picture, the horizontal layers are sedimentary rock. The black rock that cuts across these layers is the igneous rock, basalt. Since the igneous rock cuts across the layers, it must have formed below the surface after the sedimentary rock had already formed.



Igneous Intrusion – These ripples preserved in the rock show that this rock formed in a shallow ocean or coastal environment.



Metamorphic Rock

The base of the canyon is made up of the metamorphic rock called schist. This rock was first formed from sediments that were deposited two billion years ago at the bottom of the ocean. The sedimentary rock was later compressed and formed metamorphic rock. Above is an example of the type of rock found at the base of the canyon.

Weathering, Erosion, Deposition, and Uplift

Since most of the sediments seen in the canyon show evidence of being underwater, they must have been deposited in a very different environment. Some deposits formed underwater while others did not. Also, all of these sediments must have been buried very deeply in order to turn into rock. Yet, today the North Rim of the plateau reaches over 8,000 meters.

This means the rock here has been uplifted straight up. Each layer of sedimentary rock looks the same as when it was deposited. The cycle continues as weathering and erosion are carving out the deep canyon that exists today.

