

Teacher Reference for Step 5: The Landforms Identified

Aorounga

Impact Crater? Yes

Latitude: N 19° 6'

Longitude: E 19° 15'

Age: 345 million years

Size: 12.6 km in diameter

Location: Sahara Desert of northern Chad, Africa

Kind of Image: Spaceborne Imaging Radar-C/X-Band Synthetic Aperture Radar (SIR-C/X-SAR)

Description: An object less than 1 kilometer wide made this crater 7-10 miles wide. The original crater was buried by sediments, which were then partially eroded to reveal the current ring-like appearance. The dark streaks are deposits of windblown sand that migrate along valleys cut by thousands of years of wind erosion. The dark band in the upper right of the image is a portion of a proposed second crater. Scientists are using radar images to investigate the possibility that Aorounga is one of a string of impact craters formed by multiple impacts.

20,000-30,000 years ago, the area that is now the Sahara Desert was a wetland. Different kinds of forces were shaping this crater then.

360 million years ago, the Earth was undergoing a period of mass biological extinction. By way of comparison, the impact that scientists believed wiped out the dinosaurs 65 million years ago involved an asteroid or comet 10 times larger than the one that broke up to form the craters in Chad.

El'gygytgyn

Impact Crater? Yes

Latitude: N 67° 30'

Longitude: E 172° 5'

Age: 3 - 4 million years

Size: 18 km in diameter

Location: Northeastern Siberia

Kind of Image: Landsat 7

Description: This impact crater has been filled in by a lake.

Haughton

Impact Crater? Yes

Latitude: N 75° 22'

Longitude: W 89° 41'

Age: 23 million years

Size: 20 km in diameter

Location: Devon Island, Nunavut, in the Canadian high Arctic

Kind of Image: NASA's Landsat 7

Description: Although Haughton Crater has undergone substantial erosion, many of its surviving geologic features are exceptionally well preserved. The good state of preservation is due mostly to the crater's geographic setting. Erosion in the polar desert of the high Arctic is particularly sluggish due to the low amount of liquid water and the presence of continuous permafrost. The absence of any substantial vegetation cover also limits the weathering of surface materials, while it optimizes the site's exposure for geologic surveys from the ground and by remote-sensing.

The impact event punched through the entire stack of Paleozoic sediments present at the time and excavated material from a depth of over 1.7 km, biting into the gneissic basement.

Manicouagan

Impact Crater? Yes

Latitude: N 51° 23'
Longitude: W 68° 42'
Age: 214 million years
Size: 72 km in diameter now; 100 km in diameter when created
Location: northern Quebec, Canada

Kind of Image: NASA's Multi-angle Imaging Spectroradiometer (MISR)

Description: Scientists have proposed that impact of an asteroid of about 5 km in diameter created this crater, which was originally about 100 km in diameter. The initial crater rim has disappeared. A broad central uplift persists. Construction of a hydroelectric dam downstream from the crater allowed water to fill the surrounding depression, creating a lake that forms a ring around the central part.

The Manicougan crater is composed of large pieces of rock embedded in finer grained material rock ("impact-brecciated" rock). Geologists have estimated the crater's age by studying the ratios of various radioactive elements in the rock. The lake is bounded by erosion-resistant metamorphic and igneous rocks, and shock metamorphic effects are abundant in the target rocks of the crater floor.

The Manicougan impact event occurred toward the end of the Triassic period. At that time the Earth experienced a mass extinction event involving the loss of roughly 60 percent of all species. Some scientists believe the impact may have been responsible for this mass extinction.

Mount St. Helens

Impact Crater? No. Mount St. Helen's is a volcano.

Latitude: N 46° 16'

Longitude: W 122° 12'

Age: probably less than 1 million years

Size: Several km in diameter

Location: South central part of the State of Washington, northwestern United States

Kind of Image: NASA's Landsat 7

Richat

Impact Crater? No. Richat is a product of erosion.

Latitude: N 21°04'

Longitude: W 11°22'

Age: Modern age

Size: 38 km in diameter

Location: Central Mauritania, northwest Africa

Kind of Image: NASA photograph taken by astronaut on the Space Shuttle

Description: Richat is a depression or pit about 100 m deep, in which there is a dome of rock. The rock is actually different kinds of rock in layers, several hundred million years old. Some kinds of rock erode faster than others. Made of different materials, the layers of rock have eroded at different rates, creating a series of concentric ridges. Fields of sand surround Richat and are encroaching into the southern part of the structure.

Researchers once thought Richat was an impact crater. But its flat middle and lack of shock-altered rock indicate otherwise. A volcanic eruption couldn't have formed it, because there's no dome of igneous or volcanic rock. Why Richat is nearly circular, nobody knows.

Schooner

Impact Crater? No, Schooner is manmade.

Latitude: N 37deg 20' 36.1"

Longitude: W 116deg 33' 59.9"

Age: 20th century

Size: About 300 m in diameter

Location: Nevada, U.S.

Kind of Image: IKONOS (privately-owned satellite); 1-meter resolution

Description: Nuclear testing resulted in the Schooner crater.