Mapping Craters on the Earth and the Moon

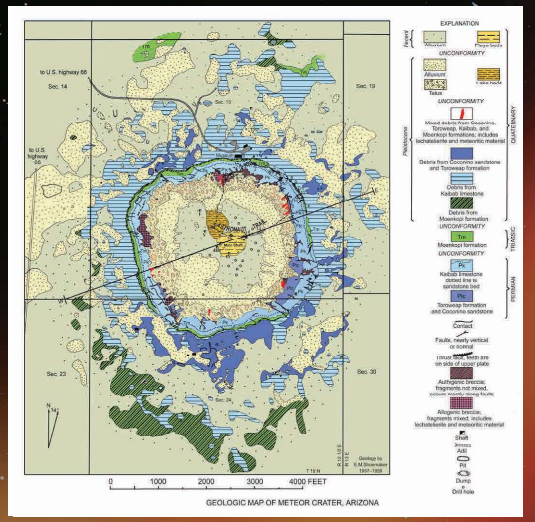
Geologic maps help advance our understanding of the geological history of Earth, the Moon, and other solid surface bodies in the Solar System. Geologic maps are tools that depict the vertical and lateral distribution of rocks and sediments that are in effect the building blocks of the uppermost crust of a planet. These maps document geologic phenomena to help us better understand geologic processes and also guide applied science initiatives, such as resource exploration and site development.

For the investigation of impact craters, geologic maps are vital for decoding the effects of high-energy impacts on planetary surfaces. Mapping geologic units and landforms such as uplifted crater rims and adjacent ejecta blankets allow scientists to reconstruct past impact events, while providing insights into geologic processes that altered those craters over time.

The integration of geologic maps and impact crater studies allows researchers to explore the history of the Earth and the Moon, enhancing our understanding of the Solar System's geological context.

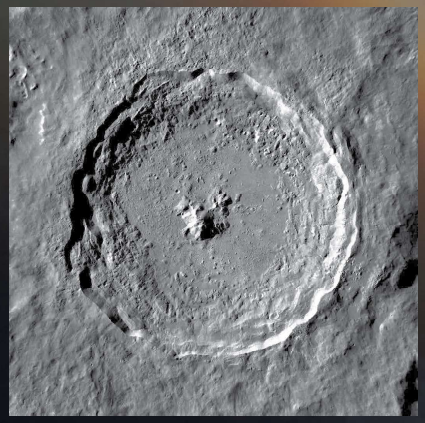
Compare the characteristics of impact craters on the Earth and the Moon using the images on this poster. Consider the size and scale of the craters, the shape of the crater rims, surrounding ejecta, and interior wall and floor features.

Visit http://bit.ly/ESW-2024 for learning activities and a webinar related to geologic mapping and impacts on the Earth and Moon. The published geologic maps with the keys and scale bars are also available, along with other related resources.

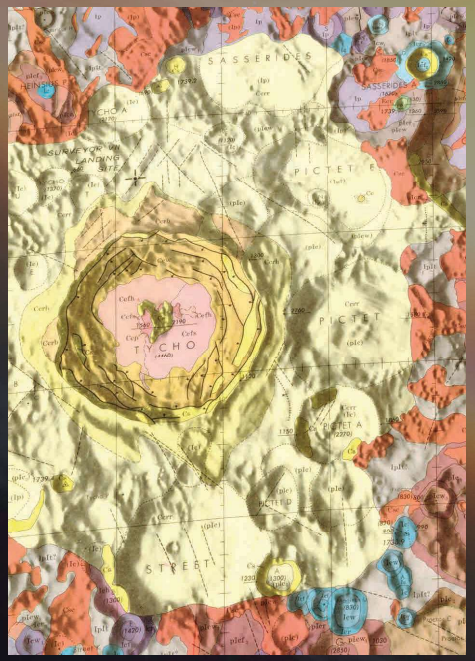


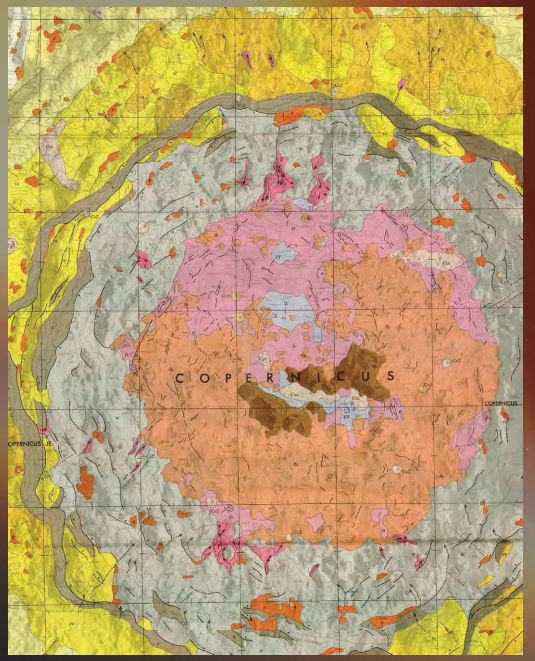
Meteor Crater, also known as Barringer Crater, was formed about 50,000 years ago by the impact of a nickel-iron meteorite, named the Canyon Diablo meteorite after the region where relicts have been located. With a diameter of 1.2 kilometers (0.75 miles) and a depth of 167 meters (548 feet), Meteor Crater is one of Earth's most remarkably preserved impact craters.

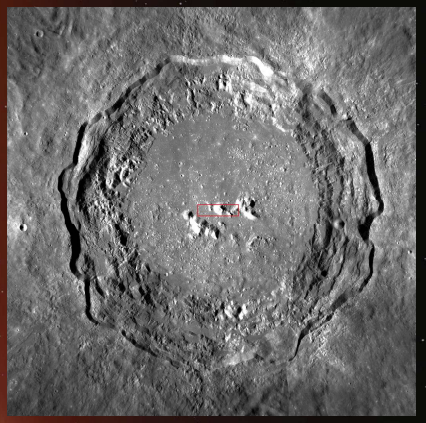
Located near Winslow, Arizona, Meteor Crater and its accompanying museum have become significant landmarks for the public to get up close and personal with the effects of the impact cratering processes. For over 50 years, Meteor Crater has served as an important training ground for astronauts, imparting valuable hands-on experience in geoscience-related fieldwork and impact processes and units, such as those that will be explored on the lunar surface.



Tycho crater is a distinctive impact crater on the moon with a diameter of 85 kilometers (52.8 miles) and 4.7 kilometers (2.9 miles) deep. Planetary scientists are interested in Tycho crater not only for its relatively young age (about 108 million years) but also for its location in the mid latitudes of the southern hemisphere, which holds potential importance for future lunar exploration. As part of NASA's Artemis program, scientists plan to study Tycho crater to uncover data about the Moon's geological history, impact processes, and the possibility of valuable resources (like water and rare earth elements) that could support future human missions to the lunar surface.







Copernicus crater, a prominent lunar feature, spans 96 kilometers (59.6 miles) in diameter and reaches a depth of 3.8 kilometers (2.4 miles). Though ejecta from Copernicus was sampled by Apollo 12 astronauts and later dated to approximately 800 million years, the feature is actually quite young compared to other impact craters on the Moon. Copernicus is the largest impact crater that retains bright streaks that radiate away from the crater's center, making it the largest "rayed" crater on the lunar surface. Scientists use the shape of Copernicus crater and its surrounding ejecta to better understand impact processes as well as the character of the lunar subsurface that the impactor excavated and exposed.

Images and map credits Meteor Crater geologic map: Gene Shoemaker/USGS, Meteor Crater satellite image: USGS National Map Data Download And Visualization Services, Tycho crater satellite image: NASA, Tycho crater geologic map: H.A. Pohn/USGS, Copernicus crater geologic map: K.A. Howard/USGS, Copernicus crater satellite image: NASA/GSFC/Arizona State University, Unified geologic map of the Moon on poster front: NASA/USGS/LPI.