

Meteorites: Messengers of Mayhem

Meteorites provide knowledge of the early Solar System.

Asteroid samples have captured the attention of both the science and exploration communities. These remnants of early Solar System processes are a tangible record of asteroids' compositions and structures, providing information scientists and engineers need to divert large asteroids that may potentially collide with Earth (right).

Image Caption:

Large asteroid impacts, like that depicted in the above artist's concept, can cause global, catastrophic damage. Image Credit: Don Davis

Although it is difficult to return asteroid samples with spacecraft, nature routinely sends samples to Earth. While large asteroid impacts with Earth are rare, small asteroids, falling as meteorites, impact the Earth every day!

Scientists have collected more than 50,000 meteoritic samples of asteroids on Earth. By comparison, we only have 2,200 samples that Apollo astronauts returned from the Moon.

Image Caption:

ANSMET team members document a meteorite find in the field during the 2013-2014 season. Every year, scientists spend 5-7 weeks on the ice in Antarctica collecting meteorites. Image Credit: Antarctic Search for Meteorites program/Alex Meshik and Steve Ballou

This impressive collection of meteorites has provided an incredible number of clues about the origin and evolution of the Solar System, including the geologic processes, such as impact cratering, that have altered the appearances of asteroids.

Meteorites record impact events on asteroids.

Before asteroids strike the Earth, they collide with each other in the asteroid belt, sometimes being bumped, cratered, and shattered many times. Asteroids, like 433 Eros seen here, show marks of billions of years of impacts.

Image Caption:

Asteroid 433 Eros: 34 kilometers (~21 miles) along its longest dimension. The crater in the blue circle is similar in diameter to the 1.2 kilometer (~0.75 mile) wide Barringer (Meteor) Crater in northern Arizona. Image Credit: NASA

Meteorites contain unique information about the history of those collisions. Close inspection of meteorites reveal how those impact cratering processes sculpt asteroid surfaces and alter asteroid interiors.

One day in the future the Earth may be faced with the possibility of a devastating asteroid impact. To better prepare for that type of future threat, it is important to continue studying meteorites to understand the diverse compositions and strengths of asteroids.

Scientists are continuing to make asteroid – meteorite connections.

Dr. Martin Schneider and Dr. Cyrena Goodrich with the Center for Lunar Science and Exploration study meteorites – making the connections between these Solar System samples and the geologic process responsible for delivering them to Earth.

Their studies measure the damage produced by impact cratering on asteroids and distinguish the types of asteroids that collide with each other. Knowing how those processes have altered the structure of an asteroid gives an indication of whether the asteroid is solid throughout or a loose collection of rubble.

What kind of impact hazard should we prepare for? Understanding the structure of asteroids will help scientists better address this question and will help scientists and engineers create solutions to remove potential, future threats of impact.

*This exhibit was developed by the Center for Lunar Science and Exploration
(www.lpi.usra.edu/exploration) of the NASA Solar System
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