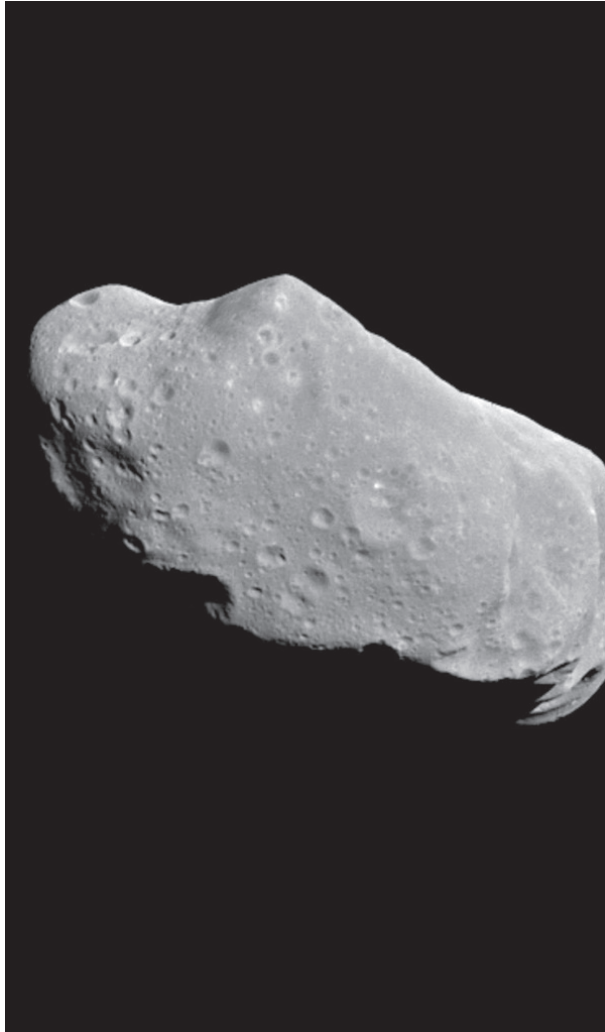
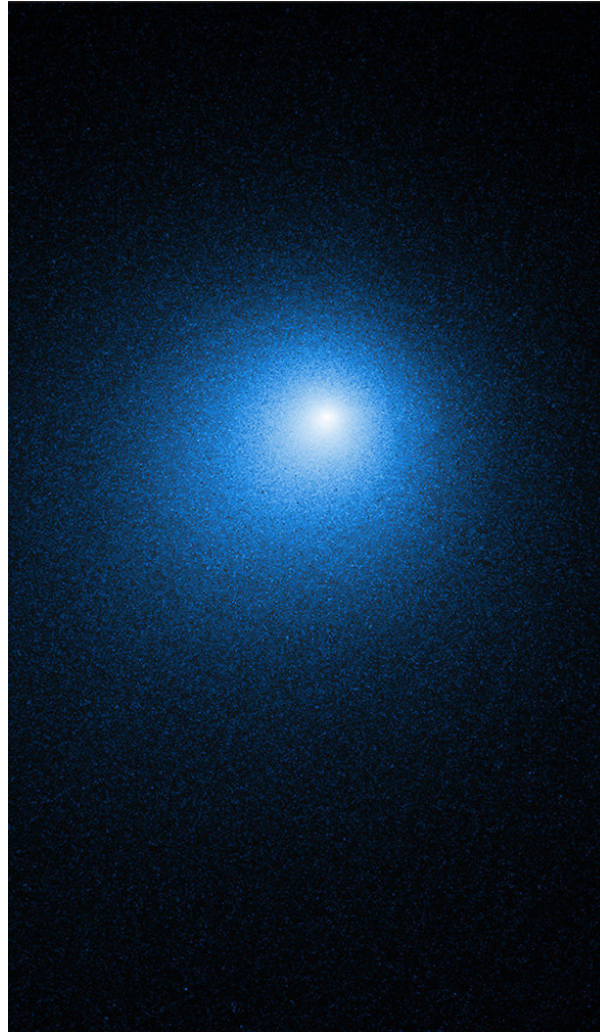


ASTERIODS



Asteroid 243 Ida taken by NASA's Galileo spacecraft. It is about 56 kilometers (35 miles) long.
Credit: NASA/JPL

COMETS



Hubble captured this view of comet 46P/Wirtanen on December 13, 2018. Credit: NASA, ESD, D. Bodewits (Auburn University) and J.-Y. Li (Planetary Science Institute)

METEORS



A meteor streaks across the sky during the annual Perseid meteor shower in 2016.
Credit: NASA Bill Ingalls

ASTEROIDS

Asteroids, sometimes called minor planets, are rocky remnants left over from the early formation of our solar system about 4.6 billion years ago.

Most of this ancient space rubble can be found orbiting the sun between Mars and Jupiter within the main asteroid belt. Asteroids range in size from Vesta—the largest at about 329 miles (530 kilometers) in diameter - to bodies down to 1 meter (3 feet) across. The total mass of all the asteroids combined is less than that of Earth's Moon.

Most asteroids are irregularly shaped, though a few are nearly spherical, and they are often pitted or cratered. As they revolve around the sun in elliptical orbits, the asteroids also rotate, sometimes quite erratically, tumbling as they go. More than 150 asteroids are known to have a small companion moon (some have two moons). There are also binary (double) asteroids, in which two rocky bodies of roughly equal size orbit each other, as well as triple asteroid systems.

Jupiter's massive gravity and occasional close encounters with Mars or another object change the asteroids' orbits, knocking them out of the main belt and hurling them into space in all directions across the orbits of the other planets. Stray asteroids and asteroid fragments slammed into Earth and the other planets in the past, playing a major role in altering the geological history of the planets and in the evolution of life on Earth.

Scientists continuously monitor Earth-crossing asteroids, whose paths intersect Earth's orbit, and near-Earth asteroids that approach Earth's orbital distance to within about 45 million kilometers (28 million miles) and may pose an impact danger. Radar is a valuable tool in detecting and monitoring potential impact hazards. By reflecting transmitted signals off objects, images and other information can be derived from the echoes. Scientists can learn a great deal about an asteroid's orbit, rotation, size, shape, and metal concentration.

COMETS

Comets are leftovers from the dawn of our solar system around 4.6 billion years ago, and consist mostly of ice coated with dark organic material. They may yield important clues about the formation of our solar system. Comets may have brought water and organic compounds, the building blocks of life, to the early Earth and other parts of the solar system.

Each comet has a tiny frozen part, called a nucleus, often no larger than a few kilometers across. The nucleus contains icy chunks, frozen gases with bits of embedded dust. A comet warms up as it nears the Sun and develops an atmosphere, or coma. The Sun's heat causes the comet's ices to change to gases so the coma gets larger. The coma may extend hundreds of thousands of kilometers. The pressure of sunlight and high-speed solar particles (solar wind) can blow the coma dust and gas away from the Sun, sometimes forming a long, bright tail. Comets actually have two tails a dust tail and an ion (gas) tail.

METEORS AND METEORITES

Meteoroids are natural objects in space that range in size from dust grains to a meter in size.

When meteoroids enter Earth's atmosphere, or that of another planet, like Mars, at high speed and burn up, they're called meteors. This is also when we refer to them as "shooting stars." Sometimes meteors can even appear brighter than Venus -- that's when we call them "fireballs." Scientists estimate that about 48.5 tons (44,000 kilograms) of meteoritic material falls on Earth each day.

When pieces of a meteoroid or asteroid survive their trip through the atmosphere and reach the ground, they're called meteorites.

METEOR SHOWERS

Several meteors per hour can usually be seen on any given night. When there are lots more meteors, you're watching a meteor shower. Some meteor showers occur annually or at regular intervals as the Earth passes through the trail of dusty debris left by a comet (and, in a few cases, asteroids).

For more information, visit:

www.nasa.gov/planetarydefense/overview

<https://cneos.jpl.nasa.gov>

www.minorplanetcenter.net