

The Science of Falling Stars

By Phil Plait | September 8, 2023

(excerpt)



Figure 1: Falling stars in the night sky over a forest.

Did you know that falling stars, also known as shooting stars, are not actually stars? They are **meteors**. During a meteor shower, it only looks like the stars are falling from the sky.

To understand meteor showers, you need to know the difference between a meteor and a **meteorite**. A meteoroid is a piece of rock traveling through outer space. Meteoroids can be as small as a particle of dust or as big as a boulder.

A meteor is a **meteoroid** that enters Earth's atmosphere. Meteors enter the atmosphere at speeds of 25,000-160,000 mph! When meteors travel through air, it creates **friction**. This causes the air around the meteor to become extremely hot. This heat makes the bright trail of light you see when a shooting star crosses the night sky.

Most meteors are smaller than a grain of sand. They quickly burn up in the atmosphere before they reach the Earth's surface. If part of a meteor does happen to reach the Earth's surface, it is called a meteorite. Meteorites rarely hit land, buildings, or humans. They usually end up in the ocean.

Sometimes a large number of meteors fall to Earth at the same time. Scientists call this a meteor shower.



Figure 2: A meteoroid falling through space toward Earth.

Why would Earth **encounter** many meteoroids at the same time? Most meteoroids come from comets. Comets are like space snowballs made of rock, dust, and frozen gases. **Comets** orbit the sun, just like the Earth and the other planets. As a comet gets closer to the sun, its icy surface boils off. This releases particles of dust and rock, called **comet debris**.

Several times each year, the orbit of the Earth crosses the orbit of a comet. When Earth travels through the path of comet debris, it creates a meteor shower. Two well known meteor showers happen in August and November. They are called the **Perseid meteor shower** and the Leonid meteor shower.

Extremely intense meteor showers are known as **metesor storm**. Meteor storms may produce over 1,000 meteors per hour. During a meteor storm, it may look as if every star in the sky is falling. This is how people described the most famous meteor storm in modern history, the **Leonid storm** of 1833. This storm excited the general public and helped start the scientific study of meteors.

While meteor storms look **spectacular**, they are not dangerous to people on Earth. Meteors stay in the upper atmosphere. They are 50 to 75 miles above the ground.



Figure 3: A meteor (shooting star) burning up as it enters Earth's atmosphere.

The best time to watch a meteor shower is between midnight and just before sunrise.

Many meteors fall during the day, but you can't see them because it's too light out. **Meteors** are easiest to see on a dark night with no clouds, far from city lights.

Watching a meteor shower is safe. If you happen to see a lot of falling stars, there's nothing to worry about. You now know that the stars aren't actually falling.

Annotation Keys

Definitions

meteors	a small body of matter from outer space that enters the earth's atmosphere, becoming incandescent as a result of friction and appearing as a streak of light.
meteorite	a piece of rock or metal that has fallen to the earth's surface from outer space as a meteor.
meteoroid	a small body moving in the solar system that would become a meteor if it entered the earth's atmosphere.
friction	the resistance that one surface or object encounters when moving over another.

encounter	unexpectedly be faced with or experience (something hostile or difficult).
Comets	a celestial object consisting of a nucleus of ice and dust and, when near the sun, a 'tail' of gas and dust particles pointing away from the sun.
spectacular	beautiful in a dramatic and eye-catching way.
storm	a violent disturbance of the atmosphere with strong winds and usually rain, thunder, lightning, or snow.
debris	scattered pieces of rubbish or remains.

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