

## **Observing Solar Explosions!**

The Sun has powerful magnetic fields that heat the area around the Sun called the corona. These magnetic structures also produce violent explosions called coronal mass ejections (CMEs) that can carry billions of tons of charged gases into space at speeds of two million miles an hour (3 million kilometers per hour). CMEs directed toward Earth can reach us in one to four days. Solar flares are smaller, but more intense events than CMEs. With flares magnetic energy is converted into relatively brief flashes of ultraviolet, X-ray, and gamma-ray radiation that can harm space travelers.

## **What is SOHO?**

SOHO, the Solar and Heliospheric Observatory, recently celebrated the 10th anniversary of its launch on December 2, 1995. Data and images from its 12 instruments have given us significant information about the internal structure of the Sun, its extensive outer atmosphere, and solar storms. Weighing two tons and measuring about 25 feet (9 meters) across, it orbits a point one million miles (1.5 million km) sunward of the Earth. On this inner path, it travels around the Sun just about the same as the Earth does. SOHO is a cooperative effort between the European Space Agency and NASA. It is managed by Goddard Space Flight Center in Maryland. It is the most advanced solar observing spacecraft ever built. There is simply no other spacecraft like it.

By observing the Sun for over 10 years, SOHO has created a nearly continuous and richly detailed record of solar activity that is allowing scientists around the world to develop a greater understanding of our star, in fact, of all stars. SOHO is our watchdog on the Sun and its storms and gives us a few day's notice of Earth-directed disturbances. SOHO has provided the first 3D images of solar weather beneath the surface of the sun, and, with the assistance of amateur astronomers around the world, has discovered over 1,000 comets. Scientists worldwide are using SOHO data to learn how to predict solar storms that could endanger the future explorers of our solar system.

What are some advantages of having an observatory in space? There is no distortion from the atmosphere, cloud cover is not an issue, and the Sun is always visible. From space, SOHO also measures the speed and power of CMEs and notes which ones might be aimed near Earth. Not all of the Sun's energy penetrates the Earth's atmosphere, so scientists rely on telescopes both on the ground and in space to investigate CMEs.