

Understanding our star and its influence on Earth with SOHO

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Originally planned for a two-year mission, the ESA–NASA Solar and Heliospheric Observatory, SOHO, has been operating for more than two decades by now. The satellite enjoys an uninterrupted view of our star from Lagrangian point L1, and its numerous mission extensions have allowed it to cover nearly all of two 11-year solar cycles, making it the longest-lived Sun-watching satellite to date. SOHO has returned a wealth of new information about the Sun, from its core through to the hot and dynamic outer atmosphere, the solar wind and solar energetic particles. Crucially, SOHO is relied upon today to monitor the effect of space weather on our planet, and it plays a vital role in forecasting potentially dangerous solar storms. These storms are typically driven by coronal mass ejections, or CMEs, which propel billions of tonnes of electrified gas from the Sun into space at millions of kilometers per hour. If Earth lies in the path of a CME our planet can be subjected to major geomagnetic storms, which may damage satellites, disrupt telecommunications, endanger astronauts and cause current surges in power lines. SOHO has studied more than 20 000 coronal mass ejections to date, pinpointing their sources on the Earth-facing hemisphere of the Sun, and determining their speed and direction to provide up to three days' warning – sufficient to take action on Earth. In addition to investigating how the Sun works, SOHO is the most prolific discoverer of comets in astronomical history, with the destinies of more than 3000 tracked as these icy worlds endured fiery encounters with the Sun.