The SECCHI Experiment on the STEREO Mission

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The Sun Earth Connection Coronal and Heliospheric Investigation (SECCHI) on the NASA Solar Terrestrial Relations Observatory (STEREO) mission is a suite of remote sensing instruments consisting of an extreme ultraviolet (EUV) imager, two white light coronagraphs, and two telescopes that comprise the heliospheric imager. SECCHI will observe coronal mass ejections (CMEs) from their birth at the sun, through the corona and into the heliosphere. A complete instrument suite is being carried on each of the two STEREO spacecraft, which will provide the first sampling of a CME from two vantage points. The spacecraft will orbit the Sun, one Ahead of the Earth and the other Behind, each separating from Earth at about 22 degrees per year. The varying separation means that we will have different observational capabilities as the spacecraft separate and therefore differing science goals. The primary science objectives all are focused on understanding the physics of the CME process - their initiation, 3D morphology, propagation, interaction with the interplanetary medium and space weather effects. By observing the CME from multiple viewpoints with UV and coronagraphic telescopes and by combining these observations with radio and in-situ observations from the other instruments on STEREO as well as from other satellites and ground based observatories operating at the same time, answers to some of the outstanding questions will be obtained. STEREO follows the very successful SOHO mission. SOHO's success was primarily due to the highly complementary nature of the instruments, but it was partly due to the very stable platform. The L1 orbit enables an extremely stable thermal environment and thus very stable pointing, as well as uninterrupted solar viewing. The STEREO will have both of these characteristics, but in addition will have multi-viewpoint viewing of CMEs, which will greatly enhance the many discoveries that SOHO data have produced. We have been developing techniques to interpret the observations from multiple viewpoints and to perform 3-dimensional deconvolution of the CME observations using forward modeling and inversion techniques. A continuous downlink of STEREO data will provide a low-resolution, real-time view from all of the instruments. The full data are downlinked

once a day and will be available about 24 hours later. In this paper we will discuss these issues, review the SECCHI instrument and compare the scientific objectives to some of the CME results from SOHO/LASCO.