# Project Details

**ROSES ID:** NRA-00-OSS-01
**Selection Year:** 2001
**Program Element:** Independent Investigation: LWS

**Project Title:**
Modeling Heliospheric Disturbance Propagation Using Remote Sensing Observations

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**Summary:**
Earth, immersed in the Sun's atmosphere and bombarded by solar high energy particles, has no choice but to react to these inputs. We now know that the largest solar coronal disturbances, called coronal mass ejections or CMEs, are the cause of major geomagnetic storms, which can create hazardous conditions affecting satellites and astronauts in orbit, communications, and even ground-based systems.
At UCSD we have been at the forefront of remote sensing studies of the origins and propagation of CMEs, and their effects on geospace. We have developed a tomographic technique to track these disturbances outward from the Sun. We are also involved in the construction of the Solar Mass Ejection Imager (SMEI) to be launched in December 2001. At present there is no effective way to track interplanetary disturbances crossing the large gulf between the solar corona and Earth. If successful, SMEI will revolutionize the way we are able to measure heliospheric features and forecast their arrival at Earth by tracking CMEs from near the Sun until they strike Earth 2-3 days later. To understand and forecast how solar transients are produced and propagate, we need to study the origins, interplanetary propagation and signatures of CMEs, and to develop techniques to measure and model heliospheric plasma and disturbances from a global perspective. To accomplish these objectives we propose to: 1) Study CMEs and other solar plasma phenomena to better understand their origins, interplanetary propagation and how they interact with Earth's magnetosphere; 2) Develop heliospheric tomographic programs for use with existing and future data sets such as interplanetary scintillation and SMEI; and 3) Develop SMEI data-reduction techniques to provide images with the requisite 0.1% differential photometric precision required for tomographic analysis. Our proposed program is relevant to NASA's Sun-Earth Connection Theme and the techniques developed will be pertinent to future NASA space missions such as STEREO, Solar Orbiter, Solar Polar, and Solar Dynamics Observatory.

# Publication References:

no references