

Project Details

ROSES ID: NRA-NNH04ZSS001N

Selection Year: 2005

Program Element: Independent Investigation: LWS

Topic: To determine the solar origins of the plasma and magnetic flux observed in an Interplanetary Coronal Mass Ejection.

Project Title:

Heliospheric Disturbance Propagation from Remote Sensing Observations - Data Analysis and Modeling

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Project Member(s):

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Summary:

Earth, immersed in the Sun's atmosphere and bombarded by solar high-energy particles, reacts to these inputs in a variety of ways. 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 have also been involved in the construction of the Solar Mass Ejection Imager (SMEI) launched February 2003 that can track interplanetary disturbances crossing the large gap between the solar corona and Earth. SMEI will revolutionize the way we are able to measure heliospheric features and forecast their arrival at Earth by measuring 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 interplanetary propagation and signatures of CMEs, and to develop techniques to measure and model heliospheric plasma and their interactions from a global perspective. To accomplish these objectives we propose to: 1) Develop our heliospheric tomography programs for use in near real-time SMEI data analysis. 2) Incorporate existing 3D-MHD programs into our tomography technique. 3) Develop SMEI analysis techniques that use the 0.1% differential photometric precision required for tomographic analysis so that other groups can use these analyses. 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 Dynamics Observatory, Telemachus and ESA's Solar Orbiter.

Publication References:

Summary: "

Reference: Jackson, Bernard UCSD - Heliospheric Disturbance Propagation from Remote Sensing Observations - Data Analysis and Modeling

Summary: no summary

Reference: Jackson, Bernard V.; Buffington, Andrew; Hick, P. P.; Wang, Cindy X.; (2005), Low resolution three dimensional reconstruction of CMEs using solar mass ejection imager (SMEI) data, AA(University of California/San Diego, USA), AB(University of California/San Diego, USA), AC(University of California/San Diego, USA), AD(University of California/San Diego, USA), doi: 10.1117/12.616329