

Project Details

ROSES ID: NRA-NNH04ZSS001N

Selection Year: 2005

Program Element: Focused Science Topic

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

Project Title:

Solar Connection of Interplanetary Coronal Mass Ejections

PI Name: Nariaki Nitta

PI Email: atn@g.ucla.edu

Affiliation: Lockheed Martin Advanced Technology Center

Project Member(s):

-

Summary:

We propose to identify and study solar sources of a few hundred interplanetary coronal mass ejections (ICMEs) identified in solar wind plasma and magnetic field data since 1996. We examine all the available EUV/X-ray full-disk images taken 30-120 hours before each ICME to isolate the particular coronal signatures that may be linked to the ICME. In the ideal case when only one fast and front-sided halo coronal mass ejection (CME) is observed in the time window, we concentrate on the few hours around the onset of the CME. ICMEs have several defining properties. One of them is the magnetic cloud, which can be modeled under the simplifying assumptions of force-free field and cylindrical geometry. Comparing the geometrical parameters from these models with solar observations, we explore the origin of flux ropes. Another ICME manifestation consists of compositional anomalies and high charge states, indicating high temperatures when the plasma is ejected with the CME. We analyze high temporal- and spatial-resolution EUV/X-ray images of solar eruptions associated with these ICMEs to understand when and where magnetic reconnection takes place during CME initiation. In order to understand why no ICMEs result from many front-sided halo CMEs, we compare LASCO and EUV/X-ray images to find any differences in the temporal or spatial behaviors of CMEs with and without ICMEs, and also study the effect of the CME's location within the large-scale magnetic field. A subset of ICMEs is directly responsible for geomagnetic storms. Our work complements several past and on-going projects that are targeted primarily to the prediction of geomagnetic storms on the basis of halo CMEs.

Publication References:

no references