Project Details

ROSES ID: NNH07ZDA001N
Selection Year: 2008
Program Element: Focused Science Topic

Topic: Prediction of the Interplanetary Magnetic Field Vector Bz at L1

Project Title:
Studying Complex Ejecta at L1 Using Realistic Models of CME Evolution and Interplanetary Magnetic Field

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Summary:
During solar cycle 23, a significant fraction of the largest Bz periods observed at the L1 point was the result of the interaction of a Coronal Mass Ejection (CME) with either a preceding event, or with a stream of fast solar wind. We propose to investigate the evolution of a CME into a complex interplanetary magnetic field (IMF), and the interaction of multiple CMEs from the Sun to L1. The science questions addressed in this proposal are:

How does the IMF vector at L1 evolve during space weather events?;

How does a preceding CME precondition the heliospace?;

How does the IMF connecting L1 with the Sun evolve with time?; and

What is the three-dimensional structure of shock waves and sheath regions of iCMEs en-route to L1?

To answer these questions, we will conduct self-consistent 3-D MHD simulations of selected events using existing, improved, and newly developed models of CME evolution, the IMF, and coronal emissions. These models will enable the LWS community to tackle problems related to some of the largest and longest-lived disruptions of the IMF's Bz component. We will work with the other members of the Focused Science Team from the topic T1-e of the LWS TR&T solicitation and make use of the STEREO Heliospheric Imagers. We will use data from ACE, SoHO and Wind to validate our models. Furthermore, we will investigate the scientific significance of having in-situ measurements closer to the Sun, as will be provided by the LWS Sentinels mission, to improve our understanding and forecasting of complex ejecta. By studying and modeling realistically the IMF from the Sun to L1, we will also provide some physical insight the production and transport of SEPs, which may prove useful to the LWS community.

Publication References:

no references