

Project Details

ROSES ID: NRA-00-OSS-01

Selection Year: 2001

Program Element: Independent Investigation: LWS

Project Title:

Propagation of CMEs through the interplanetary medium: Interactions with the Solar Wind

PI Name: Natchimuthuk Gopalswamy

PI Email: nat.gopalswamy@nasa.gov

Affiliation: Goddard Space Flight Center

Summary:

An empirical model to predict the arrival of coronal mass ejection was recently developed using SOHO and Wind data. This model has been validated using archival data from Helios-1, Pioneer Venus Orbiter and P78-1 data. We propose to improve the model by correcting for projection effects in speed measurements and the variability of solar wind speed. Using theory and MHD modeling, we shall develop a physical understanding of the empirical model. We also propose to put the model into operation to iteratively improve the model.

This proposal is relevant to at least two of NASA's four Strategic Enterprises: Space Science and Human Exploration and Development. A reliable model to predict the arrival of CMEs and their associated shocks in the vicinity of Earth based on their origin at the Sun, is an important tangible advance; a successful model is a testimony to our understanding of the coupling between CMEs and the Sun-Earth connected space. Since most of the long-lived solar energetic particle events are due to CME-driven shocks, the prediction of the latter is highly relevant to human exploration and development in space.

Publication References:

Summary: no summary

Reference: Gopalswamy, Nat; Lara, Alejandro; Yashiro, Seiji; Kaiser, Mike L.; Howard, Russell A.; (2001), Predicting the 1-AU arrival times of coronal mass ejections, Journal of Geophysical Research, Volume 106, Issue A12, p. 29207-29218, doi: 10.1029/2001JA000177

Summary: no summary

Reference: González-Esparza, J. A.; Lara, A.; Santillán, A.; Gopalswamy, N.; (2003), A Numerical Study on the Evolution of CMEs and Shocks in the Interplanetary Medium, SOLAR WIND TEN: Proceedings of the Tenth International Solar Wind Conference. AIP Conference Proceedings, Volume 679, pp. 206-209 (2003), doi: 10.1063/1.1618578