## Project Details

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

**Project Title:**
The Magnetic Structure of CMEs: A Comparison of Halo CMEs with Magnetic Clouds at 1 AU

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**Summary:**
Solar disturbances produce major effects in the corona and the heliosphere. The largest of these disturbances, coronal mass ejections or CMEs, cause major geomagnetic storms at Earth. This proposed research will focus on study of the solar origins and heliospheric characteristics of the magnetic structure of those CMEs which are geoeffective. Thus, it is directly relevant to NASA's LWS program. The primary data sets for this study will be the halo CMEs observed by the SOHO LASCO coronagraphs and associated magnetic clouds or flux rope-like structures observed by the Wind spacecraft at 1 AU. We will examine the nature of the interplanetary magnetic structures responsible for major geomagnetic storms by comparing LASCO halo CMEs with flux rope-like structures observed with the Wind MFI experiment. From early 1996 through 1998 about 25 magnetic clouds were observed at Wind and most were associated with halo CMEs. The MFI data will be used to fit the magnetic cloud structure to a flux rope model. We will use Wind plasma and IMF data on counterstreaming particle events, He enhancements, event composition, and shocks to compare with CME source structures at the Sun to better understand how to forecast Earth arrival of geoeffective events. A focus will be on how reliably the direction and strength of the IMF southward component, and the sign of the helicity of the field can be predicted from the solar and interplanetary data sets. Both the PI and Co-I have collaborated in studies of a few events involving apparent flux ropes arising from solar filament and arcade eruptions and how the sun sheds magnetic flux and helicity. The proposed effort is a logical extension of that work to a larger data set allowing us to test present assumptions about predicting space weather, and to greatly enhance our knowledge of the magnetic structure of CMEs. Our proposed program is relevant to NASA's SEC Theme and the LSW program and the techniques pertinent to future NASA space missions such as SMEI, STEREO, Solar Polar and Solar Dynamics Observatory.

## Publication References:

no references