# Project Details

**ROSES ID:** NRA-03-OSS-01
**Selection Year:** 2004
**Program Element:** Independent Investigation: LWS

**Project Title:**
The Magnetic Topology of Coronal Mass Ejections

**PI Name:** Harry Warren
**PI Email:** hwarren@nrl.navy.mil
**Affiliation:** U.S. Naval Research Laboratory
**Project Member(s):**
- Gursky, Herbert ; Authorizing Official; Naval Research Laboratory
- Winebarger, Amy ; Collaborator; Computational Physics, Inc.

**Summary:**
Understanding the magnetic configurations of solar active regions that give rise to coronal mass ejections is a major component of space weather. Coronal mass ejections can drive geomagnetic storms, which disrupt communication and knock out power systems. Solar energetic particles generated by the CME as it expands into the ambient heliosphere pose a significant risk to human exploration in space as well as to satellite systems. Mnay models of CME initiation, such as the tether cutting and flux rope models, emphasize the activity near the core fields. In these models shearing motions along the neutral line lead to a build up of magnetic energy that is violently released once a critical threshold is reached. Recent work, however, has questioned the possibility of releasing magnetic energy from simple magnetic field topologies. The breakout reconnection model asserts that the magnetic field associated with a coronal mass ejection must be quadrapolar and have a null. In this model the overlying fields constrain the fields near the neutral line and allow stress to build up. Reconnection near the null point removes the overlying fields and permits the stressed fields to erupt. We propose to test the breakout, tether cutting, and flux rope models by performing a systematic study of the magnetic topology of coronal mass ejections. We will combine SOHO MDI magnetograms with potential and linear force-free field extrapolations and TRACE image data to determine if complex magnetic fields are really necessary for coronal mass ejections. We will also investigate the timing and location of pre-flare reconnection.

# Publication References:

**Summary:** ''

**Reference:** Harry Warren / Naval Research Laboratory-The Magnetic Topology of Coronal Mass Ejections

**Summary:** no summary

**Reference:** Ugarte-Urra, Ignacio; Warren, Harry P.; Winebarger, Amy R.; (2007), The Magnetic Topology of Coronal Mass Ejection Sources, The Astrophysical Journal, Volume 662, Issue 2, pp. 1293-1301, doi: 10.1086/514814