

Project Details

ROSES ID: NRA-02-OSS-01

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Program Element: Independent Investigation: LWS

Project Title:

Injection of Magnetic Helicity into the Corona

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Summary:

Coronal mass ejections (CMEs) -- the major source of geomagnetic disturbances -- carry magnetic flux and helicity from the sun into interplanetary space. The magnetic helicity quantifies how the magnetic field is distorted and stressed beyond its lowest energy state. Such stressed states are associated with solar flares, filament eruptions and CME onsets. Thus, it is important to examine solar observations for the sources of this helicity. Recent studies show that emergence of subsurface helical fields into active regions is the most important source of coronal helicity. We will use new methods to analyze high-resolution solar vector magnetograms and find the places and rates of helicity transfer into the corona. We will analyze the magnetograms already obtained with the Imaging Vector Magnetograph to follow the flow of helicity over time scales of minutes to days. We will compare this flow to CME activity and to helicity measurements in magnetic clouds. We will try to determine which signatures of the magnetic helicity developments in active regions might be useful for forecasting CMEs. During the proposed three-year effort, we will also analyze new data, to be obtained in cooperation with the Institute for Astronomy in Hawaii during campaigns supporting the RHESSI mission.

Publication References:

Summary: "

Reference: LaBonte, Barry APL - Injection of Magnetic Helicity into the Corona

Summary: no summary

Reference: LaBonte, B. J.; Georgoulis, M. K.; Rust, D. M.; (2007), Survey of Magnetic Helicity Injection in Regions Producing X-Class Flares, The Astrophysical Journal, Volume 671, Issue 1, pp. 955-963, doi: 10.1086/522682