Project Details

ROSES ID: NRA-NNH04ZSS001N
Selection Year: 2005
Program Element: Focused Science Topic

Topic: To determine the topology and evolution of the open magnetic field of the Sun connecting the photosphere through the corona to the heliosphere.

Project Title:
Physics of the Sun-Heliosphere Magnetic Connection

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Project Member(s):
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Summary:
The Naval Research Laboratory proposes a 3-year program of research on understanding the dynamic magnetic connections between the solar photosphere/corona and the heliosphere -- a topic that has been identified as a focused science target by the NASA Living with a Star, Targeted Research and Technology (TR&T) program. Our research program is designed to mesh with that of a team of cross-discipline and cross-science-methodology researchers selected by the TR&T to address this science target. Our proposed program focuses on the following key questions: What is the dynamical topology of the solar corona's open-magnetic-flux regions? What is the role of magnetic reconnection in determining the dynamics? Answering these questions is essential for solving several outstanding problems in solar-heliospheric physics, including the origin of the slow solar wind, the rigid rotation of coronal holes, and the apparent contradiction between solar imaging and heliospheric in situ data. The work consists of a well-crafted balance of analytic theory, numerical simulation, and observational interpretation. It relies heavily on both the physical insights that we have developed from our numerous studies of solar-heliospheric activity, and from the unique state-of-art numerical technology that we have developed to model this activity. Both this physical insight and numerical technology should prove highly valuable to the TR&T team. The Principal Investigator of this program, Dr. S.K. Antiochos of the Space Science Division at the Naval Research Laboratory, is an expert in theoretical solar-heliospheric physics, and will be responsible for the coordination of theoretical analysis, numerical modeling, and observational data. His Co-Investigators --- Drs. C.R. DeVore, J.T. Karpen, and M.G. Linton --- have extensive experience in theory and numerical modeling of MHD processes in the Sun and the Heliosphere. The program will benefit from the high level of institutional support from NRL in terms of computer resources. http://solartheory.nrl.navy.mil/

Publication References:

Summary: no summary

Reference: DeVore, C. R. & Antiochos, S. K. 2008, Homologous confined filament eruptions via magnetic breakout, ApJ, 680, 740

Summary: no summary

Reference: DeVore, C. R. & Antiochos, S. K. 2008, First-principles simulations of violent space-weather events, 2008 NRL Review (Naval Research Laboratory: Washington), in press

Summary: no summary

Reference: Lynch, B. J., Antiochos, S. K., DeVore, C. R., Luhmann, J. G., & Zurbuchen, T. H. 2008, Topological evolution of a fast magnetic breakout CME in three dimensions, ApJ, 683, 1192