Project Details

ROSES ID: NNH08ZDA001N
Selection Year: 2009
Program Element: Focused Science Topic

Topic: Integrate Non-MHD/Kinetic Effects on Magnetic Reconnection, Particle Energization, and Plasma Heating into Global Models.

Project Title:
Multiscale Theory and Modeling of Solar Reconnection

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- Karpen, Judy ; Co-I; NASA/Goddard Spaceflight Center
- DeVore, C Richard; Co-I; NASA Goddard Space Flight Center
- MacNeice, Peter ; Collaborator; NASA/GSFC

Summary:
We propose a program of fundamental research that is explicitly designed to attack one of the Focused Science Topics identified by the Living With a Star, Targeted Research and Technology Program: "Integrate Non-MHD/Kinetic Effects on Magnetic Reconnection, Particle Energization, and Plasma heating into Global Models". The work builds on the long history and expertise of the proposing team in both kinetic and MHD theory and in modeling reconnection in a variety of space phenomena. We will perform three tightly coupled tasks: extend our physical understanding of kinetic reconnection so that we can develop useful, robust procedures for incorporating kinetic effects in global MHD codes, implement these procedures in the 3D MHD ARMS code, and apply the results to understanding major Heliophysics phenomena, in particular, the initiation of coronal mass ejections, energy release in solar flares, and the acceleration mechanism for coronal jets. All three phenomena are important drivers of space weather and, therefore, have strong relevance for the Living With a Star program.

The Principal Investigator directing this project is Dr. S. K. Antiochos of NASA/GSFC. He will be assisted by Drs. M. Hesse and M. Kuznetsova from GSFC, who are experts on kinetic theory/modeling, and by Drs. C. R. DeVore, J. T. Karpen, and P. J. MacNeice from GSFC and NRL, who are experts in MHD theory/modeling.

Publication References:

no references