

Project Details

ROSES ID: NRA-03-OSS-01

Selection Year: 2004

Program Element: Independent Investigation: LWS

Project Title:

A Global MHD Model of the Solar Interior for Coupled Sun-Earth System Studies

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Project Member(s):

- Abbett, William Paul; COI; Space Sciences Laboratory
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- Welsch, Brian Thomas; COI; Space Sciences Laboratory
- Gates, Patricia A; Authorizing Official; University of California Berkeley
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Summary:

The primary objective of this proposed project is to understand how the observed evolution of magnetic fields on the Sun on long (solar cycle) time scales is related to dynamic processes occurring in the solar interior, where the Sun's magnetic fields are generated. This will improve our understanding of the connection between coronal and photospheric magnetic field topologies, as well as the connections between these fields and those in the solar interior. The successful achievement of this objective will allow the development of better predictive models for the transport and evolution of magnetic fields on the Sun, and a better understanding of the correct physics to include in solar cycle evolution models. To accomplish these goals, we will use two 3-D anelastic MHD models, an existing Cartesian model known as "ANMHD", and a new model in spherical coordinates that is now being developed, known as "SANMHD", as well as existing coronal models in use in our group at UCB/SSL. Both anelastic MHD models will be released to NASA/GSFC's Community Coordinated Modeling Center (CCMC), for general use by the "Living With a Star" (LWS) and Solar Physics communities. This project directly supports one of the 2003 LWS research topics of high current interest, "The magnetic field topology connecting the photosphere to the corona", as well as the general LWS goal of understanding basic physical processes governing the Sun-Earth system. Part of our effort will be to study the connection between the very different physical environments of the corona and the solar interior, crossing discipline boundaries.

Publication References:

Summary: "

Reference: George Fisher / University of California Berkeley-A Global MHD Model of the Solar Interior for Coupled Sun-Earth System Studies

Summary: no summary

Reference: Welsch, B. T.; Fisher, G. H.; Abbett, W. P.; Regnier, S.; (2004), ILCT: Recovering Photospheric Velocities from Magnetograms by Combining the Induction Equation with Local Correlation Tracking, The Astrophysical Journal, Volume 610, Issue 2, pp. 1148-1156, doi: 10.1086/421767

Summary: no summary

Reference: Abbett, W. P.; Miki?, Z.; Linker, J. A.; McTiernan, J. M.; Magara, T.; Fisher, G. H.; (2004), The photospheric boundary of Sun-to-Earth coupled models, Journal of Atmospheric and Solar-Terrestrial Physics, Volume 66, Issue 15-16, p. 1257-1270; doi: 10.1016/j.jastp.2004.03.016

Summary: no summary

Reference:

Welsch, B. T.; Abbett, W. P.; De Rosa, M. L.; Fisher, G. H.; Georgoulis, M. K.; Kusano, K.; Longcope, D. W.; Ravindra, B.; Schuck, P. W.; (2007), Tests and Comparisons of Velocity-Inversion Techniques [Erratum: 2008ApJ...680..827W], The Astrophysical Journal, Volume 670, Issue 2, pp. 1434-1452, doi: 10.1086/522422