Project Details

ROSES ID: NNH06ZDA001N
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Program Element: Focused Science Topic

Topic: Solar Origins of Irradiance Variations

Project Title:
Physics-based Modeling of Emission in Active Regions

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Summary:
The structure and dynamics of active region magnetic fields play a crucial role in the production of EUV and X-ray emission from the Sun. A key impediment to a more comprehensive understanding and prediction of this emission has been that models of active region magnetic fields based on real data (e.g., nonlinear force-free models) have largely been disconnected from studies of coronal heating and emission.

Static loop models, the most common method for study emission, have thus far been unsuccessful in explaining some important properties of coronal loops. We propose to use physics-based models of active region magnetic fields that use solar magnetograms as boundary conditions and include realistic energy transport (radiative losses, anisotropic thermal conduction, and coronal heating) in the transition region and corona to investigate emission in active regions.

We will investigate three aspects of active region physics that may lead to time-dependent behavior of the coronal plasma:

(1) Thermal non-equilibrium; (2) Non-steady coronal heating; (3) Magnetic field evolution. Preliminary results suggest our model may be capable of explaining some of the mysterious properties of coronal loops.

Our model will produce quantitative predictions of emission that we will test against observations from SOHO, TRACE, Yohkoh, and SXI. Our proposed program is also highly relevant to the upcoming Solar-B, STEREO, and SDO missions.
Publication References:


Summary: no summary


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