The Magnetic and Energetic Connection Between the Solar Photosphere and Corona

All solar activity --- variations in energy released by the Sun, as electromagnetic radiation and energetic particles --- is mediated by the Sun's magnetic field. Examples include irradiance variations, modulation in the solar wind, acceleration of solar energetic particles, and flares and CMEs.

Although observed at and above the photosphere, solar activity arises as a result of the coupling of the solar magnetic field to the rotating, turbulent plasma of the Sun's convective envelope. Ultimately, to understand and predict solar activity, we must understand the physics of the magnetic and energetic coupling between the solar interior and atmosphere.

This challenge is addressed in two basic ways: through first principles, theoretical investigation and numerical modeling, and through direct observations of the resulting visible magnetic structures and their evolution.

The Magnetic and Energetic Connection Between the Solar Photosphere and Corona

In this session, we tie the two approaches together, and focus on several inter-related questions relevant to the physics of active regions and eruptive events:

- Can the observed surface field in an active region lead to an accurate description of the magnetic structure of the overlying atmosphere?
- What type of modeling is required to reliably reproduce the dynamic evolution of active region magnetic fields in the solar atmosphere?
- Can measurements of the surface fields and flows over time produce an accurate accounting of quantities such as magnetic helicity and free energy?

The Magnetic and Energetic Connection Between the Solar Photosphere and Corona

Scheduled speakers:

- Mark Cheung: Magnetic flux emergence in granular convection
- Mark DeRosa: Preliminary results from non-linear field extrapolations using Hinode boundary data
- Graham Barnes: A comparison of the topology of potential magnetic fields inferred for solar active regions
- Alex Pevtsov: Knots and bolts of solar helicity
- Manolis Georgoulis: Magnetic helicity and energetics of solar active regions: Can we calculate them - why do we need them?
- Brian Welsch: Tests and comparisons of velocity inversion techniques