

WG-1/2/3: SHINE Campaign Events --- Progress and Challenges Toward Incorporating Observations into Solar Models

- Ilya Roussev
 - Presented a global numerical model of the Oct 28, 2003 SHINE campaign event (the Halloween storm). This particular event is, of course, very complex, and incorporating such observational data into any numerical model presents a number of significant challenges.
 - Used MDI data as a basis for formulating a lower boundary condition for a 3D spherical AMR MHD model of the global corona. To mitigate spatial and temporal disparities, the lower boundary of the model was set in the low corona --- great care was taken in the specification of e.g., gas densities at the lower boundary so as to prevent unrealistic Alfvén speeds

- He successfully relaxed a steady state solar wind solution, and then embedded an analytical flux rope (not in equilibrium) into the low corona and followed the evolution of the resulting ejecta.
 - Another simulation, where shear flow was introduced at the boundary (like his previous simulation based on the May 1997 event) did not result in an eruption even though the magnetic topology was consistent with that of the breakout model
- Zoran Mikic
 - Performed global MHD simulations (zero-beta approximation) based on the May 1997 SHINE campaign event (a deceptively simple event)
 - Like Ilya, the lower boundary is based on MDI magnetograms, though in this case, the base of the simulation domain is at the photosphere.

- Without physical source terms in the MHD energy equation, unphysically large Alfvén speeds occur. Thus, these simulations include the effects of anisotropic thermal conduction and optically thin radiative cooling. Spatial scales are now constrained by the energy equation (resolution of $\sim 1\text{km}$ required to resolve scale heights in the transition region!)
- Developed a self-consistent technique to broaden the transition region to make the problem tractable
- Prescribed flux-preserving shear flows at the photospheric boundary, then initiated flux cancellation to trigger the eruption.