"MAGIC: A Tool for Combining, Interpolating, and Processing Magnetograms"

Transients in the solar coronal magnetic field are ultimately the source of space weather. Models which seek to track the evolution of the coronal field require magnetogram images to be used as boundary conditions. These magnetograms are obtained by numerous instruments with different cadences and resolutions. A tool is required which allows modelers to find all available data and use them to craft accurate and physically consistent boundary conditions for their models. We have developed a software tool, MAGIC (MAGnetogram Interpolation and Composition), to perform exactly this function. MAGIC can manage the acquisition of magnetogram data, cast it into a source-independent format, and then perform the necessary spatial and temporal interpolation to provide magnetic field values as requested onto model-defined grids. MAGIC has the ability to patch magnetograms from different sources together providing a more complete picture of the Sun's field than is possible from single magnetograms. In doing this, care must be taken so as not to introduce nonphysical current densities along the seam between magnetograms. We have designed a method which minimizes these spurious current densities. MAGIC also includes a number of post-processing tools which can provide additional information to models. For example, MAGIC includes an interface to the DAVE4VM tool which derives surface flow velocities from the time evolution of surface magnetic field. MAGIC has been developed as an application of the KAMELEON data formatting toolkit which has been developed by the CCMC.