Abstract

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Numerical MHD Coronal Simulations: Energy Statistics and the Study of the Cause and Evolution of a CME Event.

We present the analysis of solar events from a magnetohydrodynamic simulation that describes the upper convective zone of the Sun through the corona, and provide statistics of the energetics of these events. A total of 118 solar events were identified in M. Rempel's coronal simulation, including flares and a coronal mass ejection. The simulation creates an X-ray flux mimicking observations by the GOES (Geostationary Operational Environmental Satellite) satellite in the wavelength range 1-8Å. The power law index for the GOES X-ray flux for flares of class C and above in this simulation is found to be 1.33452. We describe the breakdown of the energies that emerge from the magnetic flux and the conversion of the energies during a flare, to provide heating of the corona and emission of radiation. This will be very important for researchers of solar eruptions as this information cannot be obtained from observations.
The FORWARD code is used to compare properties of the solar corona, with observable quantities. Using the FORWARD code, we investigate the polarisation structure of the coronal mass ejection from the simulation. This helps identify important features which give an insight into how the particular event occurred.
High Altitude Observatory's CoMP (COronal Multi-channel Polarimeter) instrument measures the magnetic field structure of the corona. We also use the FORWARD code to develop our understanding of CoMP observations and how to interpret the magnetic structure of coronal events using these observations.