Space Science Seminar
Tuesday, 2022 November 15
10:30 a.m.
NASA/MSFC TEAMS

Invention and Performance of MagPy for Forecasting Dangerous Space Weather

Dr. David Falconer / Center for Space Plasma and Aeronomic Research (CSPAR), University of Alabama in Huntsville

Host: Dr. Alphonse Sterling (Sponsored by NASA/MSFC/ST13)

As our high-tech civilization becomes ever more dependent on our space-based infrastructure, reliable prediction of spacecraft-threatening severe space weather becomes ever more important. The most severe space weather is made by huge magnetic explosions from the Sun, huge explosions of sheared and twisted strong magnetic fields that build up between big colliding sunspots of opposite magnetic polarity. Over the past 20 years, we have developed a big-data automated method of forecasting, from a proxy measure of a sunspot region's free magnetic energy, measured from a magnetogram of the region, how likely the region will have a major explosion in the coming day or so. The present version of this tool for forecasting the chance of a dangerous-space-weather explosion is called MagPy. In this talk I will outline:

1. Our earlier work (published papers) that led to MAG4 (IDL coded), from which came MagPy (Python coded).

2. How MagPy forecasts a sunspot region's chance of having a major explosion. MagPy does this by combining the measured value of a proxy of the region's free-energy with a corresponding forecasting curve distilled from (1) the proxy's measured value from each of a large number of sunspot regions and (2) the observed rate of production of major explosions by each of these sunspot regions.

3. Work with REU summer students that has improved the performance of the present version of MagPy, which is now available to the space weather forecasting community online from NASA's Community Coordinated Modeling Center (CCMC) at Goddard Space Flight Center.

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