# Upcoming Solar Maximum Presents Challenges for Satellite Operations



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Recent findings have indicated that more powerful solar storms could impact Earth as the Sun approaches the peak of its 11-year solar cycle, called the 'solar maximum,' expected in July 2025. Over the last weekend, a significant solar storm, driven by sunspot activity, successfully weathered by Earth, highlighted the increasing risk of similar events. Harvard astrophysicist Dr. Jonathan McDowell noted that future storms could be more intense.

The solar maximum phase is anticipated to feature up to 115 sunspots, compared to nearly zero during the solar minimum in 2019. These sunspots can produce solar flares and coronal mass ejection (CME) eruptions that impact satellite operations, radio communications, and power grids. The National Space Weather Prediction Center underscores the importance of monitoring these disturbances.

Last Friday, the solar storm reached "extreme (G5) geomagnetic conditions," disrupting GPS satellites and agricultural equipment in the US Midwest. Consequently, farming activities halted, as reported by local farmers. Furthermore, the increased atmospheric drag from such storms has accelerated the orbital decay of satellites, including the Hubble Space Telescope.

NASA's Chandra X-ray telescope team, including Dr. McDowell, implemented protective measures during the solar storm. Previous solar events have damaged satellites, as evidenced by the 1994 incident affecting three satellites.

Current forecasting methods rely on tracking sunspots and projecting their path toward Earth, but improvements in prediction capabilities are needed. The solar cycle, driven by the Sun’s magnetic field flipping every 11 years, influences the number of sunspots and the frequency of solar eruptions, which can send energy bursts affecting Earth’s technology infrastructure.

Readers are encouraged to remain aware of these developments as the solar maximum approaches.