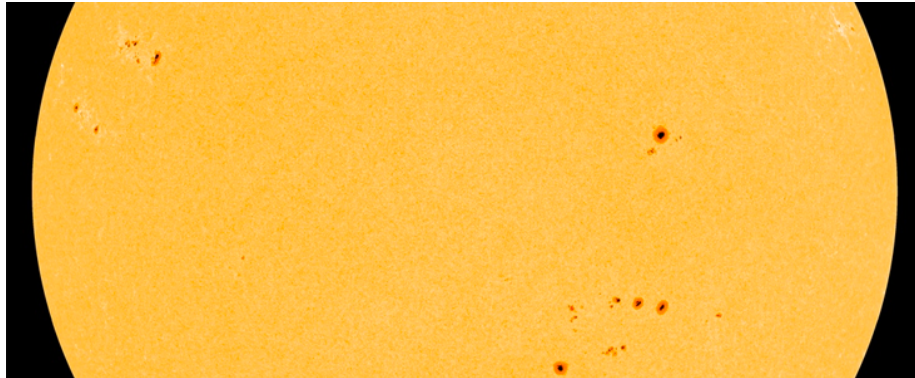


Press Release

# Indian physicists suggest the next sunspot cycle will likely peak in January 2024

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**Using 47 years data from the World Data Center SILSO and Wilcox Solar Observatory, researchers at the Indian Center of Excellence in Space Sciences discover a relationship between the decay rate of the Sun's magnetic dipole and the growth rate of the next 11-year solar cycle of sunspots, which could be a new precursor to help with this long-term prediction that is crucial for forecasting solar storms and even in the planning of future space missions. Credit: HMI/SDO/NASA**

Our Sun, a hot star ionized gas known as plasma orchestrates an intricate dance of magnetic activity every 11 years, punctuated by the emergence and dissipation of sunspots. These darkened patches on the Sun's surface signify the culmination of a magnetic field process, resulting in regions temporarily cooler and darker than their surroundings. Sunspots are comparable to the size of Earth, and have diameters ranging from 16 km to 160,000 km.

The crux of our discovery lies in the correlation between the decline of the Sun's magnetic dipole moment and the subsequent surge in sunspot activity. This link unveils a connection with the Babcock-Leighton mechanism, shedding

light on the fundamental dynamics of solar polar field generation.

Observations indicate that the reversal of the dipole moment's polarity heralds the imminent peak of the sunspot cycle, occurring approximately a year later. Given the last observed polarity reversal in July 2022, our analysis predicts the impending climax of Solar Cycle 25, likely to reach its zenith in January 2024, with a plausible range spanning from July 2023 to September 2024.

This forecast, grounded in the interplay of solar magnetic forces, not only aligns with empirical data but converges with the predictions of Bhowmik & Nandy in 2018.

*"The existence of such a strong correlation, in fact, enables one to forecast the timing of a sunspot cycle's peak once the amplitude of that cycle is independently anticipated. For example, we show that the ongoing sunspot cycle is likely to peak during January 2024 with an estimated amplitude that matches the physical model-based prediction of Bhowmik."*

Such synchronization bodes well for the field of solar cycle predictions, offering a promising alternative method that could enhance our ability to anticipate forecasting the timing of the peak of solar cycles, where intense activity and a most frequent space weather disturbances are more expected.

## More Information

This research was presented in a paper titled "Discovery of a relation between the decay rate of the Sun's magnetic dipole and the growth rate of the following sunspot cycle: a new precursor for solar cycle prediction" to appear in *Monthly Notices of the Royal Astronomical Society: Letters*, Volume 528, Issue 1, February 2024, Pages L27–L32, <https://doi.org/10.1093/mnrasl/slad122>.

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## Links

- **Research paper**

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