

Historic space weather could clarify what's next

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Historic space weather may help us understand what's coming next, according to new research by the University of Warwick.

Professor Sandra Chapman, from Warwick's Centre for Fusion, Space and Astrophysics, led a project which charted the space weather in previous solar cycles across the last half century, and discovered an underlying repeatable pattern in how space weather activity changes with the solar cycle.

The sun goes through solar cycles around every eleven years, during which time the number of sunspots increases to the maximum point (the 'solar maximum'). More solar activity means more solar flares, which in turn can mean more extreme space weather at earth.

This breakthrough will allow better understanding and planning for space weather, and for any future threats it may pose to the Earth.

Space weather can disrupt electronics, aviation and satellite systems and communications –this depends on solar activity, but as this is different for each solar cycle, the overall likelihood of [space weather events](#) can be difficult to forecast.

This exciting research shows that space weather and the activity of the sun are not entirely random – and may constrain how likely large weather events are in future cycles.

Sandra Chapman, Professor from the University of Warwick's Department of Physics and the lead author, commented:

"We analysed the last five solar maxima and found that although the overall likelihood of more extreme events varied from one solar maximum to another, there is an underlying pattern to their likelihood, which does not change.

"If this pattern persists into the next solar maximum, our research, which constrains how likely large events are, will allow better preparation for

potential space weather threats to Earth."

The drivers of space weather, the sun and solar wind, and the response seen at Earth, have now been almost continually monitored by ground and space based observations over the last five solar cycles (more than fifty years).

Each [solar cycle](#) has a different duration and peak activity level, and, as a consequence the climate of Earth's [space weather](#) has also been different at each [solar maximum](#).

The more extreme events are less frequent so that it is harder to build up a statistical picture of how likely they are to occur.

More information: S. C. Chapman et al. Reproducible aspects of the climate of space weather over the last five solar cycles, *Space Weather* (2018). [DOI: 10.1029/2018SW001884](https://doi.org/10.1029/2018SW001884)

Provided by University of Warwick

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