
Space Weather Forecast

Issued on Thursday, 23 December 2021 at 01:29 Local

This forecast provides a four day assessment of space weather events. The probabilities stated below are for reaching or exceeding the given levels. For more information about space weather impacts please see the Met Office Space Weather Scales <https://www.metoffice.gov.uk/weather/learn-about/space-weather/uk-scales>

Space Weather Forecast Headline: Chance of Minor Geomagnetic Storm late on day 1 into day 2 (23rd/24th). Moderate X-ray flares possible throughout.

Analysis of Space Weather Activity over past 24 hours

Solar Activity: Solar activity has been moderate over the past 24 hours, with numerous common class flares and one moderate class flare during the past 24 hours. This flare may have produced a Coronal Mass Ejection (CME) but further analysis is required if this will effect Earth. Further analysis is also required for a CME which left the Sun around 21/1930 UTC as this may have an Earth directed component.

There are presently 8 analysed sunspot regions on the visible side of the Sun. The most distinctive regions are a series of three sunspot regions in the southwest quadrant. As well as this there are two large sunspot regions that have recently rotated onto the disc. All other regions appear to be small and simple, with significant flare activity unlikely, but will continue to be monitored for development.

Solar Wind / Geomagnetic Activity: Solar winds have been elevated but steady throughout the past 24 hours. The total magnetic field has been weak with the important north-south component also varying weakly. Geomagnetic activity has been Quiet to Unsettled (Kp1-3).

Energetic Particles / Solar Radiation: The count rate of energetic particles (high energy protons) remained at background with no solar radiation storms occurring.

Four-Day Space Weather Forecast Summary

Solar Activity: Low to Moderate solar activity is expected to continue through the forecast period, with common class flares expected and a chance (40%) of further moderate flares. A CME which left the Sun on 20th December is forecast to arrive at Earth on late on the 23rd December.

Solar Wind / Geomagnetic Activity: Elevated solar winds should begin to decline as coronal effects wane. However, further enhancement of the solar wind is likely to take place late on the 23rd into the 24th due to the CME mentioned above. On day 3 (25th), solar winds should become slow, but towards the end of the forecast period they may become elevated once again due to further coronal hole influences. Quiet to Unsettled geomagnetic activity is generally expected through days 1 and 2 (23rd and 24th), with Active intervals likely in association with the CME, when there is a chance of minor geomagnetic storming. Predominantly Quiet geomagnetic activity is expected on days 3 and 4 (25th and 26th), but perhaps becoming Unsettled to Active later on day 4 (26th).

Energetic Particles / Solar Radiation: The count rate of energetic particles (high energy protons) is forecast to stay at background with no solar radiation storms expected. Any significant flares could lead to this count rate increasing, but are still expected to stay below radiation storm level.

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Geomagnetic Storms:

Geo-Magnetic Storm	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC)	Day 2 (00-24 UTC)	Day 3 (00-24 UTC)	Day 4 (00-24 UTC)
Probability (Exceedance)			(%)	(%)	(%)	(%)
Minor or Moderate	G1 to G2	No	30	20	5	5
Strong	G3	No	1	1	1	1
Severe	G4	No	1	1	1	1
Extreme	G5	No	1	1	1	1

Radio Blackouts - X Ray Flares:

X Ray Flares	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC)	Day 2 (00-24 UTC)	Day 3 (00-24 UTC)	Day 4 (00-24 UTC)
Probability			(%)	(%)	(%)	(%)
Active	R1-R2 M Class	Yes	40	40	40	40
Very Active	R3 to R5 X	No	5	5	5	5

Solar Radiation Storms - (High Energy Protons):

Radiation Storms	Level (cm ⁻² sr ⁻¹ s ⁻¹)	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC)	Day 2 (00-24 UTC)	Day 3 (00-24 UTC)	Day 4 (00-24 UTC)
Probability (Exceedance)			(%)	(%)	(%)	(%)
Active	≥ S1	No	5	5	5	5
Very Active	≥ S3 *	No	1	1	1	1

* S3 ≥ 10 MeV ≥ 1000 pfu and / or ≥ 50 MeV ≥ 10 pfu. (pfu = cm⁻²sr⁻¹s⁻¹)