
Space Weather Forecast

Issued on Thursday, 23 December 2021 at 13:18 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 G1/Minor geomagnetic Storm late on day 1 into day 2 (23rd/24th) with CME arrival. Chance of Moderate flares with slight chance strong flares.

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 observed, with the largest from the large bipolar sunspot region in the southwest. This has been developing further in the last 24 hours, giving an increased risk further flares. Including this region there are nine sunspot regions. A number are small and simple, with the sunspots near the main flaring one mentioned now showing signs of decay, despite some previous activity. One large bipolar region in the southwest is also of interest, having given a Moderate flares as it rotated onto the disc. There are two more developing regions in the eastern disc that are also being monitored for any further growth. No Earth-directed coronal mass ejections (CMEs) have been observed in the last 24 hours.

Solar Wind / Geomagnetic Activity: Solar winds have been elevated but gradually easing 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 (Kp0-3).

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 further common flares, a chance (40%) of Moderate flares and a slight chance (10%) of strong flares.

Solar Wind / Geomagnetic Activity: There are three potentially Earth-directed CMEs. The first from a Moderate class flare on the 20th, expected to arrive later day 1 (23rd) or day 2 (24th). The second is from an eruption on the 21st, perhaps giving a glancing impact on day 4 (26th). The third is from a Moderate flare on the 22nd, but has yet to be fully assessed in imagery. Otherwise elevated solar winds are likely to continue easing day 1 (23rd) as Earth exits the fast winds from a coronal hole, before any CME arrival occurs. Ongoing easing of solar winds is then expected through the period once the CME has passed later day 2 (23rd) onward. Quiet to Unsettled geomagnetic activity is generally expected with Active intervals likely in association with the CME, when there is a chance of a G1/Minor Storms. Perhaps becoming Unsettled to Active later on day 4 (26th) due to any glancing influence of the 2nd CME.

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	10
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	No	40	40	40	40
Very Active	R3 to R5 X	No	10	10	10	10

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)