
Space Weather Forecast

Issued on Friday, 24 December 2021 at 13:05 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: Reducing risk of Minor geomagnetic storms day 1 (24th). Chance of Moderate flares (R1/R2 Radio Blackout), with slight chance of strong Flares (R3 Radio Blackout).

Analysis of Space Weather Activity over past 24 hours

Solar Activity: Solar activity has been Low over the past 24 hours, with numerous common class flares observed. There are eight sunspot regions, however flaring has primarily been from the largest most complex group, now approaching the southwest limb, and a small decaying region following it. A further common class flare was also observed from a small but magnetically unstable region in the southeast. Another large bipolar sunspot is in the southeast, with a further moderately sized region in the northeast. Either of these have the potential for flaring. All other regions are small and magnetically simple, with some decay occurring.

No Earth-directed (coronal mass ejections) CMEs were observed in available satellite imagery.

Solar Wind / Geomagnetic Activity: The expected CME for the 23rd or early 24th has yet to arrive. Solar winds have been easing from elevated to be slightly elevated at near 430 km/s. The total magnetic field carried by the wind has been weak with the important north-south component only showing weak variations. Geomagnetic activity has been Quiet.

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 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. This risk reduces day 4 (27th).

Solar Wind / Geomagnetic Activity: There are three potentially Earth-directed CMEs. The first from an M-class flare from AR2908 on the 20th, was expected late 23rd or early 24th, but has yet to arrive. This could still arrive later on day 1 (24th) but with a decreasing chance of notable impacts and low confidence. The other two CMEs are from the 21st and 22nd but are both very weak and probably missing just ahead, but could glance Earth on the 26th or 27th. Outside of potential CME influence the currently elevated solar winds are likely to continue to gradually ease until day 4 (27th) when the faster winds from the next coronal hole are expected to arrive. Quiet geomagnetic conditions, could become Unsettled to Active for a period with any CME arrival, most likely day 1 (24th) with a slight chance day 3 or 4 (26th or 27th). There is a slight chance of G1/Minor Storm intervals. The arrival of the faster wind later day 4 (27th) is expected to increase activity to Active with a slight chance of G1/Minor Storms.

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	20	5	5	20
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	20
Very Active	R3 to R5 X	No	15	15	15	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)