

Space Weather Forecast

Issued on Sunday, 26 December 2021 at 12:47 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: Slight chance of G1/Minor Storms on 27 and 28 Dec. Reducing 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 several Common-class flares observed. This activity was observed mainly from a region near north centre disc and from near the southwest limb, where an active sunspot region is rotating off the Earth-facing disc. This left 5 sunspot regions on the visible disc, the most notable of which are in the southeast quadrant and the aforementioned region near north centre disc. Despite both being reasonably large, neither has produced anything more than Common-class flares in the last 24 hours. All other regions are currently small and simple. A CME (coronal mass ejection) has been observed from the southwest quadrant, however further imagery is needed to analyse this. No other potentially Earth-directed CMEs have been observed in available imagery.

Solar Wind / Geomagnetic Activity: Solar wind speeds were slightly elevated at around 470 km/s, before erratically declining from 25/2200 UTC to reach around 370 km/s. The total magnetic field strength was weak, with the north-south component predominately weakly negative (southward) orientated. Geomagnetic activity was Quiet (Kp 0-2).

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 forecast throughout the period, with a chance of Moderate-class flares and a slight chance of Strong flares. This risk is expected to reduce to a slight chance of M-flares during day 2 (27 Dec), due to the sunspot rotating off the visible disc moving further away. However, any further development of the large sunspot in the southeast quadrant has the potential to elevate the flare risk again.

Solar Wind / Geomagnetic Activity: There are two potentially Earth-directed CMEs forecast, however both are currently expected to miss, with only weak glancing impacts at most. Slow solar winds are expected during day 1 (26 Dec) before the arrival of the fast wind from a coronal hole on either days 2 or 3 (27 or 28 Dec) with expected speeds of around 500km/s. This is likely to be followed by further fast wind enhancements from other coronal holes, to give a broad period of slightly elevated to elevated solar winds. Mainly Quiet geomagnetic activity is forecast through day 1, with a chance of Active and a slight chance of G1/Minor Storms on days 2 or 3. Quiet to Unsettled conditions with a chance of Active intervals then follows.

Energetic Particles / Solar Radiation: The count rate of energetic particles (high energy protons) is most likely to stay at background with no solar radiation storms expected. Any significant flares could lead to this count rate increasing, but this is currently thought to be a very low risk.

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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	5	20	20	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	No	35	25	20	20
Very Active	R3 to R5 X	No	10	7	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	3	3	3
Very Active	≥ S3 *	No	1	1	1	1

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