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## Space Weather Forecast

Issued on Sunday, 26 December 2021 at 01:09 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>**

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**Space Weather Forecast Headline: Slight chance of G1/Minor Storms on 27 December. 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 C-class flares observed. The majority of the activity remained near the southwest limb, where the recent notable sunspot has rotated away from being Earth-facing to being just over the horizon. A further large sunspot has developed in the southeast disc however and whilst magnetically relatively simple, is one of the largest spots of solar cycle 25 so far. A further smaller sunspot in the northwest has also been developing in the last 24 hours. Neither of these have produced notable flaring, but do have the potential to with any further development. There are 4 other smaller sunspots on the Earth-facing disc.

No Earth-directed CMEs (coronal mass ejections) have been observed in available imagery.

**Solar Wind / Geomagnetic Activity:** Solar wind speeds have been slightly elevated around 440-460 km/s, but a brief spike to near 500 km/s was observed. The total magnetic field strength was weak, with the important north-south component also only weak, but mainly negative (southward pointing). Geomagnetic activity was Quiet (Kp 1-2).

**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 M-class flares and a slight chance of X-class flares, with the potential to still observe flares from the southwest sunspot on day 1 (26th). This risk reduces to a slight chance of M-flares day 2 (27th), however any further development of the large sunspot 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. Slightly elevated solar winds are expected to ease day 1 (26th) before the arrival of the faster winds from a coronal hole day 2 (27th) 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 days 1 (26th) with a chance of Active and a slight chance of G1/Minor Storms on day 2 (27th). 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 forecast to stay at background with no solar radiation storms expected. Any significant flares could lead to this count rate increasing, but currently expected to stay below radiation storm level.

## 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	10	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	40	20	20	20
Very Active	R3 to R5 X	No	15	10	10	10

## Solar Radiation Storms - (High Energy Protons):

Radiation Storms	Level (cm <sup>-2</sup> sr <sup>-1</sup> s <sup>-1</sup> )	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<sup>-2</sup>sr<sup>-1</sup>s<sup>-1</sup>)