

## Space Weather Forecast

Issued on Sunday, 19 December 2021 at 00:42 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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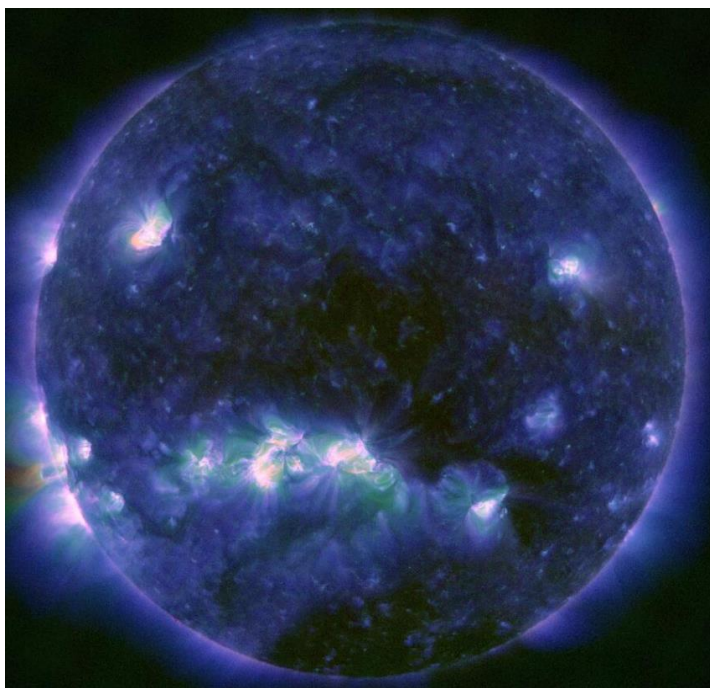
**Space Weather Forecast Headline: Daily Chance of Moderate-class X-ray flares. Slight Chance of Minor Geomagnetic Storm G1 by midweek UTC.**

### Analysis of Space Weather Activity over past 24 hours

**Solar Activity:** Solar activity has been low in the past 24 hours, with the X-ray trace dominated by a long-period middling common class X-ray flare that peaked at 18/1803UTC. This flare emanated from near the southeastern solar horizon - potentially from a new sunspot region here - of which there may be up to three in close proximity. A Coronal Mass Ejection (CME) was tied to this event, and while this has yet to be analysed, Earth-based effects are considered very unlikely, with the emission directed east of, and below the Earth in the track of its orbit. No other CMEs were in evidence in available imagery.

There are currently six confirmed sunspot regions on the visible disc, as well as the aforementioned three possible new regions in the southeast. Of these sunspots, aside from the most complex, the remainder were stable or in decay, and in all cases this has not been tied to noteworthy activity.

**Figure 1: False colour extreme UV composite satellite image from 18/2300UTC showing potential active regions. Note especially the concentration of these in the southeastern quadrant, with a CME emanating from near the cluster on the far lower left around 1800UTC.**



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**Solar Wind / Geomagnetic Activity:** Solar winds have followed a slow regime through the 24-hour period. The solar wind speed was at background levels, while the number of particles in the solar wind and their associated magnetic field were both unremarkable.

The net effect of these solar wind measures was provisionally quiet geomagnetic indices throughout - well below Minor Storm G1.

**Energetic Particles / Solar Radiation:** No solar radiation storms were observed in the period.

## Four-Day Space Weather Forecast Summary

**Solar Activity:** Solar activity is expected to continue mainly low, with the Chance (30%) of isolated Moderate-class flares, and a Slight (5%) Chance of a strong-class flare. Common class flares remain very likely at a daily 90% chance.

**Solar Wind / Geomagnetic Activity:** No CMEs feature in the current forecast period. Initially quiet geomagnetic conditions should give way to a chance of some influence from a weak fast wind later in the UTC weekend, probably insufficient to reach G1 before reverting to Quiet once again. There is then a possible low confidence late peak in activity possible from a larger coronal hole fast wind, perhaps most likely from Tuesday 21 December, which is signposted by a slight chance of G1/Minor Storm, peaking midweek.

**Energetic Particles / Solar Radiation:** No solar radiation storms are expected, however there is a slight increasing risk as the current sunspot regions transit towards the more prone western solar hemisphere.

### 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	1	1	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	30	30	30	30
Very Active	R3 to R5 X	No	5	5	5	5

## 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	2	2	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>)