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## Space Weather Forecast

Issued on Monday, 06 December 2021 at 00:36 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 day 4 from CME arrival.**

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

**Solar Activity:** Solar activity was Moderate due to an M-flare that occurred from an active region that had previously rotated around the Sun's limb and onto the far-side. This region also produced a number of common-class flares. There are two simple sunspots on the Earth-facing side. One is a very small unipolar region that is now difficult to see, the other is a small bipolar region in the southeast disc that has shown some slow growth in the last 24 hours. The coronal mass ejections (CMEs) produced by the flare activity are not Earth-directed, however a weak CME was observed leaving the south of the Sun. This was due to a line of material on the Sun, which was held by its magnetic field, being released which also known as a filament lift. This has been assessed as having a potential Earth-directed component, likely arriving on the evening of day 4 (9th).

**Solar Wind / Geomagnetic Activity:** The solar wind speed has been slightly elevated to elevated, due to Earth being within the fast winds of a coronal hole, reaching 530 km/s. The magnetic field carried by the wind was generally weak, but generally had its north-south component pointed in a negative (southward) direction. The resultant geomagnetic activity was generally Quiet to Unsettled (Kp 0-3).

**Energetic Particles / Solar Radiation:** The count rate of energetic particles (high energy protons) was at background with no solar radiation storms observed.

### Four-Day Space Weather Forecast Summary

**Solar Activity:** Solar activity is expected to be Very Low with the chance of further notable flares from around the limb rapidly diminishing, and only two small and simple sunspots on the Earth-facing disc.

**Solar Wind / Geomagnetic Activity:** There are two potentially Earth-directed CMEs. The first is the 3rd Dec and whilst expected to miss, may graze Earth on day 3 (7th) although minimal impacts are expected if it does. The second is the weak CME from the 5th, and is expected to arrive day 4 at 09/1800 UTC +/- 9 hours, but again confidence is low due to limited imagery for analysis. Current fast winds are expected to ease day 2 onward, before a further coronal hole sourced fast wind enhancement is also possible towards the end of day 4. Geomagnetic Activity is forecast to be Quiet to Unsettled with a chance of isolated Active intervals day 1, easing to mainly Quiet day 2 (6th), but with a slight chance of Active from any weak CME arrival. Activity increasing day 4 (9th) to Unsettled to Active with the potential combined influence coronal hole fast wind and CME arrival giving a slight chance of G1/Minor Storm intervals.

**Energetic Particles / Solar Radiation:** The count rate of energetic particles (high energy protons) is forecast to persist at background with no solar radiation storms expected.

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

## 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	1	1	1	1
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>)