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## Space Weather Forecast

Issued on Thursday, 16 December 2021 at 01:28 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: Numerous sunspots on the earth-facing disc. Chance of Moderate class flares.**

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

**Solar Activity:** Solar Activity was Low, with many Common-class flares in the past 24-hours, mainly from the most complex sunspot region in the southeast quadrant. There are currently six sunspot regions on the visible disc, all but one are located in the southeastern quadrant, with the one unnumbered sunspot group in the northern hemisphere near the centre disc. There is also a small, recently emerged spot group in the northeast quadrant as well as another possible sunspot region currently rotating over the northeastern limb.

No Earth-directed Coronal Mass Ejections (CMEs) have been observed in available imagery.

**Solar Wind / Geomagnetic Activity:** The solar wind speed was at background levels initially, however after 15/0300UTC speeds increased steadily to reach current elevated levels, this was due to the connection to the fast wind from a coronal hole. The magnetic field carried by the wind was weak until the arrival of the faster stream of solar wind, increasing to moderate levels for a time, before easing to weak levels again at present. The important north-south magnetic field component followed a similar trend with increased variability and some moderate southward fluctuations as the faster solar winds arrived. Geomagnetic activity was Quiet to Unsettled (Kp 1-3).

**Energetic Particles / Solar Radiation:** The count 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 Low or Very low, but with a chance of Moderate-class flares and a very slight chance of Strong flares given the current complexity of and increasing numbers of sunspot regions on the visible disc. Further sunspot regions may rotate onto the visible disc in the coming days to supplement the current risk of significant flares.

**Solar Wind / Geomagnetic Activity:** Solar winds are currently at elevated levels following connection with the high-speed stream from a coronal hole early on the 15th. Solar wind speeds should gradually ease over the coming days to become background by day 2 or 3 (17th or 18th). No further coronal hole enhancements are anticipated during the period and no earth-directed CMEs are forecast. Geomagnetic activity is expected to be Quiet to Unsettled initially on day 1 (16th). From the middle of day 1 onwards Quiet geomagnetic conditions should be predominant.

**Energetic Particles / Solar Radiation:** The count of energetic particles (high energy protons) is expected to remain at background levels, although with a slight increasing risk with time as the numerous sunspots on the visible disc transit to a more favourable location relative to earth's position.

## 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	1	1
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	35	35	35
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	1	1	3	3
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>)