## Space Weather Forecast

Issued on Wednesday, 15 December 2021 at 12:02 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 Geomagnetic Storms day 1 (15th). Potentially increasing solar activity.**

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

**Solar Activity:** Solar Activity was Low, with multiple Common-class flares in the past 12 hours, mainly from the most complex sunspot region in the southeast quadrant. There are currently four sunspot regions on the visible disc, all in the southeastern quadrant, with another sunspot rotating around the southeast limb at present. There is also a small, recently emerged spot group in the northeast quadrant. One of the sunspot regions in the southeast is complex in appearance and offers the potential for significant flaring.
A faint slow, narrow Coronal Mass Ejection (CME) from a filament eruption around N45W05 at 14/1200 UTC may have an Earth-directed component, with further analysis still pending. However, no significant impacts are expected at this time. Otherwise no other potential Earth-directed CMEs have been observed in available imagery.

**Solar Wind / Geomagnetic Activity:** The solar wind speed was at background levels for much of the period, 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 mostly 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 has remained Quiet (Kp 1-2).

**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 mainly Low, but with a chance of Moderate-class flares and a very slight chance of Strong flares given the recently developing 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 now at elevated levels following connection with coronal hole 32 early on day 1 (15th). Winds should gradually ease later day 2 (16th) and eventually back to slightly elevated or background by the end of day 4 (18th). No further coronal hole enhancements are anticipated during the period. Geomagnetic activity is expected to be Unsettled or Active initially on day 1, with a slight chance (20%) of a G1/Minor Storm. Geomagnetic activity will wane again after the peak period of fast wind into days 2 and 3 (16th and 17th) with Quiet conditions predominant.

Issued by Met Office Space Weather Advisor, Tel: +44 (0) 330 135 4254 Email: moswoc@metoffice.gov.uk

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# Met Office Space Weather Forecast

**Energetic Particles / Solar Radiation:** The count of energetic particles (high energy protons) is most likely to persist at background levels with no solar radiation storms likely; this depending on upcoming developments of aforementioned sunspot regions.

**Geomagnetic Storms:**

| Geo-Magnetic Storm Probability (Exceedance) | 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) (%) |
|---|---|---|---|---|---|---|
| Minor or Moderate | G1 to G2 | No | 20 | 5 | 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 Probability | 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) (%) |
|---|---|---|---|---|---|---|
| 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 Probability (Exceedance) | 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) (%) |
|---|---|---|---|---|---|---|
| Active | ≥ S1 | No | 1 | 3 | 3 | 5 |
| Very Active | ≥ S3 * | No | 1 | 1 | 1 | 1 |
| * S3 ≥ 10 MeV ≥ 1000 pfu and / or ≥ 50 MeV ≥ 10 pfu. (pfu = $cm^{-2}sr^{-1}s^{-1}$) | | | | | | |

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