## Space Weather Forecast

Issued on Monday, 27 December 2021 at 13:28 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: Chance of Minor Geomagnetic storm later on day 2 (28th).**

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

**Solar Activity:** Solar activity has been low over the past 24 hours, with occasional common-class X-ray flares. The largest of these flares was recorded at 26/2012UTC, and appeared to be tied to a possible 'filament eruption' from the southwest of the Sun. There are now up to six sunspot regions on the facing side of the sun, which is dominated areally and in terms of complexity by two large, and - on paper - complex regions. However, neither of these regions produced significant flare activity in the 24 hours.
A filament eruption tied to the largest flare of the 24 hours, mentioned above, has been analysed. Much of the ejecta material is forecast to miss ahead of Earths orbit, but confidence is low and there is a chance of a glancing blow on the 30th December. No other Coronal Mass Ejections (CMEs) were observed in the available imagery during the period.

**Solar Wind / Geomagnetic Activity:** The solar wind remained slow but with a slight rise in speeds towards the end of the period. The total magnetic field was generally weak but suddenly increased to moderate levels at 27/0838 UTC, with notable deflections in the important north south component. This sudden jump could be associated with one of the CME events from the 21st/22nd December, however geomagnetic activity remained Quiet (Kp 1-2) throughout the period.

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

**Four-Day Space Weather Forecast Summary**

**Solar Activity:** Low solar activity is forecast throughout the period, but with a daily chance of increasing to Moderate. No significant regions leave the visible side of the Sun, but no significant regions are expected to rotate on either.

**Solar Wind / Geomagnetic Activity:** There are two potentially Earth-directed CMEs, which may cause weak glancing impacts at the start of the period. Another CME may produce a further glancing blow on day 4 (30th), but confidence is low. Otherwise, the solar wind is expected to become elevated from late on day 2 (28th) due to coronal hole fast winds. Quiet to Unsettled geomagnetic activity is generally expected, but isolated Active intervals are possible later on day 2 (28th), with a chance of Minor Geomagnetic Storms. This risk should wane through days 3 and 4 (29th and 30th), with predominantly Quiet activity expected by the end of the period, presuming no further enhancement is provided by the CME from the 26th.

**Energetic Particles / Solar Radiation:** No solar radiation storms are expected, although there is a very slight daily chance of S1 should there be any significant flare activity.

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**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 | 10 | 30 | 10 | 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 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 | 40 | 40 | 30 | 25 |
| 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 | 5 | 5 | 5 | 5 |
| Very Active | ≥ S3 * | No | 1 | 1 | 1 | 1 |
| * S3 ≥ 10 MeV ≥ 1000 pfu and / or ≥ 50 MeV ≥ 10 pfu. (pfu = $cm^{-2}sr^{-1}s^{-1}$) | | | | | | |

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