

Space Weather Forecast

Issued on Monday, 27 December 2021 at 00:54 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>

Space Weather Forecast Headline: Chance of G1/Minor Geomagnetic storm, peaking Tuesday 27 December.

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 in the period. 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. Also of note was a marginally earlier and smaller magnitude flare at 26/1859UTC, which emanated from a sunspot now narrowly over the southwestern solar horizon.

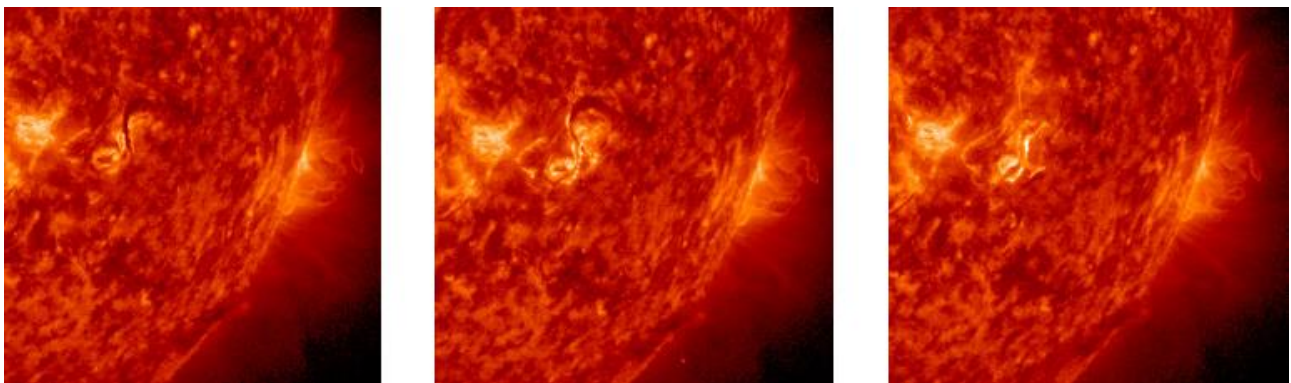


Figure 1: False-colour extreme UV imagery sequence spanning 26/2020-2036UTC, showing a 'filament eruption' in course. This feature has yet to be assessed for any Coronal Mass Ejection (CME) for lack of available satellite imagery in the ensuing hours.

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. Neither of these regions produced significant flare activity in the 24 hours.

A large 'filament eruption' was observed in the southwestern quarter of the sun between 26/0200-0300UTC. This event has been analysed and appears to both lead and lie below the Earth in its orbit to no anticipated effect. This event was joined late in the period by the aforementioned smaller 'filament eruption' tied to the largest flare of the 24 hours, although at the time of writing imagery is not yet available. No confirmed Earth-directed CMEs were in evidence, with one event to be assessed.

Solar Wind / Geomagnetic Activity: The solar wind declined to a slow solar wind regime in the period, with the speed falling from slightly elevated to background. The number of particles and their associated magnetic field were both unremarkable and within typical background levels. The net effect of the preceding solar wind measures was provisionally quiet geomagnetic activity throughout.

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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 moderate-class flares. No significant regions leave the sun in the period, although some contribution is expected from one lying narrowly over the western horizon at first. No significant returning sunspot regions are expected over the opposing solar horizon.

Solar Wind / Geomagnetic Activity: There are two potentially Earth-directed CMEs forecast, however both are currently expected to miss, with only weak glancing impacts at most at the very start of the four-day period. There is otherwise one unassessed candidate 'filament eruption' CME from the southwestern quarter of the sun, emitted 26/2012UTC. No other CMEs feature in the forecast.

Earth is currently sampling a slow solar wind environment and experiencing quiet geomagnetic activity. There is a slight chance of Minor Geomagnetic Storm G1 should either of the 21 or 22 December CMEs deliver a glancing blow at the very start of the period, with this G1 risk increasing with the expected arrival of a coronal hole fast wind on day two, Tuesday 27 December. This risk should wane midweek, rounding out the period with a gradual return to quiet geomagnetic activity.

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 from the narrowly far-sided region at first, and then the remaining two large front-sided sunspot regions.

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	30	5	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	30	25	25	25
Very Active	R3 to R5 X	No	5	1	1	1

Solar Radiation Storms - (High Energy Protons):

Radiation Storms	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)
Probability (Exceedance)			(%)	(%)	(%)	(%)
Active	≥ S1	No	5	2	2	2
Very Active	≥ S3 *	No	1	1	1	1

* S3 ≥ 10 MeV ≥ 1000 pfu and / or ≥ 50 MeV ≥ 10 pfu. (pfu = cm⁻²sr⁻¹s⁻¹)