
Space Weather Forecast

Issued on Tuesday, 28 December 2021 at 00:38 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 storms, peaking Thursday 29 December. Chance of Minor R1 radio blackouts from moderate class X-ray flares throughout.

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 observed in the period. The largest of these flares reached the bottom end of common class at 27/0420UTC, and emanated from a spotless sector of the sun in the southwest.

There are currently up to six sunspots on the sun at present, including two new tenuous bipolar groups in the northwest. The sun was otherwise little changed on the preceding 24 hours, with a small unipolar group in the southeast, while earlier growth in a small spot in the southwest stalled. The disc was otherwise dominated in terms of complexity and sunspot area by a pair of large sunspot regions: firstly one in the southeastern quarter, which showed slight proliferation but retained a similar size and stature. This left one final group in the northwest, with new leading sunspots developing in this region later in the 24 hours.

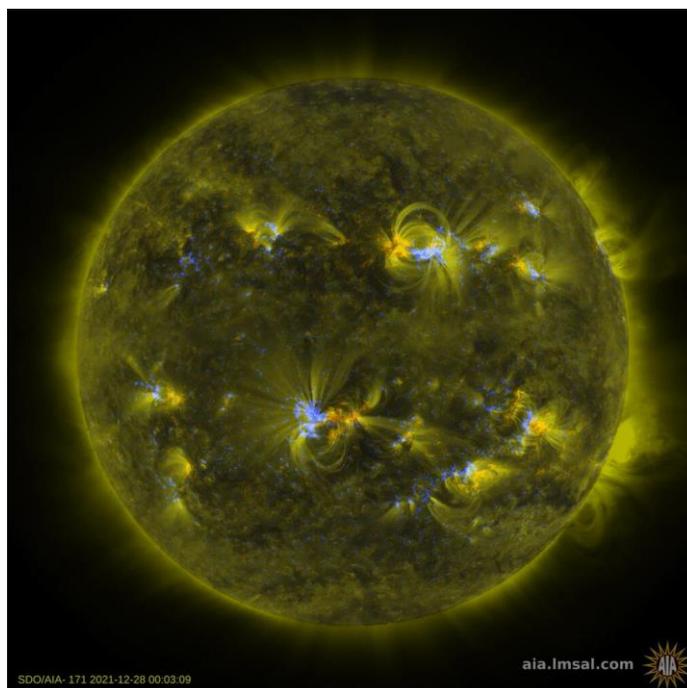


Figure 1: False-colour extreme UV satellite image of the sun's corona and magnetic field loops. The two largest sunspot regions on the sun lie centrally in both the northern and southern solar hemispheres.

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No Coronal Mass Ejections (CMEs) were observed in available satellite imagery during the period.

Solar Wind / Geomagnetic Activity: The solar wind was symptomatic of descent into a coronal hole fast wind regime, with the speed rising from background levels to peak at slightly elevated levels with the bulk of the increase occurring on onset of the coronal hole proper, shortly before 27/1500UTC. The number of particles comprising the solar wind also showed a marked increase around the middle of the UTC day, otherwise at Background early and late. The magnetic field associated with these particles also displayed the middle of the day peak, later moderating into the UTC evening.

The net result of the above solar wind measures was provisionally mainly quiet geomagnetic activity, but peaking just shy of G1 Minor Geomagnetic storm in the 12-15UTC interval, while the solar wind's magnetic field and number of particles were highest.

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, with isolated Modreate-class flares, most likely from the two largest sunspot groups. No significant regions leave or arrive on the sun in the period.

Solar Wind / Geomagnetic Activity: While most likely missing Earth, there is a Slight Chance of Minor Geomagnetic Storm G1 should a CME from the a 'filament eruption' spawned on 26/2012UTC glance Earth on day 3 (Friday 30 December).

The chances of G1 should otherwise peak (30%) for the period as a whole on onset of a second fast stream of solar wind, perhaps most likely at the very end of day one or day two (Thursday 29 December). If the aforementioned CME does not feature, a lull should then ensue through day three, before possible influence from a further fast wind to end the four days, giving a further Slight Chance of G1.

Energetic Particles / Solar Radiation: No solar radiation storms are expected, however there is a daily Slight Chance of S1 should there be any significant X-ray flare activity given the westward progression of the largest front-sided spots.

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	10	30	5	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	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	30	30	30
Very Active	R3 to R5 X	No	1	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	5	5	5
Very Active	≥ S3 *	No	1	1	1	1

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