

## Space Weather Forecast

Issued on Thursday, 16 December 2021 at 12:51 Local

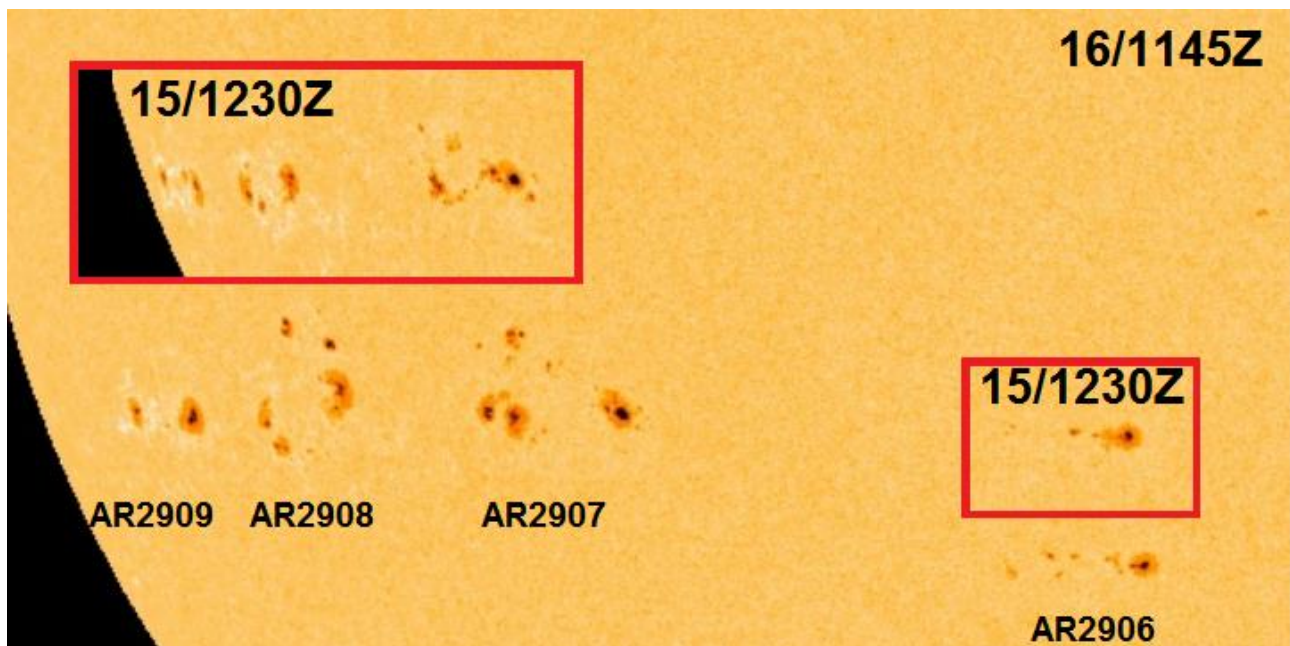
This forecast provides a four-day assessment of space weather events. The probabilities stated below are for reaching or exceeding the given levels. For more information about space weather impacts please see the Met Office Space Weather Scales <https://www.metoffice.gov.uk/weather/learn-about/space-weather/uk-scales>

**Space Weather Forecast Headline: Numerous sunspots, giving a daily chance of moderate-class X-ray flares and radio blackouts.**

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

**Solar Activity:** Solar Activity was low in the past 24 hours, with occasional small common-class flares observed, peaking with a mid-ranking event at 15/1434UTC. This flare emanated from perhaps the largest and most complex sunspot group on the sun, with this group showing rapid proliferation in its trailing spots. This is one of at least six sunspot groups on the sun at present.

Other groups of note include the one to its immediate east which also saw significant growth, with a third near the the middle of the disc also seeing slight growth in its trailing spots, although these did not produce noteworthy activity as a result.



**Figure 1: 24-hour evolution of the four foremost sunspot regions on the sun at present in visible light satellite imagery. Compare the (red boxed) inset images with the latest to see 'Active Region' AR2907 and also AR2908 as growing significantly.**

No Earth-directed Coronal Mass Ejections (CMEs) were observed in available satellite imagery for the period, although several large peripheral eastern horizon events were noted, as well as very faint and narrow western solar horizon occurrences.

**Solar Wind / Geomagnetic Activity:** Earth is currently sampling the fast wind from a 'coronal

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hole'. This feature is now well settled in, and as a result, the solar wind speed has remained elevated but relatively stable through the period, while the number of particles and their associated magnetic field both saw slight declines towards background levels.

The net result of these solar wind measures was mostly quiet geomagnetic activity, well below Minor Geomagnetic Storm G1 throughout.

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

## Four-Day Space Weather Forecast Summary

**Solar Activity:** Solar Activity is expected to be low, but with a chance of rising to moderate given a congested eastern solar hemisphere. Further potential regions are likely to arrive over the eastern horizon in the period, while none should leave, meaning the risk of significant flares ought to increase over the coming weekend. For now, common-class flares are expected, with a daily 90% chance, while there is a 30% chance of moderate and 5% for strong events.

**Solar Wind / Geomagnetic Activity:** No CMEs feature in the current forecast period. Earth is currently in a mature high speed stream from a coronal hole, with this expected to wane into the coming UTC weekend. Confidence lowers hereafter, however a previous coronal hole (that by 27-day persistence should be due in the period) appears to have largely closed, meaning instead that an early peak of occasional unsettled geomagnetic activity intervals should revert to quiet into the weekend.

**Energetic Particles / Solar Radiation:** No solar radiation storms are expected, although there is a slight increasing risk with time as the eastern hemisphere active regions continue westward with time - a position more likely to affect Earth with solar radiation storms should they flare significantly.

## 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	30	30	30	30
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	2	2	5
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>)