Geomagnetic Storm Watch Briefing

May 10, 2024

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Solar Geomagnetic Storm Watch

Updated May 10, 2024
10:00 AM EDT

Key Points:

- The NWS Space Weather Prediction Center (SWPC) has issued a Severe (G4) Geomagnetic Storm Watch.
- G4 is the second-highest level on a scale of 1-5.
- This is the first G4 Watch to be issued by SWPC since 2005.
- This watch is due to the release of as many as 7 Coronal Mass Ejections (CMEs) from the sun since May 8.
- The first waves of magnetic energy are expected later today, with the strongest energy arriving late tonight or early Saturday.

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Potential Impacts to Aviation:

Power Systems: Possible power outages

Radio Navigation: Potential loss of High Frequency radio transmissions

- Operators of infrastructure systems have already been notified so they can take any needed mitigation measures.
- The science is not good enough yet to pinpoint what locations on the planet may experience power or communications disruptions.
- More detailed list of impacts for G3 – G5 are shown on the next slide.
- Slides from the Space Weather Prediction Center are shown on Slides 5-6.
- Also attached is a Microsoft Word document with more detailed information.

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Geomagnetic Storms

Scale	Description	Effect	Physical measure	Average Frequency (1 cycle = 11 years)
G 5	Extreme	**Power systems:** Widespread voltage control problems and protective system problems can occur, some grid systems may experience complete collapse or blackouts. Transformers may experience damage. **Spacecraft operations:** May experience extensive surface charging, problems with orientation, uplink/downlink and tracking satellites. **Other systems:** Pipeline currents can reach hundreds of amps, HF (high frequency) radio propagation may be impossible in many areas for one to two days, satellite navigation may be degraded for days, low-frequency radio navigation can be out for hours, and aurora has been seen as low as Florida and southern Texas (typically 40° geomagnetic lat.).	Kp = 9	4 per cycle (4 days per cycle)
G 4	Severe	**Power systems:** Possible widespread voltage control problems and some protective systems will mistakenly trip out key assets from the grid. **Spacecraft operations:** May experience surface charging and tracking problems, corrections may be needed for orientation problems. **Other systems:** Induced pipeline currents affect preventive measures, HF radio propagation sporadic, satellite navigation degraded for hours, low-frequency radio navigation disrupted, and aurora has been seen as low as Alabama and northern California (typically 45° geomagnetic lat.).	Kp = 8, including a 9-	100 per cycle (60 days per cycle)
G 3	Strong	**Power systems:** Voltage corrections may be required, false alarms triggered on some protection devices. **Spacecraft operations:** Surface charging may occur on satellite components, drag may increase on low-Earth-orbit satellites, and corrections may be needed for orientation problems. **Other systems:** Intermittent satellite navigation and low-frequency radio navigation problems may occur, HF radio may be intermittent, and aurora has been seen as low as Illinois and Oregon (typically 50° geomagnetic lat.).	Kp = 7	200 per cycle (130 days per cycle)

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Active Space Weather Conditions Through Weekend

WHAT: Large Sunspot Groups and Flares Lead to First G4 Watch Since 2005

- On Thursday, May 9, the NOAA Space Weather Prediction Center issued a Severe (G4) **Geomagnetic Storm Watch – the first since January 2005.**
- At least **five earth-directed coronal mass ejections (CMEs)** were observed and expected to arrive as early as midday Friday, May 10, 2024, and persist through Sunday, May 12, 2024. This is an unusual event.
- Several strong flares have been observed over the past few days and were associated with a large and magnetically complex sunspot cluster (NOAA region 3664), **which is 16 times the diameter of Earth**. Additional solar activity is expected from the region.
- **Only three Severe geomagnetic storms have been observed during this solar cycle which began in December 2019**. The last G4 (Severe) was on March 23, 2024, and the last G5 (Extreme) was the Halloween Storms in October 2003. That G5 resulted in power outages in Sweden and damaged power transformers in South Africa.

National Oceanic and Atmospheric Administration
U.S. Department of Commerce

Safeguarding Society with Actionable Space Weather Information

Space Weather Prediction Center;
Boulder, CO

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Geomagnetic Storm WATCH for May 11, 2024

G4

Updated
2024-05-09
1:30pm EDT

WHAT: Several CMEs will quite likely reach Earth and lead to highly elevated geomagnetic activity

EVENT:

A coronal mass ejection (CME) is an eruption of solar material. When they arrive at Earth, a geomagnetic storm can result. Watches at this level are very rare.

TIMING:

The CMEs are anticipated to merge and arrive at Earth by late on May 10th or early on May 11th.

EFFECTS:

The general public should visit our webpage to keep properly informed. The aurora may become visible over much of the northern half of the country, and maybe as far south as Alabama to northern California.

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