Moon to Mars Space Weather Analysis Office
Weekly Highlights

July 2-8, 2025

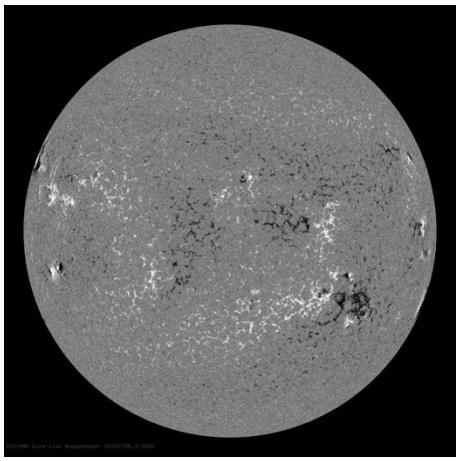


Image courtesy of NASA SDO HMI

Solar Event Summary

- 0 X-class flares
- 1 M-class flares
- 2 O-type CMEs
- 19 C-type CMEs

SCORE CME typification system:

S-type: < 500 km/s
C-type: Common 500-999 km/s
O-type: Occasional 1000-1999 km/s
R-type: Rare 2000-2999 km/s
ER-type: Extremely Rare >3000 km/s

Number of CMEs predicted to impact missions (> 500 km/s)

Mars	5
Juice	4
STEREO A	4
Parker Solar Probe	4
Lucy	1
BepiColombo	1
Europa Clipper	1

Details from CCMC's DONKI Catalog

Geomagnetic Activity:

Minor levels with Kp index (a measure of geomagnetic activity, ranging 0-9) <= 5.33 for the reporting period. The highest value of Kp = 5.33 occurred during the synoptic periods starting at 21:00 UTC on July 6th through 03:00 UTC on July 7th (more details on next page).

Radiation Belt Enhancements:

The > 2.0 MeV energetic electron flux in the Earth's outer radiation belt remained elevated above the threshold level of 1000 pfu at the beginning of the reporting period, returning to background levels on July 4th (more details on next page).

Solar Energetic Particles:

The energetic proton flux of >10 MeV protons detected at GOES and the 13-100 MeV protons at STEREO A were all at background levels for the entire reporting period.

Space Weather Impacts:

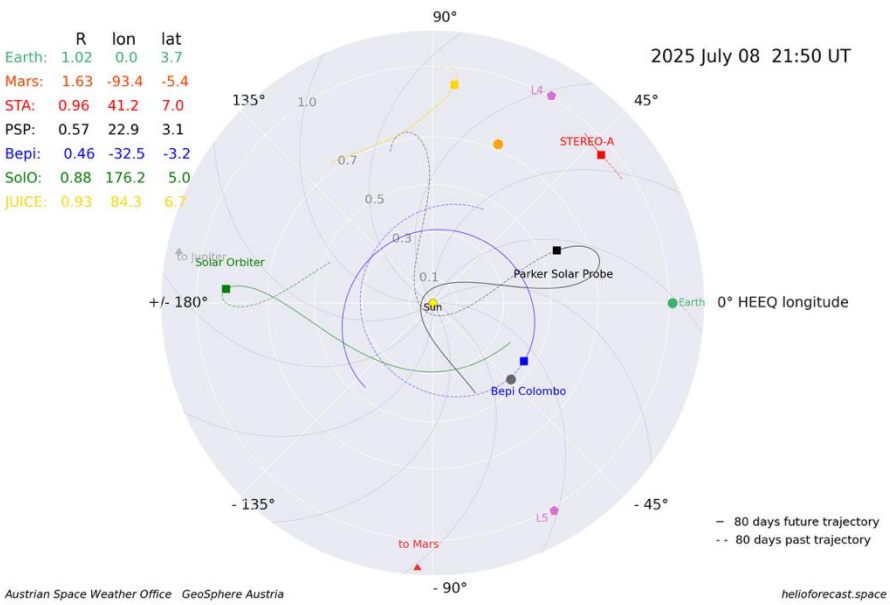
Space weather impacts on NASA spacecraft are expected to have been moderate this reporting period due to the elevated energetic electron flux in the Earth's outer radiation belt.

Space Weather Outlook:
July 9th – July 15th, 2025

Solar activity is expected to vary between low and moderate levels during the outlook period (more details on next page).

Geomagnetic activity is expected to vary between low and moderate levels during the outlook period (more details on next page).

Planets & Mission Locations



Plot courtesy of Alex Young and Solar-MACH.

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Geomagnetic Activity:

Geomagnetic activity was at minor levels with Kp index (a measure of geomagnetic activity, ranging 0-9) <=5.33 for the reporting period. The highest value of Kp = 5.33 occurred during the synoptic periods starting at 21:00 UTC on July 6th through 03:00 UTC on July 7th. This enhancement in geomagnetic activity was likely associated with the coronal hole high speed stream detected at L1 by DSCOVR and ACE on July 5th.

Radiation Belt Enhancements:

The > 2.0 MeV energetic electron flux in the Earth's outer radiation belt remained elevated above the threshold level of 1000 pfu at the beginning of the reporting period. This elevation of energetic electron flux levels observed since June 27th at 11:40 UTC was associated with the arrival of a coronal hole high speed stream detected by DSCOVR and ACE at L1 on June 25th in the previous reporting period. The energetic electron flux levels returned to background levels on July 4th.

Space Weather Outlook: July 9th – July 15th, 2025

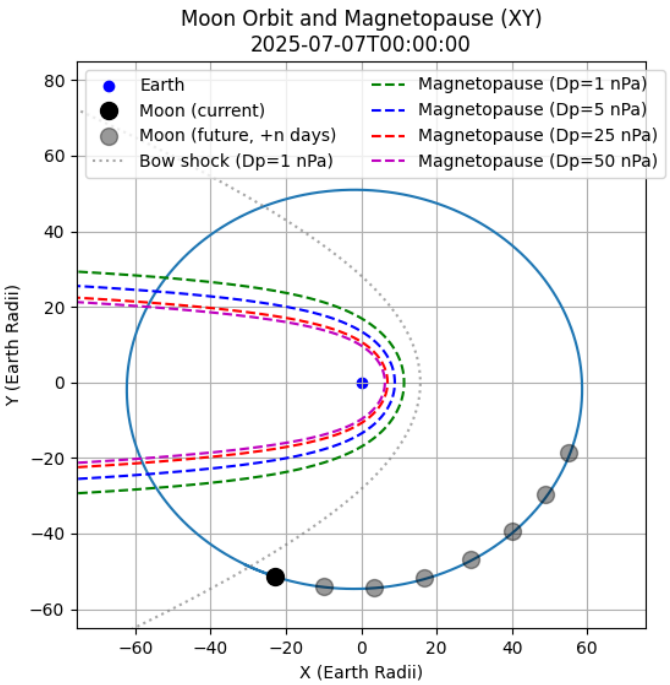
Solar activity is expected to vary between low and moderate levels during the outlook period. There are currently six Active Regions on the Earth-facing disk. Active Region 14136 (N19E71) produced the only M-class flare of the reporting period and may continue to produce similar flaring activity as it rotates onto the Earth-facing disk.

Geomagnetic activity is expected to vary between low and moderate levels during the outlook period. The > 2.0 MeV energetic electron flux in the Earth's outer radiation belt was elevated above the threshold of 1000 pfu on July 9th and may continue to be elevated throughout the outlook period due to the arrival of a coronal hole high speed stream on July 5th mentioned above. Additionally, a coronal hole spanning a large portion of the southeastern disk (as seen in available EUV imagery from SDO/AIA) began to cross the central meridian on July 8th. This coronal hole may reach geoeffective longitudes on or around July 13th.

For more information,
check out the M2M SWAO's **Weekly Report.**

Earth's Moon Outlook:

The moon is expected to be outside of the Earth's magnetosphere between July 7th 00:00 UTC to July 14th at 00:00Z.



This plot is courtesy of Daniel da Silva. It displays the Moon's orbit in relation to Earth and Earth's Magnetopause.

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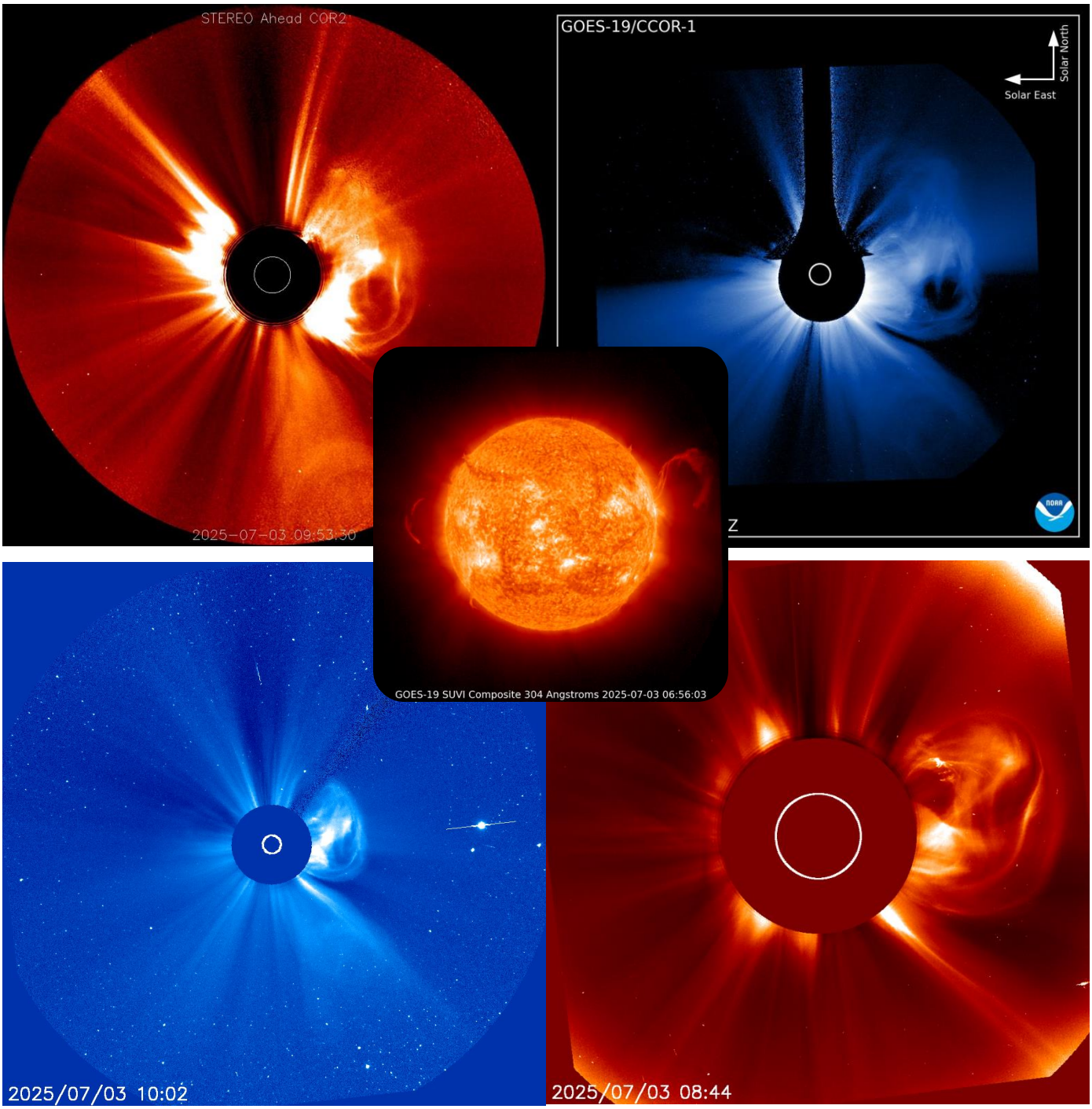
Event Highlight: *Arrival of filament eruption and associated CME detected at STEREO A.*

On July 3rd, a filament eruption was seen along the W/NW limb of the Earth-facing solar disk in SDO/AIA, GOES SUVI, and STEREO A EUVI 304 imagery. This eruption was associated with a bright CME visible in SOHO LASCO C2, C3, GOES CCOR-1, and STEREO A COR2 imagery. The CME was modeled with a speed of 616 km/s and was predicted to impact Juice at 18:09 UTC on July 5th, STEREO A at 22:50 UTC on July 5th, and as a glancing blow to Parker Solar Probe around 20:00 UTC on July 4th (+/- 7 hours). STEREO A's IMPACT/PLASTIC instruments detected an arrival starting around 20:27 UTC on July 5th, only 2.4 hours off the predicted arrival time!



Imagery available in CCMC's ISWA Webtool: https://ccmc.gsfc.nasa.gov/tools/ISWA/

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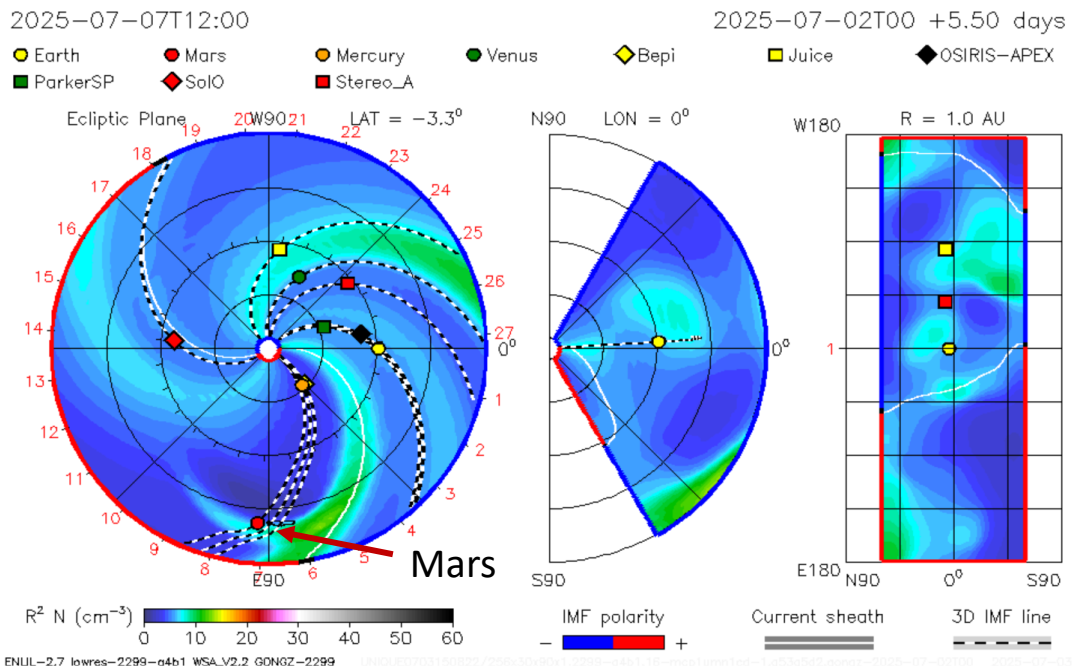
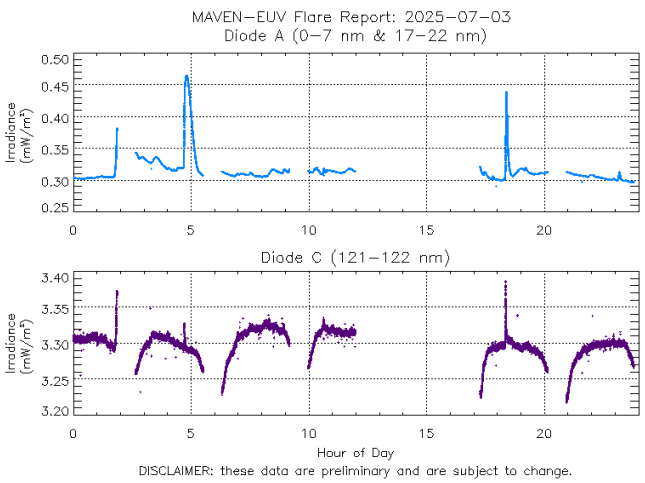
Mars Highlight: Solar activity was likely at low to moderate levels near Mars. Five CMEs were directed towards Mars during the reporting period.

CME Start Time	Estimated Arrival Time (plus/minus 7 hours)
2025-07-03T07:32Z	Mars at *2025-07-06T22:00Z (minor impact)*
2025-07-04T01:25Z	Mars at *2025-07-08T02:00Z (glancing blow)*
2025-07-04T02:24Z	Mars at *2025-07-08T02:00Z (glancing blow)*
2025-07-07T15:00Z	Mars at *2025-07-12T12:00Z (minor impact)*
2025-07-07T22:38Z	Mars at *2025-07-12T12:00Z (minor impact)*



WSA-ENLIL+Cone model of CME: 2025-07-03T07:32Z

The simulation results can be found in DONKI:
https://kauai.ccmc.gsfc.nasa.gov/DONKI/view/WSA-ENLIL/39892/1



Flares:

Flaring was mostly at C-class and B-class levels during the reporting period. An M-class flare was detected by MAVEN on July 3rd. This flare was not observed near Earth by GOES.

Left: A snapshot of flaring as seen on July 3, 2025 in MAVEN quicklook plots.

Preliminary quicklook MAVEN plots available in CCMC's ISWA Webtool: https://ccmc.gsfc.nasa.gov/tools/ISWA/