**Space Weather Highlights**
**22 May - 28 May 2023**

**SWPC PRF 2491**
**29 May 2023**

Solar activity was at low to moderate level. Region 3311 (N18, L=274, class/area=Eai/470 on 24 May) produced the strongest event of the period, an M3 (R1 - Minor) flare at 23/1213 UTC. Three other, smaller, M-class events were also produced by the region on 22 May and 24 May. Regions 3315 (S17, L=235, class/area=Ekc/800 on 28 May) and 3312 (S23, L=262, class/area=Cri/070 on 22 May) also produced M-class activity. The remaining 8 numbered active regions on the visible disk were either quiet or only produced C-class events during the reporting period.

Other activity included Type II radio sweeps on 22, 23 and 27 May; however, none of the events were associated with ejecta that was suspected to be Earth-directed.

No proton events were observed at geosynchronous orbit.

The greater than 2 MeV electron flux at geosynchronous orbit reached high levels during the entire week due higher levels of geomagnetic activity followed by sustained elevated solar wind speeds.

Geomagnetic field activity ranged from quiet to G1 (Minor) geomagnetic storm levels. G1 levels were observed on 22 May as transient influence transitioned in influence from a negative polarity CH HSS. As the HSS continued, active conditions on 23 May further decreased to unsettled levels over 24-25 May. As solar wind speeds returned to nominal levels on 26-27 May, the geomagnetic field responded with quiet conditions. A minor increase to unsettled conditions was observed on 28 May following prolonged periods of southward Bz.

**Space Weather Outlook**
**29 May - 24 June 2023**

Solar activity is likely to be at low to moderate levels (R1-R2 Minor-Moderate) throughout the outlook period due to several complex regions on the visible disk and the anticipated return of several regions that have produced moderate level activity returning from the farside of the Sun.

No proton events are expected at geosynchronous orbit.

The greater than 2 MeV electron flux at geosynchronous orbit is expected to range from moderate to high levels. High levels are likely on 03-05 May, 04-10 Jun, and 19-24 Jun in response to elevated wind speeds from multiple, recurrent CH HSSs. The remainder of the outlook period is likely to be at moderate levels.

Geomagnetic field activity is expected to range from quiet to G1 (Minor) geomagnetic storm conditions. G1 conditions are likely on 02 Jun and 18 Jun; active conditions are likely on 29 May, 03-04 Jun, and 19-20 Jun; unsettled conditions are likely on 30 May, 05-06 Jun, and 21 Jun. All elevated levels of geomagnetic field activity are in response to multiple, recurrent CH

HSSs. Quiet conditions are expected for the remainder of the outlook period.

## *Daily Solar Data*

| Date | Radio Flux 10.7cm | Sun spot No. | Sunspot Area ($10^{-6}$ hemi.) | X-ray Background Flux | Flares | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | X-ray | | | Optical | | | | |
| | | | | | C | M | X | S | 1 | 2 | 3 | 4 |
| 22 May | 162 | 97 | 930 | C1.5 | 9 | 2 | 0 | 16 | 3 | 0 | 0 | 0 |
| 23 May | 155 | 130 | 820 | C1.2 | 12 | 1 | 0 | 19 | 1 | 0 | 0 | 0 |
| 24 May | 164 | 153 | 1360 | C1.0 | 10 | 3 | 0 | 25 | 1 | 0 | 0 | 0 |
| 25 May | 152 | 121 | 1120 | B8.7 | 16 | 1 | 0 | 22 | 2 | 0 | 0 | 0 |
| 26 May | 149 | 127 | 1200 | B6.4 | 11 | 0 | 0 | 13 | 0 | 0 | 0 | 0 |
| 27 May | 157 | 125 | 1320 | B8.5 | 8 | 0 | 0 | 22 | 0 | 0 | 0 | 0 |
| 28 May | 151 | 119 | 1540 | B8.3 | 9 | 1 | 0 | 5 | 1 | 0 | 0 | 0 |

## *Daily Particle Data*

| Date | Proton Fluence (protons/cm $^2$ -day -sr) | | Electron Fluence (electrons/cm$^2$ -day -sr) |
|---|---|---|---|
| | >1 MeV | >10 MeV | >2MeV |
| 22 May | 5.2e+04 | 2.2e+04 | 2.2e+07 |
| 23 May | 4.4e+04 | 2.2e+04 | 4.4e+07 |
| 24 May | 3.9e+04 | 2.3e+04 | 1.2e+08 |
| 25 May | 4.1e+04 | 2.3e+04 | 1.4e+08 |
| 26 May | 3.4e+04 | 2.3e+04 | 2.0e+08 |
| 27 May | 3.2e+04 | 2.4e+04 | 2.6e+08 |
| 28 May | 4.8e+04 | 2.4e+04 | 2.3e+07 |

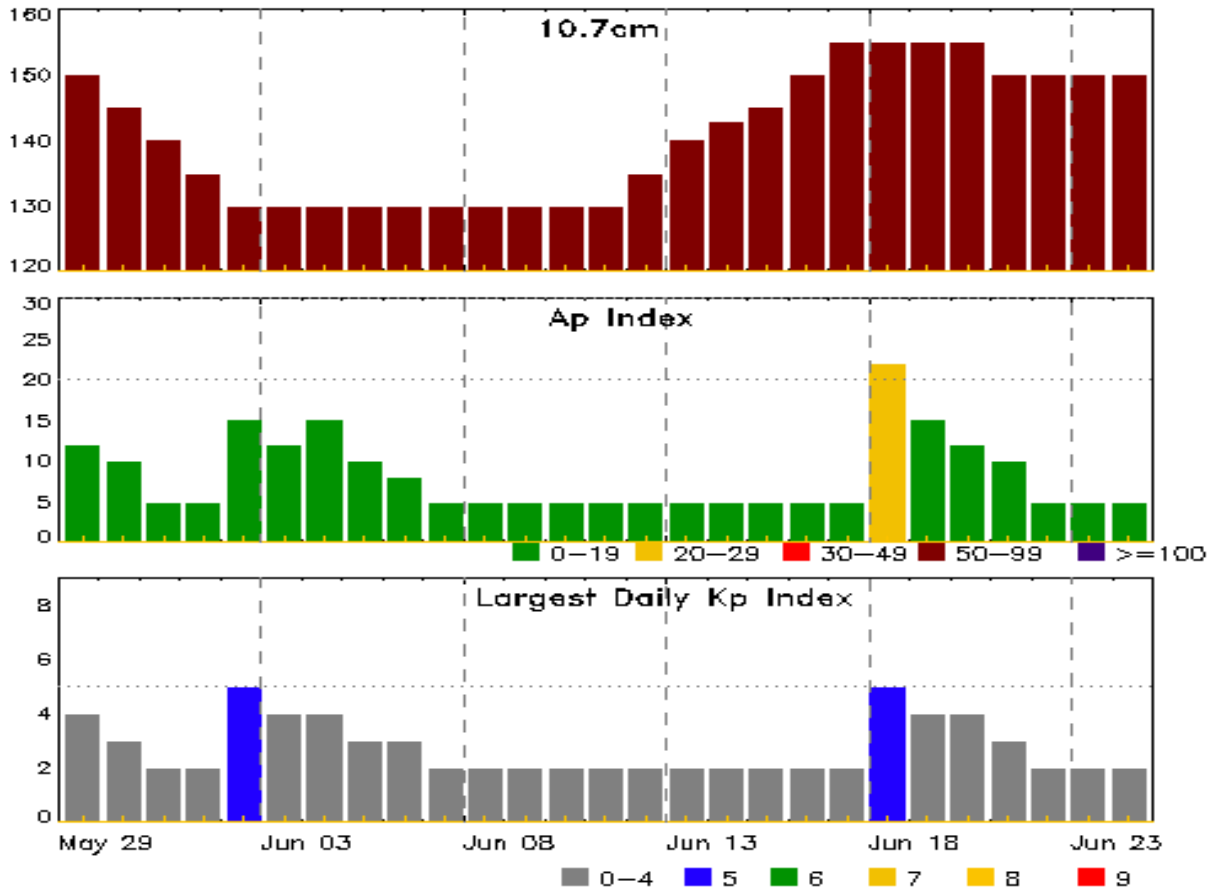
## *Daily Geomagnetic Data*

| Date | Middle Latitude Fredericksburg | | High Latitude College | | Estimated Planetary | |
|---|---|---|---|---|---|---|
| | A | K-indices | A | K-indices | A | K-indices |
| 22 May | 17 | 4-3-3-2-3-3-3-4 | 40 | 4-4-6-6-5-3-3-4 | 21 | 5-3-3-3-3-3-4-4 |
| 23 May | 11 | 3-3-2-2-2-1-3-3 | 19 | 3-4-5-4-2-1-2-3 | 12 | 3-3-3-2-1-1-3-4 |
| 24 May | 10 | 2-3-1-2-3-2-2-3 | 16 | 3-4-2-3-4-3-3-2 | 12 | 3-3-2-2-3-3-3-3 |
| 25 May | 11 | 3-3-3-3-2-2-2-1 | 21 | 3-3-4-5-5-2-2-1 | 11 | 3-3-3-3-2-2-3-2 |
| 26 May | 6 | 2-2-2-1-2-2-2-1 | 7 | 2-3-3-1-2-1-1-1 | 6 | 2-2-2-1-1-1-1-2 |
| 27 May | 5 | 1-2-1-1-2-2-1-2 | 4 | 2-2-1-1-0-1-0-2 | 4 | 1-1-1-1-1-1-1-2 |
| 28 May | 11 | 3-3-3-2-3-2-2-2 | 20 | 2-3-4-5-5-2-2-1 | 15 | 3-3-3-2-3-1-1-2 |

## *Alerts and Warnings Issued*

| Date & Time of Issue UTC | Type of Alert or Warning | Date & Time of Event UTC |
|---|---|---|
| 22 May 0231 | ALERT: Geomagnetic K = 5 | 22/0230 |
| 22 May 1153 | WATCH: Geomagnetic Storm Category G1 predicted | |
| 22 May 1400 | ALERT: Type II Radio Emission | 22/1340 |
| 22 May 1557 | ALERT: Electron 2MeV Integral Flux >= 1000pfu | 22/1545 |
| 22 May 1939 | WARNING: Geomagnetic K = 4 | 22/1937 - 23/0300 |
| 22 May 2049 | ALERT: Geomagnetic K = 4 | 22/2042 |
| 22 May 2327 | WARNING: Geomagnetic K = 5 | 22/2325 - 23/0600 |
| 22 May 2327 | EXTENDED WARNING: Geomagnetic K = 4 | 22/1937 - 23/1500 |
| 23 May 1309 | ALERT: Type IV Radio Emission | 23/1120 |
| 23 May 1328 | CONTINUED ALERT: Electron 2MeV Integral Flux >= 1000pfu | 22/1545 |
| 23 May 2219 | WARNING: Geomagnetic K = 4 | 23/2220 - 24/0300 |
| 23 May 2259 | ALERT: Geomagnetic K = 4 | 23/2258 |
| 24 May 0255 | EXTENDED WARNING: Geomagnetic K = 4 | 23/2220 - 24/1200 |
| 24 May 0506 | CONTINUED ALERT: Electron 2MeV Integral Flux >= 1000pfu | 22/1545 |
| 25 May 0200 | WARNING: Geomagnetic K = 4 | 25/0200 - 0900 |
| 25 May 0716 | CONTINUED ALERT: Electron 2MeV Integral Flux >= 1000pfu | 22/1545 |
| 25 May 0832 | EXTENDED WARNING: Geomagnetic K = 4 | 25/0200 - 1500 |
| 25 May 1456 | EXTENDED WARNING: Geomagnetic K = 4 | 25/0200 - 2100 |
| 25 May 2057 | EXTENDED WARNING: Geomagnetic K = 4 | 25/0200 - 26/0900 |
| 26 May 0459 | CONTINUED ALERT: Electron 2MeV Integral Flux >= 1000pfu | 22/1545 |
| 27 May 0455 | ALERT: Type II Radio Emission | 27/0436 |
| 27 May 0459 | CONTINUED ALERT: Electron 2MeV Integral Flux >= 1000pfu | 22/1545 |
| 27 May 2027 | ALERT: Type II Radio Emission | 27/1927 |
| 28 May 0531 | CONTINUED ALERT: Electron 2MeV Integral Flux >= 1000pfu | 22/1545 |

## *Twenty-seven Day Outlook*




| Date | Radio Flux 10.7cm | Planetary A Index | Largest Kp Index | Date | Radio Flux 10.7cm | Planetary A Index | Largest Kp Index |
|---|---|---|---|---|---|---|---|
| 29 May | 150 | 12 | 4 | 12 Jun | 135 | 5 | 2 |
| 30 | 145 | 10 | 3 | 13 | 140 | 5 | 2 |
| 31 | 140 | 5 | 2 | 14 | 143 | 5 | 2 |
| 01 Jun | 135 | 5 | 2 | 15 | 145 | 5 | 2 |
| 02 | 130 | 15 | 5 | 16 | 150 | 5 | 2 |
| 03 | 130 | 12 | 4 | 17 | 155 | 5 | 2 |
| 04 | 130 | 15 | 4 | 18 | 155 | 22 | 5 |
| 05 | 130 | 10 | 3 | 19 | 155 | 15 | 4 |
| 06 | 130 | 8 | 3 | 20 | 155 | 12 | 4 |
| 07 | 130 | 5 | 2 | 21 | 150 | 10 | 3 |
| 08 | 130 | 5 | 2 | 22 | 150 | 5 | 2 |
| 09 | 130 | 5 | 2 | 23 | 150 | 5 | 2 |
| 10 | 130 | 5 | 2 | 24 | 150 | 5 | 2 |
| 11 | 130 | 5 | 2 | | | | |

## *Energetic Events*

| | Time | | | X-ray | | Optical Information | | | Peak Radio Flux | | Sweep Freq Intensity | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Date | Begin | Max | Half Max | Class | Integ Flux | Imp/ Brtns | Location Lat CMD | Rgn # | 245 | 2695 | II | IV |
| 22 May | 1330 | 1337 | 0655 | M1.9 | 0.008 | | | | | | | |
| 22 May | 1331 | 1337 | 1343 | M1.9 | 0.010 | SF | N18E24 | 3311 | 550 | | 110 | 2 |
| 23 May | 1207 | 1213 | 1217 | M3.0 | 0.007 | | | 3311 | 510 | | | |
| 24 May | 0951 | 0958 | 1002 | M1.0 | 0.003 | SN | N18E00 | 3311 | | | | |
| 24 May | 1704 | 1721 | 1748 | M1.8 | 0.031 | 1F | N18W03 | 3311 | 140 | | | |
| 24 May | 1753 | 1800 | 1818 | M1.0 | 0.013 | SF | S17E38 | 3315 | | | | |
| 25 May | 1437 | 1446 | 1453 | M1.1 | 0.007 | 1N | S25W04 | 3312 | 100 | | | |
| 28 May | 1021 | 1036 | 1055 | M1.0 | 0.012 | 1N | S15W11 | 3315 | | | | |

## *Flare List*

| | Time | | | Optical | | | |
|---|---|---|---|---|---|---|---|
| Date | Begin | Max | End | X-ray Class | Imp/ Brtns | Location Lat CMD | Rgn # |
| 22 May | 0055 | 0108 | 0118 | C8.2 | SF | N19E34 | 3311 |
| 22 May | 0135 | 0135 | 0143 | | SF | N10W69 | 3308 |
| 22 May | 0217 | 0226 | 0234 | C3.5 | SF | N00E00 | 3305 |
| 22 May | 0228 | 0236 | 0239 | | SF | N20E33 | 3311 |
| 22 May | 0228 | 0236 | 0239 | | SF | N20E33 | 3311 |
| 22 May | 0330 | 0341 | 0350 | C3.7 | SF | N20E33 | 3311 |
| 22 May | 0450 | 0457 | 0502 | C4.1 | SF | N20E33 | 3311 |
| 22 May | 0606 | 0612 | 0617 | C4.9 | SN | N00E00 | 3305 |
| 22 May | 0746 | 0748 | 0753 | | SF | N17E29 | 3311 |
| 22 May | 0916 | 0916 | 0923 | | SF | N15E30 | 3311 |
| 22 May | 0929 | 0940 | 0944 | C3.2 | SF | N15E30 | 3311 |
| 22 May | 1001 | 1002 | 1007 | | SF | N18E31 | 3311 |
| 22 May | 1017 | 1017 | 1026 | | SF | N19E31 | 3311 |
| 22 May | 1313 | 1313 | 1322 | | SF | N14E20 | 3314 |
| 22 May | 1319 | 1327 | 1331 | C7.2 | | | |
| 22 May | 1326 | 1328 | 1334 | | SF | N18E24 | 3311 |
| 22 May | 1330 | 1337 | 0655 | M1.9 | | | |
| 22 May | 1331 | 1337 | 1343 | M1.9 | | | 3311 |
| 22 May | 1335 | 1335 | 1402 | | 1B | S27E36 | 3312 |
| 22 May | 1358 | 1413 | 1439 | C6.3 | 1N | N18E29 | 3311 |
| 22 May | 1411 | 1412 | 1426 | | 1N | N18E28 | 3311 |
| 22 May | 1825 | 1837 | 1856 | C3.0 | SF | S24E25 | 3312 |
| 23 May | 0016 | 0016 | 0019 | | SF | S18E15 | 3310 |

## *Flare List*

| | Time | | | Optical | | | |
|---|---|---|---|---|---|---|---|
| Date | Begin | Max | End | X-ray Class | Imp/ Brtns | Location Lat CMD | Rgn # |
| 23 May | 0117 | 0117 | 0126 | | SF | S24E29 | 3312 |
| 23 May | 0143 | 0144 | 0149 | | SF | N20E21 | 3311 |
| 23 May | 0419 | 0420 | 0423 | | SF | N16E17 | 3311 |
| 23 May | B0508 | 0527 | 0631 | | SF | N18E18 | 3311 |
| 23 May | 0650 | 0716 | 0745 | C2.3 | 1F | N18E18 | 3311 |
| 23 May | 0744 | 0752 | 0756 | C2.1 | SF | S27E27 | 3312 |
| 23 May | 0910 | 0932 | 0944 | | SF | N19E15 | 3311 |
| 23 May | 1002 | 1010 | 1014 | C3.2 | SF | N19E18 | 3311 |
| 23 May | 1036 | 1043 | 1047 | C4.1 | SF | N19E14 | 3311 |
| 23 May | 1141 | 1142 | 1149 | | SF | N19E13 | 3311 |
| 23 May | 1154 | 1209 | 1239 | | SN | N19E13 | 3311 |
| 23 May | 1207 | 1213 | 1217 | M3.0 | | | 3311 |
| 23 May | 1329 | 1333 | 1336 | | SF | N18E11 | 3311 |
| 23 May | 1406 | 1414 | 1420 | C2.9 | SF | N18E11 | 3311 |
| 23 May | 1431 | 1436 | 1442 | C6.8 | SF | N19E11 | 3311 |
| 23 May | 1450 | 1502 | 1521 | | SF | N13E03 | 3311 |
| 23 May | 1522 | 1534 | 1546 | C4.4 | SF | N18E10 | 3311 |
| 23 May | 1600 | 1600 | 1607 | C3.2 | SF | N17E10 | 3311 |
| 23 May | 1628 | 1634 | 1710 | C4.0 | SF | N17E11 | 3311 |
| 23 May | 1832 | 1835 | 1837 | | SF | N17E08 | 3311 |
| 23 May | 1911 | 1918 | 1923 | C1.6 | | | 3311 |
| 23 May | 1933 | 1939 | 1943 | C1.9 | | | 3311 |
| 23 May | 2028 | 2035 | 2039 | C2.0 | | | 3311 |
| 24 May | 0334 | 0350 | 0405 | C2.7 | | | |
| 24 May | B0506 | 0550 | 0608 | | SF | S17E44 | 3315 |
| 24 May | 0520 | 0523 | 0529 | | SF | N17E04 | 3311 |
| 24 May | 0716 | 0729 | 0741 | | SF | N16W02 | 3311 |
| 24 May | 0747 | 0759 | 0805 | C2.4 | SF | S26E12 | 3312 |
| 24 May | 0757 | 0833 | 0928 | | SF | N19E03 | 3311 |
| 24 May | 0929 | 0930 | 0941 | | SF | N18E04 | 3311 |
| 24 May | 0951 | 0958 | 1002 | M1.0 | SN | N18E00 | 3311 |
| 24 May | 1024 | 1026 | 1030 | C6.7 | | | 3211 |
| 24 May | 1251 | 1255 | 1304 | | SF | S25E08 | 3312 |
| 24 May | 1313 | 1314 | 1324 | | SF | S25E08 | 3312 |
| 24 May | 1326 | 1328 | 1334 | | SF | S18E40 | 3315 |
| 24 May | 1341 | 1347 | 1351 | C2.0 | | | 3311 |
| 24 May | 1358 | 1403 | 1419 | | SF | S16E33 | 3315 |
| 24 May | 1438 | 1444 | 1449 | | SF | S18E39 | 3315 |

## *Flare List*

| Date | Time | | | Optical | | | |
|---|---|---|---|---|---|---|---|
| | Begin | Max | End | X-ray Class | Imp/ Brtns | Location Lat CMD | Rgn # |
| 24 May | 1456 | 1501 | 1505 | C2.4 | SF | N19W00 | 3311 |
| 24 May | 1508 | 1521 | 1541 | | SF | S18E39 | 3315 |
| 24 May | 1525 | 1526 | 1529 | | SF | S17W11 | 3310 |
| 24 May | 1529 | 1532 | 1537 | | SF | N19E01 | 3311 |
| 24 May | 1549 | 1553 | 1557 | | SF | S18E39 | 3315 |
| 24 May | 1623 | 1623 | 1626 | | SF | N17W04 | 3311 |
| 24 May | 1701 | 1702 | 1703 | | SF | N17W04 | 3311 |
| 24 May | 1704 | 1721 | 1748 | M1.8 | 1F | N18W03 | 3311 |
| 24 May | 1742 | 1759 | 1837 | M1.0 | SF | S17E38 | 3315 |
| 24 May | 1823 | 1824 | 1831 | | SF | S25E05 | 3312 |
| 24 May | 1903 | 1910 | 1918 | C5.1 | SF | S25E05 | 3312 |
| 24 May | 1947 | 1951 | 1955 | C3.5 | | | |
| 24 May | 2010 | 2012 | 2016 | C2.8 | SF | N18W03 | 3311 |
| 24 May | 2211 | 2223 | 2232 | C1.9 | | | |
| 24 May | 2233 | 2241 | 2246 | C2.6 | SF | S27E05 | 3312 |
| 24 May | 2352 | 2356 | 2358 | | SF | S18E33 | 3315 |
| 25 May | 0201 | 0215 | 0219 | C2.1 | | | 3311 |
| 25 May | 0259 | 0303 | 0307 | C2.3 | | | 3311 |
| 25 May | 0435 | 0443 | 0454 | C3.7 | SF | N15W19 | 3314 |
| 25 May | 0507 | 0511 | 0527 | | SF | S15W17 | 3310 |
| 25 May | 0529 | 0541 | 0552 | C7.4 | 1N | N21W06 | 3311 |
| 25 May | 0741 | 0748 | 0752 | C1.6 | SF | N18W12 | 3311 |
| 25 May | 0808 | 0821 | 0825 | C3.5 | | | 3314 |
| 25 May | 0814 | 0815 | 0818 | | SF | S18E29 | 3315 |
| 25 May | 0815 | 0819 | 0833 | | SN | N15W22 | 3314 |
| 25 May | 0858 | 0904 | 0911 | C1.6 | SF | S26W01 | 3312 |
| 25 May | 0903 | 0907 | 0916 | | SF | N15W22 | 3314 |
| 25 May | 0922 | 0928 | 0933 | C1.5 | SF | S15W17 | 3310 |
| 25 May | 0931 | 0932 | 0938 | | SF | N14W22 | 3314 |
| 25 May | 0946 | 0951 | 0958 | | SF | S17E28 | 3315 |
| 25 May | 0956 | 0958 | 1010 | | SF | N18W12 | 3311 |
| 25 May | 1054 | 1110 | 1125 | C3.2 | SF | N15W22 | 3314 |
| 25 May | 1105 | 1108 | 1123 | | SF | N21W09 | 3311 |
| 25 May | 1250 | 1254 | 1258 | C1.3 | SF | S15W17 | 3310 |
| 25 May | 1304 | 1312 | 1326 | C2.0 | | | 3315 |
| 25 May | 1347 | 1352 | 1353 | C1.5 | SF | S17E26 | 3315 |
| 25 May | 1353 | 1359 | 1403 | C1.9 | SF | N14W28 | 3314 |
| 25 May | 1409 | 1409 | 1417 | | SF | N09E57 | |

## *Flare List*

| Date | Time | | | Optical | | | |
|---|---|---|---|---|---|---|---|
| | Begin | Max | End | X-ray Class | Imp/ Brtns | Location Lat CMD | Rgn # |
| 25 May | 1418 | 1430 | 1437 | C1.8 | SF | N14W25 | 3314 |
| 25 May | 1437 | 1446 | 1453 | M1.1 | 1N | S25W04 | 3312 |
| 25 May | 1702 | 1708 | 1710 | | SF | S17E24 | 3315 |
| 25 May | 1725 | 1732 | 1745 | C1.8 | SF | S17E24 | 3315 |
| 25 May | 1800 | 1800 | 1815 | | SF | N09E55 | |
| 25 May | 1858 | 1858 | 1906 | | SF | N09E54 | |
| 25 May | 2113 | 2118 | 2122 | C1.1 | | | 3311 |
| 26 May | 0102 | 0115 | 0128 | C1.3 | | | 3315 |
| 26 May | 0103 | 0105 | 0119 | | SF | S16E21 | 3315 |
| 26 May | 0120 | 0122 | 0126 | | SF | S16E23 | 3315 |
| 26 May | 0128 | 0129 | 0130 | | SF | S16E21 | 3315 |
| 26 May | 0128 | 0135 | 0139 | C1.3 | | | 3315 |
| 26 May | 0419 | 0420 | 0421 | | SF | S16E18 | 3315 |
| 26 May | 0804 | 0807 | 0810 | | SF | N14W35 | 3314 |
| 26 May | 0828 | 0833 | 0838 | C1.2 | SF | S18E16 | 3315 |
| 26 May | 1320 | 1340 | 1400 | C1.3 | SF | S17E13 | 3315 |
| 26 May | 1400 | 1404 | 1412 | C2.1 | | | 3315 |
| 26 May | B1549 | U1551 | 1606 | | SF | S16E10 | 3315 |
| 26 May | B1551 | U1551 | 1606 | | SF | N14W39 | 3314 |
| 26 May | 1656 | 1701 | 1710 | C3.0 | SN | S18E10 | 3315 |
| 26 May | 1741 | 1754 | 1808 | C5.5 | SF | N13W40 | 3314 |
| 26 May | 1832 | 1833 | 1848 | | SF | N13W41 | 3314 |
| 26 May | 1853 | 1857 | 1911 | C2.0 | | | 3315 |
| 26 May | 1956 | 2006 | 2014 | C1.5 | | | 3315 |
| 26 May | 2147 | 2157 | 2213 | C1.5 | | | 3310 |
| 26 May | 2235 | 2243 | 2248 | C6.9 | SF | S18E08 | 3315 |
| 27 May | 0015 | 0015 | 0031 | | SF | S18E06 | 3315 |
| 27 May | 0432 | 0435 | 0441 | C8.4 | SF | N14W39 | 3314 |
| 27 May | 0602 | 0612 | 0620 | C2.8 | | | 3315 |
| 27 May | 0603 | 0603 | 0614 | | SF | S26W26 | 3312 |
| 27 May | 0605 | 0610 | 0627 | | SF | S18E03 | 3315 |
| 27 May | 0624 | 0625 | 0635 | | SF | S26W26 | 3312 |
| 27 May | 0635 | 0639 | 0646 | | SF | S17E03 | 3315 |
| 27 May | 0647 | 0648 | 0652 | | SF | N14W48 | 3314 |
| 27 May | 0743 | 0743 | 0746 | | SF | S15E04 | 3315 |
| 27 May | 0859 | 0900 | 0904 | | SF | S25W29 | 3312 |
| 27 May | 1105 | 1107 | 1112 | | SF | S25W31 | 3312 |
| 27 May | 1118 | 1119 | 1123 | | SF | S17W01 | 3315 |

## *Flare List*

| Date | Time | | | Optical | | | |
|---|---|---|---|---|---|---|---|
| | Begin | Max | End | X-ray Class | Imp/ Brtns | Location Lat CMD | Rgn # |
| 27 May | 1205 | 1206 | 1212 | | SF | S17W00 | 3315 |
| 27 May | 1235 | 1249 | 1257 | | SF | S16E00 | 3315 |
| 27 May | 1240 | 1253 | 1301 | | SF | N09E31 | 3316 |
| 27 May | 1309 | 1312 | 1319 | | SF | S17W01 | 3315 |
| 27 May | 1335 | 1341 | 1345 | | SF | S17W01 | 3315 |
| 27 May | 1350 | 1401 | 1403 | | SF | S16W01 | 3315 |
| 27 May | 1432 | 1447 | 1501 | C2.1 | SF | S17W02 | 3315 |
| 27 May | 1441 | 1544 | 1642 | | SF | N20W38 | 3311 |
| 27 May | 1512 | 1527 | 1533 | C2.9 | | | 3311 |
| 27 May | 1515 | 1515 | 1520 | | SF | S24W32 | 3312 |
| 27 May | 1520 | 1549 | 1611 | | SF | S17W02 | 3315 |
| 27 May | 1533 | 1538 | 1543 | C2.9 | | | 3311 |
| 27 May | 1634 | 1634 | 1641 | | SF | S16W02 | 3315 |
| 27 May | 1814 | 1817 | 1821 | C1.3 | | | 3315 |
| 27 May | 1912 | 1924 | 1930 | C6.2 | | | 3312 |
| 27 May | 2146 | 2153 | 2158 | C2.2 | | | 3315 |
| 28 May | 0145 | 0151 | 0158 | C1.8 | SF | N16W58 | 3314 |
| 28 May | 0341 | 0346 | 0353 | C1.4 | | | 3316 |
| 28 May | 0642 | 0642 | 0643 | | SF | S18W10 | 3315 |
| 28 May | 0919 | 0925 | 0929 | C1.3 | SF | S17W11 | 3315 |
| 28 May | 1021 | 1036 | 1055 | M1.0 | 1N | S15W11 | 3315 |
| 28 May | 1217 | 1224 | 1232 | C1.6 | SF | S17W16 | 3315 |
| 28 May | 1448 | 1455 | 1502 | C2.0 | SF | S17W15 | 3315 |
| 28 May | 1534 | 1541 | 1549 | C1.6 | | | |
| 28 May | 1654 | 1659 | 1705 | C1.0 | | | 3315 |
| 28 May | 2031 | 2040 | 2053 | C1.2 | | | |
| 28 May | 2124 | 2132 | 2143 | C1.2 | | | |

## *Region Summary*

| | Location | | Sunspot Characteristics | | | | | Flares | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Helio | Area | Extent | Spot | Spot | Mag | X-ray | | | Optical | | | | |
| Date | Lat CMD | Lon | $10^{-6}$ hemi. | (helio) | Class | Count | Class | C | M | X | S | 1 | 2 | 3 | 4 |
| | | | ***Region 3302*** | | | | | | | | | | | | |
| 09 May | N18E72 | 32 | 60 | 1 | Hsx | 1 | A | | | | | | | | |
| 10 May | N18E59 | 32 | 30 | 1 | Cro | 4 | B | | | | | | | | |
| 11 May | N18E45 | 33 | 80 | 5 | Cso | 6 | B | | | | | | | | |
| 12 May | N19E32 | 33 | 70 | 5 | Cao | 5 | B | 1 | | | | | | | |
| 13 May | N19E19 | 33 | 70 | 5 | Cso | 5 | B | | | | | | | | |
| 14 May | N19E05 | 33 | 70 | 5 | Cso | 5 | B | | | | | | | | |
| 15 May | N19W09 | 34 | 90 | 6 | Dso | 5 | B | | | | | | | | |
| 16 May | N18W22 | 34 | 50 | 6 | Hsx | 4 | A | | | | | | | | |
| 17 May | N18W33 | 32 | 50 | 2 | Hsx | 1 | A | | | | | | | | |
| 18 May | N18W47 | 32 | 30 | 1 | Hsx | 1 | A | | | | | | | | |
| 19 May | N18W58 | 30 | 50 | 2 | Hsx | 1 | A | | | | | | | | |
| 20 May | N18W72 | 31 | 30 | 2 | Hsx | 1 | A | | | | | | | | |
| 21 May | N18W85 | 31 | 30 | 2 | Hsx | 1 | A | | | | | | | | |
| | | | | | | | | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

Crossed West Limb.
Absolute heliographic longitude: 33

| | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | ***Region 3305*** | | | | | | | | | | | | |
| 12 May | N10E38 | 27 | 30 | 7 | Cao | 3 | B | | | | | | | | |
| 13 May | N10E25 | 27 | 30 | 7 | Cro | 8 | B | 2 | | | | | | | |
| 14 May | N10E11 | 27 | 70 | 7 | Dai | 14 | B | 1 | | | 1 | | | | |
| 15 May | N10W03 | 28 | 110 | 10 | Dai | 24 | BG | 1 | | | | | | | |
| 16 May | N09W16 | 28 | 100 | 9 | Dai | 18 | B | 5 | | | | | | | |
| 17 May | N12W30 | 28 | 110 | 10 | Dai | 19 | BG | 1 | | | 1 | | | | |
| 18 May | N12W43 | 28 | 100 | 9 | Dsi | 12 | BG | | | | 1 | | | | |
| 19 May | N12W57 | 29 | 240 | 10 | Dai | 18 | B | | | | 5 | | | | |
| 20 May | N12W71 | 30 | 250 | 10 | Dki | 15 | B | 4 | | | 2 | | | | |
| 21 May | N12W84 | 30 | 210 | 10 | Dai | 7 | B | 7 | | | 2 | | | | |
| | | | | | | | | 21 | 0 | 0 | 12 | 0 | 0 | 0 | 0 |

Crossed West Limb.
Absolute heliographic longitude: 28

## *Region Summary - continued*

| | Location | | Sunspot Characteristics | | | | | Flares | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Helio | Area | Extent | Spot | Spot | Mag | X-ray | | | Optical | | | | |
| Date | Lat CMD | Lon | $10^{-6}$ hemi. | (helio) | Class | Count | Class | C | M | X | S | 1 | 2 | 3 | 4 |
| | | | ***Region 3307*** | | | | | | | | | | | | |
| 15 May | S09E36 | 349 | 10 | 2 | Bxo | 2 | B | | | | | | | | |
| 16 May | S08E22 | 350 | 10 | 4 | Axx | 2 | A | | | | | | | | |
| 17 May | S08E03 | 356 | 10 | 1 | Axx | 1 | A | | | | | | | | |
| 18 May | S08W10 | 355 | 10 | 3 | Bxo | 5 | B | | | | | | | | |
| 19 May | S09W20 | 352 | 10 | 1 | Axx | 1 | A | | | | | | | | |
| 20 May | S09W34 | 353 | plage | | | | | | | | | | | | |
| 21 May | S09W48 | 354 | plage | | | | | | | | | | | | |
| 22 May | S09W62 | 354 | plage | | | | | | | | | | | | |
| 23 May | S09W76 | 355 | plage | | | | | | | | | | | | |
| 24 May | S09W90 | 356 | plage | | | | | | | | | | | | |
| | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

Crossed West Limb.
Absolute heliographic longitude: 356

| | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | ***Region 3308*** | | | | | | | | | | | | |
| 16 May | N12W00 | 12 | 10 | 1 | Bxo | 2 | B | | | | | | | | |
| 17 May | N12W14 | 13 | 20 | 4 | Cro | 4 | B | | | | | | | | |
| 18 May | N12W28 | 13 | 60 | 5 | Cao | 8 | B | | | | | | | | |
| 19 May | N12W41 | 13 | 70 | 6 | Cao | 15 | B | | | | 2 | | | | |
| 20 May | N12W54 | 13 | 50 | 6 | Cao | 8 | B | | | | | | | | |
| 21 May | N12W68 | 14 | 40 | 6 | Cao | 6 | B | | | | | | | | |
| 22 May | N11W82 | 14 | 100 | 3 | Cao | 3 | B | | | | 1 | | | | |
| 23 May | N12W95 | 11 | 50 | 2 | Cao | 1 | B | | | | | | | | |
| | | | | | | | | 0 | 0 | 0 | 3 | 0 | 0 | 0 | 0 |

Crossed West Limb.
Absolute heliographic longitude: 12

## *Region Summary - continued*

| | Location | | Sunspot Characteristics | | | | | Flares | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Helio | Area | Extent | Spot | Spot | Mag | X-ray | | | Optical | | | | |
| Date | Lat CMD | Lon | $10^{-6}$ hemi. | (helio) | Class | Count | Class | C | M | X | S | 1 | 2 | 3 | 4 |
| | | ***Region 3310*** | | | | | | | | | | | | | |
| 16 May | S20E88 | 285 | plage | | | | | | 1 | | | | | | |
| 17 May | S20E74 | 285 | 250 | 5 | Dho | 3 | B | 3 | | | | | | | |
| 18 May | S20E59 | 286 | 250 | 5 | Dho | 5 | B | | | | 2 | | | | |
| 19 May | S20E48 | 284 | 320 | 7 | Cko | 8 | B | 1 | | | 1 | | | | |
| 20 May | S20E34 | 285 | 310 | 5 | Cko | 6 | B | | | | | | | | |
| 21 May | S20E20 | 286 | 300 | 6 | Cko | 4 | B | | | | | | | | |
| 22 May | S20E09 | 283 | 360 | 6 | Cho | 5 | B | | | | | | | | |
| 23 May | S19W05 | 284 | 350 | 7 | Cho | 9 | B | | | | 1 | | | | |
| 24 May | S20W18 | 284 | 480 | 7 | Cho | 11 | B | | | | 1 | | | | |
| 25 May | S18W31 | 284 | 300 | 7 | Dhi | 13 | B | 2 | | | 3 | | | | |
| 26 May | S20W45 | 285 | 270 | 5 | Cho | 4 | B | 1 | | | | | | | |
| 27 May | S20W58 | 284 | 260 | 4 | Hhx | 1 | A | | | | | | | | |
| 28 May | S20W71 | 284 | 260 | 4 | Hhx | 2 | A | | | | | | | | |
| | | | | | | | | 7 | 1 | 0 | 8 | 0 | 0 | 0 | 0 |

Still on Disk.
Absolute heliographic longitude: 284

| | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | ***Region 3311*** | | | | | | | | | | | | | |
| 18 May | N18E76 | 269 | 110 | 10 | Dao | 6 | B | 3 | 7 | | | | | | |
| 19 May | N17E60 | 272 | 330 | 13 | Ekc | 12 | BD | 12 | 5 | | 20 | 3 | | | |
| 20 May | N18E47 | 272 | 410 | 14 | Ekc | 18 | BGD | 11 | 7 | | 2 | 2 | | | |
| 21 May | N18E35 | 271 | 420 | 14 | Ekc | 31 | BGD | 4 | 2 | | 11 | 2 | 1 | | |
| 22 May | N18E20 | 272 | 310 | 14 | Eac | 28 | BGD | 5 | 1 | | 11 | 2 | | | |
| 23 May | N18E05 | 274 | 250 | 18 | Fai | 43 | BGD | 10 | 1 | | 16 | 1 | | | |
| 24 May | N18W08 | 274 | 470 | 14 | Eai | 39 | BG | 3 | 2 | | 10 | 1 | | | |
| 25 May | N19W20 | 273 | 340 | 13 | Eki | 22 | BG | 5 | | | 3 | 1 | | | |
| 26 May | N18W32 | 272 | 320 | 13 | Eai | 18 | BG | | | | | | | | |
| 27 May | N18W46 | 272 | 180 | 11 | Eao | 8 | BG | 2 | | | 1 | | | | |
| 28 May | N18W59 | 272 | 200 | 13 | Eao | 9 | BG | | | | | | | | |
| | | | | | | | | 55 | 25 | 0 | 74 | 12 | 1 | 0 | 0 |

Still on Disk.
Absolute heliographic longitude: 274

## *Region Summary - continued*

| | Location | | Sunspot Characteristics | | | | | Flares | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Helio | Area | Extent | Spot | Spot | Mag | X-ray | | | Optical | | | | |
| Date | Lat CMD | Lon | $10^{-6}$ hemi. | (helio) | Class | Count | Class | C | M | X | S | 1 | 2 | 3 | 4 |
| | | | ***Region 3312*** | | | | | | | | | | | | |
| 19 May | S25E70 | 262 | 40 | 5 | Cro | 6 | B | 1 | | | | | | | |
| 20 May | S25E57 | 262 | 30 | 4 | Cai | 6 | B | 4 | 1 | | | | | | |
| 21 May | S25E44 | 262 | 30 | 5 | Cro | 9 | B | | | | | | | | |
| 22 May | S23E30 | 262 | 70 | 5 | Cri | 10 | B | 1 | | | 1 | 1 | | | |
| 23 May | S23E16 | 263 | 30 | 7 | Cro | 12 | B | 1 | | | 2 | | | | |
| 24 May | S25E02 | 264 | 50 | 6 | Cro | 15 | B | 3 | | | 6 | | | | |
| 25 May | S24W12 | 262 | 30 | 9 | Cro | 7 | B | 1 | 1 | | 1 | 1 | | | |
| 26 May | S25W23 | 263 | 20 | 6 | Bxo | 5 | B | | | | | | | | |
| 27 May | S25W36 | 262 | 10 | 5 | Bxo | 6 | B | 1 | | | 5 | | | | |
| 28 May | S25W46 | 259 | 10 | 1 | Axx | 2 | A | | | | | | | | |
| | | | | | | | | 12 | 2 | 0 | 15 | 2 | 0 | 0 | 0 |

Still on Disk.
Absolute heliographic longitude: 264

| | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | ***Region 3313*** | | | | | | | | | | | | |
| 19 May | N22E75 | 257 | 30 | 2 | Hsx | 1 | A | | | | | | | | |
| 20 May | N22E63 | 256 | 50 | 1 | Hsx | 1 | A | | | | 1 | | | | |
| 21 May | N22E50 | 256 | 60 | 2 | Hsx | 1 | A | | | | | | | | |
| 22 May | N23E35 | 257 | 90 | 2 | Hsx | 1 | A | | | | | | | | |
| 23 May | N23E21 | 258 | 120 | 4 | Hsx | 2 | A | | | | | | | | |
| 24 May | N22E06 | 260 | 100 | 2 | Hsx | 2 | A | | | | | | | | |
| 25 May | N23W03 | 256 | 100 | 2 | Hsx | 1 | A | | | | | | | | |
| 26 May | N23W16 | 256 | 100 | 2 | Hsx | 1 | A | | | | | | | | |
| 27 May | N23W28 | 254 | 100 | 2 | Hsx | 1 | A | | | | | | | | |
| 28 May | N23W42 | 255 | 80 | 2 | Hsx | 1 | A | | | | | | | | |
| | | | | | | | | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 |

Still on Disk.
Absolute heliographic longitude: 256

## *Region Summary - continued*

| | Location | | Sunspot Characteristics | | | | | Flares | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Helio | Area | Extent | Spot | Spot | Mag | X-ray | | | Optical | | | | |
| Date | Lat CMD | Lon | $10^{-6}$ hemi. | (helio) | Class | Count | Class | C | M | X | S | 1 | 2 | 3 | 4 |
| | | | ***Region 3314*** | | | | | | | | | | | | |
| 20 May | N15E36 | 283 | 20 | 3 | Bxo | 3 | B | | | | | | | | |
| 21 May | N15E25 | 281 | 20 | 1 | Hrx | 1 | A | | | | | | | | |
| 22 May | N15E10 | 282 | plage | | | | A | | | | 1 | | | | |
| 23 May | N15W04 | 283 | plage | | | | | | | | | | | | |
| 24 May | N12W17 | 283 | 130 | 6 | Cso | 15 | B | | | | | | | | |
| 25 May | N16W31 | 284 | 120 | 3 | Cao | 7 | B | 5 | | | 7 | | | | |
| 26 May | N15W45 | 285 | 110 | 3 | Cso | 6 | B | 1 | | | 4 | | | | |
| 27 May | N15W58 | 284 | 120 | 3 | Dao | 4 | BD | 1 | | | 2 | | | | |
| 28 May | N15W72 | 285 | 160 | 3 | Dao | 4 | BD | 1 | | | 1 | | | | |
| | | | | | | | | 8 | 0 | 0 | 15 | 0 | 0 | 0 | 0 |

Still on Disk.
Absolute heliographic longitude: 283

| | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | ***Region 3315*** | | | | | | | | | | | | |
| 23 May | S15E45 | 234 | 20 | 3 | Bxo | 3 | B | | | | | | | | |
| 24 May | S17E32 | 234 | 130 | 5 | Dai | 11 | B | | 1 | | 8 | | | | |
| 25 May | S16E19 | 234 | 230 | 8 | Dai | 11 | B | 3 | | | 5 | | | | |
| 26 May | S17E05 | 235 | 360 | 10 | Dki | 18 | B | 9 | | | 9 | | | | |
| 27 May | S17W08 | 234 | 620 | 11 | Ekc | 28 | BGD | 4 | | | 13 | | | | |
| 28 May | S17W22 | 235 | 800 | 12 | Ekc | 26 | BGD | 4 | 1 | | 4 | 1 | | | |
| | | | | | | | | 20 | 2 | 0 | 39 | 1 | 0 | 0 | 0 |

Still on Disk.
Absolute heliographic longitude: 235

| | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | ***Region 3316*** | | | | | | | | | | | | |
| 26 May | N09E36 | 204 | 20 | 4 | Cro | 5 | B | | | | | | | | |
| 27 May | N09E22 | 204 | 30 | 5 | Cro | 7 | B | | | | 1 | | | | |
| 28 May | N08E08 | 205 | 30 | 6 | Dro | 5 | B | 1 | | | | | | | |
| | | | | | | | | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 |

Still on Disk.
Absolute heliographic longitude: 205

## *Preliminary Report and Forecast of Solar Geophysical Data (The Weekly)*

Published every Monday by the Space Weather Prediction Center.

U.S. Department of Commerce
NOAA / National Weather Service
Space Weather Prediction Center
325 Broadway, Boulder CO 80305

**Notice:** The 27-day Outlook, Satellite Environment, X-ray and Proton plots have been redesigned. Comments and suggestions are welcome SWPC.Webmaster@noaa.gov

The Weekly has been published continuously since 1951 and is available online since 1997.

https://www.swpc.noaa.gov/products/weekly-highlights-and-27-day-forecast -- Current

ftp://ftp.swpc.noaa.gov/pub/warehouse -- Online archive from 1997

https://www.ngdc.noaa.gov/stp/satellite/goes-r.html -- NCEI GOES data textarchive

https://www.swpc.noaa.gov/products/solar-cycle-progression -- Solar Cycle Progression web site

https://www.swpc.noaa.gov/content/contact-us -- Contact and Copyright information

https://www.swpc.noaa.gov/sites/default/files/images/u2/Usr_guide.pdf -- User Guide