**Space Weather Highlights**
**04 October - 10 October 2021**

**SWPC PRF 2406**
**11 October 2021**

Solar activity was very low over 04-06 Oct. Low levels of solar activity were observed on 07-08 and 10 Oct, and moderate solar activity was observed on 09 Oct. Region 2882 (N17, L=157, class/area=Dho/280 on 09 Oct) produced the majority of the C-class flare activity in addition to the largest event of the period, an M1/2b flare (with Type-II and IV radio emissions) at 09/0638 UTC. An associated full-halo CME signature was observed in LASCO C2 imagery beginning at 09/0712 UTC, and is likely to arrive at Earth around midday on 11 Oct.

No proton events were observed at geosynchronous orbit.

The greater than 2 MeV electron flux at geosynchronous orbit was at normal and normal to moderate levels throughout the period.

Geomagnetic field activity was quiet on 07-09 Oct, quiet to unsettled on 04-06 Oct, and quiet to active on 10 Oct.

**Space Weather Outlook**
**11 October - 06 November 2021**

Solar activity is expected to be at very low to low levels throughout the outlook period.

No proton events are expected at geosynchronous orbit.

The greater than 2 MeV electron flux at geosynchronous orbit is expected to reach high levels on 20-21 Oct. Normal and normal to moderate levels are expected throughout the remainder of the outlook period.

Geomagnetic field activity is likely to reach G2 (Moderate) geomagnetic storm levels on 11 Oct, and G1 (Minor) geomagnetic storm levels on 12 Oct, due to the anticipated arrival of a full-halo CME from 09 Oct. Active conditions are expected on 19 Oct due to the influence of a recurrent positive polarity CH HSS. Quiet and quiet to unsettled conditions are expected to prevail throughout 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 |
| 04 October | 84 | 29 | 410 | A9.9 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 |
| 05 October | 82 | 27 | 320 | A8.9 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 06 October | 85 | 22 | 260 | B1.1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 07 October | 86 | 13 | 230 | A9.9 | 2 | 0 | 0 | 1 | 0 | 0 | 0 | 0 |
| 08 October | 92 | 13 | 240 | B1.0 | 2 | 0 | 0 | 4 | 0 | 0 | 0 | 0 |
| 09 October | 81 | 14 | 280 | B1.1 | 1 | 1 | 0 | 2 | 0 | 1 | 0 | 0 |
| 10 October | 85 | 38 | 300 | B1.1 | 1 | 0 | 0 | 0 | 0 | 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 |
| 04 October | 5.1e+04 | 4.4e+04 | 2.1e+06 |
| 05 October | 5.2e+04 | 4.5e+04 | 3.6e+06 |
| 06 October | 1.1e+05 | 4.5e+04 | 1.4e+06 |
| 07 October | 5.2e+04 | 4.5e+04 | 1.2e+06 |
| 08 October | 5.2e+04 | 4.6e+04 | 1.1e+06 |
| 09 October | 1.1e+05 | 6.6e+04 | 1.3e+06 |
| 10 October | 5.0e+05 | 7.8e+04 | 1.1e+06 |

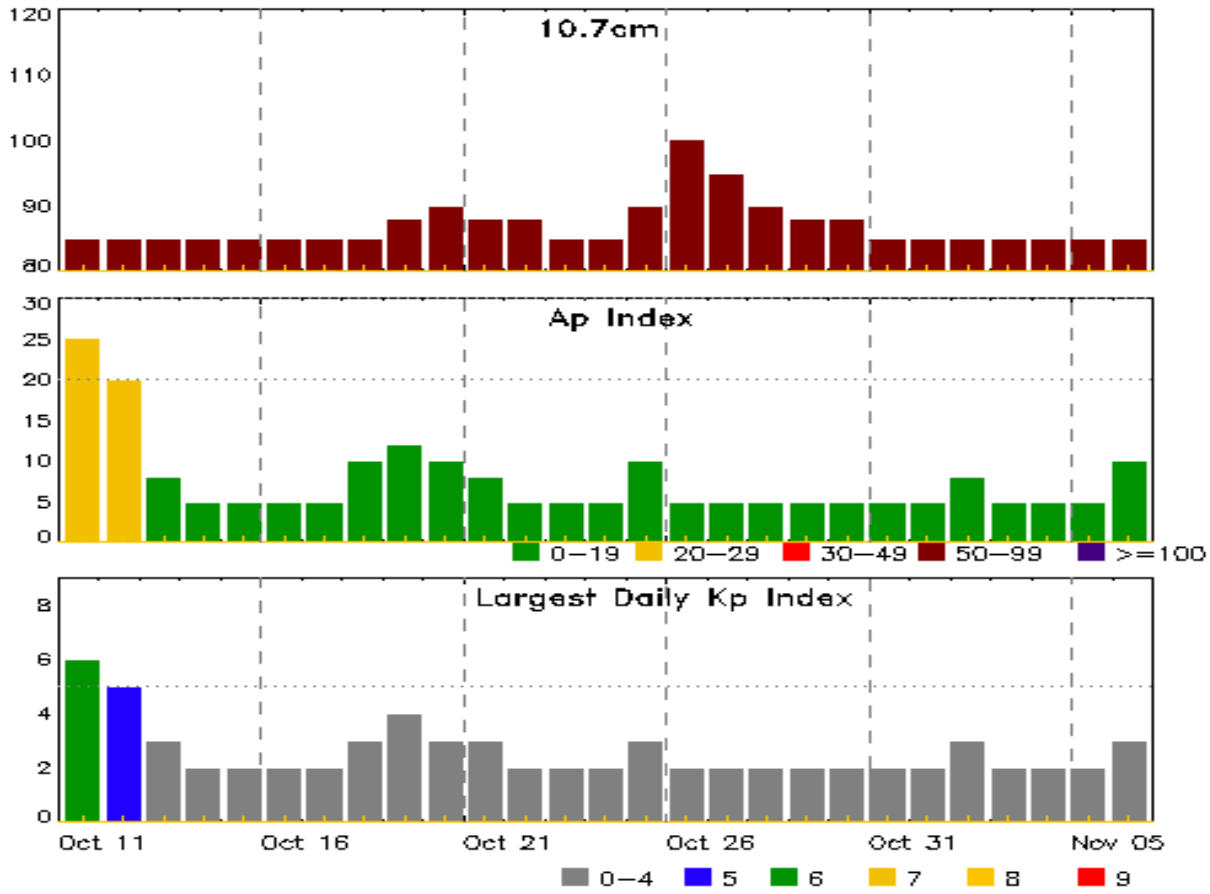
## *Daily Geomagnetic Data*

| Date | Middle Latitude Fredericksburg | | High Latitude College | | Estimated Planetary | |
|---|---|---|---|---|---|---|
| | A | K-indices | A | K-indices | A | K-indices |
| 04 October | 4 | 2-2-1-1-1-1-0-1 | 3 | 2-1-2-2-0-0-0-0 | 6 | 3-2-1-1-1-1-1-2 |
| 05 October | 6 | 3-3-1-0-1-1-1-1 | 3 | 0-1-2-2-2-1-0-0 | 5 | 2-3-1-0-1-1-0-1 |
| 06 October | 6 | 2-1-2-2-2-2-2-0 | 23 | 0-1-2-6-5-4-3-0 | 8 | 2-2-1-3-2-3-2-1 |
| 07 October | 3 | 1-0-0-0-0-2-1-0 | 2 | 0-0-0-0-0-2-0-0 | 5 | 1-1-1-2-2-2-1-0 |
| 08 October | 3 | 2-1-1-1-1-1-1-0 | 2 | 0-0-1-2-1-0-0-0 | 4 | 2-1-1-1-1-0-1-1 |
| 09 October | 4 | 1-1-1-2-2-1-1-0 | 4 | 0-0-2-2-3-1-0-0 | 5 | 2-2-2-2-2-1-0-1 |
| 10 October | 9 | 1-1-1-2-3-2-2-4 | 15 | 0-0-0-4-4-5-2-2 | 4 | 1-2-1-2-3-2-2-4 |

## *Alerts and Warnings Issued*

| Date & Time of Issue UTC | Type of Alert or Warning | Date & Time of Event UTC |
|---|---|---|
| 09 Oct 0656 | ALERT: Type II Radio Emission | 09/0633 |
| 09 Oct 0720 | SUMMARY: 10cm Radio Burst | 09/0630 - 0657 |
| 09 Oct 0743 | ALERT: Type IV Radio Emission | 09/0705 |
| 09 Oct 1829 | WATCH: Geomagnetic Storm Category G2 predicted | |
| 10 Oct 2220 | WARNING: Geomagnetic K = 4 | 10/2220 - 11/0300 |
| 10 Oct 2238 | ALERT: Geomagnetic K = 4 | 10/2235 |

## *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 |
|---|---|---|---|---|---|---|---|
| 11 Oct | 85 | 25 | 6 | 25 Oct | 90 | 10 | 3 |
| 12 | 85 | 20 | 5 | 26 | 100 | 5 | 2 |
| 13 | 85 | 8 | 3 | 27 | 95 | 5 | 2 |
| 14 | 85 | 5 | 2 | 28 | 90 | 5 | 2 |
| 15 | 85 | 5 | 2 | 29 | 88 | 5 | 2 |
| 16 | 85 | 5 | 2 | 30 | 88 | 5 | 2 |
| 17 | 85 | 5 | 2 | 31 | 85 | 5 | 2 |
| 18 | 85 | 10 | 3 | 01 Nov | 85 | 5 | 2 |
| 19 | 88 | 12 | 4 | 02 | 85 | 8 | 3 |
| 20 | 90 | 10 | 3 | 03 | 85 | 5 | 2 |
| 21 | 88 | 8 | 3 | 04 | 85 | 5 | 2 |
| 22 | 88 | 5 | 2 | 05 | 85 | 5 | 2 |
| 23 | 85 | 5 | 2 | 06 | 85 | 10 | 3 |
| 24 | 85 | 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 |
| 09 Oct | 0619 | 0638 | 0653 | M1.6 | 0.015 | 2B | N17E09 | 2882 | 100 | 430 | 3 | |

## *Flare List*

| | Time | | | | Optical | | |
|---|---|---|---|---|---|---|---|
| Date | Begin | Max | End | X-ray Class | Imp/ Brtns | Location Lat CMD | Rgn # |
| 04 Oct | 0024 | 0031 | 0042 | B3.0 | | | 2877 |
| 04 Oct | 0225 | 0238 | 0252 | B7.5 | | | 2877 |
| 04 Oct | 0252 | 0307 | 0318 | B9.2 | | | 2877 |
| 04 Oct | 0831 | 0838 | 0840 | B1.6 | | | 2877 |
| 04 Oct | 0840 | 0856 | 0901 | B1.6 | | | 2877 |
| 04 Oct | 0953 | 1003 | 1009 | B2.2 | SF | N30W19 | 2880 |
| 04 Oct | 1338 | 1342 | 1351 | B1.5 | | | 2882 |
| 04 Oct | 1539 | 1556 | 1618 | B2.3 | | | |
| 04 Oct | 1656 | 1702 | 1707 | B2.1 | | | 2882 |
| 04 Oct | 1842 | 1848 | 1852 | B1.1 | | | 2880 |
| 05 Oct | 0354 | 0358 | 0402 | B1.4 | | | |
| 05 Oct | 1119 | 1126 | 1133 | B1.6 | | | 2880 |
| 06 Oct | 0107 | 0112 | 0118 | B5.0 | | | 2882 |
| 06 Oct | 0151 | 0158 | 0204 | B1.6 | | | 2882 |
| 06 Oct | 0240 | 0246 | 0254 | B1.6 | | | |
| 06 Oct | 0256 | 0301 | 0306 | B1.7 | | | |
| 06 Oct | 0331 | 0339 | 0343 | B1.8 | | | |
| 06 Oct | 0429 | 0434 | 0440 | B1.4 | | | |
| 06 Oct | 1222 | 1230 | 1235 | B2.1 | | | 2880 |
| 06 Oct | 1310 | 1317 | 1321 | B2.0 | | | 2882 |
| 06 Oct | 1557 | 1612 | 1619 | B2.3 | | | 2882 |
| 06 Oct | 1619 | 1624 | 1629 | B2.2 | | | 2882 |
| 06 Oct | 1941 | 1954 | 2003 | B3.1 | | | 2882 |
| 06 Oct | 2205 | 2220 | 2227 | B7.6 | | | 2882 |
| 07 Oct | 0030 | 0034 | 0038 | B2.4 | | | 2882 |
| 07 Oct | 0040 | 0048 | 0104 | B2.1 | | | 2882 |
| 07 Oct | 0235 | 0246 | 0254 | C5.5 | SF | N16E46 | 2882 |
| 07 Oct | 0608 | 0618 | 0627 | B1.8 | | | |
| 07 Oct | 0808 | 0819 | 0827 | B2.4 | | | |
| 07 Oct | 1017 | 1023 | 1028 | B1.4 | | | |

## *Flare List*

| Date | Time | | | Optical | | | |
|---|---|---|---|---|---|---|---|
| | Begin | Max | End | X-ray Class | Imp/ Brtns | Location Lat CMD | Rgn # |
| 07 Oct | 1209 | 1215 | 1220 | B1.6 | | | 2882 |
| 07 Oct | 1317 | 1327 | 1337 | B2.6 | | | |
| 07 Oct | 2133 | 2140 | 2145 | B1.3 | | | |
| 07 Oct | 2213 | 2231 | 2243 | C1.0 | | | |
| 08 Oct | 0206 | 0213 | 0219 | B1.3 | | | |
| 08 Oct | 0350 | 0354 | 0358 | B1.5 | | | |
| 08 Oct | 0418 | 0424 | 0428 | B1.9 | | | |
| 08 Oct | 0449 | 0455 | 0459 | B1.7 | SF | N18E24 | |
| 08 Oct | 0558 | 0601 | 0606 | B1.8 | SF | N19E24 | |
| 08 Oct | 0633 | 0636 | 0640 | B1.4 | | | |
| 08 Oct | 0708 | 0712 | 0718 | B1.6 | SF | N18E22 | |
| 08 Oct | 0724 | 0724 | 0727 | B3.7 | SF | N18E23 | |
| 08 Oct | 1101 | 1108 | 1115 | C1.9 | | | 2882 |
| 08 Oct | 1815 | 1821 | 1826 | B1.9 | | | |
| 08 Oct | 1919 | 1956 | 2016 | C2.7 | | | 2882 |
| 09 Oct | 0019 | 0024 | 0028 | B1.7 | | | |
| 09 Oct | 0118 | 0129 | 0149 | B5.8 | | | |
| 09 Oct | 0619 | 0638 | 0653 | M1.6 | 2B | N17E09 | 2882 |
| 09 Oct | 0802 | 0802 | 0806 | | SF | N22E14 | 2882 |
| 09 Oct | 1855 | 1905 | 1923 | B2.4 | | | 2882 |
| 09 Oct | 2030 | 2045 | 2048 | B3.0 | | | 2882 |
| 09 Oct | 2242 | 2257 | 2306 | C2.0 | SF | S32E38 | 2882 |
| 10 Oct | 0427 | 0435 | 0441 | B2.0 | | | |
| 10 Oct | 0806 | 0812 | 0817 | B2.1 | | | |
| 10 Oct | 1553 | 1558 | 1603 | B1.9 | | | 2883 |
| 10 Oct | 1611 | 1616 | 1621 | B2.0 | | | |
| 10 Oct | 2228 | 2302 | 2320 | C2.3 | | | |

## *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 2282*** | | | | | | | | | | | | | |
| 07 Feb | N15E76 | 196 | 30 | 2 | Hsx | 1 | A | | | | | | | | |
| 08 Feb | N15E65 | 193 | 90 | 3 | Cao | 2 | B | 1 | | | 2 | 1 | | | |
| 09 Feb | N14E51 | 194 | 110 | 3 | Dso | 7 | B | 2 | 1 | | 2 | | | | |
| 10 Feb | N11E48 | 184 | 220 | 9 | Dso | 10 | BG | 1 | | | | | | | |
| 11 Feb | N11E31 | 187 | 250 | 13 | Eho | 13 | B | 2 | | | 3 | | | | |
| 12 Feb | N10E16 | 190 | 240 | 13 | Eso | 15 | BG | 1 | | | 4 | | | | |
| 13 Feb | N10E04 | 189 | 220 | 12 | Csi | 10 | BG | | | | 3 | | | | |
| 14 Feb | N11W09 | 188 | 220 | 11 | Csi | 13 | BG | | | | 1 | | | | |
| 15 Feb | N11W24 | 190 | 210 | 10 | Cso | 8 | B | | | | | | | | |
| 16 Feb | N11W37 | 190 | 210 | 9 | Cso | 10 | B | | | | | | | | |
| 17 Feb | N11W51 | 191 | 170 | 8 | Cao | 7 | B | | | | 1 | | | | |
| 18 Feb | N11W64 | 191 | 140 | 7 | Cao | 6 | B | 2 | | | 1 | | | | |
| 19 Feb | N10W76 | 188 | 90 | 6 | Hsx | 2 | A | 1 | | | 1 | | | | |
| 20 Feb | N10W90 | 190 | plage | | | | | | | | | | | | |
| | | | | | | | | 10 | 1 | 0 | 18 | 1 | 0 | 0 | 0 |

Crossed West Limb.
Absolute heliographic longitude: 189

| | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | ***Region 2877*** | | | | | | | | | | | | | |
| 26 Sep | S17W00 | 328 | 10 | 4 | Bxo | 4 | B | | | | | | | | |
| 27 Sep | S18W13 | 328 | 20 | 2 | Cro | 4 | B | | | | | | | | |
| 28 Sep | S18W27 | 329 | 30 | 4 | Cro | 10 | B | | | | | | | | |
| 29 Sep | S16W40 | 327 | 130 | 7 | Dai | 14 | BG | 4 | | | 11 | | | | |
| 30 Sep | S18W52 | 327 | 200 | 9 | Dao | 13 | BG | 1 | | | 9 | | | | |
| 01 Oct | S20W67 | 329 | 200 | 9 | Dao | 4 | BG | | | | 1 | | | | |
| 02 Oct | S20W78 | 327 | 150 | 10 | Dao | 2 | B | 1 | | | | | | | |
| 03 Oct | S21W93 | 328 | 30 | 2 | Hsx | 1 | A | 1 | | | 1 | | | | |
| | | | | | | | | 7 | 0 | 0 | 22 | 0 | 0 | 0 | 0 |

Crossed West Limb.
Absolute heliographic longitude: 328

## *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 2878*** | | | | | | | | | | | | |
| 26 Sep | S23E34 | 294 | 30 | 6 | Cro | 6 | B | | | | | | | | |
| 27 Sep | S22E21 | 293 | plage | | | | | | | | | | | | |
| 28 Sep | S22E07 | 295 | plage | | | | | | | | | | | | |
| 29 Sep | S23W03 | 292 | plage | | | | | | | | | | | | |
| 30 Sep | S23W17 | 292 | plage | | | | | | | | | | | | |
| 01 Oct | S23W31 | 293 | plage | | | | | | | | | | | | |
| 02 Oct | S23W45 | 294 | plage | | | | | | | | | | | | |
| 03 Oct | S23W59 | 295 | plage | | | | | | | | | | | | |
| 04 Oct | S23W73 | 296 | plage | | | | | | | | | | | | |
| 05 Oct | S23W87 | 296 | plage | | | | | | | | | | | | |
| | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

Crossed West Limb.
Absolute heliographic longitude: 292

| | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | ***Region 2880*** | | | | | | | | | | | | |
| 28 Sep | N30E54 | 246 | 10 | 4 | Cro | 5 | B | | | | 3 | | | | |
| 29 Sep | N29E43 | 244 | 390 | 9 | Dkc | 18 | BG | 1 | | | 2 | | | | |
| 30 Sep | N32E30 | 245 | 210 | 8 | Dao | 13 | B | | | | | | | | |
| 01 Oct | N30E15 | 247 | 260 | 8 | Dho | 4 | B | | | | | | | | |
| 02 Oct | N32E04 | 245 | 230 | 11 | Eso | 3 | B | | | | | | | | |
| 03 Oct | N31W07 | 243 | 230 | 10 | Dso | 6 | B | | | | | | | | |
| 04 Oct | N31W20 | 243 | 160 | 11 | Eso | 8 | B | | | | 1 | | | | |
| 05 Oct | N31W33 | 242 | 120 | 10 | Cso | 6 | B | | | | | | | | |
| 06 Oct | N32W50 | 246 | 20 | 1 | Hrx | 1 | A | | | | | | | | |
| 07 Oct | N31W64 | 247 | plage | | | | | | | | | | | | |
| 08 Oct | N31W78 | 248 | plage | | | | | | | | | | | | |
| | | | | | | | | 1 | 0 | 0 | 6 | 0 | 0 | 0 | 0 |

Crossed West Limb.
Absolute heliographic longitude: 245

| | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | ***Region 2881*** | | | | | | | | | | | | |
| 28 Sep | N16W20 | 321 | 10 | | Axx | 1 | A | | | | | | | | |
| 29 Sep | N16W33 | 321 | 10 | | Axx | 1 | A | | | | | | | | |
| 30 Sep | N16W47 | 322 | plage | | | | | | | | | | | | |
| 01 Oct | N16W61 | 323 | plage | | | | | | | | | | | | |
| 02 Oct | N16W75 | 324 | plage | | | | | | | | | | | | |
| 03 Oct | N16W89 | 325 | plage | | | | | | | | | | | | |
| | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

Crossed West Limb.
Absolute heliographic longitude: 321

## *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 2882*** | | | | | | | | | | | | |
| 03 Oct | N14E77 | 158 | 180 | 1 | Hax | 1 | A | | | | | | | | |
| 04 Oct | N16E66 | 157 | 250 | 2 | Hhx | 1 | A | | | | | | | | |
| 05 Oct | N16E52 | 157 | 200 | 2 | Hsx | 1 | A | | | | | | | | |
| 06 Oct | N16E43 | 153 | 240 | 9 | Cso | 1 | BG | | | | | | | | |
| 07 Oct | N17E28 | 155 | 230 | 5 | Dso | 3 | BG | 1 | | | 1 | | | | |
| 08 Oct | N20E13 | 156 | 240 | 4 | Dso | 3 | BG | 2 | | | | | | | |
| 09 Oct | N17W01 | 157 | 280 | 6 | Dho | 4 | BG | 1 | 1 | | 1 | | 1 | | |
| 10 Oct | N18W14 | 157 | 260 | 7 | Dho | 4 | B | | | | | | | | |
| | | | | | | | | 4 | 1 | 0 | 2 | 0 | 1 | 0 | 0 |

Still on Disk.
Absolute heliographic longitude: 157

| | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | ***Region 2883*** | | | | | | | | | | | | |
| 10 Oct | N27W60 | 203 | 30 | 2 | Bxo | 2 | B | | | | | | | | |
| | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

Still on Disk.
Absolute heliographic longitude: 203

| | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | ***Region 2884*** | | | | | | | | | | | | |
| 10 Oct | S20W27 | 170 | 10 | 2 | Bxo | 2 | B | | | | | | | | |
| | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

Still on Disk.
Absolute heliographic longitude: 170

## *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

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