**Space Weather Highlights** **SWPC PRF 2195**
**18 September - 24 September 2017** **25 September 2017**

Solar activity was at very low levels with a few B-class flares observed. Old active Region 2673 (S09, L=119), a major flare producer on its previous transit, returned on 24 Sep and was numbered 2682 (S09, L=127, Hsx/180 on 24 Sep). No Earth-directed CMEs were detected during the period.

No proton events were observed at geosynchronous orbit.

The greater than 2 MeV electron flux at geosynchronous orbit was at high levels throughout the period with a maximum flux of 36,942 pfu observed at 22/1655 UTC.

Geomagnetic field activity began the period on 18 Sep at mostly unsettled to G1 (Minor) storm conditions under the influence of a positive polarity CH HSS. During the 18th, solar wind speeds peaked at near 720 km/s, total field ranged between 2-6 nT while the Bz component varied between +5 nT to -6 nT. Quiet to unsettled conditions prevailed on 19-20 Sep under waning CH HSS influence. Mostly quiet conditions, with isolated unsettled intervals, were observed from 21-24 Sep. Beginning on 19 Sep, solar wind exhibited a steady decline in speed to a low of about 320 km/s at 24/2100 UTC. Thereafter, and through the remainder of 24 Sep, solar wind speed increased to near 415 km/s, total field peaked at 10 nT while the Bz component varied between +6 nT to -9 nT. A SSBC from a positive to a negative orientation was observed at about 24/1905 UTC.

**Space Weather Outlook**
**25 September - 21 October 2017**

Solar activity is expected to be at low levels, with a slight chance for M-class activity (R1-R2, Minor-Moderate), from 25 Sep - 07 Oct and from 20-21 Oct. This is primarily due to the flare potential from Region 2682. Mostly very low levels are expected from 08-19 Oct.

No proton events are expected at geosynchronous orbit.

The greater than 2 MeV electron flux at geosynchronous orbit is expected to be at high levels on 26-27 Sep, 28 Sep - 09 Oct and 12-21 Oct due to CH HSS influence. Normal to moderate levels are expected for the remainder of the outlook period.

Geomagnetic field activity is expected to be at unsettled to active levels on 26 Sep and 30 Sep, with G1 (Minor) storm conditions are expected on 27 Sep, 29 Sep and 11-14 Oct while G2 (Major) storm conditions are expected on 28 Sep, all due to recurrent CH HSS activity. Mostly 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 |
| 18 September | 72 | 12 | 80 | A0.0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 19 September | 71 | 11 | 50 | A2.0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 20 September | 74 | 22 | 120 | A5.2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 21 September | 73 | 22 | 140 | A1.1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 22 September | 78 | 22 | 140 | A3.7 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 23 September | 81 | 12 | 90 | A7.6 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 24 September | 87 | 22 | 270 | A9.7 | 0 | 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 | >100 MeV | >0.6 MeV | >2MeV | >4 MeV |
| 18 September | | 6.3e+06 | 2.5e+04 | 3.1e+03 | 8.1e+08 | |
| 19 September | | 1.9e+06 | 2.4e+04 | 3.2e+03 | 1.5e+09 | |
| 20 September | | 2.4e+06 | 1.8e+04 | 3.3e+03 | 1.1e+09 | |
| 21 September | | 7.5e+06 | 1.7e+04 | 3.3e+03 | 1.4e+09 | |
| 22 September | | 1.9e+06 | 1.9e+04 | 3.2e+03 | 9.5e+08 | |
| 23 September | | 1.4e+06 | 1.8e+04 | 3.3e+03 | 7.0e+07 | |
| 24 September | | 3.6e+06 | 1.7e+04 | 3.3e+03 | 1.7e+08 | |

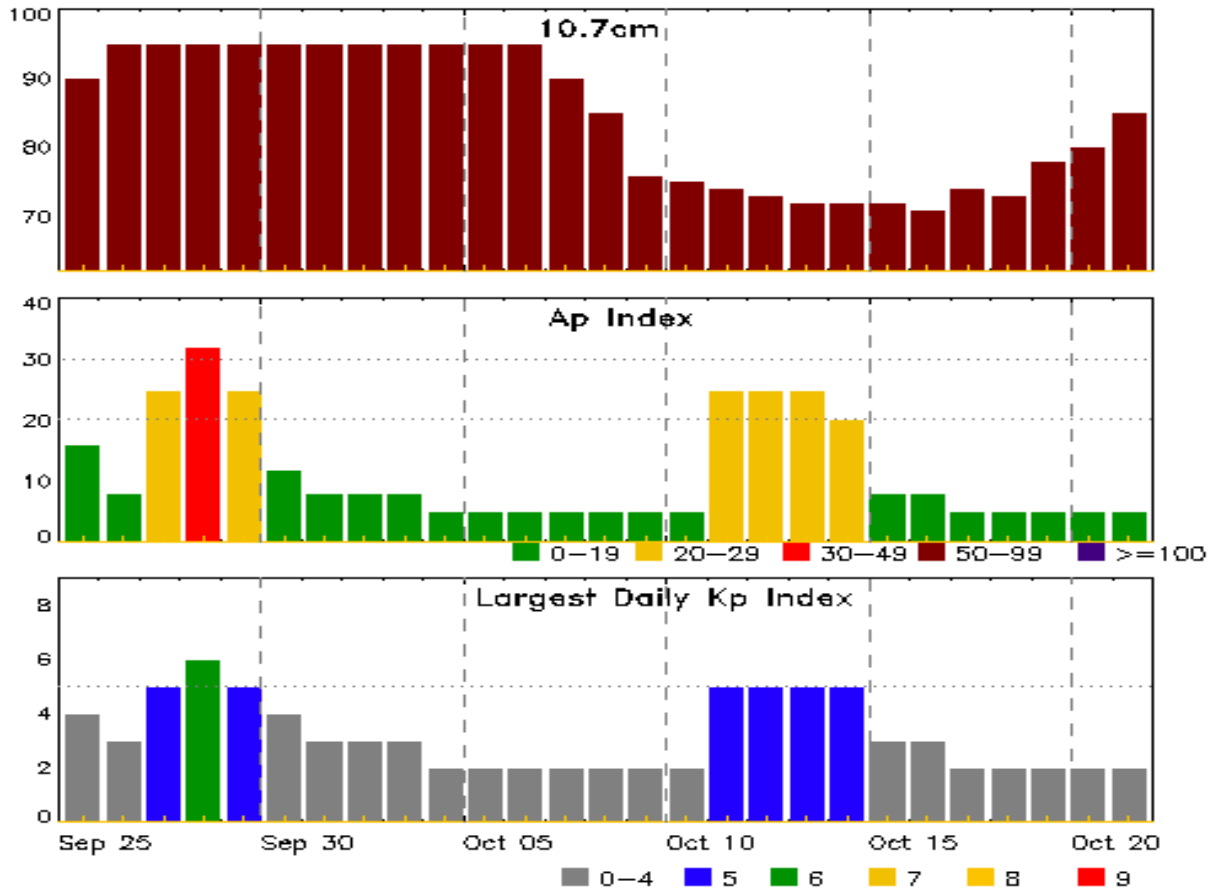
## *Daily Geomagnetic Data*

| Date | Middle Latitude Fredericksburg | | High Latitude College | | Estimated Planetary | |
|---|---|---|---|---|---|---|
| | A | K-indices | A | K-indices | A | K-indices |
| 18 September | 21 | 4-4-5-3-3-3-2-3 | 51 | 4-3-7-7-5-4-2-2 | 22 | 4-4-5-4-3-3-2-3 |
| 19 September | 6 | 2-1-1-2-2-1-2-2 | 11 | 1-1-0-4-3-2-2-4 | 8 | 3-2-1-2-2-2-3-3 |
| 20 September | 8 | 3-3-2-2-2-1-2-1 | 19 | 3-3-3-5-5-2-1-0 | 10 | 3-3-2-2-2-1-2-1 |
| 21 September | 7 | 1-2-3-2-2-1-1-2 | 9 | 1-1-4-3-4-0-0-0 | 7 | 1-2-3-2-2-0-1-2 |
| 22 September | 5 | 1-1-1-1-1-2-2-2 | 6 | 1-1-3-1-2-2-2-1 | 5 | 1-1-1-1-1-1-2-2 |
| 23 September | 4 | 1-1-1-1-1-2-2-1 | 5 | 1-1-3-2-2-0-1-1 | 5 | 1-2-1-1-1-1-2-2 |
| 24 September | 5 | 1-2-0-1-1-2-2-2 | 7 | 0-1-0-3-3-3-1-2 | 3 | 1-2-1-1-1-1-2-3 |

## *Alerts and Warnings Issued*

| Date & Time of Issue UTC | Type of Alert or Warning | Date & Time of Event UTC |
|---|---|---|
| 18 Sep 0238 | EXTENDED WARNING: Geomagnetic K = 4 | 14/1310 - 18/1200 |
| 18 Sep 0238 | WARNING: Geomagnetic K = 5 | 18/0235 - 0900 |
| 18 Sep 0616 | CONTINUED ALERT: Electron 2MeV Integral Flux >= 1000pfu | 15/0830 |
| 18 Sep 0855 | EXTENDED WARNING: Geomagnetic K = 5 | 18/0235 - 1500 |
| 18 Sep 0855 | EXTENDED WARNING: Geomagnetic K = 4 | 14/1310 - 18/2359 |
| 18 Sep 0856 | ALERT: Geomagnetic K = 5 | 18/0856 |
| 18 Sep 2311 | EXTENDED WARNING: Geomagnetic K = 4 | 14/1310 - 19/0600 |
| 19 Sep 0500 | CONTINUED ALERT: Electron 2MeV Integral Flux >= 1000pfu | 15/0830 |
| 20 Sep 0353 | WARNING: Geomagnetic K = 4 | 20/0352 - 1200 |
| 20 Sep 0505 | CONTINUED ALERT: Electron 2MeV Integral Flux >= 1000pfu | 15/0830 |
| 21 Sep 0500 | CONTINUED ALERT: Electron 2MeV Integral Flux >= 1000pfu | 15/0830 |
| 22 Sep 0500 | CONTINUED ALERT: Electron 2MeV Integral Flux >= 1000pfu | 15/0830 |
| 23 Sep 1206 | CONTINUED ALERT: Electron 2MeV Integral Flux >= 1000pfu | 15/0830 |
| 24 Sep 1105 | CONTINUED ALERT: Electron 2MeV Integral Flux >= 1000pfu | 15/0830 |
| 24 Sep 2110 | WATCH: Geomagnetic Storm Category G1 predicted | |
| 24 Sep 2304 | WARNING: Geomagnetic K = 4 | 24/2303 - 25/1500 |

## *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 |
|---|---|---|---|---|---|---|---|
| 25 Sep | 90 | 16 | 4 | 09 Oct | 76 | 5 | 2 |
| 26 | 95 | 8 | 3 | 10 | 75 | 5 | 2 |
| 27 | 95 | 25 | 5 | 11 | 74 | 25 | 5 |
| 28 | 95 | 32 | 6 | 12 | 73 | 25 | 5 |
| 29 | 95 | 25 | 5 | 13 | 72 | 25 | 5 |
| 30 | 95 | 12 | 4 | 14 | 72 | 20 | 5 |
| 01 Oct | 95 | 8 | 3 | 15 | 72 | 8 | 3 |
| 02 | 95 | 8 | 3 | 16 | 71 | 8 | 3 |
| 03 | 95 | 8 | 3 | 17 | 74 | 5 | 2 |
| 04 | 95 | 5 | 2 | 18 | 73 | 5 | 2 |
| 05 | 95 | 5 | 2 | 19 | 78 | 5 | 2 |
| 06 | 95 | 5 | 2 | 20 | 80 | 5 | 2 |
| 07 | 90 | 5 | 2 | 21 | 85 | 5 | 2 |
| 08 | 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 |

**No Events Observed**

## *Flare List*

| | Time | | | | Optical | | |
|---|---|---|---|---|---|---|---|
| Date | Begin | Max | End | X-ray Class | Imp/ Brtns | Location Lat CMD | Rgn # |
| 20 Sep | 0130 | 0137 | 0143 | B1.2 | | | |
| 20 Sep | 0251 | 0257 | 0321 | B1.7 | | | |
| 20 Sep | 0525 | 0531 | 0540 | B1.4 | | | |
| 20 Sep | 0836 | 0843 | 0848 | B1.5 | | | |
| 20 Sep | 0942 | 0950 | 0955 | B3.2 | | | 2681 |
| 20 Sep | 1231 | 1243 | 1252 | B5.4 | | | 2681 |
| 20 Sep | 1926 | 1932 | 1937 | B8.4 | | | 2680 |
| 20 Sep | 2000 | 2003 | 2009 | B1.0 | | | 2680 |
| 20 Sep | 2158 | 2201 | 2204 | B1.0 | | | 2680 |
| 23 Sep | 0551 | 0603 | 0610 | B3.0 | | | 2682 |
| 24 Sep | 0013 | 0019 | 0026 | B2.1 | | | 2682 |
| 24 Sep | 1118 | 1122 | 1124 | B2.8 | | | 2682 |
| 24 Sep | 2320 | 2327 | 2337 | B2.7 | | | 2681 |

## *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 2680*** | | | | | | | | | | | | |
| 10 Sep | N09E66 | 317 | 100 | 2 | Hsx | 1 | A | | | | | | | | |
| 11 Sep | N09E53 | 317 | 80 | 2 | Hsx | 1 | A | | | | | | | | |
| 12 Sep | N09E39 | 317 | 140 | 2 | Hsx | 1 | A | 2 | | | 5 | | | | |
| 13 Sep | N09E26 | 317 | 120 | 2 | Hsx | 1 | A | | | | 1 | | | | |
| 14 Sep | N08E13 | 317 | 120 | 2 | Hsx | 1 | A | | | | | | | | |
| 15 Sep | N08W00 | 317 | 80 | 2 | Hsx | 3 | A | | | | | | | | |
| 16 Sep | N08W13 | 317 | 90 | 3 | Hsx | 3 | A | | | | | | | | |
| 17 Sep | N08W27 | 317 | 80 | 2 | Hax | 3 | A | | | | | | | | |
| 18 Sep | N08W40 | 317 | 80 | 2 | Hsx | 2 | A | | | | | | | | |
| 19 Sep | N08W53 | 317 | 50 | 1 | Hsx | 1 | A | | | | | | | | |
| 20 Sep | N08W67 | 318 | 60 | 2 | Hsx | 1 | A | | | | | | | | |
| 21 Sep | N07W80 | 317 | 60 | 2 | Hsx | 1 | A | | | | | | | | |
| 22 Sep | N07W93 | 319 | 60 | 2 | Hsx | 1 | A | | | | | | | | |
| | | | | | | | | 2 | 0 | 0 | 6 | 0 | 0 | 0 | 0 |

Crossed West Limb.
Absolute heliographic longitude: 317

| | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | ***Region 2681*** | | | | | | | | | | | | |
| 20 Sep | S12E73 | 178 | 60 | 2 | Hsx | 1 | A | | | | | | | | |
| 21 Sep | S13E59 | 179 | 80 | 2 | Hsx | 1 | A | | | | | | | | |
| 22 Sep | S13E46 | 180 | 80 | 2 | Hsx | 1 | A | | | | | | | | |
| 23 Sep | S13E32 | 179 | 90 | 3 | Cso | 2 | B | | | | | | | | |
| 24 Sep | S13E19 | 179 | 90 | 2 | Hsx | 1 | A | | | | | | | | |
| | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

Still on Disk.
Absolute heliographic longitude: 179

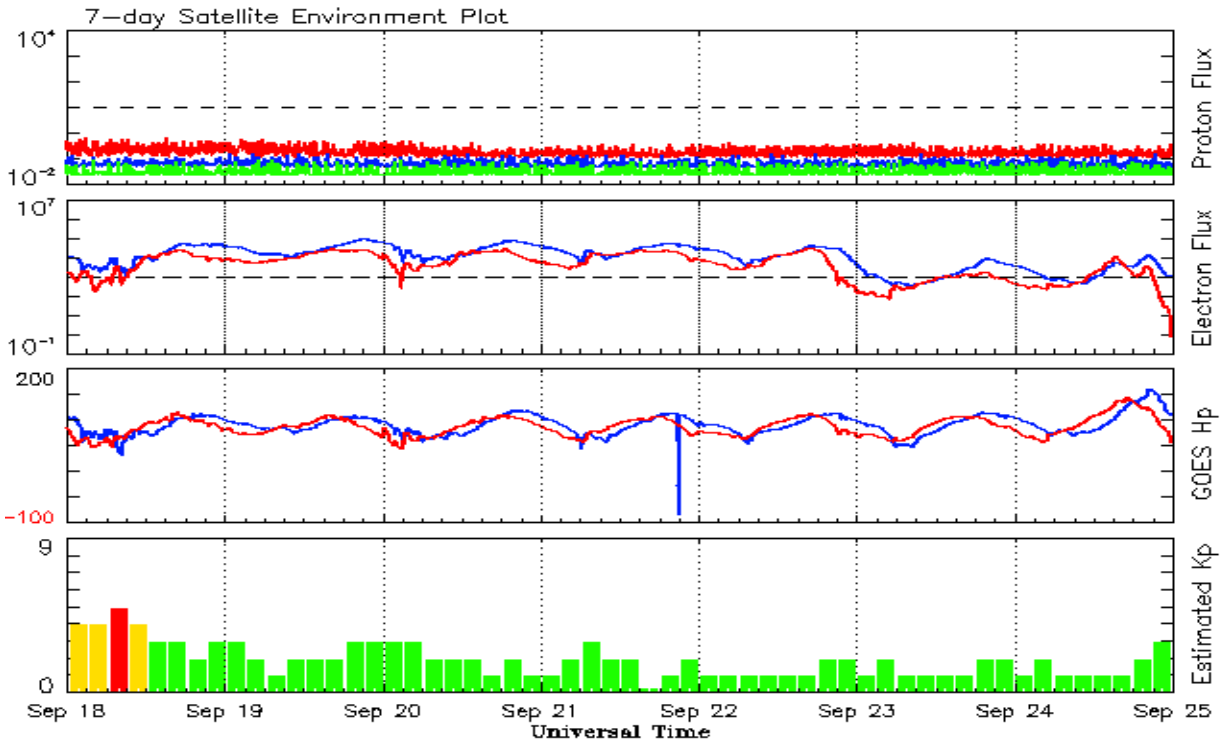
| | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | ***Region 2682*** | | | | | | | | | | | | |
| 24 Sep | S09E71 | 127 | 180 | 3 | Hsx | 1 | A | | | | | | | | |
| | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

Still on Disk.
Absolute heliographic longitude: 127

## *Recent Solar Indices (preliminary)*
## *Observed monthly mean values*

| | Sunspot Numbers | | | | | Radio Flux | | Geomagnetic | |
|---|---|---|---|---|---|---|---|---|---|
| | Observed values | | Ratio | Smooth values | | Penticton | Smooth | Planetary | Smooth |
| Month | SEC | RI | RI/SEC | SEC | RI | 10.7 cm | Value | Ap | Value |
| | | | | ***2015*** | | | | | |
| September | 72.5 | 47.2 | 0.65 | 64.0 | 39.5 | 102.1 | 110.8 | 16 | 12.8 |
| October | 59.5 | 38.2 | 0.62 | 61.8 | 38.6 | 104.1 | 107.9 | 15 | 12.5 |
| November | 61.8 | 37.3 | 0.61 | 59.0 | 36.7 | 109.6 | 105.3 | 13 | 12.5 |
| December | 54.1 | 34.8 | 0.64 | 55.1 | 34.7 | 112.8 | 102.5 | 15 | 12.5 |
| | | | | ***2016*** | | | | | |
| January | 50.4 | 34.2 | 0.67 | 51.4 | 32.6 | 103.5 | 99.9 | 10 | 12.3 |
| February | 56.0 | 33.8 | 0.61 | 49.6 | 31.5 | 103.5 | 98.1 | 10 | 12.0 |
| March | 40.9 | 32.5 | 0.80 | 47.7 | 30.2 | 91.6 | 96.6 | 11 | 11.8 |
| April | 39.2 | 22.7 | 0.58 | 45.0 | 28.7 | 93.4 | 95.3 | 10 | 11.8 |
| May | 48.9 | 30.9 | 0.64 | 42.1 | 26.9 | 93.1 | 93.2 | 12 | 11.7 |
| June | 19.3 | 12.3 | 0.65 | 39.0 | 24.9 | 81.9 | 90.4 | 9 | 11.4 |
| July | 36.8 | 19.4 | 0.53 | 36.5 | 23.1 | 85.9 | 87.7 | 10 | 11.2 |
| August | 50.4 | 30.1 | 0.60 | 34.2 | 21.6 | 85.0 | 85.5 | 10 | 11.2 |
| September | 37.4 | 26.8 | 0.72 | 32.1 | 19.9 | 87.8 | 83.7 | 16 | 11.3 |
| October | 30.0 | 20.0 | 0.67 | 31.1 | 18.9 | 86.1 | 82.5 | 16 | 11.6 |
| November | 22.4 | 12.8 | 0.57 | 29.4 | 17.9 | 78.7 | 81.1 | 10 | 11.6 |
| December | 17.6 | 11.1 | 0.64 | 28.1 | 17.1 | 75.1 | 80.0 | 10 | 11.4 |
| | | | | ***2017*** | | | | | |
| January | 28.1 | 15.7 | 0.55 | 27.3 | 16.7 | 77.4 | 79.4 | 10 | 11.3 |
| February | 22.0 | 15.8 | 0.71 | 25.5 | 16.0 | 76.9 | 78.7 | 10 | 11.3 |
| March | 25.4 | 10.6 | 0.42 | | | 74.6 | | 15 | |
| April | 30.4 | 19.6 | 0.64 | | | 80.9 | | 13 | |
| May | 18.1 | 11.3 | 0.62 | | | 73.5 | | 9 | |
| June | 18.0 | 11.6 | 0.64 | | | 74.8 | | 7 | |
| July | 18.8 | 11.0 | 0.59 | | | 77.7 | | 9 | |
| August | 25.0 | 19.9 | 0.80 | | | 77.9 | | 12 | |

**Note:** Values are final except for the most recent 6 months which are considered preliminary. Cycle 24 started in Dec 2008 with an RI=1.7.




*Weekly Geosynchronous Satellite Environment Summary*
*Week Beginning 18 September 2017*

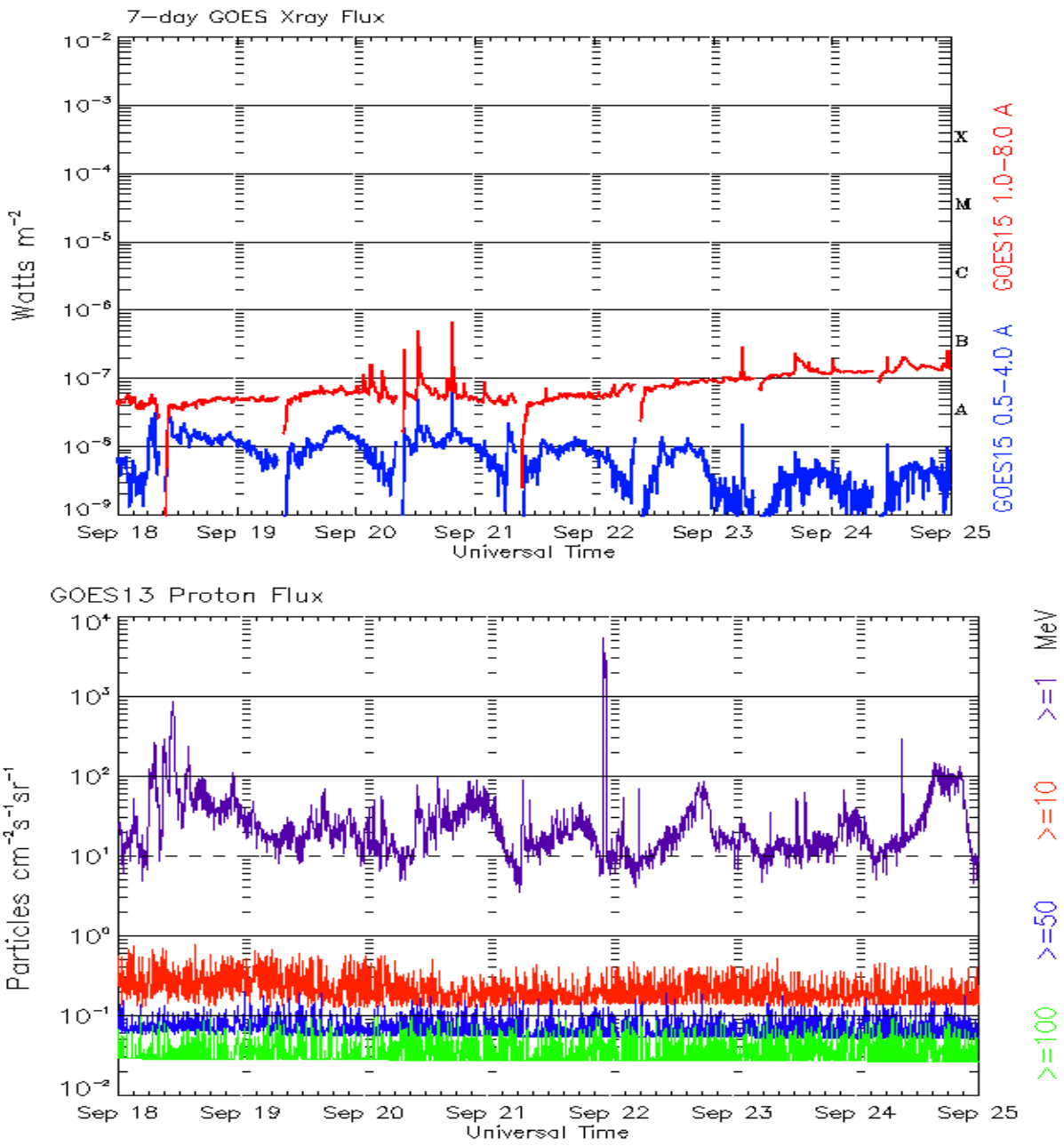
The proton flux plot contains the five-minute averaged integral proton flux (protons/cm$^2$-sec -sr) as measured by the SWPC Primary GOES satellite, near West 75, for each of three energy thresholds: greater than 10, 50, and 100 MeV.

The electron flux plot contains the five-minute averaged integral electron flux (electrons/cm$^2$-sec -sr) with energies greater than 2 MeV by the SWPC Primary GOES satellite.

The Hp plot contains the five minute averaged Hp magnetic field component in nanoteslas (nT) as by the SWPC Primary GOES satellite. The Hp component is parallel to the spin axis of the satellite, which is nearly parallel to the Earth's rotation axis.

The Estimated 3-hour Planetary Kp-index is derived at the NOAA Space Weather Prediction Center using data from the following ground-based magnetometers: Boulder, Colorado; Chambon la Foret, France; Fredericksburg, Virginia; Fresno, California; Hartland, UK; Newport, Washington; Sitka, Alaska. These data are made available thanks to the cooperative efforts between SWPC and data providers around the world, which currently includes the U.S. Geological Survey, the British Geological Survey, and the Institut de Physique du Globe de Paris.

The data included here are those now available in real time at the SWPC and are incomplete in that they do not include the full set of parameters and energy ranges known to cause satellite operating anomalies. The proton and electron fluxes and Kp are 'global' parameters that are applicable to a first order approximation over large areas. H parallel is subject to more localized phenomena and the measurements generally are applicable to within a few degrees of longitude of the measuring satellite.




*Weekly GOES Satellite X-ray and Proton Plots*
*Week Beginning 18 September 2017*

The x-ray plots contains five-minute averages x-ray flux (Watt/m$^2$) as measure by the SWPC primary GOES X-ray satellite, usually at West 105 longitude, in two wavelength bands, 0.05 - 0.4 and 0.1 - 0.8 nm. The letters A, B, C, M and X refer to x-ray event levels for the 0.1 - 0.8 nm band.

The proton plot contains the five-minute averaged intergral flux units (pfu = protons/cm$^2$ -sec -sr) as measured by the primary SWPC GOES Proton satellite for each of the energy thresholds: >1, >10, >30, and >100 MeV. The P10 event threshold is 10 pfu at greater than 10 MeV.

## *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.

http://spaceweather.gov/weekly/ -- Current and previous year
http://spaceweather.gov/ftpmenu/warehouse.html -- Online achive from 1997
http://spaceweather.gov/ftpmenu/ -- Some content as ascii text
http://spaceweather.gov/SolarCycle/ -- Solar Cycle Progression web site

http://spaceweather.gov/contacts.html -- Contact and Copyright information
http://spaceweather.gov/weekly/Usr_guide.pdf -- User Guide