

Space Weather Highlights
01 September - 07 September 2008

SEC PRF 1723
09 September 2008

Solar activity was very low. No flares were detected. The visible disk was spotless.

No proton events were observed at geosynchronous orbit.

The greater than 2 MeV electron flux at geosynchronous orbit reached high levels during 04 - 07 September.

Geomagnetic field activity was at predominantly quiet levels during 01 - 03 September. Activity increased to major storm levels on 04 September. Activity decreased to quiet to unsettled levels during 05 - 07 September. ACE solar wind measurements indicated a co-rotating interaction region (CIR) occurred on 03 September in advance of a recurrent coronal hole high-speed stream (HSS). Solar wind changes associated with the CIR included increased plasma densities (peak 27 p/cc at 03/0402 UTC) and a gradual increase in velocities. Interplanetary magnetic field (IMF) changes during the CIR included an increase in Bt (peak 16 nT at 03/0551 UTC) and intermittent periods of southward Bz (minimum -10 nT at 03/0714 UTC). The HSS commenced on 04 September and continued through the remainder of the period. Velocities ranged from 462 to 658 km/sec during the HSS. IMF activity during the HSS included variable Bz (range + 07 to - 06 nT) and Bt (range 01 to 07 nT). The HSS began to gradually subside on 07 September.

Space Weather Outlook
10 September - 06 October 2008

Solar activity is expected to be very low.

No proton events are expected at geosynchronous orbit.

The greater than 2 MeV electron flux at geosynchronous orbit is expected to reach high levels during 10 - 12 September, 15 - 22 September, and 01 - 06 October. Geomagnetic field activity is expected to be at quiet levels during 08 - 12 September. Activity is expected to increase to unsettled levels during 13 September. Activity is expected to increase to active to minor storm levels on 14 September due to a recurrent coronal hole high-speed stream. Activity is expected to decrease to unsettled levels during 15 - 16 September as the high-speed stream subsides. Quiet conditions are expected during 17 - 29 September. Activity is expected to increase to unsettled levels on 30 September. A further increase to active to minor storm levels is expected during 01 - 02 October due to a recurrent coronal hole high-speed stream. Activity is expected to decrease to unsettled levels during 03 - 04 October as the high-speed stream subsides. Quiet conditions are expected during 05 - 06 October.



Daily Solar Data

| Date | Radio Flux 10.7 cm | Sun spot No. | Sunspot Area (10 ⁻⁶ hemi.) | X-ray Background | Flares | | | | | | | |
|--------------|-----------------------|-----------------|--|------------------|------------|---|---|---------|---|---|---|---|
| | | | | | X-ray Flux | | | Optical | | | | |
| | | | | | C | M | X | S | 1 | 2 | 3 | 4 |
| 01 September | 66 | 0 | 0 | <A1.0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 02 September | 66 | 0 | 0 | <A1.0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 03 September | 66 | 0 | 0 | <A1.0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 04 September | 66 | 0 | 0 | <A1.0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 05 September | 65 | 0 | 0 | <A1.0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 06 September | 66 | 0 | 0 | <A1.0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 07 September | 67 | 0 | 0 | <A1.0 | 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 | >.6 MeV | >2MeV | >4 MeV |
| | 01 September | 9.4E+5 | 1.8E+4 | 4.1E+3 | | 9.4E+6 |
| 02 September | 7.8E+5 | 1.9E+4 | 4.3E+3 | | 7.3E+6 | |
| 03 September | 1.3E+6 | 1.8E+4 | 4.0E+3 | | 1.9E+6 | |
| 04 September | 3.3E+6 | 1.8E+4 | 3.9E+3 | | 2.0E+7 | |
| 05 September | 1.2E+6 | 1.7E+4 | 3.9E+3 | | 1.4E+8 | |
| 06 September | 1.1E+6 | 1.7E+4 | 3.8E+3 | | 1.4E+8 | |
| 07 September | 1.3E+6 | 1.7E+4 | 3.9E+3 | | 6.2E+7 | |

Daily Geomagnetic Data

| Date | Middle Latitude Fredericksburg | | High Latitude College | | Estimated Planetary | |
|--------------|-----------------------------------|-----------------|--------------------------|-----------------|------------------------|-----------------|
| | A | K-indices | A | K-indices | A | K-indices |
| | 01 September | 2 | 1-1-0-0-1-0-1-0 | 2 | 1-2-0-0-0-0-1-0 | 4 |
| 02 September | 2 | 1-0-1-1-1-0-1-1 | 4 | 0-0-1-3-2-0-0-1 | 3 | 1-0-0-1-1-0-1-1 |
| 03 September | 7 | 0-2-3-2-2-2-2-2 | 5 | 0-1-2-3-0-2-1-1 | 7 | 1-2-2-2-1-2-2-3 |
| 04 September | 17 | 4-5-3-3-3-2-2-1 | 50 | 5-5-6-6-6-5-2-2 | 33 | 6-6-4-4-4-3-2-1 |
| 05 September | 7 | 2-3-1-2-2-1-1-2 | 9 | 2-3-1-2-4-1-1-1 | 7 | 2-3-0-0-2-1-1-2 |
| 06 September | 7 | 3-1-1-2-2-1-2-2 | 9 | 2-2-0-3-4-2-1-1 | 7 | 3-1-0-1-3-2-2-2 |
| 07 September | 7 | 3-2-1-0-2-2-3-1 | 7 | 2-1-0-2-4-1-2-1 | 8 | 3-2-0-0-2-1-3-1 |

Alerts and Warnings Issued

| Date & Time of Issue | Type of Alert or Warning | Date & Time of Event UTC |
|----------------------|--|--------------------------|
| 04 Sep 0139 | WARNING: Geomagnetic K = 4 | 04 Sept 0140 - 1600 |
| 04 Sep 0147 | ALERT: Geomagnetic K = 4 | 04 Sept 0145 |
| 04 Sep 0159 | WARNING: Geomagnetic K = 5 | 04 Sept 0200 - 0300 |
| 04 Sep 0207 | ALERT: Geomagnetic K = 5 | 04 Sept 0205 |
| 04 Sep 0349 | WARNING: Geomagnetic K = 5 | 04 Sept 0350 - 1600 |
| 04 Sep 0428 | ALERT: Geomagnetic K = 5 | 04 Sept 0425 |
| 04 Sep 0438 | ALERT: Geomagnetic K = 6 | 04 Sept 0435 |
| 04 Sep 1555 | EXTENDED WARNING: Geomagnetic K = 4 | 04 Sept 0140 - 2359 |
| 04 Sep 1711 | ALERT: Electron 2MeV Integral Flux>1000pfu | 04 Sept 1655 |

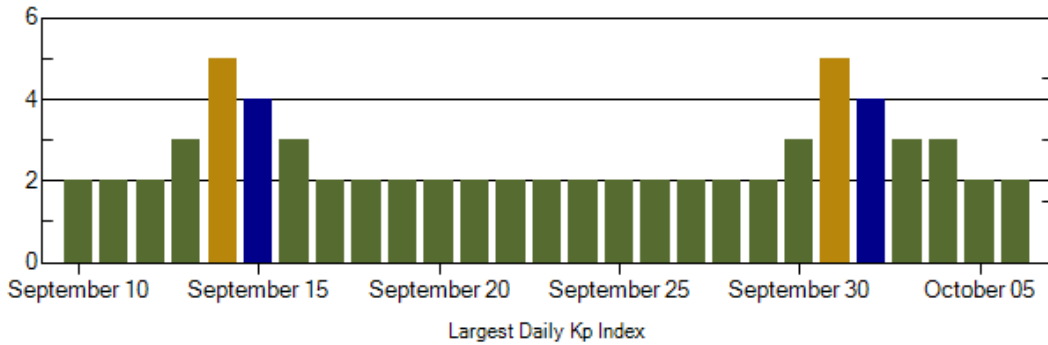
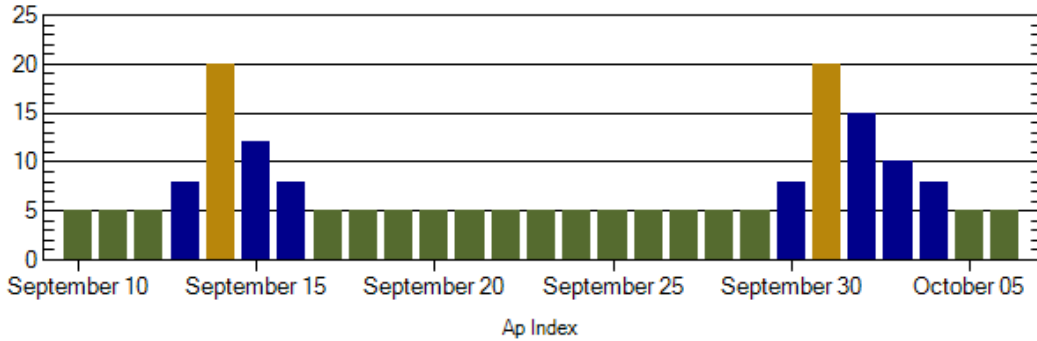
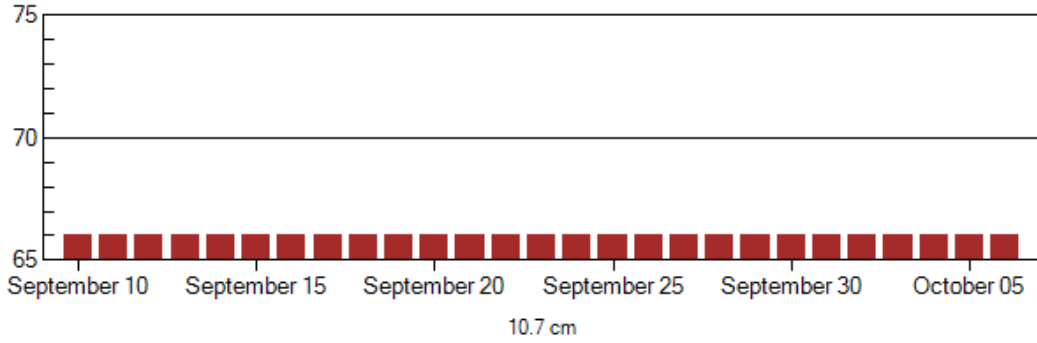


Alerts and Warnings Issued – continued.

| <u>Date & Time of Issue</u> | <u>Type of Alert or Warning</u> | <u>Date & Time of Event UTC</u> |
|---------------------------------|--|-------------------------------------|
| 05 Sep 0907 | ALERT: Electron 2MeV Integral Flux>1000pfu | 05 Sept 0845 |
| 06 Sep 0716 | ALERT: Electron 2MeV Integral Flux>1000pfu | 06 Sept 0655 |
| 06 Sep 1454 | ALERT: Geomagnetic K = 4 | 06 Sept 1452 |
| 07 Sep 1332 | ALERT: Electron 2MeV Integral Flux>1000pfu | 07 Sept 1310 |



Twenty-seven Day Outlook



| Date | Radio Flux 10.7 cm | Planetary A Index | Largest Kp Index | Date | Radio Flux 10.7 cm | Planetary A Index | Largest Kp Index |
|---------|-----------------------|----------------------|---------------------|---------|-----------------------|----------------------|---------------------|
| 10 Sept | 66 | 5 | 2 | 24 Sept | 66 | 5 | 2 |
| 11 | 66 | 5 | 2 | 25 | 66 | 5 | 2 |
| 12 | 66 | 5 | 2 | 26 | 66 | 5 | 2 |
| 13 | 66 | 8 | 3 | 27 | 66 | 5 | 2 |
| 14 | 66 | 20 | 5 | 28 | 66 | 5 | 2 |
| 15 | 66 | 12 | 3 | 29 | 66 | 5 | 2 |
| 16 | 66 | 8 | 3 | 30 | 66 | 8 | 3 |
| 17 | 66 | 5 | 2 | 01 Oct | 66 | 20 | 5 |
| 18 | 66 | 5 | 2 | 02 | 66 | 15 | 4 |
| 19 | 66 | 5 | 2 | 03 | 66 | 10 | 3 |
| 20 | 66 | 5 | 2 | 04 | 66 | 8 | 3 |
| 21 | 66 | 5 | 2 | 05 | 66 | 5 | 2 |
| 22 | 66 | 5 | 2 | 06 | 66 | 5 | 2 |
| 23 | 66 | 5 | 2 | | | | |



Energetic Events

| Date | Time | | X-ray | | Optical Information | | | Peak | | Sweep Freq |
|------|-------|-----|-------|-------|---------------------|----------|-----|------------|------|------------|
| | Begin | Max | 1/2 | Integ | Imp/ | Location | Rgn | Radio Flux | | Intensity |
| | | | | | Brtns | Lat CMD | # | 245 | 2695 | II |

No Events Observed

Flare List

| Date | Time | | | X-ray Class. | Imp / Brtns | Optical | Rgn |
|---------|---------------------------|-----|-----|-----------------|----------------|---------------------|-----|
| | Begin | Max | End | | | Location Lat CMD | |
| 01 Sept | <i>No Flares Observed</i> | | | | | | |
| 02 Sept | <i>No Flares Observed</i> | | | | | | |
| 03 Sept | <i>No Flares Observed</i> | | | | | | |
| 04 Sept | <i>No Flares Observed</i> | | | | | | |
| 05 Sept | <i>No Flares Observed</i> | | | | | | |
| 06 Sept | <i>No Flares Observed</i> | | | | | | |
| 07 Sept | <i>No Flares Observed</i> | | | | | | |

Region Summary

| Date | Location | | Sunspot Characteristics | | | | Flares | | | | | | | |
|------|----------------|-------|---------------------------------|-------------------|---------------|---------------|--------------|-------|---|---|---------|---|---|---|
| | (° Lat ° CMD) | Helio | Area (10 ⁻⁶ hemi) | Extent (helio) | Spot Class | Spot Count | Mag Class | X-ray | | | Optical | | | |
| | | Lon | | | | | | C | M | X | S | 1 | 2 | 3 |

No active regions.



Recent Solar Indices (preliminary)
Of the observed monthly mean values

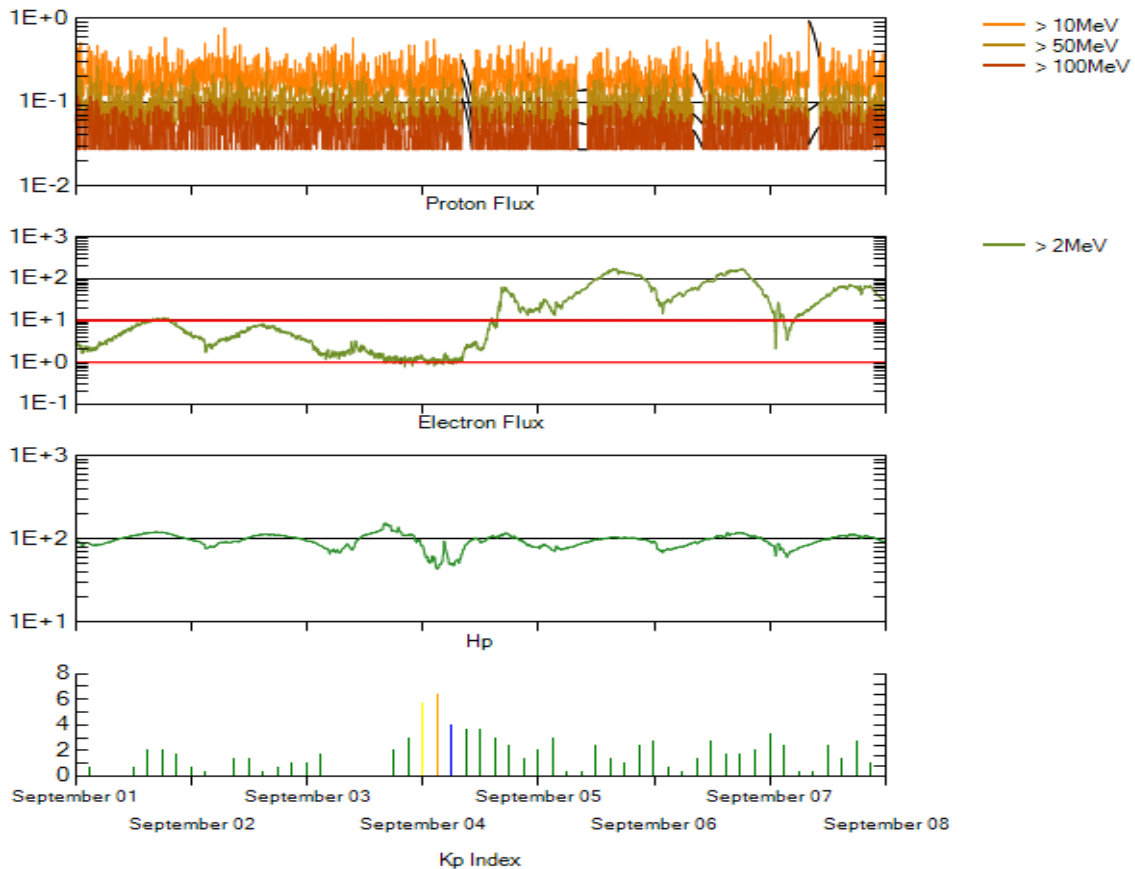
| Month | Sunspot Numbers | | | Smooth values | | Radio Flux | | Geomagnetic | |
|-------------|-----------------|--------------|-----------------|---------------|------|-----------------------|-----------------|-----------------|-----------------|
| | Observed SEC | values RI | Ratio RI/SEC | SEC | RI | *Penticton 10.7 cm | Smooth Value | Planetary Ap | Smooth Value |
| 2006 | | | | | | | | | |
| September | 25.2 | 14.5 | 0.58 | 27.7 | 15.6 | 77.8 | 80.2 | 8 | 8.7 |
| October | 15.7 | 10.4 | 0.66 | 25.2 | 14.2 | 74.3 | 79.4 | 8 | 8.6 |
| November | 31.5 | 21.5 | 0.68 | 22.3 | 12.7 | 86.4 | 78.5 | 9 | 8.5 |
| December | 22.2 | 13.6 | 0.61 | 20.7 | 12.1 | 84.3 | 77.9 | 15 | 8.5 |
| 2007 | | | | | | | | | |
| January | 26.6 | 16.9 | 0.64 | 19.7 | 12.0 | 83.5 | 77.5 | 6 | 8.4 |
| February | 17.2 | 10.6 | 0.62 | 18.9 | 11.6 | 77.8 | 76.9 | 6 | 8.4 |
| March | 9.7 | 4.8 | 0.49 | 17.5 | 10.8 | 72.3 | 76.0 | 8 | 8.4 |
| April | 6.9 | 3.7 | 0.54 | 16.0 | 9.9 | 72.4 | 75.2 | 9 | 8.5 |
| May | 19.4 | 11.7 | 0.60 | 14.2 | 8.7 | 74.5 | 74.2 | 9 | 8.4 |
| June | 20.0 | 12.0 | 0.60 | 12.8 | 7.7 | 73.7 | 73.2 | 7 | 7.8 |
| July | 15.6 | 10.0 | 0.64 | 11.6 | 7.0 | 71.6 | 72.5 | 8 | 7.4 |
| August | 9.9 | 6.2 | 0.63 | 10.2 | 6.1 | 69.2 | 71.8 | 7 | 7.6 |
| September | 4.8 | 2.4 | 0.50 | 9.9 | 5.9 | 67.1 | 71.5 | 9 | 7.8 |
| October | 1.3 | 0.9 | 0.70 | 10.0 | 6.1 | 65.5 | 71.5 | 9 | 7.9 |
| November | 2.5 | 1.7 | 0.68 | 9.4 | 5.7 | 69.7 | 71.1 | 5 | 7.8 |
| December | 16.2 | 10.1 | 0.62 | 8.1 | 5.0 | 78.6 | 70.5 | 4 | 7.8 |
| 2008 | | | | | | | | | |
| January | 5.1 | 3.4 | 0.67 | 6.9 | 4.2 | 72.1 | 70.0 | 6 | 7.7 |
| February | 3.8 | 2.1 | 0.55 | 5.9 | 3.6 | 71.2 | 69.6 | 9 | 7.6 |
| March | 15.9 | 9.3 | 0.58 | | | 72.9 | | 10 | |
| April | 4.9 | 2.9 | 0.59 | | | 70.3 | | 9 | |
| May | 5.7 | 2.9 | 0.51 | | | 68.4 | | 6 | |
| June | 4.2 | 3.1 | 0.74 | | | 65.9 | | 7 | |
| July | 1.0 | 0.5 | 0.50 | | | 65.8 | | 6 | |
| August | 0.0 | 0.5 | ** | | | 66.4 | | 5 | |

NOTE: All smoothed values after September 2002 and monthly values after March 2003 are preliminary estimates. The lowest smoothed sunspot index number for Cycle 22, RI = 8.0, occurred in May 1996. The highest smoothed sunspot number for Cycle 23, RI= 120.8, occurred April 2000.

*After June 1991, the 10.7 cm radio flux data source is Penticton, B.C. Canada. Prior to that, it was Ottawa.

**SEC sunspot number was less than RI value, so a ratio could not be done.





*Weekly Geosynchronous Satellite Environment Summary
Week Beginning 01 September 2008*

Protons plot contains the five-minute averaged integral proton flux (protons/cm²-sec-sr) as measured by GOES-11 (W135) for each of three energy thresholds: greater than 10, 50, and 100 MeV.

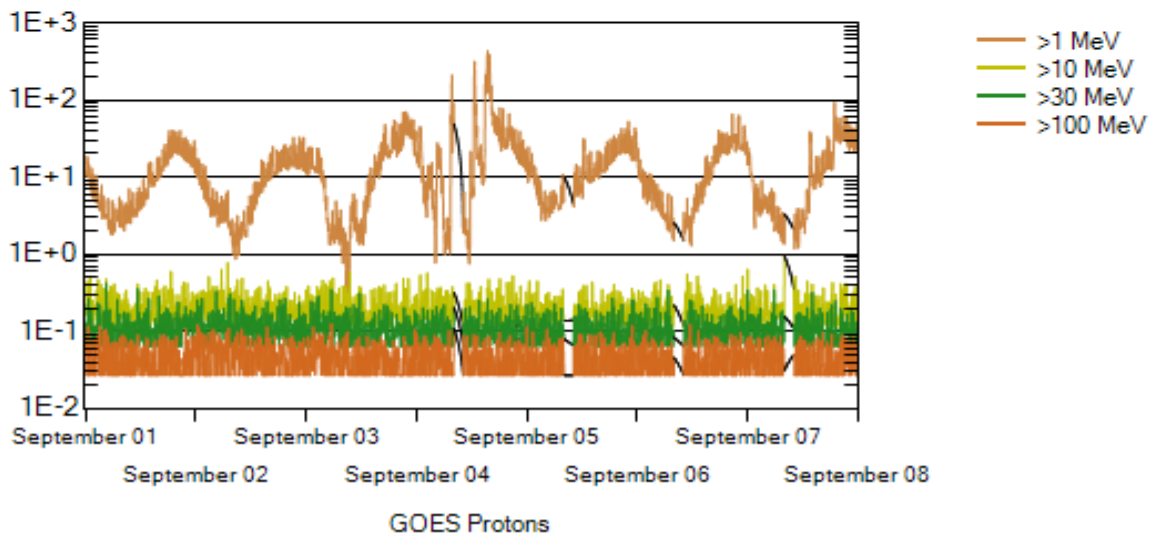
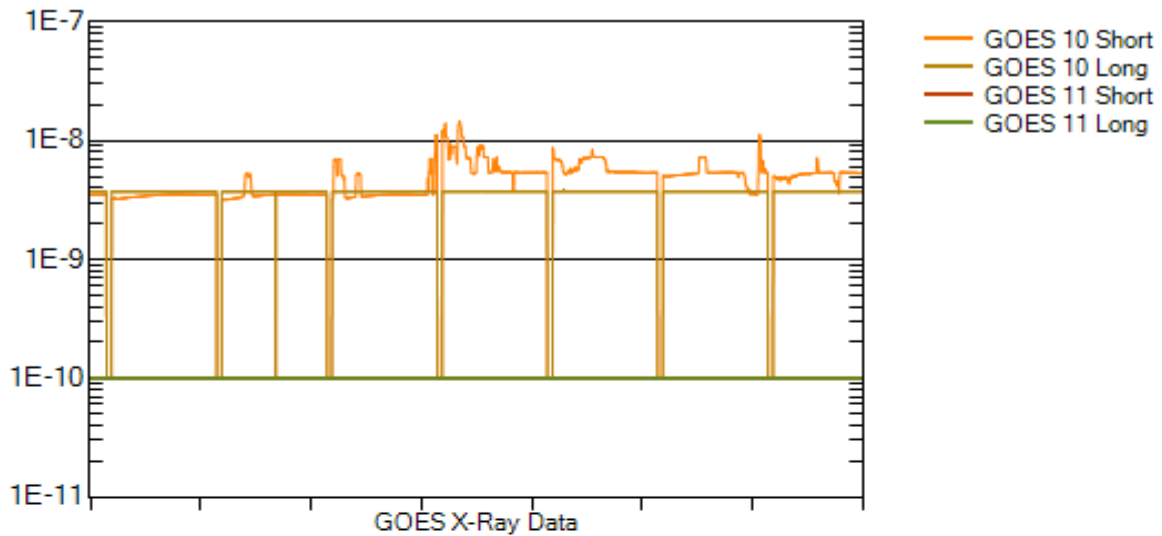
Electrons plot contains the five-minute averaged integral electron flux (electrons/cm²-sec-sr) with energies greater than 2 MeV at GOES-12 (W075).

Hp plot contains the five minute averaged magnetic field H - component in nanoteslas (nT) as measured by GOES-12. The H component is parallel to the spin axis of the satellite, which is nearly parallel to the Earth's rotation axis.

Kp plot contains the estimated planetary 3-hour K-index (derived by the Air Force Weather Agency) in real time from magnetometers at Meanook, Canada; Sitka, AK; Glenlea, Canada; St. Johns, Canada; Ottawa, Canada; Newport, WA; Fredericksburg, VA; Boulder, CO; Fresno, CA and Hartland, UK. These data are made available through cooperation from the Geological Survey of Canada (GSC), British Geological Survey (BGS) and the US Geological Survey. These may differ from the final Kp values derived from a more extensive network of magnetometers.

The data included here are those now available in real time at the SEC 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

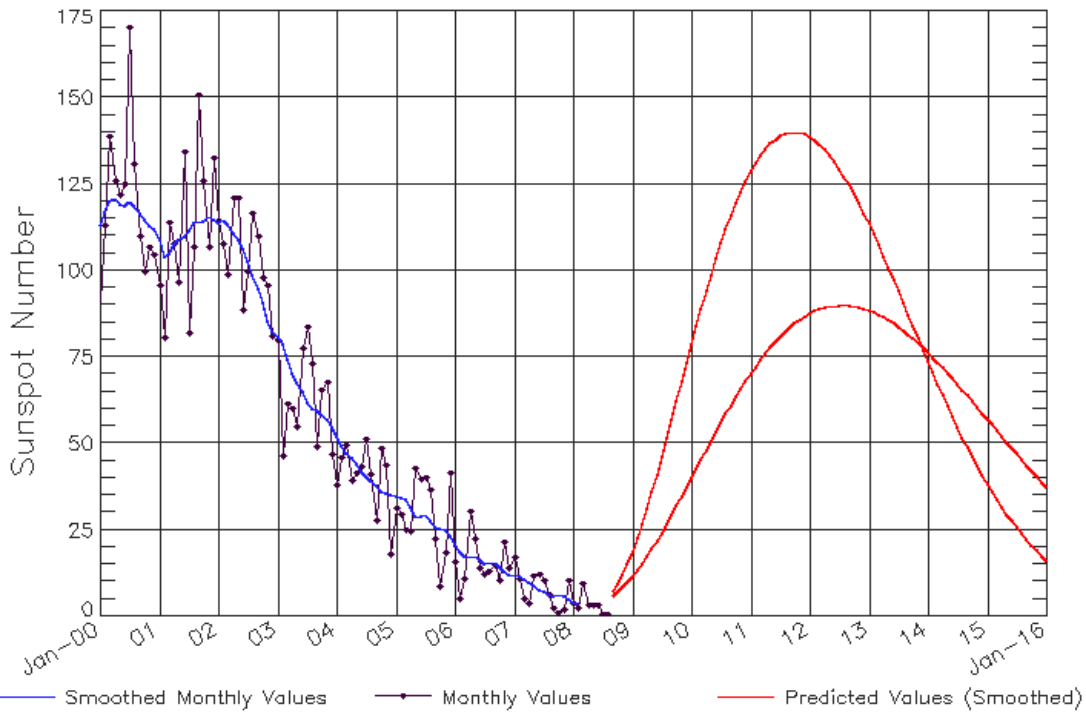
X-ray plot contains five-minute averaged x-ray flux (watts/m^2) as measured by GOES 10 (W060) and GOES 11 (W135) in two wavelength bands, .05 - .4 and .1 - .8 nm. The letters A, B, C, M and X refer to x-ray event levels for the .1 - .8 nm band.

Proton plot contains the five-minute averaged integral proton flux ($\text{protons/cm}^2\text{-sec-sr}$) as measured by GOES-11 (W135) for each of the energy thresholds: >1, >10, >30 and >100 MeV. P10 event threshold is 10 pfu ($\text{protons/cm}^2\text{-sec-sr}$) at greater than 10 MeV.



ISES Solar Cycle Sunspot Number Progression

Data Through 31 Aug 08



Updated 2008 Sep 5

NOAA/SWPC Boulder, CO USA

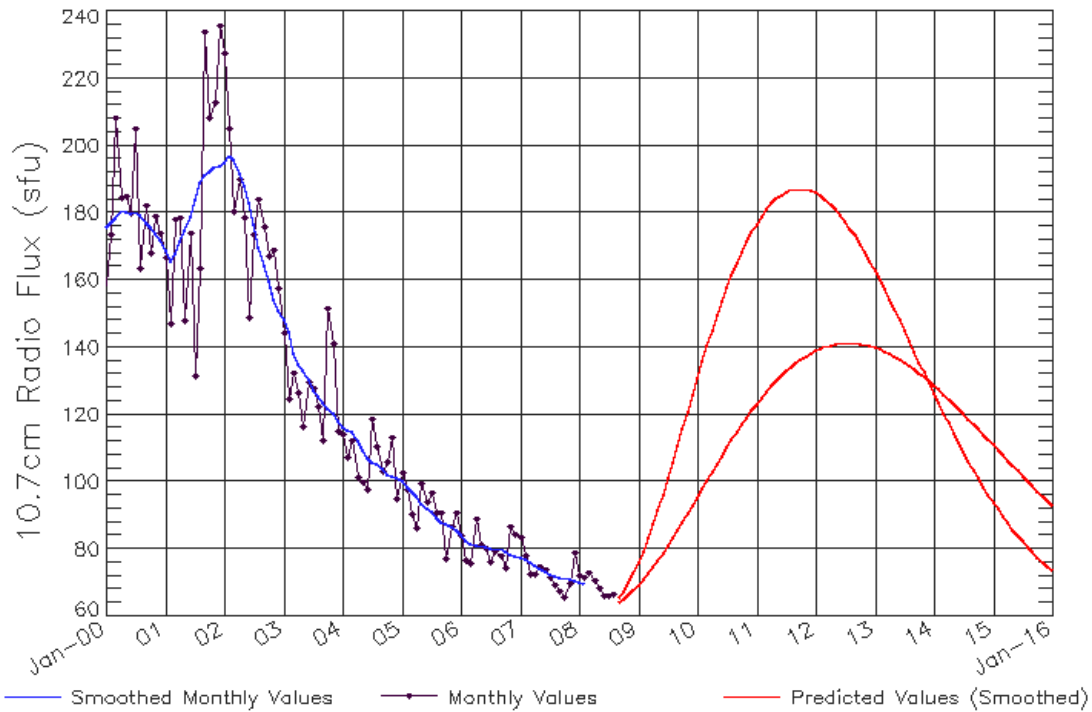
SEC Prediction of Smoothed Sunspot Number

| | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec |
|------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| | Hi/Lo | Hi/Lo | Hi/Lo | Hi/Lo | Hi/Lo | Hi/Lo | Hi/Lo | Hi/Lo | Hi/Lo | Hi/Lo | Hi/Lo | Hi/Lo |
| 2006 | 21 | 19 | 17 | 17 | 17 | 16 | 15 | 16 | 16 | 14 | 13 | 12 |
| | (***) | (***) | (***) | (***) | (***) | (***) | (***) | (***) | (***) | (***) | (***) | (***) |
| 2007 | 12 | 12 | 11 | 10 | 9 | 8 | 7 | 6 | 6 | 6 | 6 | 5 |
| | (***) | (***) | (***) | (***) | (***) | (***) | (***) | (***) | (***) | (***) | (***) | (***) |
| 2008 | 4 | 4 | 4/3 | 4/4 | 5/4 | 6/5 | 6/5 | 8/6 | 9/7 | 11/7 | 14/9 | 17/10 |
| | (***) | (***) | (1) | (3) | (5) | (7) | (8) | (9) | (10) | (11) | (12) | (13) |
| 2009 | 20/12 | 24/14 | 27/15 | 31/17 | 36/20 | 41/22 | 46/24 | 52/27 | 57/29 | 62/32 | 68/35 | 73/37 |
| | (14) | (15) | (15) | (15) | (15) | (15) | (15) | (15) | (15) | (15) | (15) | (15) |
| 2010 | 79/40 | 84/43 | 89/45 | 94/48 | 99/51 | 103/53 | 108/56 | 112/59 | 116/61 | 119/63 | 123/66 | 126/68 |
| | (15) | (15) | (15) | (15) | (15) | (15) | (15) | (15) | (15) | (15) | (15) | (15) |
| 2011 | 129/70 | 131/72 | 133/74 | 135/76 | 137/78 | 138/79 | 139/81 | 140/82 | 140/84 | 140/85 | 140/86 | 139/87 |
| | (15) | (15) | (15) | (15) | (15) | (15) | (15) | (15) | (15) | (15) | (15) | (15) |
| 2012 | 139/88 | 138/88 | 136/89 | 135/89 | 133/90 | 131/90 | 129/90 | 127/90 | 125/90 | 122/90 | 119/89 | 116/89 |
| | (15) | (15) | (15) | (15) | (15) | (15) | (15) | (15) | (15) | (15) | (15) | (15) |
| 2013 | 114/89 | 110/88 | 107/87 | 104/86 | 101/86 | 97/85 | 94/84 | 91/83 | 87/81 | 84/80 | 80/79 | 77/78 |
| | (15) | (15) | (15) | (15) | (15) | (15) | (15) | (15) | (15) | (15) | (15) | (15) |
| 2014 | 74/76 | 70/75 | 67/73 | 64/72 | 61/70 | 58/69 | 55/67 | 52/65 | 49/64 | 46/62 | 44/60 | 41/59 |
| | (15) | (15) | (15) | (15) | (15) | (15) | (15) | (15) | (15) | (15) | (15) | (15) |
| 2015 | 38/57 | 36/55 | 34/54 | 32/52 | 30/50 | 28/49 | 26/47 | 24/45 | 22/44 | 21/42 | 19/40 | 18/39 |
| | (15) | (15) | (15) | (15) | (15) | (15) | (15) | (15) | (15) | (15) | (15) | (15) |

Note: Hi is for the larger solar cycle prediction, Lo is for the smaller solar cycle prediction



ISES Solar Cycle F10.7cm Radio Flux Progression
Data Through 31 Aug 08



Updated 2008 Sep 5

NOAA/SWPC Boulder, CO USA

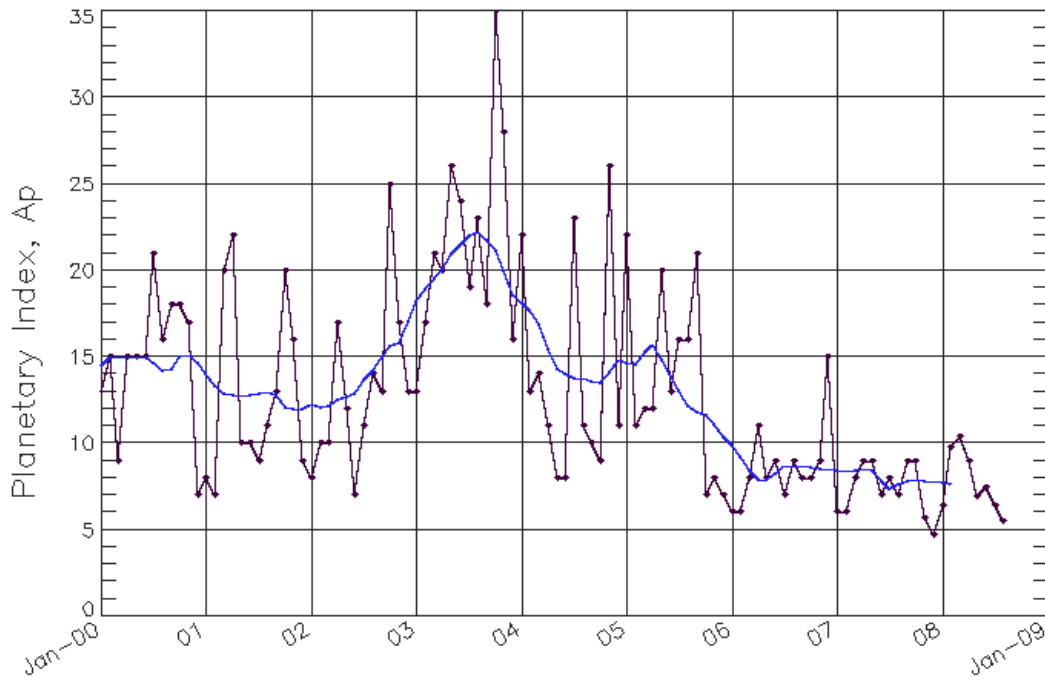
SEC Prediction of Smoothed F10.7cm Radio Flux

| | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec |
|------|------------------------|------------------------|------------------------|------------------------|------------------------|------------------------|------------------------|------------------------|------------------------|------------------------|------------------------|------------------------|
| | Hi/Lo | Hi/Lo | Hi/Lo | Hi/Lo | Hi/Lo | Hi/Lo | Hi/Lo | Hi/Lo | Hi/Lo | Hi/Lo | Hi/Lo | Hi/Lo |
| 2006 | 84 (***) | 83 (***) | 82 (***) | 81 (***) | 81 (***) | 81 (***) | 80 (***) | 80 (***) | 80 (***) | 79 (***) | 79 (***) | 78 (***) |
| 2007 | 78 (***) | 77 (***) | 76 (***) | 75 (***) | 74 (***) | 73 (***) | 73 (***) | 72 (***) | 72 (***) | 72 (***) | 71 (***) | 71 (***) |
| 2008 | 70 (***) | 70 (***) | 69/64 (1) | 69/64 (3) | 70/64 (5) | 69/63 (7) | 69/62 (9) | 70/62 (11) | 71/62 (13) | 72/62 (15) | 73/63 (17) | 76/64 (19) |
| 2009 | 78/65 (21) | 81/69 (22) | 83/73 (23) | 87/75 (23) | 92/77 (23) | 96/79 (23) | 101/81 (23) | 106/83 (23) | 111/86 (23) | 116/88 (23) | 121/90 (23) | 126/93 (23) |
| 2010 | 131/95 (23) | 136/98 (23) | 140/100 (23) | 145/103 (23) | 149/105 (23) | 154/108 (23) | 158/110 (23) | 161/112 (23) | 165/115 (23) | 168/117 (23) | 171/119 (23) | 174/121 (23) |
| 2011 | 177/123 (23) | 179/125 (23) | 181/127 (23) | 183/128 (23) | 184/130 (23) | 185/132 (23) | 186/133 (23) | 187/134 (23) | 187/135 (23) | 187/136 (23) | 187/137 (23) | 187/138 (23) |
| 2012 | 186/139 (23) | 185/140 (23) | 184/140 (23) | 183/141 (23) | 181/141 (23) | 179/141 (23) | 177/141 (23) | 175/141 (23) | 173/141 (23) | 171/141 (23) | 168/141 (23) | 166/140 (23) |
| 2013 | 163/140 (23) | 160/139 (23) | 157/139 (23) | 154/138 (23) | 151/137 (23) | 148/136 (23) | 145/136 (23) | 142/135 (23) | 139/134 (23) | 136/132 (23) | 133/131 (23) | 129/130 (23) |
| 2014 | 126/129 (23) | 123/127 (23) | 120/126 (23) | 117/125 (23) | 115/123 (23) | 112/122 (23) | 109/120 (23) | 106/119 (23) | 104/117 (23) | 101/116 (23) | 99/114 (23) | 96/113 (23) |
| 2015 | 94/111 (23) | 92/110 (23) | 90/108 (23) | 88/106 (23) | 86/105 (23) | 84/103 (23) | 82/102 (23) | 81/100 (23) | 79/99 (23) | 78/97 (23) | 76/96 (23) | 75/94 (23) |



ISES Solar Cycle Ap Progression

Data Through 31 Aug 08



— Smoothed Monthly Values —●— Monthly Values

Updated 2008 Sep 5

NOAA/SWPC Boulder, CO USA

