

Space Weather Highlights
28 August – 03 September 2006

SEC PRF 1618
05 September 2006

Solar activity was at very low to low levels. During the period, Region 905 (S06, L=327, class/area, Eac/350 on 27 August) produced three C-class flares before rotating around the west limb on 02 September. New Region 906 (S09, L=319, class/area, Dao/100 on 01 September) produced the most significant event of the period, a B7.0 x-ray event at 31/1748 UTC with an associated Type IV radio sweep and 10 cm radio burst (740 sfu). Though this event did produce a CME, it was determined to be mostly southward directed and not expected to impact Earth. No other activity of note to report.

No greater than 10 MeV proton events were observed.

The greater than 2 MeV electron flux at geosynchronous orbit was briefly at high levels on 29 August and 03 September.

The geomagnetic field was at quiet to major storm levels. Solar wind speed ranged from a high of about 700 km/s early on 28 August to a low of about 350 km/s later on 01 September. The period began with solar wind speed at about 600 km/s, and the IMF Bz varying between +/- 8 nT as a coronal hole high speed stream was geoeffective. By mid-day on 28 August, the IMF Bz relaxed to +/- 5nT. As a result, mostly quiet with an isolated active period was observed early at middle latitudes with mostly unsettled conditions at high latitudes. On 29 August, solar wind speed remained elevated near 560 km/s. During this time, middle latitudes were quiet to unsettled with periods of minor and major storming observed at high latitudes. By mid-day on 30 August, solar wind density and the IMF Bt began to increase. Conditions were mostly quiet with two minor storm periods observed at high latitudes. On the 31st, the solar wind speed continued to decrease to around 380 km/s with the IMF Bz not varying much beyond +/- 7 nT. On 01 September, a prolonged period of southward Bz resulted in minor to major storm periods at high latitudes while middle latitudes reached active levels. Midday on 02 September, wind speed began to increase to around 515 km/s and just as quickly decreased to 380 km/s by midday on 03 September. Conditions were quiet to unsettled with an isolated active period observed at high latitudes during this time.

Space Weather Outlook
06 September – 02 October 2006

Solar activity is expected to be at very low to low levels.

No greater than 10 MeV proton events are expected.

The greater than 2 MeV electron flux at geosynchronous orbit is expected to be at high levels on 06 – 13 September, 17 – 23 September and again on 02 October.

The geomagnetic field is expected to be mostly quiet to unsettled for the majority of the forecast period. Recurrent coronal hole high speed wind streams are expected to rotate into geoeffective positions on 18 September, 23 September, and again on 28 September – 02 October. Unsettled to active periods are possible on 18 and 23 September while unsettled to minor storm periods are possible on 28 September – 02 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 | |
| 28 August | 76 | 48 | 260 | A4.4 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 29 August | 73 | 30 | 180 | A2.8 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 30 August | 74 | 19 | 160 | A1.7 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 31 August | 83 | 39 | 200 | A4.5 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 01 September | 77 | 32 | 190 | A6.4 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 02 September | 76 | 27 | 120 | A5.7 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 03 September | 77 | 0 | 0 | A5.5 | 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 |
| | 28 August | 4.3E+5 | 1.7E+4 | 4.1E+3 | | 1.6E+6 |
| 29 August | 1.9E+6 | 1.7E+4 | 4.2E+3 | | 5.7E+7 | |
| 30 August | 1.2E+6 | 1.6E+4 | 3.7E+3 | | 3.2E+7 | |
| 31 August | 5.3E+5 | 1.6E+4 | 3.6E+3 | | 1.1E+7 | |
| 01 September | 9.8E+5 | 1.6E+4 | 3.5E+3 | | 7.7E+6 | |
| 02 September | 1.0E+6 | 1.5E+4 | 3.3E+3 | | 1.6E+7 | |
| 03 September | 8.4E+5 | 1.6E+4 | 3.6E+3 | | 4.2E+7 | |

Daily Geomagnetic Data

| Date | Middle Latitude Fredericksburg | | High Latitude College | | Estimated Planetary | |
|--------------|-----------------------------------|-----------------|--------------------------|-----------------|------------------------|-----------------|
| | A | K-indices | A | K-indices | A | K-indices |
| | 28 August | 9 | 4-2-2-1-2-1-2-2 | 13 | 3-3-3-3-3-2-3-2 | 11 |
| 29 August | 9 | 3-2-2-3-2-2-2-2 | 21 | 2-2-5-6-3-2-1-0 | 9 | 2-2-3-4-1-2-2-2 |
| 30 August | 5 | 1-1-2-2-1-1-2-1 | 14 | 1-1-5-5-2-1-0-0 | 6 | 1-1-3-2-1-1-1-2 |
| 31 August | 6 | 1-1-3-0-2-2-2-2 | 9 | 1-1-2-2-2-4-3-1 | 8 | 1-1-2-1-1-3-3-3 |
| 01 September | 8 | 2-0-1-2-2-2-2-4 | 26 | 3-2-3-3-5-6-3-3 | 13 | 3-1-2-2-3-3-4-3 |
| 02 September | 6 | 3-1-1-1-1-1-2-2 | 10 | 3-2-0-3-4-2-2-1 | 7 | 3-1-1-1-1-1-3-3 |
| 03 September | 6 | 2-3-2-1-1-1-1-1 | 5 | 2-2-2-2-1-1-0-1 | 6 | 2-3-1-1-1-1-1-2 |

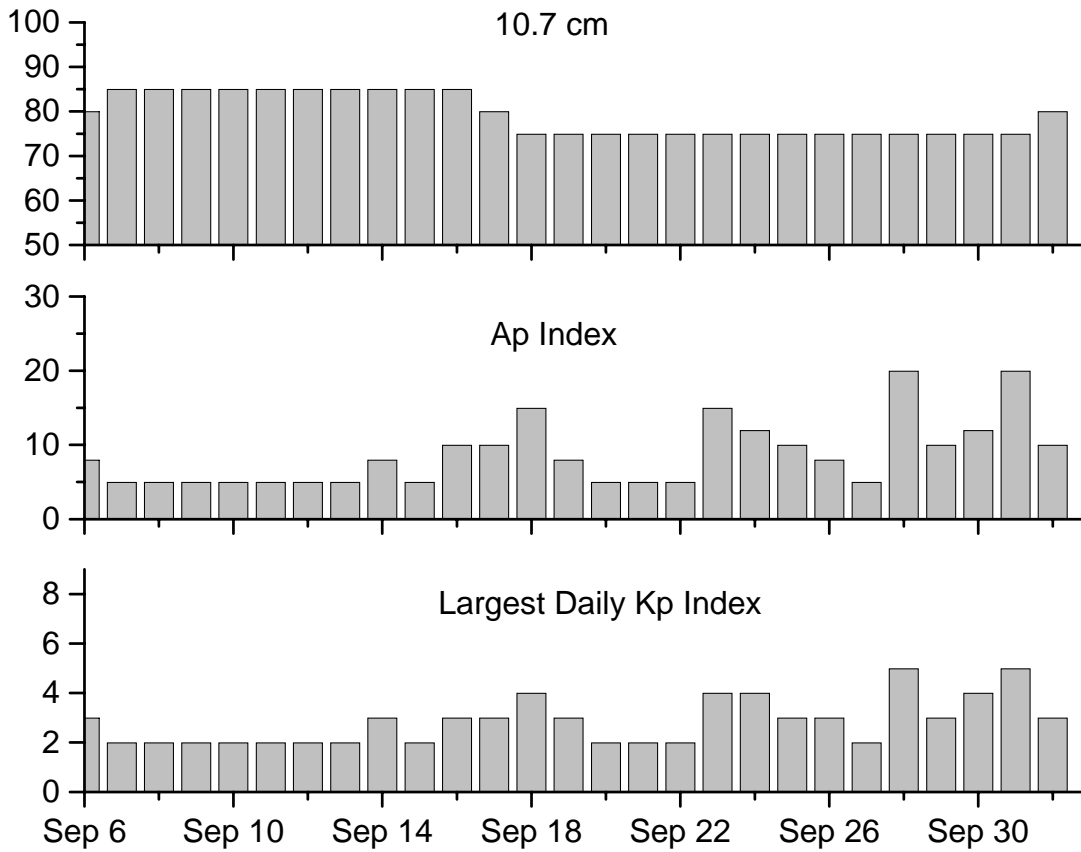


Alerts and Warnings Issued

| <u>Date & Time of Issue</u> | <u>Type of Alert or Warning</u> | <u>Date & Time of Event UTC</u> |
|---------------------------------|---|-------------------------------------|
| 28 Aug 1953 | WATCH: Geomagnetic A=20 | 29 Aug |
| 29 Aug 1023 | WARNING: Geomagnetic K=4 | 29 Aug 1025 - 1600 |
| 29 Aug 1025 | ALERT: Geomagnetic K=4 | 29 Aug 1025 |
| 29 Aug 1240 | ALERT: Electron 2MeV Integral Flux >1000pfu | 29 Aug 1220 |
| 31 Aug 2228 | ALERT: Type IV Radio Emission | 31 Aug 1843 |
| 31 Aug 2230 | SUMMARY: 10cm Radio Burst | 31 Aug 1902 |
| 03 Sep 0401 | WARNING: Geomagnetic K=4 | 03 Sep 0410 - 1600 |
| 03 Sep 0405 | ALERT: Geomagnetic K=4 | 03 Sep 0405 |
| 03 Sep 1506 | ALERT: Electron 2MeV Integral Flux >1000pfu | 03 Sep 1445 |



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 |
|---------|-----------------------|----------------------|---------------------|---------|-----------------------|----------------------|---------------------|
| 06 Sept | 80 | 8 | 3 | 20 Sept | 75 | 5 | 2 |
| 07 | 85 | 5 | 2 | 21 | 75 | 5 | 2 |
| 08 | 85 | 5 | 2 | 22 | 75 | 5 | 2 |
| 09 | 85 | 5 | 2 | 23 | 75 | 15 | 4 |
| 10 | 85 | 5 | 2 | 24 | 75 | 12 | 4 |
| 11 | 85 | 5 | 2 | 25 | 75 | 10 | 3 |
| 12 | 85 | 5 | 2 | 26 | 75 | 8 | 3 |
| 13 | 85 | 5 | 2 | 27 | 75 | 5 | 2 |
| 14 | 85 | 8 | 3 | 28 | 75 | 20 | 5 |
| 15 | 85 | 5 | 2 | 29 | 75 | 10 | 3 |
| 16 | 85 | 10 | 3 | 30 | 75 | 12 | 4 |
| 17 | 80 | 10 | 3 | 01 Oct | 75 | 20 | 5 |
| 18 | 75 | 15 | 4 | 02 | 80 | 10 | 3 |
| 19 | 75 | 8 | 3 | | | | |



Energetic Events

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

No Events Observed

Flare List

| Date | Time | | | Optical X-ray Class. | Imp / Brtns | Location Lat CMD | Rgn |
|-----------|--------------------|------|------|----------------------------|----------------|---------------------|-----|
| | Begin | Max | End | | | | |
| 28 August | 0125 | 0129 | 0137 | B1.2 | | | |
| | 0148 | 0157 | 0201 | B1.5 | | | |
| | 0434 | 0438 | 0440 | B1.5 | | | 905 |
| | 0546 | 0552 | 0600 | B1.2 | | | |
| | 0653 | 0656 | 0659 | B1.0 | | | |
| | 0825 | 0830 | 0833 | B2.1 | | | 905 |
| | 0924 | 0933 | 0935 | B2.8 | | | 905 |
| | 0936 | 0939 | 0942 | B1.1 | | | |
| | 1047 | 1052 | 1056 | B1.7 | | | |
| | 1102 | 1106 | 1108 | C1.8 | | | 905 |
| | 1141 | 1144 | 1146 | B1.5 | | | |
| | 1156 | 1159 | 1201 | B1.1 | | | 905 |
| | 1217 | 1220 | 1222 | B1.1 | | | 905 |
| | 1226 | 1229 | 1231 | B2.8 | | | 905 |
| | 1235 | 1240 | 1242 | B2.9 | | | 905 |
| | 1418 | 1422 | 1424 | B1.7 | | | |
| | 1434 | 1438 | 1440 | B3.0 | | | 905 |
| | 1503 | 1507 | 1511 | B1.4 | | | |
| | 1629 | 1632 | 1634 | B1.2 | | | |
| 2215 | 2218 | 2220 | B1.0 | | | | |
| 29 August | 1411 | 1415 | 1417 | B1.4 | | | |
| | 1438 | 1445 | 1447 | C1.4 | | | 905 |
| | 1522 | 1529 | 1531 | C2.1 | | | 905 |
| | 1607 | 1610 | 1612 | B1.7 | | | |
| | 1622 | 1625 | 1627 | B2.6 | | | 905 |
| | 1706 | 1710 | 1713 | B2.0 | | | |
| | 1722 | 1726 | 1728 | B1.3 | | | 905 |
| | 1737 | 1740 | 1742 | B3.9 | | | 905 |
| | 1858 | 1901 | 1903 | B1.1 | | | 905 |
| 2010 | 2014 | 2016 | B4.6 | | | 905 | |
| 2121 | 2131 | 2133 | B4.4 | | | 905 | |
| 30 August | No Flares Observed | | | | | | |



Flare List-Continued

| Date | Time | | | Optical | Imp / Brtns | Location Lat CMD | Rgn |
|--------------|-------|------|------|-----------------|----------------|---------------------|-----|
| | Begin | Max | End | X-ray Class. | | | |
| 31 August | 0302 | 0306 | 0313 | B1.7 | | | 906 |
| | 0424 | 0427 | 0430 | B7.1 | | | 906 |
| | 0505 | 0508 | 0512 | B1.3 | | | 906 |
| | 0533 | 0546 | 0555 | B1.4 | | | 906 |
| | 0636 | 0641 | 0648 | B1.6 | | | 906 |
| 31 August | 0823 | 0828 | 0833 | B1.7 | | | 906 |
| | 0937 | 0946 | 0951 | B2.3 | | | 906 |
| | 1048 | 1052 | 1055 | B1.7 | | | 906 |
| | 1355 | 1405 | 1412 | B6.6 | | | 906 |
| | 1529 | 1533 | 1540 | B1.2 | | | 906 |
| 01 September | 1706 | 1748 | 1806 | B7.0 | | | 906 |
| | 0110 | 0119 | 0129 | B4.5 | | | 906 |
| | 0425 | 0429 | 0433 | B1.4 | | | 906 |
| | 0506 | 0542 | 0719 | C1.0 | | | 906 |
| | 1814 | 1818 | 1823 | B1.8 | | | 906 |
| 02 September | 1845 | 1851 | 1856 | B3.9 | | | 906 |
| | 1911 | 1915 | 1918 | B1.8 | | | 906 |
| | 0622 | 0627 | 0631 | B1.2 | | | |
| | 1708 | 1711 | 1714 | B1.1 | | | |
| | 1923 | 1927 | 1931 | B1.1 | | | |
| 03 September | 2331 | 2342 | 2358 | B3.5 | | | |
| | 0602 | 0605 | 0607 | B2.0 | | | |
| | 0703 | 0707 | 0711 | B1.0 | | | |
| | 0808 | 0811 | 0815 | B1.2 | | | |
| | 1656 | 1701 | 1706 | B1.5 | | | 906 |
| | 1739 | 1813 | 1824 | B2.8 | | | 906 |
| | 1826 | 1831 | 1835 | B2.8 | | | 906 |
| | 1913 | 1918 | 1922 | B1.5 | | | |
| | 2358 | 0005 | 0013 | B1.5 | | | |



Region Summary

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

Region 905

| | | | | | | | | | | | | | | | | |
|---------------|-----|------|----|-----|-----|----|---|---|---|---|---|---|---|---|--|--|
| 21 Aug S08E74 | 325 | 0100 | 03 | Cao | 003 | B | 1 | | | | | | | | | |
| 22 Aug S07E60 | 326 | 0230 | 10 | Dso | 004 | B | | | | | | | | | | |
| 23 Aug S08E47 | 326 | 0280 | 10 | Dso | 012 | Bg | | | | | 1 | | | | | |
| 24 Aug S08E33 | 326 | 0290 | 12 | Eai | 012 | Bg | | | | | | | | | | |
| 25 Aug S08E20 | 326 | 0260 | 11 | Eho | 013 | Bg | | | | | | | | | | |
| 26 Aug S08E05 | 328 | 0330 | 12 | Eko | 011 | Bg | 1 | | | | 1 | | | | | |
| 27 Aug S06W07 | 327 | 0350 | 13 | Eac | 016 | Bg | | | | | | | | | | |
| 28 Aug S08W22 | 329 | 0260 | 15 | Eac | 038 | Bg | 1 | | | | | | | | | |
| 29 Aug S08W35 | 328 | 0180 | 15 | Cao | 020 | B | 2 | | | | | | | | | |
| 30 Aug S08W49 | 329 | 0160 | 14 | Cao | 009 | B | | | | | | | | | | |
| 31 Aug S08W68 | 335 | 0100 | 03 | Dso | 007 | B | | | | | | | | | | |
| 01 Sep S08W81 | 335 | 0090 | 03 | Hax | 002 | A | | | | | | | | | | |
| 02 Sep S08W96 | 337 | 0030 | 01 | Axx | 001 | A | | | | | | | | | | |
| | | | | | | | 5 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | | |

Crossed West Limb.

Absolute heliographic longitude: 328

Region 906

| | | | | | | | | | | | | | | | | |
|---------------|-----|------|----|-----|-----|---|---|---|---|---|---|---|---|---|--|--|
| 31 Aug S09W52 | 319 | 0100 | 05 | Cao | 012 | B | | | | | | | | | | |
| 01 Sep S09W65 | 319 | 0100 | 06 | Dao | 010 | B | | | | | | | | | | |
| 02 Sep S09W78 | 319 | 0090 | 06 | Bxo | 006 | B | | | | | | | | | | |
| 03 Sep S09W91 | 319 | | | | | | | | | | | | | | | |
| | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | |

Still on Disk.

Absolute heliographic longitude: 319

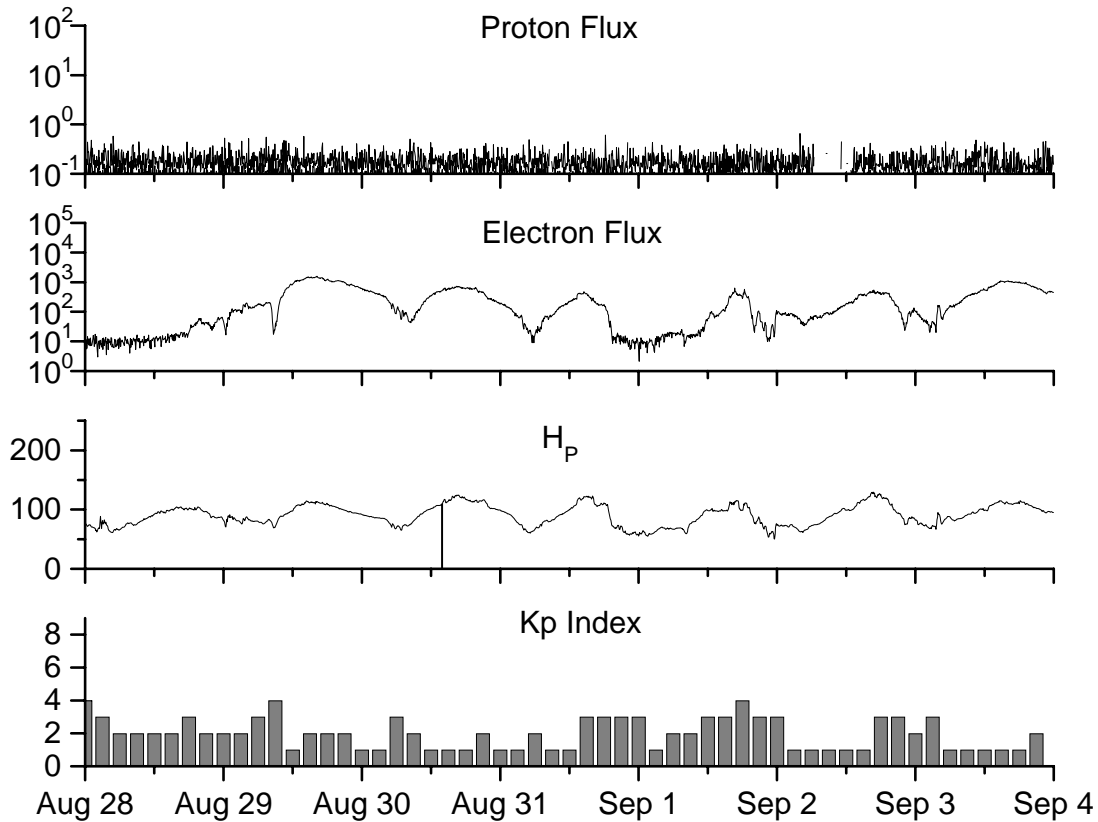


**Recent Solar Indices (preliminary)
of the observed monthly mean values**

| Month | Sunspot Numbers | | | Radio Flux | | Geomagnetic | | | |
|-------------|------------------------|-------------|-----------------|----------------------|---------------------|-----------------------|-----------------|-----------------|-----------------|
| | Observed values SEC | Ratio RI | Ratio RI/SEC | Smooth values SEC | Smooth values RI | *Penticton 10.7 cm | Smooth Value | Planetary Ap | Smooth Value |
| 2004 | | | | | | | | | |
| August | 69.5 | 40.9 | 0.59 | 66.6 | 39.3 | 110.1 | 105.0 | 11 | 13.8 |
| September | 50.0 | 27.7 | 0.55 | 63.7 | 37.6 | 103.1 | 103.7 | 10 | 13.6 |
| October | 77.9 | 48.4 | 0.62 | 61.3 | 35.9 | 105.7 | 102.1 | 9 | 13.5 |
| November | 70.5 | 43.7 | 0.62 | 60.0 | 35.4 | 113.2 | 101.5 | 26 | 14.1 |
| December | 34.7 | 17.9 | 0.52 | 58.8 | 35.3 | 94.6 | 101.3 | 11 | 14.8 |
| 2005 | | | | | | | | | |
| January | 52.0 | 31.3 | 0.60 | 57.3 | 34.7 | 102.4 | 100.3 | 22 | 14.7 |
| February | 45.4 | 29.1 | 0.64 | 56.4 | 34.0 | 97.3 | 98.5 | 11 | 14.6 |
| March | 41.0 | 24.8 | 0.60 | 55.8 | 33.6 | 90.0 | 97.2 | 12 | 15.3 |
| April | 41.5 | 24.4 | 0.59 | 52.6 | 31.7 | 85.9 | 95.5 | 12 | 15.7 |
| May | 65.4 | 42.6 | 0.65 | 48.3 | 29.0 | 99.5 | 93.2 | 20 | 14.8 |
| June | 59.8 | 39.6 | 0.66 | 47.9 | 28.9 | 93.7 | 91.9 | 13 | 13.9 |
| July | 71.0 | 39.9 | 0.56 | 48.1 | 29.2 | 96.6 | 90.9 | 16 | 13.1 |
| August | 65.6 | 36.4 | 0.55 | 45.4 | 27.5 | 90.7 | 89.3 | 16 | 12.2 |
| September | 39.2 | 22.1 | 0.56 | 42.9 | 25.9 | 90.8 | 87.8 | 21 | 11.8 |
| October | 13.0 | 8.5 | 0.65 | 42.6 | 25.5 | 76.7 | 87.4 | 7 | 11.6 |
| November | 32.2 | 18.0 | 0.56 | 42.1 | 24.9 | 86.3 | 86.7 | 8 | 11.1 |
| December | 62.6 | 41.2 | 0.66 | 40.1 | 23.0 | 90.8 | 85.4 | 7 | 10.4 |
| 2006 | | | | | | | | | |
| January | 28.0 | 15.4 | 0.55 | | | 83.8 | | 6 | |
| February | 5.3 | 4.7 | 0.89 | | | 76.6 | | 6 | |
| March | 21.3 | 10.8 | 0.51 | | | 75.5 | | 8 | |
| April | 55.2 | 30.2 | 0.55 | | | 89.0 | | 11 | |
| May | 39.6 | 22.2 | 0.56 | | | 81.0 | | 8 | |
| June | 37.7 | 13.9 | 0.37 | | | 80.1 | | 8 | |
| July | 22.6 | 12.2 | 0.54 | | | 75.8 | | 7 | |

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.





Weekly Geosynchronous Satellite Environment Summary
Week Beginning 28 August 2006

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.

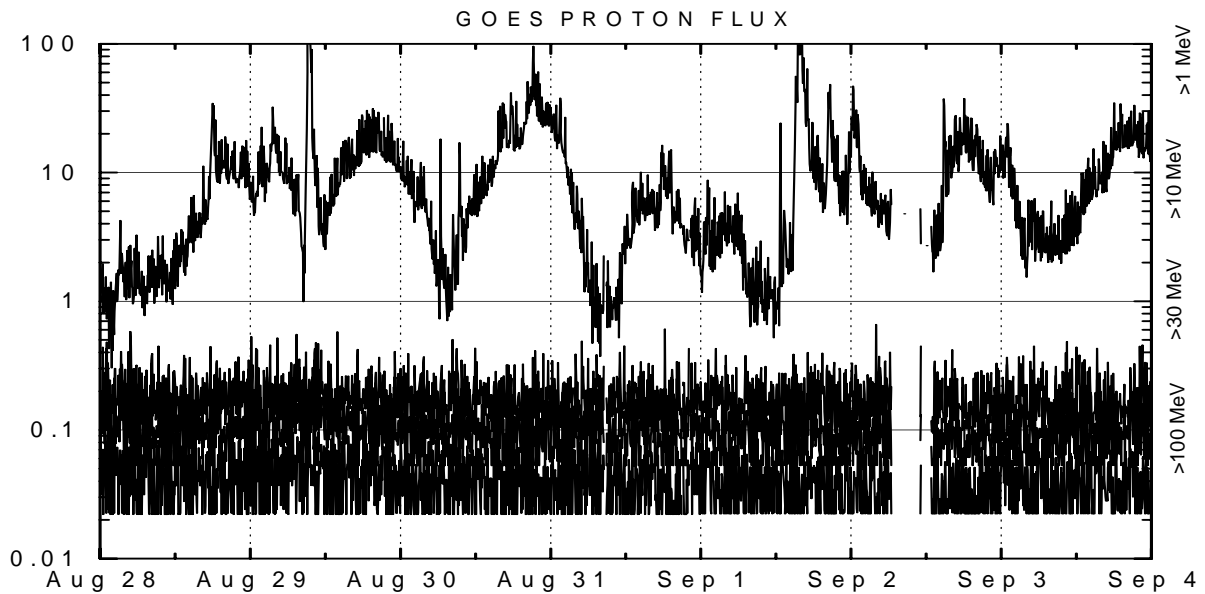
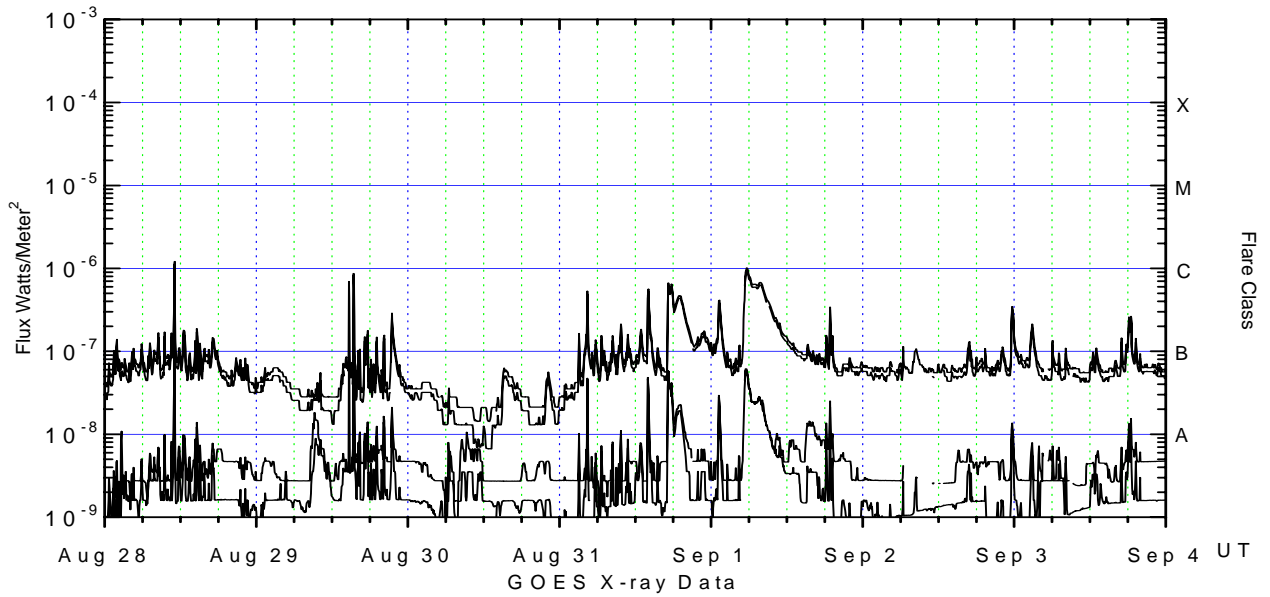
Electrons plot contains the five-minute averaged integral electron flux (electrons/cm²-sec -sr) with energies greater than 2 MeV at GOES-12 (W075).

H_p 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.

K_p 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 K_p 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 K_p 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/m²) as measured by GOES 12 (W75) 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 (protons/cm²-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 (protons/cm²-sec-sr) at greater than 10 MeV.





Space Environment Center

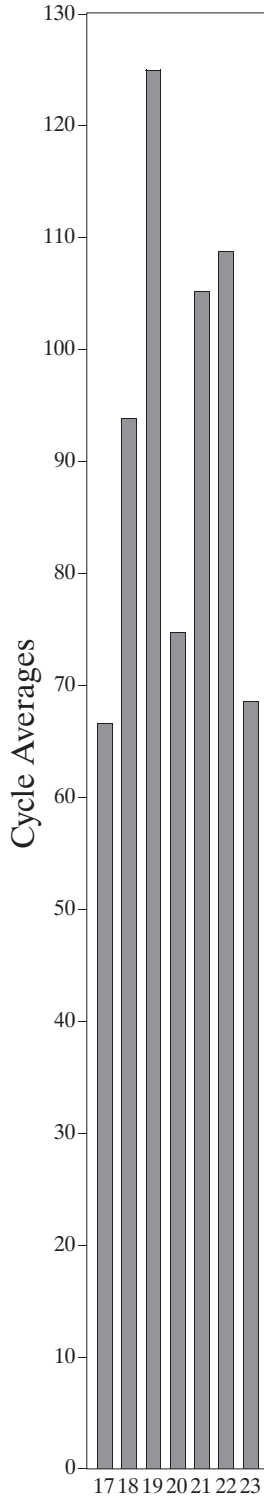
Sunspot Number (RI)

March 2006
(Month 114)

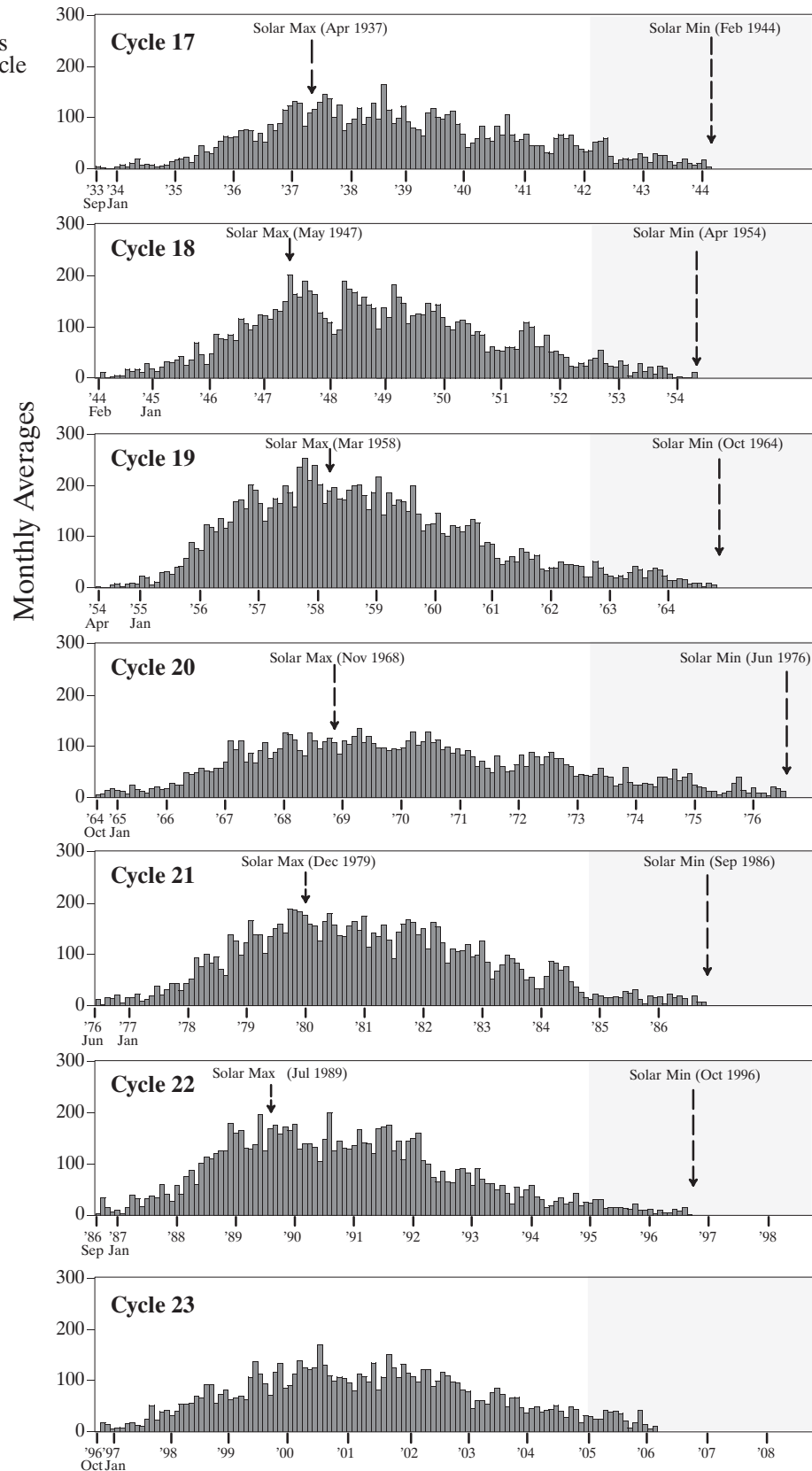
Preliminary data



Comparison of Cycles at current month in cycle



K. Tegnell



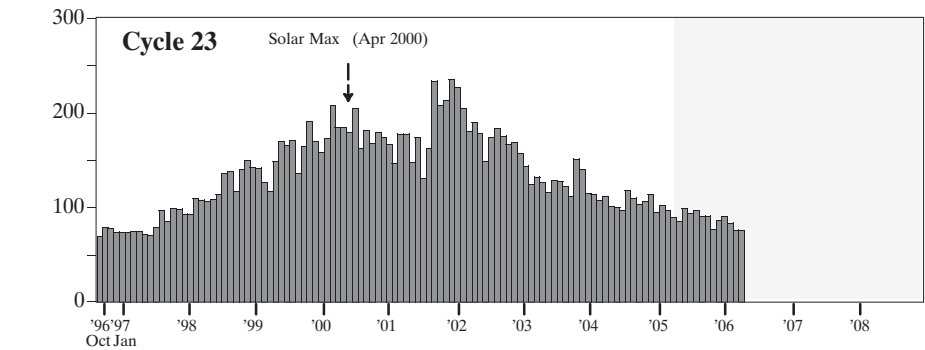
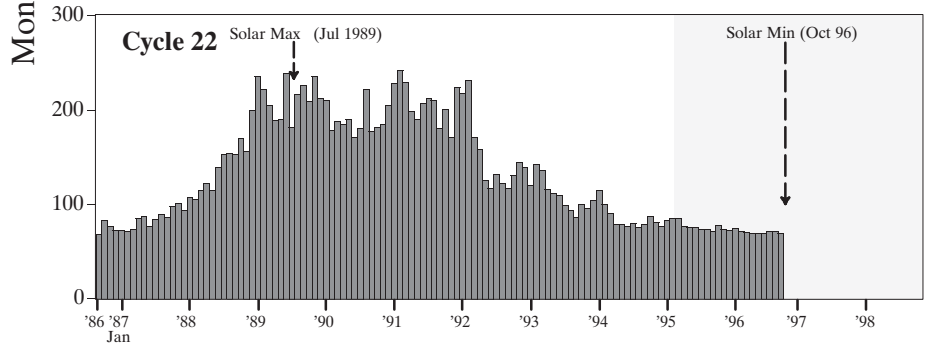
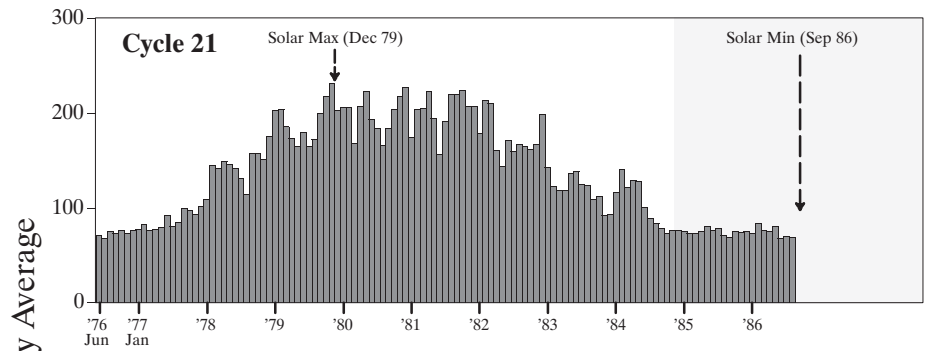
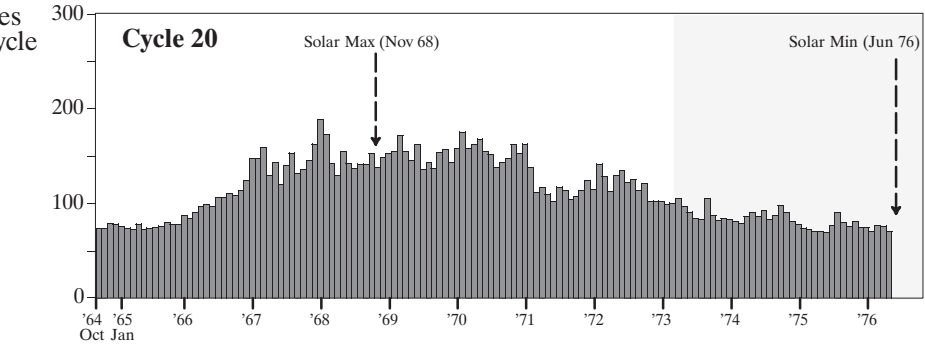
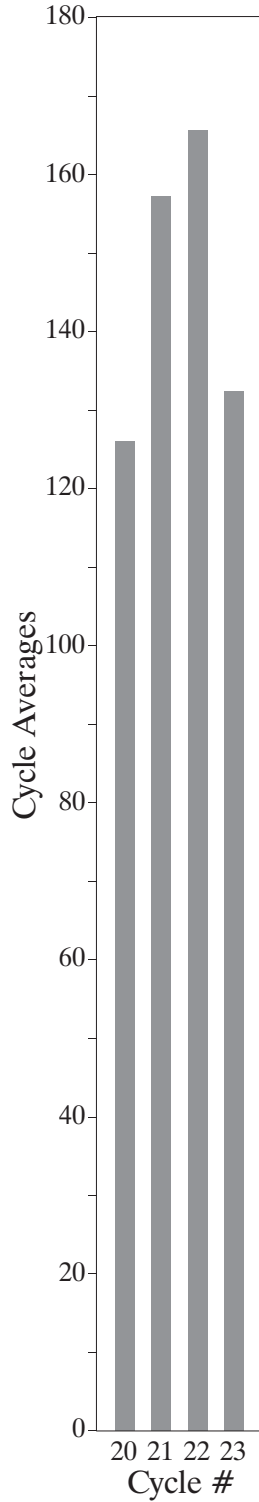


Space Environment Center

Solar Radio Flux (10.7 cm)

March 2006
(Month 114)

Comparison of Cycles at current month in cycle



K. Tegnell