

**Space Weather Highlights**  
**10 July – 16 July 2006**

**SEC PRF 1611**  
**18 July 2006**

Solar activity was at very low levels. Region 899 (S05, L=231, class/area, Dso/100 on 06 July) decayed to an simple alpha group by 13 July and was no longer visible by 14 July. New Region 900 (S05, L=139, class/area, Cao/050 on 15 July) appeared and was numbered on 14 July. This region showed little growth in area, however spot count did increase. No greater than 10 MeV proton events were observed. No greater than 2 MeV electron flux at geosynchronous orbit was at normal levels. The geomagnetic field ranged from quiet to active levels at middle latitudes, while quiet to minor storm levels were observed at high latitudes. Solar wind speed ranged from a low of around 320 km/s early on 11 July to a high of near 550 km/s late on 12 July. The period began with wind speed around 420 km/s with the IMF Bz rotating from approximately +3 nT to -5 nT as the effects of a glancing blow from the 06 July CME were still geoeffective. As a result, quiet to active periods were observed at middle latitudes with quiet to minor storm periods at high latitudes. Approximately midday on 11 July, a coronal hole high speed stream moved into geoeffective position. By late on 11 July, the IMF Bz oscillated between +/- 10 nT and solar wind speed began a slow rise to near 550 km/s by late on the 12th. The geomagnetic field responded with unsettled to minor storm conditions at high latitudes midday on 12 July with only several unsettled periods observed at middle latitudes. By midday on 13 July, solar wind speed began a gradual decline and the IMF Bz became quiet, not varying much beyond +/- 2 nT. These conditions persisted through midday on 14 July when the IMF Bz showed southward excursions to -10 nT due to effects from a solar sector boundary crossing. As a result, the geomagnetic field became unsettled to active at middle latitudes with minor storming at high latitudes on 14 July. By 15 July, the IMF Bz relaxed to not vary much beyond +/- 3 nT and the geomagnetic field became mostly quiet at all latitudes. The period ended with the wind speed around 375 km/s.

**Space Weather Outlook**  
**19 July – 14 August 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 19 July and again on 02 – 05 August.

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 25 – 26 July, and again on 31 July – 01 August. Active to minor storm periods are possible on 31 July – 01 August while unsettled to active periods are possible on 25 – 26 July and again on 07 – 08 August.



### Daily Solar Data

| Date    | Radio Flux<br>10.7 cm | Sun spot<br>No. | Sunspot Area<br>(10 <sup>-6</sup> hemi.) | X-ray Background | Flares     |   |   |         |   |   |   |   |
|---------|-----------------------|-----------------|--|------------------|------------|---|---|---------|---|---|---|---|
|         |                       |                 |  |                  | X-ray Flux |   |   | Optical |   |   |   |   |
|         |                       |                 |  |                  | C          | M | X | S       | 1 | 2 | 3 | 4 |
| 10 July | 73                    | 18              | 30                                       | A2.8             | 0          | 0 | 0 | 0       | 0 | 0 | 0 | 0 |
| 11 July | 71                    | 13              | 20                                       | A1.7             | 0          | 0 | 0 | 0       | 0 | 0 | 0 | 0 |
| 12 July | 71                    | 12              | 10                                       | <A1.0            | 0          | 0 | 0 | 0       | 0 | 0 | 0 | 0 |
| 13 July | 70                    | 11              | 1  | <A1.0            | 0          | 0 | 0 | 0       | 0 | 0 | 0 | 0 |
| 14 July | 71                    | 15              | 40                                       | <A1.0            | 0          | 0 | 0 | 0       | 0 | 0 | 0 | 0 |
| 15 July | 70                    | 17              | 50                                       | <A1.0            | 0          | 0 | 0 | 0       | 0 | 0 | 0 | 0 |
| 16 July | 71                    | 20              | 40                                       | <A1.0            | 0          | 0 | 0 | 0       | 0 | 0 | 0 | 0 |

### Daily Particle Data

| Date    | Proton Fluence<br>(protons/cm <sup>2</sup> -day-sr) |         |          | Electron Fluence<br>(electrons/cm <sup>2</sup> -day-sr) |        |        |
|---------|---|---------|----------|---|--------|--------|
|         | >1 MeV  | >10 MeV | >100 MeV | >.6 MeV   | >2MeV  | >4 MeV |
|         | 10 July   | 1.5E+6  | 1.5E+4   | 2.9E+3  |        | 9.5E+6 |
| 11 July | 7.3E+5  | 1.4E+4  | 2.7E+3   |   | 1.2E+6 |        |
| 12 July | 8.5E+5  | 1.5E+4  | 2.9E+3   |   | 1.9E+6 |        |
| 13 July | 3.9E+5  | 1.6E+4  | 4.0E+3   |   | 4.0E+6 |        |
| 14 July | 1.5E+6  | 1.5E+4  | 3.8E+3   |   | 5.3E+6 |        |
| 15 July | 3.1E+5  | 1.7E+4  | 4.0E+3   |   | 4.9E+6 |        |
| 16 July | 3.2E+5  | 1.6E+4  | 3.9E+3   |   | 9.1E+6 |        |

### Daily Geomagnetic Data

| Date    | Middle Latitude<br>Fredericksburg |                 | High Latitude<br>College |                 | Estimated<br>Planetary |                 |
|---------|-----------------------------------|-----------------|--------------------------|-----------------|------------------------|-----------------|
|         | A                                 | K-indices       | A                        | K-indices       | A                      | K-indices       |
|         | 10 July                           | 12              | 4-2-1-2-3-3-3-2          | 18              | 3-2-1-4-5-4-3-1        | 11              |
| 11 July | 5                                 | 0-1-1-1-2-2-2-2 | 4                        | 0-1-1-0-1-2-2-2 | 7                      | 1-1-1-2-2-2-3-3 |
| 12 July | 9                                 | 2-1-3-3-3-2-1-2 | 18                       | 2-2-3-5-5-2-2-2 | 12                     | 3-2-3-4-4-2-1-2 |
| 13 July | 3                                 | 1-2-1-1-0-1-1-1 | 5                        | 2-3-2-2-1-0-0-0 | 5                      | 2-2-2-1-1-1-0-2 |
| 14 July | 10                                | 1-2-1-1-4-3-3-2 | 17                       | 1-2-1-1-5-5-3-2 | 14                     | 1-1-0-2-3-4-4-3 |
| 15 July | 5                                 | 1-2-2-2-2-1-1-1 | 10                       | 1-2-2-4-4-1-1-0 | 6                      | 2-2-2-2-2-2-1-2 |
| 16 July | 2                                 | 0-2-1-1-0-1-1-0 | 2                        | 0-1-1-1-0-1-0-0 | 4                      | 1-2-1-0-1-1-0-1 |



### *Alerts and Warnings Issued*

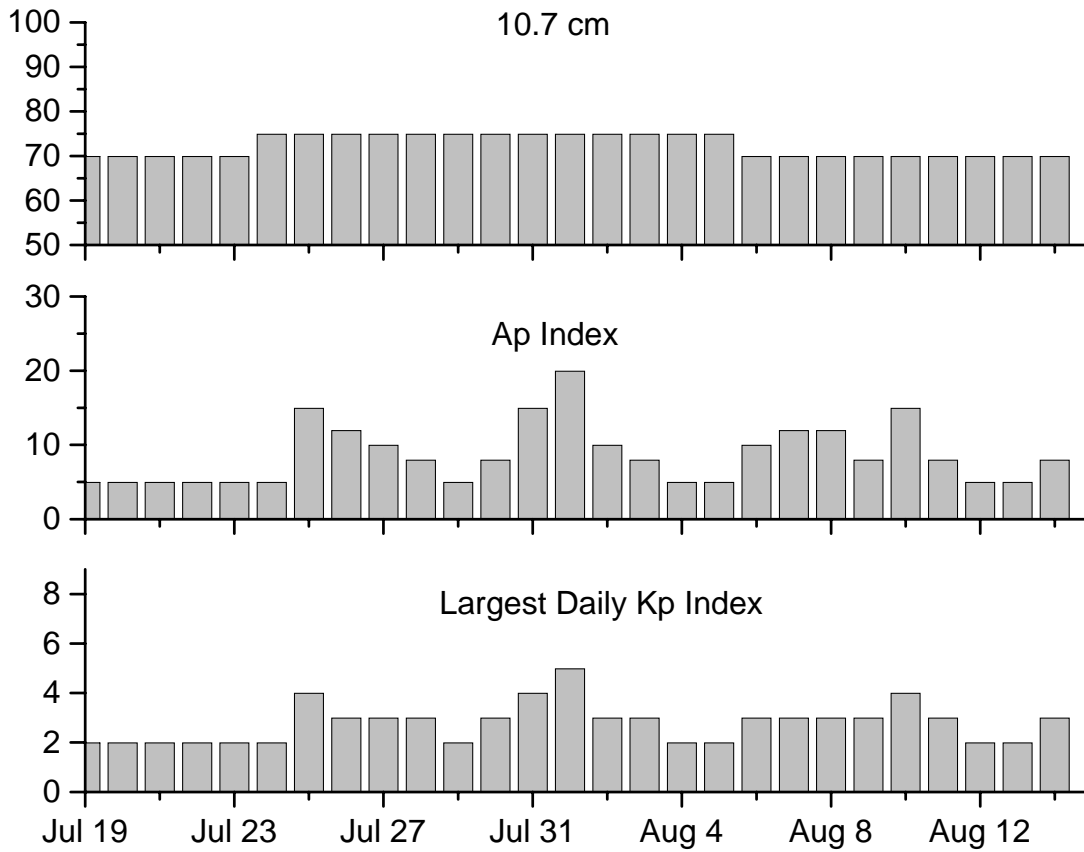
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| <u>Date &amp; Time of Issue</u> | <u>Type of Alert or Warning</u>     | <u>Date &amp; Time of Event UTC</u> |
|---------------------------------|-------------------------------------|-------------------------------------|
| 10 July 0007                    | SUMMARY: Geomagnetic Sudden Impulse | 09 July 2137                        |
| 12 July 0712                    | ALERT: Geomagnetic K=4              | 12 July 0711                        |
| 12 July 0713                    | WARNING: Geomagnetic K=4            | 12 July 0715                        |
| 12 July 1253                    | ALERT: Geomagnetic K=4              | 12 July 1253                        |
| 14 July 1651                    | ALERT: Geomagnetic K=4              | 14 July 1649                        |

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### Twenty-seven Day Outlook



| Date    | Radio Flux<br>10.7 cm | Planetary<br>A Index | Largest<br>Kp Index | Date   | Radio Flux<br>10.7 cm | Planetary<br>A Index | Largest<br>Kp Index |
|---------|-----------------------|----------------------|---------------------|--------|-----------------------|----------------------|---------------------|
| 19 July | 70                    | 5                    | 2                   | 02 Aug | 75                    | 10                   | 3                   |
| 20      | 70                    | 5                    | 2                   | 03     | 7                     | 58                   | 3                   |
| 21      | 70                    | 5                    | 2                   | 04     | 75                    | 5                    | 2                   |
| 22      | 70                    | 5                    | 2                   | 05     | 75                    | 5                    | 2                   |
| 23      | 70                    | 5                    | 2                   | 06     | 70                    | 10                   | 3                   |
| 24      | 70                    | 5                    | 2                   | 07     | 70                    | 12                   | 3                   |
| 25      | 75                    | 15                   | 4                   | 08     | 70                    | 12                   | 3                   |
| 26      | 75                    | 12                   | 3                   | 09     | 70                    | 8                    | 3                   |
| 27      | 75                    | 10                   | 3                   | 10     | 70                    | 15                   | 4                   |
| 28      | 75                    | 8                    | 3                   | 11     | 70                    | 8                    | 3                   |
| 29      | 75                    | 5                    | 2                   | 12     | 70                    | 5                    | 2                   |
| 30      | 75                    | 8                    | 3                   | 13     | 70                    | 5                    | 2                   |
| 31      | 75                    | 15                   | 4                   | 14     | 70                    | 8                    | 3                   |
| 01 Aug  | 75                    | 20                   | 5                   |        |                       |                      |                     |



***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         |

*No Events Observed*

***Flare List***

| Date    | Time          |     |     | Optical         | Imp /<br>Brtns | Location<br>Lat CMD | Rgn |
|---------|---------------|-----|-----|-----------------|----------------|---------------------|-----|
|         | Begin         | Max | End | X-ray<br>Class. |                |                     |     |
| 10 July | None Observed |     |     |                 |                |                     |     |
| 11 July | None Observed |     |     |                 |                |                     |     |
| 12 July | None Observed |     |     |                 |                |                     |     |
| 13 July | None Observed |     |     |                 |                |                     |     |
| 14 July | None Observed |     |     |                 |                |                     |     |
| 15 July | None Observed |     |     |                 |                |                     |     |
| 16 July | None Observed |     |     |                 |                |                     |     |

***Region Summary***

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

*Region 899*

|        |        |     |      |    |     |     |   |  |  |  |  |  |  |  |  |  |  |  |
|--------|--------|-----|------|----|-----|-----|---|--|--|--|--|--|--|--|--|--|--|--|
| 05 Jul | S05E69 | 232 | 0090 | 07 | Dro | 002 | B |  |  |  |  |  |  |  |  |  |  |  |
| 06 Jul | S05E56 | 231 | 0100 | 09 | Dso | 006 | B |  |  |  |  |  |  |  |  |  |  |  |
| 07 Jul | S05E40 | 234 | 0080 | 09 | Dao | 007 | B |  |  |  |  |  |  |  |  |  |  |  |
| 08 Jul | S05E27 | 234 | 0060 | 08 | Dao | 005 | B |  |  |  |  |  |  |  |  |  |  |  |
| 09 Jul | S06E15 | 233 | 0040 | 07 | Cao | 006 | B |  |  |  |  |  |  |  |  |  |  |  |
| 10 Jul | S06W05 | 240 | 0030 | 07 | Cso | 008 | B |  |  |  |  |  |  |  |  |  |  |  |
| 11 Jul | S06W18 | 240 | 0020 | 03 | Bxo | 003 | B |  |  |  |  |  |  |  |  |  |  |  |
| 12 Jul | S05W28 | 236 | 0010 | 04 | Bxo | 002 | B |  |  |  |  |  |  |  |  |  |  |  |
| 13 Jul | S05W41 | 236 | 0001 | 00 | Axx | 001 | A |  |  |  |  |  |  |  |  |  |  |  |
| 14 Jul | S04W53 | 235 |      |    |     |     |   |  |  |  |  |  |  |  |  |  |  |  |
| 15 Jul | S04W66 | 235 |      |    |     |     |   |  |  |  |  |  |  |  |  |  |  |  |
| 16 Jul | S04W79 | 235 |      |    |     |     |   |  |  |  |  |  |  |  |  |  |  |  |

0 0 0 0 0 0 0 0

Still on Disk.

Absolute heliographic longitude: 240



***Region Summary-Continued***

| Location |                |     | Sunspot Characteristics         |                   |               |               |              |       |   | X-ray |         |   | Optical |   |   |  |
|----------|----------------|-----|---------------------------------|-------------------|---------------|---------------|--------------|-------|---|-------|---------|---|---------|---|---|--|
| Date     | Helio          |     | Area<br>(10 <sup>-6</sup> hemi) | Extent<br>(helio) | Spot<br>Class | Spot<br>Count | Mag<br>Class | X-ray |   |       | Optical |   |         |   |   |  |
|          | ( ° Lat ° CMD) | Lon |                                 |                   |               |               |              | C     | M | X     | S       | 1 | 2       | 3 | 4 |  |

*Region 900*

|        |        |     |      |    |     |     |   |  |  |  |  |   |   |   |   |   |   |   |
|--------|--------|-----|------|----|-----|-----|---|--|--|--|--|---|---|---|---|---|---|---|
| 14 Jul | S05E43 | 139 | 0040 | 05 | Cso | 005 | B |  |  |  |  |   |   |   |   |   |   |   |
| 15 Jul | S05E30 | 139 | 0050 | 10 | Cao | 007 | B |  |  |  |  |   |   |   |   |   |   |   |
| 16 Jul | S06E16 | 140 | 0040 | 08 | Bxo | 010 | B |  |  |  |  |   |   |   |   |   |   |   |
|        |        |     |      |    |     |     |   |  |  |  |  | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

Still on Disk.

Absolute heliographic longitude: 140

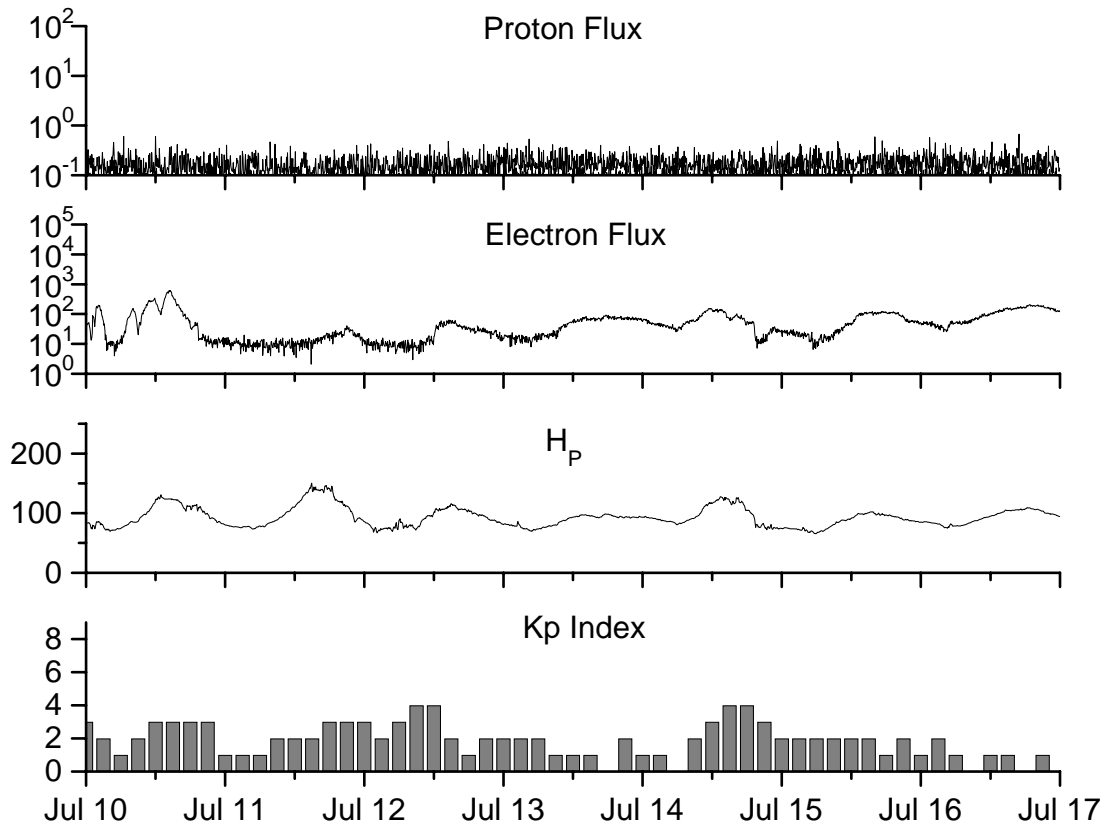


**Recent Solar Indices (preliminary)  
of the observed monthly mean values**

| Month       | Sunspot Numbers        |             |                 | Radio Flux           |                     | Geomagnetic           |                 |                 |                 |
|-------------|------------------------|-------------|-----------------|----------------------|---------------------|-----------------------|-----------------|-----------------|-----------------|
|             | Observed values<br>SEC | Ratio<br>RI | Ratio<br>RI/SEC | Smooth values<br>SEC | Smooth values<br>RI | *Penticton<br>10.7 cm | Smooth<br>Value | Planetary<br>Ap | Smooth<br>Value |
| <b>2004</b> |                        |             |                 |                      |                     |                       |                 |                 |                 |
| July        | 87.8                   | 51.0        | 0.58            | 68.3                 | 40.2                | 118.5                 | 105.9           | 23              | 13.8            |
| 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            |
| <b>2005</b> |                        |             |                 |                      |                     |                       |                 |                 |                 |
| 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            |
| <b>2006</b> |                        |             |                 |                      |                     |                       |                 |                 |                 |
| 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               |                 |

**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 10 July 2006*

*Protons* plot contains the five-minute averaged integral proton flux (protons/cm<sup>2</sup>-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/cm<sup>2</sup>-sec -sr) with energies greater than 2 MeV at GOES-12 (W075).

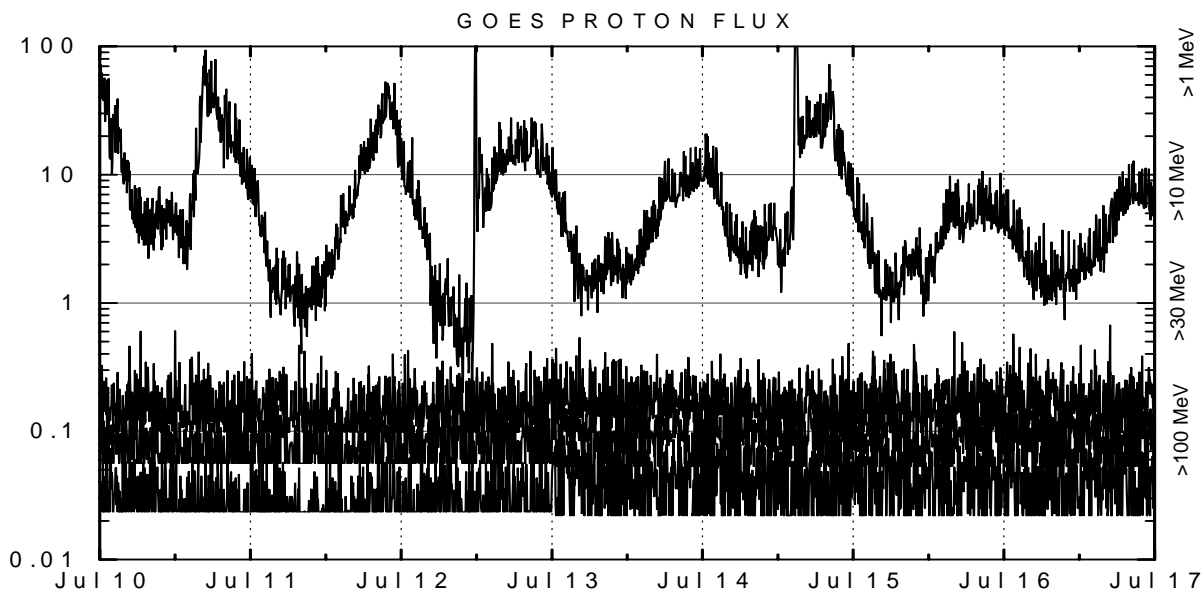
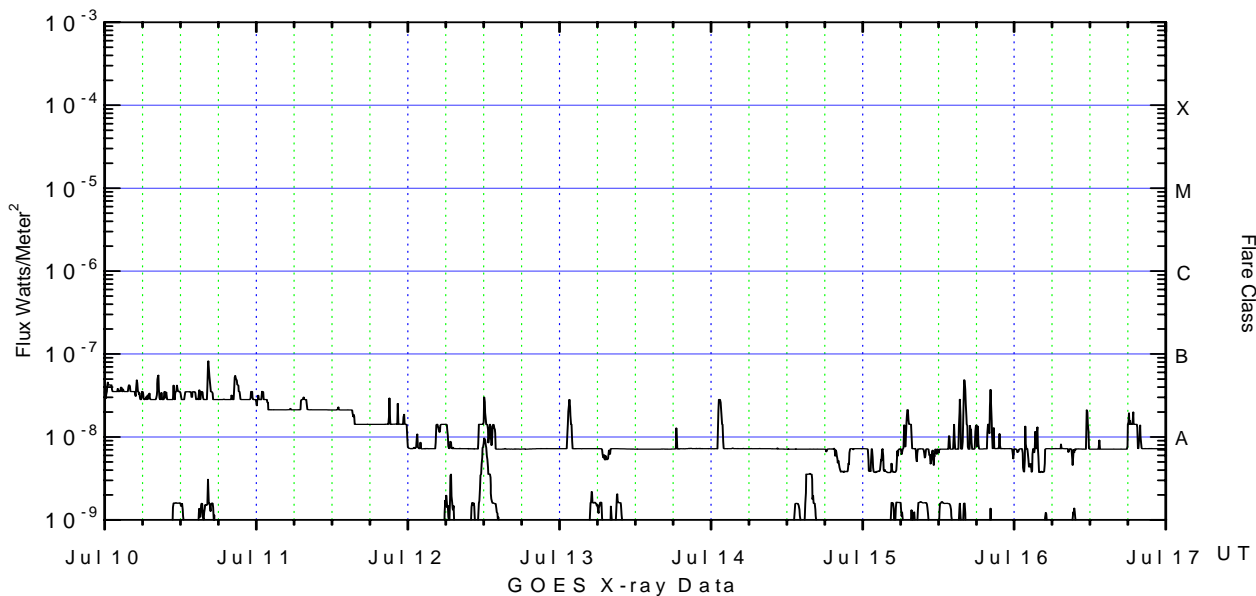
*H<sub>p</sub>* plot contains the five minute averaged magnetic field H - component in nanoteslas (nT) as measured by GOES-12. The H component is parallel to the spin axis of the satellite, which is nearly parallel to the Earth's rotation axis.

*K<sub>p</sub>* 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<sub>p</sub> 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<sup>2</sup>) as measured by GOES 12 (W75) and GOES 10 (W130) 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/cm<sup>2</sup>-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/cm<sup>2</sup>-sec-sr) at greater than 10 MeV.

