

## **Space Weather Highlights 18 - 24 August 2003**

**SWO PRF 1460  
19 August 2003**

Solar activity was at very low to low levels. The period began on 18 August with low level activity. Moderate activity was observed on 19 August with two M-class flares from Region 431 (S13, L=194, class/area/mag Ekc/500/Bgd on 14 August). The first M-flare was an impulsive M2/1n at 0759 UTC. The second M-flare was an M2.7/2f at 1006 UTC with associated Type II (614 km/s), Type IV radio sweeps and a CME that was not Earth directed. Activity on 20 – 24 August ranged from very low to low levels. A C4 flare occurred on 21 August from Region 431 beyond the west limb and a C1 flare occurred on 24 August from Region 436 (N07, L=88, class/area/mag Esi/170/B on 21 August). Region 431 continued its decay early in the period and rotated beyond the west limb on 21 August. Region 436 showed some growth and increasing magnetic complexity on 22 August but stabilized by 23 August. The only activity from this region has been minor C-class flares.

Solar wind data were available from the NASA Advanced Composition Explorer (ACE) spacecraft for most of the summary period. Late in the last summary period (17 August), a shock passed the NASA/ACE spacecraft at 1340 UTC with solar wind speeds near 550 km/s and Bz initially oriented northward. At 0100 UTC on 18 August, Bz turned southward to sustained values averaging about -15 nT with a peak near -25 nT. By 19 August the transient flow had passed, Bz returned to a northward orientation, and solar wind speeds decreased to 450 km/s. On 20 – 21 August, ACE solar wind data indicated the gradual onset of a coronal hole high-speed-stream with solar wind speed gradually increasing to 700 km/s and Bz fluctuating between +/- 10 nT.

There were no greater than 10 MeV proton events at geosynchronous orbit during the

The greater than 2 MeV electron flux at geosynchronous orbit reached high levels on 20 – 24 August.

Geomagnetic activity ranged from quiet to severe storm levels. On 18 August, as the shock passed ACE, the southward shift in Bz resulted in sustained minor to severe storm levels which continued until early on 19 August. The storm ended early on 19 August and geomagnetic activity diminished to quiet to active levels for the remainder of 19 August and through 20 August. Activity on 21 – 24 August ranged from unsettled to severe storm levels due to the onset of the coronal hole high speed stream. Isolated periods of major storm levels were observed on 21 – 22 August and isolated periods of severe storm levels were observed on 21 August and again on 23 August.

## **Space Weather Outlook 27 August - 22 September 2003**

Solar activity is expected to range from very low to low levels during the period. There is a slight chance of isolated moderate activity from returning Region 424 after 28 August.

No greater than 10 MeV proton events at geosynchronous orbit are expected during the period.

The greater than 2 MeV electron flux is expected to reach high levels on 05 – 07 September, 10 – 12 September and again on 20 – 22 September.

The geomagnetic field is expected to range from quiet to major storm levels. A returning coronal hole high speed stream is expected to produce active to major storm conditions on 02 – 05 September. Minor storm levels are possible from a smaller high speed stream on 08 – 09 September. Toward the end of the period a third coronal hole high speed stream is expected to return with active to major storm levels possible on 17 – 21 September.



### *Daily Solar Data*

| Date      | Radio Flux<br>10.7 cm | Sun spot 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 |
| 18 August | 116                   | 104          | 390                                      | B3.3             | 4          | 0 | 0 | 3       | 0 | 0 | 0 | 0 |
| 19 August | 117                   | 77           | 370                                      | B3.3             | 5          | 2 | 0 | 1       | 1 | 1 | 0 | 0 |
| 20 August | 112                   | 62           | 230                                      | B2.8             | 0          | 0 | 0 | 0       | 0 | 0 | 0 | 0 |
| 21 August | 119                   | 86           | 280                                      | B3.5             | 2          | 0 | 0 | 0       | 0 | 0 | 0 | 0 |
| 22 August | 121                   | 126          | 510                                      | B3.7             | 1          | 0 | 0 | 1       | 0 | 0 | 0 | 0 |
| 23 August | 120                   | 125          | 610                                      | B2.3             | 0          | 0 | 0 | 2       | 0 | 0 | 0 | 0 |
| 24 August | 116                   | 132          | 550                                      | B2.4             | 2          | 0 | 0 | 0       | 1 | 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) |        |       |
|-----------|---|--------|---------|---|--------|-------|
|           | >1MeV   | >10MeV | >100MeV | >.6MeV  | >2MeV  | >4MeV |
| 18 August | 2.0E+6  | 1.1E+4 | 2.2E+3  |   | 4.5E+6 |       |
| 19 August | 3.0E+5  | 1.4E+4 | 2.4E+3  |   | 1.5E+7 |       |
| 20 August | 5.7E+5  | 1.3E+4 | 2.4E+3  |   | 6.2E+7 |       |
| 21 August | 1.5E+6  | 1.2E+4 | 2.5E+3  |   | 1.8E+7 |       |
| 22 August | 7.3E+6  | 1.2E+4 | 2.6E+3  |   | 1.9E+8 |       |
| 23 August | 6.0E+6  | 1.2E+4 | 2.7E+3  |   | 6.0E+8 |       |
| 24 August | 4.0E+6  | 1.2E+4 | 2.7E+3  |   | 7.5E+8 |       |

### *Daily Geomagnetic Data*

| Date      | Middle Latitude<br>Fredericksburg |                 | High Latitude<br>College |                 | Estimated<br>Planetary |                 |
|-----------|-----------------------------------|-----------------|--------------------------|-----------------|------------------------|-----------------|
|           | A                                 | K-indices       | A                        | K-indices       | A                      | K-indices       |
|           | 18 August                         | 46              | 5-5-7-5-4-3-3-4          | 132             | 4-6-7-8-7-8-7-5        | 86              |
| 19 August | 18                                | 5-4-3-3-2-2-3-2 | 12                       | 4-3-2-2-2-3-2-2 | 21                     | 6-4-3-3-2-3-3-3 |
| 20 August | 12                                | 1-2-3-1-2-3-3-4 | 23                       | 1-3-4-5-5-3-3-3 | 15                     | 2-3-4-2-3-3-3-4 |
| 21 August | 29                                | 3-5-5-3-4-4-4-4 | 76                       | 3-4-7-6-7-6-6-5 | 53                     | 4-5-7-5-6-5-5-5 |
| 22 August | 25                                | 5-4-3-4-4-3-4-3 | 70                       | 4-5-7-6-7-6-4-3 | 43                     | 5-5-5-5-6-5-4-3 |
| 23 August | 26                                | 5-5-4-3-3-3-3-4 | 73                       | 4-4-8-6-7-5-3-2 | 44                     | 4-5-7-5-5-3-4-4 |
| 24 August | 14                                | 3-3-3-3-3-2-3-3 | 46                       | 3-3-6-7-6-3-3-2 | 24                     | 3-4-5-5-4-3-4-3 |

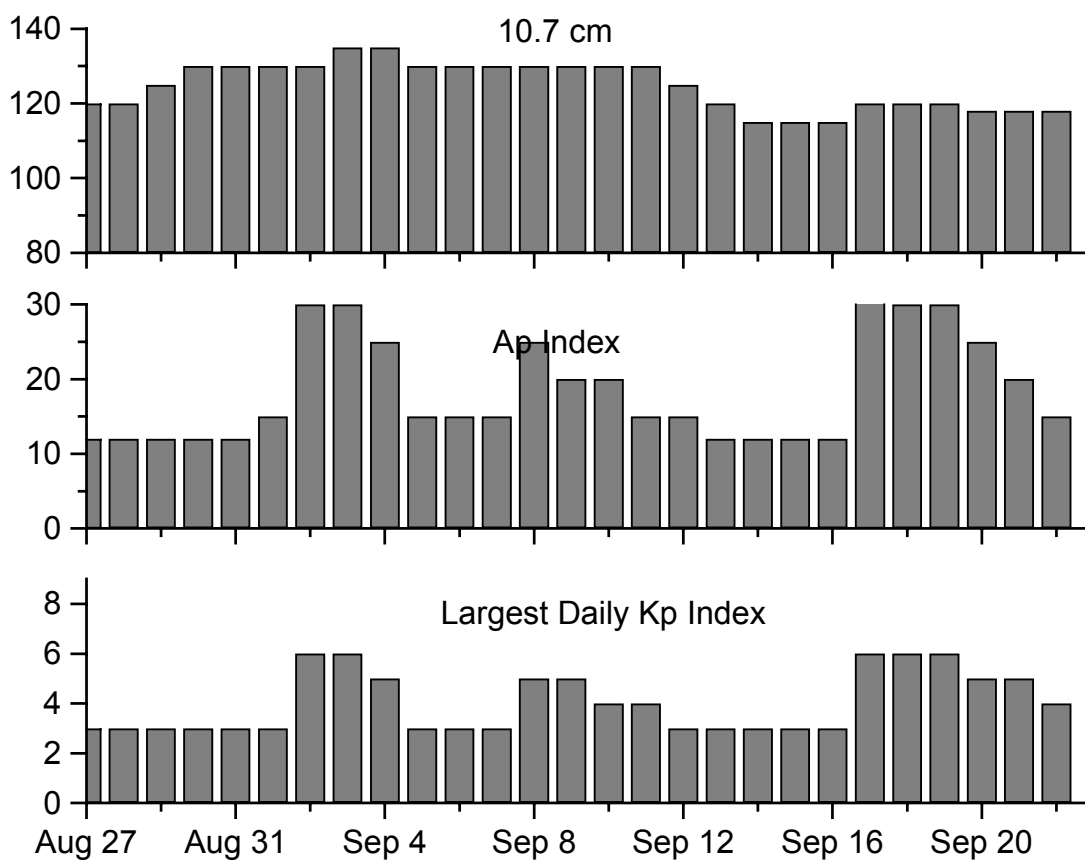


### *Alerts and Warnings Issued*

| Date & Time of Issue | Type of Alert or Warning                            | Date & Time of Event UT  |
|----------------------|---|--------------------------|
| 18 Aug 0009          | 2 - 245 MHz Radio Burst                             | 17 Aug                   |
| 18 Aug 0156          | WARNING: Geomagnetic K= 5 expected                  | 18 Aug 0200 - 1500       |
| 18 Aug 0241          | ALERT: Geomagnetic K= 5                             | 18 Aug 0240              |
| 18 Aug 0439          | WARNING: Geomagnetic K= 6                           | 18 Aug 0440 -1500        |
| 18 Aug 0641          | ALERT: Geomagnetic K= 6                             | 18 Aug 0641              |
| 18 Aug 0717          | WARNING: Geomagnetic K $\geq$ 7                     | 18 Aug 0717 - 1500       |
| 18 Aug 0727          | ALERT: Geomagnetic K=7                              | 18 Aug 0721              |
| 18 Aug 0950          | ALERT: Geomagnetic K= 6                             | 18 Aug 0950              |
| 18 Aug 1036          | ALERT: Geomagnetic K= 7                             | 18 Aug 1036              |
| 18 Aug 1437          | EXTENDED WARNING: Geomagnetic K=5                   | 18 Aug 0200 - 2359       |
| 18 Aug 2327          | EXTENDED WARNING: Geomagnetic K= 5                  | 18 Aug 0200 -19 Aug 1500 |
| 19 Aug 0850          | ALERT: Type II Radio Emission                       | 19 Aug 0804              |
| 19 Aug 1057          | SUMMARY: 10cm Radio Burst                           | 19 Aug 0947              |
| 19 Aug 1101          | ALERT: Type IV Radio Emission                       | 19 Aug 1001              |
| 19 Aug 2229          | WATCH: Geomagnetic A $\geq$ 20                      | 22 Aug                   |
| 20 Aug 0010          | 5 - 245 MHz Bursts                                  | 19 Aug                   |
| 20 Aug 0811          | ALERT: Electron 2MeV Integral Flux > 1000pfu        | 20 Aug 0615              |
| 20 Aug 0858          | WARNING: Geomagnetic K= 4                           | 20 Aug 0900 - 1500       |
| 20 Aug 0902          | ALERT: Geomagnetic K= 4                             | 20 Aug 0900              |
| 20 Aug 1432          | CANCEL ALERT: Electron 2MeV Integral Flux > 1000pfu | 20 Aug 0811              |
| 20 Aug 1433          | ALERT: Electron 2MeV Integral Flux > 1000pfu        | 20 Aug 1145              |
| 20 Aug 1715          | ALERT: Geomagnetic K= 4                             | 20 Aug 1713              |
| 20 Aug 2001          | WATCH: Geomagnetic A $\geq$ 20                      | 23 Aug                   |
| 20 Aug 2358          | WARNING: Geomagnetic K= 4                           | 20 Aug 2359 -21 Aug 1500 |
| 21 Aug 0001          | ALERT: Geomagnetic K= 4                             | 20 Aug 2359              |
| 21 Aug 0326          | WARNING: Geomagnetic K- 5                           | 21 Aug 0327 - 1500       |
| 21 Aug 0335          | ALERT: Geomagnetic K= 5                             | 21 Aug 0335              |
| 21 Aug 0657          | ALERT: Geomagnetic K= 6                             | 21 Aug 0658              |
| 21 Aug 0707          | WARNING: Geomagnetic K $\geq$ 7                     | 21 Aug 0708 - 0900       |
| 21 Aug 0712          | ALERT: Geomagnetic K=7                              | 21 Aug 0712              |
| 21 Aug 1432          | EXTENDED WARNING: Geomagnetic K= 5                  | 21 Aug 0327 -2359        |
| 21 Aug 2120          | WATCH: Geomagnetic A $\geq$ 20                      | 24 Aug                   |
| 21 Aug 2122          | EXTENDED WARNING: Geomagnetic K= 5                  | 21 Aug 0327 -22 Aug 2359 |
| 22 Aug 0012          | 2 - 245 MHz Bursts                                  | 21 Aug                   |
| 22 Aug 0239          | WARNING: Geomagnetic K= 6                           | 22 Aug 0240 - 0600       |
| 22 Aug 0254          | ALERT: Geomagnetic K= 6                             | 22 Aug 0254              |
| 22 Aug 1031          | ALERT: Electron 2MeV Integral Flux > 1000pfu        | 22 Aug 1010              |
| 22 Aug 1854          | EXTENDED WARNING: Geomagnetic K= 5                  | 21 Aug 0327 -23 Aug 1500 |
| 22 Aug 1959          | WATCH: Geomagnetic A= 20                            | 25 Aug                   |
| 23 Aug 0334          | ALERT: Geomagnetic K= 6                             | 23 Aug 0331              |
| 23 Aug 0542          | ALERT: Electron 2MeV Integral Flux > 1000pfu        | 23 Aug 0500              |
| 23 Aug 1443          | EXTENDED WARNING: Geomagnetic K= 5                  | 21 Aug 0327 -23 Aug 2359 |
| 23 Aug 2311          | WATCH: Geomagnetic A $\geq$ 20                      | 26 Aug                   |
| 23 Aug 2354          | EXTENDED WARNING: Geomagnetic K= 5                  | 21 Aug 0327 -24 Aug 1500 |
| 24 Aug 0532          | ALERT: Electron 2MeV Integral Flux > 1000pfu        | 24 Aug 0500              |
| 24 Aug 1458          | WARNING: Geomagnetic K= 4                           | 24 Aug 1459 -25 Aug 1500 |
| 24 Aug 2001          | CANCEL WATCH: Geomagnetic A $\geq$ 20               | 23 Aug 2311              |



### 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 |
|--------|-----------------------|----------------------|---------------------|--------|-----------------------|----------------------|---------------------|
| 27 Aug | 120                   | 12                   | 3                   | 10 Sep | 135                   | 20                   | 4                   |
| 28     | 120                   | 12                   | 3                   | 11     | 135                   | 15                   | 4                   |
| 29     | 125                   | 12                   | 3                   | 12     | 130                   | 15                   | 3                   |
| 30     | 130                   | 12                   | 3                   | 13     | 130                   | 12                   | 3                   |
| 31     | 130                   | 12                   | 3                   | 14     | 130                   | 12                   | 3                   |
| 01 Sep | 130                   | 15                   | 3                   | 15     | 130                   | 12                   | 3                   |
| 02     | 130                   | 30                   | 6                   | 16     | 130                   | 12                   | 3                   |
| 03     | 135                   | 30                   | 6                   | 17     | 130                   | 40                   | 6                   |
| 04     | 135                   | 25                   | 5                   | 18     | 130                   | 30                   | 6                   |
| 05     | 130                   | 15                   | 3                   | 19     | 130                   | 30                   | 6                   |
| 06     | 130                   | 15                   | 3                   | 20     | 130                   | 25                   | 5                   |
| 07     | 130                   | 15                   | 3                   | 21     | 130                   | 20                   | 5                   |
| 08     | 130                   | 25                   | 5                   | 22     | 125                   | 15                   | 4                   |
| 09     | 130                   | 20                   | 5                   |        |                       |                      |                     |



### *Energetic Events*

| Date   | Time  |      | X-ray         |       | Optical Information |          |         | Peak       |     | Sweep Freq |    |    |
|--------|-------|------|---------------|-------|---------------------|----------|---------|------------|-----|------------|----|----|
|        | Begin | Max  | $\frac{1}{2}$ | Integ | Imp/                | Location | Rgn     | Radio Flux |     | Intensity  |    |    |
|        |       |      | Max           | Class | Flux                | Brtns    | Lat CMD | #          | 245 | 2695       | II | IV |
| 19 Aug | 0738  | 0759 | 0801          | M2.0  | .006                | 1n       | S12W63  | 431        | 580 | 39         |    |    |
| 19 Aug | 0945  | 1006 | 1025          | M2.7  | .043                | 2f       | S10W57  | 431        | 170 | 230        | 2  | 1  |

### *Flare List*

| Date      | Time               |      |      | X-ray<br>Class. | Imp /<br>Brtns | Optical<br>Location<br>Lat CMD | Rgn |
|-----------|--------------------|------|------|-----------------|----------------|--------------------------------|-----|
|           | Begin              | Max  | End  |                 |                |                                |     |
| 18 August | 0002               | 0005 | 0008 | B6.8            |                |                                |     |
|           | 0240               | 0240 | 0251 |                 | Sf             | S14W44                         | 431 |
|           | 0253               | 0254 | 0257 |                 | Sf             | S14W44                         | 431 |
|           | 0430               | 0434 | 0443 | B7.8            |                |                                |     |
|           | 0902               | 0905 | 0914 | C2.4            | Sf             | S11W49                         | 431 |
|           | 1418               | 1425 | 1430 | B7.0            |                |                                | 431 |
|           | 1500               | 1507 | 1517 | C1.3            |                |                                | 431 |
|           | 1559               | 1605 | 1611 | C1.1            |                |                                | 431 |
|           | 1732               | 1742 | 1748 | C1.4            |                |                                | 431 |
|           | 2054               | 2057 | 2059 | B5.4            |                |                                |     |
| 19 August | 0222               | 0225 | 0232 | B5.4            |                |                                |     |
|           | 0422               | 0427 | 0431 | C1.1            |                |                                |     |
|           | 0756               | 0759 | 0808 | M2.0            | 1n             | S12W63                         | 431 |
|           | 0846               | 0852 | 0855 | C2.8            |                |                                |     |
|           | 0906               | 0915 | 0933 | C2.0            |                |                                |     |
|           | 0950               | 0957 | 1043 | M2.7            | 2f             | S10W57                         | 431 |
|           | 1743               | 1746 | 1748 | C1.0            |                |                                |     |
| 1821      | 1824               | 1837 | C5.6 | Sf              | N12E53         | 436                            |     |
| 20 August | No Flares Observed |      |      |                 |                |                                |     |
| 21 August | 1515               | 1522 | 1525 | C4.9            |                |                                | 431 |
|           | 1624               | 1628 | 1637 | B7.6            |                |                                | 431 |
|           | 1713               | 1718 | 1722 | B9.6            |                |                                |     |
|           | 1727               | 1731 | 1737 | C1.4            |                |                                | 431 |
| 22 August | 0326               | 0350 | 0458 | C1.9            |                |                                | 436 |
|           | 1607               | 1610 | 1619 |                 | Sf             | N11E07                         | 436 |
| 23 August | 0014               | 0014 | 0020 | B6.9            | Sf             | N12E40                         | 441 |
|           | 0016               | 0016 | 0026 |                 | Sf             | N12E33                         | 441 |
| 24 August | 0413               | 0415 | 0436 | C1.2            | 1f             | N08W21                         | 436 |
|           | 2332               | 2337 | 2339 | C1.1            |                |                                | 436 |



### Region Summary

| Date              | Location      |     | Sunspot Characteristics         |                   |               |               | Flares       |       |   |   |         |   |   |   |   |  |  |  |
|-------------------|---------------|-----|---------------------------------|-------------------|---------------|---------------|--------------|-------|---|---|---------|---|---|---|---|--|--|--|
|                   | 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 |  |  |  |
| <i>Region 431</i> |               |     |                                 |                   |               |               |              |       |   |   |         |   |   |   |   |  |  |  |
| 09 Aug            | S12E68        | 195 | 0110                            | 11                | Eso           | 006           | B            |       |   |   |         |   |   |   |   |  |  |  |
| 10 Aug            | S13E56        | 194 | 0250                            | 11                | Eac           | 016           | Bg           | 1     |   |   |         | 1 |   |   |   |  |  |  |
| 11 Aug            | S13E43        | 194 | 0160                            | 12                | Eac           | 029           | Bg           |       |   |   |         |   |   |   |   |  |  |  |
| 12 Aug            | S13E30        | 194 | 0130                            | 10                | Dac           | 031           | Bg           | 3     |   |   |         | 2 |   |   |   |  |  |  |
| 13 Aug            | S13E17        | 194 | 0500                            | 12                | Ekc           | 039           | Bgd          | 6     |   |   |         | 4 |   |   |   |  |  |  |
| 14 Aug            | S13E03        | 194 | 0500                            | 11                | Ekc           | 046           | Bgd          | 4     |   |   |         | 2 |   |   |   |  |  |  |
| 15 Aug            | S11W13        | 197 | 0470                            | 12                | Eac           | 040           | Bgd          | 6     |   |   |         | 5 |   |   |   |  |  |  |
| 16 Aug            | S12W26        | 197 | 0400                            | 13                | Eac           | 035           | Bgd          | 4     |   |   |         | 1 |   |   |   |  |  |  |
| 17 Aug            | S10W38        | 196 | 0360                            | 11                | Eai           | 041           | Bg           | 2     |   |   |         | 2 |   |   |   |  |  |  |
| 18 Aug            | S10W52        | 197 | 0180                            | 14                | Eai           | 040           | Bg           | 4     |   |   |         | 3 |   |   |   |  |  |  |
| 19 Aug            | S11W67        | 198 | 0180                            | 13                | Eai           | 012           | Bg           |       | 2 |   |         | 1 | 1 |   |   |  |  |  |
| 20 Aug            | S10W84        | 202 | 0100                            | 06                | Cso           | 005           | B            |       |   |   |         |   |   |   |   |  |  |  |
| 21 Aug            | S10W97        | 202 |                                 |                   |               |               |              |       | 2 |   |         |   |   |   |   |  |  |  |
|                   |               |     |                                 |                   |               |               |              | 32    | 2 | 0 | 20      | 1 | 1 | 0 | 0 |  |  |  |

Crossed West Limb.

Absolute heliographic longitude: 194

#### *Region 432*

|        |        |     |      |    |     |     |   |   |   |   |   |   |   |   |   |   |   |  |
|--------|--------|-----|------|----|-----|-----|---|---|---|---|---|---|---|---|---|---|---|--|
| 13 Aug | S05E71 | 140 | 0030 | 01 | Hsx | 001 | A |   |   |   |   |   |   |   |   |   |   |  |
| 14 Aug | S05E57 | 140 | 0030 | 01 | Hsx | 001 | A |   |   |   |   |   |   |   |   |   |   |  |
| 15 Aug | S04E43 | 141 | 0020 | 01 | Hsx | 001 | A |   |   |   |   |   |   |   |   |   |   |  |
| 16 Aug | S04E29 | 142 | 0020 | 02 | Hrx | 001 | A |   |   |   |   |   |   |   |   |   |   |  |
| 17 Aug | S04E18 | 140 | 0020 | 01 | Hsx | 001 | A |   |   |   |   |   |   |   |   |   |   |  |
| 18 Aug | S02E03 | 142 | 0020 | 01 | Hrx | 001 | A |   |   |   |   |   |   |   |   |   |   |  |
| 19 Aug | S03W12 | 143 | 0010 | 01 | Hsx | 001 | A |   |   |   |   |   |   |   |   |   |   |  |
| 20 Aug | S03W25 | 143 |      |    |     |     |   |   |   |   |   |   |   |   |   |   |   |  |
| 21 Aug | S03W38 | 143 |      |    |     |     |   |   |   |   |   |   |   |   |   |   |   |  |
| 22 Aug | S03W51 | 143 |      |    |     |     |   |   |   |   |   |   |   |   |   |   |   |  |
| 23 Aug | S03W64 | 143 |      |    |     |     |   |   |   |   |   |   |   |   |   |   |   |  |
| 24 Aug | S03W77 | 143 |      |    |     |     |   |   |   |   |   |   |   |   |   |   |   |  |
|        |        |     |      |    |     |     |   | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |  |

Still on Disk.

Absolute heliographic longitude: 142



**Region Summary - continued.**

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

*Region 433*

|               |     |      |    |     |     |   |  |  |  |  |  |  |  |  |  |  |  |  |
|---------------|-----|------|----|-----|-----|---|--|--|--|--|--|--|--|--|--|--|--|--|
| 14 Aug S23E18 | 179 | 0010 | 08 | Bxo | 002 | B |  |  |  |  |  |  |  |  |  |  |  |  |
| 15 Aug S19E10 | 174 | 0020 | 03 | Cso | 003 | B |  |  |  |  |  |  |  |  |  |  |  |  |
| 16 Aug S20W04 | 175 | 0020 | 02 | Hrx | 001 | A |  |  |  |  |  |  |  |  |  |  |  |  |
| 17 Aug S20W16 | 174 | 0020 | 01 | Hax | 001 | A |  |  |  |  |  |  |  |  |  |  |  |  |
| 18 Aug S20W31 | 176 | 0010 | 01 | Hrx | 001 | A |  |  |  |  |  |  |  |  |  |  |  |  |
| 19 Aug S19W45 | 176 | 0010 | 01 | Hrx | 001 | A |  |  |  |  |  |  |  |  |  |  |  |  |
| 20 Aug S20W58 | 176 | 0000 | 01 | Axx | 001 | A |  |  |  |  |  |  |  |  |  |  |  |  |
| 21 Aug S20W71 | 176 |      |    |     |     |   |  |  |  |  |  |  |  |  |  |  |  |  |
| 22 Aug S20W84 | 176 |      |    |     |     |   |  |  |  |  |  |  |  |  |  |  |  |  |

0 0 0 0 0 0 0 0

Crossed West Limb.

Absolute heliographic longitude: 175

*Region 434*

|               |     |      |    |     |     |   |  |  |  |  |  |  |  |  |  |  |  |  |
|---------------|-----|------|----|-----|-----|---|--|--|--|--|--|--|--|--|--|--|--|--|
| 15 Aug S23E02 | 182 | 0030 | 03 | Bxo | 002 | B |  |  |  |  |  |  |  |  |  |  |  |  |
| 16 Aug S23W10 | 181 | 0020 | 04 | Dro | 004 | B |  |  |  |  |  |  |  |  |  |  |  |  |
| 17 Aug S23W20 | 178 | 0010 | 05 | Bxo | 002 | B |  |  |  |  |  |  |  |  |  |  |  |  |
| 18 Aug S23W33 | 178 |      |    |     |     |   |  |  |  |  |  |  |  |  |  |  |  |  |
| 19 Aug S23W46 | 177 |      |    |     |     |   |  |  |  |  |  |  |  |  |  |  |  |  |

0 0 0 0 0 0 0 0

Crossed West Limb.

Absolute heliographic longitude: 182

*Region 435*

|               |     |      |    |     |     |   |  |  |  |  |  |  |  |  |  |  |  |  |
|---------------|-----|------|----|-----|-----|---|--|--|--|--|--|--|--|--|--|--|--|--|
| 16 Aug S18W41 | 212 | 0010 | 01 | Axx | 001 | A |  |  |  |  |  |  |  |  |  |  |  |  |
| 17 Aug S18W52 | 210 | 0020 | 05 | Cro | 005 | B |  |  |  |  |  |  |  |  |  |  |  |  |
| 18 Aug S17W67 | 212 | 0020 | 02 | Dso | 002 | B |  |  |  |  |  |  |  |  |  |  |  |  |
| 19 Aug S17W80 | 212 |      |    |     |     |   |  |  |  |  |  |  |  |  |  |  |  |  |

0 0 0 0 0 0 0 0

Crossed West Limb.

Absolute heliographic longitude: 212

*Region 436*

|               |     |      |    |     |     |    |   |  |  |  |   |  |  |   |  |  |  |  |
|---------------|-----|------|----|-----|-----|----|---|--|--|--|---|--|--|---|--|--|--|--|
| 17 Aug N07E69 | 089 | 0110 | 11 | Eso | 003 | B  |   |  |  |  |   |  |  |   |  |  |  |  |
| 18 Aug N08E57 | 088 | 0160 | 14 | Eao | 010 | B  |   |  |  |  |   |  |  |   |  |  |  |  |
| 19 Aug N08E42 | 089 | 0160 | 14 | Eao | 012 | B  | 1 |  |  |  | 1 |  |  |   |  |  |  |  |
| 20 Aug N07E29 | 089 | 0120 | 13 | Eao | 015 | B  |   |  |  |  |   |  |  |   |  |  |  |  |
| 21 Aug N07E17 | 088 | 0170 | 13 | Esi | 021 | B  |   |  |  |  |   |  |  |   |  |  |  |  |
| 22 Aug N07E03 | 089 | 0230 | 13 | Eac | 032 | Bg | 1 |  |  |  | 1 |  |  |   |  |  |  |  |
| 23 Aug N07W12 | 091 | 0210 | 13 | Eac | 023 | B  |   |  |  |  |   |  |  |   |  |  |  |  |
| 24 Aug N08W26 | 091 | 0210 | 15 | Eac | 028 | B  | 2 |  |  |  |   |  |  | 1 |  |  |  |  |

4 0 0 2 1 0 0 0

Still on Disk.

Absolute heliographic longitude: 089



**Region Summary - continued.**

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

*Region 437*

|               |     |      |    |     |     |   |
|---------------|-----|------|----|-----|-----|---|
| 19 Aug S22W27 | 158 | 0010 | 01 | Hrx | 001 | A |
| 20 Aug S22W39 | 157 | 0010 | 01 | Axx | 001 | A |
| 21 Aug S22W52 | 157 |      |    |     |     |   |
| 22 Aug S22W65 | 157 |      |    |     |     |   |
| 23 Aug S22W78 | 157 |      |    |     |     |   |
| 24 Aug S22W91 | 157 |      |    |     |     |   |

0 0 0 0 0 0 0 0

Still on Disk.

Absolute heliographic longitude: 158

*Region 438*

|               |     |      |    |     |     |   |
|---------------|-----|------|----|-----|-----|---|
| 21 Aug S31W31 | 136 | 0010 | 01 | Axx | 001 | A |
| 22 Aug S31W44 | 136 |      |    |     |     |   |
| 23 Aug S31W57 | 136 |      |    |     |     |   |
| 24 Aug S31W70 | 136 |      |    |     |     |   |

0 0 0 0 0 0 0 0

Still on Disk.

Absolute heliographic longitude: 136

*Region 439*

|               |     |      |    |     |     |   |
|---------------|-----|------|----|-----|-----|---|
| 21 Aug N08W23 | 128 | 0040 | 03 | Dso | 005 | B |
| 22 Aug N08W38 | 130 | 0040 | 04 | Dso | 005 | B |
| 23 Aug N07W51 | 130 | 0030 | 05 | Dso | 006 | B |
| 24 Aug N07W64 | 129 | 0040 | 03 | Cso | 003 | B |

0 0 0 0 0 0 0 0

Still on Disk.

Absolute heliographic longitude: 128

*Region 440*

|               |     |      |    |     |     |   |
|---------------|-----|------|----|-----|-----|---|
| 21 Aug S08E12 | 093 | 0020 | 03 | Cso | 005 | B |
| 22 Aug S07W06 | 098 | 0090 | 06 | Dso | 015 | B |
| 23 Aug S08W20 | 099 | 0090 | 07 | Dso | 012 | B |
| 24 Aug S08W33 | 098 | 0060 | 07 | Dso | 009 | B |

0 0 0 0 0 0 0 0

Still on Disk.

Absolute heliographic longitude: 098





**Region Summary - continued.**

| Date                                 | Location       |       | Sunspot Characteristics         |                   |               |               | Flares       |       |   |   |         |   |   |   |   |   |   |   |
|--------------------------------------|----------------|-------|---------------------------------|-------------------|---------------|---------------|--------------|-------|---|---|---------|---|---|---|---|---|---|---|
|                                      | ( ° Lat ° CMD) | Helio | Area<br>(10 <sup>-6</sup> hemi) | Extent<br>(helio) | Spot<br>Class | Spot<br>Count | Mag<br>Class | X-ray |   |   | Optical |   |   |   |   |   |   |   |
|                                      |                | Lon   |                                 |                   |               |               |              | C     | M | X | S       | 1 | 2 | 3 | 4 |   |   |   |
| <i>Region 441</i>                    |                |       |                                 |                   |               |               |              |       |   |   |         |   |   |   |   |   |   |   |
| 21 Aug                               | N12E48         | 057   | 0040                            | 05                | Dso           | 004           | B            |       |   |   |         |   |   |   |   |   |   |   |
| 22 Aug                               | N12E33         | 059   | 0030                            | 06                | Dso           | 007           | B            |       |   |   |         |   |   |   |   |   |   |   |
| 23 Aug                               | N11E19         | 060   | 0080                            | 05                | Dso           | 017           | B            |       |   |   |         | 2 |   |   |   |   |   |   |
| 24 Aug                               | N12E06         | 059   | 0100                            | 07                | Dao           | 024           | B            |       |   |   |         |   |   |   |   |   |   |   |
|                                      |                |       |                                 |                   |               |               |              | 0     | 0 | 0 | 2       | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Still on Disk.                       |                |       |                                 |                   |               |               |              |       |   |   |         |   |   |   |   |   |   |   |
| Absolute heliographic longitude: 059 |                |       |                                 |                   |               |               |              |       |   |   |         |   |   |   |   |   |   |   |
| <i>Region 442</i>                    |                |       |                                 |                   |               |               |              |       |   |   |         |   |   |   |   |   |   |   |
| 22 Aug                               | S12E65         | 027   | 0110                            | 10                | Dao           | 003           | B            |       |   |   |         |   |   |   |   |   |   |   |
| 23 Aug                               | S12E54         | 025   | 0160                            | 08                | Dso           | 004           | B            |       |   |   |         |   |   |   |   |   |   |   |
| 24 Aug                               | S12E43         | 022   | 0130                            | 09                | Dao           | 006           | B            |       |   |   |         |   |   |   |   |   |   |   |
|                                      |                |       |                                 |                   |               |               |              | 0     | 0 | 0 | 0       | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Still on Disk.                       |                |       |                                 |                   |               |               |              |       |   |   |         |   |   |   |   |   |   |   |
| Absolute heliographic longitude: 022 |                |       |                                 |                   |               |               |              |       |   |   |         |   |   |   |   |   |   |   |
| <i>Region 443</i>                    |                |       |                                 |                   |               |               |              |       |   |   |         |   |   |   |   |   |   |   |
| 22 Aug                               | N15E09         | 083   | 0010                            | 02                | Axx           | 004           | A            |       |   |   |         |   |   |   |   |   |   |   |
| 23 Aug                               | N15W04         | 083   |                                 |                   |               |               |              |       |   |   |         |   |   |   |   |   |   |   |
| 24 Aug                               | N15W17         | 083   |                                 |                   |               |               |              |       |   |   |         |   |   |   |   |   |   |   |
|                                      |                |       |                                 |                   |               |               |              | 0     | 0 | 0 | 0       | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Still on Disk.                       |                |       |                                 |                   |               |               |              |       |   |   |         |   |   |   |   |   |   |   |
| Absolute heliographic longitude: 083 |                |       |                                 |                   |               |               |              |       |   |   |         |   |   |   |   |   |   |   |
| <i>Region 444</i>                    |                |       |                                 |                   |               |               |              |       |   |   |         |   |   |   |   |   |   |   |
| 23 Aug                               | N09E60         | 019   | 0040                            | 02                | Hsx           | 003           | B            |       |   |   |         |   |   |   |   |   |   |   |
| 24 Aug                               | N09E44         | 021   | 0010                            | 01                | Axx           | 002           | A            |       |   |   |         |   |   |   |   |   |   |   |
|                                      |                |       |                                 |                   |               |               |              | 0     | 0 | 0 | 0       | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Still on Disk.                       |                |       |                                 |                   |               |               |              |       |   |   |         |   |   |   |   |   |   |   |
| Absolute heliographic longitude: 021 |                |       |                                 |                   |               |               |              |       |   |   |         |   |   |   |   |   |   |   |

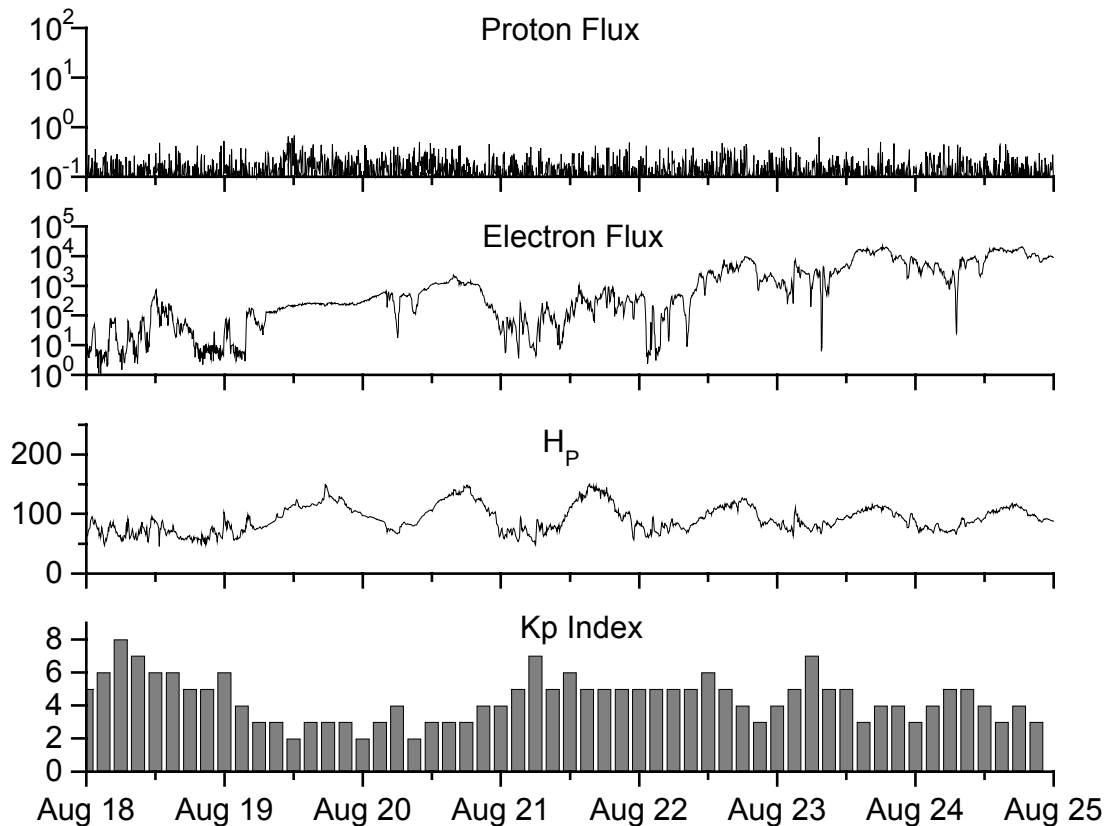


**Recent Solar Indices (preliminary)  
of the observed monthly mean values**

| Month       | Sunspot Numbers        |             |                 | Radio Flux           |                     | Geomagnetic           |                 |                 |                 |
|-------------|------------------------|-------------|-----------------|----------------------|---------------------|-----------------------|-----------------|-----------------|-----------------|
|             | Observed values<br>SWO | Ratio<br>RI | Ratio<br>RI/SWO | Smooth values<br>SWO | Smooth values<br>RI | *Penticton<br>10.7 cm | Smooth<br>Value | Planetary<br>Ap | Smooth<br>Value |
| <b>2001</b> |                        |             |                 |                      |                     |                       |                 |                 |                 |
| August      | 159.4                  | 106.4       | 0.67            | 176.7                | 113.6               | 163.1                 | 188.8           | 11              | 13.0            |
| September   | 229.1                  | 150.7       | 0.66            | 178.8                | 114.1               | 233.8                 | 191.3           | 13              | 12.8            |
| October     | 197.3                  | 125.5       | 0.64            | 179.5                | 114.0               | 208.1                 | 191.9           | 20              | 12.0            |
| November    | 178.6                  | 106.5       | 0.60            | 183.7                | 115.5               | 212.7                 | 193.7           | 16              | 12.0            |
| December    | 217.5                  | 132.2       | 0.61            | 184.5                | 114.6               | 235.6                 | 193.9           | 09              | 12.2            |
| <b>2002</b> |                        |             |                 |                      |                     |                       |                 |                 |                 |
| January     | 189.0                  | 114.1       | 0.60            | 184.8                | 113.5               | 227.3                 | 194.6           | 08              | 12.4            |
| February    | 194.5                  | 107.4       | 0.55            | 188.6                | 114.7               | 205.0                 | 197.2           | 10              | 12.8            |
| March       | 153.1                  | 98.4        | 0.64            | 188.9                | 113.4               | 180.3                 | 195.7           | 10              | 13.0            |
| April       | 194.9                  | 120.7       | 0.62            | 186.2                | 110.5               | 189.8                 | 191.5           | 15              | 13.2            |
| May         | 204.1                  | 120.8       | 0.59            | 183.6                | 108.9               | 178.4                 | 188.0           | 15              | 13.3            |
| June        | 146.0                  | 88.3        | 0.60            | 179.9                | 106.3               | 148.7                 | 183.0           | 11              | 13.5            |
| July        | 183.5                  | 99.9        | 0.54            | 175.4                | 102.7               | 173.5                 | 173.5           | 13              | 13.9            |
| August      | 191.0                  | 116.4       | 0.61            | 169.3                | 98.7                | 183.9                 | 169.5           | 16              | 14.3            |
| September   | 206.4                  | 109.6       | 0.53            | 163.4                | 94.6                | 175.8                 | 164.2           | 14              | 14.9            |
| October     | 153.9                  | 97.5        | 0.63            | 158.7                | 90.5                | 167.0                 | 159.5           | 23              | 15.5            |
| November    | 159.8                  | 95.5        | 0.60            | 150.5                | 85.3                | 168.7                 | 154.3           | 16              | 16.1            |
| December    | 147.9                  | 80.8        | 0.55            | 144.6                | 82.1                | 158.6                 | 150.9           | 13              | 17.0            |
| <b>2003</b> |                        |             |                 |                      |                     |                       |                 |                 |                 |
| January     | 149.3                  | 79.7        | 0.53            | 141.7                | 81.0                | 144.0                 | 149.2           | 13              | 18.2            |
| February    | 87.0                   | 46.0        | 0.53            |                      |                     | 124.5                 |                 | 17              |                 |
| March       | 119.7                  | 61.1        | 0.51            |                      |                     | 132.5                 |                 | 21              |                 |
| April       | 119.7                  | 60.0        | 0.50            |                      |                     | 126.3                 |                 | 20              |                 |
| May         | 89.6                   | 55.2        | 0.62            |                      |                     | 129.3                 |                 | 26              |                 |
| June        | 118.4                  | 77.4        | 0.65            |                      |                     | 129.4                 |                 | 24              |                 |
| July        | 132.8                  | 85.0        | 0.64            |                      |                     | 127.8                 |                 | 20              |                 |

**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 18 Aug 2003*

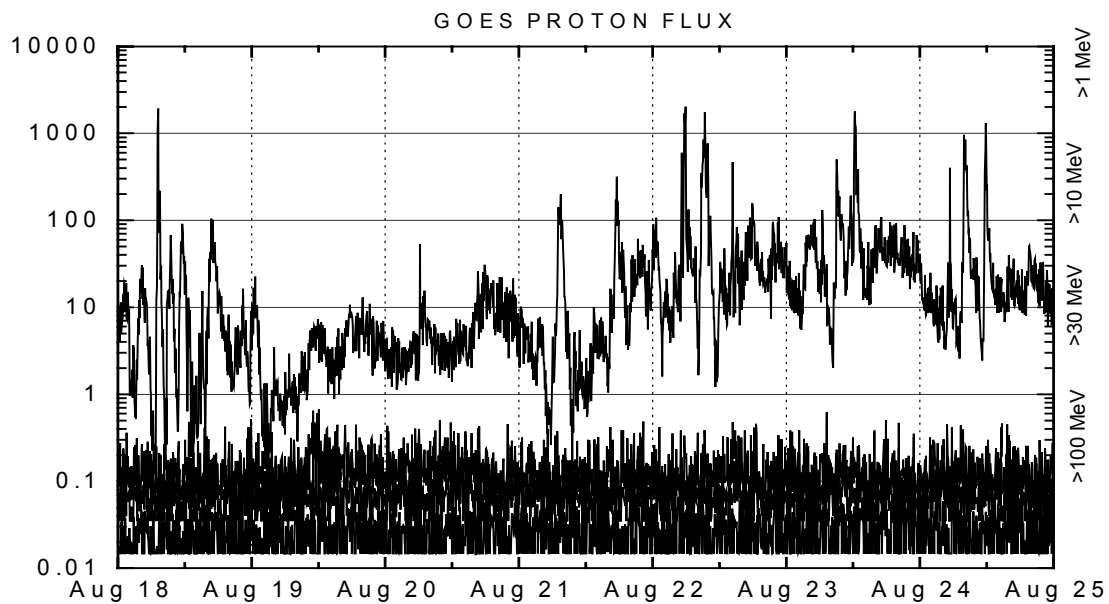
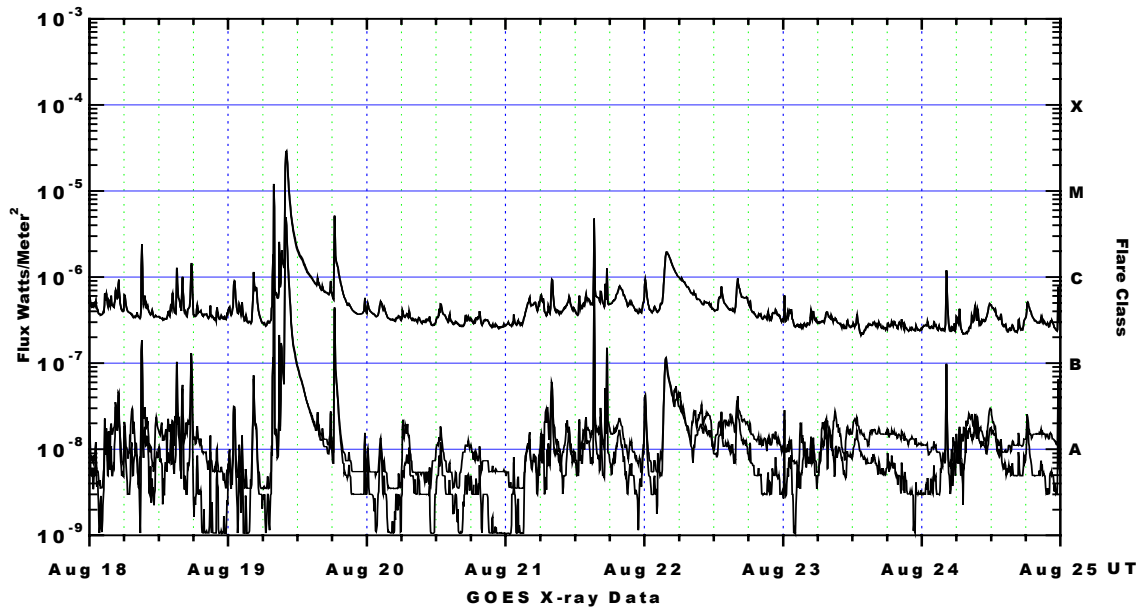
*Protons* plot contains the five-minute averaged integral proton flux (protons/cm<sup>2</sup>-sec-sr) as measured by GOES-11 (W113) for each of three energy thresholds: greater than 10, 50, and 100 MeV.

*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.

*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 Heartland, UK. These data are made available through cooperation from the Geological Survey of Canada (GSC) 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 SWO 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<sub>p</sub> are "global" parameters that are applicable to a first order approximation over large areas. H<sub>p</sub> 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 and 10 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 (W113) 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.

