

Space Weather Highlights
08 - 14 December 2003

SWO PRF 1476
16 December 2003

Solar activity was at very low to low levels this period. Activity was at very low levels from 08 - 13 December and was marked by numerous minor B-class flares. Activity increased to low levels on 14 December with two C-class flares from Region 522 (N16, L=007 class/area Cso/30 on 14 December). The largest of these two C flares was a C2 at 2340 UTC on 14 December. Region 522 appeared on the northwest disk on 13 December with a beta magnetic configuration. The largest region on the disk during the period was Region 520 (N02, L=009, class/area Dso/140 on 14 December. This region developed a beta magnetic configuration on 14 December but has yet to produce activity above the B-class level.

Solar wind data were available from the NASA Advanced Composition Explorer (ACE) spacecraft during most of the summary period. Early on 08 December, solar wind speeds increased to nearly 650 km/sec in response to a large, recurrent, mid-disk coronal hole. The Bz component of the IMF, after an initial northward direction, turned southward, and then began a north-south oscillation. This signature was consistent to that of a co-rotating interactive region that normally precedes the onset of a high-speed stream. Solar wind speeds remained steady at 650 to 700 km/sec until midway on the 10th when speeds further increased to 850 km/sec as the large coronal hole moved into a more favorable position. Solar wind speed dropped back in the range of 700 – 800 km/s on 12 December and remained there through the end of the period on 14 December.

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

The greater than 2 MeV electron flux at geosynchronous orbit reached high levels on 09 - 16 December.

The geomagnetic field ranged from unsettled to major storm levels. The onset of a coronal hole high speed stream on 08 December produced active to minor storm levels every day during the period. Major storm levels were observed on 08 December in connection with the co-rotating interaction region and again on 10 - 11 December when solar wind speed increased above 800 km/s.

Space Weather Outlook
17 December - 12 January 2004

Solar activity is expected to range from very low to moderate levels. Active longitudes are due to return to the visible disk early in the period and may produce moderate level activity. Expect mostly low activity levels in early January.

There is a small chance for a greater than 10 MeV proton event from mid to late B-class level. The greater than 2 MeV electron flux at geosynchronous orbit is expected to reach high levels on 19 - 23 December, and again on 03 - 05 January.

Geomagnetic activity is expected to range from quiet major storm levels. Unsettled to minor storm periods are expected on 18 - 22 December, and again on 01 - 05 January due to high speed coronal hole streams. The large trans equatorial coronal hole is expected to return 07 -12 January with major storm levels expected.



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 |
| 08 December | 94 | 49 | 270 | B1.2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 09 December | 92 | 23 | 110 | B1.0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 10 December | 89 | 46 | 310 | A8.7 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 11 December | 86 | 35 | 270 | A7.7 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 12 December | 87 | 36 | 220 | A7.4 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 13 December | 88 | 40 | 210 | A9.7 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 14 December | 92 | 48 | 220 | B1.3 | 2 | 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) | | |
|-------------|---|--------|---------|---|--------|-------|
| | >1MeV | >10MeV | >100MeV | >.6MeV | >2MeV | >4MeV |
| | 08 December | 1.4E+6 | 1.3E+4 | 3.4E+3 | 2.3E+7 | |
| 09 December | 8.3E+6 | 1.3E+4 | 3.5E+3 | 3.2E+8 | | |
| 10 December | 8.7E+6 | 1.2E+4 | 3.0E+3 | 3.5E+8 | | |
| 11 December | 9.9E+6 | 1.2E+4 | 3.4E+3 | 6.2E+8 | | |
| 12 December | 5.1E+6 | 1.2E+4 | 3.4E+3 | 6.3E+8 | | |
| 13 December | 7.2E+6 | 1.3E+4 | 3.4E+3 | 5.7E+8 | | |
| 14 December | 6.2E+6 | 1.3E+4 | 3.6E+3 | 7.1E+8 | | |

Daily Geomagnetic Data

| Date | Middle Latitude Fredericksburg | | High Latitude College | | Estimated Planetary | |
|-------------|-----------------------------------|-----------------|--------------------------|-----------------|------------------------|-----------------|
| | A | K-indices | A | K-indices | A | K-indices |
| | 08 December | 20 | 2-5-3-4-3-2-3-4 | 59 | 3-3-7-6-6-6-5-3 | 39 |
| 09 December | 17 | 3-3-3-3-3-3-3-4 | 78 | 3-3-7-7-7-6-5-5 | 31 | 3-4-5-5-5-5-4-4 |
| 10 December | 24 | 5-2-3-4-4-4-3-4 | 91 | 4-3-7-7-7-7-6-5 | 42 | 5-4-5-6-5-5-5-4 |
| 11 December | 27 | 5-4-4-4-4-3-2-4 | 81 | 5-4-6-7-7-7-5-4 | 40 | 5-5-6-5-4-5-3-4 |
| 12 December | 17 | 3-3-3-2-3-2-3-5 | 42 | 3-3-5-6-6-5-4-4 | 23 | 4-4-4-3-4-3-4-5 |
| 13 December | 20 | 5-4-2-3-3-3-3-3 | 60 | 4-3-6-7-6-6-4-4 | 28 | 5-4-4-4-5-5-4-3 |
| 14 December | 16 | 4-3-2-2-3-3-3-4 | 43 | 3-2-3-5-6-6-6-3 | 24 | 4-3-3-4-4-5-4-4 |

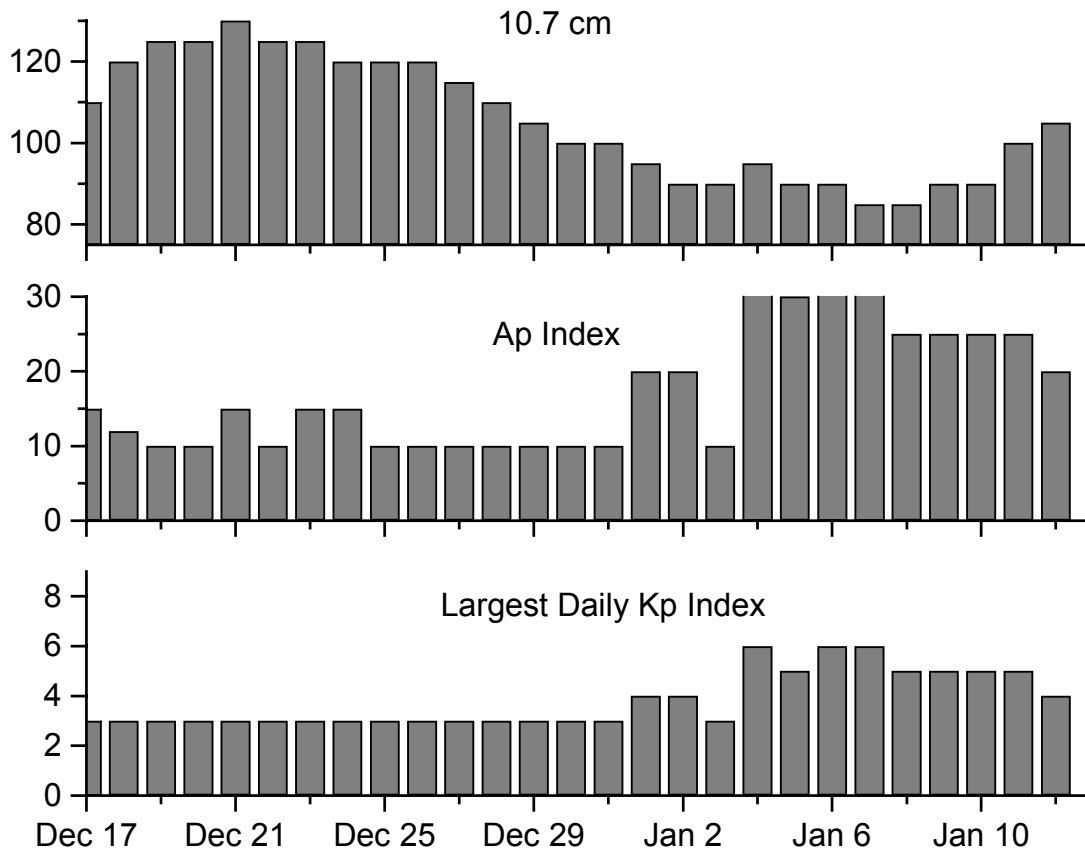


Alerts and Warnings Issued

| <u>Date & Time of Issue</u> | <u>Type of Alert or Warning</u> | <u>Date & Time of Event UT</u> |
|---------------------------------|---|------------------------------------|
| 08 Dec 0403 | WARNING: Geomagnetic K= 5 | 08 Dec 0404 - 1500 |
| 08 Dec 0409 | ALERT: Geomagnetic K= 5 | 08 Dec 0407 |
| 08 Dec 1455 | EXT WARNING: Geomagnetic K= 5 | 08 Dec 0404 - 09 Dec 1500 |
| 08 Dec 1605 | WATCH: Geomagnetic A \geq 20 or greater | 11 Dec |
| 09 Dec 0751 | ALERT: Electron 2MeV Integral Flux > 1000pfu | 09 Dec 0730 |
| 09 Dec 1440 | EXT WARNING: Geomagnetic K= 5 | 08 Dec 0404 - 10 Dec 1500 |
| 09 Dec 1540 | WATCH: Geomagnetic A \geq 20 | 12 Dec |
| 10 Dec 0130 | WARNING: Geomagnetic K = 6 | 10 Dec 0130 - 1500 |
| 10 Dec 0210 | ALERT: Geomagnetic K = 6 | 10 Dec 0200 |
| 10 Dec 0519 | ALERT: Electron 2MeV Integral Flux > 1000pfu | 10 Dec 0500 |
| 10 Dec 1440 | EXT WARNING: Geomagnetic K= 5 | 08 Dec 0404 -11 Dec 1500 |
| 10 Dec 2224 | WATCH: Geomagnetic A \geq 20 | 13 Dec |
| 11 Dec 0522 | ALERT: Electron 2MeV Integral Flux > 1000pfu | 11 Dec 0500 |
| 11 Dec 0843 | ALERT: Geomagnetic K = 6 | 11 Dec 0843 |
| 11 Dec 1454 | EXT WARNING: Geomagnetic K = 5 | 08 Dec 0404 -11 Dec 2359 |
| 11 Dec 2353 | EXT WARNING: Geomagnetic K = 5 | 08 Dec 0404 -12 Dec 1500 |
| 12 Dec 0010 | EXT WARNING: Geomagnetic K = 5 | 08 Dec 0404 -12 Dec 1500 |
| 12 Dec 0521 | ALERT: Electron 2MeV Integral Flux > 1000pfu | 12 Dec 0500 |
| 12 Dec 1439 | EXT WARNING: Geomagnetic K= 4 | 07 Dec 1750 - 12 Dec 2359 |
| 12 Dec 2333 | WARNING: Geomagnetic K = 5 | 12 Dec 2335 - 13 Dec 1500 |
| 13 Dec 0025 | 1 - 245 MHz Burst | 12 Dec |
| 13 Dec 0003 | ALERT: Geomagnetic K = 5 | 12 Dec 2359 |
| 13 Dec 0539 | ALERT: Electron 2MeV Integral Flux > 1000pfu | 13 Dec 0500 |
| 13 Dec 1433 | EXT WARNING: Geomagnetic K = 4 | 07 Dec 1750 -13 Dec 2359 |
| 13 Dec 1705 | WARNING: Geomagnetic K = 5 | 13 Dec 1705 -13 Dec 2359 |
| 13 Dec 1715 | ALERT: Geomagnetic K = 5 | 13 Dec 1714 |
| 13 Dec 2354 | EXT WARNING: Geomagnetic K = 5 | 13 Dec 1705 -14 Dec 1500 |
| 14 Dec 0024 | 1 - 245 MHz Burst | 13 Dec |
| 14 Dec 0522 | ALERT: Electron 2MeV Integral Flux exceeded 1000pfu | 14 Dec 0500 |
| 14 Dec 1500 | EXT WARNING: Geomagnetic K = 5 | 13 Dec 1705 -14 Dec 2359 |
| 14 Dec 2354 | EXT WARNING: Geomagnetic K = 5 | 13 Dec 1705 -15 Dec 1500 |



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 |
|--------|-----------------------|----------------------|---------------------|--------|-----------------------|----------------------|---------------------|
| 17 Dec | 110 | 15 | 3 | 31 Dec | 100 | 10 | 3 |
| 18 | 120 | 12 | 3 | 01 Jan | 95 | 20 | 4 |
| 19 | 125 | 10 | 3 | 02 | 90 | 20 | 4 |
| 20 | 125 | 10 | 3 | 03 | 90 | 10 | 3 |
| 21 | 130 | 15 | 3 | 04 | 95 | 35 | 6 |
| 22 | 125 | 10 | 3 | 05 | 90 | 30 | 5 |
| 23 | 125 | 15 | 3 | 06 | 90 | 35 | 6 |
| 24 | 120 | 15 | 3 | 07 | 85 | 35 | 6 |
| 25 | 120 | 10 | 3 | 08 | 85 | 25 | 5 |
| 26 | 120 | 10 | 3 | 09 | 90 | 25 | 5 |
| 27 | 115 | 10 | 3 | 10 | 90 | 25 | 5 |
| 28 | 110 | 10 | 3 | 11 | 100 | 25 | 5 |
| 29 | 105 | 10 | 3 | 12 | 105 | 20 | 4 |
| 30 | 100 | 10 | 3 | | | | |



Energetic Events

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

No Events Observed

Flare List

| Date | Time | | | X-ray Class. | Optical | | Rgn |
|-------------|--------------------|------|------|-----------------|----------------|---------------------|-----|
| | Begin | Max | End | | Imp / Brtns | Location Lat CMD | |
| 08 December | No Flares Observed | | | | | | |
| 09 December | 0425 | 0429 | 0433 | B1.8 | | | |
| | 1110 | 1115 | 1117 | B4.2 | | | |
| | 1354 | 1358 | 1404 | B2.5 | | | |
| | 1500 | 1505 | 1512 | B2.7 | | | |
| | 2009 | 2014 | 2022 | B1.8 | | | |
| 10 December | 0826 | 0833 | 0837 | B2.9 | | | |
| | 1041 | 1045 | 1048 | B1.9 | | | |
| | 1341 | 1344 | 1346 | B1.4 | | | |
| | 1415 | 1419 | 1421 | B1.5 | | | |
| | 1453 | 1457 | 1459 | B1.7 | | | |
| | 1601 | 1609 | 1622 | B3.9 | | | |
| | 2245 | 2249 | 2255 | B2.3 | | | |
| | 11 December | 0148 | 0154 | 0158 | B2.5 | | |
| | 0340 | 0345 | 0350 | B1.4 | | | |
| | 0647 | 0701 | 0713 | B3.9 | | | |
| | 1006 | 1011 | 1015 | B3.2 | | | |
| | 1322 | 1329 | 1343 | B3.7 | | | |
| | 1542 | 1546 | 1550 | B1.3 | | | |
| | 1814 | 1817 | 1821 | B1.2 | | | |
| 12 December | 1001 | 1005 | 1009 | B1.3 | | | 520 |
| | 2231 | 2239 | 2244 | B2.2 | | | 520 |
| 13 December | 0757 | 0802 | 0804 | B4.4 | | | 520 |
| | 2252 | 2300 | 2307 | B3.2 | | | 520 |
| 14 December | 0900 | 0913 | 0926 | B9.5 | | | |
| | 1213 | 1220 | 1227 | B2.7 | | | |
| | 1934 | 1940 | 1944 | C1.1 | | | 522 |
| | 2112 | 2116 | 2120 | B2.1 | | | |
| | 2300 | 2306 | 2313 | B8.4 | | | |
| | 2334 | 2340 | 2347 | C2.0 | | | |



Region Summary

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

Region 513

| | | | | | | | | | | | | | | | | | | |
|---------------|-----|------|----|-----|-----|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 26 Nov N09E71 | 195 | 0040 | 03 | Hsx | 001 | A | | | | | | | | | | | | |
| 27 Nov N13E58 | 194 | 0050 | 02 | Hsx | 001 | A | | | | | | | | | | | | |
| 28 Nov N13E45 | 194 | 0050 | 02 | Hsx | 001 | A | | | | | | | | | | | | |
| 29 Nov N13E32 | 194 | 0080 | 02 | Hsx | 001 | A | | | | | | | | | | | | |
| 30 Nov N13E18 | 194 | 0070 | 02 | Hsx | 002 | A | | | | | | | | | | | | |
| 01 Dec N13E05 | 194 | 0070 | 02 | Hsx | 001 | A | | | | | | | | | | | | |
| 02 Dec N12W07 | 193 | 0060 | 02 | Hsx | 001 | A | | | | | | | | | | | | |
| 03 Dec N12W21 | 194 | 0060 | 02 | Hsx | 001 | A | | | | | | | | | | | | |
| 04 Dec N12W34 | 194 | 0040 | 12 | Hsx | 001 | A | | | | | | | | | | | | |
| 05 Dec N12W47 | 193 | 0070 | 02 | Hsx | 001 | A | 1 | | | | | | | | | | | |
| 06 Dec N11W62 | 195 | 0060 | 02 | Hsx | 001 | A | | | | | | | | | | | | |
| 07 Dec N11W75 | 195 | 0060 | 01 | Hax | 001 | A | | | | | | | | | | | | |
| 08 Dec N11W85 | 192 | 0090 | 02 | Hsx | 001 | A | | | | | | | | | | | | |
| | | | | | | | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

Crossed West Limb.

Absolute heliographic longitude: 194

Region 515

| | | | | | | | | | | | | | | | | | | |
|---------------|-----|------|----|-----|-----|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 28 Nov S02E68 | 171 | 0050 | 01 | Hrx | 002 | A | | | | | | | | | | | | |
| 29 Nov S02E55 | 171 | 0080 | 05 | Dso | 007 | B | | | | | | | | | | | | |
| 30 Nov S02E42 | 171 | 0030 | 06 | Bxo | 008 | B | | | | | | | | | | | | |
| 01 Dec S02E28 | 171 | 0050 | 04 | Dso | 009 | B | | | | | | | | | | | | |
| 02 Dec S02E13 | 173 | 0040 | 04 | Dso | 009 | B | | | | | | | | | | | | |
| 03 Dec S03W01 | 174 | 0040 | 03 | Cro | 006 | B | | | | | | | | | | | | |
| 04 Dec S03W16 | 176 | 0010 | 01 | Axx | 001 | A | | | | | | | | | | | | |
| 05 Dec S03W29 | 176 | | | | | | | | | | | | | | | | | |
| 06 Dec S03W42 | 176 | | | | | | | | | | | | | | | | | |
| 07 Dec S03W55 | 176 | | | | | | | | | | | | | | | | | |
| 08 Dec S03W68 | 176 | | | | | | | | | | | | | | | | | |
| 09 Dec S03W81 | 176 | | | | | | | | | | | | | | | | | |
| | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

Crossed West Limb.

Absolute heliographic longitude: 174



Region Summary - continued.

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

Region 516

| | | | | | | | | | | | | | | | | | | | |
|--------|--------|-----|------|----|-----|-----|---|--|--|--|--|--|--|--|--|--|--|--|-----------------|
| 28 Nov | S17E70 | 169 | 0050 | 02 | Hsx | 001 | A | | | | | | | | | | | | |
| 29 Nov | S17E57 | 169 | 0070 | 03 | Cso | 005 | B | | | | | | | | | | | | |
| 30 Nov | S17E44 | 168 | 0090 | 05 | Dao | 007 | B | | | | | | | | | | | | |
| 01 Dec | S17E31 | 168 | 0060 | 07 | Dso | 012 | B | | | | | | | | | | | | |
| 02 Dec | S16E18 | 168 | 0050 | 07 | Dso | 015 | B | | | | | | | | | | | | |
| 03 Dec | S16E04 | 169 | 0060 | 06 | Dso | 009 | B | | | | | | | | | | | | |
| 04 Dec | S16W11 | 171 | 0040 | 05 | Cso | 005 | B | | | | | | | | | | | | |
| 05 Dec | S17W24 | 170 | 0090 | 05 | Dao | 010 | B | | | | | | | | | | | | |
| 06 Dec | S17W37 | 170 | 0100 | 06 | Dao | 011 | B | | | | | | | | | | | | |
| 07 Dec | S17W52 | 172 | 0090 | 05 | Dao | 006 | B | | | | | | | | | | | | |
| 08 Dec | S16W63 | 170 | 0060 | 02 | Cso | 002 | B | | | | | | | | | | | | |
| 09 Dec | S16W80 | 174 | 0050 | 02 | Hsx | 001 | A | | | | | | | | | | | | |
| 10 Dec | S16W92 | 173 | 0060 | 02 | Hsx | 001 | A | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | 0 0 0 0 0 0 0 0 |

Crossed West Limb.

Absolute heliographic longitude: 169

Region 517

| | | | | | | | | | | | | | | | | | | | |
|--------|--------|-----|------|----|-----|-----|---|---|--|--|--|--|--|--|--|--|--|--|-----------------|
| 30 Nov | S07E67 | 145 | 0160 | 07 | Cao | 002 | B | 1 | | | | | | | | | | | |
| 01 Dec | S07E60 | 139 | 0260 | 10 | Dko | 005 | B | | | | | | | | | | | | |
| 02 Dec | S06E47 | 139 | 0350 | 09 | Dao | 006 | B | | | | | | | | | | | | |
| 03 Dec | S06E33 | 140 | 0270 | 08 | Dso | 007 | B | | | | | | | | | | | | |
| 04 Dec | S06E20 | 140 | 0290 | 10 | Dao | 012 | B | | | | | | | | | | | | |
| 05 Dec | S06E07 | 139 | 0260 | 10 | Dao | 018 | B | | | | | | | | | | | | |
| 06 Dec | S07W06 | 139 | 0220 | 10 | Dso | 019 | B | | | | | | | | | | | | |
| 07 Dec | S08W20 | 140 | 0160 | 10 | Dao | 016 | B | | | | | | | | | | | | |
| 08 Dec | S07W32 | 139 | 0120 | 08 | Dao | 016 | B | | | | | | | | | | | | |
| 09 Dec | S08W51 | 145 | 0060 | 01 | Hsx | 002 | A | | | | | | | | | | | | |
| 10 Dec | S08W64 | 145 | 0070 | 02 | Hax | 001 | A | | | | | | | | | | | | |
| 11 Dec | S08W78 | 145 | 0060 | 02 | Hax | 001 | A | | | | | | | | | | | | |
| 12 Dec | S07W92 | 146 | 0030 | 02 | Hsx | 001 | A | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | 1 0 0 0 0 0 0 0 |

Crossed West Limb.

Absolute heliographic longitude: 139



Region Summary - continued.

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

Region 518

| | | | | | | | |
|--------|--------|-----|------|----|-----|-----|---|
| 03 Dec | S22E10 | 163 | 0000 | 01 | Axx | 001 | A |
| 04 Dec | S21W03 | 163 | 0000 | 01 | Axx | 001 | A |
| 05 Dec | S21W16 | 163 | | | | | |
| 06 Dec | S21W29 | 163 | | | | | |
| 07 Dec | S21W42 | 163 | | | | | |
| 08 Dec | S21W55 | 163 | | | | | |
| 09 Dec | S21W68 | 163 | | | | | |
| 10 Dec | S21W81 | 163 | | | | | |
| 11 Dec | S21W94 | 163 | | | | | |

0 0 0 0 0 0 0 0

Crossed West Limb.

Absolute heliographic longitude: 163

Region 519

| | | | | | | | |
|--------|--------|-----|------|----|-----|-----|---|
| 04 Dec | S08W15 | 175 | 0070 | 05 | Cao | 008 | B |
| 05 Dec | S08W28 | 174 | 0010 | 04 | Bxo | 008 | B |
| 06 Dec | S05W45 | 178 | 0010 | 01 | Axx | 001 | A |
| 07 Dec | S05W58 | 178 | | | | | |
| 08 Dec | S05W71 | 178 | | | | | |
| 09 Dec | S05W84 | 178 | | | | | |

0 0 0 0 0 0 0 0

Crossed West Limb.

Absolute heliographic longitude: 175

Region 520

| | | | | | | | |
|--------|--------|-----|------|----|-----|-----|---|
| 10 Dec | N03E75 | 006 | 0120 | 02 | Hax | 002 | A |
| 11 Dec | N02E62 | 005 | 0100 | 03 | Hax | 001 | A |
| 12 Dec | N02E47 | 007 | 0100 | 02 | Hsx | 001 | A |
| 13 Dec | N02E33 | 008 | 0110 | 02 | Hsx | 001 | A |
| 14 Dec | N02E19 | 009 | 0140 | 06 | Dso | 010 | B |

0 0 0 0 0 0 0 0

Still on Disk.

Absolute heliographic longitude: 009

Region 521

| | | | | | | | |
|--------|--------|-----|------|----|-----|-----|---|
| 10 Dec | S11E82 | 359 | 0060 | 04 | Dao | 002 | B |
| 11 Dec | S11E63 | 004 | 0110 | 08 | Dso | 003 | B |
| 12 Dec | S12E48 | 004 | 0090 | 06 | Cso | 004 | B |
| 13 Dec | S12E34 | 007 | 0080 | 06 | Dso | 004 | B |
| 14 Dec | S12E21 | 007 | 0050 | 06 | Dso | 004 | B |

0 0 0 0 0 0 0 0

Still on Disk.

Absolute heliographic longitude: 007



Region Summary - continued.

| Date | Location | | Sunspot Characteristics | | | | Flares | | | | | | | | | | | | | | | |
|-------------------|----------------|-------|---------------------------------|-------------------|---------------|---------------|--------------|-------|---|---|---------|---|---|---|---|---|---|---|---|---|---|--|
| | (° Lat ° CMD) | Helio | Area (10 ⁻⁶ hemi) | Extent (helio) | Spot Class | Spot Count | Mag Class | X-ray | | | Optical | | | | | | | | | | | |
| | | Lon | | | | | | C | M | X | S | 1 | 2 | 3 | 4 | | | | | | | |
| <i>Region 522</i> | | | | | | | | | | | | | | | | | | | | | | |
| 13 Dec | N16W50 | 091 | 0020 | 05 | Cso | 005 | B | | | | | | | | | | | | | | | |
| 14 Dec | N16W63 | 091 | 0030 | 05 | Cso | 004 | B | 1 | | | | | | | | | | | | | | |
| | | | | | | | | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |

Still on Disk.

Absolute heliographic longitude: 091

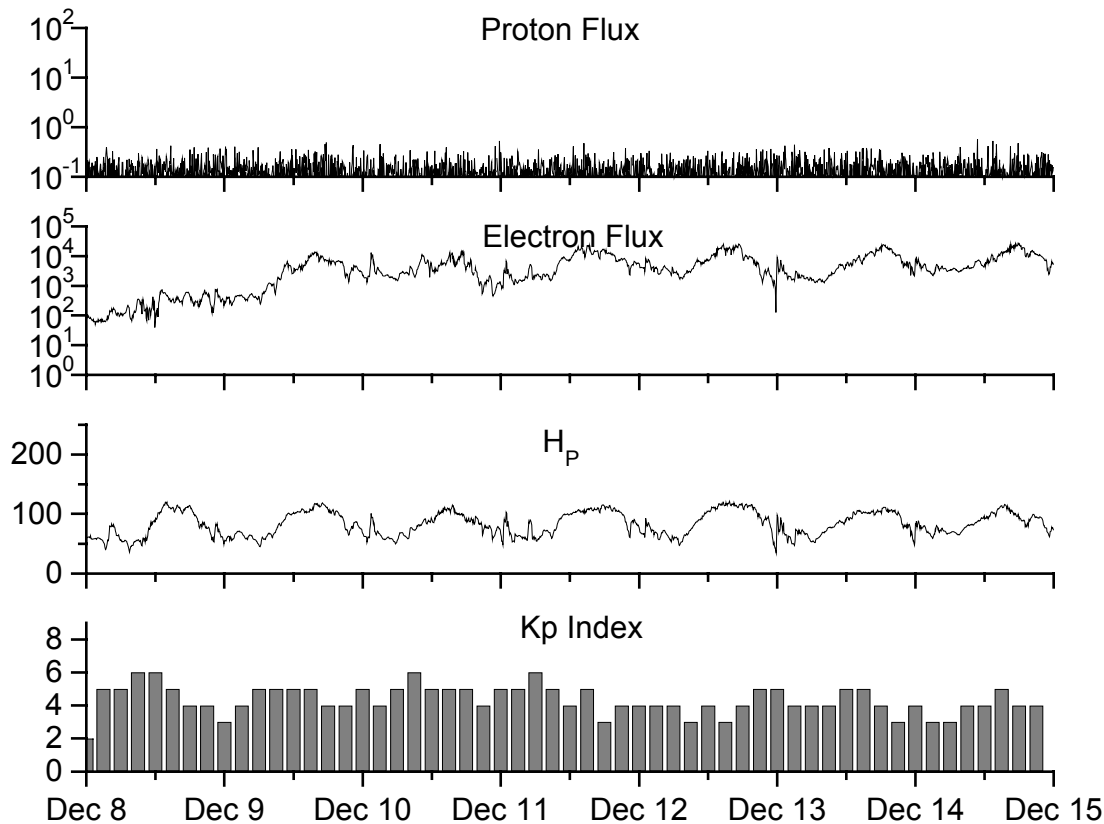


**Recent Solar Indices (preliminary)
of the observed monthly mean values**

| Month | Sunspot Numbers | | | Radio Flux | | Geomagnetic | | | |
|-------------|------------------------|-------------|-----------------|----------------------|---------------------|-----------------------|-----------------|-----------------|-----------------|
| | Observed values SWO | Ratio RI | Ratio RI/SWO | Smooth values SWO | Smooth values RI | *Penticton 10.7 cm | Smooth Value | Planetary Ap | Smooth Value |
| 2001 | | | | | | | | | |
| December | 217.5 | 132.2 | 0.61 | 184.5 | 114.6 | 235.6 | 193.9 | 09 | 12.2 |
| 2002 | | | | | | | | | |
| January | 189.0 | 114.1 | 0.60 | 184.8 | 113.5 | 227.3 | 194.6 | 08 | 12.3 |
| 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 | 113.3 | 180.3 | 195.7 | 10 | 12.9 |
| 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 | 99.6 | 0.54 | 175.4 | 102.7 | 173.5 | 176.3 | 11 | 13.7 |
| August | 191.0 | 116.4 | 0.61 | 169.2 | 98.7 | 183.9 | 169.5 | 16 | 14.2 |
| September | 206.4 | 109.6 | 0.53 | 163.4 | 94.6 | 175.8 | 164.1 | 14 | 15.0 |
| October | 153.9 | 97.5 | 0.63 | 158.8 | 90.5 | 167.0 | 159.4 | 23 | 15.6 |
| November | 159.8 | 95.5 | 0.60 | 150.9 | 85.2 | 168.7 | 154.8 | 16 | 16.3 |
| December | 147.9 | 80.8 | 0.55 | 144.6 | 82.1 | 158.6 | 150.9 | 13 | 17.0 |
| 2003 | | | | | | | | | |
| 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 | 136.4 | 78.5 | 124.5 | 144.7 | 17 | 18.9 |
| March | 119.7 | 61.1 | 0.51 | 128.1 | 74.2 | 132.2 | 139.5 | 21 | 19.4 |
| April | 119.7 | 60.0 | 0.50 | 121.5 | 70.3 | 126.3 | 136.3 | 20 | 20.0 |
| May | 89.6 | 55.2 | 0.62 | 118.3 | 67.8 | 129.3 | 135.0 | 26 | 21.0 |
| June | 118.4 | 77.4 | 0.65 | | | 129.4 | | 24 | |
| July | 132.8 | 85.0 | 0.64 | | | 127.8 | | 20 | |
| August | 114.3 | 72.7 | 0.64 | | | 122.1 | | 23 | |
| September | 82.6 | 48.8 | 0.59 | | | 112.3 | | 19 | |
| October | 118.9 | 65.6 | 0.55 | | | 153.1 | | 32 | |
| November | 118.9 | 67.2 | 0.57 | | | 153.1 | | 31 | |

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 08 December 2003

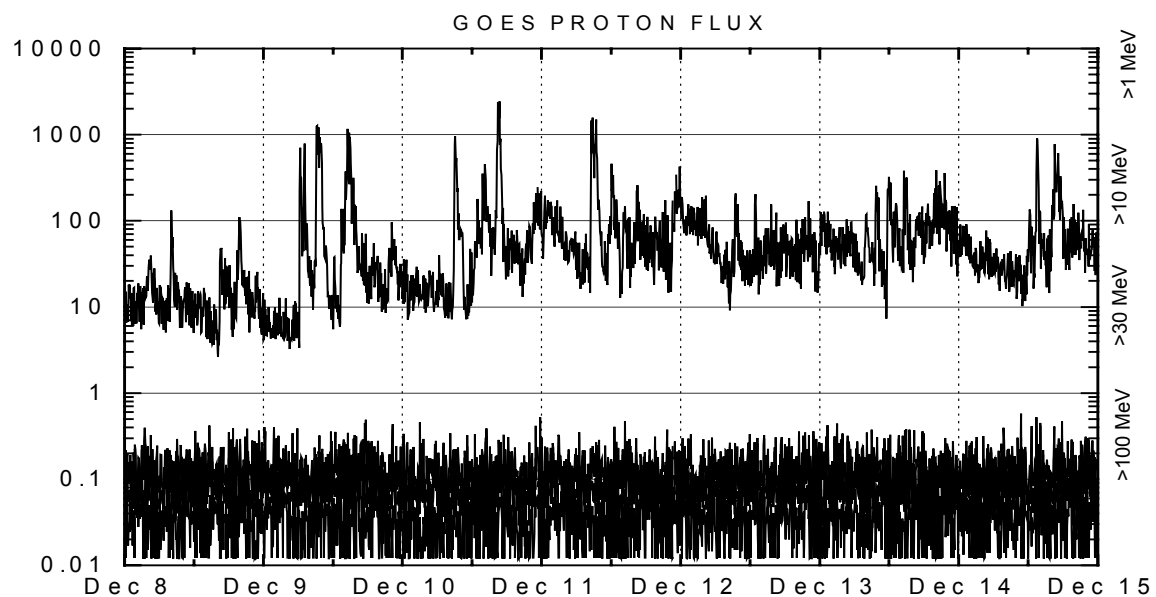
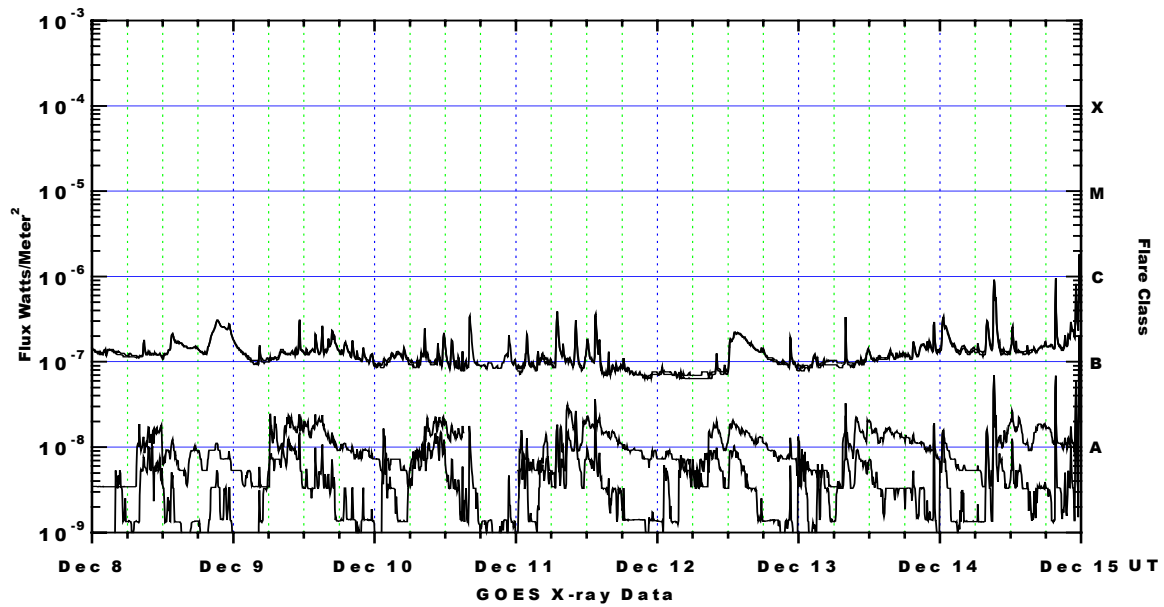
Protons plot contains the five-minute averaged integral proton flux (protons/cm²-sec-sr) as measured by GOES-11 (W113) for each of three energy thresholds: greater than 10, 50, and 100 MeV.

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

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 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_p 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_p are "global" parameters that are applicable to a first order approximation over large areas. H_p 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 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/cm²-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/cm²-sec-sr) at greater than 10 MeV.

