

**Space Weather Highlights**  
**30 December 2002 - 05 January 2003**

**SWO PRF 1427**  
**07 January 2003**

Solar activity was at very low to low levels. Activity reached low levels on 02 – 05 January. The largest event was a C5.8 flare that occurred at 05 January from Region 243 (S19, L=296, class/area Dao/200 on 05 January). For flare times and magnitudes, please refer to the Flare List and Energetic Event List. Region 243 appeared on the visible disk on 03 January, exhibited steady growth, and increased in magnetic complexity to a beta-gamma magnetic configuration. Region 242 (S08, L=216, class/area Dai/190 on 05 January) developed a beta-gamma magnetic configuration on 04 January and produced C-class flares during the period. Region 244 (S23, L=209, class/area Dao/150 on 05 January) has also shown growth and produced isolated C-class activity. The largest event from Region 244 was a C4 flare on 03 January. All of the other spotted regions on the visible disk during the summary period were relatively small and had simple magnetic structures.

Solar wind data were available from the NASA Advanced Composition Explorer (ACE) spacecraft for most of the summary period. Solar wind velocity increased on 03-04 January due to a recurring coronal hole. Velocity reached peak values near 650 km/s and the Bz component of the interplanetary magnetic field reached values near negative 10 nT.

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

The greater than 2 MeV electron flux at geo-synchronous orbit reached high levels on 30 December – 03 January.

The geomagnetic field was at quiet to active levels. On 30 December, isolated active conditions were observed on the planetary index and minor storm conditions at higher latitudes due to residual effects from a departing coronal hole. On 03 – 04 January, a small geo-effective coronal hole produced isolated active conditions on the planetary index and isolated major storm conditions at higher latitudes.

**Space Weather Outlook**  
**08 January 2003 - 03 February 2003**

Solar activity is expected to be low to moderate during the forecast period. There is a chance of isolated M-class activity early in the period and again late in the period due to Regions 242, 243, and 244.

There is a slight chance of a greater than 10 MeV proton event during the forecast period.

The greater than 2 MeV electron flux is expected to reach high levels on 17-18 January and again on 25 – 28 January due to recurring coronal holes.

The geomagnetic field is expected to be at quiet to active conditions for most of the period. Isolated active conditions are possible on 15-16 January and again on 30 – 31 January due to recurring weak coronal holes. Minor to major storm conditions are possible on 23 -24 January due to a returning coronal hole that was 30 degrees wide and centered on 00 latitude during its last rotation.



### *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 |
| 30 December | 114                   | 44              | 90                                       | B1.5             | 0          | 0 | 0 | 1       | 0 | 0 | 0 | 0 |
| 31 December | 115                   | 50              | 150                                      | B1.8             | 0          | 0 | 0 | 4       | 0 | 0 | 0 | 0 |
| 01 January  | 115                   | 47              | 120                                      | B1.7             | 0          | 0 | 0 | 1       | 0 | 0 | 0 | 0 |
| 02 January  | 118                   | 74              | 160                                      | B1.8             | 1          | 0 | 0 | 1       | 0 | 0 | 0 | 0 |
| 03 January  | 138                   | 108             | 330                                      | B3.3             | 7          | 0 | 0 | 16      | 0 | 0 | 0 | 0 |
| 04 January  | 143                   | 117             | 640                                      | B4.4             | 5          | 0 | 0 | 12      | 0 | 0 | 0 | 0 |
| 05 January  | 148                   | 128             | 660                                      | B4.6             | 3          | 0 | 0 | 7       | 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) |        |        |
|-------------|---|--------|---------|---|--------|--------|
|             | >1MeV   | >10MeV | >100MeV | >6MeV   | >2MeV  | >4MeV  |
|             | 30 December   | 8.0E+5 | 1.3E+4  | 3.0E+3  |        | 1.5E+8 |
| 31 December | 2.4E+5  | 1.4E+4 | 3.5E+3  |   | 1.2E+8 |        |
| 01 January  | 2.0E+5  | 1.3E+4 | 3.4E+3  |   | 9.5E+7 |        |
| 02 January  | 3.0E+5  | 1.4E+4 | 3.5E+3  |   | 5.1E+7 |        |
| 03 January  | 1.5E+6  | 1.3E+4 | 3.3E+3  |   | 2.9E+7 |        |
| 04 January  | 3.7E+5  | 1.3E+4 | 3.2E+3  |   | 3.7E+6 |        |
| 05 January  | 3.8E+5  | 1.3E+4 | 3.4E+3  |   | 2.0E+7 |        |

### *Daily Geomagnetic Data*

| Date        | Middle Latitude<br>Fredericksburg |                 | High Latitude<br>College |                 | Estimated<br>Planetary |                 |
|-------------|-----------------------------------|-----------------|--------------------------|-----------------|------------------------|-----------------|
|             | A                                 | K-indices       | A                        | K-indices       | A                      | K-indices       |
|             | 30 December                       | 9               | 4-2-2-1-2-2-2-1          | 21              | 1-1-4-5-5-3-3-2        | 15              |
| 31 December | 7                                 | 4-1-1-2-2-1-1-1 | 9                        | 2-1-3-4-3-0-0-1 | 11                     | 3-3-2-3-3-3-2-2 |
| 01 January  | 9                                 | 4-1-3-1-3-1-1-1 | 8                        | 0-0-3-3-4-1-1-1 | 10                     | 2-2-3-3-3-3-2-2 |
| 02 January  | 5                                 | 1-1-1-2-2-2-2-1 | 9                        | 1-1-1-3-3-3-1-1 | 8                      | 2-2-2-2-3-3-3-1 |
| 03 January  | 12                                | 2-2-2-2-3-4-2-3 | 23                       | 1-1-2-2-4-6-4-4 | 13                     | 2-2-2-2-3-4-3-4 |
| 04 January  | 9                                 | 3-2-2-2-3-2-2-2 | 20                       | 4-3-1-4-5-3-3-2 | 13                     | 4-4-2-2-3-3-3-2 |
| 05 January  | 5                                 | 1-1-1-1-2-2-2-2 | 7                        | 1-1-1-1-3-3-2-2 | 9                      | 2-2-2-2-3-3-3-2 |

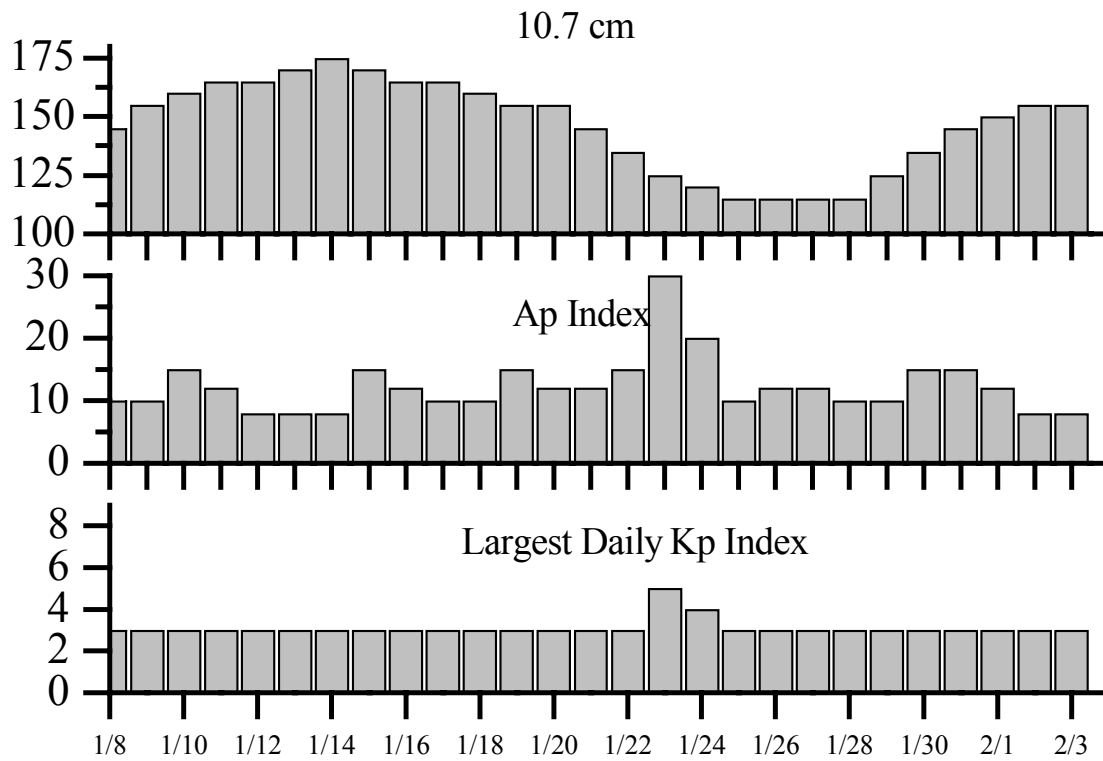


### *Alerts and Warnings Issued*

| <u>Date &amp; Time of Issue</u> | <u>Type of Alert or Warning</u>              | <u>Date &amp; Time of Event UT</u> |
|---------------------------------|--|------------------------------------|
| 30 Dec 0008                     | 1 - 245 MHz Radio Burst                      | 29 Dec                             |
| 30 Dec 0212                     | WARNING: Geomagnetic K= 4                    | 30 Dec 0213 - 1500                 |
| 30 Dec 0220                     | ALERT: Geomagnetic K= 4                      | 30 Dec 0215                        |
| 30 Dec 0928                     | ALERT: Electron 2MeV Integral Flux > 1000pfu | 30 Dec 0927                        |
| 30 Dec 1408                     | ALERT: STRATWARM                             | 30 Dec                             |
| 31 Dec 0856                     | ALERT: Electron 2MeV Integral Flux > 1000pfu | 31 Dec 0830                        |
| 31 Dec 1223                     | ALERT: STRATWARM                             | 31 Dec                             |
| 01 Jan 0753                     | ALERT: Electron 2MeV Integral Flux > 1000pfu | 01 Jan 0730                        |
| 01 Jan 1257                     | ALERT: STRATWARM                             | 01 Jan                             |
| 02 Jan 0049                     | 1 - 245 MHz Radio Burst                      | 01 Jan                             |
| 02 Jan 1132                     | ALERT: STRATWARM                             | 02 Jan                             |
| 02 Jan 1407                     | ALERT: Electron 2MeV Integral Flux > 1000pfu | 02 Jan 1345                        |
| 03 Jan 1217                     | ALERT: STRATWARM                             | 03 Jan                             |
| 04 Jan 0053                     | 1 - 245 MHz Burst                            | 03 Jan                             |
| 03 Jan 1329                     | ALERT: Electron 2MeV Integral Flux > 1000pfu | 03 Jan 1310                        |
| 03 Jan 1623                     | WARNING: Geomagnetic K= 4 expected           | 03 Jan 1624 - 04 Jan 2359          |
| 03 Jan 1624                     | ALERT: Geomagnetic K= 4                      | 03 Jan 1624                        |
| 03 Jan 1732                     | ALERT: Geomagnetic K= 5                      | 03 Jan 1724                        |
| 04 Jan 1214                     | ALERT: STRATWARM                             | 04 Jan                             |
| 04 Jan 1518                     | CANCEL WARNING: Geomagnetic K= 4             | 03 Jan 1623                        |
| 05 Jan 0035                     | 2 - 245 MHz Bursts                           | 04 Jan                             |
| 05 Jan 1151                     | ALERT: STRATWARM                             | 05 Jan                             |



### 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 |
|--------|-----------------------|----------------------|---------------------|--------|-----------------------|----------------------|---------------------|
| 08 Jan | 145                   | 10                   | 3                   | 22 Jan | 135                   | 15                   | 3                   |
| 09     | 155                   | 10                   | 3                   | 23     | 125                   | 30                   | 5                   |
| 10     | 160                   | 15                   | 3                   | 24     | 120                   | 20                   | 4                   |
| 11     | 165                   | 12                   | 3                   | 25     | 115                   | 10                   | 3                   |
| 12     | 165                   | 8                    | 3                   | 26     | 115                   | 12                   | 3                   |
| 13     | 170                   | 8                    | 3                   | 27     | 115                   | 12                   | 3                   |
| 14     | 175                   | 8                    | 3                   | 28     | 115                   | 10                   | 3                   |
| 15     | 170                   | 15                   | 3                   | 29     | 125                   | 10                   | 3                   |
| 16     | 165                   | 12                   | 3                   | 30     | 135                   | 15                   | 3                   |
| 17     | 165                   | 10                   | 3                   | 31     | 145                   | 15                   | 3                   |
| 18     | 160                   | 10                   | 3                   | 01 Feb | 150                   | 12                   | 3                   |
| 19     | 155                   | 15                   | 3                   | 02     | 155                   | 8                    | 3                   |
| 20     | 155                   | 12                   | 3                   | 03     | 155                   | 8                    | 3                   |
| 21     | 145                   | 12                   | 3                   |        |                       |                      |                     |



***Energetic Events***

| Date                      | Time  |     | X-ray    |       | Optical Information |               |          | Peak |            | Sweep Freq |           |    |
|---------------------------|-------|-----|----------|-------|---------------------|---------------|----------|------|------------|------------|-----------|----|
|                           | Begin | Max | ½<br>Max | Class | Integ<br>Flux       | Imp/<br>Brtns | Location |      | Radio Flux |            | Intensity |    |
|                           |       |     |          |       |                     |               | Lat      | CMD  | 245        | 2695       | II        | IV |
| <b>No Events Observed</b> |       |     |          |       |                     |               |          |      |            |            |           |    |

***Flare List***

| Date        | Time  |       |       | X-ray<br>Class. | Optical        |                     | Rgn |
|-------------|-------|-------|-------|-----------------|----------------|---------------------|-----|
|             | Begin | Max   | End   |                 | Imp /<br>Brtns | Location<br>Lat CMD |     |
| 30 December | 0350  | 0354  | 0401  | B2.7            |                |                     |     |
|             | 0813  | 0818  | 0822  | B2.2            |                |                     |     |
|             | 0915  | 0921  | 0924  | B2.4            |                |                     |     |
|             | 1418  | 1418  | 1427  | B2.5            | Sf             | N18E01              | 234 |
|             | 1653  | 1656  | 1704  | B1.9            |                |                     |     |
|             | 1817  | 1826  | 1832  | B2.2            |                |                     |     |
| 31 December | 0043  | 0044  | 0053  |                 | Sf             | S12E22              | 239 |
|             | 0203  | 0205  | 0237  | B6.6            | Sf             | N15W06              | 234 |
|             | 0222  | 0225  | 0230  | B3.0            |                |                     |     |
|             | 0242  | 0246  | 0307  | B5.0            | Sf             | N18W09              | 234 |
|             | 0702  | 0702  | 0710  | B4.2            | Sf             | N20W09              | 234 |
|             | 0842  | 0849  | 0857  | B6.6            |                |                     |     |
| 01 January  | 0752  | 0752  | 0802  | B3.3            | Sf             | N19W22              | 234 |
| 02 January  | 0441  | 0446  | 0453  | B3.6            |                |                     |     |
|             | 1258  | 1306  | 1323  | C1.5            |                |                     |     |
| 03 January  | 2337  | 2338  | 2343  |                 | Sf             | S08E56              | 242 |
|             | 0005  | 0005  | 0012  |                 | Sf             | S08E57              | 242 |
|             | 0147  | 0156  | 0159  | B6.8            |                |                     |     |
|             | 0302  | 0305  | 0308  | B3.8            |                |                     |     |
|             | 0420  | 0425  | 0431  | B7.2            |                |                     |     |
|             | 0450  | 0451  | 0457  | C1.0            | Sf             | S09E57              | 242 |
|             | 0629  | 0634  | 0639  | B7.3            |                |                     |     |
|             | 0854  | 0904  | 0912  | B4.9            |                |                     |     |
|             | 1034  | 1034  | 1039  | B8.1            | Sf             | S09E51              | 242 |
|             | B1309 | U1312 | 1318  |                 | Sf             | S23E68              | 244 |
|             | 1420  | 1423  | 1426  | B6.6            |                |                     |     |
|             | 1440  | 1442  | 1453  | C2.0            | Sf             | N18W51              | 234 |
|             | 1454  | 1458  | 1500  |                 | Sf             | N19W51              | 234 |
|             | 1541  | 1542  | 1547  | B6.7            | Sf             | S07E50              | 242 |
|             | B1652 | U1654 | A1700 | B6.2            | Sf             | S20W31              | 243 |
|             | 1734  | 1734  | 1739  |                 | Sf             | S22E54              | 244 |
| 1858        | 1859  | 1901  |       | Sf              | S20W32         | 243                 |     |
| 1936        | 1938  | 1946  | C1.9  | Sf              | S19W31         | 243                 |     |
| 1953        | 1959  | 2010  |       | Sf              | S22E56         | 244                 |     |
| 2046        | 2050  | 2108  | C2.0  | Sf              | S19W31         | 243                 |     |
| 2110        | 2111  | 2122  |       | Sf              | S23E56         | 244                 |     |



*Flare List - continued.*

| Date       | Time  |       |       | X-ray<br>Class. | Optical        |                     | Rgn |
|------------|-------|-------|-------|-----------------|----------------|---------------------|-----|
|            | Begin | Max   | End   |                 | Imp /<br>Brtns | Location<br>Lat CMD |     |
| 03 January | 2151  | 2159  | 2215  | C4.7            | Sf             | S22E55              | 244 |
|            | 2240  | 2242  | 2308  | C3.3            | Sf             | S19W31              | 243 |
|            | 2341  | 2354  | 2357  | C1.5            |                |                     | 243 |
| 04 January | 0002  | 0003  | 0008  |                 | Sf             | S23E51              | 244 |
|            | 0358  | 0402  | 0426  |                 | Sf             | S19W37              | 243 |
|            | 0521  | 0524  | 0538  | B9.0            | Sf             | S20W39              | 243 |
|            | 0619  | 0619  | 0626  | B9.2            | Sf             | S19W39              | 243 |
|            | 0810  | 0815  | 0826  | C1.0            | Sf             | S20W41              | 243 |
|            | 0858  | 0904  | 0917  | C1.9            | Sf             | S28E47              | 244 |
|            | 0930  | 0932  | 0941  |                 | Sf             | S23E48              | 244 |
|            | 1050  | 1057  | 1107  | C1.0            |                |                     | 243 |
|            | B1132 | U1132 | 1136  | C1.4            | Sf             | S20W40              | 243 |
|            | 1508  | 1511  | 1514  |                 | Sf             | S20W44              | 243 |
|            | 1516  | 1533  | A1544 | B7.0            | Sf             | S19W43              | 243 |
|            | 1649  | 1657  | 1715  | C1.3            | Sf             | S23E43              | 244 |
|            | 1801  | 1806  | 1816  | B8.3            | Sf             | S19W45              | 243 |
|            | 2319  | 2322  | 2324  | B6.5            |                |                     | 243 |
| 05 January | 0132  | 0133  | 0137  |                 | Sf             | S09E31              | 242 |
|            | 0143  | 0144  | 0153  | B8.7            | Sf             | S08E30              | 242 |
|            | 0508  | 0508  | 0511  | B8.5            | Sf             | S08E32              | 242 |
|            | 0555  | 0610  | 0632  | C5.8            | Sf             | S20W51              | 243 |
|            | 0756  | 0758  | 0805  | C1.0            | Sf             | S08E27              | 242 |
|            | 0929  | 0929  | 0933  | B9.2            | Sf             | S19W55              | 243 |
|            | 1151  | 1154  | 1158  | C1.3            |                |                     | 244 |
|            | 1359  | 1401  | 1410  | B7.7            | Sf             | S22E31              | 244 |
|            | 1701  | 1703  | 1705  | B5.7            |                |                     | 243 |



### *Region Summary*

| 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 233*

|               |     |      |    |     |     |   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|---------------|-----|------|----|-----|-----|---|--|--|--|--|--|--|--|--|--|--|--|--|--|--|
| 23 Dec N11E42 | 004 | 0020 | 02 | Bxo | 004 | B |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 24 Dec N13E27 | 006 | 0030 | 04 | Cro | 005 | B |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 25 Dec N13E14 | 006 |      |    |     |     |   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 26 Dec N13E01 | 006 |      |    |     |     |   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 27 Dec N13W12 | 006 |      |    |     |     |   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 28 Dec N13W25 | 006 |      |    |     |     |   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 29 Dec N13W38 | 006 |      |    |     |     |   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 30 Dec N13W51 | 006 |      |    |     |     |   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 31 Dec N13W64 | 006 |      |    |     |     |   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 01 Jan N13W77 | 006 |      |    |     |     |   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |

0 0 0 0 0 0 0 0

Crossed West Limb.

Absolute heliographic longitude: 006

*Region 234*

|               |     |      |    |     |     |   |  |  |  |  |  |  |   |  |  |  |  |  |  |  |
|---------------|-----|------|----|-----|-----|---|--|--|--|--|--|--|---|--|--|--|--|--|--|--|
| 24 Dec N18E73 | 320 | 0040 | 02 | Hsx | 001 | A |  |  |  |  |  |  |   |  |  |  |  |  |  |  |
| 25 Dec N17E58 | 322 | 0060 | 07 | Cso | 003 | B |  |  |  |  |  |  |   |  |  |  |  |  |  |  |
| 26 Dec N17E45 | 322 | 0060 | 04 | Cao | 002 | B |  |  |  |  |  |  |   |  |  |  |  |  |  |  |
| 27 Dec N18E32 | 322 | 0050 | 02 | Hsx | 001 | A |  |  |  |  |  |  |   |  |  |  |  |  |  |  |
| 28 Dec N19E19 | 322 | 0040 | 03 | Cao | 005 | B |  |  |  |  |  |  |   |  |  |  |  |  |  |  |
| 29 Dec N18E05 | 322 | 0040 | 02 | Hsx | 001 | A |  |  |  |  |  |  |   |  |  |  |  |  |  |  |
| 30 Dec N18W08 | 322 | 0030 | 02 | Hsx | 002 | A |  |  |  |  |  |  | 1 |  |  |  |  |  |  |  |
| 31 Dec N20W21 | 322 | 0040 | 01 | Hsx | 001 | A |  |  |  |  |  |  |   |  |  |  |  |  |  |  |
| 01 Jan N19W33 | 321 | 0030 | 02 | Hsx | 003 | A |  |  |  |  |  |  |   |  |  |  |  |  |  |  |
| 02 Jan N19W47 | 322 | 0030 | 02 | Hax | 001 | A |  |  |  |  |  |  |   |  |  |  |  |  |  |  |
| 03 Jan N19W60 | 322 | 0010 | 01 | Axx | 001 | A |  |  |  |  |  |  |   |  |  |  |  |  |  |  |

1 0 0 3 0 0 0 0  
1 0 0 3 0 0 0 0

Still on Disk.

Absolute heliographic longitude: 322

*Region 235*

|               |     |      |    |     |     |   |  |  |  |  |  |  |  |   |  |  |  |  |  |  |
|---------------|-----|------|----|-----|-----|---|--|--|--|--|--|--|--|---|--|--|--|--|--|--|
| 25 Dec N13E28 | 352 | 0010 | 03 | Bxo | 003 | B |  |  |  |  |  |  |  |   |  |  |  |  |  |  |
| 26 Dec N14E15 | 352 | 0010 | 03 | Bxo | 003 | B |  |  |  |  |  |  |  | 2 |  |  |  |  |  |  |
| 27 Dec N13E05 | 349 | 0010 | 03 | Bxo | 002 | B |  |  |  |  |  |  |  | 1 |  |  |  |  |  |  |
| 28 Dec N13W08 | 349 |      |    |     |     |   |  |  |  |  |  |  |  |   |  |  |  |  |  |  |
| 29 Dec N14W22 | 349 | 0010 | 03 | Cso | 004 | B |  |  |  |  |  |  |  |   |  |  |  |  |  |  |
| 30 Dec N14W35 | 349 | 0020 | 03 | Cso | 003 | B |  |  |  |  |  |  |  |   |  |  |  |  |  |  |
| 31 Dec N14W50 | 351 |      |    |     |     |   |  |  |  |  |  |  |  |   |  |  |  |  |  |  |
| 01 Jan N14W63 | 351 |      |    |     |     |   |  |  |  |  |  |  |  |   |  |  |  |  |  |  |
| 02 Jan N14W76 | 351 |      |    |     |     |   |  |  |  |  |  |  |  |   |  |  |  |  |  |  |

0 0 0 3 0 0 0 0

Crossed West Limb.

Absolute heliographic longitude: 349



***Region Summary - continued.***

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

*Region 236*

|        |        |     |      |    |     |     |   |  |   |   |   |   |   |   |   |   |   |
|--------|--------|-----|------|----|-----|-----|---|--|---|---|---|---|---|---|---|---|---|
| 27 Dec | N17W27 | 021 | 0030 | 03 | Cao | 004 | B |  |   |   |   | 1 |   |   |   |   |   |
| 28 Dec | N16W41 | 022 | 0040 | 04 | Dso | 007 | B |  |   |   |   |   |   |   |   |   |   |
| 29 Dec | N16W53 | 020 | 0020 | 01 | Hax | 001 | A |  |   |   |   |   |   |   |   |   |   |
| 30 Dec | N16W66 | 020 |      |    |     |     |   |  |   |   |   |   |   |   |   |   |   |
| 31 Dec | N16W79 | 020 |      |    |     |     |   |  |   |   |   |   |   |   |   |   |   |
|        |        |     |      |    |     |     |   |  | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 |

Crossed West Limb.

Absolute heliographic longitude: 021

*Region 237*

|        |        |     |      |    |     |     |   |  |   |   |   |   |   |   |   |   |   |
|--------|--------|-----|------|----|-----|-----|---|--|---|---|---|---|---|---|---|---|---|
| 28 Dec | S26E00 | 341 | 0010 | 05 | Bxo | 005 | B |  |   |   |   |   |   |   |   |   |   |
| 29 Dec | S26W13 | 341 |      |    |     |     |   |  |   |   |   |   |   |   |   |   |   |
| 30 Dec | S26W26 | 341 |      |    |     |     |   |  |   |   |   |   |   |   |   |   |   |
| 31 Dec | S26W39 | 341 |      |    |     |     |   |  |   |   |   |   |   |   |   |   |   |
| 01 Jan | S26W52 | 341 |      |    |     |     |   |  |   |   |   |   |   |   |   |   |   |
| 02 Jan | S26W65 | 341 |      |    |     |     |   |  |   |   |   |   |   |   |   |   |   |
|        |        |     |      |    |     |     |   |  | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

Crossed West Limb.

Absolute heliographic longitude: 341

*Region 238*

|        |        |     |      |    |     |     |   |  |   |   |   |   |   |   |   |   |   |
|--------|--------|-----|------|----|-----|-----|---|--|---|---|---|---|---|---|---|---|---|
| 28 Dec | N09E15 | 326 | 0010 | 01 | Axx | 002 | A |  |   |   |   |   |   |   |   |   |   |
| 29 Dec | N08E02 | 326 |      |    |     |     |   |  |   |   |   |   |   |   |   |   |   |
| 30 Dec | N08W11 | 326 |      |    |     |     |   |  |   |   |   |   |   |   |   |   |   |
| 31 Dec | N08W24 | 326 |      |    |     |     |   |  |   |   |   |   |   |   |   |   |   |
| 01 Jan | N08W37 | 326 |      |    |     |     |   |  |   |   |   |   |   |   |   |   |   |
| 02 Jan | N08W50 | 326 |      |    |     |     |   |  |   |   |   |   |   |   |   |   |   |
|        |        |     |      |    |     |     |   |  | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

Still on Disk.

Absolute heliographic longitude: 326

*Region 239*

|        |        |     |      |    |     |     |   |  |   |   |   |   |   |   |   |   |   |
|--------|--------|-----|------|----|-----|-----|---|--|---|---|---|---|---|---|---|---|---|
| 29 Dec | S10E37 | 290 | 0030 | 04 | Cro | 005 | B |  |   |   |   |   |   |   |   |   |   |
| 30 Dec | S10E24 | 290 | 0040 | 06 | Dso | 009 | B |  |   |   |   |   |   |   |   |   |   |
| 31 Dec | S10E10 | 291 | 0070 | 08 | Dao | 012 | B |  |   |   |   |   |   |   |   |   |   |
| 01 Jan | S09W04 | 292 | 0080 | 06 | Dai | 011 | B |  |   |   |   |   |   |   |   |   |   |
| 02 Jan | S09W17 | 292 | 0070 | 09 | Dao | 010 | B |  |   |   |   |   |   |   |   |   |   |
| 03 Jan | S09W30 | 292 | 0040 | 04 | Cao | 005 | B |  |   |   |   |   |   |   |   |   |   |
| 04 Jan | S09W43 | 292 | 0020 | 01 | Hrx | 002 | A |  |   |   |   |   |   |   |   |   |   |
| 05 Jan | S07W54 | 290 | 0030 | 05 | Cso | 007 | B |  |   |   |   |   |   |   |   |   |   |
|        |        |     |      |    |     |     |   |  | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

Still on Disk.

Absolute heliographic longitude: 292





**Region Summary - continued.**

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

*Region 240*

|        |        |     |      |    |     |     |   |   |   |   |   |   |   |   |   |   |   |
|--------|--------|-----|------|----|-----|-----|---|---|---|---|---|---|---|---|---|---|---|
| 31 Dec | S06E20 | 281 | 0040 | 04 | Dso | 007 | B |   |   |   |   |   |   |   |   |   |   |
| 01 Jan | S08E06 | 282 | 0010 | 03 | Bxo | 003 | B |   |   |   |   |   |   |   |   |   |   |
| 02 Jan | S08W04 | 279 | 0010 | 02 | Axx | 002 | A |   |   |   |   |   |   |   |   |   |   |
| 03 Jan | S08W17 | 279 |      |    |     |     |   |   |   |   |   |   |   |   |   |   |   |
| 04 Jan | S08W38 | 287 | 0010 | 01 | Hrx | 001 | A |   |   |   |   |   |   |   |   |   |   |
| 05 Jan | S08W53 | 289 | 0010 | 02 | Hrx | 002 | A |   |   |   |   |   |   |   |   |   |   |
|        |        |     |      |    |     |     |   | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

Still on Disk.

Absolute heliographic longitude: 279

*Region 241*

|        |        |     |      |    |     |     |   |   |   |   |   |   |   |   |   |   |   |
|--------|--------|-----|------|----|-----|-----|---|---|---|---|---|---|---|---|---|---|---|
| 02 Jan | S25W40 | 315 | 0020 | 03 | Cao | 005 | B |   |   |   |   |   |   |   |   |   |   |
| 03 Jan | S24W53 | 315 | 0020 | 01 | Hrx | 002 | A |   |   |   |   |   |   |   |   |   |   |
| 04 Jan | S24W66 | 315 | 0030 | 06 | Dro | 003 | B |   |   |   |   |   |   |   |   |   |   |
| 05 Jan | S24W79 | 315 |      |    |     |     |   |   |   |   |   |   |   |   |   |   |   |
|        |        |     |      |    |     |     |   | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

Still on Disk.

Absolute heliographic longitude: 315

*Region 242*

|        |        |     |      |    |     |     |    |   |   |   |   |   |   |   |   |   |   |
|--------|--------|-----|------|----|-----|-----|----|---|---|---|---|---|---|---|---|---|---|
| 02 Jan | S08E61 | 214 | 0030 | 03 | Cso | 006 | B  |   |   | 1 |   |   |   |   |   |   |   |
| 03 Jan | S08E48 | 214 | 0090 | 06 | Dai | 015 | B  | 1 |   | 4 |   |   |   |   |   |   |   |
| 04 Jan | S08E33 | 216 | 0180 | 08 | Dai | 018 | Bg |   |   |   |   |   |   |   |   |   |   |
| 05 Jan | S08E20 | 216 | 0190 | 09 | Dai | 028 | Bg | 1 |   | 4 |   |   |   |   |   |   |   |
|        |        |     |      |    |     |     |    | 2 | 0 | 0 | 9 | 0 | 0 | 0 | 0 | 0 | 0 |

Still on Disk.

Absolute heliographic longitude: 216

*Region 243*

|        |        |     |      |    |     |     |    |   |   |   |    |   |   |   |   |   |   |
|--------|--------|-----|------|----|-----|-----|----|---|---|---|----|---|---|---|---|---|---|
| 03 Jan | S19W34 | 296 | 0050 | 04 | Dao | 005 | B  | 1 |   | 1 |    |   |   |   |   |   |   |
| 04 Jan | S19W47 | 296 | 0150 | 06 | Dao | 013 | Bg | 2 |   | 8 |    |   |   |   |   |   |   |
| 05 Jan | S19W60 | 296 | 0200 | 08 | Dao | 013 | Bg | 1 |   | 2 |    |   |   |   |   |   |   |
|        |        |     |      |    |     |     |    | 4 | 0 | 0 | 11 | 0 | 0 | 0 | 0 | 0 | 0 |

Still on Disk.

Absolute heliographic longitude: 296

*Region 244*

|        |        |     |      |    |     |     |   |   |   |   |   |   |   |   |   |   |   |
|--------|--------|-----|------|----|-----|-----|---|---|---|---|---|---|---|---|---|---|---|
| 03 Jan | S15E58 | 204 | 0050 | 05 | Dao | 009 | B | 1 |   | 1 |   |   |   |   |   |   |   |
| 04 Jan | S23E40 | 209 | 0140 | 07 | Dao | 009 | B | 2 |   | 4 |   |   |   |   |   |   |   |
| 05 Jan | S23E27 | 209 | 0150 | 07 | Dao | 015 | B | 1 |   | 1 |   |   |   |   |   |   |   |
|        |        |     |      |    |     |     |   | 4 | 0 | 0 | 6 | 0 | 0 | 0 | 0 | 0 | 0 |

Still on Disk.

Absolute heliographic longitude: 209



***Region Summary - continued.***

| Date              | Location      |                        | Sunspot Characteristics |         |       |       | Flares |       |   |         |   |   |   |
|-------------------|---------------|------------------------|-------------------------|---------|-------|-------|--------|-------|---|---------|---|---|---|
|                   | (° Lat ° CMD) | Helio                  | Area                    | Extent  | Spot  | Spot  | Mag    | X-ray |   | Optical |   |   |   |
|                   | (° Lat ° CMD) | Lon(10 <sup>-6</sup> ) | hemi)                   | (helio) | Class | Count | Class  | C     | M | X       | S | 1 | 2 |
| <i>Region 245</i> |               |                        |                         |         |       |       |        |       |   |         |   |   |   |
| 03 Jan            | N12E74        | 188                    | 0070                    | 02      | Hax   | 001   | A      |       |   |         |   |   |   |
| 04 Jan            | N11E59        | 190                    | 0110                    | 02      | Hax   | 001   | A      |       |   |         |   |   |   |
| 05 Jan            | N11E46        | 190                    | 0080                    | 02      | Hax   | 003   | A      |       |   |         |   |   |   |
|                   |               |                        |                         |         |       |       |        | 0     | 0 | 0       | 0 | 0 | 0 |

Still on Disk.

Absolute heliographic longitude: 190

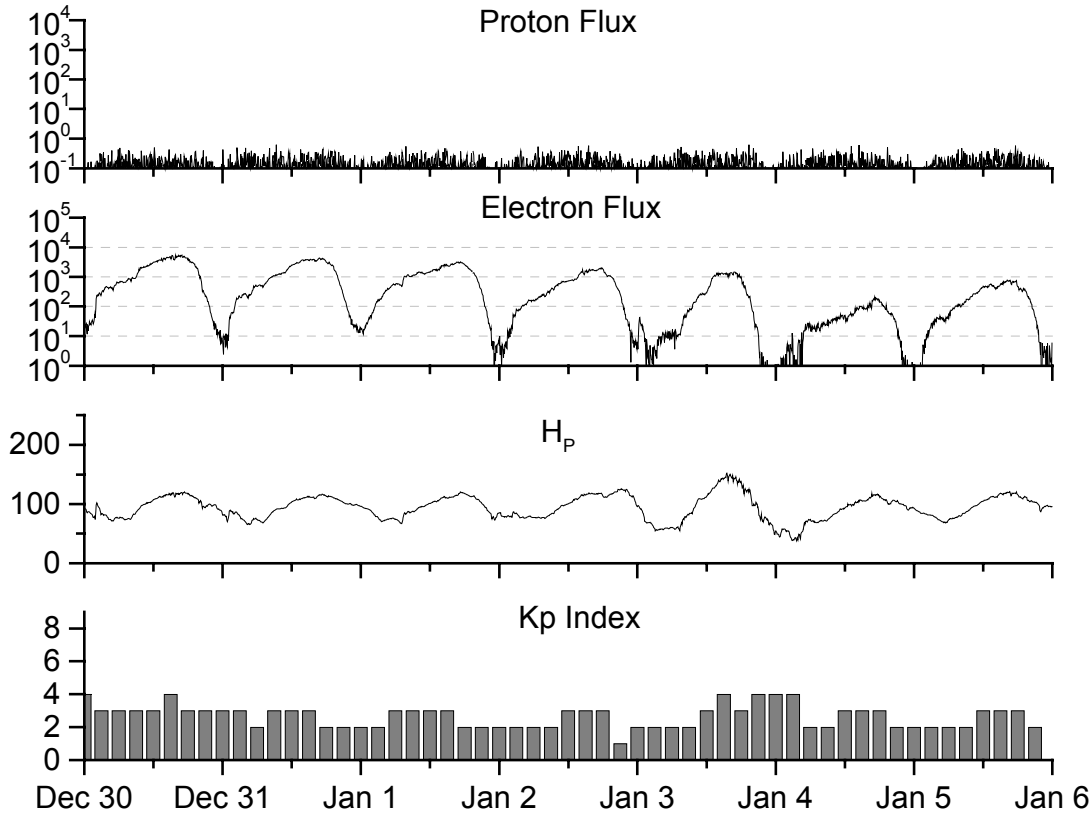


**Recent Solar Indices (preliminary)  
of the observed monthly mean values**

| Month       | Sunspot Numbers        |             |                 | Radio Flux           |              | Geomagnetic           |                 |                 |                 |
|-------------|------------------------|-------------|-----------------|----------------------|--------------|-----------------------|-----------------|-----------------|-----------------|
|             | Observed values<br>SWO | Ratio<br>RI | Ratio<br>RI/SWO | Smooth values<br>SWO | Smooth<br>RI | *Penticton<br>10.7 cm | Smooth<br>Value | Planetary<br>Ap | Smooth<br>Value |
| <b>2001</b> |                        |             |                 |                      |              |                       |                 |                 |                 |
| January     | 142.7                  | 95.1        | 0.67            | 156.3                | 108.8        | 166.7                 | 168.8           | 08              | 13.8            |
| February    | 131.0                  | 80.1        | 0.61            | 151.4                | 104.2        | 147.3                 | 165.8           | 06              | 13.3            |
| March       | 166.7                  | 114.2       | 0.69            | 154.0                | 104.9        | 177.7                 | 167.9           | 17              | 12.9            |
| April       | 163.6                  | 108.2       | 0.66            | 159.4                | 107.7        | 178.3                 | 171.7           | 18              | 12.7            |
| May         | 135.1                  | 97.3        | 0.72            | 163.1                | 108.8        | 148.7                 | 174.8           | 12              | 12.5            |
| June        | 196.7                  | 134.0       | 0.68            | 167.2                | 109.9        | 173.7                 | 178.8           | 12              | 12.4            |
| July        | 124.6                  | 82.2        | 0.66            | 172.1                | 111.8        | 131.3                 | 183.9           | 11              | 12.4            |
| August      | 159.4                  | 106.8       | 0.67            | 176.7                | 113.8        | 163.2                 | 188.8           | 13              | 12.5            |
| September   | 229.1                  | 150.7       | 0.66            | 178.8                | 114.3        | 233.8                 | 191.3           | 13              | 12.8            |
| October     | 197.4                  | 125.6       | 0.64            | 179.5                | 114.1        | 208.1                 | 191.9           | 20              | 12.0            |
| November    | 178.6                  | 106.5       | 0.60            | 183.7                | 115.6        | 212.7                 | 193.7           | 16              | 12.0            |
| December    | 217.5                  | 131.8       | 0.61            | 184.5                | 114.7        | 235.6                 | 193.9           | 09              | 12.2            |
| <b>2002</b> |                        |             |                 |                      |              |                       |                 |                 |                 |
| January     | 189.0                  | 113.9       | 0.60            | 184.8                | 113.5        | 227.3                 | 194.6           | 08              | 12.4            |
| February    | 194.5                  | 108.0       | 0.56            | 188.6                | 114.7        | 205.0                 | 197.2           | 10              | 12.8            |
| March       | 153.1                  | 98.1        | 0.64            | 188.9                | 113.3        | 180.3                 | 195.7           | 10              | 13.0            |
| April       | 194.9                  | 120.4       | 0.62            | 186.2                | 110.4        | 189.8                 | 191.5           | 15              | 13.2            |
| May         | 204.1                  | 120.8       | 0.59            | 183.6                | 108.8        | 178.4                 | 188.0           | 15              | 13.3            |
| June        | 146.0                  | 88.5        | 0.61            | 179.9                | 106.2        | 148.7                 | 183.0           | 11              | 13.5            |
| July        | 183.5                  | 99.9        | 0.54            |                      |              | 173.5                 |                 | 13              |                 |
| August      | 191.0                  | 116.4       | 0.61            |                      |              | 183.9                 |                 | 16              |                 |
| September   | 206.4                  | 109.3       | 0.53            |                      |              | 175.8                 |                 | 14              |                 |
| October     | 153.9                  | 97.5        | 0.63            |                      |              | 167.0                 |                 | 23              |                 |
| November    | 159.8                  | 95.0        | 0.59            |                      |              | 168.7                 |                 | 16              |                 |
| December    | 147.9                  | 81.6        | 0.55            |                      |              | 158.6                 |                 | 13              |                 |

**NOTE:** All smoothed values after June 1999 and monthly values after December 2000 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 22, RI= 158.5, occurred July 1989. \*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 30 December 2002*

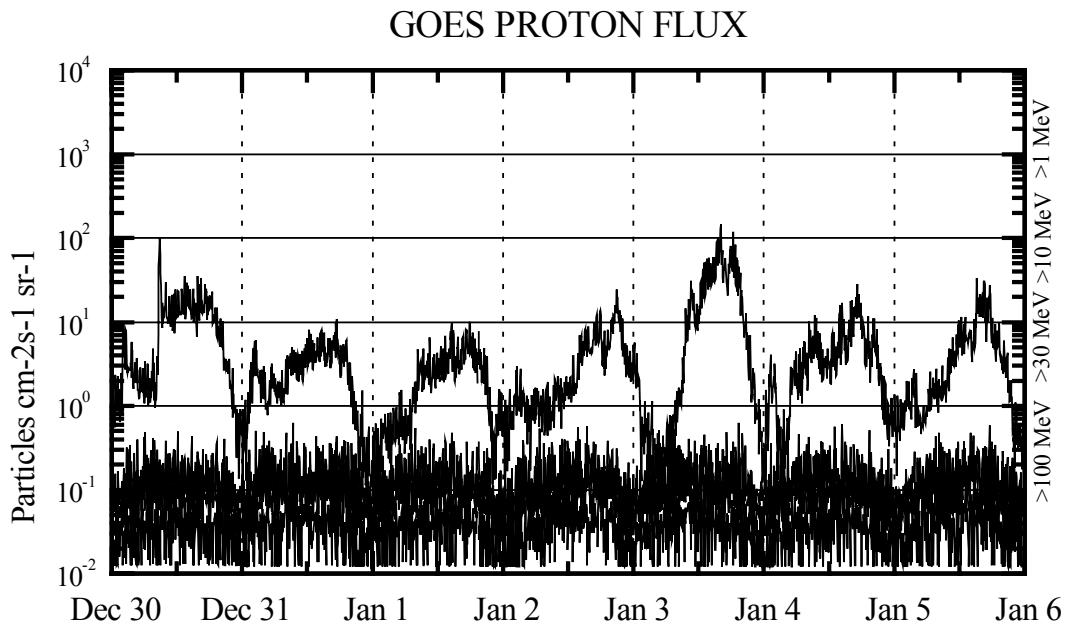
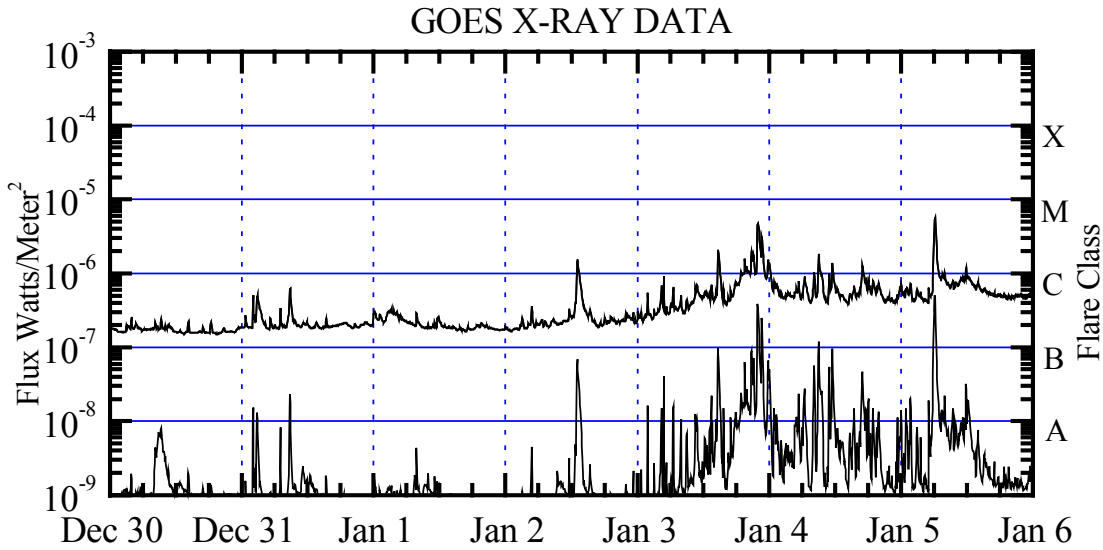
*Protons* plot contains the five-minute averaged integral proton flux (protons/cm<sup>2</sup>-sec -sr ) as measured by GOES-8 (W75) for each of three energy thresholds: greater than 10, 50, and 100 MeV.

*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-8.

*H<sub>p</sub>* plot contains the five minute averaged magnetic field H - component in nanoteslas (nT) as measured by GOES-8. 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.



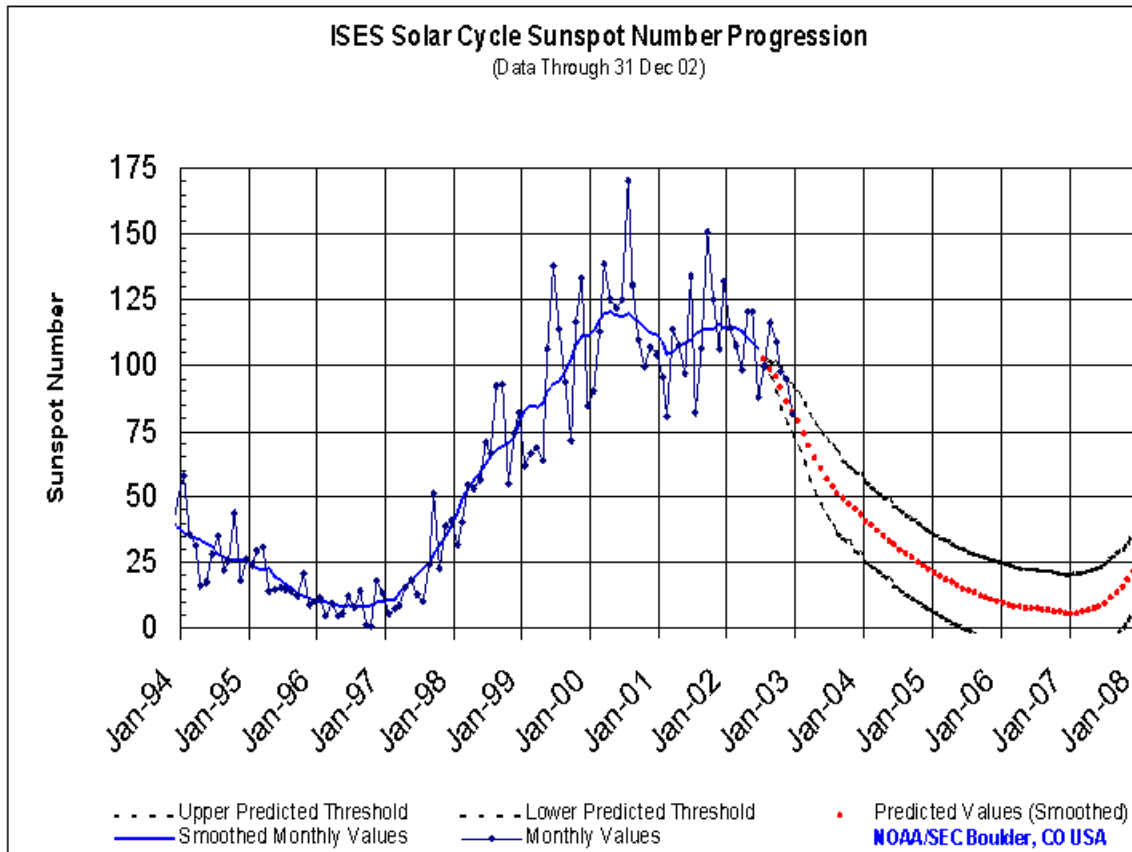


#### Weekly GOES Satellite X-ray and Proton Plots

X-ray plot contains five-minute averaged x-ray flux (watts/m<sup>2</sup>) as measured by GOES 8 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-8 (W75) 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.

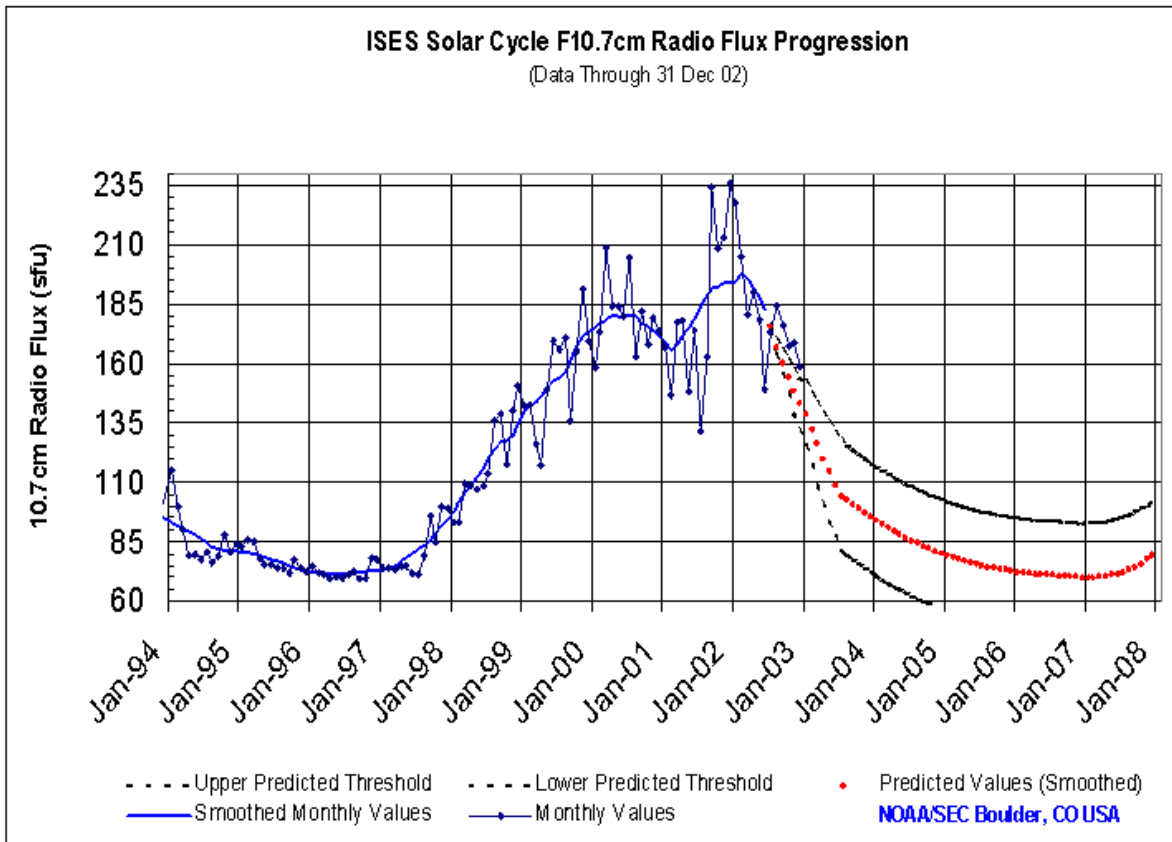




### SEC Prediction of Smoothed Sunspot Number

|      | Jan               | Feb               | Mar               | Apr               | May               | Jun               | Jul               | Aug               | Sep               | Oct               | Nov               | Dec               |
|------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|
| 1998 | 44<br>(***)       | 49<br>(***)       | 53<br>(***)       | 57<br>(***)       | 59<br>(***)       | 63<br>(***)       | 66<br>(***)       | 68<br>(***)       | 70<br>(***)       | 71<br>(***)       | 73<br>(***)       | 78<br>(***)       |
| 1999 | 83<br>(***)       | 85<br>(***)       | 84<br>(***)       | 86<br>(***)       | 91<br>(***)       | 93<br>(***)       | 94<br>(***)       | 97<br>(***)       | 102<br>(***)      | 108<br>(***)      | 111<br>(***)      | 111<br>(***)      |
| 2000 | 113<br>(***)      | 117<br>(***)      | 120<br>(***)      | 121<br>(***)      | 119<br>(***)      | 119<br>(***)      | 120<br>(***)      | 119<br>(***)      | 116<br>(***)      | 114<br>(***)      | 113<br>(***)      | 112<br>(***)      |
| 2001 | 109<br>(***)      | 104<br>(***)      | 105<br>(***)      | 108<br>(***)      | 109<br>(***)      | 110<br>(***)      | 112<br>(***)      | 114<br>(***)      | 114<br>(***)      | 114<br>(***)      | 116<br>(***)      | 115<br>(***)      |
| 2002 | 114<br>(***)      | 115<br>(***)      | 113<br>(***)      | 110<br>(***)      | 109<br>(***)      | 106<br>(***)      | <b>102</b><br>(1) | <b>99</b><br>(3)  | <b>95</b><br>(5)  | <b>91</b><br>(7)  | <b>86</b><br>(8)  | <b>82</b><br>(9)  |
| 2003 | <b>79</b><br>(10) | <b>74</b><br>(11) | <b>69</b><br>(12) | <b>65</b><br>(13) | <b>60</b><br>(14) | <b>57</b><br>(15) | <b>54</b><br>(15) | <b>51</b><br>(15) | <b>49</b><br>(15) | <b>47</b><br>(15) | <b>45</b><br>(15) | <b>43</b><br>(15) |
| 2004 | <b>41</b><br>(15) | <b>39</b><br>(15) | <b>37</b><br>(15) | <b>35</b><br>(15) | <b>33</b><br>(15) | <b>31</b><br>(15) | <b>30</b><br>(15) | <b>28</b><br>(15) | <b>27</b><br>(15) | <b>25</b><br>(15) | <b>24</b><br>(15) | <b>22</b><br>(15) |
| 2005 | <b>21</b><br>(15) | <b>20</b><br>(15) | <b>18</b><br>(15) | <b>17</b><br>(15) | <b>16</b><br>(15) | <b>15</b><br>(15) | <b>14</b><br>(15) | <b>13</b><br>(15) | <b>12</b><br>(15) | <b>12</b><br>(15) | <b>11</b><br>(15) | <b>10</b><br>(15) |
| 2006 | <b>10</b><br>(15) | <b>9</b><br>(15)  | <b>8</b><br>(15)  | <b>8</b><br>(15)  | <b>8</b><br>(15)  | <b>7</b><br>(15)  | <b>7</b><br>(15)  | <b>7</b><br>(15)  | <b>7</b><br>(15)  | <b>6</b><br>(15)  | <b>6</b><br>(15)  | <b>5</b><br>(15)  |
| 2007 | <b>5</b><br>(15)  | <b>6</b><br>(15)  | <b>6</b><br>(15)  | <b>6</b><br>(15)  | <b>7</b><br>(15)  | <b>8</b><br>(15)  | <b>10</b><br>(15) | <b>11</b><br>(15) | <b>13</b><br>(15) | <b>16</b><br>(15) | <b>18</b><br>(15) | <b>21</b><br>(15) |





### SEC Prediction of Smoothed F10.7cm Radio Flux

|      | Jan                | Feb                | Mar                | Apr                | May                | Jun                | Jul                | Aug                | Sep                | Oct               | Nov               | Dec                |
|------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|-------------------|-------------------|--------------------|
| 1998 | 98<br>(***)        | 102<br>(***)       | 106<br>(***)       | 109<br>(***)       | 112<br>(***)       | 116<br>(***)       | 120<br>(***)       | 124<br>(***)       | 127<br>(***)       | 128<br>(***)      | 130<br>(***)      | 134<br>(***)       |
| 1999 | 139<br>(***)       | 143<br>(***)       | 144<br>(***)       | 146<br>(***)       | 150<br>(***)       | 153<br>(***)       | 154<br>(***)       | 156<br>(***)       | 161<br>(***)       | 167<br>(***)      | 172<br>(***)      | 173<br>(***)       |
| 2000 | 175<br>(***)       | 176<br>(***)       | 178<br>(***)       | 181<br>(***)       | 180<br>(***)       | 180<br>(***)       | 180<br>(***)       | 180<br>(***)       | 177<br>(***)       | 176<br>(***)      | 174<br>(***)      | 172<br>(***)       |
| 2001 | 169<br>(***)       | 166<br>(***)       | 168<br>(***)       | 172<br>(***)       | 175<br>(***)       | 179<br>(***)       | 184<br>(***)       | 189<br>(***)       | 191<br>(***)       | 192<br>(***)      | 194<br>(***)      | 194<br>(***)       |
| 2002 | 195<br>(***)       | 197<br>(***)       | 196<br>(***)       | 192<br>(***)       | 188<br>(***)       | 183<br>(***)       | <b>175</b><br>(1)  | <b>167</b><br>(3)  | <b>160</b><br>(5)  | <b>154</b><br>(7) | <b>148</b><br>(9) | <b>143</b><br>(11) |
| 2003 | <b>139</b><br>(13) | <b>132</b><br>(15) | <b>126</b><br>(17) | <b>120</b><br>(19) | <b>114</b><br>(21) | <b>108</b><br>(22) | <b>104</b><br>(23) | <b>103</b><br>(23) | <b>101</b><br>(23) | <b>99</b><br>(23) | <b>97</b><br>(23) | <b>95</b><br>(23)  |
| 2004 | <b>94</b><br>(23)  | <b>92</b><br>(23)  | <b>91</b><br>(23)  | <b>89</b><br>(23)  | <b>88</b><br>(23)  | <b>87</b><br>(23)  | <b>85</b><br>(23)  | <b>84</b><br>(23)  | <b>83</b><br>(23)  | <b>82</b><br>(23) | <b>81</b><br>(23) | <b>80</b><br>(23)  |
| 2005 | <b>79</b><br>(23)  | <b>78</b><br>(23)  | <b>78</b><br>(23)  | <b>77</b><br>(23)  | <b>76</b><br>(23)  | <b>75</b><br>(23)  | <b>75</b><br>(23)  | <b>74</b><br>(23)  | <b>74</b><br>(23)  | <b>73</b><br>(23) | <b>73</b><br>(23) | <b>73</b><br>(23)  |
| 2006 | <b>72</b><br>(23)  | <b>72</b><br>(23)  | <b>71</b><br>(23)  | <b>71</b><br>(23)  | <b>71</b><br>(23)  | <b>71</b><br>(23)  | <b>71</b><br>(23)  | <b>71</b><br>(23)  | <b>70</b><br>(23)  | <b>70</b><br>(23) | <b>70</b><br>(23) | <b>70</b><br>(23)  |
| 2007 | <b>70</b><br>(23)  | <b>70</b><br>(23)  | <b>70</b><br>(23)  | <b>70</b><br>(23)  | <b>71</b><br>(23)  | <b>71</b><br>(23)  | <b>72</b><br>(23)  | <b>73</b><br>(23)  | <b>74</b><br>(23)  | <b>76</b><br>(23) | <b>77</b><br>(23) | <b>79</b><br>(23)  |



### ISES Solar Cycle Ap Progression

(Data Through 31 Dec 02)

