

## **Space Weather Highlights 01 – 07 March 2004**

**SWO PRF 1488  
09 March 2004**

Solar activity levels ranged from very low to moderate with all of this period's activity confined to just two regions. Region 567 (S12, L=070, class/area, Eac/160 on 04 March) produced six weak, impulsive C-class flares, the largest a C2.7/Sf on 06/0701 UTC. New Region 570 (S14, L=302, class/area, Ekc/570 on 07 March) rotated onto the disk on 05 March as a large, single Alpha spot and produced three low to moderate level C-class flares. Activity levels increased from low to moderate on 06 March as Region 570 produced four low-level C-class flares and one M-class flare, an M1.3 at 06/1217 UTC. This region has shown significant areal growth since first appearing on 05 March.

Solar wind data were available from the NASA Advanced Composition Explorer (ACE) spacecraft during most of the summary period. The period began with solar wind velocities elevated at speeds between 625 – 725 km/s and speeds remained at these levels through 03 March. By 04 March, wind speeds began a gradual decline and decreased to just over 300 km/s by the end of the period. The elevated solar wind speeds at the beginning of the period were driven by a favorably positioned, recurrent coronal hole. The Bz component of the interplanetary magnetic field did not vary beyond +/- 5 nT for the entire period.

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 was at high levels every day of the summary period.

The geomagnetic field ranged from quiet to minor storm levels. Mostly quiet to active levels, with one isolated period of minor storming mid-day on 03 March, were observed during the period 01 - 03 March. This activity was due to a coronal hole driven high-speed solar wind stream. Quiet to unsettled levels occurred during the remainder of the summary period.

## **Space Weather Outlook 10 March - 05 April 2004**

Solar activity is expected to be at low to moderate levels through 18 March. From 19 -31 March, predominantly very low to low levels are expected due to Region 570 rotating off the west limb. By 01 April, old Region 570 is due to return and as a result, low to moderate level activity is expected through the end of the forecast period.

Greater than 10 MeV proton events are possible with significant flare activity from Region 570.

The greater than 2 MeV electron flux at geosynchronous orbit is expected to reach high levels on 10 - 17 March, 22 - 23 March and again on 29 - 31 March due to recurrent coronal holes.

Geomagnetic activity is expected to range from quiet to minor storm levels. A large, recurrent coronal hole high-speed stream is due to return on 09 - 14 March and is expected to produce active to minor storm conditions. A weak coronal hole high-speed stream is due to return on 19 - 20 March and is expected to produce quiet to active conditions. From 26 - 27 March, activity levels are expected to increase to active to minor storm levels as another small coronal hole high-speed stream rotates into geoeffective position.



### 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 |   |
| 01 March | 102                   | 66              | 330                                      | B1.5             | 0          | 0 | 0 | 0       | 0 | 0 | 0 | 0 | 0 |
| 02 March | 99                    | 50              | 240                                      | B1.5             | 2          | 0 | 0 | 2       | 0 | 0 | 0 | 0 | 0 |
| 03 March | 90                    | 42              | 240                                      | B1.3             | 0          | 0 | 0 | 0       | 0 | 0 | 0 | 0 | 0 |
| 04 March | 98                    | 53              | 180                                      | B1.8             | 2          | 0 | 0 | 0       | 0 | 0 | 0 | 0 | 0 |
| 05 March | 107                   | 55              | 300                                      | B3.2             | 3          | 0 | 0 | 0       | 0 | 0 | 0 | 0 | 0 |
| 06 March | 105                   | 61              | 620                                      | B3.1             | 6          | 1 | 0 | 1       | 0 | 0 | 0 | 0 | 0 |
| 07 March | 106                   | 53              | 680                                      | B2.5             | 0          | 0 | 0 | 0       | 0 | 0 | 0 | 0 | 0 |

### Daily Particle Data

| Date     | Proton Fluence<br>(protons/cm <sup>2</sup> -day-sr) |        |         | Electron Fluence<br>(electrons/cm <sup>2</sup> -day-sr) |        |        |
|----------|---|--------|---------|---|--------|--------|
|          | >1MeV   | >10MeV | >100MeV | >.6MeV  | >2MeV  | >4MeV  |
|          | 01 March  | 1.7E+6 | 1.2E+4  | 2.4E+3  |        | 9.9E+7 |
| 02 March | 1.0E+6  | 1.3E+4 | 2.5E+3  |   | 9.2E+7 |        |
| 03 March | 2.3E+6  | 1.2E+4 | 2.8E+3  |   | 2.6E+8 |        |
| 04 March | 1.8E+6  | 1.2E+4 | 2.6E+3  |   | 3.4E+8 |        |
| 05 March | 1.2E+6  | 1.2E+4 | 2.7E+3  |   | 2.3E+8 |        |
| 06 March | 1.3E+6  | 1.3E+4 | 2.7E+3  |   | 2.9E+8 |        |
| 07 March | 1.3E+6  | 1.3E+4 | 2.9E+3  |   | 3.6E+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       |
|          | 01 March                          | 12              | 2-2-3-2-3-3-3-3          | 35              | 2-2-4-5-6-6-3-3        | 18              |
| 02 March | 14                                | 4-3-3-1-3-2-3-3 | 40                       | 4-3-6-4-6-6-2-2 | 17                     | 4-3-4-3-4-3-3-3 |
| 03 March | 8                                 | 1-2-1-3-3-2-2-2 | 33                       | 2-2-1-7-6-3-2-1 | 15                     | 3-2-2-5-4-3-4-2 |
| 04 March | 4                                 | 1-1-1-2-1-1-2-1 | 6                        | 1-1-1-4-2-1-1-0 | 7                      | 2-2-1-3-2-3-2-2 |
| 05 March | 4                                 | 2-1-2-1-1-0-1-2 | 4                        | 1-1-2-3-0-0-0-1 | 8                      | 2-1-2-2-0-2-3-2 |
| 06 March | 3                                 | 1-2-1-0-1-1-1-0 | 1                        | 0-1-0-1-0-0-0-0 | 5                      | 2-2-1-2-2-2-2-1 |
| 07 March | 3                                 | 0-0-2-1-1-1-1-1 | 2                        | 0-0-2-1-0-1-1-1 | 6                      | 1-1-2-2-2-3-1-2 |

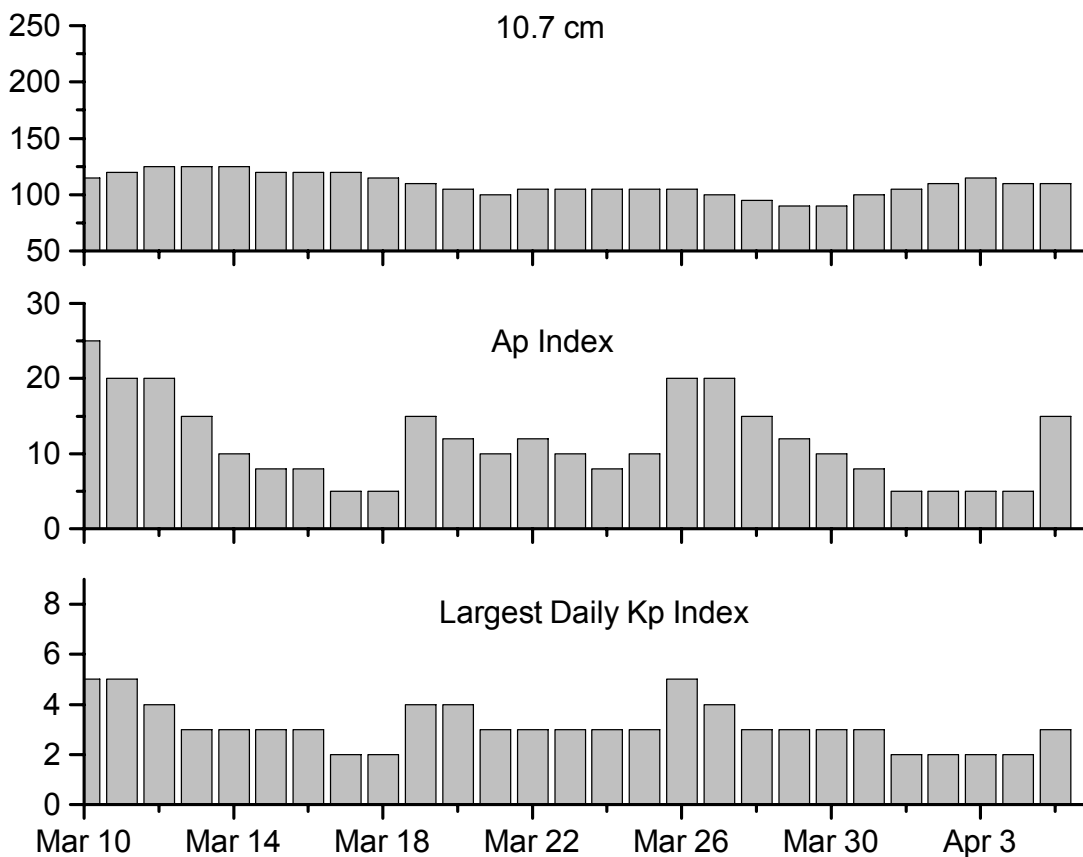


### *Alerts and Warnings Issued*

| Date & Time of Issue | Type of Alert or Warning                     | Date & Time of Event UT   |
|----------------------|--|---------------------------|
| 01 Mar 0029          | WARNING: Geomagnetic K= 4                    | 01 Mar 0030 - 1500        |
| 01 Mar 0837          | ALERT: Geomagnetic K= 4                      | 01 Mar 0835               |
| 01 Mar 1215          | ALERT: Electron 2MeV Integral Flux > 1000pfu | 01 Mar 1155               |
| 01 Mar 1455          | EXTENDED WARNING: Geomagnetic K= 4           | 01 Mar 0030 - 2359        |
| 01 Mar 2336          | EXTENDED WARNING: Geomagnetic K= 4           | 01 Mar 0030 – 02 Mar 1500 |
| 02 Mar 1106          | ALERT: Electron 2MeV Integral Flux > 1000pfu | 02 Mar 1045               |
| 02 Mar 1455          | EXTENDED WARNING: Geomagnetic K= 4           | 01 Mar 0030 – 02 Mar 2359 |
| 03 Mar 1023          | ALERT: Geomagnetic K= 4                      | 03 Mar 1022               |
| 03 Mar 1112          | ALERT: Electron 2MeV Integral Flux > 1000pfu | 03 Mar 1050               |
| 04 Mar 0515          | ALERT: Electron 2MeV Integral Flux > 1000pfu | 04 Mar 0500               |
| 05 Mar 0519          | ALERT: Electron 2MeV Integral Flux > 1000pfu | 05 Mar 0500               |
| 06 Mar 0013          | 1 – 245 MHz Radio Burst                      | 05 Mar                    |
| 06 Mar 0013          | 1 – 245 MHz Radio Noise Storm                | 05 Mar                    |
| 06 Mar 0516          | ALERT: Electron 2MeV Integral Flux > 1000pfu | 06 Mar 0500               |
| 07 Mar 0130          | 2 – 245 MHz Radio Bursts                     | 06 Mar                    |
| 07 Mar 0518          | ALERT: Electron 2MeV Integral Flux > 1000pfu | 07 Mar 0500               |



## 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 |
|--------|-----------------------|----------------------|---------------------|--------|-----------------------|----------------------|---------------------|
| 10 Mar | 115                   | 25                   | 5                   | 24 Mar | 105                   | 8                    | 3                   |
| 11     | 120                   | 20                   | 5                   | 25     | 105                   | 10                   | 3                   |
| 12     | 125                   | 20                   | 4                   | 26     | 105                   | 20                   | 5                   |
| 13     | 125                   | 15                   | 3                   | 27     | 100                   | 20                   | 4                   |
| 14     | 125                   | 10                   | 3                   | 28     | 95                    | 15                   | 3                   |
| 15     | 120                   | 8                    | 3                   | 29     | 90                    | 12                   | 3                   |
| 16     | 120                   | 8                    | 3                   | 30     | 90                    | 10                   | 3                   |
| 17     | 120                   | 5                    | 2                   | 31     | 100                   | 8                    | 3                   |
| 18     | 115                   | 5                    | 2                   | 01 Apr | 105                   | 5                    | 2                   |
| 19     | 110                   | 15                   | 4                   | 02     | 110                   | 5                    | 2                   |
| 20     | 105                   | 12                   | 4                   | 03     | 115                   | 5                    | 2                   |
| 21     | 100                   | 10                   | 3                   | 04     | 110                   | 5                    | 2                   |
| 22     | 105                   | 12                   | 3                   | 05     | 110                   | 15                   | 3                   |
| 23     | 105                   | 10                   | 3                   |        |                       |                      |                     |



***Energetic Events***

| Date   | Time  |      |      | X-ray |      | Optical Information |          |     | Peak       |      | Sweep Freq |    |
|--------|-------|------|------|-------|------|---------------------|----------|-----|------------|------|------------|----|
|        | Begin | Max  | Max  | Class | Flux | Imp/                | Location | Rgn | Radio Flux |      | Intensity  |    |
|        |       |      |      |       |      | Brtns               | Lat CMD  | #   | 245        | 2695 | II         | IV |
| 06 Mar | 1208  | 1217 | 1241 | M1.3  | .016 |                     |          | 570 |            |      |            |    |

***Flare List***

| Date     | Time     |      |      | X-ray<br>Class. | Imp /<br>Brtns | Optical<br>Location<br>Lat CMD | Rgn |
|----------|----------|------|------|-----------------|----------------|--------------------------------|-----|
|          | Begin    | Max  | End  |                 |                |                                |     |
| 01 March | 0544     | 0547 | 0558 | B2.3            |                |                                | 564 |
|          | 1601     | 1608 | 1616 | B4.8            |                |                                | 564 |
| 02 March | 0656     | 0659 | 0702 | B2.8            |                |                                | 564 |
|          | B2146    | 2146 | 2155 | C1.7            | Sf             | S12E00                         | 567 |
|          | B2326    | 2327 | 2330 | C1.7            | Sf             | S09W06                         | 567 |
| 03 March | 0123     | 0127 | 0134 | B2.7            |                |                                | 567 |
|          | 2256     | 2301 | 2304 | B2.8            |                |                                | 567 |
| 04 March | 0146     | 0154 | 0158 | B6.9            |                |                                | 567 |
|          | 0229     | 0235 | 0242 | B4.8            |                |                                | 567 |
|          | 0447     | 0455 | 0513 | B9.6            |                |                                |     |
|          | 0633     | 0642 | 0655 | B4.6            |                |                                | 567 |
|          | 1000     | 1007 | 1014 | C2.5            |                |                                | 567 |
|          | 1711     | 1716 | 1721 | C1.0            |                |                                | 567 |
|          | 05 March | 0059 | 0103 | 0107            | B9.6           |                                |     |
|          | 0135     | 0140 | 0148 | B7.3            |                |                                | 570 |
|          | 0320     | 0341 | 0353 | C2.4            |                |                                | 570 |
|          | 0540     | 0547 | 0605 | B8.0            |                |                                |     |
|          | 0655     | 0700 | 0705 | B6.3            |                |                                | 567 |
|          | 0851     | 0912 | 0937 | C6.6            |                |                                | 570 |
|          | 1217     | 1223 | 1230 | B7.5            |                |                                | 567 |
|          | 1841     | 1851 | 1910 | C5.2            |                |                                | 570 |
| 06 March | 0225     | 0229 | 0231 | C1.6            |                |                                | 567 |
|          | 0700     | 0704 | 0710 | C2.7            | Sf             | S12W43                         | 567 |
|          | 0759     | 0803 | 0806 | B6.1            |                |                                | 570 |
|          | 1014     | 1023 | 1028 | C1.9            |                |                                | 570 |
|          | 1208     | 1217 | 1241 | M1.3            |                |                                | 570 |
|          | 1512     | 1516 | 1518 | C1.2            |                |                                | 570 |
|          | 1622     | 1628 | 1633 | C1.4            |                |                                | 570 |
|          | 1922     | 1935 | 1942 | C2.0            |                |                                | 570 |
|          | 2255     | 2300 | 2316 | B5.3            |                |                                | 570 |
| 07 March | 0442     | 0448 | 0455 | B5.5            |                |                                |     |
|          | 1231     | 1237 | 1244 | B4.7            |                |                                | 567 |
|          | 2246     | 2301 | 2323 | B8.4            |                |                                | 570 |



### 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 |

#### Region 562

|        |        |     |      |    |     |     |   |  |  |  |  |  |  |  |  |  |  |  |  |
|--------|--------|-----|------|----|-----|-----|---|--|--|--|--|--|--|--|--|--|--|--|--|
| 19 Feb | S11E73 | 152 | 0010 | 01 | Axx | 001 | A |  |  |  |  |  |  |  |  |  |  |  |  |
| 20 Feb | S11E59 | 153 | 0060 | 08 | Dao | 002 | B |  |  |  |  |  |  |  |  |  |  |  |  |
| 21 Feb | S13E45 | 154 | 0020 | 07 | Bxo | 002 | B |  |  |  |  |  |  |  |  |  |  |  |  |
| 22 Feb | S12E29 | 157 | 0010 | 01 | Axx | 001 | A |  |  |  |  |  |  |  |  |  |  |  |  |
| 23 Feb | S13E13 | 160 | 0000 | 00 | Axx | 001 | A |  |  |  |  |  |  |  |  |  |  |  |  |
| 24 Feb | S13E00 | 160 |      |    |     |     |   |  |  |  |  |  |  |  |  |  |  |  |  |
| 25 Feb | S12W09 | 155 | 0010 | 03 | Bxo | 002 | B |  |  |  |  |  |  |  |  |  |  |  |  |
| 26 Feb | S12W22 | 155 |      |    |     |     |   |  |  |  |  |  |  |  |  |  |  |  |  |
| 28 Feb | S12W48 | 155 |      |    |     |     |   |  |  |  |  |  |  |  |  |  |  |  |  |
| 29 Feb | S09W61 | 155 |      |    |     |     |   |  |  |  |  |  |  |  |  |  |  |  |  |
| 01 Mar | S09W74 | 155 |      |    |     |     |   |  |  |  |  |  |  |  |  |  |  |  |  |
| 02 Mar | S09W87 | 155 |      |    |     |     |   |  |  |  |  |  |  |  |  |  |  |  |  |

0 0 0 0 0 0 0 0 0

Crossed West Limb.

Absolute heliographic longitude:160

#### Region 563

|        |        |     |      |    |     |     |   |  |  |  |  |  |  |  |  |  |  |  |  |
|--------|--------|-----|------|----|-----|-----|---|--|--|--|--|--|--|--|--|--|--|--|--|
| 20 Feb | S21E66 | 146 | 0030 | 01 | Axx | 001 | A |  |  |  |  |  |  |  |  |  |  |  |  |
| 21 Feb | S24E51 | 148 | 0020 | 01 | Axx | 001 | A |  |  |  |  |  |  |  |  |  |  |  |  |
| 22 Feb | S23E40 | 146 | 0030 | 01 | Hsx | 001 | A |  |  |  |  |  |  |  |  |  |  |  |  |
| 23 Feb | S24E26 | 147 | 0010 | 01 | Hrx | 001 | A |  |  |  |  |  |  |  |  |  |  |  |  |
| 24 Feb | S24E13 | 147 | 0030 | 02 | Hsx | 002 | A |  |  |  |  |  |  |  |  |  |  |  |  |
| 25 Feb | S23E01 | 145 | 0030 | 02 | Hsx | 002 | A |  |  |  |  |  |  |  |  |  |  |  |  |
| 26 Feb | S23W12 | 145 | 0010 | 01 | Hsx | 001 | A |  |  |  |  |  |  |  |  |  |  |  |  |
| 27 Feb | S23W27 | 147 | 0010 | 01 | Axx | 001 | A |  |  |  |  |  |  |  |  |  |  |  |  |
| 28 Feb | S23W39 | 146 | 0020 | 02 | Cso | 002 | B |  |  |  |  |  |  |  |  |  |  |  |  |
| 29 Feb | S23W52 | 146 |      |    |     |     |   |  |  |  |  |  |  |  |  |  |  |  |  |
| 01 Mar | S23W65 | 146 |      |    |     |     |   |  |  |  |  |  |  |  |  |  |  |  |  |
| 02 Mar | S23W78 | 146 |      |    |     |     |   |  |  |  |  |  |  |  |  |  |  |  |  |

0 0 0 0 0 0 0 0 0

Crossed West Limb.

Absolute heliographic longitude:145



**Region Summary - continued.**

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

*Region 564*

|        |        |     |      |    |     |     |     |    |   |   |    |    |   |   |   |
|--------|--------|-----|------|----|-----|-----|-----|----|---|---|----|----|---|---|---|
| 21 Feb | N14E42 | 157 | 0020 | 06 | Bxo | 007 | B   |    |   |   |    |    |   |   |   |
| 22 Feb | N13E26 | 160 | 0180 | 11 | Eai | 015 | Bg  | 5  |   |   |    | 10 |   |   |   |
| 23 Feb | N13E13 | 160 | 0300 | 12 | Eko | 020 | Bg  |    |   |   |    |    |   |   |   |
| 24 Feb | N15E00 | 160 | 0470 | 11 | Eki | 027 | Bg  |    |   |   |    | 2  |   |   |   |
| 25 Feb | N14W14 | 160 | 0540 | 11 | Ekc | 039 | Bg  | 8  |   |   |    | 8  |   |   |   |
| 26 Feb | N14W27 | 160 | 0650 | 11 | Ekc | 051 | Bgd | 5  | 1 | 1 | 3  | 1  | 1 |   |   |
| 27 Feb | N14W42 | 162 | 0870 | 11 | Ekc | 029 | Bg  | 1  |   |   |    |    |   |   |   |
| 28 Feb | N15W54 | 161 | 0780 | 11 | Ekc | 028 | Bg  | 1  |   |   |    |    |   |   |   |
| 29 Feb | N13W67 | 161 | 0650 | 12 | Eai | 016 | Bg  |    |   |   |    |    |   |   |   |
| 01 Mar | N13W80 | 160 | 0130 | 10 | Dso | 012 | B   |    |   |   |    |    |   |   |   |
|        |        |     |      |    |     |     |     | 20 | 1 | 1 | 23 | 1  | 1 | 0 | 0 |

Crossed West Limb.

Absolute heliographic longitude:160

*Region 565*

|        |        |     |      |    |     |     |    |   |   |   |   |   |   |   |   |
|--------|--------|-----|------|----|-----|-----|----|---|---|---|---|---|---|---|---|
| 23 Feb | S05E35 | 138 | 0050 | 06 | Dro | 006 | B  |   |   |   |   |   |   |   |   |
| 24 Feb | S04E22 | 138 | 0120 | 07 | Cao | 013 | B  |   |   |   |   |   |   |   |   |
| 25 Feb | S05E07 | 139 | 0180 | 08 | Cao | 013 | B  |   |   |   |   | 1 |   |   |   |
| 26 Feb | S05W07 | 140 | 0130 | 07 | Dai | 023 | B  |   |   |   |   |   |   |   |   |
| 27 Feb | S04W21 | 141 | 0190 | 08 | Dko | 015 | B  |   |   |   |   |   |   |   |   |
| 28 Feb | S04W33 | 140 | 0180 | 09 | Dao | 011 | B  |   |   |   |   |   |   |   |   |
| 29 Feb | S04W51 | 145 | 0100 | 05 | Dao | 006 | B  |   |   |   |   |   |   |   |   |
| 01 Mar | S04W64 | 144 | 0080 | 05 | Cso | 007 | Bg |   |   |   |   |   |   |   |   |
| 02 Mar | S03W78 | 145 | 0100 | 04 | Dso | 002 | B  |   |   |   |   |   |   |   |   |
| 03 Mar | S02W93 | 147 | 0080 | 03 | Hsx | 001 | A  |   |   |   |   |   |   |   |   |
|        |        |     |      |    |     |     |    | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 |

Crossed West Limb.

Absolute heliographic longitude:139

*Region 567*

|        |        |     |      |    |     |     |     |   |   |   |   |   |   |   |   |
|--------|--------|-----|------|----|-----|-----|-----|---|---|---|---|---|---|---|---|
| 27 Feb | S13E50 | 070 | 0040 | 06 | Cso | 005 | B   |   |   |   |   |   |   |   |   |
| 28 Feb | S13E37 | 070 | 0070 | 08 | Dao | 009 | B   | 2 |   |   |   |   |   |   |   |
| 29 Feb | S13E24 | 070 | 0120 | 09 | Dao | 016 | B   |   |   |   |   |   |   |   |   |
| 01 Mar | S13E11 | 069 | 0120 | 09 | Dai | 017 | Bg  |   |   |   |   |   |   |   |   |
| 02 Mar | S12W04 | 071 | 0140 | 11 | Esi | 028 | B   | 2 |   |   |   | 2 |   |   |   |
| 03 Mar | S12W16 | 070 | 0160 | 12 | Eai | 021 | Bg  |   |   |   |   |   |   |   |   |
| 04 Mar | S12W29 | 070 | 0160 | 12 | Eac | 029 | Bgd | 2 |   |   |   |   |   |   |   |
| 05 Mar | S12W42 | 070 | 0160 | 14 | Eao | 016 | Bgd |   |   |   |   |   |   |   |   |
| 06 Mar | S12W55 | 070 | 0210 | 13 | Eao | 017 | Bg  | 2 |   |   |   | 1 |   |   |   |
| 07 Mar | S14W66 | 067 | 0080 | 11 | Eao | 008 | B   |   |   |   |   |   |   |   |   |
|        |        |     |      |    |     |     |     | 8 | 0 | 0 | 3 | 0 | 0 | 0 | 0 |

Still on Disk.

Absolute heliographic longitude:071



**Region Summary - continued.**

| Date                                | Location       |              | Sunspot Characteristics         |                   |               |               | Flares       |       |   |   |         |   |   |   |
|-------------------------------------|----------------|--------------|---------------------------------|-------------------|---------------|---------------|--------------|-------|---|---|---------|---|---|---|
|                                     | ( ° Lat ° CMD) | Helio<br>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 | 4 |
| <i>Region 568</i>                   |                |              |                                 |                   |               |               |              |       |   |   |         |   |   |   |
| 28 Feb                              | S16W20         | 127          | 0020                            | 04                | Bxo           | 004           | B            |       |   |   |         |   |   |   |
| 29 Feb                              | S17W32         | 126          | 0010                            | 03                | Bxo           | 003           | B            |       |   |   |         |   |   |   |
| 01 Mar                              | S17W45         | 126          |                                 |                   |               |               |              |       |   |   |         |   |   |   |
| 02 Mar                              | S17W58         | 126          |                                 |                   |               |               |              |       |   |   |         |   |   |   |
| 03 Mar                              | S17W71         | 126          |                                 |                   |               |               |              |       |   |   |         |   |   |   |
| 04 Mar                              | S17W84         | 126          |                                 |                   |               |               |              |       |   |   |         |   |   |   |
| 05 Mar                              | S17W97         | 126          |                                 |                   |               |               |              |       |   |   |         |   |   |   |
|                                     |                |              |                                 |                   |               |               | 0            | 0     | 0 | 0 | 0       | 0 | 0 | 0 |
| Crossed West Limb.                  |                |              |                                 |                   |               |               |              |       |   |   |         |   |   |   |
| Absolute heliographic longitude:127 |                |              |                                 |                   |               |               |              |       |   |   |         |   |   |   |
| <i>Region 569</i>                   |                |              |                                 |                   |               |               |              |       |   |   |         |   |   |   |
| 04 Mar                              | S11E34         | 011          | 0020                            | 04                | Bxo           | 004           | B            |       |   |   |         |   |   |   |
| 05 Mar                              | S11E16         | 012          | 0040                            | 04                | Cso           | 008           | B            |       |   |   |         |   |   |   |
| 06 Mar                              | S11E03         | 012          | 0070                            | 06                | Dao           | 007           | B            |       |   |   |         |   |   |   |
| 07 Mar                              | S11W11         | 012          | 0030                            | 06                | Dao           | 006           | B            |       |   |   |         |   |   |   |
|                                     |                |              |                                 |                   |               |               | 0            | 0     | 0 | 0 | 0       | 0 | 0 | 0 |
| Still on Disk.                      |                |              |                                 |                   |               |               |              |       |   |   |         |   |   |   |
| Absolute heliographic longitude:012 |                |              |                                 |                   |               |               |              |       |   |   |         |   |   |   |
| <i>Region 570</i>                   |                |              |                                 |                   |               |               |              |       |   |   |         |   |   |   |
| 05 Mar                              | S13E84         | 304          | 0100                            | 03                | Hkx           | 001           | A            | 3     |   |   |         |   |   |   |
| 06 Mar                              | S13E70         | 305          | 0340                            | 17                | Cko           | 007           | B            | 4     | 1 |   |         |   |   |   |
| 07 Mar                              | S14E59         | 302          | 0570                            | 14                | Ekc           | 009           | B            |       |   |   |         |   |   |   |
|                                     |                |              |                                 |                   |               |               | 7            | 1     | 0 | 0 | 0       | 0 | 0 | 0 |
| Still on Disk.                      |                |              |                                 |                   |               |               |              |       |   |   |         |   |   |   |
| Absolute heliographic longitude:302 |                |              |                                 |                   |               |               |              |       |   |   |         |   |   |   |



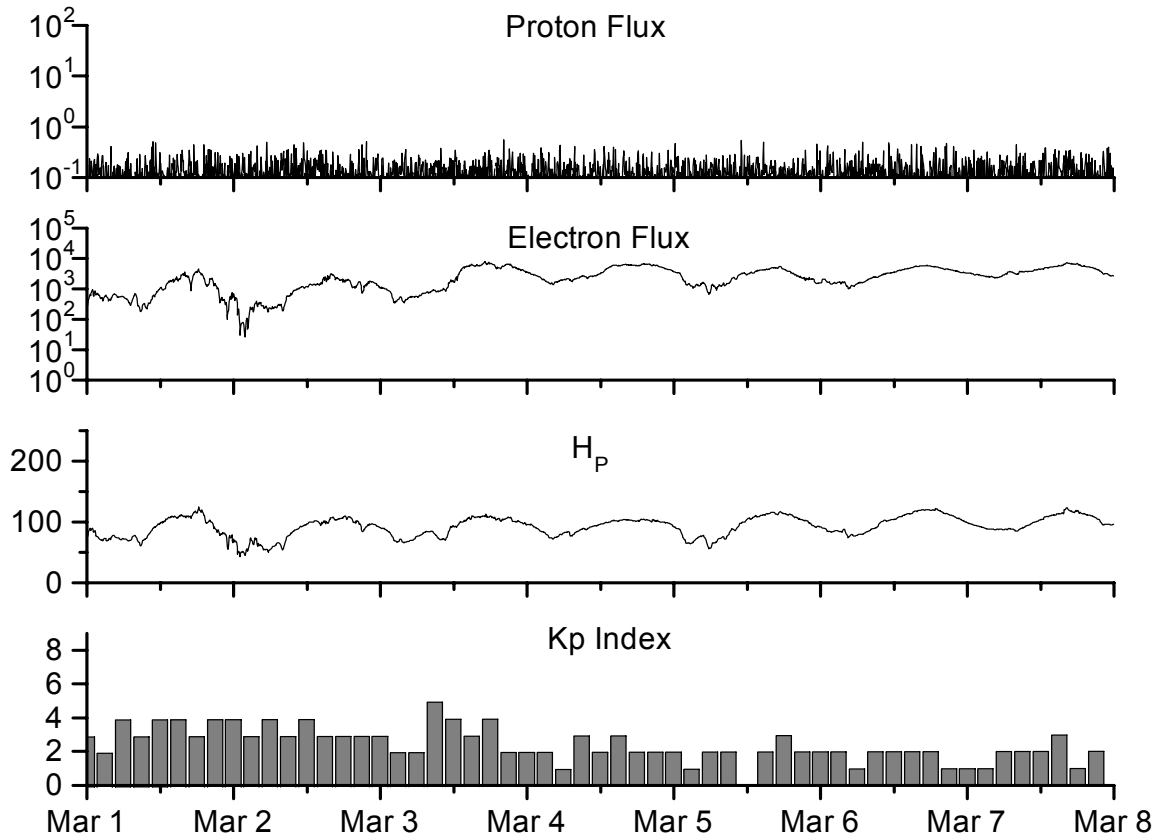


**Recent Solar Indices (preliminary)  
of the observed monthly mean values**

| 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>2002</b> |                        |             |                 |                      |                     |                       |                 |                 |                 |
| 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            |
| <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            | 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            | 113.6                | 65.2                | 129.4                 | 132.6           | 24              | 21.8            |
| July        | 132.8                  | 85.0        | 0.64            | 106.9                | 62.0                | 127.8                 | 129.5           | 20              | 22.3            |
| August      | 114.3                  | 72.7        | 0.64            | 102.8                | 60.3                | 122.1                 | 127.5           | 23              | 22.4            |
| 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              |                 |
| December    | 75.4                   | 47.0        | 0.62            |                      |                     | 115.1                 |                 | 18              |                 |
| <b>2004</b> |                        |             |                 |                      |                     |                       |                 |                 |                 |
| January     | 62.3                   | 37.2        | 0.60            |                      |                     | 114.1                 |                 | 20              |                 |
| February    | 75.6                   | 46.0        | 0.61            |                      |                     | 107.0                 |                 | 13              |                 |

**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 01 March 2004*

*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.

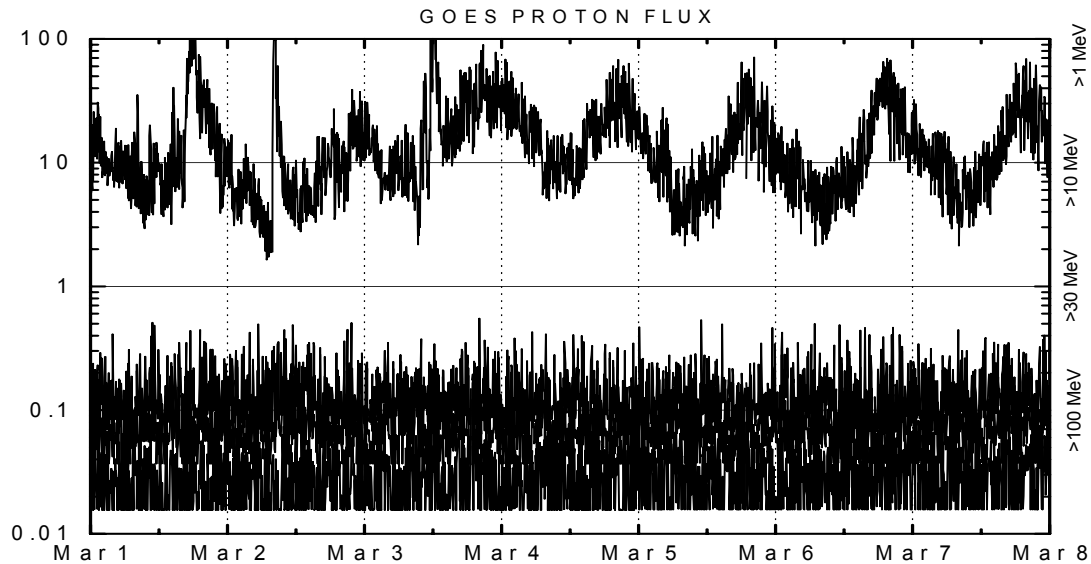
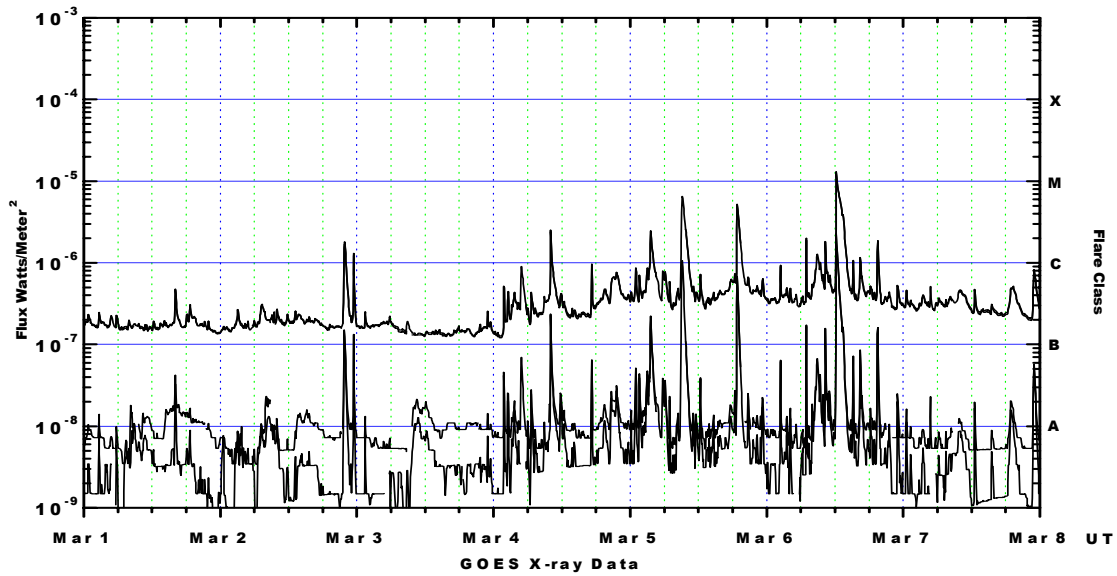
*Electrons* plot contains the five-minute averaged integral electron flux (electrons/cm<sup>2</sup>-sec -sr) with energies greater than 2 MeV at GOES-12.

*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*

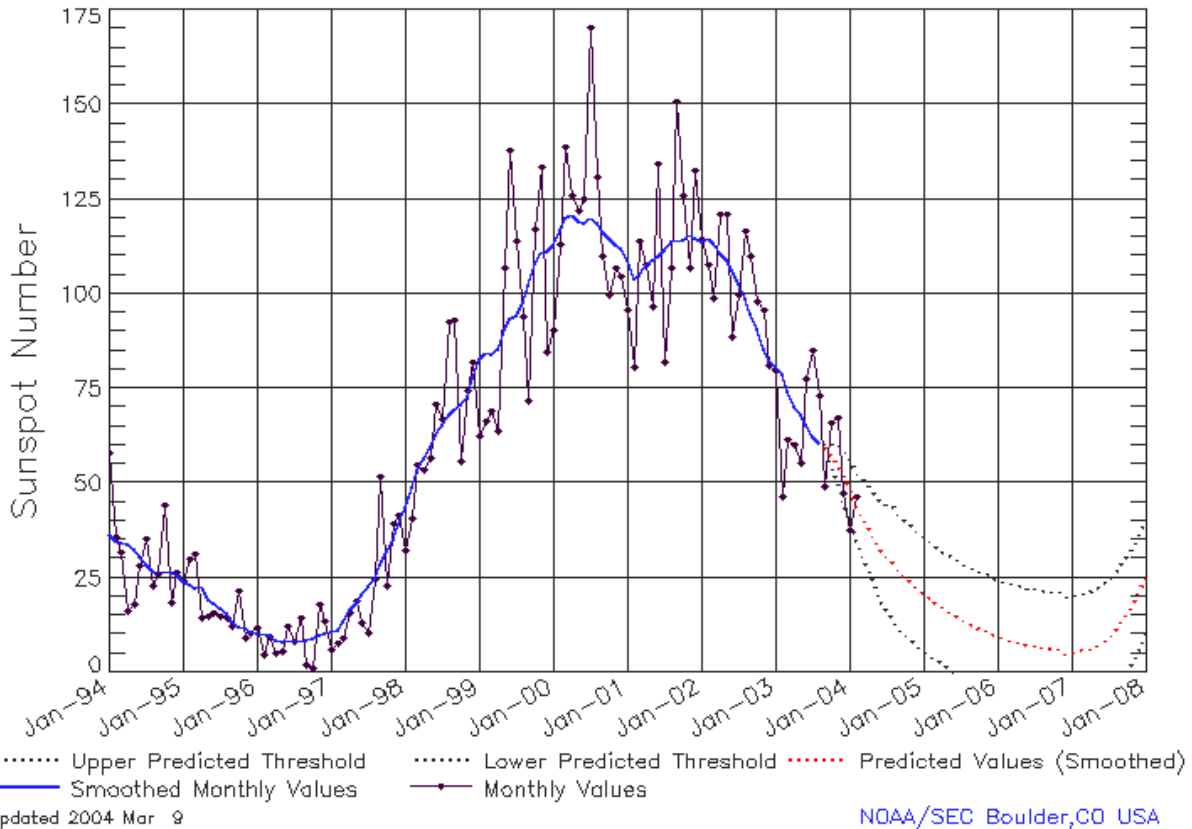
X-ray plot contains five-minute averaged x-ray flux (watts/m<sup>2</sup>) as measured by GOES 12 and 10 in two wavelength bands, .05 - .4 and .1 - .8 nm. The letters A, B, C, M and X refer to x-ray event levels for the .1 - .8 nm band.

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.



# ISES Solar Cycle Sunspot Number Progression

Data Through 29 Feb 04



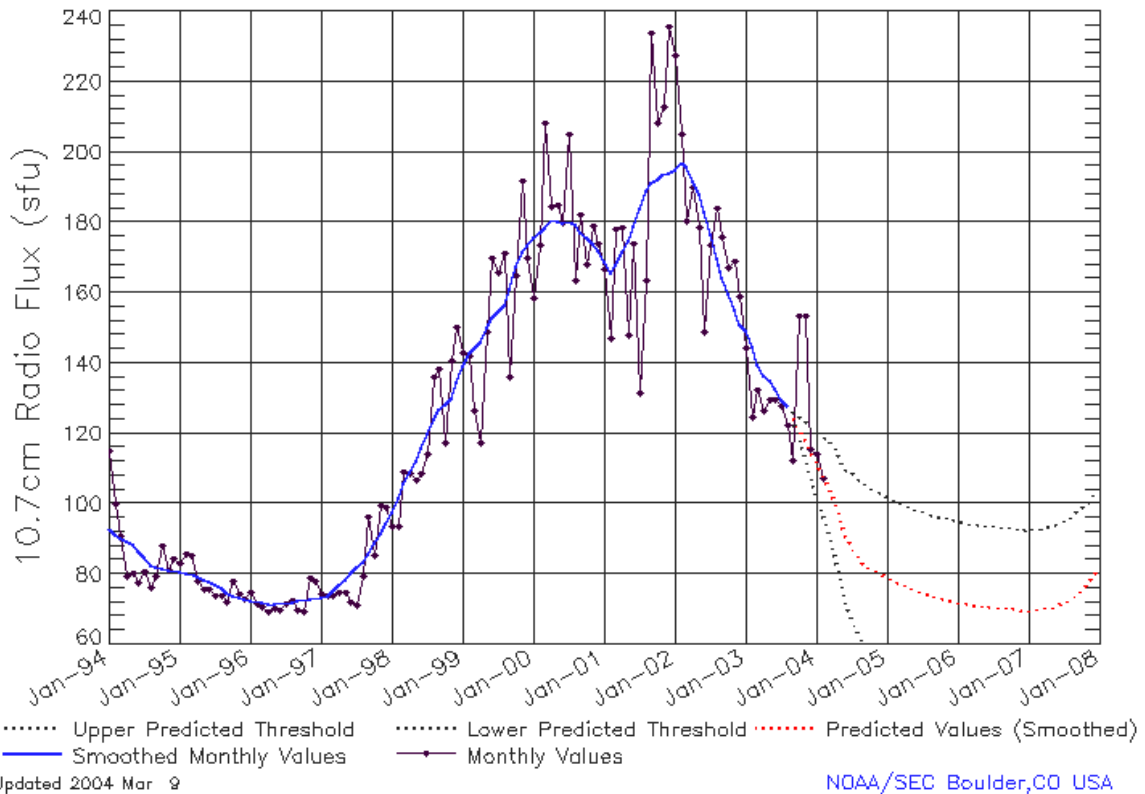
## SEC Prediction of Smoothed Sunspot Number

|      | 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>(***)      | 103<br>(***)      | 99<br>(***)       | 95<br>(***)       | 91<br>(***)       | 85<br>(***)       | 82<br>(***)       |
| 2003 | 81<br>(***)       | 79<br>(***)       | 74<br>(***)       | 70<br>(***)       | 68<br>(***)       | 65<br>(***)       | 62<br>(***)       | 60<br>(***)       | <b>59</b><br>(1)  | <b>57</b><br>(3)  | <b>55</b><br>(5)  | <b>52</b><br>(7)  |
| 2004 | <b>48</b><br>(8)  | <b>44</b><br>(9)  | <b>41</b><br>(10) | <b>39</b><br>(11) | <b>35</b><br>(12) | <b>32</b><br>(13) | <b>31</b><br>(14) | <b>29</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) |



# ISES Solar Cycle F10.7cm Radio Flux Progression

Data Through 29 Feb 04



Updated 2004 Mar 9

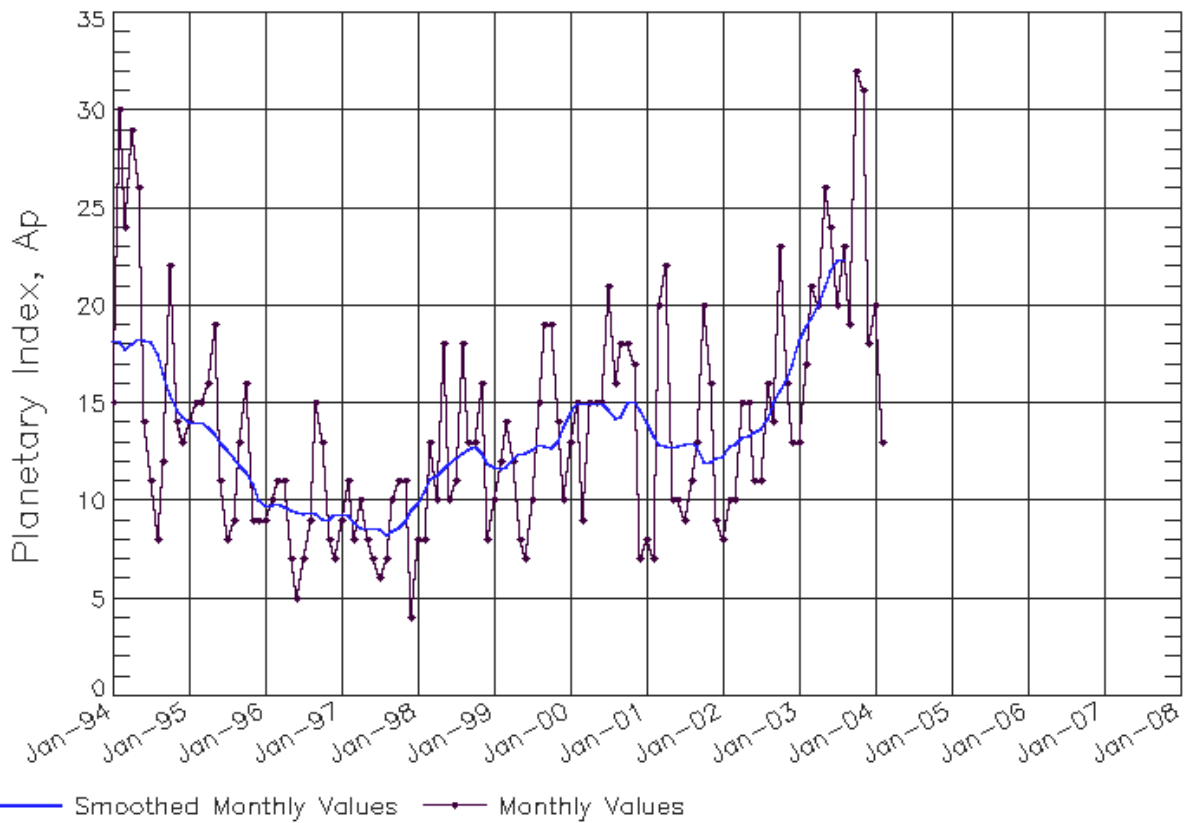
### SEC Prediction of Smoothed F10.7cm Radio Flux

|      | 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>(***)      | 176<br>(***)      | 170<br>(***)      | 164<br>(***)      | 159<br>(***)      | 155<br>(***)      | 151<br>(***)      |
| 2003 | 149<br>(***)      | 145<br>(***)       | 140<br>(***)       | 136<br>(***)       | 135<br>(***)      | 133<br>(***)      | 130<br>(***)      | 128<br>(***)      | <b>125</b><br>(1) | <b>122</b><br>(3) | <b>119</b><br>(5) | <b>115</b><br>(7) |
| 2004 | <b>112</b><br>(9) | <b>108</b><br>(11) | <b>105</b><br>(12) | <b>101</b><br>(13) | <b>95</b><br>(15) | <b>91</b><br>(17) | <b>88</b><br>(19) | <b>85</b><br>(21) | <b>83</b><br>(22) | <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 29 Feb 04



Updated 2004 Mar 9

NOAA/SEC Boulder, CO USA




# Solar Radio Flux (10.7 cm)



Space Environment Center

February 2004  
( Month 89 )

 Preliminary data

