

Space Weather Highlights
10 - 16 May 2010

SWO PRF 1811
18 May 2010

Solar activity was very low. A few low-level B-class events were observed early in the week. The solar disk was void of sunspots throughout the period.

No proton events were observed at geosynchronous orbit.

The greater than 2 MeV electron flux at geosynchronous orbit was at high levels throughout the period.

The geomagnetic field was predominantly quiet throughout the period, with the exception of some isolated unsettled periods and a single isolated active period at high latitudes on 11-12 May.

Space Weather Outlook
19 May – 14 June 2010

Solar activity is expected to be at very low to low levels.

No proton events are expected at geosynchronous orbit.

The greater than 2 MeV electron flux at geosynchronous orbit is expected to be at normal background levels for most of the period. However, increases to high levels are possible on 31 May – 06 June and 11-12 June in response to recurrent high speed streams.

Geomagnetic field activity is expected to be quiet for 19 May, and is expected to increase to mostly unsettled levels for 20-22 May in response to a favorably positioned coronal hole. Quiet levels are expected for 23-28 May. An increase to active levels is expected for 29-30 May in response to a recurrent high speed stream. Activity should decline to mostly unsettled levels for 31 May. Quiet levels are expected to predominate from 01-10 June. Quiet to unsettled levels are possible on 08-09 June in response to another recurrent high speed stream, and quiet levels should return from 10-14 June.



Daily Solar Data

| Date | Radio Flux 10.7 cm | Sun spot No. | Sunspot Area (10 ⁻⁶ hemi.) | X-ray Background | Flares | | | | | | | | |
|--------|--------------------------|--------------------|---|---------------------|------------|---|---|---------|---|---|---|---|---|
| | | | | | X-ray Flux | | | Optical | | | | | |
| | | | | | C | M | X | S | 1 | 2 | 3 | 4 | |
| 10 May | 74 | 0 | 0 | A2.8 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 11 May | 74 | 0 | 0 | A2.1 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 |
| 12 May | 71 | 0 | 0 | A1.9 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 13 May | 69 | 0 | 0 | A1.6 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 14 May | 70 | 0 | 0 | A1.7 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 15 May | 70 | 0 | 0 | A1.6 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 16 May | 69 | 0 | 0 | A1.5 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

Daily Particle Data

| Date | Proton Fluence (protons/cm ² -day-sr) | | | Electron Fluence (electrons/cm ² -day-sr) | | |
|--------|---|---------|----------|---|---------|--------|
| | >1 MeV | >10 MeV | >100 MeV | >.6 MeV | >2MeV | >4 MeV |
| | | | | | | |
| 10 May | 5.6e+05 | 2.0e+04 | 8.3e+03 | | 5.4e+08 | |
| 11 May | 5.9e+05 | 2.0e+04 | 8.2e+03 | | 2.1e+08 | |
| 12 May | 3.9e+05 | 2.0e+04 | 8.0e+03 | | 1.0e+08 | |
| 13 May | 5.3e+05 | 2.0e+04 | 8.6e+03 | | 1.6e+08 | |
| 14 May | 6.9e+05 | 2.0e+04 | 8.7e+03 | | 1.9e+08 | |
| 15 May | 4.2e+05 | 2.0e+04 | 8.7e+03 | | 1.8e+08 | |
| 16 May | 7.2e+05 | 2.1e+04 | 9.3e+03 | | 1.9e+08 | |

Daily Geomagnetic Data

| Date | Middle Latitude Fredericksburg | | High Latitude College | | Estimated Planetary | |
|--------|-----------------------------------|-----------------|--------------------------|-----------------|------------------------|-----------------|
| | A | K-indices | A | K-indices | A | K-indices |
| | | | | | | |
| 10 May | 4 | 1-1-0-1-1-1-3-1 | 2 | 1-0-0-0-1-1-1-1 | 5 | 1-1-0-1-1-2-2-2 |
| 11 May | 6 | 2-2-2-2-2-1-1-1 | 5 | 2-2-1-2-1-1-1-1 | 8 | 2-2-2-2-1-3-3-1 |
| 12 May | 4 | 1-1-1-1-2-1-1-1 | 8 | 2-2-0-3-4-1-0-1 | 5 | 2-1-1-2-2-1-1-1 |
| 13 May | 2 | 1-0-0-1-1-1-1-0 | 1 | 1-0-0-1-0-0-0-0 | 4 | 1-0-1-1-1-1-1-1 |
| 14 May | 1 | 0-0-0-0-1-1-1-0 | 1 | 0-1-0-0-0-0-1-0 | 3 | 1-0-0-0-0-2-1-1 |
| 15 May | 2 | 1-1-0-0-1-1-0-0 | 2 | 1-1-0-1-1-0-0-0 | 4 | 2-1-0-1-1-1-1-1 |
| 16 May | 3 | 1-1-1-0-1-1-1-1 | 2 | 1-0-0-0-1-1-1-1 | 4 | 1-1-0-0-1-1-2-2 |

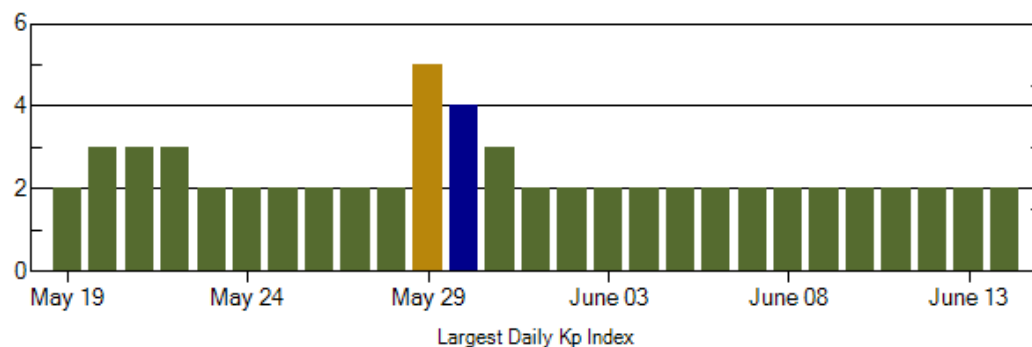
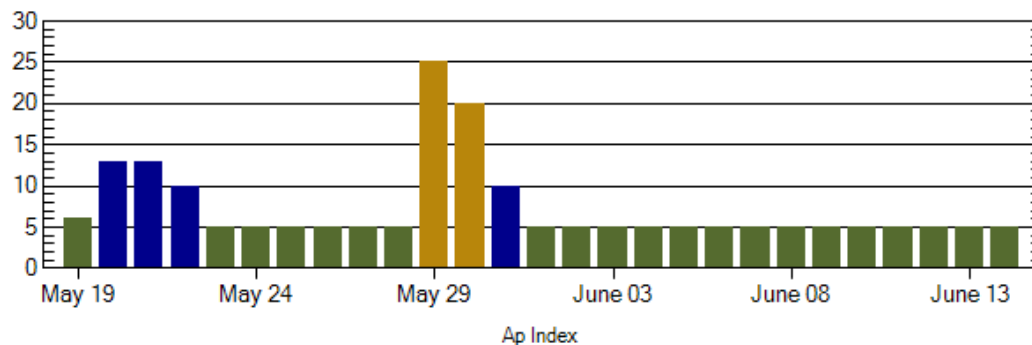
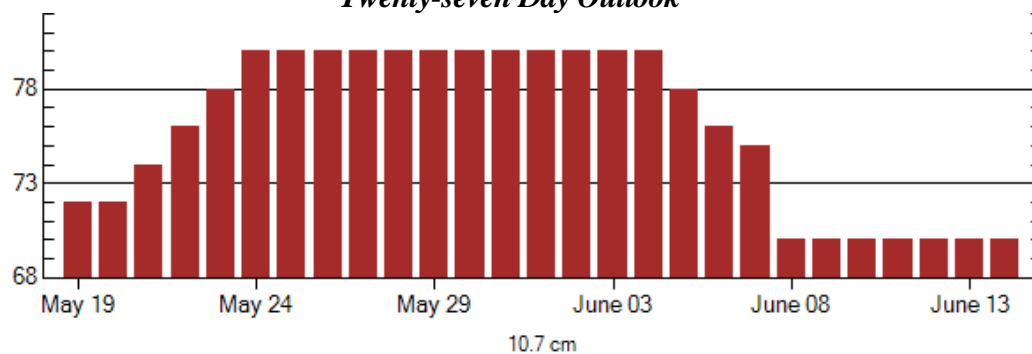


Alerts and Warnings Issued

| Date & Time of Issue | Type of Alert or Warning | Date & Time of Event UTC |
|----------------------|--|--------------------------|
| 10 May 0510 | CONTINUED ALERT: Electron 2MeV Integral Flux >= 1000pfu | 03 May 1235 |
| 11 May 0851 | CONTINUED ALERT: Electron 2MeV Integral Flux >= 1000pfu | 03 May 1235 |
| 12 May 1109 | CONTINUED ALERT: Electron 2MeV Integral Flux >= 1000pfu | 03 May 1235 |
| 13 May 0558 | CONTINUED ALERT: Electron 2MeV Integral Flux >= 1000pfu | 03 May 1235 |
| 14 May 0507 | CONTINUED ALERT: Electron 2MeV Integral Flux >= 1000pfu | 03 May 1235 |
| 15 May 0505 | CONTINUED ALERT: Electron 2MeV Integral Flux >= 1000pfu | 03 May 1235 |
| 16 May 0508 | CONTINUED ALERT: Electron 2MeV Integral Flux >= 1000pfu | 03 May 1235 |



Twenty-seven Day Outlook



| Date | Radio Flux 10.7 cm | Planetary A Index | Largest Kp Index | Date | Radio Flux 10.7 cm | Planetary A Index | Largest Kp Index |
|--------|-----------------------|----------------------|---------------------|--------|-----------------------|----------------------|---------------------|
| 19 May | 72 | 6 | 2 | 02 Jun | 80 | 5 | 2 |
| 20 | 72 | 13 | 3 | 03 | 80 | 5 | 2 |
| 21 | 74 | 13 | 3 | 04 | 80 | 5 | 2 |
| 22 | 76 | 10 | 3 | 05 | 78 | 5 | 2 |
| 23 | 78 | 5 | 2 | 06 | 76 | 5 | 2 |
| 24 | 80 | 5 | 2 | 07 | 75 | 5 | 2 |
| 25 | 80 | 5 | 2 | 08 | 70 | 5 | 2 |
| 26 | 80 | 5 | 2 | 09 | 70 | 5 | 2 |
| 27 | 80 | 5 | 2 | 10 | 70 | 5 | 2 |
| 28 | 80 | 5 | 2 | 11 | 70 | 5 | 2 |
| 29 | 80 | 25 | 5 | 12 | 70 | 5 | 2 |
| 30 | 80 | 20 | 4 | 13 | 70 | 5 | 2 |
| 31 | 80 | 10 | 3 | 14 | 70 | 5 | 2 |
| 01 Jun | 80 | 5 | 2 | | | | |



Energetic Events

| Date | Time | | | X-ray | | Optical Information | | | Peak | | Sweep Freq | |
|------|---------------|-----|-----|-------|------|---------------------|----------|-----|------------|------|------------|----|
| | $\frac{1}{2}$ | | | Integ | | Imp/ | Location | Rgn | Radio Flux | | Intensity | |
| | Begin | Max | Max | Class | Flux | Brtns | Lat CMD | # | 245 | 2695 | II | IV |

No Events Observed

Flare List

| Date | Time | | | X-ray Class. | Imp / Brtns | Optical | | Rgn |
|--------|--------------------|------|------|-----------------|----------------|----------|---------|------|
| | Begin | Max | End | | | Location | Lat CMD | |
| 10 May | 1059 | 1106 | 1115 | B1.4 | | | | |
| 11 May | 0842 | 0842 | 0850 | B1.1 | SF | S20W19 | | 1068 |
| | 1933 | 2016 | 2042 | B1.5 | | | | |
| 12 May | 0208 | 0222 | 0229 | B1.5 | | | | |
| | 1352 | 1409 | 1419 | B1.6 | | | | |
| 13 May | 0349 | 0355 | 0359 | B2.8 | | | | |
| 14 May | No Flares Observed | | | | | | | |
| 15 May | No Flares Observed | | | | | | | |
| 16 May | No Flares Observed | | | | | | | |



Region Summary

| Table 1. Summary of Observations | | | | | | | | | | | | | | | |
|----------------------------------|---------------|-------|---------------------------------|-------------------|---------------|---------------|--------------|--------|---|---|---|---------|---|---|---|
| Date | Location | | Sunspot Characteristics | | | | | Flares | | | | | | | |
| | (° Lat ° CMD) | Helio | Area (10 ⁻⁶ hemi) | Extent (helio) | Spot Class | Spot Count | Mag Class | X-ray | | | S | Optical | | | |
| | | Lon | | | | | | C | M | X | | 1 | 2 | 3 | 4 |

Region 1066

| | | | | | | | | | | | | | | | |
|--------|--------|-----|----|---|-----|---|---|--|--|--|--|--|--|--|--|
| 02 May | S27E16 | 209 | 0 | 1 | AXX | 1 | A | | | | | | | | |
| 03 May | S27E05 | 207 | 20 | 5 | CRO | 5 | B | | | | | | | | |
| 04 May | S26W07 | 205 | 10 | 6 | BXO | 3 | B | | | | | | | | |
| 05 May | S26W22 | 206 | 10 | 1 | AXX | 1 | A | | | | | | | | |
| 06 May | S26W35 | 206 | | | | | | | | | | | | | |
| 07 May | S21W48 | 206 | | | | | | | | | | | | | |
| 08 May | S21W61 | 206 | | | | | | | | | | | | | |
| 09 May | S21W74 | 206 | | | | | | | | | | | | | |
| 10 May | S21W87 | 206 | | | | | | | | | | | | | |

0 0 0 0 0 0 0 0

Crossed West Limb.

Absolute heliographic longitude: 207

Region 1067

| | | | | | | | | | | | | | | | |
|--------|--------|-----|----|---|-----|---|---|---|--|--|---|--|--|--|--|
| 30 Apr | N23E84 | 168 | | | | | | 1 | | | | | | | |
| 01 May | N23E70 | 168 | | | | | | 1 | | | 1 | | | | |
| 02 May | N23E55 | 170 | 20 | 5 | BXO | 4 | B | | | | | | | | |
| 03 May | N23E38 | 174 | 20 | 4 | CSO | 2 | B | | | | | | | | |
| 04 May | N23E24 | 174 | 20 | 6 | DRO | 3 | B | | | | | | | | |
| 05 May | N23E13 | 171 | 10 | 5 | BXO | 3 | B | | | | | | | | |
| 06 May | N23E03 | 168 | 10 | 2 | BXO | 2 | B | | | | | | | | |
| 07 May | N23W10 | 168 | | | | | | | | | | | | | |
| 08 May | N23W23 | 168 | | | | | | | | | | | | | |
| 09 May | N23W36 | 168 | | | | | | | | | | | | | |
| 10 May | N23W49 | 168 | | | | | | | | | | | | | |
| 11 May | N23W62 | 168 | | | | | | | | | | | | | |
| 12 May | N23W75 | 168 | | | | | | | | | | | | | |
| 13 May | N23W88 | 168 | | | | | | | | | | | | | |

2 0 0 1 0 0 0 0

Crossed West Limb.

Absolute heliographic longitude: 168



Region Summary (cont.)

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

Region 1068

| | | | | | | | | | | | | | | | |
|--------|--------|-----|----|---|-----|---|---|--|--|--|---|--|--|--|--|
| 03 May | S19E76 | 135 | 0 | 1 | AXX | 1 | A | | | | | | | | |
| 04 May | S19E65 | 133 | 10 | 1 | BXO | 2 | B | | | | | | | | |
| 05 May | S21E54 | 130 | 10 | 1 | AXX | 1 | A | | | | | | | | |
| 06 May | S20E41 | 130 | 10 | 3 | BXO | 4 | B | | | | | | | | |
| 07 May | S19E28 | 130 | 0 | 1 | AXX | 1 | A | | | | | | | | |
| 08 May | S19E15 | 130 | | | | | | | | | | | | | |
| 09 May | S19E02 | 130 | | | | | | | | | | | | | |
| 10 May | S19W11 | 130 | | | | | | | | | | | | | |
| 11 May | S19W24 | 130 | | | | | | | | | 1 | | | | |
| 12 May | S19W37 | 130 | | | | | | | | | | | | | |
| 13 May | S19W50 | 130 | | | | | | | | | | | | | |
| 14 May | S19W63 | 130 | | | | | | | | | | | | | |
| 15 May | S19W76 | 130 | | | | | | | | | | | | | |
| 16 May | S19W89 | 130 | | | | | | | | | | | | | |

0 0 0 1 0 0 0 0

Crossed West Limb.

Absolute heliographic longitude: 130

Region 1070

| | | | | | | | | | | | | | | | |
|--------|--------|-----|----|---|-----|---|---|--|--|--|--|--|--|--|--|
| 05 May | N21W08 | 192 | 10 | 2 | BXO | 3 | B | | | | | | | | |
| 06 May | N21W21 | 192 | | | | | | | | | | | | | |
| 07 May | N21W34 | 192 | | | | | | | | | | | | | |
| 08 May | N21W47 | 192 | | | | | | | | | | | | | |
| 09 May | N21W60 | 192 | | | | | | | | | | | | | |
| 10 May | N21W73 | 192 | | | | | | | | | | | | | |
| 11 May | N21W86 | 192 | | | | | | | | | | | | | |

0 0 0 0 0 0 0 0

Crossed West Limb.

Absolute heliographic longitude: 192



Region Summary (cont.)

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

Region 1071

| | | | | | | | |
|--------|--------|-----|---|---|-----|---|---|
| 08 May | S20W42 | 187 | 0 | 1 | AXX | 1 | A |
| 09 May | S20W55 | 187 | | | | | |
| 10 May | S20W68 | 187 | | | | | |
| 11 May | S20W81 | 187 | | | | | |

0 0 0 0 0 0 0 0 0

Crossed West Limb.

Absolute heliographic longitude: 187



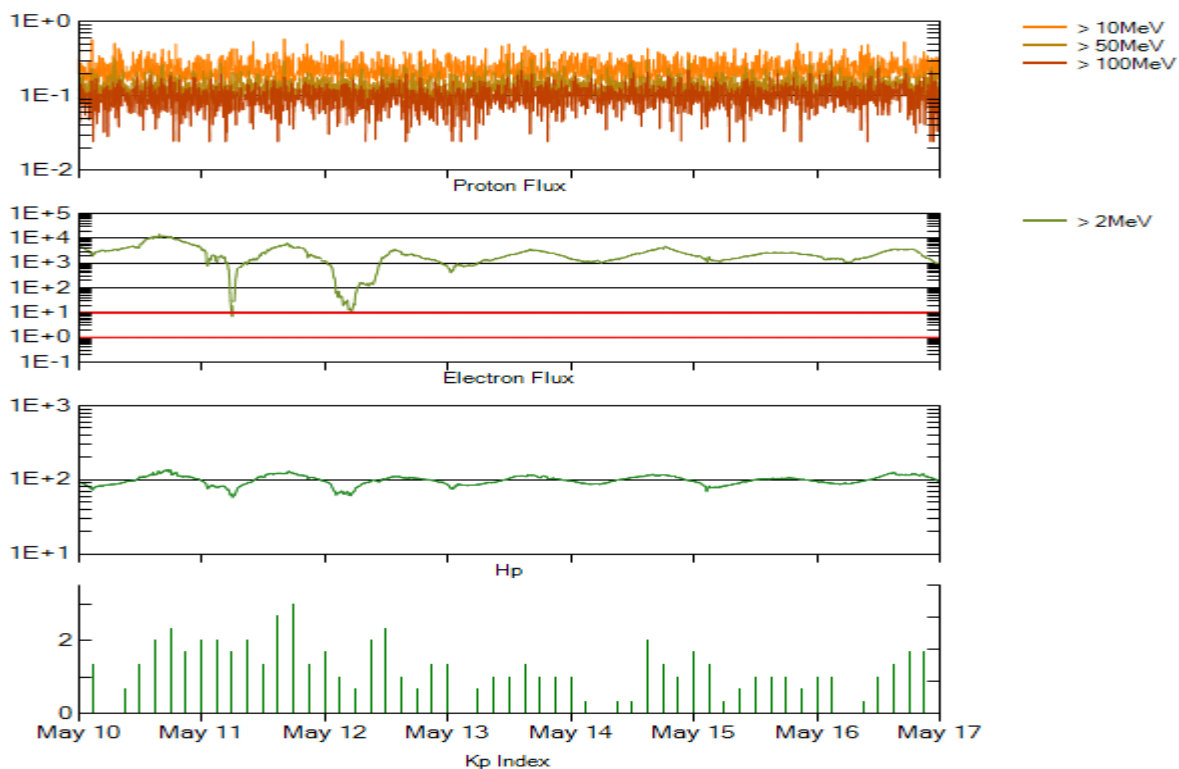
Recent Solar Indices (preliminary)
Of the observed monthly mean values

| Month | Sunspot Numbers | | | | | Radio Flux | | Geomagnetic | |
|-----------|-----------------|--------|--------|--------|--------|------------|--------|-------------|--------|
| | Observed | values | Ratio | Smooth | values | *Penticton | Smooth | Planetary | Smooth |
| | SEC | RI | RI/SEC | SEC | RI | 10.7 cm | Value | Ap | Value |
| 2008 | | | | | | | | | |
| May | 5.7 | 3.2 | 0.56 | 5.7 | 3.5 | 68.4 | 69.8 | 6 | 7.2 |
| June | 4.2 | 3.4 | 0.81 | 5.2 | 3.3 | 65.9 | 69.4 | 7 | 7.0 |
| July | 1.0 | 0.8 | 0.80 | 4.5 | 2.8 | 65.7 | 68.8 | 5 | 6.8 |
| August | 0.0 | 0.5 | ** | 4.4 | 2.7 | 66.3 | 68.6 | 5 | 6.3 |
| September | 1.5 | 1.1 | 0.73 | 3.7 | 2.3 | 67.1 | 68.4 | 6 | 5.8 |
| October | 5.2 | 2.9 | 0.56 | 2.9 | 1.8 | 68.3 | 68.2 | 7 | 5.4 |
| November | 6.8 | 4.1 | 0.60 | 2.7 | 1.7 | 68.6 | 68.3 | 4 | 5.1 |
| December | 1.3 | 0.8 | 0.62 | 2.7 | 1.7 | 69.2 | 68.5 | 4 | 4.9 |
| 2009 | | | | | | | | | |
| January | 2.8 | 1.3 | 0.46 | 3.0 | 1.8 | 69.8 | 68.7 | 4 | 4.7 |
| February | 2.5 | 1.4 | 0.56 | 3.1 | 1.9 | 70.0 | 68.8 | 5 | 4.7 |
| March | 0.7 | 0.7 | 1.00 | 3.4 | 2.0 | 69.2 | 69.0 | 5 | 4.6 |
| April | 1.2 | 0.8 | 1.00 | 3.7 | 2.2 | 69.7 | 69.3 | 4 | 4.3 |
| May | 3.9 | 2.9 | 0.74 | 3.8 | 2.3 | 70.5 | 69.7 | 4 | 4.1 |
| June | 6.6 | 2.9 | 0.39 | 4.4 | 2.7 | 68.6 | 70.2 | 4 | 4.0 |
| July | 5.0 | 3.2 | 0.70 | 5.8 | 3.6 | 68.2 | 71.0 | 4 | 3.9 |
| August | 0.3 | 0.0 | 0.00 | 7.7 | 4.8 | 67.4 | 72.1 | 5 | 3.8 |
| September | 6.6 | 4.3 | 0.64 | 9.9 | 6.1 | 70.5 | 73.3 | 4 | 3.8 |
| October | 7.0 | 4.6 | 0.66 | 11.3 | 7.0 | 72.3 | 74.1 | 3 | 4.0 |
| November | 7.7 | 4.2 | 0.55 | | | 73.6 | | 3 | |
| December | 15.7 | 10.6 | 0.68 | | | 76.8 | | 2 | |
| 2010 | | | | | | | | | |
| January | 21.3 | 13.1 | 0.62 | | | 81.1 | | 3 | |
| February | 31.0 | 18.6 | 0.60 | | | 84.7 | | 5 | |
| March | 24.7 | 15.4 | 0.62 | | | 83.3 | | 4 | |
| April | 11.2 | 7.9 | 0.71 | | | 75.9 | | 10 | |

NOTE: Values are final except for the most recent 6 months which are considered preliminary. Cycle 23 started in May 1996 with an RI=8.0. Cycle 23 maximum was April 2000 with an RI=120.8.

** SWPC sunspot number was zero, so a ratio could not be computed.





Weekly Geosynchronous Satellite Environment Summary
Week Beginning 10 May 2010

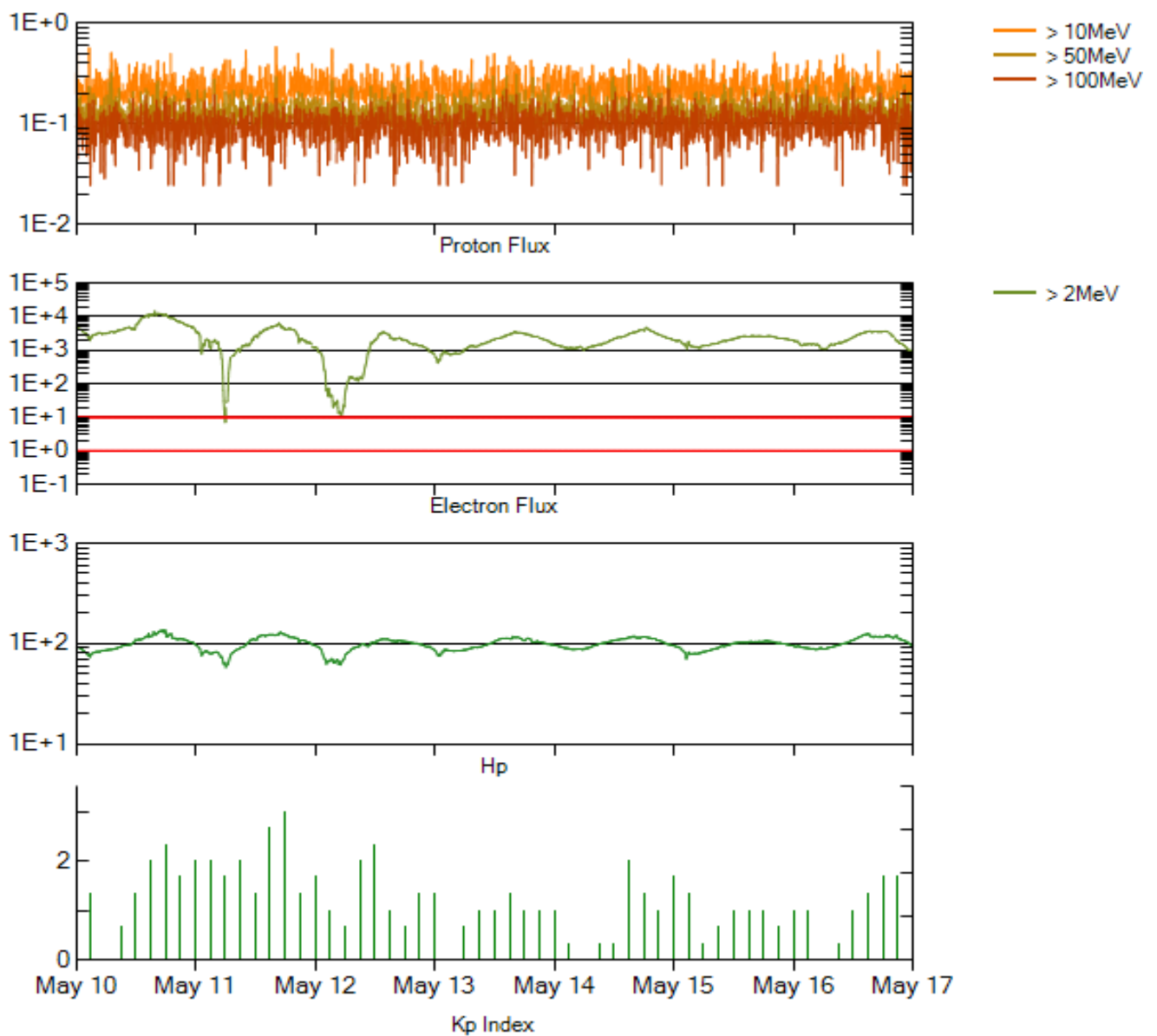
The proton flux plot contains the five-minute averaged integral proton flux (protons/cm²–sec–sr) as measured by GOES-13 (W75) for each of three energy thresholds: greater than 10, 50, and 100 MeV. The electron flux plot contains the five-minute averaged integral electron flux (electrons/cm²–sec–sr) with energies greater than 2 MeV at GOES-13.

The Hp plot contains the five minute averaged Hp magnetic field component in nanoteslas (nT) as measured by GOES-13. The Hp component is parallel to the spin axis of the satellite, which is nearly parallel to the Earth's rotation axis.

Kp plot contains the estimated planetary 3-hour K-index (derived by the Air Force Weather Agency) in real time from magnetometers at Meanook, Canada; Sitka, AK; Glenlea, Canada; St. Johns, Canada; Ottawa, Canada; Newport, WA; Fredericksburg, VA; Boulder, CO; Fresno, CA and Hartland, UK. These data are made available through cooperation from the Geological Survey of Canada (GSC), British Geological Survey (BGS) and the US Geological Survey. These may differ from the final Kp values derived from a more extensive network of magnetometers.

The data included here are those now available in real time at the SWPC and are incomplete in that they do not include the full set of parameters and energy ranges known to cause satellite operating anomalies. The proton and electron fluxes and Kp are “global” parameters that are applicable to a first order approximation over large areas. H parallel is subject to more localized phenomena and the measurements generally are applicable to within a few degrees of longitude of the measuring satellite.





Weekly GOES Satellite X-ray and Proton Plots

The x-ray plot contains five-minute averaged x-ray flux (Watts/m^2) as measured by GOES 14 (W105) in two wavelength bands, 0.05 - 0.4 and 0.1 - 0.8 nm. The letters A, B, C, M and X refer to x-ray event levels for the 0.1 - 0.8 nm band.

The proton plot contains the five-minute averaged integral proton flux ($\text{protons/cm}^2\text{-sec-sr}$) as measured by GOES-13 for each of the energy thresholds: >1 , >10 , >30 and >100 MeV. P10 event threshold is 10 pfu ($\text{protons/cm}^2\text{-sec-sr}$) at greater than 10 MeV.

