

**Space Weather Highlights**  
**05 December - 11 December 2016**

**SWPC PRF 2154**  
**12 December 2016**

Solar activity ranged from very low to low over the period. Very low levels were observed on 06-09 December and again on 11 December. Low levels occurred on 05 and 10 December with isolated C-class flare activity observed from Region 2615 (S07, L=139, class/area Dai/200 on 05 Dec).

No proton events were observed at geosynchronous orbit.

The greater than 2 MeV electron flux at geosynchronous orbit was at high levels on 05-07 December and on 09-11 December with moderate levels observed on 08 December. A peak flux of 24,002 pfu was observed at 11/1525 UTC.

Geomagnetic field activity ranged from quiet to active levels with a couple of isolated G1 (Minor) storm periods. The period began with quiet to isolated unsettled activity through midday on 07 December. Solar wind parameters were nominal with wind speeds in the 300-375 km/s range. By midday to late on 07 December, activity levels increased to unsettled to active as the field came under the influence of a large, recurrent, negative polarity CH HSS. Phi angle rotated from a positive to a negative orientation, wind speeds spiked from about 375 km/s to near 550 km/s, total field Bt increased to 16 nT while the Bz component was variable between +14 nT to -8 nT. From 08-09 December, wind speeds continued to increase reaching a peak of 731 km/s early on 09 December. Field conditions responded with unsettled to active levels with G1 (Minor) storm levels recorded late on the 9th. From 10-11 December, field conditions were generally at unsettled to active levels with some quiet periods on the 10th. Wind speeds began a gradual decline with values near 550 km/s by the end of the summary period.

**Space Weather Outlook**  
**12 December - 07 January 2017**

Solar activity is expected to be at very low levels with a slight chance of C-class activity throughout the outlook period.

No proton events are expected at geosynchronous orbit.

The greater than 2 MeV electron flux at geosynchronous orbit is expected to be at mostly high levels through the summary period with moderate levels likely on 19-21 December.

Geomagnetic field activity is expected to be at unsettled to active levels on 18-25 December and again on 02-07 January due to recurrent CH HSSs. In addition, G1 (Minor) storm conditions are likely on 21 December and 04-05 January to include G2 (Moderate) storm conditions on 22 December. Mostly quiet conditions are expected for the remainder of the outlook period.



### *Daily Solar Data*

| Date        | Radio Flux<br>10.7cm | Sun spot<br>No. | Sunspot Area<br>(10 <sup>-6</sup> hemi.) | X-ray Background<br>Flux |   | Flares |   |   |         |   |   |   |
|-------------|----------------------|-----------------|--|--------------------------|---|--------|---|---|---------|---|---|---|
|             |                      |                 |  |                          |   | X-ray  |   |   | Optical |   |   |   |
|             |                      |                 |  |                          |   | C      | M | X | S       | 1 | 2 | 3 |
| 05 December | 83                   | 37              | 220                                      | B1.1                     | 1 | 0      | 0 | 2 | 0       | 0 | 0 | 0 |
| 06 December | 80                   | 24              | 170                                      | B1.0                     | 0 | 0      | 0 | 0 | 0       | 0 | 0 | 0 |
| 07 December | 77                   | 18              | 170                                      | A9.1                     | 0 | 0      | 0 | 0 | 0       | 0 | 0 | 0 |
| 08 December | 75                   | 14              | 60                                       | A8.7                     | 0 | 0      | 0 | 0 | 0       | 0 | 0 | 0 |
| 09 December | 73                   | 12              | 60                                       | A8.0                     | 0 | 0      | 0 | 0 | 0       | 0 | 0 | 0 |
| 10 December | 72                   | 0               | 0  | A8.0                     | 1 | 0      | 0 | 0 | 0       | 0 | 0 | 0 |
| 11 December | 71                   | 13              | 10                                       | A6.3                     | 0 | 0      | 0 | 1 | 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) |         |         |
|-------------|--|---------|----------|--|---------|---------|
|             | >1 MeV   | >10 MeV | >100 MeV | >0.6 MeV   | >2MeV   | >4 MeV  |
|             | 05 December  |         | 2.0e+06  | 1.5e+04  | 3.5e+03 |         |
| 06 December |  | 1.5e+06 | 1.4e+04  | 3.5e+03  |         | 2.6e+07 |
| 07 December |  | 2.3e+06 | 1.5e+04  | 3.6e+03  |         | 1.5e+07 |
| 08 December |  | 1.3e+06 | 1.5e+04  | 3.4e+03  |         | 3.2e+06 |
| 09 December |  | 2.0e+06 | 1.5e+04  | 3.4e+03  |         | 7.4e+07 |
| 10 December |  | 1.4e+06 | 1.4e+04  | 3.4e+03  |         | 2.8e+08 |
| 11 December |  | 2.8e+06 | 1.5e+04  | 3.6e+03  |         | 7.2e+08 |

### *Daily Geomagnetic Data*

| Date        | Middle Latitude<br>Fredericksburg |                 | High Latitude<br>College |                 | Estimated<br>Planetary |                 |
|-------------|-----------------------------------|-----------------|--------------------------|-----------------|------------------------|-----------------|
|             | A                                 | K-indices       | A                        | K-indices       | A                      | K-indices       |
|             | 05 December                       | 2               | 2-1-0-0-1-1-0-1          | 2               | 0-0-0-0-0-1-2-1        | 4               |
| 06 December | 6                                 | 0-1-1-2-3-2-1-2 | 5                        | 0-0-0-3-0-3-1-1 | 7                      | 1-1-1-2-3-2-1-3 |
| 07 December | 9                                 | 0-1-3-2-2-2-3-3 | 21                       | 1-1-5-4-4-4-3-3 | 11                     | 1-2-3-2-2-3-3-3 |
| 08 December | 14                                | 3-3-2-2-2-3-3-4 | 29                       | 2-4-3-5-5-5-3-4 | 23                     | 4-4-3-3-3-4-4-4 |
| 09 December | 18                                | 4-1-3-3-3-3-4-4 | 38                       | 3-2-4-6-5-5-5-4 | 25                     | 4-2-3-4-3-4-5-5 |
| 10 December | 11                                | 4-3-2-2-2-1-2-3 | 21                       | 3-2-3-5-5-3-3-2 | 16                     | 4-3-3-3-3-3-3-3 |
| 11 December | 11                                | 3-4-2-3-2-2-2-1 | 25                       | 3-3-2-5-5-5-3-1 | 22                     | 4-4-2-3-2-3-3-2 |



### *Alerts and Warnings Issued*

| Date & Time<br>of Issue UTC | Type of Alert or Warning                                       | Date & Time<br>of Event UTC |
|-----------------------------|--|-----------------------------|
| 05 Dec 1145                 | CONTINUED ALERT:<br>Electron 2MeV Integral Flux $\geq$ 1000pfu | 25/0955                     |
| 05 Dec 2053                 | WATCH: Geomagnetic Storm Category G1 predicted                 |                             |
| 06 Dec 1201                 | CONTINUED ALERT:<br>Electron 2MeV Integral Flux $\geq$ 1000pfu | 25/0955                     |
| 06 Dec 1258                 | WARNING: Geomagnetic K = 4                                     | 06/1300 - 1800              |
| 06 Dec 1810                 | WATCH: Geomagnetic Storm Category G1 predicted                 |                             |
| 07 Dec 0854                 | WARNING: Geomagnetic K = 4                                     | 07/0855 - 1500              |
| 07 Dec 1454                 | EXTENDED WARNING: Geomagnetic K = 4                            | 07/0855 - 2359              |
| 07 Dec 1603                 | CONTINUED ALERT:<br>Electron 2MeV Integral Flux $\geq$ 1000pfu | 25/0955                     |
| 07 Dec 1933                 | EXTENDED WARNING: Geomagnetic K = 4                            | 07/0855 - 0600              |
| 07 Dec 1933                 | WARNING: Geomagnetic K = 5                                     | 07/1935 - 08/0300           |
| 08 Dec 0301                 | ALERT: Geomagnetic K = 4                                       | 08/0259                     |
| 08 Dec 0436                 | EXTENDED WARNING: Geomagnetic K = 4                            | 07/0855 - 08/1500           |
| 08 Dec 0438                 | WARNING: Geomagnetic K = 5                                     | 08/0437 - 0900              |
| 08 Dec 0900                 | EXTENDED WARNING: Geomagnetic K = 5                            | 08/0437 - 1300              |
| 08 Dec 1613                 | WARNING: Geomagnetic K = 4                                     | 08/1615 - 2359              |
| 08 Dec 1620                 | ALERT: Geomagnetic K = 4                                       | 08/1521                     |
| 08 Dec 1635                 | WARNING: Geomagnetic K = 5                                     | 08/1635 - 2300              |
| 08 Dec 2245                 | EXTENDED WARNING: Geomagnetic K = 4                            | 08/1615 - 09/1200           |
| 08 Dec 2245                 | EXTENDED WARNING: Geomagnetic K = 5                            | 08/1635 - 09/0600           |
| 09 Dec 1126                 | EXTENDED WARNING: Geomagnetic K = 4                            | 08/1615 - 09/2100           |
| 09 Dec 1207                 | ALERT: Electron 2MeV Integral Flux $\geq$ 1000pfu              | 09/1150                     |
| 09 Dec 1909                 | WARNING: Geomagnetic K = 5                                     | 09/1909 - 2359              |
| 09 Dec 2020                 | WATCH: Geomagnetic Storm Category G1 predicted                 |                             |
| 09 Dec 2024                 | EXTENDED WARNING: Geomagnetic K = 4                            | 08/1615 - 10/1500           |
| 09 Dec 2050                 | ALERT: Geomagnetic K = 5                                       | 09/2050                     |
| 09 Dec 2201                 | EXTENDED WARNING: Geomagnetic K = 5                            | 09/1909 - 10/0900           |
| 09 Dec 2252                 | ALERT: Geomagnetic K = 5                                       | 09/2252                     |

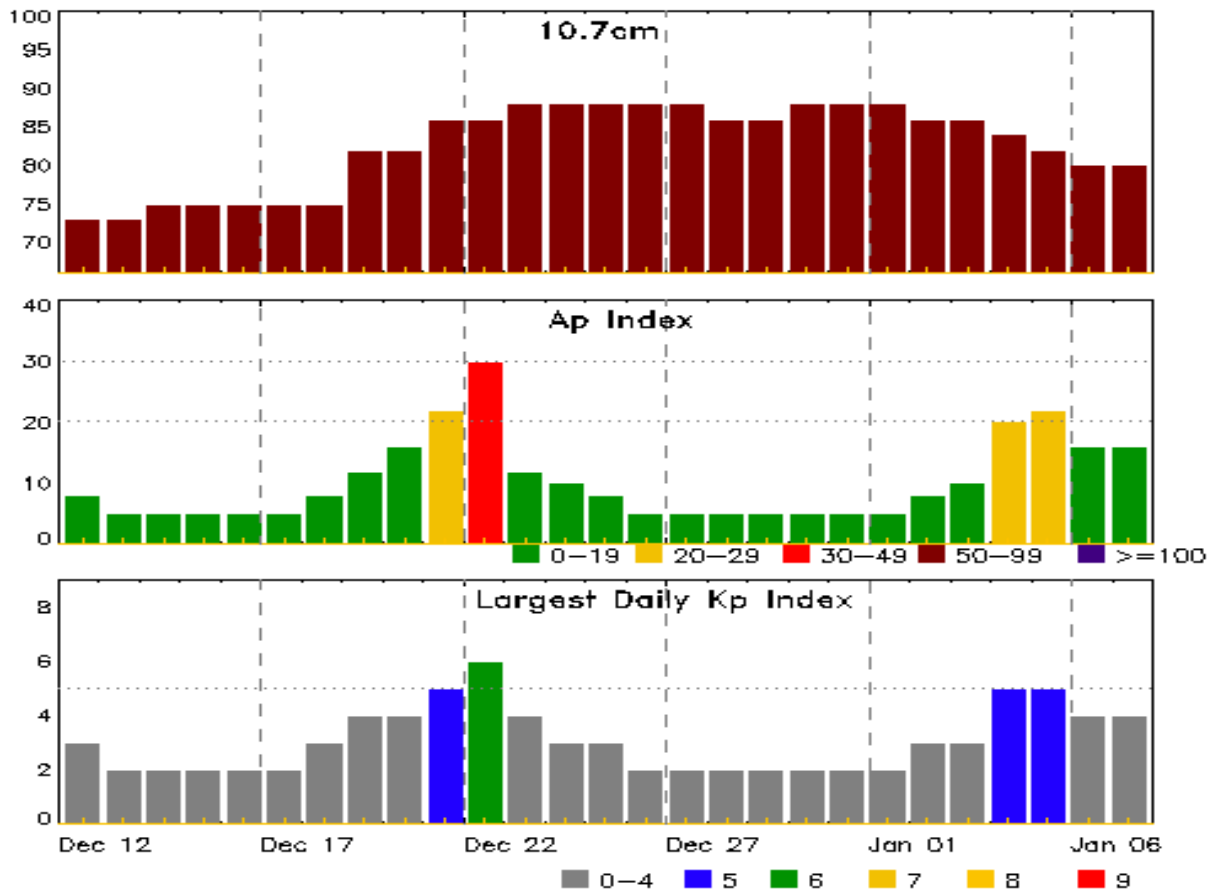


### *Alerts and Warnings Issued*

| <b>Date &amp; Time<br/>of Issue UTC</b> | <b>Type of Alert or Warning</b>                                | <b>Date &amp; Time<br/>of Event UTC</b> |
|---|--|---|
| 10 Dec 0946                             | CONTINUED ALERT:<br>Electron 2MeV Integral Flux $\geq$ 1000pfu | 09/1150                                 |
| 10 Dec 1441                             | EXTENDED WARNING: Geomagnetic K = 4                            | 08/1615 - 10/2359                       |
| 10 Dec 2354                             | EXTENDED WARNING: Geomagnetic K = 4                            | 08/1615 - 11/1200                       |
| 11 Dec 0501                             | CONTINUED ALERT:<br>Electron 2MeV Integral Flux $\geq$ 1000pfu | 09/1150                                 |
| 11 Dec 1156                             | EXTENDED WARNING: Geomagnetic K = 4                            | 08/1615 - 11/1800                       |
| 11 Dec 1755                             | EXTENDED WARNING: Geomagnetic K = 4                            | 08/1615 - 11/2359                       |



## Twenty-seven Day Outlook



| Date   | Radio Flux<br>10.7cm | Planetary<br>A Index | Largest<br>Kp Index | Date   | Radio Flux<br>10.7cm | Planetary<br>A Index | Largest<br>Kp Index |
|--------|----------------------|----------------------|---------------------|--------|----------------------|----------------------|---------------------|
| 12 Dec | 73                   | 8                    | 3                   | 26 Dec | 88                   | 5                    | 2                   |
| 13     | 73                   | 5                    | 2                   | 27     | 88                   | 5                    | 2                   |
| 14     | 75                   | 5                    | 2                   | 28     | 86                   | 5                    | 2                   |
| 15     | 75                   | 5                    | 2                   | 29     | 86                   | 5                    | 2                   |
| 16     | 75                   | 5                    | 2                   | 30     | 88                   | 5                    | 2                   |
| 17     | 75                   | 5                    | 2                   | 31     | 88                   | 5                    | 2                   |
| 18     | 75                   | 8                    | 3                   | 01 Jan | 88                   | 5                    | 2                   |
| 19     | 82                   | 12                   | 4                   | 02     | 86                   | 8                    | 3                   |
| 20     | 82                   | 16                   | 4                   | 03     | 86                   | 10                   | 3                   |
| 21     | 86                   | 22                   | 5                   | 04     | 84                   | 20                   | 5                   |
| 22     | 86                   | 30                   | 6                   | 05     | 82                   | 22                   | 5                   |
| 23     | 88                   | 12                   | 4                   | 06     | 80                   | 16                   | 4                   |
| 24     | 88                   | 10                   | 3                   | 07     | 80                   | 16                   | 4                   |
| 25     | 88                   | 8                    | 3                   |        |                      |                      |                     |



### *Energetic Events*

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

**No Events Observed**

### *Flare List*

| Date   | Time  |      |      | X-ray Class | Imp/ Brtns | Optical          |       | Rgn # |
|--------|-------|------|------|-------------|------------|------------------|-------|-------|
|        | Begin | Max  | End  |             |            | Location Lat CMD | Rgn # |       |
| 05 Dec | 0400  | 0405 | 0413 | B3.5        |            |                  |       | 2615  |
| 05 Dec | 0557  | 0607 | 0614 | C1.2        | SF         | S08W20           |       | 2615  |
| 05 Dec | 1710  | 1715 | 1719 | B2.5        | SF         | S04W27           |       | 2615  |
| 06 Dec | 1008  | 1012 | 1015 | B1.7        |            |                  |       | 2615  |
| 06 Dec | 1037  | 1040 | 1043 | B1.6        |            |                  |       | 2615  |
| 06 Dec | 1907  | 1911 | 1914 | B2.9        |            |                  |       | 2615  |
| 07 Dec | 0114  | 0117 | 0128 | B1.6        |            |                  |       | 2615  |
| 07 Dec | 0334  | 0345 | 0354 | B1.6        |            |                  |       | 2615  |
| 07 Dec | 0957  | 1000 | 1003 | B1.7        |            |                  |       | 2615  |
| 07 Dec | 1119  | 1123 | 1132 | B1.7        |            |                  |       | 2615  |
| 07 Dec | 1552  | 1556 | 1600 | B1.6        |            |                  |       | 2615  |
| 07 Dec | 1752  | 1809 | 1820 | B3.6        |            |                  |       | 2615  |
| 09 Dec | 0721  | 0725 | 0727 | B1.5        |            |                  |       | 2615  |
| 10 Dec | 1648  | 1715 | 1737 | C4.0        |            |                  |       | 2615  |
| 11 Dec | 1710  | 1715 | 1718 | B1.3        |            |                  |       | 2617  |
| 11 Dec | 1916  | 1925 | 1929 | B1.2        | SF         | N17W42           |       | 2617  |



## Region Summary

| Date               | Location |     | Sunspot Characteristics         |      |                   |               | Flares        |              |       |   |   |         |   |   |   |   |   |   |
|--------------------|----------|-----|---------------------------------|------|-------------------|---------------|---------------|--------------|-------|---|---|---------|---|---|---|---|---|---|
|                    | Lat CMD  | Lon | Helio<br>10 <sup>-6</sup> hemi. | Area | Extent<br>(helio) | Spot<br>Class | Spot<br>Count | Mag<br>Class | X-ray |   |   | Optical |   |   |   |   |   |   |
|                    |          |     |                                 |      |                   |               |               |              | C     | M | X | S       | 1 | 2 | 3 | 4 |   |   |
| <b>Region 2612</b> |          |     |                                 |      |                   |               |               |              |       |   |   |         |   |   |   |   |   |   |
| 23 Nov             | N07E68   |     | 196                             | 120  | 3                 | Hsx           | 1             | A            |       |   |   |         |   |   |   |   |   |   |
| 24 Nov             | N09E56   |     | 194                             | 180  | 3                 | Hax           | 2             | A            |       |   |   |         |   |   |   |   |   |   |
| 25 Nov             | N09E43   |     | 194                             | 230  | 3                 | Hax           | 2             | A            |       |   |   |         |   |   |   |   |   |   |
| 26 Nov             | N08E29   |     | 195                             | 160  | 4                 | Hax           | 3             | A            |       |   |   |         |   |   |   |   |   |   |
| 27 Nov             | N08E17   |     | 195                             | 170  | 4                 | Cao           | 6             | B            |       |   |   |         |   |   |   |   |   |   |
| 28 Nov             | N08E03   |     | 195                             | 170  | 4                 | Cao           | 4             | B            |       |   |   | 1       |   |   |   |   |   |   |
| 29 Nov             | N09W10   |     | 194                             | 150  | 4                 | Cao           | 4             | B            |       |   |   |         |   |   |   |   |   |   |
| 30 Nov             | N08W23   |     | 194                             | 110  | 3                 | Dso           | 34            | B            |       |   |   |         |   |   |   |   |   |   |
| 01 Dec             | N09W36   |     | 195                             | 120  | 4                 | Dao           | 5             | B            |       |   |   |         |   |   |   |   |   |   |
| 02 Dec             | N09W49   |     | 195                             | 90   | 3                 | Dao           | 5             | B            |       |   |   |         |   |   |   |   |   |   |
| 03 Dec             | N09W62   |     | 194                             | 70   | 4                 | Dao           | 4             | B            |       |   |   |         |   |   |   |   |   |   |
| 04 Dec             | N09W75   |     | 194                             | 20   | 5                 | Cao           | 2             | B            |       |   |   |         |   |   |   |   |   |   |
| 05 Dec             | N09W89   |     | 195                             | 20   | 1                 | Hax           | 1             | A            |       |   |   |         |   |   |   |   |   |   |
|                    |          |     |                                 |      |                   |               |               |              |       | 0 | 0 | 0       | 1 | 0 | 0 | 0 | 0 | 0 |

Crossed West Limb.  
Absolute heliographic longitude: 195

|                    |        |  |     |       |   |     |   |   |  |   |   |   |   |   |   |   |   |   |
|--------------------|--------|--|-----|-------|---|-----|---|---|--|---|---|---|---|---|---|---|---|---|
| <b>Region 2614</b> |        |  |     |       |   |     |   |   |  |   |   |   |   |   |   |   |   |   |
| 28 Nov             | N06E35 |  | 162 | 10    | 4 | Cro | 7 | B |  |   |   |   |   |   |   |   |   |   |
| 29 Nov             | N05E21 |  | 163 | 80    | 5 | Cro | 7 | B |  |   |   |   |   |   |   |   |   |   |
| 30 Nov             | N05E06 |  | 164 | 60    | 5 | Dao | 3 | B |  |   |   | 1 |   |   |   |   |   |   |
| 01 Dec             | N06W06 |  | 165 | 30    | 5 | Cao | 4 | B |  |   |   |   |   |   |   |   |   |   |
| 02 Dec             | N06W21 |  | 167 | 10    | 1 | Bxo | 2 | B |  |   |   |   |   |   |   |   |   |   |
| 03 Dec             | N06W34 |  | 166 | 10    | 2 | Bxo | 2 | B |  |   |   |   |   |   |   |   |   |   |
| 04 Dec             | N06W49 |  | 168 | plage |   |     |   |   |  |   |   |   |   |   |   |   |   |   |
| 05 Dec             | N06W64 |  | 170 | plage |   |     |   |   |  |   |   |   |   |   |   |   |   |   |
| 06 Dec             | N06W79 |  | 172 | plage |   |     |   |   |  |   |   |   |   |   |   |   |   |   |
|                    |        |  |     |       |   |     |   |   |  | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 |

Crossed West Limb.  
Absolute heliographic longitude: 164



### *Region Summary - continued*

| Date               | Location |           | Sunspot Characteristics     |                |            |            | Flares    |       |   |   |         |   |   |   |   |  |  |
|--------------------|----------|-----------|-----------------------------|----------------|------------|------------|-----------|-------|---|---|---------|---|---|---|---|--|--|
|                    | Lat CMD  | Helio Lon | Area 10 <sup>-6</sup> hemi. | Extent (helio) | Spot Class | Spot Count | Mag Class | X-ray |   |   | Optical |   |   |   |   |  |  |
|                    |          |           |                             |                |            |            |           | C     | M | X | S       | 1 | 2 | 3 | 4 |  |  |
| <b>Region 2615</b> |          |           |                             |                |            |            |           |       |   |   |         |   |   |   |   |  |  |
| 29 Nov             | S08E51   | 132       | 30                          | 4              | Dsi        | 2          | B         | 4     | 2 |   | 10      |   |   |   |   |  |  |
| 30 Nov             | S07E37   | 134       | 60                          | 7              | Dai        | 8          | B         | 4     |   |   | 8       |   |   |   |   |  |  |
| 01 Dec             | S07E22   | 137       | 110                         | 7              | Dai        | 10         | B         |       |   |   |         |   |   |   |   |  |  |
| 02 Dec             | S07E08   | 138       | 110                         | 8              | Dao        | 9          | B         |       |   |   |         |   |   |   |   |  |  |
| 03 Dec             | S07W07   | 139       | 140                         | 8              | Dai        | 14         | B         |       |   |   |         |   |   |   |   |  |  |
| 04 Dec             | S07W20   | 139       | 170                         | 10             | Dai        | 15         | B         | 3     |   |   | 5       |   |   |   |   |  |  |
| 05 Dec             | S07W33   | 139       | 200                         | 9              | Dai        | 16         | B         | 1     |   |   | 2       |   |   |   |   |  |  |
| 06 Dec             | S07W45   | 138       | 170                         | 8              | Dsi        | 14         | B         |       |   |   |         |   |   |   |   |  |  |
| 07 Dec             | S07W60   | 138       | 170                         | 8              | Cso        | 8          | B         |       |   |   |         |   |   |   |   |  |  |
| 08 Dec             | S06W71   | 138       | 60                          | 8              | Cao        | 4          | B         |       |   |   |         |   |   |   |   |  |  |
| 09 Dec             | S06W88   | 141       | 60                          | 3              | Hsx        | 2          | A         |       |   |   |         |   |   |   |   |  |  |
|                    |          |           |                             |                |            |            |           | 12    | 2 | 0 | 25      | 0 | 0 | 0 | 0 |  |  |

Crossed West Limb.  
 Absolute heliographic longitude: 139

#### **Region 2616**

|        |        |     |       |   |     |   |   |   |   |   |   |   |   |   |   |   |  |
|--------|--------|-----|-------|---|-----|---|---|---|---|---|---|---|---|---|---|---|--|
| 02 Dec | N17W18 | 164 | 20    | 1 | Bxo | 3 | B |   |   |   |   |   |   |   |   |   |  |
| 03 Dec | N18W33 | 165 | 10    | 1 | Axx | 2 | A |   |   |   |   |   |   |   |   |   |  |
| 04 Dec | N18W47 | 166 | plage |   |     |   |   |   |   |   |   |   |   |   |   |   |  |
| 05 Dec | N18W61 | 167 | plage |   |     |   |   |   |   |   |   |   |   |   |   |   |  |
| 06 Dec | N18W75 | 168 | plage |   |     |   |   |   |   |   |   |   |   |   |   |   |  |
| 07 Dec | N18W89 | 169 | plage |   |     |   |   |   |   |   |   |   |   |   |   |   |  |
|        |        |     |       |   |     |   |   | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |  |

Crossed West Limb.  
 Absolute heliographic longitude: 164

#### **Region 2617**

|        |        |    |    |   |     |   |   |   |   |   |   |   |   |   |   |   |  |
|--------|--------|----|----|---|-----|---|---|---|---|---|---|---|---|---|---|---|--|
| 11 Dec | N17W44 | 71 | 10 | 3 | Bxo | 3 | B |   |   |   | 1 |   |   |   |   |   |  |
|        |        |    |    |   |     |   |   | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 |  |

Still on Disk.  
 Absolute heliographic longitude: 71



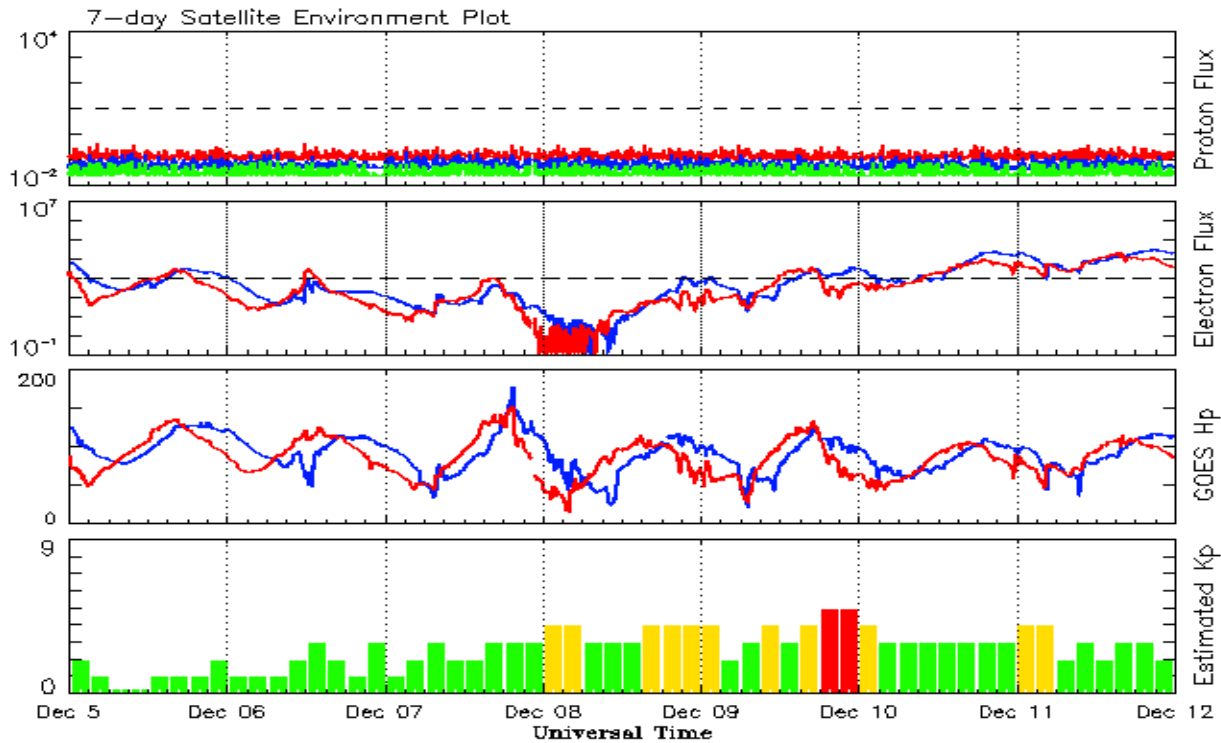


**Recent Solar Indices (preliminary)**  
**Observed monthly mean values**

| 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  |
| <b>2014</b> |                 |      |        |               |      |            |        |             |        |
| December    | 120.0           | 67.7 | 0.65   | 95.2          | 55.3 | 158.7      | 137.0  | 12          | 10.5   |
| <b>2015</b> |                 |      |        |               |      |            |        |             |        |
| January     | 101.2           | 55.8 | 0.66   | 92.1          | 53.6 | 141.7      | 135.8  | 10          | 11.0   |
| February    | 70.6            | 40.0 | 0.63   | 88.3          | 51.7 | 128.8      | 133.8  | 10          | 11.5   |
| March       | 61.7            | 32.7 | 0.62   | 84.2          | 49.3 | 126.0      | 131.2  | 17          | 12.0   |
| April       | 72.5            | 45.2 | 0.75   | 80.5          | 47.3 | 129.2      | 127.3  | 12          | 12.4   |
| May         | 83.0            | 53.3 | 0.71   | 77.5          | 45.7 | 120.1      | 123.3  | 9           | 12.7   |
| June        | 77.3            | 39.9 | 0.53   | 73.1          | 43.3 | 123.2      | 119.5  | 14          | 13.0   |
| July        | 68.4            | 39.5 | 0.58   | 68.2          | 41.0 | 107.0      | 116.0  | 10          | 13.1   |
| August      | 61.6            | 38.6 | 0.63   | 65.5          | 39.8 | 106.2      | 113.3  | 16          | 13.1   |
| September   | 72.5            | 47.2 | 0.65   | 64.0          | 39.5 | 102.1      | 110.8  | 16          | 12.8   |
| October     | 59.5            | 38.2 | 0.62   | 61.8          | 38.6 | 104.1      | 107.9  | 15          | 12.5   |
| November    | 61.8            | 37.3 | 0.61   | 59.0          | 36.7 | 109.6      | 105.3  | 13          | 12.5   |
| December    | 54.1            | 34.8 | 0.64   | 55.1          | 34.7 | 112.8      | 102.5  | 15          | 12.5   |
| <b>2016</b> |                 |      |        |               |      |            |        |             |        |
| January     | 50.4            | 34.2 | 0.67   | 51.4          | 32.6 | 103.5      | 99.9   | 10          | 12.3   |
| February    | 56.0            | 33.8 | 0.61   | 49.6          | 31.5 | 103.5      | 98.1   | 10          | 12.0   |
| March       | 40.9            | 32.5 | 0.80   | 47.7          | 30.3 | 91.6       | 96.6   | 11          | 11.8   |
| April       | 39.2            | 22.7 | 0.58   | 45.0          | 28.7 | 93.4       | 95.3   | 10          | 11.8   |
| May         | 48.9            | 30.9 | 0.64   | 42.1          | 26.9 | 93.1       | 93.2   | 12          | 11.7   |
| June        | 19.3            | 12.3 | 0.65   |               |      | 81.9       |        | 9           |        |
| July        | 36.8            | 19.5 | 0.53   |               |      | 85.9       |        | 10          |        |
| August      | 50.4            | 30.4 | 0.60   |               |      | 85.0       |        | 10          |        |
| September   | 37.4            | 26.8 | 0.72   |               |      | 87.8       |        | 16          |        |
| October     | 30.0            | 20.2 | 0.67   |               |      | 86.1       |        | 16          |        |
| November    | 22.4            | 12.8 | 0.57   |               |      | 78.7       |        | 10          |        |

**Note:** Values are final except for the most recent 6 months which are considered preliminary.  
Cycle 24 started in Dec 2008 with an RI=1.7.





*Weekly Geosynchronous Satellite Environment Summary  
Week Beginning 05 December 2016*

The proton flux plot contains the five-minute averaged integral proton flux (protons/cm<sup>2</sup>-sec -sr) as measured by the SWPC Primary GOES satellite, near West 75, for each of three energy thresholds: greater than 10, 50, and 100 MeV.

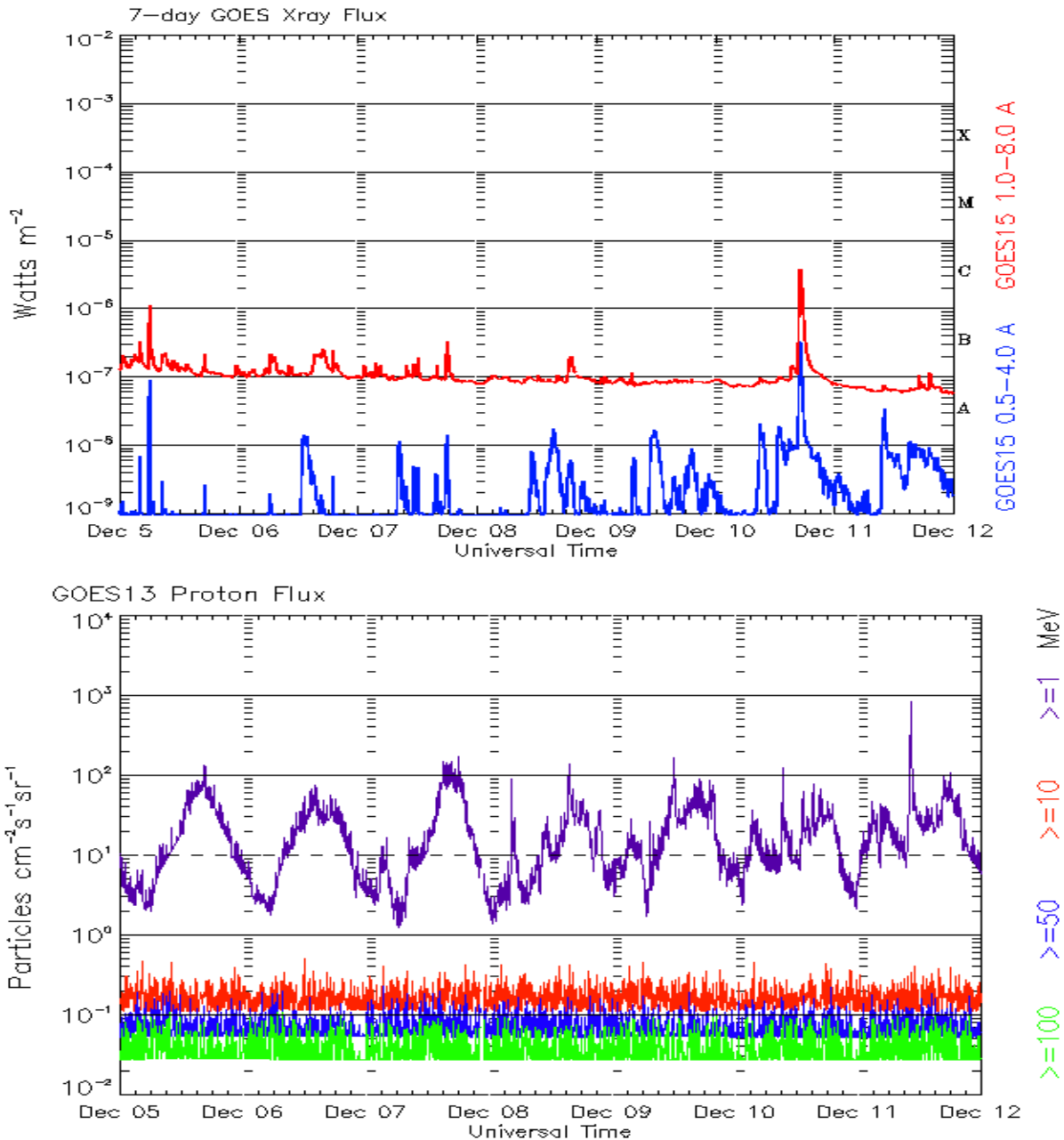
The electron flux plot contains the five-minute averaged integral electron flux (electrons/cm<sup>2</sup>-sec -sr) with energies greater than 2 MeV by the SWPC Primary GOES satellite.

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

The Estimated 3-hour Planetary Kp-index is derived at the NOAA Space Weather Prediction Center using data from the following ground-based magnetometers: Boulder, Colorado; Chambon la Foret, France; Fredericksburg, Virginia; Fresno, California; Hartland, UK; Newport, Washington; Sitka, Alaska. These data are made available thanks to the cooperative efforts between SWPC and data providers around the world, which currently includes the U.S. Geological Survey, the British Geological Survey, and the Institut de Physique du Globe de Paris.

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  
Week Beginning 05 December 2016*

The x-ray plots contains five-minute averages x-ray flux (Watt/m<sup>2</sup>) as measure by the SWPC primary GOES X-ray satellite, usually at West 105 longitude, 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 intergral flux units (pfu = protons/cm<sup>2</sup> -sec -sr) as measured by the primary SWPC GOES Proton satellite for each of the energy thresholds: >1, >10, >30, and >100 MeV. The P10 event threshold is 10 pfu at greater than 10 MeV.



## ***Preliminary Report and Forecast of Solar Geophysical Data (The Weekly)***

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**Notice:** The 27-day Outlook, Satellite Environment, X-ray and Proton plots have been redesigned. Comments and suggestions are welcome SWPC.Webmaster@noaa.gov

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