

**Space Weather Highlights**  
**11 January - 17 January 2016**

**SWPC PRF 2107**  
**18 January 2016**

Solar activity ranged from very low to low levels. Very low conditions were observed on 11-14 January and again on 16-17 January. Low levels occurred on 15 January with a few weak C-class flares observed from Region 2480 (N02, L=125, class/area Eso/190 on 10 Jan). A 14 degree long filament, centered near S30W03, erupted between 14/1803-2048 UTC. An associated coronal mass ejection (CME) was visible in SOHO LASCO imagery beginning at 14/2324 UTC. Analysis, and subsequent WSA-Enlil model output, determined a potential glancing blow could impact Earth early on 19 Jan.

No proton events were observed at geosynchronous orbit.

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

Geomagnetic field activity began the period on 11-14 January at quiet to active levels due to effects from a negative polarity coronal hole high speed stream (CH HSS). Quiet conditions persisted on 15-17 January. ACE satellite parameters indicated a maximum wind speed reading of 662 km/s at 12/0711 UTC. By period's end, wind speeds had declined to about 330 km/s. Total field (Bt) reached a maximum reading of 10 nT late on the 10th and generally ranged between 3-7 nT for a majority of the period. The Bz component varied between +/- 7 nT from late on the 11th through early on the 13th. Through the remainder of the period, Bz did not vary much beyond +/- 4 nT. The phi angle was in a predominately negative (towards) orientation through midday on 16 January when a rotation to a more positive (away) sector was observed.

**Space Weather Outlook**  
**18 January - 13 February 2016**

Solar activity is expected to be at very low levels with a chance for C-class flares 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 high levels on 18, 23-26, 29-31 January, 01-06 and 09-13 February. Normal to moderate levels are expected for the remainder of the outlook period.

Geomagnetic field activity is expected to be at unsettled to active periods on 18-19 January due to possible glancing blow effects from the 14 Jan CME. Unsettled to active levels are expected on 22-23, 28-29 January, 02-03 and 07-09 February due to recurrent CH HSS effects. Predominately quiet levels are expected for the remainder of the outlook period.



### *Daily Solar Data*

| Date       | Radio<br>Flux<br>10.7cm | Sun<br>spot<br>No. | Sunspot<br>Area<br>(10 <sup>-6</sup> hemi.) | X-ray<br>Background<br>Flux | Flares |   |   |         |   |   |   |   |
|------------|-------------------------|--------------------|---|-----------------------------|--------|---|---|---------|---|---|---|---|
|            |                         |                    |   |                             | X-ray  |   |   | Optical |   |   |   |   |
|            |                         |                    |   |                             | C      | M | X | S       | 1 | 2 | 3 | 4 |
| 11 January | 108                     | 41                 | 350   | B2.1                        | 0      | 0 | 0 | 1       | 0 | 0 | 0 | 0 |
| 12 January | 106                     | 29                 | 280   | B2.0                        | 0      | 0 | 0 | 1       | 0 | 0 | 0 | 0 |
| 13 January | 104                     | 26                 | 280   | B1.8                        | 0      | 0 | 0 | 0       | 0 | 0 | 0 | 0 |
| 14 January | 103                     | 36                 | 260   | B1.8                        | 0      | 0 | 0 | 2       | 0 | 0 | 0 | 0 |
| 15 January | 104                     | 38                 | 250   | B2.1                        | 4      | 0 | 0 | 1       | 0 | 0 | 0 | 0 |
| 16 January | 100                     | 38                 | 210   | B2.0                        | 0      | 0 | 0 | 0       | 0 | 0 | 0 | 0 |
| 17 January | 101                     | 48                 | 260   | B1.7                        | 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) |         |        |
|------------|--|---------|----------|--|---------|--------|
|            | >1 MeV   | >10 MeV | >100 MeV | >0.6 MeV   | >2MeV   | >4 MeV |
|            | 11 January   | 7.0e+05 | 1.2e+04  | 2.9e+03  | 7.4e+07 |        |
| 12 January | 4.5e+05  | 1.1e+04 | 2.8e+03  | 2.9e+07  |         |        |
| 13 January | 5.5e+05  | 1.2e+04 | 2.8e+03  | 8.4e+07  |         |        |
| 14 January | 5.5e+05  | 1.2e+04 | 2.8e+03  | 1.2e+08  |         |        |
| 15 January | 2.0e+05  | 1.3e+04 | 3.1e+03  | 1.3e+08  |         |        |
| 16 January | 4.5e+05  | 1.3e+04 | 3.1e+03  | 1.7e+08  |         |        |
| 17 January | 4.6e+05  | 1.2e+04 | 2.9e+03  | 1.3e+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       |
|            | 11 January                        | 9               | 1-2-2-2-2-2-3-3          | 14              | 1-1-3-2-3-4-4-3        | 14              |
| 12 January | 10                                | 3-2-3-2-2-3-2-2 | 17                       | 3-2-3-3-5-2-3-3 | 15                     | 4-3-3-2-2-2-3-3 |
| 13 January | 11                                | 3-4-2-2-2-2-3-1 | 16                       | 4-3-3-3-4-3-2-1 | 14                     | 4-4-2-2-2-2-3-2 |
| 14 January | 6                                 | 1-1-2-2-2-2-1-2 | 19                       | 1-1-5-5-4-3-1-1 | 8                      | 2-2-3-2-2-2-2-3 |
| 15 January | 4                                 | 2-2-1-1-0-2-1-1 | 5                        | 1-1-1-2-3-1-1-1 | 6                      | 2-2-2-1-1-1-1-1 |
| 16 January | 3                                 | 0-1-1-1-2-1-1-0 | 2                        | 0-0-1-3-0-0-0-0 | 4                      | 0-1-1-2-2-0-1-1 |
| 17 January | 3                                 | 0-0-1-0-2-2-1-1 | 3                        | 0-0-2-1-2-1-0-0 | 2                      | 0-0-2-1-1-1-1-1 |

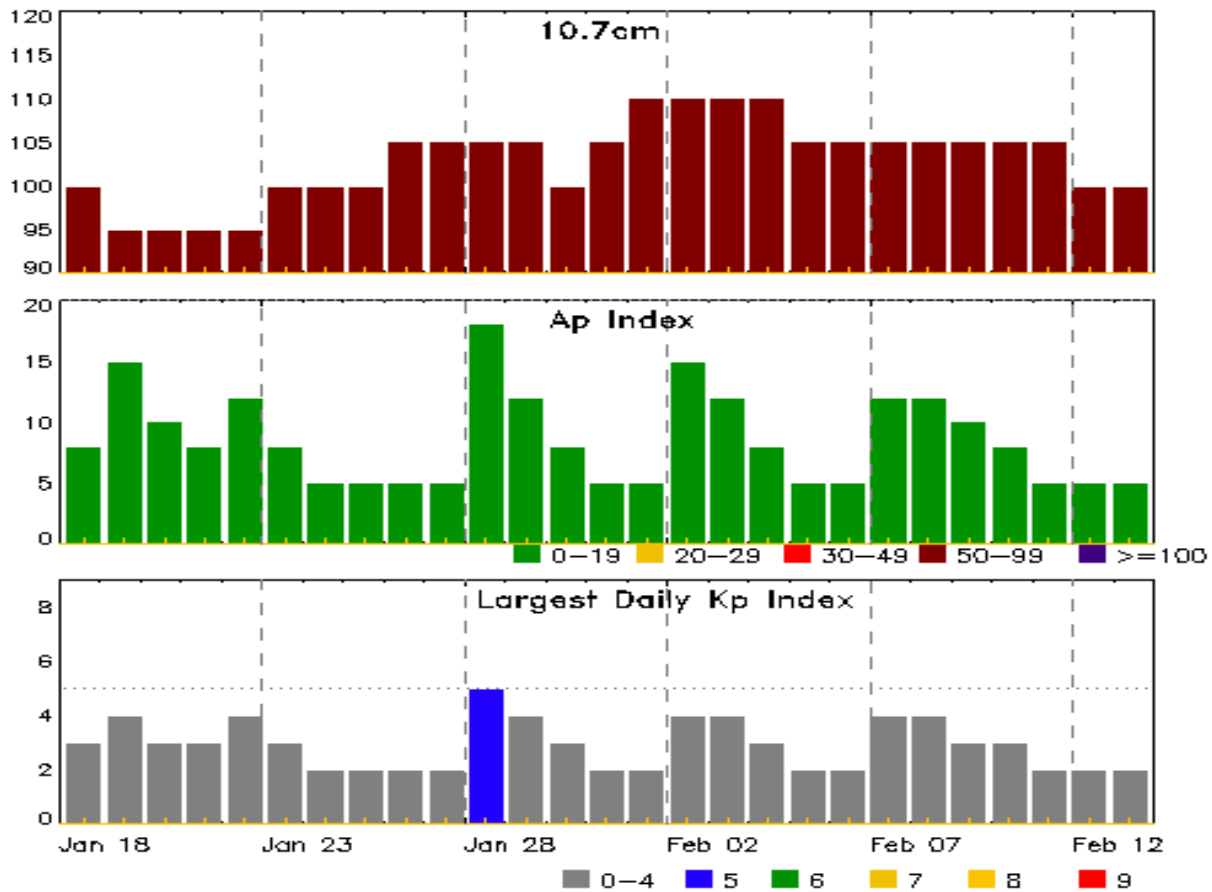


### *Alerts and Warnings Issued*

| Date & Time<br>of Issue UTC | Type of Alert or Warning                                       | Date & Time<br>of Event UTC |
|-----------------------------|--|-----------------------------|
| 11 Jan 1146                 | CONTINUED ALERT:<br>Electron 2MeV Integral Flux $\geq$ 1000pfu | 01/2035                     |
| 11 Jan 1805                 | WARNING: Geomagnetic K = 4                                     | 11/1820 - 2300              |
| 11 Jan 1918                 | ALERT: Geomagnetic K = 4                                       | 11/1917                     |
| 11 Jan 2247                 | EXTENDED WARNING: Geomagnetic K = 4                            | 11/1820 - 12/1200           |
| 12 Jan 1156                 | EXTENDED WARNING: Geomagnetic K = 4                            | 11/1820 - 12/1800           |
| 12 Jan 1757                 | EXTENDED WARNING: Geomagnetic K = 4                            | 11/1820 - 13/0600           |
| 13 Jan 0516                 | EXTENDED WARNING: Geomagnetic K = 4                            | 11/1820 - 13/1200           |
| 13 Jan 1145                 | EXTENDED WARNING: Geomagnetic K = 4                            | 11/1820 - 13/1800           |
| 13 Jan 1436                 | ALERT: Electron 2MeV Integral Flux $\geq$ 1000pfu              | 13/1420                     |
| 14 Jan 0936                 | CONTINUED ALERT:<br>Electron 2MeV Integral Flux $\geq$ 1000pfu | 13/1420                     |
| 15 Jan 0324                 | ALERT: Type II Radio Emission                                  | 15/0241                     |
| 15 Jan 0944                 | CONTINUED ALERT:<br>Electron 2MeV Integral Flux $\geq$ 1000pfu | 13/1420                     |
| 16 Jan 0811                 | CONTINUED ALERT:<br>Electron 2MeV Integral Flux $\geq$ 1000pfu | 13/1420                     |
| 17 Jan 0846                 | CONTINUED ALERT:<br>Electron 2MeV Integral Flux $\geq$ 1000pfu | 13/1420                     |



## 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 |
|--------|----------------------|----------------------|---------------------|--------|----------------------|----------------------|---------------------|
| 18 Jan | 100                  | 8                    | 3                   | 01 Feb | 110                  | 5                    | 2                   |
| 19     | 95                   | 15                   | 4                   | 02     | 110                  | 15                   | 4                   |
| 20     | 95                   | 10                   | 3                   | 03     | 110                  | 12                   | 4                   |
| 21     | 95                   | 8                    | 3                   | 04     | 110                  | 8                    | 3                   |
| 22     | 95                   | 12                   | 4                   | 05     | 105                  | 5                    | 2                   |
| 23     | 100                  | 8                    | 3                   | 06     | 105                  | 5                    | 2                   |
| 24     | 100                  | 5                    | 2                   | 07     | 105                  | 12                   | 4                   |
| 25     | 100                  | 5                    | 2                   | 08     | 105                  | 12                   | 4                   |
| 26     | 105                  | 5                    | 2                   | 09     | 105                  | 10                   | 3                   |
| 27     | 105                  | 5                    | 2                   | 10     | 105                  | 8                    | 3                   |
| 28     | 105                  | 18                   | 5                   | 11     | 105                  | 5                    | 2                   |
| 29     | 105                  | 12                   | 4                   | 12     | 100                  | 5                    | 2                   |
| 30     | 100                  | 8                    | 3                   | 13     | 100                  | 5                    | 2                   |
| 31     | 105                  | 5                    | 2                   |        |                      |                      |                     |



## *Energetic Events*

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

**No Events Observed**

## *Flare List*

| Date   | Time  |      |      | X-ray Class | Imp/ Brtns | Location Lat CMD | Rgn # |
|--------|-------|------|------|-------------|------------|------------------|-------|
|        | Begin | Max  | End  |             |            |                  |       |
| 11 Jan | 1118  | 1121 | 1124 | B4.0        |            |                  |       |
| 11 Jan | 1700  | 1714 | 1733 | B4.4        |            |                  | 2480  |
| 11 Jan | 2041  | 2114 | 2136 | B4.9        |            |                  | 2480  |
| 11 Jan | 2304  | 2305 | 2307 |             | SF         | N18E36           | 2483  |
| 12 Jan | 0903  | 0907 | 0912 | B6.8        |            |                  | 2483  |
| 12 Jan | 1339  | 1353 | 1409 | B5.3        | SF         | N02W00           | 2480  |
| 12 Jan | 1919  | 1931 | 1954 | B3.3        |            |                  | 2480  |
| 12 Jan | 2151  | 2231 | 2244 | B4.0        |            |                  | 2480  |
| 13 Jan | 0705  | 0725 | 0743 | B3.9        |            |                  | 2483  |
| 13 Jan | 1113  | 1122 | 1127 | B2.5        |            |                  | 2480  |
| 13 Jan | 1333  | 1351 | 1410 | B2.4        |            |                  | 2483  |
| 13 Jan | 1457  | 1505 | 1513 | B2.4        |            |                  |       |
| 13 Jan | 1659  | 1705 | 1708 | B2.3        |            |                  | 2483  |
| 13 Jan | 1827  | 1834 | 1841 | B4.4        |            |                  |       |
| 13 Jan | 2351  | 0001 | 0011 | B2.5        |            |                  | 2480  |
| 14 Jan | 1004  | 1008 | 1017 | B3.7        | SF         | N03W33           | 2480  |
| 14 Jan | 2158  | 2200 | 2202 |             | SF         | N15E69           | 2485  |
| 15 Jan | 0234  | 0239 | 0241 | C2.8        |            |                  | 2480  |
| 15 Jan | 1135  | 1140 | 1144 | B4.2        |            |                  | 2480  |
| 15 Jan | 1210  | 1216 | 1218 | C1.0        |            |                  | 2480  |
| 15 Jan | 1325  | 1328 | 1331 | B5.1        |            |                  | 2480  |
| 15 Jan | 1352  | 1355 | 1401 | B3.2        |            |                  | 2480  |
| 15 Jan | 1518  | 1525 | 1531 | C1.7        | SF         | N07W49           | 2480  |
| 15 Jan | 1741  | 1745 | 1748 | B4.4        |            |                  | 2480  |
| 15 Jan | 1956  | 2002 | 2005 | B8.6        |            |                  | 2480  |
| 15 Jan | 2009  | 2016 | 2036 | B8.8        |            |                  |       |
| 15 Jan | 2159  | 2203 | 2205 | C1.1        |            |                  | 2480  |
| 16 Jan | 0014  | 0017 | 0019 | B5.6        |            |                  | 2480  |
| 16 Jan | 0128  | 0131 | 0133 | B3.2        |            |                  | 2480  |
| 16 Jan | 0332  | 0336 | 0339 | B8.7        |            |                  | 2480  |
| 16 Jan | 0640  | 0657 | 0705 | B6.0        |            |                  | 2480  |



## *Flare List*

| Date   | Time  |      |      | Optical     |            |                  |       |
|--------|-------|------|------|-------------|------------|------------------|-------|
|        | Begin | Max  | End  | X-ray Class | Imp/ Brtns | Location Lat CMD | Rgn # |
| 16 Jan | 1115  | 1118 | 1121 | B4.5        |            |                  | 2480  |
| 16 Jan | 1320  | 1324 | 1327 | B3.5        |            |                  | 2480  |
| 16 Jan | 2005  | 2009 | 2011 | B4.2        |            |                  | 2480  |
| 17 Jan | 1036  | 1049 | 1112 | B3.7        |            |                  | 2485  |



## Region Summary

| Date | Location |     | Sunspot Characteristics        |                   |               |               | Flares       |       |   |   |         |   |   |   |
|------|----------|-----|--------------------------------|-------------------|---------------|---------------|--------------|-------|---|---|---------|---|---|---|
|      | Lat CMD  | Lon | Helio<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 |

### Region 2476

|        |        |     |       |   |     |    |   |  |  |   |   |   |   |   |   |   |   |
|--------|--------|-----|-------|---|-----|----|---|--|--|---|---|---|---|---|---|---|---|
| 01 Jan | S11E61 | 200 | 10    | 1 | Axx | 1  | A |  |  |   |   |   |   |   |   |   |   |
| 02 Jan | S10E47 | 201 | 20    | 4 | Cro | 6  | B |  |  |   |   |   |   |   |   |   |   |
| 03 Jan | S10E34 | 201 | 80    | 7 | Dai | 16 | B |  |  |   | 1 |   |   |   |   |   |   |
| 04 Jan | S10E20 | 202 | 70    | 6 | Dao | 12 | B |  |  |   |   |   |   |   |   |   |   |
| 05 Jan | S10E06 | 202 | 30    | 6 | Cro | 8  | B |  |  |   |   |   |   |   |   |   |   |
| 06 Jan | S09W08 | 203 | 10    | 4 | Bxo | 3  | B |  |  |   |   |   |   |   |   |   |   |
| 07 Jan | S09W22 | 204 | 10    | 1 | Axx | 2  | A |  |  |   |   |   |   |   |   |   |   |
| 08 Jan | S09W36 | 205 | plage |   |     |    |   |  |  |   |   |   |   |   |   |   |   |
| 09 Jan | S09W50 | 206 | plage |   |     |    |   |  |  |   |   |   |   |   |   |   |   |
| 10 Jan | S09W64 | 206 | plage |   |     |    |   |  |  |   |   |   |   |   |   |   |   |
| 11 Jan | S09W78 | 207 | plage |   |     |    |   |  |  |   |   |   |   |   |   |   |   |
|        |        |     |       |   |     |    |   |  |  | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 |

Crossed West Limb.

Absolute heliographic longitude: 202

### Region 2477

|        |        |     |       |   |     |   |   |  |  |   |   |   |   |   |   |   |   |
|--------|--------|-----|-------|---|-----|---|---|--|--|---|---|---|---|---|---|---|---|
| 01 Jan | N12E75 | 186 | 20    | 2 | Hsx | 1 | A |  |  |   |   |   |   |   |   |   |   |
| 02 Jan | N12E61 | 187 | 70    | 3 | Hsx | 1 | A |  |  |   |   |   |   |   |   |   |   |
| 03 Jan | N12E47 | 188 | 70    | 2 | Hsx | 1 | A |  |  |   |   |   |   |   |   |   |   |
| 04 Jan | N12E33 | 189 | 70    | 2 | Hsx | 1 | A |  |  |   |   |   |   |   |   |   |   |
| 05 Jan | N12E19 | 189 | 70    | 2 | Hsx | 1 | A |  |  |   |   |   |   |   |   |   |   |
| 06 Jan | N12E05 | 190 | 70    | 2 | Hsx | 1 | A |  |  |   |   |   |   |   |   |   |   |
| 07 Jan | N12W09 | 191 | 60    | 2 | Hax | 1 | A |  |  |   |   |   |   |   |   |   |   |
| 08 Jan | N12W21 | 190 | 50    | 2 | Hax | 1 | A |  |  |   |   |   |   |   |   |   |   |
| 09 Jan | N11W33 | 189 | 40    | 2 | Hax | 2 | A |  |  |   |   |   |   |   |   |   |   |
| 10 Jan | N12W45 | 187 | 10    | 1 | Hsx | 2 | A |  |  |   |   |   |   |   |   |   |   |
| 11 Jan | N12W59 | 187 | 0     |   | Axx | 1 | A |  |  |   |   |   |   |   |   |   |   |
| 12 Jan | N12W73 | 189 | plage |   |     |   |   |  |  |   |   |   |   |   |   |   |   |
| 13 Jan | N12W87 | 190 | plage |   |     |   |   |  |  |   |   |   |   |   |   |   |   |
|        |        |     |       |   |     |   |   |  |  | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

Crossed West Limb.

Absolute heliographic longitude: 190



**Region Summary - continued**

| 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 |

**Region 2478**

|        |        |     |       |   |     |   |   |  |   |   |   |   |   |   |   |   |   |
|--------|--------|-----|-------|---|-----|---|---|--|---|---|---|---|---|---|---|---|---|
| 02 Jan | N07E53 | 195 | 10    | 2 | Bxo | 2 | B |  |   |   |   |   |   |   |   |   |   |
| 03 Jan | N07E38 | 197 | 20    | 2 | Cro | 3 | B |  |   |   |   |   |   |   |   |   |   |
| 04 Jan | N07E24 | 198 | 10    | 3 | Bxo | 3 | B |  |   |   |   |   |   |   |   |   |   |
| 05 Jan | N07E10 | 198 | plage |   |     |   |   |  |   |   |   |   |   |   |   |   |   |
| 06 Jan | N07W04 | 199 | plage |   |     |   |   |  |   |   |   |   |   |   |   |   |   |
| 07 Jan | N07W18 | 200 | plage |   |     |   |   |  |   |   |   |   |   |   |   |   |   |
| 08 Jan | N07W28 | 197 | 10    | 2 | Bxo | 3 | B |  |   |   |   |   |   |   |   |   |   |
| 09 Jan | N06W40 | 196 | 10    | 4 | Bxo | 3 | B |  |   |   |   |   |   |   |   |   |   |
| 10 Jan | N06W55 | 197 | plage |   |     |   |   |  |   |   |   |   |   |   |   |   |   |
| 11 Jan | N06W70 | 199 | plage |   |     |   |   |  |   |   |   |   |   |   |   |   |   |
| 12 Jan | N06W85 | 201 | plage |   |     |   |   |  |   |   |   |   |   |   |   |   |   |
|        |        |     |       |   |     |   |   |  | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

Crossed West Limb.  
Absolute heliographic longitude: 199

**Region 2479**

|        |        |     |       |   |     |   |   |  |   |   |   |   |   |   |   |   |   |
|--------|--------|-----|-------|---|-----|---|---|--|---|---|---|---|---|---|---|---|---|
| 04 Jan | N11E05 | 217 | 10    | 3 | Bxo | 4 | B |  |   |   |   |   |   |   |   |   |   |
| 05 Jan | N11W09 | 217 | plage |   |     |   |   |  |   |   |   |   |   |   |   |   |   |
| 06 Jan | N11W23 | 218 | plage |   |     |   |   |  |   |   |   |   |   |   |   |   |   |
| 07 Jan | N11W37 | 219 | plage |   |     |   |   |  |   |   |   |   |   |   |   |   |   |
| 08 Jan | N11W51 | 220 | plage |   |     |   |   |  |   |   |   |   |   |   |   |   |   |
| 09 Jan | N11W65 | 221 | plage |   |     |   |   |  |   |   |   |   |   |   |   |   |   |
| 10 Jan | N11W79 | 221 | plage |   |     |   |   |  |   |   |   |   |   |   |   |   |   |
|        |        |     |       |   |     |   |   |  | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

Crossed West Limb.  
Absolute heliographic longitude: 217





### *Region Summary - continued*

| 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 2480</b> |          |     |                                |      |                   |               |               |              |       |   |   |         |   |   |   |   |  |  |  |  |  |  |  |
| 06 Jan             | N04E74   | 121 | 80                             | 5    | Cao               | 4             | B             | 1            |       |   |   |         |   |   |   |   |  |  |  |  |  |  |  |
| 07 Jan             | N03E58   | 124 | 180                            | 10   | Dao               | 6             | B             | 1            |       |   |   | 1       |   |   |   |   |  |  |  |  |  |  |  |
| 08 Jan             | N03E43   | 126 | 180                            | 10   | Dao               | 6             | B             |              |       |   |   |         |   |   |   |   |  |  |  |  |  |  |  |
| 09 Jan             | N03E32   | 124 | 180                            | 10   | Dao               | 7             | B             |              |       |   |   |         |   |   |   |   |  |  |  |  |  |  |  |
| 10 Jan             | N02E17   | 125 | 190                            | 11   | Eso               | 7             | B             |              |       |   |   |         |   |   |   |   |  |  |  |  |  |  |  |
| 11 Jan             | N03E05   | 123 | 170                            | 11   | Eso               | 3             | B             |              |       |   |   |         |   |   |   |   |  |  |  |  |  |  |  |
| 12 Jan             | N03W08   | 123 | 150                            | 9    | Cso               | 4             | B             |              |       |   |   | 1       |   |   |   |   |  |  |  |  |  |  |  |
| 13 Jan             | N03W23   | 126 | 140                            | 6    | Cso               | 3             | B             |              |       |   |   |         |   |   |   |   |  |  |  |  |  |  |  |
| 14 Jan             | N03W39   | 128 | 140                            | 4    | Hax               | 2             | A             |              |       |   |   | 1       |   |   |   |   |  |  |  |  |  |  |  |
| 15 Jan             | N04W52   | 129 | 130                            | 5    | Hsx               | 2             | A             | 4            |       |   |   | 1       |   |   |   |   |  |  |  |  |  |  |  |
| 16 Jan             | N03W66   | 129 | 130                            | 4    | Hsx               | 1             | A             |              |       |   |   |         |   |   |   |   |  |  |  |  |  |  |  |
| 17 Jan             | N03W79   | 129 | 140                            | 3    | Hsx               | 1             | A             |              |       |   |   |         |   |   |   |   |  |  |  |  |  |  |  |
|                    |          |     |                                |      |                   |               |               | 6            | 0     | 0 | 4 | 0       | 0 | 0 | 0 | 0 |  |  |  |  |  |  |  |

Still on Disk.

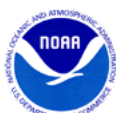
Absolute heliographic longitude: 123

### **Region 2482**

|        |        |     |       |   |     |   |   |   |   |   |   |   |   |   |   |   |  |  |  |  |  |
|--------|--------|-----|-------|---|-----|---|---|---|---|---|---|---|---|---|---|---|--|--|--|--|--|
| 08 Jan | N03W10 | 178 | 10    | 3 | Bxo | 2 | B |   |   |   |   |   |   |   |   |   |  |  |  |  |  |
| 09 Jan | N02W23 | 179 | 10    | 3 | Bxo | 4 | B |   |   |   |   |   |   |   |   |   |  |  |  |  |  |
| 10 Jan | N02W36 | 178 | 10    | 3 | Bxo | 3 | B |   |   |   |   |   |   |   |   |   |  |  |  |  |  |
| 11 Jan | N02W51 | 180 | plage |   |     |   |   |   |   |   |   |   |   |   |   |   |  |  |  |  |  |
| 12 Jan | N02W66 | 182 | plage |   |     |   |   |   |   |   |   |   |   |   |   |   |  |  |  |  |  |
| 13 Jan | N03W81 | 184 | plage |   |     |   |   |   |   |   |   |   |   |   |   |   |  |  |  |  |  |
|        |        |     |       |   |     |   |   | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |  |  |  |  |  |

Crossed West Limb.

Absolute heliographic longitude: 178



**Region Summary - continued**

| Date               | Location |     | Sunspot Characteristics        |                   |               |               | Flares       |       |   |   |         |   |   |   |   |   |  |
|--------------------|----------|-----|--------------------------------|-------------------|---------------|---------------|--------------|-------|---|---|---------|---|---|---|---|---|--|
|                    | Lat CMD  | Lon | Helio<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 |   |  |
| <b>Region 2483</b> |          |     |                                |                   |               |               |              |       |   |   |         |   |   |   |   |   |  |
| 08 Jan             | N16E44   | 125 | 10                             | 3                 | Bxo           | 3             | B            |       |   |   |         |   |   |   |   |   |  |
| 09 Jan             | N17E30   | 126 | 30                             | 6                 | Cso           | 5             | B            |       |   |   |         |   |   |   |   |   |  |
| 10 Jan             | N17E17   | 125 | 50                             | 6                 | Dao           | 8             | B            |       |   |   |         |   |   |   |   |   |  |
| 11 Jan             | N17E03   | 125 | 180                            | 7                 | Dao           | 7             | B            |       |   |   |         | 1 |   |   |   |   |  |
| 12 Jan             | N17W09   | 124 | 130                            | 8                 | Dao           | 5             | B            |       |   |   |         |   |   |   |   |   |  |
| 13 Jan             | N18W22   | 125 | 140                            | 8                 | Dao           | 3             | B            |       |   |   |         |   |   |   |   |   |  |
| 14 Jan             | N18W35   | 124 | 90                             | 7                 | Cao           | 2             | B            |       |   |   |         |   |   |   |   |   |  |
| 15 Jan             | N17W49   | 126 | 90                             | 2                 | Hsx           | 1             | A            |       |   |   |         |   |   |   |   |   |  |
| 16 Jan             | N17W65   | 128 | 60                             | 3                 | Hsx           | 1             | A            |       |   |   |         |   |   |   |   |   |  |
| 17 Jan             | N17W78   | 128 | 70                             | 2                 | Hax           | 1             | A            |       |   |   |         |   |   |   |   |   |  |
|                    |          |     |                                |                   |               |               |              | 0     | 0 | 0 | 1       | 0 | 0 | 0 | 0 | 0 |  |

Still on Disk.

Absolute heliographic longitude: 125

|                    |        |     |       |   |     |   |   |   |   |   |   |   |   |   |   |   |  |
|--------------------|--------|-----|-------|---|-----|---|---|---|---|---|---|---|---|---|---|---|--|
| <b>Region 2484</b> |        |     |       |   |     |   |   |   |   |   |   |   |   |   |   |   |  |
| 10 Jan             | N05E48 | 94  | 10    | 2 | Bxo | 3 | B |   |   |   |   |   |   |   |   |   |  |
| 11 Jan             | N07E34 | 94  | plage |   |     |   |   |   |   |   |   |   |   |   |   |   |  |
| 12 Jan             | N07E19 | 97  | plage |   |     |   |   |   |   |   |   |   |   |   |   |   |  |
| 13 Jan             | N07E06 | 97  | plage |   |     |   |   |   |   |   |   |   |   |   |   |   |  |
| 14 Jan             | N07W09 | 99  | plage |   |     |   |   |   |   |   |   |   |   |   |   |   |  |
| 15 Jan             | N07W24 | 101 | plage |   |     |   |   |   |   |   |   |   |   |   |   |   |  |
| 16 Jan             | N07W39 | 103 | plage |   |     |   |   |   |   |   |   |   |   |   |   |   |  |
| 17 Jan             | N07W54 | 104 | plage |   |     |   |   |   |   |   |   |   |   |   |   |   |  |
|                    |        |     |       |   |     |   |   | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |  |

Still on Disk.

Absolute heliographic longitude: 97

|                    |        |    |    |   |     |   |   |   |   |   |   |   |   |   |   |   |  |
|--------------------|--------|----|----|---|-----|---|---|---|---|---|---|---|---|---|---|---|--|
| <b>Region 2485</b> |        |    |    |   |     |   |   |   |   |   |   |   |   |   |   |   |  |
| 14 Jan             | N13E60 | 29 | 30 | 4 | Cro | 2 | B |   |   |   |   | 1 |   |   |   |   |  |
| 15 Jan             | N13E46 | 29 | 30 | 6 | Dro | 5 | B |   |   |   |   |   |   |   |   |   |  |
| 16 Jan             | N13E34 | 29 | 20 | 5 | Cro | 6 | B |   |   |   |   |   |   |   |   |   |  |
| 17 Jan             | N14E21 | 29 | 10 | 5 | Bxo | 5 | B |   |   |   |   |   |   |   |   |   |  |
|                    |        |    |    |   |     |   |   | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 |  |

Still on Disk.

Absolute heliographic longitude: 29



***Region Summary - continued***

| Date                      | Location |     | Sunspot Characteristics  |               |                   |               | Flares        |              |       |   |   |         |   |   |   |   |
|---------------------------|----------|-----|--------------------------|---------------|-------------------|---------------|---------------|--------------|-------|---|---|---------|---|---|---|---|
|                           | Lat CMD  | Lon | Heli<br>10 <sup>-6</sup> | Area<br>hemi. | Extent<br>(helio) | Spot<br>Class | Spot<br>Count | Mag<br>Class | X-ray |   |   | Optical |   |   |   |   |
|                           |          |     |                          |               |                   |               |               |              | C     | M | X | S       | 1 | 2 | 3 | 4 |
| <b><i>Region 2486</i></b> |          |     |                          |               |                   |               |               |              |       |   |   |         |   |   |   |   |
| 17 Jan                    | S20E67   | 343 | 40                       | 1             | Hax               | 1             | A             | 0            | 0     | 0 | 0 | 0       | 0 | 0 | 0 | 0 |

Still on Disk.

Absolute heliographic longitude: 343

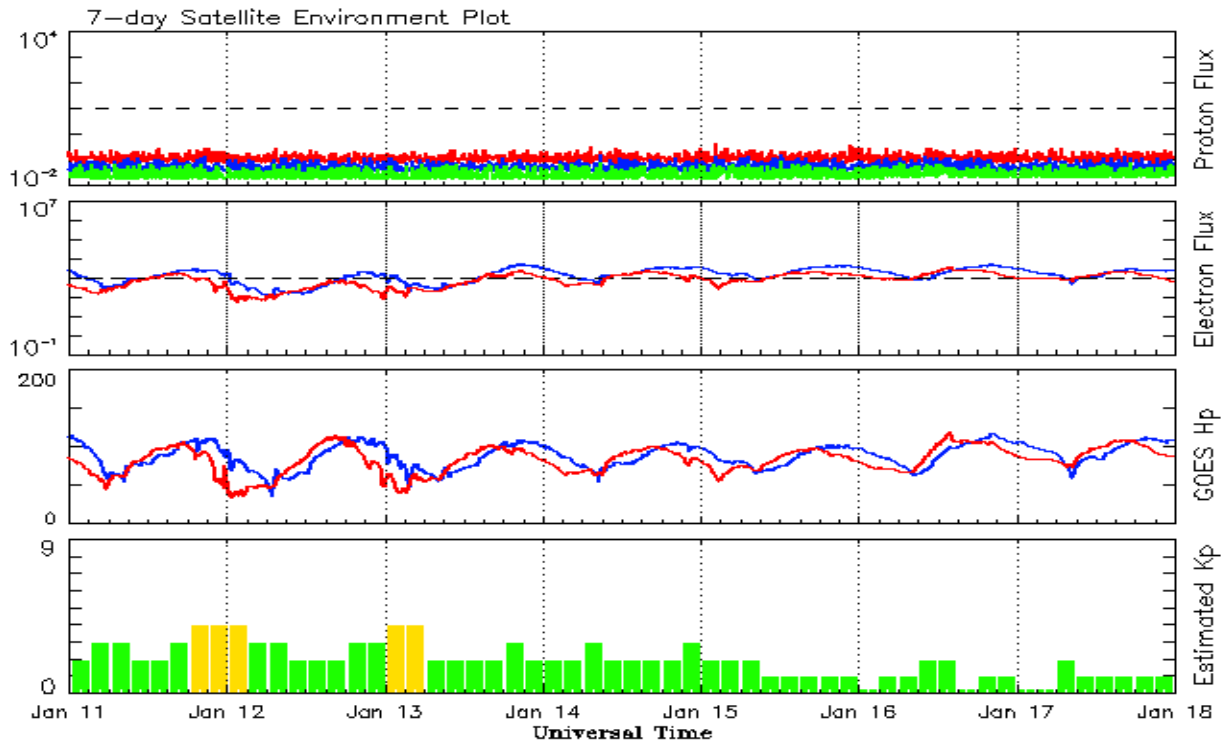


**Recent Solar Indices (preliminary)**  
**Observed monthly mean values**

| 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> |                 |       |        |               |            |           |             |           |        |
| January     | 125.9           | 81.8  | 0.65   | 117.7         | 77.3       | 158.6     | 137.3       | 6         | 7.1    |
| February    | 174.6           | 102.3 | 0.59   | 119.5         | 78.3       | 170.3     | 138.6       | 12        | 6.9    |
| March       | 141.1           | 91.9  | 0.65   | 123.2         | 80.8       | 149.9     | 140.8       | 6         | 7.2    |
| April       | 130.5           | 67.5  | 0.65   | 124.8         | 69.8       | 144.3     | 143.5       | 9         | 7.5    |
| May         | 116.8           | 67.5  | 0.64   | 122.3         | 69.0       | 130.0     | 144.7       | 7         | 7.9    |
| June        | 107.7           | 61.7  | 0.66   | 121.4         | 68.5       | 122.2     | 145.5       | 7         | 8.4    |
| July        | 113.6           | 60.1  | 0.64   | 120.4         | 67.6       | 137.3     | 145.2       | 5         | 8.8    |
| August      | 106.2           | 64.1  | 0.70   | 115.1         | 65.0       | 124.7     | 142.8       | 9         | 8.9    |
| September   | 127.4           | 78.0  | 0.69   | 107.4         | 61.1       | 146.1     | 140.1       | 11        | 9.3    |
| October     | 92.0            | 54.0  | 0.66   | 101.7         | 58.4       | 153.7     | 138.4       | 10        | 9.9    |
| November    | 101.8           | 62.2  | 0.69   | 97.9          | 56.8       | 155.3     | 137.4       | 10        | 10.1   |
| 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          | 45.6       | 120.1     | 123.3       | 9         | 12.7   |
| June        | 77.3            | 39.9  | 0.53   | 73.1          | 43.2       | 123.2     | 119.5       | 14        | 13.0   |
| July        | 68.4            | 39.5  | 0.58   |               |            | 107.0     |             | 10        |        |
| August      | 61.6            | 38.6  | 0.63   |               |            | 106.2     |             | 16        |        |
| September   | 72.5            | 47.2  | 0.65   |               |            | 102.1     |             | 16        |        |
| October     | 59.5            | 37.0  | 0.62   |               |            | 104.1     |             | 15        |        |
| November    | 61.8            | 37.9  | 0.61   |               |            | 109.6     |             | 13        |        |
| December    | 54.1            | 34.6  | 0.64   |               |            | 112.8     |             | 15        |        |

**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 11 January 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.

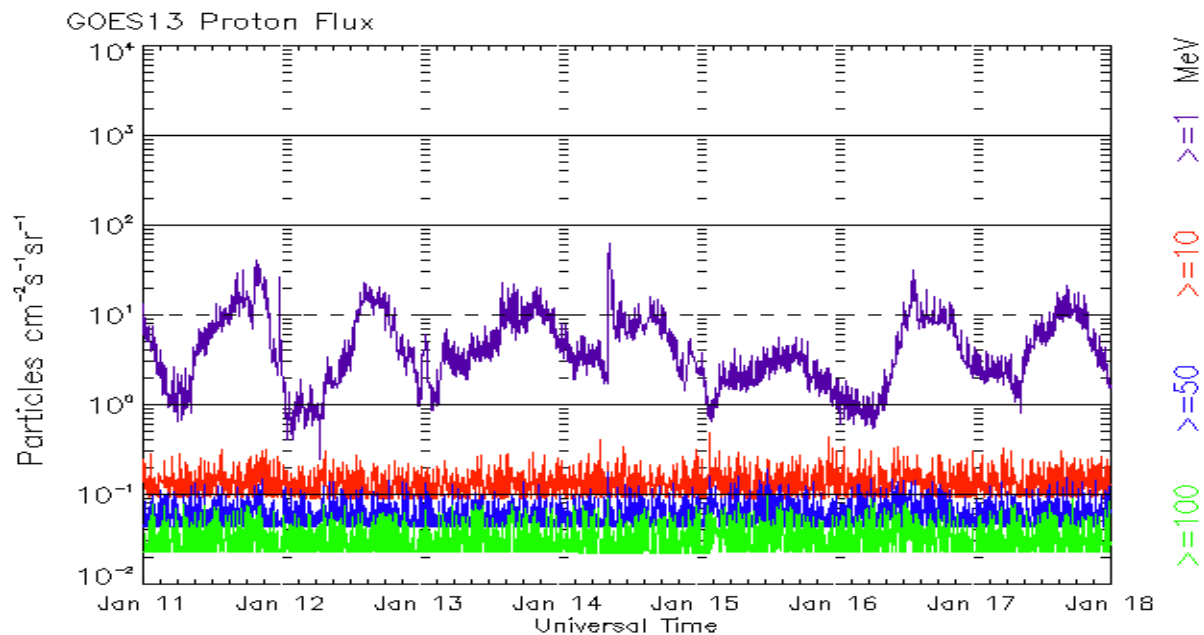
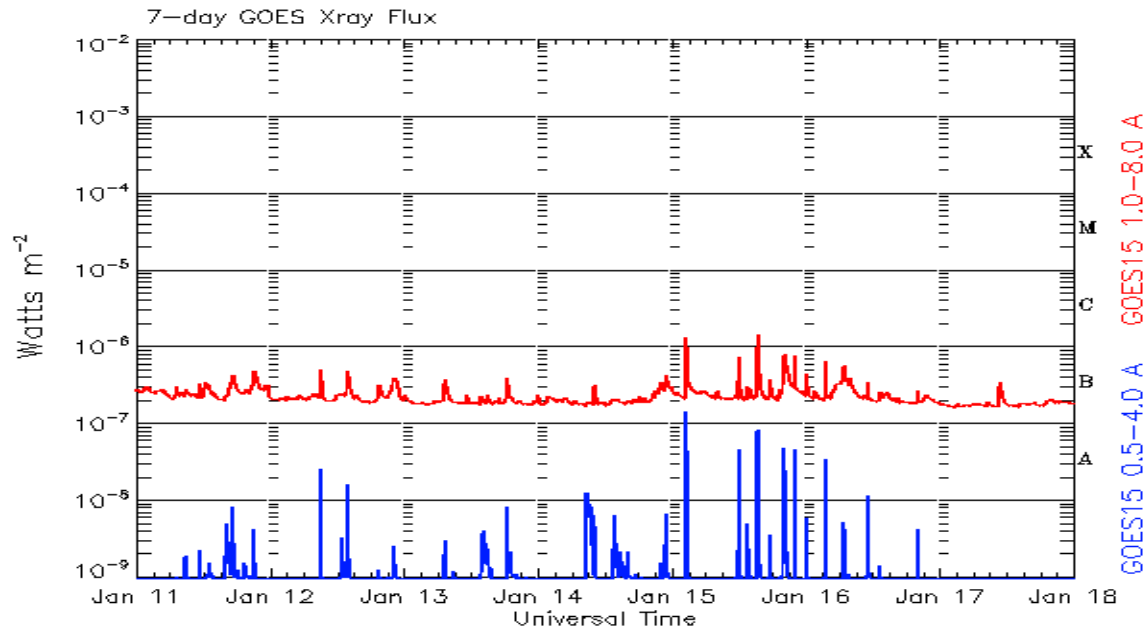
The electron flux plot contains the five-minute averaged integral electron flux (electrons/cm<sup>2</sup>-sec -sr) with energies greater than 2 MeV by the SWPC Primary GOES satellite.

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 11 January 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 (pflu = 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 pflu 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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