

Solar activity reached moderate levels this week with a total of three M-class events, two of which came from Region 1620 (S12, L=97, class/area=Ekc/420 on 28 November). This region appeared on 20 November and remained relatively small and stable for the first six days. On 26 November, it more than quadrupled in size (to 240 mil) and almost doubled in spot count (to 23). The following day it produced the first of two M-class events, an M1/Sf on 27/2126 UTC. By this time it had evolved to a beta-gamma-delta magnetic configuration which it would maintain for the following two days. The rapid growth continued and Region 1620 reached 420 mils on 28 November when it produced an M2/1f event at 2136 UTC. Following this second M-class event, the region began to decay and produced only occasional C-class events until it crossed the west limb on 01 December.

The remaining M-class flare was attributed to Region 1618 (N08, L=135, class/area=Ekc/450 on 23 November). This region produced three M-class flares in the week prior. This week it only managed to produce one, an M1/Sf on 27 November at 1557 UTC. By this time it had shrunk to 170 millionths but retained its beta-gamma-delta magnetic configuration. It rotated around the west limb the next day.

The largest region on the disk this week was Region 1623 (N09, L=340, class/area=Eko/450 on 28 November). It produced a C5/Sf flare on 29/1205 UTC and four other C-flares as its magnetic complexity increased to a beta-gamma configuration. It retained this complexity for the next three days but failed to produce any more C-flares. Nearby, Region 1625 (N15, L=338, class/area=Dso/230 on 29 November) managed to produce six unremarkable C-flares on its first day. The remaining regions during the week were relatively quiescent.

No proton events were observed at geosynchronous orbit.

The greater than 2 MeV electron flux at geosynchronous orbit was at normal to moderate levels all week.

Geomagnetic field activity was quiet all week with the exception of two unsettled periods. The first was during the 00-03 synoptic period on 26 November most likely associated with a CME that erupted on 23 November. A weak interplanetary shock was observed at the ACE spacecraft at 26/0437 UTC followed by an 8nT sudden impulse at the Boulder magnetometer at 26/0514 UTC. Conditions quickly returned to quiet levels. The second unsettled period was early on 02 December associated with co-rotating interaction region.

### **Space Weather Outlook**

**03 December - 29 December 2012**

Solar activity is expected to be at low levels with a chance of isolated M-class flares through the entire forecast period (03-29 December).

No proton events are expected at geosynchronous orbit.

The greater than 2 MeV electron flux at geosynchronous orbit is expected to be at normal levels



except during 14-21 December following the onset of a coronal hole high speed stream on 11 December and sustained by another stream which is expected to become geoeffective on 14 December.

Geomagnetic field activity is expected to be at quiet levels for the majority of the forecast period. Unsettled to potentially active levels are expected on 11-12, 14, and 29 December associated with recurrent high speed solar wind streams.



### *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 | 4 |
| 26 November | 122                  | 81              | 630                                      | B5.8                     | 13     | 0 | 0 | 12      | 0 | 0 | 0 | 0 |
| 27 November | 117                  | 76              | 730                                      | B4.8                     | 12     | 2 | 0 | 6       | 0 | 0 | 0 | 0 |
| 28 November | 114                  | 66              | 980                                      | B4.6                     | 6      | 1 | 0 | 3       | 1 | 0 | 0 | 0 |
| 29 November | 113                  | 89              | 1070                                     | B3.9                     | 13     | 0 | 0 | 13      | 0 | 0 | 0 | 0 |
| 30 November | 111                  | 67              | 660                                      | B3.4                     | 3      | 0 | 0 | 7       | 0 | 0 | 0 | 0 |
| 01 December | 102                  | 49              | 440                                      | B2.9                     | 3      | 0 | 0 | 2       | 0 | 0 | 0 | 0 |
| 02 December | 98                   | 43              | 270                                      | B1.6                     | 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  |
|             | 26 November   | 5.0e+05 | 1.1e+04  | 2.7e+03   |         | 2.3e+06 |
| 27 November | 1.4e+05   | 1.0e+04 | 2.5e+03  |   | 2.4e+06 |         |
| 28 November | 1.6e+05   | 1.1e+04 | 2.8e+03  |   | 3.0e+06 |         |
| 29 November | 1.6e+05   | 1.1e+04 | 2.6e+03  |   | 3.8e+06 |         |
| 30 November | 5.9e+05   | 1.1e+04 | 2.7e+03  |   | 5.6e+06 |         |
| 01 December | 7.9e+05   | 1.1e+04 | 2.6e+03  |   | 5.4e+06 |         |
| 02 December | 8.3e+04   | 1.0e+04 | 2.5e+03  |   | 1.6e+06 |         |

### *Daily Geomagnetic Data*

| Date        | Middle Latitude<br>Fredericksburg |                 | High Latitude<br>College |                 | Estimated<br>Planetary |                 |
|-------------|-----------------------------------|-----------------|--------------------------|-----------------|------------------------|-----------------|
|             | A                                 | K-indices       | A                        | K-indices       | A                      | K-indices       |
|             | 26 November                       | 6               | 3-2-1-1-1-2-1-1          | 3               | 2-1-1-2-0-0-1-0        | 5               |
| 27 November | 3                                 | 1-1-1-1-1-1-1-0 | 2                        | 0-0-1-1-2-0-0-0 | 4                      | 1-1-1-1-1-1-1-1 |
| 28 November | 2                                 | 0-1-0-0-1-1-1-1 | 0                        | 0-0-0-0-0-0-0-1 | 2                      | 1-1-0-0-0-0-1-1 |
| 29 November | 2                                 | 0-1-0-1-1-1-1-0 | 1                        | 0-0-0-2-0-0-0-1 | 3                      | 0-1-1-1-0-1-1-1 |
| 30 November | 1                                 | 0-0-0-1-1-1-0-0 | 2                        | 0-0-1-2-1-0-0-0 | 2                      | 0-0-0-1-0-1-0-0 |
| 01 December | 3                                 | 1-1-0-0-1-2-2-1 | 1                        | 0-0-0-0-0-1-1-0 | 4                      | 1-1-0-0-0-1-2-2 |
| 02 December | 8                                 | 2-3-3-3-2-0-1-0 | 13                       | 1-2-5-3-4-1-0-0 | 7                      | 2-2-3-2-2-1-0-1 |

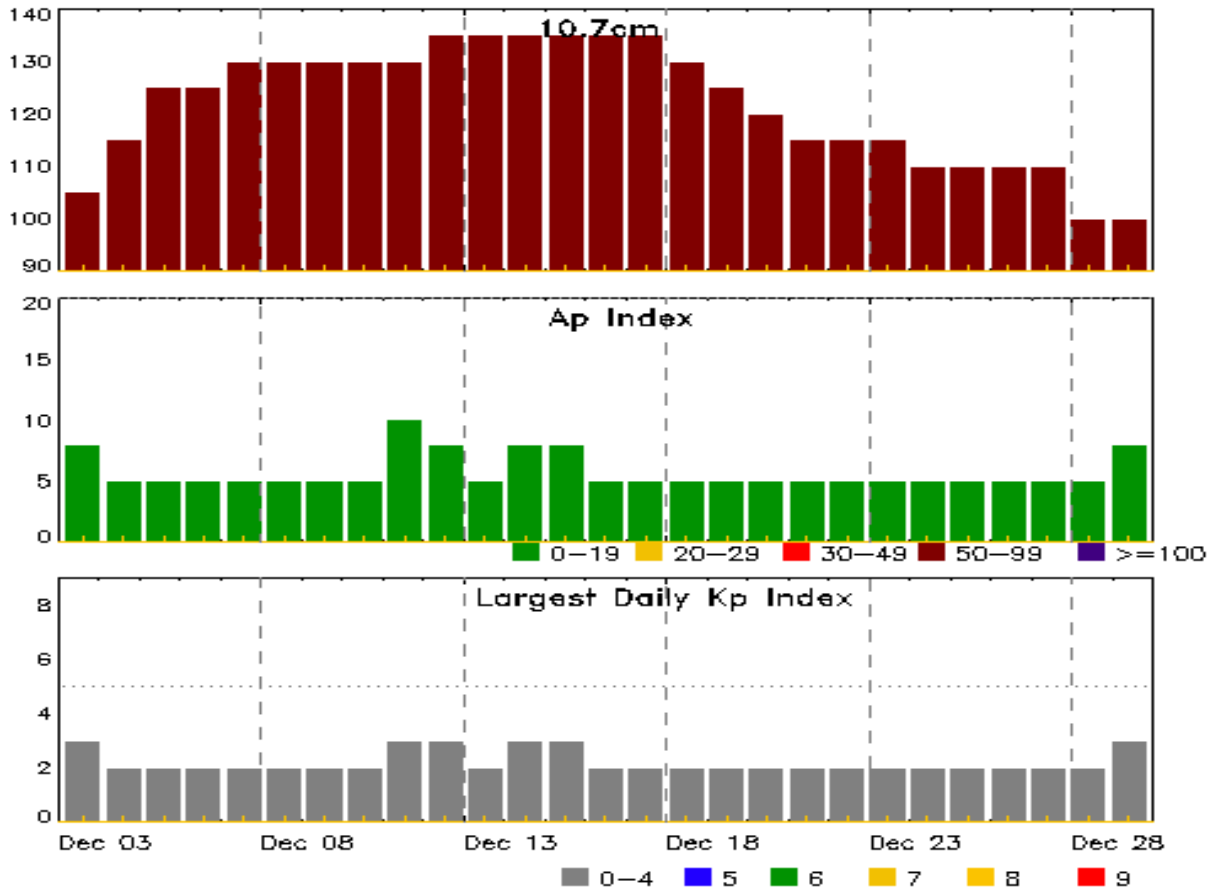


### *Alerts and Warnings Issued*

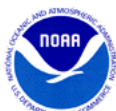
| <b>Date &amp; Time<br/>of Issue UTC</b> | <b>Type of Alert or Warning</b>              | <b>Date &amp; Time<br/>of Event UTC</b> |
|---|--|---|
| 26 Nov 0453                             | WARNING: Geomagnetic Sudden Impulse expected | 26/0510 - 0550                          |
| 26 Nov 0511                             | WARNING: Geomagnetic K = 4                   | 26/0520 - 1200                          |
| 26 Nov 0530                             | SUMMARY: Geomagnetic Sudden Impulse          | 26/0514                                 |



## 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 |
|--------|----------------------|----------------------|---------------------|--------|----------------------|----------------------|---------------------|
| 03 Dec | 105                  | 8                    | 3                   | 17 Dec | 135                  | 5                    | 2                   |
| 04     | 115                  | 5                    | 2                   | 18     | 130                  | 5                    | 2                   |
| 05     | 125                  | 5                    | 2                   | 19     | 125                  | 5                    | 2                   |
| 06     | 125                  | 5                    | 2                   | 20     | 120                  | 5                    | 2                   |
| 07     | 130                  | 5                    | 2                   | 21     | 115                  | 5                    | 2                   |
| 08     | 130                  | 5                    | 2                   | 22     | 115                  | 5                    | 2                   |
| 09     | 130                  | 5                    | 2                   | 23     | 115                  | 5                    | 2                   |
| 10     | 130                  | 5                    | 2                   | 24     | 110                  | 5                    | 2                   |
| 11     | 130                  | 10                   | 3                   | 25     | 110                  | 5                    | 2                   |
| 12     | 135                  | 8                    | 3                   | 26     | 110                  | 5                    | 2                   |
| 13     | 135                  | 5                    | 2                   | 27     | 110                  | 5                    | 2                   |
| 14     | 135                  | 8                    | 3                   | 28     | 100                  | 5                    | 2                   |
| 15     | 135                  | 8                    | 3                   | 29     | 100                  | 8                    | 3                   |
| 16     | 135                  | 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 245 | 2695       | Intensity II | IV |
| 27 Nov | 1552  | 1557 | 1603     | M1.6  | 0.006               | SF         | N05W73           | 1618  |                |            |              |    |
| 27 Nov | 2105  | 2126 | 2130     | M1.0  | 0.005               | SF         | S14W41           | 1620  |                |            |              |    |
| 28 Nov | 2120  | 2136 | 2148     | M2.2  | 0.019               | 1F         | S14W57           | 1620  |                |            |              |    |

### *Flare List*

| Date   | Time  |       |       | X-ray Class | Imp/ Brtns | Optical Location Lat CMD | Rgn # |
|--------|-------|-------|-------|-------------|------------|--------------------------|-------|
|        | Begin | Max   | End   |             |            |                          |       |
| 26 Nov | 0037  | 0042  | 0045  | C1.9        |            |                          | 1620  |
| 26 Nov | 0209  | 0213  | 0215  | C1.0        |            |                          | 1618  |
| 26 Nov | 0330  | 0331  | A0444 |             | SF         | S13W18                   | 1620  |
| 26 Nov | 0533  | 0534  | 0541  |             | SF         | S13W18                   | 1620  |
| 26 Nov | 0639  | 0643  | 0701  |             | SF         | S13W21                   | 1620  |
| 26 Nov | 0717  | 0726  | 0742  |             | SF         | S13W21                   | 1620  |
| 26 Nov | 0846  | 0850  | 0934  | C1.5        |            |                          | 1620  |
| 26 Nov | 0851  | 0852  | 0854  |             | SF         | N06W53                   | 1618  |
| 26 Nov | 0852  | 0903  | 0914  |             | SF         | S13W21                   | 1620  |
| 26 Nov | 1007  | 1010  | 1014  | C1.5        |            |                          |       |
| 26 Nov | 1037  | U1049 | 1053  |             | SF         | S13W24                   | 1620  |
| 26 Nov | 1139  | 1143  | 1148  | C1.8        | SF         | S12W26                   | 1620  |
| 26 Nov | 1201  | 1212  | 1220  | C1.9        | SF         | S13W21                   | 1620  |
| 26 Nov | 1232  | 1237  | 1240  | C1.9        |            |                          | 1620  |
| 26 Nov | 1311  | 1314  | 1317  | B9.9        |            |                          | 1620  |
| 26 Nov | 1429  | 1432  | 1434  | B9.0        |            |                          | 1620  |
| 26 Nov | 1455  | 1506  | 1517  | C1.7        |            |                          | 1620  |
| 26 Nov | 1522  | 1526  | 1529  | C2.3        |            |                          | 1620  |
| 26 Nov | 1949  | 1953  | 1956  | C1.2        | SF         | S13W25                   | 1620  |
| 26 Nov | 2045  | 2054  | 2059  | C1.1        |            |                          |       |
| 26 Nov | 2101  | 2121  | 2157  | C2.1        | SF         | S13W27                   | 1620  |
| 26 Nov | 2248  | 2253  | 2258  | C1.3        | SF         | S13W30                   | 1620  |
| 27 Nov | 0006  | 0017  | 0025  | B9.8        |            |                          | 1620  |
| 27 Nov | 0210  | 0215  | 0220  | C5.9        |            |                          | 1620  |
| 27 Nov | 0236  | 0242  | 0244  |             | SF         | S12W30                   | 1620  |
| 27 Nov | 0454  | 0458  | 0501  | C1.7        |            |                          | 1620  |
| 27 Nov | 0801  | 0804  | 0806  | C1.0        |            |                          | 1620  |
| 27 Nov | 0913  | 0917  | 0921  | C1.5        |            |                          | 1618  |



## *Flare List*

| Date   | Time  |       |       | X-ray<br>Class | Optical       |                     | Rgn<br># |
|--------|-------|-------|-------|----------------|---------------|---------------------|----------|
|        | Begin | Max   | End   |                | Imp/<br>Brtns | Location<br>Lat CMD |          |
| 27 Nov | 1125  | 1131  | 1134  | C1.6           |               |                     | 1620     |
| 27 Nov | 1214  | 1223  | 1227  | B9.4           |               |                     | 1623     |
| 27 Nov | 1257  | 1305  | 1310  | B8.3           |               |                     | 1618     |
| 27 Nov | 1325  | 1332  | 1340  | C1.9           |               |                     | 1620     |
| 27 Nov | 1432  | 1439  | 1449  | C1.1           |               |                     | 1623     |
| 27 Nov | 1512  | 1513  | 1523  | C1.0           | SF            | S14W38              | 1620     |
| 27 Nov | 1532  | 1535  | 1541  |                | SF            | S14W39              | 1620     |
| 27 Nov | 1552  | 1557  | 1603  | M1.6           | SF            | N05W73              | 1618     |
| 27 Nov | 1658  | 1703  | 1713  | C1.3           |               |                     | 1620     |
| 27 Nov | 1812  | 1817  | 1819  | C3.2           | SF            | S12W44              | 1620     |
| 27 Nov | 2030  | 2036  | 2040  | C1.6           |               |                     | 1623     |
| 27 Nov | 2105  | 2126  | 2130  | M1.0           | SF            | S14W41              | 1620     |
| 27 Nov | 2302  | 2324  | 2337  | C7.1           |               |                     | 1620     |
| 28 Nov | 0138  | 0148  | 0155  | B7.9           |               |                     | 1620     |
| 28 Nov | 0246  | 0255  | 0257  | C3.1           |               |                     | 1623     |
| 28 Nov | 0804  | 0810  | 0821  | B7.7           |               |                     |          |
| 28 Nov | 0853  | 0858  | 0904  | B8.1           | SF            | S14W46              | 1620     |
| 28 Nov | 0928  | 0955  | 1002  | C1.1           |               |                     | 1620     |
| 28 Nov | 1102  | 1112  | 1123  | B8.6           |               |                     | 1623     |
| 28 Nov | 1132  | 1138  | 1202  | C1.1           |               |                     | 1620     |
| 28 Nov | 1213  | 1224  | 1233  | C4.8           |               |                     | 1620     |
| 28 Nov | 1501  | 1504  | 1507  | B8.4           |               |                     |          |
| 28 Nov | 1738  | 1758  | 1806  | C3.0           | SF            | S13W56              | 1620     |
| 28 Nov | 1806  | 1807  | 1813  |                | SF            | N16E67              | 1623     |
| 28 Nov | 2120  | 2136  | 2148  | M2.2           | 1F            | S14W57              | 1620     |
| 28 Nov | 2307  | 2312  | 2320  | C1.1           |               |                     | 1620     |
| 29 Nov | 0059  | 0103  | 0106  | B7.0           |               |                     | 1620     |
| 29 Nov | 0112  | 0116  | 0119  | C1.0           |               |                     | 1623     |
| 29 Nov | 0227  | 0237  | 0246  | C1.9           |               |                     | 1623     |
| 29 Nov | 0315  | 0316  | 0321  |                | SF            | N11E62              | 1623     |
| 29 Nov | 0332  | 0334  | 0336  |                | SF            | N11E62              | 1623     |
| 29 Nov | 0428  | 0430  | 0432  |                | SF            | N15E62              | 1623     |
| 29 Nov | 0554  | 0559  | 0607  | C1.7           | SF            | N12E60              | 1623     |
| 29 Nov | 0703  | 0710  | 0718  | C3.7           | SF            | S14W62              | 1620     |
| 29 Nov | 0845  | 0849  | 0851  | C1.1           |               |                     | 1620     |
| 29 Nov | 1113  | 1118  | 1123  | C2.0           | SF            | N14E58              | 1623     |
| 29 Nov | 1140  | 1205  | 1219  | C5.8           | SF            | N15E59              | 1623     |
| 29 Nov | B1214 | U1215 | A1231 |                | SF            | S17W64              | 1620     |



## *Flare List*

| Date   | Time  |       |       | Optical     |           |                  | Rgn # |
|--------|-------|-------|-------|-------------|-----------|------------------|-------|
|        | Begin | Max   | End   | X-ray Class | Imp/Brtns | Location Lat CMD |       |
| 29 Nov | B1409 | U1410 | A1422 |             | SF        | N14E54           | 1623  |
| 29 Nov | 1747  | 1750  | 1754  | B7.3        |           |                  | 1625  |
| 29 Nov | 1833  | 1838  | 1843  | C1.4        | SF        | N14E53           | 1625  |
| 29 Nov | 1859  | 1906  | 1909  | C2.8        |           |                  | 1625  |
| 29 Nov | 2035  | 2041  | 2048  | C1.3        | SF        | N14E51           | 1625  |
| 29 Nov | 2146  | 2150  | 2154  | C1.5        | SF        | N14E51           | 1625  |
| 29 Nov | 2237  | 2244  | 2252  | C1.0        | SF        | N14E51           | 1625  |
| 29 Nov | 2352  | 0019  | 0032  | C2.5        | SF        | N13E50           | 1625  |
| 30 Nov | 0111  | 0115  | 0119  | C1.7        | SF        | S13W71           | 1620  |
| 30 Nov | 0159  | 0203  | 0203  |             | SF        | N13E48           | 1625  |
| 30 Nov | 0402  | 0416  | 0425  | B8.7        | SF        | N14E47           | 1625  |
| 30 Nov | 0841  | 0926  | 0945  | C1.2        | SF        | N17E45           | 1625  |
| 30 Nov | 1030  | 1035  | 1045  | B6.9        |           |                  | 1625  |
| 30 Nov | 1432  | 1437  | 1442  | B7.6        |           |                  | 1623  |
| 30 Nov | 1656  | 1748  | 1810  | C5.4        | SF        | S14W85           | 1620  |
| 30 Nov | 1836  | 1837  | 1839  |             | SF        | S14W80           | 1620  |
| 01 Dec | 0353  | 0354  | 0356  |             | SF        | S17W84           | 1620  |
| 01 Dec | 0607  | 0610  | 0612  | B6.2        |           |                  |       |
| 01 Dec | 0831  | 0836  | 0844  | C1.3        | SF        | N13E33           | 1625  |
| 01 Dec | 0914  | 0917  | 0920  | B6.2        |           |                  | 1620  |
| 01 Dec | 1017  | 1030  | 1042  | C1.9        |           |                  | 1620  |
| 01 Dec | 1526  | 1530  | 1535  | B4.4        |           |                  |       |
| 01 Dec | 1555  | 1601  | 1607  | B7.1        |           |                  | 1625  |
| 01 Dec | 2127  | 2142  | 2149  | C1.1        |           |                  |       |
| 01 Dec | 2237  | 2259  | 2306  | B9.4        |           |                  | 1625  |
| 02 Dec | 0018  | 0021  | 0025  | B3.4        |           |                  |       |
| 02 Dec | 1357  | 1401  | 1404  | B2.8        |           |                  | 1623  |





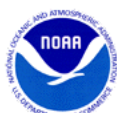
## Region Summary

| Date               | Location |           | Sunspot Characteristics       |                   |               |               | Flares       |       |   |   |         |   |   |   |   |   |   |
|--------------------|----------|-----------|-------------------------------|-------------------|---------------|---------------|--------------|-------|---|---|---------|---|---|---|---|---|---|
|                    | Lat CMD  | Helio 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 |   |   |
| <b>Region 1616</b> |          |           |                               |                   |               |               |              |       |   |   |         |   |   |   |   |   |   |
| 14 Nov             | N21E61   | 164       | 70                            | 4                 | Dro           | 2             | B            |       |   |   |         |   |   |   |   |   |   |
| 15 Nov             | N21E50   | 163       | 100                           | 9                 | Dso           | 4             | B            |       |   |   |         |   |   |   |   |   |   |
| 16 Nov             | N19E37   | 163       | 110                           | 9                 | Dso           | 13            | B            |       |   |   |         |   |   |   |   |   |   |
| 17 Nov             | N19E23   | 164       | 60                            | 10                | Cso           | 12            | B            |       |   |   |         |   |   |   |   |   |   |
| 18 Nov             | N19E11   | 163       | 30                            | 10                | Cro           | 10            | B            |       |   |   |         |   |   |   |   |   |   |
| 19 Nov             | N19W03   | 163       | 100                           | 9                 | Cao           | 9             | B            |       |   |   |         |   |   |   |   |   |   |
| 20 Nov             | N19W14   | 160       | 10                            | 3                 | Bxo           | 3             | B            |       |   |   |         |   |   |   |   |   |   |
| 21 Nov             | N19W28   | 160       | plage                         |                   |               |               |              |       |   |   |         |   |   |   |   |   |   |
| 22 Nov             | N19W42   | 160       | 30                            | 10                | Dro           | 4             | B            |       |   |   |         |   |   |   |   |   |   |
| 23 Nov             | N19W55   | 163       | 30                            | 10                | Dao           | 4             | B            |       |   |   |         |   |   |   |   |   |   |
| 24 Nov             | N19W69   | 164       | 20                            | 8                 | Dao           | 5             | B            |       |   |   |         |   |   |   |   |   |   |
| 25 Nov             | N19W83   | 164       | plage                         |                   |               |               |              |       |   |   |         |   |   |   |   |   |   |
|                    |          |           |                               |                   |               |               |              | 0     | 0 | 0 | 0       | 0 | 0 | 0 | 0 | 0 | 0 |

Crossed West Limb.  
Absolute heliographic longitude: 163

|                    |        |     |     |    |     |    |     |    |   |   |    |   |   |   |   |   |   |
|--------------------|--------|-----|-----|----|-----|----|-----|----|---|---|----|---|---|---|---|---|---|
| <b>Region 1618</b> |        |     |     |    |     |    |     |    |   |   |    |   |   |   |   |   |   |
| 17 Nov             | N09E50 | 136 | 20  | 13 | Eai | 1  | B   | 1  |   |   |    |   |   |   |   |   |   |
| 18 Nov             | N08E37 | 136 | 90  | 12 | Eai | 8  | B   | 2  |   |   |    |   |   |   |   |   |   |
| 19 Nov             | N09E28 | 131 | 160 | 14 | Fac | 18 | BG  | 1  |   |   |    | 2 |   |   |   |   |   |
| 20 Nov             | N08E14 | 132 | 270 | 13 | Ekc | 29 | BG  | 5  | 1 |   | 10 |   |   |   |   |   |   |
| 21 Nov             | N09E01 | 132 | 300 | 13 | Ekc | 27 | BGD | 4  | 2 |   | 5  | 1 |   |   |   |   |   |
| 22 Nov             | N08W13 | 133 | 350 | 13 | Ekc | 30 | BGD |    |   |   | 2  |   |   |   |   |   |   |
| 23 Nov             | N08W27 | 135 | 450 | 12 | Ekc | 37 | BGD | 8  |   |   |    |   |   |   |   |   |   |
| 24 Nov             | N08W41 | 134 | 340 | 13 | Ekc | 22 | BGD | 1  |   |   |    | 1 |   |   |   |   |   |
| 25 Nov             | N08W55 | 136 | 270 | 12 | Ekc | 21 | BGD |    |   |   | 2  |   |   |   |   |   |   |
| 26 Nov             | N08W69 | 137 | 270 | 11 | Eki | 15 | BGD | 1  |   |   | 1  |   |   |   |   |   |   |
| 27 Nov             | N09W81 | 136 | 170 | 12 | Eao | 10 | BGD | 1  | 1 |   | 1  |   |   |   |   |   |   |
|                    |        |     |     |    |     |    |     | 25 | 4 | 0 | 23 | 2 | 0 | 0 | 0 | 0 | 0 |

Crossed West Limb.  
Absolute heliographic longitude: 132



**Region Summary - continued**

| Date               | Location |     | Sunspot Characteristics |                       |         |       |       | Flares |       |   |   |         |   |   |   |   |
|--------------------|----------|-----|-------------------------|-----------------------|---------|-------|-------|--------|-------|---|---|---------|---|---|---|---|
|                    | Lat      | CMD | Helio                   | Area                  | Extent  | Spot  | Spot  | Mag    | X-ray |   |   | Optical |   |   |   |   |
|                    |          |     | Lon                     | 10 <sup>6</sup> hemi. | (helio) | Class | Count | Class  | C     | M | X | S       | 1 | 2 | 3 | 4 |
| <b>Region 1620</b> |          |     |                         |                       |         |       |       |        |       |   |   |         |   |   |   |   |
| 20 Nov             | S08E59   |     | 87                      | 40                    | 6       | Cso   | 1     | B      |       |   |   |         |   |   |   |   |
| 21 Nov             | S08E44   |     | 89                      | 20                    | 2       | Hsx   | 1     | A      |       |   |   |         |   |   |   |   |
| 22 Nov             | S12E30   |     | 90                      | 60                    | 5       | Hsx   | 1     | A      |       |   |   |         |   |   |   |   |
| 23 Nov             | S13E16   |     | 92                      | 90                    | 8       | Hax   | 2     | A      |       |   |   |         |   |   |   |   |
| 24 Nov             | S12W00   |     | 94                      | 20                    | 9       | Cso   | 5     | B      |       |   |   |         |   |   |   |   |
| 25 Nov             | S13W14   |     | 95                      | 50                    | 10      | Dai   | 12    | BG     | 1     |   |   | 3       | 1 |   |   |   |
| 26 Nov             | S13W28   |     | 96                      | 240                   | 11      | Esi   | 23    | BG     | 10    |   |   | 11      |   |   |   |   |
| 27 Nov             | S12W43   |     | 97                      | 260                   | 11      | Ekc   | 22    | BGD    | 9     | 1 |   | 5       |   |   |   |   |
| 28 Nov             | S12W57   |     | 97                      | 420                   | 12      | Ekc   | 20    | BGD    | 5     | 1 |   | 2       | 1 |   |   |   |
| 29 Nov             | S13W69   |     | 98                      | 350                   | 14      | Ekc   | 16    | BGD    | 2     |   |   | 2       |   |   |   |   |
| 30 Nov             | S13W81   |     | 96                      | 180                   | 15      | Eai   | 8     | BG     | 2     |   |   | 3       |   |   |   |   |
|                    |          |     |                         |                       |         |       |       |        | 29    | 2 | 0 | 26      | 2 | 0 | 0 | 0 |

Crossed West Limb.  
 Absolute heliographic longitude: 94

|                    |        |  |    |     |   |     |   |   |   |   |   |   |   |   |   |   |
|--------------------|--------|--|----|-----|---|-----|---|---|---|---|---|---|---|---|---|---|
| <b>Region 1621</b> |        |  |    |     |   |     |   |   |   |   |   |   |   |   |   |   |
| 24 Nov             | N15E76 |  | 18 | 60  | 2 | Hax | 1 | A |   |   |   |   |   |   |   |   |
| 25 Nov             | N15E62 |  | 19 | 100 | 3 | Hsx | 1 | A |   |   |   |   |   |   |   |   |
| 26 Nov             | N15E48 |  | 20 | 110 | 4 | Hsx | 1 | A |   |   |   |   |   |   |   |   |
| 27 Nov             | N16E37 |  | 17 | 130 | 3 | Cao | 2 | B |   |   |   |   |   |   |   |   |
| 28 Nov             | N15E25 |  | 16 | 100 | 3 | Cso | 1 | B |   |   |   |   |   |   |   |   |
| 29 Nov             | N15E10 |  | 17 | 130 | 2 | Hsx | 1 | A |   |   |   |   |   |   |   |   |
| 30 Nov             | N15W02 |  | 17 | 120 | 3 | Cso | 2 | B |   |   |   |   |   |   |   |   |
| 01 Dec             | N15W16 |  | 18 | 100 | 3 | Cso | 3 | B |   |   |   |   |   |   |   |   |
| 02 Dec             | N15W30 |  | 18 | 80  | 2 | Cso | 3 | B |   |   |   |   |   |   |   |   |
|                    |        |  |    |     |   |     |   |   | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

Still on Disk.  
 Absolute heliographic longitude: 17



### *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 1622</b> |          |     |                                |      |                   |               |               |              |       |   |   |         |   |   |   |   |   |   |   |   |   |  |  |
| 26 Nov             | S24E16   | 52  | 10                             | 4    | Bxo               | 2             | B             |              |       |   |   |         |   |   |   |   |   |   |   |   |   |  |  |
| 27 Nov             | S24E02   | 53  | plage                          |      |                   |               |               |              |       |   |   |         |   |   |   |   |   |   |   |   |   |  |  |
| 28 Nov             | S24W12   | 54  | plage                          |      |                   |               |               |              |       |   |   |         |   |   |   |   |   |   |   |   |   |  |  |
| 29 Nov             | S24W26   | 55  | plage                          |      |                   |               |               |              |       |   |   |         |   |   |   |   |   |   |   |   |   |  |  |
| 30 Nov             | S24W40   | 55  | plage                          |      |                   |               |               |              |       |   |   |         |   |   |   |   |   |   |   |   |   |  |  |
| 01 Dec             | S24W54   | 56  | plage                          |      |                   |               |               |              |       |   |   |         |   |   |   |   |   |   |   |   |   |  |  |
| 02 Dec             | S24W68   | 57  | plage                          |      |                   |               |               |              |       |   |   |         |   |   |   |   |   |   |   |   |   |  |  |
|                    |          |     |                                |      |                   |               |               |              |       |   |   | 0       | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |  |  |

Still on Disk.

Absolute heliographic longitude: 53

|                    |        |     |     |    |     |    |    |   |  |  |  |   |   |   |   |   |   |   |   |   |   |  |  |
|--------------------|--------|-----|-----|----|-----|----|----|---|--|--|--|---|---|---|---|---|---|---|---|---|---|--|--|
| <b>Region 1623</b> |        |     |     |    |     |    |    |   |  |  |  |   |   |   |   |   |   |   |   |   |   |  |  |
| 27 Nov             | N11E74 | 341 | 170 | 2  | Dso | 2  | B  | 2 |  |  |  |   |   |   |   |   |   |   |   |   |   |  |  |
| 28 Nov             | N09E60 | 340 | 450 | 11 | Eko | 3  | B  | 1 |  |  |  | 1 |   |   |   |   |   |   |   |   |   |  |  |
| 29 Nov             | N09E48 | 340 | 350 | 11 | Eko | 11 | BG | 5 |  |  |  | 7 |   |   |   |   |   |   |   |   |   |  |  |
| 30 Nov             | N08E35 | 339 | 210 | 8  | Dao | 9  | BG |   |  |  |  |   |   |   |   |   |   |   |   |   |   |  |  |
| 01 Dec             | N08E21 | 340 | 230 | 7  | Dao | 7  | BG |   |  |  |  |   |   |   |   |   |   |   |   |   |   |  |  |
| 02 Dec             | N08E08 | 340 | 130 | 7  | Dao | 4  | B  |   |  |  |  |   |   |   |   |   |   |   |   |   |   |  |  |
|                    |        |     |     |    |     |    |    |   |  |  |  | 8 | 0 | 0 | 8 | 0 | 0 | 0 | 0 | 0 | 0 |  |  |

Still on Disk.

Absolute heliographic longitude: 340

|                    |        |    |       |   |     |   |   |  |  |  |  |   |   |   |   |   |   |   |   |   |   |  |  |
|--------------------|--------|----|-------|---|-----|---|---|--|--|--|--|---|---|---|---|---|---|---|---|---|---|--|--|
| <b>Region 1624</b> |        |    |       |   |     |   |   |  |  |  |  |   |   |   |   |   |   |   |   |   |   |  |  |
| 28 Nov             | N20E08 | 33 | 10    | 2 | Bxo | 2 | B |  |  |  |  |   |   |   |   |   |   |   |   |   |   |  |  |
| 29 Nov             | N19W04 | 32 | 10    | 1 | Axx | 1 | A |  |  |  |  |   |   |   |   |   |   |   |   |   |   |  |  |
| 30 Nov             | N19W18 | 33 | plage |   |     |   |   |  |  |  |  |   |   |   |   |   |   |   |   |   |   |  |  |
| 01 Dec             | N19W32 | 34 | plage |   |     |   |   |  |  |  |  |   |   |   |   |   |   |   |   |   |   |  |  |
| 02 Dec             | N19W46 | 35 | plage |   |     |   |   |  |  |  |  |   |   |   |   |   |   |   |   |   |   |  |  |
|                    |        |    |       |   |     |   |   |  |  |  |  | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |  |  |

Still on Disk.

Absolute heliographic longitude: 32



**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 1625</b> |          |     |                                 |      |                   |               |               |              |       |   |   |         |   |   |   |   |   |  |  |  |
| 29 Nov             | N15E51   |     | 338                             | 230  | 8                 | Dso           | 10            | BG           | 6     |   |   |         | 4 |   |   |   |   |  |  |  |
| 30 Nov             | N14E36   |     | 339                             | 150  | 8                 | Dao           | 8             | BG           | 1     |   |   |         | 4 |   |   |   |   |  |  |  |
| 01 Dec             | N14E21   |     | 340                             | 110  | 7                 | Dao           | 9             | BG           | 1     |   |   |         | 1 |   |   |   |   |  |  |  |
| 02 Dec             | N14E08   |     | 340                             | 60   | 9                 | Dao           | 6             | B            |       |   |   |         |   |   |   |   |   |  |  |  |
|                    |          |     |                                 |      |                   |               |               |              | 8     | 0 | 0 | 9       | 0 | 0 | 0 | 0 | 0 |  |  |  |

Still on Disk.

Absolute heliographic longitude: 340

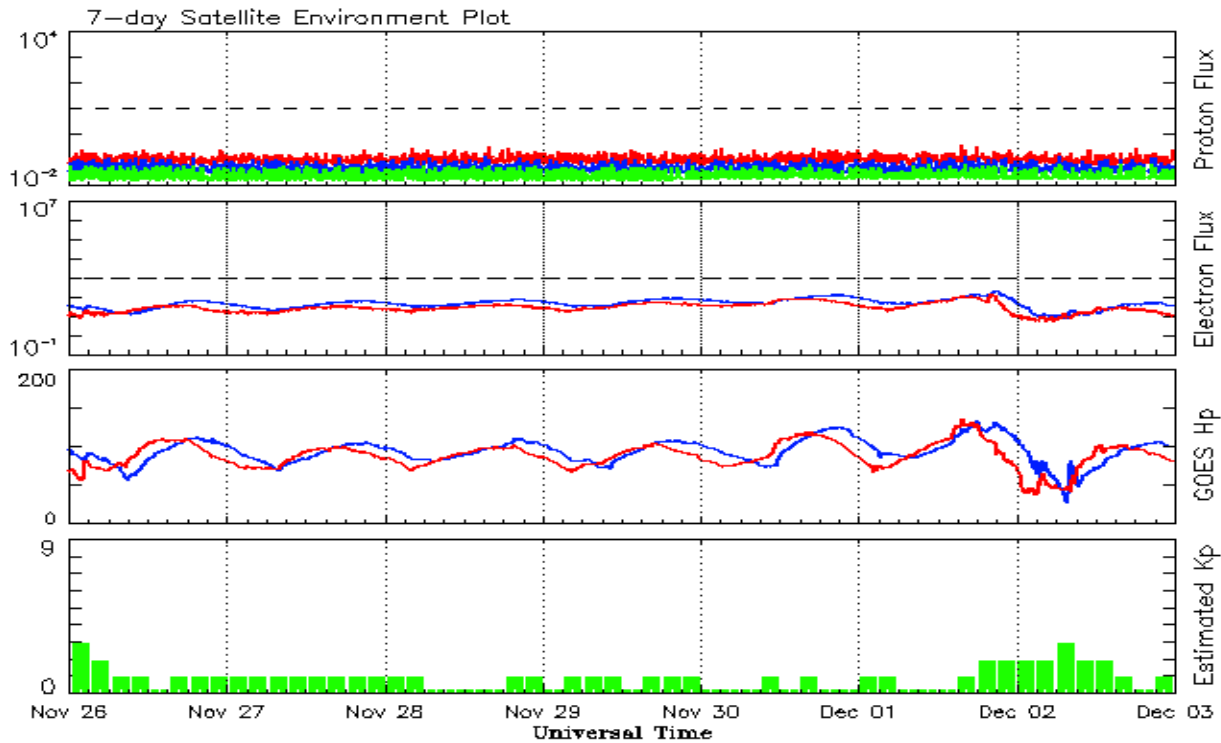


**Recent Solar Indices (preliminary)**  
**Observed monthly mean values**

| 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>2010</b> |                 |      |        |               |      |            |        |             |        |
| December    | 22.0            | 14.4 | 0.66   | 43.8          | 28.8 | 84.3       | 89.6   | 4           | 6.5    |
| <b>2011</b> |                 |      |        |               |      |            |        |             |        |
| January     | 32.1            | 18.8 | 0.59   | 47.2          | 30.9 | 83.7       | 91.2   | 6           | 6.7    |
| February    | 53.2            | 29.6 | 0.55   | 50.6          | 33.4 | 94.5       | 92.7   | 6           | 6.8    |
| March       | 81.0            | 55.8 | 0.69   | 55.2          | 36.9 | 115.3      | 95.8   | 7           | 7.2    |
| April       | 81.7            | 54.4 | 0.67   | 61.5          | 41.8 | 112.6      | 100.4  | 9           | 7.5    |
| May         | 61.4            | 41.6 | 0.68   | 69.0          | 47.6 | 95.9       | 105.6  | 9           | 7.5    |
| June        | 55.5            | 37.0 | 0.67   | 76.5          | 53.2 | 95.8       | 110.9  | 8           | 7.4    |
| July        | 67.0            | 43.8 | 0.66   | 82.5          | 57.3 | 94.2       | 115.4  | 9           | 7.3    |
| August      | 66.1            | 50.6 | 0.77   | 84.9          | 59.0 | 101.7      | 117.9  | 8           | 7.4    |
| September   | 106.4           | 78.0 | 0.73   | 84.6          | 59.5 | 134.5      | 118.4  | 13          | 7.7    |
| October     | 116.8           | 88.0 | 0.75   | 84.6          | 59.9 | 137.2      | 118.4  | 7           | 8.0    |
| November    | 133.1           | 96.7 | 0.73   | 86.3          | 61.1 | 153.1      | 119.5  | 3           | 8.0    |
| December    | 106.3           | 73.0 | 0.69   | 89.2          | 63.4 | 141.2      | 121.6  | 3           | 8.0    |
| <b>2012</b> |                 |      |        |               |      |            |        |             |        |
| January     | 91.3            | 58.3 | 0.64   | 92.0          | 65.5 | 133.1      | 124.4  | 6           | 8.3    |
| February    | 50.1            | 32.9 | 0.66   | 94.2          | 66.9 | 106.7      | 126.7  | 7           | 8.4    |
| March       | 77.9            | 64.3 | 0.82   | 94.1          | 66.8 | 115.1      | 126.8  | 14          | 8.1    |
| April       | 84.4            | 55.2 | 0.65   | 91.3          | 64.6 | 113.1      | 125.8  | 9           | 8.0    |
| May         | 99.5            | 69.0 | 0.69   | 87.7          | 61.7 | 121.5      | 123.8  | 8           | 8.2    |
| June        | 88.6            | 64.5 | 0.73   |               |      | 120.5      |        | 10          |        |
| July        | 99.6            | 66.5 | 0.67   |               |      | 135.6      |        | 13          |        |
| August      | 85.8            | 63.1 | 0.74   |               |      | 115.7      |        | 7           |        |
| September   | 84.0            | 61.5 | 0.73   |               |      | 123.2      |        | 8           |        |
| October     | 73.5            | 53.3 | 0.73   |               |      | 123.3      |        | 9           |        |
| November    | 89.2            | 61.4 | 0.69   |               |      | 120.9      |        | 6           |        |

**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 26 November 2012*

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.

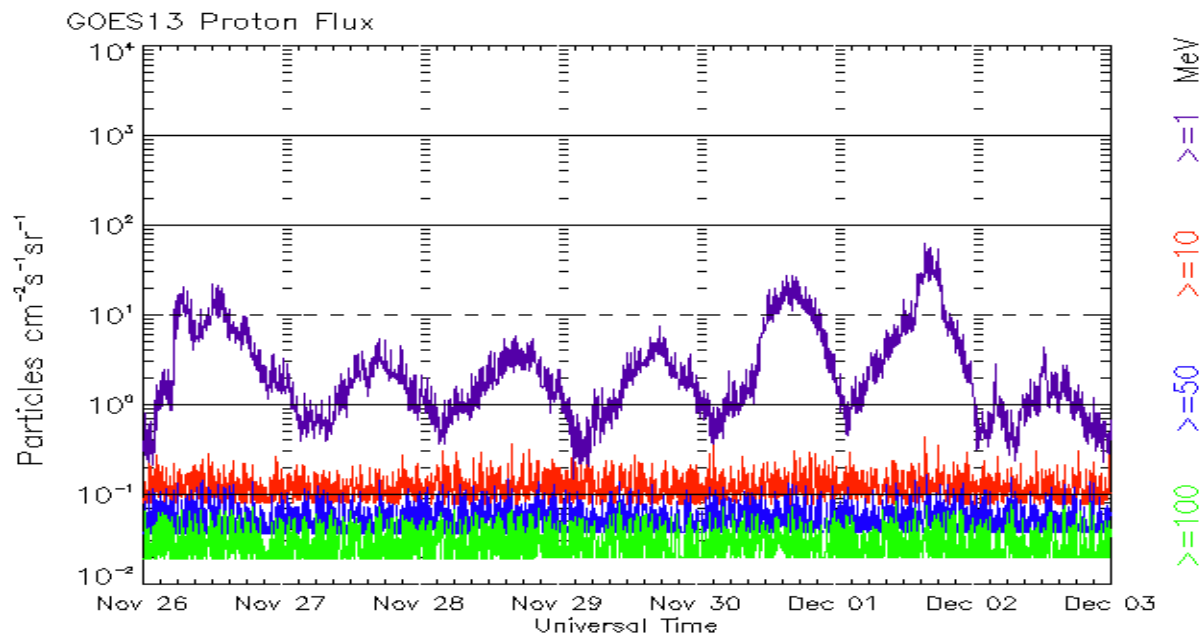
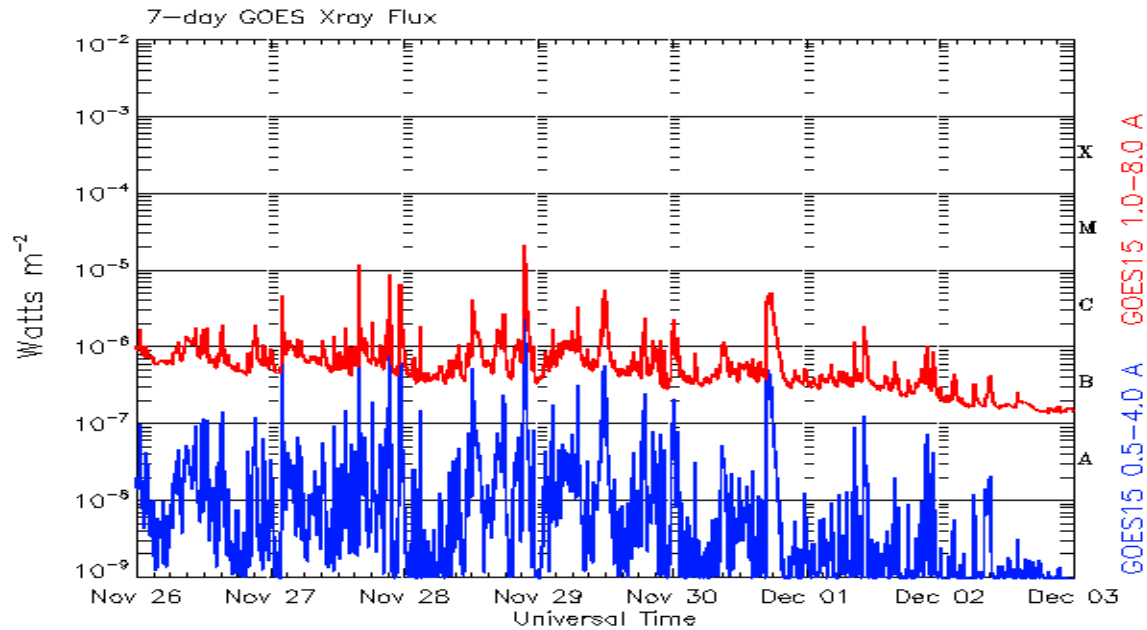
The electron flux plot contains the five-minute averaged integral electron flux (electrons/cm<sup>2</sup>-sec -sr) with energies greater than 2 MeV by the SWPC Primary GOES satellite.

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 26 November 2012*

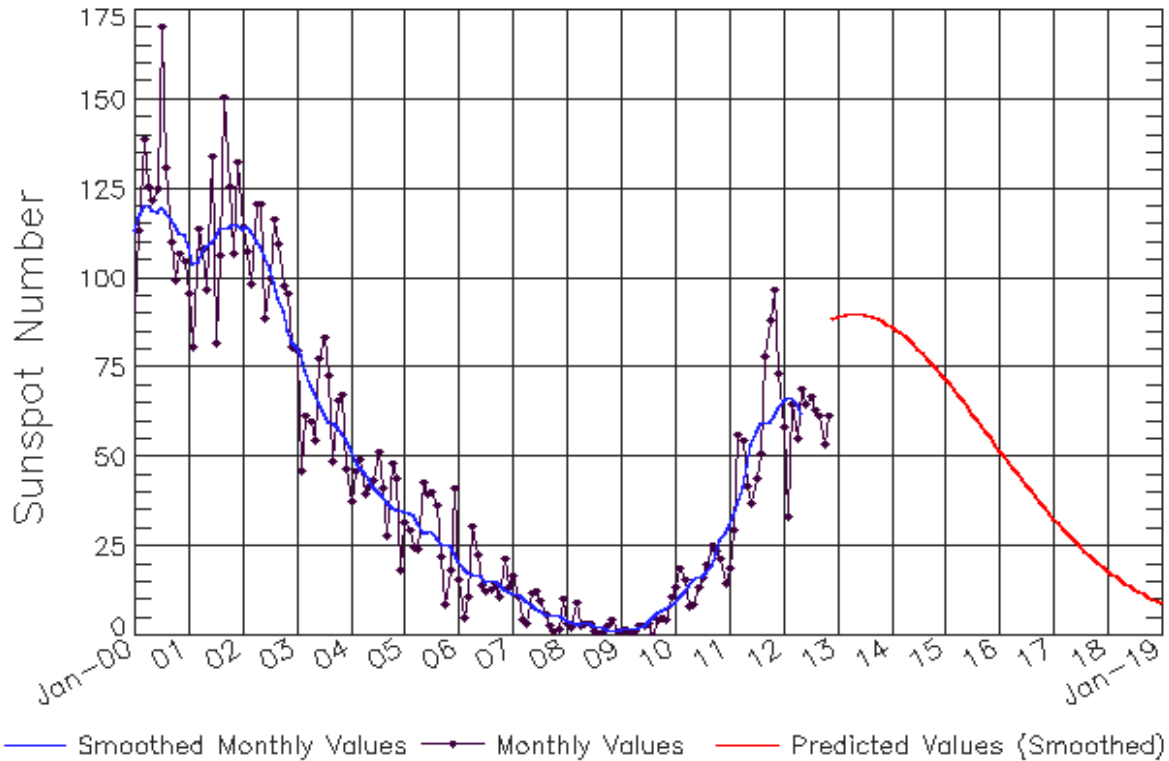
The x-ray plots contains five-minute averages x-ray flux (Watt/ $m^2$ ) as measure by the SWPC primary GOES X-ray satellite, usually at West 105 longitude, in two wavelength bands, 0.05 - 0.4 and 0.1 - 0.8 nm. The letters A, B, C, M and X refer to x-ray event levels for the 0.1 - 0.8 nm band.

The proton plot contains the five-minute averaged intergral flux units (pfu = protons/ $cm^2$  -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.



# ISES Solar Cycle Sunspot Number Progression

Observed data through Nov 2012



Updated 2012 Dec 3

NOAA/SWPC Boulder, CO USA

## *Smoothed Sunspot Number Prediction*

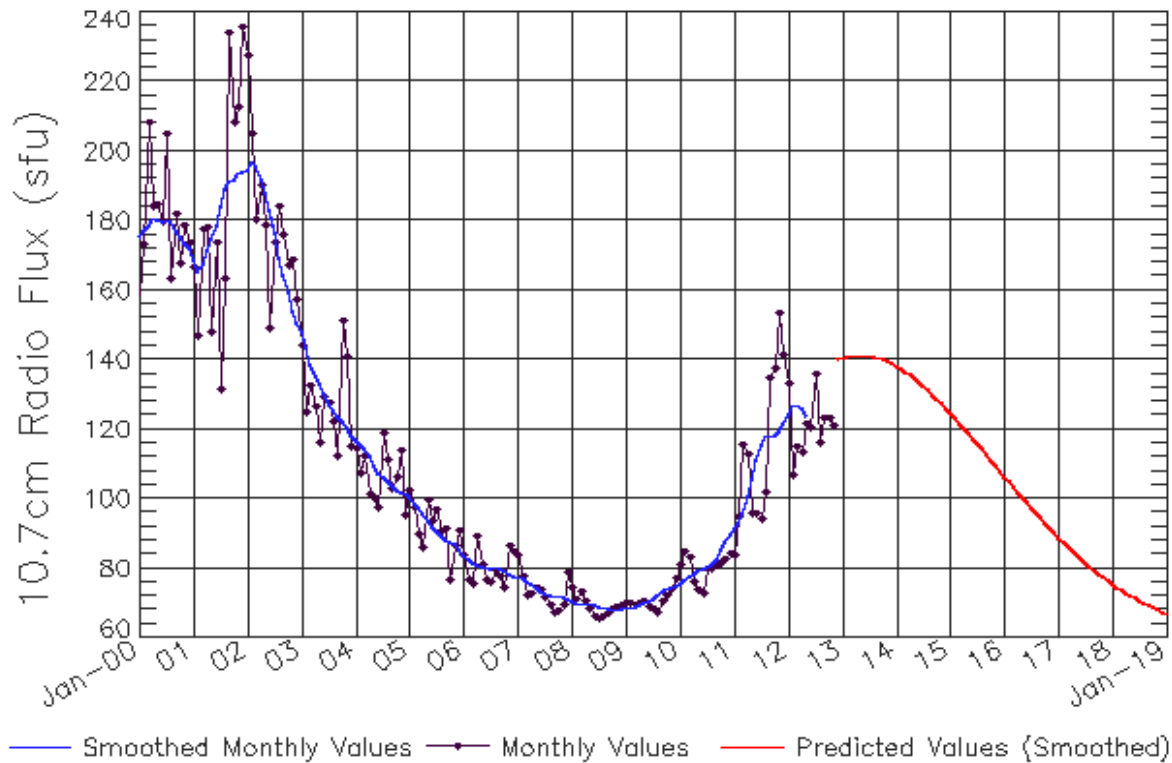
| Year | Jan         | Feb         | Mar         | Apr         | May         | Jun         | Jul         | Aug         | Sep         | Oct         | Nov         | Dec         |
|------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
| 2010 | 9<br>(***)  | 11<br>(***) | 12<br>(***) | 14<br>(***) | 16<br>(***) | 16<br>(***) | 17<br>(***) | 17<br>(***) | 20<br>(***) | 23<br>(***) | 27<br>(***) | 29<br>(***) |
| 2011 | 31<br>(***) | 33<br>(***) | 37<br>(***) | 42<br>(***) | 48<br>(***) | 53<br>(***) | 57<br>(***) | 59<br>(***) | 60<br>(***) | 60<br>(***) | 61<br>(***) | 63<br>(***) |
| 2012 | 66<br>(***) | 67<br>(***) | 67<br>(***) | 65<br>(***) | 62<br>(***) | 61<br>(1)   | 63<br>(2)   | 67<br>(3)   | 70<br>(5)   | 72<br>(5)   | 75<br>(6)   | 77<br>(7)   |
| 2013 | 79<br>(7)   | 81<br>(8)   | 83<br>(9)   | 86<br>(9)   | 88<br>(10)  | 90<br>(10)  | 90<br>(10)  | 89<br>(10)  | 89<br>(10)  | 89<br>(10)  | 88<br>(10)  | 87<br>(10)  |
| 2014 | 86<br>(10)  | 86<br>(10)  | 85<br>(10)  | 84<br>(10)  | 83<br>(10)  | 81<br>(10)  | 80<br>(10)  | 79<br>(10)  | 78<br>(10)  | 76<br>(10)  | 75<br>(10)  | 73<br>(10)  |
| 2015 | 72<br>(10)  | 70<br>(10)  | 69<br>(10)  | 67<br>(10)  | 65<br>(10)  | 64<br>(10)  | 62<br>(10)  | 60<br>(10)  | 59<br>(10)  | 57<br>(10)  | 55<br>(10)  | 54<br>(10)  |
| 2016 | 52<br>(10)  | 50<br>(10)  | 49<br>(10)  | 47<br>(10)  | 45<br>(10)  | 44<br>(10)  | 42<br>(10)  | 40<br>(10)  | 39<br>(10)  | 37<br>(10)  | 36<br>(10)  | 34<br>(10)  |
| 2017 | 33<br>(10)  | 31<br>(10)  | 30<br>(10)  | 29<br>(10)  | 27<br>(10)  | 26<br>(10)  | 25<br>(10)  | 24<br>(10)  | 23<br>(10)  | 21<br>(10)  | 20<br>(10)  | 19<br>(10)  |
| 2018 | 18<br>(10)  | 17<br>(10)  | 16<br>(10)  | 15<br>(10)  | 15<br>(10)  | 14<br>(10)  | 13<br>(10)  | 12<br>(10)  | 12<br>(10)  | 11<br>(10)  | 10<br>(10)  | 10<br>(10)  |
| 2019 | 9<br>(10)   | 8<br>(10)   | 8<br>(10)   | 7<br>(10)   | 7<br>(10)   | 6<br>(10)   | 6<br>(10)   | 6<br>(10)   | 5<br>(10)   | 5<br>(10)   | 4<br>(10)   | 4<br>(10)   |





# ISES Solar Cycle F10.7cm Radio Flux Progression

Observed data through Nov 2012



Updated 2012 Dec 3

NOAA/SWPC Boulder, CO USA

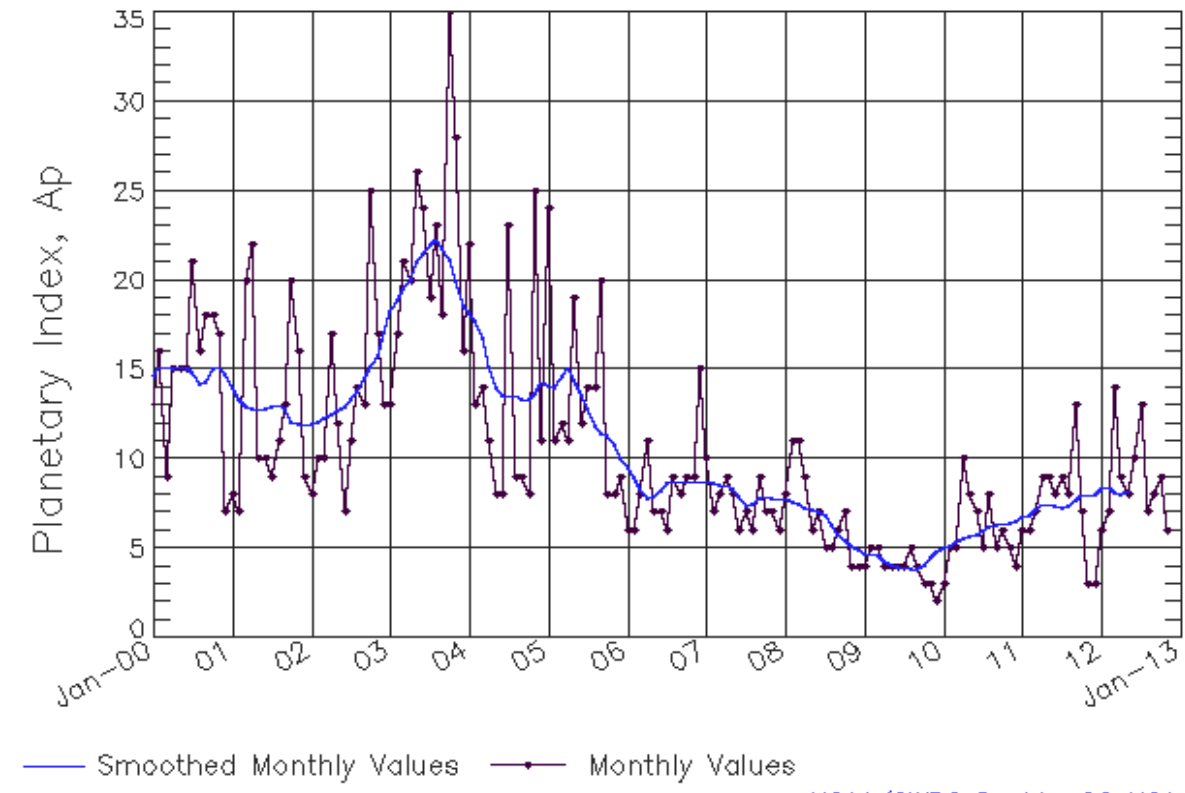
## *Smoothed F10.7cm Radio Flux Prediction*

| Year | Jan          | Feb          | Mar          | Apr          | May          | Jun          | Jul          | Aug          | Sep          | Oct          | Nov          | Dec          |
|------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|
| 2010 | 76<br>(***)  | 77<br>(***)  | 78<br>(***)  | 78<br>(***)  | 79<br>(***)  | 80<br>(***)  | 80<br>(***)  | 81<br>(***)  | 82<br>(***)  | 85<br>(***)  | 88<br>(***)  | 90<br>(***)  |
| 2011 | 91<br>(***)  | 93<br>(***)  | 96<br>(***)  | 100<br>(***) | 106<br>(***) | 111<br>(***) | 115<br>(***) | 118<br>(***) | 118<br>(***) | 118<br>(***) | 120<br>(***) | 122<br>(***) |
| 2012 | 124<br>(***) | 127<br>(***) | 127<br>(***) | 126<br>(***) | 124<br>(***) | 123<br>(1)   | 123<br>(1)   | 125<br>(2)   | 127<br>(3)   | 129<br>(4)   | 131<br>(4)   | 133<br>(5)   |
| 2013 | 134<br>(6)   | 135<br>(7)   | 137<br>(8)   | 138<br>(8)   | 140<br>(9)   | 141<br>(9)   | 141<br>(9)   | 141<br>(9)   | 140<br>(9)   | 140<br>(9)   | 139<br>(9)   | 139<br>(9)   |
| 2014 | 138<br>(9)   | 137<br>(9)   | 136<br>(9)   | 136<br>(9)   | 135<br>(9)   | 134<br>(9)   | 132<br>(9)   | 131<br>(9)   | 130<br>(9)   | 129<br>(9)   | 127<br>(9)   | 126<br>(9)   |
| 2015 | 125<br>(9)   | 123<br>(9)   | 122<br>(9)   | 120<br>(9)   | 119<br>(9)   | 117<br>(9)   | 116<br>(9)   | 114<br>(9)   | 113<br>(9)   | 111<br>(9)   | 110<br>(9)   | 108<br>(9)   |
| 2016 | 106<br>(9)   | 105<br>(9)   | 103<br>(9)   | 102<br>(9)   | 100<br>(9)   | 99<br>(9)    | 97<br>(9)    | 96<br>(9)    | 94<br>(9)    | 93<br>(9)    | 92<br>(9)    | 90<br>(9)    |
| 2017 | 89<br>(9)    | 88<br>(9)    | 86<br>(9)    | 85<br>(9)    | 84<br>(9)    | 83<br>(9)    | 82<br>(9)    | 80<br>(9)    | 79<br>(9)    | 78<br>(9)    | 77<br>(9)    | 76<br>(9)    |
| 2018 | 75<br>(9)    | 75<br>(9)    | 74<br>(9)    | 73<br>(9)    | 72<br>(9)    | 71<br>(9)    | 71<br>(9)    | 70<br>(9)    | 69<br>(9)    | 69<br>(9)    | 68<br>(9)    | 67<br>(9)    |
| 2019 | 67<br>(9)    | 66<br>(9)    | 66<br>(9)    | 65<br>(9)    | 65<br>(9)    | 65<br>(9)    | 64<br>(9)    | 64<br>(9)    | 63<br>(9)    | 63<br>(9)    | 63<br>(9)    | 63<br>(9)    |



# ISES Solar Cycle Ap Progression

Observed data through Nov 2012



Updated 2012 Dec 3

NOAA/SWPC Boulder, CO USA

*Solar Cycle Comparison charts are temporarily unavailable.*



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

Published every Monday by the Space Weather Prediction Center.

U.S. Department of Commerce  
NOAA / National Weather Service  
Space Weather Prediction Center  
325 Broadway, Boulder CO 80305

**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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