**Space Weather Highlights** **SWO PRF 1298**
**10 - 16 July 2000** **18 July 2000**

Solar activity was high for most of the period. Region 9077 (N18, L = 310, class/area Fkc/1010 on 11 July), a large group with a magnetically complex (beta-gamma-delta) structure, produced four major flares during the period. The first of these was a M5/2B long-duration flare at 10/2142UT with associated Type II and IV radio sweeps that occurred as the region grew at a rapid rate. Region 9077 produced an X1/2N flare at 11/1310UT as the region continued rapid development. This flare was associated with a 1600 SFU Tenflare and a full-halo coronal mass ejection (CME). Region 9077 also produced an M4 x-ray flare at 11/1141UT. Region 9070 (N19, L = 029, class/area Fko/680 on 12 July), a large magnetically complex group showed growth as it produced an M1/1N flare at 11/1858UT. Region 9077 produced an X1/2B flare at 12/1037UT accompanied by a 390 SFU Tenflare and a Type IV radio sweep. Region 9070 added to the major flare count with an M5/2F at 12/1849UT with an associated 230 SFU Tenflare. It also produced a subflare at 12/2013UT with an associated Type II radio sweep. Solar activity remained high on 13 July due to five low-level M-class flares from a number of regions including 9070, 9077, and 9085 (N14, L = 254, class/area Eki/270 on 16 July). Region 9077 produced the fourth and largest of its major flares with an X5/3B at 14/1024UT with an associated 2600 SFU Tenflare, Type II and IV radio sweeps (Type IV duration about 6.5 hours), and a fast-moving halo-CME. This flare also produced a huge solar proton event (see the description below). Activity decreased to moderate levels on 15 July as Region 9077 began to slowly decay although it remained large and retained its beta-gamma-delta magnetic structure. Activity returned to high levels on 16 July with an M5/1N flare at 16/0203UT from Region 9090 (N16, L = 204, class/area Dso/090 on 16 July), as well as an M1/1N flare at 16/2157UT. As the period ended, Region 9077 continued to gradually decay, but remained large and complex.

Real-time solar wind velocity and density data were not available from the NASA Advanced Composition Explorer (ACE) spacecraft during 14/1100 - 16/0000UT due to the solar proton events described below. However, velocity and density readings were available from the SOHO/MTOF sensor. Three interplanetary shocks passed the ACE spacecraft during the period associated with CMEs that followed flares from Region 9077. The third and strongest of these shocks occurred at approximately 15/1400UT and was accompanied by wildly varying IMF Bz readings (plus 40 to minus 54 nT (GSM)), velocities as high as 950 km/sec, and densities as high as 50 p/cc. Solar wind parameters were gradually returning to more nominal values as the period ended.

Proton events at greater than 100 MeV and greater than 10 MeV occurred at geosynchronous orbit following the X5/3B of 14 July. The greater than 100 MeV event began at 14/1040UT, reached a peak of 410 PFU at 14/1610UT, and ended at 16/0400UT. This was the largest greater than 100 MeV proton event seen since 1989. The greater than 10 MeV event began at 14/1050UT and reached a maximum of 24000 PFU at 15/1230UT. This event, the largest observed since 1991, was in progress as the period ended. A polar-cap absorption (PCA) event was associated with the proton event. It began at 14/1041UT. Eventually reached a peak of 49 dB (estimated), then ended at 17/1943UT. A ground-level event (GLE) also followed the X5 flare and peaked at 36% above background at 14/1043UT. This was only the second GLE observed this cycle – the first occurred in November 1997.

The greater than 2 MeV electron flux at geosynchronous orbit was at normal levels through 13 July. Flux readings were not available during the remainder of the period due to sensor contamination resulting from the high energy proton event mentioned above.

Geomagnetic field activity was at quiet to unsettled levels until a weak shock passed the ACE spacecraft around 10/1600UT, then activity increased to unsettled to active levels. Activity increased to unsettled to minor storm levels on 11 July following a second shock passage at the ACE spacecraft at 11/1125UT. Activity decreased to quiet to unsettled levels after 13/0300UT. Quiet to unsettled conditions prevailed until 13/0900UT. A sudden storm commencement (SSC) occurred at 13/0945UT (30 nT, as measured by the Boulder USGS magnetometer) following a strong shock passage at the ACE spacecraft at 13/0900UT. The SSC was followed by unsettled to major storm levels with isolated severe storm levels at high latitudes. Multiple, short-duration magnetopause crossings were detected during 14/1740 - 1810UT and 14/1915 - 2000UT. Activity increased to unsettled to severe storm levels during 15 - 16 July with severe storm levels detected globally during 15/1200 - 16/0600UT. Field activity decreased to active to quiet levels after 16/0600UT. This storm was the largest recorded since 1989 (preliminary Ap = 152 on 15 July). A Forbush decrease (peak decrease of 8.2%) was observed during the storm.

**Space Weather Outlook**
**19 July -14 August 2000**

Solar activity is expected to be at moderate to high levels through 26 July with isolated major flare activity possible from Regions 9077 and 9087 (S13, L = 230, class/area Dao/210 on 16 July). Activity is expected to be at low to moderate levels during the rest of the period.

There will be a chance for a greater than 10 MeV solar proton event at geosynchronous orbit through 26 July.

The greater than 2 MeV electron flux at geosynchronous orbit is expected to be at normal to moderate levels through most of the period.

Geomagnetic field activity is expected to be at quiet to unsettled levels, barring an Earth-directed CME.

## *Daily Solar Data*

| Date | Radio Flux 10.7 cm | Sun spot No. | Sunspot Area ($10^{-6}$ hemi.) | X-ray Background | Flares: X-ray Flux C | M | X | Flares: Optical S | 1 | 2 | 3 | 4 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 10 July | 215 | 232 | 2420 | C1.7 | 3 | 5 | 0 | 33 | 2 | 1 | 0 | 0 |
| 11 July | 225 | 281 | 2720 | C5.5 | 6 | 2 | 1 | 39 | 1 | 1 | 0 | 0 |
| 12 July | 230 | 241 | 2950 | C2.4 | 2 | 4 | 1 | 24 | 1 | 2 | 0 | 0 |
| 13 July | 232 | 240 | 2550 | C3.6 | 9 | 5 | 0 | 49 | 4 | 0 | 0 | 0 |
| 14 July | 204 | 243 | 1560 | C2.9 | 4 | 2 | 1 | 15 | 2 | 0 | 0 | 0 |
| 15 July | 213 | 229 | 1120 | C2.6 | 8 | 1 | 0 | 28 | 1 | 0 | 0 | 0 |
| 16 July | 219 | 268 | 1310 | C1.7 | 9 | 4 | 0 | 23 | 5 | 1 | 0 | 0 |

## *Daily Particle Data*

| Date | Proton Fluence (protons/cm$^2$-day-sr) >1MeV | >10MeV | >100MeV | Electron Fluence (electrons/cm$^2$-day-sr) >.6MeV | >2MeV | >4MeV |
|---|---|---|---|---|---|---|
| 10 July | 3.9E+5 | 9.9E+3 | 2.2E+3 | | 3.7E+6 | |
| 11 July | 3.8E+5 | 2.1E+4 | 2.0E+3 | | 3.7E+5 | |
| 12 July | 1.0E+6 | 3.7E+4 | 2.0E+3 | | 7.4E+5 | |
| 13 July | 4.7E+7 | 2.1E+5 | 1.9E+3 | | 1.0E+6 | |
| 14 July | 3.3E+8 | 2.3E+8 | 1.1E+7 | | | |
| 15 July | 2.6E+9 | 1.0E+9 | 4.7E+6 | | | |
| 16 July | 1.4E+8 | 2.6E+7 | 5.9E+4 | | 1.3E+6 | |

## *Daily Geomagnetic Data*

| Date | Middle Latitude Fredericksburg A | K-indices | High Latitude College A | K-indices | Estimated Planetary A | K-indices |
|---|---|---|---|---|---|---|
| 10 July | 18 | 1-3-4-3-4-4-3-3 | 20 | 2-3-4-4-3-4-4-3 | 19 | 2-3-4-3-4-4-4-3 |
| 11 July | 31 | 3-5-4-5-4-4-3-5 | 28 | 3-4-4-4-5-4-4-4 | 31 | 4-5-4-5-5-4-4-5 |
| 12 July | 12 | 4-3-1-3-1-2-3-2 | 5 | 3-2-1-2-0-1-1-1 | 12 | 4-3-2-3-2-3-2-3 |
| 13 July | 18 | 2-1-3-4-5-4-2-2 | 28 | 1-2-3-5-5-6-3-2 | 33 | 2-2-3-5-7-5-2-3 |
| 14 July | 33 | 3-3-3-3-3-6-6-4 | 49 | 4-4-3-5-4-7-6-4 | 35 | 4-3-4-4-4-6-5-4 |
| 15 July | 148 | 3-3-3-3-6-8-9-9 | * | 3-4-5-6-7-*-*-* | 152 | 4-4-5-5-6-9-9-9 |
| 16 July | 32 | 6-6-4-4-3-3-2-2 | * | *-*-*-*-*-*-*-* | 46 | 8-6-4-4-4-3-3-3 |

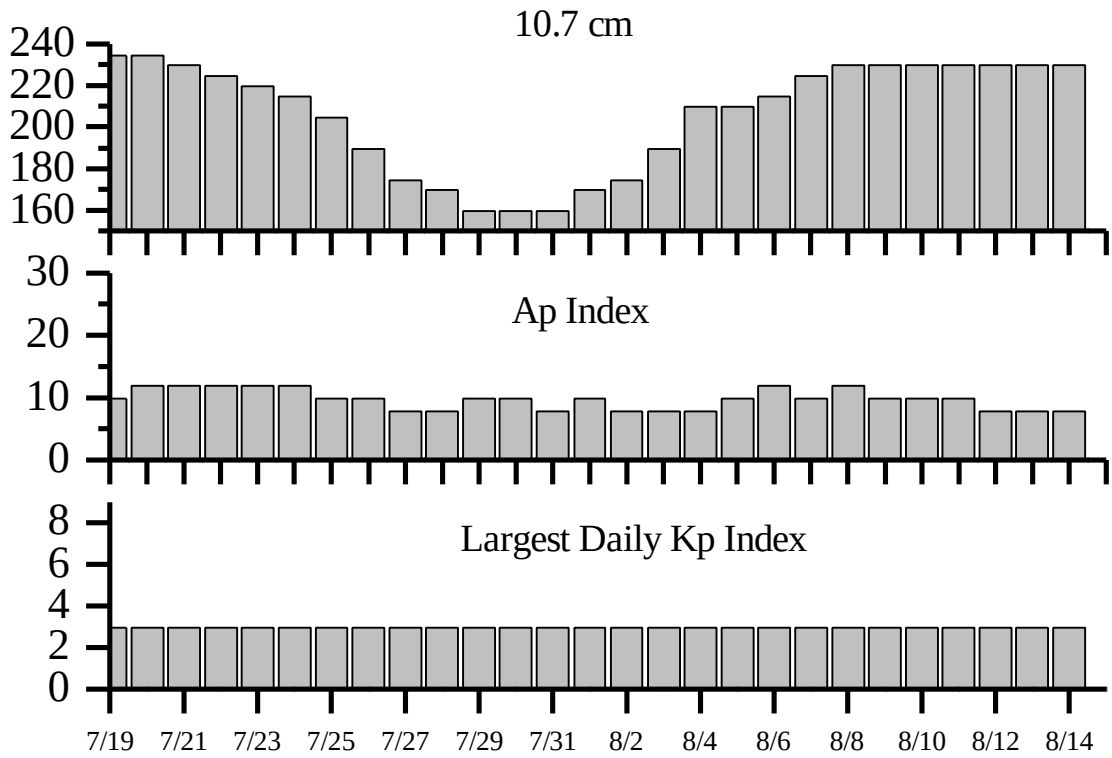
***Alerts and Warnings Issued***

| Date & Time of Issue | Type of Alert or Warning | Date & Time of Event UT |
|---|---|---|
| 10 Jul 0749 | K = 4 Warning | 10/0800 – 11/1500 Jul |
| 10 Jul 0857 | K = 4 Observed | 10 Jul 0600 – 0900 |
| 10 Jul 2201 | Type II Radio Emission | 10 Jul 2123 |
| 11 Jul 0000 | X-Ray event M5/2b | 10 Jul 2105 |
| 11 Jul 0027 | 3 - 245 MHz Bursts | 10 Jul |
| 11 Jul 0027 | 245 MHz Noise storm | 10 Jul |
| 11 Jul 0024 | Type IV Radio Emission | 10 Jul 2123 |
| 11 Jul 0448 | K = 5 Warning | 11 July 0600 - 1500 |
| 11 Jul 0600 | A ≥ 20 Observed | 11 Jul 0600 |
| 11 Jul 0600 | K = 5 Observed | 11 Jul 03 - 06 |
| 11 Jul 1426 | X-Ray event X1/2B | 11 Jul 1335 |
| 11 Jul 1440 | Proton Event >10MeV ≥10pfu Warning | 11/1438 – 12/0000 Jul |
| 11 Jul 1457 | EXTENDED K = 4 Warning | 10/0800 – 12/1500 Jul |
| 11 Jul 1534 | 10cm Radio Burst 1600 F.U. | 11 Jul 1236 |
| 11 Jul 1955 | A ≥ 20 Watch | 13 Jul |
| 11 Jul 1956 | A ≥ 50 Watch | 14 Jul |
| 11 Jul 2311 | K = 5 Warning | 12 Jul 0000 - 1200 |
| 12 Jul 0026 | 5 – 245 MHz Bursts | 11 Jul |
| 12 Jul 0026 | 245 MHz Noise Storm | 11 Jul |
| 12 Jul 0046 | A ≥ 30 Observed | 12 Jul 0000 |
| 12 Jul 0046 | K = 5 Observed | 11 Jul 21 - 24 |
| 12 Jul 0600 | ENDED A ≥ 30 Observed | 12 Jul 0000 |
| 12 Jul 1147 | X-Ray event X1.9 | 12 Jul 1018 |
| 12 Jul 1205 | 10cm Radio Burst 390 F.U. | 12 Jul 1033 |
| 12 Jul 1220 | Type IV Radio Emission | 12 Jul 1046 |
| 12 Jul 1245 | Proton Event >10MeV ≥10pfu Warning | 12 Jul 13 - 18 |
| 12 Jul 1508 | ENDED A ≥ 20 Observed | 11 Jul 0600 |
| 12 Jul 1912 | X-Ray event M5.7 | 12 Jul 1841 |
| 12 Jul 2047 | 10cm Radio Burst 490 F.U. | 12 Jul 2004 |
| 12 Jul 2117 | 10cm Radio Burst 230 F.U. | 12 Jul 1847 |
| 12 Jul 2120 | Type II Radio Emission | 12 Jul 2014 |
| 13 Jul 0040 | 4 – 245 MHz Bursts | 12 Jul |
| 13 Jul 0040 | 245 MHz Noise Storm | 12 Jul |
| 13 Jul 1131 | Sudden Impulse observed at Boulder | 13 Jul 0954 |
| 13 Jul 1134 | K = 5 Warning | 13/1200 – 14/1500 Jul |
| 13 Jul 1159 | K = 6 Observed | 13 Jul 0900 - 1200 |
| 13 Jul 1441 | K ≥ 6 Warning | 13/1438 – 15/000 Jul |
| 13 Jul 1503 | K = 6 Observed | 13 Jul 1200 - 1500 |
| 13 Jul 1510 | A ≥ 20 Observed | 13 Jul 1500 |
| 13 Jul 1805 | A ≥ 30 Observed | 13 Jul 1800 |
| 14 Jul 0008 | 14 – 245 MHz Bursts | 13 Jul |
| 14 Jul 0008 | 245 MHz Noise Storm | 13 Jul |
| 14 Jul 1046 | X-Ray event X5.7/3B | 14 Jul 1003 |

***Alerts and Warnings Issued -continued***

| Date & Time of Issue | Type of Alert or Warning | Date & Time of Event UT |
|---|---|---|
| 14 Jul 1050 | Proton Event >10MeV ≥10pfu Warning | 14 Jul 1055 - 2200 |
| 14 Jul 1051 | Proton Event >100MeV ≥1pfu Warning | 14 Jul 1055 – 1500 |
| 14 Jul 1052 | Type II Radio Emission | 14 Jul 1020 |
| 14 Jul 1059 | Proton event >100 MeV >1pfu | 14 Jul 1040 |
| 14 Jul 1106 | Protons Event >10 MeV ≥10pfu | 14 Jul 1050 |
| 14 Jul 1111 | Type IV Radio Emission | 14 Jul 1026 |
| 14 Jul 1139 | 10cm Radio Burst 3000 F.U. | 14 Jul |
| 14 Jul 1202 | ENDED A ≥ 30 Observed | 13 Jul 1800 |
| 14 Jul 1317 | CONTINUED Proton event >100 MeV >1pfu | 14 Jul 1040 |
| 14 Jul 1345 | CONTINUED Proton event >10 MeV ≥10pfu | 14 Jul 1050 |
| 14 Jul 1515 | Proton Event >100MeV ≥1pfu Warning | 14/1515 – 15/1500 Jul |
| 14 Jul 1639 | A ≥ 50 Watch | 15 Jul |
| 14 Jul 1640 | A ≥ 50 Watch | 16 Jul |
| 14 Jul 1641 | A ≥ 50 Watch | 17 Jul |
| 14 Jul 1804 | K = 6 Observed | 14 Jul 1500 - 1800 |
| 14 Jul 2358 | A ≥ 30 Warning | 15 Jul 0000 - 0600 |
| 15 Jul 0000 | EXTENDED K ≥ 6 Warning | 13/1438 – 17/0000 Jul |
| 15 Jul 0054 | CONTINUED Proton event >10 MeV ≥10pfu | 14 Jul 1050 |
| 15 Jul 0103 | CONTINUED Proton event >100 MeV >1pfu | 14 Jul 1040 |
| 15 Jul 0221 | 8 – 245 MHz Bursts | 14 Jul |
| 15 Jul 0221 | 245 MHz Noise Storm | 14 Jul |
| 15 Jul 0600 | A ≥ 30 Observed | 15 Jul 0600 |
| 15 Jul 1537 | Type II Radio Emission | 15 Jul 1433 |
| 15 Jul 1802 | A ≥ 50 Observed | 15 Jul 1800 |
| 15 Jul 1802 | K ≥ 7 Observed | 15 Jul 1500 - 1800 |
| 15 Jul 2100 | K ≥ 7 Observed | 15 Jul 1800 - 2100 |
| 16 Jul 0000 | K ≥ 7 Observed | 15 Jul 2100 - 0000 |
| 16 Jul 0046 | 6 – 245 MHz Bursts | 15 Jul |
| 16 Jul 0046 | 245 MHz Noise Storm | 15 Jul |
| 16 Jul 0109 | CONTINUED Proton event >100 MeV >1pfu | 14 Jul 1040 |
| 16 Jul 0115 | CONTINUED Proton event >10 MeV ≥10pfu | 14 Jul 1050 |
| 16 Jul 0142 | 10cm Radio Burst 290 F.U. | 16 Jul 0123 |
| 16 Jul 0225 | X-Ray event M5.5 | 16 Jul 0159 |
| 16 Jul 2101 | ENDED Proton event >100 MeV >1pfu | 14 Jul 1040 |

***Twenty-seven Day Outlook***




| Date | Radio Flux 10.7 cm | Planetary A Index | Largest Kp Index | Date | Radio Flux 10.7 cm | Planetary A Index | Largest Kp Index |
|---|---|---|---|---|---|---|---|
| 19 July | 235 | 10 | 3 | 02 Aug | 175 | 8 | 3 |
| 20 | 235 | 12 | 3 | 03 | 190 | 8 | 3 |
| 21 | 230 | 12 | 3 | 04 | 210 | 8 | 3 |
| 22 | 225 | 12 | 3 | 05 | 210 | 10 | 3 |
| 23 | 220 | 12 | 3 | 06 | 215 | 12 | 3 |
| 24 | 215 | 12 | 3 | 07 | 225 | 10 | 3 |
| 25 | 205 | 10 | 3 | 08 | 230 | 12 | 3 |
| 26 | 190 | 10 | 3 | 09 | 230 | 10 | 3 |
| 27 | 175 | 8 | 3 | 10 | 230 | 10 | 3 |
| 28 | 170 | 8 | 3 | 11 | 230 | 10 | 3 |
| 29 | 160 | 10 | 3 | 12 | 230 | 8 | 3 |
| 30 | 160 | 10 | 3 | 13 | 230 | 8 | 3 |
| 31 | 160 | 8 | 3 | 14 | 230 | 8 | 3 |
| 01 Aug | 170 | 10 | 3 | | | | |

## *Energetic Events*

| Date | Time | | | X-ray | | Optical Information | | | Peak Radio Flux | | Sweep Freq Intensity | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Begin | Max | ½ Max | Class | Integ Flux | Imp/ Brtns | Location Lat CMD | Rgn # | 245 | 2695 | II | IV |
| 10 Jul | 1026 | 1056 | 1143 | M1.1 | .057 | SF | N18E53 | 9077 | 57 | 23 | | |
| 10 Jul | 1416 | 1426 | 1437 | M1.4 | .013 | 1N | N18E52 | 9077 | | | | |
| 10 Jul | 1830 | 1838 | 1848 | M1.8 | .012 | 1N | S18W32 | 9069 | | 61 | | |
| 10 Jul | 1955 | 0025 | 2013 | M1.9 | .014 | SB | N16W43 | 9070 | 68 | 120 | | |
| 10 Jul | 2105 | 2142 | 2227 | M5.7 | .220 | 2B | N18E49 | 9077 | 13000 | 140 | 3 | 3 |
| 11 Jul | 1132 | 1141 | 1152 | M4.2 | .029 | | | 9077 | | | | |
| 11 Jul | 1212 | 1310 | 1335 | X1 | .310 | 2N | N18E27 | 9077 | 2000 | 1600 | | |
| 11 Jul | 1847 | 1858 | 1908 | M1.1 | .012 | 1N | N16W56 | 9070 | | | | |
| 12 Jul | 0455 | 0502 | 0509 | M1.2 | .009 | 1N | N16E31 | 9077 | | 43 | | |
| 12 Jul | 1018 | 1037 | 1046 | X1.9 | .140 | 2B | N17E27 | 9077 | 510 | 390 | | 2 |
| 12 Jul | 1606 | 1652 | 1806 | M1 | .086 | | | | | | | |
| 12 Jul | 1841 | 1849 | 1907 | M5.7 | .063 | 2F | N16W64 | 9070 | | 230 | | |
| 12 Jul | 2137 | 2140 | 2143 | M1.9 | .006 | | | | | 170 | | |
| 13 Jul | 1151 | 1205 | 1212 | M1.3 | .010 | SF | N20W73 | 9070 | | | | |
| 13 Jul | 1615 | 1623 | 1627 | M1.1 | .007 | 1N | N13E65 | 9085 | 100 | | | |
| 13 Jul | 1628 | 1634 | 1711 | M1.5 | .036 | 1F | N19W75 | 9070 | | | | |
| 13 Jul | 1832 | 1842 | 1904 | M1.2 | .023 | SF | N20W77 | 9070 | | | | |
| 13 Jul | 2201 | 2206 | 2210 | M1.5 | .005 | | | | | | | |
| 14 Jul | 0039 | 0045 | 0050 | M1.5 | .007 | | | | | | | |
| 14 Jul | 1003 | 1024 | 1043 | X5.7 | .750 | 3B | N22W07 | 9077 | 31000 | 2600 | 3 | 3 |
| 14 Jul | 1344 | 1352 | 1400 | M3.7 | .025 | 1N | N20W08 | 9077 | 470 | 220 | | |
| 15 Jul | 0820 | 0833 | 0848 | M1.3 | .018 | SF | S10E62 | 9087 | | | | |
| 16 Jul | 0159 | 0203 | 0208 | M5.5 | .016 | 1N | N09E81 | 9090 | | 23 | | |
| 16 Jul | 0223 | 0228 | 0233 | M1.1 | .007 | | | | | | | |
| 16 Jul | 2147 | 2157 | 2204 | M1.1 | .009 | 1N | N14E76 | 9090 | | | | |
| 16 Jul | 2337 | 0004 | 0015 | M1.4 | .017 | 2F | N17W38 | 9077 | | | | |

## *Flare List*

| Date | Time | | | X-ray | Optical | | Rgn |
|---|---|---|---|---|---|---|---|
| | Begin | Max | End | Class. | Imp / Brtns | Location Lat CMD | |
| 10 July | 0107 | 0110 | 0140 | C6.0 | SN | N17E58 | 9077 |
| | 0220 | 0222 | 0252 | | SF | N19W27 | 9070 |
| | 0242 | 0243 | 0316 | | SF | N18E56 | 9077 |
| | 0301 | 0306 | 0322 | | SF | S18W26 | 9069 |
| | 0317 | 0319 | 0321 | | SF | N18E40 | 9077 |
| | 0322 | 0322 | 0331 | | SF | N17E58 | 9077 |
| | 0335 | 0338 | 0340 | | SF | N18E40 | 9077 |
| | 0526 | 0526 | 0540 | | SF | N17E56 | 9077 |
| | 0754 | 0758 | 0804 | C3.5 | SF | N18W30 | 9070 |
| | 0833 | 0835 | 0847 | | SF | S20W47 | 9068 |
| | 0949 | U0951 | 0958 | | SF | S18W33 | 9069 |
| | 1034 | U1048 | 1129 | M1.1 | SF | N18E53 | 9077 |
| | 1132 | 1134 | 1137 | | SF | N18E34 | 9077 |
| | 1144 | 1146 | 1154 | | SF | S21W14 | 9073 |
| | 1152 | 1153 | 1157 | | SF | S16W35 | 9069 |
| | 1224 | 1224 | 1234 | | SF | N17E54 | 9077 |

***Flare List – continued.***

| Date | Time Begin | Time Max | Time End | X-ray | Optical Imp / Class. | Optical Location Brtns | Rgn Lat CMD |
|---|---|---|---|---|---|---|---|
| 10 July | 1243 | 1251 | 1257 | | SF | N25E63 | 9080 |
| | 1355 | 1427 | 1623 | M1.4 | 1N | N18E52 | 9077 |
| | 1447 | 1450 | 1502 | | SF | N20W33 | 9070 |
| | 1509 | 1515 | 1528 | | SF | N16E54 | 9077 |
| | 1514 | 1516 | 1522 | | SF | N15W77 | 9066 |
| | 1533 | 1548 | 1553 | | SF | S18W31 | 9069 |
| | 1647 | 1650 | 1701 | | SF | N15W68 | 9066 |
| | 1648 | 1649 | 1659 | | SF | N15W59 | 9096 |
| | 1651 | 1702 | 1707 | | SF | N17E29 | 9077 |
| | 1702 | 1707 | 1716 | C3.2 | SF | N17W37 | 9070 |
| | 1733 | 1735 | 1746 | | SF | N16E51 | 9077 |
| | 1813 | 1816 | 1824 | | SF | N54E77 | 9077 |
| | 1827 | 1849 | 1907 | | SF | N16E52 | 9077 |
| | 1832 | 1838 | 1920 | M1.8 | 1N | S18W32 | 9069 |
| | 1905 | 1911 | 1920 | | SF | N17W43 | 9070 |
| | 1908 | 1918 | 2000 | | SF | N16E50 | 9077 |
| | 1957 | 2002 | 2052 | M1.9 | SB | N16W43 | 9070 |
| | 1958 | 2010 | 2019 | | SF | N16W59 | 9066 |
| | 1959 | 2000 | 2023 | | SF | S17W47 | 9068 |
| | B2132 | U2138 | 0046 | M5.7 | 2B | N18E49 | 9077 |
| 11 July | B0322 | 0347 | 0545 | C7.6 | SF | N18W44 | 9070 |
| | B0330 | U0335 | A0344 | | SF | N19W57 | 9070 |
| | 0447 | 0457 | 0505 | | SF | N18E46 | 9077 |
| | 0506 | 0508 | 0510 | | SF | N18E46 | 9077 |
| | 0617 | 0619 | 0635 | | SF | N19W41 | 9070 |
| | 0617 | 0648 | 0659 | C5.7 | SF | N18E45 | 9077 |
| | 0712 | 0713 | 0718 | | SF | N13W68 | 9066 |
| | 0715 | 0719 | 0723 | | SF | N21E58 | 9080 |
| | 0720 | 0723 | 0727 | | SF | N09W75 | 9066 |
| | 0750 | 0757 | 0814 | C4.7 | SF | N19W41 | 9070 |
| | 0854 | 0857 | 0906 | | SF | N18E22 | 9077 |
| | 1036 | 1037 | 1040 | | SF | N03E73 | 9081 |
| | 1044 | 1048 | 1050 | | SF | N03E73 | 9081 |
| | 1111 | 1115 | 1122 | | SF | N03E74 | 9081 |
| | 1129 | 1130 | 1135 | | SN | N18W50 | 9070 |
| | 1132 | 1141 | 1152 | M4.2 | | | 9077 |
| | 1209 | 1211 | 1220 | | SF | S17W47 | 9069 |
| | 1231 | 1231 | 1236 | | SF | S18W42 | 9069 |
| | B1320 | U1323 | 1837 | X1 | 2N | N18E27 | 9077 |
| | B1322 | 1325 | 1335 | | SF | N15W56 | 9072 |
| | 1325 | 1326 | 1329 | | SF | S17W47 | 9069 |
| | 1334 | 1335 | 1338 | | SF | S22W61 | 9068 |

***Flare List – continued.***

| Date | Time Begin | Time Max | Time End | X-ray | Optical Imp / Class. | Optical Location Brtns | Rgn Lat CMD |
|---|---|---|---|---|---|---|---|
| 11 July | 1338 | 1340 | 1348 | | SF | S22W61 | 9068 |
| | 1407 | 1410 | 1413 | | SF | N19W44 | 9070 |
| | 1532 | 1533 | 1537 | | SF | S18W66 | 9068 |
| | 1538 | 1541 | 1551 | | SF | S18W48 | 9069 |
| | 1557 | 1605 | 1622 | | SF | S20W58 | 9068 |
| | 1625 | 1627 | 1658 | | SF | S21W58 | 9068 |
| | 1658 | 1700 | 1703 | | SF | N20W65 | 9065 |
| | 1706 | 1708 | 1715 | | SF | N20W65 | 9065 |
| | 1716 | 1716 | 1740 | | SF | S20W30 | 9073 |
| | 1809 | 1817 | 1828 | | SF | S18W49 | 9069 |
| | 1831 | 1837 | 1848 | | SF | N18W49 | 9070 |
| | 1848 | 1849 | 1926 | | SF | S20W31 | 9073 |
| | 1849 | 1900 | 1929 | M1.1 | 1N | N16W56 | 9070 |
| | 1903 | 1903 | 1915 | | SF | N16E33 | 9077 |
| | 1921 | 1925 | 1945 | | SF | N17E28 | 9077 |
| | 2032 | 2037 | 2057 | | SF | S21W45 | 9069 |
| | 2039 | 2105 | 2150 | C7.3 | SF | N17W57 | 9070 |
| | 2103 | 2104 | 2120 | | SF | S18W47 | 9069 |
| | 2129 | 2133 | 2142 | | SF | S18W47 | 9069 |
| | 2143 | 2150 | 2214 | | SF | S18W47 | 9069 |
| | 2240 | 2244 | 2252 | C5.5 | | | |
| | 2354 | 0009 | 0020 | C6.8 | | | |
| 12 July | 0151 | 0158 | 0211 | C5.3 | | | |
| | 0454 | 0459 | 0536 | M1.2 | 1N | N16E31 | 9077 |
| | B0915 | U0917 | A0920 | C5.3 | SF | N17E30 | 9077 |
| | B0924 | U0924 | A0928 | | SF | N19W60 | 9070 |
| | B0941 | U0943 | A0948 | | SF | S17W58 | 9069 |
| | 1005 | 1006 | 1016 | | SF | S18W56 | 9069 |
| | B1005 | U1009 | 1037 | | SF | N19W60 | 9070 |
| | 1015 | U1038 | A1114 | X1.9 | 2B | N17E27 | 9077 |
| | B1059 | U1059 | A1114 | | SF | S18W56 | 9069 |
| | 1136 | 1140 | 1148 | | SF | N19W63 | 9070 |
| | 1148 | 1149 | 1157 | | SF | N17E18 | 9077 |
| | 1157 | 1158 | 1205 | | SF | N18W66 | 9070 |
| | 1207 | 1211 | 1212 | | SF | N17E18 | 9077 |
| | 1216 | 1219 | 1224 | | SF | N17E18 | 9077 |
| | 1224 | 1227 | 1230 | | SF | N19W61 | 9070 |
| | 1304 | 1304 | 1307 | | SF | N18W66 | 9070 |
| | 1358 | 1401 | 1413 | | SF | N19W62 | 9070 |
| | 1408 | 1408 | 1412 | | SF | N17E31 | 9077 |
| | 1606 | 1652 | 1806 | M1 | | | |
| | 1630 | 1646 | 1727 | | SF | N18W68 | 9070 |
| | 1630 | 1634 | 1643 | | SF | N18E27 | 9077 |

***Flare List – continued.***

| Date | Time Begin | Time Max | Time End | X-ray | Optical Imp / Class. | Optical Location Brtns | Rgn Lat CMD |
|---|---|---|---|---|---|---|---|
| 12 July | 1718 | 1718 | 1722 | | SF | S18W62 | 9069 |
| | B1743 | U1743 | A1913 | | SF | N19E27 | 9077 |
| | B1744 | U1746 | A1751 | | SF | N16W59 | 9070 |
| | 1804 | 1808 | 1815 | | SF | N22E40 | 9080 |
| | B1848 | U1848 | A1957 | M5.7 | 2F | N16W64 | 9070 |
| | 2009 | 2013 | 2016 | | SF | N17W65 | 9070 |
| | 2022 | 2024 | 2038 | | SF | N15E76 | 9085 |
| | 2137 | 2140 | 2143 | M1.9 | | | |
| | B2150 | U2200 | 2221 | | SF | N18E27 | 9077 |
| 13 July | 0201 | 0206 | 0211 | C6.1 | | | |
| | 0430 | 0430 | 0436 | | SF | N15E71 | 9085 |
| | 0447 | 0448 | 0455 | | SF | N19W70 | 9070 |
| | 0453 | 0510 | 0517 | | SF | N15E71 | 9085 |
| | 0505 | 0506 | 0511 | | SF | N17W80 | 9070 |
| | 0518 | 0519 | 0526 | | SF | N18W78 | 9070 |
| | 0522 | 0523 | 0530 | C4.9 | SF | S17W76 | 9069 |
| | 0524 | 0532 | 0546 | | SF | N12E65 | 9085 |
| | 0536 | 0540 | 0544 | | SF | N03E50 | 9081 |
| | 0555 | 0557 | 0621 | | SF | N03E50 | 9081 |
| | 0610 | 0627 | 0642 | C7.1 | SF | N12E65 | 9085 |
| | 0611 | 0612 | 0628 | | SF | N19W66 | 9070 |
| | 0631 | 0640 | 0705 | C9.8 | SF | N19W66 | 9070 |
| | B0703 | U0704 | A0734 | | SF | N19E32 | 9084 |
| | 0708 | 0709 | 0715 | | SF | N03E49 | 9081 |
| | B0708 | U0817 | 0849 | | SF | N12E64 | 9085 |
| | B0816 | U0816 | 0822 | | SF | N03E49 | 9081 |
| | 0925 | 0930 | 0933 | C6.0 | | | |
| | 1058 | 1100 | 1129 | | SF | N15E15 | 9077 |
| | 1114 | 1115 | 1128 | | SF | N13E67 | 9085 |
| | 1117 | 1122 | 1151 | | SF | N20W73 | 9070 |
| | 1129 | 1130 | 1144 | | SF | N25E33 | 9084 |
| | 1143 | 1153 | 1222 | | SF | N15E17 | 9077 |
| | 1153 | 1211 | 1217 | M1.3 | SF | N20W73 | 9070 |
| | 1209 | 1217 | 1305 | | SF | N13E68 | 9085 |
| | 1215 | 1217 | 1221 | | SF | N01E50 | 9081 |
| | 1306 | 1307 | 1325 | | SF | N13E68 | 9085 |
| | 1311 | 1434 | 1502 | | SF | N19E07 | 9077 |
| | 1352 | 1354 | 1359 | | SF | N01E49 | 9081 |
| | 1357 | 1401 | 1407 | | SF | N12E67 | 9085 |
| | 1400 | 1401 | 1405 | | SF | N20W74 | 9070 |
| | 1413 | 1414 | 1417 | | SF | N13E67 | 9085 |
| | 1424 | 1448 | 1453 | | SF | N20W74 | 9070 |

***Flare List – continued.***

| Date | Time Begin | Time Max | Time End | X-ray | Optical Imp / Class. | Optical Location Brtns | Optical Rgn Lat CMD |
|---|---|---|---|---|---|---|---|
| 13 July | 1506 | 1507 | 1513 | | SF | N19W78 | 9070 |
| | 1515 | 1515 | 1523 | | SF | N13E66 | 9085 |
| | 1521 | 1526 | 1531 | | SF | N19W79 | 9070 |
| | 1530 | 1532 | 1541 | | SF | N13E66 | 9085 |
| | 1541 | 1546 | 1601 | | SF | N20E28 | 9084 |
| | 1548 | 1557 | 1611 | | SF | N19W78 | 9070 |
| | 1549 | 1601 | 1631 | | SF | N16E09 | 9077 |
| | 1605 | 1612 | 1645 | M1.1 | 1N | N13E65 | 9085 |
| | 1616 | 1622 | 1650 | M1.5 | 1F | N19W75 | 9070 |
| | 1656 | 1702 | 1705 | | SF | N01E47 | 9081 |
| | 1700 | 1700 | 1712 | | SF | N16E11 | 9077 |
| | 1706 | 1709 | 1713 | | SF | N19W73 | 9070 |
| | 1715 | 1723 | 1735 | | SF | N12E63 | 9085 |
| | 1742 | 1742 | 1746 | | SF | N12E65 | 9085 |
| | 1752 | 1758 | 1815 | | 1N | N19W82 | 9070 |
| | 1813 | 1815 | 1907 | | SF | N16E10 | 9077 |
| | 1835 | 1836 | 1840 | | SF | N20W75 | 9070 |
| | 1846 | U1855 | 1934 | | 1F | N18E08 | 9077 |
| | 1853 | 1853 | 1856 | M1.2 | SF | N20W77 | 9070 |
| | 1858 | 1906 | 1910 | | SF | N20W77 | 9070 |
| | 1922 | 1922 | 1928 | | SF | N16E62 | 9085 |
| | 1944 | 1944 | 1948 | | SF | N19W81 | 9070 |
| | 2001 | 2004 | 2006 | C5.5 | | | |
| | 2026 | 2031 | 2036 | C7.3 | | | |
| | 2044 | 2048 | 2052 | C5.6 | | | |
| | 2201 | 2206 | 2210 | M1.5 | | | |
| | 2246 | 2251 | 2255 | C6.7 | | | |
| 14 July | 0020 | 0023 | 0026 | C4.9 | | | |
| | 0039 | 0045 | 0050 | M1.5 | | | |
| | 0214 | 0217 | 0220 | C6.1 | | | |
| | B0430 | U0447 | 0520 | | SF | N20W02 | 9077 |
| | 0652 | 0657 | 0705 | C7.1 | | | |
| | 0735 | 0746 | 0811 | | SF | N16E02 | 9077 |
| | 0809 | 0828 | A0900 | | 1F | N14E53 | 9085 |
| | 0951 | 0955 | 0959 | C5.9 | | | |
| | 1003 | 1024 | 1043 | X5.7 | 3B | N22W07 | 9077 |
| | B1102 | U1106 | 1143 | | SF | S17W79 | 9069 |
| | 1102 | 1103 | 1231 | | SF | N18E14 | 9084 |
| | 1300 | 1300 | 1337 | | SF | N12E50 | 9085 |
| | 1346 | U1350 | A1424 | M3.7 | 1N | N20W08 | 9077 |
| | 1552 | 1557 | 1640 | | SF | N13E50 | 9085 |
| | 1637 | 1641 | 1706 | | SF | S09W02 | 9082 |

***Flare List – continued.***

| Date | Time Begin | Time Max | Time End | X-ray | Optical Imp / Class. | Optical Location Brtns | Rgn Lat CMD |
|---|---|---|---|---|---|---|---|
| 14 July | 1652 | 1657 | 1713 | | SF | N13E50 | 9085 |
| | 1710 | 1712 | 1713 | | SF | S10W04 | 9082 |
| | 1845 | 1847 | 1909 | | SF | N19E33 | 9088 |
| | 1914 | 1920 | 1936 | | SF | N22E12 | 9084 |
| | 1926 | 1931 | 1942 | | SF | N16W03 | 9077 |
| | 2030 | 2034 | 2042 | | SF | S11W02 | 9082 |
| | 2358 | 0010 | 0018 | | SF | N14E45 | 9085 |
| 15 July | 0042 | 0046 | 0053 | | SF | N14E47 | 9085 |
| | 0120 | 0121 | 0131 | C5.0 | SF | N14E45 | 9085 |
| | 0233 | 0236 | 0240 | C3.7 | | | |
| | 0251 | 0252 | 0259 | | SF | N16W10 | 9077 |
| | 0344 | 0347 | 0418 | C4.2 | SF | N17W11 | 9077 |
| | 0418 | 0418 | 0423 | | SF | N16W11 | 9077 |
| | 0512 | 0512 | 0533 | C6.9 | SF | N18W13 | 9077 |
| | 0526 | 0541 | 0609 | | SF | S13W23 | 9078 |
| | 0555 | 0601 | 0641 | | 1F | S09W13 | 9082 |
| | 0610 | 0612 | 0614 | | SF | S13W23 | 9078 |
| | 0720 | 0720 | 0724 | | SF | S13E67 | 9087 |
| | 0754 | 0800 | 0826 | M1.3 | SF | S10E62 | 9087 |
| | 1405 | 1410 | 1421 | | SF | N17W14 | 9077 |
| | 1432 | 1437 | 1444 | | SF | S09W18 | 9082 |
| | 1536 | 1611 | 1624 | C7.8 | | | |
| | 1551 | 1555 | 1602 | | SF | S13E64 | 9087 |
| | 1724 | 1725 | 1734 | | SF | N17W20 | 9077 |
| | 1803 | 1804 | 1812 | | SF | N19E20 | 9088 |
| | 1830 | 1832 | 1847 | | SF | N16W16 | 9077 |
| | 1853 | 1853 | 1857 | | SF | S12E61 | 9087 |
| | 1915 | 1916 | 1924 | | SF | S11W35 | 9078 |
| | 1919 | 1920 | 1923 | | SF | N19W24 | 9077 |
| | 2036 | 2038 | 2041 | | SF | S09E57 | 9087 |
| | 2039 | 2040 | 2043 | | SF | N17W18 | 9077 |
| | 2044 | 2046 | 2132 | C3.7 | SF | N16E35 | 9085 |
| | 2121 | 2123 | 2139 | | SF | S12E59 | 9087 |
| | 2146 | 2146 | 2211 | | SF | S09W19 | 9082 |
| | 2202 | 2205 | 2214 | | SF | S08E56 | 9087 |
| | 2216 | 2217 | 2232 | C3.2 | SF | S08E55 | 9087 |
| | 2258 | 2301 | 2317 | C7.1 | SF | S14E60 | 9087 |
| | 2313 | 2314 | 2328 | | SF | N03E16 | 9081 |
| 16 July | B0122 | 0125 | 0147 | C6.3 | 1N | S11E53 | 9087 |
| | 0205 | 0205 | A0214 | M5.5 | 1N | N09E81 | 9090 |
| | 0223 | 0228 | 0233 | M1.1 | | | |
| | B0610 | U0610 | 0633 | C3.8 | SF | S08W25 | 9082 |

***Flare List – continued.***

| Date | Time Begin | Time Max | Time End | X-ray | Optical Imp / Class. | Optical Location Brtns | Rgn Lat CMD |
|---|---|---|---|---|---|---|---|
| 16 July | 0720 | 0726 | 0731 | C4.5 | | | |
| | 0940 | 0941 | 0945 | C3.2 | SF | S09E53 | 9087 |
| | B1158 | U1158 | A1204 | C6.2 | SF | S12E53 | 9087 |
| | 1425 | 1429 | 1434 | | SF | S15E54 | 9087 |
| | 1440 | 1440 | 1449 | | SF | N16E23 | 9085 |
| | 1444 | 1444 | 1455 | | SF | N19E09 | 9088 |
| | 1510 | 1510 | 1520 | C2.9 | SF | S13E51 | 9087 |
| | 1523 | 1534 | 1551 | | SF | S09E45 | 9087 |
| | 1523 | 1531 | 1551 | | SF | N16W31 | 9077 |
| | 1612 | 1612 | 1616 | | SF | N12E26 | 9085 |
| | 1636 | 1641 | 1651 | | SF | N18W29 | 9077 |
| | 1724 | 1728 | 1734 | C3.4 | SF | N18W29 | 9077 |
| | 1804 | 1807 | 1815 | | SF | N16W31 | 9077 |
| | 1805 | 1806 | 1810 | | SF | S12E48 | 9087 |
| | 1827 | 1827 | 1832 | | SF | S13E44 | 9087 |
| | 1828 | 1830 | 1834 | | SF | N05E79 | 9090 |
| | 1847 | 1847 | 1851 | | SF | S13E44 | 9087 |
| | 1904 | 1906 | 1918 | | SF | S13E48 | 9087 |
| | 1936 | 1938 | 1959 | C6.5 | 1N | S13E48 | 9087 |
| | 2046 | 2049 | 2106 | C4.9 | 1N | S04E68 | 9091 |
| | 2058 | 2058 | 2105 | | SF | N15E67 | 9090 |
| | 2102 | 2104 | 2114 | | SF | N16W33 | 9077 |
| | 2149 | 2152 | 2219 | M1.1 | 1N | N14E76 | 9090 |
| | 2150 | U2152 | A2215 | | SF | N07E75 | 9090 |
| | 2155 | 2155 | 2158 | | SF | N19W13 | 9084 |
| | 2241 | 2243 | 2258 | | SF | S08E46 | 9087 |
| | 2341 | 0006 | 0113 | M1.4 | 2F | N17W38 | 9077 |

## *Region Summary*

| Date | Location ( ° Lat ° CMD) | Helio Lon | Sunspot Characteristics Area ($10^{-6}$ hemi) | Extent (helio) | Spot Class | Spot Count | Mag Class | Flares X-ray C | M | X | Optical S | 1 | 2 | 3 | 4 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | *Region 9065* | | | | | | | | | | | | |
| 29 Jun | N20E75 | 064 | 0060 | 01 | HSX | 001 | A | | | | | | | | |
| 30 Jun | N20E63 | 063 | 0080 | 03 | HSX | 001 | A | | | | | | | | |
| 01 Jul | N20E50 | 062 | 0050 | 02 | HSX | 001 | A | | | | | | | | |
| 02 Jul | N21E39 | 060 | 0040 | 04 | CSO | 003 | B | | | | | | | | |
| 03 Jul | N22E25 | 061 | 0040 | 01 | CSO | 004 | B | | | | | | | | |
| 04 Jul | N22E13 | 060 | 0010 | 01 | HSX | 001 | A | | | | | | | | |
| 05 Jul | N23W02 | 062 | 0000 | 00 | AXX | 001 | A | | | | | | | | |
| 06 Jul | N23W15 | 062 | | | | | | | | | | | | | |
| 07 Jul | N24W26 | 058 | 0010 | 01 | BXO | 002 | B | | | | | | | | |
| 08 Jul | N24W39 | 058 | | | | | | | | | | | | | |
| 09 Jul | N24W52 | 058 | | | | | | | | | | | | | |
| 10 Jul | N24W65 | 058 | | | | | | | | | | | | | |
| 11 Jul | N24W78 | 058 | | | | | | | | | 2 | | | | |
| | | | | | | | | 0 | 0 | 0 | 2 | 0 | 0 | 0 | 0 |

Crossed West Limb.
Absolute heliographic longitude: 062

| Date | Location ( ° Lat ° CMD) | Helio Lon | Sunspot Characteristics Area ($10^{-6}$ hemi) | Extent (helio) | Spot Class | Spot Count | Mag Class | Flares X-ray C | M | X | Optical S | 1 | 2 | 3 | 4 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | *Region 9066* | | | | | | | | | | | | |
| 29 Jun | N10E75 | 064 | 0100 | 07 | HSX | 001 | A | | | | | | | | |
| 30 Jun | N13E63 | 063 | 0110 | 05 | CAO | 005 | B | | | | | | | | |
| 01 Jul | N13E55 | 057 | 0090 | 14 | CSO | 011 | B | | | | 2 | | | | |
| 02 Jul | N12E39 | 060 | 0070 | 07 | DSO | 009 | B | | | | | | | | |
| 03 Jul | N12E23 | 063 | 0070 | 05 | DSO | 006 | B | | | | | | | | |
| 04 Jul | N12E12 | 061 | 0060 | 06 | DSO | 010 | B | | | | | | | | |
| 05 Jul | N11W03 | 063 | 0030 | 03 | CAO | 004 | B | | | | | | | | |
| 06 Jul | N12W16 | 061 | 0030 | 04 | CSO | 005 | B | | | | | | | | |
| 07 Jul | N12W30 | 062 | 0020 | 02 | CRO | 002 | B | | | | | | | | |
| 08 Jul | N13W43 | 062 | 0010 | 04 | CRO | 005 | B | | | | | | | | |
| 09 Jul | N12W55 | 061 | 0010 | 03 | BXO | 002 | B | | | | 1 | | | | |
| 10 Jul | N12W68 | 061 | | | | | | 1 | 1 | | 3 | | | | |
| 11 Jul | N14W78 | 058 | 0050 | 06 | CSO | 003 | B | | | | 2 | | | | |
| 12 Jul | N13W88 | 054 | 0020 | 06 | CRO | 002 | B | | | | | | | | |
| | | | | | | | | 1 | 1 | 0 | 8 | 0 | 0 | 0 | 0 |

Crossed West Limb.
Absolute heliographic longitude: 063

## *Region Summary - continued*

| Date | Location ( ° Lat ° CMD) | Helio Lon | Sunspot Characteristics Area ($10^{-6}$ hemi) | Extent (helio) | Spot Class | Spot Count | Mag Class | Flares X-ray C | M | X | Optical S | 1 | 2 | 3 | 4 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | *Region 9067* | | | | | | | | | | | | | | |
| 29 Jun | S22E73 | 066 | 0130 | 02 | HSX | 001 | A | | | | | | | | |
| 30 Jun | S20E60 | 066 | 0180 | 02 | HSX | 001 | A | | | | | | | | |
| 01 Jul | S20E47 | 065 | 0210 | 03 | HSX | 001 | A | 2 | | | 3 | | | | |
| 02 Jul | S20E35 | 064 | 0200 | 02 | HSX | 001 | A | | | | | | | | |
| 03 Jul | S20E22 | 064 | 0200 | 03 | HSX | 001 | A | | | | | | | | |
| 04 Jul | S20E09 | 064 | 0210 | 02 | HAX | 001 | A | | | | | | | | |
| 05 Jul | S21W04 | 064 | 0230 | 03 | HAX | 001 | A | | | | | | | | |
| 06 Jul | S20W18 | 063 | 0200 | 03 | HSX | 001 | A | | | | | | | | |
| 07 Jul | S20W30 | 062 | 0150 | 02 | CAO | 002 | B | | | | | | | | |
| 08 Jul | S19W44 | 063 | 0190 | 03 | HAX | 001 | A | | | | | | | | |
| 09 Jul | S18W56 | 063 | 0160 | 02 | HSX | 001 | A | | | | | | | | |
| 10 Jul | S19W72 | 065 | 0130 | 02 | HSX | 001 | A | | | | | | | | |
| 11 Jul | S18W87 | 067 | 0100 | 03 | HSX | 001 | A | | | | | | | | |
| | | | | | | | | 2 | 0 | 0 | 3 | 0 | 0 | 0 | 0 |

Crossed West Limb.
Absolute heliographic longitude: 064

| Date | Location ( ° Lat ° CMD) | Helio Lon | Sunspot Characteristics Area ($10^{-6}$ hemi) | Extent (helio) | Spot Class | Spot Count | Mag Class | Flares X-ray C | M | X | Optical S | 1 | 2 | 3 | 4 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | *Region 9068* | | | | | | | | | | | | | | |
| 01 Jul | S19E63 | 049 | 0070 | 05 | DSO | 005 | B | 1 | | | 3 | | | | |
| 02 Jul | S19E51 | 048 | 0160 | 10 | DAO | 013 | B | 2 | | | 9 | | | | |
| 03 Jul | S19E38 | 048 | 0200 | 10 | DAO | 013 | B | | | | 1 | | | | |
| 04 Jul | S20E26 | 047 | 0210 | 10 | DAO | 024 | B | 2 | | | 3 | | | | |
| 05 Jul | S19E11 | 049 | 0200 | 10 | DAO | 023 | B | | | | | | | | |
| 06 Jul | S18W03 | 048 | 0310 | 10 | DAI | 025 | B | 1 | | | 1 | | | | |
| 07 Jul | S18W15 | 047 | 0270 | 11 | EAO | 025 | B | | | | 2 | | | | |
| 08 Jul | S18W28 | 047 | 0390 | 11 | EKC | 034 | B | | | | | | | | |
| 09 Jul | S17W42 | 048 | 0320 | 09 | DAI | 022 | B | | | | | | | | |
| 10 Jul | S18W53 | 046 | 0300 | 09 | DAI | 019 | B | | | | 2 | | | | |
| 11 Jul | S17W69 | 049 | 0230 | 10 | DAI | 011 | B | | | | 5 | | | | |
| 12 Jul | S17W80 | 046 | 0190 | 06 | DAO | 004 | B | | | | | | | | |
| | | | | | | | | 6 | 0 | 0 | 26 | 0 | 0 | 0 | 0 |

Crossed West Limb.
Absolute heliographic longitude: 048

## *Region Summary - continued*

| Date | Location ( ° Lat ° CMD) | Helio Lon | Sunspot Characteristics Area ($10^{-6}$ hemi) | Extent (helio) | Spot Class | Spot Count | Mag Class | Flares X-ray C | X-ray M | X-ray X | Optical S | Optical 1 | Optical 2 | Optical 3 | Optical 4 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | *Region 9069* | | | | | | | | | | | | | | |
| 01 Jul | S13E70 | 042 | 0040 | 02 | HSX | 001 | A | | | | 1 | | | | |
| 02 Jul | S14E59 | 040 | 0050 | 01 | HSX | 001 | A | | | | | | | | |
| 03 Jul | S14E47 | 039 | 0050 | 01 | HSX | 001 | A | | | | | | | | |
| 04 Jul | S14E33 | 040 | 0050 | 01 | HAX | 002 | A | | | | | | | | |
| 05 Jul | S14E19 | 041 | 0020 | 02 | HAX | 002 | A | | | | | | | | |
| 06 Jul | S13E05 | 040 | 0020 | 03 | CSO | 002 | B | | | | | | | | |
| 07 Jul | S12W07 | 039 | 0010 | 03 | BXO | 003 | B | | | | | | | | |
| 08 Jul | S18W11 | 030 | 0140 | 08 | DAO | 015 | B | 1 | | | 2 | | | | |
| 09 Jul | S17W25 | 031 | 0300 | 11 | EAO | 017 | B | | | | 1 | | | | |
| 10 Jul | S17W39 | 032 | 0370 | 13 | EAI | 021 | B | | 1 | | 4 | 1 | | | |
| 11 Jul | S17W51 | 031 | 0430 | 16 | FAI | 024 | B | | | | 9 | | | | |
| 12 Jul | S17W64 | 030 | 0470 | 14 | EAI | 019 | BG | | | | 4 | | | | |
| 13 Jul | S16W78 | 031 | 0500 | 17 | FAI | 009 | B | 1 | | | 1 | | | | |
| 14 Jul | S18W87 | 027 | 0150 | 09 | DAO | 004 | B | | | | 1 | | | | |
| | | | | | | | | 2 | 1 | 0 | 23 | 1 | 0 | 0 | 0 |

Crossed West Limb.
Absolute heliographic longitude: 040

| Date | Location ( ° Lat ° CMD) | Helio Lon | Sunspot Characteristics Area ($10^{-6}$ hemi) | Extent (helio) | Spot Class | Spot Count | Mag Class | Flares X-ray C | X-ray M | X-ray X | Optical S | Optical 1 | Optical 2 | Optical 3 | Optical 4 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | *Region 9070* | | | | | | | | | | | | | | |
| 02 Jul | N19E72 | 027 | 0030 | 01 | HAX | 001 | A | | | | 3 | | | | |
| 03 Jul | N18E57 | 029 | 0030 | 01 | HSX | 001 | A | | | | 1 | | | | |
| 04 Jul | N18E44 | 029 | 0090 | 07 | DAO | 015 | B | 1 | | | 3 | | | | |
| 05 Jul | N17E29 | 031 | 0310 | 09 | DAI | 022 | BG | 1 | | | 1 | | | | |
| 06 Jul | N18E15 | 030 | 0340 | 10 | DAI | 022 | B | 1 | | | 10 | 1 | | | |
| 07 Jul | N18E03 | 029 | 0320 | 11 | EAO | 031 | BG | 3 | | | 10 | | | | |
| 08 Jul | N19W11 | 030 | 0340 | 12 | EAC | 038 | BG | 6 | | | 10 | 2 | | | |
| 09 Jul | N19W24 | 030 | 0320 | 13 | EAC | 026 | BG | | | | 3 | 1 | | | |
| 10 Jul | N19W38 | 031 | 0330 | 15 | EAC | 027 | BG | 1 | 1 | | 6 | | | | |
| 11 Jul | N19W52 | 032 | 0400 | 18 | FKI | 021 | BG | 3 | 1 | | 8 | 1 | | | |
| 12 Jul | N19W63 | 029 | 0680 | 16 | FKO | 014 | BGD | | 1 | | 10 | | 1 | | |
| 13 Jul | N20W78 | 031 | 0510 | 17 | FKO | 006 | BG | 1 | 2 | | 17 | 2 | | | |
| 14 Jul | N19W91 | 031 | 0050 | 05 | DSO | 003 | B | | | | | | | | |
| | | | | | | | | 17 | 5 | 0 | 82 | 7 | 1 | 0 | 0 |

Crossed West Limb.
Absolute heliographic longitude: 029

## *Region Summary - continued*

| Date | Location ( ° Lat ° CMD) | Helio Lon | Sunspot Characteristics: Area ($10^{-6}$ hemi) | Extent (helio) | Spot Class | Spot Count | Mag Class | Flares: X-ray C | M | X | Optical S | 1 | 2 | 3 | 4 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | *Region 9071* | | | | | | | | | | | | |
| 05 Jul | N22W23 | 083 | 0010 | 03 | BXO | 005 | B | 1 | | | 2 | | | | |
| 06 Jul | N22W35 | 080 | 0010 | 06 | BXO | 007 | B | | | | 1 | | | | |
| 07 Jul | N23W48 | 080 | 0050 | 07 | CRO | 007 | B | 2 | 2 | | 6 | 1 | | | |
| 08 Jul | N22W62 | 081 | 0040 | 08 | CRO | 006 | B | | | | 2 | | | | |
| 09 Jul | N24W76 | 082 | 0010 | 05 | BXO | 002 | B | | | | | | | | |
| 10 Jul | N24W89 | 082 | | | | | | | | | | | | | |
| | | | | | | | | 3 | 2 | 0 | 11 | 1 | 0 | 0 | 0 |

Crossed West Limb.
Absolute heliographic longitude: 083

| Date | Location ( ° Lat ° CMD) | Helio Lon | Sunspot Characteristics: Area ($10^{-6}$ hemi) | Extent (helio) | Spot Class | Spot Count | Mag Class | Flares: X-ray C | M | X | Optical S | 1 | 2 | 3 | 4 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | *Region 9072* | | | | | | | | | | | | |
| 05 Jul | N15E16 | 044 | 0000 | 01 | AXX | 002 | A | | | | | | | | |
| 06 Jul | N16E02 | 043 | 0010 | 01 | HRX | 002 | A | | | | | | | | |
| 07 Jul | N16W11 | 043 | | | | | | | | | | | | | |
| 08 Jul | N16W24 | 043 | | | | | | | | | | | | | |
| 09 Jul | N16W37 | 043 | | | | | | | | | | | | | |
| 10 Jul | N16W50 | 043 | | | | | | | | | | | | | |
| 11 Jul | N16W63 | 043 | | | | | | | | | 1 | | | | |
| 12 Jul | N16W76 | 043 | | | | | | | | | | | | | |
| 13 Jul | N16W89 | 043 | | | | | | | | | | | | | |
| | | | | | | | | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 |

Crossed West Limb.
Absolute heliographic longitude: 043

| Date | Location ( ° Lat ° CMD) | Helio Lon | Sunspot Characteristics: Area ($10^{-6}$ hemi) | Extent (helio) | Spot Class | Spot Count | Mag Class | Flares: X-ray C | M | X | Optical S | 1 | 2 | 3 | 4 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | *Region 9073* | | | | | | | | | | | | |
| 05 Jul | S21E44 | 016 | 0020 | 04 | BXO | 003 | B | | | | | | | | |
| 06 Jul | S22E30 | 015 | 0060 | 07 | DAO | 007 | B | | | | | | | | |
| 07 Jul | S20E18 | 014 | 0060 | 08 | DAO | 011 | B | | | | | | | | |
| 08 Jul | S19E04 | 015 | 0150 | 12 | EAO | 023 | B | 3 | | | 14 | | | | |
| 09 Jul | S19W09 | 015 | 0160 | 12 | ESO | 016 | B | | | | | | | | |
| 10 Jul | S19W23 | 016 | 0170 | 12 | ESO | 018 | B | | | | 1 | | | | |
| 11 Jul | S19W35 | 015 | 0240 | 15 | EAI | 024 | B | | | | 2 | | | | |
| 12 Jul | S19W49 | 015 | 0270 | 12 | EAI | 011 | B | | | | | | | | |
| 13 Jul | S19W62 | 015 | 0280 | 13 | EAO | 009 | B | | | | | | | | |
| 14 Jul | S20W70 | 010 | 0220 | 14 | EAO | 008 | B | | | | 1 | | | | |
| 15 Jul | S18W85 | 012 | 0020 | 08 | BXO | 005 | B | | | | | | | | |
| | | | | | | | | 3 | 0 | 0 | 18 | 0 | 0 | 0 | 0 |

Still on Disk.
Absolute heliographic longitude: 015

## *Region Summary - continued*

| Date | Location ( ° Lat ° CMD) | Helio Lon | Sunspot Characteristics Area ($10^{-6}$ hemi) | Extent (helio) | Spot Class | Spot Count | Mag Class | Flares X-ray C | X-ray M | X-ray X | Optical S | Optical 1 | Optical 2 | Optical 3 | Optical 4 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | *Region 9074* | | | | | | | | | | | | | | |
| 05 Jul | N10E64 | 356 | 0000 | 00 | AXX | 001 | A | | | | | | | | |
| 06 Jul | N11E49 | 356 | 0000 | 00 | AXX | 001 | A | | | | | | | | |
| 07 Jul | N11E36 | 356 | | | | | | | | | 1 | | | | |
| 08 Jul | N13E30 | 349 | 0010 | 09 | BXO | 004 | B | | | | 1 | | | | |
| 09 Jul | N12E16 | 350 | 0020 | 07 | BXO | 005 | B | | | | | | | | |
| 10 Jul | N13E02 | 351 | 0020 | 04 | CSO | 004 | B | | | | | | | | |
| 11 Jul | N13W11 | 351 | | | | | | | | | | | | | |
| 12 Jul | N13W24 | 351 | | | | | | | | | | | | | |
| 13 Jul | N13W37 | 351 | | | | | | | | | | | | | |
| 14 Jul | N13W50 | 351 | | | | | | | | | | | | | |
| 15 Jul | N13W63 | 351 | | | | | | | | | | | | | |
| 16 Jul | N13W76 | 351 | | | | | | | | | | | | | |
| | | | | | | | | 0 | 0 | 0 | 2 | 0 | 0 | 0 | 0 |

Still on Disk.
Absolute heliographic longitude: 351

| Date | Location ( ° Lat ° CMD) | Helio Lon | Sunspot Characteristics Area ($10^{-6}$ hemi) | Extent (helio) | Spot Class | Spot Count | Mag Class | Flares X-ray C | X-ray M | X-ray X | Optical S | Optical 1 | Optical 2 | Optical 3 | Optical 4 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | *Region 9075* | | | | | | | | | | | | | | |
| 06 Jul | N06E64 | 341 | 0010 | 06 | BXO | 002 | B | | | | | | | | |
| 07 Jul | N06E54 | 338 | 0010 | 04 | BXO | 002 | B | | | | | | | | |
| 08 Jul | N06E43 | 336 | 0000 | 00 | AXX | 001 | A | | | | | | | | |
| 09 Jul | N06E31 | 336 | 0020 | 04 | DSO | 002 | B | | | | | | | | |
| 10 Jul | N06E17 | 336 | | | | | | | | | | | | | |
| 11 Jul | N06E04 | 336 | | | | | | | | | | | | | |
| 12 Jul | N06W09 | 336 | | | | | | | | | | | | | |
| 13 Jul | N06W22 | 336 | | | | | | | | | | | | | |
| 14 Jul | N06W35 | 336 | | | | | | | | | | | | | |
| 15 Jul | N06W48 | 336 | | | | | | | | | | | | | |
| 16 Jul | N06W61 | 336 | | | | | | | | | | | | | |
| | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

Still on Disk.
Absolute heliographic longitude: 336

## *Region Summary - continued*

| Date | Location ( ° Lat ° CMD) | Helio Lon | Sunspot Characteristics: Area ($10^{-6}$ hemi) | Extent (helio) | Spot Class | Spot Count | Mag Class | Flares: X-ray C | M | X | Optical S | 1 | 2 | 3 | 4 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | *Region 9076* | | | | | | | | | | | | | | |
| 06 Jul | S24E69 | 336 | 0050 | 02 | HSX | 001 | A | | | | | | | | |
| 07 Jul | S22E59 | 333 | 0030 | 01 | HSX | 001 | A | | | | | | | | |
| 08 Jul | S22E46 | 333 | 0030 | 01 | HSX | 001 | A | | | | | | | | |
| 09 Jul | S23E32 | 334 | 0020 | 01 | HSX | 001 | A | | | | | | | | |
| 10 Jul | S23E19 | 334 | 0020 | 01 | HSX | 001 | A | | | | | | | | |
| 11 Jul | S23E07 | 333 | 0010 | 03 | CSO | 003 | B | | | | | | | | |
| 12 Jul | S21W08 | 334 | 0020 | 04 | CSO | 002 | B | | | | | | | | |
| 13 Jul | S22W19 | 332 | 0000 | 00 | AXX | 001 | A | | | | | | | | |
| 14 Jul | S22W32 | 332 | | | | | | | | | | | | | |
| 15 Jul | S22W45 | 332 | | | | | | | | | | | | | |
| 16 Jul | S23W58 | 332 | 0000 | 02 | BXO | 002 | B | | | | | | | | |
| | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

Still on Disk.
Absolute heliographic longitude: 333

| Date | Location ( ° Lat ° CMD) | Helio Lon | Sunspot Characteristics: Area ($10^{-6}$ hemi) | Extent (helio) | Spot Class | Spot Count | Mag Class | Flares: X-ray C | M | X | Optical S | 1 | 2 | 3 | 4 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | *Region 9077* | | | | | | | | | | | | | | |
| 07 Jul | N18E72 | 320 | 0100 | 10 | DSO | 004 | B | | | | | | | | |
| 08 Jul | N18E64 | 315 | 0410 | 18 | FKI | 010 | B | 1 | | | 4 | | | | |
| 09 Jul | N18E55 | 311 | 0750 | 26 | FKI | 021 | BG | 4 | 1 | | 8 | 1 | | | |
| 10 Jul | N17E44 | 309 | 0950 | 25 | FKC | 028 | BGD | 1 | 3 | | 15 | 1 | 1 | | |
| 11 Jul | N18E33 | 307 | 1010 | 25 | FKC | 041 | BGD | 1 | 1 | 1 | 6 | 1 | 1 | | |
| 12 Jul | N17E16 | 310 | 0940 | 20 | FKC | 038 | BGD | 1 | 1 | 1 | 8 | 1 | 1 | | |
| 13 Jul | N17E03 | 310 | 0730 | 21 | FKC | 042 | BGD | | 1 | | 6 | 1 | | | |
| 14 Jul | N18W09 | 309 | 0460 | 21 | FKC | 057 | BGD | | 1 | 1 | 3 | 1 | | 1 | |
| 15 Jul | N18W21 | 308 | 0420 | 21 | FKI | 062 | BGD | 2 | 1 | | 9 | | | | |
| 16 Jul | N18W36 | 310 | 0450 | 20 | FKI | 045 | BG | 1 | 1 | | 5 | | 1 | | |
| | | | | | | | | 11 | 10 | 3 | 64 | 6 | 4 | 1 | 0 |

Still on Disk.
Absolute heliographic longitude: 310

## *Region Summary - continued*

| Date | Location ( ° Lat ° CMD) | Helio Lon | Sunspot Characteristics: Area ($10^{-6}$ hemi) | Extent (helio) | Spot Class | Spot Count | Mag Class | Flares: X-ray C | X-ray M | X-ray X | Optical S | Optical 1 | Optical 2 | Optical 3 | Optical 4 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | *Region 9078* | | | | | | | | | | | | |
| 07 Jul | S13E74 | 318 | 0040 | 01 | CAO | 002 | B | | | | | | | | |
| 08 Jul | S13E57 | 322 | 0030 | 01 | HRX | 002 | A | | | | | | | | |
| 09 Jul | S14E44 | 322 | 0020 | 06 | BXO | 005 | B | | | | | | | | |
| 10 Jul | S14E28 | 325 | 0030 | 01 | HRX | 001 | A | | | | | | | | |
| 11 Jul | S14E14 | 326 | 0010 | 01 | HRX | 003 | A | | | | | | | | |
| 12 Jul | S14E01 | 326 | | | | | | | | | | | | | |
| 13 Jul | S12W09 | 322 | 0020 | 07 | CAO | 005 | B | | | | | | | | |
| 14 Jul | S12W22 | 322 | | | | | | | | | | | | | |
| 15 Jul | S12W35 | 322 | | | | | | | | | 3 | | | | |
| 16 Jul | S12W48 | 322 | | | | | | | | | | | | | |
| | | | | | | | | 0 | 0 | 0 | 3 | 0 | 0 | 0 | 0 |

Still on Disk.
Absolute heliographic longitude: 326

| | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | *Region 9079* | | | | | | | | | | | | |
| 09 Jul | S29E65 | 301 | 0070 | 02 | HSX | 001 | A | | | | | | | | |
| 10 Jul | S29E51 | 302 | 0070 | 02 | HSX | 001 | A | | | | | | | | |
| 11 Jul | S28E39 | 301 | 0070 | 02 | HAX | 001 | A | | | | | | | | |
| 12 Jul | S28E25 | 301 | 0060 | 01 | HAX | 001 | A | | | | | | | | |
| 13 Jul | S28E13 | 300 | 0070 | 02 | HSX | 001 | A | | | | | | | | |
| 14 Jul | S28E01 | 299 | 0060 | 02 | HSX | 001 | A | | | | | | | | |
| 15 Jul | S28W12 | 299 | 0060 | 02 | HSX | 001 | A | | | | | | | | |
| 16 Jul | S26W25 | 299 | 0060 | 02 | HSX | 001 | A | | | | | | | | |
| | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

Still on Disk.
Absolute heliographic longitude: 299

| | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | *Region 9080* | | | | | | | | | | | | |
| 09 Jul | N26E80 | 286 | 0060 | 01 | HSX | 001 | A | | | | | | | | |
| 10 Jul | N25E68 | 285 | 0030 | 01 | HSX | 001 | A | | | | 1 | | | | |
| 11 Jul | N26E53 | 287 | 0050 | 01 | HAX | 001 | A | | | | 1 | | | | |
| 12 Jul | N25E40 | 286 | 0030 | 01 | HSX | 001 | A | | | | 1 | | | | |
| 13 Jul | N24E25 | 288 | 0040 | 07 | CSO | 003 | B | | | | | | | | |
| 14 Jul | N26E13 | 287 | 0020 | 01 | HSX | 001 | A | | | | | | | | |
| 15 Jul | N26E02 | 285 | 0020 | 04 | CSO | 003 | B | | | | | | | | |
| 16 Jul | N26W10 | 284 | 0020 | 05 | CRO | 007 | B | | | | | | | | |
| | | | | | | | | 0 | 0 | 0 | 3 | 0 | 0 | 0 | 0 |

Still on Disk.
Absolute heliographic longitude: 285

## *Region Summary - continued*

| Date | Location ( ° Lat ° CMD) | Helio Lon | Sunspot Characteristics Area ($10^{-6}$ hemi) | Extent (helio) | Spot Class | Spot Count | Mag Class | Flares X-ray C | X-ray M | X-ray X | Optical S | Optical 1 | Optical 2 | Optical 3 | Optical 4 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | *Region 9081* | | | | | | | | | | | | | | |
| 11 Jul | N02E69 | 271 | 0100 | 10 | DSO | 005 | B | | | | 3 | | | | |
| 12 Jul | N02E55 | 271 | 0170 | 09 | DAO | 006 | B | | | | | | | | |
| 13 Jul | N01E41 | 272 | 0180 | 09 | DAO | 011 | B | | | | 7 | | | | |
| 14 Jul | N02E29 | 271 | 0160 | 10 | DAO | 014 | B | | | | | | | | |
| 15 Jul | N02E16 | 271 | 0120 | 09 | DAO | 012 | B | | | | 1 | | | | |
| 16 Jul | N03E02 | 272 | 0090 | 08 | DAO | 011 | B | | | | | | | | |
| | | | | | | | | 0 | 0 | 0 | 11 | 0 | 0 | 0 | 0 |

Still on Disk.
Absolute heliographic longitude: 272

| | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | *Region 9082* | | | | | | | | | | | | | | |
| 11 Jul | S12E39 | 301 | 0010 | 01 | AXX | 001 | A | | | | | | | | |
| 12 Jul | S12E21 | 305 | 0030 | 06 | CSO | 008 | B | | | | | | | | |
| 13 Jul | S11E06 | 307 | 0070 | 08 | DAO | 009 | B | | | | | | | | |
| 14 Jul | S11W06 | 306 | 0070 | 08 | CAO | 011 | B | | | | 3 | | | | |
| 15 Jul | S10W19 | 306 | 0040 | 06 | CAO | 009 | B | | | | 2 | 1 | | | |
| 16 Jul | S10W33 | 307 | 0020 | 06 | CSO | 008 | B | 1 | | | 1 | | | | |
| | | | | | | | | 1 | 0 | 0 | 6 | 1 | 0 | 0 | 0 |

Still on Disk.
Absolute heliographic longitude: 307

| | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | *Region 9083* | | | | | | | | | | | | | | |
| 11 Jul | S18W21 | 001 | 0010 | 03 | BXO | 002 | B | | | | | | | | |
| 12 Jul | S18W34 | 001 | | | | | | | | | | | | | |
| 13 Jul | S18W47 | 001 | | | | | | | | | | | | | |
| 15 Jul | S18W73 | 001 | | | | | | | | | | | | | |
| 16 Jul | S18W86 | 001 | | | | | | | | | | | | | |
| | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

Still on Disk.
Absolute heliographic longitude: 001

| | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | *Region 9084* | | | | | | | | | | | | | | |
| 12 Jul | N20E35 | 291 | 0020 | 04 | CRO | 003 | B | | | | | | | | |
| 13 Jul | N19E22 | 291 | 0020 | 03 | DSO | 002 | B | | 1 | | 3 | | | | |
| 14 Jul | N21E09 | 291 | 0020 | 05 | CAO | 002 | B | | | | 2 | | | | |
| 15 Jul | N21W04 | 291 | | | | | | | | | | | | | |
| 16 Jul | N20W12 | 286 | 0010 | 04 | BXO | 004 | B | | | | 1 | | | | |
| | | | | | | | | 0 | 1 | 0 | 6 | 0 | 0 | 0 | 0 |

Still on Disk.
Absolute heliographic longitude: 291

## *Region Summary - continued*

| Date | Location ( ° Lat ° CMD) | Helio Lon | Sunspot Characteristics Area ($10^{-6}$ hemi) | Extent (helio) | Spot Class | Spot Count | Mag Class | Flares X-ray C | X-ray M | X-ray X | Optical S | Optical 1 | Optical 2 | Optical 3 | Optical 4 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | *Region 9085* | | | | | | | | | | | | | | |
| 12 Jul | N13E69 | 257 | 0050 | 02 | DRO | 002 | B | | | | 1 | | | | |
| 13 Jul | N13E59 | 254 | 0120 | 10 | DAO | 009 | B | 1 | 1 | | 15 | 1 | | | |
| 14 Jul | N14E47 | 253 | 0170 | 10 | DAI | 017 | BG | | | | 5 | 1 | | | |
| 15 Jul | N14E33 | 254 | 0180 | 09 | DAO | 019 | BG | 2 | | | 3 | | | | |
| 16 Jul | N14E20 | 254 | 0270 | 11 | EKI | 023 | BG | | | | 2 | | | | |
| | | | | | | | | 3 | 1 | 0 | 26 | 2 | 0 | 0 | 0 |
| Still on Disk. | | | | | | | | | | | | | | | |
| Absolute heliographic longitude: | | 254 | | | | | | | | | | | | | |
| | *Region 9086* | | | | | | | | | | | | | | |
| 13 Jul | S10W40 | 353 | 0010 | 03 | BXO | 003 | B | | | | | | | | |
| 14 Jul | S10W53 | 353 | | | | | | | | | | | | | |
| 15 Jul | S10W66 | 353 | | | | | | | | | | | | | |
| 16 Jul | S10W79 | 353 | | | | | | | | | | | | | |
| | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Still on Disk. | | | | | | | | | | | | | | | |
| Absolute heliographic longitude: | | 353 | | | | | | | | | | | | | |
| | *Region 9087* | | | | | | | | | | | | | | |
| 14 Jul | S12E71 | 229 | 0170 | 05 | HAX | 002 | A | | | | | | | | |
| 15 Jul | S13E58 | 229 | 0240 | 06 | CAO | 005 | B | 2 | | | 9 | | | | |
| 16 Jul | S13E44 | 230 | 0210 | 07 | DAO | 015 | BG | 5 | | | 10 | 2 | | | |
| | | | | | | | | 7 | 0 | 0 | 19 | 2 | 0 | 0 | 0 |
| Still on Disk. | | | | | | | | | | | | | | | |
| Absolute heliographic longitude: | | 230 | | | | | | | | | | | | | |
| | *Region 9088* | | | | | | | | | | | | | | |
| 14 Jul | N23E25 | 275 | 0010 | 04 | BXO | 003 | B | | | | 1 | | | | |
| 15 Jul | N20E16 | 271 | 0020 | 05 | BXO | 012 | B | | | | 1 | | | | |
| 16 Jul | N19E05 | 269 | 0060 | 06 | DAO | 014 | B | | | | 1 | | | | |
| | | | | | | | | 0 | 0 | 0 | 3 | 0 | 0 | 0 | 0 |
| Still on Disk. | | | | | | | | | | | | | | | |
| Absolute heliographic longitude: | | 269 | | | | | | | | | | | | | |
| | *Region 9089* | | | | | | | | | | | | | | |
| 15 Jul | N11E41 | 246 | 0000 | 00 | AXX | 001 | A | | | | | | | | |
| 16 Jul | N12E30 | 244 | 0000 | 00 | AXX | 001 | A | | | | | | | | |
| | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Still on Disk. | | | | | | | | | | | | | | | |
| Absolute heliographic longitude: | | 244 | | | | | | | | | | | | | |

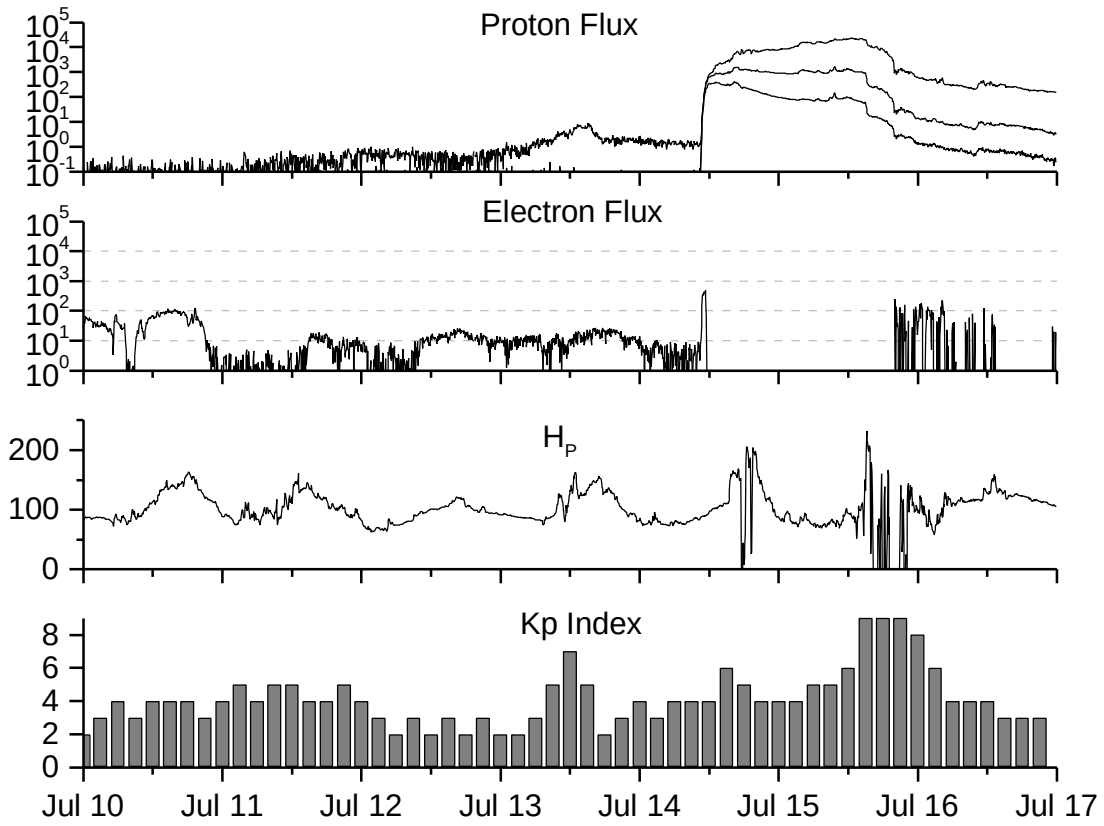
## *Region Summary - continued*

| Date | Location ( ° Lat ° CMD) | Helio Lon | Area ($10^{-6}$ hemi) | Extent (helio) | Spot Class | Spot Count | Mag Class | Flares: X-ray C | X-ray M | X-ray X | Optical S | Optical 1 | Optical 2 | Optical 3 | Optical 4 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | *Region 9090* | | | | | | | | | | | | | | |
| 16 Jul | N10E70 | 204 | 0090 | 10 | DSO | 006 | B | | 2 | | 3 | 2 | | | |
| | | | | | | | | 0 | 2 | 0 | 3 | 2 | 0 | 0 | 0 |
| Still on Disk. | | | | | | | | | | | | | | | |
| Absolute heliographic longitude: 204 | | | | | | | | | | | | | | | |
| | *Region 9091* | | | | | | | | | | | | | | |
| 16 Jul | S07E69 | 205 | 0030 | 02 | HSX | 001 | A | 1 | | | | 1 | | | |
| | | | | | | | | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 0 |
| Still on Disk. | | | | | | | | | | | | | | | |
| Absolute heliographic longitude: 205 | | | | | | | | | | | | | | | |

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

| | Sunspot Numbers | | | | | Radio Flux | | Geomagnetic | |
|---|---|---|---|---|---|---|---|---|---|
| | Observed values | | Ratio | Smooth values | | *Penticton | Smooth | Planetary | Smooth |
| Month | SWO | RI | RI/SWO | SWO | RI | 10.7 cm | Value | Ap | Value |
| | | | | | **1998** | | | | |
| July | 98.3 | 66.6 | 0.68 | 90.3 | 65.5 | 114.0 | 120.3 | 11 | 12.2 |
| August | 118.6 | 92.2 | 0.78 | 93.7 | 67.8 | 136.0 | 124.1 | 18 | 12.4 |
| September | 119.0 | 92.9 | 0.78 | 96.1 | 69.5 | 138.3 | 126.8 | 13 | 12.6 |
| October | 77.0 | 55.5 | 0.72 | 97.7 | 70.5 | 117.3 | 127.9 | 13 | 12.8 |
| November | 99.5 | 74.0 | 0.74 | 101.3 | 73.0 | 140.2 | 130.0 | 16 | 12.4 |
| December | 120.8 | 81.9 | 0.68 | 108.8 | 77.9 | 150.1 | 134.3 | 08 | 11.9 |
| | | | | | **1999** | | | | |
| January | 94.3 | 62.0 | 0.66 | 116.5 | 82.6 | 142.6 | 139.0 | 10 | 11.7 |
| February | 93.4 | 66.3 | 0.71 | 120.2 | 84.6 | 142.0 | 142.6 | 12 | 11.6 |
| March | 100.5 | 68.8 | 0.68 | 120.5 | 83.8 | 126.3 | 144.0 | 14 | 11.7 |
| April | 92.9 | 63.7 | 0.69 | 123.8 | 85.5 | 117.2 | 145.8 | 12 | 12.2 |
| May | 140.5 | 106.4 | 0.76 | 131.7 | 90.5 | 148.6 | 149.9 | 08 | 12.4 |
| June | 208.3 | 137.7 | 0.66 | 136.0 | 93.1 | 169.8 | 152.9 | 07 | 12.4 |
| July | 169.2 | 113.5 | 0.67 | 138.0 | 94.4 | 165.6 | 154.4 | 10 | 12.6 |
| August | 136.1 | 93.7 | 0.69 | 142.8 | 97.5 | 170.8 | 156.3 | 15 | 12.9 |
| September | 107.4 | 71.5 | 0.66 | 150.0 | 102.3 | 135.7 | 161.0 | 19 | 12.8 |
| October | 167.7 | 116.7 | 0.69 | 158.5 | 107.7 | 164.8 | 167.2 | 19 | 12.7 |
| November | 199.3 | 133.2 | 0.67 | 164.7 | 110.9 | 191.5 | 171.5 | 14 | 13.2 |
| December | 123.5 | 86.4 | 0.70 | 165.9 | 110.9 | 169.8 | 173.4 | 10 | 13.9 |
| | | | | | **2000** | | | | |
| January | 140.8 | 90.2 | 0.64 | | | 158.1 | | 13 | |
| February | 161.9 | 112.3 | 0.69 | | | 173.2 | | 15 | |
| March | 203.6 | 138.2 | 0.68 | | | 208.2 | | 09 | |
| April | 193.4 | 125.3 | 0.65 | | | 184.2 | | 15 | |
| May | 188.8 | 120.8 | 0.64 | | | 184.5 | | 16 | |
| June | 190.3 | 124.9 | 0.66 | | | 178.8 | | 16 | |

**NOTE:** All smoothed values after June 1999 and monthly values after December 1999 are preliminary estimates. The lowest smoothed sunspot index number for Cycle 22, RI = 8.0, occurred in May 1996. The highest smoothed sunspot number for Cycle 22, RI= 158.5, occurred July 1989. * After June 1991, the 10.7 cm radio flux data source is Penticton, B.C. Canada. Prior to that, it was Ottawa.




*Weekly Geosynchronous Satellite Environment Summary*
*Week Beginning 10 July 2000*

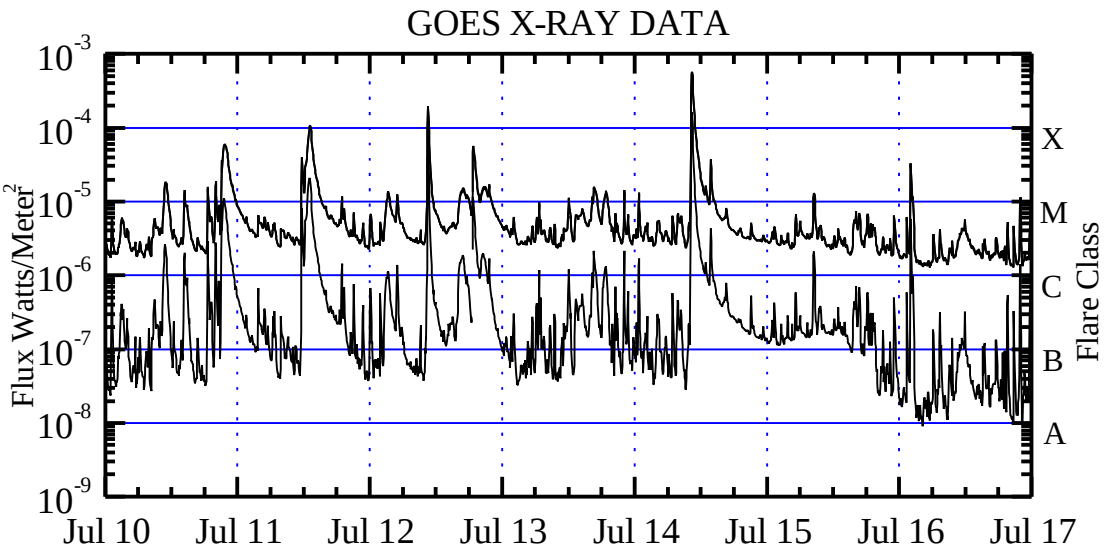
*Protons* plot contains the five-mine averaged integral proton flux (protons/cm$^2$–sec –sr ) as measured by GOES-8 (W75) for each of three energy thresholds: greater than 10, 50, and 100 MeV.

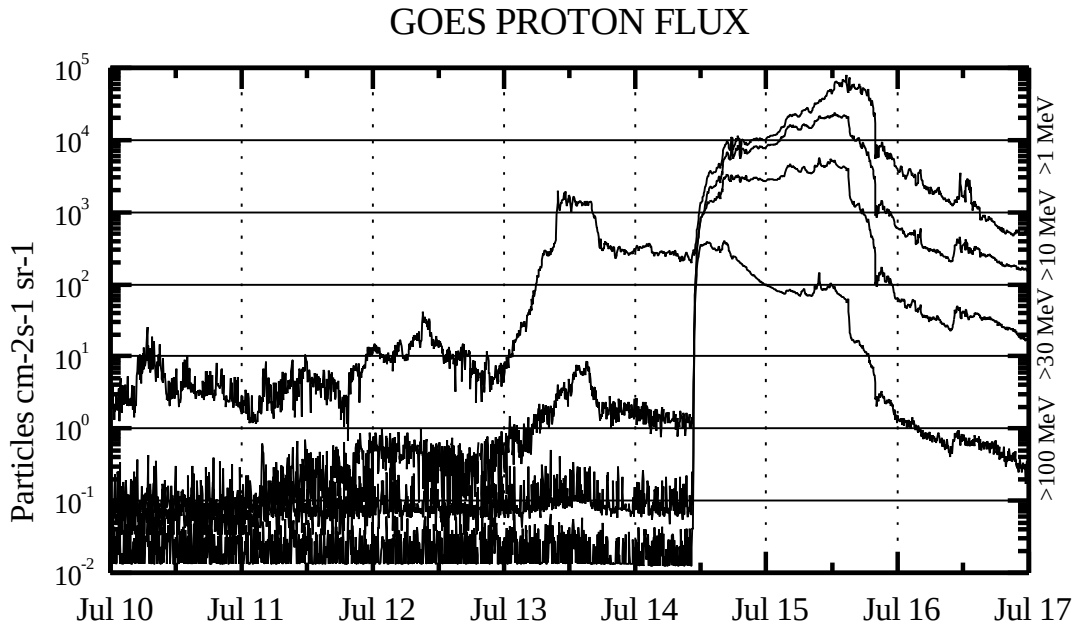
*Electrons* plot contains the five-mine averaged integral electron flux (electrons/cm$^2$–sec –sr) with energies greater than 2 MeV at GOES-8.

*Hp* plot contains the five mine averaged magnetic field H - component in nanoteslas (nT) as measured by GOES-8. The H component is parallel to the spin axis of the satellite, which is nearly parallel to the Earth's rotation axis.

*Kp* plot contains the estimated planetary 3-hour K-index (derived by the USAF 55$^{th}$ Space Weather Squadron) in real time from magnetometers at Meanook, Canada; Sitka, AK; Glenlea, Canada; St. Johns, Canada; Ottawa, Canada; Newport, WA; Fredericksburg, VA; Boulder, CO; Fresno, CA and Heartland, UK. These data are made available through cooperation from the Geological Survey of Canada (GSC) and the US Geological Survey. These may differ from the final Kp values derived from a more extensive network of magnetometers.

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




*Weekly GOES Satellite X-ray and Proton Plots*

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

Proton plot contains the five mine averaged integral proton flux (protons/$cm^2$ –sec-sr) as measured by GOES-8 (W75) for each of the energy thresholds: >1, >10, >30 and >100 MeV. P10 event threshold is 10 pfu (protons/$cm^2$-sec-sr) at greater than 10 MeV.