

Solar Activity ranged from moderate to high levels. Activity on 27 – 29 October was at high levels with most of the activity originating in Region 486 (S16, L=285, class/area Fkc/2610 on 29 October) and Region 488 (N08, L=289 class/area Fkc/1750 on 30 October). An M6/Sf occurred on 27 October from Region 486. On 28 October, Region 486 produced one of the largest flares of this solar cycle, an X17/4B proton flare peaking at 1110 UTC on the 28th. This flare had intense radio bursts including a 245 MhZ burst near 500,000 sfu, a Tenflare of 13,000 sfu and Type II (1250 km/s) and Type IV radio sweeps. An extremely fast (near 2000 km/s), earthward directed halo CME was observed on SOHO/LASCO imagery. On the 29th, Region 486 produced another major flare, an X10 at 29/2049 UTC. Once again, intense radio emissions accompanied this flare, including a 360,000 sfu burst at 245 MHz, a 2500 sfu Tenflare, and strong Type II/IV radio sweeps. A very fast (over 1900 km/s) earth-directed full halo CME was observed on LASCO imagery. Throughout the period Region 486 maintained its tremendous size and magnetic complexity, with strong delta configurations. On 29 October, the sunspot area of Region 486 grew to 2610 millionths making it the largest spot group observed to date in this solar cycle. Moderate level activity was observed on 30 October – 01 November due to minor M-class flares from Regions 486 and 488. Region 484 (N04, L=354, class/area Ekc/1750 on 22 October) rotated beyond the west limb on 30 October. Region 488 developed very rapidly near center disk on 27 October and exhibited rapid growth over the next three days, reaching 1750 millionths in size. Despite its impressive size activity from Region 488 consisted of mainly minor M-class events. At the end of the period Region 486 produced another major event, an X8/2b flare at 1725 UTC on 02 November. This flare was associated with a Tenflare of 7,700 sfu, a 245 MhZ radio burst of 24,000 sfu, Type II (1691 km/s) and Type IV (70 min.) radio sweeps. LASCO imagery indicated a halo CME associated with the X8. At the time of this report issue (04 November) Regions 486 and 488 produced a couple of X-class event on 03-04 November; an X3/2b from Region 486 on the 3rd, an X2/2f from Region 488 on the 3rd, and an X17-plus at 1953 UTC (saturation ended, exact peak not known) on the 4th. The X17-plus flare saturated the GOES X-ray instrument for 12 minutes. Further detail will be provided in next week's summary.

Solar wind data were partially available from the NASA Advanced Composition Explorer (ACE) spacecraft during the summary period. The large proton events mentioned below contaminated the SWEPAM and EPAM instruments on board ACE making the data unreliable during 28 – 30 October and again on 02- 03 November. Solar wind events during the period were closely associated with geomagnetic activity and are summarized below with the geomagnetic activity.

A number of proton events occurred this period. First, the proton event that began last summary period on 26 October, and ended at 27/1910 UTC. Second, the X17 flare from the 28th produced a greater than 10 MeV and greater than 100 MeV proton event. The greater than 100 MeV event began at 18/1150 UTC, reached a peak value of 186 pfu at 29/0015 UTC, and ended at 31/0145 UTC. The greater than 10 MeV event began at 28/1240 UTC, max value of 29,500 pfu at 29/0615 UTC, and ended at 01/1310 UTC. This 10 MeV proton event is the second largest, to date in this solar cycle. A secondary enhancement of greater than 10 MeV and 100 MeV protons was observed late on 29 October due to the X10 flare. The greater than 10 MeV flux increased to a secondary maximum of 3300 pfu at 30/1935 UTC and the greater than 100 MeV flux increased to 110 pfu at 29/2310 UTC. Third, a greater than 10 MeV proton flux exceeded event threshold at 02/1105 UTC due to the M3 flare from Region 486 and reached a peak value of 30 pfu at 1415 UTC. Before this proton event ended the X8 flare at 1725 on the 2nd increased the greater than 10 MeV proton flux to new maximums. Greater than 10 MeV flux reached 1570 pfu at 03/0815 UTC and the event is still in progress as of the time of this report (04 November). The greater than 100 MeV proton flux due to the X8 event began at 02/1740 UTC, reached a peak value 49 pfu at 02/1905 UTC, and ended at 03/1720 UTC.

The greater than 2 MeV electron flux at geosynchronous orbit reached high levels on 01 – 02 November. From 28 – 31 October the 2 MeV data from GOES-11 and GOES-10 were unreliable due to solar radiation contamination of the instrument.



Geomagnetic activity ranged from quiet to severe storm levels. Activity was at quiet to active levels from 27 – 28 October. A shock and CME associated with the X1 flare on the 26th passed the ACE spacecraft at around 0130 UTC on 28 October. Solar wind speed rose to near 800 km/s, but Bz stayed northward and the geomagnetic field was at active levels. The powerful shock and CME from the X17/4b flare on the 28th, passed ACE at 0559 UTC, and impacted Earth's magnetic field at 0613 UTC on 29 October with a very strong sudden impulse. The sudden impulse measured 140 nT on the Boulder magnetometer. The transit time for this CME was around 19 hours, making it one of the fastest on record. Strong southward IMF Bz initiated severe (K9) storming at middle and high latitudes. Mostly northward Bz occurred following the initial shock, however major to severe storming persisted (K7). A sharp southward turn in the Bz occurred at around 1800 UTC on the 29th ending the day with severe storming (K8-9). The intense geomagnetic storming continued through the first half of 30 October. Severe (K8-9) levels were observed during the 00 – 06 UTC period. A short-lived "lull" (K5-6) in activity preceded the onset of another severe geomagnetic storm. The very fast CME from the X10 flare at 29/2049 UTC impacted the magnetic field at around 1600 UTC on 30 October – another fast 19-hour transit from Sun to Earth. GOES-10, 11, and 12 geosynchronous satellites experienced magnetopause crossings lasting over three hours in duration. Sustained southward IMF Bz in the -15 to -30 nT and a total IMF measurement near 40 nT as measured at ACE produced severe storming after 1600 UTC on 30 October. Bz rotated northward early on 31 October and by midday on 31 October, geomagnetic activity had declined to active levels. Activity on 01 – 02 November was predominantly at unsettled to active levels due to the declining but still elevated solar wind speed (600 – 1000 km/s).

Space Weather Outlook 05 November - 01 December 2003

Solar activity is expected to range from low to high levels. Regions 486 and 488 have the potential for M and X-class activity until they rotate beyond the west limb on 04 – 05 November. Regions 484, 486, and 488 are due to return to the visible disk on 12, 17, and 18 November, respectively. Activity after the 12th is expected to range from low to high levels.

Currently a greater than 10 MeV proton event is in progress and was further enhanced due to the X17-plus flare, and is expected to end early on 07 November. Additional proton producing flares are possible until Regions 486 and 488 are well beyond the west limb, after 06 November. Proton events are possible once Region 484 returns to the visible disk on 12 November.

The greater than 2 MeV electron flux at geosynchronous orbit is expected to reach high levels on 12 – 19 November due to a large returning coronal hole

The geomagnetic field is expected to range from quiet to major storm levels during the period. A CME from the X17-plus event is expected to arrive on day two or three of the period with major storm levels possible. A large coronal hole is due to return on 09 – 18 November and is expected to produce major storm levels. Major flare activity from returning Region 484, 486, and 488 may produce severe storm levels during the second half of the period.



Daily Solar Data

Date	Radio Flux 10.7 cm	Sun spot No.	Sunspot Area (10 ⁻⁶ hemi.)	X-ray Background	Flares							
					X-ray Flux			Optical				
					C	M	X	S	1	2	3	4
27 October	257	238	4270	C3.6	8	5	0	31	1	1	0	0
28 October	274	230	4520	C3.2	5	0	1	31	4	1	0	1
29 October	279	330	5160	C3.3	4	2	1	16	2	1	0	0
30 October	271	293	5690	C2.8	6	2	0	2	2	0	0	0
31 October	249	266	4420	C1.8	7	2	0	12	0	0	0	0
01 November	210	277	4170	C1.8	9	3	0	10	1	0	0	0
02 November	190	174	4050	C1.9	1	2	1	9	0	1	0	0

Daily Particle Data

Date	Proton Fluence (protons/cm ² -day-sr)			Electron Fluence (electrons/cm ² -day-sr)		
	>1MeV	>10MeV	>100MeV	>.6MeV	>2MeV	>4MeV
27 October	5.0E+7	9.6E+6	1.9E+4		1.2E+7	
28 October	2.8E+8	1.8E+8	5.2E+6		4.8E+6	
29 October	3.0E+9	7.7E+8	4.2E+6		4.7E+6	
30 October	7.7E+8	1.4E+8	2.6E+6		1.9E+7	
31 October	9.8E+7	7.0E+6	2.2E+4		3.4E+6	
01 November	1.6E+7	7.6E+5	2.5E+3		1.5E+8	
02 November	3.1E+7	1.5E+7	5.0E+5		4.3E+8	

Daily Geomagnetic Data

Date	Middle Latitude Fredericksburg		High Latitude College		Estimated Planetary	
	A	K-indices	A	K-indices	A	K-indices
	27 October	13	3-5-3-2-2-2-1-0	24	4-4-5-5-2-3-2-3	15
28 October	15	2-4-3-3-2-3-3-3	28	2-3-5-5-3-5-4-3	20	3-4-4-4-3-4-3-4
29 October	199	3-3-9-6-7-7-9-9	197	5-4-9-8-7-8-9-6	189	4-3-9-8-7-7-9-8
30 October	144	7-5-4-4-4-6-9-9	124	6-5-4-6-7-8-7-8	162	8-7-6-5-5-8-9-9
31 October	73	8-7-6-4-5-3-3-3	69	6-6-6-6-6-5-6-4	93	8-7-7-6-6-5-4-4
01 November	16	5-4-3-1-2-2-1-3	32	4-4-5-5-5-4-3-3	21	4-5-4-3-3-3-3-3
02 November	11	3-3-2-2-2-3-3-2	27	4-3-3-4-5-5-4-2	18	3-4-3-3-3-4-4-3



Alerts and Warnings Issued

<u>Date & Time of Issue</u>	<u>Type of Alert or Warning</u>	<u>Date & Time of Event UT</u>
27 Oct 0015	6 - 245 MHz Radio Bursts	26 Oct
27 Oct 0015	1 - 245 MHz Radio Noise Storm	26 Oct
27 Oct 0315	WARNING: Proton 100MeV Integral Flux > 1pfu	27 Oct 0315 - 1500
27 Oct 0828	ALERT: Type IV Radio Emission	27 Oct 0819
27 Oct 0914	SUMMARY: 10cm Radio Burst	27 Oct 0821
27 Oct 0926	ALERT: X-Ray Flux > M5	27 Oct 0529
27 Oct 0940	SUMMARY: X-ray Event > M5	27 Oct 0927
27 Oct 1237	ALERT: X-Ray Flux > M5	27 Oct 1237
27 Oct 1307	SUMMARY: X-ray Event > M5	27 Oct 1243
27 Oct 1505	SUMMARY: Proton Event 10MeV Integral Flux > 100pfu	26 Oct 2235
27 Oct 1528	WARNING: Proton 10MeV Integral Flux > 10pfu	27 Oct 1528 - 1800
27 Oct 1616	WARNING: Geomagnetic K= 4	27 Oct 1700 - 2359
27 Oct 1746	ALERT: Geomagnetic K= 4	27 Oct 1736
27 Oct 1759	EXT WARNING: Proton 10MeV Integral Flux > 10pfu	27 Oct 1528 - 2359
27 Oct 2240	WATCH: Geomagnetic A ≥ 20	28 Oct
27 Oct 2241	WATCH: Geomagnetic A ≥ 20	29 Oct
28 Oct 0008	8 - 245 MHz Radio Bursts	27 Oct
28 Oct 0008	1 - 245 MHz Radio Noise Storm	27 Oct
28 Oct 0205	WARNING: Geomagnetic Sudden Impulse expected	28 Oct 0240 - 0330
28 Oct 0226	SUMMARY: Geomagnetic Sudden Impulse	28 Oct 0207
28 Oct 0241	SUMMARY: Proton Event 10MeV Integral Flux > 10pfu	26 Oct 2235
28 Oct 0443	WARNING: Geomagnetic K= 4	28 Oct 0444 - 1500
28 Oct 0448	ALERT: Geomagnetic K= 4	28 Oct 0446
28 Oct 1040	ALERT: X-Ray Flux exceeded M5	28 Oct 1035
28 Oct 1046	ALERT: Type IV Radio Emission	28 Oct 1033
28 Oct 1137	SUMMARY: X-ray Event > X10	28 Oct 1110
28 Oct 1146	WARNING: Proton 100MeV Integral Flux > 1pfu	28 Oct 1147 - 1200
28 Oct 1151	ALERT: Proton Event 100MeV Integral Flux > 1pfu	28 Oct 1150
28 Oct 1157	EXT WARNING: Proton 100MeV Integral Flux > 1pfu	28 Oct 1147 - 1500
28 Oct 1201	WARNING: Proton 10MeV Integral Flux > 10pfu	28 Oct 1201 - 1500
28 Oct 1213	ALERT: Type II Radio Emission	28 Oct 1102
28 Oct 1220	ALERT: Type IV Radio Emission	28 Oct 1126
28 Oct 1223	ALERT: Proton Event 10MeV Integral Flux > 10pfu	28 Oct 1215
28 Oct 1248	ALERT: Proton Event 10MeV Integral Flux > 100pfu	28 Oct 1240
28 Oct 1341	ALERT: Proton Event 10MeV Integral Flux > 1000pfu	28 Oct 1335
28 Oct 1407	ALERT: Type IV Radio Emission	28 Oct 1349
28 Oct 1455	EXT WARNING: Proton 10MeV Integral Flux > 10pfu	28 Oct 1201 -30 Oct 1200
28 Oct 1457	EXT WARNING: Proton 100MeV Integral Flux >1pfu	28 Oct 1147 -29 Oct 1500
28 Oct 1608	EXTENDED WARNING: Geomagnetic K= 4	28 Oct 0444 - 1600
28 Oct 1628	SUMMARY: 10cm Radio Burst	28 Oct 1014
28 Oct 1704	EXTENDED WARNING: Geomagnetic K= 4	28 Oct 0444 - 29 Oct 1600
28 Oct 1713	SUMMARY: 10cm Radio Burst	28 Oct 1530
28 Oct 2038	WATCH: Geomagnetic A ≥ 50	29 Oct
28 Oct 2039	WATCH: Geomagnetic A ≥ 100	30 Oct
29 Oct 0024	11 - 245 MHz Radio Bursts	28 Oct
29 Oct 0024	1 - 245 MHz Radio Noise Storm	28 Oct
29 Oct 0046	ALERT: Proton Event 10MeV Integral Flux > 10000pfu	29 Oct 0025
29 Oct 0252	WARNING: Geomagnetic K= 5	29 Oct 0300 - 1500
29 Oct 0559	ALERT: Type IV Radio Emission	29 Oct 0535
29 Oct 0607	WARNING: Geomagnetic Sudden Impulse	29 Oct 0620 - 0630
29 Oct 0609	WARNING: Geomagnetic K= 6	29 Oct 0630 - 1500
29 Oct 0620	ALERT: Geomagnetic K= 6	29 Oct 0613
29 Oct 0623	WARNING: Geomagnetic K ≥ 7	29 Oct 0700 - 1500



Alerts and Warnings Issued - continued.

<u>Date & Time of Issue</u>	<u>Type of Alert or Warning</u>	<u>Date & Time of Event UT</u>
29 Oct 0633	SUMMARY: Geomagnetic Sudden Impulse	29 Oct 0613
29 Oct 0644	SUMMARY: 10cm Radio Burst	29 Oct 0440
29 Oct 0649	ALERT: Geomagnetic K-index of 7	29 Oct 0648
29 Oct 0745	ALERT: Geomagnetic K= 8	29 Oct 0744
29 Oct 0841	ALERT: Geomagnetic K= 9	29 Oct 0839
29 Oct 0921	ALERT: Geomagnetic K= 6	29 Oct 0919
29 Oct 1128	ALERT: Geomagnetic K= 7	29 Oct 1126
29 Oct 1425	SUMMARY: Proton Event 10MeV Integral Flux > 10000pfu	29 Oct 0030
29 Oct 1428	ALERT: Geomagnetic K= 6	29 Oct 1426
29 Oct 1459	SUMMARY: Proton Event 10MeV Integral Flux > 1000pfu	28 Oct 1335
29 Oct 1506	EXT WARNING: Geomagnetic K= 7	29 Oct 0700 - 2359
29 Oct 1509	EXT WARNING: Proton 100MeV Integral Flux > 1pfu	28 Oct 1147 - 29 Oct 2359
29 Oct 1522	ALERT: Geomagnetic K= 6	29 Oct 1518
29 Oct 1605	ALERT: Geomagnetic K= 7	29 Oct 1602
29 Oct 1821	ALERT: Geomagnetic K= 6	29 Oct 1817
29 Oct 1842	ALERT: Geomagnetic K= 7	29 Oct 1840
29 Oct 1924	ALERT: Geomagnetic K= 8	29 Oct 1922
29 Oct 1938	ALERT: Proton Event 10MeV Integral Flux > 1000pfu	29 Oct 1920
29 Oct 2043	ALERT: X-Ray Flux exceeded M5	29 Oct 2041
29 Oct 2059	ALERT: Geomagnetic K= 9	29 Oct 2056
29 Oct 2116	ALERT: Type II Radio Emission	29 Oct 2044
29 Oct 2119	SUMMARY: X-ray Event exceeded X10	29 Oct 2049
29 Oct 2120	ALERT: Type IV Radio Emission	29 Oct 2057
29 Oct 2132	ALERT: Geomagnetic K= 6	29 Oct 2129
29 Oct 2148	ALERT: Geomagnetic K= 7	29 Oct 2147
29 Oct 2241	ALERT: Geomagnetic K= 8	29 Oct 2239
29 Oct 2319	EXT WARNING: Proton 100MeV Integral Flux > 1pfu	28 Oct 1147 - 30 Oct 2359
30 Oct 0011	4 - 245 MHz Radio Bursts	29 Oct
30 Oct 0011	1 - 245 MHz Radio Noise Storm	29 Oct
30 Oct 0020	WATCH: Geomagnetic A ≥100	31 Oct
30 Oct 0030	EXT WARNING: Proton 10MeV Integral Flux > 10pfu	28 Oct 1201 -31 Oct 2359
30 Oct 0052	ALERT: Geomagnetic K= 7	30 Oct 0049
30 Oct 0054	EXTENDED WARNING: Geomagnetic K= 7	29 Oct 0700 - 30 Oct 1600
30 Oct 0116	CONT ALERT: Proton Event 10MeV Integral Flux > 1000pfu	29 Oct 1920
30 Oct 0126	CONT ALERT: Proton Event 100MeV Integral Flux > 1pfu	28 Oct 1150
30 Oct 0434	ALERT: Geomagnetic K= 6	30 Oct 0431
30 Oct 0515	ALERT: Geomagnetic K= 7	30 Oct 0512
30 Oct 1557	WARNING: Geomagnetic K= 5	30 Oct 1600 - 31 Oct 1600
30 Oct 1618	ALERT: Geomagnetic K= 5	30 Oct 1618
30 Oct 1657	WARNING: Geomagnetic K ≥ 7	30 Oct 1700 -31 Oct 1600
30 Oct 1711	ALERT: Geomagnetic K= 6	30 Oct 30 1705
30 Oct 1737	ALERT: Geomagnetic K= 7	30 Oct 30 1733
30 Oct 1936	ALERT: Geomagnetic K= 6	30 Oct 30 1933
30 Oct 2003	ALERT: Geomagnetic K= 8	30 Oct 30 1959
30 Oct 2126	ALERT: Geomagnetic K= 7	30 Oct 30 2122
30 Oct 2132	ALERT: Geomagnetic K= 8	30 Oct 30 2131
30 Oct 2231	ALERT: Geomagnetic K= 9	30 Oct 30 2230
31 Oct 0108	7 - 245 MHz Radio Bursts	30 Oct
31 Oct 0108	1 - 245 MHz Radio Noise Storm	30 Oct
31 Oct 0034	ALERT: Geomagnetic K= 6	31 Oct 0030
31 Oct 0052	CONT ALERT: Proton Event 100MeV Integral Flux > 1pfu	28 Oct 1150
31 Oct 0148	EXT WARNING: Proton 100MeV Integral Flux > 1pfu	28 Oct 1147 - 31 Oct 1600
31 Oct 0153	ALERT: Geomagnetic K= 7	31 Oct 0151
31 Oct 0354	ALERT: Geomagnetic K-index of 6	31 Oct 0353

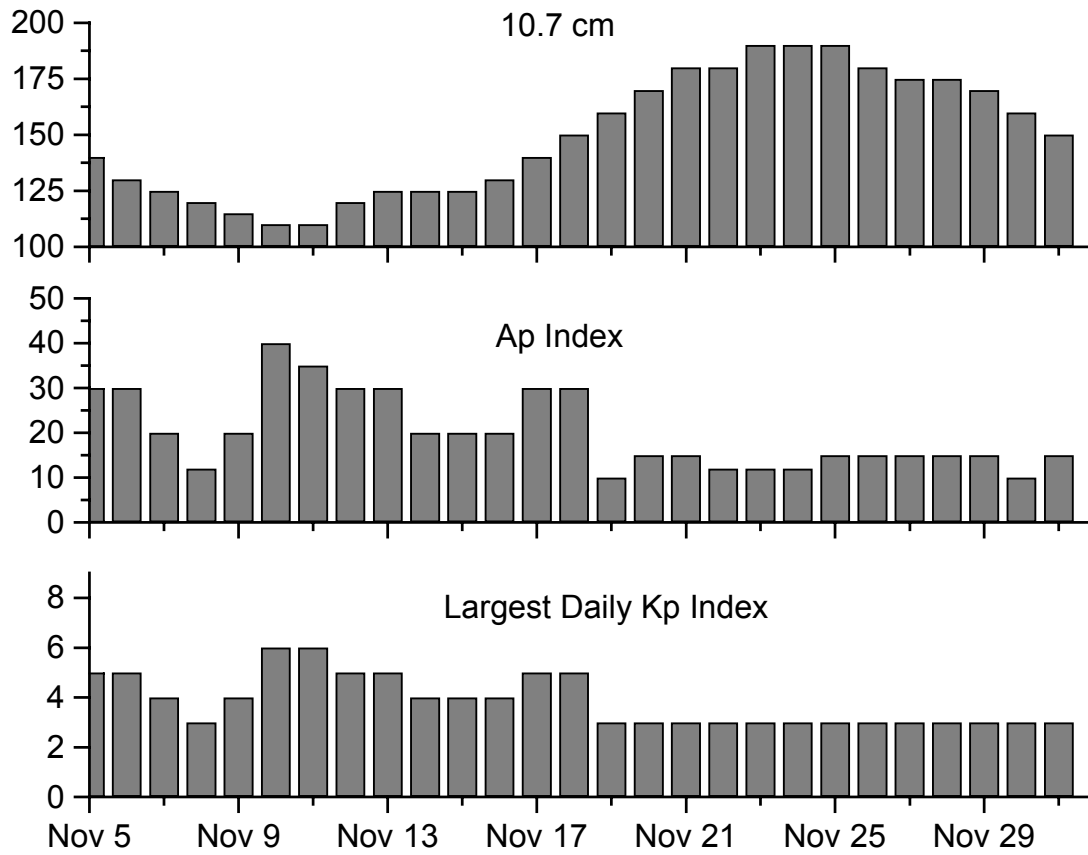


Alerts and Warnings Issued - continued.

<u>Date & Time of Issue</u>	<u>Type of Alert or Warning</u>	<u>Date & Time of Event UT</u>
31 Oct 0625	ALERT: Geomagnetic K= 6	31 Oct 0625
31 Oct 0638	ALERT: Geomagnetic K= 7	31 Oct 0636
31 Oct 0939	CONT ALERT: Proton Event 10MeV Integral Flux > 1000pfu	29 Oct 1920
31 Oct 1602	EXT WARNING: Geomagnetic K= 5	30 Oct 1600 -01 Nov 1600
31 Oct 1743	SUMMARY: Proton Event 10MeV Integral Flux > 1000pfu	29 Oct 1920
31 Oct 1751	SUMMARY: Proton Event 10MeV Integral Flux > 100pfu	28 Oct 1240
31 Oct 1759	SUMMARY: Proton Event 100MeV Integral Flux > 1pfu	28 Oct 1150
01 Nov 0014	WATCH: Geomagnetic A \geq 20	01 Nov
01 Nov 0159	EXTENDED WARNING: Proton 10MeV Integral Flux > 10pfu	28 Oct 1201 -01 Nov 1600
01 Nov 0209	CONT ALERT: Proton Event 10MeV Integral Flux > 1000pfu	29 Oct 1920
01 Nov 1152	ALERT: Electron 2MeV Integral Flux > 1000pfu	01 Nov 1130
01 Nov 1556	WARNING: Geomagnetic K= 4 expected	01 Nov 1600 - 2359
01 Nov 2259	SUMMARY: Proton Event 10MeV Integral Flux > 10pfu	28 Oct 1201
01 Nov 2309	ALERT: Type II Radio Emission	01 Nov 01 2234
01 Nov 2321	ALERT: Type IV Radio Emission	01 Nov 01 2243
01 Nov 2355	EXTENDED WARNING: Geomagnetic K= 4	01 Nov 1600 -02 Nov 1600
02 Nov 0056	WARNING: Proton 10MeV Integral Flux > 10pfu	02 Nov 0125 -02 Nov 2359
02 Nov 0441	WARNING: Geomagnetic K= 5	02 Nov 0443 -02 Nov 1600
02 Nov 0445	ALERT: Geomagnetic K=5	02 Nov 0445
02 Nov 0523	ALERT: Electron 2MeV Integral Flux > 1000pfu	02 Nov 0515
02 Nov 1122	ALERT: Proton Event 10MeV Integral Flux > 10pfu	02 Nov 1105
02 Nov 1556	EXTENDED WARNING: Geomagnetic K= 4	01 Nov 1600 -03 Nov 2359
02 Nov 1713	ALERT: X-Ray Flux exceeded M5	02 Nov 1712
02 Nov 1735	ALERT: Type IV Radio Emission	02 Nov 1715
02 Nov 1746	ALERT: Geomagnetic K= 5	02 Nov 1743
02 Nov 1753	WARNING: Proton 100MeV Integral Flux > 1pfu	02 Nov 1753 - 2359
02 Nov 1756	ALERT: Proton Event 100MeV Integral Flux > 1pfu	02 Nov 1740
02 Nov 1803	SUMMARY: X-ray Event > X1	02 Nov 1706
02 Nov 1826	ALERT: Type II Radio Emission	02 Nov 1714
02 Nov 1857	ALERT: Proton Event 10MeV Integral Flux > 100pfu	02 Nov 1840
02 Nov 2020	WATCH: Geomagnetic A \geq 50	03 Nov
02 Nov 2022	WATCH: Geomagnetic A \geq 100	04 Nov
02 Nov 2024	WATCH: Geomagnetic A \geq 20	05 Nov
02 Nov 2046	WARNING: Geomagnetic K= 5	02 Nov 2047 -03 Nov 1600
02 Nov 2151	SUMMARY: 10cm Radio Burst	02 Nov 1703
02 Nov 2219	ALERT: Proton Event 10MeV Integral Flux > 1000pfu	02 Nov 2200
02 Nov 2303	EXT WARNING: Proton 100MeV Integral Flux > 1pfu	02 Nov 1753 - 03 Nov 1600
02 Nov 2311	EXT WARNING: Proton 10MeV Integral Flux > 10pfu	02 Nov 0125 - 03 Nov 2359



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
05 Nov	140	30	5	19 Nov	160	10	3
06	130	30	5	20	170	15	3
07	125	20	4	21	180	15	3
08	120	12	3	22	180	12	3
09	115	20	4	23	190	12	3
10	110	40	6	24	190	12	3
11	110	35	6	25	190	15	3
12	120	30	5	26	180	15	3
13	125	30	5	27	175	15	3
14	125	20	4	28	175	15	3
15	125	20	4	29	170	15	3
16	130	20	4	30	160	10	3
17	140	30	5	01 Dec	150	15	3
18	150	30	5				



Energetic Events

Date	Time		X-ray		Optical Information			Peak		Sweep Freq		
	Begin	Max	$\frac{1}{2}$	Class	Integ Flux	Imp/ Brtns	Location		Radio Flux		Intensity	
			Max				Lat	CMD	245	2695	II	IV
27 Oct	0412	0439	0508	M1.2	.030	Sf	N00W44					
27 Oct	0751	0833	0924	M2.7	.120	2f	N00W45		1000	1100		1
27 Oct	0921	0927	0932	M5.0	.026	Sf	S16E26		65			
27 Oct	1227	1243	1252	M6.7	.064	Sf	S17E25		420	59		
27 Oct	2146	2151	2205	M1.9	.013	Sn	N08E09					
28 Oct	0951	1110	1124	X17.	1.800	4b	S16E08		490000	13000	3	3
29 Oct	0026	0151	0208	M1.1	.052	1f	S16E10		5400	63		
29 Oct	0408	0511	0554	M3.5	.120	Sn	S17E06		6600	610	1	
29 Oct	2037	2049	2101	X10.	.870	2b	S15W02		360000	2500	3	2
30 Oct	0156	0207	0229	M1.6	.030	1f	N08W22					
30 Oct	1515	1528	1537	M1.5	.015				29			
31 Oct	0426	0433	0437	M2.0	.009				67			
31 Oct	0608	0616	0628	M1.1	.011	Sf	N08W28					
01 Nov	0839	0852	0906	M1.3	.016							
01 Nov	1742	1751	1808	M1.1	.014	Sf	N09W50		1200			
01 Nov	2226	2238	2249	M3.2	.028	1n	S12W60		90000	95	2	1
02 Nov	0659	0753	0812	M1.0	.033	Sf	S17W55					
02 Nov	1230	1247	1312	M1.8	.035					22		
02 Nov	1703	1725	1739	X8.3	.910	2b	S14W56		24000	7700	3	3

Flare List

Date	Time			X-ray Class.	Imp / Brtns	Optical Location Lat CMD	Rgn	
	Begin	Max	End					
27 October	0135	0137	0144	C6.2	Sf	S21E30	486	
	0207	0207	0212		Sf	N08E22		
	0240	0240	0248		Sf	N07E21		
	0248	0249	0252		Sf	N07E21		
	B0352	0433	0448		Sf	S01W45	484	
	0358	0400	0407		Sf	N00W43	484	
	0409	0413	0416		M1.2	Sf	N00W44	484
	0428	0434	0438		Sf	N01W43	484	
	B0524	0527	0530		Sf	S16E31		
	0533	0534	0550		Sf	N09W41	484	
	0614	0616	0629		C9.0	Sf	S20E29	486
	0746	0826	0932		M2.7	2f	N00W45	484
	0847	0847	0850		Sf	N08E17		
	0923	0923	0944		M5.0	Sf	S16E26	486
	1029	1029	1035		Sf	N08E15		
	B1251	U1251	1304		M6.7	Sf	S17E25	486
	B1253	U1258	1310		Sf	N07W46	484	
	1402	1411	1421		C5.1			488
	1408	U1412	A1447		Sf	N09E11	488	
	B1451	U1457	A1528		C5.7	Sf	N09E12	488
1611	1621	1636	Sf	N10E13				



Flare List - continued.

Date	Time			X-ray Class.	Optical		Rgn
	Begin	Max	End		Imp / Brtns	Location Lat CMD	
27 October	1702	1704	1710		Sf	N07E12	488
	1836	1838	1859		Sf	N04W56	484
	1842	1846	1854	C7.5	Sf	S17E11	486
	1949	1957	2029	C9.0	1n	N07W50	484
	1952	1957	2005		Sf	N09E13	488
	B2028	2028	2033		Sf	N08W49	
	2120	2120	2122		Sf	N08E09	488
	2149	2151	2237	M1.9	Sn	N08E09	488
	2239	2240	2245		Sf	N09E11	488
	2314	2314	2322	C4.1	Sf	N10E10	488
	2348	2348	2353		Sf	S17E17	486
	2359	0005	0011	C6.8	Sf	S19E16	486
	2359	0001	0010		Sf	N08E08	488
	28 October	0012	0014	0016		Sf	N08E08
0032		0044	0121	C5.3	Sf	N08E08	488
0054		0100	0129	C6.7	1f	N03W55	484
0122		0125	0134		Sf	N08E07	488
0130		0133	0140	C7.5	Sf	S19E15	486
0219		0219	0223		Sf	N08E07	488
0227		0234	0245		Sf	N09E08	488
0248		0257	0309		Sf	N08E07	488
0309		0313	0316		Sf	N10E07	488
0317		0333	0352		Sf	N08E07	488
0353		0411	0513		1f	N08E06	488
0509		0513	0552	C7.7	1f	N06W53	484
0514		0548	0620		Sf	N08E05	488
0547		0549	0553		Sf	S11E00	489
0553		0602	0638		1f	N03W58	484
0623		0647	0703		Sf	N10E04	488
0734		0737	0743		Sf	S11W01	489
0738		0740	0749		Sf	N06W56	484
0753		0755	0759		Sf	N08E04	488
0756		0757	0802		Sf	S20E08	486
0819		0827	0838		Sf	S17E12	486
0842		0849	0906		Sf	S17E09	486
0842		U0859	A0902	C8.7	Sf	N08E04	488
0908		0913	0916		Sf	N08E03	488
B1001		U1205	A1420	X17.2	4b	S16E08	486
B1132		1132	A1211		Sf	S06E02	491
1452	1453	1534		Sf	S16E01	486	
B1601	U1613	A1617		Sf	S16W01	486	
1613	1615	1645		2f	N06W61	484	



Flare List - continued.

Date	Time			X-ray Class.	Optical		Rgn
	Begin	Max	End		Imp / Brtns	Location Lat CMD	
28 October	1628	1631	1638		Sf	N07W02	488
	1945	1946	1950		Sf	S15E03	486
	2033	2041	2105		Sf	S15E03	486
	2047	2103	2200		Sf	N10W03	488
	B2127	2128	2133		Sf	N10W03	
	2137	2138	2151		Sf	S15E03	486
	B2333	2333	2338		Sf	N10W04	
29 October	0029	U0047	0239		1f	S18E08	486
	B0048	0048	0228	M1.1	1f	S16E10	486
	0146	U0147	A0208		Sf	N07W07	488
	B0234	0234	0244		Sf	S17E08	
	B0319	U0319	0331		Sf	S26E06	0
	0338	0339	0346		Sf	N08W07	488
	0410	0417	0425	C6.2			
	0412	0412	0425		Sf	N06W09	488
	0427	0428	0431		Sf	N10W08	488
	0437	0459	0636	M3.5	Sn	S17E06	486
	B0649	0650	0653		Sf	S17E07	
	B0709	0709	0717		Sf	S17E06	
	1421	1422	1446	C9.2	Sf	S16W03	486
	1652	1653	1811	C8.1	Sf	S19W07	486
	1811	1812	1829	C7.8	Sf	N08W16	488
	2001	2004	2015		Sf	S15W02	486
	2008	2036	2055		Sf	S22W41	492
	2037	2042	2253	X10.0	2b	S15W02	486
	2037	2041	2046		Sf	N12W13	488
		B2305	2322	2353		Sf	S18W02
30 October	0153	0159	0254	M1.6	1f	N08W22	488
	0215	0216	0221		Sf	S20W20	486
	0826	0839	0850	C7.7	1f	S21W55	492
	1222	1226	1230	C7.6			
	1245	1251	1257	C7.3			488
	1515	1528	1537	M1.5			486
	1614	1618	1624	C5.7			488
	1830	1836	1843	C5.8			488
	1918	1921	1927	C5.6			
		B2355	0009	0013		Sf	S18W02
31 October	0148	0149	0156		Sf	N13E06	487
	0152	0153	0159	C5.5	Sf	N08W25	488
	0240	0242	0248	C5.0	Sf	N08W33	488
	0354	0356	0401		Sf	N08W26	488



Flare List - continued.

Date	Time			X-ray Class.	Optical		Rgn
	Begin	Max	End		Imp / Brtns	Location Lat CMD	
31 October	0426	0433	0437	M2.0			
	0603	0615	0701	M1.1	Sf	N08W28	488
	0908	0909	0913		Sf	N08W30	488
	1224	1231	1235	C8.5			
	1611	1612	1618		Sf	N12W40	488
	1647	1649	1724		Sf	S19W44	486
	1736	1737	1746	C5.3	Sf	S20W28	486
	1927	1927	1933		Sf	S16W27	486
	2035	2042	2047	C5.1	Sf	N08W44	488
	2050	2110	2144	C9.5	Sf	N08W44	488
	2350	0020	0037	C4.4			
01 November	0127	0128	0137		Sf	N13W47	488
	0419	0422	0425	C3.7	Sf	S17W40	486
	0436	0440	0444	C2.8			
	0457	0457	0500	C5.6	Sf	N09W47	488
	0502	0502	0508		Sf	S14W33	486
	0518	0530	0546	C3.6	Sf	S14W38	486
	0808	0817	0826	C4.4	Sf	S13W41	486
	0839	0852	0906	M1.3			488
	1131	1145	1204	C9.7			488
	1552	1554	1609	C3.8	Sf	S16W45	486
	1648	1717	1737	C4.4	Sf	N08W49	488
	1738	1750	1808	M1.1	Sf	N09W50	488
	1915	1915	1920	C3.5	Sf	N06W55	488
	2228	2234	2312	M3.2	1n	S12W60	486
02 November	B0238	0238	0249	C4.0	Sf	S14W52	486
	B0718	U0800	A0856	M1.0	Sf	S17W55	486
	1230	1247	1312	M1.8			488
	1539	1612	1642		Sf	S14W55	486
	1704	1717	1954	X8.3	2b	S14W56	486
	1716	1717	1719		Sf	N06W62	488
	1735	1736	1741		Sf	N08W69	488
	2022	2025	2032		Sf	N08W63	488
	2026	2026	2033		Sf	S19W53	486
	2034	2037	2039		Sf	S20W53	486
	B2112	2122	2129		Sf	S20W54	



Region Summary - continued.

Date	Location		Sunspot Characteristics				Flares										
	Helio		Area (10 ⁻⁶ hemi)	Extent (helio)	Spot Class	Spot Count	Mag Class	X-ray			Optical						
	(° Lat ° CMD)	Lon						C	M	X	S	1	2	3	4		
<i>Region 484</i>																	
18 Oct	N05E68	351	0240	04	Dac	020	B	9			8	2					
19 Oct	N06E53	353	1030	10	Dkc	028	Bgd	2	2	1	9	2					
20 Oct	N05E40	353	1420	11	Ekc	046	Bgd	7	1		7	1					
21 Oct	N04E26	354	1720	16	Dkc	069	Bgd	3	1		7						
22 Oct	N04E13	354	1750	11	Ekc	056	Bgd		2		16						
23 Oct	N04W00	354	1750	13	Ekc	053	Bgd		3		6	1					
24 Oct	N05W15	355	1460	12	Ekc	067	Bgd	2	1		6	1					
25 Oct	N04W28	355	1700	10	Dkc	052	Bgd	2	2		5						
26 Oct	N03W41	355	1350	11	Ekc	057	Bgd		2	1	1	1	1				
27 Oct	N03W54	355	1440	10	Dkc	029	Bgd	1	2		7	1	1				
28 Oct	N03W68	355	1240	09	Dkc	015	Bgd	2			1	3	1				
29 Oct	N03W82	356	0530	11	Eki	014	Bg										
30 Oct	N01W95	356	0210	10	Dao	006	Bg										
								28	16	2	73	1	3	0	0		

Crossed West Limb.

Absolute heliographic longitude: 354

<i>Region 485</i>																	
21 Oct	S06E47	333	0030	06	Dro	007	B										
22 Oct	S06E34	333	0020	05	Bxo	004	B										
23 Oct	S06E21	332	0010	02	Hrx	002	A										
24 Oct	S07E08	332	0000	02	Bxo	003	B										
25 Oct	S07W05	332															
26 Oct	S07W18	332															
27 Oct	S07W31	332															
28 Oct	S07W44	332															
29 Oct	S07W57	332															
30 Oct	S07W70	332															
31 Oct	S07W83	332															
								0	0	0	0	0	0	0	0	0	

Crossed West Limb.

Absolute heliographic longitude: 332



Region Summary - continued.

Date	Location		Sunspot Characteristics					Flares															
	Helio		Area (10 ⁻⁶ hemi)	Extent (helio)	Spot Class	Spot Count	Mag Class	X-ray			Optical												
	(° Lat ° CMD)	Lon						C	M	X	S	1	2	3	4								
<i>Region 486</i>																							
22 Oct	S16E81	286	0150	05	Hkx	001	A	4			1												
23 Oct	S16E70	285	1160	14	Ekc	024	Bgd			2		2											
24 Oct	S16E57	283	1540	16	Fkc	049	Bgd	1	2		3	2											
25 Oct	S15E45	282	2200	18	Fkc	052	Bgd		1		3		1										
26 Oct	S15E31	283	2170	19	Fkc	094	Bgd			1	2				1								
27 Oct	S16E18	283	2180	19	Fkc	074	Bgd	4	2		7												
28 Oct	S17E04	283	2120	19	Fkc	055	Bgd	1		1	9									1			
29 Oct	S16W11	285	2610	18	Fkc	108	Bgd	2	2	1	4	2	1										
30 Oct	S18W23	284	2600	18	Fkc	080	Bgd		1		1												
31 Oct	S17W36	284	2030	20	Fkc	069	Bgd	1			3												
01 Nov	S17W49	284	1900	16	Fkc	099	Bgd	4	1		5	1											
02 Nov	S17W62	284	2160	16	Fkc	060	Bgd	1	1	1	5		1										
								14	14	6	43	7	3	1	1								

Still on Disk.

Absolute heliographic longitude: 283

Region 487

25 Oct	N13E72	255	0160	07	Cso	005	B															
26 Oct	N14E60	254	0250	08	Dao	010	B															
27 Oct	N14E46	255	0240	07	Dao	013	B															
28 Oct	N13E32	255	0170	06	Dao	010	B															
29 Oct	N12E20	254	0150	06	Dao	016	B															
30 Oct	N12E06	255	0280	07	Dko	023	B															
31 Oct	N12W08	256	0130	06	Dai	020	B					1										
01 Nov	N12W21	256	0110	07	Dao	020	B															
02 Nov	N12W34	256	0080	04	Dao	015	B															
								0	0	0	1	0	0	0	0							

Still on Disk.

Absolute heliographic longitude: 255

Region 488

27 Oct	N09E09	292	0270	08	Dko	020	B	3	1		9											
28 Oct	N08W04	291	0800	10	Dkc	034	Bgd	2			16	1										
29 Oct	N07W17	291	1460	16	Fkc	061	Bgd	1			6											
30 Oct	N08W28	289	1750	17	Fkc	034	Bgd	3	1			1										
31 Oct	N08W42	290	1570	17	Fkc	045	Bgd	4	1		8											
01 Nov	N08W55	290	1610	17	Fkc	040	Bgd	4	2		5											
02 Nov	N08W68	290	1600	16	Fkc	023	Bgd		1	1	3											
								17	6	1	47	2	0	0	0							

Still on Disk.

Absolute heliographic longitude: 291



Region Summary - continued.

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

Region 489

27 Oct	S11E05	296	0030	04	Cro	008	B											
28 Oct	S11W08	295	0020	05	Cro	007	B							2				
29 Oct	S12W22	296	0050	05	Dso	010	B											
30 Oct	S12W36	297	0130	06	Dao	009	B											
31 Oct	S12W50	298	0120	06	Dao	007	B											
01 Nov	S12W63	298	0030	06	Dro	004	B											
02 Nov	S12W76	298	0050	06	Cso	003	B											

Still on Disk.

Absolute heliographic longitude: 296

Region 490

27 Oct	S10E25	276	0050	05	Cso	006	B											
28 Oct	S11E11	276	0030	01	Hrx	001	A											
29 Oct	S11W03	277	0010	05	Cro	005	B											
30 Oct	S12W14	275	0010	01	Hrx	003	A											
31 Oct	S12W27	275																
01 Nov	S12W40	275																
02 Nov	S12W53	275																

Still on Disk.

Absolute heliographic longitude: 277

Region 491

27 Oct	S06E09	292	0050	04	Dao	003	B											
28 Oct	S07W05	292	0050	05	Dao	006	B							1				
29 Oct	S06W19	293	0100	06	Dao	013	B											
30 Oct	S06W32	293	0120	07	Dso	010	B											
31 Oct	S07W47	295	0060	07	Dao	012	B											
01 Nov	S07W60	295	0040	07	Dso	007	B											
02 Nov	S08W73	295	0030	02	Axx	002	A											

Still on Disk.

Absolute heliographic longitude: 292



Region Summary - continued.

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

Region 492

27 Oct	S22W20	321	0010	03	Bxo	005	B											
28 Oct	S23W34	321	0080	06	Dso	010	B											
29 Oct	S22W48	322	0250	09	Dai	023	B					1						
30 Oct	S23W62	323	0340	11	Eko	017	B	1						1				
31 Oct	S23W74	322	0280	10	Dao	013	B											
01 Nov	S23W87	322	0240	11	Eao	005	B											
								1	0	0	1	1	0	0	0	0		

Crossed West Limb.

Absolute heliographic longitude: 321

Region 493

28 Oct	N09E04	283	0010	04	Bxo	002	B											
29 Oct	N09W09	283																
30 Oct	N09W22	283																
31 Oct	N09W35	283																
01 Nov	N09W48	283																
02 Nov	N09W61	283																
								0	0	0	0	0	0	0	0	0	0	0

Still on Disk.

Absolute heliographic longitude: 283

Region 494

30 Oct	S23E08	253	0010	00	Axx	001	A											
31 Oct	S23W05	253																
01 Nov	S23W18	253																
02 Nov	S23W31	253																
								0	0	0	0	0	0	0	0	0	0	0

Still on Disk.

Absolute heliographic longitude: 253

Region 495

30 Oct	S22E20	241	0240	08	Dso	010	B											
31 Oct	S22E05	243	0210	08	Dso	016	B											
01 Nov	S22W08	243	0220	09	Dsi	014	B											
02 Nov	S22W21	243	0130	09	Dso	011	B											
								0	0	0	0	0	0	0	0	0	0	0

Still on Disk.

Absolute heliographic longitude: 243



Region Summary - continued.

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

Region 496

31 Oct	S12E09	239	0020	04	Cso	004	B										
01 Nov	S12W04	239	0020	07	Cro	008	B										
02 Nov	S12W17	239															

0 0 0 0 0 0 0 0

Still on Disk.

Absolute heliographic longitude: 239

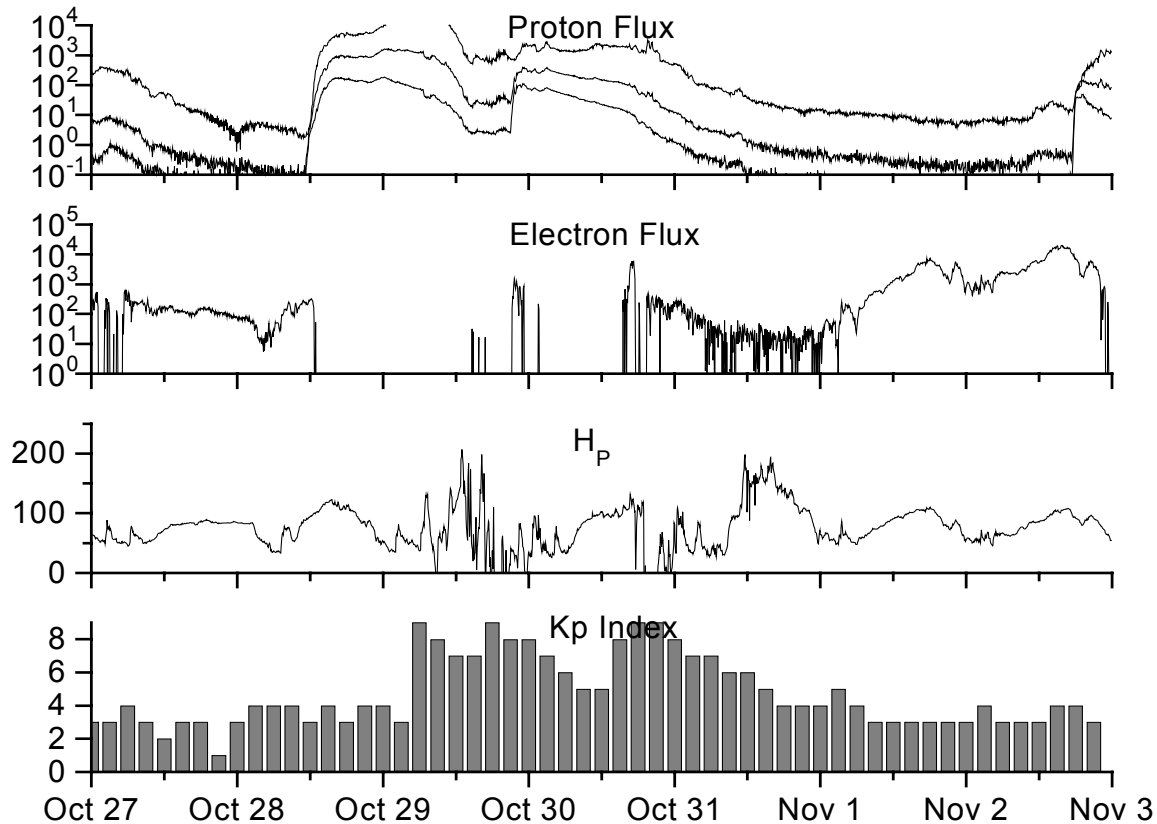


**Recent Solar Indices (preliminary)
of the observed monthly mean values**

Month	Sunspot Numbers			Radio Flux		Geomagnetic			
	Observed values SWO	Ratio RI	Ratio RI/SWO	Smooth values SWO	Smooth values RI	*Penticton 10.7 cm	Smooth Value	Planetary Ap	Smooth Value
2001									
October	197.3	125.5	0.64	179.5	114.0	208.1	191.9	20	12.0
November	178.6	106.5	0.60	183.7	115.5	212.7	193.7	16	12.0
December	217.5	132.2	0.61	184.5	114.6	235.6	193.9	09	12.2
2002									
January	189.0	114.1	0.60	184.8	113.5	227.3	194.6	08	12.3
February	194.5	107.4	0.55	188.6	114.7	205.0	197.2	10	12.8
March	153.1	98.4	0.64	188.9	113.3	180.3	195.7	10	12.9
April	194.9	120.7	0.62	186.2	110.5	189.8	191.5	15	13.2
May	204.1	120.8	0.59	183.6	108.9	178.4	188.0	15	13.3
June	146.0	88.3	0.60	179.9	106.3	148.7	183.0	11	13.5
July	183.5	99.6	0.54	175.4	102.7	173.5	176.3	11	13.7
August	191.0	116.4	0.61	169.2	98.7	183.9	169.5	16	14.2
September	206.4	109.6	0.53	163.4	94.6	175.8	164.1	14	15.0
October	153.9	97.5	0.63	158.8	90.5	167.0	159.4	23	15.6
November	159.8	95.5	0.60	150.9	85.2	168.7	154.8	16	16.3
December	147.9	80.8	0.55	144.6	82.1	158.6	150.9	13	17.0
2003									
January	149.3	79.7	0.53	141.7	81.0	144.0	149.2	13	18.2
February	87.0	46.0	0.53	136.4	78.5	124.5	144.7	17	18.9
March	119.7	61.1	0.51	128.1	74.2	132.2	139.5	21	19.4
April	119.7	60.0	0.50			126.3		20	
May	89.6	55.2	0.62			129.3		26	
June	118.4	77.4	0.65			129.4		24	
July	132.8	85.0	0.64			127.8		20	
August	114.3	72.7	0.64			122.1		23	
September	82.6	48.8	0.59			112.3		19	

NOTE: All smoothed values after September 2002 and monthly values after March 2003 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 23, RI = 120.8, occurred April 2000. *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 27 October 2003

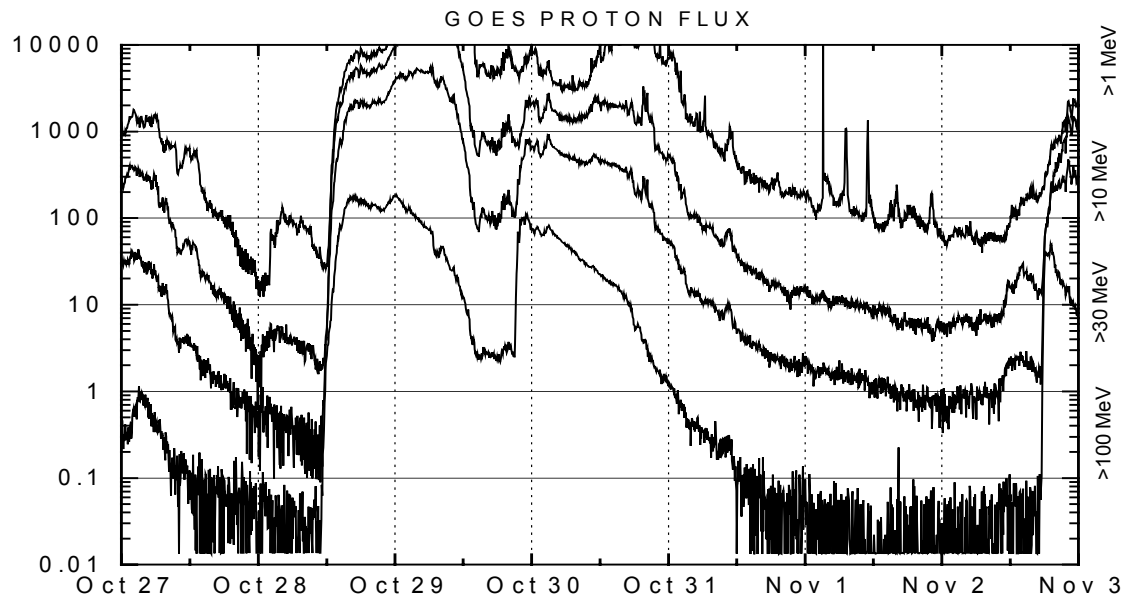
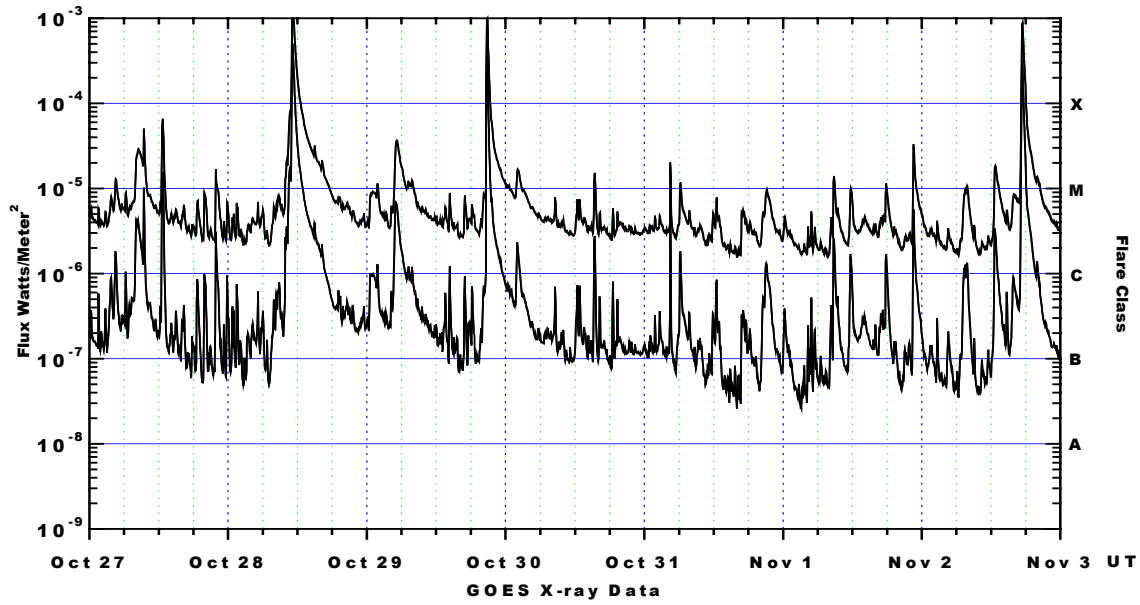
Protons plot contains the five-minute averaged integral proton flux (protons/cm²-sec -sr) as measured by GOES-11 (W113) for each of three energy thresholds: greater than 10, 50, and 100 MeV.

Electrons plot contains the five-minute averaged integral electron flux (electrons/cm²-sec -sr) with energies greater than 2 MeV at GOES-12.

H_p plot contains the five minute averaged magnetic field H - component in nanoteslas (nT) as measured by GOES-12. The H component is parallel to the spin axis of the satellite, which is nearly parallel to the Earth's rotation axis.

K_p plot contains the estimated planetary 3-hour K-index (derived by the Air Force Weather Agency) in real time from magnetometers at Meanook, Canada; Sitka, AK; Glenlea, Canada; St. Johns, Canada; Ottawa, Canada; Newport, WA; Fredericksburg, VA; Boulder, CO; Fresno, CA and 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 K_p 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 K_p are "global" parameters that are applicable to a first order approximation over large areas. H_p 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-minute averaged x-ray flux (watts/m²) as measured by GOES 12 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-minute averaged integral proton flux (protons/cm²-sec-sr) as measured by GOES-11 (W113) for each of the energy thresholds: >1, >10, >30 and >100 MeV. P10 event threshold is 10 pfu (protons/cm²-sec-sr) at greater than 10 MeV.

