

Space Weather Highlights
18 - 24 October 2004

SWO PRF 1521
26 October 2004

Solar activity ranged from very low to moderate this period. Very low conditions were observed on 18 October. Low levels occurred on 19, 21, and 23 October, while moderate levels were reached on 20, 22 and 24 October. Two regions accounted for the majority of the twenty four C-class and three M-class flares this summary period. Region 682 (S14, L=271, class/area, Dai/240 on 15 October) produced ten low-level C-flares before rotating around the west limb on 24 October. New Region 687 (N12, L=175, class/area, Eki/280 on 24 October) produced the majority of the period's activity with twelve C-class and three M-class flares. The most significant event of the period occurred on 22 October when Region 687 produced an M2.1/1n flare at 0811 UTC. Associated with this event were Type II (521 km/s shock velocity) and Type IV radio sweeps, and a CME on LASCO imagery.

Solar wind data were available from the NASA Advanced Composition Explorer (ACE) spacecraft during most of the summary period. Solar wind speed ranged from a low of near 300 km/s early on 18 October to a high near 525 km/s late on the 24 October. The period began on 18 October with very stable solar wind conditions. Midday on 18 October, a solar sector boundary crossing was followed by elevated solar wind plasma and the IMF Bz oscillating between +/- 10 nT. These weak disturbed conditions persisted through 21 October. Solar wind gradually returned to more stable conditions. By 24 October, a weak geoeffective coronal hole wind stream was detected at ACE. Solar wind speed increased to over 500 km/s and the IMF Bz began oscillating +/- 8 nT.

There were no greater than 10 MeV proton events at geo-synchronous orbit during the summary period

The greater than 2 MeV electron flux at geosynchronous orbit was at high levels on 18 and 19 October.

The geomagnetic field was at mostly quiet to unsettled levels. A brief period of active conditions were observed at mid latitudes late on 24 October due to a weak, geoeffective coronal hole wind stream. Periods of southward Bz produced isolated major storm periods at high latitudes on 20 October.

Space Weather Outlook
27 October - 22 November 2004

Solar activity is expected to be low to moderate through early November and again from mid-November through the end of the forecast period due to possible M-class flare activity from Region 687. Otherwise, activity levels are expected to remain very low to low.

A greater than 10 MeV proton event is possible through early November.

The greater than 2 MeV electron flux at geosynchronous orbit is expected to be at high levels on 10 – 13 November.

The geomagnetic field is expected to range from mostly quiet to unsettled with isolated active periods. From 09 – 11 November, a recurrent coronal hole wind stream is expected to produce occasional active to minor storm periods with isolated major storm periods at high latitudes.



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
18 October	96	86	230	B1.1	0	0	0	0	0	0	0	0
19 October	99	86	380	B1.2	2	0	0	0	0	0	0	0
20 October	111	129	460	B2.1	1	1	0	2	0	0	0	0
21 October	112	112	550	B2.2	7	0	0	9	1	0	0	0
22 October	123	134	880	B4.0	2	1	0	3	1	0	0	0
23 October	132	141	720	B3.8	5	0	0	4	0	0	0	0
24 October	135	178	820	B4.7	7	1	0	5	1	0	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
	18 October	9.8E+5	1.4E+4	3.4E+3		3.8E+8
19 October	8.1E+5	1.4E+4	3.1E+3		5.9E+7	
20 October	2.7E+5	1.5E+4	3.3E+3		6.9E+6	
21 October	1.3E+5	1.5E+4	3.5E+3		1.6E+6	
22 October	1.1E+5	1.4E+4	3.7E+3		1.7E+6	
23 October	2.2E+5	1.5E+4	3.4E+3		3.0E+6	
24 October	3.2E+5	1.5E+4	3.4E+3		3.0E+6	

Daily Geomagnetic Data

Date	Middle Latitude Fredericksburg		High Latitude College		Estimated Planetary	
	A	K-indices	A	K-indices	A	K-indices
	18 October	4	0-0-1-1-1-2-3-1	2	0-0-0-1-0-1-1-1	4
19 October	3	0-1-0-1-2-1-1-1	3	0-0-0-1-2-2-1-1	4	0-1-0-1-2-2-1-1
20 October	9	1-3-2-1-3-3-1-2	29	1-4-4-2-6-6-1-2	12	1-3-3-1-4-4-1-2
21 October	5	2-2-2-1-1-1-1-1	6	2-3-3-2-0-0-0-0	8	2-3-3-1-2-2-2-1
22 October	5	2-2-1-1-1-1-2-1	4	1-1-1-2-2-1-1-0	6	2-2-1-1-2-2-2-1
23 October	1	0-0-0-0-0-1-1-1	1	0-0-0-1-0-0-1-0	4	0-0-1-1-1-2-1-1
24 October	6	1-1-0-1-2-2-3-2	5	0-0-0-0-1-3-3-2	9	2-0-0-1-2-3-4-2

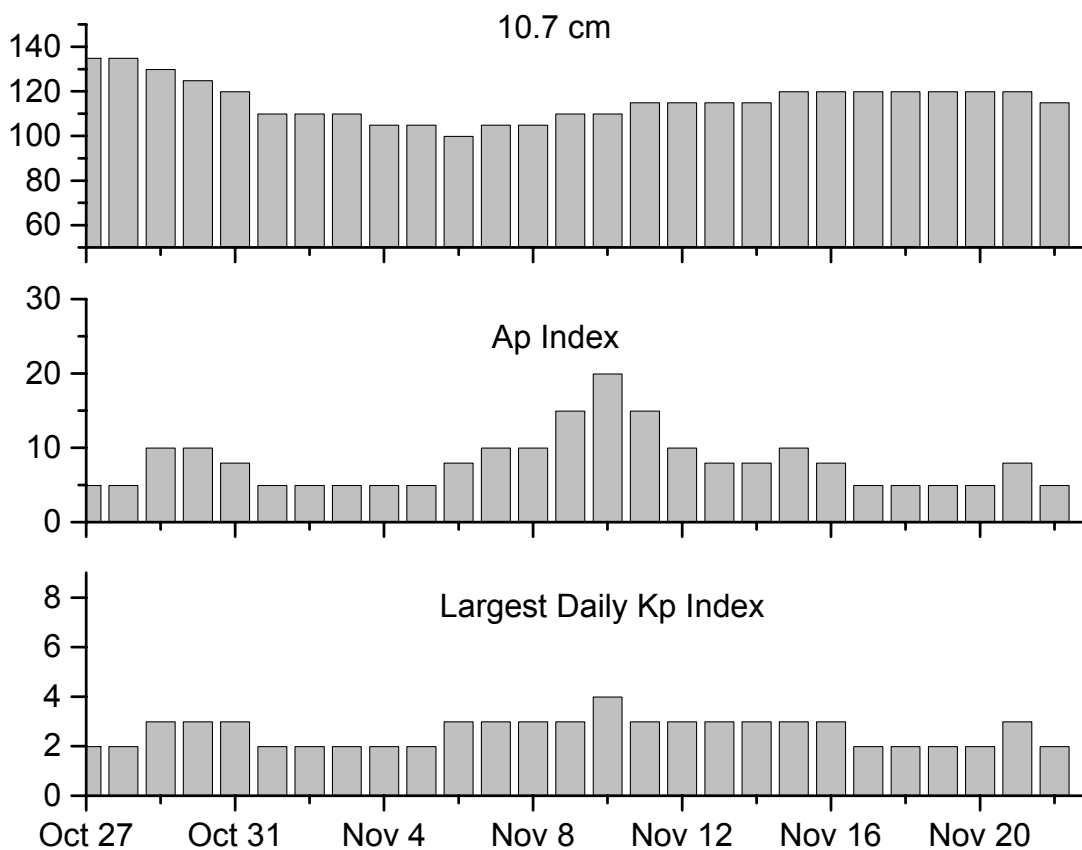


Alerts and Warnings Issued

<u>Date & Time of Issue</u>	<u>Type of Alert or Warning</u>	<u>Date & Time of Event UT</u>
12 Oct 0007	1 - 245 MHz Radio Burst	11 Oct
13 Oct 0029	2 - 245 MHz Radio Bursts	12 Oct
18 Oct 0517	ALERT: Electron 2MeV Integral Flux > 1000pfu	18 Oct 0500
19 Oct 1514	ALERT: Electron 2MeV Integral Flux > 1000pfu	19 Oct 1450
21 Oct 0007	3 - 245 MHz Radio Bursts	20 Oct
22 Oct 0024	4 - 245 MHz Radio Bursts	21 Oct
22 Oct 0851	ALERT: Type II Radio Emission	22 Oct 0819
22 Oct 0857	ALERT: Type IV Radio Emission	22 Oct 0834
23 Oct 0025	3 - 245 MHz Radio Bursts	22 Oct
24 Oct 0038	1 - 245 MHz Radio Burst	23 Oct



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
27 Oct	135	5	2	10 Nov	110	20	4
28	135	5	2	11	115	15	3
29	130	10	3	12	115	10	3
30	125	10	3	13	115	8	3
31	120	8	3	14	115	8	3
01 Nov	110	5	2	15	120	10	3
02	110	5	2	16	120	8	3
03	110	5	2	17	120	5	2
04	105	5	2	18	120	5	2
05	105	5	2	19	120	5	2
06	100	8	3	20	120	5	2
07	105	10	3	21	120	8	3
08	105	10	3	22	115	5	2
09	110	15	3				



Energetic Events

Date	Time		X-ray		Optical Information			Peak		Sweep Freq		
	Begin	Max	Max	Class	Flux	Imp/ Brtns	Location Lat CMD	Rgn #	Radio Flux		Intensity	
									245	2695	II	IV
20 Oct	1043	1051	1056	M2.6	.010			687	99	71		
22 Oct	0752	0811	0816	M2.1	.010	1n	N09E44	687	92	110	2	1
24 Oct	2017	2028	2035	M2.3	.015	1n	N10E15	687				

Flare List

Date	Time			X-ray Class.	Optical Imp / Brtns	Location Lat CMD	Rgn
	Begin	Max	End				
18 October	1134	1137	1139	B2.2			
	1350	1400	1405	B2.3			
	1602	1606	1610	B2.9			
	1855	1902	1924	B2.5			
	2330	2336	2346	B3.6			682
19 October	0230	0254	0310	C1.0			682
	1157	1204	1214	B3.9			
	1419	1428	1437	C1.9			682
	1849	1857	1904	B5.1			682
	2021	2025	2027	B2.3			682
	2105	2108	2110	B3.0			682
	2156	2159	2201	B2.3			
	2225	2229	2231	B4.7			682
	2336	2339	2342	B3.9			
20 October	2347	2357	0003	B5.8			682
	0032	0036	0043	B7.2			682
	0138	0141	0145	B6.2			
	0212	0213	0227	C4.5	Sf	S13W23	682
	1043	1051	1056	M2.6			687
	1231	1236	1240	B3.6			682
21 October	B2149	2159	2200		Sf	N11E63	
	B0022	0041	0053		1n	N11E61	687
	0027	0030	0037		Sf	N11E63	687
	0038	0041	0100	C7.8	Sf	N11E63	687
	0213	0215	0221	C4.3	Sf	N11E62	687
	0400	0408	0411	B4.9			687
	0509	0513	0515	C2.0	Sf	N05E60	687
	0648	0653	0657	C5.2	Sf	N11E60	687
	0921	0934	0941	B9.8			687
	1405	1405	1408	B9.9	Sf	N08E54	687
	1436	1446	1449	C1.7	Sf	S14W43	682
	1521	1521	1533	C4.3	Sf	S12W40	682
	1829	1829	1835		Sf	N11E50	687
1924	1948	1956	C9.9			687	



Flare List

Date	Time			X-ray Class.	Optical		Rgn				
	Begin	Max	End		Imp / Brtns	Location Lat CMD					
22 October	B0149	0153	0156	B6.8	Sf	N09E47	687				
	0455	0517	0533	B9.4			682				
	0622	0625	0627	B7.3			687				
22 October	0804	0811	0836	M2.1	In	N09E44	687				
	1145	1149	1152	B9.5							
	2156	2156	2201	C1.0			Sf	S13W62	682		
	2212	2213	2220	C5.1			Sf	N15E45	687		
23 October	2340	2343	2352	B6.3							
	0059	0103	0108	B8.0			687				
	0133	0135	0142	B6.1	Sf	S07W03	684				
	0226	0230	0233	B7.5							
	0351	0354	0356	B8.5							
	0357	0400	0403	C1.8							
	0506	0515	0520	B8.6							
	0720	0724	0727	C3.2					682		
	0808	0812	0817	C1.3					682		
	1136	1139	1145	B7.4							
	1532	1536	1541	B6.8					682		
	1629	1633	1727	C9.9			Sf	N11E33	687		
	1919	1921	1941	C8.0			Sf	N14E35	687		
	2304	2304	2308				Sf	N14E33	687		
	2351	2354	2356	B8.5					687		
	24 October	0142	0142	0147			C1.6	Sf	N12E28	687	
		0223	0227	0230			C1.9			687	
0245		0248	0252	B7.1			691				
B0300		0303	0314	C1.7			Sf			N11E19	687
0346		0352	0356	B7.1	687						
0409		0412	0414	B8.6	687						
B0418		0418	0425		Sf	N13E29					
0425		0428	0430	B9.5			687				
0550		0553	0559	B7.1							
0656		0713	0726	C2.6			691				
1138		1143	1155	B7.0			682				
1353		1357	1406	B7.0			682				
1708		1709	1712	C1.0			Sf			N12E19	687
1821		1824	1827	C2.1							682
1956		2000	2009		Sf	N11E19	687				
2020	2025	2144	M2.3	In	N10E15	687					
2144	2151	2157	C5.5			682					



Region Summary

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 681

12 Oct	N12W09	357	0010	03	Bxo	004	B											
13 Oct	N11W21	356	0020	04	Cso	009	B											
14 Oct	N10W36	358	0020	03	Axx	004	A											
15 Oct	N10W49	358																
16 Oct	N10W62	357	0010	01	Axx	002	A											
17 Oct	N10W75	357																
18 Oct	N10W88	357																
								0	0	0	0	0	0	0	0	0	0	

Crossed West Limb.

Absolute heliographic longitude:357

Region 682

13 Oct	S13E64	271	0170	05	Cao	012	B	1										
14 Oct	S13E50	272	0245	05	Dsi	014	B	1		1								
15 Oct	S14E37	271	0240	04	Dai	016	B											
16 Oct	S14E24	271	0210	07	Dai	021	B											
17 Oct	S14E10	272	0150	07	Dao	014	B											
18 Oct	S13W03	272	0130	09	Dao	015	B											
19 Oct	S13W19	275	0120	11	Eao	009	Bg	2										
20 Oct	S13W33	275	0150	12	Eai	020	Bg	1		1								
21 Oct	S13W46	275	0140	13	Eac	013	Bg	2		2								
22 Oct	S13W59	275	0150	12	Esi	010	Bg	1		1								
23 Oct	S13W73	276	0080	09	Dso	007	B	2										
24 Oct	S12W86	276	0030	05	Cao	004	B	2										
								12	0	0	5	0	0	0	0	0		

Still on Disk.

Absolute heliographic longitude:272

Region 683

17 Oct	S09E22	260	0030	05	Cao	006	B											
18 Oct	S10E08	261	0050	06	Dao	010	B											
19 Oct	S11W05	261	0060	07	Bxo	005	B											
20 Oct	S11W18	260	0030	03	Cso	010	B											
21 Oct	S11W31	260	0040	06	Dso	007	B											
22 Oct	S11W44	260	0020	03	Cro	004	B											
23 Oct	S11W57	260																
								0	0	0	0	0	0	0	0	0		

Still on Disk.

Absolute heliographic longitude:261



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 684

17 Oct	S04E65	217	0030	01	Hsx	001	A											
18 Oct	S05E53	216	0020	01	Hax	001	A											
19 Oct	S04E41	215	0040	06	Cso	002	B											
20 Oct	S05E27	215	0030	02	Hax	002	A											
21 Oct	S05E14	215	0010	01	Hrx	001	A											
22 Oct	S05E01	215	0200	07	Dai	012	B											
23 Oct	S03W12	215	0180	07	Dai	017	B											1
24 Oct	S04W27	217	0150	07	Dai	024	B											
																		0 0 0 1 0 0 0 0

Still on Disk.

Absolute heliographic longitude:215

Region 685

18 Oct	S05E26	243	0020	03	Cao	009	B											
19 Oct	S06E12	244	0030	06	Cso	007	B											
20 Oct	S06W02	244	0030	06	Dao	013	B											
21 Oct	S06W15	244	0050	08	Dso	010	B											
22 Oct	S06W28	244	0050	08	Dso	009	B											
23 Oct	S06W45	248	0010	05	Bxo	006	B											
24 Oct	S07W56	246	0020	03	Axx	003	A											
																		0 0 0 0 0 0 0 0

Still on Disk.

Absolute heliographic longitude:244

Region 686

18 Oct	S20E43	226	0010	01	Axx	001	A											
19 Oct	S20E31	225	0010	01	Axx	001	A											
20 Oct	S20E17	225	0020	01	Hsx	001	A											
21 Oct	S20E04	225																
22 Oct	S20W09	225																
																		0 0 0 0 0 0 0 0

Still on Disk.

Absolute heliographic longitude:225



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	4			
<i>Region 687</i>																		
19 Oct	N10E79	177	0120	04	Dao	002	B											
20 Oct	N10E65	177	0160	06	Dac	007	Bg		1									
21 Oct	N10E52	177	0210	06	Cko	007	Bg	5			7	1						
22 Oct	N10E39	177	0280	11	Eki	016	Bg	1	1		2	1						
23 Oct	N11E28	175	0270	12	Eai	027	Bg	2			3							
24 Oct	N12E15	175	0280	12	Eki	044	Bd	4	1		4	1						
								12	3	0	16	3	0	0	0	0		

Still on Disk.

Absolute heliographic longitude:175

<i>Region 688</i>																		
20 Oct	S08W48	290	0040	04	Dso	006	B											
21 Oct	S08W61	290	0040	07	Dso	003	B											
22 Oct	S08W74	290	0060	00	Axx	001	A											
23 Oct	S08W87	290	0020	02	Axx	001	A											
								0	0	0	0	0	0	0	0	0	0	0

Crossed West Limb.

Absolute heliographic longitude:290

<i>Region 689</i>																		
21 Oct	N12E74	155	0060	01	Hsx	001	A											
22 Oct	N12E61	155	0060	01	Hsx	001	A											
23 Oct	N12E48	155	0040	02	Hax	001	A											
24 Oct	N11E34	156	0050	02	Hsx	001	A											
								0	0	0	0	0	0	0	0	0	0	0

Still on Disk.

Absolute heliographic longitude:156

<i>Region 690</i>																		
22 Oct	N00E78	138	0060	01	Hax	001	A											
23 Oct	N00E66	137	0070	02	Hsx	001	A											
24 Oct	N00E53	137	0070	02	Hax	003	A											
								0	0	0	0	0	0	0	0	0	0	0

Still on Disk.

Absolute heliographic longitude:137



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	4							
<i>Region 691</i>																						
23 Oct	N16E69	134	0050	02	Hsx	001	A															
24 Oct	N15E59	131	0150	13	Eai	011	Bgd	1														
								1	0	0	0	0	0	0	0	0	0	0	0	0	0	
Still on Disk.																						
Absolute heliographic longitude:131																						
<i>Region 692</i>																						
24 Oct	S17E30	160	0070	04	Dao	008	B															
								0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Still on Disk.																						
Absolute heliographic longitude:160																						

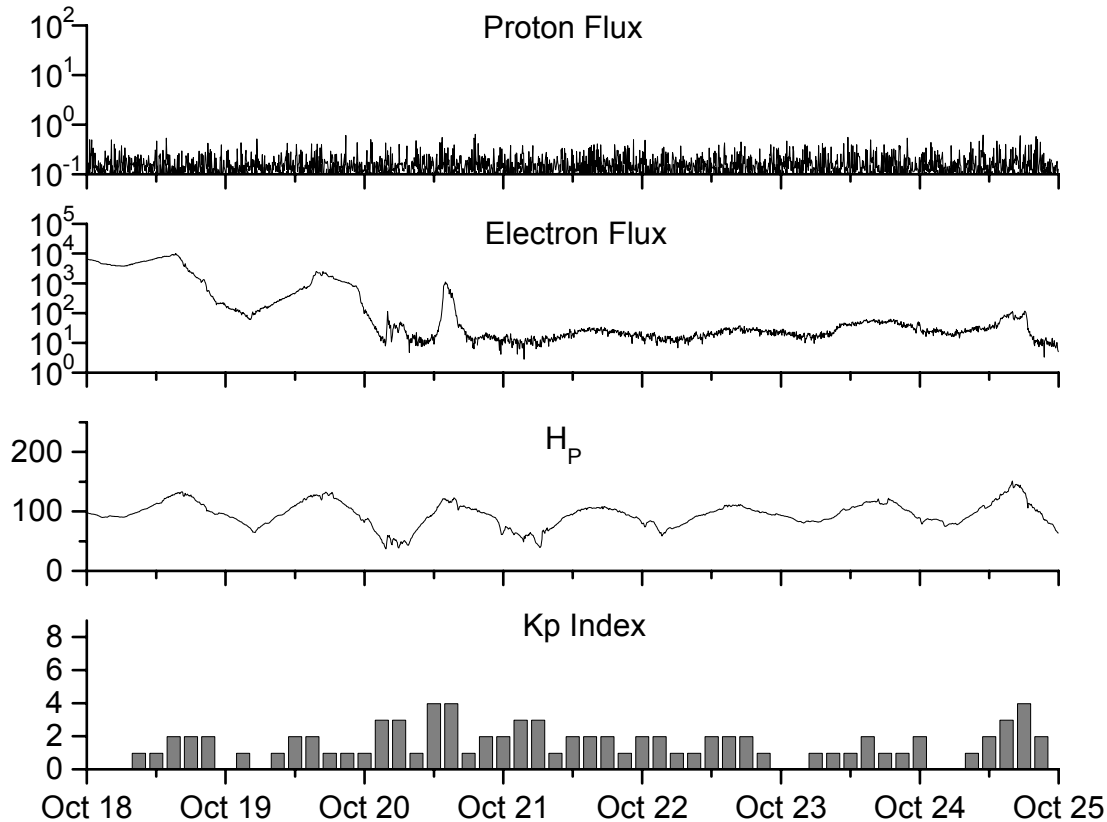


**Recent Solar Indices (preliminary)
of the observed monthly mean values**

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
2002									
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	121.5	70.3	126.3	135.0	20	20.1
May	89.6	55.2	0.62	118.3	67.8	129.3	133.1	26	21.0
June	118.4	77.4	0.65	113.6	65.2	129.4	130.2	24	21.5
July	132.8	85.0	0.64	106.9	62.0	127.8	127.2	19	22.0
August	114.3	72.7	0.64	102.8	60.3	122.1	125.2	23	22.2
September	82.6	48.8	0.59	100.7	59.8	112.3	123.7	18	21.8
October	118.9	65.6	0.55	96.6	58.4	153.1	121.8	35	21.1
November	118.9	67.2	0.57	93.6	57.0	153.1	120.1	28	20.0
December	75.4	47.0	0.62	91.4	55.0	115.1	118.0	16	18.6
2004									
January	62.3	37.2	0.60	87.9	52.0	114.1	116.3	22	18.1
February	75.6	46.0	0.61	84.2	49.4	107.0	115.5	13	17.7
March	81.0	48.9	0.60	80.9	47.2	112.2	114.6	14	16.9
April	59.3	39.3	0.66			101.2		11	
May	77.3	41.5	0.54			99.8		8	
June	78.9	43.2	0.55			97.4		8	
July	87.8	51.0	0.58			118.5		23	
August	69.5	40.9	0.59			110.1		10	
September	50.0	27.7	0.55			103.1		10	

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 18 October 2004*

Protons plot contains the five-minute averaged integral proton flux (protons/cm²-sec -sr) as measured by GOES-11 (W100) for each of three energy thresholds: greater than 10, 50, and 100 MeV.

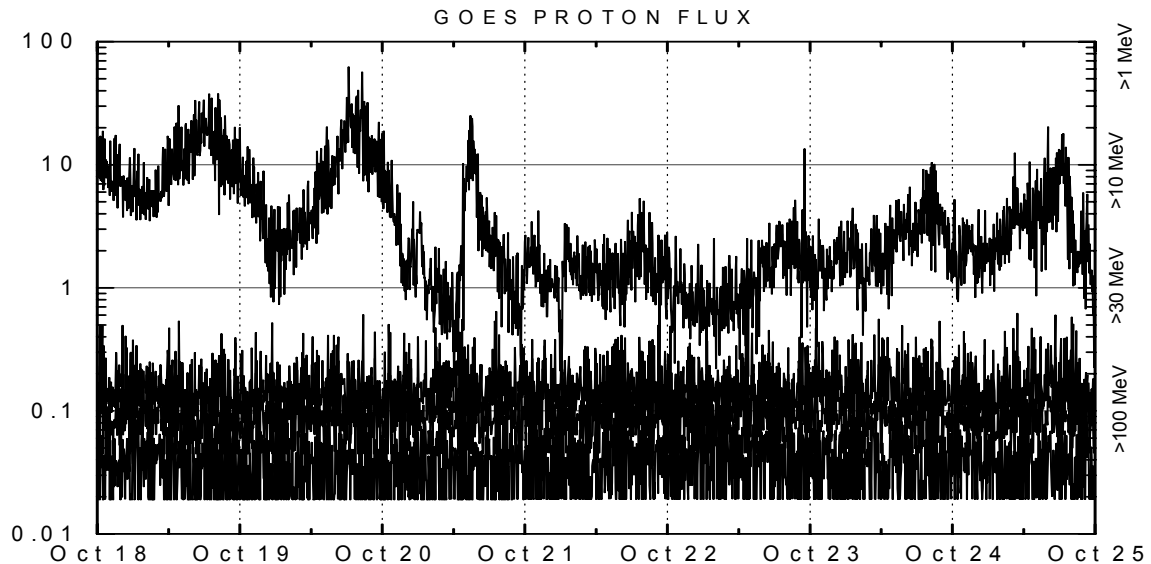
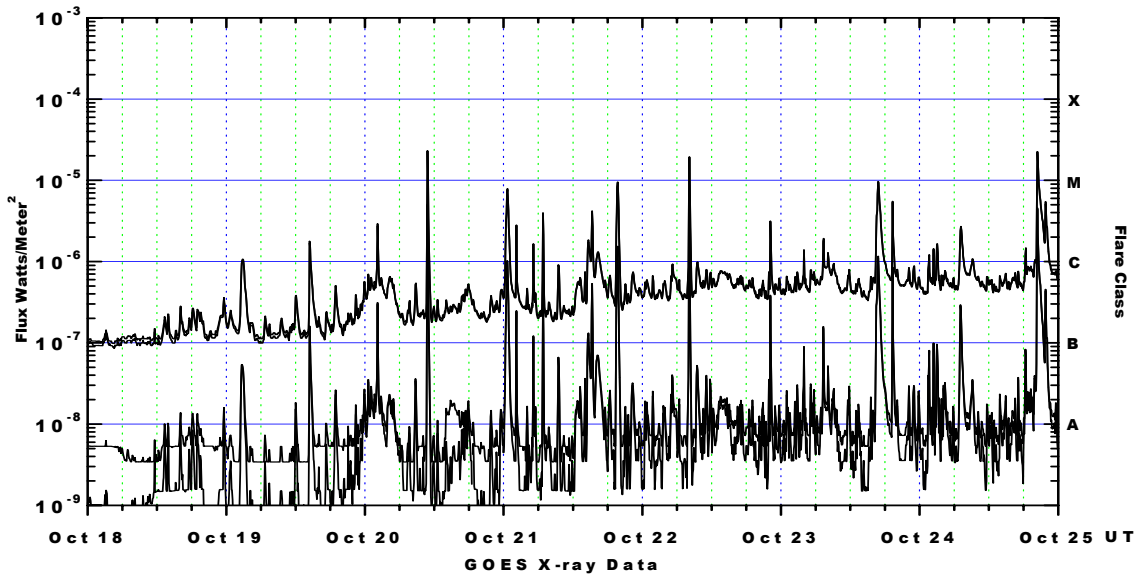
Electrons plot contains the five-minute averaged integral electron flux (electrons/cm²-sec -sr) with energies greater than 2 MeV at GOES-12 (W74).

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 Hartland, UK. These data are made available through cooperation from the Geological Survey of Canada (GSC), British Geological Survey (BGS) 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 (W75) and GOES 10 (W136) 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 (W100) 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.



Optical Flares



Space
Environment
Center



September 2004
(Month 96)

Preliminary data

Comparison of Cycles
at current month in cycle

