

Space Weather Highlights
22 - 28 September 2003

SWO PRF 1465
30 September 2003

Solar activity ranged from very low to low levels. Activity was at low levels for the entire period except the first day, 22 September when it was at very low levels. Region 464 (N04, L=356, class/area Fki/610 on 26 September) was a large, moderately complex region that developed a beta-gamma configuration on 22 September and maintained this configuration throughout the period. The majority of activity during the period was from Region 464. On 24 September, Region 464 produced numerous minor C-class flares including a C5/1f flare at 0717 UTC. This region also produced the largest event of the period, a long duration C6/Sf flare on 28 September at 1558 UTC. A 20-degree filament near S19W23 erupted off the disk on 24 September with a rather faint CME observed on LASCO imagery following the eruption.

Solar wind data were available from the NASA Advanced Composition Explorer (ACE) spacecraft for most of the summary period. The period began with solar wind speed near 600 km/s due to a coronal hole high speed flow. On 23 September, the high speed flow was in decline as yet another coronal hole high speed flow rotated into a geoeffective position. Wind speed increased on 24 September and reached a peak near 775 km/s on 25 September. The second high speed flow was in steady decline from 26-28 September and solar wind speed at the close of the period was near 375 km/s. The Bz component of the interplanetary magnetic field fluctuated mostly between +/- 6nT during the two high speed flows. Peak fluctuations reached -9nT on 24 September.

There were no greater than 10 MeV proton events at geosynchronous orbit during the period.

The greater than 2 MeV electron flux at geosynchronous orbit reached high level everyday during the period (22-28 September).

Geomagnetic activity ranged from quiet to minor storm levels. The period began at quiet to occasionally active levels on 22-23 September. Geomagnetic activity increased on 24-25 September as a coronal hole rotated into geoeffective position producing mostly unsettled to minor storm levels. As the coronal hole high speed flow began to wane on 26 September activity was at unsettled to active levels. Activity from the remainder of the period, 27-28 September was at quiet to unsettled levels.

Space Weather Outlook
01 October - 27 October 2003

Solar activity is expected to range from very low to low levels with a chance of isolated M-class events. Region 464 has the potential for isolated M-class activity early in the period before it rotates beyond the west limb on 03 October. Region 471 rotated onto the visible disk on 30 September and is most likely old Region 456 (S08, L=222), which was quite active as it rotated beyond the west limb on its last rotation. Region 471 may keep activity levels somewhat enhanced.

No greater than 10 MeV proton events at geosynchronous orbit are expected during the period.

The greater than 2 MeV electron flux at geosynchronous orbit is expected to reach high levels on 02 – 05 October, 07 – 09 October, and 17 – 26 October.

The geomagnetic field is expected to range from quiet to major storm levels during the period. A returning coronal hole is expected on 05 – 08 October and could produce active to isolated minor storm levels. A large coronal hole is due to return on 14 – 22 October and is expected to produce major storm levels.



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	
22 September	123	91	740	B2.6	0	0	0	0	0	0	0	0	0
23 September	125	133	860	B3.0	1	0	0	2	0	0	0	0	0
24 September	134	121	750	B3.9	12	0	0	12	1	0	0	0	0
25 September	133	122	780	B2.9	2	0	0	0	0	0	0	0	0
26 September	131	127	730	B3.4	2	0	0	2	0	0	0	0	0
27 September	130	137	730	B3.1	2	0	0	3	0	0	0	0	0
28 September	137	139	710	B4.0	3	0	0	3	0	0	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
	22 September	1.4E+6	1.2E+4	2.9E+3		6.8E+8
23 September	8.5E+5	1.3E+4	3.0E+3		3.7E+8	
24 September	1.4E+6	1.3E+4	2.8E+3		9.7E+7	
25 September	3.4E+6	1.3E+4	2.9E+3		1.2E+8	
26 September	1.8E+6	1.2E+4	2.8E+3		4.5E+8	
27 September	1.6E+6	1.2E+4	2.7E+3		8.3E+8	
28 September	1.9E+6	1.3E+4	2.8E+3		8.9E+8	

Daily Geomagnetic Data

Date	Middle Latitude Fredericksburg		High Latitude College		Estimated Planetary	
	A	K-indices	A	K-indices	A	K-indices
	22 September	17	2-4-3-4-3-3-4-2	30	2-3-5-6-5-4-3-1	18
23 September	10	2-3-3-2-2-2-2-3	21	2-4-3-5-5-3-3-2	17	3-4-3-3-3-3-4-3
24 September	27	5-5-3-3-3-3-3-5	44	4-5-6-5-4-6-4-3	33	5-5-5-4-4-4-4-4
25 September	16	3-3-4-3-3-3-3-3	40	3-4-6-6-5-5-3-2	28	4-4-5-5-4-4-4-3
26 September	11	3-2-3-3-2-2-2-3	27	3-2-5-6-4-4-2-2	17	3-3-4-4-3-3-3-3
27 September	13	3-2-4-5-0-0-1-2	5	3-1-1-2-0-0-2-1	9	3-2-2-3-2-2-2-2
28 September	2	0-1-0-1-1-1-1-0	4	0-0-1-3-2-1-1-0	6	2-1-2-3-2-2-2-1

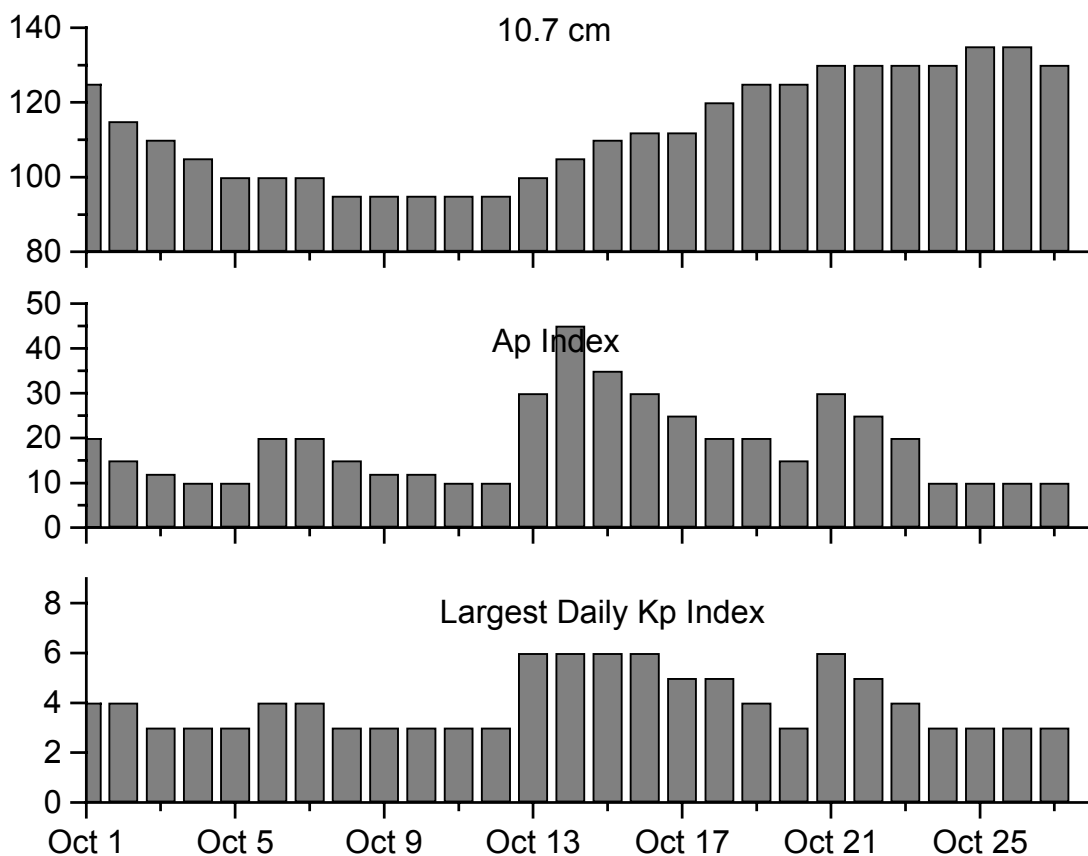


Alerts and Warnings Issued

Date & Time of Issue	Type of Alert or Warning	Date & Time of Event UT
22 Sep 0033	2 - 245 MHz Radio Bursts	21 Sep
22 Sep 0033	1 - 245 MHz Radio Noise Storm	21 Sep
22 Sep 0515	ALERT: Electron 2MeV Integral Flux > 1000pfu	22 Sep 0500
22 Sep 0529	WARNING: Geomagnetic K= 4	22 Sep 0530 - 1500
22 Sep 0535	ALERT: Geomagnetic K = 4	22 Sep 0536
22 Sep 2008	ALERT: Geomagnetic K = 4	22 Sep 2008
23 Sep 0509	ALERT: Geomagnetic K = 4	23 Sep 0508
23 Sep 0525	ALERT: Electron 2MeV Integral Flux > 1000pfu	23 Sep 0500
24 Sep 0208	WARNING: Geomagnetic K = 4	24 Sep 0211 - 1500
24 Sep 0210	ALERT: Geomagnetic K = 4	24 Sep 0211
24 Sep 0216	ALERT: Geomagnetic K = 5	24 Sep 0215
24 Sep 0218	WARNING: Geomagnetic K = 5	24 Sep 0219 - 1500
24 Sep 0915	ALERT: Electron 2MeV Integral Flux > 1000pfu	24 Sep 0725
24 Sep 1439	EXTENDED WARNING: Geomagnetic K = 4	24 Sep 0211 - 2359
24 Sep 1629	WARNING: Geomagnetic K = 5	24 Sep 1635 - 2359
24 Sep 2139	WATCH: Geomagnetic A \geq 20	27 Sep
24 Sep 2349	EXTENDED WARNING: Geomagnetic K= 5	24 Sep 1635 - 25 Sep 1500
25 Sep 0021	4 - 245 MHz Radio Bursts	24 Sep
25 Sep 1226	ALERT: Electron 2MeV Integral Flux > 1000pfu	25 Sep 1205
25 Sep 1456	EXTENDED WARNING: Geomagnetic K = 4	24 Sep 0211 - 2359
25 Sep 2354	EXTENDED WARNING: Geomagnetic K = 4	24 Sep 0211 - 26 Sep 1500
26 Sep 0041	3 - 245 MHz Radio Bursts	25 Sep
26 Sep 0041	1 - 245 MHz Radio Noise Storm	25 Sep
26 Sep 0844	WARNING: Geomagnetic K = 5 expected	26 Sep 0844 - 1500
26 Sep 0855	ALERT: Geomagnetic K = 5	26 Sep 0855
26 Sep 0922	ALERT: Electron 2MeV Integral Flux > 1000pfu	26 Sep 0900
26 Sep 1453	EXTENDED WARNING: Geomagnetic K = 4	24 Sep 0211 - 26 Sep 2359
26 Sep 2353	EXTENDED WARNING: Geomagnetic K = 4	24 Sep 0211 - 27 Sep 1500
27 Sep 0057	2 - 245 MHz Radio Bursts	26 Sep
27 Sep 0529	ALERT: Electron 2MeV Integral Flux > 1000pfu	27 Sep 0500
28 Sep 0024	3 - 245 MHz Radio Bursts	27 Sep
28 Sep 0639	ALERT: Electron 2MeV Integral Flux > 1000pfu	28 Sep 0500



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
01 Oct	125	20	4	15 Oct	110	35	6
02	115	15	4	16	112	30	6
03	110	12	3	17	112	25	5
04	105	10	3	18	120	20	5
05	100	10	3	19	125	20	4
06	100	20	4	20	125	15	3
07	100	20	4	21	130	30	6
08	95	15	3	22	130	25	5
09	95	12	3	23	130	20	4
10	95	12	3	24	130	10	3
11	95	10	3	25	135	10	3
12	95	10	3	26	135	10	3
13	100	30	6	27	130	10	3
14	105	45	6				



Energetic Events

Date	Time		X-ray		Optical Information			Peak		Sweep Freq		
	Begin	Max	½ Max	Class	Integ Flux	Imp/ Brtns	Location Lat CMD	Rgn #	Radio Flux		Intensity	
									245	2695	II	IV

No Events Observed

Flare List

Date	Time			X-ray Class.	Optical		Rgn
	Begin	Max	End		Imp / Brtns	Location Lat CMD	
22 September	1313	1331	1348	B4.9			
	2012	2016	2025	B5.7			
23 September	0615	0615	0619		Sf	N03E38	464
	1139	1144	1149	B8.0			
	1443	1443	1448	C2.1	Sf	N01E42	464
24 September	0015	0023	0027	B8.1			464
	0219	0232	0235	B8.3			464
	0434	0434	0444	C2.1	Sf	N01E23	464
	0532	0532	0534	B7.2	Sf	N02E23	464
	0625	0630	0636	C1.2	Sf	N01E23	464
	0716	0717	0723	C5.4	1f	N01E20	464
	0855	0856	0858	C2.0	Sf	N01E21	464
	0933	0935	0942	C1.4	Sf	N00E21	464
	0952	0954	1003		Sf	N01E20	464
	1037	1040	1045	C1.1	Sf	N02E18	464
	1156	1157	1201	C1.4	Sf	N01E19	464
	1253	1254	1258	C1.9	Sf	N01E18	464
	1405	1409	1412	B9.6			
	1447	1450	1455	B9.7			
	1456	1504	1508	C1.1			464
1527	1530	1534	C1.6	Sf	N02E17	464	
1738	1740	1743	B8.8	Sf	N01E17	464	
2002	2005	2007	C1.1			466	
2323	2323	2328	C1.1	Sf	N02E11	464	
25 September	0029	0035	0052	C1.1			464
	1308	1313	1320	B6.2			
	1717	1725	1734	C1.1			464
26 September	2212	2215	2229	B9.2			
	1202	1207	1215	B7.7			
	1215	1219	1222	B9.5			
	1454	1455	1501	C1.3	Sf	N05W04	464
	1751	1751	1758	C2.3	Sf	N05W06	464
	1855	1858	1901	B7.0			
27 September	2247	2251	2257	B6.1			
	1105	1109	1111	B6.7			
	1142	1143	1150	C1.3	Sf	N14W20	464
	1201	1205	1223	C1.3	Sf	N16W23	464



Flare List

Date	Time			X-ray Class.	Optical		Rgn
	Begin	Max	End		Imp / Brtns	Location Lat CMD	
27 September	1244	1247	1250		Sf	N17W16	464
	2130	2134	2148	B5.7			
28 September	0159	0203	0207	B7.2			464
	1410	1428	1455	C2.3			
	1553	1555	1620	C6.8	Sf	N03W34	
	2036	2037	2042	C1.6	Sf	N05W37	
	B2040	2040	2044		Sf	N05W37	
	2255	2259	2301	B7.5			
	2331	2334	2337	B7.3			

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
<i>Region 459</i>													
14 Sep	S11E38	111	0010	02	Bxo	003	B						
15 Sep	S11E24	111	0020	04	Dso	004	B						
16 Sep	S11E12	110	0030	06	Dso	008	B						
17 Sep	S11W01	110	0050	08	Dso	012	B				1		
18 Sep	S11W14	109	0070	06	Dao	013	B						
19 Sep	S11W27	109	0100	07	Dao	009	B						
20 Sep	S12W41	109	0100	08	Dao	011	B						
21 Sep	S11W56	111	0080	07	Cso	007	B						
22 Sep	S12W69	111	0030	07	Cao	003	B						
23 Sep	S11W84	113	0030	04	Bxo	002	B						
24 Sep	S11W97	113											

0 0 0 1 0 0 0 0

Crossed West Limb.

Absolute heliographic longitude: 110



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

Region 460

15 Sep	N16E75	060	0040	01	Hsx	001	A										
16 Sep	N17E62	060	0050	07	Cso	004	B										
17 Sep	N17E51	058	0040	09	Cso	002	B										
18 Sep	N17E38	057	0040	07	Cao	003	B										
19 Sep	N17E21	061	0020	01	Hax	002	A										
20 Sep	N17E07	061	0010	01	Hsx	003	A										
21 Sep	N17W05	060	0010	03	Bxo	006	B										
22 Sep	N16W19	061	0010	03	Bxo	002	B										
23 Sep	N17W34	063	0010	01	Hrx	003	A										
24 Sep	N17W47	063															
25 Sep	N17W60	063															

0 0 0 0 0 0 0 0

Crossed West Limb.

Absolute heliographic longitude: 060

Region 463

17 Sep	N09E74	035	0090	02	Hax	001	A										
18 Sep	N09E59	036	0080	02	Hsx	001	A										
19 Sep	N09E46	036	0070	02	Hsx	001	A										
20 Sep	N08E33	035	0070	02	Hsx	001	A										
21 Sep	N09E18	037	0070	02	Hsx	001	A										
22 Sep	N09E06	036	0050	02	Hax	001	A										
23 Sep	N09W09	038	0060	02	Hsx	001	A										
24 Sep	N09W22	038	0040	02	Hsx	001	A										
25 Sep	N09W35	038	0050	03	Cso	002	B										
26 Sep	N08W50	039	0030	01	Hsx	001	A										
27 Sep	N09W63	039	0020	01	Hsx	001	A										
28 Sep	N09W77	040	0010	01	Axx	001	A										

0 0 0 0 0 0 0 0

Still on Disk.

Absolute heliographic longitude: 036



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 464</i>																	
20 Sep	N05E77	351	0360	12	Eko	006	B	1									
21 Sep	N03E62	353	0460	12	Eko	010	B	3									
22 Sep	N06E49	353	0560	14	Eko	017	Bg										
23 Sep	N04E35	354	0600	14	Eki	030	Bg										
24 Sep	N04E22	354	0570	16	Fki	037	Bg	10			12	1					
25 Sep	N04E09	354	0580	18	Fkc	050	Bg	2									
26 Sep	N04W07	356	0610	18	Fki	057	Bg	2			2						
27 Sep	N05W20	356	0580	20	Fsi	054	Bg	2			3						
28 Sep	N03W34	357	0540	19	Fkc	055	Bg	3			2						
								23	0	0	19	1	0	0	0	0	

Still on Disk.

Absolute heliographic longitude: 356

<i>Region 465</i>																	
22 Sep	S02E50	352	0060	04	Cao	007	B										
23 Sep	N00E36	353	0040	05	Cso	008	B										
24 Sep	N00E23	353	0030	04	Cso	005	B										
25 Sep	N00E10	353	0020	04	Dro	009	B										
26 Sep	S01W03	352	0010	02	Bxo	007	B										
27 Sep	S01W19	355	0010	03	Cro	003	B										
28 Sep	S02W32	355	0010	05	Bxo	003	B										
								0	0	0	0	0	0	0	0	0	

Still on Disk.

Absolute heliographic longitude: 352

<i>Region 466</i>																	
22 Sep	S04E72	330	0030	01	Hsx	001	A										
23 Sep	S05E60	329	0110	06	Dao	007	B										
24 Sep	S05E47	329	0090	06	Dso	010	B	1									
25 Sep	S05E34	329	0100	06	Dso	007	B										
26 Sep	S07E19	330	0060	05	Cso	005	B										
27 Sep	S05E05	331	0070	05	Cso	007	B										
28 Sep	S05W09	332	0080	06	Dso	009	B										
								1	0	0	0	0	0	0	0	0	

Still on Disk.

Absolute heliographic longitude: 331



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 467</i>																	
23 Sep	S10E46	343	0010	00	Hrx	001	A										
24 Sep	S10E33	343	0020	06	Cso	007	B										
25 Sep	S10E20	343	0030	06	Cso	004	B										
26 Sep	S10E06	343	0020	05	Cso	007	B										
27 Sep	S10W06	342	0030	06	Dso	006	B										
28 Sep	S11W20	343	0020	05	Cso	003	B										
								0	0	0	0	0	0	0	0	0	0
Still on Disk.																	
Absolute heliographic longitude: 343																	
<i>Region 468</i>																	
23 Sep	N16W16	045	0000	00	Axx	001	A										
24 Sep	N16W29	045	0000	01	Axx	001	A										
25 Sep	N16W42	045															
								0	0	0	0	0	0	0	0	0	0
Still on Disk.																	
Absolute heliographic longitude: 045																	
<i>Region 469</i>																	
27 Sep	S09W24	360	0020	03	Bxo	006	B										
28 Sep	S09W38	001	0050	04	Dso	008	B										
								0	0	0	0	0	0	0	0	0	0
Still on Disk.																	
Absolute heliographic longitude: 360																	

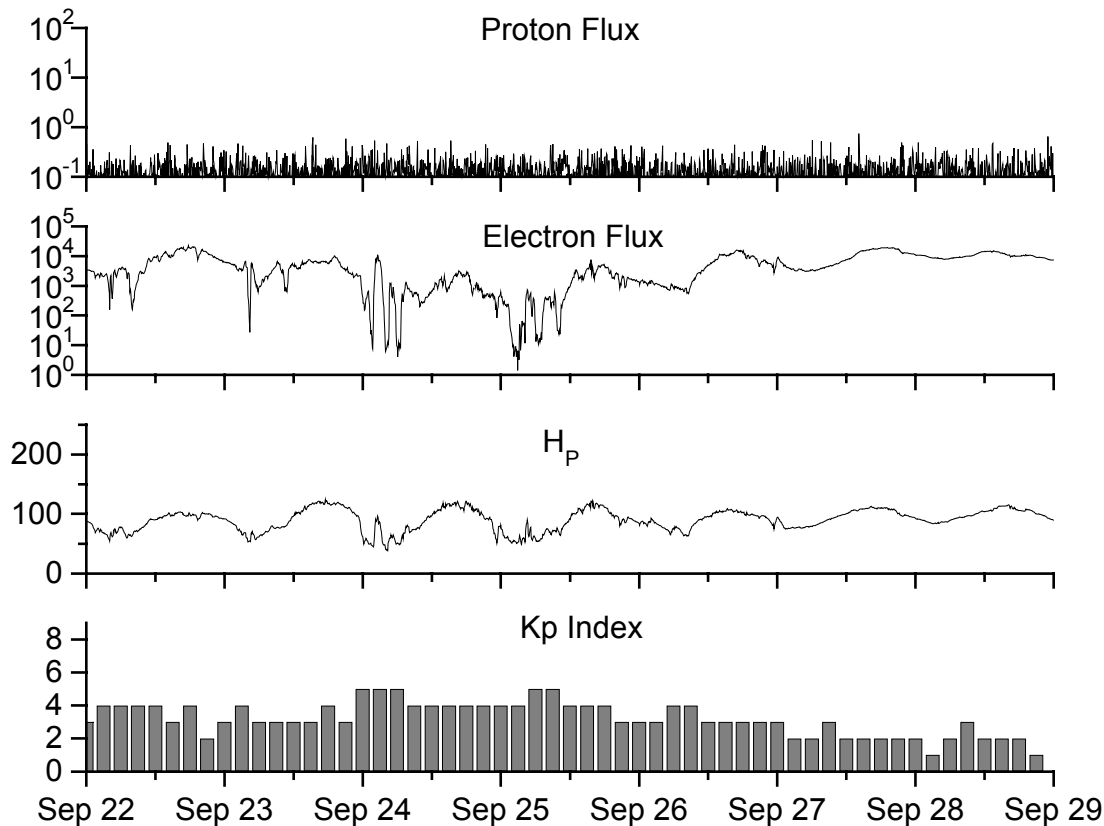


**Recent Solar Indices (preliminary)
of the observed monthly mean values**

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									
September	229.1	150.7	0.66	178.8	114.1	233.8	191.3	13	12.8
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			132.2		21	
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	

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 22 September 2003

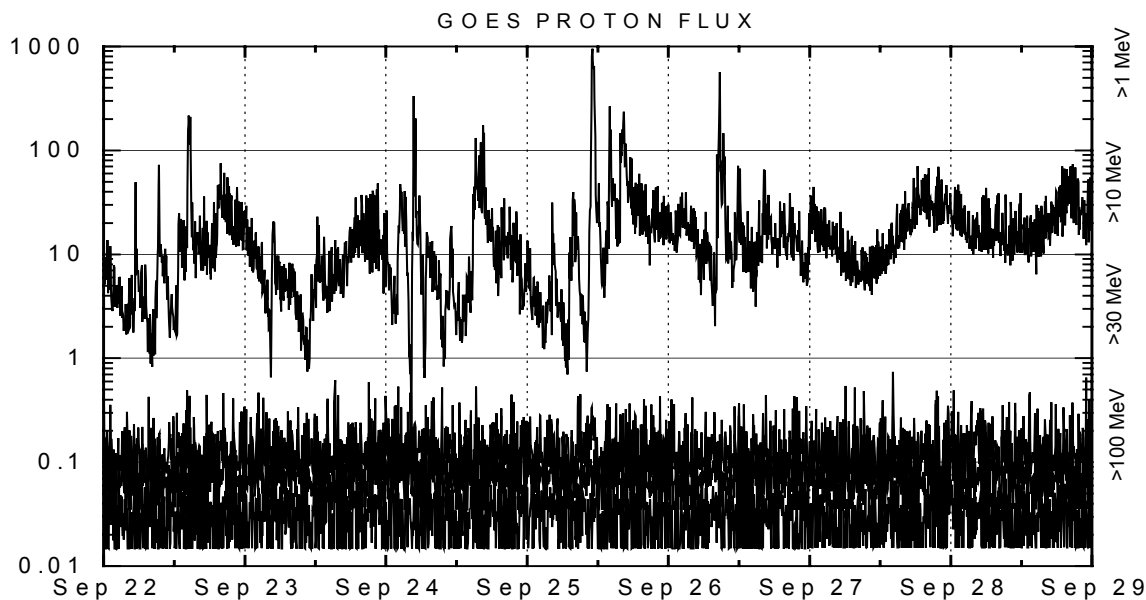
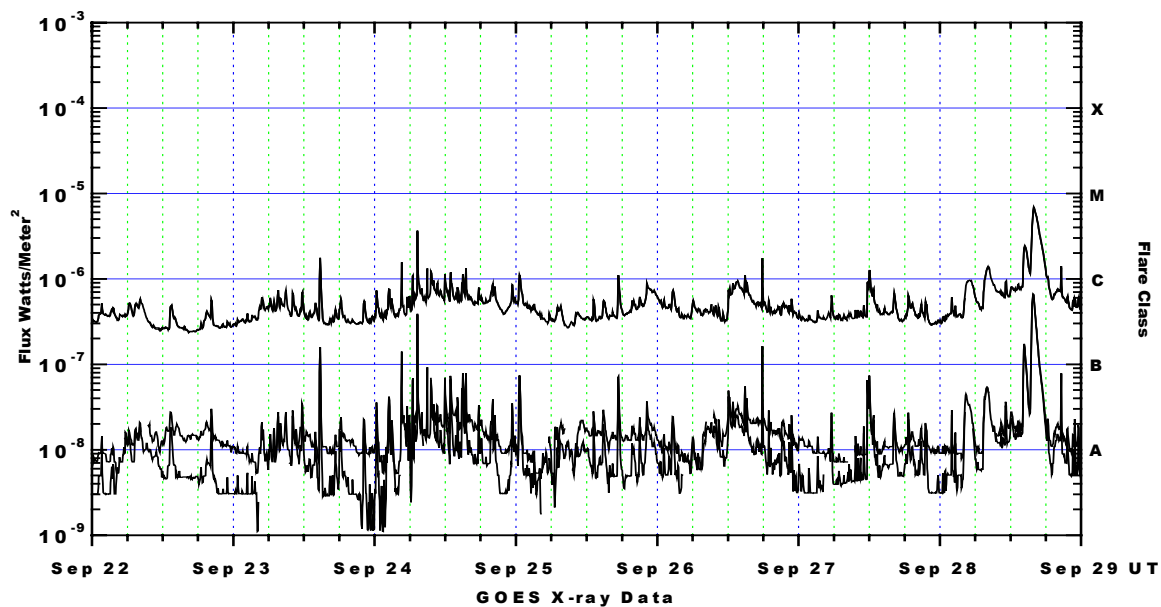
Protons plot contains the five-minute averaged integral proton flux (protons/cm²-sec-sr) as measured by GOES-11 (W113) for each of three energy thresholds: greater than 10, 50, and 100 MeV.

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.

