Space Weather Highlights **SWO PRF 1496**
26 April – 02 May 2004 **04 May 2004**

Solar activity ranged from very low to low this summary period. The period began with low activity on 26 and 27 April. At 27/0723 UTC, Region 599 (N15, L=048, class/area, Dao/200 on 26 April) produced a C3.1 flare with an associated Type II radio burst with a plane-of-sky speed estimated at 732 km/s. EIT imagery indicated the existence of a possible weak, Earthward-directed CME. The group grew steadily and showed some magnetic complexity early in the period, but toward the end of the summary period, showed signs of decay in size and magnetic structure. From 28 to 29 April, activity was at very low levels. Activity levels increased to low from 30 April to 02 May as numerous low to high-level C-class flares were observed from new Regions 601 and 602. Region 602 (S14, L=062, class/area Dso/060 on 30 April) formed on the disk on 30 April and produced a C1.7 flare at 30/0547 UTC. The region decayed to spotless plage as it approached the west limb. New Region 601 (S10, L=030, class/area, Dao/270 on 02 May) also formed on the disk on 30 April and produced the largest flare of the summary period, an impulsive C9.5 at 01/1536 UTC with an associated weak, Earthward-directed CME. This region displayed significant growth in coverage and magnetic complexity.

Solar wind data were available from the NASA Advanced Composition Explorer (ACE) spacecraft during most of the summary period. The period began with solar wind speed at 525 km/s and solar wind signatures showing a gradual declining trend in velocity with a very weak IMF. At 26/1520 UTC, a compression wave followed by some transient flow was observed: density, velocity, temperature and magnetic field all increased over a few minutes, and Bz showed a rotation over 2-3 hours from +5 to around –7 nT. Wind speed showed a slow decay on 27 April and by early on the 28th, was near 425 km/s. Midday on 28 April, wind speed showed a sudden increase to about 550 km/s with Bz rotating between +/- 7 nT over a 5-6 hour period. Speed decreased to about 450 km/s through 29 April with a weak IMF. Late on 29 April, portions of the weak CME from the C3.1 flare from 26 April likely elevated the solar wind speed to near 500 km/s. The IMF Bz responded with fluctuations between +/- 7 nT. By the end of the summary period, wind speed decayed to near 400 km/s.

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 normal to moderate levels the entire summary period.

The field was at predominately quiet to unsettled levels. Isolated periods of active conditions were observed late on 28 April (weak high-speed stream) and 30 April CME transient effect).

Space Weather Outlook
05 May - 31 May 2004

Solar activity levels are expected to range from very low to moderate for the forecast period. Isolated moderate activity is possible from Region 601 and from returning old

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

The greater than 2 MeV electron flux at geosynchronous orbit is expected to reach high levels 15 – 16, 21 – 24 and 30 - 31 May due to recurrent coronal hole high-speed streams.

The geomagnetic field is expected to range from quiet to minor storm levels. Unsettled to active conditions are possible beginning late on 05 May through 07 May due to effects from a weak coronal hole high-speed stream. Unsettled to active conditions are also possible on 20 – 22 may due to recurrent coronal hole effects. The remainder of the interval is expected to be quiet to unsettled.

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
26 April	100	47	470	B1.2	1	0	0	2	0	0	0	0
27 April	95	28	310	A7.8	1	0	0	0	0	0	0	0
28 April	90	32	290	A6.2	0	0	0	0	0	0	0	0
29 April	89	25	200	A5.6	0	0	0	0	0	0	0	0
30 April	89	46	130	A6.0	1	0	0	0	0	0	0	0
01 May	94	65	170	A9.1	2	0	0	1	0	0	0	0
02 May	98	41	340	B2.4	8	0	0	3	0	0	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
26 April	2.3E+5	1.3E+4	2.8E+3		7.5E+6	
27 April	2.2E+5	1.3E+4	2.5E+3		1.0E+7	
28 April	2.2E+5	1.2E+4	2.6E+3		7.9E+6	
29 April	2.2E+5	1.2E+4	2.7E+3		4.8E+6	
30 April	2.3E+5	1.3E+4	2.7E+3		3.8E+6	
01 May	1.8E+5	1.3E+4	2.7E+3		8.3E+5	
02 May	1.6E+5	1.3E+4	2.8E+3		1.4E+6	

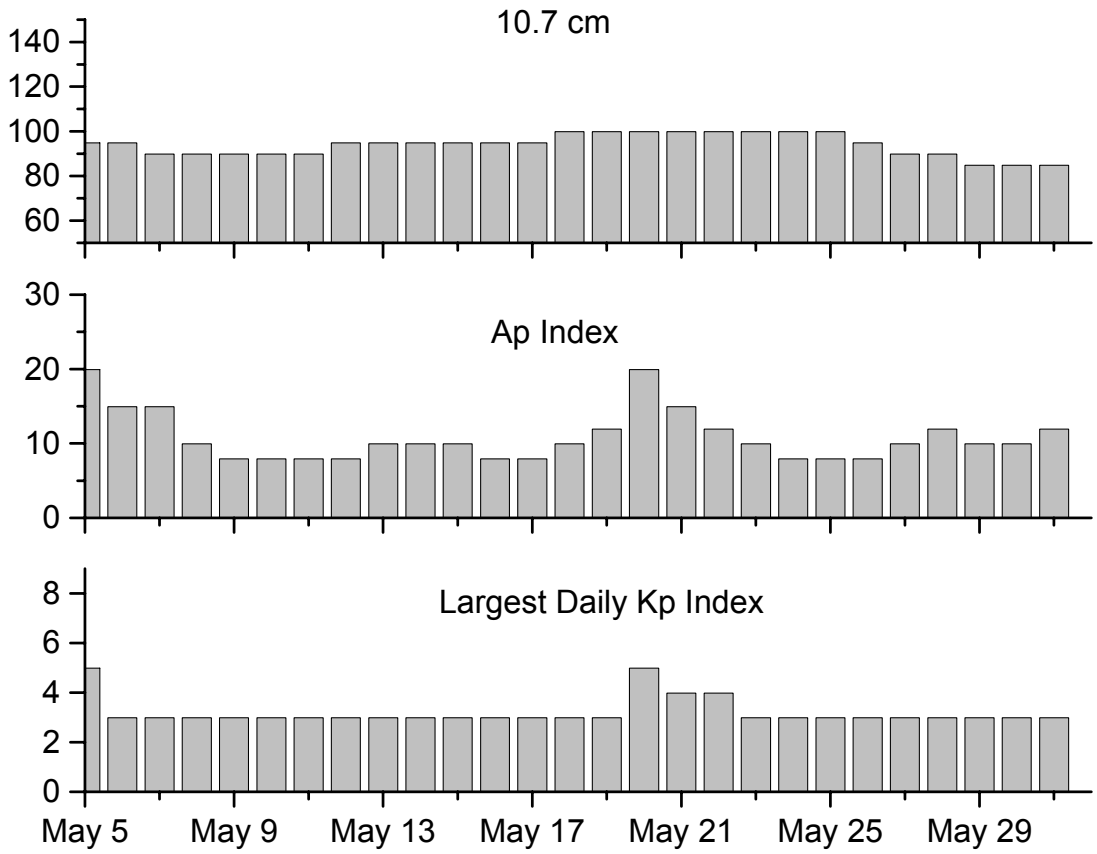
Daily Geomagnetic Data

Date	Middle Latitude Fredericksburg A	K-indices	High Latitude College A	K-indices	Estimated Planetary A	K-indices
26 April	4	2-1-1-0-1-1-2-1	5	2-2-2-0-1-1-2-2	7	2-1-3-1-2-2-2-2
27 April	5	1-2-1-1-1-2-2-1	2	1-2-0-0-0-1-1-1	5	1-1-1-1-2-2-2-2
28 April	8	1-0-2-2-2-3-3-2	7	1-0-1-0-2-3-3-3	8	1-0-2-1-2-3-4-2
29 April	3	1-2-1-0-1-0-1-2	3	1-1-2-1-0-0-1-1	4	1-2-1-1-2-2-1-2
30 April	9	2-3-2-1-1-2-3-3	10	1-3-3-2-0-2-3-3	12	2-3-3-1-2-3-3-4
01 May	8	3-2-2-2-2-1-1-3	10	3-3-3-3-2-2-1-0	13	3-3-3-3-3-3-3-3
02 May	4	2-1-1-2-1-0-2-1	3	3-1-0-1-0-1-1-0	6	3-1-0-2-2-2-2-2

Alerts and Warnings Issued

Date & Time of Issue	Type of Alert or Warning	Date & Time of Event UT
27 Apr 1139	ALERT: Type II Radio Emission	27 Apr 0716
28 Apr 0026	2 – 245 MHz Radio Bursts	27 Apr
28 Apr 0026	1 - 245 MHz Radio Noise Storm	27 Apr
28 Apr 1609	ALERT: Geomagnetic K= 4	28 Apr 1608
30 Apr 2041	ALERT: Geomagnetic K= 4	30 Apr 2039
30 Apr 2049	WARNING: Geomagnetic K= 4	30 Apr 2045 – 01 May 1500
02 May 0024	1 - 245 MHz Radio Noise Storm	01 May

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 May	95	20	5	19 May	100	12	3
06	95	15	4	20	100	20	5
07	90	15	4	21	100	15	4
08	90	10	3	22	100	12	3
09	90	8	3	23	100	10	3
10	90	8	3	24	100	8	3
11	90	8	3	25	100	8	3
12	95	8	3	26	95	8	3
13	95	10	3	27	90	10	3
14	95	10	3	28	90	12	3
15	95	10	3	29	85	10	3
16	95	8	3	30	85	10	3
17	95	8	3	31	85	12	3
18	100	10	3				

Energetic Events

Date	Time Begin	Time Max	Time ½ Max	X-ray Class	X-ray Integ Flux	Optical Information Imp/ Brtns	Optical Information Location Lat	Optical Information Location CMD	Optical Information Rgn #	Peak Radio Flux 245	Peak Radio Flux 2695	Sweep Freq Intensity II	Sweep Freq Intensity IV
No Events Observed													

Flare List

Date	Time Begin	Time Max	Time End	X-ray Class.	Optical Imp / Brtns	Optical Location Lat CMD	Rgn
26 April	0055	0055	0101	B4.6	Sf	N13E29	599
	0236	0238	0250	C2.4	Sf	N13E28	599
	0536	0540	0543	B3.6			599
	0608	0613	0620	B3.1			599
	1008	1013	1019	B3.1			599
	1156	1200	1206	B4.4			599
	1330	1334	1340	B3.1			599
	1823	1827	1832	B2.0			
27 April	0000	0004	0010	B1.7			599
	0708	0723	0737	C3.1			599
	1357	1406	1417	B6.4			
	2153	2157	2202	B1.2			
28 April	0447	0454	0500	B1.4			595
	1158	1205	1210	B1.4			595
	2238	2247	2253	B4.1			596
29 April	0619	0626	0636	B1.9			596
	0926	0931	0935	B1.3			
30 April	0540	0547	0551	C1.7			
	0739	0746	0751	B2.0			
	1109	1122	1135	B1.9			
	1255	1301	1312	B2.7			
	1330	1333	1337	B1.5			
	1444	1448	1501	B1.0			
	1635	1638	1640	B1.0			
	2203	2212	2222	B2.2			601
01 May	0212	0216	0229	B1.3			601
	0443	0446	0453	B8.9	Sf	S10W25	601
	0644	0652	0713	B4.7			601
	0830	0844	0851	B6.4			601
	0857	0903	0909	B9.5			601
	1343	1355	1402	C2.8			601
	1526	1536	1545	C9.5			601
	1731	1735	1744	B3.8			601
	1802	1813	1825	B4.5			601
02 May	0026	0032	0042	B4.5			601
	0237	0255	0306	B7.6			601
	0334	0338	0349	C5.4	Sf	S10W38	601

Flare List – continued.

Date	Time Begin	Time Max	Time End	X-ray Class.	Optical Imp / Brtns	Optical Location Lat CMD	Rgn
02 May	B0535	0536	0539	C1.3	Sf	S08W38	601
	0553	0610	0624	B6.3			601
	0657	0719	0754	B7.0			601
	0822	0836	0851	C1.4			601
	1007	1011	1014	C1.1			601
	1113	1115	1129	C8.3	Sf	S08W42	601
	1300	1314	1323	B7.4			601
	1507	1601	1615	C2.6			601
	1641	1645	1648	C1.0			601
	1715	1719	1727	C1.1			601
	1834	1843	1903	B5.7			601
	2047	2053	2057	B8.8			601
	2317	2327	2331	B9.7			601

Region Summary

Date	Location (° Lat ° CMD)	Location 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 595														
16 Apr	S09E68	126	0040	06	Cso	004	B								
17 Apr	S09E55	126	0010	06	Bxo	003	B								
18 Apr	S08E40	128	0030	11	Ero	006	B								
19 Apr	S07E27	127	0080	08	Dai	025	B								
20 Apr	S07E13	128	0070	07	Dao	010	B								
21 Apr	S06E00	128	0050	08	Cao	011	B								
22 Apr	S07W14	129	0030	06	Cso	006	B				1				
23 Apr	S07W26	128	0040	07	Cso	009	B								
24 Apr	S08W38	126	0010	04	Bxo	011	B								
25 Apr	S08W51	126													
26 Apr	S08W64	126													
27 Apr	S08W77	126													
28 Apr	S08W90	126													
								0	0	0	1	0	0	0	0

Crossed West Limb.
Absolute heliographic longitude:128

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 596												
18 Apr	S08E60	108	0160	09	Dso	008	B								
19 Apr	S09E44	110	0290	11	Eki	021	B	2			2				
20 Apr	S09E31	110	0340	10	Dko	020	B				1				
21 Apr	S07E19	109	0340	12	Eai	022	Bg	2			5				
22 Apr	S08E04	110	0400	13	Eko	024	Bg	1	1		10	1			
23 Apr	S08W09	111	0320	11	Eko	020	Bg								
24 Apr	S09W21	109	0240	11	Eso	015	B								
25 Apr	S08W36	111	0230	11	Eao	008	B								
26 Apr	S08W52	114	0240	05	Cao	003	B								
27 Apr	S08W67	116	0170	04	Hax	001	B								
28 Apr	S08W79	115	0200	05	Dso	002	B								
29 Apr	S07W92	115	0120	04	Hsx	001	A								
								5	1	0	18	1	0	0	0
Crossed West Limb.															
Absolute heliographic longitude: 110															
			Region 599												
24 Apr	N14E51	037	0120	06	Dai	008	B	3			2				
25 Apr	N16E28	047	0170	08	Dai	017	Bg	5	1		6	1			
26 Apr	N15E14	048	0200	09	Dao	012	Bg	1			2				
27 Apr	N14E02	047	0140	10	Dso	007	B	1							
28 Apr	N15W11	047	0090	10	Cao	010	B								
29 Apr	N16W26	049	0080	08	Cao	004	B								
30 Apr	N17W41	050	0050	02	Cao	002	B								
01 May	N17W54	050	0030	03	Cso	003	B								
02 May	N17W67	050													
								10	1	0	10	1	0	0	0
Still on Disk.															
Absolute heliographic longitude: 047															
			Region 600												
26 Apr	N18W06	068	0030	03	Cso	002	B								
27 Apr	N18W19	068													
28 Apr	N18W32	068													
								0	0	0	0	0	0	0	0
Still on Disk.															
Absolute heliographic longitude: 068															

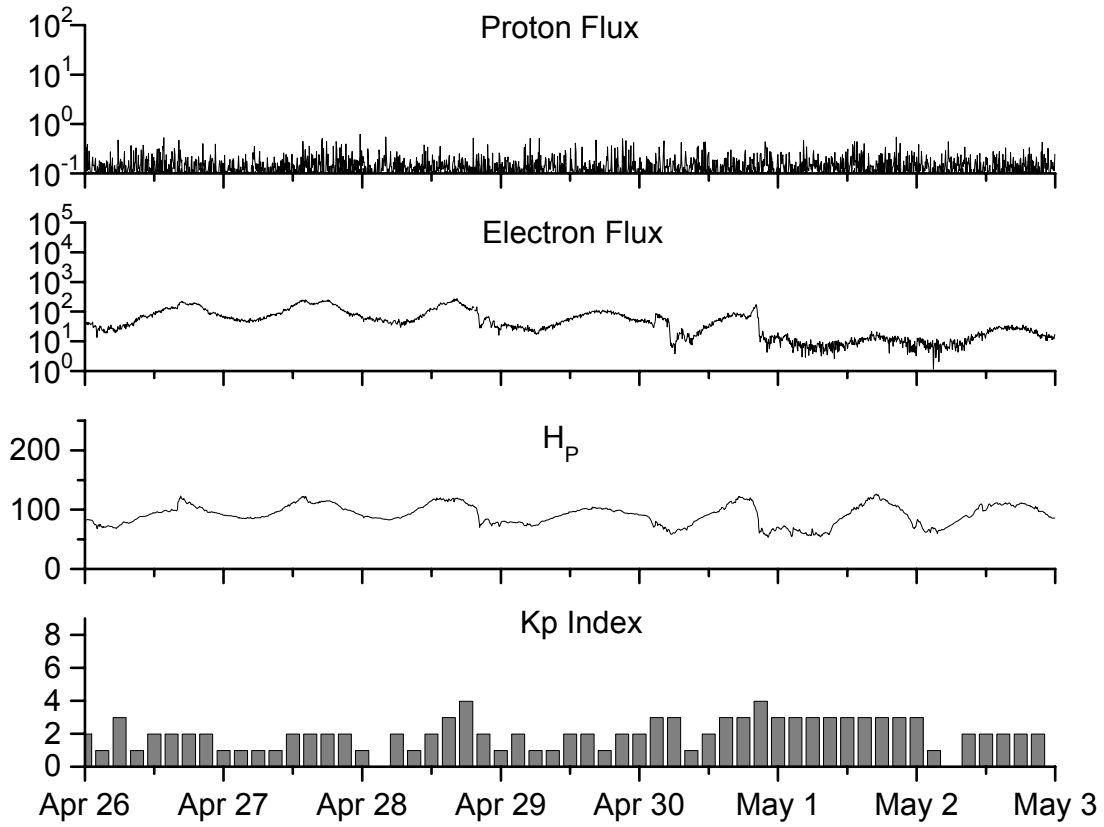
Region Summary - continued.

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 601													
30 Apr	S09W20	029	0020	05	Bxo	007	B								
01 May	S09W34	030	0090	07	Dso	010	B	2			1				
02 May	S10W47	030	0270	09	Dao	013	B	8			3				
								10	0	0	4	0	0	0	0
Still on Disk.															
Absolute heliographic longitude:029															
		Region 603													
30 Apr	S14W53	062	0060	05	Dso	007	B								
01 May	S13W66	062	0030	07	Bxo	006	B								
02 May	S13W79	062													
								0	0	0	0	0	0	0	0
Still on Disk.															
Absolute heliographic longitude:062															
		Region 603													
01 May	S15W37	033	0020	03	Cso	006	B								
02 May	S16W50	033	0070	06	Dso	008	B								
								0	0	0	0	0	0	0	0
Still on Disk.															
Absolute heliographic longitude:033															

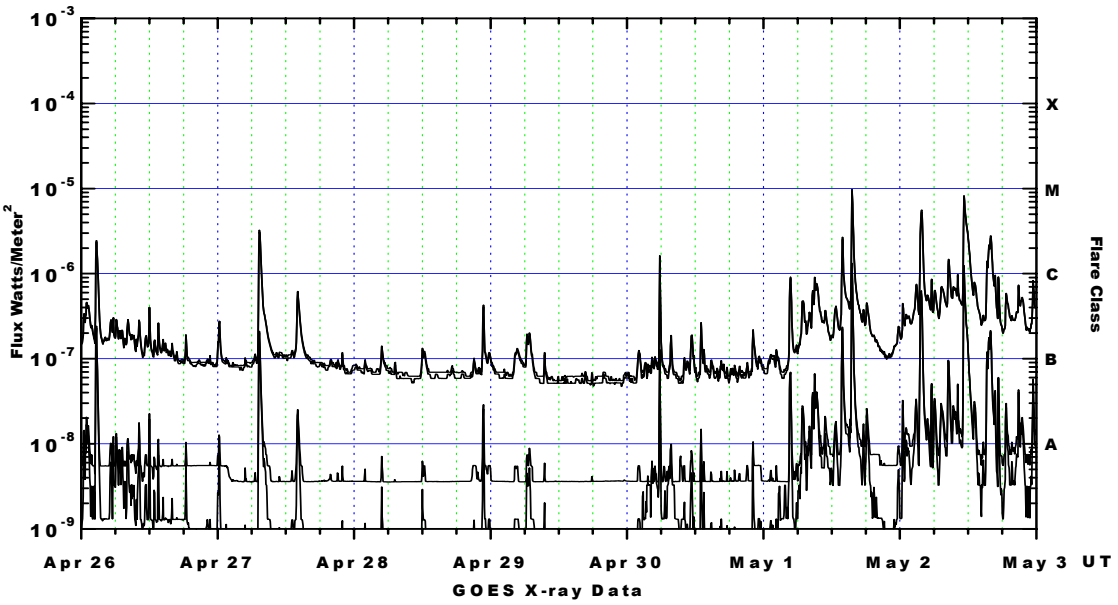
Recent Solar Indices (preliminary)
of the observed monthly mean values

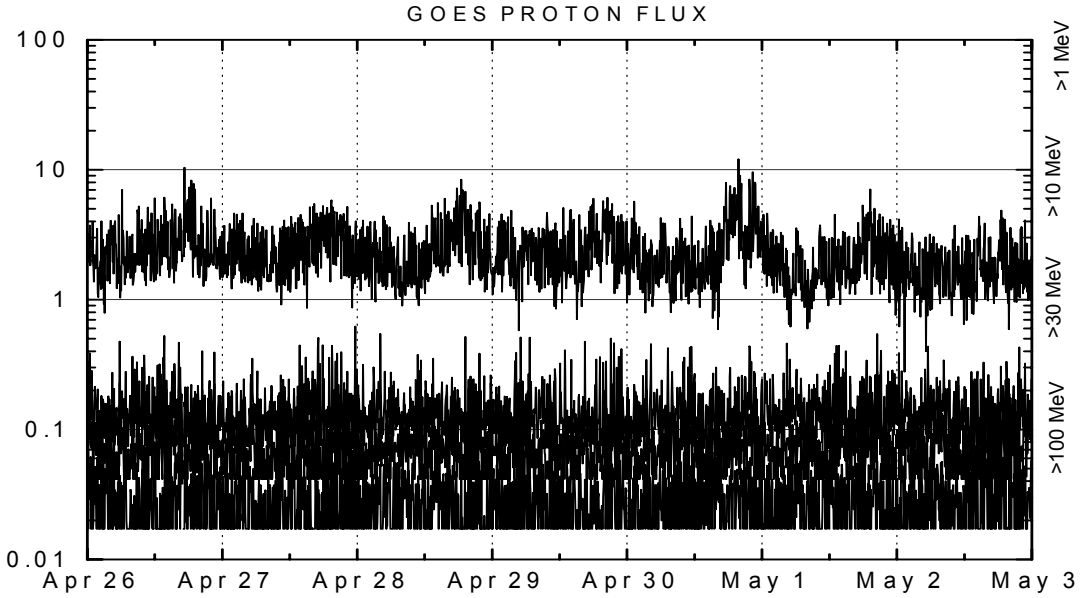
	Sunspot Numbers					Radio Flux		Geomagnetic	
	Observed values		Ratio	Smooth values		*Penticton	Smooth	Planetary	Smooth
Month	SWO	RI	RI/SWO	SWO	RI	10.7 cm	Value	Ap	Value
				2002					
April	194.9	120.7	0.62	186.2	110.5	189.8	191.5	15	13.2
May	204.1	120.8	0.59	183.6	108.9	178.4	188.0	15	13.3
June	146.0	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	121.5	70.3	126.3	136.3	20	20.0
May	89.6	55.2	0.62	118.3	67.8	129.3	135.0	26	21.0
June	118.4	77.4	0.65	113.6	65.2	129.4	132.6	24	21.8
July	132.8	85.0	0.64	106.9	62.0	127.8	129.5	20	22.3
August	114.3	72.7	0.64	102.8	60.3	122.1	127.5	23	22.4
September	82.6	48.8	0.59	100.7	59.8	112.3	126.0	19	21.9
October	118.9	65.6	0.55			153.1		32	
November	118.9	67.2	0.57			153.1		31	
December	75.4	47.0	0.62			115.1		18	
				2004					
January	62.3	37.2	0.60			114.1		20	
February	75.6	46.0	0.61			107.0		13	
March	81.0	48.9	0.60			112.2		12	

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 26 April 2004
Protons plot contains the five-minute averaged integral proton flux (protons/cm^2 –sec –sr) as measured by GOES-11 (W98) for each of three energy thresholds: greater than 10, 50, and 100 MeV.
Electrons plot contains the five-minute averaged integral electron flux (electrons/cm^2 –sec –sr) with energies greater than 2 MeV at GOES-12 (W75).
Hp 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.
Kp 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 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-minute averaged x-ray flux (watts/m$^{2)}$ as measured by GOES 12 (W75) and GOES 10 (W135) 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/cm^2 –sec-sr) as measured by GOES-11 (W98) 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.