

Space Weather Highlights
03 May – 09 May 2004

SWO PRF 1497
11 May 2004

Solar activity ranged from very low to low. The summary period began with low activity on 03 May as Region 601 (S10, L=031, class/area, Dso/200 on 03 May) produced an impulsive C1.0 flare on 03/1343 UTC. Region 601 decayed in both coverage and magnetic complexity as it rotated around the west limb early on 06 May. Region 605 (S12, L=319, class/area, Dao/100 on 05 May) produced a C1.0/Sf at 07/1403 UTC with an associated weak CME that was observed on LASCO imagery. Earlier on 07 May, new Region 606 (S09, L=197, class/area, Hax/220 on 08 May) produced a B7.3 with an associated Type II sweep with a shock speed estimated at 739 km/s. This activity announced the return of old Region 597 which produced a flurry of low to moderate-level activity as it rotated off the disk on 23 April.

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 380 km/s. By 04/0100 UTC, wind velocity jumped slightly to 450 km/s as a recurrent coronal hole high-speed stream moved into geoeffective position. Speed jumped again to 585 km/s midday on 05 May and was elevated to near 675 km/s early on 06 May. The IMF Bz responded with fluctuations between +/- 7 nT. By the end of the summary period on 09 May, solar wind speed had decayed to about 475 km/s and the IMF Bz responded with small N-S fluctuations, not varying much beyond +/- 5 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 07 – 09 May.

The field was at predominately quiet to active levels. Unsettled to active conditions were observed on 05 – 07 May as a result of a high-speed coronal hole stream. By 08 May, effects from the coronal hole had subsided and the geomagnetic field decayed to mostly quiet to unsettled levels.

Space Weather Outlook
12 May – 07 June 2004

Solar activity levels are expected to range from very low to low for the forecast period. Isolated moderate activity is possible after 12 May when old Region 596 (S08, L=110) returns.

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 May and 01 – 06 June due to recurrent coronal hole high-speed streams.

The geomagnetic field is expected to range from quiet to minor storm levels. From 14 – 15 May, unsettled to active conditions are possible as a weak coronal hole is due to return to a geoeffective position. Active to minor storm conditions are possible from 20 – 22 May and 31 May – 04 June as recurrent coronal hole high-speed streams rotate into geoeffective position.



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
03 May	91	50	270	B1.0	1	0	0	0	0	0	0	0
04 May	87	63	280	A6.0	0	0	0	0	0	0	0	0
05 May	89	47	290	A7.5	0	0	0	0	0	0	0	0
06 May	86	30	100	A8.5	0	0	0	0	0	0	0	0
07 May	85	34	180	A6.1	1	0	0	1	0	0	0	0
08 May	87	37	290	A6.6	0	0	0	0	0	0	0	0
09 May	93	57	280	B1.0	0	0	0	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
	03 May	1.7E+5	1.3E+4	2.9E+3		2.5E+6
04 May	2.1E+5	1.3E+4	3.0E+3		2.0E+6	
05 May	2.9E+5	1.3E+4	3.0E+3		5.4E+6	
06 May	1.8E+5	1.4E+4	3.1E+3		6.6E+6	
07 May	4.0E+5	1.3E+4	2.9E+3		5.2E+7	
08 May	3.5E+5	1.3E+4	3.0E+3		1.6E+8	
09 May	2.4E+5	1.4E+4	3.1E+3		1.9E+8	

Daily Geomagnetic Data

Date	Middle Latitude Fredericksburg		High Latitude College		Estimated Planetary	
	A	K-indices	A	K-indices	A	K-indices
	03 May	6	1-2-2-1-2-2-1-2	6	0-2-3-2-2-1-1-2	7
04 May	6	2-2-2-1-2-1-1-2	10	3-2-4-2-3-1-1-2	10	2-3-3-2-3-2-2-3
05 May	12	2-2-3-3-2-3-3-3	23	2-3-4-5-3-5-3-2	13	2-3-3-3-3-3-3-3
06 May	10	2-2-3-1-2-2-2-4	12	3-2-3-2-4-2-2-2	8	2-2-3-2-2-2-3-2
07 May	13	3-3-3-2-2-2-2-4	31	3-5-5-4-5-5-1-2	17	3-4-4-2-3-4-3-2
08 May	7	3-2-1-2-2-1-2-2	*	*_*_*_*_*_*_*_*_*_*	10	3-3-2-2-3-3-3-2
09 May	7	2-3-2-1-2-1-1-2	*	*_*_*_*_*_*_*_*_*_*	6	2-3-2-1-2-3-2-1

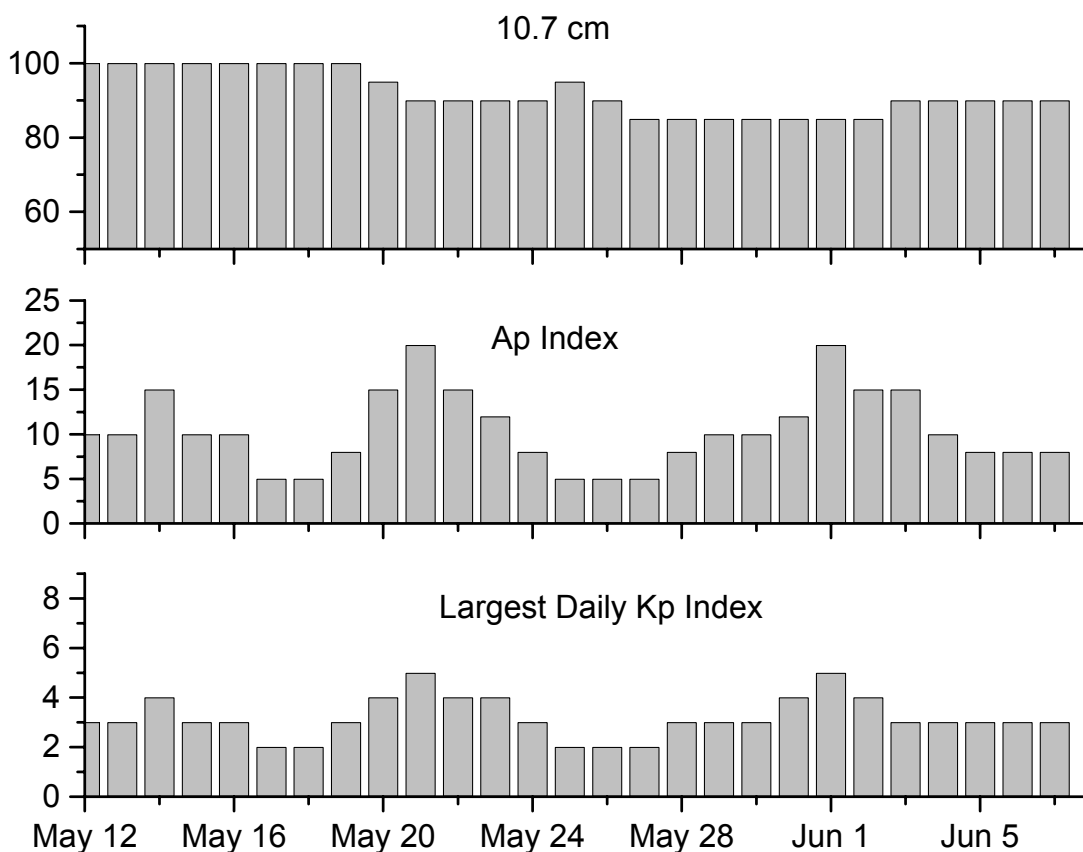


Alerts and Warnings Issued

<u>Date & Time of Issue</u>	<u>Type of Alert or Warning</u>	<u>Date & Time of Event UT</u>
03 May 0006	245 MHz Radio Burst	02 May
05 May 1105	ALERT: Geomagnetic K= 4	05 May 1104
05 May 1624	WARNING: Geomagnetic K= 4	05 May 1630 – 06/1500
05 May 1655	ALERT: Geomagnetic K= 4	05 May 1652
07 May 0244	ALERT: Geomagnetic K= 4	07 May 0244
07 May 0437	WARNING: Geomagnetic K= 4	07 May 0440 – 1500
07 May 0445	ALERT: Geomagnetic K= 4	07 May 0445
07 May 1211	ALERT: Type II Radio Emission	07 May 1021
07 May 1436	ALERT: Electron 2MeV Integral Flux exceeded 1000pfu	07 May 1420
07 May 1728	ALERT: Geomagnetic K= 4	07 May 1724
08 May 1056	ALERT: Electron 2MeV Integral Flux exceeded 1000pfu	08 May 1035
08 May 1711	WARNING: Geomagnetic K= 4	08 May 1730 – 2359
09 May 0120	245 MHz Radio Burst	08 May
09 May 0847	ALERT: Electron 2MeV Integral Flux exceeded 1000pfu	09 May 0825



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
12 May	100	10	3	26 May	90	5	2
13	100	10	3	27	85	5	2
14	100	15	4	28	85	8	3
15	100	10	3	29	85	10	3
16	100	10	3	30	85	10	3
17	100	5	2	31	85	12	4
18	100	5	2	01 Jun	85	20	5
19	100	8	3	02	85	15	4
20	95	15	4	03	90	15	3
21	90	20	5	04	90	10	3
22	90	15	4	05	90	8	3
23	90	12	4	06	90	8	3
24	90	8	3	07	90	8	3
25	95	5	2				



Energetic Events

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

No Events Observed

Flare List

Date	Time			X-ray Class.	Optical		Rgn
	Begin	Max	End		Imp / Brtns	Location Lat CMD	
03 May	0224	0227	0229	B2.4			
	0332	0337	0340	B3.3			601
	0722	0726	0730	B2.5			601
	0805	0809	0811	B1.7			601
	0822	0846	0906	B3.2			
	0950	0954	0956	B2.6			601
	1258	1301	1303	B2.1			
	1322	1325	1327	B2.7			601
	1340	1343	1346	C1.0			601
	1435	1439	1443	B2.5			
	1548	1552	1554	B2.3			601
	1757	1800	1811	B1.9			601
	2005	2009	2015	B1.3			601
	2049	2052	2054	B1.3			
2359	0015	0025	B4.2			601	
04 May	0918	0922	0924	B2.5			
	1558	1609	1620	B2.8			601
	1653	1702	1711	B2.3			605
05 May	0313	0319	0321	B1.8			605
	0330	0338	0343	B2.5			605
	0835	0843	0851	B3.1			603
	1146	1150	1152	B5.4			605
	1437	1440	1444	B1.6			605
	1804	1807	1810	B1.3			601
06 May	0124	0132	0137	B1.3			
	0313	0316	0318	B1.4			601
07 May	0112	0120	0141	B2.7			604
	0956	1018	1038	B7.3			
	1359	1402	1410	C1.0	Sf	S12W36	605
08 May	0026	0034	0044	B2.6			604
	0404	0408	0413	B1.1			
	1029	1037	1043	B1.3			605
	2349	2352	2355	B1.1			
09 May	0214	0218	0221	B2.9			
	0859	0903	0909	B2.0			
	1412	1415	1417	B2.1			
	1617	1637	1659	B3.4			608



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	4		
<i>Region 599</i>																	
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															
03 May	N17W80	050															
04 May	N17W93	050															
								10	1	0	10	1	0	0	0	0	

Crossed West Limb.

Absolute heliographic longitude:047

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					
03 May	S10W61	031	0200	11	Dso	014	B	1									
04 May	S09W77	034	0180	11	Eao	010	B										
05 May	S09W89	032	0150	10	Cso	002	B										
								11	0	0	4	0	0	0	0	0	

Crossed West Limb.

Absolute heliographic longitude:029

Region 602

30 Apr	S14W53	062	0060	05	Dso	007	B										
01 May	S13W66	062	0030	07	Bxo	006	B										
02 May	S13W79	062															
03 May	S13W92	062															
								0	0	0	0	0	0	0	0	0	

Crossed West Limb.

Absolute heliographic longitude:062



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 603

01 May	S15W37	033	0020	03	Cso	006	B
02 May	S16W50	033	0070	06	Dso	008	B
03 May	S16W63	033	0040	07	Bxo	005	B
04 May	S16W78	035	0010	06	Bxo	002	B
05 May	S16W91	035					

0 0 0 0 0 0 0 0

Crossed West Limb.

Absolute heliographic longitude:033

Region 604

03 May	S19E52	278	0030	01	Hsx	001	A
04 May	S19E38	279	0050	03	Cso	005	B
05 May	S19E23	280	0040	02	Cso	003	B
06 May	S19E10	279	0030	03	Dso	002	B
07 May	S18W02	278	0010	02	Bxo	002	B
08 May	S18W15	278	0010	01	Axx	001	A
09 May	S18W28	278					

0 0 0 0 0 0 0 0

Still on Disk.

Absolute heliographic longitude:278

Region 605

04 May	S12W02	319	0040	05	Cso	006	B
05 May	S12W16	319	0100	08	Dao	012	B
06 May	S11W30	319	0070	08	Dso	008	B
07 May	S12W45	321	0050	02	Hsx	001	A
08 May	S12W58	321	0060	06	Cso	005	B
09 May	S11W70	320	0070	05	Dso	006	B

1 0 0 1 0 0 0 0

Still on Disk.

Absolute heliographic longitude:319

Region 606

07 May	S09E81	195	0120	02	Hsx	001	A
08 May	S09E66	197	0220	05	Hax	001	A
09 May	S08E53	197	0160	02	Hsx	002	A

0 0 0 0 0 0 0 0

Still on Disk.

Absolute heliographic longitude:197



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 607</i>																				
09 May	S11E00	250	0010	02	Bxo	003	B													
Still on Disk.								0	0	0	0	0	0	0	0	0	0	0	0	0
Absolute heliographic longitude:250																				
<i>Region 608</i>																				
09 May	S04E68	182	0040	08	Cso	006	B													
Still on Disk.								0	0	0	0	0	0	0	0	0	0	0	0	0
Absolute heliographic longitude:182																				

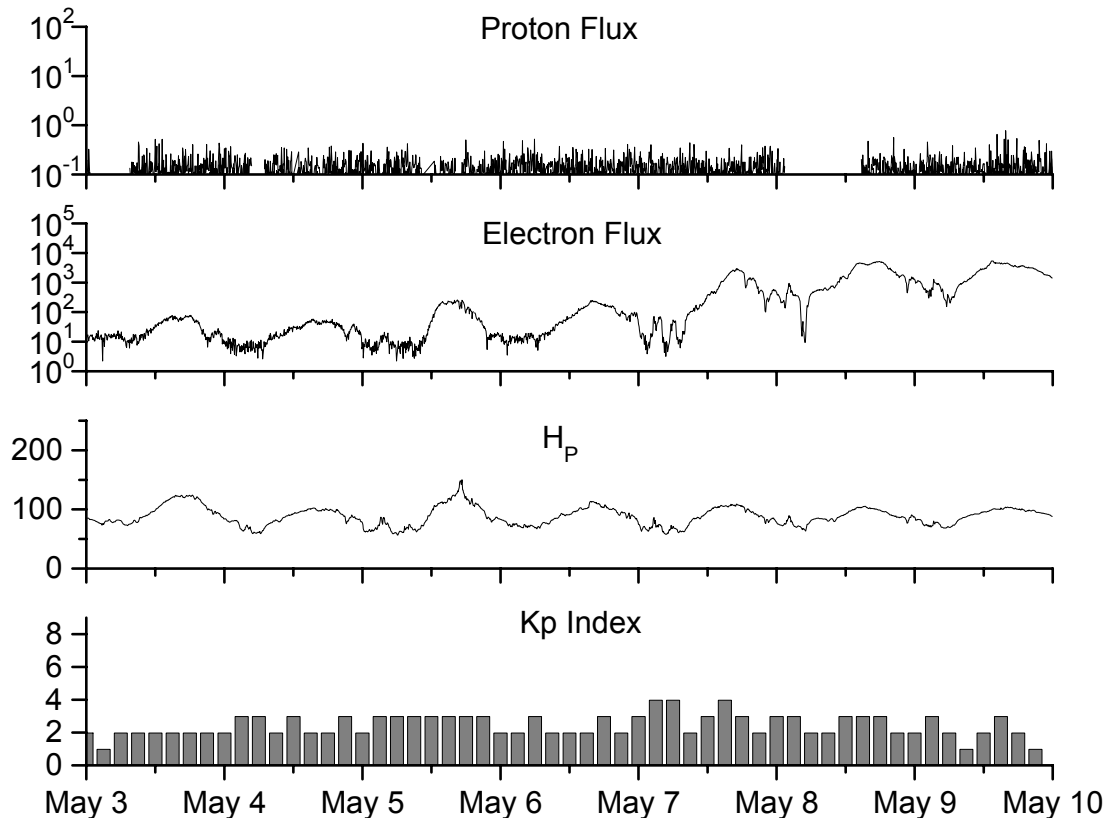


**Recent Solar Indices (preliminary)
of the observed monthly mean values**

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									
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	96.6	58.4	153.1	124.1	32	21.1
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	
April	59.3	39.3	0.66			101.3		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 03 May 2004*

Protons plot contains the five-minute averaged integral proton flux (protons/cm²-sec -sr) as measured by GOES-11 (W98) for each of three energy thresholds: greater than 10, 50, and 100 MeV.

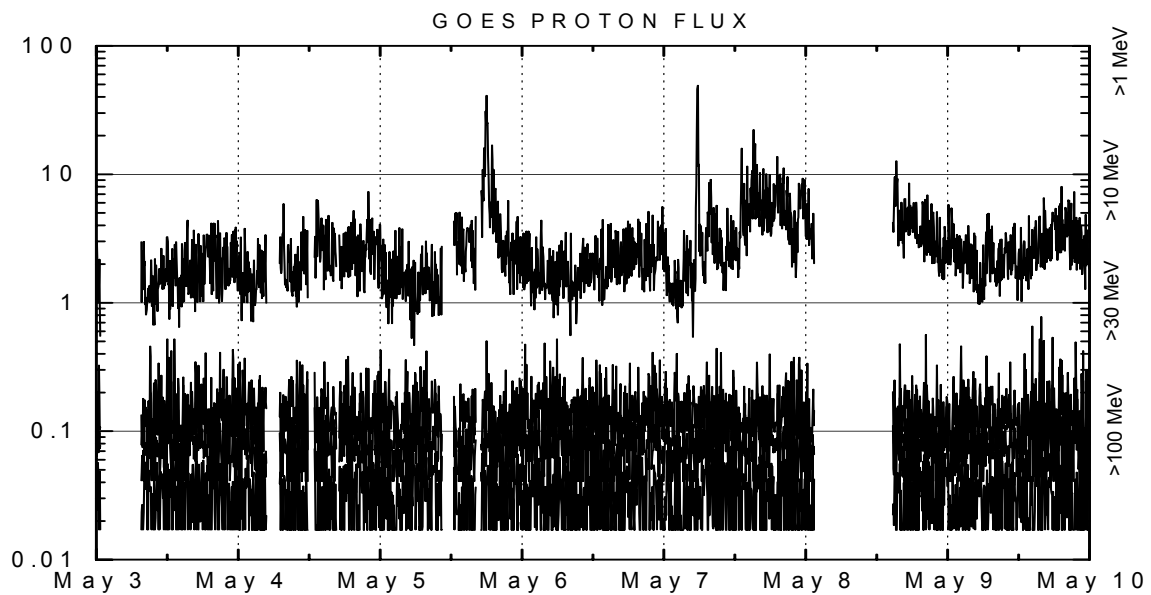
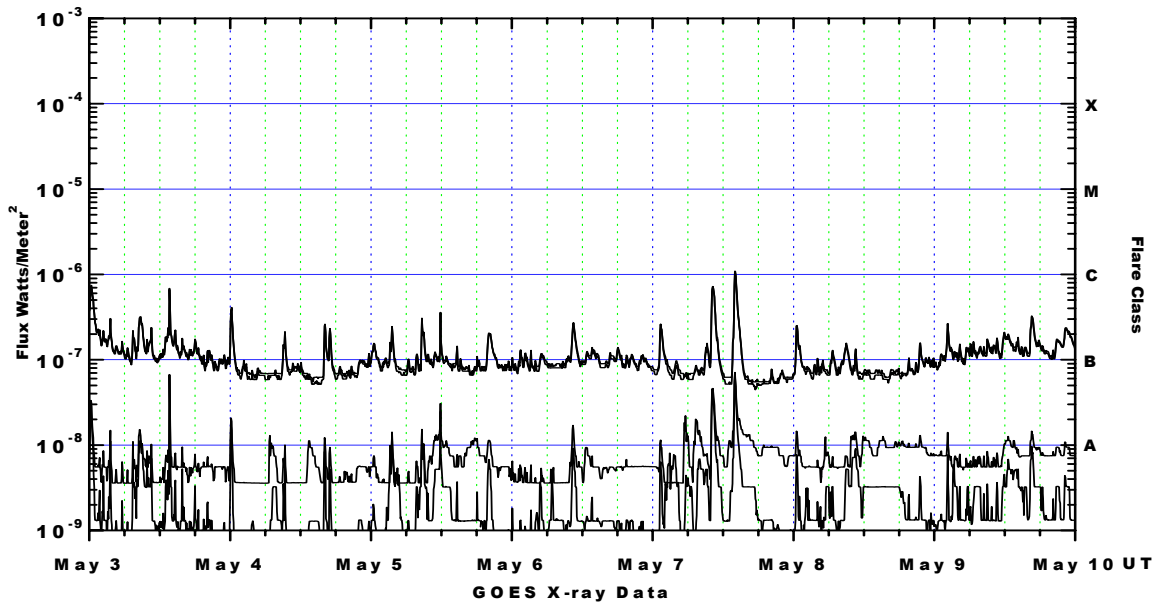
Electrons plot contains the five-minute averaged integral electron flux (electrons/cm²-sec -sr) with energies greater than 2 MeV at GOES-12 (W75).

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

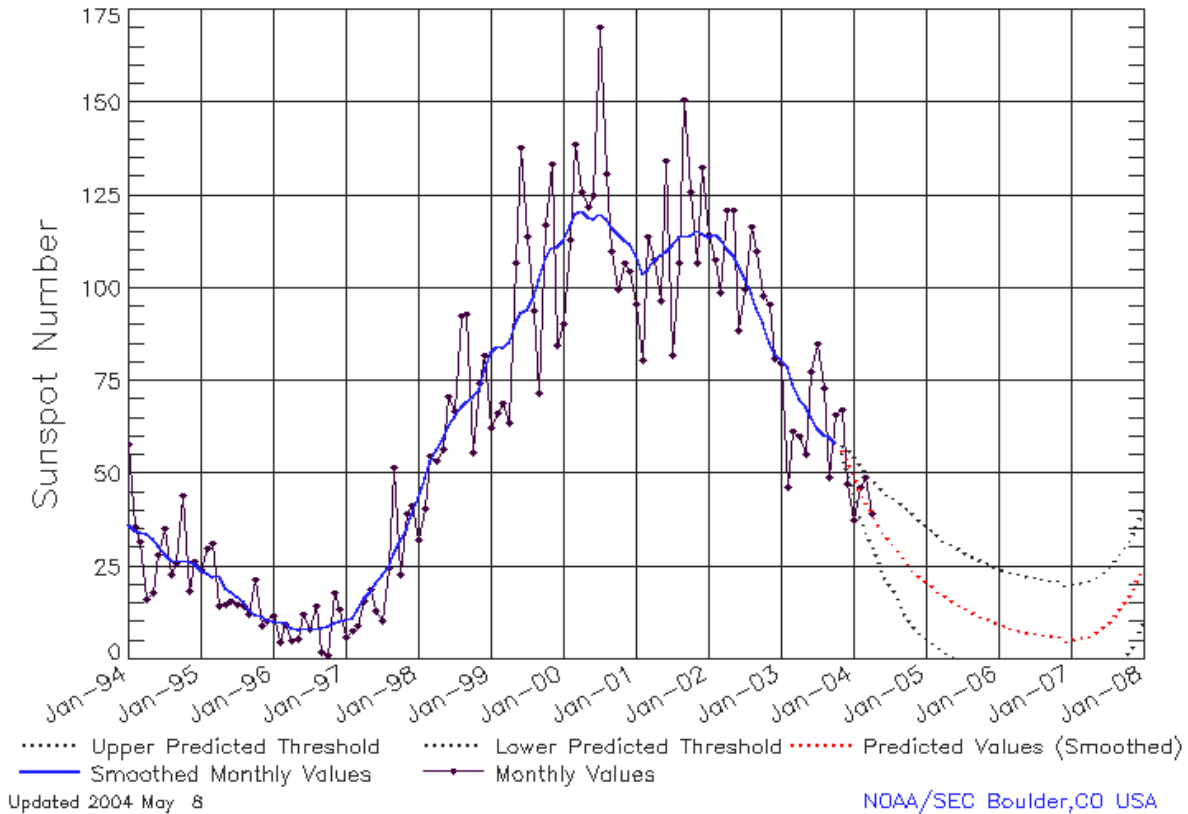
X-ray plot contains five-minute averaged x-ray flux (watts/m²) as measured by GOES 12 (W75) and GOES 10 (W135) in two wavelength bands, .05 - .4 and .1 - .8 nm. The letters A, B, C, M and X refer to x-ray event levels for the .1 - .8 nm band.

Proton plot contains the five-minute averaged integral proton flux (protons/cm²-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/cm²-sec-sr) at greater than 10 MeV.



ISES Solar Cycle Sunspot Number Progression

Data Through 30 Apr 04



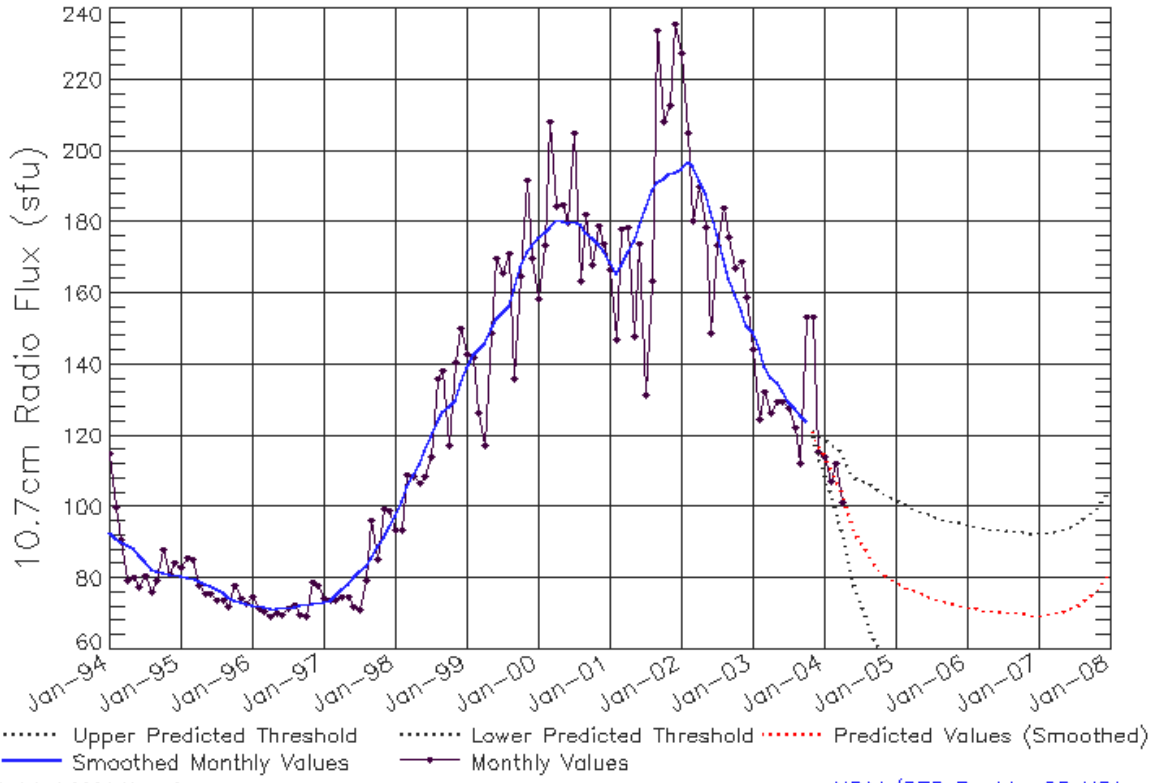
SEC Prediction of Smoothed Sunspot Number

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1998	44 (***)	49 (***)	53 (***)	57 (***)	59 (***)	63 (***)	66 (***)	68 (***)	70 (***)	71 (***)	73 (***)	78 (***)
1999	83 (***)	85 (***)	84 (***)	86 (***)	91 (***)	93 (***)	94 (***)	97 (***)	102 (***)	108 (***)	111 (***)	111 (***)
2000	113 (***)	117 (***)	120 (***)	121 (***)	119 (***)	119 (***)	120 (***)	119 (***)	116 (***)	114 (***)	113 (***)	112 (***)
2001	109 (***)	104 (***)	105 (***)	108 (***)	109 (***)	110 (***)	112 (***)	114 (***)	114 (***)	114 (***)	116 (***)	115 (***)
2002	114 (***)	115 (***)	113 (***)	110 (***)	109 (***)	106 (***)	103 (***)	99 (***)	95 (***)	91 (***)	85 (***)	82 (***)
2003	81 (***)	79 (***)	74 (***)	70 (***)	68 (***)	65 (***)	62 (***)	60 (***)	60 (***)	58 (***)	57 (1)	54 (3)
2004	50 (5)	45 (7)	43 (8)	40 (9)	37 (10)	34 (11)	32 (12)	30 (13)	28 (14)	26 (15)	24 (15)	22 (15)
2005	21 (15)	20 (15)	18 (15)	17 (15)	16 (15)	15 (15)	14 (15)	13 (15)	12 (15)	12 (15)	11 (15)	10 (15)
2006	10 (15)	9 (15)	8 (15)	8 (15)	8 (15)	7 (15)	7 (15)	7 (15)	7 (15)	6 (15)	6 (15)	5 (15)
2007	5 (15)	6 (15)	6 (15)	6 (15)	7 (15)	8 (15)	10 (15)	11 (15)	13 (15)	16 (15)	18 (15)	21 (15)



ISES Solar Cycle F10.7cm Radio Flux Progression

Data Through 30 Apr 04



Updated 2004 May 8

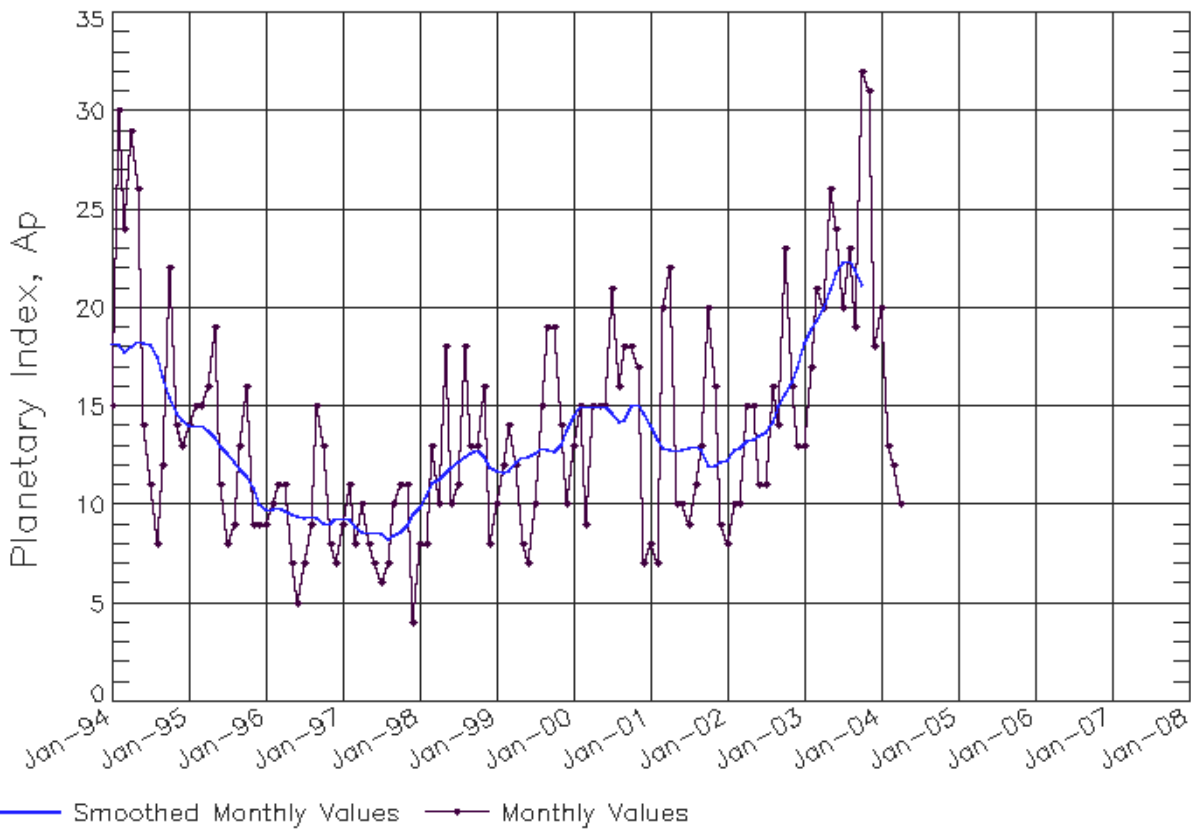
SEC Prediction of Smoothed F10.7cm Radio Flux

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1998	98 (***)	102 (***)	106 (***)	109 (***)	112 (***)	116 (***)	120 (***)	124 (***)	127 (***)	128 (***)	130 (***)	134 (***)
1999	139 (***)	143 (***)	144 (***)	146 (***)	150 (***)	153 (***)	154 (***)	156 (***)	161 (***)	167 (***)	172 (***)	173 (***)
2000	175 (***)	176 (***)	178 (***)	181 (***)	180 (***)	180 (***)	180 (***)	180 (***)	177 (***)	176 (***)	174 (***)	172 (***)
2001	169 (***)	166 (***)	168 (***)	172 (***)	175 (***)	179 (***)	184 (***)	189 (***)	191 (***)	192 (***)	194 (***)	194 (***)
2002	195 (***)	197 (***)	196 (***)	192 (***)	188 (***)	183 (***)	176 (***)	170 (***)	164 (***)	159 (***)	155 (***)	151 (***)
2003	149 (***)	145 (***)	140 (***)	136 (***)	135 (***)	133 (***)	130 (***)	128 (***)	126 (***)	124 (***)	121 (1)	118 (3)
2004	114 (5)	111 (7)	108 (9)	104 (11)	98 (13)	94 (15)	91 (17)	88 (19)	85 (21)	83 (22)	81 (23)	80 (23)
2005	79 (23)	78 (23)	78 (23)	77 (23)	76 (23)	75 (23)	75 (23)	74 (23)	74 (23)	73 (23)	73 (23)	73 (23)
2006	72 (23)	72 (23)	71 (23)	71 (23)	71 (23)	71 (23)	71 (23)	71 (23)	70 (23)	70 (23)	70 (23)	70 (23)
2007	70 (23)	70 (23)	70 (23)	70 (23)	71 (23)	71 (23)	72 (23)	73 (23)	74 (23)	76 (23)	77 (23)	79 (23)



ISES Solar Cycle Ap Progression

Data Through 30 Apr 04



Updated 2004 May 8

NOAA/SEC Boulder, CO USA




Cosmic-Ray Ground-Level Events



Space
Environment
Center

May 2003
(Month 92)

 Preliminary data

Comparison of Cycles
at current month in cycle

