

## **Space Weather Highlights**

### **23 - 29 June 2003**

**SWO PRF 1452**  
**01 July 2003**

Solar activity was at very low to low levels. Activity on day one of the period was at very low levels and for the remainder of the period activity was at low levels. Region 386 (S07, L=187, class/area Ekc/290 on 18 June) began the period in gradual decay, simplifying to a beta-gamma configuration on 23 June and by 27 June was no longer visible. Region 391 (N14, L=164, class/area Dao/190 on 26 June) developed rapidly on 23 June to an area of 290 millionths with a beta magnetic configuration. This region was the source of low level activity on 24 June, producing four C-class flares. The growth rate of Region 391 slowed on 25 – 26 June and the region entered decay phase on 27 June. Activity on 25 – 27 June came from Region 397 (N12, L=034, class/area Fho/790 on 29 June) beyond the northeast limb. Activity included a long duration C3 on 25 June at 1632 UTC and a C3 on 27 June at 0321 UTC. The largest flare of the period was an impulsive C4 at 0656 UTC on 28 June from Region 391. The period ended with a C3 flare at 1101 UTC on the west limb, most likely Region 387 (N18, L=169, class/area Eao/270 on 22 June).

Real time Solar wind data were available from the NASA Advanced Composition Explorer (ACE) spacecraft for most of the summary period. Solar wind speeds were elevated near 500 – 600 km/s early in the period due to coronal hole high speed streams. Late on 26 June a large southern coronal hole increased solar wind speed to near 650 km/s. Wind speed continued to increase on 27 – 29 June reaching peak values near 800 km/s and average values near 700 km/s. The Bz component of the interplanetary magnetic field associated with this high speed stream exhibited an oscillating signature with average values near  $-4\text{nT}$  and peak values near  $-10\text{nT}$ .

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

The greater than 2 MeV electron flux at geo-synchronous orbit reached high levels on 23 and 25 – 29 June.

The geomagnetic field ranged from quiet to major storm levels. The elevated solar wind produced isolated periods of minor storm levels on 23 June. Sustained minor storm levels were observed on 24 June. Activity on 25 – 26 June was at unsettled to active levels with solar wind speed steady near 550 km/s. Late on 26 June a large coronal hole rotated into a geoeffective position and produced active to major storm levels on 27 – 28 June and minor storm levels on 29 June.

## **Space Weather Outlook**

### **02 - 28 July 2003**

Solar activity is expected to range from very low to moderate levels during the period. Region 397 may develop M-class potential early in the period. Activity for the remainder of the period is expected to be very low to low.

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

The greater than 2 MeV electron flux is expected to reach high levels on 02 - 03 July, 06 - 08 July, 12-14 July, 16 -18 July, and again on 20 - 28 July due to recurrent coronal hole high speed streams.

The geomagnetic field is expected to range from quiet to major storm levels during the period. Minor storm levels are possible on 03 - 07 July, and again on 18 – 20 July due to smaller recurrent coronal hole high speed streams. Unsettled to major storm levels are possible on 14– 16 July due to small but intense coronal hole high speed stream. A larger southern coronal hole is due to return on 23 July, and could produce major storm levels possible.



### Daily Solar Data

Date	Radio Flux 10.7 cm	Sun spot No.	Sunspot Area (10 <sup>-6</sup> hemi.)	X-ray Background	Flares							
					X-ray Flux			Optical				
					C	M	X	S	1	2	3	4
23 June	114	104	540	B1.9	0	0	0	2	0	0	0	0
24 June	115	131	570	B2.9	4	0	0	7	0	0	0	0
25 June	116	115	680	B2.4	2	0	0	1	0	0	0	0
26 June	119	122	590	B3.7	3	0	0	0	0	0	0	0
27 June	124	128	670	B3.8	5	0	0	0	0	0	0	0
28 June	124	151	1120	B4.1	3	0	0	0	0	0	0	0
29 June	127	112	1200	B3.7	4	0	0	3	0	0	0	0

### Daily Particle Data

Date	Proton Fluence (protons/cm <sup>2</sup> -day-sr)			Electron Fluence (electrons/cm <sup>2</sup> -day-sr)		
	>1MeV	>10MeV	>100MeV	>.6MeV	>2MeV	>4MeV
23 June	3.1E+6	1.2E+4	2.1E+3		1.4E+8	
24 June	1.7E+6	1.0E+4	1.9E+3		2.3E+7	
25 June	1.2E+6	9.4E+3	2.0E+3		8.7E+7	
26 June	1.3E+6	9.3E+3	2.0E+3		1.8E+8	
27 June	1.4E+6	9.6E+3	2.1E+3		3.8E+7	
28 June	2.1E+6	9.8E+3	2.1E+3		4.0E+7	
29 June	2.3E+6	1.1E+4	2.5E+3		9.4E+7	

### Daily Geomagnetic Data

Date	Middle Latitude Fredericksburg		High Latitude College		Estimated Planetary	
	A	K-indices	A	K-indices	A	K-indices
	23 June	15	3-4-4-2-2-2-3-3	29	5-4-3-6-3-4-2-3	20
24 June	20	3-4-4-5-3-2-2-3	45	4-4-6-6-6-5-2-2	31	4-5-5-5-5-3-3-3
25 June	14	2-2-4-3-2-3-3-3	24	3-3-5-5-4-3-3-2	19	3-3-4-3-3-4-4-4
26 June	16	3-3-3-3-4-3-2-3	24	3-3-3-5-5-3-2-4	19	4-3-4-4-4-3-3-3
27 June	21	4-3-4-4-4-3-3-3	41	3-4-5-6-6-5-3-3	28	4-4-6-4-4-4-4-3
28 June	30	3-4-3-6-4-3-3-5	46	3-5-3-7-5-5-4-4	32	3-5-3-6-5-4-4-4
29 June	14	4-3-3-3-3-3-3-3	39	4-4-6-5-5-5-3-3	26	4-3-5-5-4-3-4-4

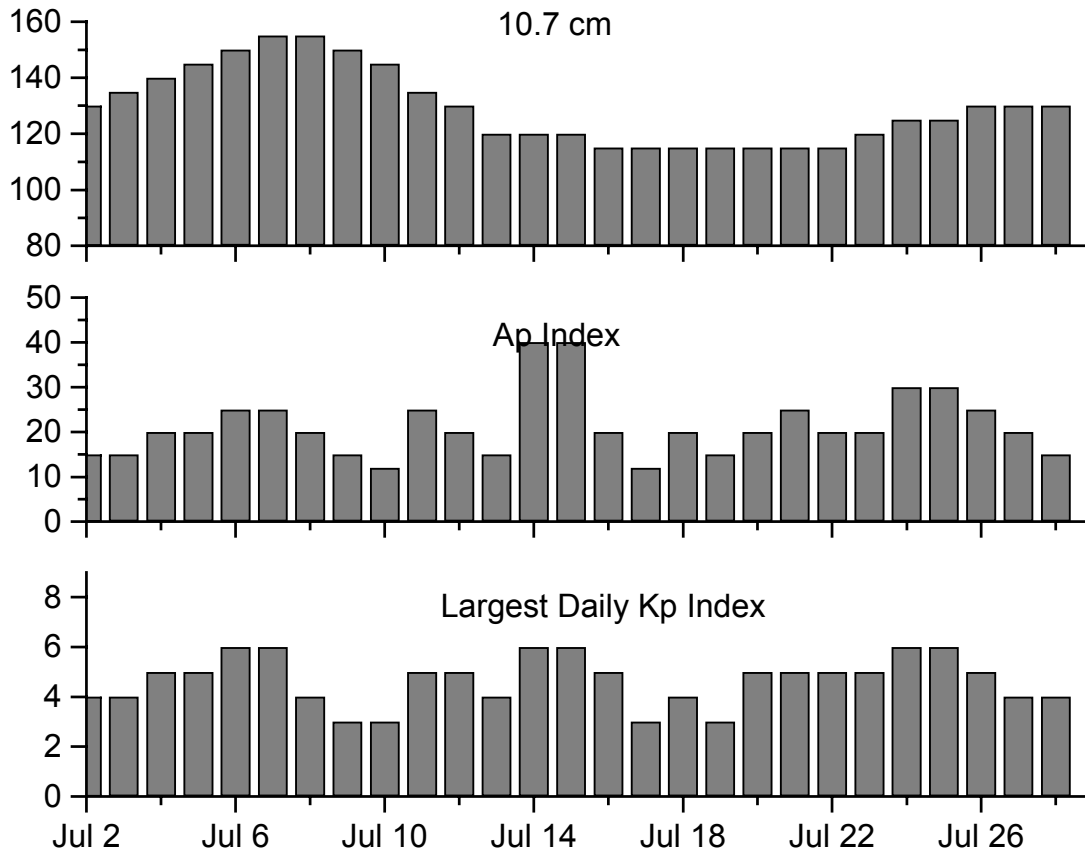


### *Alerts and Warnings Issued*

<u>Date &amp; Time of Issue</u>	<u>Type of Alert or Warning</u>	<u>Date &amp; Time of Event UT</u>
23 Jun 0016	4 - 245 MHz Radio Bursts	22 Jun
23 Jun 0526	WARNING: Geomagnetic K = 4	23 Jun 0527 - 1500
23 Jun 0530	ALERT: Geomagnetic K = 4	23 Jun 0530
23 Jun 0533	WARNING: Geomagnetic K = 5	23 Jun 0535 - 1500
23 Jun 0536	ALERT: Geomagnetic K = 5	23 Jun 0536
23 Jun 0558	ALERT: Electron 2MeV Integral Flux > 1000pfu	23 Jun 0535
24 Jun 0009	1 - 245 MHz Radio Burst	23 Jun
24 Jun 0019	WARNING: Geomagnetic K = 4	24 Jun 0100 - 1500
24 Jun 0232	ALERT: Geomagnetic K = 4	24 Jun 0230
24 Jun 0341	ALERT: Geomagnetic K = 5	24 Jun 0340
24 Jun 0858	WARNING: Geomagnetic K = 5	24 Jun 0858 -24 Jun 1500
24 Jun 1458	EXTENDED WARNING: Geomagnetic K = 4	24 Jun 0100 - 2359
24 Jun 2246	EXTENDED WARNING: Geomagnetic K = 4	24 Jun 0100 -25 Jun 1500
25 Jun 0014	2 - 245 MHz Radio Bursts	24 Jun
25 Jun 1126	ALERT: Electron 2MeV Integral Flux > 1000pfu	25 Jun 1105
25 Jun 1709	ALERT: Geomagnetic K = 4	25 Jun 1708
25 Jun 1827	WARNING: Geomagnetic K = 4 expected	25 Jun 1830 - 26 Jun 1500
25 Jun 2020	WATCH: Geomagnetic A $\geq$ 20	28 Jun
26 Jun 0948	ALERT: Geomagnetic K = 4	26 Jun 0948
26 Jun 1022	ALERT: Electron 2MeV Integral Flux > 1000pfu	26 Jun 1000
26 Jun 1448	EXTENDED WARNING: Geomagnetic K =4	25 Jun 1830 - 26 Jun 1500
26 Jun 1608	EXTENDED WARNING: Geomagnetic K = 4	25 Jun 1830 -27 Jun 1500
27 Jun 0546	WARNING: Geomagnetic K= 5	27 Jun 0546 - 1500
27 Jun 0547	ALERT: Geomagnetic K = 5	27 Jun 0540
27 Jun 0711	WARNING: Geomagnetic K = 6	27 Jun 0711 - 1500
27 Jun 0732	ALERT: Geomagnetic K = 6	27 Jun 0720
27 Jun 1450	EXTENDED WARNING: Geomagnetic K = 5	27 Jun 0546 - 28 Jun 1500
27 Jun 1509	WATCH: Geomagnetic A $\geq$ 20	29 Jun
27 Jun 1512	WATCH: Geomagnetic A $\geq$ 20	30 Jun
27 Jun 1550	ALERT: Electron 2MeV Integral Flux > 1000pfu	27 Jun 1530
28 Jun 0947	WARNING: Geomagnetic K = 6	28 Jun 0947 - 1500
28 Jun 1105	ALERT: Geomagnetic K = 6	28 Jun 1101
28 Jun 1136	ALERT: Electron 2MeV Integral Flux > 1000pfu	28 Jun 1115
28 Jun 1450	EXTENDED WARNING: Geomagnetic K = 5	27 Jun 0546 - 29 Jun 1500
29 Jun 0041	3 - 245 MHz Bursts	28 Jun
29 Jun 0931	ALERT: Electron 2MeV Integral Flux > 1000pfu	29 Jun 0910
29 Jun 1452	EXTENDED WARNING: Geomagnetic K = 5	27 Jun 0546 - 30 Jun 1500



### 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
02 Jul	130	15	4	16 Jul	115	20	5
03	135	15	4	17	115	12	3
04	140	20	5	18	115	20	4
05	145	20	5	19	115	15	3
06	150	25	6	20	115	20	5
07	155	25	6	21	115	25	5
08	155	20	4	22	115	20	5
09	150	15	3	23	120	20	5
10	145	12	3	24	125	30	6
11	135	25	5	25	125	30	6
12	135	20	5	26	130	25	5
13	120	15	4	27	130	20	4
14	120	40	6	28	130	15	4
15	120	40	6				



### *Energetic Events*

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

*No Events Observed*

### *Flare List*

Date	Time			X-ray Class.	Imp / Brtns	Optical Location Lat CMD	Rgn
	Begin	Max	End				
23 June	0213	0217	0223	B3.6			
	1540	1541	1546	B3.9	Sf	S04W19	386
	1705	1706	1711	B4.4	Sf	N02W45	388
24 June	0453	0457	0506	C1.5	Sf	N13E01	391
	0633	0633	0636	B7.5	Sf	N14W01	391
	0811	0814	0816	B6.5			
	0924	0925	0930	C1.3	Sf	N14W03	391
	1019	1025	1036	C2.8	Sf	N14W03	391
	1130	1131	1135		Sf	N14W04	391
	1231	1231	1235	B7.1	Sf	N14W04	391
25 June	1324	1329	1345	C1.4	Sf	N13W07	391
	0810	0821	0842	B6.8			
	1515	1632	1804	C3.7			
	1518	1518	1525		Sf	S17E62	393
	2132	2156	2332	C1.3			393
26 June	0445	0450	0455	B6.2			
	1104	1130	1225	C1.4			
	1239	1316	1333	C1.7			
	1853	1919	2002	C2.4			
27 June	0309	0321	0331	C3.9			
	0516	0520	0528	C1.2			
	0549	0553	0557	C1.4			
	1251	1255	1306	B6.8			
	1729	1743	1747	C1.5			
28 June	2107	2113	2120	C1.0			
	0334	0340	0358	B8.2			
	0651	0656	0658	C4.3			
	1443	1449	1454	C1.0			
	1524	1540	1555	C3.0			
29 June	2307	2311	2315	B7.2			
	0233	0247	0256	C1.2			
	1005	1022	1028	B8.5			
	1055	1101	1108	C3.9			
	1606	1606	1609	B8.5	Sf	S04W35	396
	1912	1913	1919	C2.2	Sf	S03W43	396
	2150	2157	2213	C2.6	Sf	S02W45	396



### Region Summary

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

#### Region 385

15 Jun	N30E30	241	0040	06	Dso	007	B										
16 Jun	N29E17	241	0070	06	Dao	010	B										
17 Jun	N28E04	241	0050	07	Cso	008	B										
18 Jun	N28W09	241	0070	07	Dso	011	B										
19 Jun	N28W22	241	0030	08	Bxo	005	B										
20 Jun	N28W36	241	0030	07	Cso	004	B										
21 Jun	N28W49	241	0020	08	Cso	003	B										
22 Jun	N29W61	240															
23 Jun	N29W74	240															
24 Jun	N29W87	240															

0 0 0 0 0 0 0 0

Crossed West Limb.

Absolute heliographic longitude: 241

#### Region 386

16 Jun	S07E71	187	0190	08	Dao	013	B		2		2						
17 Jun	S07E58	187	0310	07	Dai	017	Bg	4	1		2	1					
18 Jun	S07E43	187	0290	11	Ekc	024	Bgd				1						
19 Jun	S07E30	189	0200	11	Ekc	034	Bgd										
20 Jun	S07E17	188	0230	06	Dkc	025	Bgd	3			1						
21 Jun	S07E04	188	0100	07	Dac	020	Bgd	2			1						
22 Jun	S06W08	187	0090	04	Dai	014	Bgd										
23 Jun	S07W22	188	0080	06	Dai	011	Bg				1						
24 Jun	S06W35	188	0060	04	Cao	009	Bg										
25 Jun	S05W48	188	0040	03	Cao	005	B										
26 Jun	S06W62	188	0030	02	Hrx	003	A										
27 Jun	S06W75	188															
28 Jun	S06W88	188															

9 3 0 8 1 0 0 0

Crossed West Limb.

Absolute heliographic longitude: 188



**Region Summary - continued.**

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

*Region 387*

18 Jun	N18E62	170	0100	08	Cso	007	B												5
19 Jun	N18E49	170	0200	10	Dko	007	Bg												
20 Jun	N18E36	169	0250	09	Dai	019	Bg												
21 Jun	N18E23	169	0260	11	Eso	021	Bg												
22 Jun	N18E10	169	0270	11	Eao	021	Bg												
23 Jun	N17W03	169	0230	14	Eko	022	Bg												
24 Jun	N19W16	169	0160	11	Eao	016	B												
25 Jun	N18W29	169	0230	11	Eao	012	B												
26 Jun	N19W42	168	0170	11	Eso	009	B												
27 Jun	N18W55	168	0120	10	Dao	004	B												
28 Jun	N19W70	170	0130	11	Cso	004	B												
29 Jun	N16W83	170	0110	02	Hsx	001	A												
																			0 0 0 5 0 0 0 0

Still on Disk.

Absolute heliographic longitude: 169

*Region 388*

19 Jun	S03E08	211	0030	09	Cso	008	B												
20 Jun	S03W06	211	0060	08	Dai	020	B												1
21 Jun	S03W19	211	0140	11	Eai	022	B	2											2
22 Jun	S02W32	211	0130	07	Dao	017	B	2											2
23 Jun	S01W47	213	0100	11	Eao	010	Bg												1
24 Jun	S02W57	210	0060	09	Dao	008	B												
25 Jun	N02W79	219	0040	03	Bxo	003	B												
																			4 0 0 6 0 0 0 0

Crossed West Limb.

Absolute heliographic longitude: 211

*Region 389*

20 Jun	S12E14	191	0020	04	Cao	003	B												
21 Jun	S12E01	191	0010	02	Axx	002	A												
22 Jun	S12W12	191																	
23 Jun	S12W25	191																	
24 Jun	S12W38	191																	
25 Jun	S12W51	191																	
26 Jun	S12W64	191																	
27 Jun	S12W77	191																	
																			0 0 0 0 0 0 0 0

Crossed West Limb.

Absolute heliographic longitude: 191



**Region Summary - continued.**

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

*Region 390*

22 Jun	N15E76	103	0080	08	Dai	002	B										
23 Jun	N13E64	102	0070	01	Hax	002	A										
24 Jun	N13E51	102	0090	04	Cao	007	B										
25 Jun	N13E37	103	0090	02	Hsx	002	A										
26 Jun	N14E23	103	0070	05	Cso	005	B										
27 Jun	N14E10	103	0060	03	Hsx	003	A										
28 Jun	N16W03	103	0070	03	Cso	005	B										
29 Jun	N16W16	103	0090	03	Hsx	001	A										

0 0 0 0 0 0 0 0

Still on Disk.

Absolute heliographic longitude: 103

*Region 391*

23 Jun	N15E03	163	0060	06	Dao	009	B										
24 Jun	N14W09	162	0110	07	Dao	017	B	4			7						
25 Jun	N14W23	163	0170	08	Dao	018	B										
26 Jun	N14W38	164	0190	08	Dao	016	B										
27 Jun	N14W51	164	0150	08	Dao	013	B										
28 Jun	N14W64	164	0170	10	Dao	009	B										
29 Jun	N15W77	164															

4 0 0 7 0 0 0 0

Still on Disk.

Absolute heliographic longitude: 163

*Region 392*

24 Jun	N07E69	084	0030	02	Hax	002	A										
25 Jun	N05E57	083	0020	01	Hsx	001	A										
26 Jun	N06E43	083	0010	01	Hrx	001	A										
27 Jun	N06E30	083	0020	01	Hsx	001	A										
28 Jun	N10E17	083	0010	01	Hsx	001	A										
29 Jun	N06E04	083	0000	00	Axx	001	A										

0 0 0 0 0 0 0 0

Still on Disk.

Absolute heliographic longitude: 083





**Region Summary - continued.**

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

*Region 393*

24 Jun	S15E72	081	0060	06	Dao	002	B											
25 Jun	S18E57	083	0090	07	Dao	004	B	1				1						
26 Jun	S18E43	083	0050	08	Cao	005	B											
27 Jun	S17E28	085	0030	04	Cso	003	B											
28 Jun	S16E13	087	0020	02	Hsx	005	A											
29 Jun	S13E00	087																
									1	0	0	1	0	0	0	0	0	0

Still on Disk.

Absolute heliographic longitude: 087

*Region 394*

26 Jun	N08E22	104	0010	02	Axx	002	B											
27 Jun	N10E09	104	0020	04	Cro	005	B											
28 Jun	N10W06	106	0070	05	Dao	010	B											
29 Jun	N10W19	106	0060	06	Dao	005	B											
									0	0	0	0	0	0	0	0	0	0

Still on Disk.

Absolute heliographic longitude: 106

*Region 395*

26 Jun	N10E62	064	0060	02	Hsx	001	A											
27 Jun	N10E49	064	0050	02	Hax	002	A											
28 Jun	N11E36	064	0020	02	Hsx	003	A											
29 Jun	N11E23	064	0000	00	Axx	001	A											
									0	0	0	0	0	0	0	0	0	0

Still on Disk.

Absolute heliographic longitude: 064

*Region 396*

27 Jun	S04W12	125	0050	05	Dao	006	B											
28 Jun	S04W26	126	0120	07	Dso	017	B											
29 Jun	S04W38	125	0150	10	Dao	019	B	2				3						
								2	0	0	3	0	0	0	0	0	0	0

Still on Disk.

Absolute heliographic longitude: 125

*Region 397*

27 Jun	N09E72	041	0170	05	Hax	001	A											
28 Jun	N10E65	035	0510	16	Fkc	007	B											
29 Jun	N12E53	034	0790	18	Fho	014	B											
									0	0	0	0	0	0	0	0	0	0

Still on Disk.

Absolute heliographic longitude: 034

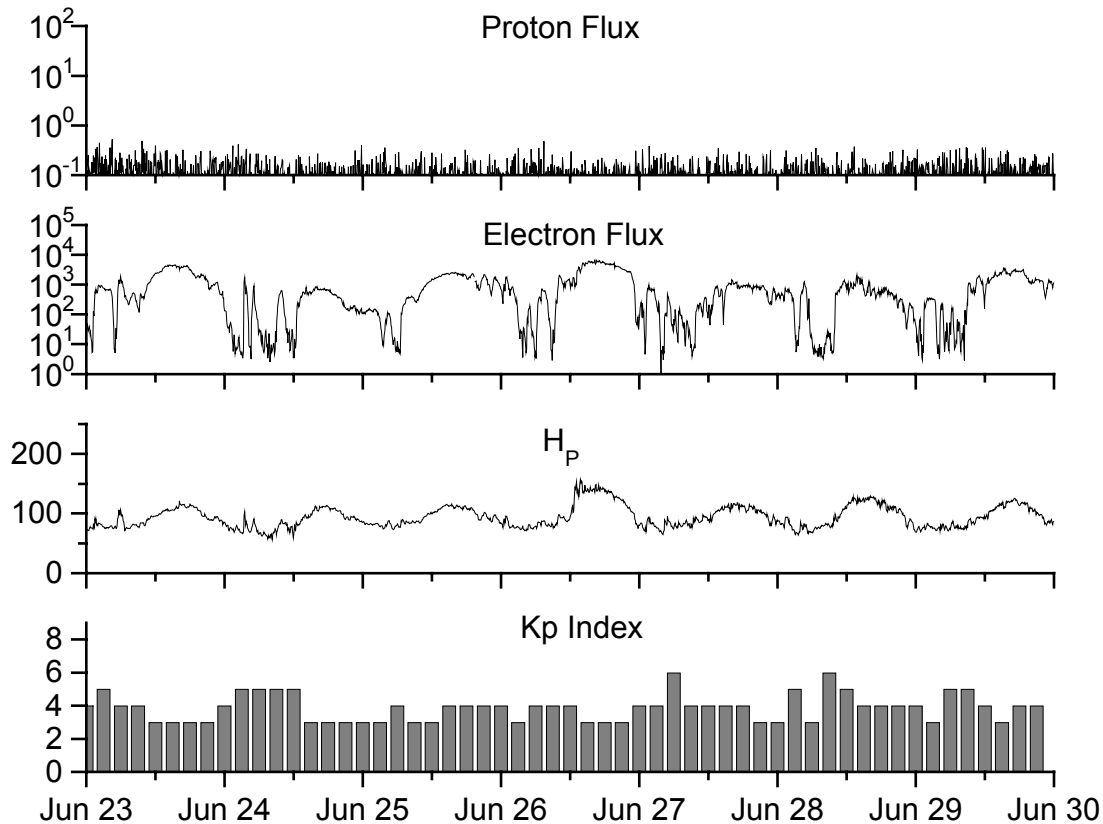


**Recent Solar Indices (preliminary)  
of the observed monthly mean values**

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
<b>2001</b>									
July	124.6	81.1	0.66	172.1	111.7	131.3	183.9	9	12.9
August	159.4	106.4	0.67	176.7	113.6	163.1	188.8	11	13.0
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
<b>2002</b>									
January	189.0	114.1	0.60	184.8	113.5	227.3	194.6	08	12.4
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	113.4	180.3	195.7	10	13.0
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	99.9	0.54	175.4	102.7	173.5	173.5	13	13.9
August	191.0	116.4	0.61	169.3	98.7	183.9	169.5	16	14.3
September	206.4	109.6	0.53	163.4	94.6	175.8	164.2	14	14.9
October	153.9	97.5	0.63	158.7	90.5	167.0	159.5	23	15.5
November	159.8	95.5	0.60	150.5	85.3	168.7	154.3	16	16.1
December	147.9	80.8	0.55	144.6	82.1	158.6	150.9	13	17.0
<b>2003</b>									
January	149.3	79.5	0.53			144.6		13	
February	87.9	46.2	0.53			124.6		15	
March	119.7	61.5	0.51			132.3		19	
April	114.3	60.0	0.52			126.5		20	
May	89.6	55.2	0.62			116.2		25	
June	118.4	77.4	0.65			129.4		24	

**NOTE:** All smoothed values after June 1999 and monthly values after December 2000 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 22, RI= 158.5, occurred July 1989. \*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 23 Jun 2003*

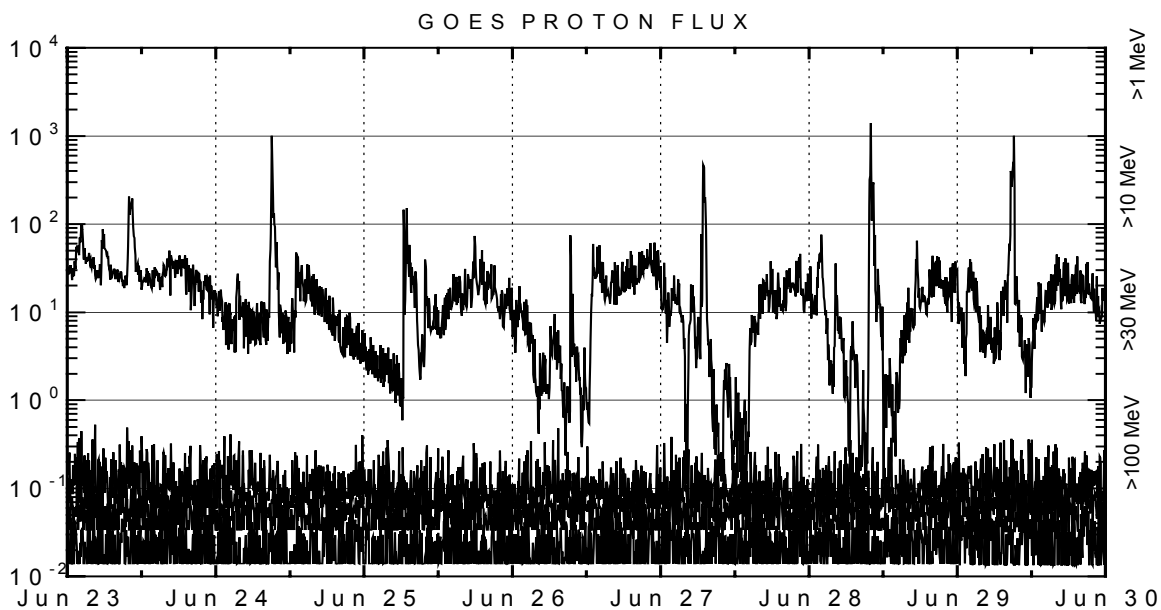
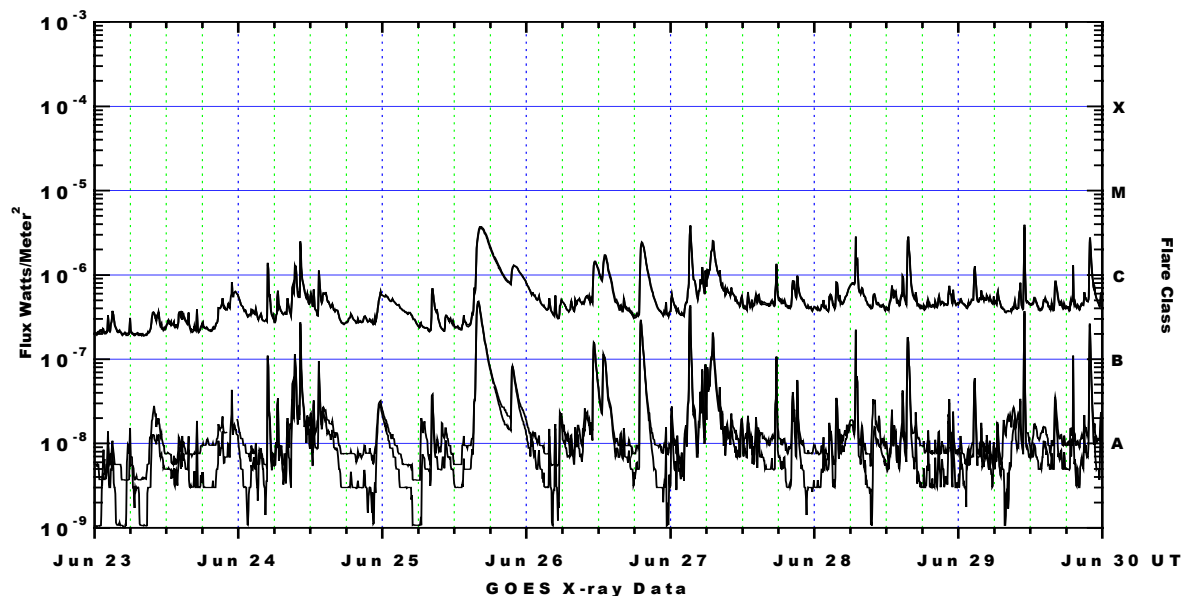
*Protons* plot contains the five-minute averaged integral proton flux (protons/cm<sup>2</sup>-sec-sr) as measured by GOES-8 (W75)/GOES-11 (W113) for each of three energy thresholds: greater than 10, 50, and 100 MeV. The primary proton instrument was switched from GOES-8 to GOES-11 on 19 June 2003 (See details at <http://www.sec.noaa.gov/GOES.html>).

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

*H<sub>p</sub>* 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<sub>p</sub>* 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<sub>p</sub> 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<sub>p</sub> are "global" parameters that are applicable to a first order approximation over large areas. H<sub>p</sub> 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*

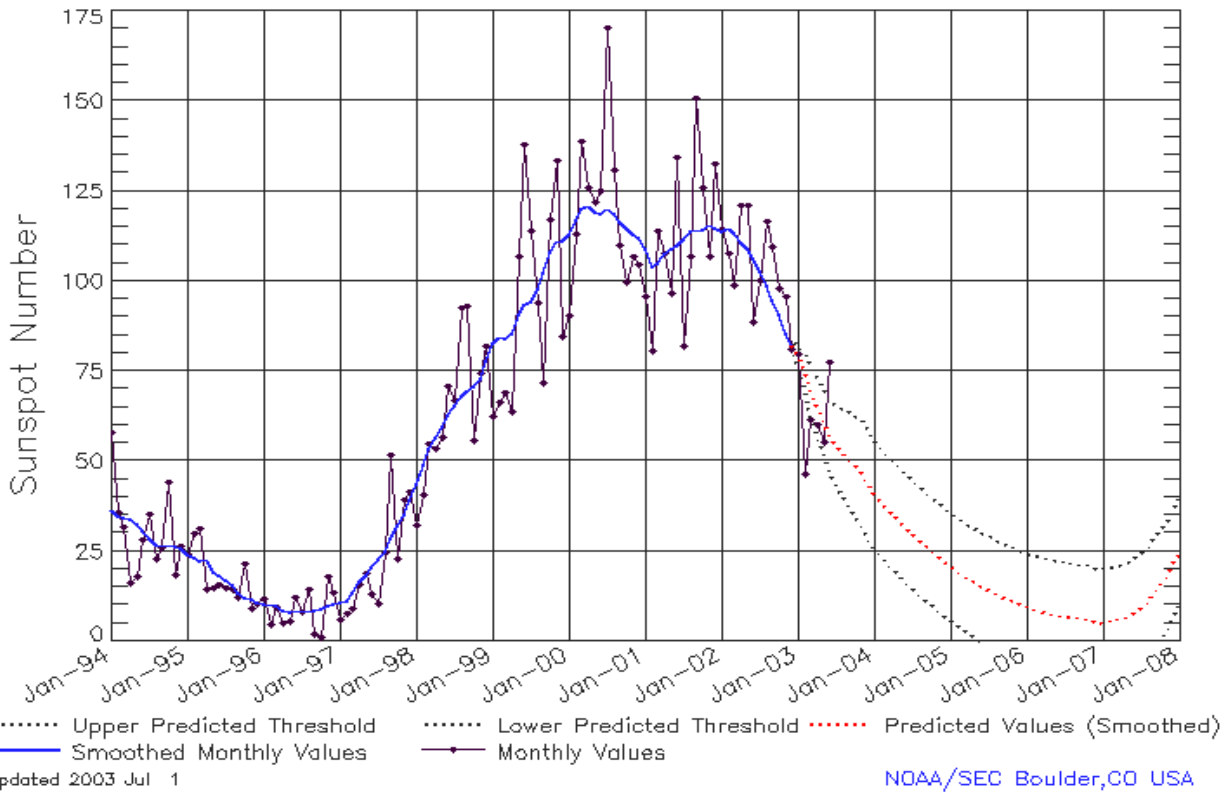
X-ray plot contains five-minute averaged x-ray flux (watts/m<sup>2</sup>) as measured by GOES 12 and 10 in two wavelength bands, .05 - .4 and .1 - .8 nm. The letters A, B, C, M and X refer to x-ray event levels for the .1 - .8 nm band.

Proton plot contains the five-minute averaged integral proton flux (protons/cm<sup>2</sup>-sec-sr) as measured by GOES-8 (W75)/GOES-11 (W113) for each of the energy thresholds: >1, >10, >30 and >100 MeV. P10 event threshold is 10 pfu (protons/cm<sup>2</sup>-sec-sr) at greater than 10 MeV. The primary proton instrument was switched from GOES-8 to GOES-11 on 19 June 2003 (See details at <http://www.sec.noaa.gov/GOES.html>).



## ISES Solar Cycle Sunspot Number Progression

Data Through 30 Jun 03



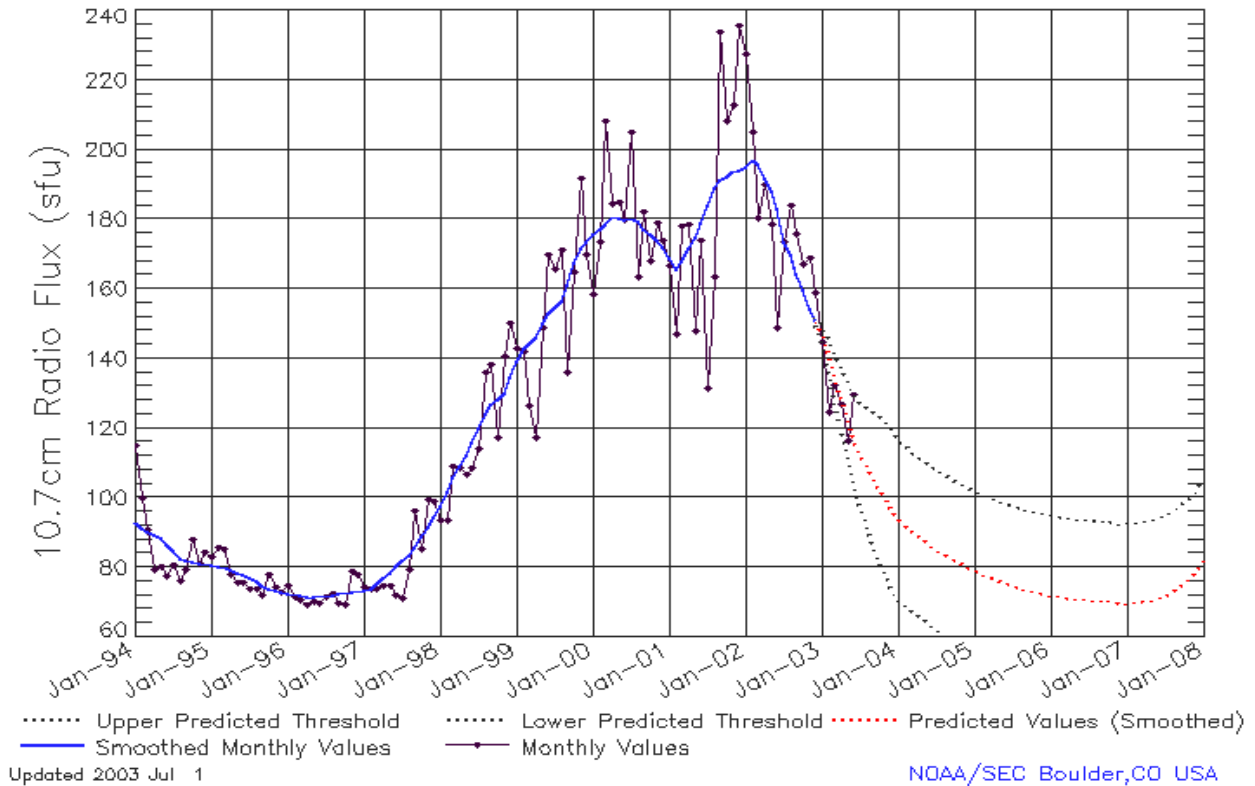
### SEC Prediction of Smoothed Sunspot Number

	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	<b>80</b>	<b>75</b>	<b>70</b>	<b>65</b>	<b>61</b>	<b>57</b>	<b>54</b>	<b>52</b>	<b>51</b>	<b>49</b>	<b>47</b>	<b>44</b>
	(1)	(3)	(5)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)
2004	<b>41</b>	<b>39</b>	<b>37</b>	<b>35</b>	<b>33</b>	<b>31</b>	<b>30</b>	<b>28</b>	<b>27</b>	<b>25</b>	<b>24</b>	<b>22</b>
	(15)	(15)	(15)	(15)	(15)	(15)	(15)	(15)	(15)	(15)	(15)	(15)
2005	<b>21</b>	<b>20</b>	<b>18</b>	<b>17</b>	<b>16</b>	<b>15</b>	<b>14</b>	<b>13</b>	<b>12</b>	<b>12</b>	<b>11</b>	<b>10</b>
	(15)	(15)	(15)	(15)	(15)	(15)	(15)	(15)	(15)	(15)	(15)	(15)
2006	<b>10</b>	<b>9</b>	<b>8</b>	<b>8</b>	<b>8</b>	<b>7</b>	<b>7</b>	<b>7</b>	<b>7</b>	<b>6</b>	<b>6</b>	<b>5</b>
	(15)	(15)	(15)	(15)	(15)	(15)	(15)	(15)	(15)	(15)	(15)	(15)
2007	<b>5</b>	<b>6</b>	<b>6</b>	<b>6</b>	<b>7</b>	<b>8</b>	<b>10</b>	<b>11</b>	<b>13</b>	<b>16</b>	<b>18</b>	<b>21</b>
	(15)	(15)	(15)	(15)	(15)	(15)	(15)	(15)	(15)	(15)	(15)	(15)



## ISES Solar Cycle F10.7cm Radio Flux Progression

Data Through 30 Jun 03



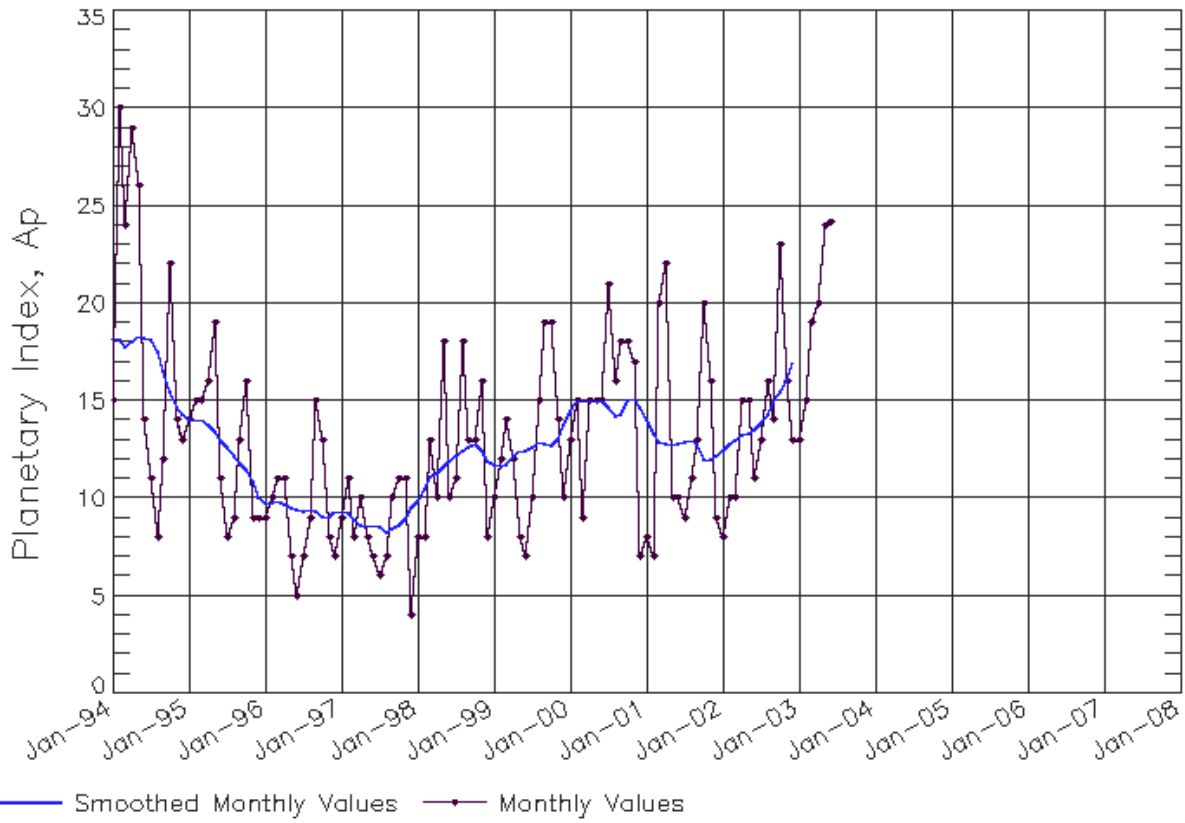
### SEC Prediction of Smoothed F10.7cm Radio Flux

	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 (***)	174 (***)	170 (***)	164 (***)	160 (***)	154 (***)	151 (***)
2003	<b>147</b> (1)	<b>141</b> (3)	<b>134</b> (5)	<b>128</b> (7)	<b>123</b> (9)	<b>117</b> (11)	<b>112</b> (13)	<b>109</b> (15)	<b>106</b> (17)	<b>102</b> (19)	<b>100</b> (21)	<b>97</b> (22)
2004	<b>94</b> (23)	<b>92</b> (23)	<b>91</b> (23)	<b>89</b> (23)	<b>88</b> (23)	<b>87</b> (23)	<b>85</b> (23)	<b>84</b> (23)	<b>83</b> (23)	<b>82</b> (23)	<b>81</b> (23)	<b>80</b> (23)
2005	<b>79</b> (23)	<b>78</b> (23)	<b>78</b> (23)	<b>77</b> (23)	<b>76</b> (23)	<b>75</b> (23)	<b>75</b> (23)	<b>74</b> (23)	<b>74</b> (23)	<b>73</b> (23)	<b>73</b> (23)	<b>73</b> (23)
2006	<b>72</b> (23)	<b>72</b> (23)	<b>71</b> (23)	<b>71</b> (23)	<b>71</b> (23)	<b>71</b> (23)	<b>71</b> (23)	<b>71</b> (23)	<b>70</b> (23)	<b>70</b> (23)	<b>70</b> (23)	<b>70</b> (23)
2007	<b>70</b> (23)	<b>70</b> (23)	<b>70</b> (23)	<b>70</b> (23)	<b>71</b> (23)	<b>71</b> (23)	<b>72</b> (23)	<b>73</b> (23)	<b>74</b> (23)	<b>76</b> (23)	<b>77</b> (23)	<b>79</b> (23)



# ISES Solar Cycle Ap Progression

Data Through 30 Jun 03



Updated 2003 Jul 1

NOAA/SEC Boulder, CO USA

