

## Space Weather Highlights 12 – 18 July 2004

SWO PRF 1507  
20 Jul 2004

Solar activity ranged from moderate to high. The period began with occasional low to moderate-level M-class flares on 12 – 13 July from new Region 649 (S10, L=044, class/area, Fki/530 on 16 July). New Region 646 (N13, L=169, class/area, Dai/220 on 13 July) emerged on 11 July and went into a rapid growth phase on 12 – 13 July. Activity levels increased to high on the 13th as developing region 646 produced three strong flares – two M5s and an M6. Lower M-class activity was also observed in Region 649. Two asymmetrical full-halo CMEs were observed from Region 646 due to the M-class activity. High levels continued on the 14th with another M6 flare from Region 646. New growth was observed in Region 649 on 15 July and a complex delta magnetic configuration formed in the trailing spots. Activity levels remained high on 15 – 17 July as Region 649 produced six X-class flares, the largest an X3.6/3b at 16/1355 UTC. No highly structured CMEs were observed from any of the major flares observed in Region 649. New Region 652 (N05, L=346, class/area, Fkc/1370 on 18 July) rotated into view on 16 July and produced low to moderate level C-class activity. Though still near the east limb, a strong delta structure was evident.

Solar wind data were available from the NASA Advanced Composition Explorer (ACE) spacecraft during most of the summary period. The period began under the influence of a coronal hole high speed stream. Solar wind speeds were observed at 550 to 600 km/s and persisted at this velocity through early on the 14th. Solar wind speed gradually declined to near 400 km/s when late on 16 July, a shock passed the ACE satellite and wind velocity increased sharply to near 600 km/s. This transient was believed to have been the result of the full halo CME activity seen on 13 July. Solar wind speed gradually decreased to 400 km/s through the end the period. IMF Bz was generally in the +5 to –5 nT range with a brief period of sustained southward Bz to –15nT beginning late on the 16th.

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 remained below the high threshold.

The geomagnetic field ranged from quiet to major storm levels. The first two days of the summary period were dominated by quiet to active geomagnetic conditions due to the influence of the coronal hole high speed stream. Activity levels decayed to generally quiet to unsettled conditions with isolated active periods. The onset of the transient on 16 July resulted in active to major storm levels early on 17 July. Thereafter, through the end of the summary period, the field was quiet to unsettled.

## Space Weather Outlook 21 July – 16 August 2004

Solar activity is expected to range from low to high. Regions 649 and 652 are both expected to produce further M and X-class activity early in the period. Old Region 646 is due to return on 29 July and could produce isolated M-class flare activity through 12

A greater than 10 MeV proton event is possible.

The greater than 2 MeV electron flux at geosynchronous orbit is expected to reach high levels on 26 – 27 July due to a recurrent coronal hole high speed stream.

The geomagnetic field is expected to range from quiet to active levels with minor storm periods at high latitudes. Unsettled to active conditions with high latitude minor storm periods are possible on 25-26 July as a recurrent coronal high speed stream rotates into a geoeffective position. At the time of this writing, a CME associated with an M8 flare in Region 652 appears to be at least partially Earth directed; consequently, minor to major storm levels are possible on 23 July. Region 652 is a very large and complex sunspot group with good potential for geoeffective CMEs during the first week the forecast.



### *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
12 July	125	118	440	B7.3	11	1	0	1	0	0	0	0
13 July	127	129	970	B7.2	10	5	0	7	3	0	0	0
14 July	138	149	830	B6.1	12	2	0	4	1	0	0	0
15 July	146	146	630	B7.5	4	0	2	1	0	0	0	0
16 July	147	142	1080	B8.4	4	1	3	4	2	0	1	0
17 July	149	165	1570	B6.7	12	3	1	8	3	0	0	0
18 July	155	169	2300	B6.8	13	3	0	11	2	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
	12 July	3.1E+5	1.5E+4	3.0E+3		2.2E+6
13 July	4.5E+5	3.4E+4	2.8E+3		1.9E+6	
14 July	2.8E+5	1.5E+4	2.8E+3		6.6E+6	
15 July	2.6E+5	1.4E+4	2.6E+3		1.6E+7	
16 July	2.2E+5	1.3E+4	2.6E+3		3.8E+6	
17 July	1.5E+5	1.2E+4	2.5E+3		6.5E+5	
18 July	3.1E+5	1.3E+4	2.5E+3		4.0E+6	

### *Daily Geomagnetic Data*

Date	Middle Latitude Fredericksburg		High Latitude College		Estimated Planetary	
	A	K-indices	A	K-indices	A	K-indices
	12 July	12	3-2-2-2-2-3-4	13	4-3-3-1-3-1-2-3	13
13 July	11	4-3-3-2-2-1-2-2	14	3-3-4-1-3-3-3-1	16	4-3-4-2-2-3-3-3
14 July	6	2-3-2-1-1-1-1-1	11	1-3-3-2-2-3-4-0	9	2-3-3-2-2-2-3-2
15 July	7	1-0-0-1-1-2-3-4	3	1-1-0-0-0-1-2-2	9	2-1-1-1-2-3-3-4
16 July	8	1-0-1-1-3-2-1-4	7	1-1-2-2-1-2-2-3	12	2-0-2-2-3-3-3-4
17 July	13	5-3-3-2-2-1-1-2	28	5-4-4-6-4-2-1-1	24	6-4-5-3-3-3-3-2
18 July	6	1-3-3-1-0-1-1-2	5	2-2-3-2-0-0-1-1	9	1-3-3-2-2-3-2-2

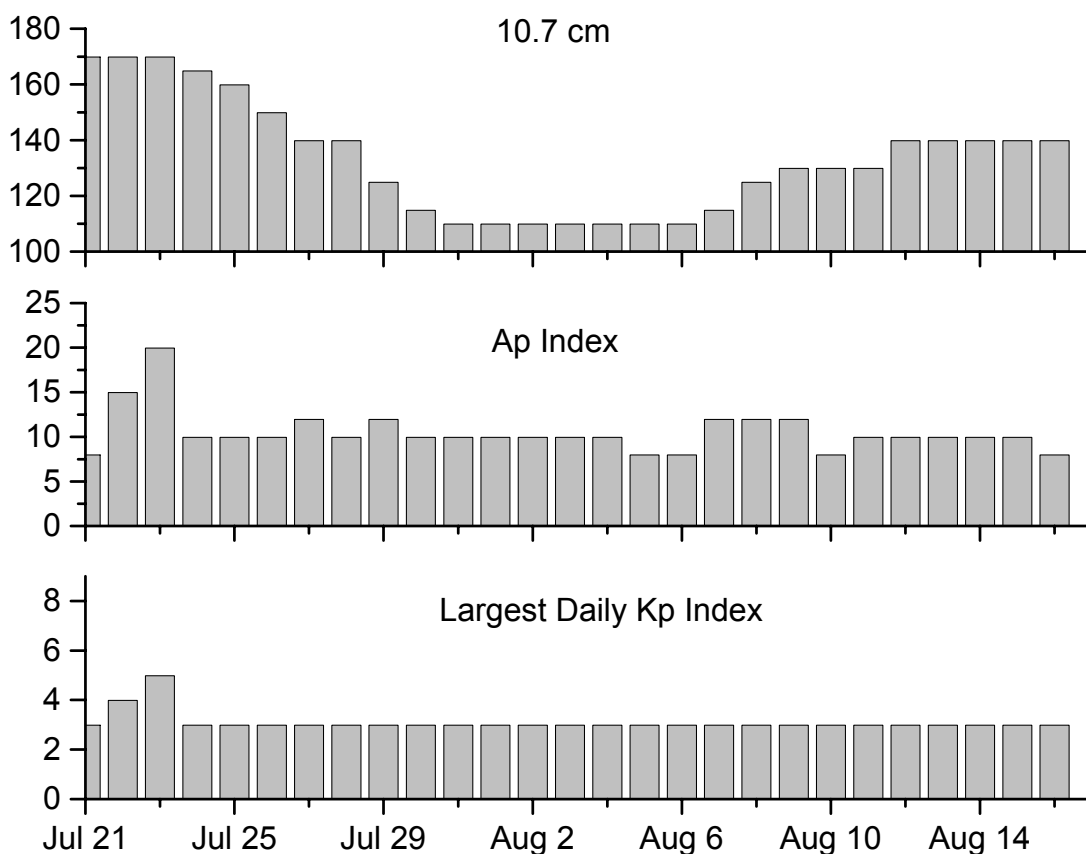


### *Alerts and Warnings Issued*

<u>Date &amp; Time of Issue</u>	<u>Type of Alert or Warning</u>	<u>Date &amp; Time of Event UT</u>
12 Jul 0821	ALERT: Type II Radio Emission	12 Jul 0806
12 Jul 2231	ALERT: Geomagnetic K= 4	12 Jul 2228
13 Jul 0016	ALERT: X-Ray Flux $\geq$ M5	13 Jul 0016
13 Jul 0030	SUMMARY: X-ray Event $\geq$ M5	13 Jul 0017
13 Jul 0038	SUMMARY: 10cm Radio Burst	13 Jul 0013
13 Jul 0053	ALERT: Geomagnetic K= 4	13 Jul 0048
13 Jul 0103	ALERT: Type II Radio Emission	13 Jul 0016
13 Jul 0746	ALERT: Geomagnetic K= 4	13 Jul 0745
13 Jul 0849	ALERT: X-Ray Flux $\geq$ M5	13 Jul 0849
13 Jul 0919	SUMMARY: X-ray Event $\geq$ M5	13 Jul 0848
13 Jul 0930	ALERT: Type II Radio Emission	13 Jul 0851
13 Jul 1221	SUMMARY: 10cm Radio Burst	13 Jul 1202
13 Jul 1932	ALERT: X-Ray Flux $\geq$ M5	13 Jul 1931
13 Jul 1941	SUMMARY: X-ray Event $\geq$ M5	13 Jul 1932
14 Jul 0016	5 – 245 MHz Radio Bursts	13 Jul
14 Jul 0523	ALERT: X-Ray Flux $\geq$ M5	14 Jul 0521
14 Jul 0534	SUMMARY: X-ray Event $\geq$ M5	14 Jul 0523
15 Jul 0019	2 – 245 MHz Radio Bursts	14 Jul
15 Jul 0139	ALERT: X-Ray Flux $\geq$ M5	15 Jul 0138
15 Jul 0157	SUMMARY: X-ray Event $\geq$ X1	15 Jul 0141
15 Jul 0207	SUMMARY: 10cm Radio Burst	15 Jul 0136
15 Jul 1823	ALERT: X-Ray Flux $\geq$ M5	15 Jul 1822
15 Jul 1838	SUMMARY: X-ray Event $\geq$ X1	15 Jul 1824
15 Jul 2303	ALERT: Geomagnetic K= 4	15 Jul 2300
16 Jul 0018	245 MHz Radio Burst	15 Jul
16 Jul 0204	ALERT: X-Ray Flux $\geq$ M5	16 Jul 0203
16 Jul 0217	SUMMARY: 10cm Radio Burst	16 Jul 0203
16 Jul 0221	SUMMARY: X-ray Event $\geq$ X1	16 Jul 0206
16 Jul 1041	ALERT: X-Ray Flux $\geq$ M5	16 Jul 1040
16 Jul 1055	SUMMARY: X-ray Event $\geq$ X1	16 Jul 1041
16 Jul 1116	SUMMARY: 10cm Radio Burst	16 Jul 1038
16 Jul 1354	ALERT: X-Ray Flux $\geq$ M5	16 Jul 1353
16 Jul 1409	SUMMARY: X-ray Event $\geq$ X1	16 Jul 1355
16 Jul 1459	SUMMARY: 10cm Radio Burst	16 Jul 1354
16 Jul 1502	ALERT: Type II Radio Emission	16 Jul 1359
16 Jul 2127	WARNING: Sudden Impulse	16 Jul 2200 – 2210
16 Jul 2203	SUMMARY: Sudden Impulse	16 Jul 2158
16 Jul 2245	WARNING: Geomagnetic K= 4	16 Jul 2245 – 17/0600
16 Jul 2330	ALERT: Geomagnetic K= 4	16 Jul 2328
17 Jul 0011	3 – 245 MHz Radio Bursts	16 Jul
17 Jul 0024	WARNING: Geomagnetic K= 5	17 Jul 0025 – 1500
17 Jul 0209	ALERT: Geomagnetic K= 5	17 Jul 0207
17 Jul 0757	ALERT: X-Ray Flux $\geq$ M5	17 Jul 0756
17 Jul 0804	SUMMARY: X-ray Event $\geq$ X1	17 Jul 0757
17 Jul 0822	SUMMARY: 10cm Radio Burst	17 Jul 0755
18 Jul 0009	4 – 245 MHz Radio Bursts	17 Jul



### 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
21 Jul	170	8	3	04 Aug	110	10	3
22	170	15	4	05	110	8	3
23	170	20	5	06	110	8	3
24	165	10	3	07	115	12	3
25	160	10	3	08	125	12	3
26	150	10	3	09	130	12	3
27	140	12	3	10	130	8	3
28	140	10	3	11	130	10	3
29	125	12	3	12	140	10	3
30	115	10	3	13	140	10	3
31	110	10	3	14	140	10	3
01 Aug	110	10	3	15	140	10	3
02	110	10	3	16	140	8	3
03	110	10	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
12 Jul	0736	0808	0859	M1.6	.060				88	52	1	
13 Jul	0009	0017	0023	M6.7	.029			646	7800	350	2	
13 Jul	0840	0848	0855	M5.4	.025	1n	N12W52	646	67	89	2	
13 Jul	1159	1208	1212	M2.9	.010			649		260		
13 Jul	1833	1838	1842	M1.1	.004	1n	S10E65	649				
13 Jul	1924	1932	1936	M6.2	.019	1b	N13W56	646	330	170		
14 Jul	0502	0523	0527	M6.2	.020	1n	N12W62	646		46		
14 Jul	1812	1816	1818	M1.0	.002	Sf	S11E56	649				
15 Jul	0130	0141	0148	X1.8	.085			649		310		
15 Jul	1815	1824	1828	X1.6	.049			649		700		
16 Jul	0143	0206	0212	X1.3	.062			649		450		
16 Jul	1032	1041	1046	X1.1	.040	1f	S10E36	649		600		
16 Jul	1349	1355	1401	X3.6	.140	3b	S11E35	649		2900	1	
16 Jul	1622	1628	1631	M1.2	.005	Sf	S11E30	649				
17 Jul	0751	0757	0759	X1.0	.022	1f	S10E24	649		670		
17 Jul	1645	1651	1657	M2.5	.010	1n	S10E18	649		52		
17 Jul	2124	2131	2138	M2.0	.010	1f	S09E13	649				
17 Jul	2254	2308	2316	M1.1	.012			649				
18 Jul	0005	0035	0040	M2.0	.012	1f	S09E12	649				
18 Jul	0251	0257	0303	M1.5	.007	Sf	S12E12	649				
18 Jul	1704	1713	1715	M1.9	.005	1f	S11E05	649				

### *Flare List*

Date	Time			X-ray Class.	Optical		Rgn
	Begin	Max	End		Imp / Brtns	Location Lat CMD	
12 July	0057	0105	0120	C3.2			
	0310	0315	0323	C1.6			
	0428	0438	0444	C5.5			
	0621	0629	0637	C2.2			
	0711	0719	0726	C2.8			
	0736	0808	0859	M1.6			
	1249	1302	1312	C3.4			649
	1550	1602	1615	C3.2			649
	1645	1648	1650	C1.8			
	1831	1843	1854	C4.5			649
	1833	1840	1856		Sf	N10W42	646
	2119	2128	2138	C1.7			649
	2146	2151	2159	C2.5			649
	13 July	0009	0017	0023	M6.7		
0431		0440	0446	C2.4			649
0527		0534	0550	C6.7	Sf	N15W49	646
0626		0633	0648	C4.1			649
0630		0632	0651		Sf	N16W50	646
0710		0714	0719	C2.6			649
0825		0829	0834	C1.5			649



*Flare List-continued*

Date	Time			X-ray Class.	Optical		Rgn
	Begin	Max	End		Imp / Brtns	Location Lat CMD	
13 July	0843	U0852	0916	M5.4	1n	N12W52	646
	1159	1208	1212	M2.9			649
	1245	1249	1252	C5.0			649
	1655	1700	1705		Sf	N14W56	646
	1818	1826	1831		Sf	N14W56	646
	1833	1834	1843		Sf	N14W57	646
	1836	1837	1846	M1.1	1n	S10E65	649
	1927	1932	1953	M6.2	1b	N13W56	646
	2122	2123	2128	C2.2	Sf	N14W59	646
	2203	2206	2212	C5.1	Sn	S11E64	649
	2304	2309	2314	C2.8			646
	2327	2333	2337	C3.2			646
	14 July	0040	0043	0052	C3.1	Sf	N14W61
0130		0147	0203	C3.7			
0341		0348	0353	C1.3			646
0518		0525	A0540	M6.2	1n	N12W62	646
0811		0816	0822	C1.9			646
0924		0931	0938	C1.3			649
1455		1459	1501	C1.0			649
1745		1749	1800	C5.8	Sf	S11E56	649
1815		1817	1827	M1.0	Sf	S11E56	649
1826		1830	1834	C2.8			649
1950		1955	2001	C2.0			646
2010		2020	2029	C3.6			646
2036		2043	2050	C3.5			646
2051		2054	2058	C6.6			646
15 July		2150	2150	2201		Sf	N13W73
	0130	0141	0148	X1.8			649
	0428	0430	0436		Sf	N11W77	646
	1111	1116	1119	C2.5			651
	1451	1456	1504	C1.4			649
	1815	1824	1828	X1.6			649
	2125	2201	2218	C3.9			649
	2224	2233	2252	C7.9			
16 July	0143	0206	0212	X1.3			649
	0834	0838	0842	C1.7			
	0855	0859	0902	C1.9			
	1037	1042	1058	X1.1	1f	S10E36	649
	1232	1259	1314	C8.2			
	1329	1330	1338		1n	S10E33	649
	1350	1357	1532	X3.6	3b	S11E35	649
	1624	1627	1637	M1.2	Sf	S11E30	649



*Flare List-continued*

Date	Time			X-ray Class.	Optical		Rgn
	Begin	Max	End		Imp / Brtns	Location Lat CMD	
16 July	1928	1933	1943		Sf	N10E91	
	2031	2038	2102	C9.0	Sf	S09E27	649
	2114	2115	2119		Sf	N11E89	652
17 July	0154	0201	0206	C5.7			649
	0207	0213	0216	C6.8			649
	0342	0347	0349	C4.2			652
	0755	0758	0826	X1.0	1f	S10E24	649
	0946	0953	0957	C5.0			649
	1124	1137	1142	C7.2			649
	1300	1308	1321	C8.8	Sf	S11E21	649
	1307	1308	1311		Sf	S11E21	649
	1550	1551	1608	C2.6	Sf	S11E19	649
	1649	1652	1722	M2.5	1n	S10E18	649
	1724	1726	1730		Sf	S09E15	649
	1821	1827	1831	C2.2			
	1917	1920	1923	C5.3	Sf	N08E71	652
	2039	2039	2050		Sf	N08E65	652
	2042	2059	2112	C3.4	Sf	S09E14	649
	2054	2103	2110	C5.7			649
	2113	2113	2122		Sf	S09E14	649
	2124	2134	2203	M2.0	1f	S09E13	649
	2228	2239	2246	C5.7			649
	2254	2308	2316	M1.1			649
18 July	0012	0012	0111	M2.0	1f	S09E12	649
	0058	0059	0113		Sf	S09E11	649
	0254	0258	0324	M1.5	Sf	S12E12	649
	0606	0607	0615	C1.2	Sf	S09E09	649
	0807	0809	0817		Sf	N08E65	652
	1138	1141	1143	C1.6	Sf	N09E58	652
	1147	1151	1201		Sf	S11E08	649
	1228	1229	1237	C2.9	Sf	S12E09	649
	1343	1348	1401	C4.0	Sf	S11E07	649
	1412	1414	1427	C9.4	Sf	S10E07	649
	1625	1629	1632	C1.4			649
	1643	1647	1650	C1.6			649
	1709	1711	1731	M1.9	1f	S11E05	649
	1717	1720	1722	C4.1			649
	1749	1754	1757	C1.2			649
	1805	1809	1811	C1.7			649
	1845	1847	1855	C2.3	Sf	S10E03	649
2043	2046	2050		Sf	N09E49	652	
2139	2142	2149	C1.3			649	
2208	2215	2218	C1.7			652	







**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 644*

10 Jul	N11E69	080	0100	03	Hsx	001	A											
11 Jul	N12E58	078	0140	03	Hax	001	A											
12 Jul	N11E44	079	0110	04	Dso	007	B											
13 Jul	N11E30	080	0120	05	Dao	010	B											
14 Jul	N11E17	080	0130	04	Dso	009	B											
15 Jul	N12E04	079	0120	05	Cso	004	B											
16 Jul	N13W07	077	0160	04	Hsx	005	A											
17 Jul	N13W20	077	0150	05	Dso	008	B											
18 Jul	N13W33	077	0110	04	Cso	006	B											

0 0 0 0 0 0 0 0 0

Still on Disk.

Absolute heliographic longitude:079

*Region 645*

10 Jul	N12W11	160	0020	03	Bxo	003	B											
11 Jul	N11W18	154	0020	03	Dro	004	B											
12 Jul	N11W32	155	0010	03	Bxo	002	B											
13 Jul	N11W45	155																
14 Jul	N11W58	155																
15 Jul	N11W71	153																
16 Jul	N11W84	154																

0 0 0 0 0 0 0 0 0

Crossed West Limb.

Absolute heliographic longitude:156

*Region 646*

11 Jul	N13W33	169	0010	04	Cro	003	B											
12 Jul	N12W46	169	0070	07	Dai	014	B				1							
13 Jul	N13W60	170	0220	08	Dai	016	B	4	3		6	2						
14 Jul	N12W72	169	0190	09	Dai	010	B	7	1		2	1						
15 Jul	N14W84	167	0010	08	Bxo	007	B				1							

11 4 0 10 3 0 0 0

Crossed West Limb.

Absolute heliographic longitude:169



**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 647*

11 Jul	S14E61	075	0010	01	Axx	001	A											
12 Jul	S14E48	075																
13 Jul	S14E35	075																
14 Jul	S14E22	075																
15 Jul	S14E09	075																
16 Jul	S14W04	074																
17 Jul	S14W17	075																
18 Jul	S14W30	075																

Still on Disk.

Absolute heliographic longitude:075

*Region 648*

12 Jul	N14W08	131	0030	05	Cao	006	B											
13 Jul	N16W22	132	0070	06	Dao	010	B											
14 Jul	N16W35	132	0030	07	Cro	006	B											
15 Jul	N15W51	134	0010	02	Bxo	002	B											
16 Jul	N15W64	134																
17 Jul	N15W77	134																
18 Jul	N15W90	134																

Still on Disk.

Absolute heliographic longitude:132

*Region 649*

12 Jul	S10E76	047	0090	10	Cao	004	B	5										
13 Jul	S10E64	046	0410	16	Fai	026	B	6	2		1	1						
14 Jul	S10E53	044	0360	15	Eai	034	Bgd	4	1		2							
15 Jul	S10E40	043	0360	15	Eac	038	Bgd	2		2								
16 Jul	S10E26	044	0530	16	Fki	048	Bgd	1	1	3	2	2		1				
17 Jul	S10E13	044	0500	16	Fkc	047	Bgd	9	3	1	6	3						
18 Jul	S10E00	044	0510	16	Fac	043	Bgd	11	3		8	2						
								38	10	6	19	8	0	1	0			

Still on Disk.

Absolute heliographic longitude:045



**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	4		
<i>Region 650</i>																	
14 Jul	S08E31	066	0010	01	Hsx	001	A										
15 Jul	S08E18	065	0010	02	Axx	002	A										
16 Jul	S08E08	062	0010	04	Bxo	010	B										
17 Jul	S08W05	062															
18 Jul	S12W15	059	0010	04	Bxo	002	B										
									0	0	0	0	0	0	0	0	0
Still on Disk.																	
Absolute heliographic longitude:063																	
<i>Region 651</i>																	
14 Jul	S16E44	053	0010	06	Bxo	004	B										
15 Jul	S16E29	054	0010	09	Bxo	012	B	1									
16 Jul	S16E14	056	0010	09	Bxo	011	B										
17 Jul	S16E01	056	0010	06	Bxo	005	B										
18 Jul	S16W10	054	0010	04	Bxo	005	B										
									1	0	0	0	0	0	0	0	0
Still on Disk.																	
Absolute heliographic longitude:055																	
<i>Region 652</i>																	
16 Jul	N05E84	346	0300	07	Hhx	002	A					1					
17 Jul	N05E71	346	0750	11	Ekc	028	B	2				2					
18 Jul	N05E58	346	1370	17	Fkc	030	Bgd	2				3					
								4	0	0	0	6	0	0	0	0	0
Still on Disk.																	
Absolute heliographic longitude:346																	
<i>Region 653</i>																	
17 Jul	S14E71	346	0100	08	Dao	010	B										
18 Jul	S14E58	346	0200	11	Cao	011	B										
									0	0	0	0	0	0	0	0	0
Still on Disk.																	
Absolute heliographic longitude:346																	

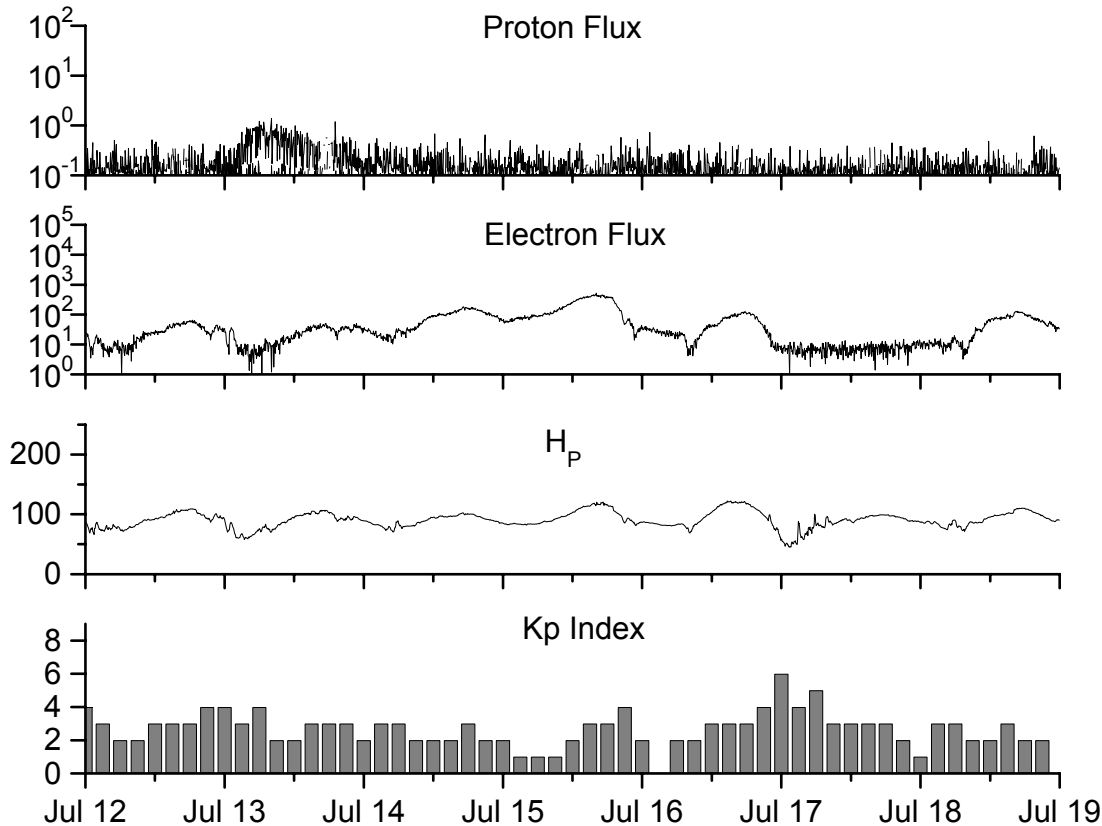


**Recent Solar Indices (preliminary)  
of the observed monthly mean values**

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>2002</b>									
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
<b>2003</b>									
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	93.6	57.0	153.1	121.8	31	20.0
December	75.4	47.0	0.62			115.1		18	
<b>2004</b>									
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	
May	77.3	41.5	0.54			99.7		9	
June	78.9	43.2	0.55			99.7		9	

**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 12 July 2004*

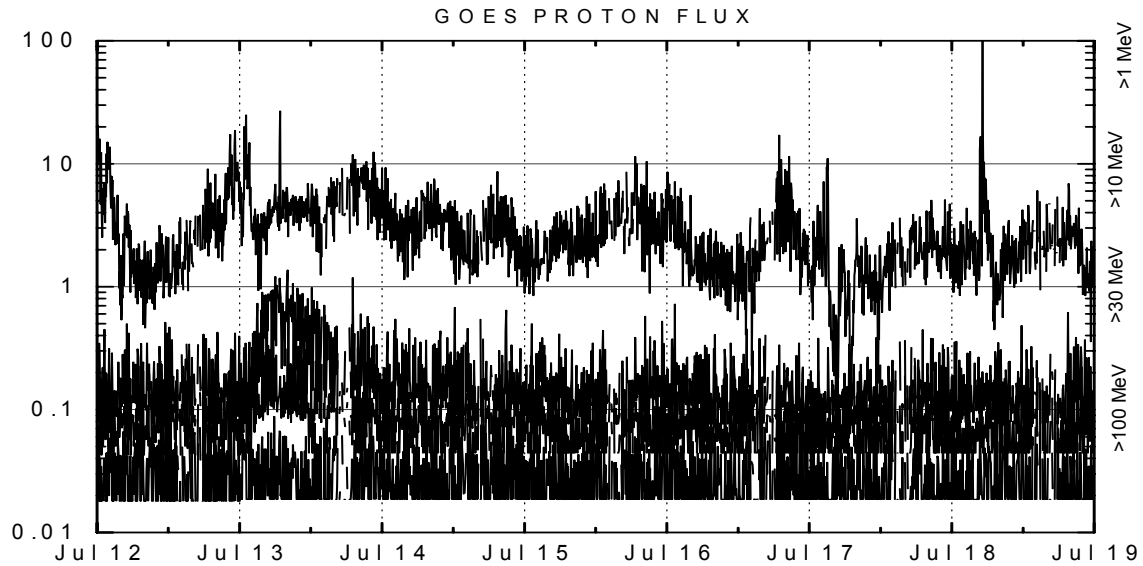
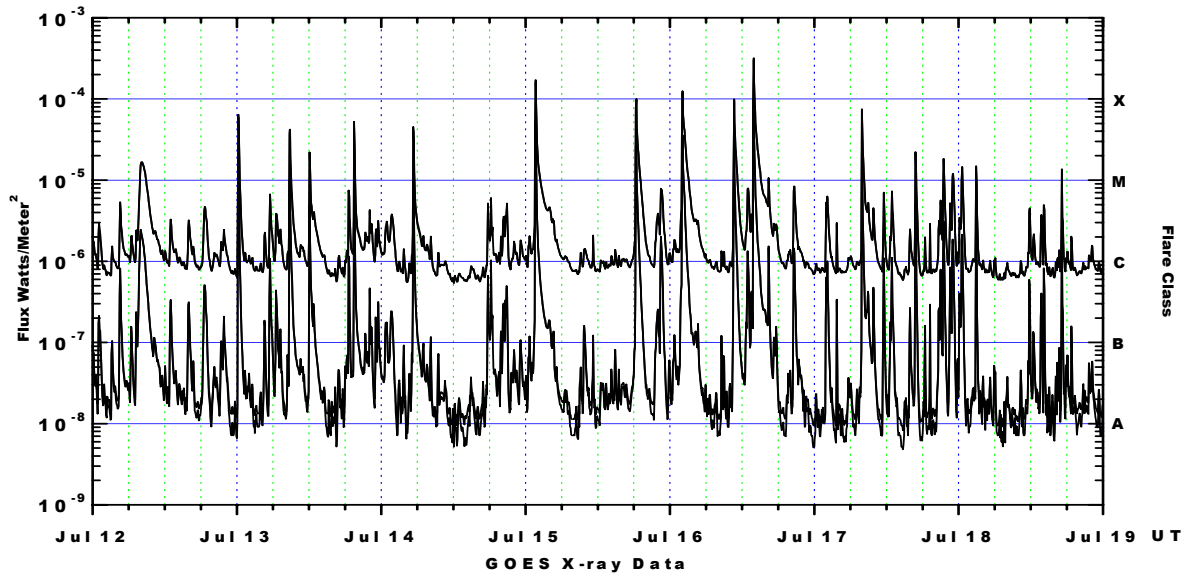
*Protons* plot contains the five-minute averaged integral proton flux (protons/cm<sup>2</sup>-sec -sr) as measured by GOES-11 (W98) for each of three energy thresholds: greater than 10, 50, and 100 MeV. *Electrons* plot contains the five-minute averaged integral electron flux (electrons/cm<sup>2</sup>-sec -sr) with energies greater than 2 MeV at GOES-12 (W75).

*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*

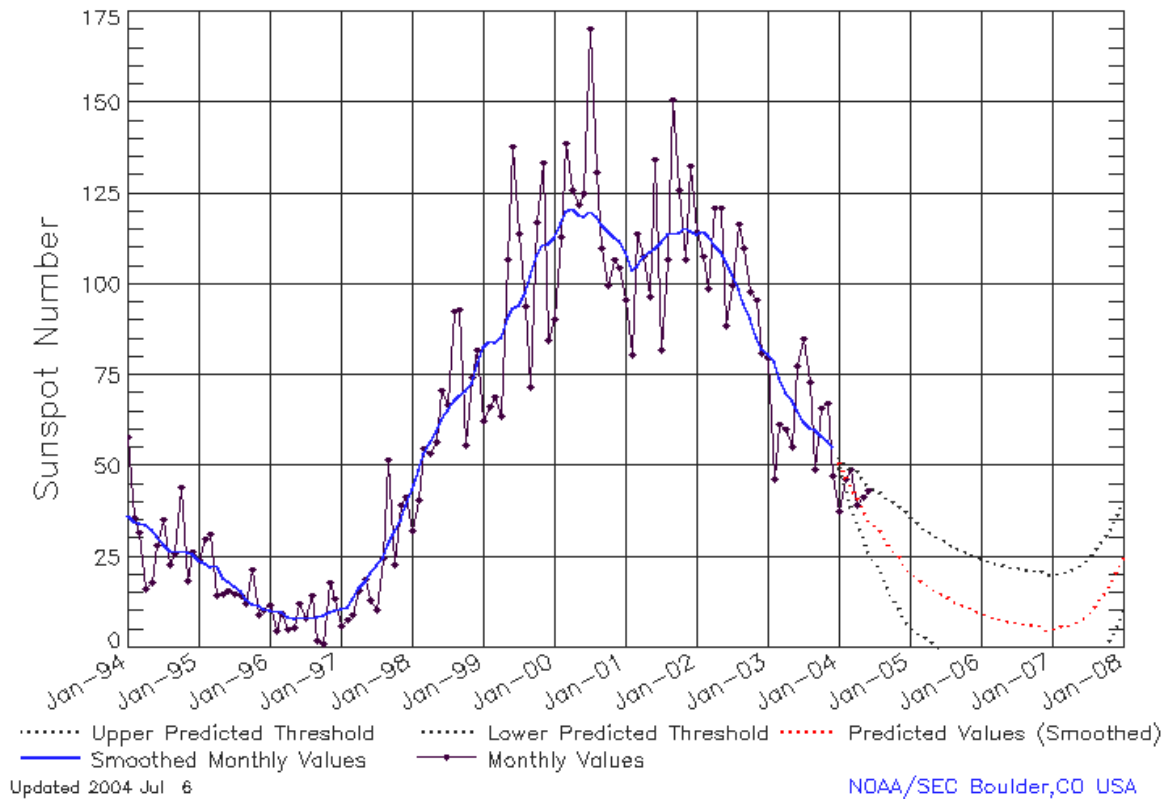
X-ray plot contains five-minute averaged x-ray flux (watts/m<sup>2</sup>) as measured by GOES 12 (W75) and GOES 10 (W135) in two wavelength bands, .05 - .4 and .1 - .8 nm. The letters A, B, C, M and X refer to x-ray event levels for the .1 - .8 nm band.

Proton plot contains the five-minute averaged integral proton flux (protons/cm<sup>2</sup>-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<sup>2</sup>-sec-sr) at greater than 10 MeV.



# ISES Solar Cycle Sunspot Number Progression

Data Through 30 Jun 04



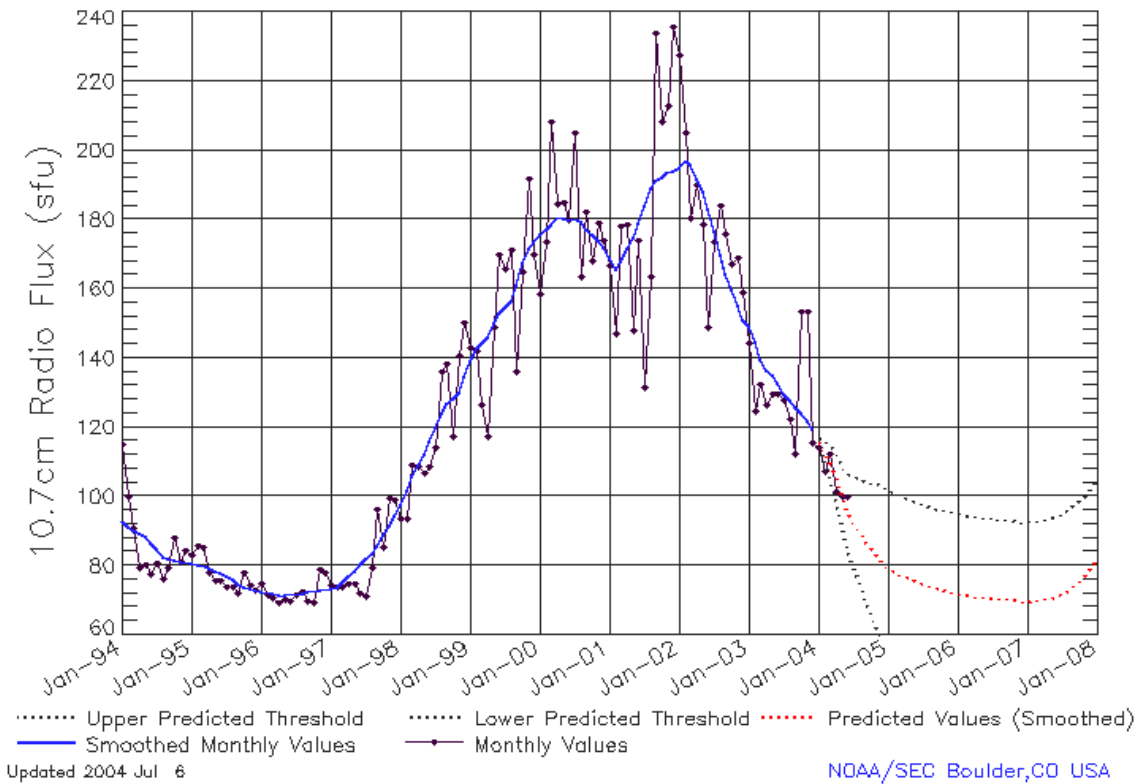
## SEC Prediction of Smoothed Sunspot Number

	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	55
	(***)	(***)	(***)	(***)	(***)	(***)	(***)	(***)	(***)	(***)	(***)	(***)
2004	<b>51</b>	<b>47</b>	<b>44</b>	<b>42</b>	<b>38</b>	<b>35</b>	<b>34</b>	<b>32</b>	<b>30</b>	<b>27</b>	<b>25</b>	<b>23</b>
	(1)	(3)	(5)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(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 04



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

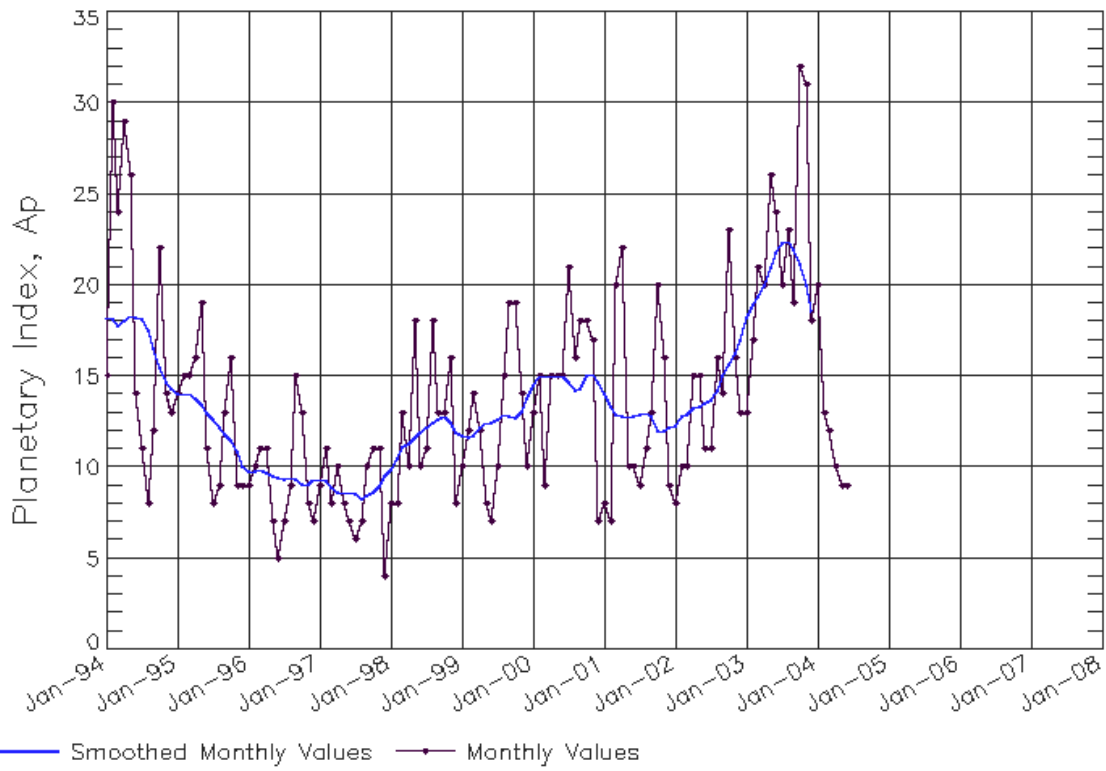
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1998	98 (***)	102 (***)	106 (***)	109 (***)	112 (***)	116 (***)	120 (***)	124 (***)	127 (***)	128 (***)	130 (***)	134 (***)
1999	139 (***)	143 (***)	144 (***)	146 (***)	150 (***)	153 (***)	154 (***)	156 (***)	161 (***)	167 (***)	172 (***)	173 (***)
2000	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 (***)	122 (***)	119 (***)
2004	<b>116</b> (1)	<b>113</b> (3)	<b>110</b> (5)	<b>106</b> (7)	<b>100</b> (9)	<b>96</b> (11)	<b>93</b> (13)	<b>90</b> (15)	<b>87</b> (17)	<b>85</b> (19)	<b>83</b> (21)	<b>81</b> (22)
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 04



Updated 2004 Jul 6

NOAA/SEC Boulder, CO USA

