

Solar activity reached high levels during this reporting period. At the start of the period, very low conditions were observed as Region 713 (S10, L=125, class/area, Fai/190 on 22 December) was nearing the west limb. Only a few small B-class flares were observed from this region and a region that was coming around on the northeast limb. On 28 December, conditions started to increase to low levels as Region 715 (N04, L=339, class/area, Dkc/350, on 30 December) had rotated on the visible disk. Regions 713 and 715 produced a combined total of 11 C-flares. On 29 through 31 December, solar activity reached moderate levels. Regions 713 and 715 produced M-class flares on 29 December. The largest of these was a M2, from Region 715 (a beta-gamma-delta magnetic class), that occurred at 1627Z. This flare had an associated Tenflare (510 sfu), a type II radio sweep with an estimated shock speed of 411 km/s, and a CME that was not earth directed. On 30 December, Region 715 produced several M-flares; the largest of these was a M4/2n flare at 2218Z along with an associated Tenflare (230 sfu), type IV radio sweep, type II radio sweep with an estimated shock speed of 1378 km/s, and a related CME that had a slight earth directed component. On 31 December, Region 715 produced an M1 flare at 1445Z. On 01 January, solar activity reached high levels as Region 715 produced an X1.7 at 0031Z with an associated type IV radio sweep, type II radio sweep with an estimated shock speed of 760 km/s, and a CME that was expected to be geoeffective. Region 715 started a decay phase on 01 January and continued the trend on 02 January as it decreased in both area and magnetic complexity. On 02 January, low conditions were observed as Region 715 (now a beta-gamma magnetic class) was responsible for isolated low C-class and B-class flares.

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 near 450 km/s. At approximately 0600Z on 27 December, Solar wind speed increased to approximately 590 km/s and declined until 1400Z on 28 December. The spike in solar wind was the result of a geoeffective coronal hole high speed stream. Solar wind speed declined to around 450 km/s until 29 December when the effects of a transequatorial coronal hole high speed stream were felt. The solar wind increased to a maximum of 520 km/s just after 0800Z on 30 December. Solar wind speed was in a decline phase thereafter until 01 January when it leveled off at about 420 km/s. Solar wind speed showed another increase on 02 January as it increased to between 700 and 850 km/s and remained there the rest of the day. The reason for this increase was another geoeffective coronal hole high speed stream, possibly combined with a weak transient flow from the late December CME activity.

No greater than 10 MeV proton events were observed this period.

The greater than 2 MeV electron flux at geosynchronous orbit increased to high levels on 29 and 30 December, and on 01 January.

The geomagnetic field ranged from quiet to minor storm levels with isolated severe storm periods at high latitudes. The period began with quiet to unsettled levels on 27 December. Quiet to active levels were experienced on 28 December due to sustained periods of southward Bz around 5nT. On 29 December, quiet to active levels were seen with an isolated minor storm period at mid-latitudes. Increased activity continued into 30 December due to the effects of a transequatorial high speed coronal hole stream. On 31 December, conditions were quiet to unsettled. On 01 January, quiet to active conditions were experienced as geomagnetic activity started to increase due to the onset of a geoeffective coronal hole high speed stream. On 02 January, Quiet to minor storm levels were observed, with severe storm periods at high latitudes, due to the high speed stream, possibly combined with a weak transient flow.



## **Space Weather Outlook**

**05 January 2005 - 31 January 2005**

Solar activity is expected to be very low to low with a chance of M-class activity from Region 715. Region 715 will be departing on 10 January. Expect very low to low conditions after 10 January. Expect very low to low with a chance of M-class activity from old Region 715 again as it rotates back on the visible disk on 23 January.

A greater than 10 MeV proton event is not expected.

The greater than 2 MeV electron flux at geosynchronous orbit is expected to be at high levels on 14-15, 18-19, 25-27, and 30-31 January.

The geomagnetic field is expected to range from mostly quiet to active levels with isolated minor storm periods. High speed coronal hole streams are expected to produce occasional storm periods on 13-14, 17-18, 24-26, and 29-30 January. Otherwise, expect quiet to unsettled conditions.



### *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
27 December	97	11	100	B1.2	0	0	0	2	0	0	0	0
28 December	105	27	230	B2.4	11	0	0	5	1	0	0	0
29 December	99	27	410	B2.8	5	2	0	2	0	0	0	0
30 December	100	34	360	B1.8	6	2	0	6	1	1	0	0
31 December	99	60	250	B1.5	4	1	0	4	0	0	0	0
01 January	99	51	230	B1.3	1	0	1	1	0	0	0	0
02 January	100	52	250	B1.9	2	0	0	0	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
	27 December	5.8E+5	1.4E+4	3.2E+3		7.6E+6
28 December	9.2E+5	1.4E+4	3.0E+3		6.6E+6	
29 December	9.2E+5	1.3E+4	2.8E+3		2.1E+7	
30 December	8.2E+5	1.4E+4	2.9E+3		1.9E+7	
31 December	4.0E+5	1.3E+4	3.2E+3		3.0E+7	
01 January	7.4E+5	1.3E+4	3.1E+3		2.5E+7	
02 January	5.3E+6	1.4E+4	2.9E+3		1.2E+7	

### *Daily Geomagnetic Data*

Date	Middle Latitude Fredericksburg		High Latitude College		Estimated Planetary	
	A	K-indices	A	K-indices	A	K-indices
	27 December	6	1-2-2-1-1-1-3-2	7	1-1-3-0-0-1-3-3	7
28 December	12	2-1-1-2-2-3-4-4	33	2-1-6-5-4-4-4-5	16	3-2-2-3-2-3-4-4
29 December	16	3-3-2-2-4-5-1-2	29	3-4-4-6-5-4-2-1	18	4-4-3-4-4-2-2-2
30 December	12	2-3-4-2-3-3-1-2	30	2-3-4-5-5-6-2-2	15	2-3-4-3-3-4-2-3
31 December	5	2-1-2-2-2-1-1-1	6	1-1-2-3-3-1-1-0	8	3-1-3-2-3-2-1-1
01 January	10	1-3-2-2-2-2-3-3	34	4-5-3-4-5-3-6-3	15	1-4-3-2-3-3-4-3
02 January	20	3-3-3-3-2-4-3-5	64	2-3-7-6-5-7-4-5	33	4-4-5-4-3-5-3-5

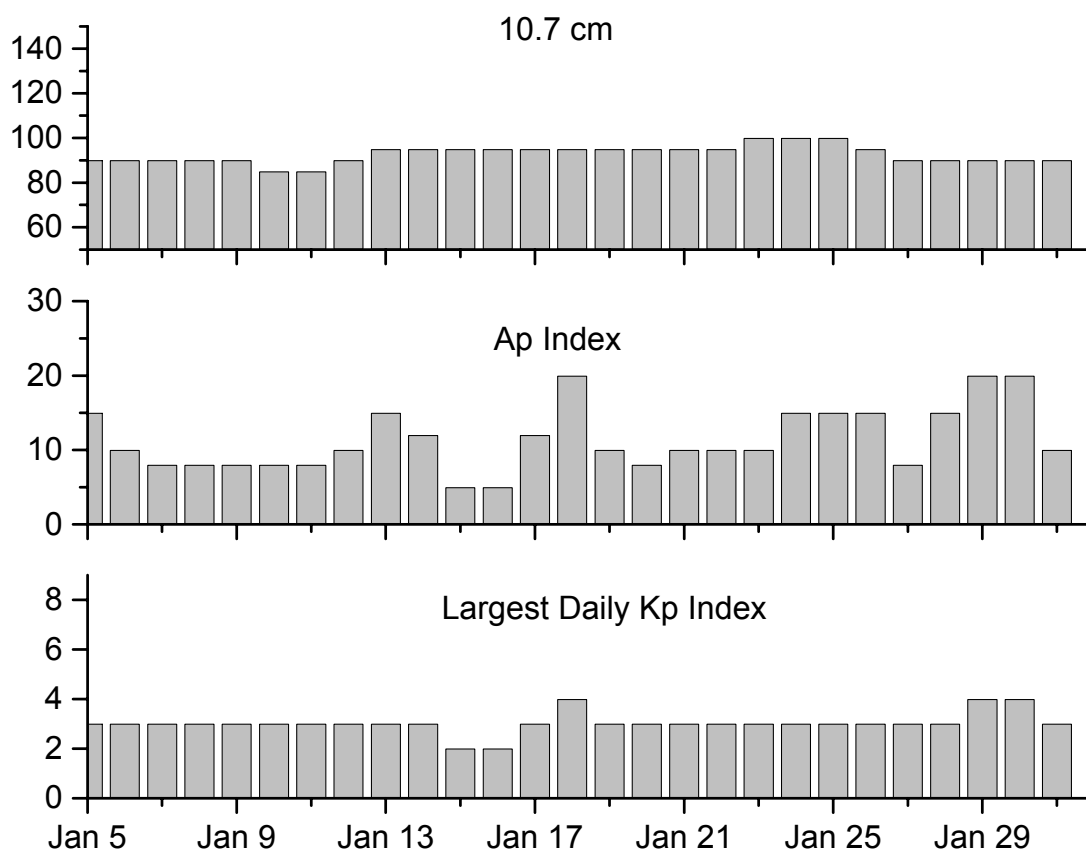


### *Alerts and Warnings Issued*

<u>Date &amp; Time of Issue</u>	<u>Type of Alert or Warning</u>	<u>Date &amp; Time of Event UT</u>
28 Dec 1816	SUMMARY: 10cm Radio Burst	28 Dec 1746
28 Dec 2046	WARNING: Geomagnetic K= 4	28 Dec 2050 - 2359
28 Dec 2053	ALERT: Geomagnetic K-index of 4	28 Dec 2050
28 Dec 2324	EXTENDED WARNING: Geomagnetic K= 4	28 Dec 2050 - 29 Dec 1500
29 Dec 0006	7 – 245 MHz Radio Bursts	28 Dec
29 Dec 1137	WARNING: Geomagnetic K= 5	29 Dec 1140 - 29 Dec 1600
29 Dec 1454	EXTENDED WARNING: Geomagnetic K= 4	28 Dec 2050 - 29 Dec 2359
29 Dec 1500	ALERT: Electron 2MeV Integral Flux > 1000pfu	29 Dec 1440
29 Dec 1737	ALERT: Type II Radio Emission	29 Dec 1626
29 Dec 1742	SUMMARY: 10cm Radio Burst	29 Dec 1620
29 Dec 2354	EXTENDED WARNING: Geomagnetic K= 4	28 Dec 2050 - 30 Dec 1500
30 Dec 0005	1 – 245 MHz Radio Burst	29 Dec
30 Dec 0005	245 MHz Radio Noise Storm	29 Dec
30 Dec 1122	ALERT: Type II Radio Emission	30 Dec 1041
30 Dec 1135	SUMMARY: 10cm Radio Burst	30 Dec 1038
30 Dec 1530	ALERT: Geomagnetic K= 4	30 Dec 1528
30 Dec 1637	ALERT: Electron 2MeV Integral Flux > 1000pfu	30 Dec 1615
30 Dec 2239	SUMMARY: 10cm Radio Burst	30 Dec 2208
30 Dec 2246	ALERT: Type II Radio Emission	30 Dec 2211
30 Dec 2249	ALERT: Type IV Radio Emission	30 Dec 2212
31 Dec 0043	3 – 245 MHz Radio Bursts	30 Dec
01 Jan 0011	6 – 245 MHz Radio Bursts	31 Dec
01 Jan 032	ALERT: X-Ray Flux exceeded M5	01 Jan 0030
01 Jan 043	SUMMARY: X-ray Event exceeded X1	01 Jan 0001
01 Jan 049	ALERT: Type II Radio Emission	01 Jan 0030
01 Jan 053	ALERT: Type IV Radio Emission	01 Jan 0032
01 Jan 104	SUMMARY: 10cm Radio Burst	01 Jan 0027
01 Jan 548	WARNING: Geomagnetic K= 4	01 Jan 0548 -1600
01 Jan 554	ALERT: Geomagnetic K= 4	01 Jan 0550
01 Jan 1727	ALERT: Electron 2MeV Integral Flux > 1000pfu	01 Jan 1705
01 Jan 1816	WARNING: Geomagnetic K= 4	01 Jan 1817 -2359
01 Jan 1837	ALERT: Geomagnetic K= 4	01 Jan 1834
01 Jan 2336	EXTENDED WARNING: Geomagnetic K= 4	01 Jan 1817 -02 Jan 1600
02 Jan 0005	6 – 245 MHz Radio Bursts	01 Jan
02 Jan 158	WARNING: Geomagnetic K = 5	02 Jan 0200 -1600
02 Jan 833	ALERT: Geomagnetic K = 5	02 Jan 0830
02 Jan 1555	EXTENDED WARNING: Geomagnetic K= 4	01 Jan 1817 - 03 Jan 1600
02 Jan 1625	WARNING: Geomagnetic K = 5	02 Jan 1627 - 02 Jan 2359
02 Jan 1632	ALERT: Geomagnetic K = 5	02 Jan 1633
02 Jan 2226	WATCH: Geomagnetic A ≥ 20	03 Jan
02 Jan 2354	EXTENDED WARNING: Geomagnetic K= 5	02 Jan 1627 - 03 Jan 1600



## 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 Jan	90	15	3	19 Jan	95	10	3
06	90	10	3	20	95	8	4
07	90	8	3	21	95	10	3
08	90	8	3	22	95	10	3
09	90	8	3	23	100	10	2
10	85	8	3	24	100	15	2
11	85	8	3	25	100	15	4
12	90	10	3	26	95	15	3
13	95	15	3	27	90	8	3
14	95	12	3	28	90	15	3
15	95	5	2	29	90	20	4
16	95	5	2	30	90	20	4
17	95	12	3	31	90	10	3
18	95	20	4				



### *Energetic Events*

Date	Time			X-ray		Optical Information			Peak		Sweep Freq	
	Begin	Max	1/2 Max	Class	Flux	Imp/ Brtns	Location Lat CMD	Rgn #	Radio Flux		Intensity	
									245	2695	II	IV
29 Dec	1557	1627	1638	M2.3	.018			715	5400	510	1	
29 Dec	1910	1920	1925	M1.4	.007			713				
30 Dec	1034	1047	1057	M2.2	.017	Sf	N03E53	715	1500	230	1	
30 Dec	2202	2218	2228	M4.2	.036	2n	N03E48	715	440	230	1	1
31 Dec	1438	1445	1448	M1.2	.003			715	210	36		
01 Jan	0001	0031	0039	X1.7	.092			715	8700	760	2	2

### *Flare List*

Date	Time			X-ray Class.	Imp / Brtns	Optical Location Lat CMD	Rgn
	Begin	Max	End				
27 December	0432	0439	0446	B3.4			
	1509	1513	1516	B1.5			713
	1653	1656	1658	B1.9			714
	1840	1843	1845	B2.4			715
	1918	1921	1924	B2.2			715
	1952	2000	2005	B2.7			715
	2058	2102	2107	B3.7			713
	2239	2242	2249	B4.7	Sf	S11W82	713
28 December	2317	2318	2321		Sf	S11W82	713
	0009	0011	0016	C7.2	1f	S11W83	713
	0119	0131	0133	B9.8			713
	0153	0244	0255	B7.2			
	0417	0421	0428	B4.6			713
	0453	0503	0507	B3.2			713
	0600	0609	0613	C2.3			713
	0630	0631	0633	C2.4	Sf	S10W64	713
	0829	0832	0837	B4.0			713
	0901	0906	0910	C1.1			713
	0915	0922	0926	C3.5	Sf	S12W75	713
	0931	0932	0934		Sf	S11W77	713
	1043	1051	1057	C1.1			713
	1122	1138	1141	B9.0			713
	1228	1235	1240	C4.3			713
	1330	1334	1336	B5.2			713
	1359	1410	1413	B8.8			713
1438	1443	1450	B3.7			713	
1545	1555	1600	C4.1			713	
1638	1645	1653	B4.7			715	
1747	1747	1750	C7.2	Sf	N05E77	715	
2025	2029	2032	C1.9			715	
2056	2057	2106	C3.5	Sf	S12W80	713	
29 December	0214	0222	0236	C1.3			713
	0258	0258	0303	C7.5	Sf	S09W90	713



*Flare List - continued.*

Date	Time			X-ray Class.	Optical		Rgn
	Begin	Max	End		Imp / Brtns	Location Lat CMD	
29 December	0441	0500	0504	B6.1			713
	0542	0553	0558	C4.9			713
	0734	0824	0935	C2.6			713
	1302	1305	1307	B6.7			713
	1325	1338	1350	C2.5			713
	1434	1438	1440	B6.3			713
	1557	1627	1638	M2.3			715
	1910	1920	1925	M1.4			713
	2052	2056	2100	B9.5			713
	2159	2159	2206		Sf	N01E57	715
2334	2338	2341	B4.0			713	
30 December	0010	0013	0016	B3.5			713
	0316	0320	0323	B2.5			
	0338	0346	0356	B5.1			713
	B0430	0433	0443	B6.0	1f	N03E59	715
	B0622	0630	0635	C2.5	Sf	N04E60	715
	B0640	0649	0652		Sf	N04E60	
	0738	0742	0744	C1.6			715
	0819	0843	0849	B6.5			715
	1010	1017	1019	C1.3			715
	1041	1043	1059	M2.2	Sf	N03E53	715
	1214	1217	1219	C2.6			715
	B1316	U1318	1320	C1.0	Sf	N07E51	715
	1507	1511	1513	B5.8			715
	1658	1702	1705	B5.1			715
	1818	1821	1823	B3.8			715
	2130	2136	2138	B2.8			715
	2145	2149	2159	C4.1	Sf	N02E50	715
	2205	2217	2257	M4.2	2n	N03E48	715
B2334	2339	2341		Sf	N04E49		
31 December	0029	0043	0054	C1.2			
	0033	0036	0040	C1.2	Sf	N03E47	715
	0417	0429	0524	C5.7	Sf	N05E45	715
	0625	0629	0706		Sf	N01E46	715
	1210	1224	1231	B7.2			715
	1438	1445	1448	M1.2			715
	1450	U1452	1539	C6.8	Sf	N02E40	715
	2222	2226	2231	B2.0			
	2245	2253	2256	B2.7			715
	01 January	0001	0031	0039	X1.7		
0927		0939	0945	B7.8			715
1408		1424	1432	C1.2			715
1538		1544	1553	B6.2			715



**Flare List- continued.**

Date	Time			X-ray Class.	Imp / Brtns	Optical Location Lat CMD	Rgn
	Begin	Max	End				
01 January	1844	1845	1848		Sf	N07W69	717
	1918	1922	1927	B2.5			
	2358	0002	0005	B3.2			
02 January	0101	0106	0113	B4.0			715
	0241	0252	0306	B6.5			715
	0421	0505	0529	C2.3			
	1256	1306	1311	C1.2			715
	1601	1608	1616	B5.2			717

**Region Summary**

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 712*

17 Dec	S10E50	148	0020	06	Dso	004	B											
18 Dec	S10E37	148	0030	05	Cso	005	B											
19 Dec	S11E24	147	0010	04	Bxo	002	B											
20 Dec	S11E11	147																
21 Dec	S11W02	147																
22 Dec	S11W15	147																
23 Dec	S11W28	147																
24 Dec	S11W41	147																
25 Dec	S11W54	147																
26 Dec	S11W67	147																
27 Dec	S11W80	147																
28 Dec	S11W93	147									2							
											2	0	0	0	0	0	0	0

Crossed West Limb.

Absolute heliographic longitude:147





**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 713</i>																		
17 Dec	S10E70	128	0070	03	Hax	001	A											
18 Dec	S10E59	126	0100	07	Dao	004	B											
19 Dec	S10E46	125	0120	10	Cso	007	B	1										
20 Dec	S09E34	124	0210	11	Eai	020	Bg											
21 Dec	S08E22	123	0210	11	Eai	015	Bg											
22 Dec	S10E07	125	0190	16	Fai	025	Bg	2			2							
23 Dec	S08W06	125	0210	10	Dao	021	Bg	2										
24 Dec	S08W21	126	0190	12	Eai	020	B											
25 Dec	S09W36	128	0100	07	Dsi	005	B											
26 Dec	S08W47	126	0090	04	Cso	006	B											
27 Dec	S09W65	131	0100	03	Hax	001	A				2							
28 Dec	S09W78	131	0150	07	Cso	005	B	9			4	1						
29 Dec	S09W91	131	0150	12	Eai	004	B	5	1		1							
								19	1	0	9	1	0	0	0			

Crossed West Limb.

Absolute heliographic longitude:125

<i>Region 714</i>																		
22 Dec	S04W01	133	0010	03	Cao	002	B											
23 Dec	S03W16	135	0020	04	Bxo	006	B											
24 Dec	S03W30	135	0020	05	Cro	002	B											
25 Dec	S03W40	132	0000	01	Axx	001	A											
26 Dec	S03W53	132																
27 Dec	S03W66	132																
28 Dec	S03W79	132																
29 Dec	S03W92	132																
											0	0	0	0	0	0	0	0

Crossed West Limb.

Absolute heliographic longitude:133

<i>Region 715</i>																		
28 Dec	N04E74	339	0080	05	Dao	002	B	2			1							
29 Dec	N04E61	339	0260	08	Dko	003	Bgd		1		1							
30 Dec	N04E47	339	0350	05	Dkc	012	Bgd	6	2		4	1	1					
31 Dec	N04E34	339	0220	06	Dac	022	Bgd	3	1		4							
01 Jan	N05E21	339	0180	05	Dac	016	Bg	1		1								
02 Jan	N05E08	339	0130	07	Dsi	017	Bg	1										
								13	4	1	10	1	1	0	0			

Still on Disk.

Absolute heliographic longitude:339



***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 716</i>																						
30 Dec	S16E52	334	0010	04	Bxo	002	B															
31 Dec	S14E37	336	0020	03	Cao	005	B															
01 Jan	S14E24	336	0020	01	Dso	001	B															
02 Jan	S13E11	336	0010	03	Cso	002	B															
																					0 0 0 0 0 0 0 0	
Still on Disk.																						
Absolute heliographic longitude:336																						
<i>Region 717</i>																						
31 Dec	N07W56	069	0010	03	Cao	003	B															
01 Jan	N07W73	073	0030	03	Cao	004	B															
02 Jan	N08W86	073	0110	04	Dso	003	B															
																						0 0 0 1 0 0 0 0
Still on Disk.																						
Absolute heliographic longitude: 069																						

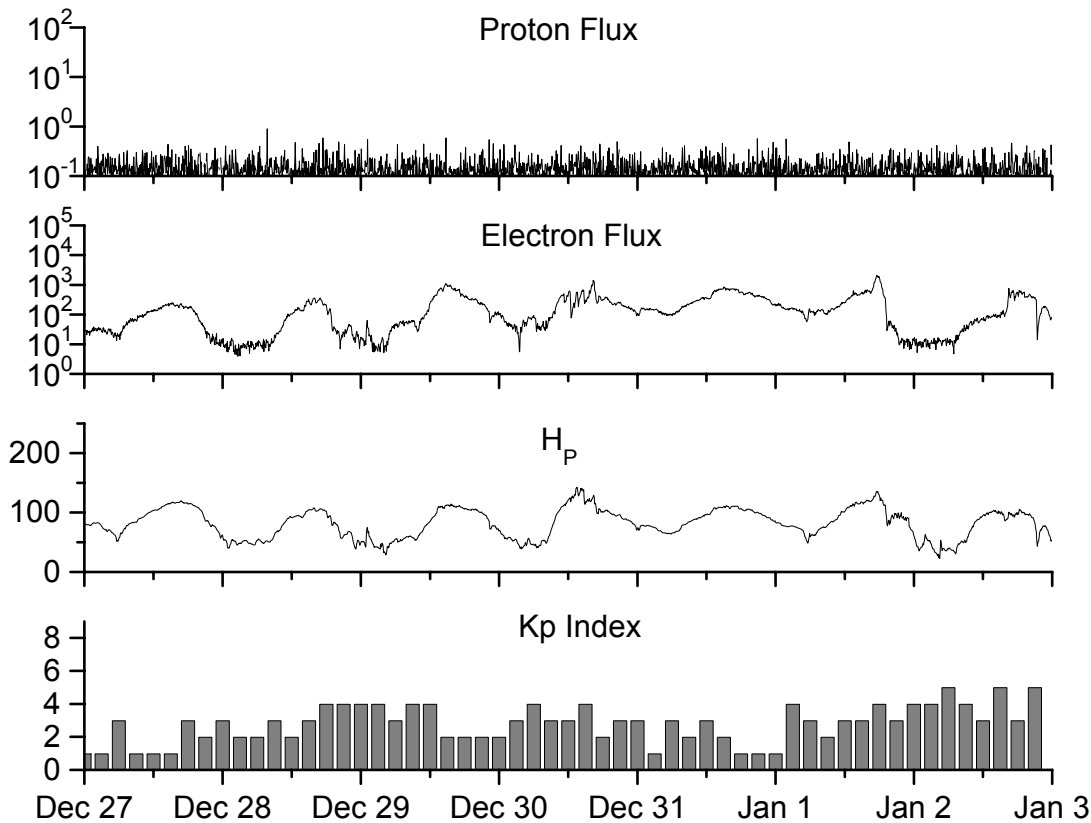


**Recent Solar Indices (preliminary)  
of the observed monthly mean values**

Month	Sunspot Numbers			Radio Flux		Geomagnetic			
	Observed SWO	values RI	Ratio RI/SWO	Smooth SWO	values RI	*Penticton 10.7 cm	Smooth Value	Planetary Ap	Smooth Value
<b>2002</b>									
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	135.0	20	20.1
May	89.6	55.2	0.62	118.3	67.8	129.3	133.1	26	21.0
June	118.4	77.4	0.65	113.6	65.2	129.4	130.2	24	21.5
July	132.8	85.0	0.64	106.9	62.0	127.8	127.2	19	22.0
August	114.3	72.7	0.64	102.8	60.3	122.1	125.2	23	22.2
September	82.6	48.8	0.59	100.7	59.8	112.3	123.7	18	21.8
October	118.9	65.5	0.55	96.6	58.4	153.1	121.8	35	21.1
November	118.9	67.3	0.57	93.6	57.0	153.1	120.1	28	20.0
December	75.4	46.5	0.62	91.4	55.0	115.1	118.0	16	18.6
<b>2004</b>									
January	62.3	37.7	0.61	87.9	52.0	114.1	116.3	22	18.1
February	75.6	45.8	0.61	84.2	49.4	107.0	115.5	13	17.7
March	81.0	49.1	0.61	80.9	47.2	112.2	114.6	14	16.9
April	59.3	39.3	0.66	77.9	45.6	101.2	112.3	11	15.5
May	77.3	41.5	0.54			99.8		8	
June	78.9	43.2	0.55			97.4		8	
July	87.8	51.0	0.58			118.5		23	
August	69.5	40.9	0.59			110.1		11	
September	50.0	27.7	0.55			103.1		10	
October	77.9	48.4	0.62			167.0		9	
November	70.5	43.7	0.62			113.2		26	

**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 27 December 2004*

*Protons* plot contains the five-minute averaged integral proton flux (protons/cm<sup>2</sup>-sec -sr) as measured by GOES-11 (W103) for each of three energy thresholds: greater than 10, 50, and 100 MeV.

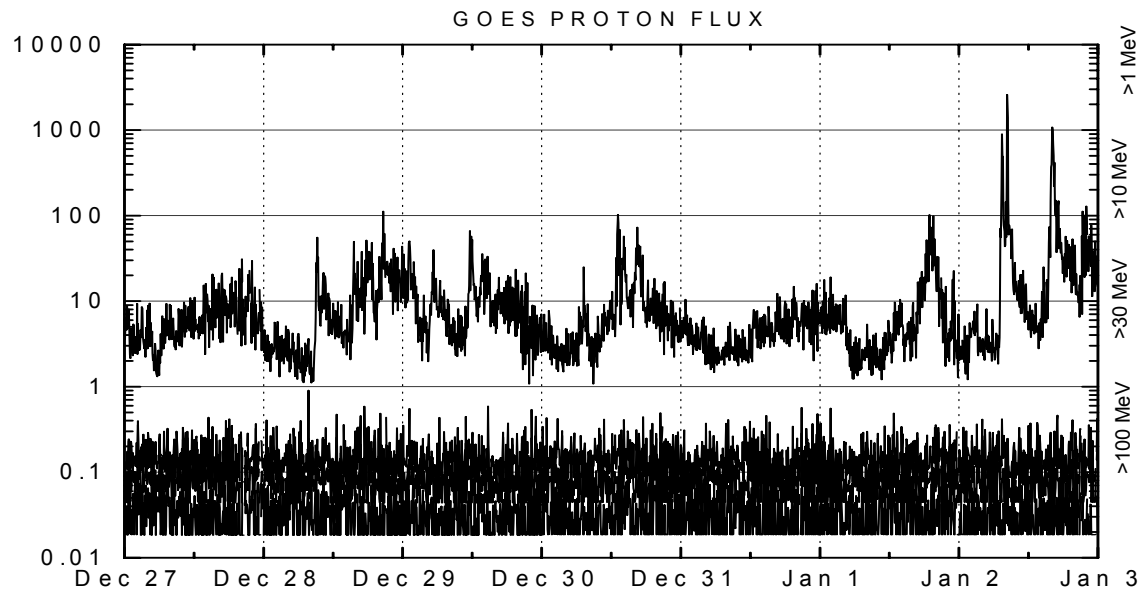
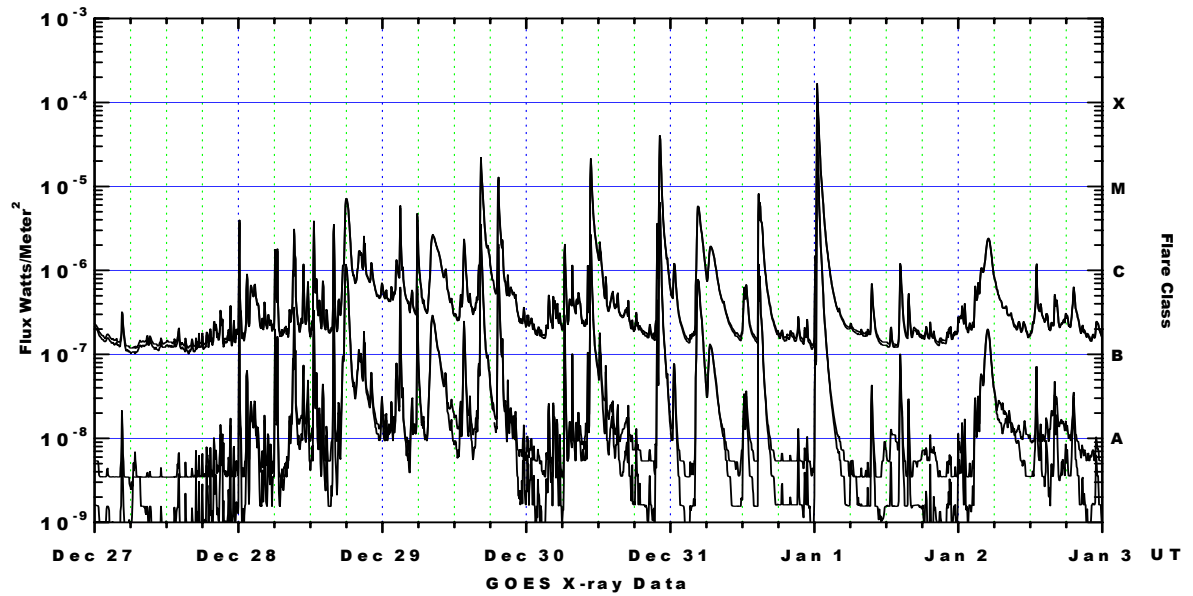
*Electrons* plot contains the five-minute averaged integral electron flux (electrons/cm<sup>2</sup>-sec -sr) with energies greater than 2 MeV at GOES-12 (W75).

*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 Hartland, UK. These data are made available through cooperation from the Geological Survey of Canada (GSC), British Geological Survey (BGS) 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>parallel</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*

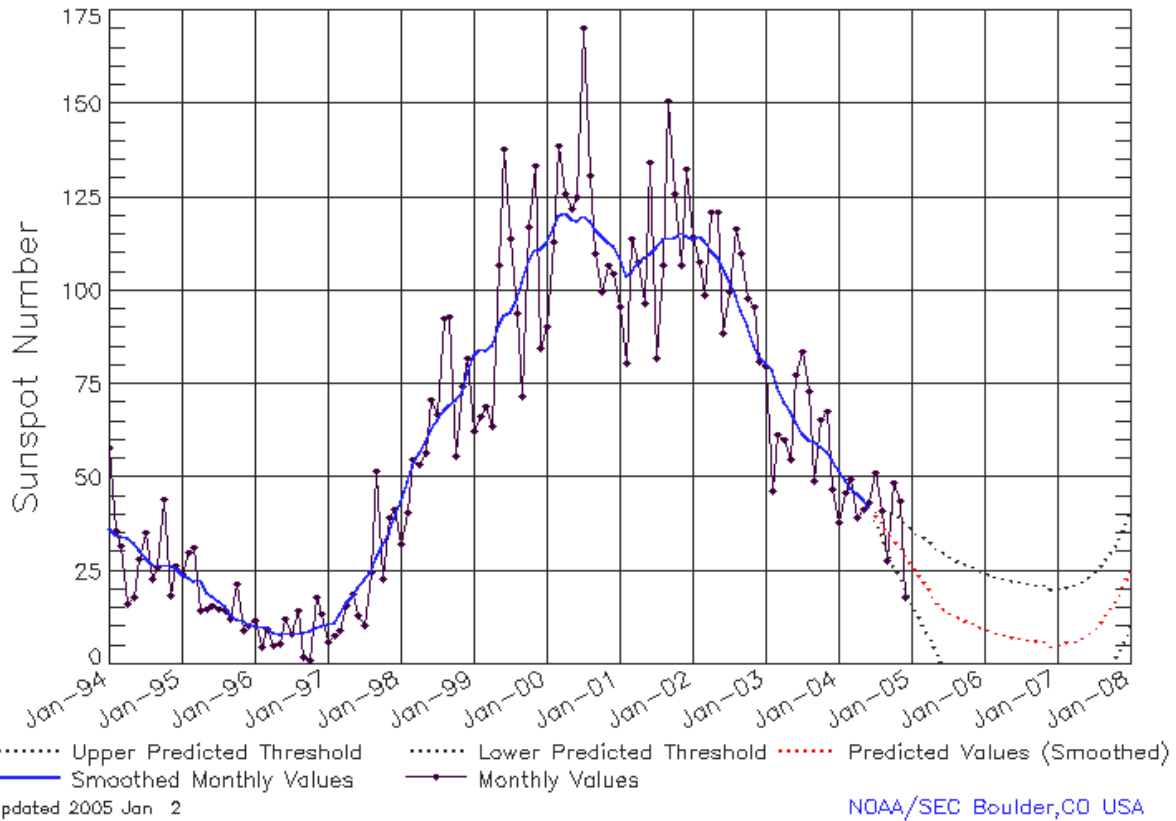
X-ray plot contains five-minute averaged x-ray flux (watts/m<sup>2</sup>) as measured by GOES 12 (W75) and GOES 10 (W135) in two wavelength bands, .05 - .4 and .1 - .8 nm. The letters A, B, C, M and X refer to x-ray event levels for the .1 - .8 nm band.

Proton plot contains the five-minute averaged integral proton flux (protons/cm<sup>2</sup>-sec-sr) as measured by GOES-11 (W103) 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 31 Dec 04



Updated 2005 Jan 2

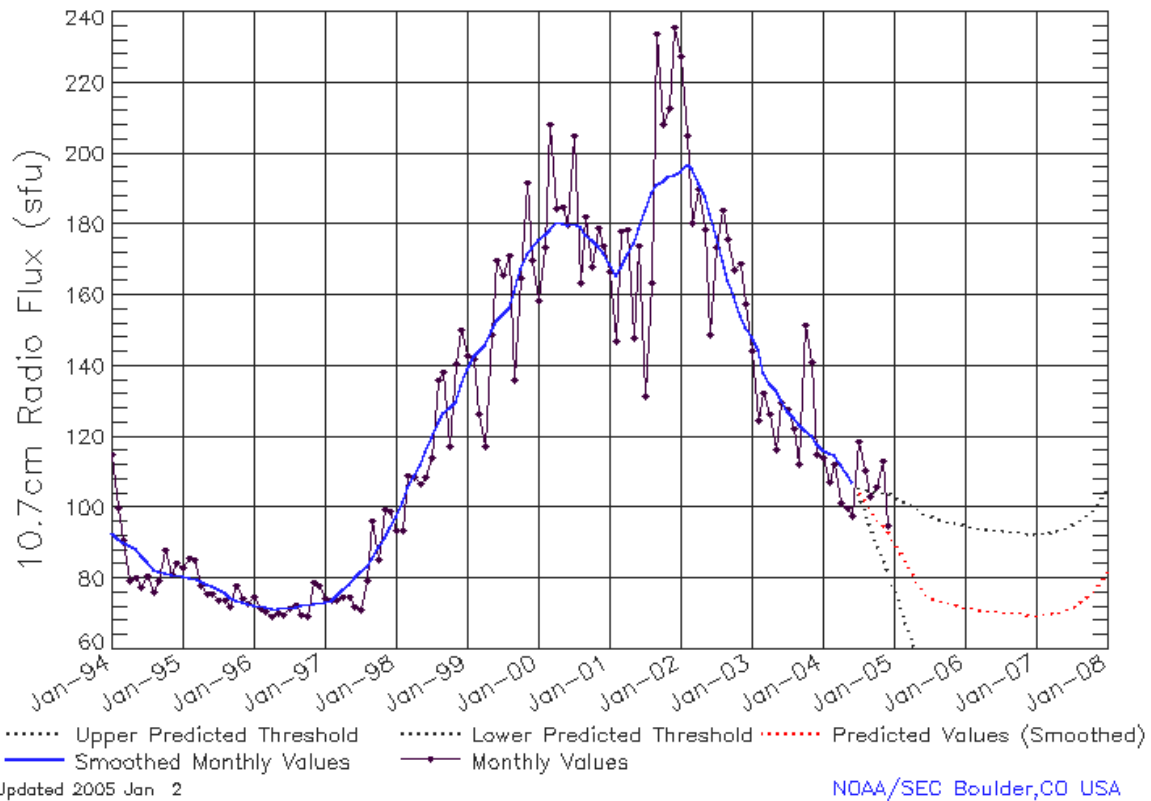
## SEC Prediction of Smoothed Sunspot Number

	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 (***)	98 (***)	102 (***)	108 (***)	111 (***)	111 (***)
2000	113 (***)	117 (***)	120 (***)	121 (***)	119 (***)	119 (***)	120 (***)	119 (***)	116 (***)	115 (***)	113 (***)	112 (***)
2001	109 (***)	104 (***)	105 (***)	108 (***)	109 (***)	110 (***)	112 (***)	114 (***)	114 (***)	114 (***)	116 (***)	115 (***)
2002	114 (***)	115 (***)	113 (***)	111 (***)	109 (***)	106 (***)	103 (***)	99 (***)	95 (***)	91 (***)	85 (***)	82 (***)
2003	81 (***)	79 (***)	74 (***)	70 (***)	68 (***)	65 (***)	62 (***)	60 (***)	60 (***)	58 (***)	57 (***)	55 (***)
2004	52 (***)	49 (***)	47 (***)	46 (***)	44 (***)	42 (***)	<b>40</b> (1)	<b>38</b> (3)	<b>36</b> (5)	<b>34</b> (7)	<b>32</b> (8)	<b>29</b> (9)
2005	<b>27</b> (10)	<b>24</b> (11)	<b>22</b> (12)	<b>20</b> (13)	<b>17</b> (14)	<b>15</b> (15)	<b>14</b> (15)	<b>13</b> (15)	<b>12</b> (15)	<b>12</b> (15)	<b>11</b> (15)	<b>10</b> (15)
2006	<b>10</b> (15)	<b>9</b> (15)	<b>8</b> (15)	<b>8</b> (15)	<b>8</b> (15)	<b>7</b> (15)	<b>7</b> (15)	<b>7</b> (15)	<b>7</b> (15)	<b>6</b> (15)	<b>6</b> (15)	<b>5</b> (15)
2007	<b>5</b> (15)	<b>6</b> (15)	<b>6</b> (15)	<b>6</b> (15)	<b>7</b> (15)	<b>8</b> (15)	<b>10</b> (15)	<b>11</b> (15)	<b>13</b> (15)	<b>16</b> (15)	<b>18</b> (15)	<b>21</b> (15)



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

Data Through 31 Dec 04



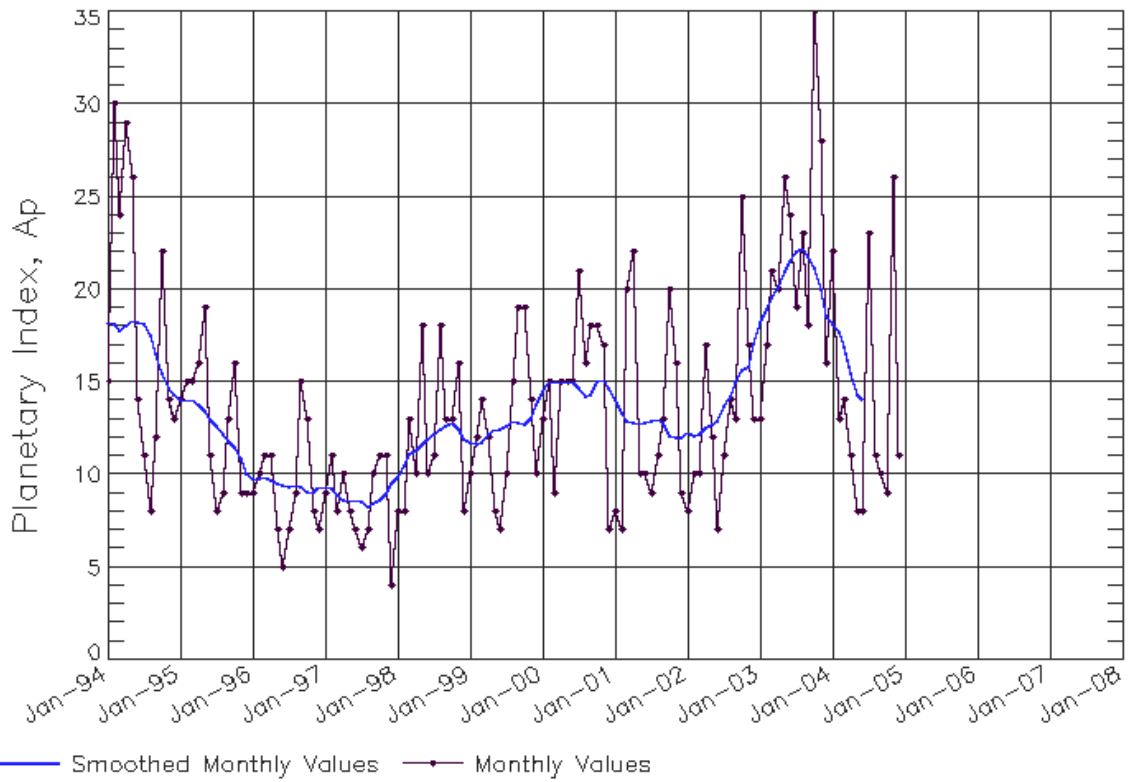
### SEC Prediction of Smoothed F10.7cm Radio Flux

	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	176	177	178	181	180	180	180	179	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	154	151
	(**)	(**)	(**)	(**)	(**)	(**)	(**)	(**)	(**)	(**)	(**)	(**)
2003	148	145	138	135	133	130	127	125	124	122	120	118
	(**)	(**)	(**)	(**)	(**)	(**)	(**)	(**)	(**)	(**)	(**)	(**)
2004	116	116	115	112	109	107	<b>105</b>	<b>102</b>	<b>100</b>	<b>97</b>	<b>95</b>	<b>93</b>
	(**)	(**)	(**)	(**)	(**)	(**)	(1)	(3)	(5)	(7)	(9)	(11)
2005	<b>91</b>	<b>87</b>	<b>85</b>	<b>82</b>	<b>79</b>	<b>76</b>	<b>75</b>	<b>74</b>	<b>74</b>	<b>73</b>	<b>73</b>	<b>73</b>
	(13)	(15)	(17)	(19)	(21)	(22)	(23)	(23)	(23)	(23)	(23)	(23)
2006	<b>72</b>	<b>72</b>	<b>71</b>	<b>71</b>	<b>71</b>	<b>71</b>	<b>71</b>	<b>71</b>	<b>70</b>	<b>70</b>	<b>70</b>	<b>70</b>
	(23)	(23)	(23)	(23)	(23)	(23)	(23)	(23)	(23)	(23)	(23)	(23)
2007	<b>70</b>	<b>70</b>	<b>70</b>	<b>70</b>	<b>71</b>	<b>71</b>	<b>72</b>	<b>73</b>	<b>74</b>	<b>76</b>	<b>77</b>	<b>79</b>
	(23)	(23)	(23)	(23)	(23)	(23)	(23)	(23)	(23)	(23)	(23)	(23)



# ISES Solar Cycle Ap Progression

Data Through 31 Dec 04



Updated 2005 Jan 2

NOAA/SEC Boulder, CO USA

