Space Weather Highlights **SWO PRF 1424**
09 - 15 December 2002 **17 December 2002**

Solar activity was at low to moderate levels. Moderate levels were observed on 10 December due to an optically uncorrelated M1 flare at 10/1226 UTC. Early in the period Region 220 (S12, L=186, class/area Dai/310 on 10 December) developed a beta-gamma magnetic configuration and was the source of minor C-class flaring. During the latter half of the summary period, seven new regions appeared on the visible disk. Region 224 (S18, L=116, class/area Eai/290 on 14 December) is the most magnetically complex of the new regions, developing a beta-gamma configuration on 14 December. Region 226 (S28, L=127, class/area Eki/290 on 15 December) was the most active of the new regions and exhibited rapid growth in area coverage. Region 226 produced over twenty optical sub-flares and seven minor C-class flares in the first three days it was on the disk. Region 229 (N17, L=101, class/area Dki/400 on 15 December) was the largest spot group on the disk, but has produced only a couple of minor C-class flares and sub-flares.

Solar wind data were available from the NASA Advanced Composition Explorer (ACE) spacecraft for most of the summary period. Solar wind velocity was below 500 km/s for most of the summary period. On 14 December, solar wind velocities increased with peak velocities near 600 km/s and have remained elevated through the end of the period. The Bz component of the interplanetary magnetic field was, on average, positive during the entire period.

The greater than 10 MeV protons at geo-synchronous orbit were at background levels during the summary period.

The greater than 2 MeV electron flux at geo-synchronous orbit reached moderate levels on 10 - 14 December.

The geomagnetic field was at quiet to unsettled levels during the summary period. Brief periods of active conditions were observed at the higher latitudes on 14-15 December.

Space Weather Outlook
18 December - 13 January 2003

Solar activity is expected to be low to moderate. M-class activity is possible during the first half of the period from Regions 224, 226, and 229. These regions are also due to return to the visible disk late in the period resulting in M-class potential after 08 January.

There is a slight chance of a greater than 10 MeV proton event during the forecast period.

The greater than 2 MeV electron flux at geo-synchronous orbit is expected to reach event threshold on 21-22 December and again on 28 - 29 December due to recurring coronal holes.

The geomagnetic field is expected to be at quiet to active levels during the forecast period. A positive polarity coronal hole is due to return to a geo-effective position on 18-19 December and is expected to result in active to isolated minor storm conditions. A weaker recurring coronal hole is expected to return on 25-28 December resulting in unsettled to isolated active conditions.

Daily Solar Data

Date	Radio Flux 10.7 cm	Sun spot No.	Sunspot Area (10^{-6} hemi.)	X-ray Background	Flares: X-ray Flux C	M	X	Flares: Optical S	1	2	3	4
09 December	156	189	750	B7.7	5	0	0	1	0	0	0	0
10 December	161	142	580	C1.0	5	1	0	5	0	0	0	0
11 December	152	171	500	B9.1	4	0	0	0	0	0	0	0
12 December	153	129	430	B9.4	3	0	0	1	0	0	0	0
13 December	167	176	810	B9.7	9	0	0	13	0	0	0	0
14 December	186	214	1260	C1.1	6	0	0	21	1	0	0	0
15 December	203	217	1350	C1.1	12	0	0	9	0	0	0	0

Daily Particle Data

Date	Proton Fluence (protons/cm^2-day-sr) >1MeV	>10MeV	>100MeV	Electron Fluence (electrons/cm^2-day-sr) > 6MeV	>2MeV	>4MeV
09 December	1.0E+5	1.1E+4	2.3E+3		2.8E+6	
10 December	1.2E+5	1.1E+4	2.5E+3		3.9E+6	
11 December	1.7E+5	1.3E+4	2.5E+3		5.2E+6	
12 December	3.1E+5	1.3E+4	2.7E+3		4.6E+6	
13 December	5.7E+5	1.2E+4	2.6E+3		5.6E+6	
14 December	1.1E+6	1.3E+4	2.4E+3		3.0E+6	
15 December	1.1E+6	1.3E+4	2.3E+3		6.7E+5	

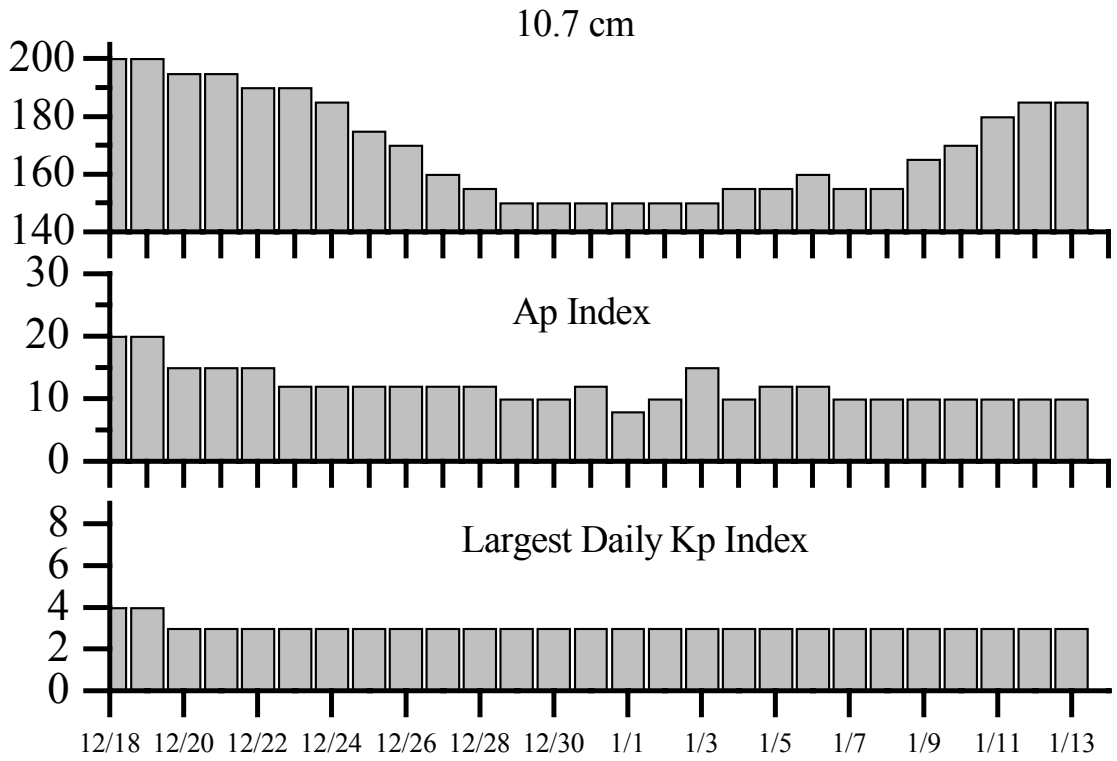
Daily Geomagnetic Data

Date	Middle Latitude Fredericksburg A	K-indices	High Latitude College A	K-indices	Estimated Planetary A	K-indices
09 December	3	2-0-0-0-1-2-1-1	4	2-0-0-1-2-2-1-1	8	3-2-1-2-2-3-2-2
10 December	4	2-1-1-1-0-1-2-1	3	1-1-0-2-0-1-1-1	7	2-2-1-2-2-3-2-2
11 December	5	0-1-2-1-3-1-2-1	1	0-0-1-1-0-1-0-0	6	2-2-1-2-2-3-2-2
12 December	6	1-2-1-2-2-2-2-2	1	0-0-0-1-0-1-0-0	7	2-2-1-2-2-3-2-2
13 December	2	1-1-0-0-1-1-1-1	1	1-0-0-0-0-1-0-0	7	2-2-1-2-2-3-2-2
14 December	9	1-1-1-2-2-3-3-3	14	1-1-1-4-3-4-4-2	11	2-2-2-2-3-3-3-3
15 December	5	3-1-1-1-2-1-1-0	9	2-2-2-2-4-2-1-1	9	3-2-2-2-3-3-3-2

Alerts and Warnings Issued

Date & Time of Issue	Type of Alert or Warning	Date & Time of Event UT
09 Dec 0017	1 - 245 MHz Radio Burst	08 Dec
10 Dec 0011	1 - 245 MHz Radio Burst	09 Dec
11 Dec 0012	3 - 245 MHz Radio Bursts	10 Dec
12 Dec 0006	5 - 245 MHz Radio Bursts	11 Dec
13 Dec 0007	4 - 245 MHz Radio Bursts	12 Dec

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
18 Dec	200	20	4	01 Jan	150	8	3
19	200	20	4	02	150	10	3
20	195	15	3	03	150	15	3
21	195	15	3	04	155	10	3
22	190	15	3	05	155	12	3
23	190	12	3	06	160	12	3
24	185	12	3	07	155	10	3
25 Dec	175	12	3	08	155	10	3
26	170	12	3	09	165	10	3
27	160	12	3	10	170	10	3
28	155	12	3	11	180	10	3
29	150	10	3	12	185	10	3
30	150	10	3	13	185	10	3
31	150	12	3				

Energetic Events

Date	Time			X-ray		Optical Information			Peak Radio Flux		Sweep Freq Intensity	
	Begin	Max	½ Max	Class	Integ Flux	Imp/ Brtns	Location Lat CMD	Rgn #	245	2695	II	IV
10 Dec	1219	1226	1231	M1.1	.005					73		

Flare List

Date	Time Begin	Time Max	Time End	X-ray Class.	Optical Imp / Brtns	Optical Location Lat CMD	Rgn
09 December	0402	0404	0429	Sf	S08W13	219	
	0627	0632	0636	C1.5			
	1212	1217	1302	C1.1			
	1708	1713	1736	C1.9			
	1955	2000	2006	C2.4			
	2134	2137	2141	C4.1			
10 December	0126	0130	0139	C5.5	Sf	S11E47	220
	0354	0356	0405	C2.9	Sf	S11E46	220
	0453	0500	0524		Sf	S18E54	218
	0518	0518	0523		Sf	N15W05	213
	1057	1102	1108	C2.1			
	1219	1226	1231	M1.1			
	1715	1722	1727	C2.1			
	B1934	U1934	A2015	C2.6	Sf	S11E36	220
11 December	0600	0607	0614	C2.1			
	1402	1410	1419	C7.1			
	1655	1706	1715	C1.9			
	1941	1955	2002	C2.3			
12 December	0802	0817	0832	C4.2			
	1121	1143	1223	C5.8			
	1233	1239	1242	C8.3			
	B1844	1857	1911		Sf	N24E74	223
13 December	0106	0106	0135	C3.0	Sf	S12E08	220
	0436	0442	0447	C1.5	Sf	N23E66	223
	0659	0702	0714		Sf	N24E66	223
	0834	0835	0842	C3.4	Sf	S16E63	224
	0920	0936	0944	C1.9			
	1013	1021	1030	C2.4			
	1325	1332	1338	C8.0			
	1527	1532	1537	C1.6			
	1710	1725	1738	C6.8			
	1904	1905	1911		Sf	S29E57	226
	1906	1909	1911		Sf	S17E63	224
	1924	1925	1946		Sf	S28E57	226
	B1958	2009	A2014		Sf	S29E56	226
	2033	2055	2105		Sf	S28E56	226

Flare List - continued.

Date	Time Begin	Time Max	Time End	X-ray Class.	Optical Imp / Brtns	Optical Location Lat CMD	Rgn
13 December	2210	2233	2234		Sf	S28E53	226
	2236	2237	2242		Sf	S29E53	226
	2247	2255	2300	C1.7	Sf	S28E55	226
	2325	2325	2329		Sf	S29E53	226
14 December	0245	0246	0257		Sf	N15E59	225
	0247	0247	0250		Sf	S29E49	226
	0258	0301	0303		Sf	S29E51	226
	0428	0435	0440	C1.9	Sf	S28E48	226
	0513	0513	0516		Sf	S16E56	224
	0640	0648	0652	C1.1	Sf	S12W09	220
	0816	0838	0858	C3.9	1f	S29E48	226
	0859	0918	0934		Sf	S29E49	226
	1158	1201	1203	C2.0			
	1444	1458	1504	C2.9	Sf	S28E45	226
	1459	1502	1508		Sf	N16E69	225
	B1510	U1510	1516		Sf	N24E48	223
	B1526	U1526	1533		Sf	S29E46	226
	B1823	U1823	1827		Sf	N17E54	225
	2032	2034	2058	C2.1	Sf	S28E43	226
	2037	2040	2043		Sf	N21E67	229
	2105	2105	2109		Sf	S29E44	226
	2150	2150	2155		Sf	S29E43	226
	2206	2208	2212		Sf	N21E66	229
	2213	2221	2224		Sf	N20E66	229
	2220	2221	2235		Sf	S15E62	228
	2222	2232	2247		Sf	N16E65	229
	2356	2357	0002		Sf	N23E43	223
15 December	0028	0029	0033	C2.1	Sf	N18E63	229
	0129	0131	0133		Sf	S29E39	226
	0140	0145	0205		Sf	S29E39	226
	0406	0410	0413	C2.5			
	0425	0425	0432	C1.8	Sf	S29E38	226
	0626	0626	0638	C2.0	Sf	N17E62	229
	0643	0648	0652		Sf	N18E60	229
	0802	0803	0808	C2.0	Sf	S28E33	226
	1020	1021	A1027	C2.8	Sf	S27E31	226
	1022	1023	A1027		Sf	N17E46	225
	1125	1136	1144	C3.1			
15 December	1546	1553	1608	C4.3			
	1801	1804	1807	C5.9			
	2007	2011	2016	C2.5			
	2109	2118	2131	C2.6			
	2231	2236	2240	C3.1			

Region Summary

Date	Location (° Lat ° CMD)	Helio Lon	Sunspot Characteristics: Area (10^{-6} hemi)	Extent (helio)	Spot Class	Spot Count	Mag Class	Flares: X-ray C	M	X	Optical S	1	2	3	4
	Region 205														
27 Nov	N19E63	327	0050	01	Hsx	001	A								
28 Nov	N19E49	328	0040	01	Hsx	001	A								
29 Nov	N19E36	328	0050	02	Hsx	001	A								
30 Nov	N19E23	328	0020	01	Hsx	001	A								
01 Dec	N19E10	328	0020	01	Hsx	001	A								
02 Dec	N19W03	327	0000	01	Axx	001	A								
03 Dec	N20W16	327	0020	03	Cso	005	B								
04 Dec	N20W29	327	0020	04	Cro	005	B								
05 Dec	N20W41	326	0010	03	Cro	004	B								
06 Dec	N20W54	326													
07 Dec	N20W67	326													
08 Dec	N18W78	323	0070	06	Hsx	002	A								
09 Dec	N20W88	320	0120	04	Cao	002	B								
								0	0	0	0	0	0	0	0
Crossed West Limb.															
Absolute heliographic longitude: 327															
	Region 207														
27 Nov	S19E69	321	0220	09	Dao	004	B	1			7				
28 Nov	S19E59	318	0430	11	Eko	009	B	2			3				
29 Nov	S19E44	320	0430	12	Eao	014	B				1				
30 Nov	S19E31	320	0290	11	Eai	019	B								
01 Dec	S19E20	318	0230	13	Eai	020	B								
02 Dec	S20E06	318	0290	13	Eao	020	B	1			1				
03 Dec	S19W06	317	0240	13	Eao	018	B				2				
04 Dec	S19W21	319	0210	13	Eao	015	B				1				
05 Dec	S20W34	319	0170	14	Eso	010	B								
06 Dec	S20W50	322	0140	12	Eso	005	B								
07 Dec	S18W67	325	0060	01	Hsx	001	A								
08 Dec	S17W81	326	0090	02	Hax	001	A								
09 Dec	S17W94	326	0050	02	Hsx	001	A								
								4	0	0	15	0	0	0	0
Crossed West Limb.															
Absolute heliographic longitude: 318															

Region Summary - continued.

Date	Location (° Lat ° CMD)	Helio Lon	Sunspot Characteristics Area (10^{-6} hemi)	Extent (helio)	Spot Class	Spot Count	Mag Class	Flares X-ray C	M	X	Optical S	1	2	3	4
			Region 208												
29 Nov	N09E75	289	0100	10	Dso	006	B								
30 Nov	N10E63	288	0210	07	Dao	012	B								
01 Dec	N10E49	289	0140	09	Dso	016	B	2			2				
02 Dec	N10E35	289	0170	10	Dai	022	Bg	2			1	1			
03 Dec	N11E22	289	0120	11	Eai	024	Bg	1			2				
04 Dec	N10E08	290	0140	11	Eai	026	Bg				1				
05 Dec	N10W06	291	0130	11	Eao	027	Bg								
06 Dec	N09W24	296	0090	03	Dao	008	Bg								
07 Dec	N09W38	296	0060	03	Dao	004	B								
08 Dec	N11W51	296	0040	03	Dao	005	B								
09 Dec	N11W64	296													
								5	0	0	6	1	0	0	0

Crossed West Limb.
Absolute heliographic longitude: 291

Date	Location (° Lat ° CMD)	Helio Lon	Sunspot Characteristics Area (10^{-6} hemi)	Extent (helio)	Spot Class	Spot Count	Mag Class	Flares X-ray C	M	X	Optical S	1	2	3	4
			Region 209												
30 Nov	S20E62	289	0140	09	Dao	008	B	1			1				
01 Dec	S21E48	290	0170	12	Eao	007	B	1			1				
02 Dec	S20E35	289	0170	13	Eso	010	B								
03 Dec	S19E20	291	0110	11	Eso	006	B								
04 Dec	S19E07	291	0120	12	Cso	011	B								
05 Dec	S20W07	292	0110	14	Cso	006	B								
06 Dec	S19W26	298	0090	02	Hax	001	A								
07 Dec	S20W39	297	0050	16	Fao	006	B								
08 Dec	S18W52	297	0060	02	Hsx	001	A								
09 Dec	S18W65	297	0060	02	Hax	001	A								
10 Dec	S17W79	298	0050	02	Hsx	001	A								
11 Dec	S17W90	296	0060	02	Hsx	001	A								
								2	0	0	2	0	0	0	0

Crossed West Limb.
Absolute heliographic longitude: 291

Region Summary - continued.

Date	Location (° Lat ° CMD)	Helio Lon	Sunspot Characteristics Area (10^{-6} hemi)	Extent (helio)	Spot Class	Spot Count	Mag Class	Flares X-ray C	M	X	Optical S	1	2	3	4
	Region 211														
02 Dec	S08E04	320	0020	03	Bxo	004	B								
03 Dec	S08W09	320													
04 Dec	S08W22	320													
05 Dec	S08W35	320													
06 Dec	S08W48	320													
07 Dec	S08W61	320													
08 Dec	S08W74	320													
09 Dec	S08W87	320													
								0	0	0	0	0	0	0	0

Crossed West Limb.
Absolute heliographic longitude: 320

Date	Location (° Lat ° CMD)	Helio Lon	Sunspot Characteristics Area (10^{-6} hemi)	Extent (helio)	Spot Class	Spot Count	Mag Class	Flares X-ray C	M	X	Optical S	1	2	3	4
	Region 212														
02 Dec	N13E75	249	0160	05	Cao	004	B								
03 Dec	N14E62	249	0180	05	Dao	008	B								
04 Dec	N13E49	249	0180	07	Dao	009	B				1				
05 Dec	N12E35	250	0170	06	Cao	012	B								
06 Dec	N12E21	251	0170	07	Dao	013	B				1				
07 Dec	N13E08	250	0090	07	Dao	012	B								
08 Dec	N14W05	250	0080	06	Dao	009	Bg								
09 Dec	N14W18	250	0060	04	Dao	009	B								
10 Dec	N14W31	250	0030	03	Dso	006	B								
11 Dec	N13W46	252	0020	06	Dso	006	B								
12 Dec	N13W59	252													
13 Dec	N13W72	252													
14 Dec	N13W85	252													
								0	0	0	2	0	0	0	0

Still on Disk.
Absolute heliographic longitude: 250

Region Summary - continued.

Date	Location (° Lat ° CMD)	Helio Lon	Sunspot Characteristics: Area (10^{-6} hemi)	Extent (helio)	Spot Class	Spot Count	Mag Class	Flares: X-ray C	M	X	Optical S	1	2	3	4
	Region 213														
03 Dec	N15E79	232	0070	07	Cso	003	B				1				
04 Dec	N14E64	234	0090	07	Cao	005	B		1				1		
05 Dec	N14E50	235	0110	08	Cao	006	B								
06 Dec	N14E38	234	0040	05	Cao	004	B								
07 Dec	N14E24	234	0040	07	Cao	002	B								
08 Dec	N14E14	231	0020	02	Cso	002	B								
09 Dec	N14E01	231	0020	07	Cso	006	B								
10 Dec	N15W12	231	0010	01	Axx	001	A				1				
11 Dec	N16W28	234	0020	05	Cso	007	B								
12 Dec	N17W41	233	0010	03	Cso	004	B								
13 Dec	N18W53	232	0020	03	Cso	003	B								
14 Dec	N18W66	232													
15 Dec	N18W79	232													
								0	1	0	2	0	1	0	0

Still on Disk.
Absolute heliographic longitude: 231

	Region 214														
05 Dec	N12W27	312	0060	05	Dro	007	B								
06 Dec	N12W41	313	0090	06	Dao	009	B	1			1				
07 Dec	N13W55	313	0110	08	Dao	009	Bg								
08 Dec	N13W70	315	0120	11	Eso	009	Bg	1			1				
09 Dec	N13W83	315	0070	06	Bxo	003	B								
								2	0	0	2	0	0	0	0

Crossed West Limb.
Absolute heliographic longitude: 312

	Region 215														
05 Dec	S18E74	211	0100	03	Hax	001	A								
06 Dec	S19E59	213	0080	02	Hsx	002	A								
07 Dec	S18E46	213	0080	02	Hsx	002	A								
08 Dec	S18E32	213	0070	03	Hax	002	A								
09 Dec	S18E19	213	0040	05	Dao	011	B								
10 Dec	S18E04	215	0060	03	Dao	010	B								
11 Dec	S18W07	213	0030	04	Dso	009	B								
12 Dec	S17W21	213	0030	01	Hrx	001	A								
13 Dec	S17W35	214													
14 Dec	S18W48	213	0000	00	Axx	001	A								
15 Dec	S18W61	213													
								0	0	0	0	0	0	0	0

Still on Disk.
Absolute heliographic longitude: 215

Region Summary - continued.

Date	Location (° Lat ° CMD)	Helio Lon	Sunspot Characteristics Area (10^{-6} hemi)	Extent (helio)	Spot Class	Spot Count	Mag Class	Flares X-ray C	X-ray M	X-ray X	Optical S	Optical 1	Optical 2	Optical 3	Optical 4
			Region 216												
08 Dec	S24W39	284	0040	06	Cso	006	B								
09 Dec	S24W52	284	0050	06	Dao	003	B								
10 Dec	S23W66	285	0020	08	Dso	002	B								
11 Dec	S23W79	285													
								0	0	0	0	0	0	0	0
Crossed West Limb.															
Absolute heliographic longitude:		284													
			Region 217												
08 Dec	N12E56	189	0020	01	Axx	002	A								
09 Dec	N12E43	189	0020	02	Hsx	004	A								
10 Dec	N12E29	190	0010	01	Axx	001	A								
11 Dec	N12E17	189	0010	04	Bxo	003	B								
12 Dec	N14E04	188	0000	01	Axx	002	A								
13 Dec	N13W09	188													
14 Dec	N13W22	188													
15 Dec	N13W35	188													
								0	0	0	0	0	0	0	0
Still on Disk.															
Absolute heliographic longitude:		188													
			Region 218												
08 Dec	S20E68	177	0050	01	Hax	001	A				1				
09 Dec	S20E55	177	0070	02	Hax	002	A								
10 Dec	S18E42	177	0060	03	Cso	003	B				1				
11 Dec	S19E30	176	0040	03	Cao	007	B								
12 Dec	S19E17	175	0020	02	Hsx	002	B								
13 Dec	S18E03	176	0080	06	Dao	012	B								
14 Dec	S18W11	176	0090	06	Dao	016	B								
15 Dec	S18W25	177	0070	08	Dao	012	B								
								0	0	0	2	0	0	0	0
Still on Disk.															
Absolute heliographic longitude:		176													
			Region 219												
09 Dec	S05W25	257	0020	02	Hax	003	A				1				
10 Dec	S06W38	257	0010	01	Hsx	001	A								
11 Dec	S05W51	257	0010	01	Axx	001	A								
12 Dec	S05W64	257													
13 Dec	S05W77	257													
								0	0	0	1	0	0	0	0
Crossed West Limb.															
Absolute heliographic longitude:		257													

Region Summary - continued.

Date	Location (° Lat ° CMD)	Helio Lon	Sunspot Characteristics: Area (10^{-6} hemi)	Extent (helio)	Spot Class	Spot Count	Mag Class	Flares: X-ray C	X-ray M	X-ray X	Optical S	Optical 1	Optical 2	Optical 3	Optical 4
			Region 220												
09 Dec	S12E47	185	0150	06	Dao	012	B								
10 Dec	S12E33	186	0310	07	Dai	016	Bg	3			3				
11 Dec	S12E21	185	0270	09	Dai	025	Bg								
12 Dec	S12E07	185	0190	10	Dai	017	B								
13 Dec	S12W06	185	0140	10	Dao	015	B	1			1				
14 Dec	S13W18	183	0120	11	Eao	016	B	1			1				
15 Dec	S12W33	185	0080	10	Dao	012	B								
								5	0	0	5	0	0	0	0
Still on Disk.															
Absolute heliographic longitude:		185													
			Region 221												
09 Dec	N22E61	171	0020	02	Hsx	002	A								
10 Dec	N23E48	171	0020	02	Hsx	001	A								
11 Dec	N23E35	171	0020	03	Cso	004	B								
12 Dec	N23E22	171	0010	03	Bxo	002	B								
13 Dec	N20E12	167	0010	02	Axx	002	A								
14 Dec	N20W01	166	0020	02	Cro	004	B								
15 Dec	N20W14	166													
								0	0	0	0	0	0	0	0
Still on Disk.															
Absolute heliographic longitude:		166													
			Region 222												
11 Dec	S06W03	209	0020	05	Cso	008	B								
12 Dec	S12W16	208	0010	04	Bxo	007	B								
13 Dec	S13W28	207	0010	03	Bxo	007	B								
14 Dec	S13W41	207													
15 Dec	S13W54	207													
								0	0	0	0	0	0	0	0
Still on Disk.															
Absolute heliographic longitude:		209													
			Region 223												
12 Dec	N23E71	121	0070	02	Hsx	001	A				1				
13 Dec	N24E60	119	0130	06	Cso	006	B	1			2				
14 Dec	N23E46	119	0140	04	Dso	005	B				2				
15 Dec	N24E34	118	0140	04	Cai	007	B								
								1	0	0	5	0	0	0	0
Still on Disk.															
Absolute heliographic longitude:		118													

Region Summary - continued.

Date	Location (° Lat ° CMD)	Helio Lon	Sunspot Characteristics Area (10^{-6} hemi)	Extent (helio)	Spot Class	Spot Count	Mag Class	Flares X-ray C	M	X	Optical S	1	2	3	4
			Region 224												
12 Dec	S16E70	122	0090	05	Dao	003	B								
13 Dec	S17E61	118	0220	15	Eao	011	B	1			2				
14 Dec	S18E49	116	0290	13	Eai	022	Bg				1				
15 Dec	S18E36	116	0200	15	Eai	025	Bg								
								1	0	0	3	0	0	0	0
Still on Disk.															
Absolute heliographic longitude:		116													
			Region 225												
13 Dec	N17E66	113	0120	10	Dao	009	B								
14 Dec	N17E51	114	0140	09	Dai	009	B				3				
15 Dec	N16E38	114	0100	07	Dai	014	B				1				
								0	0	0	4	0	0	0	0
Still on Disk.															
Absolute heliographic longitude:		114													
			Region 226												
13 Dec	S28E51	128	0070	06	Dso	008	B				8				
14 Dec	S28E39	126	0170	08	Dai	019	B	4			9	1			
15 Dec	S28E25	127	0290	12	Eki	020	B	3			5				
								7	0	0	22	1	0	0	0
Still on Disk.															
Absolute heliographic longitude:		127													
			Region 227												
13 Dec	N05E34	145	0010	03	Bxo	003	B								
14 Dec	N06E21	144	0030	04	Cso	004	B								
15 Dec	N06E08	144	0050	06	Dsi	008	B								
								0	0	0	0	0	0	0	0
Still on Disk.															
Absolute heliographic longitude:		144													

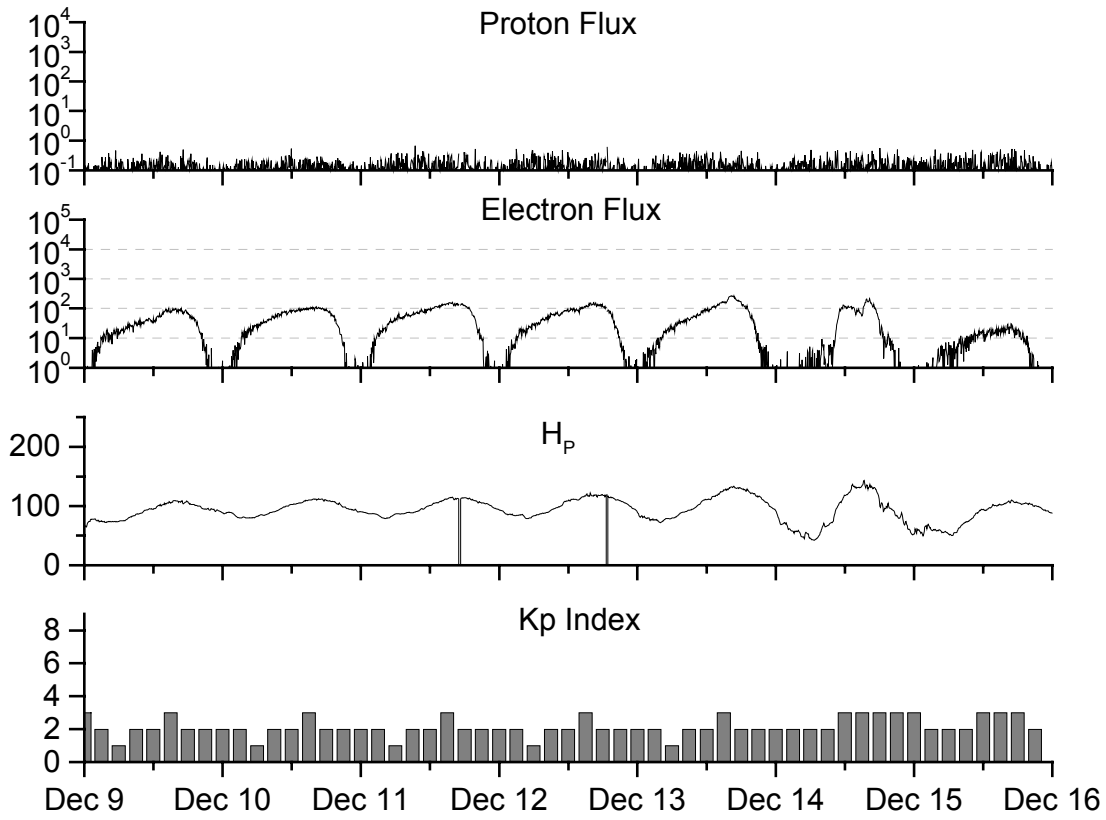
Region Summary - continued.

Date	Location (° Lat ° CMD)	Helio Lon	Sunspot Characteristics: Area (10^{-6} hemi)	Extent (helio)	Spot Class	Spot Count	Mag Class	Flares: X-ray C	M	X	Optical S	1	2	3	4
	Region 228														
14 Dec	S14E65	100	0040	01	Hsx	001	A				1				
15 Dec	S15E52	100	0020	01	Hrx	001	A								
								0	0	0	1	0	0	0	0
Still on Disk.															
Absolute heliographic longitude:		100													
	Region 229														
14 Dec	N15E63	102	0220	07	Dai	007	B				4				
15 Dec	N17E51	101	0400	10	Dki	028	B	2			3				
								2	0	0	7	0	0	0	0
Still on Disk.															
Absolute heliographic longitude:		101													

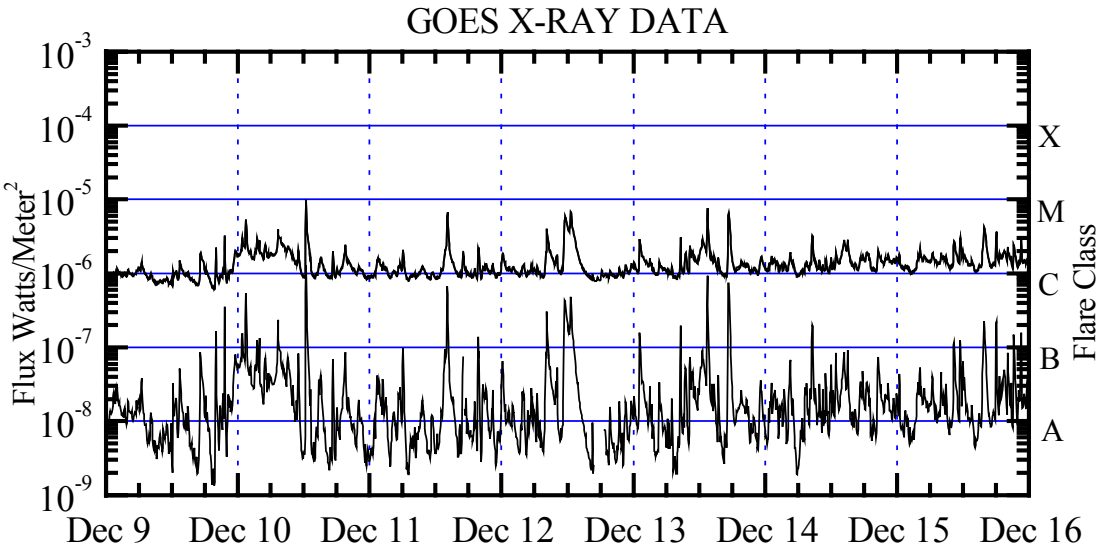
Recent Solar Indices (preliminary)
of the observed monthly mean values

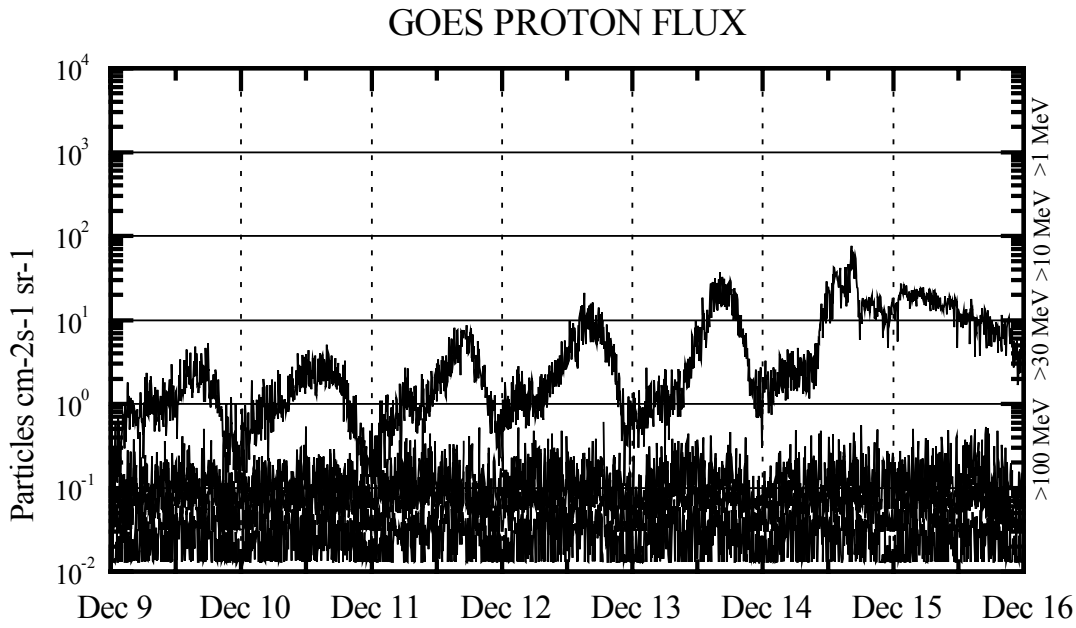
	Sunspot Numbers					Radio Flux		Geomagnetic	
	Observed values		Ratio	Smooth values		*Penticton	Smooth	Planetary	Smooth
Month	SWO	RI	RI/SWO	SWO	RI	10.7 cm	Value	Ap	Value
					2000				
December	146.4	104.5	0.71	160.8	112.1	173.6	172.1	08	14.4
					2001				
January	142.7	95.1	0.67	156.3	108.8	166.7	168.8	08	13.8
February	131.0	80.1	0.61	151.4	104.2	147.3	165.8	06	13.3
March	166.7	114.2	0.69	154.0	104.9	177.7	167.9	17	12.9
April	163.6	108.2	0.66	159.4	107.7	178.3	171.7	18	12.7
May	135.1	97.3	0.72	163.1	108.8	148.7	174.8	12	12.5
June	196.7	134.0	0.68	167.2	109.9	173.7	178.8	12	12.4
July	124.6	82.2	0.66	172.1	111.8	131.3	183.9	11	12.4
August	159.4	106.8	0.67	176.7	113.8	163.2	188.8	13	12.5
September	229.1	150.7	0.66	178.8	114.3	233.8	191.3	13	12.8
October	197.4	125.6	0.64	179.5	114.1	208.1	191.9	20	12.0
November	178.6	106.5	0.60	183.7	115.6	212.7	193.7	16	12.0
December	217.5	131.8	0.61	184.5	114.7	235.6	193.9	09	12.2
					2002				
January	189.0	113.9	0.60	184.8	113.5	227.3	194.6	08	12.4
February	194.5	108.0	0.56	188.6	114.7	205.0	197.2	10	12.8
March	153.1	98.1	0.64	188.9	113.3	180.3	195.7	10	13.0
April	194.9	120.4	0.62	186.2	110.4	189.8	191.5	15	13.2
May	204.1	120.8	0.59	183.6	108.8	178.4	188.0	15	13.3
June	146.0	88.5	0.61			148.7		11	
July	183.5	99.9	0.54			173.5		13	
August	191.0	116.4	0.61			183.9		16	
September	206.4	109.3	0.53			175.8		14	
October	153.9	97.5	0.63			167.0		23	
November	159.8	95.0	0.59			168.7		16	

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 09 December 2002
Protons plot contains the five-minute averaged integral proton flux (protons/cm^2 –sec –sr) as measured by GOES-8 (W75) for each of three energy thresholds: greater than 10, 50, and 100 MeV.
Electrons plot contains the five-minute averaged integral electron flux (electrons/cm^2 –sec –sr) with energies greater than 2 MeV at GOES-8.
Hp plot contains the five minute averaged magnetic field H - component in nanoteslas (nT) as measured by GOES-8. The H component is parallel to the spin axis of the satellite, which is nearly parallel to the Earth's rotation axis.
Kp plot contains the estimated planetary 3-hour K-index (derived by the Air Force Weather Agency) in real time from magnetometers at Meanook, Canada; Sitka, AK; Glenlea, Canada; St. Johns, Canada; Ottawa, Canada; Newport, WA; Fredericksburg, VA; Boulder, CO; Fresno, CA and Heartland, UK. These data are made available through cooperation from the Geological Survey of Canada (GSC) and the US Geological Survey. These may differ from the final Kp values derived from a more extensive network of magnetometers. The data included here are those now available in real time at the SWO and are incomplete in that they do not include the full set of parameters and energy ranges known to cause satellite operating anomalies. The proton and electron fluxes and Kp are " global " parameters that are applicable to a first order approximation over large areas. Hparallel is subject to more localized phenomena and the measurements generally are applicable to within a few degrees of longitude of the measuring satellite.

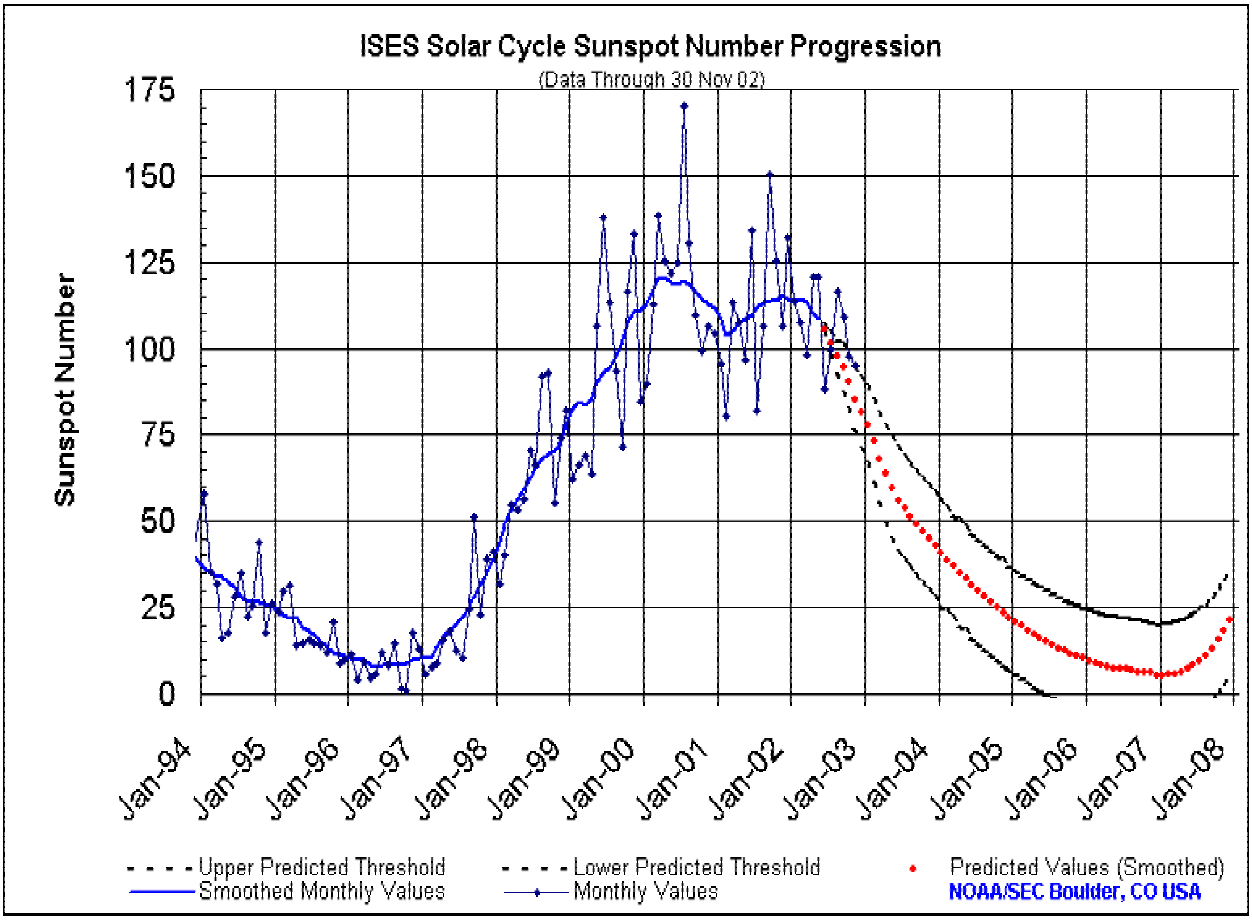




Weekly GOES Satellite X-ray and Proton Plots

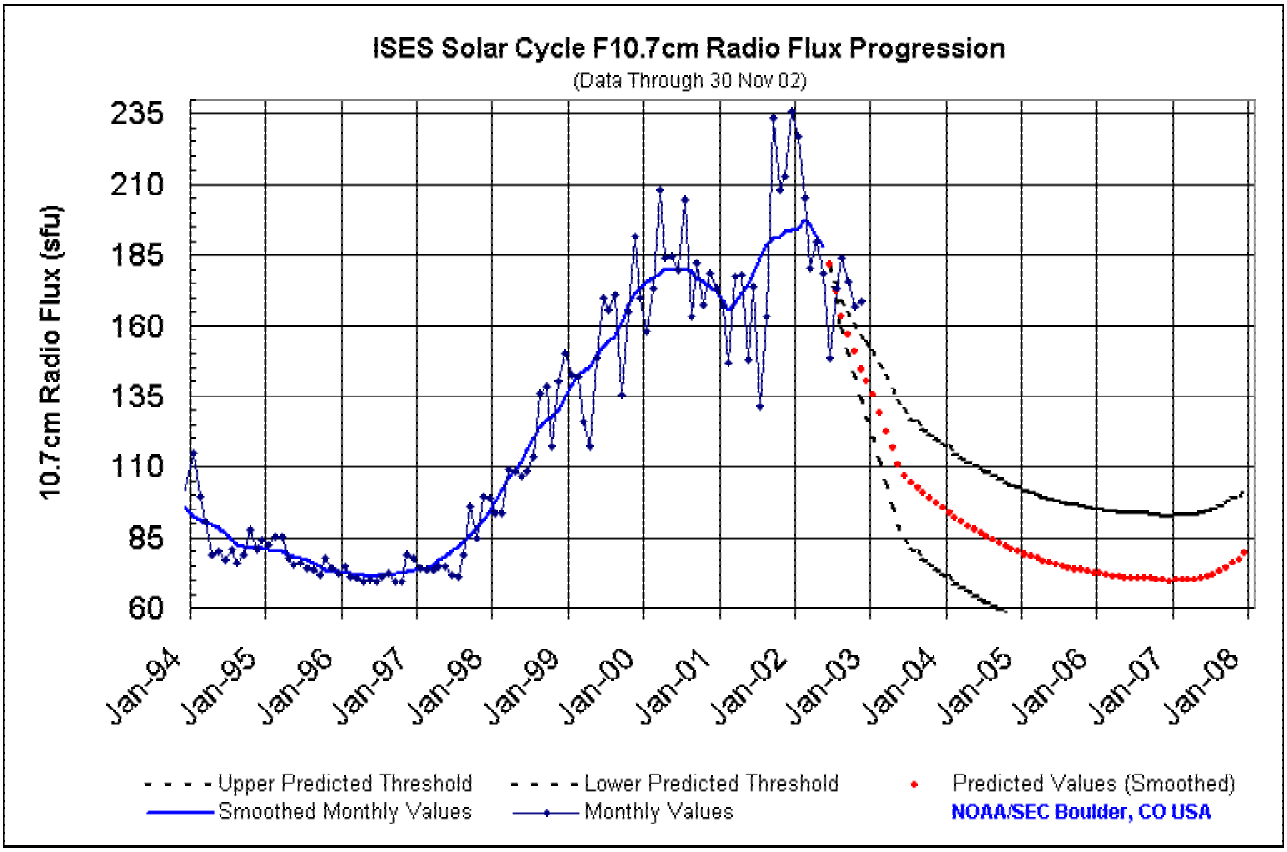
X-ray plot contains five-minute averaged x-ray flux (watts/$m^{2)}$ as measured by GOES 8 and 10 in two wavelength bands, .05 -. 4 and .1 - .8 nm. The letters A, B, C, M and X refer to x-ray event levels for the .1 - .8 nm band.

Proton plot contains the five-minute averaged integral proton flux (protons/cm^2 –sec-sr) as measured by GOES-8 (W75) for each of the energy thresholds: >1, >10, >30 and >100 MeV. P10 event threshold is 10 pfu (protons/cm^2-sec-sr) at greater than 10 MeV.



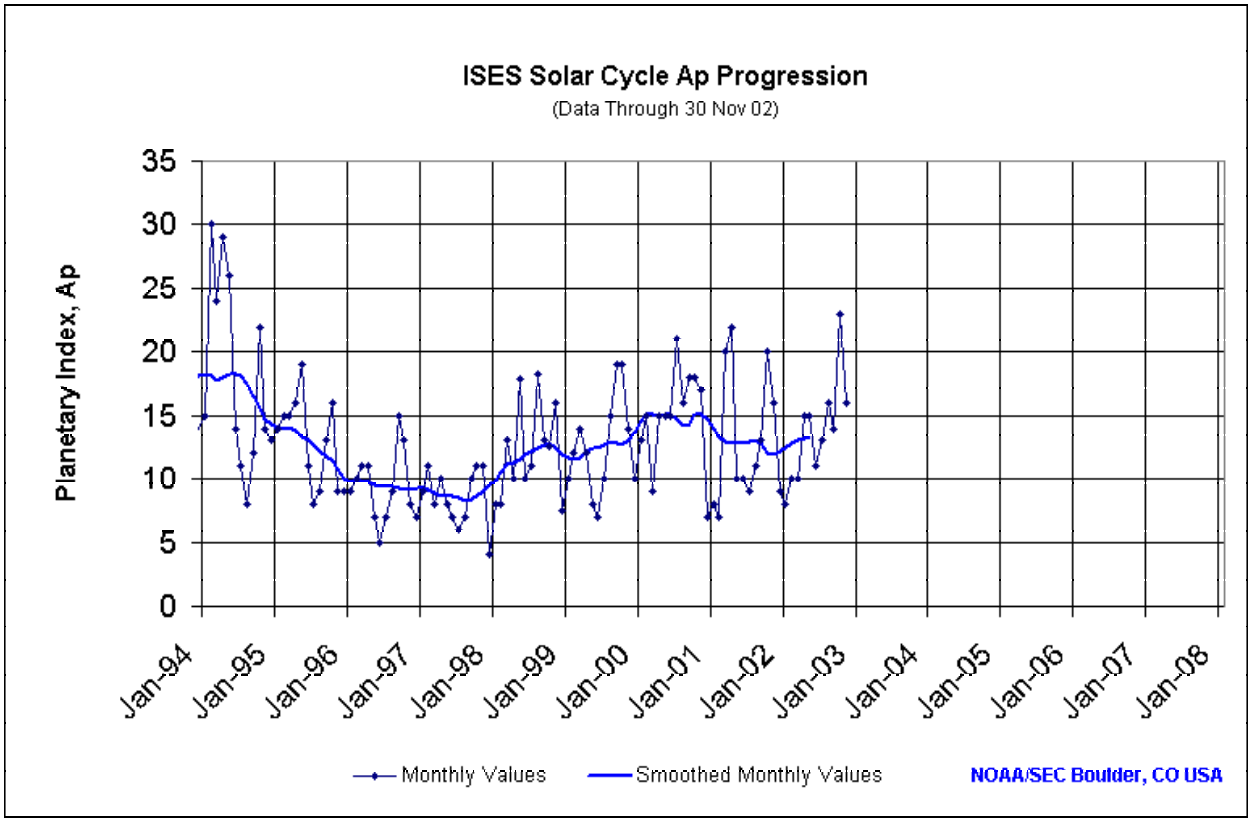
SEC Prediction of Smoothed Sunspot Number

	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**	**101**	**98**	**94**	**90**	**85**	**81**
	(***)	(***)	(***)	(***)	(***)	(1)	(3)	(5)	(7)	(8)	(9)	(10)
2003	**78**	**73**	**68**	**64**	**59**	**56**	**54**	**51**	**49**	**47**	**45**	**43**
	(11)	(12)	(13)	(14)	(15)	(15)	(15)	(15)	(15)	(15)	(15)	(15)
2004	**41**	**39**	**37**	**35**	**33**	**31**	**30**	**28**	**27**	**25**	**24**	**22**
	(15)	(15)	(15)	(15)	(15)	(15)	(15)	(15)	(15)	(15)	(15)	(15)
2005	**21**	**20**	**18**	**17**	**16**	**15**	**14**	**13**	**12**	**12**	**11**	**10**
	(15)	(15)	(15)	(15)	(15)	(15)	(15)	(15)	(15)	(15)	(15)	(15)
2006	**10**	**9**	**8**	**8**	**8**	**7**	**7**	**7**	**7**	**6**	**6**	**5**
	(15)	(15)	(15)	(15)	(15)	(15)	(15)	(15)	(15)	(15)	(15)	(15)
2007	**5**	**6**	**6**	**6**	**7**	**8**	**10**	**11**	**13**	**16**	**18**	**21**
	(15)	(15)	(15)	(15)	(15)	(15)	(15)	(15)	(15)	(15)	(15)	(15)



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	**181**	**172**	**164**	**157**	**151**	**145**	**140**
	(***)	(***)	(***)	(***)	(***)	(1)	(3)	(5)	(7)	(9)	(11)	(13)
2003	**135**	**129**	**123**	**117**	**111**	**107**	**104**	**103**	**101**	**99**	**97**	**95**
	(15)	(17)	(19)	(21)	(22)	(23)	(23)	(23)	(23)	(23)	(23)	(23)
2004	**94**	**92**	**91**	**89**	**88**	**87**	**85**	**84**	**83**	**82**	**81**	**80**
	(23)	(23)	(23)	(23)	(23)	(23)	(23)	(23)	(23)	(23)	(23)	(23)
2005	**79**	**78**	**78**	**77**	**76**	**75**	**75**	**74**	**74**	**73**	**73**	**73**
	(23)	(23)	(23)	(23)	(23)	(23)	(23)	(23)	(23)	(23)	(23)	(23)
2006	**72**	**72**	**71**	**71**	**71**	**71**	**71**	**71**	**70**	**70**	**70**	**70**
	(23)	(23)	(23)	(23)	(23)	(23)	(23)	(23)	(23)	(23)	(23)	(23)
2007	**70**	**70**	**70**	**70**	**71**	**71**	**72**	**73**	**74**	**76**	**77**	**79**
	(23)	(23)	(23)	(23)	(23)	(23)	(23)	(23)	(23)	(23)	(23)	(23)


ISES Solar Cycle Ap Progression
(Data Through 30 Nov 02)
Planetary Index, Ap
35
30
25
20
15
10
5
0
Jan-94
Jan-95
Jan-96
Jan-97
Jan-98
Jan-99
Jan-00
Jan-01
Jan-02
Jan-03
Jan-04
Jan-05
Jan-06
Jan-07
Jan-08
Monthly Values
Smoothed Monthly Values
NOAA/SEC Boulder, CO USA

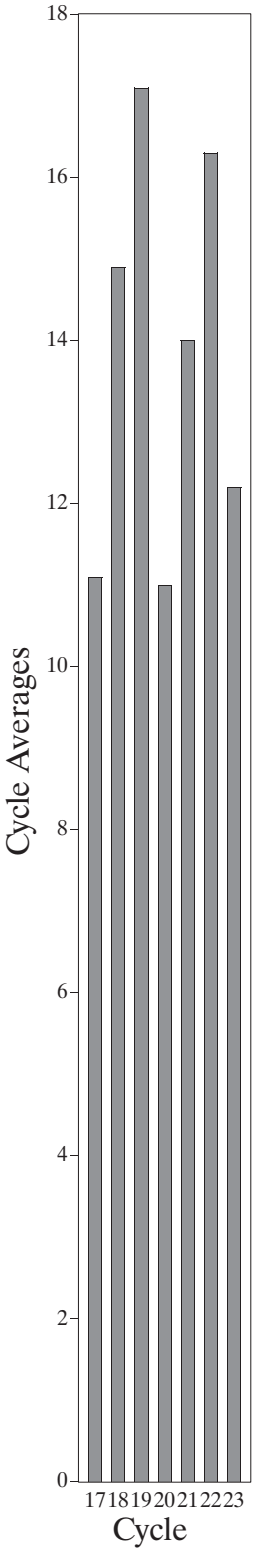
Geomagnetic Activity (Ap)

Space Environment Center

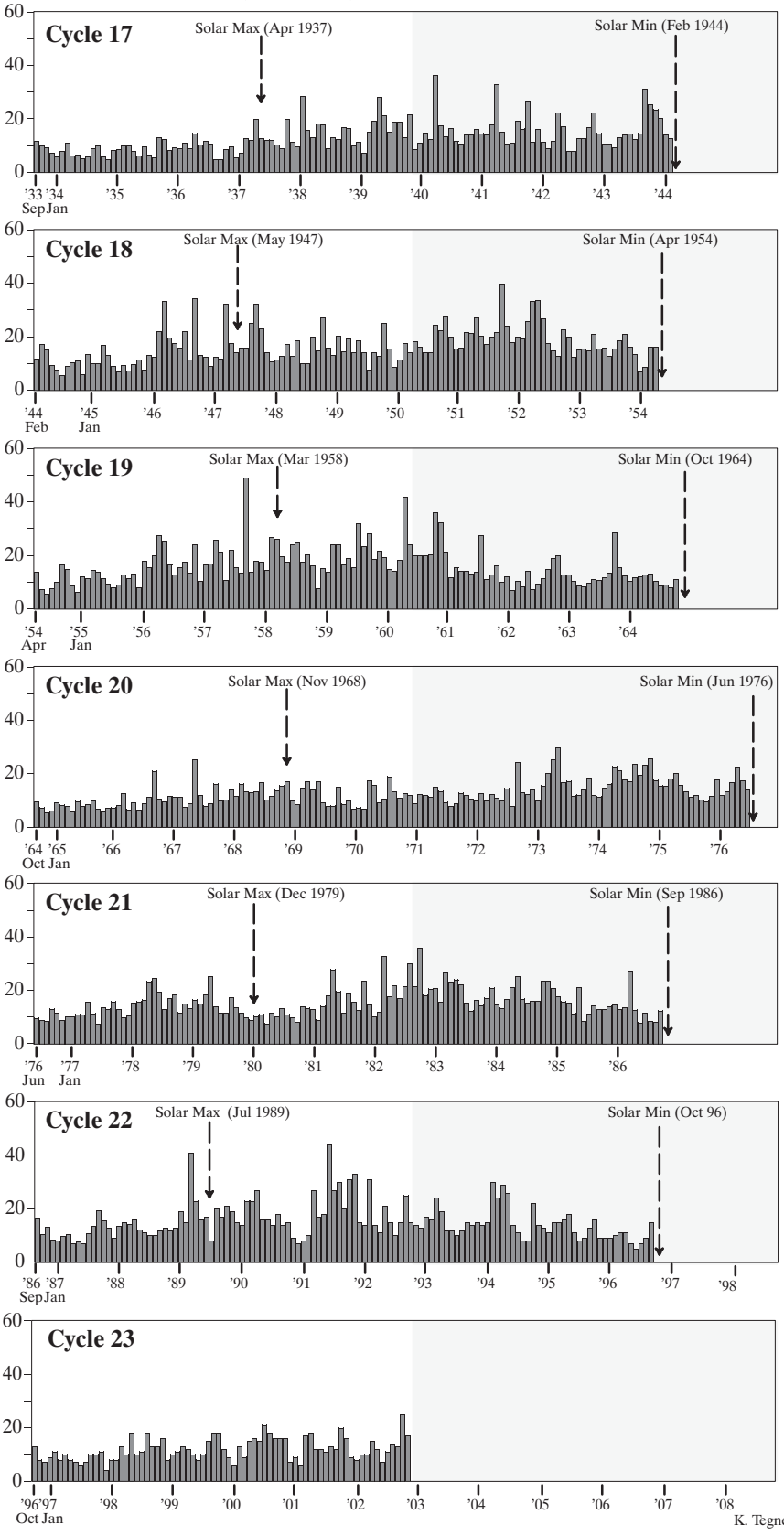
November 2002
(Month 74)

Preliminary data

Comparison of Cycles at current month in cycle



Monthly Averages



K. Tegnell