

Space Weather Highlights
29 Nov – 05 Dec 1999

Solar activity was moderate on 29 November, but decreased to low levels during the rest of the week. Region 8773 (S15, L = 164, class/area Dro/030 on 26 November) produced an impulsive M1/SF flare at 29/1414UT as it rounded the west limb. There were a few small- to moderate-sized sunspot groups that produced occasional C-class flares during the rest of the period. Two events of interest were a C3 x-ray flare at 05/2221UT with an associated Type II radio sweep and an optically uncorrelated Type II radio sweep at 05/2332UT.

Real-time solar wind data were available from the Advanced Composition Explorer (ACE) spacecraft for most of the period. Recurrent coronal hole effects began on 03 December and continued through the remainder of the period. Solar wind speeds steadily increased during 03 - 04 December and briefly reached 790 km/sec late on 04 December before slowly declining. Sustained periods of southward IMF Bz also occurred during 03 - 04 December with maximum deflections to minus 17 nT (GSM) detected late on 04 December. Particle densities dropped to 01 to 03 p/cc during 04 - 05 December. A shift to an away (positive polarity) solar sector also accompanied the transition to the coronal hole wind stream.

No proton events were detected at geosynchronous orbit during the period.

The greater than 2 MeV electron flux at geosynchronous orbit was mostly normal through 03 December. Flux levels increased during the rest of the period and reached high levels by 05 December.

Geomagnetic field activity was at quiet to unsettled levels through 02 December. The field was disturbed during 03 - 05 December due to coronal hole effects. Active to minor storm levels occurred during the disturbance with brief major storm periods detected at high latitudes.

Space Weather Outlook
08 December 1999 - 03 January 2000

Solar activity is expected to range from low to high levels. Frequent C-class flares are likely. Isolated M-class flares will be possible throughout the period. There are also chances for isolated major flares as potentially active regions 8765, 8766, and 8771 are due to return on 7-13 December.

There is a chance for a solar proton event at geosynchronous orbit when the above mentioned regions return starting on 07 December.

The greater than 2 MeV electron flux at geosynchronous altitude is expected to be at moderate to high levels through 10 December with normal to moderate levels expected during most of the rest of the period.

The geomagnetic field is expected to be at unsettled to active levels during 08 December as recurrent coronal hole effects continue. Active levels are possible during 09 - 10 December due to CME effects. Otherwise, activity is expected to vary between quiet and unsettled levels (barring any Earth-directed coronal mass ejections).



Daily Solar Data

Date	Radio Flux 10.7 cm	Sun spot No. (10 ⁶ hemi.)	Sunspot Area	X-ray Background	Flares							
					X-ray Flux			Optical				
					C	M	X	S	1	2	3	4
29 November	164	101	490	C5.5	4	1	0	23	1	0	0	0
30 November	163	127	570	B6.5	10	0	0	8	2	0	0	0
01 December	165	119	750	B5.3	1	0	0	4	0	0	0	0
02 December	166	156	1250	C1.0	2	0	0	10	0	0	0	0
03 December	152	107	880	B9.6	4	0	0	2	0	0	0	0
04 December	148	78	920	B7.1	3	0	0	3	1	0	0	0
05 December	143	78	780	B5.1	4	0	0	1	0	0	0	0

Daily Particle Data

Date	Proton Fluence (protons/cm ² -day-sr)			Electron Fluence (electrons/cm ² -day-sr)		
	>1MeV	>10MeV	>100MeV	>.6MeV	>2MeV	>4MeV
29 November	1.9E+5	1.6E+4	2.9E+3		3.0E+6	
30 November	6.4E+5	1.4E+4	3.0E+3		3.4E+6	
01 December	3.1E+5	1.3E+4	2.7E+3		1.5E+6	
02 December	4.4E+5	1.2E+4	2.6E+3		2.2E+6	
03 December	2.2E+5	1.2E+4	2.8E+3		7.3E+5	
04 December	1.9E+6	1.4E+4	2.9E+3		6.6E+6	
05 December	2.4E+6	1.3E+4	2.7E+3		1.1E+8	

Daily Geomagnetic Data

Date	Middle Latitude Fredericksburg		High Latitude College		Estimated Planetary	
	A	K-indices	A	K-indices	A	K-indices
	29 November	2	1-1-0-2-1-0-1-0	5	1-1-1-3-3-0-0-0	4
30 November	8	2-1-2-3-3-0-2-2	14	1-1-1-5-5-0-2-1	8	2-2-2-3-3-2-2-2
01 December	2	2-0-0-1-0-1-1-1	1	1-0-0-0-0-1-1-0	4	1-1-0-1-1-1-2-1
02 December	3	2-1-0-0-1-1-1-2	2	0-0-0-1-1-0-1-2	4	2-0-0-1-1-1-2-2
03 December	9	2-2-2-3-3-2-2-2	23	2-2-1-4-5-6-2-2	13	3-2-2-3-3-4-3-2
04 December	21	4-2-3-5-4-3-3-3	60	1-2-5-7-7-6-5-3	28	4-3-4-6-5-4-3-3
05 December	19	4-4-4-4-3-3-2-2	*	*_*_*_*_*_*_*_*_*_*	18	4-4-4-4-3-3-3-2

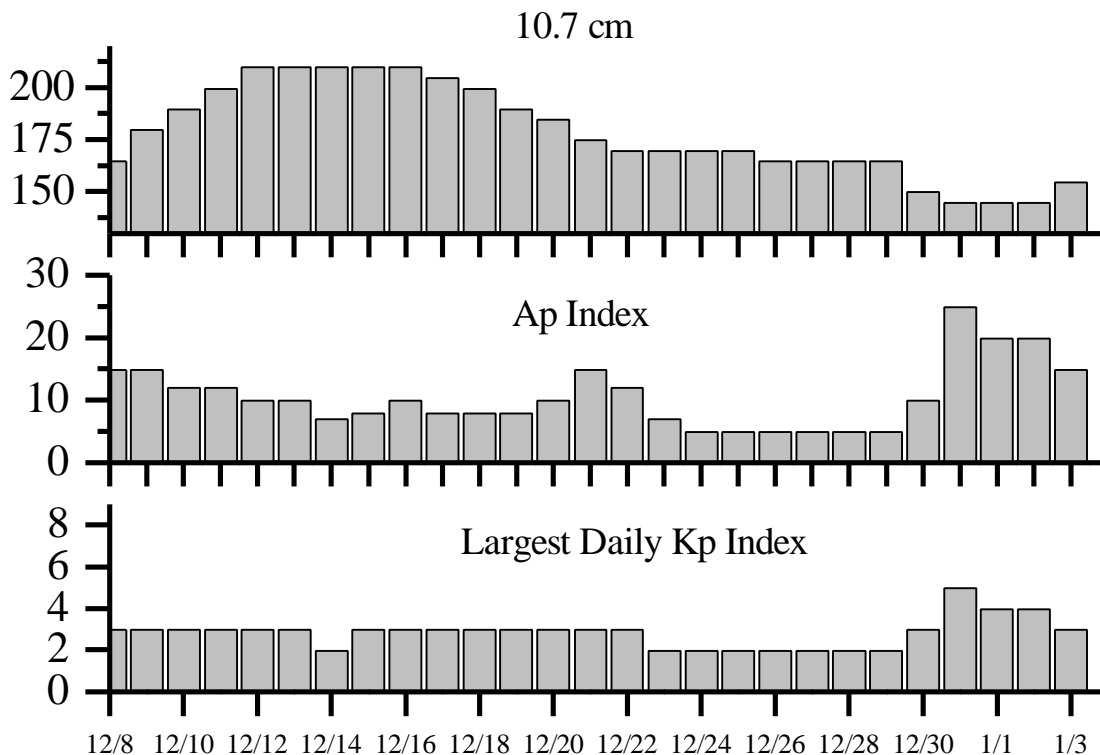


Alerts and Warnings Issued

Date & Time of Issue (UT)	Type of Alert or Warning	Date & Time of Event (UT)
30 Nov 0036	1 - 245 MHz Burst	29 Nov
01 Dec 0042	2 - 245 MHz Bursts	30 Nov
01 Dec 0042	245 MHz Noise Storm	30 Nov
03 Dec 0007	3 - 245 MHz Bursts	02 Dec
03 Dec 1447	K= 4 Warning	03/1500 - 04/1500 Dec
03 Dec 1455	K= 4 Observed	03 Dec 12 - 15
04 Dec 0009	2 - 245 MHz Bursts	03 Dec
04 Dec 1151	$A \geq 20$ Observed	04 Dec 1200
04 Dec 1157	K= 6 Observed	04 Dec 09 - 12
04 Dec 1503	K= 4 Warning	04/1500 - 06/1500 Dec
04 Dec 1520	$A \geq 20$ Watch	05 Dec
04 Dec 1521	$A \geq 20$ Watch	06 Dec
05 Dec 0704	$A \geq 30$ Warning	05 Dec 09 - 12
05 Dec 0712	K= 5 Warning	05 Dec 09 - 12
05 Dec 0851	$A \geq 30$	05 Dec 0900
05 Dec 0852	K= 5	05 Dec 06 - 09
05 Dec 1139	>2MeV Electron Event ≥ 1000 pfu	05 Dec 1120
05 Dec 1156	>2MeV Electron Event ≥ 1000 pfu CONTINUED	05 Dec 1120
05 Dec 1157	$A \geq 20$ CONTINUED	04 Dec 1200
07 Dec 0011	3 - 245 MHz Bursts	06 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
08 Dec	165	15	3	22 Dec	170	12	3
09	180	15	3	23	170	7	2
10	190	12	3	24	170	5	2
11	200	12	3	25	170	5	2
12	210	10	3	26	165	5	2
13	210	10	3	27	165	5	2
14	210	7	2	28	165	5	2
15	210	8	3	29	165	5	2
16	210	10	3	30	150	10	3
17	205	8	3	31	145	25	5
18	200	8	3	01 Jan	145	20	4
19	190	8	3	02	145	20	4
20	185	10	3	03	155	15	3
21	175	15	3				



Energetic Events

Date	Time (UT)			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
29 Nov	1409	1414	1418	M1.1	.004	SF	S14W84	8773				

Flare List

Date	Time			X-ray Class.	Imp / Brtns	Optical		Rgn #
	Begin	Max	End			Location Lat CMD		
29 November	0108	0108	0117		SF	N11W15		8782
	0109	0115	0147		SF	S14W34		8778
	0129	U0131	0142		SF	S13W88		8771
	0150	0150	0154		SF	N10W16		8782
	0157	0222	0252		SF	N10W16		8782
	0315	0323	0332		SF	S12W31		8778
	0413	0434	0436		SF	N10W17		8782
	0422	0437	0501	C6.0	SF	S14W36		8778
	0522	0523	0532		SF	S12W32		8778
	0614	0617	0626		SF	S12W32		8778
	0629	0630	0650		SF	S14W37		8778
	0637	0641	0650		SF	N10W18		8782
	0744	0754	0802		SF	N10W19		8782
	0804	0818	0827		SF	N10W19		8782
	0830	0832	0835		SF	S12W34		8778
	0846	0850	0928		1F	S11W07		8780
	0849	0850	0907	C4.3	SF	S12W34		8778
	1012	1022	A1021		SF	S16W36		8778
	1101	1107	1117	C3.2				
	1143	1201	1209		SF	S18W38		8778
1416	1416	1422	M1.1	SF	S14W84		8773	
1435	1436	1451		SF	S14W46		8778	
1532	1533	1605		SF	S15W40		8778	
1635	1637	1641	C6.6	SF	S14W90		8771	
1757	1757	1804		SF	S16W39		8778	
30 November	0158	0201	0204	B9.7				
	0308	0313	0318	C1.6				
	0330	0342	0423	C2.6	1F	N10W30		8782
	0620	0629	0629		SF	N10W31		8782
	0704	0705	0713	C1.8	SF	S16W45		8778
	0725	0726	0729		SF	S12W46		8778
	0739	0745	0755		SF	N10W32		8782
	0802	0802	0808		SF	N10W32		8782
	0830	0833	0953	C2.3	1F	N10W33		8782
	1108	1113	1117	C1.2				
1215	1225	1238	C1.1					



Flare List-continued

Date	Time			X-ray Class.	Optical		Rgn #
	Begin	Max	End		Imp / Brtns	Location Lat CMD	
30 November	1425	1425	1437	C2.2	SF	N10W35	8782
	1605	1608	1615	C1.8	SF	N11W37	8782
	1739	1741	1801	C1.4	SF	N11W37	8782
	2340	2345	2348	C2.7			
01 December	0522	0527	0621		SF	N10W44	8782
	0658	0703	0708		SF	N10W45	8782
	0755	0755	0802	C1.0	SF	N10W46	8782
	2252	2317	A2323		SF	N08W58	8782
02 December	0113	0114	0122		SF	N10W55	8782
	0143	0145	0149		SF	N10W55	8782
	0150	0238	0246		SF	N10W56	8782
	0250	0255	0258		SF	N10W56	8782
	0326	0326	0331		SF	N10W56	8782
	0336	0338	0341		SF	N10W57	8782
	0658	0709	0713		SF	N10W59	8782
	0900	0904	0911		SF	N10W60	8782
	0945	1012	1041	C5.3			
	1052	1054	1102		SF	S10W25	8781
	1200	1205	1212	C2.3			
	2304	2304	2309		SF	N12E76	
	03 December	0116	0120	0123	C2.1		
0923		U0926	0932		SF	N09E89	8788
1330		1334	1338	C1.5			
1530		1534	1537	C1.4	SF	N09W78	8782
04 December	1948	1953	1955	C6.3			
	0254	0256	0259		SF	N10W83	8782
	0421	0427	0435	C1.5			
	1745	1750	1754	C1.7			
	1906	1909	1912		SF	N11E57	8788
	2005	2007	2016		SF	N10E57	8788
	2118	2120	2143	C4.3	1F	N10E56	8788
05 December	0323	0327	0331	B9.2			
	0551	0556	0606	C1.3			
	0923	0923	0930	C1.5	SF	N10E55	8788
	1736	1748	1826	C1.4			
	2156	2221	2238	C3.3			



Region Summary

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

Region 8772

18 Nov	N05E71	144	0020	01	HAX	001	A										
19 Nov	N05E55	147	0060	04	CSO	007	B										
20 Nov	N04E42	147	0030	03	CSO	004	B										
21 Nov	N04E29	146	0020	05	CSO	008	B										
22 Nov	N05E16	146	0040	06	CSO	010	B						1				
23 Nov	N06E04	145	0020	08	CSO	003	B						1				
24 Nov	N06W08	144	0010	02	AXX	003	A										
25 Nov	N07W20	142	0010	02	AXX	004	A										
26 Nov	N06W31	140	0000	00	AXX	001	A										
27 Nov	N10W45	140	0010	04	BXO	006	B						1				
28 Nov	N07W55	137	0000	00	AXX	001	A						1				
29 Nov	N07W68	137															

0 0 0 4 0 0 0 0

Crossed West Limb.

Absolute heliographic longitude: 145

Region 8773

19 Nov	S14E39	163	0030	04	CSO	009	B										
20 Nov	S16E25	164	0030	03	CSO	005	B						2				
21 Nov	S15E12	163	0020	03	BXO	006	B										
22 Nov	S15W02	164	0020	07	CRO	007	B										
23 Nov	S15W15	164	0010	03	CSO	004	B										
24 Nov	S15W27	163	0010	03	BXO	004	B										
25 Nov	S15W39	161	0010	07	BXO	005	B										
26 Nov	S13W47	156	0030	07	DRO	005	B										
27 Nov	S12W60	155	0020	10	BXO	004	B	1					3				
28 Nov	S12W71	153	0020	06	BXO	003	B						3				
29 Nov	S11W85	154	0010	05	BXO	003	B			1			1				

1 1 0 9 0 0 0 0

Crossed West Limb.

Absolute heliographic longitude: 164



Region Summary-continued

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

Region 8778

21 Nov	S14E62	113	0010	04	BXO	002	B												
22 Nov	S12E48	114	0010	00	AXX	002	A	1				4							
23 Nov	S16E36	113	0040	04	CAO	004	B					2							
24 Nov	S15E23	113	0080	08	CAO	016	B	3	1			8	1						
25 Nov	S14E10	112	0090	09	DSO	026	B	4				8	1						
26 Nov	S14W05	114	0140	12	EAO	029	B	3	1			7							
27 Nov	S14W19	114	0180	14	EAI	036	BG	2	1			1	1						
28 Nov	S14W33	115	0200	15	EAI	031	BG					6							
29 Nov	S14W47	116	0160	16	FAI	019	B	2				13							
30 Nov	S14W62	118	0130	14	CAO	013	B	1				2							
01 Dec	S15W78	121	0160	10	CAO	007	B												
02 Dec	S12W91	120	0180	10	CAO	005	B												
								16	3	0	51	3	0	0	0				

Crossed West Limb.

Absolute heliographic longitude: 114

Region 8780

24 Nov	S11E51	085	0030	03	CSO	003	B												
25 Nov	S11E38	084	0010	00	AXX	001	A												
26 Nov	S11E25	084																	
27 Nov	S16E14	081	0000	00	AXX	001	A												
28 Nov	S11W03	085	0000	01	AXX	002	A					1							
29 Nov	S11W16	085						1					1						
30 Nov	S16W26	082	0000	00	AXX	001	A												
01 Dec	S15W39	082	0000	00	AXX	001	A												
02 Dec	S15W52	082																	
03 Dec	S15W65	082																	
04 Dec	S15W78	082																	
								1	0	0	1	1	0	0	0				

Still on Disk.

Absolute heliographic longitude: 085



Region Summary-continued

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

Region 8781

24 Nov	S13E71	065	0050	03	HAX	001	A										
25 Nov	S13E58	064	0070	02	HSX	001	A										
26 Nov	S13E47	062	0080	08	CSO	004	B					1					
27 Nov	S13E34	061	0100	09	DSO	013	B										
28 Nov	S13E22	060	0170	09	DAI	027	B					2					
29 Nov	S13E09	060	0230	09	DAI	023	B										
30 Nov	S12W03	059	0230	10	DAI	021	B										
01 Dec	S12W16	059	0250	10	DKI	016	B										
02 Dec	S12W29	058	0280	11	EAO	020	B					1					
03 Dec	S12W42	058	0190	10	DAO	013	B										
04 Dec	S12W58	061	0160	03	HSX	004	A										
05 Dec	S13W71	061	0140	05	CAO	004	B										

0 0 0 4 0 0 0 0

Still on Disk.

Absolute heliographic longitude: 059

Region 8782

27 Nov	N11E01	094	0010	02	BXO	004	B										
28 Nov	N10W13	095	0040	05	CSO	009	B					1					
29 Nov	N10W27	096	0090	08	DAO	016	B					7					
30 Nov	N11W41	097	0170	09	DAI	023	B	5				6	2				
01 Dec	N09W53	096	0220	12	EAI	017	B	1				4					
02 Dec	N11W68	097	0400	15	EAI	014	B					8					
03 Dec	N10W83	099	0310	16	FAI	015	B	1				1					
04 Dec	N11W92	095	0120	02	HAX	001	A					1					

7 0 0 28 2 0 0 0

Crossed West Limb.

Absolute heliographic longitude: 094

Region 8783

30 Nov	S16W43	099	0020	03	CRO	005	B										
01 Dec	S16W58	101	0030	03	CRO	003	B										
02 Dec	S16W72	101	0010	01	HRX	001	A										
03 Dec	S16W85	101															

0 0 0 0 0 0 0 0

Crossed West Limb.

Absolute heliographic longitude: 099



Region Summary-continued

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

Region 8784

30 Nov	N30E32	024	0020	03	BXO	004	B										
01 Dec	N30E18	025	0030	06	CAO	004	B										
02 Dec	N30E05	024	0030	06	CRO	004	B										
03 Dec	N30W08	024															
04 Dec	N30W21	024															
05 Dec	N30W34	024															
										0	0	0	0	0	0	0	0

Still on Disk.

Absolute heliographic longitude: 024

Region 8785

01 Dec	N14E71	332	0060	02	HSX	001	A										
02 Dec	N14E58	331	0160	03	HAX	002	A										
03 Dec	N13E43	333	0100	03	HSX	002	A										
04 Dec	N13E30	333	0120	02	HSX	002	A										
05 Dec	N13E18	332	0130	03	CSO	006	B										
										0	0	0	0	0	0	0	0

Still on Disk.

Absolute heliographic longitude: 332

Region 8786

02 Dec	N22W07	036	0010	04	CRO	004	B										
03 Dec	N22W23	039	0000	03	BXO	002	B										
04 Dec	N22W39	042															
05 Dec	N22W52	042															
										0	0	0	0	0	0	0	0

Still on Disk.

Absolute heliographic longitude: 036

Region 8787

02 Dec	N14E46	343	0000	04	BXO	002	B										
03 Dec	N11E30	346	0000	00	AXX	001	A										
04 Dec	N12E18	345	0010	06	BXO	002	B										
05 Dec	N12E03	347	0000	03	BXO	002	B										
										0	0	0	0	0	0	0	0

Still on Disk.

Absolute heliographic longitude: 347



Region Summary-continued

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

Region 8788

02 Dec	N13E78	311	0180	05	HKX	001	A											
03 Dec	N10E66	310	0270	03	HKX	001	A						1					
04 Dec	N10E56	307	0510	17	FKI	019	BG	1					2	1				
05 Dec	N10E43	307	0510	17	FKO	013	B	1					1					
								2	0	0	4	1	0	0	0			

Still on Disk.

Absolute heliographic longitude: 307

Region 8789

02 Dec	N29W10	039	0000	04	BXO	003	B											
03 Dec	N29W23	039	0010	03	BXO	003	B											
04 Dec	N29W36	039																
05 Dec	N29W48	038	0000	03	BXO	003	B											
								0	0	0	0	0	0	0	0	0	0	0

Still on Disk.

Absolute heliographic longitude: 039

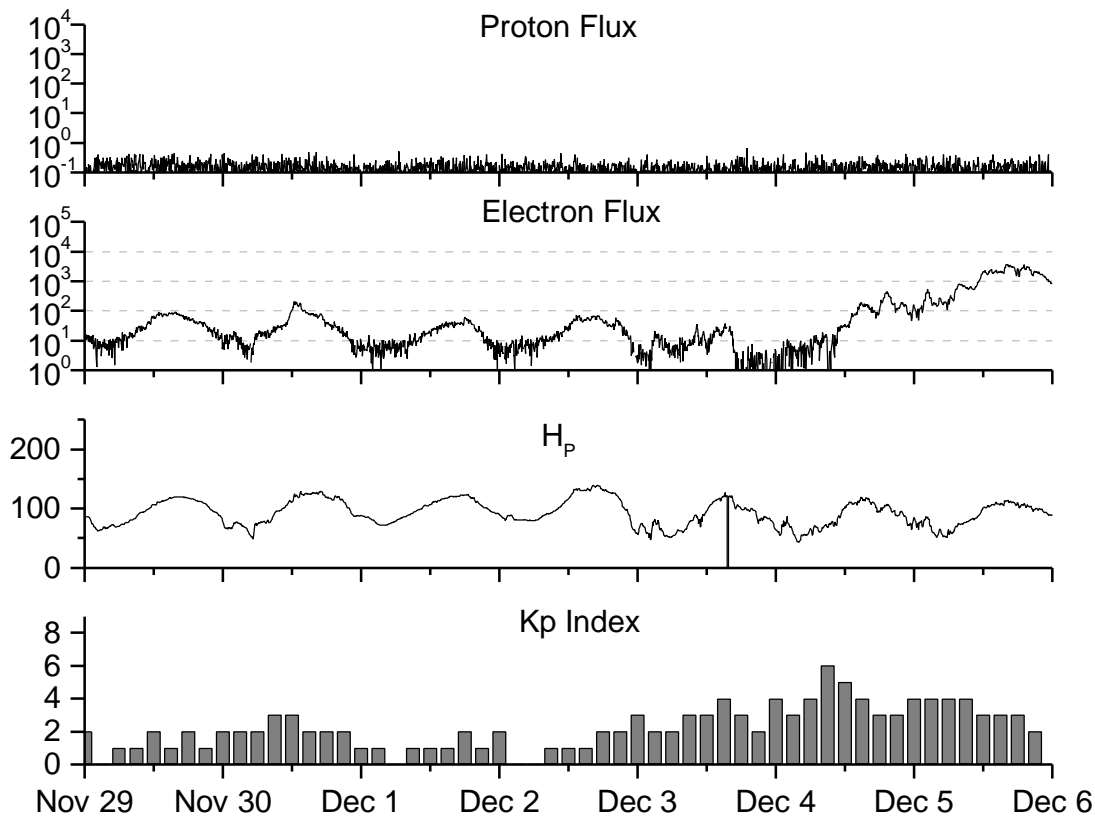


**Recent Solar Indices (preliminary)
of the observed monthly mean values**

Month	Sunspot Numbers				Radio Flux		Geomagnetic		
	Observed values SWO	RI	Ratio RI/SWO	Smooth values SWO	RI	*Penticton 10.7 cm	Smooth Value	Planetary Ap	Smooth Value
1997									
December	57.9	41.2	0.71	54.2	39.0	98.8	94.2	05	09.5
1998									
January	51.8	31.9	0.62	60.6	43.7	93.4	97.5	08	09.9
February	54.4	40.3	0.74	67.4	48.8	93.4	101.7	08	10.5
March	81.8	54.8	0.67	73.3	53.4	109.1	105.8	13	11.1
April	73.6	53.4	0.73	77.7	56.5	108.3	109.1	10	11.3
May	74.3	56.3	0.76	81.4	59.3	106.7	112.4	18	11.6
June	93.6	70.7	0.76	85.9	62.4	108.4	116.2	10	11.9
July	98.3	66.2	0.67	90.3	65.4	114.0	120.3	11	12.2
August	118.6	91.7	0.77	93.7	67.8	136.0	124.1	18	12.4
September	119.0	92.9	0.78	96.1	69.4	138.4	126.8	13	12.5
October	77.0	55.5	0.72	97.7	70.5	117.3	127.9	13	12.5
November	99.5	74.0	0.74	101.3	73.0	140.2	130.0	16	12.3
December	120.8	81.9	0.69	108.8	77.9	150.1	134.3	08	11.9
1999									
January	94.3	62.4	0.66	116.5	82.6	142.6	139.0	10	11.7
February	93.4	66.3	0.71	120.2	84.6	142.0	142.6	12	11.6
March	100.5	68.8	0.68	120.5	83.8	126.3	144.0	14	11.6
April	092.9	063.9	0.69	123.8	85.4	117.2	145.8	12	12.1
May	140.5	106.3	0.76	131.7	90.4	148.6	150.0	08	12.1
June	208.3	137.4	0.66			169.8		07	
July	169.2	113.5	0.67			165.6		10	
August	136.1	93.7	0.69			170.8		15	
September	107.4	70.9	0.66			135.7		18	
October	167.7	116.4	0.69			164.9		18	
November	199.3	132.7	0.67			191.7		12	

NOTE: All smoothed values after January 1998 and monthly values after September 1998 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 29 November 1999*

Protons plot contains the five-minute averaged integral proton flux (protons/cm²-sec -sr) as measured by GOES-8 (W75) for each of three energy thresholds: greater than 10, 50, and 100 MeV.

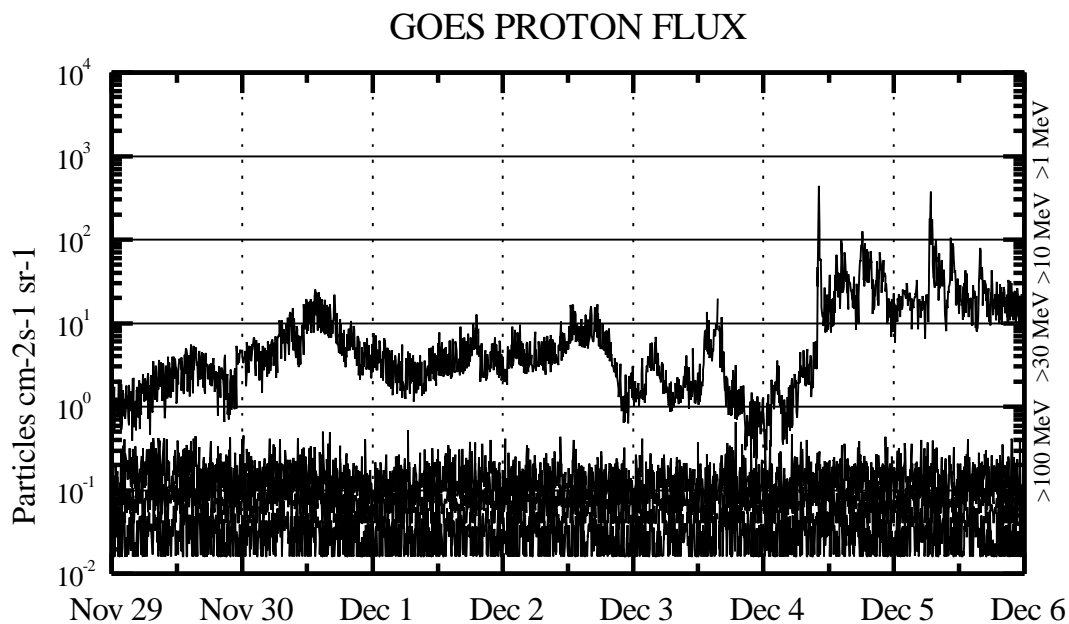
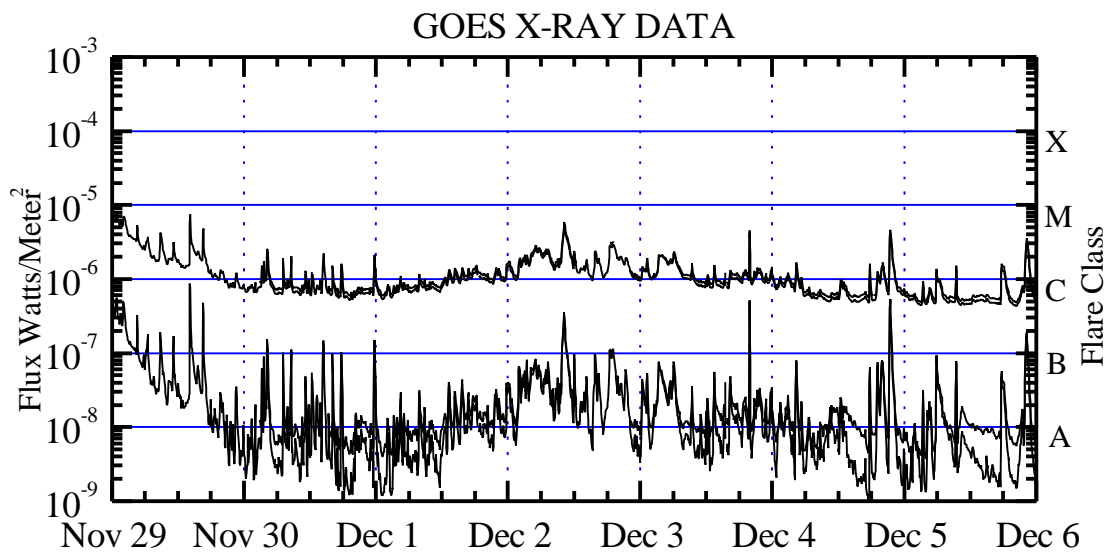
Electrons plot contains the five-minute averaged integral electron flux (electrons/cm² -sec -sr) with energies greater than 2 MeV at GOES-8.

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 USAF 55th Space Weather Squadron) 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.



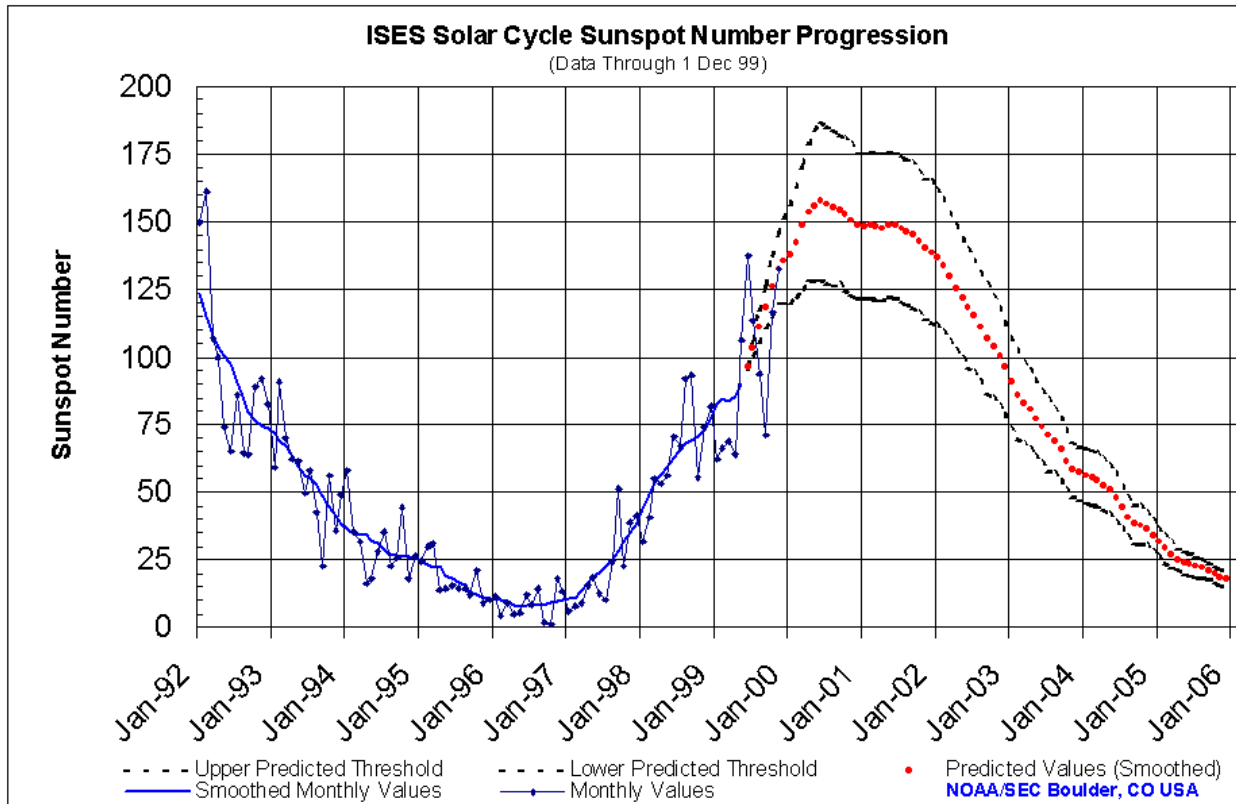


Weekly GOES Satellite X-ray and Proton Plots

X-ray plot contains five minute averaged x-ray flux (watts/m²) 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/cm² -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/cm²-sec-sr) at greater than 10 MeV.

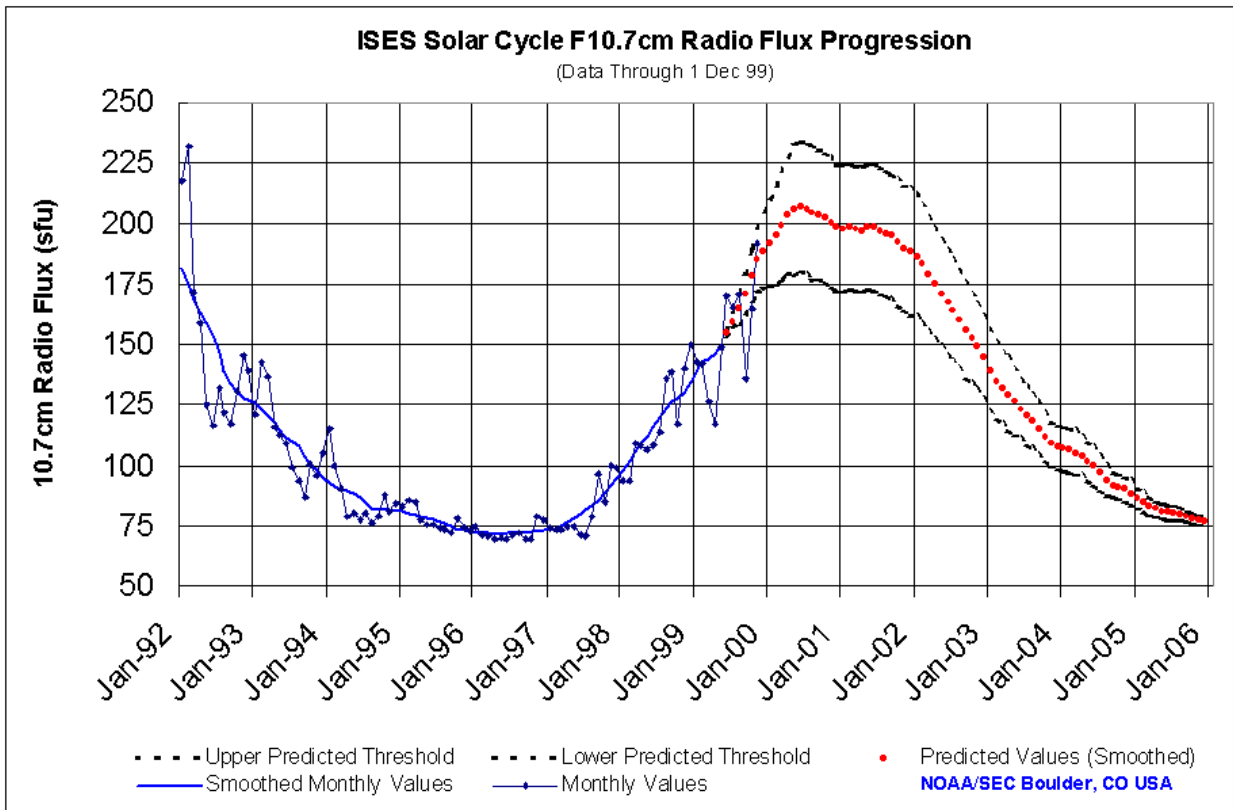




SEC Prediction of Smoothed Sunspot Number

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1996	10 (***)	10 (***)	10 (***)	9 (***)	8 (***)	9 (***)	8 (***)	8 (***)	8 (***)	9 (***)	10 (***)	10 (***)
1997	11 (***)	11 (***)	14 (***)	17 (***)	18 (***)	20 (***)	23 (***)	25 (***)	28 (***)	32 (***)	35 (***)	39 (***)
1998	44 (***)	49 (***)	53 (***)	57 (***)	59 (***)	63 (***)	66 (***)	68 (***)	70 (***)	71 (***)	73 (***)	78 (***)
1999	83 (***)	85 (***)	84 (***)	85 (***)	90 (***)	96 (1)	103 (3)	111 (6)	118 (8)	126 (11)	132 (13)	135 (16)
2000	138 (18)	142 (20)	148 (23)	153 (25)	156 (28)	158 (29)	156 (29)	155 (29)	154 (28)	153 (28)	151 (28)	148 (27)
2001	148 (27)	149 (27)	148 (27)	148 (27)	149 (27)	149 (27)	147 (27)	146 (27)	145 (27)	143 (26)	140 (26)	139 (26)
2002	137 (25)	134 (25)	130 (24)	125 (23)	122 (22)	118 (22)	115 (21)	111 (20)	107 (20)	104 (19)	100 (18)	96 (17)
2003	91 (17)	86 (16)	83 (15)	81 (15)	77 (14)	74 (13)	71 (13)	69 (12)	66 (12)	62 (11)	59 (10)	57 (10)
2004	56 (10)	56 (10)	55 (10)	53 (9)	51 (9)	48 (9)	44 (8)	41 (7)	38 (7)	38 (7)	36 (6)	34 (6)
2005	31 (5)	29 (5)	27 (5)	25 (4)	24 (4)	23 (4)	23 (4)	22 (4)	21 (3)	20 (3)	19 (3)	18 (3)





SEC Prediction of Smoothed F10.7cm Radio Flux

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1996	72	72	72	72	71	72	72	72	72	73	73	73
	(***)	(***)	(***)	(***)	(***)	(***)	(***)	(***)	(***)	(***)	(***)	(***)
1997	73	74	75	77	78	80	82	83	86	89	91	94
	(***)	(***)	(***)	(***)	(***)	(***)	(***)	(***)	(***)	(***)	(***)	(***)
1998	98	102	106	109	112	116	120	124	127	128	130	134
	(***)	(***)	(***)	(***)	(***)	(***)	(***)	(***)	(***)	(***)	(***)	(***)
1999	139	143	144	146	150	154	159	165	171	178	185	189
	(***)	(***)	(***)	(***)	(***)	(1)	(3)	(6)	(8)	(11)	(13)	(16)
2000	192	195	199	204	205	207	206	204	204	202	200	198
	(18)	(20)	(22)	(24)	(27)	(27)	(27)	(28)	(27)	(27)	(27)	(26)
2001	198	198	198	197	198	198	197	196	195	192	190	188
	(26)	(26)	(26)	(26)	(26)	(26)	(26)	(26)	(26)	(26)	(26)	(26)
2002	187	184	179	175	171	167	164	160	156	153	149	145
	(25)	(25)	(24)	(23)	(22)	(22)	(21)	(20)	(20)	(19)	(18)	(17)
2003	140	135	132	130	126	123	120	118	115	112	110	108
	(17)	(16)	(15)	(15)	(14)	(12)	(12)	(11)	(11)	(10)	(9)	(9)
2004	107	106	105	104	102	100	97	94	92	91	90	88
	(9)	(9)	(9)	(8)	(8)	(8)	(7)	(6)	(5)	(5)	(5)	(5)
2005	87	85	83	82	81	81	80	80	79	78	78	77
	(4)	(4)	(4)	(3)	(3)	(3)	(3)	(3)	(2)	(2)	(2)	(2)



ISES Solar Cycle Ap Progression

(Data Through 1 Dec 99)

