

**Space Weather Highlights**  
**19 - 25 February 2001**

**SWO PRF 1330**  
**27 February 2001**

Solar activity was low during most of the time, briefly dipping to very low levels on the last day of the period. Most of the sunspot groups were small and simply structured. The exception was Region 9354 (S09, L = 284, class/area Dao/240 on 25 February), which was a moderate-sized group that showed gradual development through 23 February as it produced isolated B- and C-class subflares. It was stable during 24 - 25 February as it approached the west limb.

Data were available from the Advanced Composition Explorer (ACE) spacecraft for most of the period. Minor changes were observed in the solar wind flow. No significant transients or high-speed streams were evident.

There were no proton events detected at geosynchronous orbit.

The greater than 2 MeV electron flux at geosynchronous orbit was at normal levels.

Geomagnetic field activity was at mostly quiet to unsettled levels. Isolated active periods occurred on 20, 21, and 23 February related to minor changes in the solar wind flow.

**Space Weather Outlook**  
**28 February - 26 March 2001**

Solar activity is expected to be at low to moderate levels. There will be a slight to fair chance for isolated M-class flares during the period. An increasing trend will be possible during the latter half of the period.

No proton events are expected during the period. However, chances for a proton event may increase during the latter half of the period.

The greater than 2 MeV electron flux at geosynchronous orbit is expected to be at normal levels during most of the period.

Geomagnetic field activity is expected to be at quiet to unsettled levels, barring an Earth-directed CME.



**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
19 February	137	147	310	B3.3	1	0	0	2	0	0	0	0
20 February	146	119	430	B5.4	4	0	0	3	0	0	0	0
21 February	144	119	470	B3.5	4	0	0	3	0	0	0	0
22 February	146	135	520	B3.9	1	0	0	5	0	0	0	0
23 February	145	135	530	B3.4	3	0	0	3	0	0	0	0
24 February	137	99	580	B6.1	1	0	0	0	0	0	0	0
25 February	135	111	480	B2.8	0	0	0	1	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
	19 February	1.6E+5	1.0E+4	2.4E+3		6.8E+6
20 February	8.9E+4	1.1E+4	2.3E+3		7.7E+5	
21 February	5.0E+4	1.1E+4	2.5E+3		5.9E+5	
22 February	9.9E+4	1.1E+4	2.5E+3		8.2E+5	
23 February	1.5E+5	1.0E+4	2.6E+3		1.7E+6	
24 February	6.8E+4	1.0E+4	2.7E+3		3.1E+6	
25 February	8.9E+4	1.1E+4	2.7E+3		4.1E+6	

**Daily Geomagnetic Data**

Date	Middle Latitude Fredericksburg		High Latitude College		Estimated Planetary	
	A	K-indices	A	K-indices	A	K-indices
	19 February	3	0-1-2-1-2-1-1-0	4	0-0-2-3-1-2-1-0	6
20 February	9	2-1-2-4-3-2-1-2	*	*-*-*-*-*-*-*	8	1-1-2-3-3-2-2-2
21 February	6	3-1-0-2-3-2-0-1	13	4-0-1-4-5-1-0-0	6	2-1-1-2-3-2-2-2
22 February	7	1-0-3-3-2-2-2-1	*	1-0-*-*-*2-1-1	6	0-0-3-2-1-2-2-3
23 February	9	3-2-3-2-3-1-1-1	18	3-3-4-3-5-3-1-1	11	3-3-4-2-3-3-2-2
24 February	3	1-2-0-0-2-1-0-0	3	1-1-0-2-2-1-0-0	5	1-2-0-2-2-3-1-0
25 February	1	0-1-0-0-0-0-1-0	0	0-0-0-1-0-0-0-0	3	0-0-1-1-1-2-1-0



*Alerts and Warnings Issued*

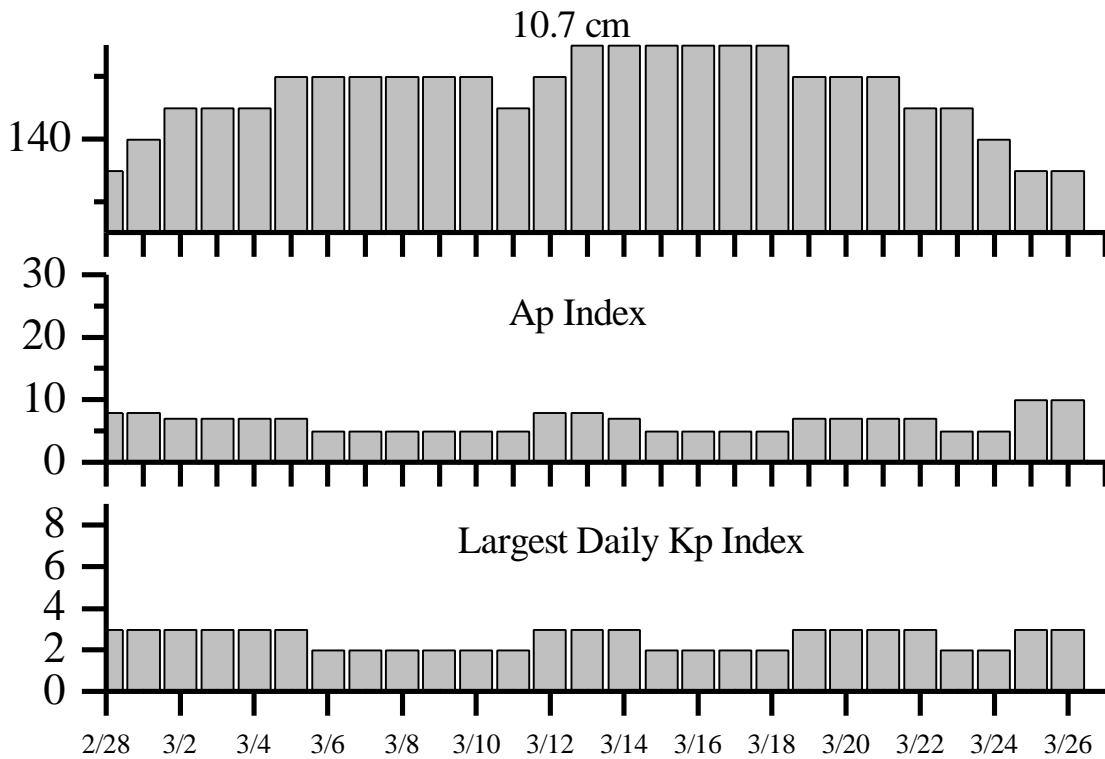
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Date & Time of Issue	Type of Alert or Warning	Date & Time of Event UT
19 Feb 0100	CONTINUED Electron Event >2MeV >=1000pfu	16 Feb 1515
19 Feb 1236	Stratwarm Alert Exists Monday	
20 Feb 1155	K= 4 Warning	20 Feb 1200 - 1500
20 Feb 1200	K= 4 Observed	20 Feb 0900 - 1200
20 Feb 1221	Stratwarm Alert Exists Tuesday	
21 Feb 1107	Stratwarm Alert Exists Wednesday	
22 Feb 0013	1 – 245 MHz Radio Bursts	21 Feb
22 Feb 1252	Stratwarm Alert Exists Thursday	
23 Feb 858	K= 4 Observed	23 Feb 0600 - 0900
23 Feb 1124	Stratwarm Alert Exists Friday	
24 Feb 0117	3 – 245 MHz Radio Bursts	23 Feb
24 Feb 1241	Stratwarm Alert Exists Saturday	
25 Feb 1334	Stratwarm Alert Exists Sunday	

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### 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
28 Feb	135	8	3	14 Mar	155	7	2
01 Mar	140	8	3	15	155	5	2
02	145	7	2	16	155	5	2
03	145	7	2	17	155	5	2
04	145	7	2	18	155	5	2
05	150	7	2	19	150	7	2
06	150	5	2	20	150	7	2
07	150	5	2	21	150	7	2
08	150	5	2	22	145	7	2
09	150	5	2	23	145	5	2
10	150	5	2	24	140	5	2
11	145	5	2	25	135	10	3
12	150	8	3	26	135	10	3
13	155	8	3				



***Energetic Events***

Date	Time		X-ray		Optical Information			Peak		Sweep Freq		
	Begin	Max	½ Max	Class	Integ Flux	Imp/ Brtns	Location		Radio Flux		Intensity	
							Lat	CMD	245	2695	II	IV

*No Events Observed*

***Flare List***

Date	Time			X-ray Class.	Optical Imp / Brtns	Location Lat CMD	Rgn
	Begin	Max	End				
19 February	1030	1043	1047	B7.5			
	B1131	U1132	1135		Sf	S09E00	9354
	1312	1313	1321	B7.9	Sf	S09W01	9354
	1348	1351	1358	B7.8			
	1514	1518	1525	B7.7			
	1947	1952	2000	B9.7			
20 February	2043	2100	2121	C5.4			
	0110	0122	0129	C3.1			
	0344	0349	0357	B9.8			
	1356	1400	1404	B8.4			
	1450	1451	1455	C2.2	Sf	S09W15	9354
	1540	1540	1546	C2.1	Sf	S09W15	9354
	1706	1711	1716	C1.5			
	2029	2029	2038		Sf	S09W19	9354
21 February	2337	2341	2345	B6.4			
	0758	0802	0806	B6.2			
	0807	0820	0828	C3.0			
	1416	1426	1447	C6.2	Sf	S08W29	9354
	2009	2010	2031	C1.2	Sf	S08W31	9354
22 February	2251	2259	2306	C1.8			
	0000	0004	0009		Sf	S08W34	9354
	0036	0036	0043		Sf	S09W34	9354
	0157	0158	0212	C1.1	Sf	S22W53	9353
	B0650	U0650	0656		Sf	S09W36	9354
23 February	1319	1323	1326		Sf	S07W41	9354
	0611	0631	0638	B8.3			
	1224	1228	1233	B6.2			
	1256	1309	1322	C1.1			
	1419	1421	1436	C1.4	Sf	N11E44	9359
	1613	1617	1620	B5.6			
	1625	1627	1632	B8.2	Sf	S26W27	9357
	2147	2319	0006	C2.2			
B2300	2327	0008		Sf	S12E46		



**Flare List – continued.**

Date	Time			X-ray Class.	Imp / Brtns	Optical	Rgn
	Begin	Max	End			Location Lat CMD	
24 February	0420	0426	0435	B7.3			
	0832	0835	0838	B5.4			
	1354	1357	1359	C1.1			
	2155	2201	2204	B4.5			
25 February	0140	0146	0157	B5.2			
	2140	2141	2144	B7.4	Sf	S27W56	9357
	2329	2335	2351	B7.1			

**Region Summary**

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

*Region 9347*

09 Feb	N04E66	344	0090	06	Cso	004	B										
10 Feb	N03E51	346	0040	03	Cso	004	B										
11 Feb	N04E38	346	0050	04	Dao	004	B										
12 Feb	N04E25	346	0050	04	Dso	003	B										
13 Feb	N04E12	345	0030	03	Dso	003	B										
14 Feb	N04W01	345	0030	04	Cso	004	B										
15 Feb	N04W15	346	0030	05	Dao	005	B										
16 Feb	N04W29	347	0010	04	Cso	003	B										
17 Feb	N05W41	346	0020	02	Hsx	002	A										
18 Feb	N05W54	346															
19 Feb	N05W67	346															

0 0 0 0 0 0 0 0

Crossed West Limb.

Absolute heliographic longitude: 345



**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 9349*

10 Feb	N28E60	337	0050	01	Hsx	001	A											
11 Feb	N28E46	338	0040	01	Hsx	001	A											
12 Feb	N28E34	337	0030	02	Hsx	001	A											
13 Feb	N28E21	336	0030	01	Hsx	001	A											
14 Feb	N28E08	336	0030	01	Hax	001	A											
15 Feb	N28W05	336	0020	01	Hsx	001	A											
16 Feb	N28W18	336	0030	01	Hsx	001	A											
17 Feb	N28W31	336	0010	01	Hrx	001	A											
18 Feb	N28W44	336	0020	01	Hrx	001	A											
19 Feb	N28W56	334	0000	01	Axx	001	A											
20 Feb	N30W69	334	0020	01	Hrx	001	A											
21 Feb	N30W82	334																

0 0 0 0 0 0 0 0

Crossed West Limb.

Absolute heliographic longitude: 336

*Region 9350*

11 Feb	N18E69	315	0060	03	Hsx	001	A											
12 Feb	N18E56	315	0060	02	Hax	001	A											
13 Feb	N18E43	314	0060	01	Hsx	002	A											
14 Feb	N18E30	314	0060	02	Hsx	002	A											
15 Feb	N18E16	315	0070	02	Hsx	001	A											
16 Feb	N18E04	314	0060	02	Hsx	001	A											
17 Feb	N18W09	314	0080	02	Hsx	001	A											
18 Feb	N18W23	315	0070	02	Hsx	001	A											
19 Feb	N18W36	314	0050	02	Hsx	001	A											
20 Feb	N19W50	315	0060	02	Hsx	001	A											
21 Feb	N19W62	314	0040	02	Hsx	001	A											
22 Feb	N18W76	315	0050	02	Hsx	001	A											

0 0 0 0 0 0 0 0

Crossed West Limb.

Absolute heliographic longitude: 314

*Region 9351*

15 Feb	S21W42	013	0010	03	Bxo	003	B											
16 Feb	S23W53	011	0030	04	Cso	002	B											
17 Feb	S23W66	011	0000	00		000												
18 Feb	S20W81	013	0010	03	Cso	002	B											
19 Feb	S21W92	010	0000	01	Axx	001	A											

0 0 0 0 0 0 0 0

Crossed West Limb.

Absolute heliographic longitude: 013



**Region Summary- continued.**

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

*Region 9352*

15 Feb	S23E63	268	0020	04	Bxo	002	B												
16 Feb	S22E51	267	0010	05	Bxo	002	B												
17 Feb	S22E36	269	0010	03	Bxo	003	B												
18 Feb	S23E25	267	0020	05	Cso	006	B												
19 Feb	S21E14	264	0010	04	Bxo	003	B												
20 Feb	S21E02	263	0010	00	Axx	001	A												
21 Feb	S21W11	263																	
22 Feb	S21W24	263																	
23 Feb	S21W35	261	0000	01	Axx	002	A												
24 Feb	S21W48	261																	

0 0 0 0 0 0 0 0

Still on Disk.

Absolute heliographic longitude: 263

*Region 9353*

16 Feb	S23E17	301	0010	02	Hsx	002	A												
17 Feb	S23E03	302	0010	04	Bxo	006	B												
18 Feb	S22W10	302	0030	05	Cso	006	B												
19 Feb	S22W24	302	0010	05	Bxo	005	B												
20 Feb	S22W36	301	0040	05	Dao	004	B												
21 Feb	S24W50	302	0030	07	Dso	003	B												
22 Feb	S24W64	303	0010	05	Bxo	003	B	1			1								
23 Feb	S13W80	306																	
24 Feb	S24W84	296																	

1 0 0 1 0 0 0 0

Still on Disk.

Absolute heliographic longitude: 302

*Region 9354*

16 Feb	S09E34	284	0000	01	Axx	001	A												
17 Feb	S08E20	285	0050	04	Dao	008	B												
18 Feb	S09E07	285	0110	07	Dao	014	B												
19 Feb	S09W06	284	0150	07	Dai	017	B					2							
20 Feb	S08W20	285	0150	09	Dao	018	B	2				3							
21 Feb	S08W32	284	0180	08	Dai	015	B	2				3							
22 Feb	S09W45	284	0200	08	Dao	018	B					4							
23 Feb	S09W59	285	0250	10	Dao	018	B												
24 Feb	S09W72	284	0280	09	Dao	015	B												
25 Feb	S09W83	282	0200	10	Dao	005	B												

4 0 0 12 0 0 0 0

Still on Disk.

Absolute heliographic longitude: 284





**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 9355*

18 Feb	N20E35	257	0020	04	Cro	004	B											
19 Feb	N20E21	257	0010	05	Bxo	005	B											
20 Feb	N20E08	257																
21 Feb	N20W05	257																
22 Feb	N20W18	257																
23 Feb	N20W31	257																
24 Feb	N20W44	257																

0 0 0 0 0 0 0 0

Still on Disk.

Absolute heliographic longitude: 257

*Region 9356*

18 Feb	S13W10	302	0010	03	Bxo	004	B											
19 Feb	S13W23	301	0020	03	Bxo	005	B											
20 Feb	S13W36	301	0000	00		000												
21 Feb	S15W52	304	0010	01	Axx	001	A											
22 Feb	S15W66	305	0020	01	Axx	002	A											
23 Feb	S13W80	306	0010	03	Cso	002	B											

0 0 0 0 0 0 0 0

Crossed West Limb.

Absolute heliographic longitude: 302

*Region 9357*

18 Feb	S26E35	257	0040	02	Hsx	003	A											
19 Feb	S25E19	259	0020	04	Cro	003	B											
20 Feb	S26E06	259	0020	03	Cso	002	B											
21 Feb	S26W07	259	0020	05	Cso	004	B											
22 Feb	S26W20	259	0010	05	Bxo	003	B											
23 Feb	S25W33	259	0020	07	Bxo	008	B											1
24 Feb	S25W46	258	0020	06	Cro	005	B											
25 Feb	S25W57	256	0060	07	Cso	008	B											1

0 0 0 2 0 0 0 0

Still on Disk.

Absolute heliographic longitude: 259



**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 9358*

18 Feb	S08E46	246	0010	03	Bxo	002	B												
19 Feb	S08E33	245	0040	04	Cro	006	B												
20 Feb	S08E20	245	0050	07	Dao	009	B												
21 Feb	S18E07	245	0050	07	Dso	009	B												
22 Feb	S08W05	244	0010	05	Cso	005	B												
23 Feb	S04W22	248	0010	08	Bxo	006	B												
24 Feb	S07W34	246	0010	01	Hsx	001	A												
25 Feb	S10W43	242	0010	01	Axx	001	A												
										0	0	0	0	0	0	0	0	0	0

Still on Disk.

Absolute heliographic longitude: 244

*Region 9359*

20 Feb	N10E74	191	0080	03	Cso	003	B												
21 Feb	N10E64	188	0120	06	Dao	005	B												
22 Feb	N12E52	187	0190	08	Dao	010	B												
23 Feb	N12E34	192	0200	12	Eao	015	B	1				1							
24 Feb	N13E23	189	0240	11	Eao	016	B												
25 Feb	N13E10	189	0170	10	Dai	022	B												
										1	0	0	1	0	0	0	0	0	0

Still on Disk.

Absolute heliographic longitude: 189

*Region 9360*

21 Feb	S11E58	194	0020	01	Hsx	001	A												
22 Feb	S10E45	194	0030	01	Hsx	001	A												
23 Feb	S10E31	195	0030	01	Hrx	001	A												
24 Feb	S10E17	195	0020	01	Hsx	001	A												
25 Feb	S11E04	195	0020	03	Cso	003	B												
										0	0	0	0	0	0	0	0	0	0

Still on Disk.

Absolute heliographic longitude: 195

*Region 9361*

22 Feb	S17E07	232	0000	03	Bxo	002	B												
23 Feb	S12W06	232	0010	02	Bxo	003	B												
24 Feb	S16W18	230	0010	01	Axx	001	A												
25 Feb	S15W36	235	0010	01	Axx	001	A												
										0	0	0	0	0	0	0	0	0	0

Still on Disk.

Absolute heliographic longitude: 232



***Region Summary- continued.***

Date	Location		Sunspot Characteristics				Flares							
	( ° Lat ° CMD)	Helio Lon	Area (10 <sup>-6</sup> hemi)	Extent (helio)	Spot Class	Spot Count	Mag Class	X-ray			Optical			
							C	M	X	S	1	2	3	4
<i>Region 9362</i>														
25 Feb	S07E12	187	0010	01	Axx	001	A							
								0	0	0	0	0	0	0

Still on Disk.

Absolute heliographic longitude: 187

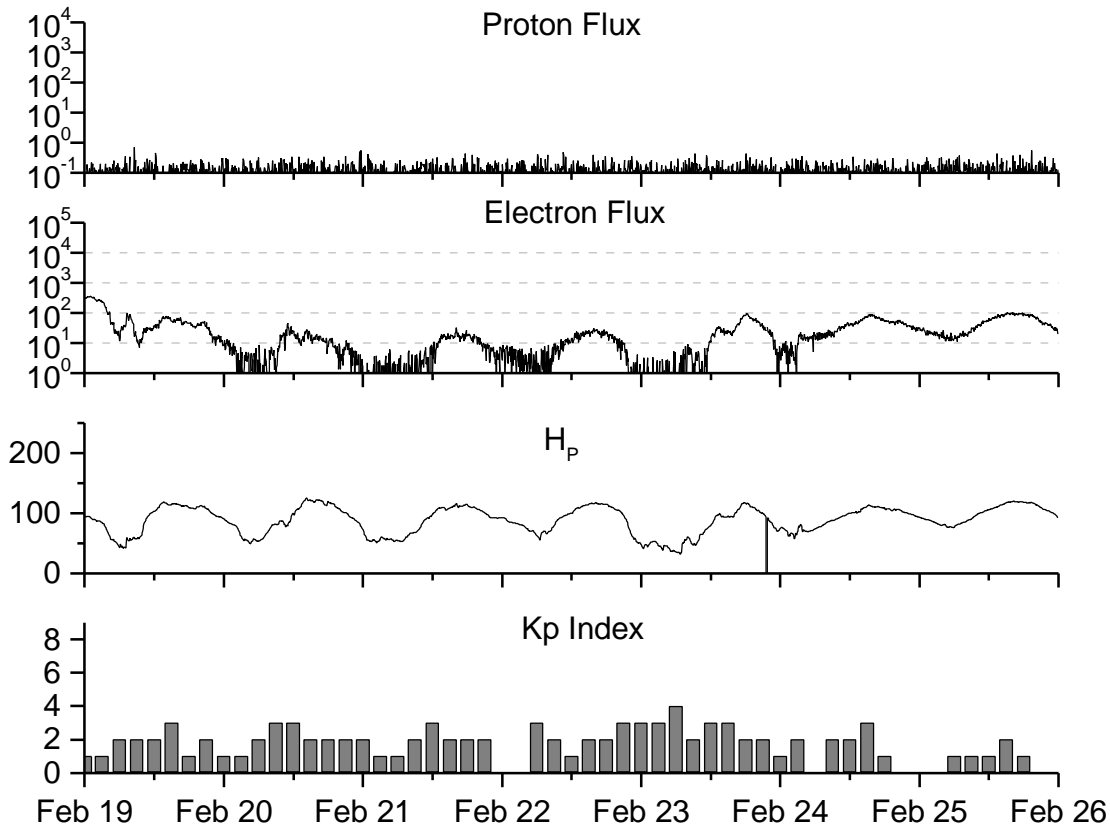


**Recent Solar Indices (preliminary)  
of the observed monthly mean values**

Month	Sunspot Numbers				Radio Flux		Geomagnetic		
	Observed values		Ratio	Smooth values		*Penticton	Smooth	Planetary	Smooth
	SWO	RI	RI/SWO	SWO	RI	10.7 cm	Value	Ap	Value
<b>1999</b>									
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	11.7
April	92.9	63.7	0.69	123.8	85.5	117.2	145.8	12	12.2
May	140.5	106.4	0.76	131.7	90.5	148.6	149.9	08	12.4
June	208.3	137.7	0.66	136.0	93.1	169.8	152.9	07	12.4
July	169.2	113.5	0.67	138.0	94.3	165.6	154.4	10	12.6
August	136.1	93.7	0.69	142.8	97.5	170.8	156.3	15	12.9
September	107.4	71.5	0.67	150.0	102.3	135.7	161.0	19	12.8
October	167.7	116.7	0.70	158.5	107.8	164.8	167.2	19	12.7
November	199.3	133.2	0.67	164.7	110.0	191.5	171.5	14	13.1
December	123.5	86.4	0.69	165.9	111.1	169.8	173.4	10	13.8
<b>2000</b>									
January	140.8	90.1	0.64	168.0	112.9	158.1	175.5	13	14.5
February	161.9	112.9	0.70	172.1	116.7	173.2	176.8	15	15.0
March	203.6	138.5	0.68	175.4	119.9	208.2	178.4	09	15.0
April	193.4	125.5	0.65	176.3	120.8	184.2	180.5	15	15.0
May	188.8	121.6	0.64	173.1	119.0	184.5	180.0	15	15.0
June	190.3	124.9	0.66	172.0	118.7	179.8	179.7	15	15.1
July	236.7	169.1	0.71	173.0	119.7	204.7	180.2	21	14.8
August	166.6	130.5	0.78			163.1		16	
September	157.9	109.9	0.70			182.1		18	
October	138.9	100.1	0.72			167.7		18	
November	149.9	106.5	0.71			178.8		17	
December	146.4	104.5	0.71			173.6		08	
<b>2001</b>									
January	142.7	95.1	0.67			166.7		08	

**NOTE:** All smoothed values after December 1999 and monthly values after June 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 19 February 2001*

*Protons* plot contains the five-minute averaged integral proton flux (protons/cm<sup>2</sup>-sec -sr ) as measured by GOES-8 (W75) for each of three energy thresholds: greater than 10, 50, and 100 MeV.

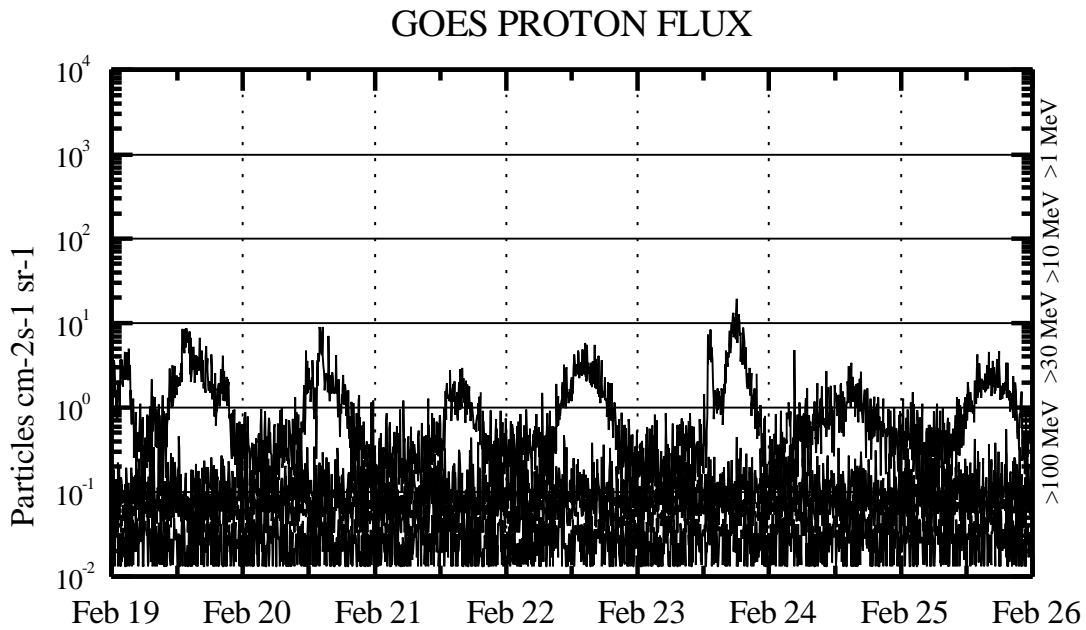
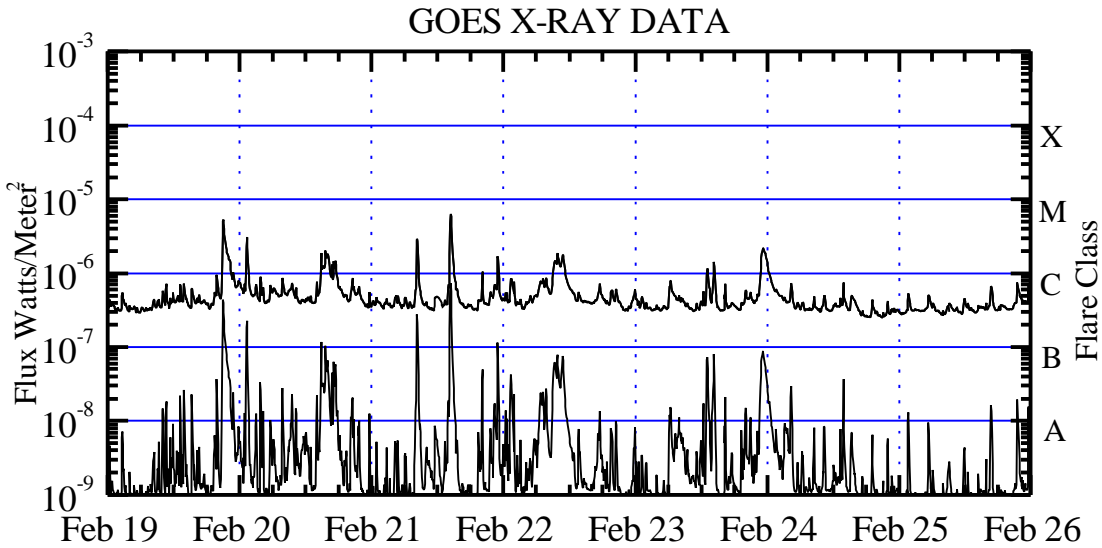
*Electrons* plot contains the five-minute averaged integral electron flux (electrons/cm<sup>2</sup> -sec -sr) with energies greater than 2 MeV at GOES-8.

*H<sub>p</sub>* 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.

*K<sub>p</sub>* plot contains the estimated planetary 3-hour K-index (derived by the USAF 55<sup>th</sup> 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 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 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<sup>2</sup>-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<sup>2</sup>-sec-sr) at greater than 10 MeV.

