

Space Weather Highlights
24 February - 02 March 2003

SWO PRF 1435
04 March 2003

Solar activity was at very low to low levels. The period began with low level activity on 24 February due to a C1 flare from Region 290 (N17, L=331, class/area Eki/360 on 21 February). Activity decreased to very low levels on 25 – 26 February with B-class flares primarily from Region 290. For the remainder of the period, 27 February – 02 March, activity returned to low levels. Region 296 (N12, L=169, class/area Dko/640 on 01 March) was the source of most of the C-class activity on 28 February as it rotated onto the visible disk. On 01 March, Region 297 (S15, L=162, class/area Dso/50 on 02 March) produced the largest event of the period, a C5 flare at 0136 UTC. Region 296 was also active on 01 March with numerous minor C-class events. At the close of the period, Region 296 developed some mixing polarity in the trailing spots.

Solar wind data were available from the NASA Advanced Composition Explorer (ACE) spacecraft for most of the summary period. Late on 26 February, a sector boundary crossing was observed and followed on 27 February, by a corotating interacting region and coronal hole high speed stream. Solar wind speed increased to over 600 km/s and periods of moderate to strong southward Bz near – 20 nT were associated with the CIR. Solar wind velocity gradually decreased over the remainder of the period and was at 350 km/s at the close of the period.

There were no greater than 10 MeV proton events at geo-synchronous orbit during the summary period.

The greater than 2 MeV electron flux at geo-synchronous orbit reached high levels on 24 and 28 February, and again on 01 March.

The geomagnetic field was at quiet to active levels. On 24 – 25 February, activity was at quiet to unsettled levels. On 26 – 28 February, a coronal hole high speed stream rotated into a geo-effective position and produced unsettled to active conditions at mid latitudes and minor to major storm levels at higher latitudes. For the remainder of the period, 01 – 02 March, residual effects from the coronal hole produced unsettled to isolated active conditions.

Space Weather Outlook
05 March - 31 March 2003

Solar activity is expected to be at low levels with a slight chance of moderate activity. Region 296 has the potential for isolated M-class activity until it rotates beyond the west limb on 13 March. After 13 March, activity is expected to be very low to low.

No greater than 10 MeV proton events are expected during the forecast period.

The greater than 2 MeV electron flux may reach high levels on 05 – 07, 19 – 24, and 27 – 28 March due to returning coronal holes.

The geomagnetic field is expected to be at quiet to major storm levels. Unsettled to isolated minor storm conditions are possible on 05 March due to a high speed stream. A large southern coronal hole is expected to return to a geo-effective position on 14 – 21 March and is expected to produce unsettled to isolated minor storm conditions. Two smaller but intense coronal holes are due on 25 – 27 March and 30 – 31 March and are expected to produce active to isolated major storm levels.



Daily Solar Data

Date	Radio Flux 10.7 cm	Sun spot No.	Sunspot Area (10 ⁻⁶ hemi.)	X-ray Background	Flares							
					X-ray Flux			Optical				
					C	M	X	S	1	2	3	4
24 February	102	44	270	A8.0	1	0	0	1	0	0	0	0
25 February	102	48	210	A9.4	0	0	0	2	0	0	0	0
26 February	109	45	220	B2.2	0	0	0	1	0	0	0	0
27 February	118	82	250	B4.1	2	0	0	0	0	0	0	0
28 February	125	77	510	B4.5	5	0	0	2	0	0	0	0
01 March	138	73	850	B5.1	7	0	0	2	0	0	0	0
02 March	147	67	840	B5.3	5	0	0	5	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
24 February	2.0E+5	1.2E+4	2.5E+3		4.1E+7	
25 February	3.4E+5	1.3E+4	2.7E+3		3.3E+7	
26 February	5.0E+5	1.3E+4	2.6E+3		5.2E+6	
27 February	6.1E+5	1.2E+4	2.7E+3		3.4E+6	
28 February	3.8E+5	1.2E+4	2.6E+3		3.5E+7	
01 March	1.2E+5	1.2E+4	2.9E+3		3.5E+7	
02 March	1.0E+5	1.2E+4	2.8E+3		1.6E+7	

Daily Geomagnetic Data

Date	Middle Latitude Fredericksburg		High Latitude College		Estimated Planetary	
	A	K-indices	A	K-indices	A	K-indices
	24 February	5	2-1-1-2-2-2-1-1	*	*_*_*_*_*_*_*_*	6
25 February	2	1-0-0-2-1-1-0-0	5	1-1-0-2-3-1-1-1	5	2-1-1-2-2-2-2-1
26 February	12	0-2-4-3-2-2-2-4	25	0-1-4-6-5-3-3-3	16	1-2-4-4-3-3-3-4
27 February	17	4-4-3-3-3-3-3-2	43	4-3-5-5-6-6-3-4	22	4-4-3-3-4-4-3-4
28 February	11	2-0-2-3-2-3-2-4	36	3-2-3-6-6-5-4-3	17	3-2-3-4-3-4-3-4
01 March	9	3-1-1-3-3-2-1-2	15	2-1-2-5-3-4-2-2	14	4-1-1-3-3-3-3-3
02 March	9	1-2-3-2-3-2-2-2	21	1-3-3-5-5-3-3-2	14	2-3-3-3-4-3-3-3

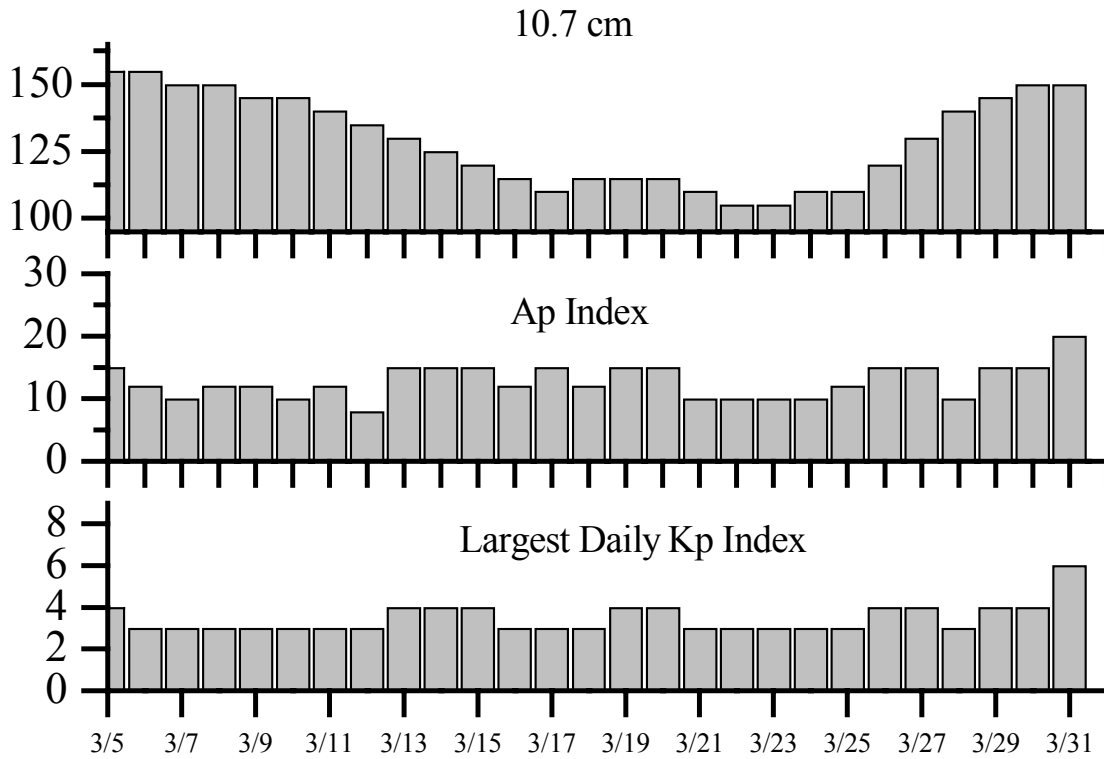


Alerts and Warnings Issued

<u>Date & Time of Issue</u>	<u>Type of Alert or Warning</u>	<u>Date & Time of Event UT</u>
24 Feb 1627	ALERT: Electron 2MeV Integral Flux > 1000pfu	24 Feb 1610
24 Feb 1635	CANCEL ALERT: Electron 2MeV Integral Flux > 1000pfu	24 Feb 1627
24 Feb 1637	ALERT: Electron 2MeV Integral Flux > 1000pfu	24 Feb 1610
26 Feb 0848	WARNING: Geomagnetic K= 4	26 Feb 0855 -1500
26 Feb 1147	ALERT: Geomagnetic K= 4	26 Feb 1146
26 Feb 2259	WARNING: Geomagnetic K= 4	26 Feb 2300 -27 Feb 1500
26 Feb 2326	ALERT: Geomagnetic K= 4	26 Feb 2325
27 Feb 0039	1 - 245 MHz Burst	26 Feb
27 Feb 0058	WARNING: Geomagnetic K = 5	27 Feb 0100 -1200
27 Feb 0252	ALERT: Geomagnetic K = 5	27 Feb 0250
27 Feb 1734	ALERT: Geomagnetic K = 4	27 Feb 1732
27 Feb 2037	ALERT: Geomagnetic K = 4	27 Feb 1735
27 Feb 2112	CANCEL ALERT: Geomagnetic K = 4	27 Feb 2037
27 Feb 2114	ALERT: Geomagnetic K = 4	27 Feb 2035
28 Feb 1119	WARNING: Geomagnetic K= 4	28 Feb 1120 -1500
28 Feb 1129	ALERT: Geomagnetic K= 4	28 Feb 1129
28 Feb 1356	ALERT: Electron 2MeV Integral Flux > 1000pfu	28 Feb 1330
28 Feb 1737	WARNING: Geomagnetic K= 4	28 Feb 1737 -2359
28 Feb 1739	ALERT: Geomagnetic K=4	28 Feb 1738
28 Feb 2354	EXTENDED WARNING: Geomagnetic K= 4	28 Feb 1737 -01 Mar 1800
01 Mar 0030	3 - 245 MHz Bursts	28 Feb
01 Mar 0030	2 - 245 MHz Noise Storms	28 Feb 2003
01 Mar 1529	ALERT: Electron 2MeV Integral Flux > 1000pfu	01 Mar 1510
02 Mar 0043	10 - 245 MHz Bursts	01 Mar
02 Mar 0043	2 - 245 MHz Noise Storms	01 Mar



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 Mar	155	15	4	19 Mar	115	15	4
06	155	12	3	20	115	15	4
07	150	10	3	21	110	10	3
08	150	12	3	22	105	10	3
09	145	12	3	23	105	10	3
10	145	10	3	24	110	10	3
11	140	12	3	25	110	12	3
12	135	8	3	26	120	15	4
13	130	15	4	27	130	15	4
14	125	15	4	28	140	10	3
15	120	15	4	29	145	15	4
16	115	12	3	30	150	15	4
17	110	15	3	31	150	20	6
18	115	12	3				



Energetic Events

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

No Events Observed

Flare List

Date	Time			X-ray Class.	Optical		Rgn
	Begin	Max	End		Imp / Brtns	Location Lat CMD	
24 February	0729	0733	0736	B2.2			
	B1126	U1126	1217	C1.1	Sf	N16W29	290
	1716	1719	1721	B1.7			
	1838	1843	1845	B3.2			
	2036	2039	2042	B1.5			
	2045	2049	2051	B1.9			
	2219	2230	2232	B2.2			
	2246	2249	2254	B1.7			
25 February	2309	2317	2321	B4.2			
	0140	0144	0149	B1.7			
	0201	0206	0209	B4.7			
	0227	0229	0234	B2.7	Sf	N18W35	290
	0353	0401	0405	B8.1			288
	1343	1348	1400	B2.6			
	1419	1420	1425	B2.2	Sf	N18W45	290
	1450	1453	1457	B1.6			
26 February	2042	2045	2049	B2.2			
	0057	0101	0105	B2.9			
	0945	0945	0949	B7.8	Sf	N16W61	290
27 February	1600	1605	1612	B4.2			
	0155	0158	0201	C1.2			288
	0528	0533	0535	B7.8			
28 February	2344	2352	2359	C3.4			
	0033	0037	0040	C1.5			
	0620	0628	0634	C1.7			
	B1254	U1254	1311	C1.0	Sf	S06W19	293
	1312	1314	1326		Sf	N12E59	296
	1732	1735	1737	B9.0			
01 March	1742	1751	1755	C1.1			297
	2227	2234	2238	C1.5			296
	0116	0136	0152	C5.1			
	0834	0842	0849	C2.4			292
	1326	1332	1338	C1.2			
	1420	1432	1444	C3.0			292
	1537	1542	1547	C1.9			296



Flare List - continued.

Date	Time			X-ray Class.Brtns	Optical		Rgn Lat CMD
	Begin	Max	End		Imp /	Location	
01 March	1650	1654	1658	B8.4			296
	B1717	U1717	1723	C2.1	Sf	N11E62	296
	B1907	U0000	1912	C3.5	Sf	N13E78	296
02 March	0444	0445	0452		Sf	N12E60	296
	0631	0631	0633		Sf	S09W72	292
	0717	0720	0728		Sf	S09W73	292
	0743	0749	0814	C1.1	Sf	S09W73	292
	0859	0927	0941	C1.1			292
	1005	1021	1028	C1.3			292
	1037	1039	1044	C1.2			292
	1345	1346	1348	C1.0			296
	1425	1426	1433		Sf	N08E57	296
	2320	2324	2327	B7.7			



Region Summary

Date	Location		Sunspot Characteristics				Flares											
	Helio		Area (10 ⁻⁶ hemi)	Extent (helio)	Spot Class	Spot Count	Mag Class	X-ray			Optical							
	(° Lat ° CMD)	Lon						C	M	X	S	1	2	3	4			
<i>Region 288</i>																		
15 Feb	N12E72	345	0010	01	Hsx	001	A						1					
16 Feb	N11E59	344	0050	06	Dso	004	B											
17 Feb	N12E44	346	0050	07	Dso	006	B											
18 Feb	N12E32	345	0030	07	Dso	010	B											
19 Feb	N13E15	349	0020	02	Hsx	004	A											2
20 Feb	N13E01	350	0050	05	Cso	006	B											
21 Feb	N13W10	346	0060	08	Cso	006	B											
22 Feb	N14W27	350	0030	01	Hsx	001	A											
23 Feb	N14W40	350	0040	02	Hsx	001	A											
24 Feb	N15W54	351	0030	01	Hsx	001	A											
25 Feb	N16W66	350	0040	01	Hsx	001	A											
26 Feb	N16W81	351	0050	01	Hsx	001	A											
27 Feb	N14W94	351	0030	02	Hsx	001	A				1							
											1	0	0	3	0	0	0	0

Crossed West Limb.

Absolute heliographic longitude: 350

<i>Region 290</i>																		
18 Feb	N17E46	331	0010	09	Cro	004	B											
19 Feb	N18E31	333	0080	10	Dso	013	Bg	2					5					
20 Feb	N17E18	333	0310	11	Eai	022	Bg						2					
21 Feb	N17E05	331	0360	12	Eki	029	Bg	3					3					
22 Feb	N18W06	329	0350	11	Eki	019	Bg	5					5					
23 Feb	N18W21	331	0340	12	Eki	020	Bg											
24 Feb	N18W33	330	0240	13	Eai	023	Bg	1					1					
25 Feb	N18W47	331	0140	11	Eao	010	B						2					
26 Feb	N18W60	330	0140	08	Dao	007	B						1					
27 Feb	N18W75	332	0080	05	Cao	006	B											
28 Feb	N18W89	333	0050	02	Hsx	001	A											
											11	0	0	19	0	0	0	0

Crossed West Limb.

Absolute heliographic longitude: 331



Region Summary - continued.

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

Region 291

21 Feb	S23E03	333	0020	04	Cso	007	B										
22 Feb	S23W08	331	0020	04	Cso	003	B										
23 Feb	S23W21	331															
24 Feb	S23W34	331															
25 Feb	S23W47	331															
26 Feb	S23W60	331															
27 Feb	S23W73	331															
28 Feb	S23W86	331															
									0	0	0	0	0	0	0	0	0

Crossed West Limb.

Absolute heliographic longitude: 333

Region 292

25 Feb	S08W14	298	0030	04	Dao	007	B											
26 Feb	S08W28	298	0030	06	Cso	007	B											
27 Feb	S07W42	299	0020	04	Cso	003	B											
28 Feb	S07W58	302	0010	01	Axx	001	A											
01 Mar	S07W71	302									2							
02 Mar	S09W80	297	0100	07	Dso	004	B				4			3				
											6	0	0	3	0	0	0	0

Still on Disk.

Absolute heliographic longitude: 298

Region 293

27 Feb	S21E26	231	0010	03	Bxo	003	B											
28 Feb	S19E19	223	0020	04	Dso	003	B				1			1				
01 Mar	S17E02	229	0010	03	Bxo	003	B											
02 Mar	S17W11	229																
											1	0	0	1	0	0	0	0

Still on Disk.

Absolute heliographic longitude: 229

Region 294

27 Feb	S08E42	215	0040	04	Cao	006	B											
28 Feb	S07E29	215	0070	05	Dso	006	B											
01 Mar	S07E15	216	0030	05	Bxo	006	B											
02 Mar	S07E00	218	0030	01	Hsx	001	A											
											0	0	0	0	0	0	0	0

Still on Disk.

Absolute heliographic longitude: 218



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 295

27 Feb	S19E65	192	0070	06	Cao	003	B												
28 Feb	S17E55	189	0090	05	Cso	004	B												
01 Mar	S17E41	190	0070	02	Hsx	001	A												
02 Mar	S18E27	192	0070	02	Hsx	001	A												
												0	0	0	0	0	0	0	0

Still on Disk.

Absolute heliographic longitude: 192

Region 296

28 Feb	N12E73	171	0270	04	Dho	002	B						1					
01 Mar	N12E62	169	0640	10	Dko	008	B	3					2					
02 Mar	N11E48	169	0590	11	Eho	007	B	1					2					
								4	0	0	0	5	0	0	0	0	0	0

Still on Disk.

Absolute heliographic longitude: 169

Region 297

01 Mar	S15E67	165	0100	08	Bxo	005	B											
02 Mar	S16E56	162	0050	05	Dso	004	B											

Still on Disk.

Absolute heliographic longitude: 162

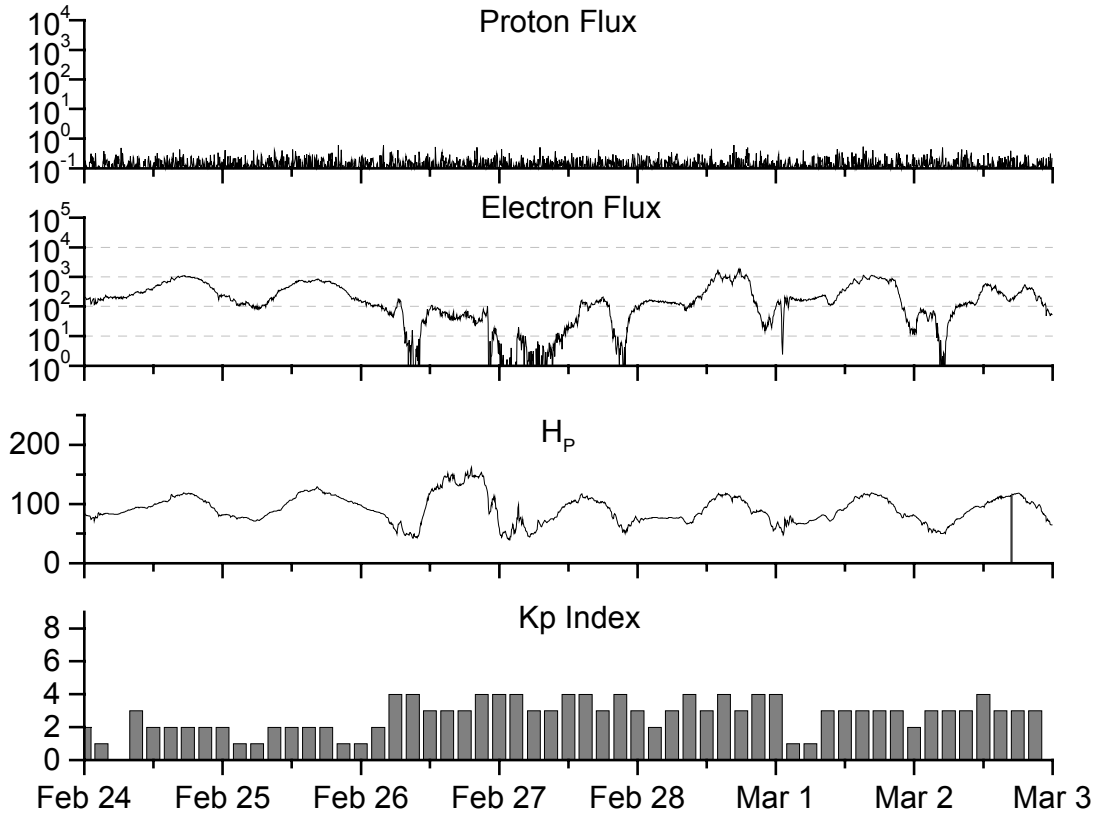


**Recent Solar Indices (preliminary)
of the observed monthly mean values**

Month	Sunspot Numbers			Radio Flux		Geomagnetic			
	Observed values SWO	Ratio RI	Ratio RI/SWO	Smooth values SWO	Smooth values RI	*Penticton 10.7 cm	Smooth Value	Planetary Ap	Smooth Value
2001									
February	131.0	80.1	0.61	151.4	104.2	146.7	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	178.1	171.7	18	12.7
May	135.1	97.3	0.72	163.1	108.8	147.9	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	163.1	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	179.9	106.2	148.7	183.0	11	13.5
July	183.5	99.9	0.54	175.4	102.7	173.5	176.3	13	13.9
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	
December	147.9	81.6	0.55			158.6		13	
2003									
January	150.0	79.5	0.53			144.0		13	

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 24 February 2003

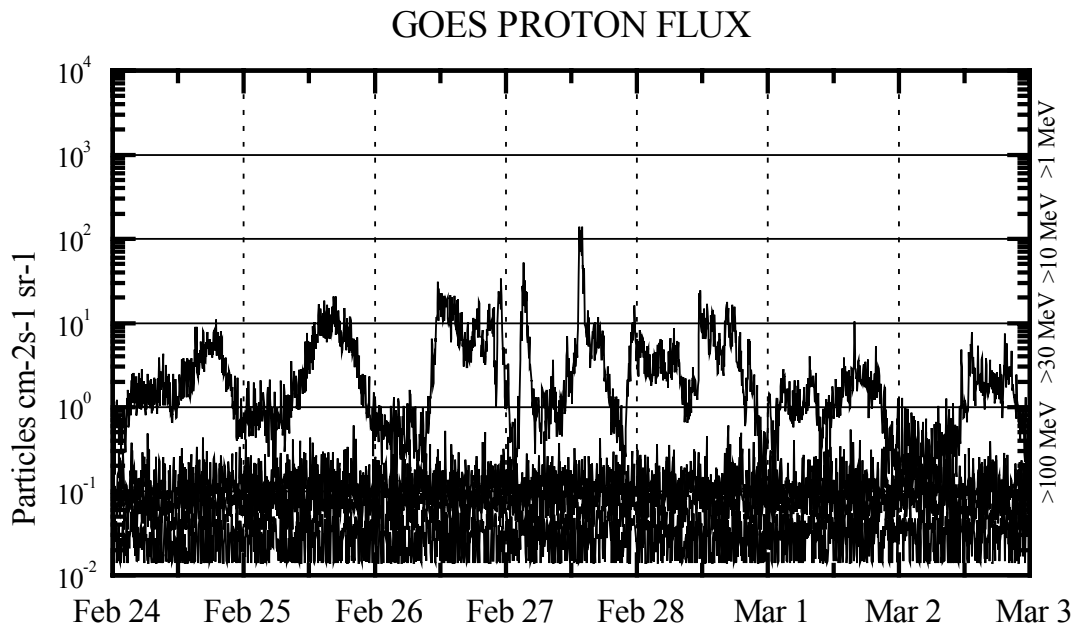
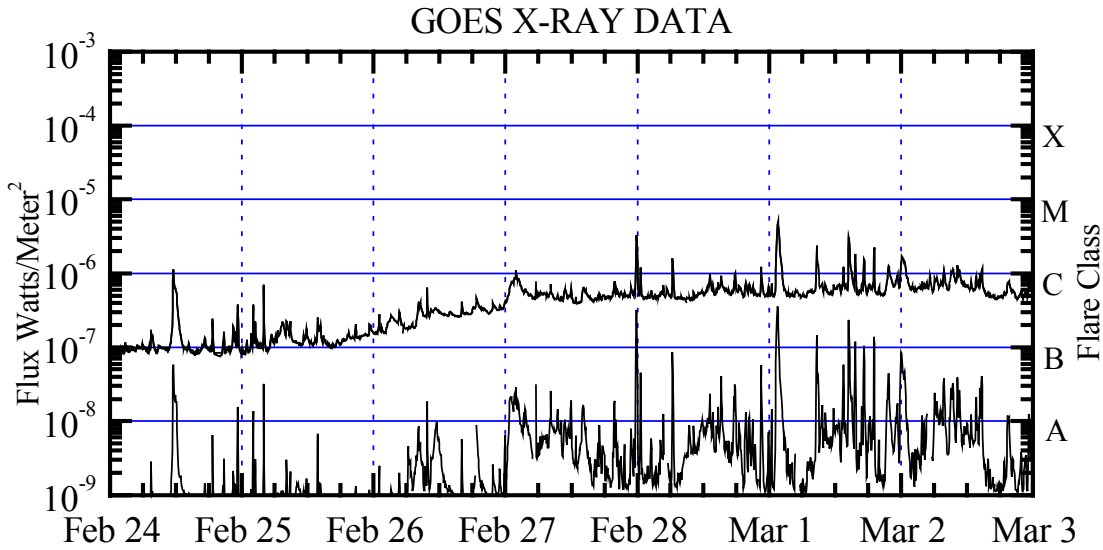
Protons plot contains the five-minute averaged integral proton flux (protons/cm²-sec -sr) as measured by GOES-8 (W75) for each of three energy thresholds: greater than 10, 50, and 100 MeV.

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

H_p 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_p plot contains the estimated planetary 3-hour K-index (derived by the Air Force Weather Agency) in real time from magnetometers at Meanook, Canada; Sitka, AK; Glenlea, Canada; St. Johns, Canada; Ottawa, Canada; Newport, WA; Fredericksburg, VA; Boulder, CO; Fresno, CA and Heartland, UK. These data are made available through cooperation from the Geological Survey of Canada (GSC) and the US Geological Survey. These may differ from the final K_p 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_p are "global" parameters that are applicable to a first order approximation over large areas. H_p 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.

