Space Weather Highlights **SWO PRF 1434**
17 - 23 February 2003 **25 February 2003**

Solar activity was at very low to low levels. The period began with low levels on 17 February and very low levels on 18 February. Early on 18 February, there was a forty-seven degree filament eruption off the NW quadrant at 0125 UTC. Activity returned to low levels on 19 – 22 February. Region 290 (N17, L=331, class/area/mag. Eki/360/Bg on 21 February) exhibited growth in area size and increased in magnetic complexity to a beta-gamma configuration during this time. Activity from Region 290 consisted of numerous B and C-class flares with the largest a C5/Sf flare on 22 February at 0929 UTC. Region 290 entered a gradual decay phase on 22 February. Activity on 23 February was at low levels with only minor B-class flare observed.

Solar wind data were available from the NASA Advanced Composition Explorer (ACE) spacecraft for most of the summary period. Late on 17 February, a transient passed the NASA/ACE spacecraft. Solar wind speed increased to over 700 km/s and total IMF reached peak values near 20 nT. Very structured, but declining solar wind parameters persisted through 18 - 19 February with solar wind speed tailing off to near 500 km/s and Bz sustained northward. We transitioned into yet another high-speed stream on 20 February with solar wind speed exceeding 700 km/s.

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 17 February and again on 22 – 23 February.

The geomagnetic field was at quiet to active levels. Late on 17 February, a transient passage produced increased solar wind speeds and periods of southward Bz resulting in active levels on 18 February. Very structured, but declining solar wind parameters persisted through 19 February and produced quiet to active levels. Quiet to active levels were observed for the remainder of the period, 20 – 23 February, due to another high speed stream that began on 20 February.

Space Weather Outlook
26 February - 24 March 2003

Solar activity is expected to be at low levels with a slight chance of moderate activity. Region 290 has a slight potential for isolated M-class events until it rotates beyond the west limb on 03 March. Regions 276, 280 (S04, L=151), 282 (N10, L=128) and 284 had increased activity as they transited the west limb and may be the source of M-class activity when they return to the visible disk starting on 27 February.

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 March and again on 19 – 24 March due to returning coronal holes.

The geomagnetic field is expected to be at quiet to active levels. Two weak coronal holes are due to return to a geo-effective position, one on 26 – 27 February and the second on 02 – 05 March. A large southern coronal hole is expected to return to a geo-effective position on 15 – 20 March and may produce quiet to active levels with a chance of isolated minor storm 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	Optical S	1	2	3	4
17 February	112	16	50	B2.3	2	0	0	0	0	0	0	0
18 February	110	51	60	B1.4	0	0	0	0	0	0	0	0
19 February	116	57	240	B1.9	2	0	0	7	0	0	0	0
20 February	118	66	590	B2.8	2	0	0	2	0	0	0	0
21 February	120	87	520	B4.5	10	0	0	3	0	0	0	0
22 February	107	53	400	B2.2	7	0	0	5	0	0	0	0
23 February	104	41	380	B1.0	0	0	0	0	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
17 February	9.1E+5	1.3E+4	2.8E+3		5.2E+7	
18 February	5.6E+5	1.1E+4	2.4E+3		7.7E+6	
19 February	4.7E+5	1.1E+4	2.3E+3		5.3E+6	
20 February	6.6E+5	1.1E+4	2.4E+3		5.5E+6	
21 February	3.7E+5	1.0E+4	2.1E+3		1.8E+7	
22 February	5.0E+5	1.0E+4	2.4E+3		4.2E+7	
23 February	2.9E+5	1.1E+4	2.4E+3		4.1E+7	

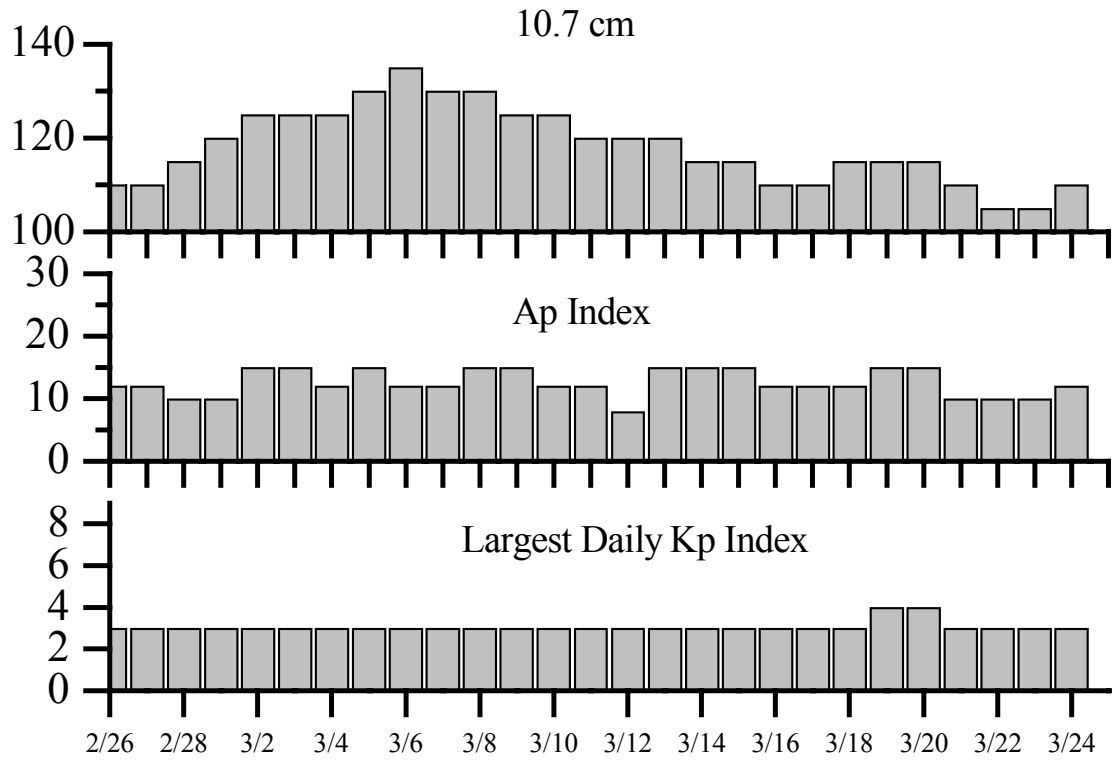
Daily Geomagnetic Data

Date	Middle Latitude Fredericksburg A	K-indices	High Latitude College A	K-indices	Estimated Planetary A	K-indices
17 February	8	2-2-2-2-3-2-2-2	15	3-2-2-4-4-3-3-2	11	3-2-2-3-3-3-2-3
18 February	17	2-5-4-3-2-2-2-3	19	2-4-3-5-4-3-2-2	17	2-4-3-4-3-3-2-3
19 February	10	2-3-2-1-3-2-2-3	18	3-2-3-3-5-4-2-2	12	3-3-3-2-3-3-3-3
20 February	12	2-3-3-3-3-2-3-2	22	1-3-3-5-4-4-4-3	16	3-3-4-4-3-4-3-3
21 February	10	2-3-2-2-2-3-3-2	17	2-2-4-3-2-5-2-3	13	2-3-3-2-2-4-4-3
22 February	11	4-3-1-2-3-3-1-1	25	1-1-3-5-6-5-1-0	11	2-3-2-3-3-4-2-1
23 February	10	2-3-2-1-4-2-2-2	*	*-*-*-*-*-*-*-*	11	2-3-2-2-4-3-2-2

Alerts and Warnings Issued

Date & Time of Issue	Type of Alert or Warning	Date & Time of Event UT
17 Feb 1237	ALERT: STRATWARM	17 Feb
17 Feb 1433	ALERT: Electron 2MeV Integral Flux > 1000pfu	17 Feb 1415
17 Feb 1615	ALERT: Electron 2MeV Integral Flux > 1000pfu	17 Feb 1415
18 Feb 0514	ALERT: Geomagnetic K= 5	18 Feb 0513
18 Feb 0520	WARNING: Geomagnetic K= 4	18 Feb 0525 -18 Feb 1500
18 Feb 1121	ALERT: Geomagnetic K= 5	18 Feb 1121
18 Feb 1347	ALERT: STRATWARM	18 Feb
18 Feb 1448	EXTENDED WARNING: Geomagnetic K= 4	18 Feb 0525 - 19 Feb 1500
19 Feb 1355	ALERT: STRATWARM	19 Feb
20 Feb 0020	1 - 245 MHz Radio Noise Storm	19 Feb
20 Feb 0559	ALERT: Geomagnetic K= 4	20 Feb 0559
20 Feb 0639	WARNING: Geomagnetic K= 4	20 Feb 0640 - 1500
20 Feb 0643	ALERT: Geomagnetic K= 4	20 Feb 0643
20 Feb 1315	ALERT: STRATWARM	20 Feb
20 Feb 1456	EXTENDED WARNING: Geomagnetic K= 4	20 Feb 0640 -21 Feb 1500
21 Feb 0013	1 - 245 MHz Radio Noise Storm	20 Feb
21 Feb 1220	ALERT: STRATWARM	21 Feb
21 Feb 1600	ALERT: Geomagnetic K-index of 4	21 Feb 1557
22 Feb 0024	2 - 245 MHz Radio Burst	21 Feb
22 Feb 0024	1 - 245 MHz Radio Noise Storm	21 Feb
22 Feb 1252	ALERT: STRATWARM	22 Feb
22 Feb 1501	ALERT: Electron 2MeV Integral Flux > 1000pfu	22 Feb 1440
22 Feb 1634	ALERT: Geomagnetic K= 4	22 Feb 1633
23 Feb 0013	3 - 245 MHz Bursts	22 Feb
23 Feb 1322	WARNING: Geomagnetic K= 4	23 Feb 1322 - 1500
23 Feb 1330	ALERT: Geomagnetic K= 4	23 Feb 1330
23 Feb 1501	EXTENDED WARNING: Geomagnetic K= 4	23 Feb 1322 -24 Feb 1500
23 Feb 1732	ALERT: Electron 2MeV Integral Flux > 1000pfu	23 Feb 1710

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
26 Feb	110	12	3	12 Mar	120	8	3
27	110	12	3	13	120	15	3
28	115	10	3	14	115	15	4
01 Mar	120	10	3	15	115	15	4
02	125	15	3	16	110	12	3
03	125	15	3	17	110	12	3
04	125	12	3	18	115	12	3
05	130	15	3	19	115	15	3
06	135	12	3	20	115	15	3
07	130	12	3	21	110	10	3
08	130	15	3	22	105	10	3
09	125	15	3	23	105	10	3
10	125	12	3	24	110	12	3
11	120	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
	No Events Observed												

Flare List

Date	Time			X-ray	Optical			
	Begin	Max	End	Class.	Imp / Brtns	Location Lat CMD		Rgn
17 February	0248	0311	0325	B7.9				
	0548	0608	0619	B8.4				
	1034	1129	1148	C1.0				
	1414	1421	1433	B7.5				
	1721	1729	1745	C1.9				
18 February	0833	0841	0850	B9.8				
	1704	1711	1723	B3.6				
	2003	2027	2040	B3.9				
	2043	2056	2112	B5.3				
19 February	0217	0225	0237	B3.3				
	0324	0324	0328	B3.6	Sf	N13E29		288
	0548	0552	0601	B3.1				
	0643	0643	0654	B8.0	Sf	N17E38		290
	0933	0939	0952	B3.6				
	1045	1103	1114	B4.2				
	1319	U1325	1329		Sf	N17E39		290
	1416	U1420	A1600	C1.8	Sf	N17E35		290
	1618	1622	1626	B3.4				
	1825	1830	1934		Sf	N17E37		290
	1944	1946	1948	B9.1	Sf	N12E21		288
	2004	2006	2012		Sf	N17E34		290
	2222	2232	2246	C1.7				290
20 February	0218	0225	0235	B6.4				
	0256	0306	0316	C1.7				
	0522	0525	0531	B5.4				
	1046	1051	1059	B4.6				
	B1224	U1224	1231	B5.9	Sf	N18E28		290
	B1249	U1249	1302	B6.0	Sf	N19E28		290
	1348	1354	1358	B7.0				
	1422	1426	1431	B4.9				
	1450	1453	1456	B4.7				
	1642	1645	1648	B4.6				
	1658	1701	1705	B5.2				
	1728	1733	1735	C1.3				
	1834	1842	1903	B6.5				
	2132	2135	2139	B5.6				

Flare List - continued.

Date	Time Begin	Time Max	Time End	X-ray Class.Brtns	Optical Imp /	Optical Location	Rgn Lat CMD
21 February	0149	0200	0212	C2.5			
	0229	0234	0244	C1.6			
	0505	0505	0512	C1.6	Sf	N11E14	290
	0546	0617	0629	C1.8			289
	0707	0717	0721	C2.1			
	1115	1122	1127	C1.0			
	B1253	U1253	1311	C1.3	Sf	N16E07	290
	1512	1515	1522	C3.7	Sf	N15E07	290
	1546	1551	1555	C1.1			
	1946	1950	1954	C4.3			290
	2110	2113	2115	B7.3			
22 February	0159	0203	0217	C4.3	Sf	N11E02	290
	0250	0254	0257	C1.1			
	0444	0450	0500	B9.6			
	0509	0512	0515	C4.7	Sf	N16W02	290
	0929	0930	0938	C5.8	Sf	N16W05	290
	1044	1044	1047	C2.1	Sf	N16E03	290
	1049	1052	1054	C1.5			
	1221	1226	1230	C1.7	Sf	N17W06	290
	1555	1600	1603	B5.3			
	1848	1933	2026	B6.1			
	2205	2215	2225	B6.7			
23 February	No Flares Observed						

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 281												
06 Feb	S14E73	102	0030	01	Hsx	001	A								
07 Feb	S14E60	102	0050	01	Hax	001	A								
08 Feb	S13E46	103	0040	01	Hsx	001	A								
09 Feb	S15E33	103	0030	01	Hsx	001	A								
10 Feb	S14E20	102	0030	01	Hsx	002	A								
11 Feb	S15E07	102	0020	02	Hsx	002	A								
12 Feb	S15W06	102	0020	01	Hsx	001	A								
13 Feb	S15W19	102	0010	01	Hsx	001	A								
14 Feb	S15W32	102	0010	01	Hsx	001	A								
15 Feb	S15W45	102	0010	02	Hsx	003	A								
16 Feb	S15W58	102													
17 Feb	S15W71	102													
18 Feb	S15W84	102													
								0	0	0	0	0	0	0	0

Crossed West Limb.
Absolute heliographic longitude: 102

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 283												
07 Feb	N01E52	110	0040	04	Cso	003	B								
08 Feb	N01E38	111	0050	06	Dao	005	B								
09 Feb	N00E25	111	0050	07	Dso	013	B								
10 Feb	N01E13	109	0030	06	Dso	005	B								
11 Feb	N00E00	109	0020	06	Dso	005	B								
12 Feb	N00W13	109	0020	04	Cso	005	B								
13 Feb	N00W26	109	0010	02	Axx	003	A								
14 Feb	N00W39	109	0020	05	Cso	004	B								
15 Feb	N00W52	109	0020	05	Cro	005	B								
16 Feb	N01W67	111													
17 Feb	N01W80	111													
								0	0	0	0	0	0	0	0

Crossed West Limb.
Absolute heliographic longitude: 109

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 285												
08 Feb	S10E75	074	0060	04	Hsx	001	A								
09 Feb	S11E65	071	0070	02	Hax	001	A								
10 Feb	S11E51	071	0070	03	Cao	002	B								
11 Feb	S11E38	071	0060	03	Cao	002	B								
12 Feb	S11E25	071	0050	04	Cso	002	B								
13 Feb	S11E12	071	0030	03	Cao	003	B								
14 Feb	S11W01	071	0030	04	Cao	004	B								
15 Feb	S11W14	071	0020	06	Bxo	008	B								
16 Feb	S12W27	070	0010	03	Cso	004	B								
17 Feb	S12W40	070													
18 Feb	S12W53	070													
19 Feb	S12W66	070													
20 Feb	S12W79	070													
								0	0	0	0	0	0	0	0

Crossed West Limb.
Absolute heliographic longitude: 071

			Region 287												
14 Feb	N12W50	120	0020	03	Cro	004	B								
15 Feb	N12W63	120	0040	02	Hax	004	A								
16 Feb	N12W77	121													
17 Feb	N12W90	121													
								0	0	0	0	0	0	0	0

Crossed West Limb.
Absolute heliographic longitude: 120

			Region 288												
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								
								0	0	0	3	0	0	0	0

Still on Disk.
Absolute heliographic longitude: 350

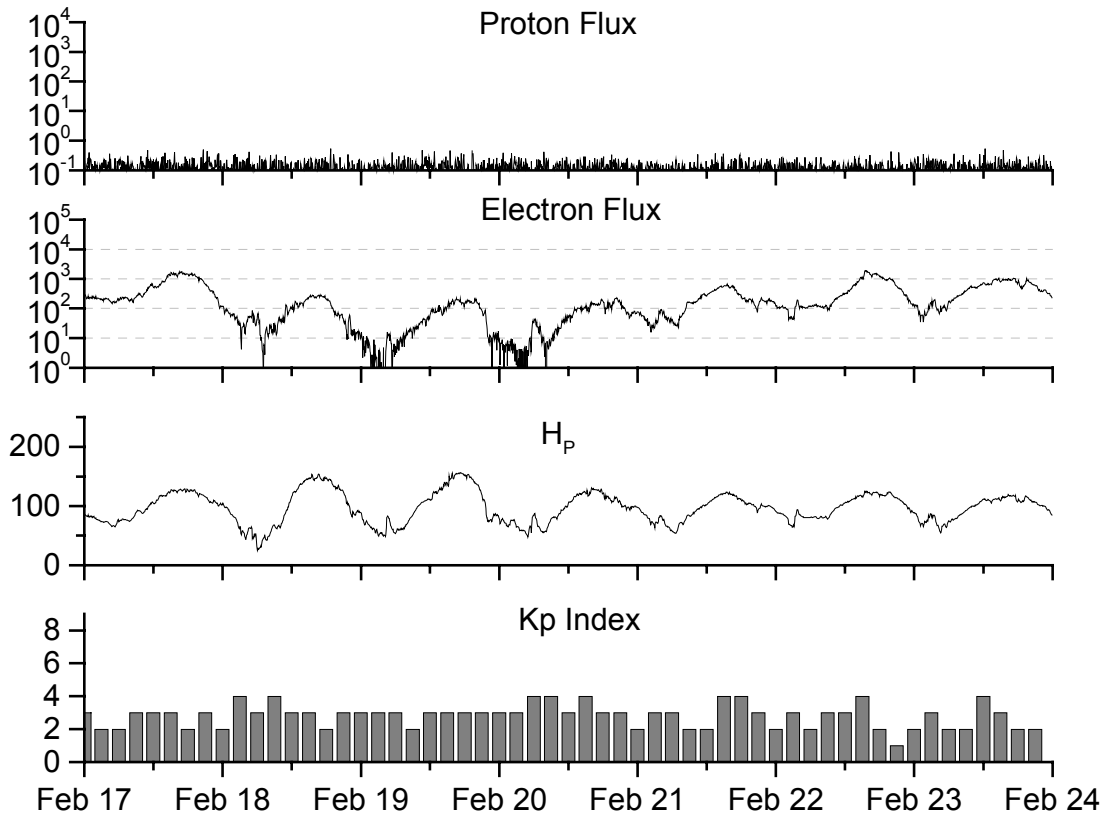
Region Summary - continued.

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 289												
18 Feb	N11W52	069	0020	05	Cao	007	B								
19 Feb	N09W66	070	0140	08	Dko	010	B								
20 Feb	N10W81	072	0230	10	Dao	008	B								
21 Feb	N09W91	067	0080	06	Dso	005	B	2							
								2	0	0	0	0	0	0	0
Crossed West Limb.															
Absolute heliographic longitude:		069													
			Region 290												
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								
								10	0	0	15	0	0	0	0
Still on Disk.															
Absolute heliographic longitude:		331													
			Region 291												
21 Feb	S23E03	333	0020	04	Cso	007	B								
22 Feb	S23W08	331	0020	04	Cso	003	B								
23 Feb	S23W21	331													
								0	0	0	0	0	0	0	0
Still on Disk.															
Absolute heliographic longitude:		333													

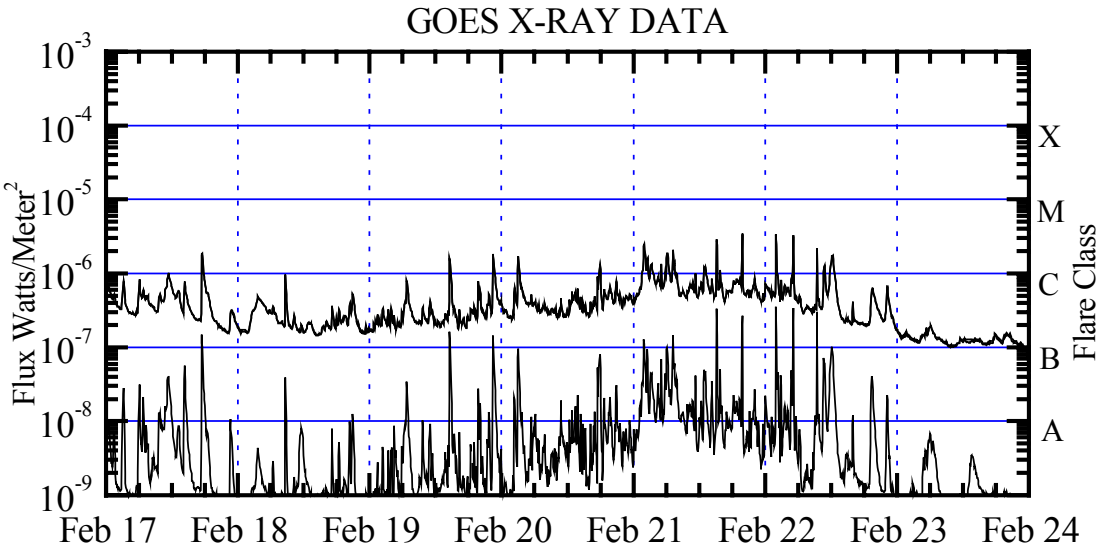
Recent Solar Indices (preliminary)
of the observed monthly mean values

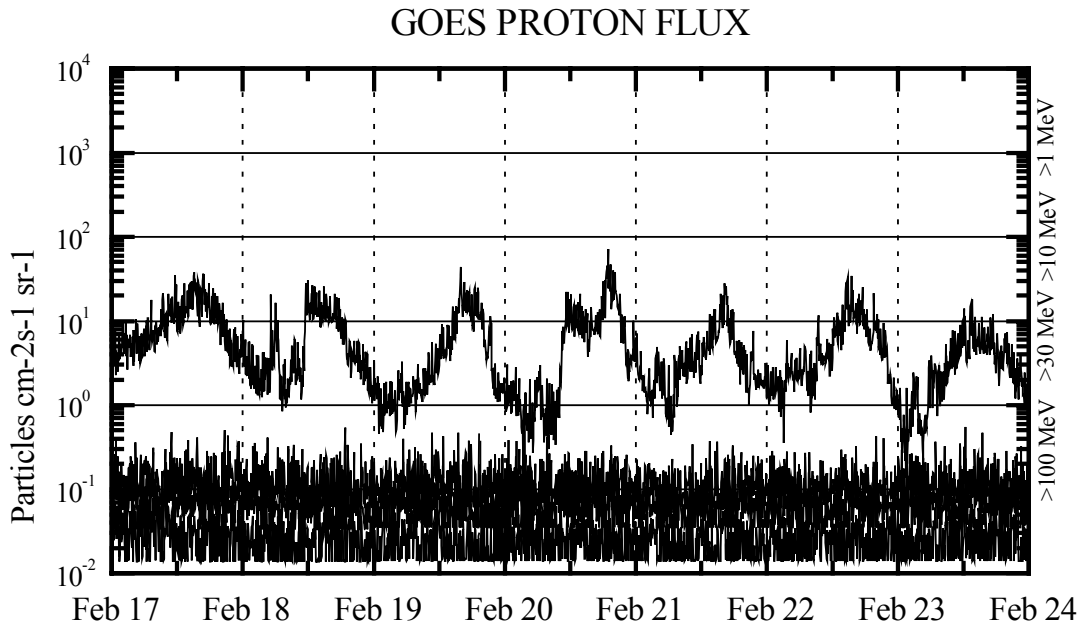
	Sunspot Numbers					Radio Flux		Geomagnetic	
	Observed values		Ratio	Smooth values		*Penticton	Smooth	Planetary	Smooth
Month	SWO	RI	RI/SWO	SWO	RI	10.7 cm	Value	Ap	Value
					2001				
February	131.0	80.1	0.61	151.4	104.2	146.7	165.8	06	13.3
March	166.7	114.2	0.69	154.0	104.9	177.7	167.9	17	12.9
April	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 17 February 2003
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.