

Space Weather Highlights
16 – 22 February 2004

SWO PRF 1486
24 February 2004

Solar activity ranged from very low to low levels. Activity was low on 16 February due to a single C-class flare. Activity then dropped to very low levels from 17 – 21 February. Low level activity returned on 22 February as Region 564 (N13, L=160, class/area Eai/180 on 22 February) developed on the disk, exhibiting rapid growth and a few C-class flares. Magnetic complexity in Region 564 increased on 22 February with a weak delta configuration forming in the intermediate spots. Activity from this region consisted of B-class to low level C-class flares; including the largest flare of the period, a C1.9 at 2000 UTC on 22 February. At the time of this report Region 564 continues to grow and has reached an area of 300 millionths. The magnetic complexity appears to be declining.

Solar wind data were available from the NASA Advanced Composition Explorer (ACE) spacecraft during most of the summary period. The period began with solar wind speed elevated between 500 – 600 km/s and declining. The decreasing wind speed was due to a coronal hole rotating beyond a geoeffective position. By 17 February, the wind speed dropped below 500 km/s and by 20 February the wind speed was steady near 400 km/s. The Bz component of the interplanetary magnetic field did not vary beyond +/- 7 nT through out the period.

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

The greater than 2 MeV electron flux at geosynchronous orbit reached high levels every day during the period, 16 – 22 February.

The geomagnetic field ranged from quiet to unsettled during the period. Quiet levels were observed on 17 and 20 February. Isolated minor storm levels occurred at high latitudes on 21 February, and isolated major storm levels were observed at high latitudes on 22 February.

Space Weather Outlook
25 February - 22 March 2004

Solar activity is expected to range from very low to low levels. Predominantly very low to low activity levels are expected from late February through early March. Mostly low level activity may return by mid March due to the return Region 564.

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

The greater than 2 MeV electron flux at geosynchronous orbit is expected to reach high levels on 02 – 05 March and again on 11 – 15 March, due to recurrent coronal holes.

Geomagnetic activity is expected to range from quiet to minor storm levels. A small coronal hole is expected to rotate into a geoeffective position on 01-04 March and may produce periods of minor storm activity. A second coronal hole high speed stream is due to return on 09 – 14 March and is expected to produce active to 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			Optical				
					C	M	X	S	1	2	3	4
16 February	99	81	190	A9.0	1	0	0	1	0	0	0	0
17 February	102	22	80	A9.2	0	0	0	0	0	0	0	0
18 February	98	23	80	A9.4	0	0	0	0	0	0	0	0
19 February	96	33	100	B1.0	0	0	0	0	0	0	0	0
20 February	95	34	100	A8.3	0	0	0	0	0	0	0	0
21 February	98	52	80	A8.9	0	0	0	0	0	0	0	0
22 February	104	58	230	B1.6	6	0	0	10	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
	16 February	1.2E+6	1.3E+4	3.1E+3		1.3E+9
17 February	6.9E+5	1.3E+4	3.0E+3		1.4E+9	
18 February	6.8E+5	1.3E+4	3.1E+3		1.7E+9	
19 February	5.1E+5	1.3E+4	3.2E+3		3.3E+8	
20 February	6.3E+5	1.4E+4	3.2E+3		6.1E+8	
21 February	7.6E+5	1.4E+4	3.5E+3		1.4E+8	
22 February	5.0E+5	1.4E+4	3.7E+3		3.3E+7	

Daily Geomagnetic Data

Date	Middle Latitude Fredericksburg		High Latitude College		Estimated Planetary	
	A	K-indices	A	K-indices	A	K-indices
	16 February	6	3-1-0-2-1-1-3-0	5	2-1-0-3-2-1-1-1	7
17 February	4	1-1-0-3-1-1-0-1	3	0-1-1-1-1-1-0-2	5	2-2-1-2-2-1-1-2
18 February	4	1-1-1-0-1-2-2-2	10	2-2-1-1-1-4-3-3	8	2-2-1-2-2-3-3-2
19 February	5	2-1-1-3-0-1-1-2	8	3-3-2-2-0-1-2-2	5	2-1-1-1-2-3-2-1
20 February	2	1-1-0-0-1-1-1-1	3	1-1-0-0-1-2-2-0	4	1-1-1-1-2-1-2-1
21 February	4	2-1-0-1-2-1-1-1	9	1-1-0-2-5-2-1-1	7	2-1-1-2-3-3-2-2
22 February	7	1-1-0-4-2-1-1-2	16	1-1-1-3-6-3-1-2	8	2-1-1-2-3-3-2-2

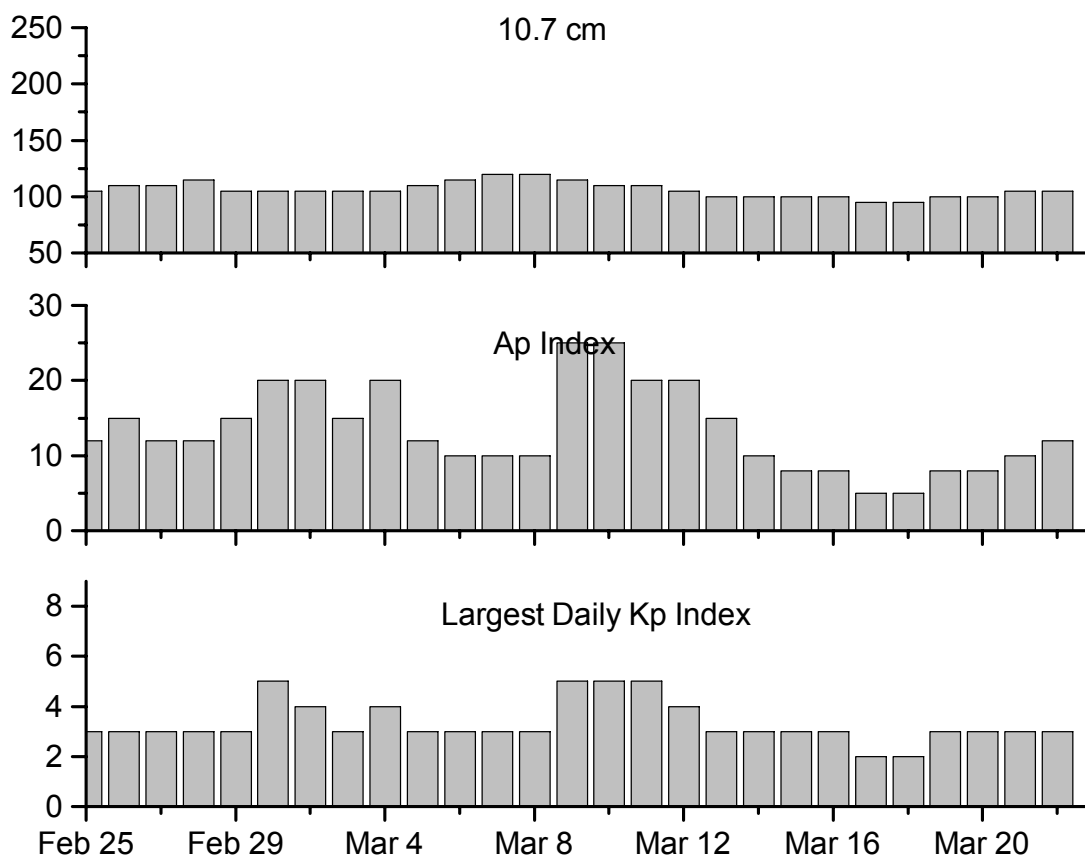


Alerts and Warnings Issued

<u>Date & Time of Issue</u>	<u>Type of Alert or Warning</u>	<u>Date & Time of Event UT</u>
16 Feb 0023	5 – 245 MHz Radio Bursts	15 Feb
16 Feb 0023	1 – 245 MHz Radio Noise Storm	15 Feb
16 Feb 0515	ALERT: Electron 2MeV Integral Flux > 1000pfu	16 Feb 0500
17 Feb 0017	2 – 245 MHz Radio Bursts	16 Feb
17 Feb 0515	ALERT: Electron 2MeV Integral Flux > 1000pfu	17 Feb 0500
18 Feb 0517	ALERT: Electron 2MeV Integral Flux > 1000pfu	18 Feb 0500
19 Feb 0011	1 – 245 MHz Radio Burst	18 Feb
19 Feb 0515	ALERT: Electron 2MeV Integral Flux > 1000pfu	19 Feb 0500
20 Feb 0025	1 – 245 MHz Radio Burst	19 Feb
20 Feb 0516	ALERT: Electron 2MeV Integral Flux > 1000pfu	20 Feb 0500
21 Feb 1027	ALERT: Electron 2MeV Integral Flux > 1000pfu	21 Feb 1005
22 Feb 1317	ALERT: Electron 2MeV Integral Flux > 1000pfu	22 Feb 1255



Twenty-seven Day Outlook



Radio Flux	Planetary	Largest	Radio Flux	Planetary	Largest		
Date	10.7 cm	A Index	Kp Index	Date	10.7 cm	A Index	Kp Index
25 Feb	105	12	3	10 Mar	110	25	5
26	110	15	3	11	110	20	5
27	110	12	3	12	105	20	4
28	115	12	3	13	100	15	3
29	105	15	3	14	100	10	3
01 Mar	105	20	5	15	100	8	3
02	105	20	4	16	100	8	3
03	105	15	3	17	95	5	2
04	105	20	4	18	95	5	2
05	110	12	3	19	100	8	3
06	115	10	3	20	100	8	3
07	120	10	3	21	105	10	3
08	120	10	3	22	105	12	3
09	115	25	5				



Energetic Events

Date	Time		X-ray	Optical Information			Peak		Sweep Freq			
	Begin	Max	1/2 Max	Integ Class	Flux	Imp/ Brtns	Location Lat CMD	Rgn #	Radio Flux		Intensity	
									245	2695	II	IV

No Events Observed

Flare List

Date	Time			X-ray Class.	Imp / Brtns	Optical Location Lat CMD	Rgn
	Begin	Max	End				
16 February	0258	0258	0303	C1.6	Sf	N16W43	556
	1106	1115	1121	B1.9			556
17 February	0008	0013	0019	B1.6			554
	1230	1243	1246	B2.1			554
18 February	1934	2006	2047	B4.9			
	0058	0108	0110	B1.1			
	0202	0215	0219	B1.7			
	1057	1101	1104	B1.7			
19 February	1658	1708	1720	B5.0			556
	0010	0014	0017	B1.6			562
	0147	0150	0154	B1.5			562
	0326	0330	0334	B1.6			562
	0440	0443	0448	B1.7			556
	1042	1046	1051	B1.9			556
	1155	1159	1203	B2.0			556
20 February	1609	1616	1623	B3.5			556
	2339	2349	0000	B3.3			562
21 February	0646	0651	0720	B1.8			
	1437	1444	1449	B6.2			564
	1525	1540	1546	B3.1			564
	1721	1726	1731	B5.5			562
	1933	1937	1939	B2.6			564
	2023	2026	2028	B2.7			564
	2352	2356	2358	B2.0			564
22 February	0053	0056	0058	B2.5			564
	0138	0143	0148	B2.8			564
	0153	0156	0159	B2.9			564
	0217	0222	0225	B3.9			564
	0238	0241	0247	B2.5			564
	0313	0315	0322		Sf	N12E38	564
	0357	0359	0415	C1.1	Sf	N14E38	564
	0448	0448	0457		Sf	N14E38	564
	0548	0600	0609	B4.1	Sf	N14E37	564
	0609	0610	0616		Sf	N14E37	564
0627	0630	0650		Sf	N14E37	564	



Flare List – continued.

Date	Time			X-ray Class.	Optical		Rgn
	Begin	Max	End		Imp / Brtns	Location Lat CMD	
22 February	0650	0654	0656		Sf	N14E37	564
	0658	0731	0802	C1.2	Sf	N12E34	564
	0822	0822	0826		Sf	N14E36	564
	0913	0955	1019	C1.1			
	1208	1211	1218	B2.1			564
	1253	1303	1329	B3.1			564
	1407	1426	1516	C1.1			564
	1542	1547	1550	B5.7			564
	1835	1842	1854	B8.8			564
	1915	1915	1917		Sf	N14E28	564
	1951	2000	2006	C1.9			564
	2210	2213	2216	B4.3			
	2311	2321	2326	C1.2			564
	2341	2345	2348	B6.8			564

Region Summary

Date	Location		Sunspot Characteristics				Flares			Optical											
	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 554</i>																					
07 Feb	S08E76	308	0000	01	Axx	001	A	1													
08 Feb	S08E62	308	0170	06	Dkc	006	B	6	1		3										
09 Feb	S08E52	305	0310	09	Dhc	008	Bgd	9			4										
10 Feb	S10E38	306	0250	09	Dsc	014	Bg														
11 Feb	S09E24	307	0240	11	Eho	015	B														
12 Feb	S10E12	306	0290	09	Dho	007	B														
13 Feb	S08W01	306	0150	08	Dso	004	B														
14 Feb	S09W13	304	0170	08	Dso	008	B														
15 Feb	S09W28	306	0130	08	Cso	006	B														
16 Feb	S08W43	308	0100	07	Cso	002	B														
17 Feb	S08W56	308	0050	03	Hsx	001	A														
18 Feb	S08W69	308	0060	02	Hsx	001	A														
19 Feb	S08W83	308	0060	01	Hsx	001	A														
								16	1	0	7	0	0	0	0	0					

Crossed West Limb.

Absolute heliographic longitude:306



Region Summary - continued.

Date	Location		Sunspot Characteristics				Flares							
	(° Lat ° CMD)	Helio Lon	Area (10 ⁻⁶ hemi)	Extent (helio)	Spot Class	Spot Count	Mag Class	X-ray			Optical			
							C	M	X	S	1	2	3	4

Region 555

09 Feb	S14E72	285	0020	01	Hax	001	A								
10 Feb	S14E58	286	0030	01	Hsx	001	A								
11 Feb	S14E45	286	0020	01	Hax	001	A								
12 Feb	S14E32	286	0010	01	Axx	001	A								
13 Feb	S14E19	286													
14 Feb	S14E06	286													
15 Feb	S14W07	286													
16 Feb	S16W22	287	0000	00	Axx	001	A								
17 Feb	S16W35	287													
18 Feb	S16W48	287													
19 Feb	S16W61	287													
20 Feb	S16W74	287													
21 Feb	S16W87	287													

0 0 0 0 0 0 0 0

Crossed West Limb.

Absolute heliographic longitude:286

Region 556

11 Feb	N16E22	309	0030	05	Cao	010	B								
12 Feb	N16E06	312	0030	08	Bxi	012	B								
13 Feb	N16W04	309	0020	06	Cso	007	B								
14 Feb	N17W19	310	0010	05	Cso	006	B								
15 Feb	N16W37	315	0020	02	Bxo	002	B								
16 Feb	N15W54	319	0020	03	Cso	003	B	1		1					
17 Feb	N15W67	319													
18 Feb	N15W80	319													
19 Feb	N15W93	319													

1 0 0 1 0 0 0 0

Crossed West Limb.

Absolute heliographic longitude:309

Region 557

13 Feb	S11W32	337	0030	03	Cao	006	B								
14 Feb	S11W45	337													
15 Feb	S11W58	337													
16 Feb	S11W71	337													
17 Feb	S11W84	337													

0 0 0 0 0 0 0 0

Crossed West Limb.

Absolute heliographic longitude:337



Region Summary - continued.

Date	Location		Sunspot Characteristics				Flares							
	(° Lat ° CMD)	Helio Lon	Area (10 ⁻⁶ hemi)	Extent (helio)	Spot Class	Spot Count	Mag Class	X-ray			Optical			
							C	M	X	S	1	2	3	4

Region 558

13 Feb	S15E36	269	0020	04	Cso	002	B								
14 Feb	S16E21	270	0010	01	Hrx	001	A								
15 Feb	S16E07	271	0010	01	Axx	001	A								
16 Feb	S16W06	271	0000	00	Axx	001	A								
17 Feb	S16W19	271													
18 Feb	S16W32	271													
19 Feb	S16W45	271													
20 Feb	S16W58	271													
21 Feb	S16W71	271													
22 Feb	S16W84	271													

0 0 0 0 0 0 0 0

Still on Disk.

Absolute heliographic longitude:271

Region 559

14 Feb	N07W42	333	0020	04	Cso	009	B								
15 Feb	N08W56	334	0060	04	Dso	004	B								
16 Feb	N07W68	333	0030	01	Hsx	001	A								
17 Feb	N07W81	333													
18 Feb	N07W94	333													

0 0 0 0 0 0 0 0

Crossed West Limb.

Absolute heliographic longitude:333

Region 560

15 Feb	S16E30	248	0020	01	Axx	001	A								
16 Feb	S17E17	248	0010	03	Cso	002	B								
17 Feb	S17E04	248													
18 Feb	S17W09	248													
19 Feb	S17W22	248													
20 Feb	S17W35	248													
21 Feb	S17W48	248													
22 Feb	S17W61	248													

0 0 0 0 0 0 0 0

Still on Disk.

Absolute heliographic longitude:248



Region Summary - continued.

Date	Location		Sunspot Characteristics				Flares							
	(° Lat ° CMD)	Helio Lon	Area (10 ⁻⁶ hemi)	Extent (helio)	Spot Class	Spot Count	Mag Class	X-ray			Optical			
							C	M	X	S	1	2	3	4

Region 561

15 Feb	N02E64	214	0030	02	Hrx	001	A								
16 Feb	N02E52	213	0030	01	Hsx	001	A								
17 Feb	N02E39	213	0030	02	Hsx	001	A								
18 Feb	N02E26	213	0020	02	Hsx	002	A								
19 Feb	N02E12	213	0030	01	Hsx	001	A								
20 Feb	N02W01	213	0010	01	Hsx	001	A								
21 Feb	N02W15	214	0020	01	Axx	002	A								
22 Feb	N02W30	216	0010	01	Axx	001	A								
											0	0	0	0	0

Still on Disk.

Absolute heliographic longitude:213

Region 562

19 Feb	S11E73	152	0010	01	Axx	001	A								
20 Feb	S11E59	153	0060	08	Dao	002	B								
21 Feb	S13E45	154	0020	07	Bxo	002	B								
22 Feb	S12E29	157	0010	01	Axx	001	A								
											0	0	0	0	0

Still on Disk.

Absolute heliographic longitude:157

Region 563

20 Feb	S21E66	146	0030	01	Axx	001	A								
21 Feb	S24E51	148	0020	01	Axx	001	A								
22 Feb	S23E40	146	0030	01	Hsx	001	A								
											0	0	0	0	0

Still on Disk.

Absolute heliographic longitude:146

Region 564

21 Feb	N14E42	157	0020	06	Bxo	007	B								
22 Feb	N13E26	160	0180	11	Eai	015	Bg	5		10					
								5	0	0	10	0	0	0	0

Still on Disk.

Absolute heliographic longitude:160

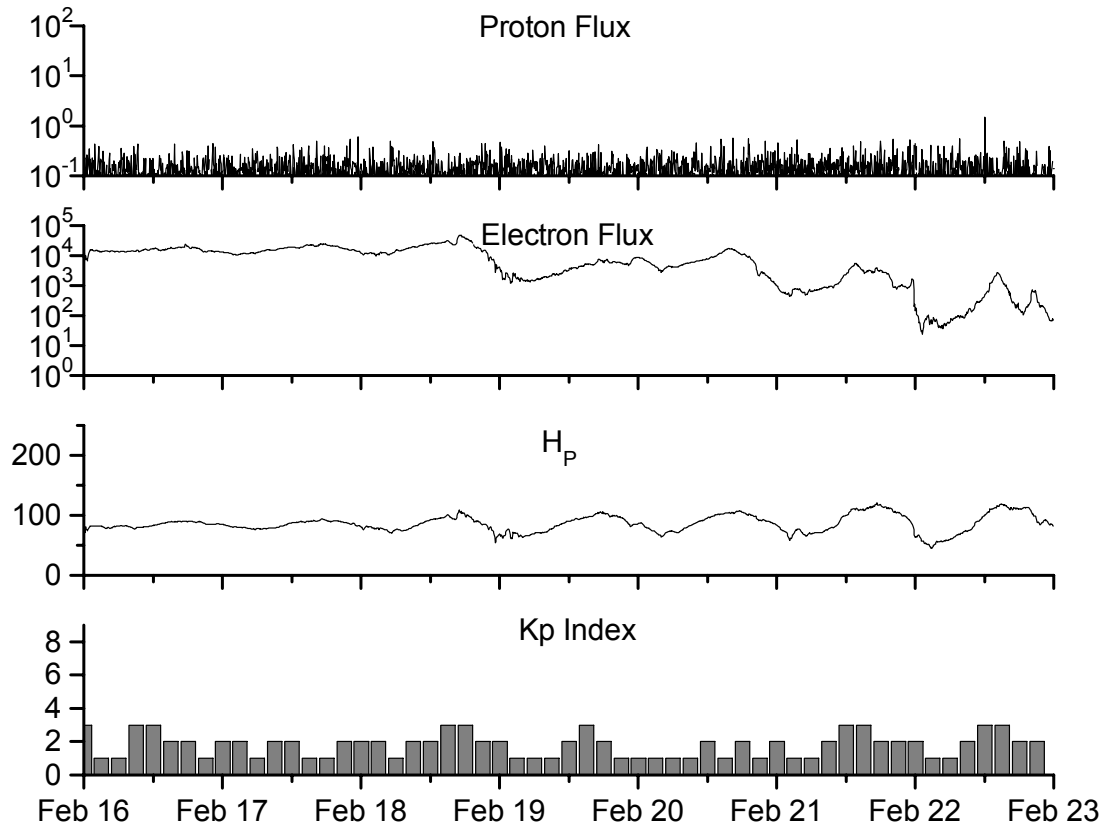


**Recent Solar Indices (preliminary)
of the observed monthly mean values**

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
2002									
February	194.5	107.4	0.55	188.6	114.7	205.0	197.2	10	12.8
March	153.1	98.4	0.64	188.9	113.3	180.3	195.7	10	12.9
April	194.9	120.7	0.62	186.2	110.5	189.8	191.5	15	13.2
May	204.1	120.8	0.59	183.6	108.9	178.4	188.0	15	13.3
June	146.0	88.3	0.60	179.9	106.3	148.7	183.0	11	13.5
July	183.5	99.6	0.54	175.4	102.7	173.5	176.3	11	13.7
August	191.0	116.4	0.61	169.2	98.7	183.9	169.5	16	14.2
September	206.4	109.6	0.53	163.4	94.6	175.8	164.1	14	15.0
October	153.9	97.5	0.63	158.8	90.5	167.0	159.4	23	15.6
November	159.8	95.5	0.60	150.9	85.2	168.7	154.8	16	16.3
December	147.9	80.8	0.55	144.6	82.1	158.6	150.9	13	17.0
2003									
January	149.3	79.7	0.53	141.7	81.0	144.0	149.2	13	18.2
February	87.0	46.0	0.53	136.4	78.5	124.5	144.7	17	18.9
March	119.7	61.1	0.51	128.1	74.2	132.2	139.5	21	19.4
April	119.7	60.0	0.50	121.5	70.3	126.3	136.3	20	20.0
May	89.6	55.2	0.62	118.3	67.8	129.3	135.0	26	21.0
June	118.4	77.4	0.65	113.6	65.2	129.4	132.6	24	21.8
July	132.8	85.0	0.64	106.9	62.0	127.8	129.5	20	22.3
August	114.3	72.7	0.64			122.1		23	
September	82.6	48.8	0.59			112.3		19	
October	118.9	65.6	0.55			153.1		32	
November	118.9	67.2	0.57			153.1		31	
December	75.4	47.0	0.62			115.1		18	
2004									
January	62.3	37.2	0.60			114.1		20	

NOTE: All smoothed values after September 2002 and monthly values after March 2003 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 23, RI= 120.8, occurred April 2000. *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 16 February 2004

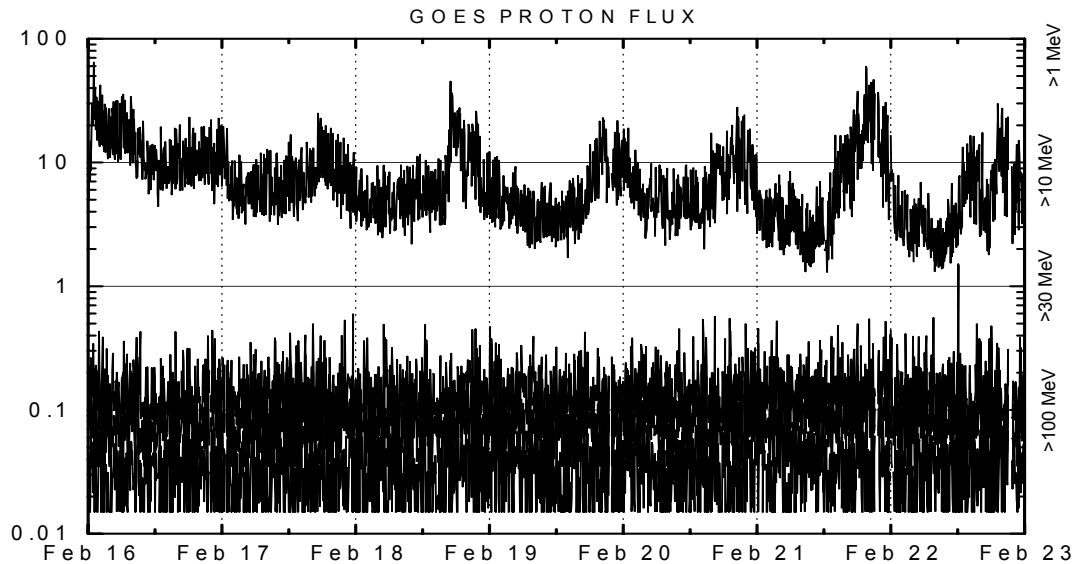
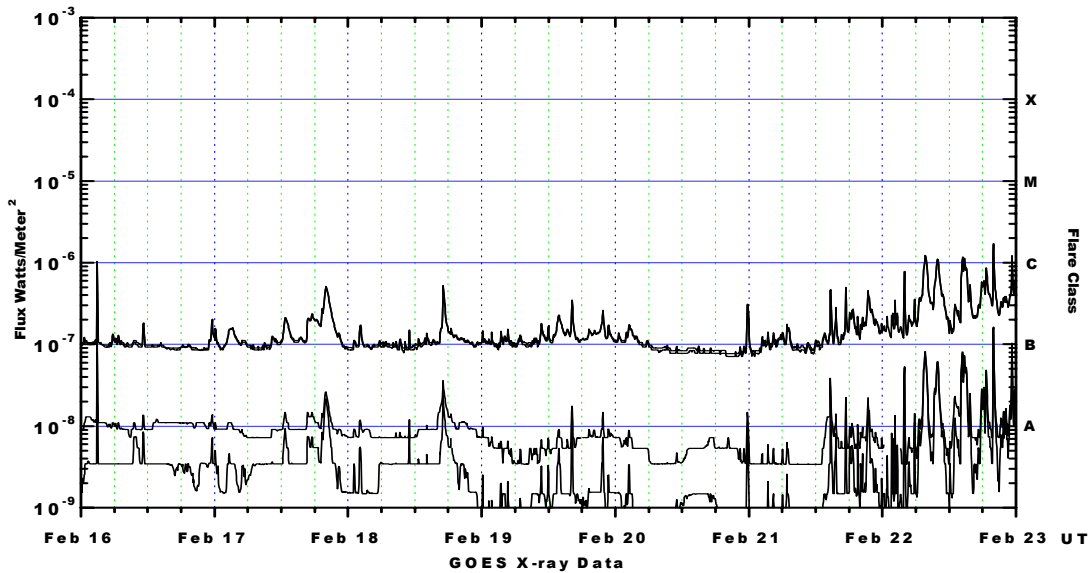
Protons plot contains the five-minute averaged integral proton flux (protons/cm²-sec -sr) as measured by GOES-11 (W113) for each of three energy thresholds: greater than 10, 50, and 100 MeV.

Electrons plot contains the five-minute averaged integral electron flux (electrons/cm²-sec -sr) with energies greater than 2 MeV at GOES-12.

H_p plot contains the five minute averaged magnetic field H - component in nanoteslas (nT) as measured by GOES-12. 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 12 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-11 (W113) 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.

