

Space Weather Highlights 19 January 2004

SWO PRF 1482
27 January 2004

Solar activity ranged from very low to high levels. The period began at moderate levels with Region 540 (S11, L=285, class/area Eao/500 on 13 January) producing two M1 flares and several C-class flares. This moderate sized region was in gradual decay, but maintained considerable complexity during the first half of the period. Activity increased to high levels on 20 January as Region 540 produced an M6/2n flare with moderate radio bursts that included a 4500 sfu burst on 245 MHz and a Type II radio sweep (950 km/s). This region also produced an impressive long duration C5 flare on the 20th. An associated Earth-directed halo CME was observed on SOHO/LASCO imagery. Activity levels were very low to low for the remainder of the period. Occasional C-class activity was observed in Region 543 (S16, L=269, class/area Dao/100 on 21 January), the largest being a C6 flare late on the 25th. Two large filament eruptions occurred on the 21st. The first was a 28-degree filament eruption and CME that occurred in the southeast quadrant at around 1200 UTC on 21 January. The second event occurred late on the 21st, when a large prominence erupted off the northwest limb. A CME was visible on LASCO imagery following the eruption.

Solar wind data were available from the NASA Advanced Composition Explorer (ACE) spacecraft during most of the summary period. The period began with elevated solar wind speeds near 560 to 660 km/s in the waning stages of a high speed coronal hole stream. Solar wind speed continued its gradual decline through early on the 22nd. At 0100 UTC on the 22nd, a CME impacted ACE; solar wind speed increased sharply from 475 km/s to over 700 km/s. Sharp increases in density and temperature were also noted. IMF Bz was initially northward, but rotated southward at around 0900 UTC on the 22nd, and stayed southward through most of the 23rd. A second weaker transient impacted ACE at approximately 1400 UTC on the 23rd. Solar wind plasma parameters again rose sharply, but to a much lesser degree than the previous transient. Weak transient signatures were again evident late on the 24th through the 25th, but solar wind speed remained at or below 500 km/s.

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 this period.

The geomagnetic field ranged from quiet to severe storm levels. Quiet to active conditions were observed on 19 - 21 January due to a high speed coronal hole stream. A 33 nT sudden impulse early on the 22nd, signified the onset of a severe geomagnetic storm. This CME was likely associated with the long duration C5 flare observed in Region 540 on 20 January. Severe storm periods were observed at all latitudes until midday on the 22nd. Unsettled to minor storm conditions prevailed late on the 22nd through the 23rd. Mostly quiet to active conditions were observed on the 24th. Unsettled to minor storm conditions were observed on the 25th due to weak transient solar wind flow.

Space Weather Outlook 28 January - 23 February 2004

Solar activity is expected to be at very low to moderate levels. The period will begin with an almost spotless visible disk, so expect very low to low conditions to persist through into the first few days of the period. Old active Region 536 is due to rotate back into view in the next few days and will likely elevate activity levels from very low to low with a chance for an M-class flare. Old active Region 537 will return in early February and further enhance flare probabilities. The late stages of the forecast period will likely see a return to low and even very low conditions as the active longitudes rotate out of view.

There is a slight chance for a greater than 10 MeV proton event during the period.

The greater than 2 MeV electron flux at geosynchronous orbit is expected to reach high levels on 28 January, 01 - 08 February, and again on 12 - 18 February, due to recurrent coronal holes.

Geomagnetic activity is expected to range from quiet to minor storm levels with a chance of isolated major storm levels. The large transequatorial coronal hole of the last few rotations has broken up into several smaller coronal holes. This series of recurrent coronal holes is due to return on 31 January - 07 February and is expected to produce minor storm level activity with a chance of isolated major storm levels. Another coronal hole is expected to return on 11 - 14 February and produce active to minor 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
19 January	135	87	490	B3.9	9	2	0	4	0	0	0	0
20 January	129	94	540	B3.9	0	1	0	1	1	1	0	0
21 January	130	104	560	B3.3	2	0	0	1	0	0	0	0
22 January	122	76	400	B2.5	0	0	0	0	0	0	0	0
23 January	115	62	260	B1.9	0	0	0	0	0	0	0	0
24 January	108	47	230	B1.8	0	0	0	0	0	0	0	0
25 January	102	48	130	B1.6	1	0	0	2	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
	19 January	3.1E+6	1.5E+4	4.2E+3		3.0E+8
20 January	2.0E+6	1.4E+4	3.8E+3		1.5E+8	
21 January	1.0E+7	1.5E+4	3.7E+3		2.0E+8	
22 January	2.5E+7	1.2E+4	2.7E+3		2.2E+7	
23 January	2.7E+6	1.1E+4	2.7E+3		6.6E+7	
24 January	1.1E+6	1.1E+4	2.4E+3		1.3E+8	
25 January	6.6E+5	1.0E+4	2.0E+3		4.0E+7	

Daily Geomagnetic Data

Date	Middle Latitude Fredericksburg		High Latitude College		Estimated Planetary	
	A	K-indices	A	K-indices	A	K-indices
	19 January	10	3-2-2-2-3-3-2-2	37	3-2-2-6-6-6-3-3	17
20 January	11	3-2-2-2-3-3-2-2	37	3-2-2-6-6-6-3-3	16	3-3-3-2-4-4-3-3
21 January	8	2-2-3-2-2-1-2-2	26	2-2-4-5-5-5-3-2	12	2-2-4-3-4-3-3-2
22 January	35	4-4-3-5-5-2-4-6	80	5-5-7-7-7-4-6-3	62	5-5-6-7-7-4-5-4
23 January	21	3-4-3-4-3-4-4-3	80	3-4-6-7-7-7-6-3	38	4-5-4-5-5-5-5-3
24 January	10	4-2-2-3-2-1-2-2	23	4-2-3-5-4-3-4-3	15	4-2-2-4-3-3-3-3
25 January	17	4-3-3-3-3-3-2-3	48	4-5-5-6-5-6-4-4	33	5-5-5-4-4-4-3-3

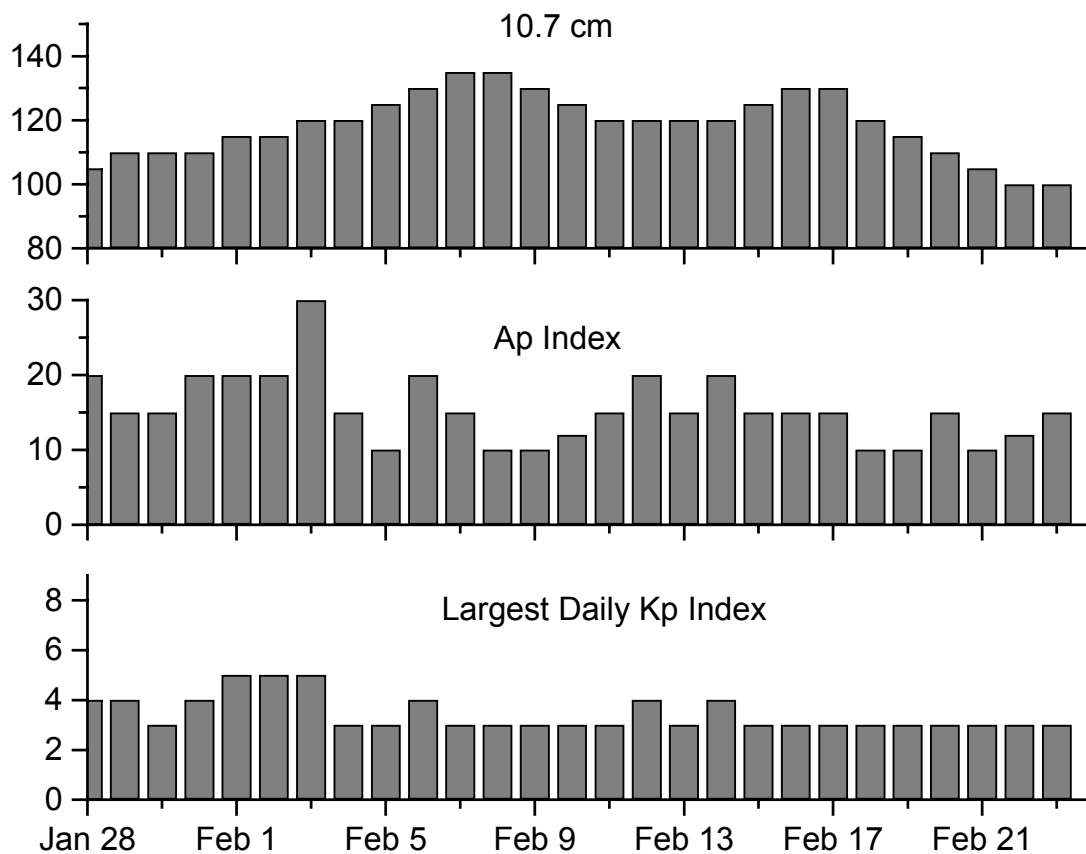


Alerts and Warnings Issued

Date & Time of Issue	Type of Alert or Warning	Date & Time of Event UT
19 Jan 0010	5 - 245 MHz Bursts	18 Jan
19 Jan 0949	ALERT: Electron 2MeV Integral Flux > 1000pfu	19 Jan 0930
19 Jan 1358	ALERT: Geomagnetic K= 4	19 Jan 1358
19 Jan 1539	EXTENDED WARNING: Geomagnetic K= 4	18 Jan 2047 - 19 Jan 2359
19 Jan 2137	ALERT: Type II Radio Emission	19 Jan 2003
19 Jan 2319	EXTENDED WARNING: Geomagnetic K=4	18 Jan 2047 - 20 Jan 1600
20 Jan 0010	3 - 245 MHz Bursts	19 Jan
20 Jan 0744	ALERT: X-Ray Flux exceeded M5	20 Jan 0742
20 Jan 0759	SUMMARY: X-ray Event > M5	20 Jan 0743
20 Jan 0817	SUMMARY: 10cm Radio Burst	20 Jan 0734
20 Jan 0822	ALERT: Type II Radio Emission	20 Jan 0739
20 Jan 0912	ALERT: Electron 2MeV Integral Flux > 1000pfu	20 Jan 0850
20 Jan 1552	EXTENDED WARNING: Geomagnetic K= 4	18 Jan 2047 - 20 Jan 2359
20 Jan 2336	EXTENDED WARNING: Geomagnetic K= 4	18 Jan 2047 - 21 Jan 1600
21 Jan 0843	ALERT: Electron 2MeV Integral Flux > 1000pfu	21 Jan 0820
21 Jan 2138	WATCH: Geomagnetic A \geq 30	22 Jan
22 Jan 0111	WARNING: Geomagnetic K= 5	22 Jan 0125 - 1600
22 Jan 0114	WARNING: Geomagnetic Sudden Impulse	22 Jan 0125 - 0200
22 Jan 0143	ALERT: Geomagnetic K= 4	22 Jan 0140
22 Jan 0145	SUMMARY: Geomagnetic Sudden Impulse	22 Jan 0140
22 Jan 0202	ALERT: Geomagnetic K-index of 5	22 Jan 0200
22 Jan 0514	ALERT: Electron 2MeV Integral Flux > 1000pfu	22 Jan 0500
22 Jan 1257	WARNING: Geomagnetic K= 6	22 Jan 1257 - 1600
22 Jan 1304	ALERT: Geomagnetic K= 6	22 Jan 1305
22 Jan 1435	ALERT: Geomagnetic K= 7	22 Jan 1433
22 Jan 1557	EXTENDED WARNING: Geomagnetic K= 5	22 Jan 0125 - 2359
22 Jan 2358	WARNING: Geomagnetic K= 4	22 Jan 2359 - 1600
23 Jan 0119	2 - 245 MHz Radio Bursts	22 Jan
23 Jan 0503	WARNING: Geomagnetic K= 5	23 Jan 0504 - 1600
23 Jan 0505	ALERT: Geomagnetic K= 5	23 Jan 0506
23 Jan 1234	ALERT: Electron 2MeV Integral Flux > 1000pfu	23 Jan 1205
23 Jan 1552	EXTENDED WARNING: Geomagnetic K= 5	23 Jan 0504 - 2359
23 Jan 2349	EXTENDED WARNING: Geomagnetic K= 5	23 Jan 0504 - 24 Jan 1600
24 Jan 1142	ALERT: Electron 2MeV Integral Flux > 1000pfu	24 Jan 1120
24 Jan 1555	WARNING: Geomagnetic K= 4	24 Jan 1600 - Jan 24 2359
24 Jan 2353	EXTENDED WARNING: Geomagnetic K= 4	24 Jan 1600 - Jan 25 1600
25 Jan 0016	1 - 245 MHz Radio Burst	24 Jan
25 Jan 134	CANCEL WARNING: Geomagnetic K= 4	24 Jan 1555
25 Jan 142	WARNING: Geomagnetic K= 4	25 Jan 0142 - 1600
25 Jan 814	WARNING: Geomagnetic K = 5	25 Jan 0814 - 1600
25 Jan 824	ALERT: Geomagnetic K-index of 5	25 Jan 0823
25 Jan 1552	ALERT: Electron 2MeV Integral Flux > 1000pfu	25 Jan 1525



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 Jan	105	20	4	11 Feb	120	15	3
29	110	15	4	12	120	20	4
30	110	15	3	13	120	15	3
31	110	20	4	14	120	20	4
01 Feb	115	20	5	15	125	15	3
02	115	20	5	16	130	15	3
03	120	30	5	17	130	15	3
04	120	15	3	18	120	10	3
05	125	10	3	19	115	10	3
06	130	20	4	20	110	15	3
07	135	15	3	21	105	10	3
08	135	10	3	22	100	12	3
09	130	10	3	23	100	15	3
10	125	12	3				



Energetic Events

Date	Time		X-ray		Optical Information			Peak		Sweep Freq		
	Begin	Max	$\frac{1}{2}$	Class	Integ Flux	Imp/ Brtns	Location Lat CMD	Rgn #	Radio Flux		Intensity	
			Max						245	2695	II	IV
19 Jan 04	0525	0532	0535	M1.0	.003	Sf	S17E05	540	290			
19 Jan 04	1230	1240	1246	M1.0	.006	540		560	59			
20 Jan 04	0729	0743	0747	M6.1	.028	2n	S16W12	540	4500	150	3	

Flare List

Date	Time			X-ray Class.	Imp / Brtns	Optical Location Lat CMD	Rgn
	Begin	Max	End				
19 January	0102	0108	0112	C1.1			537
	0138	0143	0149	B6.7			540
	0206	0213	0219	C1.1			540
	0226	0231	0235	C1.7			540
	0248	0255	0303	C1.2			540
	0442	0447	0455	B5.8			
	0529	0533	0543	M1.0	Sf	S17E05	540
	0658	0658	0703		Sf	S15W01	540
	0932	0936	0938	C1.0			537
	1230	1240	1246	M1.0			540
	1425	1439	1456	C3.4			543
	1738	1743	1746	C1.5			537
	1958	2000	2024	C8.2	Sf	S15W03	540
	2202	0045	0229	C5.5			
20 January	2346	0040	0137		Sf	S13W09	540
	B0010	0022	A0022		1f	S13W09	
	B0104	0112	A0112		Sf	S12W08	
21 January	0734	0744	0810	M6.1	2n	S16W12	540
	0020	0036	0102	C2.3			543
22 January	0025	0029	0059		Sf	S16W12	543
	0402	0511	0530	C1.2			
	1031	1052	1112	B7.6			
	1706	1720	1729	B8.6			
	1908	1913	1916	B7.4			
	2340	2347	2357	B7.2			540
	0930	0935	0940	B5.7			544
23 January	1705	1713	1726	B8.1			
	1115	1122	1127	B2.7			542
	1611	1619	1624	B3.3			540
24 January	1800	1804	1808	B2.5			544
	0449	0455	0459	B2.5			540
	1006	1009	1012	B2.5			540
25 January	0756	0800	0802	B4.3			540
	1322	1325	1327	B3.9			540
	2227	2227	2249		Sf	N11W70	542
	2232	2232	2248	C6.3	Sf	S18W72	543



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	4			
<i>Region 540</i>																		
12 Jan	S11E76	290	0060	06	Hhx	006	A	1										
13 Jan	S11E68	285	0500	15	Eao	007	B											
14 Jan	S13E59	286	0180	11	Eao	004	B											
15 Jan	S13E43	284	0300	14	Eso	010	B	2				1						
16 Jan	S13E28	286	0350	13	Eao	013	B											
17 Jan	S14E15	286	0350	14	Eso	009	B	5	1		3							
18 Jan	S14E02	285	0330	16	Fko	036	B	1	1		1	1						
19 Jan	S14W10	284	0300	16	Fko	030	Bgd	4	2		4							
20 Jan	S14W22	283	0220	15	Eao	023	Bgd		1					1				
21 Jan	S14W35	283	0220	13	Eso	022	Bg											
22 Jan	S14W48	283	0100	12	Eso	005	Bg											
23 Jan	S14W61	283	0080	13	Cso	003	B											
24 Jan	S14W81	289	0110	02	Hsx	001	A											
25 Jan	S15W91	286	0060	01	Hsx	001	A											
								13	5	0	8	2	1	0	0			

Still on Disk.

Absolute heliographic longitude: 285

Region 541

15 Jan	S09W03	330	0030	05	Dso	005	B											
16 Jan	S09W18	332	0010	02	Bxo	003	B											
17 Jan	S09W31	332	0060	03	Dao	003	B											
18 Jan	S10W44	331	0010	02	Bxo	003	B											
19 Jan	S09W58	332	0010	01	Axx	001	A											
20 Jan	S09W71	332																
21 Jan	S09W84	332																
22 Jan	S09W97	332																
								0	0	0	0	0	0	0	0	0	0	

Crossed West Limb.

Absolute heliographic longitude: 330



Region Summary - continued.

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

Region 542

16 Jan	N11E54	260	0060	03	Cso	002	B											
17 Jan	N11E43	258	0030	01	Hsx	001	A											
18 Jan	N11E30	258	0000	00		000												
19 Jan	N08E15	259	0110	15	Bxo	011	B											
20 Jan	N10W03	264	0110	08	Dai	012	Bg											
21 Jan	N10W16	264	0110	11	Dai	021	Bg											
22 Jan	N10W29	264	0090	08	Dsi	014	B											
23 Jan	N10W42	264	0040	06	Cso	007	B											
24 Jan	N10W61	269	0030	01	Hsx	001	A											
25 Jan	N09W71	266	0040	04	Cso	003	B					1						
								0	0	0	0	1	0	0	0	0	0	0

Still on Disk.

Absolute heliographic longitude: 264

Region 543

19 Jan	S18E05	269	0070	04	Cai	005	Bg	1										
20 Jan	S17W08	269	0080	05	Dao	005	Bg											
21 Jan	S16W21	269	0100	05	Dao	010	Bg	1			1							
22 Jan	S16W34	269	0080	04	Dso	006	Bg											
23 Jan	S16W47	269	0040	04	Cso	004	B											
24 Jan	S16W60	268	0050	02	Hsx	001	A											
25 Jan	S16W72	267	0020	01	Hsx	001	A	1			1							
								3	0	0	2	0	0	0	0	0	0	0

Still on Disk.

Absolute heliographic longitude: 269

Region 544

20 Jan	N08E09	252	0130	08	Dai	014	Bg											
21 Jan	N08W04	252	0130	08	Dso	011	Bg											
22 Jan	N08W17	252	0130	09	Cso	011	B											
23 Jan	N08W30	252	0100	10	Dao	008	B											
24 Jan	N08W44	252	0040	07	Bxo	004	B											
25 Jan	N08W57	252	0010	06	Bxo	003	B											
								0	0	0	0	0	0	0	0	0	0	0

Still on Disk.

Absolute heliographic longitude: 252

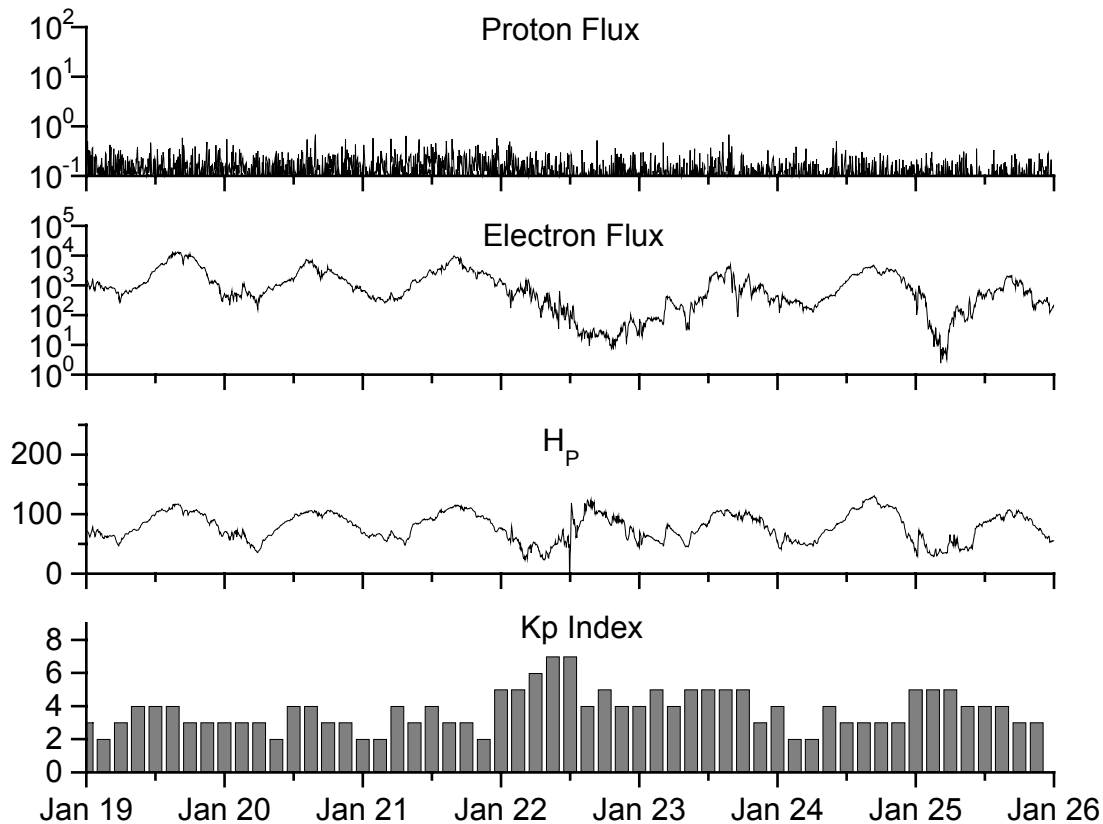


**Recent Solar Indices (preliminary)
of the observed monthly mean values**

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									
January	189.0	114.1	0.60	184.8	113.5	227.3	194.6	08	12.3
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			127.8		20	
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		17	

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 19 January 2004

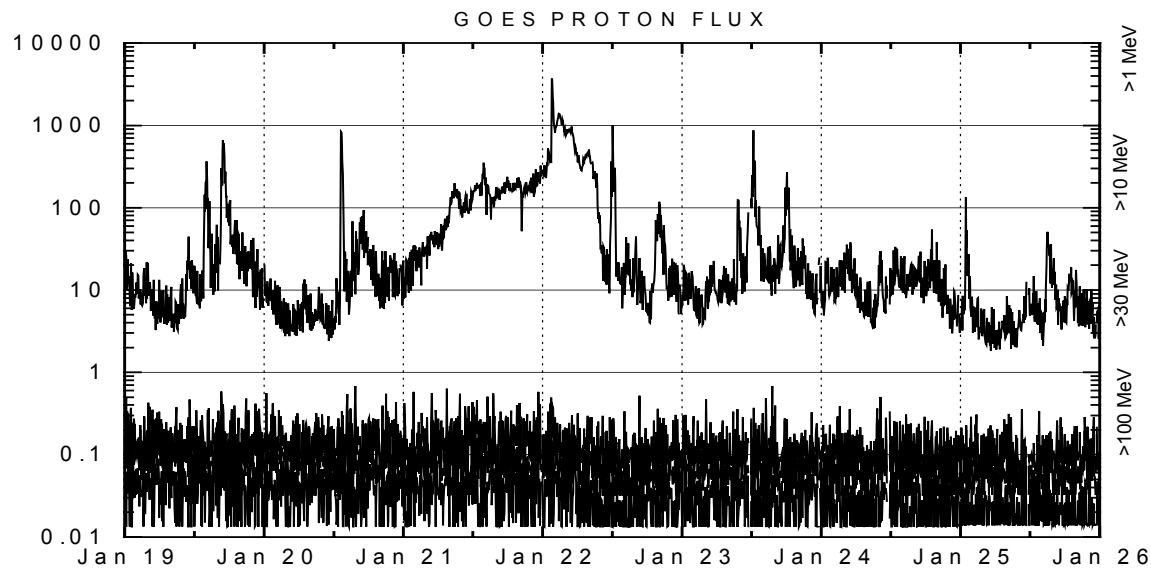
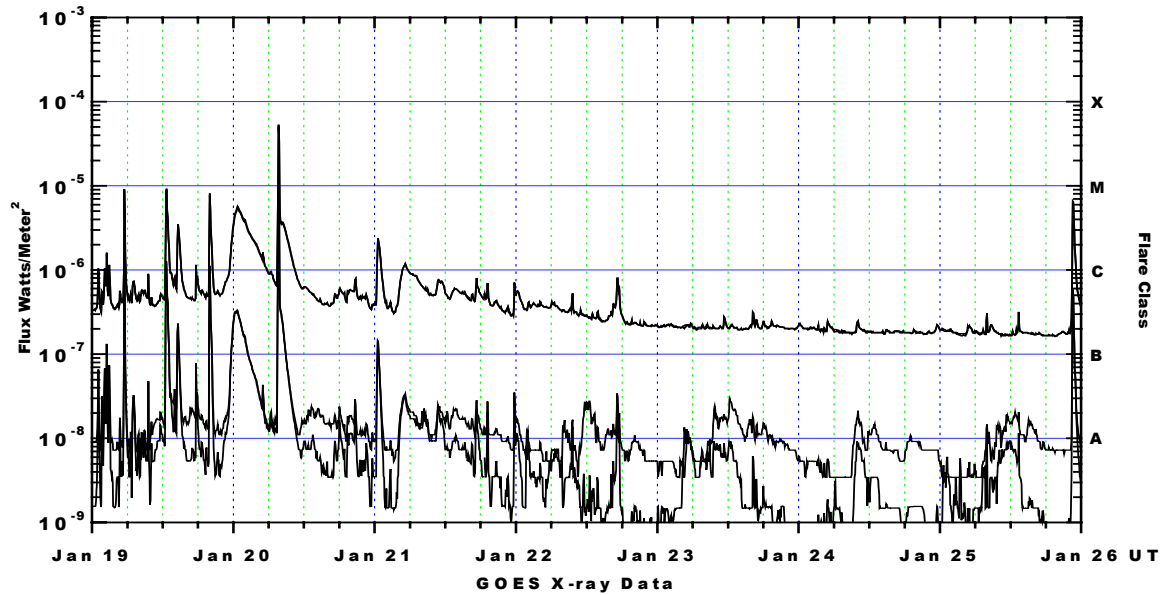
Protons plot contains the five-minute averaged integral proton flux (protons/cm²-sec -sr) as measured by GOES-11 (W113) for each of three energy thresholds: greater than 10, 50, and 100 MeV.

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.

