

Space Weather Highlights
25-31 January 1999

Solar activity ranged from very low to moderate. Activity reached moderate levels on 25 January due to an M2/SN flare at 25/0056UT from Region 8444 (N19, L = 233, class/area Dso/100 on 25 January), which showed slight growth prior to the flare. This region also produced a long-duration C3/SF at 25/0012UT with a Type II radio sweep. Activity dropped to very low to low levels for the rest of the week with occasional B- and C-class subfolders from a variety of small sunspot groups.

Real-time solar wind data were available from the Advanced Composition Explorer (ACE) spacecraft during most of the period. A few minor changes were detected in the solar wind flow on 27 January including a velocity increase from 330 to 450 km/sec, a density enhancement which peaked at 17 p/cc, and southerly IMF Bz variations to minus 08 nT (GSM). Phi data indicated that Earth was within an away solar sector (positive polarity, phi angle near 135 degrees) during the period.

The proton enhancement at geo-synchronous altitude that followed the M5 flare of 20 January returned to background levels on 27 January. Proton fluxes remained at background levels for the rest of the period.

The greater than 2 MeV electron flux at geosynchronous altitude was at normal to moderate levels through 26 January, then dropped to normal levels for the balance of the period.

The geomagnetic field was at quiet to unsettled levels. However, there were brief, localized active to minor storm periods detected at some high latitude stations.

Space Weather Outlook
03 February 1999 - 01 March 1999

Solar activity is expected to be low to moderate. An increase in activity levels is possible beginning 07 February with the expected return of old Regions 8439 and 8440.

No significant proton enhancements are expected at geosynchronous altitude.

The greater than 2 MeV electron flux at geosynchronous altitude is expected to be at normal to moderate levels during most of the period with high levels possible during 10 - 13 February.

The geomagnetic field is expected to be at quiet to unsettled levels during most of the period. However, active periods are possible during 09 - 11 February due to recurrent coronal hole effects.



Daily Solar Data

Date	Radio Flux 10.7 cm	Sun spot No. (10 ⁶ hemi.)	Sunspot Area (10 ⁶ hemi.)	X-ray Background	Flares							
					X-ray Flux			Optical				
					C	M	X	S	1	2	3	4
25 January	138	81	290	C1.7	4	1	0	4	0	0	0	0
26 January	133	47	100	C1.1	3	0	0	3	1	0	0	0
27 January	125	64	70	B4.2	3	0	0	0	0	1	0	0
28 January	119	37	20	B7.4	0	0	0	2	0	0	0	0
29 January	118	33	30	B2.4	1	0	0	2	0	0	0	0
30 January	118	29	170	B2.4	0	0	0	1	0	0	0	0
31 January	115	59	210	B3.6	0	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
25 January	3.8E+6	7.5E+4	2.5E+3		2.1E+7	
26 January	2.2E+6	3.8E+4	2.5E+3		2.9E+7	
27 January	1.1E+6	2.2E+4	2.5E+3		2.0E+6	
28 January	2.7E+5	1.5E+4	2.5E+3		1.5E+6	
29 January	1.7E+5	1.3E+4	2.5E+3		2.3E+6	
30 January	9.3E+4	1.4E+4	2.7E+3		2.8E+6	
31 January	4.9E+4	1.4E+4	3.5E+3		3.6E+6	

Daily Geomagnetic Data

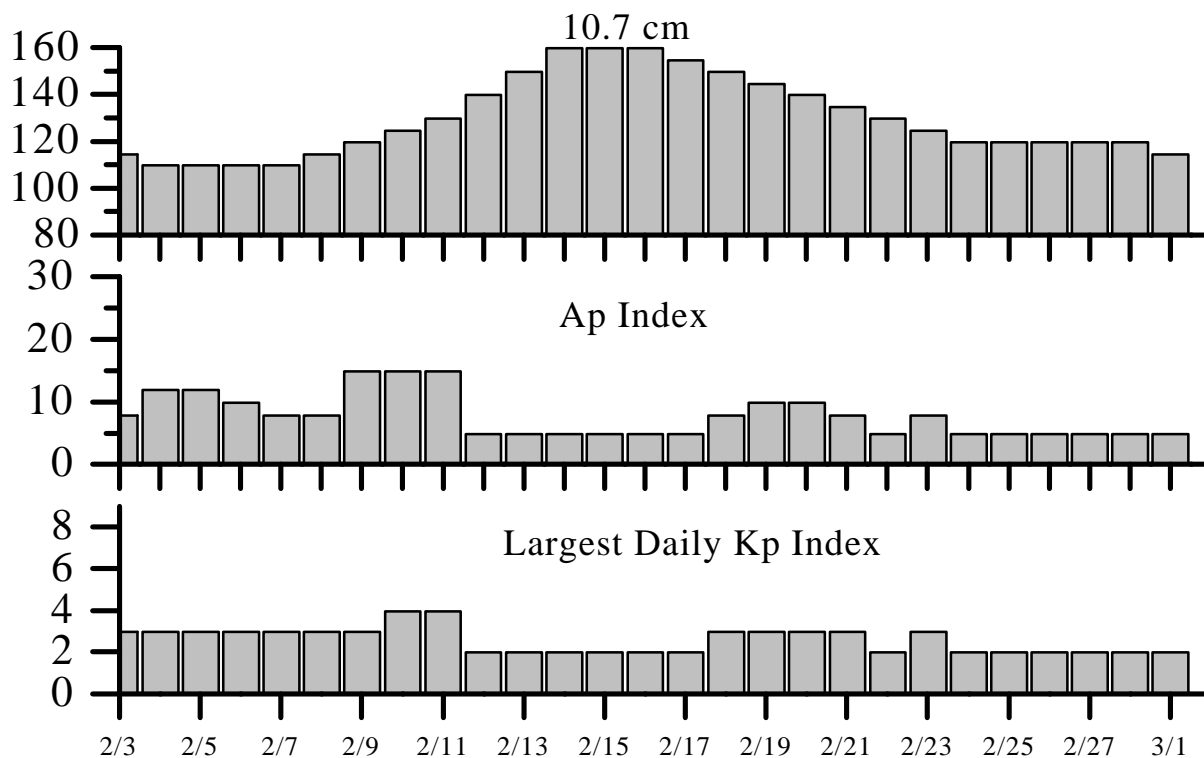
Date	Middle Latitude Fredericksburg		High Latitude College		Estimated Planetary	
	A	K-indices	A	K-indices	A	K-indices
	25 January	6	3-2-2-2-1-1-0-1	7	2-2-1-4-2-0-2-1	9
26 January	3	2-0-1-2-1-0-1-1	*	1-0-1-*-1-0-2-1	4	2-0-1-2-1-1-1-2
27 January	6	2-3-1-1-2-1-1-1	19	2-1-4-4-5-4-2-2	9	2-3-2-2-3-3-2-1
28 January	6	1-1-3-2-2-2-1-1	*	0-1-*-*-3-1-1	7	1-1-3-2-3-3-2-2
29 January	6	1-2-1-2-2-2-2-1	13	1-2-3-3-4-4-1-2	7	1-2-2-3-2-2-2-2
30 January	4	1-0-2-2-1-1-1-1	16	1-5-4-5-0-0-0-0	5	2-1-2-2-1-1-1-1
31 January	3	0-1-1-1-2-1-1-0	2	0-0-0-2-1-1-0-0	3	0-2-0-1-1-1-1-1

Alerts and Warnings Issued

Date and Time of Issue (UT)	Type of Alert or Warning	Date and Time of Event (UT)
25 Jan 0229	Type II Radio Emission	25 Jan 0011
26 Jan 0054	1- 245 MHz Burst	25 Jan
27 Jan 0128	1- 245 MHz Burst	26 Jan
28 Jan 0050	1- 245 MHz Burst	27 Jan



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
03 Feb	115	8	3	17 Feb	155	5	2
04	110	12	3	18	150	8	3
05	110	12	3	19	145	10	3
06	110	10	3	20	140	10	3
07	110	8	3	21	135	8	3
08	115	8	3	22	130	5	2
09	120	15	3	23	125	8	3
10	125	15	4	24	120	5	2
11	130	15	4	25	120	5	2
12	140	5	2	26	120	5	2
13	150	5	2	27	120	5	2
14	160	5	2	28	120	5	2
15	160	5	2	01 Mar	115	5	2
16	160	5	2				



Energetic Events

Date	Time (UT)			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
25 Jan 99	0001	0012	0045	C3.1	.007	SF	N21W37	8444	99		2	
25 Jan 99	0052	0056	0058	M2.6	.005	SN	N20W43	8444	1800	93		

Flare List

Date	Time			X-ray Class.	Imp / Brtns	Optical Location		Rgn #
	Begin	Max	End			Lat	CMD	
25 January	0003	0013	0034	C3.1	SF	N21W37	8444	
	0055	0056	0102	M2.6	SN	N20W43	8444	
	0517	0527	0542	C5.6				
	1406	1408	1414	C8.0	SF	N20W50	8444	
	1618	1646	1710	C3.5				8447
	B1624	U1624	1631		SF	N18W54	8447	
26 January	1903	1906	1910	B9.6				
	0406	0415	0432	C2.2				
	1040	1121	1156	C5.4				
	1436	1436	1439		SF	N19W73	8447	
	1840	1841	1902	C7.9	1N	N19W70	8447	
	1908	1909	1927		SF	N27E01		
27 January	2022	2022	2032		SF	N27W01		
	0115	0121	0126	C1.1				
	1625	1649	1814	C3.9	2F	N24W16	8450	
28 January	2340	0048	0200	C1.1				
	1001	1004	1008	B4.8				
	1045	1048	1050	B4.3				
29 January	1149	1153	1156	B4.5				
	1232	1237	1242	B8.8				
	1309	1309	1319		SF	S16W28	8448	
	1553	1553	1600		SF	N26W44	8449	
	1206	1212	1234		SF	N15W39	8446	
	1334	1438	1446		SF	N16W41	8446	
30 January	1441	1454	1504	C1.2				
	0501	0504	0508		SF	N16W50	8446	
31 January	1046	1049	1052	B4.7				
	0044	0047	0049	B5.6				
	0711	0712	0715	B7.8	SF	N23W78	8449	
	1140	1143	1145	B5.8				
	1150	1205	1219	B8.8				
	1341	1344	1349	B7.3				
	1625	1628	1630	B4.4				
	1713	1717	1721	B5.8				
	1941	1943	1948	B7.0	SF	N19W66	8446	
2043	2048	2053	B5.9					



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 8439</i>																		
12 Jan	S24E75	277	0160	08	CAO	005	B							4				
13 Jan	S24E65	269	0260	12	EAI	011	BG	3						5				
14 Jan	S24E53	268	0270	14	EAI	019	B	2						5				
15 Jan	S24E41	267	0270	14	EAI	024	BG	1					1	1				
16 Jan	S24E28	266	0270	15	EAI	031	B	2						3				
17 Jan	S24E14	267	0210	16	FAO	040	B	4						7				
18 Jan	S24E00	268	0240	16	FAI	046	BG	14	1				23	1				
19 Jan	S23W13	268	0300	17	FAI	044	BG	5						14				
20 Jan	S24W28	270	0290	16	FAI	034	BG	1						5				
21 Jan	S23W42	271	0410	14	EAC	023	BG							5				
22 Jan	S23W57	272	0480	12	EKC	020	BG	3						14	1			
23 Jan	S23W70	272	0390	13	EHC	023	BG	10						13	2			
24 Jan	S23W82	271	0260	15	EKO	012	BG	1						2				
25 Jan	S23W94	270	0080	02	CAO	002	B											
								46	1	0	10	1	5	0	0	0	0	

Crossed West Limb.

Absolute heliographic longitude: 268

<i>Region 8440</i>																		
13 Jan	N21E70	264	0060	04	CAO	005	B	4						9	2			
14 Jan	N19E56	265	0190	07	DAO	012	B	7	2					17	1			
15 Jan	N20E42	266	0300	10	DAI	026	BG	14	1					16	4			
16 Jan	N19E29	265	0360	12	EAI	031	BG	13	1					14	1			
17 Jan	N19E16	265	0300	14	EAI	042	BG	9						15				
18 Jan	N19E03	265	0310	16	FSI	054	B	6	1					6	2			
19 Jan	N19W10	265	0300	15	EAI	049	BG	2						9				
20 Jan	N19W24	266	0300	16	FAI	039	BG	1						1				
21 Jan	N19W37	266	0330	16	FAI	025	B	1						2				
22 Jan	N19W50	265	0360	17	FHI	021	BG	1	1					12				
23 Jan	N19W63	265	0270	17	FAI	017	BG											
24 Jan	N19W79	268	0150	16	FSO	007	BG							2				
25 Jan	N19W88	264	0060	08	DAO	004	B											
								58	6	0	10	3	10	0	0	0	0	

Crossed West Limb.

Absolute heliographic longitude: 265



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 8443

18 Jan	S18E65	203	0010	15	BXO	003	B											
19 Jan	S17E55	200	0010	11	BXO	003	B											
20 Jan	S17E45	197	0000	01	AXX	001	A											1
21 Jan	S16E34	195	0010	01	HRX	001	A											
22 Jan	S17E20	195	0000	01	AXX	002	A											
23 Jan	S18E07	195	0010	01	CRO	002	B											
24 Jan	S15W04	193	0000	03	BXO	002	B											
25 Jan	S15W16	192	0010	02	BXO	002	B											
26 Jan	S15W29	192																
27 Jan	S16W43	192	0010	04	BXO	004	B											
28 Jan	S16W56	192																
29 Jan	S16W69	192																
																		0 0 0 1 0 0 0 0

Died on Disk.

Absolute heliographic longitude: 193

Region 8444

19 Jan	N19E20	235	0000	01	AXX	002	A											1
20 Jan	N19E05	237	0000	01	AXX	002	A											
21 Jan	N20W04	233	0020	06	CSO	007	B											1
22 Jan	N19W14	229	0060	06	DAO	008	B	1										1
23 Jan	N20W27	229	0070	07	DAO	010	BG											
24 Jan	N20W39	228	0070	06	DSO	008	B	1										6
25 Jan	N20W52	228	0100	06	DSO	007	B	2	1									3
26 Jan	N19W66	229	0070	07	CSO	003	B											
27 Jan	N19W77	226	0060	03	CSO	003	B											
																		4 1 0 12 0 0 0 0

Died on Disk.

Absolute heliographic longitude: 233



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 8446

21 Jan	N14E60	169	0010	04	BXO	003	B													
22 Jan	N15E46	169	0000	03	BXO	002	B													
23 Jan	N14E33	169	0010	01	AXX	002	A													
24 Jan	N15E19	170	0000	01	AXX	001	A						1							
25 Jan	N15E06	170																		
26 Jan	N15W07	170																		
27 Jan	N15W20	170																		
28 Jan	N17W31	167	0020	04	BXO	005	B													
29 Jan	N17W43	166	0020	06	DRO	011	B						2							
30 Jan	N17W59	169	0160	09	DSO	006	B						1							
31 Jan	N17W72	169	0170	10	DSO	008	B						1							
													0	0	0	5	0	0	0	0

Still on Disk.

Absolute heliographic longitude: 170

Region 8447

22 Jan	N19W20	235	0030	03	CRO	004	B	1					1					
23 Jan	N19W34	236	0010	03	BXO	003	B						2					
24 Jan	N20W46	235	0030	05	BXO	006	B						1					
25 Jan	N19W59	235	0030	04	CSO	003	B	1					1					
26 Jan	N19W73	236	0020	05	BXO	002	B	1					1	1				
								3	0	0	6	1	0	0	0	0		

Died on Disk.

Absolute heliographic longitude: 235

Region 8448

24 Jan	S16E22	167	0000	01	AXX	001	A													
25 Jan	S16E09	167	0010	04	BXO	003	B													
26 Jan	S17W06	169	0000	00	AXX	001	A													
27 Jan	S17W18	167	0000	00	AXX	001	A													
28 Jan	S17W31	167											1							
29 Jan	S17W44	167																		
30 Jan	S17W57	167																		
31 Jan	S17W70	167																		
													0	0	0	1	0	0	0	0

Still on Disk.

Absolute heliographic longitude: 169



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	4			
<i>Region 8449</i>																		
26 Jan	N26W22	185	0010	00	AXX	001	A											
27 Jan	N27W35	184	0000	02	BXO	003	B											
28 Jan	N27W49	185	0000	01	AXX	001	A					1						
29 Jan	N27W60	183	0010	04	BXO	002	B											
30 Jan	N27W74	184	0010	04	BXO	003	B											
31 Jan	N26W86	183	0010	08	BXO	005	B					1						
								0	0	0	2	0	0	0	0	0		
Still on Disk.																		
Absolute heliographic longitude: 185																		
<i>Region 8450</i>																		
27 Jan	N21W19	168	0000	03	BXO	003	B							1				
28 Jan	N22W31	167	0000	01	AXX	001	A											
29 Jan	N22W44	167																
30 Jan	N22W59	169																
31 Jan	N22W30	127																
								0	0	0	0	0	1	0	0			
Still on Disk.																		
Absolute heliographic longitude: 168																		
<i>Region 8451</i>																		
31 Jan	N28W40	137	0020	02	BXO	004	B											
								0	0	0	0	0	0	0	0			
Still on Disk.																		
Absolute heliographic longitude: 137																		
<i>Region 8452</i>																		
31 Jan	N22W30	127	0010	03	BXO	002	B											
								0	0	0	0	0	0	0	0			
Still on Disk.																		
Absolute heliographic longitude: 127																		



**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
1997									
February	11.3	07.6	0.67	17.4	11.0	73.8	73.7	11	09.2
March	14.4	08.7	0.60	20.4	13.5	73.5	75.1	08	08.9
April	24.5	15.5	0.63	24.0	16.5	74.5	76.8	10	08.6
May	28.6	18.5	0.65	26.4	18.3	74.6	78.4	08	08.6
June	22.1	12.7	0.57	29.0	20.3	71.7	80.1	07	08.6
July	17.0	10.4	0.61	32.4	22.6	71.1	81.8	06	08.5
August	36.7	24.4	0.66	35.9	25.0	79.0	83.4	07	08.3
September	52.8	51.3	0.88	40.5	28.3	96.2	85.7	10	08.4
October	33.6	22.8	0.68	45.4	31.8	84.9	88.6	11	08.6
November	53.5	39.0	0.73	49.3	35.0	99.5	91.3	11	09.0
December	57.9	41.2	0.71	54.2	39.0*	98.8	94.2*	05	09.5
1998									
January	51.8	31.9	0.62	60.6	43.7*	93.4	97.5*	08	09.9*
February	54.4	40.3	0.74	67.4	48.8*	93.4	101.7*	08	10.5*
March	81.8	54.8	0.67	73.3	53.4*	109.1	105.8*	13	11.2*
April	73.6	53.4	0.73	77.7	56.5*	108.3	109.1*	10	11.4*
May	74.3	56.3	0.76	81.4	59.3*	106.7	112.4*	18	11.7*
June	93.6	70.7*	0.76*	85.9	62.4*	108.4*	116.2*	10	12.0*
July	98.3	66.2*	0.67*	90.3	65.4*	114.0*	120.3*	11*	12.2*
August	118.6	91.7*	0.77*			136.0*		18*	
September	119.0	92.9*	0.78*			138.4*		14*	
October	77.0	55.6*	0.72*			121.9*		13*	
November	99.5	73.6*	0.74*			140.2*		16*	
December	120.8	81.6*	0.68*			150.1*		08*	
1999									
January	94.3	62.4*	0.66*			140.6*		08*	

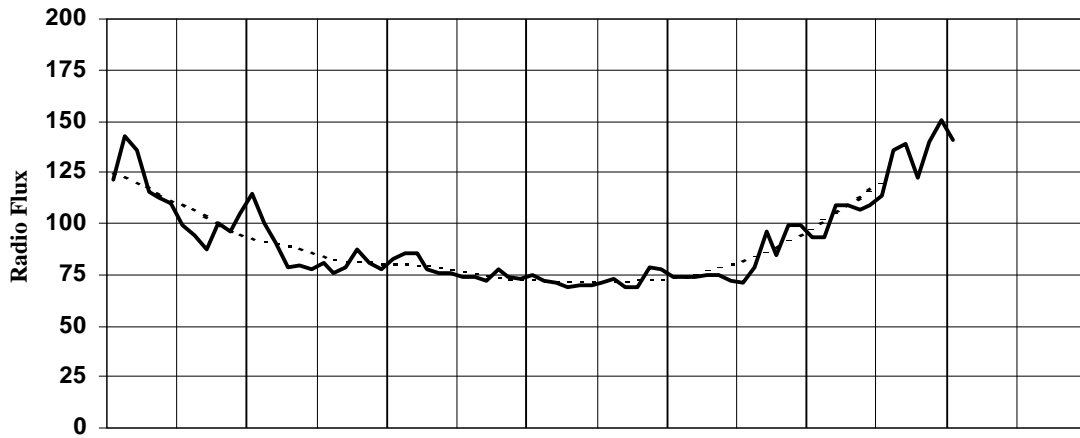
*Preliminary estimates.

The lowest smoothed sunspot indices 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.

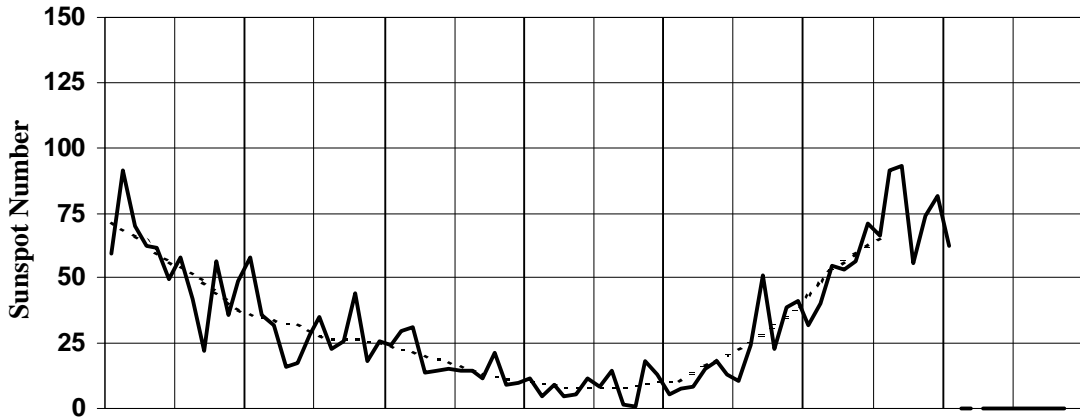
** From June 1991 onward, the 10.7-cm radio flux data source is Penticton, B.C. Canada. Prior to that, it was Ottawa.



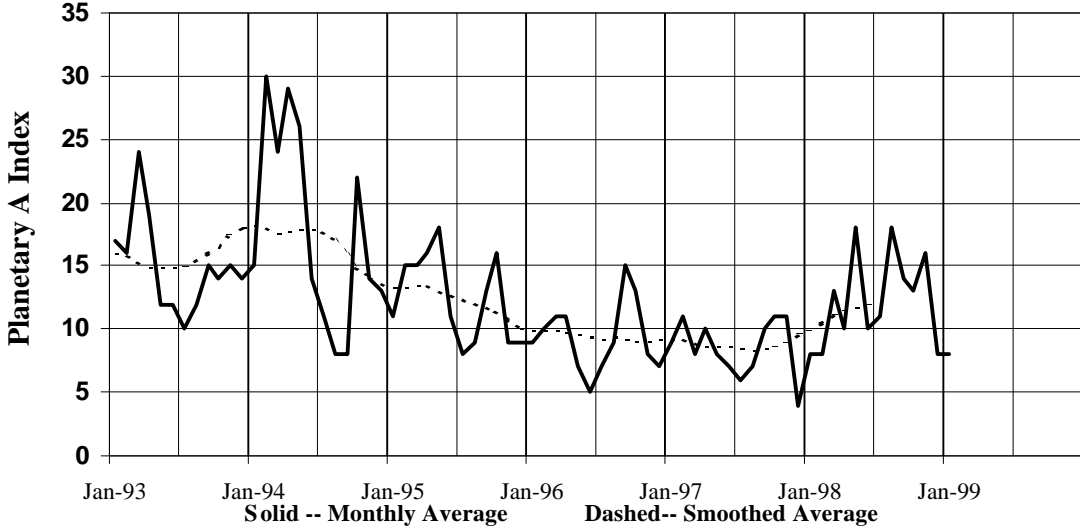
Penticton (DRAO) Radio Flux 2800MHz (10.7cm)
 (With data through 1 Feb 99 for all graphs)



International Sunspot Number

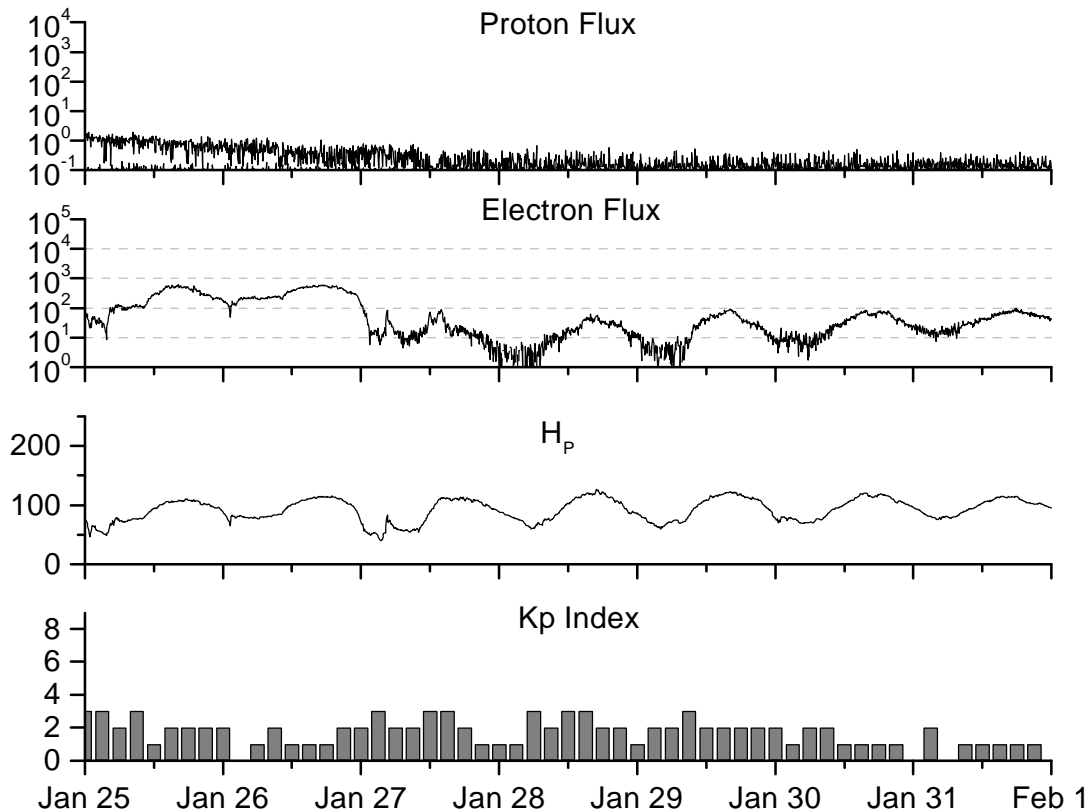


Planetary Geomagnetic A Index (Estimated)



Jan-93 Jan-94 Jan-95 Jan-96 Jan-97 Jan-98 Jan-99
 Solid -- Monthly Average Dashed-- Smoothed Average





*Weekly Geosynchronous Satellite Environment Summary
Week Beginning 25 January 1999*

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.

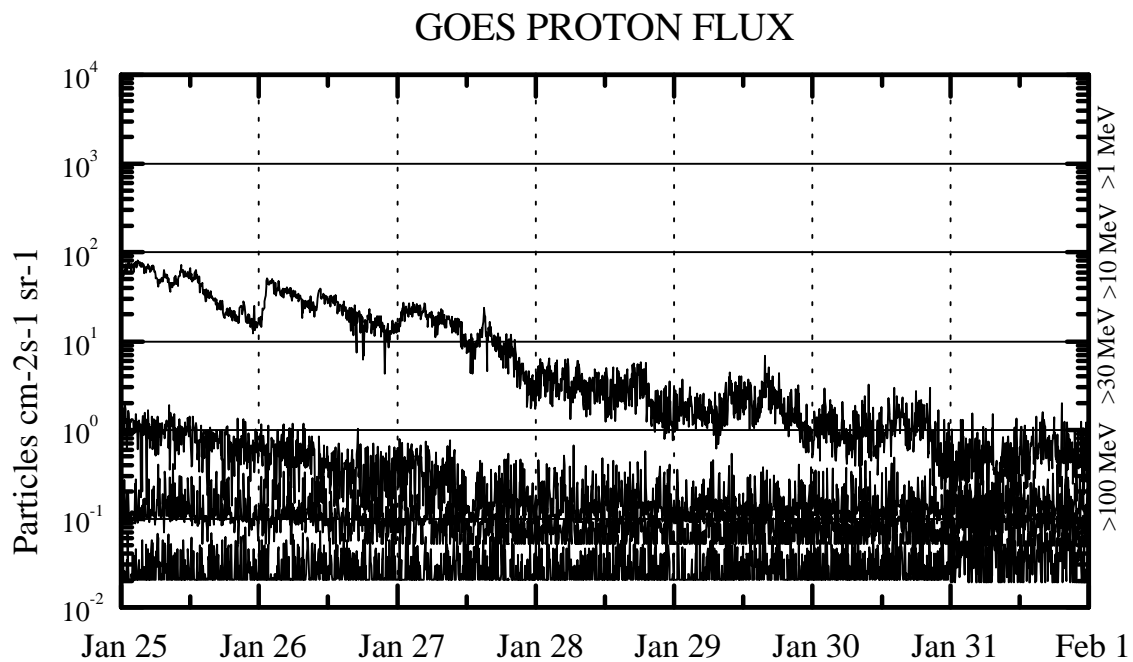
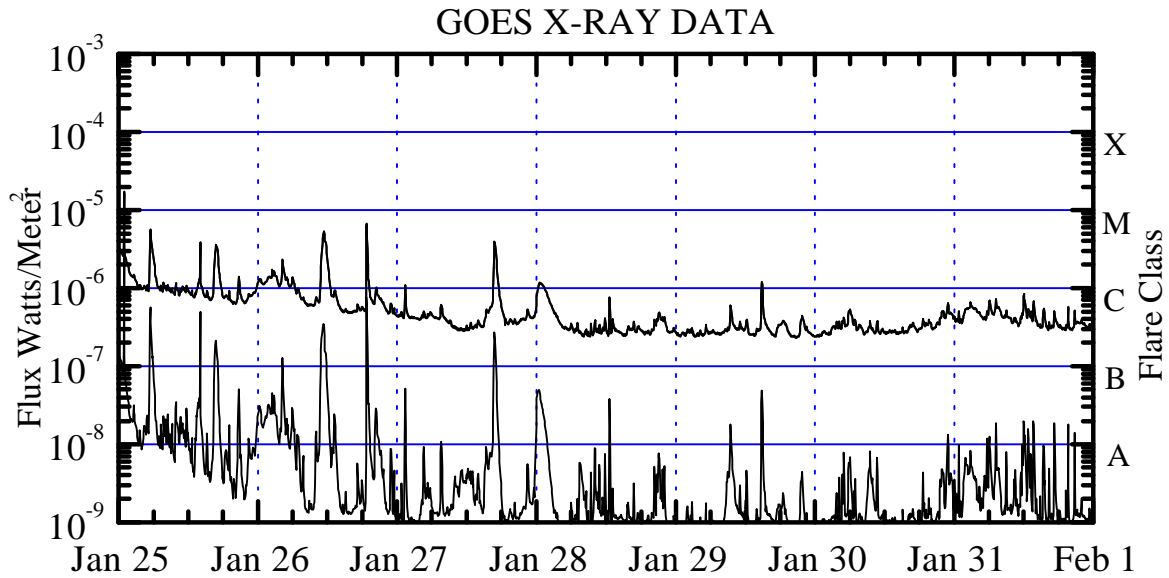
Electrons plot contains the five-minute averaged integral electron flux (electrons/ cm^2 -sec-sr) with energies greater than 2 MeV at GOES-8.

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 USAF 55th 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_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 a 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



Sudden Storm Commencements and Impulses



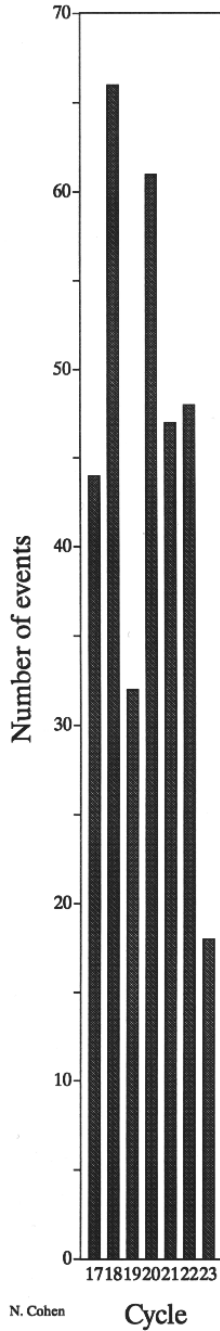
Space Environment Center



January 1999
(Month 28)

Preliminary data

Comparison of Cycles at current month in cycle



N. Cohen

