

Space Weather Highlights
01-07 December 1997

Solar activity ranged moderate to very low. Region 8113 (N20, L = 309, class/area Fsc/0940 on 30 November) produced an M1/1N at 01/0237UT, accompanied by modest radio emissions. Activity dropped to mostly low levels for the remainder of the period as Region 8113 gradually declined in size and magnetic complexity. A 14 degree filament, last observed near N47W13, disappeared on 06 December. A space-based coronagraph detected a partial-halo coronal mass ejection (CME) shortly after the filament disappearance. The CME appeared to be mostly westward-directed. A long-duration B9 X-ray enhancement occurred during 06/1052 - 2341UT and was also associated with the disappearance.

Solar wind data were received from the WIND spacecraft a few hours per day. Velocities decreased from 400 - 320 km/sec during 01 - 02 December, then varied between 200 - 300 km/sec for the rest of the period. Densities varied 03 - 13 p/cc. Bz was in the plus 06 to minus 06 nT (GSM) range. Solar sector orientation was toward (phi angle near 315 degrees) during 01 - 02 December, then shifted to away conditions (phi angle near 135 degrees) for most of the remainder of the period.

There were no significant proton enhancements observed at geosynchronous altitude.

The greater than 2 MeV electron flux at geosynchronous altitude was at normal to moderate levels.

The geomagnetic field was mostly quiet.

Space Weather Forecast
10 December 1997 -05 January 1998

Solar activity is expected to range from low to moderate. C-class flares are expected to occur throughout the period. Isolated, low-level M-class flares are possible as well.

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.

The geomagnetic field is expected to be quiet to unsettled during most of the period. However, active periods may occur during 10 - 11 December due to the CME activity of 06 December.



Daily Solar Data

Date	Radio	Sun	Sunspot	X-ray	X-ray Flux			Flares				
	Flux 10.7 cm	spot No. (10 ⁶ hemi.)	Area	Background	C	M	X	S	Optical			
									1	2	3	4
01 December	117	73	560	B2.7	7	1	0	9	2	0	0	0
02 December	112	54	610	B2.8	1	0	0	2	0	0	0	0
03 December	112	54	610	B4.9	7	0	0	8	0	0	0	0
04 December	107	34	320	B2.2	1	0	0	3	0	0	0	0
05 December	104	58	350	B1.7	0	0	0	0	0	0	0	0
06 December	109	44	320	B1.7	2	0	0	0	0	0	0	0
07 December	99	70	290	B4.4	0	0	0	0	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
01 December	2.3E+6	1.9E+4	5.1E+3		3.8E+7	
02 December	2.5E+6	1.9E+4	5.2E+3		2.4E+7	
03 December	1.7E+6	2.0E+4	5.3E+3		1.7E+7	
04 December	2.1E+6	1.9E+4	5.0E+3		1.3E+7	
05 December	1.5E+6	1.8E+4	4.9E+3		6.7E+6	
06 December	6.5E+5	2.0E+4	4.9E+3		7.4E+6	
07 December	8.3E+5	1.8E+4	4.9E+3		9.8E+6	

Daily Geomagnetic Data

Date	Middle Latitude Fredericksburg		High Latitude College		Estimated Planetary	
	A	K-indices	A	K-indices	A	K-indices
01 December	3	0-1-1-0-2-1-1-2	0	0-0-0-0-1-0-0-0	3	0-0-0-0-1-1-1-2
02 December	3	1-1-0-1-1-1-1-1	0	0-0-0-0-1-0-0-0	3	1-0-0-1-1-1-1-2
03 December	6	2-1-2-1-2-2-1-2	7	0-0-2-5-0-1-0-0	6	2-0-2-2-3-2-1-2
04 December	4	2-0-1-1-1-1-2-2	2	0-0-0-2-1-1-1-0	4	1-0-0-1-1-2-2-2
05 December	7	1-2-2-2-2-2-2-2	12	0-0-5-3-4-1-1-1	8	1-2-3-2-2-3-2-3
06 December	5	2-1-2-2-1-1-1-2	3	0-0-0-4-0-0-0-0	5	1-0-2-2-1-1-1-1
07 December		1-0-0-0-2-2-0-1		0-0-0-2-0-0-0-0		0-0-0-1-1-1-1-0

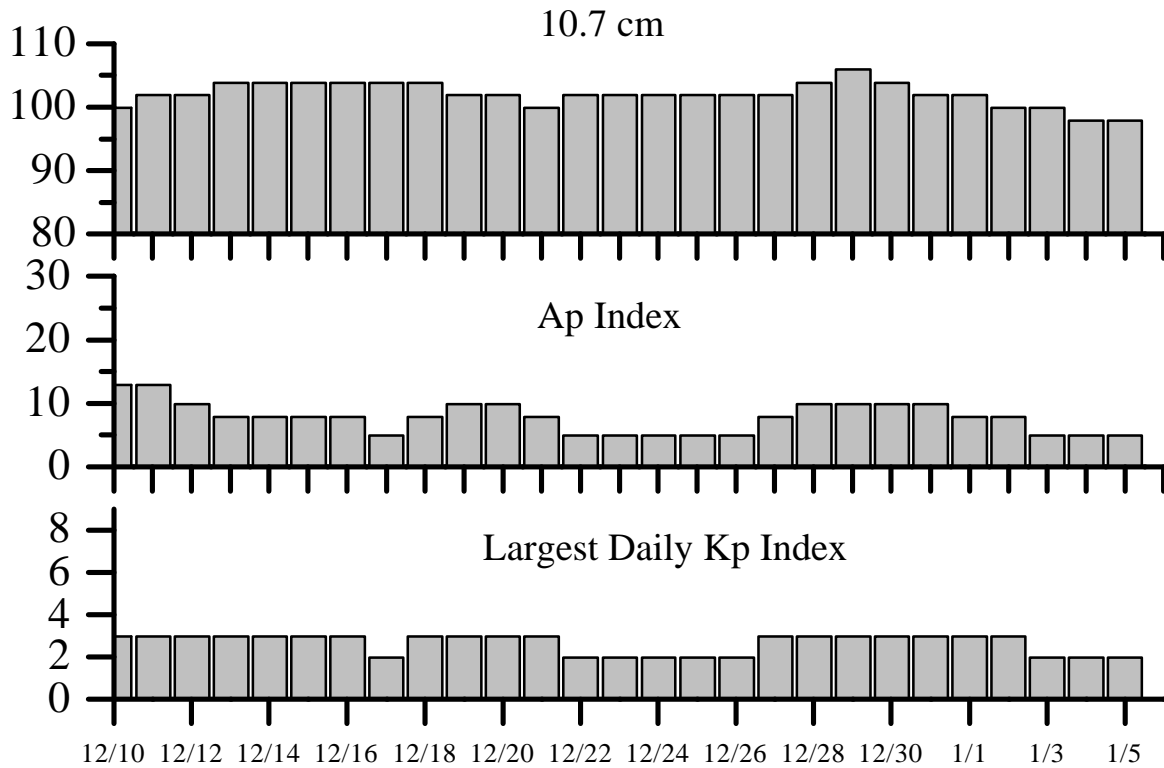


Alerts and Warnings Issued

Date and Time of Issue (UT)	Type of Alert or Warning	Date and Time of Event (UT)
01 Dec 0006	>2MeV Electron Event in Progress ≥ 1000 pfu	30 Nov
01 Dec 0010	1-245 MHz Radio Burst	30 Nov
02 Dec 0010	2-245 MHz Radio Bursts	01 Dec
03 Dec 0010	4-245 MHz Radio Bursts	02 Dec
04 Dec 0010	4-245 MHz Radio Bursts	03 Dec
04 Dec 0010	1-245 MHz Radio Noise Storm	03 Dec
04 Dec 0616	2695MHz Radio Burst 32 s.f.u.	04 Dec 0554



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
10 Dec	100	13	3	24	102	5	2
11	102	13	3	25	102	5	2
12	102	10	3	26	102	5	2
13	104	8	3	27	102	8	3
14	104	8	3	28	104	10	3
15	104	8	3	29	106	10	3
16	104	8	3	30	104	10	3
17	104	5	3	31	102	10	3
18	104	8	3	01 Jan	102	8	3
19	102	10	3	02	100	8	3
20	102	10	3	03	100	5	2
21	100	8	3	04	98	5	2
22	102	5	2	05	98	5	2
23	102	5	2				



Energetic Events

Date	Time (UT)			X-ray		Optical Information			Peak		Sweep Freq		
	Begin	Max	½	Class	Integ Flux	Imp Brtns	Location		Rgn #	Radio Flux		Intensity	
			Max				Lat	CMD		245	2695	II	IV
01 Dec 97	0232	0237	0247	M1.2	.007	1N	N19E27		8113				

Flare List

Date	Time			X-ray Class.	Imp / Brtns	Optical		Rgn #
	Begin	Max	End			Location	Lat CMD	
01 December	0039	0040	0042	C1.1	SF	N18E27		8113
	0130	0131	0142	B7.2	SF	N17E27		8113
	0235	0235	0331	M1.2	1N	N19E27		8113
	0439	0439	0444		SF	N19E26		8113
	0702	0705	0707	B3.4				
	0728	0732	0738	B7.0				
	0844	0850	0856	B4.7				
	0929	0930	0935	B4.7	SF	N19E18		8113
	0952	U0952	A1001	B4.6	SF	N18E17		8113
	1100	1120	1126	B7.5				
	1139	1139	1143		SF	N18E16		8113
	1226	1232	1249	C1.3	SF	N20E19		8113
	1326	1328	1344	C6.6	SF	N20E19		8113
	1402	1405	1407	B5.7				
	B1845	U1845	1855	C2.4	SF	N20E16		8113
	1914	1923	2000	C4.3	1F	N18E12		8113
	2055	2100	2103	B6.4				
	2116	2121	2127	B6.0				
	2139	2143	2146	C1.0				
	2235	2241	2252	C1.0				
02 December	0536	0538	0550	B9.5	SF	N19E08		8113
	0653	0653	0658		SF	N19E08		8113
	0824	0832	0839	B6.6				
	0904	0908	0917	B6.9				
	1503	1506	1508	B4.3				
1622	1632	1642	C1.3					
03 December	0021	0029	0036	C2.2				
	0058	0118	0137	C1.6	SF	N19W02		8113
	0326	0330	0402	C2.1	SF	N19W03		8113
	0403	0405	0411		SF	N19W04		8113
	0412	0417	0446	C1.0	SF	N19W04		8113
	0505	0505	0512	B5.9	SF	N19W04		8113
	0706	0715	0734	C1.0	SF	N19W06		8113
	1203	1213	1220	C1.1				
1404	1408	1416	C1.5	SF	N19W10		8113	



Flare List – continued.

Date	Time			X-ray Class.	Optical		Rgn #
	Begin	Max	End		Imp / Brtns	Location Lat CMD	
03 December	2222	2222	2242	B8.6	SF	N22W10	8113
04 December	0127	0127	0133	B7.1	SF	N20W15	8113
	0543	0550	0604	C1.4	SF	N21W17	8113
	2329	2333	2344	B4.1	SF	N22W25	8113
05 December	No Flares Observed						
06 December	0834	0842	0850	C1.2			
	1944	1952	2006	C1.5			
07 December	0543	0547	0551	B5.4			
	1802	1808	1814	B5.3			



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 8113

25 Nov	N19E87	307	0100	02	HAX	001	A													
26 Nov	N20E77	307	0330	13	EKO	010	B	2	1		7									
27 Nov	N20E60	311	0610	14	EKO	012	B	1		1	4		1							
28 Nov	N20E48	310	0680	14	EKO	019	BGD	5	1		7	1	1							
29 Nov	N20E36	309	0710	14	EHO	027	BG	3	1		5		1							
30 Nov	N22E21	310	0940	17	FSC	046	BGD	2			6	1								
01 Dec	N21E09	309	0550	17	FHI	050	BG	5	1		9	2								
02 Dec	N20W04	309	0610	15	EKI	044	BG				2									
03 Dec	N21W16	308	0600	15	EKI	032	BG	5			8									
04 Dec	N21W28	307	0420	14	EHI	026	B	1			3									
05 Dec	N20W42	307	0330	14	EHO	013	B													
06 Dec	N21W55	307	0280	13	CAO	007	B													
07 Dec	N20W70	309	0190	12	CAO	005	B													
								24	4	1	51	4	3	0	0					

Still on Disk.

Absolute heliographic longitude: 309

Region 8114

03 Dec	S30E04	288	0010	03	BXO	002	B													
04 Dec	S30W08	287	0000	00	AXX	001	A													
05 Dec	S30W21	286	0000	01	AXX	001	A													
06 Dec	S30W34	286	0000	00		000														
07 Dec	S28W51	290	0000	00	AXX	001	A													
								0	0	0	0	0	0	0	0	0				

Still on Disk.

Absolute heliographic longitude: 288

Region 8115

05 Dec	N32W19	284	0020	05	BXO	003	B													
06 Dec	N33W34	286	0010	06	BXO	003	B													
07 Dec	N33W46	285	0010	06	BXO	003	B													
								0	0	0	0	0	0	0	0	0				

Still on Disk.

Absolute heliographic longitude: 284

Region 8116

05 Dec	N25E40	225	0000	00	AXX	001	A													
06 Dec	N26E27	225	0030	05	CRO	004	B													
07 Dec	N25E13	226	0080	06	CSO	008	B													
								0	0	0	0	0	0	0	0	0				

Still on Disk.

Absolute heliographic longitude: 226



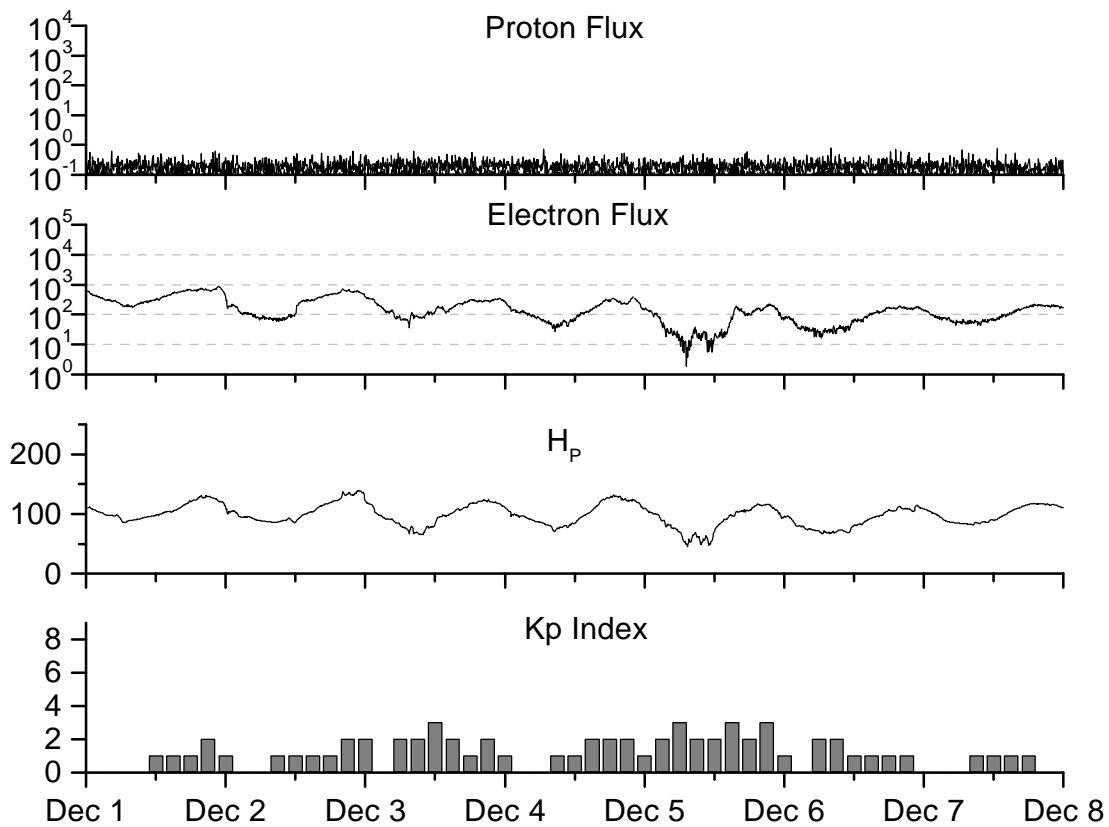
**Recent Solar Indices (preliminary)
of the observed monthly mean values**

Month	Sunspot Numbers					Radio Flux		Geomagnetic	
	Observed values		Ratio	Smooth values		Penticton	Smooth	Planetary	Smooth
	SWO	RI	RI/SWO	SWO	RI	10.7 cm	Value	Ap	Value
1995									
December	16.2	10.0	0.62	17.6	10.8	72.6	72.8	09	10.0
1996									
January	17.6	11.5	0.65	16.8	10.4	74.5	72.4	09	09.8
February	09.1	04.4	0.48	16.2	10.1	71.5	72.2	10	09.8
March	12.1	09.2	0.76	15.4	09.7	72.7	72.1	11	09.9
April	08.5	04.8	0.56	13.6	08.5	69.3	71.6	11	09.7
May	11.8	05.5	0.47	12.9	08.0	72.1	71.4	07	09.5
June	18.8	11.8	0.63	13.5	08.5	69.6	71.8	05	09.4
July	13.2	08.2	0.62	13.4	08.4	71.2	72.0	07	09.3
August	20.5	14.4	0.70	13.1	08.3	72.4	72.1	09	09.4
September	02.9	01.6	0.55	13.3	08.4	69.4	72.3	15	09.3
October	02.3	00.9	0.39	14.0	08.8	69.2	72.6	13	09.1
November	26.7	17.9	0.67	15.4	09.8	78.7	73.0	08	09.1
December	21.1	13.3	0.63	16.2	10.4	77.8	73.3	07	09.3
1997									
January	09.0	05.7	0.63	16.5	10.5*	74.0	73.4	09	09.3*
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	09.0*
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	18.4*	74.6	78.4*	08	08.6*
June	22.1	12.7	0.57			71.7		07	
July	17.0	10.5*	0.62*			71.1		06*	
August	36.7	24.7*	0.67*			79.0		08*	
September	52.8	51.3*	0.88*			96.2*		10*	
October	33.6	23.3*	0.69*			85.0*		10*	
November	53.5	39.3*	0.73*			99.5*		10*	

*Preliminary estimates.

The lowest smoothed sunspot indices number for Cycle 22, RI = 0.9, occurred October 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.





Weekly Geosynchronous Satellite Environment Summary

Week Beginning 01 December 1997

Protons plot contains the five-minute averaged integral proton flux (protons/ cm^2 -sec-sr) as measured by GOES-9 (W135) 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-9.

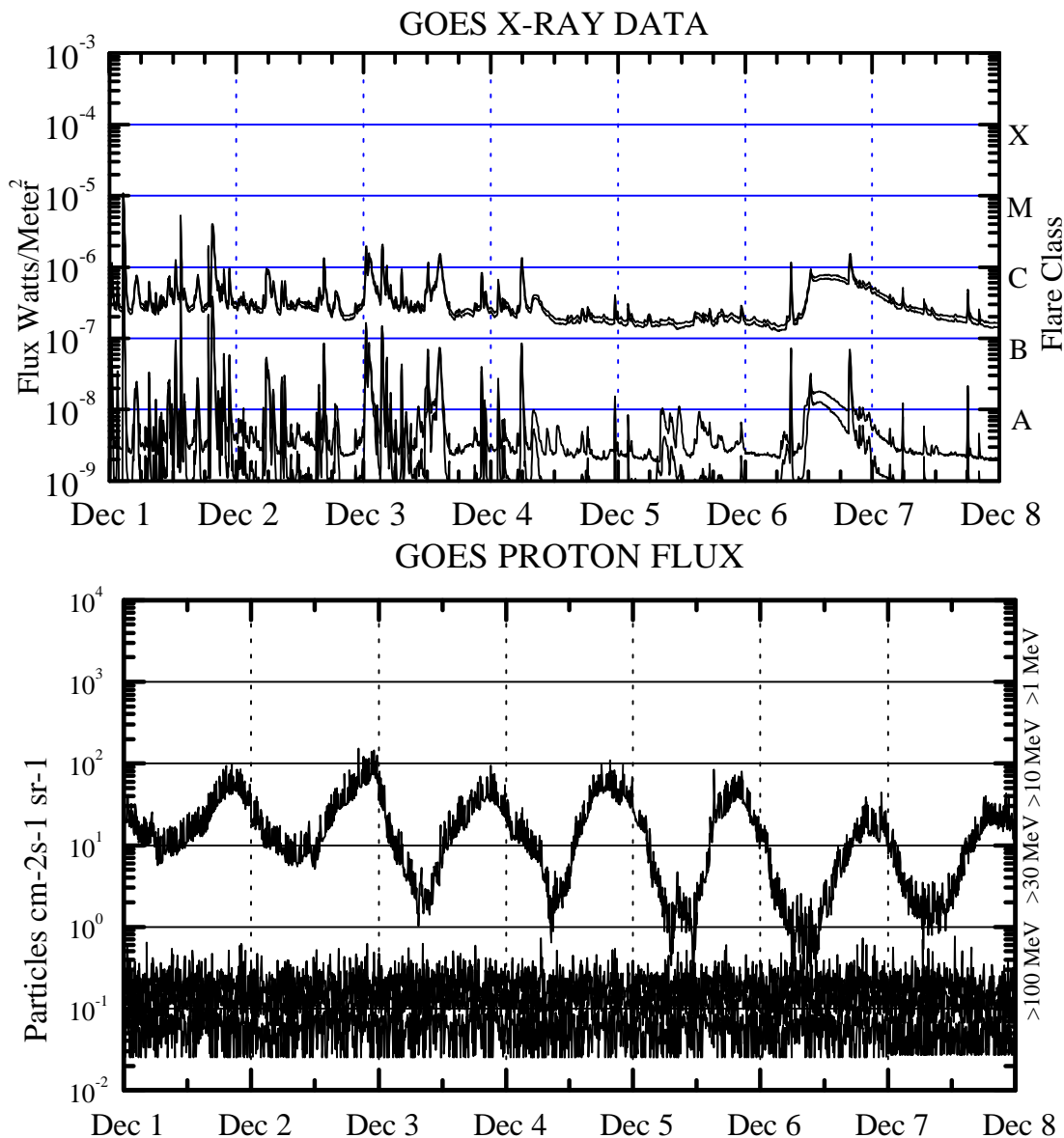
H_p plot contains the five minute averaged magnetic field H component in nanoteslas (nT) as measured by GOES-9. The H component is parallel to the spin axis of the satellite, which is nearly parallel to the Earth's rotation axis.

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_{parallel} is subject to a more localized phenomena and the measurements generally are applicable to within a few degrees of longitude of the measuring satellite.



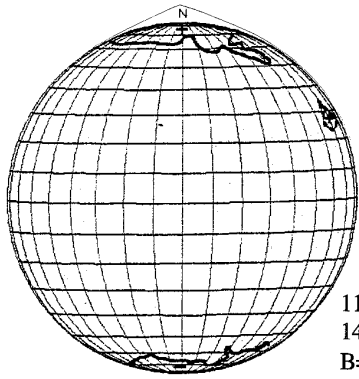


Weekly GOES Satellite X-ray and Proton Plots

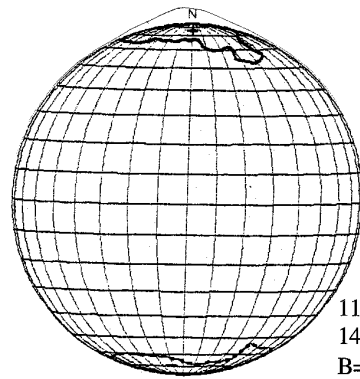
Proton plot contains the five minute averaged integral proton flux (protons/cm²-sec-sr) as measured by GOES-9 (W135) for each of the energy thresholds: >1, >10, >30 and >100 MeV. P10 event threshold is 10 pfu (protons/cm²-sec-sr) at greater than 10 MeV.

X-ray plot contains five minute averaged x-ray flux (watts/m²) as measured by GOES 8 and 9 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.





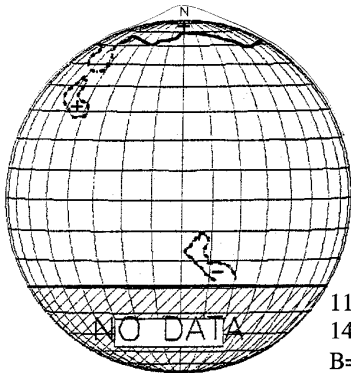
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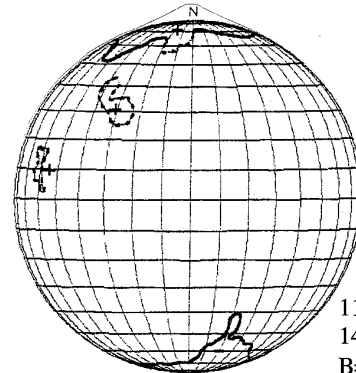
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11/26/97
no data

11/27/97
no data



11/28/97
1444UT
B=+1°



11/29/97
1440UT
B=+1°

11/30/97
no data

Coronal hole maps from the National Solar Observatory, Kitt Peak, Arizona

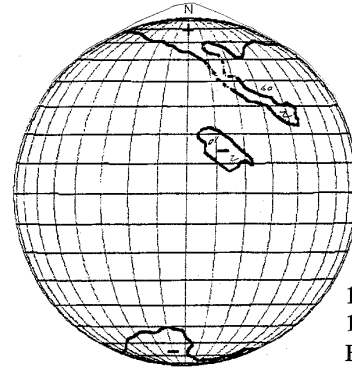
These maps are reproductions of the coronal hole contours as derived from the Kitt Peak 1083 nm raw data images. These are preliminary data, where solid (and dashed) lines are used to indicate more (and less) confidence in an inference and are printed whenever they are available at SWO.



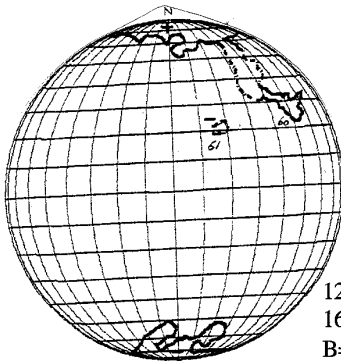
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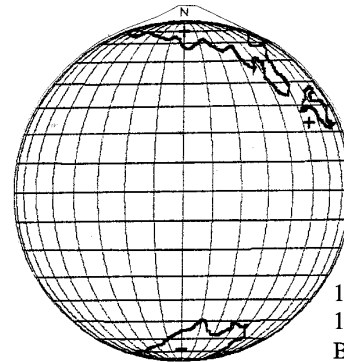
12/03/97
no data



12/04/97
1745UT
B=+0°



12/05/97
1658UT
B=+0°



12/06/97
1751UT
B=+0°

12/07/97
no data

Coronal hole maps from the National Solar Observatory, Kitt Peak, Arizona

These maps are reproductions of the coronal hole contours as derived from the Kitt Peak 1083 nm raw data images. These are preliminary data, where solid (and dashed) lines are used to indicate more (and less) confidence in an inference and are printed whenever they are available at SWO.

