

Space Weather Highlights
13-19 October 1997

Solar activity was low to very low. Isolated B-class subflares occurred during most of the period.

Solar wind data were received from the WIND spacecraft a few hours per day. Velocities varied from 280 - 380 km/sec. Particle densities varied from 03 - 10 p/cc through 16 October, then increased to a range of 15 - 25 p/cc during 17 - 19 October before dropping to around 05 p/cc on the last day of the period. Bz ranged from plus to minus 04 nT (GSM). Solar sector orientation was mostly away (phi angle near 135 degrees) through 16 October, but was not discernible during the remainder of the period.

No significant proton enhancements were observed at geosynchronous altitude.

The greater than 2 MeV electron flux at geosynchronous altitude briefly reached high levels late on 14 October. Otherwise, fluxes were normal to moderate.

The geomagnetic field was quiet to unsettled.

Space Weather Forecast
22 October 1997 - 17 November 1997

Solar activity is expected to range from very low to low.

No significant proton enhancements are expected at satellite altitudes.

The greater than 2 MeV electron flux at geosynchronous altitude is expected to be normal to moderate during most of the period.

The geomagnetic field is expected to be mostly quiet to unsettled.



Daily Solar Data

Date	Radio	Sun	Sunspot	X-ray	Flares							
	Flux 10.7 cm	spot No. (10^6 hemi.)	Area	Background	X-ray Flux			Optical				
					C	M	X	S	1	2	3	4
13 October	88	48	110	A8.2	1	0	0	1	1	0	0	0
14 October	85	44	110	A7.9	0	0	0	1	0	0	0	0
15 October	87	47	180	A7.1	0	0	0	0	0	0	0	0
16 October	88	45	170	A8.6	0	0	0	1	0	0	0	0
17 October	88	52	190	B2.5	0	0	0	3	0	0	0	0
18 October	87	45	130	A8.0	0	0	0	0	0	0	0	0
19 October	85	37	90	A6.5	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
13 October	4.7E+5	1.8E+4	4.3E+3		1.5E+7	
14 October	8.2E+5	1.8E+4	4.6E+3		3.7E+7	
15 October	6.0E+5	1.9E+4	4.9E+3		2.8E+7	
16 October	1.4E+6	2.0E+4	5.0E+3		2.3E+7	
17 October	8.1E+5	1.9E+4	4.7E+3		9.3E+6	
18 October	7.7E+5	1.9E+4	4.9E+3		3.0E+6	
19 October	4.8E+5	1.9E+4	4.7E+3		1.4E+6	

Daily Geomagnetic Data

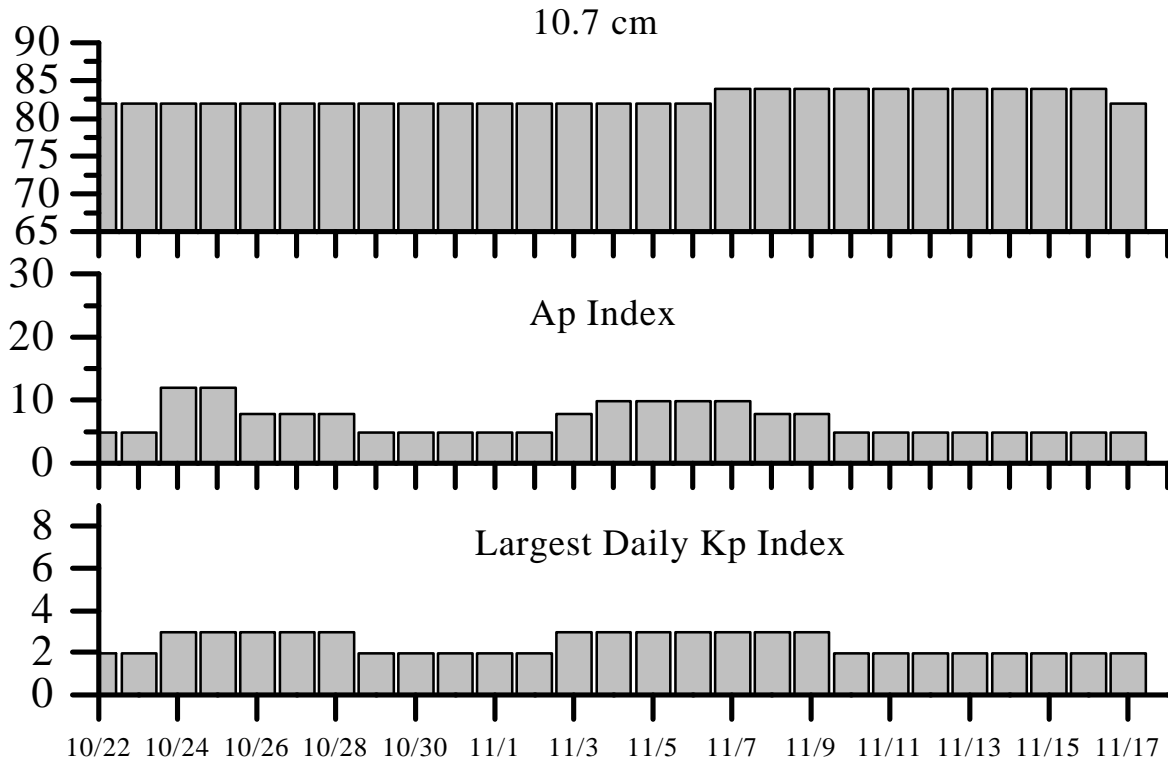
Date	Middle Latitude		High Latitude		Estimated	
	Fredericksburg		College		Planetary	
	A	K-indices	A	K-indices	A	K-indices
13 October	9	2-2-2-4-2-1-1-2	4	2-1-2-3-2-1-0-0	7	2-2-2-4-1-1-1-1
14 October	5	0-2-2-2-2-2-1-1	2	0-0-2-2-2-0-0-0	5	0-1-2-2-2-2-1-1
15 October	5	0-0-0-1-1-2-2-1	*	0-0-0-3-*-2-0-0	4	1-0-0-1-1-2-2-1
16 October	6	1-2-2-1-1-2-2-2	1	0-0-1-0-0-0-1-1	3	1-0-2-1-1-1-1-1
17 October	6	1-0-2-2-2-2-2-2	3	0-0-1-2-3-1-0-0	5	0-0-1-2-3-2-2-2
18 October	3	1-2-2-1-1-1-0-0	0	0-0-1-1-0-0-0-0	3	1-1-2-1-0-1-0-0
19 October	4	1-1-1-1-1-1-1-2	1	0-0-0-2-1-0-0-0	3	0-1-1-1-1-1-1-1

Alerts and Warnings Issued

Date and Time of Issue (UT)	Type of Alert or Warning	Date and Time of Event (UT)
13 Oct 1200	K = 4 observed	13 Oct 09 -12
14 Oct 2050	>2MeV Electron Event \geq 1000pfu	14 Oct 2003



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
22 Oct	82	5	2	04 Nov	82	10	3
23	82	5	2	05	82	10	3
24	82	12	3	06	84	10	3
25	82	12	3	07	84	10	3
26	82	8	3	08	84	8	3
27	82	8	3	09	84	8	3
28	82	8	3	10	84	5	2
29	82	5	2	11	84	5	2
30	82	5	2	12	84	5	2
31	82	5	2	13	84	5	2
01 Nov	82	5	2	14	84	5	2
02	82	5	2	15	84	5	2
03	82	8	3	16	84	5	2
				17	82	5	2



Energetic Event

Date	Time (UT)			X-ray		Optical Information			Peak		Sweep Freq		
	Begin	Max	½ Max	Class	Integ Flux	Imp Brtns	Location		Rgn #	Radio Flux		Intensity	
							Lat	CMD		245	2695	II	IV

No Event Observed

Flare List

Date	Time			X-ray Class.	Imp / Brtns	Optical Location		Rgn #
	Begin	Max	End			Lat	CMD	
13 October	0043	0043	0050	B1.8	SF	N22W50		8094
	0910	1240	1423	B6.8				
	2314	2317	2338	C1.0	1F	N22W63		8094
14 October	1218	1223	1229	B1.3				
	2007	2011	2014	B1.6				
	2115	2117	2125	B2.6	SF	N13E64		8096
15 October	1507	1528	1548	B5.9				
16 October	0507	0521	0536	B2.4				
	B1723	U1723	A1731	B1.2	SF	N20E85		8097
	2139	2147	2151	B1.5				
17 October	0459	0459	0504		SF	N31W50		8093
	0541	0542	0547		SF	N31W50		8093
	0554	0558	0602	B2.2				
	1215	1221	1227	B2.3				
	1420	1421	1433	B3.0	SF	N32W56		8093
18 October	0826	0830	0838	B1.5				
	1511	1515	1519	B1.2				
19 October	1900	1906	1913	B1.5				



Region Summary

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							
<i>Region 8091</i>																							
01 Oct	N22E72		330	0020	08	BXO	006	B															
02 Oct	N25E60		329	0040	08	CRO	005	B													1		
03 Oct	N25E47		329	0060	08	CSO	006	B													2		
04 Oct	N23E34		329	0040	07	CSO	005	B															
05 Oct	N23E21		329	0030	08	CSO	005	B													1		
06 Oct	N24E07		330	0010	06	BXO	003	B															
07 Oct	N24W09		332	0000	00	AXX	001	A															
08 Oct	N24W22		332																				
09 Oct	N24W35		332																				
10 Oct	N24W48		332																				
11 Oct	N24W61		332																				
12 Oct	N24W74		332																				
13 Oct	N24W87		332																				

0 0 0 4 0 0 0 0

Crossed West Limb.

Absolute heliographic longitude: 330

<i>Region 8092</i>																					
07 Oct	N24E57		266	0010	02	BXO	003	B													
08 Oct	N24E41		269	0010	04	BXO	007	B													
09 Oct	N25E28		269	0010	04	BXO	004	B													1
10 Oct	N24E13		271	0000	02	AXX	002	A													1
11 Oct	N24E00		271																		1
12 Oct	N27W08		265	0000	00	AXX	001	A													
13 Oct	N27W21		265																		
14 Oct	N27W34		265																		
15 Oct	N27W47		265																		
16 Oct	N27W60		265																		
17 Oct	N27W73		265																		

0 0 0 3 0 0 0 0

Died on Disk.

Absolute heliographic longitude: 271



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 8093

09 Oct	N32E41	256	0010	05	BXO	003	B													
10 Oct	N31E27	257	0030	06	CRO	005	B													
11 Oct	N31E14	257	0040	06	CRO	006	B													
12 Oct	N31E01	256	0060	07	DSO	009	B													
13 Oct	N31W12	256	0090	08	DAO	012	B													
14 Oct	N31W23	254	0090	08	DAO	010	B													
15 Oct	N30W37	255	0070	09	CAO	009	B													
16 Oct	N30W50	255	0080	10	CSO	008	B													
17 Oct	N31W62	254	0070	10	CSO	009	B						3							
18 Oct	N31W75	253	0040	11	BXO	005	B													
19 Oct	N27W91	255	0030	03	BXO	002	B													
													0	0	0	3	0	0	0	0

Still on Disk.

Absolute heliographic longitude: 256

Region 8094

10 Oct	N23W24	308	0010	04	BXO	007	B													
11 Oct	N21W37	308	0010	05	BXO	005	B													
12 Oct	N20W50	307	0020	06	BXO	008	B													
13 Oct	N20W63	307	0020	05	BXO	004	B	1				1	1							
14 Oct	N21W74	305	0000	01	AXX	001	A													
15 Oct	N21W87	305																		
													1	0	0	1	1	0	0	0

Crossed West Limb.

Absolute heliographic longitude: 308

Region 8095

12 Oct	N33E42	215	0010	03	BXO	002	B													
13 Oct	N33E32	212	0000	01	AXX	002	A													
14 Oct	N33E19	212																		
15 Oct	N33E06	212																		
16 Oct	N33W07	212																		
17 Oct	N33W20	212																		
													0	0	0	0	0	0	0	0

Died on Disk.

Absolute heliographic longitude: 212



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 8096</i>																						
14 Oct	N14E62	169	0020	04	BXO	003	B					1										
15 Oct	N15E47	171	0050	06	CSO	006	B															
16 Oct	N14E34	171	0030	06	BXO	005	B															
17 Oct	N13E21	171	0040	07	BXO	010	B															
18 Oct	N13E08	170	0030	06	CSO	007	B															
19 Oct	N13W03	167	0030	04	CSO	004	B															
											0	0	0	1	0	0	0	0	0			

Still on Disk.

Absolute heliographic longitude: 167

Region 8097

15 Oct	N18E77	141	0060	02	HSX	002	A												
16 Oct	N16E69	136	0060	08	CSO	002	B					1							
17 Oct	N17E57	135	0080	08	CSO	003	B												
18 Oct	N17E43	135	0060	08	CSO	003	B												
19 Oct	N17E26	138	0030	02	HSX	001	A												
											0	0	0	1	0	0	0	0	0

Still on Disk.

Absolute heliographic longitude: 138



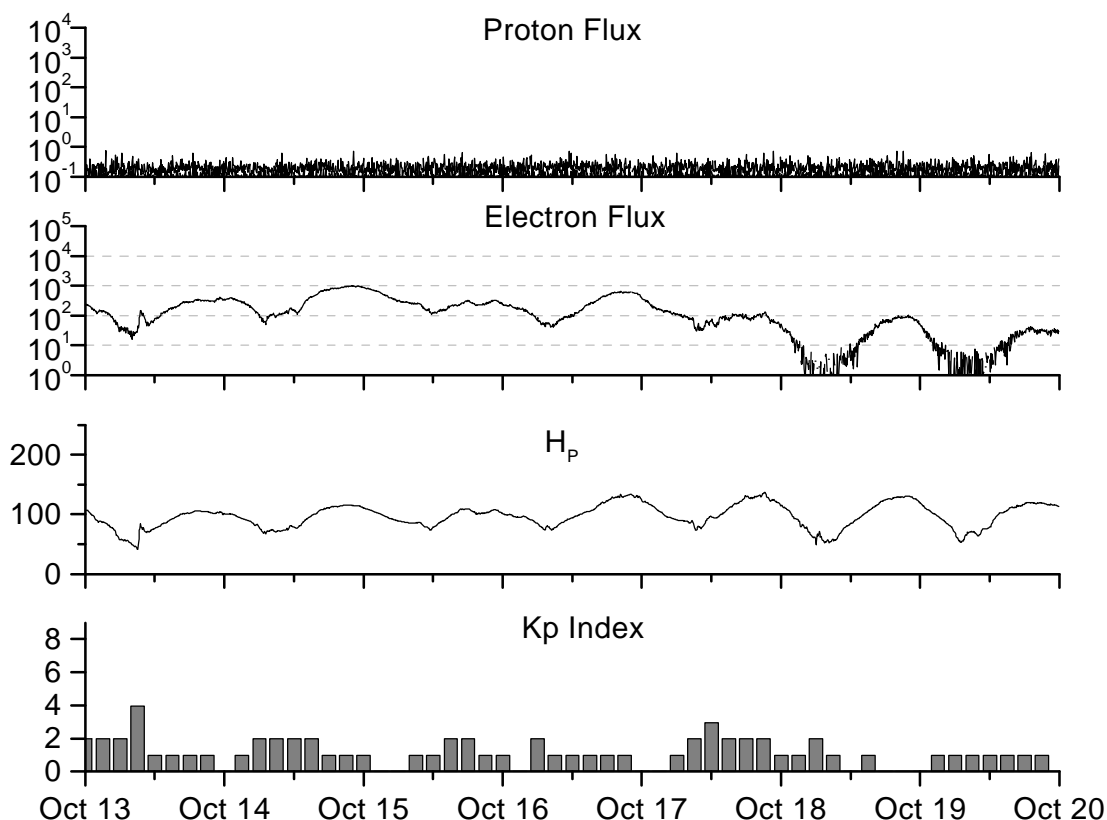
**Recent Solar Indices (preliminary)
of the observed monthly mean values**

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									
October	31.6	21.1	0.67	19.7	12.1	77.9	73.8	16	11.5
November	15.7	09.0	0.57	18.5	11.4	74.2	73.2	09	10.8
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	70.7	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	70.1	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	08.5*	69.4	72.3	15	09.3
October	02.3	00.9	0.39	14.0	08.9*	69.2	72.6	13	09.1
November	26.7	17.9	0.67	15.4	09.9*	78.7	73.0	08	09.1
December	21.1	13.3	0.63	16.2	10.5*	77.8	73.3	07	09.3
1997									
January	09.0	06.5*	0.72*	16.5	10.6*	74.0	73.4	09	09.3*
February	11.3	07.6*	0.67*	17.4	11.2*	73.8	73.7	11	09.2*
March	14.4	08.8*	0.61*	20.4	13.7*	73.5	75.1*	08	09.0*
April	24.5	15.8*	0.64*			74.5		10	
May	28.6	18.5*	0.65*			74.6		08	
June	22.1	13.1*	0.59*			71.7		07	
July	17.0	10.5*	0.62*			71.1		06*	
August	36.7	24.7*	0.67*			79.0		08*	
September	58.2	51.3*	0.88*			96.2*		10*	

*Preliminary estimates.

The lowest smoothed sunspot indices number for Cycle 21, RI = 12.3, occurred September 1986. 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 13 October 1997

Protons plot contains the five minute averaged integral proton flux (protons/ cm²-sec-sr) as measured by GOES-9 (W135) for each of three energy thresholds: greater than 10, 50, and 100 MeV.

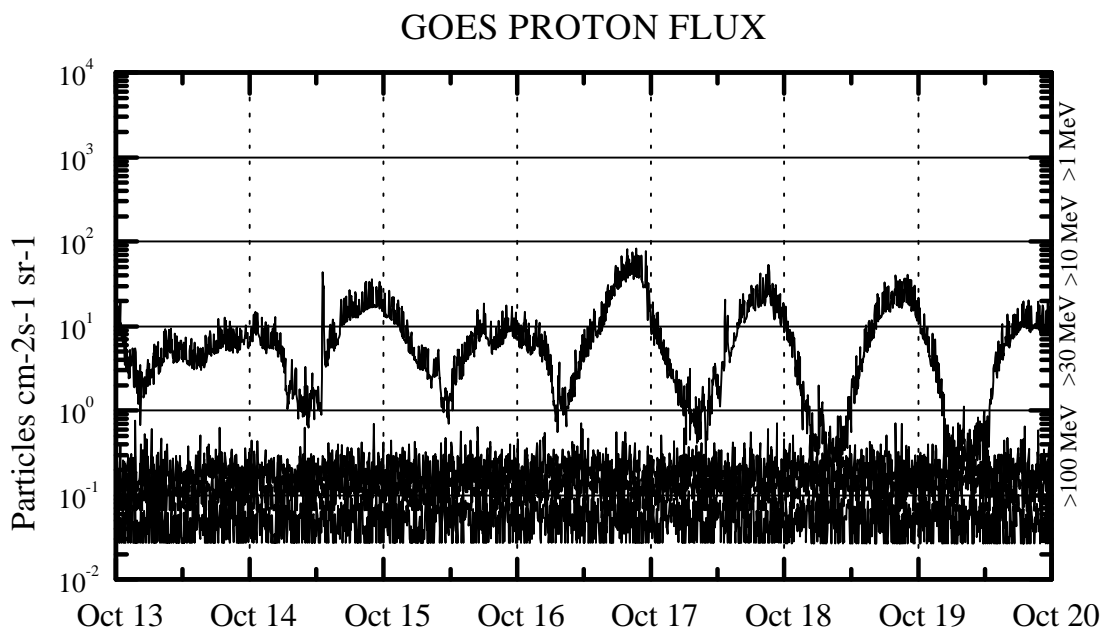
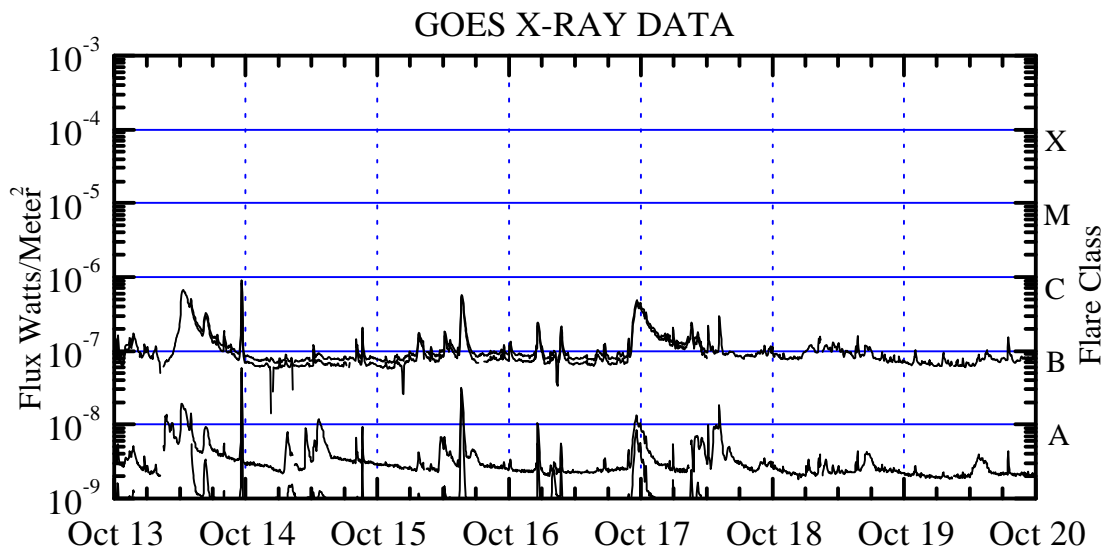
Electrons plot contains the five minute averaged integral electron flux (electrons/ cm²-sec-sr) with energies greater than 2 MeV at GOES-9.

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. 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_pparallel 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

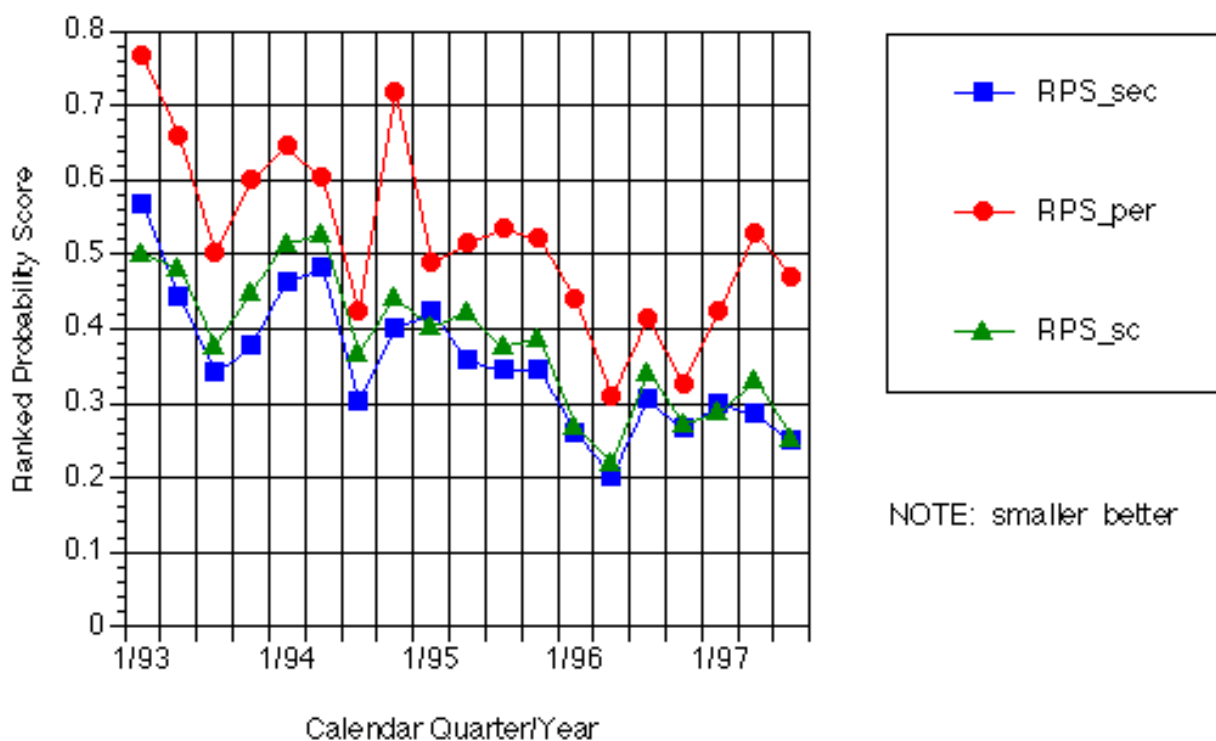
Proton plot contains the five minute averaged integral proton flux (protons/cm²-sec-sr) as measured by GOES-9 (W135) for each of the energy thresholds: >1, >10, >30 and >100 MeV. P10 event threshold is 10 pfu (protons/cm²-sec-sr) at greater than 10 MeV.

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.



Verification of SEC Forecasts

Forecast Type ⁽³⁾	Verification Statistics ⁽¹⁾			Event Climatology ⁽²⁾		
	Bias ⁽⁴⁾	Accuracy ⁽⁵⁾	Skill ⁽⁶⁾	Quarter	1-year	5-year
M Flares	0.019	0.060 (0.24)	-0.12	0.074	0.022	0.066
X Flares	0.013	0.000 (0.02)	***	0	0	0.002
Proton Events	0.012	0.000 (0.02)	***	0	0	0.003
10.7cm Flux	-0.40	9.3 (3.1)	0.94	82.0	76.2	87.4
Afred Index	-0.02	38.8 (6.2)	-1.32	8.8	8.8	11.5
A*p Index	1.63	38.9 (6.2)	-0.88	8.1	8.2	11.9



Trend diagram for probability forecasts of middle-latitude geomagnetic activity level at a 1-day lead time. These are forecasts of the likelihood of occurrence of the most-disturbed 3-hour interval over a 24-hour period (as measured by the K-index) in four disturbance categories: quiet-unsettled ($k=0,1,2,3$), active ($k=4$), minor storm ($k=5$), and major-severe storm ($k=6,7,8,9$). The ranked probability score (RPS) is plotted for each calendar quarter, January 1993–September 1997. Data are for all SEC forecasters (_sec), 1-day persistence (_per), and sample climatology (_sc). Smaller values are better.

- (1) Verification statistics for the calendar quarter ending 9/30/97.
- (2) Climatology is the average occurrence of the event during the indicated period.
- (3) Next-day probability forecasts of flares and proton events, and next-day integer forecasts of A-index and 10.7cm flux.
- (4) Forecast reliability, or bias, as measured by the mean error (forecast – observed).
- (5) Forecast accuracy as measured by the mean square error and, in parentheses, the root mean square error.
- (6) Forecast skill with respect to the climatology of the event (positive values are better; negative values are worse).
- (7) Missing values (***) due to the non-occurrence of the event during the quarter.
- (8) The A*p Index is a pseudo (estimated) planetary A-index derived by the US Air Force.

NOTE: Additional verification results can be found on SEC's World Wide Web server (<http://www.sec.noaa.gov>).

