

**Space Weather Highlights**  
**22 - 28 September 1997**

Solar activity ranged from very low to high. The period began with activity at low levels. A long-duration, optically uncorrelated C1 X-ray burst occurred during 23/2136 - 2350UT. A coronal mass ejection (CME) was associated with the burst. Activity rose to high levels as Region 8088 (S28, L = 125, class/area Eai/290 on 25 September) produced an M5/1B flare at 24/0248UT during a period of rapid growth. Major Types II and IV sweep bursts, a 650 SFU Tenflare, and a partial-halo CME were associated with this major flare. The region also produced an M3/SF flare at 24/1110UT and a C8/1N flare with an associated minor Type II sweep burst. Activity declined to low levels on 25 September as Region 8088 entered a period of slow decay and produced isolated C-class subflares. A long-duration X-ray enhancement began around 27/2200UT and was associated with a halo-type CME. The source of the enhancement was a long-lived area of extended plage in the northwest quadrant. Activity dropped to very low levels on 28 September.

Solar wind data were received from the WIND spacecraft a few hours per day. WIND data was not reliable on 28 September due to spacecraft positioning. Velocities ranged from 300 - 500 km/sec with significant increases noted on 22 and 27 September. Densities ranged from 02 - 10 p/cc during 22 - 23 September. Densities increased to a range of 10 - 22 p/cc during 24 - 26 September, then dropped during 27 September. Bz was northward during 22 September with a maximum deflection of plus 12 nT (GSM), then hovered about zero (plus/minus 05 nT) during 23 - 26 September. Bz variations increased to plus 10 to minus 10 nT during 27 September. Solar sector orientation was not discernible during 23 and 26 - 27 September. Mostly away orientation (phi angle near 135 degrees) occurred the remaining days.

The greater than 10 MeV proton flux became slightly enhanced in the wake of the M5/1B flare mentioned above.

The greater than 2 MeV electron flux at geosynchronous altitude reached high levels on 28 September. Otherwise, fluxes were normal to moderate.

The geomagnetic field was at unsettled to active levels until 22/0600UT, then declined to mostly quiet levels through 26 September. A disturbance occurred during 27/0300 - 28/1200UT with brief active to minor storm periods observed at all latitudes. Thereafter, activity declined to quiet to unsettled levels.

**Space Weather Forecast**  
**01 - 27 October 1997**

Solar activity is expected to range from low to moderate. The best chance for isolated M-class flare activity occurs after 01 October, with the return of previously active regions.

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. However, high fluxes are expected during 27 - 31 October.

The geomagnetic field is expected to be predominately quiet to unsettled. However, disturbed conditions are expected around 25 - 26 October due to a polar high speed coronal hole stream. Expect brief active periods during the disturbance.



### *Daily Solar Data*

Date	Radio Flux	Sun spot	Sunspot Area	X-ray Background	X-ray Flux			Flares				
	10.7 cm	No. (10 <sup>6</sup> hemi.)	(10 <sup>6</sup> hemi.)		C	M	X	S	1	2	3	4
22 September	89	47	230	B1.2	7	0	0	12	0	0	0	0
23 September	92	48	290	B1.2	3	0	0	8	0	0	0	0
24 September	93	47	300	B2.9	5	2	0	5	2	0	0	0
25 September	89	50	320	B1.7	2	0	0	3	1	0	0	0
26 September	89	40	260	B1.0	1	0	0	1	0	0	0	0
27 September	88	33	240	A7.8	0	0	0	0	0	0	0	0
28 September	87	23	260	B1.7	1	0	0	0	0	0	0	0

### *Daily Particle Data*

Date	Proton Fluence (protons/cm <sup>2</sup> -day-sr)			Electron Fluence (electrons/cm <sup>2</sup> -day-sr)		
	>1MeV	>10MeV	>100MeV	>.6MeV	>2MeV	>4MeV
22 September	5.8E+5	1.8E+4	4.5E+3		7.3E+6	
23 September	6.8E+5	1.8E+4	4.3E+3		8.9E+6	
24 September	5.4E+5	2.1E+4	4.8E+3		6.7E+6	
25 September	3.0E+5	1.9E+4	4.4E+3		5.6E+6	
26 September	4.0E+5	1.8E+4	4.4E+3		3.0E+6	
27 September	8.1E+5	1.7E+4	4.1E+3		1.5E+6	
28 September	1.2E+6	1.7E+4	3.9E+3		6.6E+7	

### *Daily Geomagnetic Data*

Date	Middle Latitude Fredericksburg		High Latitude College		Estimated Planetary	
	A	K-indices	A	K-indices	A	K-indices
22 September	10	4-4-2-1-1-1-2-1	0	1-1-0-0-0-0-0-0	8	4-4-2-0-1-1-1-1
23 September	5	1-1-1-1-2-1-2-2	0	1-0-0-0-0-0-1-0	4	1-1-1-0-1-2-1-2
24 September	5	2-1-1-1-2-1-2-2	0	0-0-0-2-0-0-0-0	4	1-1-1-2-1-1-1-1
25 September	3	0-1-1-0-2-1-2-1	0	0-0-0-0-1-0-0-0	3	0-0-0-0-1-2-2-2
26 September	4	0-0-1-1-2-1-2-2	1	0-0-1-2-0-0-0-0	4	0-0-1-2-2-2-1-1
27 September	11	3-1-3-2-2-3-2-3	13	0-0-5-2-3-4-1-2	13	3-1-3-3-2-4-3-3
28 September	13	3-4-4-2-2-2-2-1	*	*-*-3-4-2-2-0-0	14	2-4-5-3-3-3-2-1

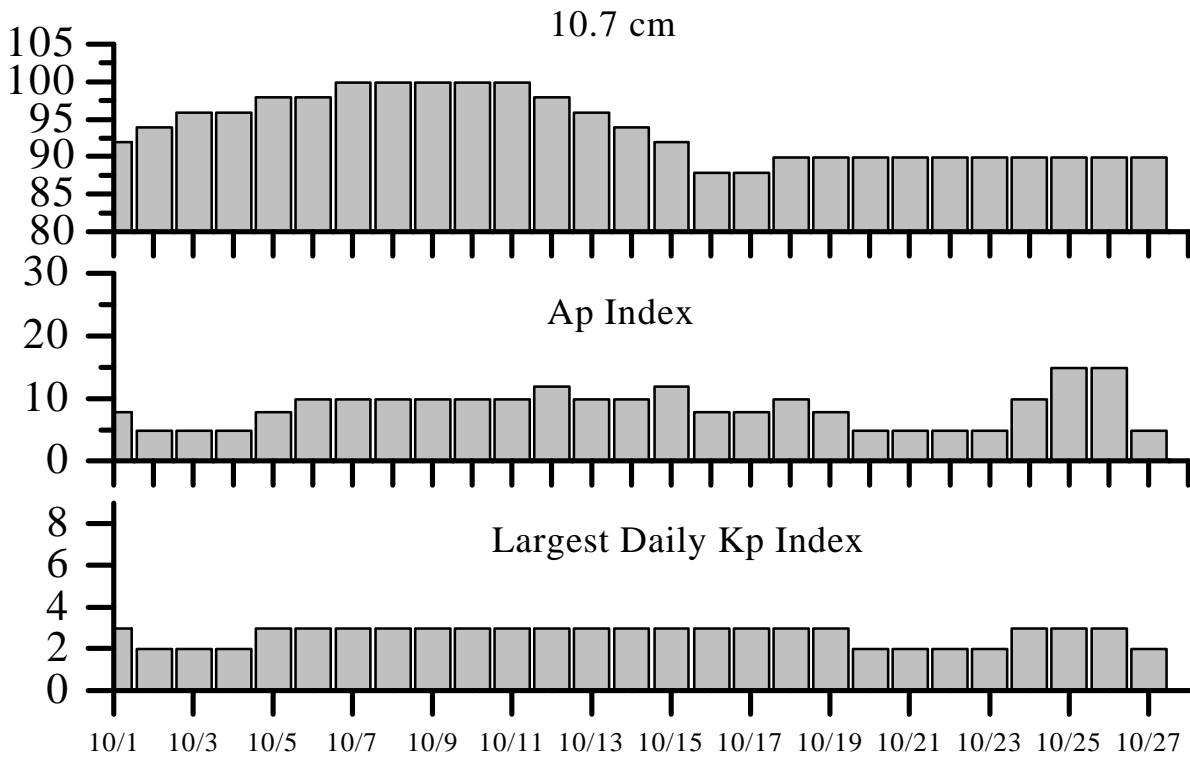


### *Alerts and Warnings Issued*

Date and Time of Issue (UT)	Type of Alert or Warning	Date and Time of Event (UT)
22 Sep 0006	1-245MHz Radio Burst	21 Sep 0057
22 Sep 0006	K=4 observed	21 Sep 21-24
22 Sep 0018	1-245MHz Radio Burst	21 Sep 0127
24 Sep 0011	245MHz Radio Noise Storm	23 Sep 2228
24 Sep 0342	X-Ray event M5/1B	24 Sep 0243
24 Sep 0405	2695MHz Radio Burst	24 Sep 0246
24 Sep 0405	Type IV Radio Emission	24 Sep 0248
24 Sep 1147	Type II Radio Emission	24 Sep 1107
24 Sep 1315	Type IV Radio Emission	24 Sep 1210
24 Sep 2000	Type II Radio Emission	24 Sep 1834
24 Sep 2053	A $\geq$ 20 Watch	26 Sep
24 Sep 2115	A $\geq$ 30 Watch	27 Sep
25 Sep 0052	5 - 245MHz Radio Bursts	24 Sep
25 Sep 2121	A $\geq$ 20 Watch	28 Sep
26 Sep 0051	4 - 245MHz Radio Bursts	25 Sep
26 Sep 0051	245MHz Radio Noise Storm	25 Sep 1807
27 Sep 0014	245MHz Radio Noise Storm	26 Sep 1100
27 Sep 0016	245MHz Radio Noise Storm	26 Sep 1320
27 Sep 1806	K= 4 observed	27 Sep 15-18
28 Sep 0007	1-245MHz Radio Burst	27 Sep
28 Sep 0011	245MHz Radio Noise Storm	27 Sep 1116
28 Sep 0855	K= 5 observed	28 Sep 06-09
28 Sep 0858	A $\geq$ 20 observed	28 Sep 0900
28 Sep 1534	Type II Radio Emission	28 Sep 1419
28 Sep 1627	>2MeV Electron Event $\geq$ 1000pfu	28 Sep 1623



Twenty-seven Day Outlook



Date	Radio Flux	Planetary	Largest	Date	Radio Flux	Planetary	Largest
	10.7 cm	A Index	Kp Index		10.7 cm	A Index	Kp Index
01 Oct	92	8	3	14	94	10	3
02	94	5	2	15	92	12	3
03	96	5	2	16	88	8	3
04	96	5	2	17	88	8	3
05	98	8	3	18	90	10	3
06	98	10	3	19	90	8	3
07	100	10	3	20	90	5	2
08	100	10	3	21	90	5	2
09	100	10	3	22	90	5	2
10	100	10	3	23	90	5	2
11	100	10	3	24	90	10	3
12	98	12	3	25	90	15	3
13	96	10	3	26	90	15	3
		10	3	27	90	5	2



### *Energetic Event*

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
24 Sep	0243	0248	0252	M5.9	.001	1B	S31E19		8088	81000	650	3	3
24 Sep	1057	1106	1110	M3.0	.001	SF	S28E18		8088	1800	76	3	2

### *Flare List*

Date	Time			X-ray Class.	Imp / Brtns	Optical Location		Rgn #
	Begin	Max	End			Lat	CMD	
22 September	0050	0051	0053	C1.7	SF	S25E69		8087
	0308	0313	0315	B3.5				
	0446	0450	0454	B2.0	SF	S33E45		8088
	0530	0542	0552	B5.2	SF	S33E44		8088
	0607	0625	0635	C1.4	SF	S33E44		8088
	0639	0644	0648		SF	S32E40		8088
	0747	0758	0834	B4.4	SF	S28E46		8088
	0907	0912	0927	C2.2	SF	S32E41		8088
	1122	U1123	1129	C1.0	SF	S20E65		8087
	1306	1315	1324	C2.6				
	B1412	U1418	1451	C4.7	SF	S28E43		8088
	1515	1521	1526	B7.2				
	1640	1643	1645		SF	S28E42		8088
	1720	1724	1727	B3.1				
	1811	1814	1824	C5.1	SF	S28E40		8088
	2106	2107	2110		SF	S29E42		8088
23 September	2220	2224	2226	B3.0				
	0217	0220	0226	B2.1				
	0317	0319	0322		SF	S29E38		8088
	0325	0326	0331		SF	S29E38		8088
	0332	0335	0340	B2.1				
	0341	0346	0354		SF	S29E38		8088
	0354	0356	0402		SF	S29E38		8088
	0404	0413	0416	B4.0				
	0546	0550	0555	B2.6				
	0707	0710	0717	B3.4	SF	S29E36		8088
	0825	0828	0832	B2.3				
	1129	1132	1136	B1.7				
	1550	1552	1601	B9.5	SF	S28E28		8088
	1845	1846	1850		SF	S29E30		8088
	1903	1908	1921	B5.8	SF	S28E29		8088
1924	1932	1938	B8.3					
2105	2117	2123	C1.9					
2127	2131	2136	C1.4					
2136	2214	2350	C1.5					



*Flare List – continued.*

Date	Time			X-ray Class.	Optical		Rgn #
	Begin	Max	End		Imp / Brtns	Location Lat CMD	
24 September	0217	0221	0225	C1.1			
	0247	0247	0309	M5.9	1B	S31E19	8088
	0534	0534	0543	C4.5	SF	S29E15	8088
	0656	0700	0716	C2.5	SF	S29E15	8088
	0736	0739	0741	B2.4			
	0845	0850	0852	B3.5			
	0854	0857	0859	B3.1			
	0911	0913	0923	C2.2	SN	S29E13	8088
	1021	1030	1032	B9.1			
	B1103	U1110	1121	M3.0	SF	S28E18	8088
	1539	1542	1544	B2.4			
	1658	1722	1725	B2.8			
	1740	1748	1753	B3.6			
	1825	1831	1854	C8.3	1N	S29E15	8088
	1931	1935	1938	B3.6			
	2151	2158	2207	B4.2			
	2316	2317	2322	B8.3	SF	S29E06	8088
25 September	0038	0040	0046	B5.6	SF	S29E05	8088
	0135	0246	0312	B4.0			
	0319	0327	0345	C2.7	SN	S29E04	8088
	0346	0346	0350		SF	S29E04	8088
	1143	1154	1223	C7.2	1N	S27E02	8088
	1655	1701	1706	B5.6			
26 September	2233	2241	2255	B4.2			
	0315	0318	0343	C4.4	SN	S26W08	8088
	0703	0707	0710	B1.7			
	1213	1218	1224	B1.7			
	1433	1441	1450	B2.5			
27 September	1637	1642	1648	B1.9			
	1634	1640	1647	B1.9			
28 September	1354	1400	1405	B3.7			
	1411	1442	1534	C1.0			
	2053	2056	2058	B2.1			
	2212	2215	2217	B2.3			



## Region Summary

Date	Location		Sunspot Characteristics				Flares											
	(° Lat ° CMD)	Helio	Area (10 <sup>6</sup> hemi)	Extent (helio)	Spot Class	Spot Count	Mag Class	X-ray			Optical							
		Lon						C	M	X	S	1	2	3	4			
<i>Region 8086</i>																		
11 Sep	N27E76	230	0010	05	BXO	002	B											
12 Sep	N27E63	230	0000	00		000												
13 Sep	N27E50	230	0040	04	CSO	004	B					4						
14 Sep	N28E38	229	0080	06	CSO	005	B	1				2						
15 Sep	N27E27	226	0200	08	DAI	013	B	3				9						
16 Sep	N28E14	226	0180	10	DSO	022	B											
17 Sep	N27E00	227	0160	12	ESO	014	B											
18 Sep	N28W11	225	0120	12	CSO	009	B											
19 Sep	N27W25	226	0090	12	CSO	008	B											
20 Sep	N29W38	226	0060	07	CSO	005	B					1						
21 Sep	N26W54	228	0050	04	CSO	006	B											
22 Sep	N25W68	229	0040	03	CAO	003	B											
23 Sep	N25W82	230	0000	00	AXX	001	A											
24 Sep	N25W95	230																
								4	0	0	16	0	0	0	0	0		

Crossed West Limb.

Absolute heliographic longitude: 227

<i>Region 8087</i>																		
21 Sep	S22E72	102	0030	02	HSX	001	A											
22 Sep	S21E58	103	0050	02	HSX	001	A	2				2						
23 Sep	S21E44	104	0060	02	HAX	002	A											
24 Sep	S22E32	103	0040	02	HSX	002	A											
25 Sep	S23E23	099	0030	14	BXO	005	B											
26 Sep	S26E14	094	0010	02	AXX	002	A											
27 Sep	S25E06	089	0000	00	AXX	001	A											
28 Sep	S25W07	089																
								2	0	0	2	0	0	0	0	0		

Still on Disk.

Absolute heliographic longitude:089



*Region Summary – continued.*

Date	Location		Sunspot Characteristics				Flares											
	( ° Lat ° CMD)	Helio	Area (10 <sup>6</sup> hemi)	Extent (helio)	Spot Class	Spot Count	Mag Class	X-ray			Optical							
		Lon						C	M	X	S	1	2	3	4			
<i>Region 8088</i>																		
21 Sep	S28E53	121	0010	02	BXO	002	B											
22 Sep	S28E38	123	0140	08	CSO	013	B	4				10						
23 Sep	S28E24	124	0230	09	DAO	015	B					8						
24 Sep	S28E10	125	0260	11	EAI	025	BG	4	2			5	2					
25 Sep	S28W03	125	0290	12	EAI	025	BG	2				3	1					
26 Sep	S29W16	124	0250	12	ESO	018	B	1				1						
27 Sep	S29W30	125	0240	10	DAO	012	B											
28 Sep	S29W41	123	0260	09	DAO	013	B											
								11	2	0	27	3	0	0	0	0		

Still on Disk.

Absolute heliographic longitude: 125





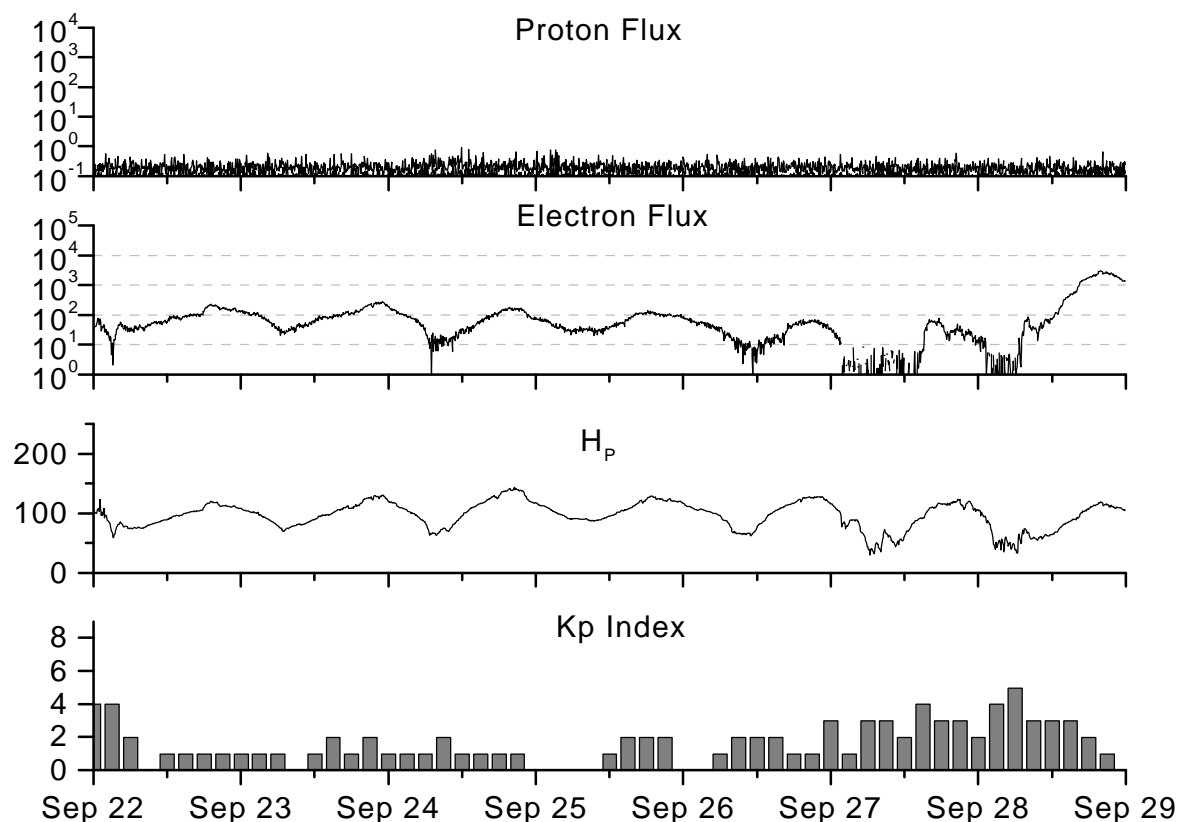
**Recent Solar Indices (preliminary)  
of the observed monthly mean values**

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
<b>1995</b>									
September	16.5	11.8	0.72	22.0	13.4	72.0	74.8	13	11.8
October	31.6	21.1	0.67	19.7	12.1	77.9	73.8	16	11.4
November	15.7	09.0	0.57	18.5	11.4	74.2	73.2	09	10.7
December	16.2	10.0	0.62	17.6	10.8	72.6	72.8	09	10.0
<b>1996</b>									
January	17.6	11.5	0.55	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	0.60	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	0.67	13.4	08.4*	71.2	72.0	07	09.3
August	20.5	14.4	0.68	13.1	08.3*	72.4	72.1	09	09.4
September	02.9	01.6	0.62	13.3	08.5*	69.4	72.3	15	09.3
October	02.3	00.9	0.78	14.0	08.9*	69.2	72.6	13	09.1
November	26.7	17.9	0.72	15.4	09.9*	78.7	73.0	08	09.1
December	21.1	13.3	0.60	16.2	10.5*	77.8	73.3	07	09.3
<b>1997</b>									
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	73.6*	11	09.2*
March	14.4	08.8*	0.61*			73.5		08	
April	24.5	15.8*	0.64*			74.5		10	
May	28.6	18.5*	0.64*			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*			76.8*		08*	

\*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 22 September 1997*

*Protons* plot contains the five minute averaged integral proton flux (protons/  $\text{cm}^2$ -sec-sr) as measured by GOES-9 (W135) for each of three energy thresholds: greater than 10, 50, and 100 MeV.

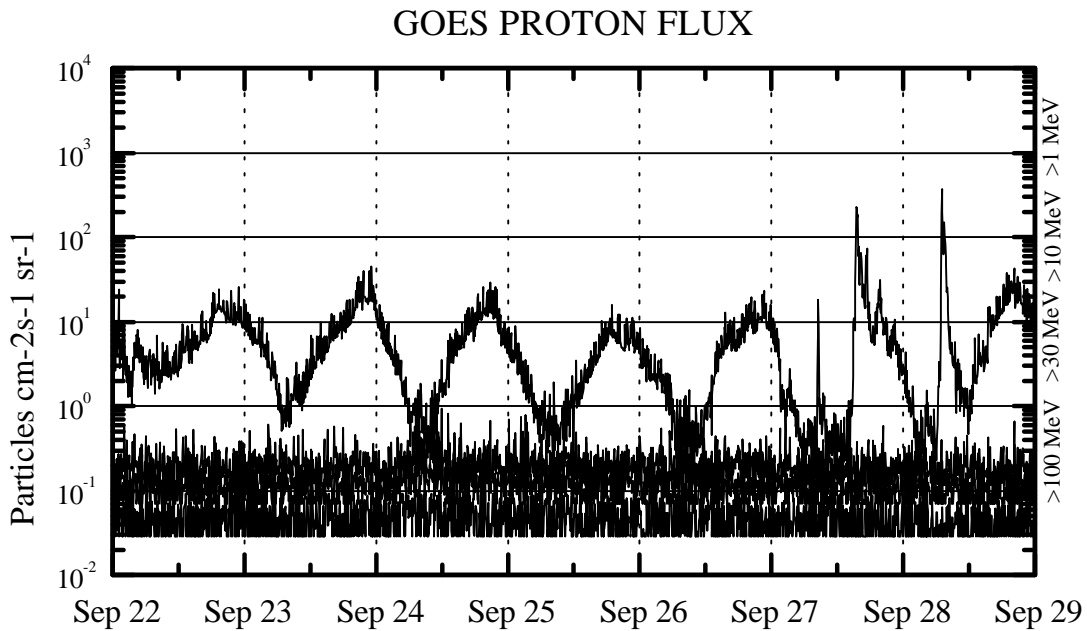
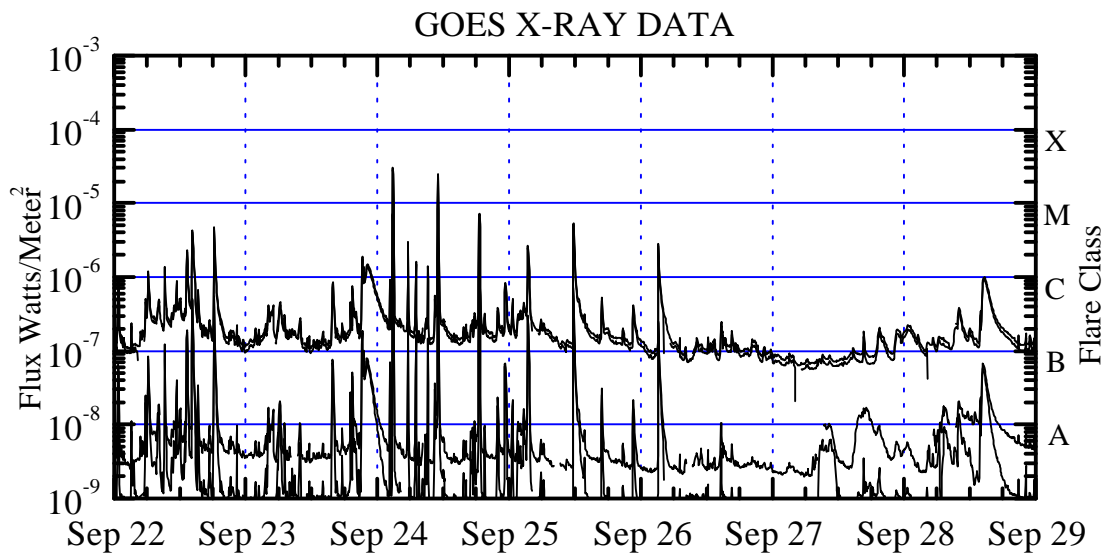
*Electrons* plot contains the five minute averaged integral electron flux (electrons/  $\text{cm}^2$ -sec-sr) with energies greater than 2 MeV at GOES-9.

*H<sub>p</sub>* 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<sub>p</sub>* plot contains the estimated planetary 3-hour K-index (derived by the USAF 55<sup>th</sup> 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<sub>p</sub> 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<sub>p</sub> are "global" parameters that are applicable to a first order approximation over large areas. H<sub>parallel</sub> 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*

Proton plot contains the five minute averaged integral proton flux (protons/cm<sup>2</sup>-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/cm<sup>2</sup>-sec-sr) at greater than 10 MeV.

X-ray plot contains five minute averaged x-ray flux (watts/m<sup>2</sup>) 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.

