

Space Weather Highlights
14-20 September 1998

Solar activity was at very low to moderate levels. Isolated B- and C-class subflares occurred during 14 - 19 September. Activity rose to moderate levels on 20 September by virtue of an M1 flare at 20/0251UT with an associated major Type IV radio sweep. Radio heliograph images indicated that Region 8340 (N20, L = 012, class/area Dko/490 on 20 September) was the source of the flare. This region was the return of old Region 8319 which produced five M-class flares during its previous passage. Old Region 8307, which produced six major flares during 17 - 24 August, returned on 15 September as a simple plage region.

Real-time solar wind data were available from the Advanced Composition Explorer (ACE) spacecraft during most of the period. Velocities increased during 18 - 19 September and peaked at 490 km/sec. Particle densities were enhanced during 17 - 18 September with a peak of 29 p/cc noted on the 18th. Bz became strongly southward during 18 September with maximum deflections to minus 16 nT (GSM). Sector orientation was away (phi angle near 135 degrees) during most of the period.

No significant proton enhancements occurred at geosynchronous altitude.

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

The geomagnetic field was quiet during most of the period. However, a disturbance occurred during 18 September with active to minor storm levels detected at all latitudes.

Space Weather Forecast
23 September - 19 October 1998

Solar activity is expected to be low to moderate. Region 8340 may produce isolated M-class flares. Old Region 8323 (S22, L = 271) is expected to return during 24 September and produce M-class activity 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 moderate to high levels during 25 - 28 September. Otherwise, normal to moderate fluxes are expected.

The geomagnetic field is expected to be at quiet to unsettled levels for a majority of the period. However, active to minor storm levels are expected during 24 - 26 September due to coronal hole effects.



Daily Solar Data

Date	Radio Flux 10.7 cm	Sun spot No. (10^6 hemi.)	Sunspot Area	X-ray Background	Flares							
					X-ray Flux			Optical				
					C	M	X	S	1	2	3	4
14 September	122	106	630	B2.9	1	0	0	5	0	0	0	0
15 September	117	71	400	B2.7	1	0	0	2	0	0	0	0
16 September	119	86	280	B2.8	0	0	0	0	0	0	0	0
17 September	117	100	390	B3.6	0	0	0	0	0	0	0	0
18 September	123	106	700	B3.7	0	0	0	5	0	0	0	0
19 September	127	133	800	B3.2	0	0	0	4	0	0	0	0
20 September	132	130	790	B3.1	1	1	0	5	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
14 September	8.6E+4	1.7E+4	4.3E+3		7.6E+6	
15 September	8.9E+4	1.8E+4	4.4E+3		8.9E+6	
16 September	6.5E+4	1.7E+4	4.5E+3		8.9E+6	
17 September	1.0E+5	1.7E+4	4.0E+3		3.5E+6	
18 September	2.5E+5	1.6E+4	3.8E+3		5.0E+5	
19 September	4.9E+4	1.6E+4	3.7E+3		9.0E+5	
20 September	9.7E+4	1.5E+4	3.8E+3		4.5E+6	

Daily Geomagnetic Data

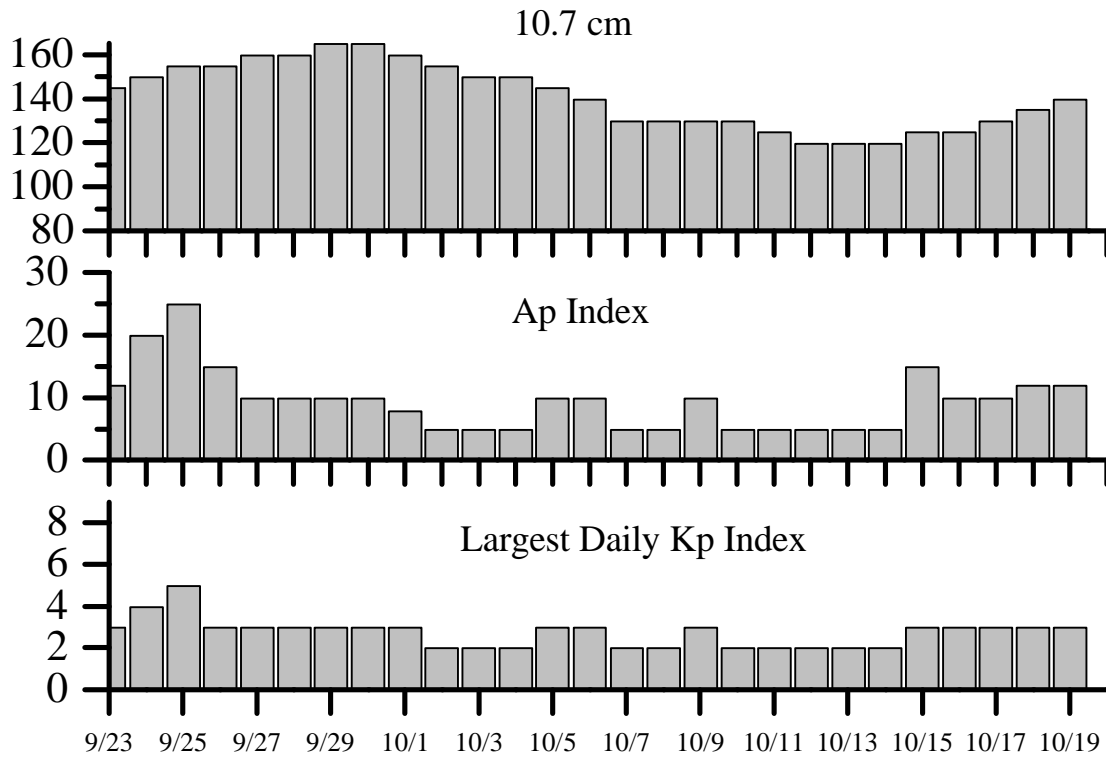
Date	Middle Latitude Fredericksburg		High Latitude College		Estimated Planetary	
	A	K-indices	A	K-indices	A	K-indices
14 September	2	1-0-1-0-0-0-1-1	8	4-0-2-2-2-0-0-3	6	1-0-2-2-2-3-3-2
15 September	5	1-2-3-2-1-1-1-0	6	1-2-2-2-1-3-1-0	7	1-3-3-2-1-2-2-2
16 September	2	0-0-2-1-1-0-1-1	5	0-0-3-3-2-0-0-1	4	0-0-2-2-2-2-2-2
17 September	5	2-1-1-1-0-1-2-3	2	1-1-1-0-0-0-1-1	7	2-2-1-0-1-2-2-2
18 September	14	2-2-1-3-5-2-3-2	22	2-1-1-5-5-5-3-2	20	2-2-2-3-6-3-4-3
19 September	8	2-1-1-1-2-3-2-3	15	1-1-1-5-5-2-1-1	12	2-2-1-3-3-3-3-3
20 September	4	3-1-0-1-1-0-1-2	5	2-1-2-3-2-1-0-0	8	2-1-1-2-3-3-3-2

Alerts and Warnings Issued

Date and Time of Issue (UT)	Type of Alert or Warning	Date and Time of Event (UT)
14 Sep 0007	1-245 MHz Radio Burst	13 Sep
15 Sep 0055	7-245 MHz Radio Bursts	14 Sep
18 Sep 1211	K= 4 Observed	18 Sep 09-12
18 Sep 1501	K= 4 Observed	18 Sep 12-15
20 Sep 0314	10cm Radio Burst 300 s.f.u.	20 Sep 0238
20 Sep 0342	Type IV Radio Emission	20 Sep 0232



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
23 Sep	145	12	3	07 Oct	130	5	2
24	150	20	4	08	130	5	2
25	155	25	5	09	130	10	3
26	155	15	3	10	130	5	2
27	160	10	3	11	125	5	2
28	160	10	3	12	120	5	2
29	165	10	3	13	120	5	2
30	165	10	3	14	120	5	2
01 Oct	160	8	3	15	125	15	3
02	155	5	2	16	125	10	3
03	150	5	2	17	130	10	3
04	150	5	2	18	135	12	3
05	145	10	3	19	140	12	3
06	140	10	3				



Energetic Events

Date	Time (UT)			X-ray		Optical Information			Peak		Sweep Freq	
	Begin	Max	½	Class	Integ	Imp Brtns	Location		Radio Flux		Intensity	
			Max		Flux		Lat	CMD	245	2695	II	IV
20 Sep	0233	0251	0328	M1.8	.044							3

Flare List

Date	Time			X-ray Class.	Imp / Brtns	Location Lat CMD	Rgn #
	Begin	Max	End				
14 September	0055	0059	0102	B6.1			
	0448	0451	0458	C1.2	SF	N22W58	8326
	0937	0939	0945	B8.8	SF	S23E51	8335
	1047	1050	1052	B3.3	SF	S21E41	8335
	1142	1146	1149	B3.8			
	1333	1335	1339	B3.7	SF	S22E41	8335
	1603	1606	1610	B4.1			
	1643	1644	1650	B3.2			
	2116	2122	2131	B3.9			
	2347	2348	2352	B7.1	SF	S20E36	8335
15 September	0435	0436	0441		SF	S20E33	8335
	0438	0444	0452		SF	N24W24	8331
	0509	0536	0638	C2.0			
16 September	0721	1731	0746	B6.8			
	2241	2246	2248	B7.5			
17 September	0740	0744	0746	B5.7			
	1036	1039	1043	B5.2			
	1922	1925	1927	B4.8			
18 September	1154	1203	1219	B4.7			
	B1305	1314	1321		SF	S14E35	8339
	1401	1430	1438		SF	S16E35	8339
	1439	1439	1449		SF	S17E33	8339
	1509	1511	1524		SF	S16E35	8339
	1625	1625	1631		SF	S15E32	8339
19 September	1048	1048	1058		SF	S30E21	8336
	1342	1345	1350		SF	S16E18	8339
	1808	1813	1826		SF	N39E64	
	1944	1947	1954	B6.8	SF	N39E63	8343
20 September	0104	0110	0115	B6.0			
	0233	0251	0328	M1.8			8340
	0948	0949	1009	C1.5	SF	S31E07	8336
	1123	1140	1146		SF	N18E32	8342
	1342	1345	1355		SF	N19E31	8342
	1822	1824	1833		SF	N19E29	8342
	1834	1834	1914		SF	N19E29	8342



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 8326</i>																		
03 Sep	N19E73	201	0100	09	DSO	002	B											
04 Sep	N18E60	201	0160	13	ESO	003	B	1				1						
05 Sep	N21E50	198	0070	10	DSO	006	B	4				5						
06 Sep	N22E39	196	0080	10	DSO	011	B	2				4						
07 Sep	N22E25	197	0080	10	DSO	015	B											
08 Sep	N22E12	196	0090	10	DAO	017	B					1						
09 Sep	N21W01	196	0020	10	BXO	008	B											
10 Sep	N22W12	194	0020	08	BXO	005	B	1				1						
11 Sep	N21W27	196	0010	10	CSO	004	B											
12 Sep	N21W40	196						1				1						
13 Sep	N21W53	196						1				1						
14 Sep	N21W66	196						1				1						
15 Sep	N21W79	196																
								11 0 0 15 0 0 0 0										

Crossed West Limb.

Absolute heliographic longitude: 196

<i>Region 8327</i>																		
03 Sep	N30E78	196	0050	02	HSX	001	A											
04 Sep	N28E64	197	0070	03	HSX	001	A											
05 Sep	N30E52	196	0030	01	HSX	003	A											
06 Sep	N30E39	196	0030	03	CSO	003	B											
07 Sep	N30E28	194	0020	04	BXO	004	B											
08 Sep	N29E14	194	0010	04	BXO	003	B											
09 Sep	N29E01	194	0000	00	AXX	001	A											
10 Sep	N28W13	195	0000	00	AXX	001	A											
11 Sep	N29W24	193	0000	00	AXX	002	A					1						
12 Sep	N29W37	193																
13 Sep	N29W50	193																
14 Sep	N29W63	193																
15 Sep	N29W76	193																
16 Sep	N29W89	193																
								0 0 0 1 0 0 0 0										

Crossed West Limb.

Absolute heliographic longitude: 194



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 8328</i>																							
04 Sep	S18E72	189	0010	01	AXX	002	A																
05 Sep	S17E58	190	0100	02	HSX	002	A																
06 Sep	S16E45	190	0120	03	CSO	005	B														1		
07 Sep	S17E33	189	0100	06	CSO	010	B														2		
08 Sep	S18E20	188	0160	07	CSO	011	B																
09 Sep	S18E08	187	0140	07	CSO	010	B														2		
10 Sep	S17W08	190	0090	04	CSO	005	B														1		
11 Sep	S18W20	189	0090	04	CSO	006	B																
12 Sep	S18W34	190	0080	04	CSO	004	B																
13 Sep	S18W47	189	0080	04	CSO	003	B																
14 Sep	S17W61	190	0060	02	HSX	002	A																
15 Sep	S17W75	191	0040	01	HSX	001	A																
16 Sep	S15W89	192	0010	01	AXX	001	A																
																						0 0 0 6 0 0 0 0	

Crossed West Limb.

Absolute heliographic longitude: 187

<i>Region 8329</i>																							
05 Sep	N15E52	196	0150	10	DSO	009	B	1														1	
06 Sep	N15E38	197	0200	09	DAO	014	B																
07 Sep	N16E25	197	0150	10	DSO	013	B																
08 Sep	N14E11	197	0300	14	EAI	024	B															1	
09 Sep	N14W02	197	0240	13	ESI	021	B															2	
10 Sep	N14W18	200	0200	13	ESO	011	B															1	
11 Sep	N15W32	201	0240	10	DSO	010	B	1														3	
12 Sep	N14W46	202	0210	11	ESO	003	B	1														1	
13 Sep	N14W60	202	0210	10	DSO	003	B	1														2	
14 Sep	N14W73	202	0190	10	DSO	003	B																
15 Sep	N14W86	202	0100	13	CSO	002	B																
																							4 0 0 11 0 0 0 0

Crossed West Limb.

Absolute heliographic longitude: 197



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 8330</i>																							
06 Sep	S20E68	167	0050	07	CRO	003	B																
07 Sep	S20E57	165	0060	10	DAO	003	B																
08 Sep	S22E44	164	0060	10	CSO	003	B																
09 Sep	S22E36	159	0040	02	HSX	002	A																
10 Sep	S22E24	158	0040	01	HSX	001	A																
11 Sep	S23E12	157	0040	01	HSX	001	A																
12 Sep	S23E00	156	0130	01	HSX	001	A																
13 Sep	S24W13	155	0030	04	CSO	003	B																
14 Sep	S23W26	155	0030	01	HSX	001	A																
15 Sep	S24W40	156	0020	01	HSX	001	A																
16 Sep	S24W52	155	0000	00	AXX	001	A																
17 Sep	S23W65	155	0010	01	AXX	001	A																
18 Sep	S23W78	155																					

0 0 0 0 0 0 0 0

Crossed West Limb.

Absolute heliographic longitude: 156

<i>Region 8331</i>																							
06 Sep	N25E74	161	0080	01	HSX	001	A																
07 Sep	N24E63	159	0120	02	HSX	001	A																
08 Sep	N24E51	157	0100	09	CSO	006	B						1										
09 Sep	N26E41	154	0160	12	ESO	012	B	1					3	1									
10 Sep	N26E24	158	0190	10	DAO	015	B																
11 Sep	N25E14	155	0180	11	CAO	020	B																
12 Sep	N25E02	154	0160	13	EAI	025	B	1					3										
13 Sep	N25W12	154	0180	13	EAI	023	B																
14 Sep	N26W23	152	0100	14	EAO	021	B																
15 Sep	N25W34	150	0050	10	CRO	012	B						1										
16 Sep	N26W45	148	0020	04	BXO	003	B																
17 Sep	N27W58	148	0010	05	BXO	003	B																
18 Sep	N22W79	156	0010	07	BXO	002	B																

2 0 0 8 1 0 0 0

Crossed West Limb.

Absolute heliographic longitude: 154



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 8339</i>																								
17 Sep	S17E42	048	0010	04	BXO	003	B																	
18 Sep	S16E30	047	0020	06	CRO	007	B						5											
19 Sep	S17E16	047	0050	07	CSO	007	B						1											
20 Sep	S16E01	049	0050	10	CSO	007	B																	
														0	0	0	6	0	0	0	0			
Still on Disk.																								
Absolute heliographic longitude: 049																								
<i>Region 8340</i>																								
17 Sep	N20E76	014	0150	04	HHX	001	A																	
18 Sep	N22E64	013	0360	08	DKO	008	B																	
19 Sep	N19E50	013	0470	08	CKO	012	B																	
20 Sep	N19E38	012	0490	07	DKO	011	B							1										
														0	1	0	0	0	0	0	0			
Still on Disk.																								
Absolute heliographic longitude: 012																								
<i>Region 8341</i>																								
19 Sep	N19W58	121	0020	04	BXO	002	B																	
20 Sep	N19W71	121																						
														0	0	0	0	0	0	0	0			
Still on Disk.																								
Absolute heliographic longitude: 121																								
<i>Region 8342</i>																								
19 Sep	N17E38	025	0010	00	AXX	001	A																	
20 Sep	N18E25	025	0040	05	CSO	008	B							4										
														0	0	0	4	0	0	0	0			
Still on Disk.																								
Absolute heliographic longitude: 025																								
<i>Region 8343</i>																								
19 Sep	N42E65	358	0010	00	AXX	002	B							1										
20 Sep	N37E47	003	0000	00	AXX	001	A																	
														0	0	0	1	0	0	0	0			
Still on Disk.																								
Absolute heliographic longitude: 003																								



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

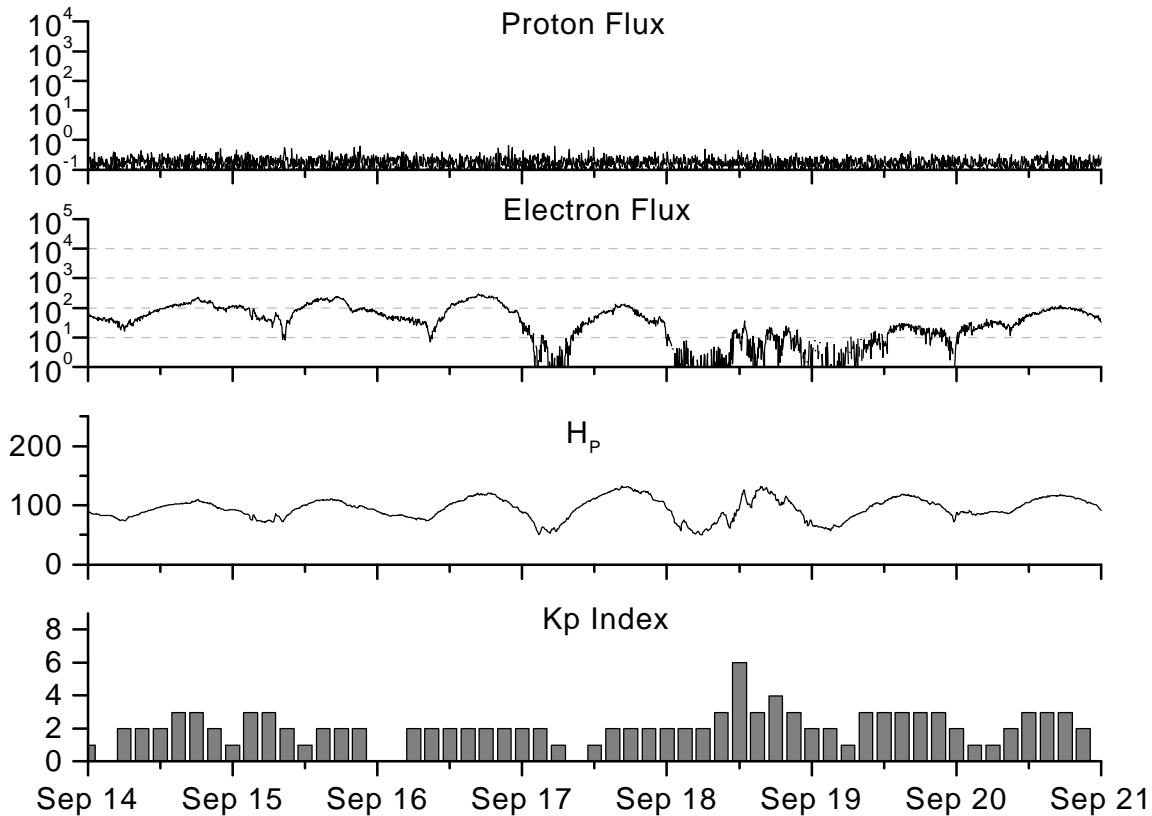
Month	Sunspot Numbers			Smooth values		Radio Flux	Geomagnetic		
	Observed SWO	RI	Ratio RI/SWO	SWO	RI	**Penticton 10.7 cm	Smooth Value	Planetary Ap	Smooth Value
1996									
September	02.9	01.6	0.55	13.3	08.4	69.4	72.3	15	09.3
October	02.3	00.9	0.39	14.0	08.8	69.2	72.6	13	09.1
November	26.7	17.9	0.67	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	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			109.1		13	
April	73.6	53.4	0.73			108.3		10	
May	74.3	56.3	0.76			106.7		18	
June	93.6	70.7*	0.76*			108.4*		10	
July	98.3	66.2*	0.67*			114.0*		11*	
August	118.6	91.7*	0.77*			136.0*		18*	

*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.





Weekly Geosynchronous Satellite Environment Summary
Week Beginning 14 September 1998

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.

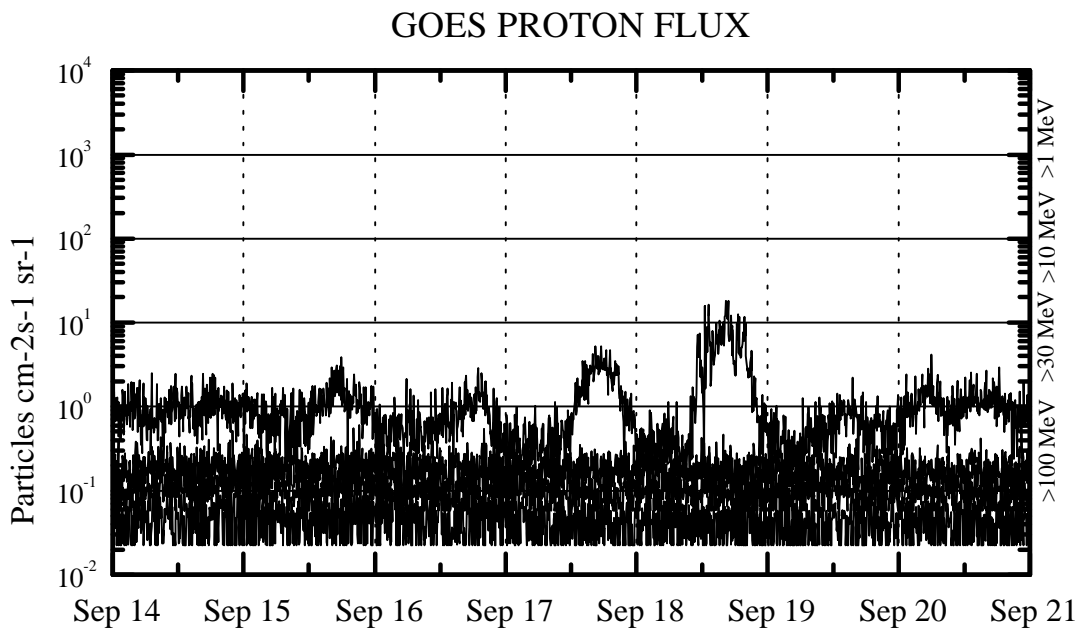
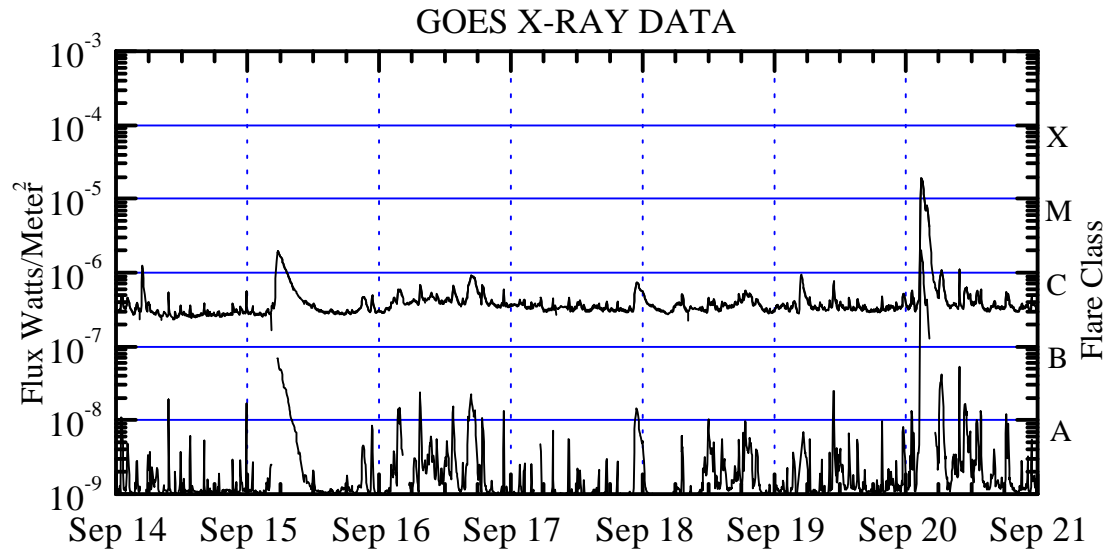
Electrons plot contains the five-minute averaged integral electron flux (electrons/ cm^2 -sec-sr) with energies greater than 2 MeV at GOES-8.

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_{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

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 is 10 pfu (protons/cm²-sec-sr) at greater than 10 MeV.

