

Space Weather Highlights
19-25 October 1998

Solar activity was low throughout the period. Isolated C-class subflares occurred each day. A long-duration C7 x-ray flare occurred at 20/2103UT and was associated with a weak Type IV radio sweep and minor discrete radio emission. Region 8365 (S27, L = 031, class/area Eko/330 on 23 October) grew rapidly during 21 - 22 October and produced C-class subflares, none of which were associated with significant radio emission. By 23 October, Region 8365 had stabilized as a moderate-sized spot group. It remained stable for the rest of the period and produced isolated B- and C-class subflares.

Real-time solar wind data were available from the Advanced Composition Explorer (ACE) spacecraft during most of the period. The spacecraft detected an interplanetary shock passage at 18/1902UT related to a halo-CME produced by a large filament disappearance on 15 October. Early on 19 October, following the shock, densities increased to a peak of 64 p/cc and Bz became strongly southward with maximum deflections of minus 21 nT (GSM). By late 19 October Bz returned to near zero, then ranged from plus 08 nT to minus 05 nT for the rest of the period. Coronal hole effects were evident during 20 - 24 October with increased solar wind speeds (maximum 740 km/sec on 22 October) and low densities (01 - 04 p/cc).

A greater than 10 MeV proton enhancement at geosynchronous altitude occurred on 19 October and was related to the shock passage described above. Fluxes returned to background levels by 21 October.

The greater than 2 MeV electron flux at geosynchronous altitude increased to high levels on 21 October and remained so for the balance of the period.

The geomagnetic field was at minor to severe storm levels on 19 October following the CME-related shock passage described above with severe storm levels limited to high latitudes. Field activity declined to unsettled to active levels by late 19 October. A high-speed coronal hole wind stream disturbed the field during 20 - 24 October with occasional, brief active periods at middle latitudes and active to minor storm periods at high latitudes. Field activity declined to quiet to unsettled levels for the rest of the period.

Space Weather Forecast
28 October - 23 November 1998

Solar activity is expected to be low during most of the period. However, M-class flare probabilities may increase during 02 - 15 November with the return of old Region 8358.

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 through 31 October and again during 17 November through the end of the period. Otherwise, normal to moderate fluxes are expected.

The geomagnetic field is expected to be at quiet to unsettled levels during most of the period. However, active levels are possible during 16 - 18 November due to recurrent 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
19 October	118	116	570	B3.3	6	0	0	9	1	0	0	0
20 October	121	104	290	B6.7	8	0	0	7	0	0	0	0
21 October	118	99	220	B7.1	3	0	0	2	0	0	0	0
22 October	115	60	420	B3.7	5	0	0	6	0	0	0	0
23 October	113	71	390	B2.2	1	0	0	1	0	0	0	0
24 October	111	43	260	B2.0	1	0	0	1	0	0	0	0
25 October	108	49	90	B2.8	1	0	0	3	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
19 October	2.6E+6	1.5E+5	3.7E+3		3.4E+6	
20 October	9.2E+5	3.9E+4	3.3E+3		1.5E+7	
21 October	1.1E+6	1.9E+4	3.3E+3		2.3E+8	
22 October	8.7E+5	1.5E+4	3.2E+3		4.2E+8	
23 October	9.1E+5	1.5E+4	3.3E+3		7.5E+8	
24 October	4.2E+5	1.4E+4	3.2E+3		7.4E+8	
25 October	2.4E+5	1.5E+4	3.5E+3		3.0E+8	

Daily Geomagnetic Data

Date	Middle Latitude Fredericksburg		High Latitude College		Estimated Planetary	
	A	K-indices	A	K-indices	A	K-indices
	19 October	27	5-5-3-3-4-4-3-4	72	3-5-5-6-7-7-6-4	52
20 October	11	2-2-2-3-2-1-3-4	15	2-3-2-4-3-2-4-3	17	3-3-3-3-2-3-4-4
21 October	16	4-4-3-3-2-3-3-1	37	3-4-6-5-4-5-5-1	23	4-4-5-4-2-4-4-3
22 October	12	1-2-4-3-3-2-2-3	37	2-1-5-6-6-5-3-3	18	2-3-4-4-4-3-3-4
23 October	8	1-2-1-2-3-3-2-2	29	2-3-2-5-6-5-3-3	13	2-3-2-2-4-4-3-3
24 October	11	3-3-3-2-2-1-2-3	20	2-4-4-4-5-2-2-2	13	3-4-3-2-2-2-3-3
25 October	10	3-4-3-3-2-1-0-0	*	*_*_*_*_*_*_*_*_*_*	16	3-4-4-3-3-3-2-2

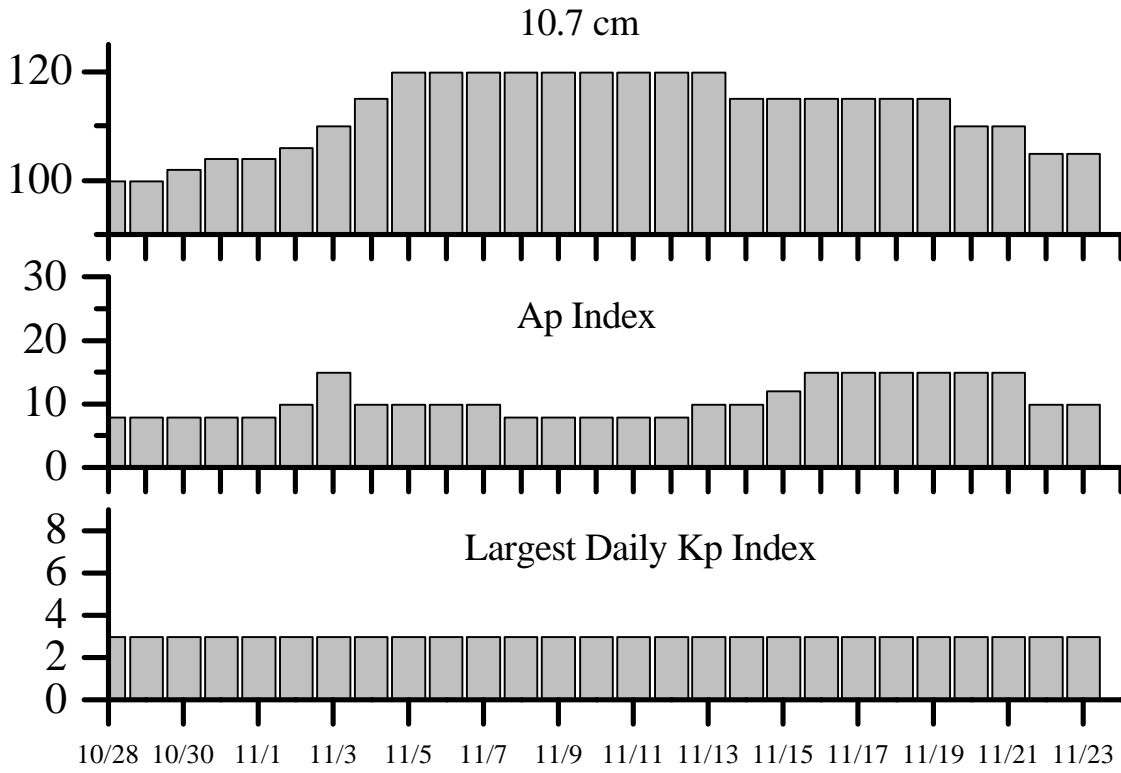


Alerts and Warnings Issued

Date and Time of Issue (UT)	Type of Alert or Warning	Date and Time of Event (UT)
19 Oct 0036	Type II Radio Emission	18 Oct 2112
19 Oct 0115	1-245 MHz Radio Burst	18 Oct
19 Oct 0115	245 MHz Radio Noise Storm	18 Oct
19 Oct 0303	K= 5 Observed	19 Oct 00-03
19 Oct 0600	A \geq 20 Observed	19 Oct 0600
19 Oct 1500	A \geq 30 Observed	19 Oct 1500
20 Oct 0217	1-245 MHz Radio Burst	19 Oct
20 Oct 0217	245 MHz Radio Noise Storm	19 Oct
20 Oct 0900	ENDED 20 Oct 0300 A \geq 30 Observed	19 Oct 1500
20 Oct 2100	K= 4 Observed	20 Oct 18-21
20 Oct 2348	Type II Radio Emission	20 Oct 2320
21 Oct 0259	K= 4 Observed	21 Oct 00-03
21 Oct 0821	>2MeV Electron Event \geq 1000pfu	21 Oct 0805
21 Oct 1204	A \geq 20 Observed	21 Oct 1200
21 Oct 1557	Type IV Radio Emission	20 Oct 2027
22 Oct 0904	K= 4 Observed	22 Oct 06-09
22 Oct 1342	CONTINUED >2 MeV Electron Event \geq 1000pfu	21 Oct 0805
23 Oct 1202	CONTINUED >2 MeV Electron Event \geq 1000pfu	21 Oct 0805
23 Oct 1806	K= 4 Observed	23 Oct 15-18
24 Oct 0022	1-245 MHz Radio Burst	23 Oct
24 Oct 0915	K= 4 Observed	24 Oct 06-09
24 Oct 1202	CONTINUED >2 MeV Electron Event \geq 1000pfu	21 Oct 0805
25 Oct 0601	K= 5 Observed	25 Oct 03-06
25 Oct 1201	CONTINUED >2 MeV Electron Event \geq 1000pfu	21 Oct 0805



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
28 Oct	100	8	3	11	120	8	3
29	100	8	3	12	120	8	3
30	102	8	3	13	120	10	3
31	104	8	3	14	115	10	3
01 Nov	104	8	3	15	115	12	3
02	106	10	3	16	115	15	3
03	110	15	3	17	115	15	3
04 Nov	115	10	3	18	115	15	3
05	120	10	3	19	115	15	3
06	120	10	3	20	110	15	3
07	120	10	3	21	110	15	3
08	120	8	3	22	105	10	3
09	120	8	3	23	105	10	3
10	120	8	3				



Energetic Events

Date	Time (UT)		X-ray		Optical Information			Peak		Sweep Freq	
	Begin	Max	Class	Flux	Imp Brtns	Location Lat CMD	Rgn #	Radio Flux		Intensity	
								245	2695	II	IV
<i>No Events Observed</i>											

Flare List

Date	Time			X-ray Class.	Imp / Brtns	Optical		Rgn #
	Begin	Max	End			Location Lat CMD		
19 October	0649	0653	0656	B5.8	SF	N14W60		8361
	0831	0836	0841	B5.7				
	1127	U1128	A1139	C1.9	SF	N13W59		8361
	1151	1154	1204		SF	N14W59		8361
	1221	1232	1309	C7.1	1N	N14W59		8361
	1354	1354	1402		SF	N21E08		8364
	1426	1426	1438		SF	N14W60		8361
	1527	1530	1542		SF	N16W62		8361
	1618	1618	1621		SF	N14W62		8361
	1716	1718	1726		SF	N14W63		8361
	2219	2222	2224	C1.5				
	2225	2228	2230	C1.9				
	2232	2235	2237	C3.2				
	2255	2258	2304	B7.6				
20 October	2356	2359	0003	C1.0	SF	N15W63		8361
	0028	0041	0047	C1.3				
	0144	0150	0153	C5.1				
	0249	0250	0253		SF	N14W68		8361
	0342	0343	0349		SF	N16W80		8358
	0342	0343	0346	C1.4	SF	N14W69		8361
	0343	0358	0407		SF	S29W04		8365
	0512	0515	0517	B6.8				
	0519	0522	0527	B9.0	SF	N16W80		8358
	0622	0632	0638		SF	N16W81		8358
	0629	0630	0634		SF	N14W72		8361
	0926	0929	0932	C1.0				
	1003	1007	1011	B8.4				
	1116	1136	1149	C1.1				
	1421	1429	1437	C3.3				
	1753	1801	1805	C3.2				
	1909	1913	1916	B6.5				
2030	2103	2148	C7.4					
21 October	1124	1127	1130	C1.3	SF	S26W26		8365
	1502	1502	1510		SF	S27W29		8365
	1812	1815	1817	C1.2				
	2338	2343	2348	C1.0				



Flare List – continued.

Date	Begin	Time		X-ray	Optical		Rgn #
		Max	End		Class.	Imp / Brtns	
22 October	0144	0144	0148		SF	S27W35	8365
	0509	0515	0522	B8.1	SF	S27W37	8365
	0724	0726	0743	C1.0	SF	S26W38	8365
	0935	0935	0939		SF	S26W39	8365
	0947	0950	0958	C1.5	SF	S26W39	8365
	1133	1141	1150	C1.2			
	1201	1201	1208	C1.1	SF	S26W42	8365
	1633	1644	1652	C1.0			
	2155	2200	2205	B8.8			
	2345	2349	2353	B5.2			
23 October	0147	0151	0156	C1.0	SF	S27W48	8365
	0249	0256	0301	B6.2			
	0653	0656	0659	B7.7			
	1023	1030	1039	B8.1			
24 October	0110	0147	0238	B4.0			
	0448	0451	0508	C1.3	SF	S27W62	8365
	1003	1006	1012	B3.3			
25 October	0728	0732	0736	B4.9			
	1325	1325	1332		SF	N18E66	8369
	1354	1356	1404	C2.2	SN	S11W53	8366
	1511	1511	A1518		SF	N18E68	8369



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 8355</i>																	
07 Oct	S21E64	121	0320	09	DAO	006	B	6	2		13	2					
08 Oct	S22E51	121	0220	07	DAI	010	BD	3			9						
09 Oct	S22E37	122	0160	07	DAI	013	B	1			2						
10 Oct	S22E23	123	0180	07	DAI	017	B										
11 Oct	S22E10	122	0110	07	DSO	016	B				1						
12 Oct	S22W04	123	0150	08	DSO	016	B	1			1						
13 Oct	S21W17	123	0120	07	DAI	016	B										
14 Oct	S21W29	122	0080	06	DAO	010	B				1						
15 Oct	S21W43	123	0020	06	BXO	004	B										
16 Oct	S22W59	125	0000	00	AXX	002	A										
17 Oct	S22W72	125															
18 Oct	S22W85	125															
								11	2	0	27	2	0	0	0	0	

Crossed West Limb.

Absolute heliographic longitude: 123

<i>Region 8358</i>																	
13 Oct	N15E02	104	0040	05	CAO	008	B	1			1						
14 Oct	N15W12	105	0110	08	DSO	013	B				1						
15 Oct	N15W26	106	0080	09	DSO	014	B										
16 Oct	N15W41	107	0120	10	CSO	015	B	1			4						
17 Oct	N16W55	108	0170	08	CAO	010	BG	4			6	1					
18 Oct	N15W69	109	0290	09	DAO	010	BG	1	1		2						
19 Oct	N15W82	109	0190	09	DAO	005	B										
20 Oct	N17W93	107	0060	08	DAO	002	B				3						
								7	1	0	15	3	0	0	0	0	

Crossed West Limb.

Absolute heliographic longitude: 104

<i>Region 8360</i>																	
14 Oct	S19W12	105	0100	05	DSO	010	B	1			9						
15 Oct	S19W25	105	0270	08	DSI	014	B	1			1						
16 Oct	S18W39	105	0340	09	DSO	018	B	1			3						
17 Oct	S19W52	105	0390	10	DKO	008	B										
18 Oct	S19W64	104	0290	10	DHO	005	B										
19 Oct	S20W78	105	0180	12	EHO	006	B										
20 Oct	S18W92	106	0120	04	HKX	001	A										
								3	0	0	13	0	0	0	0	0	

Crossed West Limb.

Absolute heliographic longitude: 105



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 8361</i>																					
15 Oct	N14W10	090	0010	04	CRO	003	B														
16 Oct	N14W25	091	0030	05	CSO	006	B														
17 Oct	N14W38	091	0030	07	CSO	009	B														
18 Oct	N15W51	091	0070	08	CSO	009	B						1								
19 Oct	N14W66	093	0090	08	DSI	010	B	3					8	1							
20 Oct	N14W79	093	0050	09	CAO	007	B	1					3								
21 Oct	N15W94	094	0010	00	HSX	001	A														
													4	0	0	12	1	0	0	0	0

Crossed West Limb.

Absolute heliographic longitude: 090

Region 8362

15 Oct	N20E73	007	0040	02	HSX	001	A														
16 Oct	N18E58	008	0030	01	HSX	001	A														
17 Oct	N20E46	007	0030	01	HRX	002	A														
18 Oct	N19E33	007	0010	01	AXX	001	A														
19 Oct	N20E20	007	0010	01	HRX	001	A														
20 Oct	N18E06	008	0010	05	BXO	003	B														
21 Oct	N18W08	008	0010	06	BXO	005	B														
22 Oct	N18W21	008																			
23 Oct	N18W34	008																			
24 Oct	N18W47	008																			
25 Oct	N18W60	008																			
													0	0	0	0	0	0	0	0	0

Still on Disk.

Absolute heliographic longitude: 008

Region 8363

15 Oct	N26E47	033	0020	04	BXO	005	B														
16 Oct	N24E31	035	0040	05	DSO	007	B														
17 Oct	N25E17	036	0100	07	DAO	014	B														
18 Oct	N25E05	035	0110	08	DAO	011	B														
19 Oct	N25W10	037	0080	08	DAO	016	B														
20 Oct	N25W22	036	0030	08	CSO	010	B														
21 Oct	N24W36	036	0030	08	BXO	005	B														
22 Oct	N25W49	036	0010	07	DRO	004	B														
23 Oct	N25W62	036	0000	00	AXX	001	A														
24 Oct	N18W69	030																			
25 Oct	N18W82	030																			
													0	0	0	0	0	0	0	0	0

Still on Disk.

Absolute heliographic longitude: 035



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 8364</i>																			
17 Oct	N18E24	029	0010	04	BXO	004	B												
18 Oct	N19E13	027	0030	06	CRO	005	B												
19 Oct	N19W02	029	0010	05	BXO	004	B					1							
20 Oct	N19W16	030	0000	05	BXO	003	B												
21 Oct	N18W27	027	0010	06	BXO	004	B												
22 Oct	N18W40	027																	
23 Oct	N18W53	027																	
24 Oct	N18W66	027																	
25 Oct	N18W79	027																	
												0	0	0	1	0	0	0	0

Still on Disk.

Absolute heliographic longitude: 029

<i>Region 8365</i>																			
18 Oct	S28E10	030	0020	04	BXO	003	B												
19 Oct	S29W04	031	0010	04	BXO	004	B												
20 Oct	S27W21	035	0020	04	BXO	008	B					1							
21 Oct	S28W34	034	0120	09	CAI	019	B	1				2							
22 Oct	S27W47	034	0320	12	EAO	014	BG	3				6							
23 Oct	S27W61	035	0330	13	EKO	013	B	1				1							
24 Oct	S26W72	033	0220	14	EAO	006	B	1				1							
25 Oct	S26W91	039	0020	05	BXO	002	B												
												6	0	0	11	0	0	0	0

Still on Disk.

Absolute heliographic longitude: 031

<i>Region 8366</i>																			
18 Oct	S16E35	005	0000	00	AXX	001	A												
19 Oct	S16E71	316																	
20 Oct	S16E58	316																	
21 Oct	S16E45	316																	
22 Oct	S16E32	316																	
23 Oct	S16E19	316	0020	05	CRO	007	B												
24 Oct	S11W43	004	0020	06	CRO	003	B												
25 Oct	S12W54	002	0010	00	AXX	001	A	1				1							
												1	0	0	1	0	0	0	0

Still on Disk.

Absolute heliographic longitude: 316



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

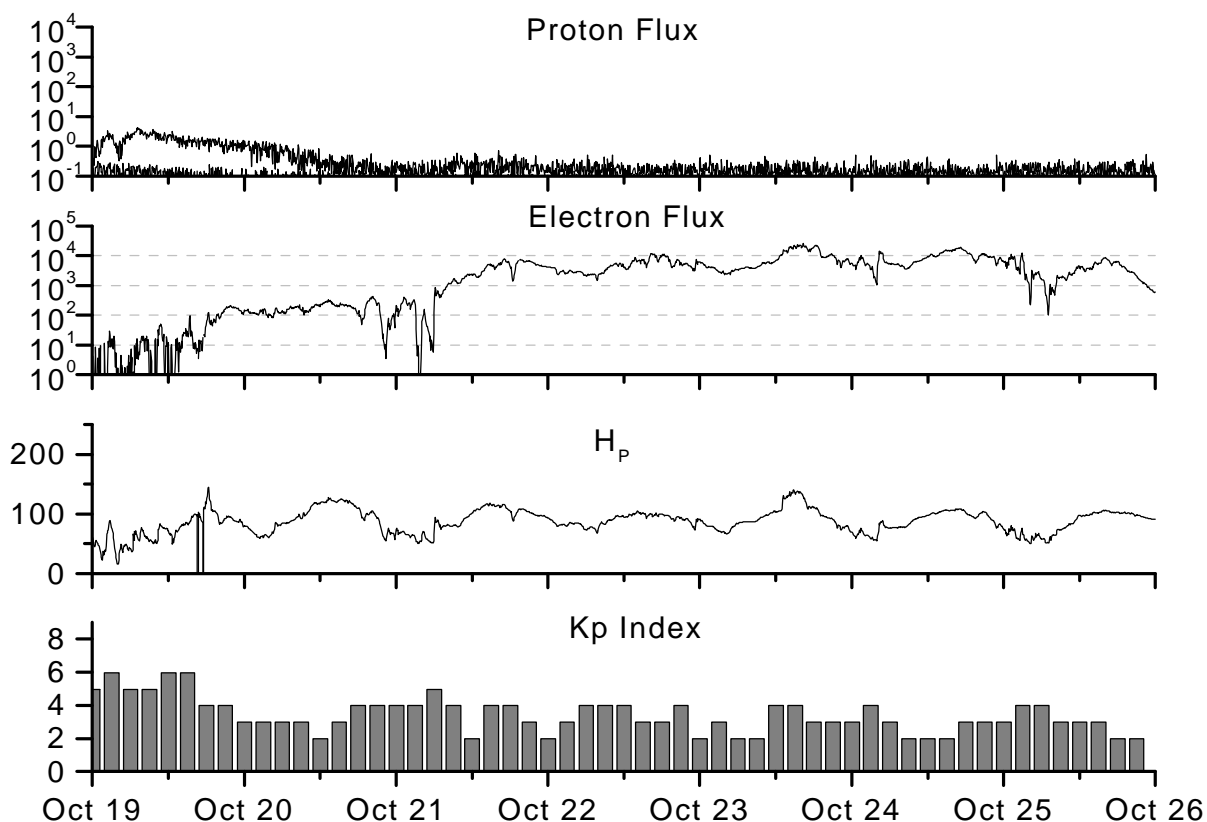
Month	Sunspot Numbers			Radio Flux		Geomagnetic			
	Observed values SWO	Ratio RI	Smooth values RI/SWO	Smooth values SWO	Ratio RI	**Penticton 10.7 cm	Smooth Value	Planetary Ap	Smooth Value
1996									
October	02.3	00.9	0.39	14.0	08.8	69.2	72.6	13	09.1
November	26.7	17.9	0.67	15.4	09.8	78.7	73.0	08	09.1
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	73.3	53.4*	109.1	105.8*	13	11.2*
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*	
September	119.0	92.9*	0.78*			138.4*		14*	

*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 19 October 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.

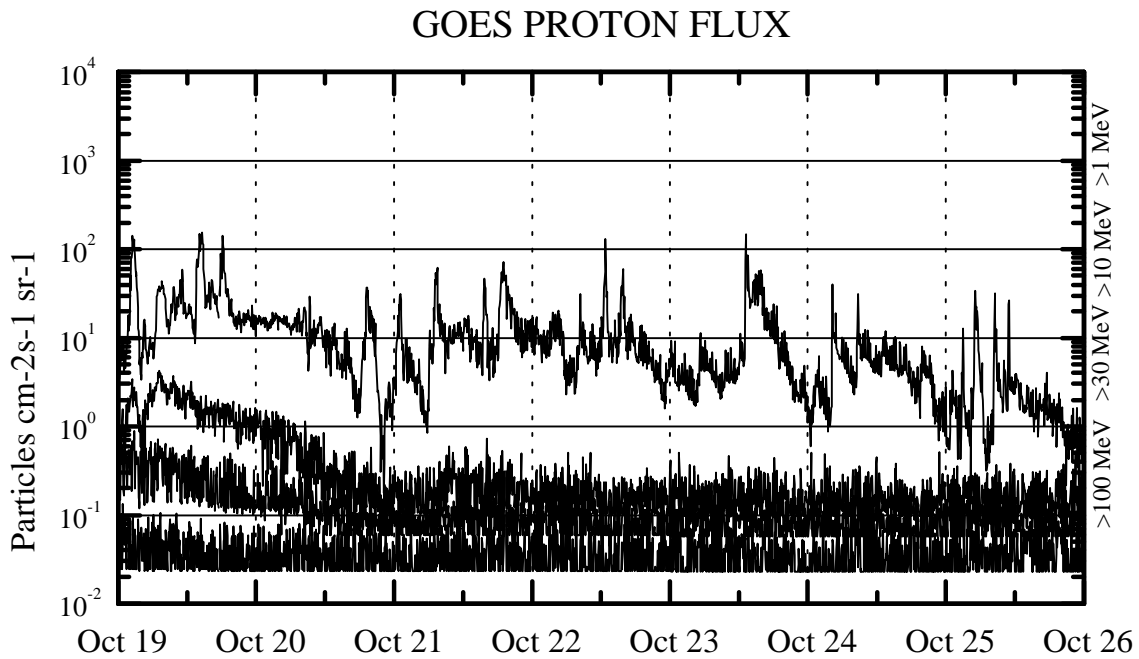
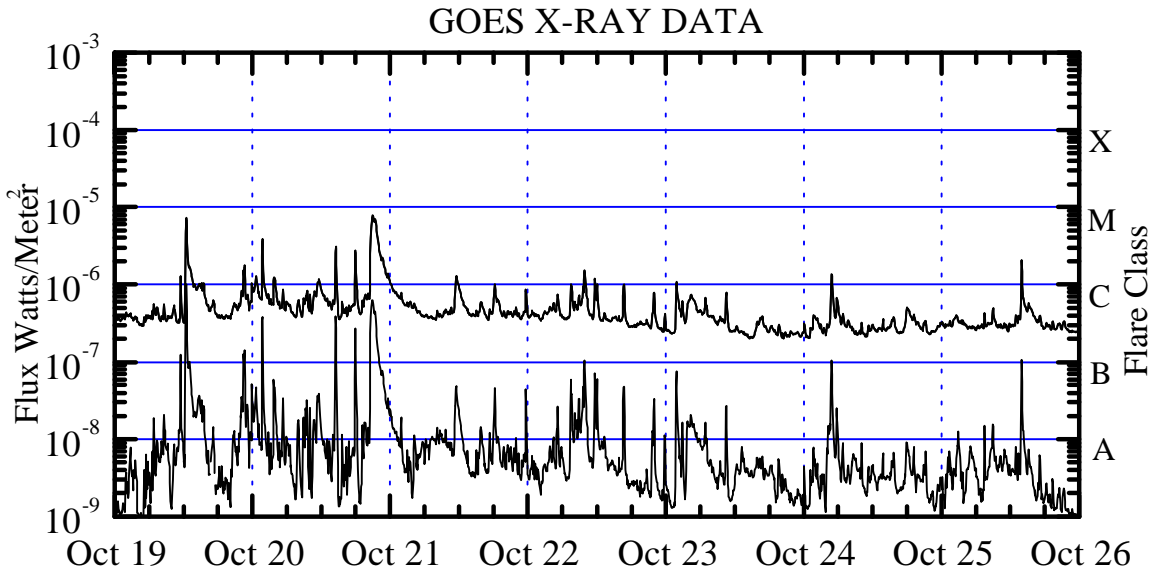
Electrons plot contains the five-minute averaged integral electron flux (electrons/ cm^2 -sec-sr) with energies greater than 2 MeV at GOES-8.

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

