

Space Weather Highlights
13-19 April 1998

Solar activity was at very low to low levels. A few B- and C-class subflares occurred. Region 8194 (S18, L = 035, class/area Dso/310 on 07 April) rotated out of view on 18 April.

Solar wind data were available from the ACE spacecraft during most of the period. Velocities were steady near 400 km/sec through 16 April, then increased during 17 - 18 April, peaking at 680 km/sec. Velocities declined to 400 km/sec on 19 April. Particle densities ranged from 01 - 07 p/cc. Bz hovered around zero, ranging from plus 08 to minus 12 nT (GSM). Solar sector orientation was away (phi angle near 135 degrees) during most of the period, but shifted to toward orientation (phi angle near 315 degrees) on 14 April.

There were no significant proton enhancements observed at geosynchronous altitude. However, a solar proton event began on 20 April and was in progress at issue time. Details will be available in next week's issue.

The greater than 2 MeV electron flux at geosynchronous altitude reached high levels during 14 - 16 April, then declined to normal levels for the rest of the period.

The geomagnetic field was quiet to unsettled. No significant disturbances were detected.

Space Weather Forecast
22 April 1998 - 18 May 1998

Solar activity is expected to range from low to moderate. Chances for M-class flares will increase after 01 May with the return of old Region 8194.

The solar proton event that began on 20 April is expected to continue through 22 April, then gradually decline to background levels. No proton enhancements are expected during the remainder of the period.

The greater than 2 MeV electron flux at geosynchronous altitude is expected to be at normal to occasionally moderate levels.

The geomagnetic field is expected to be at quiet to unsettled levels during most of the period. However, active periods are possible during 23 - 25 April due to coronal hole effects.



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
13 April	115	82	430	B3.1	1	0	0	3	0	0	0	0
14 April	112	83	280	B3.6	0	0	0	1	0	0	0	0
15 April	113	79	380	B2.8	5	0	0	5	1	0	0	0
16 April	106	59	210	B5.4	3	0	0	1	0	0	0	0
17 April	101	70	130	B3.1	0	0	0	0	0	0	0	0
18 April	99	28	50	B4.9	0	0	0	0	0	0	0	0
19 April	96	35	90	B3.0	0	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
13 April	2.3E+5	1.5E+4	3.0E+3		2.1E+7	
14 April	2.8E+5	1.5E+4	3.2E+3		4.4E+7	
15 April	1.7E+5	1.5E+4	3.1E+3		4.2E+7	
16 April	2.0E+5	1.6E+4	4.2E+3		2.3E+7	
17 April	1.9E+5	1.6E+4	3.7E+3		3.9E+6	
18 April	2.2E+5	1.6E+4	3.5E+3		2.4E+6	
19 April	2.6E+5	1.5E+4	3.6E+3		3.2E+6	

Daily Geomagnetic Data

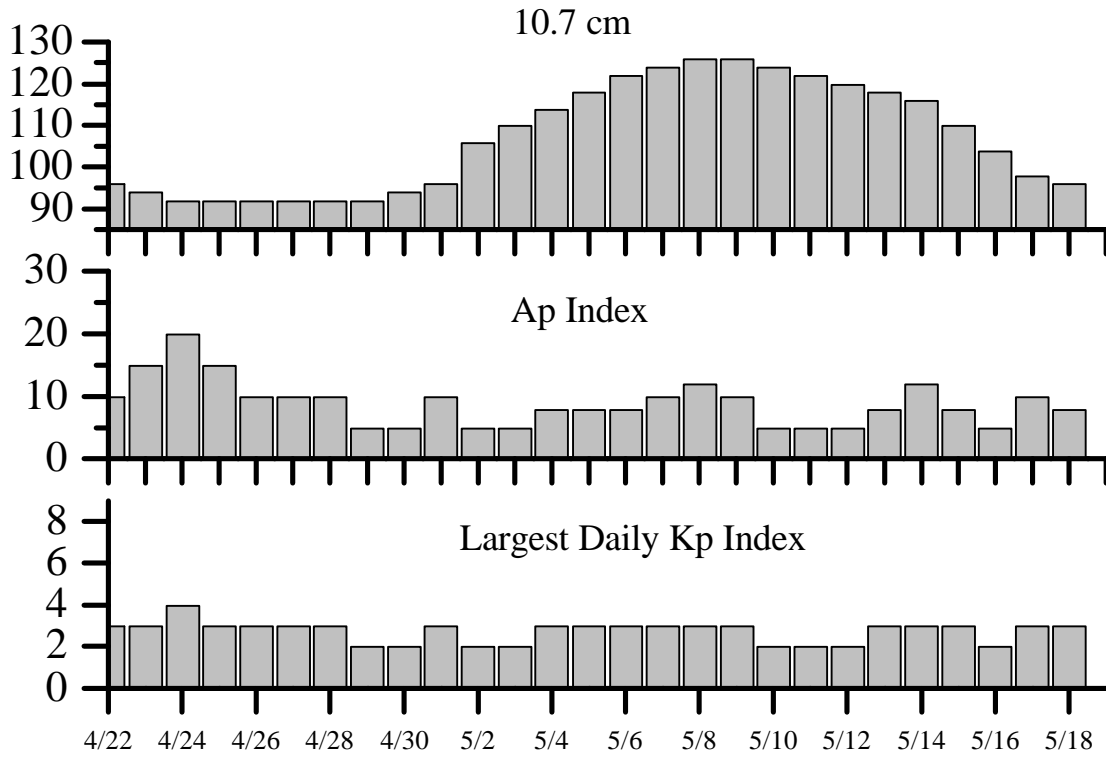
Date	Middle Latitude		High Latitude		Estimated	
	Fredericksburg		College		Planetary	
	A	K-indices	A	K-indices	A	K-indices
13 April	4	1-1-1-0-0-0-2-3	*	*_*_*_*_*_*_*_*_*_*	5	1-1-0-1-1-1-2-3
14 April	6	2-3-2-1-2-1-1-1	*	*_*_*_*_*_*_*_*_*_*	8	2-3-3-2-2-3-2-1
15 April	1	0-1-1-0-0-0-0-1	*	*_*_*_*_*_*_*_*_*_*	4	1-1-1-1-2-2-1-1
16 April	7	2-0-2-3-1-1-1-3	*	*_*_*_*_*_*_*_*_*_*	7	2-0-2-3-2-2-1-3
17 April	12	2-3-2-3-4-2-3-1	*	*_*_*_*_*_*_*_*_*_*	15	2-3-3-4-4-3-3-2
18 April	6	1-1-2-3-3-1-1-0	9	2-2-2-4-3-0-1-0	6	1-0-3-3-2-2-1-1
19 April	2	0-0-0-0-1-1-2-2	6	0-0-0-4-1-2-2-2	4	0-0-0-1-1-2-2-2

Alerts and Warnings Issued

Date and Time of Issue (UT)	Type of Alert or Warning	Date and Time of Event (UT)
14 Apr 1747	>2MeV Electron Event ≥ 1000 pfu	14 Apr 1720
15 Apr 0838	Type IV Radio Emission	15 Apr 0758
15 Apr 1306	Type IV Radio Emission	15 Apr 1226
16 Apr 0000	>2MeV Electron Event in Progress ≥ 1000 pfu	15 Apr
17 Apr 0000	>2MeV Electron Event in Progress ≥ 1000 pfu	16 Apr
17 Apr 1156	K = 4 Observed	17 Apr 09 -12



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 Apr	96	10	3	06	122	8	3
23	94	15	3	07	124	10	3
24	92	20	4	08	126	12	3
25	92	15	3	09	126	10	3
26	92	10	3	10	124	5	2
27	92	10	3	11	122	5	2
28	92	10	3	12	120	5	2
29	92	5	2	13	118	8	3
30	94	5	2	14	116	12	3
01 May	96	10	3	15	110	8	3
02	106	5	2	16	104	5	2
03	110	5	2	17	98	10	3
04	114	8	3	18	96	8	3
05	118	8	3				



Energetic Events

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

No Events Observed

Flare List

Date	Time			X-ray Class.	Imp / Brtns	Optical		Rgn #
	Begin	Max	End			Location	Lat CMD	
13 April	0332	0343	0412	C1.3	SF	S24E17		8202
	0824	0824	0827					
	1152	1158	1204	B7.1				
	1854	1855	1858	B6.4	SF	S25W77		8199
14 April	1323	1327	1334	B4.0				
	2138	2140	2148	B5.6	SF	S30W19		8198
	2230	2239	2247	B5.1				
15 April	0533	0541	0547	B9.0				
	0721	0722	0730		SF	N29W15		8203
	0739	0745	0806	C8.8	SN	N29W15		8203
	0801	0812	0822	C3.7				
	1201	1223	1245	C8.2	SF	N27W19		8203
	1419	1419	1434		SF	S30W25		8198
	1505	1511	1555		1F	S28W32		8198
	1509	1510	1514	C9.9	SF	N27W20		8203
16 April	2140	2149	2210	C1.2				8200
	0102	0111	0117	C9.5				
	0222	0222	0228	C1.0	SF	S22W24		8202
	0406	0424	0445	C1.0				
	0904	0908	0913	B4.5				
	0923	0932	0948	B7.8				
	2124	2127	2129	B6.9				
	17 April	No Flares Observed						
18 April	No Flares Observed							
19 April	1139	1144	1147	B2.8				
	1302	1305	1319	B6.2	SF	N21W17		8205
	1412	1420	1429	B3.6	SF	N21W18		8205
	1555	1600	1604	B4.2				
	1635	1636	1641	B4.1	SF	N19W19		8205
	2217	2220	2224	B3.8				



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 8204</i>																	
16 Apr	S15E12	314	0010	03	BXO	004	B										
17 Apr	S16W02	315	0010	03	BXO	002	B										
18 Apr	S16W15	315															
19 Apr	S16W28	315															
								0	0	0	0	0	0	0	0	0	0
Still on Disk.																	
Absolute heliographic longitude: 315																	
<i>Region 8205</i>																	
17 Apr	N21E00	313	0020	04	BXO	008	B										
18 Apr	N21W12	312	0050	06	DSO	007	B										
19 Apr	N21W25	312	0070	09	DSO	012	B				3						
								0	0	0	3	0	0	0	0	0	0
Still on Disk.																	
Absolute heliographic longitude: 313																	
<i>Region 8206</i>																	
19 Apr	N23E42	245	0020	03	BXO	003	B										
								0	0	0	0	0	0	0	0	0	0
Still on Disk.																	
Absolute heliographic longitude: 245																	



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

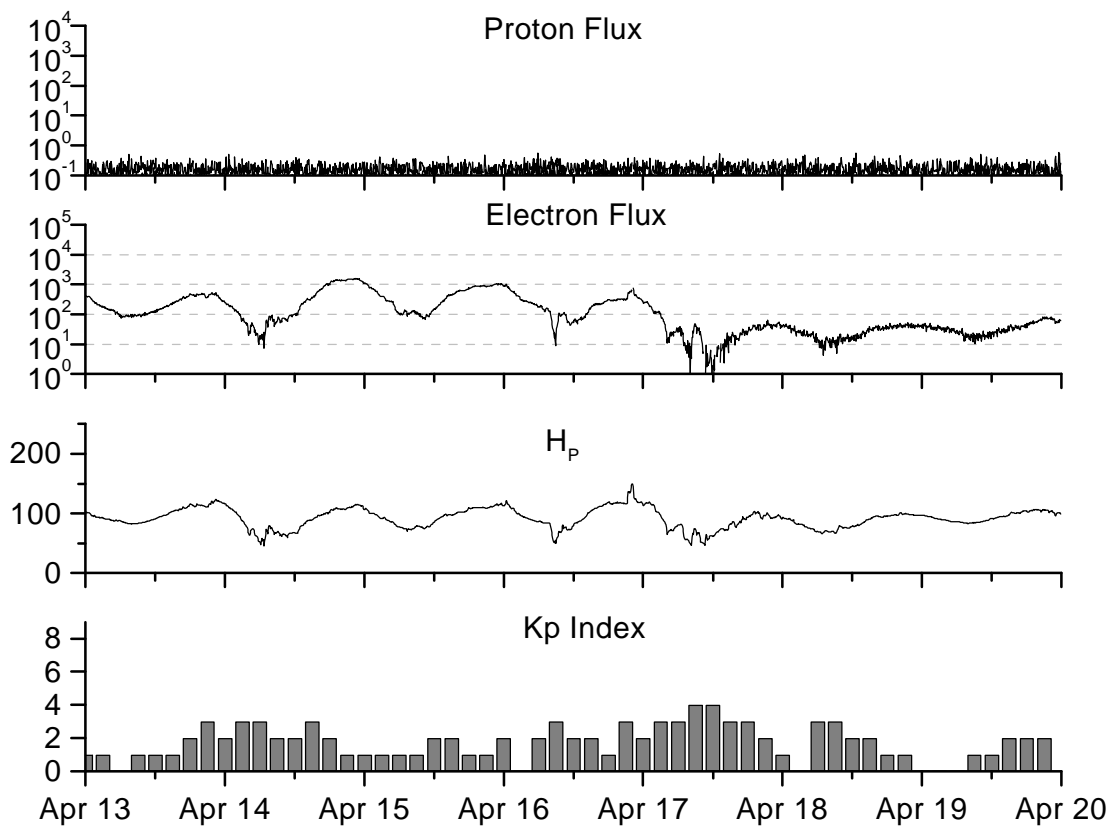
Month	Sunspot Numbers				Radio Flux		Geomagnetic		
	Observed SWO	values RI	Ratio RI/SWO	Smooth SWO	values RI	**Penticton 10.7 cm	Smooth Value	Planetary Ap	Smooth Value
1996									
April	08.5	04.8	0.56	13.6	08.5	69.3	71.6	11	09.7
May	11.8	05.5	0.47	12.9	08.0	72.1	71.4	07	09.5
June	18.8	11.8	0.63	13.5	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	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	18.4*	74.6	78.4*	08	08.6*
June	22.1	12.7	0.57	29.0	20.4*	71.7	80.1*	07	08.7*
July	17.0	10.5*	0.62*	32.4	22.7*	71.1	81.8*	06*	08.5*
August	36.7	24.7*	0.67*	35.9	25.2*	79.0	83.4*	08*	08.3*
September	58.2	51.3*	0.88*	40.5	28.5*	96.2	85.7*	10*	08.2*
October	33.6	23.3*	0.69*			84.9*		11*	
November	53.5	39.3*	0.73*			99.5*		11*	
December	57.9	41.5*	0.72*			98.8*		05*	
1998									
January	51.8	32.3*	0.62*			93.5*		07*	
February	54.4	40.7*	0.75*			93.6*		07*	
March	81.1	54.8*	0.67*			109.4*		11*	

*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 13 April 1998*

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.

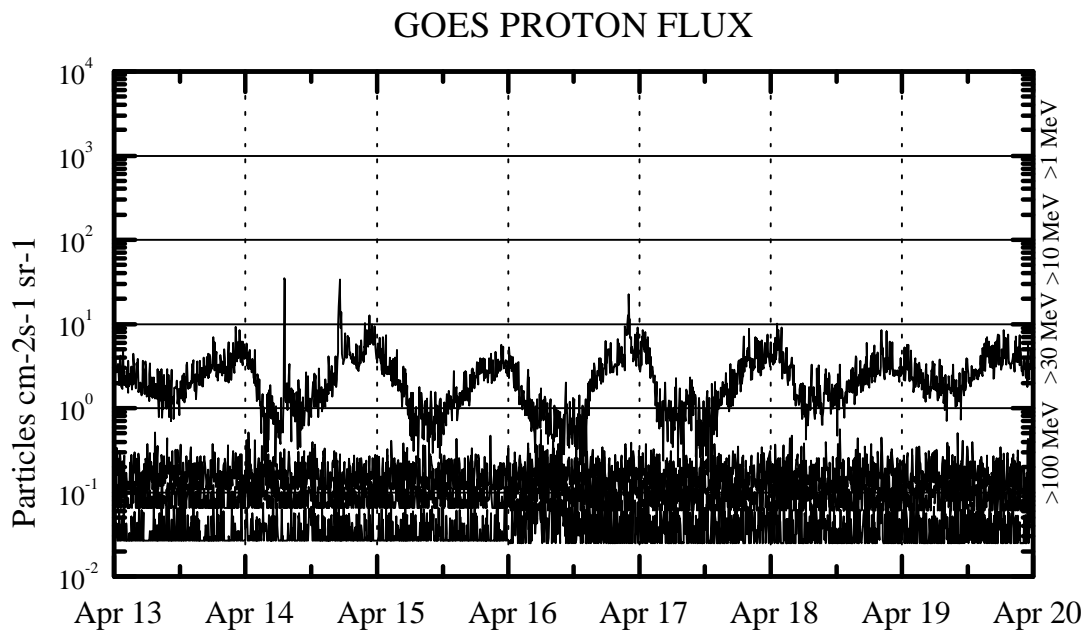
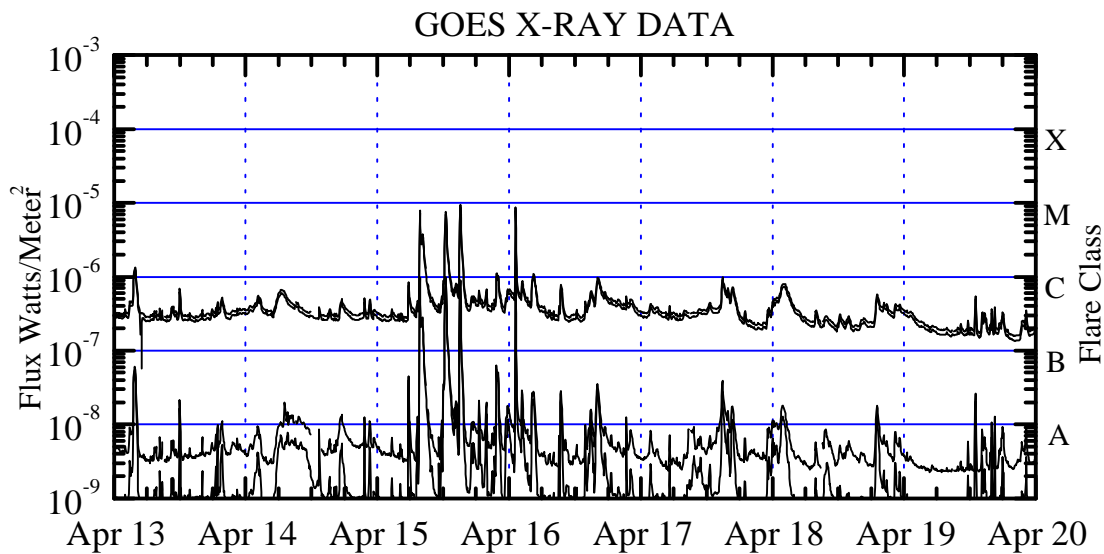
Electrons plot contains the five-minute averaged integral electron flux (electrons/ cm²-sec-sr) with energies greater than 2 MeV at GOES-9.

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 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_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.

