

**Space Weather Highlights**  
**08 - 14 September 2003**

**SWO PRF 1463**  
**16 September 2003**

Solar activity ranged from very low to low levels. The period began with very low level activity on 08 - 10 September and again on 12 September. Low level activity was observed on 11 September and 13 -14 September. Up until 12 September, all of the sunspot regions on the visible disk were relatively small and magnetically simple. Late on 11 September, a long duration B7 X-ray enhancement occurred at 2237 UTC and was correlated with the two disappearing solar filaments. The first DSF was five-degrees long and lifted off around 2100 UTC in the vicinity of S25E05. The second DSF followed the first and was along the same inversion line. This DSF was ten-degrees long and lifted off in the vicinity of S18E15. LASCO C2 imagery indicates a partial halo CME associated with the two DSF's. Region 456 (S07, L=221, class/area Dai/240 on 13 September) was in a slow gradual growth phase for most of the period and by 12 September had developed some polarity mixing in the intermediate spots. A beta-gamma-delta magnetic configuration developed for a brief period on 13 September. Activity from Region 456 consisted of a few mid level C-class flares, including the largest flare of the period, a C4/Sf on 14 September at 0127 UTC.

Solar wind data were available from the NASA Advanced Composition Explorer (ACE) spacecraft for most of the summary period. Late on 08 September, a coronal hole high-speed flow rotated into a geoeffective position with the solar wind speed increasing to 700 km/s by 10 September. Wind speeds remained elevated above 600 km/s until late on 12 September. On 13 -14 September, wind speed declined and by the close of the period was back to 400 km/s. The Bz component of the interplanetary magnetic field (IMF) was oscillating between -5nT and +8nT during most of the high speed flow with peak fluctuations near -10nT. Total IMF measurements were over 10nT on 08-09 September but then decreased to approximately 6nT for the duration of the high speed flow.

There were no greater than 10 MeV proton events at geosynchronous orbit during the period.

The greater than 2 MeV electron flux at geosynchronous orbit reached high levels on 08 September and again on 11 - 14 September.

Geomagnetic activity ranged from quiet to isolated minor storm levels. The period began with quiet to unsettled conditions on 08 September. Late on 08 September, a coronal hole high-speed flow rotated into a geoeffective position producing mostly unsettled to active conditions on 09 - 11 September with one period of minor storm levels observed on 11 September. The remainder of the period (12 -14 September) was at quiet to unsettled levels.

**Space Weather Outlook**  
**17 September - 13 October 2003**

Solar activity is expected to range from very low to low levels during the period.

No greater than 10 MeV proton events at geosynchronous orbit are expected during the

The greater than 2 MeV electron flux at geosynchronous orbit is expected to reach high levels on 19 - 23 September and again on 02 - 05 October.

The geomagnetic field is expected to range from quiet to major storm levels during the period. A large coronal hole high speed flow is expected to return on 17 - 21 September with major storm levels possible. Another coronal hole is due to return on 01 - 03 October and is expected to produce mostly active conditions with isolated minor storm levels possible. A returning coronal hole on 05 - 08 October is expected to produce active to isolated minor storm levels.



### *Daily Solar Data*

Date	Radio Flux 10.7 cm	Sun spot No.	Sunspot Area (10 <sup>-6</sup> hemi.)	X-ray Background	Flares								
					X-ray Flux			Optical					
					C	M	X	S	1	2	3	4	
08 September	99	58	150	B2.3	0	0	0	0	0	0	0	0	0
09 September	96	43	60	B1.6	0	0	0	0	0	0	0	0	0
10 September	99	42	160	B1.7	0	0	0	1	0	0	0	0	0
11 September	97	55	210	B1.8	2	0	0	0	0	0	0	0	0
12 September	94	58	230	B1.5	0	0	0	1	0	0	0	0	0
13 September	96	57	270	B1.9	1	0	0	2	0	0	0	0	0
14 September	95	58	210	B1.4	2	0	0	2	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
08 September	1.7E+6	1.2E+4	2.7E+3		4.5E+8	
09 September	6.5E+5	1.1E+4	2.5E+3		1.7E+7	
10 September	5.0E+5	1.1E+4	2.7E+3		2.1E+7	
11 September	6.9E+5	1.1E+4	2.6E+3		1.4E+8	
12 September	8.4E+5	1.1E+4	2.5E+3		1.7E+8	
13 September	8.1E+5	1.1E+4	2.6E+3		2.1E+8	
14 September	5.7E+5	1.1E+4	2.6E+3		1.7E+8	

### *Daily Geomagnetic Data*

Date	Middle Latitude Fredericksburg		High Latitude College		Estimated Planetary	
	A	K-indices	A	K-indices	A	K-indices
	08 September	4	0-0-0-1-2-1-1-3	4	0-0-0-0-1-2-1-3	9
09 September	17	2-2-2-3-4-3-4-4	17	2-2-3-4-4-2-3-4	19	2-2-3-4-4-3-4-4
10 September	12	4-1-2-3-3-2-3-2	30	5-3-3-6-4-4-3-3	19	4-2-3-4-3-3-4-3
11 September	10	3-4-1-2-2-2-2-1	15	3-4-1-4-4-2-1-2	15	4-5-2-3-3-3-3-3
12 September	8	3-3-2-2-2-1-2-1	10	2-3-2-3-3-2-2-1	11	3-3-3-3-3-3-2-2
13 September	6	3-3-2-1-0-0-1-2	9	3-2-4-3-0-1-1-1	11	3-3-3-3-2-2-2-2
14 September	3	1-1-1-0-1-1-1-1	3	1-0-0-1-1-2-1-1	7	2-1-2-2-2-3-2-2

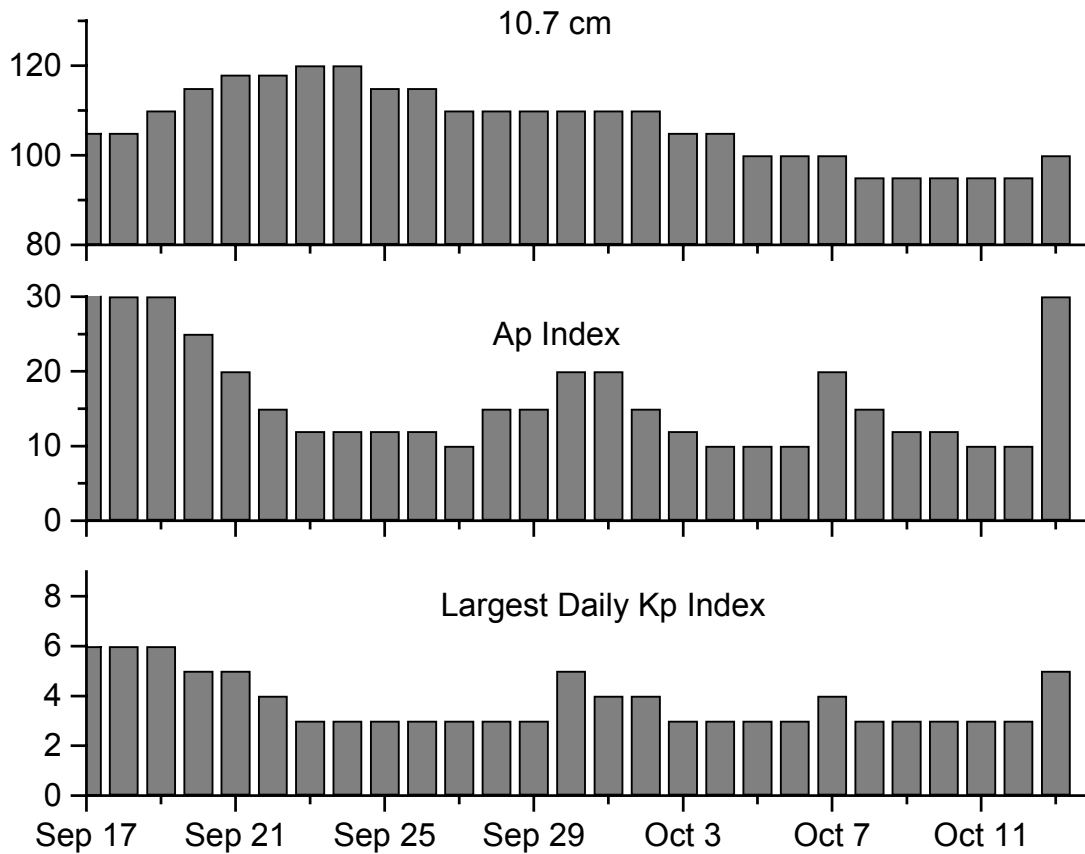


### *Alerts and Warnings Issued*

<u>Date &amp; Time of Issue</u>	<u>Type of Alert or Warning</u>	<u>Date &amp; Time of Event UT</u>
08 Sep 0006	1 - 245 MHz Radio Burst	07 Sep
08 Sep 0516	ALERT: Electron 2MeV Integral Flux > 1000pfu	08 Sep 0500
08 Sep 1934	WARNING: Geomagnetic K= 4 expected	08 Sep 2000 - 09 Sep 1500
08 Sep 2332	ALERT: Geomagnetic K= 4	08 Sep 2332
09 Sep 1053	WARNING: Geomagnetic K= 5	09 Sep 1054 - 1500
09 Sep 1453	EXTENDED WARNING: Geomagnetic K= 4	08 Sep 2000 -10 Sep 1500
09 Sep 2340	WARNING: Geomagnetic K= 5	09 Sep 2340 -10Sep 1500
09 Sep 2351	ALERT: Geomagnetic K= 5	09 Sep 2350
10 Sep 1451	EXTENDED WARNING: Geomagnetic K= 4	08 Sep 2000 -10 Sep 2359
10 Sep 2302	EXTENDED WARNING: Geomagnetic K= 4	08 Sep 2000 -11Sep 1500
11 Sep 0346	ALERT: Geomagnetic K= 5	11 Sep 0347
11 Sep 0925	ALERT: Electron 2MeV Integral Flux > 1000pfu	11 Sep 0900
11 Sep 1438	EXTENDED WARNING: Geomagnetic K= 4 expected	08 Sep 2000 - 11 Sep 2359
11 Sep 2354	EXTENDED WARNING: Geomagnetic K= 4	08 Sep 2000 - 12 Sep 1500
12 Sep 1010	ALERT: Electron 2MeV Integral Flux > 1000pfu	12 Sep 0950
13 Sep 0530	WARNING: Geomagnetic K= 4 expected	13 Sep 0530 - 1500
13 Sep 0900	ALERT: Electron 2MeV Integral Flux > 1000pfu	13 Sep 0840
14 Sep 0846	ALERT: Electron 2MeV Integral Flux > 1000pfu	14 Sep 0820
14 Sep 2053	WATCH: Geomagnetic A≥ 20	17 Sep



### 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
17 Sep	105	35	6	01 Oct	110	20	4
18	105	30	6	02	110	15	4
19	110	30	6	03	105	12	3
20	115	25	5	04	105	10	3
21	118	20	5	05	100	10	3
22	118	15	4	06	100	10	3
23	120	12	3	07	100	20	4
24	120	12	3	08	95	15	3
25	115	12	3	09	95	12	3
26	115	12	3	10	95	12	3
27	110	10	3	11	95	10	3
28	110	15	3	12	95	10	3
29	110	15	3	13	100	30	5
30	110	20	3				



### *Energetic Events*

Date	Time		X-ray		Optical Information			Peak		Sweep Freq		
	Begin	Max	1/2 Max	Class	Integ Flux	Imp/ Brtns	Location Lat CMD	Rgn #	Radio Flux		Intensity	
									245	2695	II	IV
<b>No Events Observed</b>												

### *Flare List*

Date	Time			X-ray Class.	Imp / Brtns	Optical		Rgn
	Begin	Max	End			Location Lat CMD		
08 September	No Flares Observed							
09 September	0912	0917	0919	B4.3				456
	1014	1017	1021	B3.4				456
10 September	0302	0312	0325	B4.3				456
	1512	1552	1609	B4.3				456
	2330	2331	2347	B6.5	Sf	S07W18		456
11 September	1348	1412	1424	C1.0				
	1446	1454	1507	C1.2				
	2016	2237	0008	B7.9				
12 September	0410	0413	0420	B3.6				
	0626	0631	0644	B3.6				
	0912	0917	0921	B4.0				
	1356	1400	1408	B2.9				
	1419	1422	1424	B2.5				
	1506	1516	1521	B4.3				
	1524	1524	1528		Sf	S07W41		456
	1853	1906	1917	B4.6				
	1956	2003	2007	B8.4				
	2222	2235	2241	B5.7				
13 September	0039	0046	0057	B3.8				
	0250	0253	0255	B4.5				
	0644	0647	0649	B3.5				
	0658	0702	0712	B8.8	Sf	S07W50		456
14 September	0738	0741	0829	C2.2	Sf	S06W52		456
	0124	0125	0143	C4.4	Sf	S07W61		456
	0346	0349	0353	B2.7				
	0439	0443	0445	B3.5				
	0533	0538	0542	B3.3				
	1754	1758	1803	B4.7				
	1911	1915	1917	B4.6				
	1957	2004	2013	B3.5				
	2134	2138	2141	B3.7				
	2239	2241	2248	C3.6	Sf	S08W73		456



### Region Summary

Date	Location		Sunspot Characteristics				Flares							
	Helio		Area (10 <sup>-6</sup> hemi)	Extent (helio)	Spot Class	Spot Count	Mag Class	X-ray			Optical			
	(° Lat ° CMD)	Lon						C	M	X	S	1	2	3

#### Region 450

29 Aug S18E66	294	0060	02	Hsx	001	A	1											
30 Aug S18E52	294	0070	02	Hsx	001	A												
31 Aug S18E39	294	0040	02	Hsx	001	A												
01 Sep S17E27	293	0020	01	Hsx	001	A												
02 Sep S18E14	293	0040	04	Dso	007	B												
03 Sep S16W07	301	0120	16	Fso	013	B												
04 Sep S17W20	300	0070	15	Eso	009	B												
05 Sep S17W35	302	0040	11	Cso	006	B												
06 Sep S17W52	306	0030	08	Dso	004	B												
07 Sep S17W63	304	0030	04	Bxo	004	B	1				1							
08 Sep S17W78	306	0010	00	Axx	001	A												
09 Sep S17W91	306																	
							2	0	0	1	0	0	0	0	0			

Crossed West Limb.

Absolute heliographic longitude: 301

#### Region 453

04 Sep S23W44	324	0090	06	Dso	010	B												
05 Sep S23W56	323	0190	08	Dao	014	B												
06 Sep S23W69	323	0200	10	Dso	010	B												
07 Sep S24W78	319	0140	08	Dho	003	B												
08 Sep S24W91	319	0090	02	Hsx	001	A												
							0	0	0	0	0	0	0	0	0			

Crossed West Limb.

Absolute heliographic longitude: 324

#### Region 454

04 Sep S10E22	258	0030	04	Cso	006	B												
05 Sep S10E09	258	0060	05	Dao	007	B												
06 Sep S10W04	258	0050	06	Dso	005	B												
07 Sep S10W18	259	0020	06	Dro	005	B												
08 Sep S10W31	259																	
09 Sep S10W44	259																	
10 Sep S10W57	259																	
11 Sep S10W70	259																	
12 Sep S10W83	259																	
							0	0	0	0	0	0	0	0	0			

Crossed West Limb.

Absolute heliographic longitude: 258



**Region Summary - continued.**

Date	Location		Sunspot Characteristics				Flares							
	(° Lat ° CMD)	Helio Lon	Area (10 <sup>-6</sup> hemi)	Extent (helio)	Spot Class	Spot Count	Mag Class	X-ray			Optical			
							C	M	X	S	1	2	3	4

*Region 455*

06 Sep	S16E32	222	0010	01	Hsx	001	A								
07 Sep	S20E24	217	0020	02	Cso	002	B								
08 Sep	S20E11	217	0020	04	Dro	006	B								
09 Sep	S20W02	217													
10 Sep	S20W15	217													
11 Sep	S20W28	217													
12 Sep	S20W41	217													
13 Sep	S20W54	217													
14 Sep	S20W67	217													
															0 0 0 0 0 0 0 0

Still on Disk.

Absolute heliographic longitude: 217

*Region 456*

08 Sep	S09E08	220	0030	07	Dso	010	B								
09 Sep	S09W05	220	0050	07	Dao	015	B								
10 Sep	S09W19	220	0150	07	Dai	017	Bg					1			
11 Sep	S08W32	220	0180	08	Dai	029	B								
12 Sep	S07W45	220	0190	10	Dai	032	B					1			
13 Sep	S07W59	221	0240	10	Dai	020	Bgd	1				2			
14 Sep	S08W73	222	0170	12	Eai	019	B	2				2			
															3 0 0 6 0 0 0 0

Still on Disk.

Absolute heliographic longitude: 220

*Region 457*

09 Sep	S11E08	207	0010	04	Bxo	008	B								
10 Sep	S11W06	207	0010	03	Bxo	005	B								
11 Sep	S11W17	205	0030	06	Cso	006	B								
12 Sep	S11W27	202	0040	06	Cro	006	B								
13 Sep	S12W38	200	0010	01	Hsx	001	A								
14 Sep	S12W51	200													
															0 0 0 0 0 0 0 0

Still on Disk.

Absolute heliographic longitude: 207

*Region 458*

13 Sep	S08W32	194	0020	04	Cso	006	B								
14 Sep	S09W46	195	0030	04	Cro	006	B								
															0 0 0 0 0 0 0 0

Still on Disk.

Absolute heliographic longitude: 194





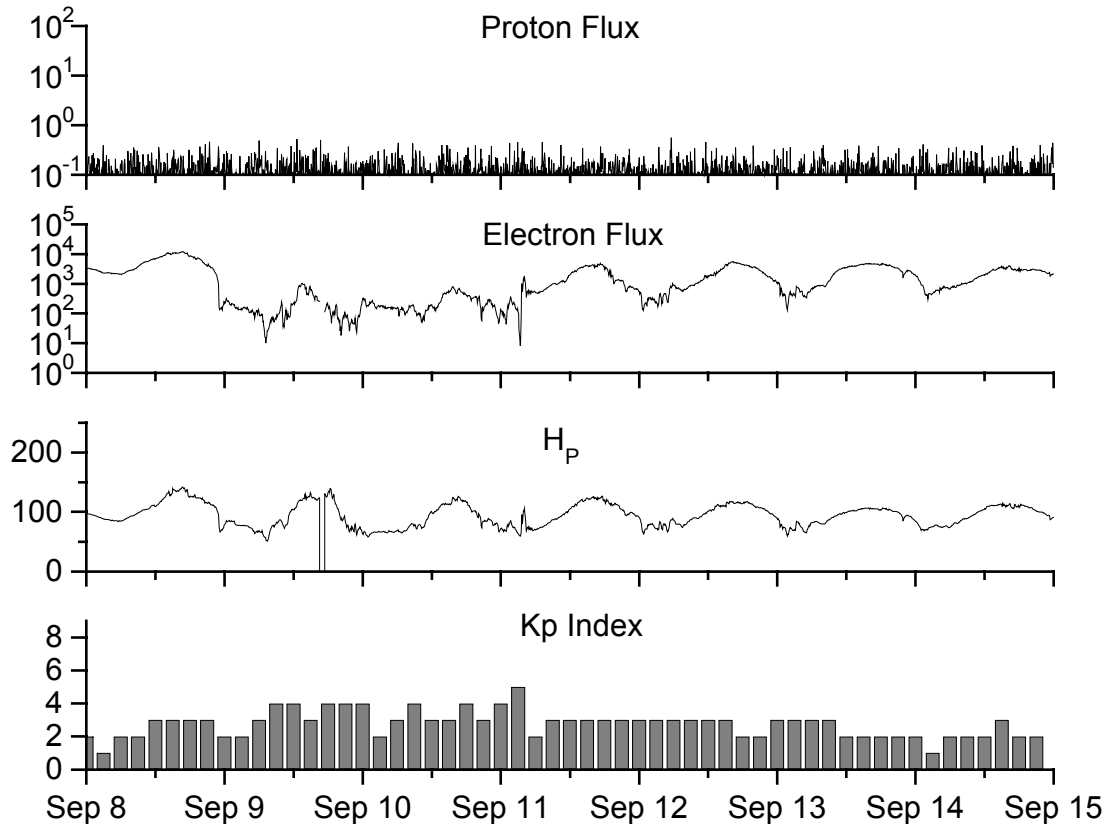


**Recent Solar Indices (preliminary)  
of the observed monthly mean values**

Month	Sunspot Numbers			Radio Flux		Geomagnetic			
	Observed values SWO	Ratio RI	Ratio RI/SWO	Smooth values SWO	Smooth values RI	*Penticton 10.7 cm	Smooth Value	Planetary Ap	Smooth Value
<b>2001</b>									
September	229.1	150.7	0.66	178.8	114.1	233.8	191.3	13	12.8
October	197.3	125.5	0.64	179.5	114.0	208.1	191.9	20	12.0
November	178.6	106.5	0.60	183.7	115.5	212.7	193.7	16	12.0
December	217.5	132.2	0.61	184.5	114.6	235.6	193.9	09	12.2
<b>2002</b>									
January	189.0	114.1	0.60	184.8	113.5	227.3	194.6	08	12.3
February	194.5	107.4	0.55	188.6	114.7	205.0	197.2	10	12.8
March	153.1	98.4	0.64	188.9	113.3	180.3	195.7	10	12.9
April	194.9	120.7	0.62	186.2	110.5	189.8	191.5	15	13.2
May	204.1	120.8	0.59	183.6	108.9	178.4	188.0	15	13.3
June	146.0	88.3	0.60	179.9	106.3	148.7	183.0	11	13.5
July	183.5	99.6	0.54	175.4	102.7	173.5	176.3	11	13.7
August	191.0	116.4	0.61	169.2	98.7	183.9	169.5	16	14.2
September	206.4	109.6	0.53	163.4	94.6	175.8	164.1	14	15.0
October	153.9	97.5	0.63	158.8	90.5	167.0	159.4	23	15.6
November	159.8	95.5	0.60	150.9	85.2	168.7	154.8	16	16.3
December	147.9	80.8	0.55	144.6	82.1	158.6	150.9	13	17.0
<b>2003</b>									
January	149.3	79.7	0.53	141.7	81.0	144.0	149.2	13	18.2
February	87.0	46.0	0.53	136.4	78.5	124.5	144.7	17	18.9
March	119.7	61.1	0.51			132.2		21	
April	119.7	60.0	0.50			126.3		20	
May	89.6	55.2	0.62			129.3		26	
June	118.4	77.4	0.65			129.4		24	
July	132.8	85.0	0.64			127.8		20	
August	114.3	72.7	0.64			122.1		23	

**NOTE:** All smoothed values after September 2002 and monthly values after March 2003 are preliminary estimates. The lowest smoothed sunspot index number for Cycle 22, RI = 8.0, occurred in May 1996. The highest smoothed sunspot number for Cycle 23, RI = 120.8, occurred April 2000. \*After June 1991, 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 08 September 2003*

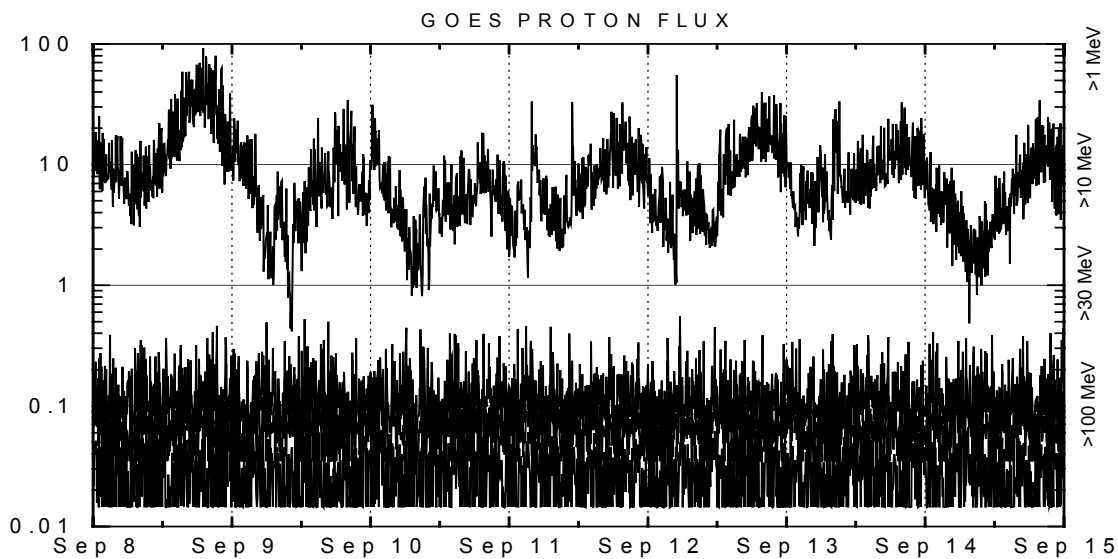
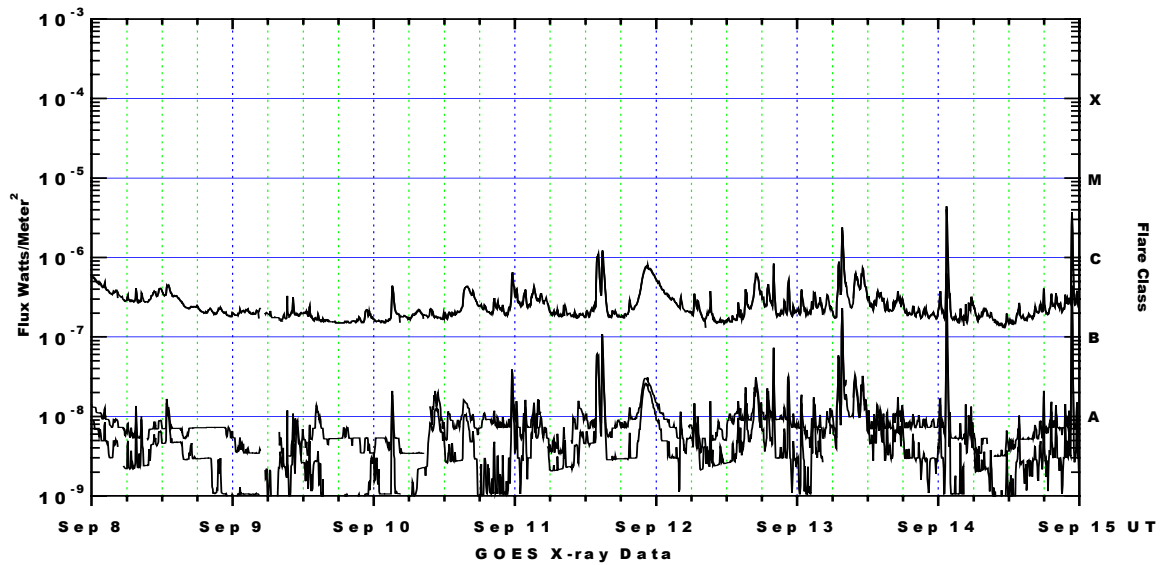
*Protons* plot contains the five-minute averaged integral proton flux (protons/cm<sup>2</sup>-sec-sr) as measured by GOES-11 (W113) for each of three energy thresholds: greater than 10, 50, and 100 MeV.

*Electrons* plot contains the five-minute averaged integral electron flux (electrons/cm<sup>2</sup>-sec-sr) with energies greater than 2 MeV at GOES-12.

*H<sub>p</sub>* plot contains the five minute averaged magnetic field H - component in nanoteslas (nT) as measured by GOES-12. 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 Air Force Weather Agency) 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<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>p</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*

X-ray plot contains five-minute averaged x-ray flux (watts/m<sup>2</sup>) as measured by GOES 12 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/cm<sup>2</sup>-sec-sr) as measured by GOES-11 (W113) 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.



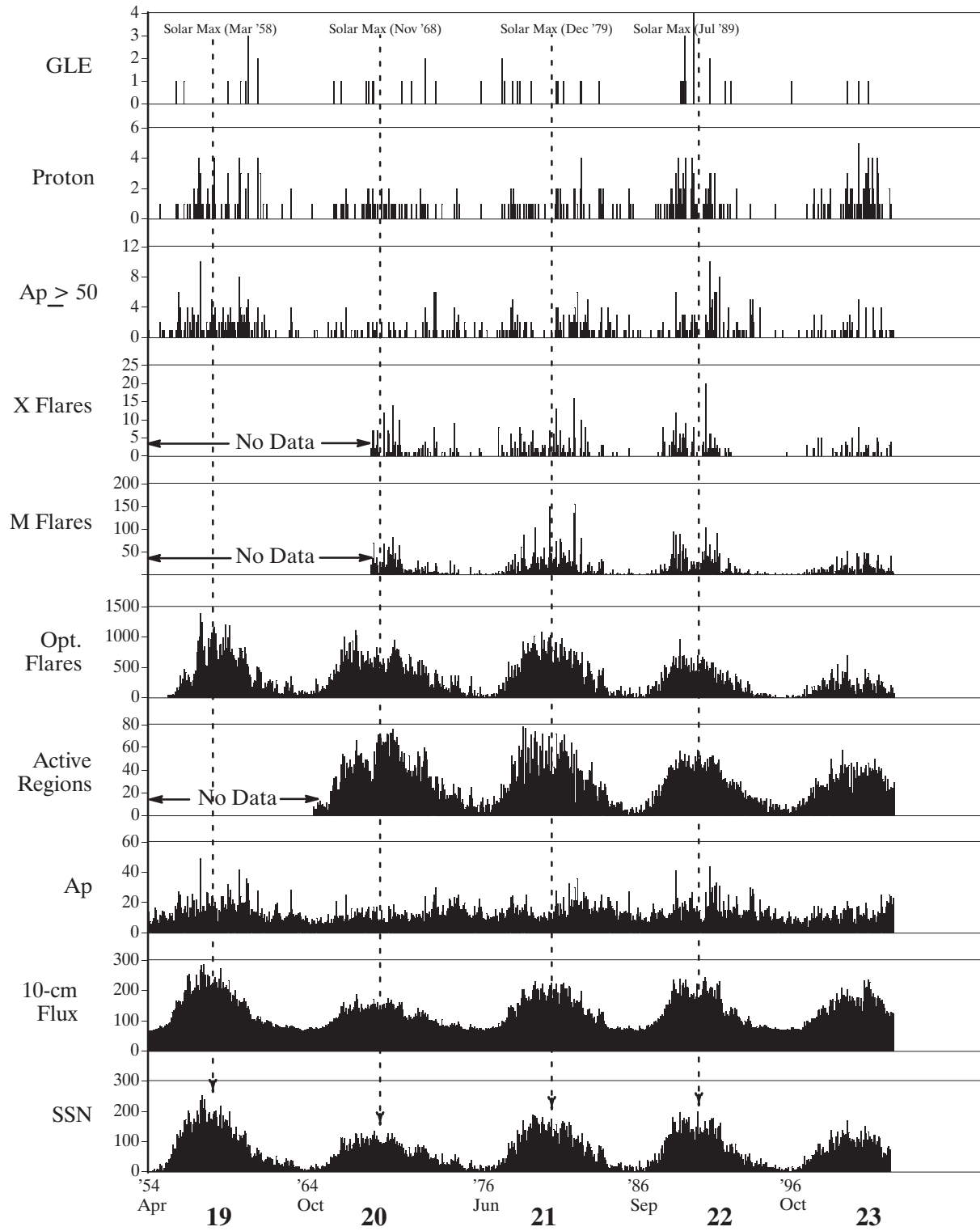


Space Environment Center

# Solar-Terrestrial Indices

## Monthly Values

August 2003 Month 83 STI 593



Solar Cycle

K. Tegnell