

Space Weather Highlights
10 May – 16 May 2004

SWO PRF 1498
18 May 2004

Solar activity ranged from very low to low. Region 609 (S03, L=176, class/area, Dkc/500 on 15 May) accounted for all the period's activity with five C-class flares. The summary period began with very low activity on 10 and 11 May. By 12 May, activity levels rose to low as Region 609 produced a C1.3/Sf at 12/1543 UTC. On 13 May, this region produced the largest flare of the period, a C7.7/Sf at 13/1334 UTC. Activity levels decayed to very low on 14 May but increased to low on 15 May as weak C-class flare activity was observed. The period ended on 16 May with very low activity levels. Since first rotating onto the disk on 10 May, Region 609 has shown significant growth both in size and magnetic complexity.

Solar wind data were available from the NASA Advanced Composition Explorer (ACE) spacecraft during most of the summary period. The period began with solar wind speed at 425 km/s. Velocity remained steady through 13 May but early on 14 May, wind speed began a slow decay and ended the summary period at 350 km/s. The IMF Bz did not vary much beyond +/- 7 nT for the entire period.

There were no greater than 10 MeV proton events at geo-synchronous orbit during the summary period.

The greater than 2 MeV electron flux at geosynchronous orbit was high on 10 - 11 May.

The field was at predominately quiet to unsettled levels. Isolated active conditions were observed due to occasional periods of sustained southward IMF Bz.

Space Weather Outlook
19 May - 14 June 2004

Solar activity levels are expected to range from very low to low for the forecast period. Isolated moderate activity is possible from Region 609 through 22 May.

No greater than 10 MeV proton events are expected during the period.

The greater than 2 MeV electron flux at geosynchronous orbit is expected to reach high levels 21 – 24 May, 01 - 04 June, and 09 – 10 June due to recurrent coronal hole high-speed streams.

The geomagnetic field is expected to range from quiet to active. Unsettled to active conditions are possible from 20 – 22 May, 31 May – 03 June, and 08 – 09 June as weak, recurrent coronal hole high-speed streams rotate into a geoeffective position.

Note: The ACE spacecraft orbit will bring ACE nearly in line with the Sun from about 30 May – 02 June. During that time, solar radio noise may interfere with spacecraft telemetry resulting in the loss of solar wind plasma, magnetic field, and particle data.



Daily Solar Data

Date	Radio Flux 10.7 cm	Sun spot No.	Sunspot Area (10 ⁻⁶ hemi.)	X-ray Background	Flares							
					X-ray Flux			Optical				
					C	M	X	S	1	2	3	4
10 May	93	55	260	A7.3	0	0	0	0	0	0	0	0
11 May	90	46	300	A6.0	0	0	0	0	0	0	0	0
12 May	99	83	300	A7.6	1	0	0	1	0	0	0	0
13 May	101	107	450	B1.4	3	0	0	2	0	0	0	0
14 May	110	98	550	B1.6	0	0	0	0	0	0	0	0
15 May	115	117	820	B2.1	1	0	0	0	0	0	0	0
16 May	118	148	850	B1.9	0	0	0	0	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
10 May	2.2E+5	1.4E+4	3.0E+3		2.4E+8	
11 May	2.4E+5	1.3E+4	3.0E+3		3.4E+7	
12 May	1.7E+5	1.4E+4	3.0E+3		2.3E+6	
13 May	2.5E+5	1.3E+4	3.1E+3		3.3E+6	
14 May	1.7E+5	1.3E+4	2.8E+3		4.1E+6	
15 May	1.2E+5	1.4E+4	2.9E+3		1.3E+6	
16 May	1.1E+5	1.4E+4	3.1E+3		1.2E+6	

Daily Geomagnetic Data

Date	Middle Latitude Fredericksburg		High Latitude College		Estimated Planetary	
	A	K-indices	A	K-indices	A	K-indices
	10 May	5	2-2-1-1-1-1-2	4	1-1-1-1-2-1-1-2	7
11 May	8	3-2-2-0-1-1-3-3	6	3-2-2-0-1-1-2-2	10	3-3-1-1-2-2-3-4
12 May	9	3-4-1-1-1-1-2-2	16	3-4-5-3-1-2-2-1	11	3-4-2-2-2-2-3-2
13 May	17	2-2-5-5-1-1-3-2	21	1-3-6-4-3-3-2-2	13	2-3-4-3-3-3-3-3
14 May	4	2-2-1-0-1-0-2-2	9	3-3-2-1-3-1-1-2	8	2-3-1-1-3-2-2-2
15 May	7	3-2-2-2-1-1-1-2	10	2-3-3-4-1-2-1-1	9	4-2-2-2-2-2-2-2
16 May	4	2-1-1-1-0-1-1-2	4	1-2-2-2-1-1-0-1	4	2-2-1-1-2-1-1-2

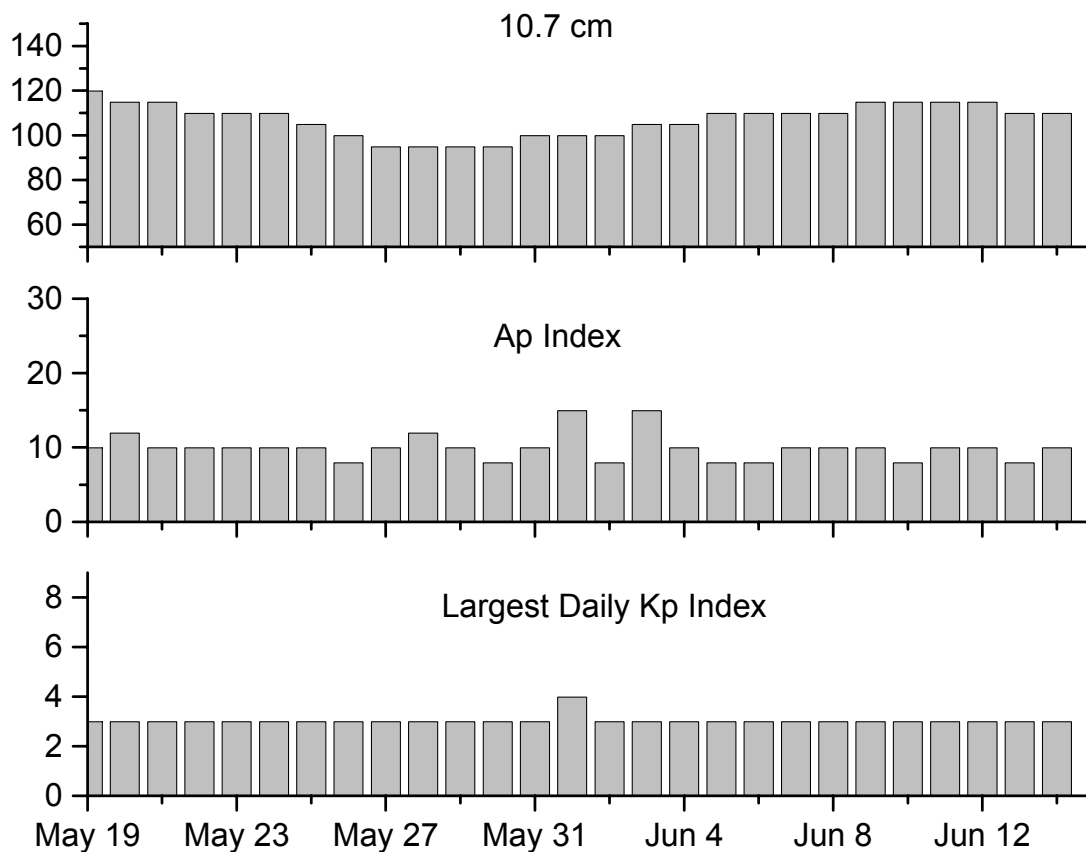


Alerts and Warnings Issued

<u>Date & Time of Issue</u>	<u>Type of Alert or Warning</u>	<u>Date & Time of Event UT</u>
10 May 0006	1 - 245 MHz Radio Burst	09 May
10 May 816	ALERT: Electron 2MeV Integral Flux > 1000pfu	10 May 0645
11 May 1755	ALERT: Electron 2MeV Integral Flux > 1000pfu	11 May 1735
12 May 0302	ALERT: Geomagnetic K=4	12 May 0257
12 May 0406	ALERT: Geomagnetic K= 4	12 May 0402
13 May 0658	ALERT: Geomagnetic K= 4	13 May 0657
13 May 0752	ALERT: Geomagnetic K= 5	13 May 0752
13 May 1719	ALERT: Geomagnetic K= 4	13 May 1718
14 May 2256	WARNING: Geomagnetic K= 4	14 May 2300 – 15 May 1500
15 May 0018	2 - 245 MHz Radio Bursts	14 May
15 May 0141	ALERT: Geomagnetic K= 4	15 May 0138
16 May 0005	2 - 245 MHz Radio Bursts	15 May
16 May 0005	1 – 245 MHz Radio Noise Storm	15 May



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
19 May	120	10	3	02 Jun	100	8	3
20	115	12	3	03	105	15	3
21	115	10	3	04	105	10	3
22	110	10	3	05	110	8	3
23	110	10	3	06	110	8	3
24	110	10	3	07	110	10	3
25	105	10	3	08	110	10	3
26	100	8	3	09	115	10	3
27	95	10	3	10	115	8	3
28	95	12	3	11	115	10	3
29	95	10	3	12	115	10	3
30	95	8	3	13	110	8	3
31	100	10	3	14	110	10	3
01 Jun	100	15	4				



Energetic Events

Date	Time		X-ray	Optical Information			Peak		Sweep Freq	
	Begin	Max	Integ	Imp/	Location	Rgn	Radio Flux		Intensity	
			Class	Flux	Brtns	Lat CMD	#	245	2695	II

No Events Observed

Flare List

Date	Time			X-ray Class.	Imp / Brtns	Optical		Rgn
	Begin	Max	End			Location	Lat CMD	
10 May	0348	0355	0404	B1.9				604
	0744	0747	0749	B1.1				
	0918	0926	0931	B4.4				606
	1459	1507	1517	B2.6				606
	1630	1635	1643	B2.2				604
11 May	0743	0747	0752	B1.0				
12 May	0314	0327	0332	B1.2				608
	0842	0852	0912	B2.3				609
	1249	1309	1336	B2.2				606
	1542	1543	1549	C1.3	Sf	S01E40		609
	2310	2315	2320	B4.0				609
13 May	0038	0046	0104	B4.1				
	0337	0341	0345	B4.5				609
	0741	0743	0800	C1.7	Sf	S03E33		609
	0930	0940	0952	C1.3				609
	1328	1330	1412	C7.7	Sf	S02E30		609
14 May	0737	0743	0807	B7.0				
	1118	1123	1138	B3.3				609
	1322	1326	1329	B3.1				609
	1426	1430	1436	B2.9				609
	2115	2119	2124	B4.9				
15 May	0002	0025	0035	B3.9				
	0244	0249	0253	B5.2				609
	0333	0336	0340	B3.3				609
	1000	1004	1008	B3.4				609
	1434	1446	1453	C2.2				609
	1534	1551	1604	B3.2				609
	1603	1622	1628	B4.4				609
	2059	2112	2125	B9.4				609
16 May	0025	0030	0035	B3.8				
	1116	1121	1126	B5.4				
	1536	1541	1548	B5.2				607
	1802	1808	1834	B4.5				614



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

Region 604

03 May	S19E52	278	0030	01	Hsx	001	A										
04 May	S19E38	279	0050	03	Cso	005	B										
05 May	S19E23	280	0040	02	Cso	003	B										
06 May	S19E10	279	0030	03	Dso	002	B										
07 May	S18W02	278	0010	02	Bxo	002	B										
08 May	S18W15	278	0010	01	Axx	001	A										
09 May	S18W28	278															
10 May	S18W41	278															

0 0 0 0 0 0 0 0

Crossed West Limb.

Absolute heliographic longitude:278

Region 605

04 May	S12W02	319	0040	05	Cso	006	B										
05 May	S12W16	319	0100	08	Dao	012	B										
06 May	S11W30	319	0070	08	Dso	008	B										
07 May	S12W45	321	0050	02	Hsx	001	A	1			1						
08 May	S12W58	321	0060	06	Cso	005	B										
09 May	S11W70	320	0070	05	Dso	006	B										
10 May	S11W84	321	0060	02	Hsx	001	A										

1 0 0 1 0 0 0 0

Crossed West Limb.

Absolute heliographic longitude:319

Region 606

07 May	S09E81	195	0120	02	Hsx	001	A										
08 May	S09E66	197	0220	05	Hax	001	A										
09 May	S08E53	197	0160	02	Hsx	002	A										
10 May	S09E40	197	0140	03	Hkx	003	B										
11 May	S10E27	196	0230	04	Hkx	006	A										
12 May	S10E13	197	0190	05	Hax	006	A										
13 May	S09E01	196	0220	08	Cko	014	B										
14 May	S10W13	197	0220	07	Cko	009	B										
15 May	S09W26	197	0130	05	Cao	008	B										
16 May	S08W39	196	0070	06	Dao	004	B										

0 0 0 0 0 0 0 0

Still on Disk.

Absolute heliographic longitude:196



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

Region 607

09 May	S11E00	250	0010	02	Bxo	003	B											
10 May	S11W13	250																
									0	0	0	0	0	0	0	0	0	0

Still on Disk.

Absolute heliographic longitude:250

Region 608

09 May	S04E68	182	0040	08	Cso	006	B											
10 May	S04E52	185	0060	08	Dso	010	B											
11 May	S05E38	185	0050	08	Dao	005	B											
12 May	S04E27	183	0030	09	Cao	004	B											
13 May	S06E16	181	0020	02	Cro	003	B											
14 May	S06E03	181	0010	02	Bxo	002	B											
15 May	S06W13	184	0010	01	Bxo	002	B											
16 May	S04W26	183	0010	02	Axx	002	A											
									0	0	0	0	0	0	0	0	0	0

Still on Disk.

Absolute heliographic longitude:181

Region 609

10 May	S03E63	174	0000	01	Axx	001	A											
11 May	S04E48	175	0020	03	Bxo	005	B											
12 May	S04E41	169	0040	05	Dro	015	B	1			1							
13 May	S03E24	173	0160	07	Dac	022	B	3			2							
14 May	S04E10	174	0230	09	Dac	028	B											
15 May	S03W05	176	0500	08	Dkc	039	Bg	1										
16 May	S03W19	176	0410	08	Dkc	035	Bg											
								5	0	0	3	0	0	0	0	0	0	0

Still on Disk.

Absolute heliographic longitude:176

Region 610

12 May	S02E19	191	0020	02	Bxo	006	B											
13 May	S01E04	193	0010	01	Axx	001	A											
14 May	S01W11	193																
15 May	S01W24	193																
16 May	S01W37	193																
									0	0	0	0	0	0	0	0	0	0

Still on Disk.

Absolute heliographic longitude:193



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 611</i>																	
12 May	S12W14	224	0020	01	Cso	002	B										
13 May	S12W27	224															
14 May	S12W40	224															
15 May	S12W53	224															
16 May	S12W66	224															
								0	0	0	0	0	0	0	0	0	0
Still on Disk.																	
Absolute heliographic longitude:224																	
<i>Region 612</i>																	
13 May	N10E07	190	0010	03	Bxo	005	B										
14 May	N10W08	192	0040	05	Dao	008	B										
15 May	N10W21	192	0100	06	Dao	017	B										
16 May	N11W34	191	0150	07	Dai	016	B										
								0	0	0	0	0	0	0	0	0	0
Still on Disk.																	
Absolute heliographic longitude:190																	
<i>Region 613</i>																	
13 May	S08E83	114	0030	05	Hsx	002	A										
14 May	S08E64	120	0050	03	Hsx	001	A										
15 May	S08E52	119	0080	02	Hsx	001	A										
16 May	S08E38	119	0080	02	Hsx	002	A										
								0	0	0	0	0	0	0	0	0	0
Still on Disk.																	
Absolute heliographic longitude:119																	
<i>Region 614</i>																	
16 May	S05W76	233	0070	05	Cao	006	B										
								0	0	0	0	0	0	0	0	0	0
Still on Disk.																	
Absolute heliographic longitude:233																	
<i>Region 615</i>																	
16 May	N17E64	093	0060	02	Hsx	002	A										
								0	0	0	0	0	0	0	0	0	0
Still on Disk.																	
Absolute heliographic longitude:093																	
<i>Region 616</i>																	
16 May	N08E71	086	0000	01	Axx	001	A										
								0	0	0	0	0	0	0	0	0	0
Still on Disk.																	
Absolute heliographic longitude:086																	

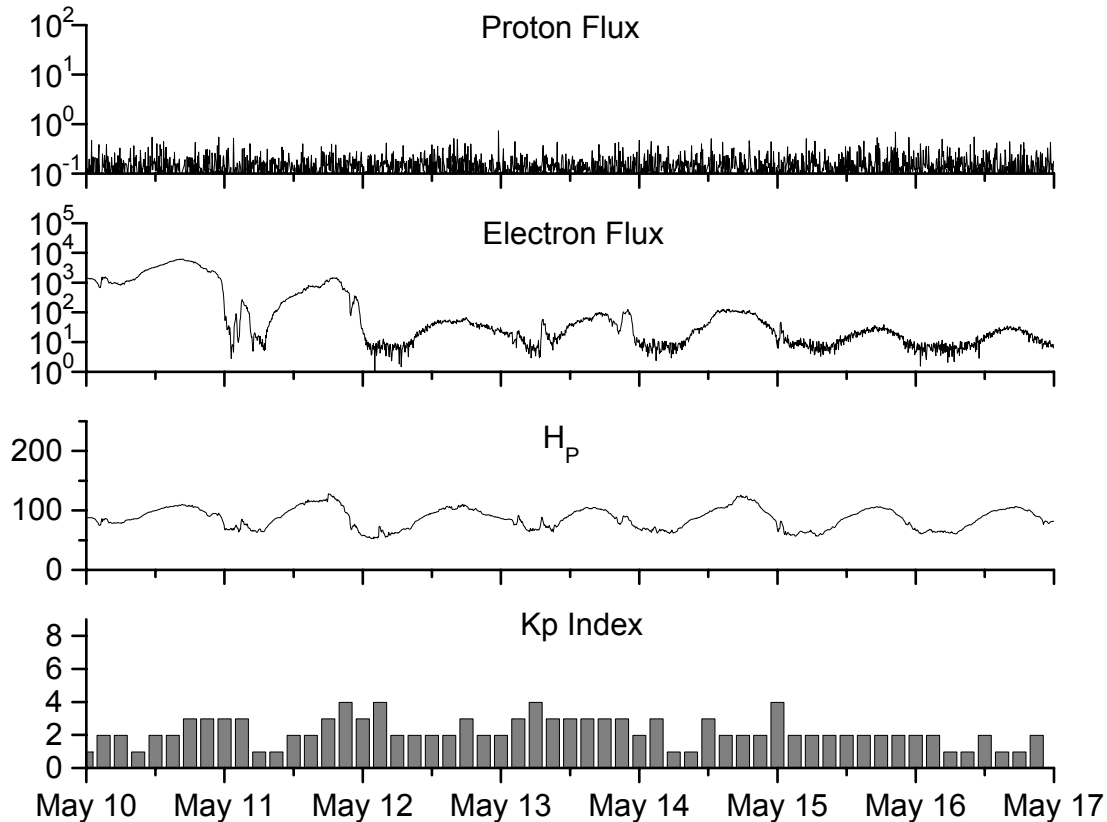


**Recent Solar Indices (preliminary)
of the observed monthly mean values**

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
2002									
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
2003									
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	128.1	74.2	132.2	139.5	21	19.4
April	119.7	60.0	0.50	121.5	70.3	126.3	136.3	20	20.0
May	89.6	55.2	0.62	118.3	67.8	129.3	135.0	26	21.0
June	118.4	77.4	0.65	113.6	65.2	129.4	132.6	24	21.8
July	132.8	85.0	0.64	106.9	62.0	127.8	129.5	20	22.3
August	114.3	72.7	0.64	102.8	60.3	122.1	127.5	23	22.4
September	82.6	48.8	0.59	100.7	59.8	112.3	126.0	19	21.9
October	118.9	65.6	0.55	96.6	58.4	153.1	124.1	32	21.1
November	118.9	67.2	0.57			153.1		31	
December	75.4	47.0	0.62			115.1		18	
2004									
January	62.3	37.2	0.60			114.1		20	
February	75.6	46.0	0.61			107.0		13	
March	81.0	48.9	0.60			112.2		12	
April	59.3	39.3	0.66			101.3		10	

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 10 May 2004

Protons plot contains the five-minute averaged integral proton flux (protons/cm²-sec -sr) as measured by GOES-11 (W98) for each of three energy thresholds: greater than 10, 50, and 100 MeV.

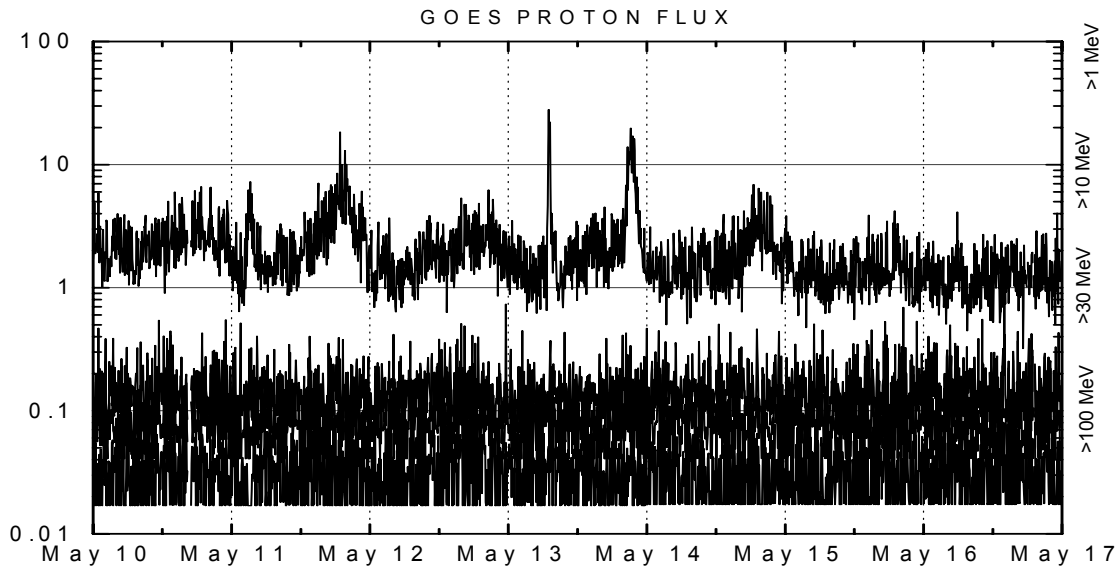
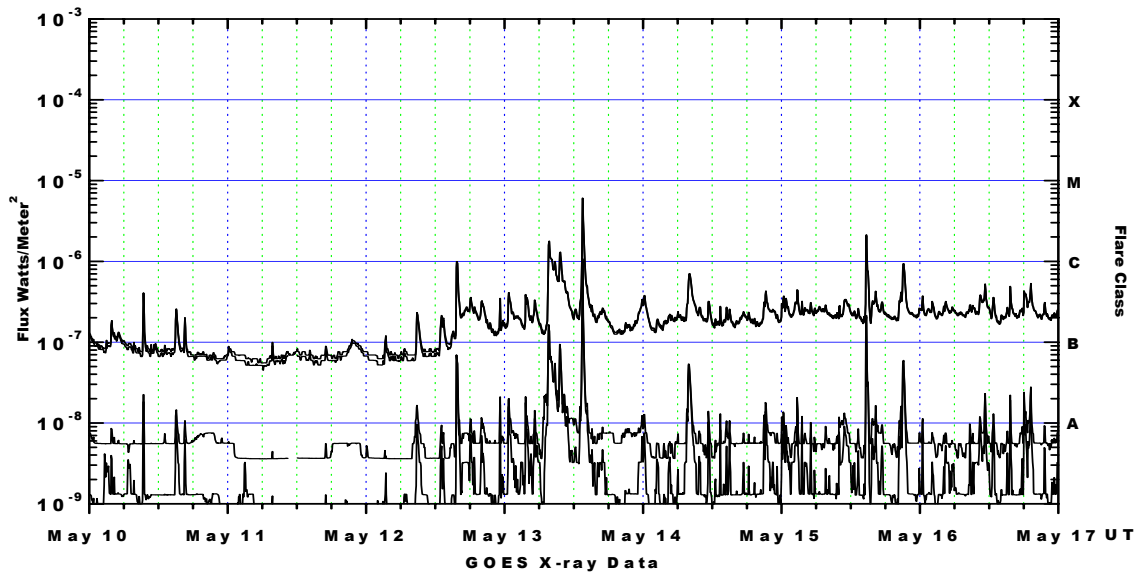
Electrons plot contains the five-minute averaged integral electron flux (electrons/cm²-sec -sr) with energies greater than 2 MeV at GOES-12 (W75).

H_p 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_p 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_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 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 12 (W75) and GOES 10 (W135) 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-11 (W98) 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.

