

Space Weather Highlights 16 - 22 May 2005

SWO PRF 1551
24 May 2005

Solar activity ranged from very low to moderate. The majority of the period's activity occurred from Region 763 (S16, L=016, class/area, Eai/190 on 15 May), which produced 11 C-class and 3 M-class flares. The most significant of these M-class flares was observed early on the 17th at 0239 UTC when the region produced an M1.8/1b flare with Type II and Type IV radio sweeps and a weak 100 sfu Tenflare. Associated with this flare was a faint, full halo CME seen in LASCO imagery with a rough plane-of-sky measurement of 300 km/s. Earlier in the summary period, beginning at 16/1350 UTC, LASCO imagery showed what appeared to be a partial halo CME. This event was actually two separate events. The first was a filament eruption near Region 759 (N14, L=052, class/area, Ehi/540 on 09 May), which at the time, was located near N11W35 at 16/1243 UTC. The second was a backside event at about 16/1358 UTC. Most of the frontside ejecta was directed northward so was not expected to be a significant geoeffective event. Following the last M-class flare on 17 May, Region 763 decayed significantly, and posed little threat for significant activity. The remainder of the disk and limb were quiet and stable.

Solar wind data were available from the NASA Advanced Composition Explorer (ACE) spacecraft during most of the summary period. Solar wind speed ranged from a high of 775 km/s early on 16 May to a low of 385 km/s late on 21 May. The period began with solar wind speed elevated near 775 km/s and the IMF Bz south at -12 nT as effects from the large, full halo CME from the 13 May M8.0 flare were still present. These conditions persisted through 16 May. By the 17th, effects from the CME waned and as a result, the IMF Bz relaxed and became mostly neutral, while solar wind speed decayed to near 400 to 450 km/s. Early on 20 May, a small disturbance was seen at ACE; wind speed increased from about 450 to 480 km/s and the IMF Bz turned southward to about -10 nT. These conditions persisted through early on 21 May. This disturbance was probably due to one of the weak/slow CMEs of 16 and 17 May. The period ended with the IMF Bz not varying much beyond +/- 3 nT and wind speed near 385 km/s.

No greater than 10 MeV proton events were observed this period.

The greater than 2 MeV electron flux at geosynchronous orbit was at high levels on 16, 17, 20, and 22 May and very high on 18 - 19 May.

The geomagnetic field ranged from quiet to severe storm levels. The period began with active to minor storming at middle latitudes, while active to severe storming at the higher latitudes were observed as effects from the interplanetary shock and CME continued. These conditions persisted through about 16/1800 UTC. Thereafter, through early on 20 May, activity levels decayed to quiet to active levels at middle latitudes with some periods of major storming observed at the higher latitudes. By early on the 20th, activity levels increased to minor to major storming as effects from one of the weak/slow CMEs of 16 and 17 May became geoeffective. By 20/1200 UTC, activity levels decreased to quiet to active at the middle latitudes and quiet to minor storming at the higher latitudes. These conditions persisted through the remainder of the summary period.

Space Weather Outlook 25 May - 20 June 2005

Solar activity is expected to be at mostly very low to low levels. Isolated M-class activity is possible after 28 May upon the return of old Regions 758 (S10, L=136) on 28 May, 759 (N12, L=055) on 03 June, and 763 (S16, L=016) on 06 June. All three regions were M-class producers on their previous transits.

A greater than 10 MeV proton event is not expected.

The greater than 2 MeV electron flux at geosynchronous orbit is expected to be at high levels on 28 May - 02 June and 07 - 19 June.

The geomagnetic field is expected to range from quiet to minor storming. Recurrent coronal hole high speed wind streams are expected to produce active to minor storm levels on 27 - 28 May and 11 - 14 June. Otherwise, expect quiet to unsettled conditions.



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
16 May	99	70	520	B2.7	7	2	0	11	1	0	0	0
17 May	90	45	360	B1.4	3	1	0	2	2	0	0	0
18 May	84	46	400	A8.8	2	0	0	1	0	0	0	0
19 May	85	34	310	A6.9	0	0	0	0	0	0	0	0
20 May	84	22	170	A8.4	0	0	0	0	0	0	0	0
21 May	82	37	130	A9.4	0	0	0	0	0	0	0	0
22 May	82	42	200	A6.9	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
16 May	2.9E+7	1.7E+5	2.3E+3		2.2E+8	
17 May	1.2E+7	4.2E+4	2.2E+3		1.8E+9	
18 May	2.5E+6	1.8E+4	2.3E+3		2.7E+9	
19 May	2.0E+6	1.4E+4	3.6E+3		3.0E+9	
20 May	1.1E+6	1.4E+4	3.2E+3		1.0E+8	
21 May	6.0E+5	1.4E+4	3.5E+3		6.2E+6	
22 May	4.4E+5	1.4E+4	3.8E+3		3.2E+7	

Daily Geomagnetic Data

Date	Middle Latitude Fredericksburg		High Latitude College		Estimated Planetary	
	A	K-indices	A	K-indices	A	K-indices
	16 May	18	4-4-5-3-2-2-1-2	78	4-7-7-6-6-7-2-2	33
17 May	10	3-3-3-2-2-2-2-2	43	3-6-5-6-5-5-2-3	19	4-4-4-3-3-3-2-3
18 May	6	2-2-2-2-2-1-1-1	36	2-3-5-4-6-5-3-5	13	3-3-4-3-4-3-2-2
19 May	7	1-2-3-1-1-1-2-3	17	1-3-4-5-4-2-1-2	11	2-3-3-2-2-2-3-3
20 May	17	2-5-4-3-3-2-2-2	29	3-5-6-3-5-3-2-2	30	3-6-6-4-4-3-2-3
21 May	13	3-3-3-3-2-2-3-3	33	2-5-5-5-5-5-2-2	21	3-4-4-4-3-3-3-3
22 May	10	4-2-2-3-2-1-2-2	19	3-4-4-4-5-1-1-1	14	4-2-3-4-3-2-3-2

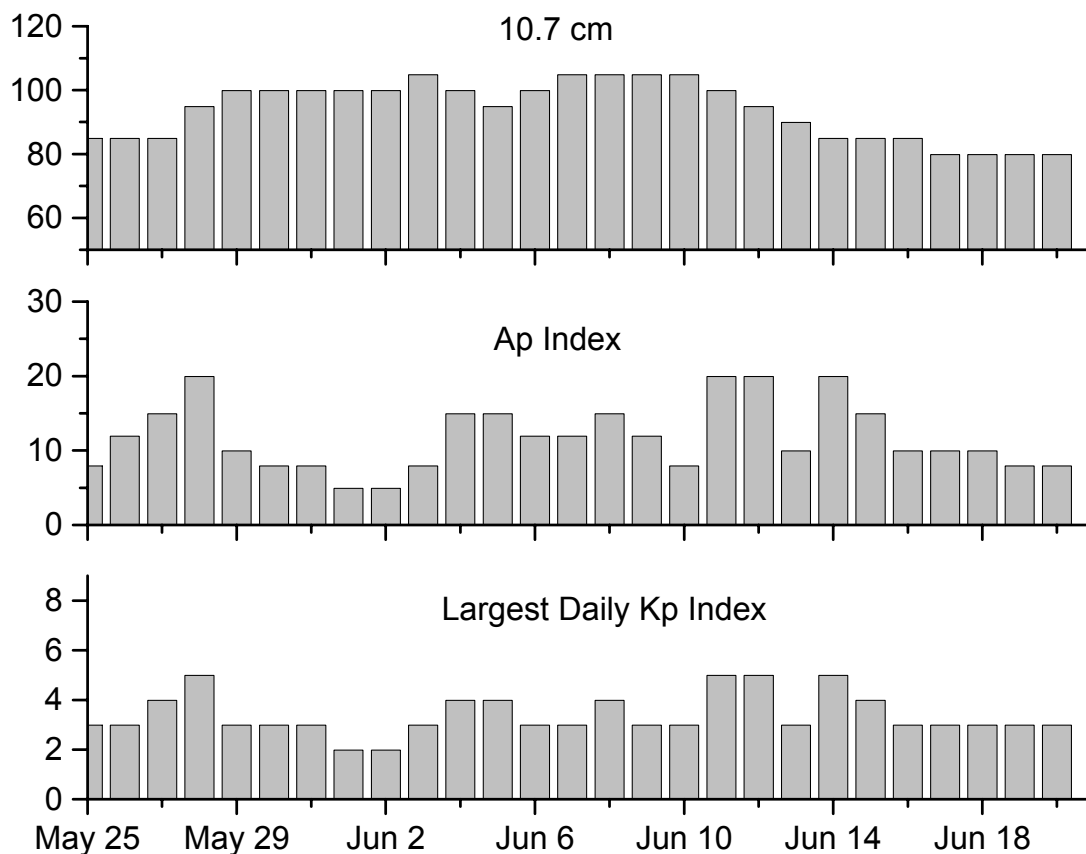


Alerts and Warnings Issued

<u>Date & Time of Issue</u>	<u>Type of Alert or Warning</u>	<u>Date & Time of Event UTC</u>
16 May 0108	5 – 245 MHz Radio Bursts	15 May
16 May 0008	ALERT: Type II Radio Emission	15 May 2235
16 May 0036	SUMMARY: Proton Event 10MeV Integral Flux > 10pfu	14 May 0525
16 May 0126	WARNING: Geomagnetic K= 6	16 May 0130 - 0600
16 May 0536	EXTENDED WARNING: Geomagnetic K= 6	16 May 0130 -1500
16 May 0539	ALERT: Geomagnetic K= 6	16 May 0537
16 May 1126	ALERT: Electron 2MeV Integral Flux > 1000pfu	16 May 1110
16 May 1724	WARNING: Geomagnetic K= 4	16 May 1724 -2359
16 May 1726	ALERT: Geomagnetic K= 4	16 May 1725
16 May 2332	EXTENDED WARNING: Geomagnetic K= 4	16 May 1724 –17 May 1500
17 May 0008	4 – 245 MHz Radio Bursts	16 May
17 May 0008	1 – 245 Radio Noise Storm	16 May
17 May 0249	ALERT: Type II Radio Emission	17 May 0236
17 May 0318	SUMMARY: 10cm Radio Burst	17 May 0242
17 May 0322	ALERT: Type IV Radio Emission	17 May 0255
17 May 0601	ALERT: Electron 2MeV Integral Flux > 1000pfu	17 May 0535
17 May 1455	EXTENDED WARNING: Geomagnetic K= 4	16 May 1724 - 17 May 2359
18 May 0515	ALERT: Electron 2MeV Integral Flux > 1000pfu	18 May 0500
18 May 0858	ALERT: Geomagnetic K= 4	18 May 0856
18 May 0937	WARNING: Geomagnetic K= 4	18 May 0940 -1500
18 May 1455	EXTENDED WARNING: Geomagnetic K= 4	18 May 0940 - 2359
19 May 0514	ALERT: Electron 2MeV Integral Flux > 1000pfu	19 May 0500
20 May 0413	WARNING: Geomagnetic K= 4	20 May 0413 - 1600
20 May 0415	ALERT: Geomagnetic K= 4	20 May 0413
20 May 0444	WARNING: Geomagnetic K= 5	20 May 0445 - 1600
20 May 0448	ALERT: Geomagnetic K= 5	20 May 0447
20 May 0520	ALERT: Electron 2MeV Integral Flux > 1000pfu	20 May 0500
21 May 0359	ALERT: Geomagnetic K= 4	21 May 0357
21 May 0742	ALERT: Geomagnetic K= 4	21 May 0742
21 May 1102	WARNING: Geomagnetic K= 4	21 May 1100 - 1600
21 May 1109	ALERT: Geomagnetic K= 4	21 May 1109
22 May 0147	ALERT: Geomagnetic K= 4	22 May 0147
22 May 0151	WARNING: Geomagnetic K= 5	22 May 0150 - 1600
22 May 0153	ALERT: Geomagnetic K= 5	22 May 0151
22 May 1426	ALERT: Electron 2MeV Integral Flux > 1000pfu	22 May 1405



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
25 May	85	8	3	08 Jun	105	15	4
26	85	12	3	09	105	12	3
27	85	15	4	10	105	8	3
28	95	20	5	11	100	20	5
29	100	10	3	12	95	20	5
30	100	8	3	13	90	10	3
31	100	8	3	14	85	20	5
01 Jun	100	5	2	15	85	15	4
02	100	5	2	16	85	10	3
03	105	8	3	17	80	10	3
04	100	15	4	18	80	10	3
05	95	15	4	19	80	8	3
06	100	12	3	20	80	8	3
07	105	12	3				



Energetic Events

Date	Time		X-ray		Optical Information			Peak		Sweep Freq		
	Begin	Max	Max	Class	Flux	Imp/	Location	Rgn	Radio Flux		Intensity	
						Brtns	Lat CMD		245	2695	II	IV
16 May	0233	0243	0250	M1.4	.008	1b	S17E17	763	100	61		
16 May	0856	0908	0915	M1.6	.009	Sf	S17E15	763	56	29		
17 May	0231	0239	0252	M1.8	.015	1b	S16W01	763	66	100	2	1

Flare List

Date	Time			Optical	Imp / Brtns	Location	Rgn
	Begin	Max	End	X-ray Class.		Lat CMD	
16 May	0021	0022	0033		Sf	S16E20	763
	0119	0128	0159	B8.1	Sf	N16W18	759
	0234	0240	0321	M1.4	1b	S17E17	763
	0334	0336	0402	C2.9	Sf	S16E10	763
	0437	0438	0444		Sf	S16E10	763
	0905	0908	0919	M1.6	Sf	S17E15	763
	0957	1000	1004	C1.3			763
	1256	1256	1323	C1.2	Sf	N13W29	759
	1554	1606	1628	C1.8			763
	1600	1605	1624		Sf	S15E04	763
	1642	1645	1706	C2.0	Sf	S16E09	763
	1939	1943	2009	C5.5	Sn	S15E06	763
	2037	2042	2046	C1.1			763
	2103	2103	2110		Sf	S17E02	763
	2357	0002	0041	B7.3	Sf	S16E06	763
17 May	0021	0028	0031	B5.5			763
	0134	0138	0140	B5.6			763
	0235	0236	0324	M1.8	1b	S16W01	763
	0401	0403	0425	C8.4	1n	S16E03	763
	0549	0553	0558	C2.8	Sf	S16W04	763
	0956	1002	1005	B6.1			763
	1514	1525	1541	B3.3			763
	1644	1648	1650	B2.2			759
18 May	2213	2232	2237	B2.6			762
	2332	2351	0011	C1.1	Sf	S16W14	763
	0112	0116	0118	B1.8			763
	0320	0326	0331	B2.0			763
	0438	0440	0451	B6.1	Sf	S16W16	763
	0616	0622	0627	B2.7			763
	0822	0828	0832	C1.6			763
	1018	1022	1025	B1.8			763
	1434	1449	1457	C2.0			763
	1831	1841	1846	B1.7			761
1924	1928	1933	B1.2			763	
1959	2008	2013	B3.8			763	
2236	2240	2244	B1.7			763	

Flare List – continued.



Date	Time			Optical X-ray Class.	Imp / Brtns	Location Lat CMD	Rgn
	Begin	Max	End				
19 May	0546	0556	0608	B1.3			
	1358	1402	1408	B1.1			
	2131	2134	2137	B1.2			
20 May	0424	0430	0434	B2.4			763
	0503	0515	0523	B2.7			
	1059	1103	1107	B1.8			765
	1816	1829	1852	B4.5			765
	2135	2151	2227	B9.5			759
21 May	No Flares Observed						
22 May	1033	1038	1050	B1.5			767

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 759</i>																		
08 May	N12E71	055	0340	08	Dko	008	B											
09 May	N14E60	052	0540	11	Ehi	007	B	3				2						
10 May	N12E50	049	0390	11	Eki	009	Bg	2				1	1					
11 May	N12E33	053	0450	13	Eki	012	B	1				1		1				
12 May	N12E19	054	0300	11	Ehi	010	B	6	2			5	1	2				
13 May	N12E06	054	0310	09	Dhi	019	B	2	1			3		1				
14 May	N11W07	053	0350	09	Dhi	022	B											
15 May	N11W20	053	0290	09	Dho	014	B											
16 May	N11W35	055	0300	08	Dho	011	B	1				2						
17 May	N11W50	057	0220	08	Hkx	001	B					1						
18 May	N12W62	056	0280	12	Cho	009	B											
19 May	N12W75	056	0270	03	Hhx	001	A											
20 May	N12W88	055	0150	02	Hax	001	A											
								15	3	0	15	2	4	0	0	0		

Crossed West Limb.

Absolute heliographic longitude: 054



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 762

10 May	S08E18	081	0040	08	Dro	007	B											
11 May	S11E04	082	0080	08	Dai	012	B	1					1					
12 May	S12W12	084	0130	09	Dao	011	B											
13 May	S12W24	084	0150	08	Dso	013	B											
14 May	S12W37	083	0090	08	Dao	013	B											
15 May	S13W53	086	0060	06	Dao	006	B											
16 May	S12W68	088	0030	01	Hsx	001	A											
17 May	S12W81	088																
1 0 0 0 1 0 0 0																		

Crossed West Limb.

Absolute heliographic longitude: 082

Region 763

11 May	S14E70	016	0110	05	Dao	004	B											
12 May	S14E57	016	0150	09	Dao	008	B	1					1					
13 May	S15E45	015	0200	10	Dao	014	B											
14 May	S16E31	015	0130	10	Dao	013	B						2					
15 May	S15E16	017	0140	09	Dai	019	B	5	1				1	1				
16 May	S16E04	016	0190	12	Eai	028	Bg	6	2				9	1				
17 May	S14W10	017	0140	11	Eai	024	Bg	3	1				2	2				
18 May	S16W24	018	0120	12	Eai	017	Bg	2					1					
19 May	S16W35	016	0010	03	Bxo	002	B											
20 May	S16W48	016																
21 May	S16W61	016																
22 May	S16W74	016																
17 4 0 16 4 0 0 0																		

Still on Disk.

Absolute heliographic longitude: 016

Region 765

19 May	N09E65	276	0030	01	Hsx	001	A											
20 May	N09E51	276	0020	01	Hsx	001	A											
21 May	N08E36	278	0010	01	Axx	001	A											
22 May	N08E23	278	0010	01	Axx	001	A											
0 0 0 0 0 0 0 0																		

Still on Disk.

Absolute heliographic longitude: 278

Region 766

21 May	N15E75	239	0060	02	Hax	005	A											
22 May	N15E62	239	0090	07	Dao	007	B											
0 0 0 0 0 0 0 0																		

Still on Disk.

Absolute heliographic longitude: 239



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 767

21 May	S07E80	234	0060	02	Hax	001	A											
22 May	S07E67	234	0100	07	Dso	004	B											
								0	0	0	0	0	0	0	0	0	0	0

Still on Disk.

Absolute heliographic longitude: 234

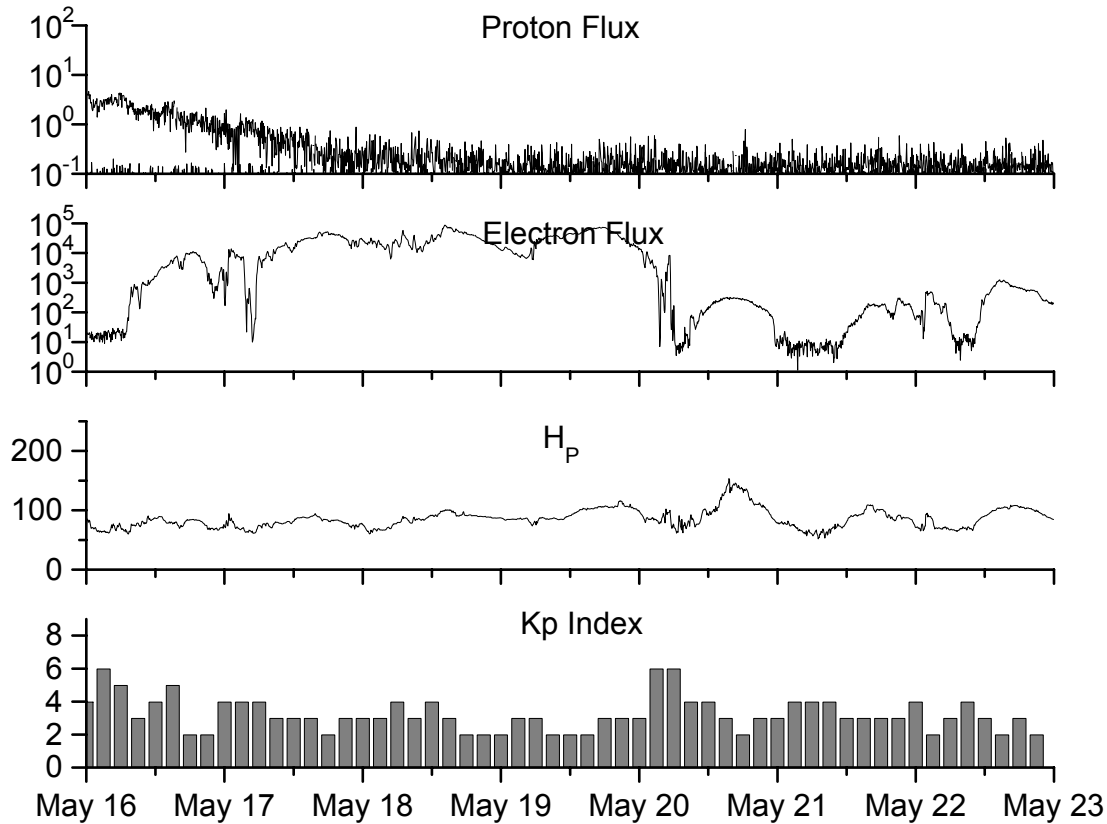


**Recent Solar Indices (preliminary)
of the observed monthly mean values**

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
2003									
May	89.6	55.2	0.62	118.3	67.8	129.3	133.1	26	21.0
June	118.4	77.4	0.65	113.6	65.2	129.4	130.2	24	21.5
July	132.8	85.0	0.64	106.9	62.0	127.8	127.2	19	22.0
August	114.3	72.7	0.64	102.8	60.3	122.1	125.2	23	22.2
September	82.6	48.8	0.59	100.7	59.8	112.3	123.7	18	21.8
October	118.9	65.5	0.55	96.6	58.4	153.1	121.8	35	21.1
November	118.9	67.3	0.57	93.6	57.0	153.1	120.1	28	20.0
December	75.4	46.5	0.62	91.4	55.0	115.1	118.0	16	18.6
2004									
January	62.3	37.7	0.61	87.9	52.0	114.1	116.3	22	18.1
February	75.6	45.8	0.61	84.2	49.4	107.0	115.5	13	17.7
March	81.0	49.1	0.61	80.9	47.2	112.2	114.6	14	16.9
April	59.3	39.3	0.66	77.9	45.6	101.2	112.3	11	15.5
May	77.3	41.5	0.54	74.1	43.9	99.8	109.2	8	14.3
June	78.9	43.2	0.55	70.4	41.7	97.4	107.2	8	14.0
July	87.8	51.0	0.58	68.3	40.2	118.5	105.9	23	13.8
August	69.5	40.9	0.59	66.6	39.3	110.1	105.0	11	13.8
September	50.0	27.7	0.55	63.7	37.6	103.1	103.7	10	13.6
October	77.9	48.4	0.62	61.3	35.9	105.7	102.1	9	13.5
November	70.5	43.7	0.62			113.2		26	
December	34.7	17.9	0.52			94.6		11	
2005									
January	52.0	31.3	0.60			102.4		22	
February	45.4	29.1	0.64			97.3		11	
March	41.0	24.8	0.60			90.0		12	
April	41.5	24.4	0.59			85.9		12	

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 16 May 2005*

Protons plot contains the five-minute averaged integral proton flux (protons/cm²-sec-sr) as measured by GOES-11 (W114) for each of three energy thresholds: greater than 10, 50, and 100 MeV.

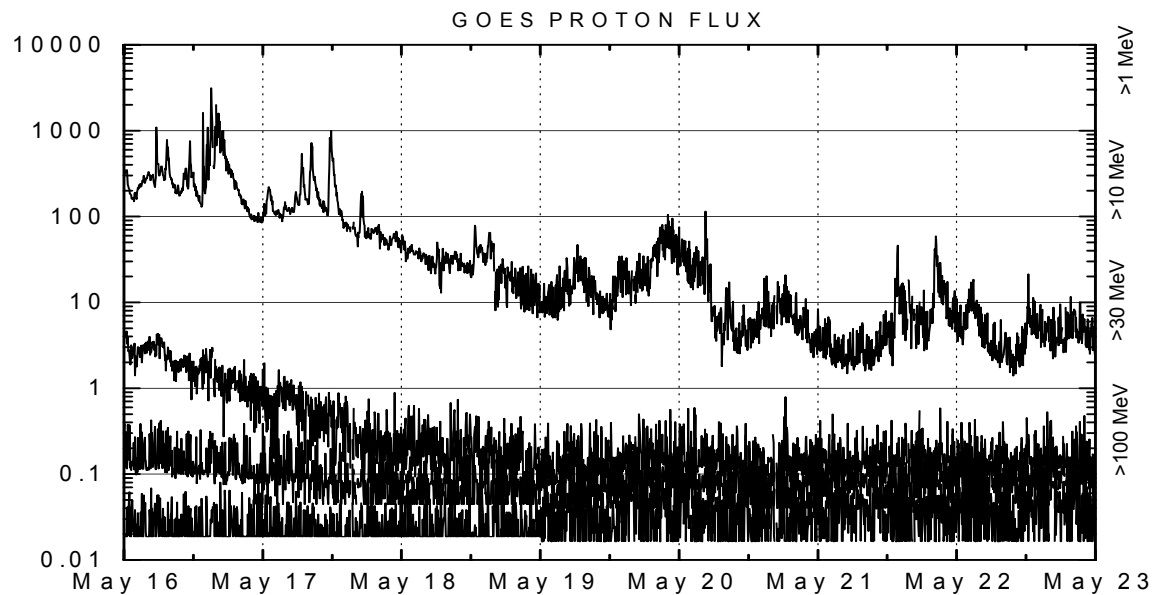
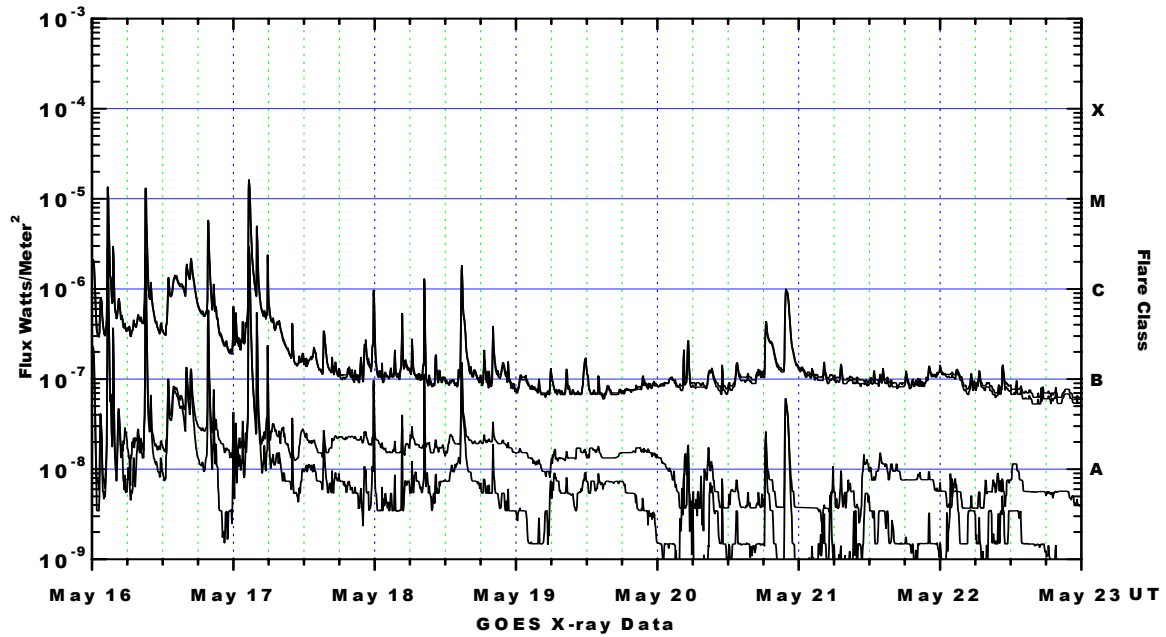
Electrons plot contains the five-minute averaged integral electron flux (electrons/cm²-sec-sr) with energies greater than 2 MeV at GOES-12 (W75).

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 Hartland, UK. These data are made available through cooperation from the Geological Survey of Canada (GSC), British Geological Survey (BGS) 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 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 (W114) 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.

