

Space Weather Highlights 22 – 28 November 2004

SWO PRF 1526
30 November 2004

Solar activity ranged from very low to low this period. Isolated minor C-class activity was observed on 22 and 23 November. The C-class flares on 23 November originated from behind the east limb signifying the return of old active Regions 693 (S17, L=074) and 698 (S09, L=062). The east limb regions rotated into view on 24 November and were numbered as Regions 706 (S07, L=069, class/area, Cso/150 on 28 November) and 707 (S16, L=074, class/area, Dai/170 on 27 November). Isolated C-class flares continued on the 24th including C8 and C9 flares with associated minor centimetric radio bursts from Region 706. Activity persisted at low levels on 25 November with just a single C-class flare observed near the northeast limb. This decline in activity levels continued through the remainder of the period with just isolated low C-class flares observed in Regions 706 and 707 on 27 November. Old Region 696 (N09, L=026) rotated back on to the visible disk on 26 November and was numbered as Region 708 (N10, L=032, class/area, Cso/140 on 28 November). This region produced major flare activity during its previous rotation on the visible disk, but its flare potential appears considerably diminished this time around.

Solar wind data were available from the NASA Advanced Composition Explorer (ACE) spacecraft during most of the summary period. The period began under the influence of a high speed coronal hole stream. Solar wind speed was near 600 km/s, but in decline. The interplanetary magnetic field (IMF) Bz component oscillated between +5 and -5 nT. The high speed stream gradually declined to about 400 km/s by late on the 23rd. Another weak high speed stream began late on 24 November. Solar wind speed increased to near 530 km/s and IMF underwent some periods of sustained southward Bz. Prolonged periods of southward Bz persisted through the remainder of the period. Yet another high speed stream began late on 28 November as a trans-equatorial coronal hole rotated into a geoeffective position.

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 every day this period except for 25 November.

The geomagnetic field ranged from quiet to active levels this period with occasional minor to major storm periods. The high speed stream on 22 November produced unsettled to active periods at all latitudes. Predominantly quiet to unsettled levels were observed on 23 and 24 November. Active periods were observed at all latitudes on 25 and 26 November in response to elevated solar wind speed and southward Bz. High latitude minor storm periods were observed on 27 November due to persistent southward Bz. A short-lived minor to major storm period was observed at all latitudes early on 28 November.

Space Weather Outlook 01 - 27 December 2004

Solar activity is expected to be predominantly very low to low; however, isolated moderate levels are possible. The four active regions currently on the visible disk do not appear to have potential for M-class activity. One or more regions expected to rotate around the east limb on 04 December may increase activity levels.

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 01-03 December, 07 – 11 December, and on 18-19 December.

The geomagnetic field is expected to range from mostly quiet to active levels with isolated minor storm periods. High speed coronal hole streams are expected to produce occasional storm periods on 01-02, 06-08, and 22-23 December.



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	
22 November	106	28	140	B2.7	1	0	0	0	0	0	0	0	0
23 November	107	45	190	B3.0	2	0	0	0	0	0	0	0	0
24 November	107	72	320	B2.6	3	0	0	2	0	0	0	0	0
25 November	109	61	310	B2.8	1	0	0	0	0	0	0	0	0
26 November	111	61	470	B2.5	0	0	0	0	0	0	0	0	0
27 November	110	64	420	B1.9	2	0	0	2	0	0	0	0	0
28 November	113	66	470	B2.1	0	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
	22 November	1.6E+6	1.5E+4	4.7E+3		7.9E+7
23 November	1.8E+6	1.6E+4	4.8E+3		1.4E+8	
24 November	1.6E+6	1.7E+4	4.9E+3		3.9E+7	
25 November	2.4E+6	1.7E+4	4.8E+3		2.1E+7	
26 November	9.7E+5	1.6E+4	5.0E+3		5.0E+7	
27 November	9.6E+5	1.5E+4	5.3E+3		3.7E+7	
28 November	1.5E+6	1.6E+4	5.4E+3		2.6E+7	

Daily Geomagnetic Data

Date	Middle Latitude Fredericksburg		High Latitude College		Estimated Planetary	
	A	K-indices	A	K-indices	A	K-indices
	22 November	6	1-3-3-1-1-1-1-1	9	1-3-3-4-1-1-2-0	10
23 November	4	2-1-0-1-1-2-1-2	5	1-1-2-0-0-3-1-2	5	2-1-1-1-1-2-1-2
24 November	7	2-2-1-3-2-2-2-2	14	2-2-1-5-4-1-1-1	6	2-1-1-3-2-2-1-2
25 November	19	4-4-3-3-3-4-2-3	33	5-5-4-5-5-4-2-2	20	4-5-3-4-4-3-2-2
26 November	16	3-4-4-4-2-2-2-3	19	2-2-5-5-3-3-2-2	13	3-3-4-3-2-2-2-3
27 November	10	2-2-3-2-3-3-2-2	28	2-1-5-5-5-5-3-1	10	1-2-3-2-3-3-3-2
28 November	16	3-3-5-2-2-2-3-3	23	2-3-6-3-4-4-2-2	14	3-3-5-2-2-3-2-2

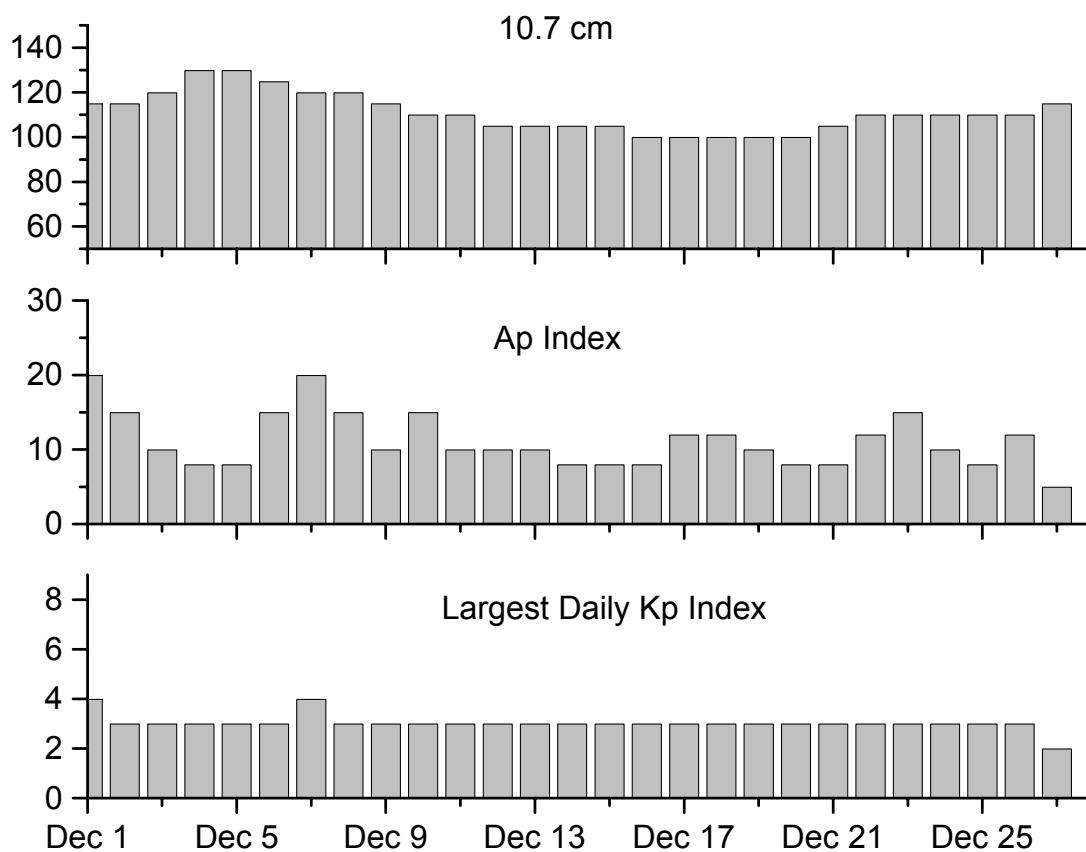


Alerts and Warnings Issued

<u>Date & Time of Issue</u>	<u>Type of Alert or Warning</u>	<u>Date & Time of Event UT</u>
22 Nov 1052	ALERT: Electron 2MeV Integral Flux > 1000pfu	22 Nov 1030
23 Nov 1122	ALERT: Electron 2MeV Integral Flux > 1000pfu	23 Nov 1100
24 Nov 1409	ALERT: Electron 2MeV Integral Flux > 1000pfu	24 Nov 1355
25 Nov 0230	WARNING: Geomagnetic K= 4	25 Nov 0230 - 1500
25 Nov 0233	ALERT: Geomagnetic K= 4	25 Nov 0233
25 Nov 1612	WARNING: Geomagnetic K= 4	25 Nov 1613 - 2359
25 Nov 1618	ALERT: Geomagnetic K= 4	25 Nov 1618
26 Nov 0420	ALERT: Geomagnetic K= 4	26 Nov 0418
26 Nov 0422	WARNING: Geomagnetic K= 4	26 Nov 0422 - 1500
26 Nov 1628	ALERT: Electron 2MeV Integral Flux > 1000pfu	26 Nov 1555
27 Nov 1503	ALERT: Electron 2MeV Integral Flux > 1000pfu	27 Nov 1440
28 Nov 0709	WARNING: Geomagnetic K= 4	28 Nov 0708 - 1500
28 Nov 0717	WARNING: Geomagnetic K= 5	28 Nov 0717 - 1500
28 Nov 0720	ALERT: Geomagnetic K= 5	28 Nov 0719
28 Nov 1436	ALERT: Electron 2MeV Integral Flux > 1000pfu	28 Nov 1415
28 Nov 2223	WARNING: Geomagnetic K=4	28 Nov 2230 - 29 Nov 0600



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
01 Dec	115	20	4	15 Dec	105	8	3
02	115	15	3	16	100	8	3
03	120	10	3	17	100	12	3
04	130	8	3	18	100	12	3
05	130	8	3	19	100	10	3
06	125	15	3	20	100	8	3
07	120	20	4	21	105	8	3
08	120	15	3	22	110	12	3
09	115	10	3	23	110	15	3
10	110	15	3	24	110	10	3
11	110	10	3	25	110	8	3
12	105	10	3	26	110	12	3
13	105	10	3	27	115	5	2
14	105	8	3				



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	
22 November	0307	0757	0840	C1.1				
	1149	1154	1158	B9.4				702
	1439	1454	1519	B6.3				702
	2030	2037	2103	B5.2				
	2208	2215	2227	B7.2				702
23 November	0844	0852	0856	C2.3				
	1502	1507	1514	C6.5				
	2117	2125	2127	B6.3				
24 November	0109	0114	0120	B4.4				
	0755	0757	0804	C5.9	Sf	S08E79		706
	1018	1021	1023	B5.8				707
	1718	1725	1729	C8.2				706
	2135	2143	2155	C9.8	Sf	S05E71		706
25 November	0005	0009	0012	B7.3				705
	0106	0113	0122	B9.8				704
	0137	0140	0142	B5.2				
	0535	0604	0625	B7.4				707
	1041	1101	1115	C2.6				
	1438	1443	1449	B5.3				704
	2307	2321	0031	B4.8				
26 November	0158	0202	0205	B3.8				706
	1700	1707	1713	B4.6				707
	2135	2143	2148	B4.9				706
27 November	0202	0204	0209	C2.0	Sf	S19E43		707
	0448	0452	0454	C1.5	Sf	S07E43		706
28 November	0854	0858	0907	B4.6				
	1020	1023	1027	B3.0				
	1045	1049	1053	B3.6				
	1119	1125	1131	B5.4				708
	1826	1857	1909	B4.3				



Region Summary

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

Region 701

11 Nov S16E70	241	0080	07	Cso	002	B												
12 Nov S17E60	238	0100	08	Cso	002	B												
13 Nov S17E45	240	0100	07	Cao	003	B												
14 Nov S15E30	242	0070	02	Hax	002	A												
15 Nov S15E17	242	0070	05	Cso	003	B												
16 Nov S15E04	242	0060	02	Hsx	001	A												
17 Nov S15W09	241	0050	02	Hsx	001	A												
18 Nov S15W22	241	0060	02	Hsx	001	A												
19 Nov S16W34	240	0050	02	Hsx	001	A												
20 Nov S16W48	241	0050	04	Hsx	002	A												
21 Nov S15W61	241	0030	02	Hsx	001	A												
22 Nov S17W74	241	0030	02	Hsx	001	A												
23 Nov S15W83	237	0030	02	Hsx	001	A												

0 0 0 0 0 0 0 0 0

Crossed West Limb.

Absolute heliographic longitude: 242

Region 702

17 Nov S10W27	259	0080	06	Dso	011	B													2
18 Nov S10W40	259	0050	08	Dso	010	B													
19 Nov S11W54	260	0060	10	Dso	006	B													
20 Nov S09W72	265	0020	02	Hrx	001	A													
21 Nov S09W85	265																		
22 Nov S09W98	265																		

0 0 0 2 0 0 0 0 0

Crossed West Limb.

Absolute heliographic longitude: 259



Region Summary – continued.

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

Region 703

18 Nov	N13E46	173	0010	01	Axx	001	A										
19 Nov	N12E34	172	0030	01	Axx	002	A										
20 Nov	N13E21	172															
21 Nov	N13E08	172															
22 Nov	N13W05	172															
23 Nov	N13W18	172															
24 Nov	N13W31	172	0010	06	Axx	004	A										
25 Nov	N13W44	172															
26 Nov	N13W57	172															
27 Nov	N13W70	172															
28 Nov	N13W83	172															

0 0 0 0 0 0 0 0

Still on Disk.

Absolute heliographic longitude:172

Region 704

18 Nov	N12E75	144	0050	01	Hax	001	A										
19 Nov	N13E62	144	0070	02	Hsx	001	A										
20 Nov	N12E51	142	0110	08	Dao	007	B										
21 Nov	N12E39	141	0090	09	Dso	006	B										
22 Nov	N13E25	142	0110	10	Dso	007	B										
23 Nov	N12E11	143	0090	09	Dso	006	B										
24 Nov	N13W04	145	0090	08	Dao	007	B										
25 Nov	N13W17	145	0070	06	Dao	006	B										
26 Nov	N12W30	145	0060	03	Cao	006	B										
27 Nov	N13W44	145	0030	03	Hax	003	A										
28 Nov	N13W54	142	0010	08	Bxo	003	B										

0 0 0 0 0 0 0 0

Still on Disk.

Absolute heliographic longitude:145

Region 705

23 Nov	S04W64	218	0070	06	Dao	008	B										
24 Nov	S04W80	221	0060	05	Cao	005	B										
25 Nov	S04W95	223	0060	07	Cao	003	B										

0 0 0 0 0 0 0 0

Crossed West Limb.

Absolute heliographic longitude:218



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 706

24 Nov	S08E71	070	0080	06	Dao	005	B	3		2							
25 Nov	S08E56	072	0070	07	Dao	006	B										
26 Nov	S07E44	071	0140	08	Dao	005	B										
27 Nov	S07E31	070	0120	06	Cao	006	B										
28 Nov	S07E19	069	0150	05	Cso	006	B										
								3	0	0	2	0	0	0	0	0	0

Still on Disk.

Absolute heliographic longitude: 069

Region 707

24 Nov	S16E68	073	0080	01	Hax	001	A										
25 Nov	S15E57	071	0110	06	Cao	006	B										
26 Nov	S16E42	073	0150	06	Dai	009	Bg										
27 Nov	S16E27	074	0170	07	Dai	014	Bg										
28 Nov	S15E14	074	0170	09	Cao	015	B										
								0	0	0	0	0	0	0	0	0	0

Still on Disk.

Absolute heliographic longitude: 074

Region 708

26 Nov	N08E81	034	0120	03	Hax	001	A										
27 Nov	N10E67	034	0100	02	Hsx	001	A										
28 Nov	N10E56	032	0140	03	Cso	002	B										
								0	0	0	0	0	0	0	0	0	0

Still on Disk.

Absolute heliographic longitude: 032

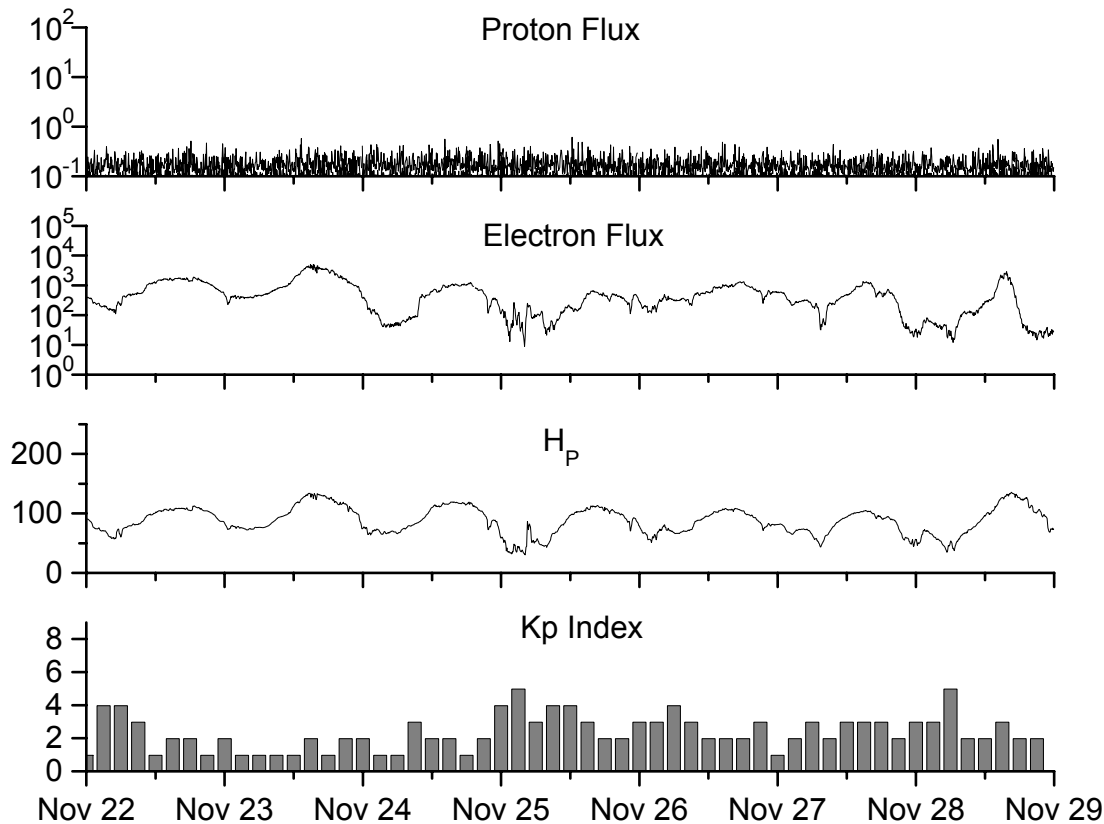


**Recent Solar Indices (preliminary)
of the observed monthly mean values**

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									
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	135.0	20	20.1
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			99.8		8	
June	78.9	43.2	0.55			97.4		8	
July	87.8	51.0	0.58			118.5		23	
August	69.5	40.9	0.59			110.1		11	
September	50.0	27.7	0.55			103.1		10	
October	77.9	48.4	0.62			167.0		9	

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 22 November 2004

Protons plot contains the five-minute averaged integral proton flux (protons/cm²-sec -sr) as measured by GOES-11 (W103) for each of three energy thresholds: greater than 10, 50, and 100 MeV.

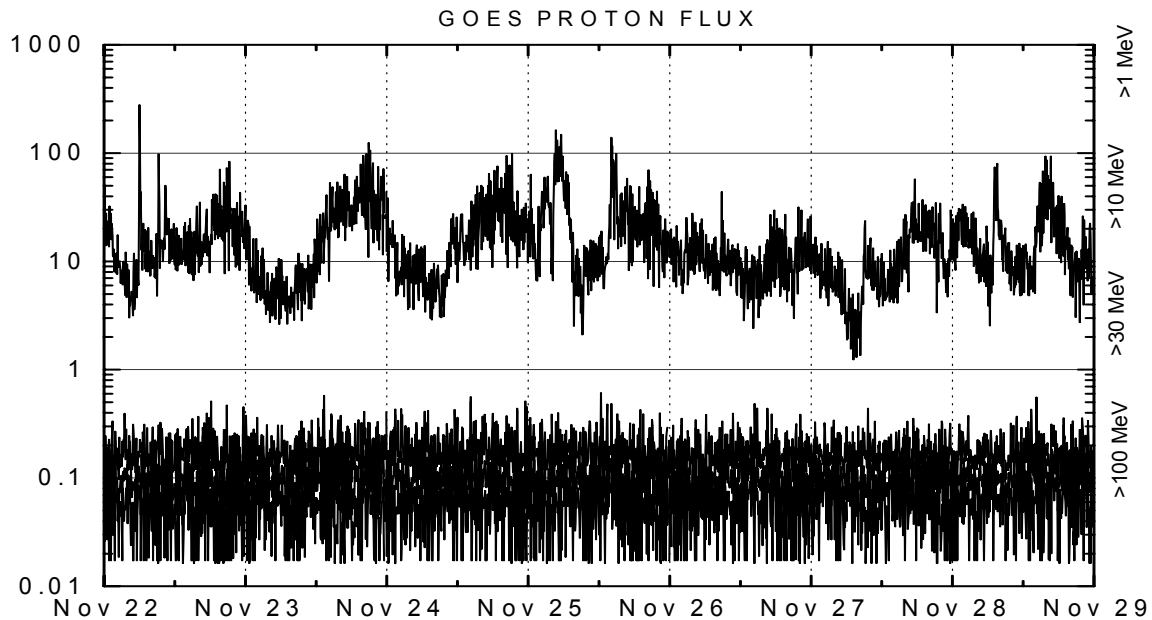
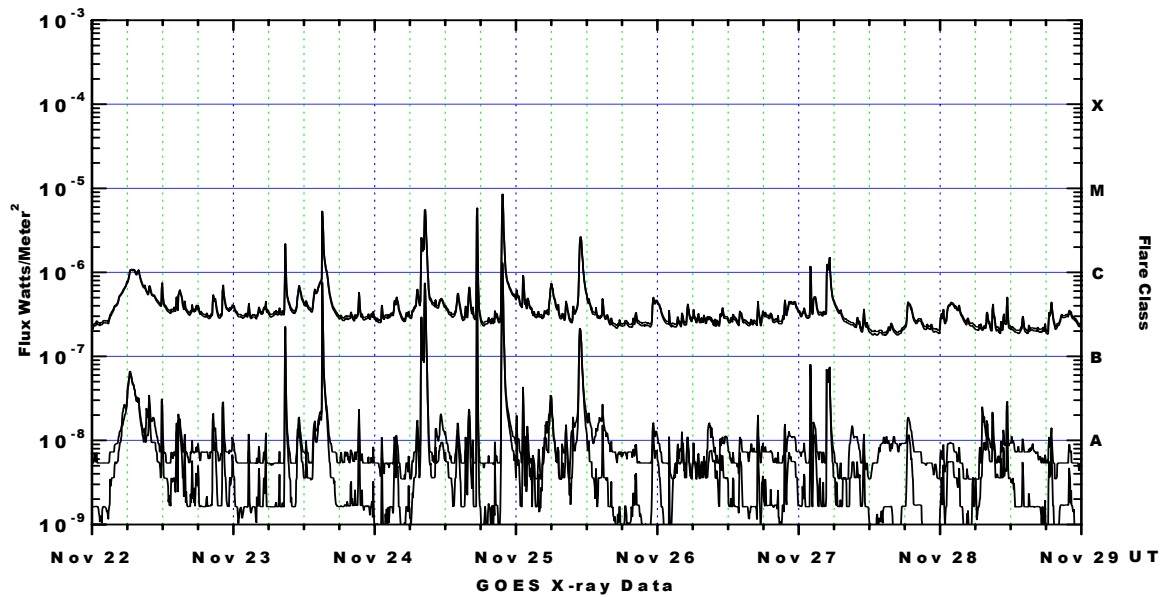
Electrons plot contains the five-minute averaged integral electron flux (electrons/cm²-sec -sr) with energies greater than 2 MeV at GOES-12 (W75).

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_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 (W103) 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.

