

Space Weather Highlights
15 - 21 November 1999

Solar activity was moderate during most of the period, but increased to high levels during 16 - 17 November. Activity increased to high levels on 16 November with five low-level M-class flares from four different regions (see the Energetic Event list for event times/sources). Activity remained high on 17 November by virtue of an M7/2B flare at 17/0957UT with associated Type II and IV radio sweeps and a 390 SFU Tenflare from Region 8766 (N18, L=213, class/area Eac/360 on 17 November). This region had been in a period of gradual decay when the M7/2B flare occurred, then stabilized on 18 November as a medium-sized, magnetically complex E-type spot group. Region 8765 (S12, L=234, class/area Ekc/1280 on 18 November) was the largest, most structurally complex region on the visible disk with multiple magnetic delta configurations observed within the group. It produced isolated M-class flares early in the period during a gradual growth phase. It also produced a couple M-class flares on 21 November as it entered a period of gradual decay, though it remained large and magnetically complex. Region 8771 (S15, L=174, class/area Eai/220 on 21 November) developed at a moderate pace during 18 - 20 November and produced isolated M-class flares. This medium-sized, mixed-polarity region was still developing as the period ended, but at a slower pace.

Real-time solar wind data (SWEPAM) were not available from the Advance Composition Explorer (ACE) spacecraft during 15/1600 - 18/1800UT due to the Leonids shower. Velocities briefly reached 600 km/sec on 18 November, then gradually decreased during the remainder of the period. There were periods of sustained southward IMF Bz detected during 15- 16, 19, and 21 November. Solar sector orientation shifted from away (positive polarity) to toward on 17 November.

A minor proton enhancement began late on 17 November and ended early on 20 November. The enhancement followed the M7/2B flare of 17 November.

The greater than 2 MeV electron flux briefly reached high levels late on 21 November. Otherwise, flux levels varied from normal to moderate levels.

Geomagnetic field activity ranged from quiet to unsettled levels during most of the period. However, brief active to minor storm periods occurred on 16 and 21 November following periods of sustained southward IMF Bz.

Space Weather Outlook
24 November - 20 December 1999

Solar activity is expected to range from low to high levels. Frequent C-class flares are likely. Isolated M-class flares will be possible throughout the period. There is also a chance for an isolated major flare through 28 November.

There is a chance for a solar proton event at geosynchronous orbit through 28 November due to the major flare potential in Regions 8765 and 8771.

The greater than 2 MeV electron flux at geosynchronous altitude is expected to be at moderate to high levels during 05 - 10 December with normal to moderate levels during the remainder of the period.

The geomagnetic field is expected to be at unsettled to minor storm levels during 04 - 08 December due to recurrent coronal hole effects. Otherwise, activity is expected to vary between quiet and unsettled levels (barring any Earth-directed coronal mass ejections).



Daily Solar Data

Date	Radio Flux 10.7 cm	Sun spot No. (10 ⁶ hemi.)	Sunspot Area	X-ray Background	Flares							
					X-ray Flux			Optical				
					C	M	X	S	1	2	3	4
15 November	206	213	2030	C2.5	8	1	0	20	2	1	0	0
16 November	233	231	2250	C1.9	5	7	0	23	4	0	0	0
17 November	221	248	2290	C1.4	12	1	0	25	1	1	0	0
18 November	218	194	2260	C1.7	5	1	0	14	2	0	0	0
19 November	210	234	1970	C1.1	5	0	0	20	2	0	0	0
20 November	204	225	1570	C1.0	5	1	0	13	0	1	0	0
21 November	210	200	1290	C2.8	2	3	0	16	2	1	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
	15 November	1.9E+5	1.2E+4	2.2E+3		2.1E+7
16 November	3.1E+5	1.2E+4	2.4E+3		7.9E+6	
17 November	8.9E+5	1.7E+4	2.6E+3		1.4E+6	
18 November	1.0E+6	4.2E+4	2.7E+3		8.9E+6	
19 November	6.9E+6	4.8E+4	2.6E+3		1.3E+7	
20 November	3.1E+6	1.7E+4	2.4E+3		2.6E+7	
21 November	1.1E+6	1.2E+4	2.4E+3		2.3E+7	

Daily Geomagnetic Data

Date	Middle Latitude Fredericksburg		High Latitude College		Estimated Planetary	
	A	K-indices	A	K-indices	A	K-indices
	15 November	3	1-0-2-1-1-1-1-0	*	*-*-*-*-*-*-*	6
16 November	11	1-1-2-4-3-3-3-1	*	*-*-*-*-*-*-*	16	1-1-2-4-4-3-3-3
17 November	8	2-1-2-2-3-2-3-1	1	2-3-3-4-3-2-*	10	2-2-2-2-3-3-3-2
18 November	8	2-2-2-3-2-2-2-2	19	2-2-4-4-4-4-3-3	12	2-2-3-3-3-3-3-3
19 November	9	3-3-2-1-2-0-2-3	22	2-3-5-4-5-3-1-3	12	3-3-3-3-3-2-3-3
20 November	7	3-3-2-2-1-1-1-1	11	3-2-2-5-2-0-2-0	9	3-3-2-2-2-2-2-2
21 November	11	2-3-4-1-0-2-3-3	9	0-2-4-3-2-1-2-2	10	2-2-3-2-1-3-3-3

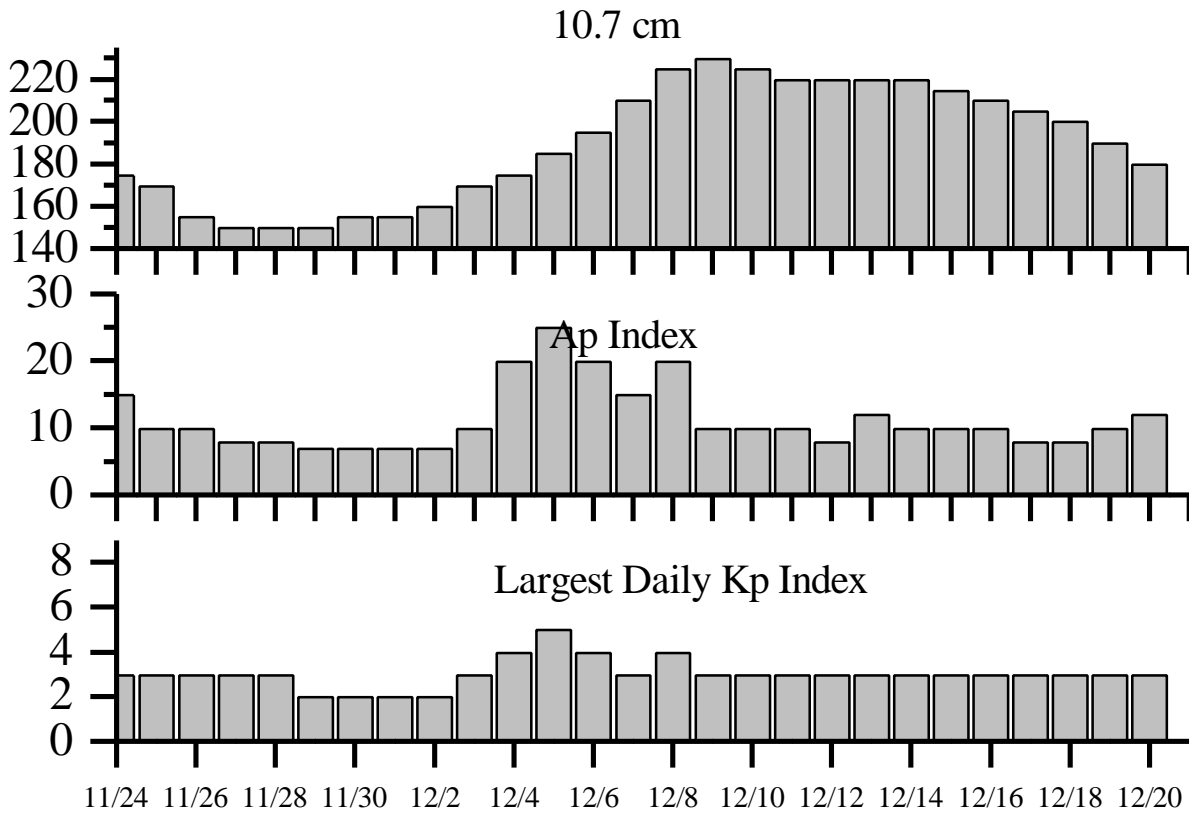


Alerts and Warnings Issued

Date & Time of Issue (UT)	Type of Alert or Warning	Date & Time of Event (UT)
15 Nov 0010	3 - 245 MHz Bursts	14 Nov
16 Nov 0043	6 - 245 MHz Bursts	15 Nov
16 Nov 0043	245 MHz Noise Storm	15 Nov
16 Nov 0254	10cm Radio Burst 360 s.f.u.	16 Nov 0239
16 Nov 0317	Type II Radio Emission	16 Nov 0247
16 Nov 0540	Type II Radio Emission	16 Nov 0507
16 Nov 0820	10cm Radio Burst 340 s.f.u.	16 Nov 0604
16 Nov 0938	Type IV Radio Emission	16 Nov 0257
16 Nov 1200	K= 4 Observed	16 Nov 09 - 12
16 Nov 2036	A >=20 Watch	19 Nov
17 Nov 0045	4 - 245 MHz Bursts	16 Nov
17 Nov 0045	245 MHz Noise Storm	16 Nov
17 Nov 1009	X-Ray event M7.4/1N	17 Nov 0929
17 Nov 1019	10cm Radio Burst 390 s.f.u.	17 Nov 0951
17 Nov 1045	X-Ray event M7.4/2	17 Nov 0929
17 Nov 1100	Type II Radio Emission	17 Nov 0959
17 Nov 1318	Type IV Radio Emission	17 Nov 0951
17 Nov 2149	Type II Radio Emission	17 Nov 2020
17 Nov 2156	A >=20 Watch	20 Nov
18 Nov 0036	7 - 245 MHz Bursts	17 Nov
18 Nov 0036	245 MHz Noise Storm	17 Nov
19 Nov 0038	1-245 MHz Burst	18 Nov
19 Nov 0038	245 MHz Noise Storm	18 Nov
20 Nov 0247	K= 4 Warning	20 Nov 0246 - 1500
20 Nov 0307	K= 4 Observed	20 Nov 00 - 03
20 Nov 0052	245 MHz Noise Storm	19 Nov
21 Nov 0052	2 - 245 MHz Bursts	20 Nov
21 Nov 0232	Type II Radio Emission	20 Nov 2239
21 Nov 0603	K= 4 Observed	21 Nov 03 - 06
21 Nov 0608	K= 4 Warning	21 Nov 06 - 15
21 Nov 0855	K=5 Observed	21 Nov 06 - 09
21 Nov 1919	>2MeV Electron Event >=1000pfu	21 Nov 1735
21 Nov 2009	10cm Radio Burst 270 s.f.u.	21 Nov 1813



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
24 Nov	175	15	3	08 Dec	225	20	4
25	170	10	3	09	230	10	3
26	155	10	3	10	225	10	3
27	150	8	3	11	220	10	3
28	150	8	3	12	220	8	3
29	150	7	2	13	220	12	3
30	155	7	2	14	220	10	3
01 Dec	155	7	2	15	215	10	3
02	160	7	2	16	210	10	3
03	170	10	3	17	205	8	3
04	175	20	4	18	200	8	3
05	185	25	5	19	190	10	3
06	195	20	4	20	180	12	3
07	210	15	3				



Energetic Events

Date	Time (UT)			X-ray		Optical Information			Peak		Sweep Freq		
	Begin	Max	Max	Class	Integ Flux	Imp/ Brtns	Location		Rgn #	Radio Flux		Intensity	
							Lat	CMD		245	2695	II	IV
15 Nov	0825	0841	0855	M2.9	.036	2N	S13E29	8765		20			
16 Nov	0236	0246	0254	M3.8	.028	1B	N17E38	8766	1400	360	3	2	
16 Nov	0405	0410	0413	M3.0	.007	SN	N12W74	8760		170			
16 Nov	0447	0512	0545	M1.8	.052	SF	N18E43	8766				2	
16 Nov	0606	0710	0739	M2.3	.100	1N	S14E10	8765	250	340			
16 Nov	1347	1411	1436	M1.4	.029	1N	S09E06	8765					
16 Nov	2118	2124	2143	M2.0	.024	1N	S11E08	8765					
17 Nov	0947	0957	1002	M7.4	.040	2B	N17E21	8766	9600	390	2	3	
18 Nov	0142	0149	0154	M1.4	.007	1F	S17E55	8771		41			
20 Nov	2217	2235	2251	M3.2	.039	2B	S15E19	8771	93	39	2		
21 Nov	0007	0014	0018	M1.3	.006	1N	S09W53	8765		280			
21 Nov	1003	1017	1024	M2.2	.017	SN	S15W53	8765					
21 Nov	1810	1820	1825	M3.4	.019	2N	S15W56	8765		270			

Flare List

Date	Time			X-ray Class.	Optical Imp / Brtns	Location Lat CMD	Rgn #
	Begin	Max	End				
15 November	0000	0007	0032	C8.9	SF	N17E53	8766
	0046	0051	0101		SF	N09W25	8759
	0116	0127	0143		SF	N17E52	8766
	0147	0147	0155		SF	N09W26	8759
	0218	0219	0223		SF	S09E26	8765
	0219	0222	0223		SF	N17E52	8766
	0241	0301	0334		SF	S09E25	8765
	0259	0313	0322	C6.5			
	0436	0447	0526	C3.9	SF	N18E57	8766
	0613	0615	0628		SN	S16E17	8763
	0651	0654	0706		SF	S12E29	8765
	0721	0721	0737		SF	S14E23	8765
	0816	0834	A1014	M2.9	2N	S13E29	8765
	B1017	U1021	A1026		SF	N17E47	8766
	1307	1317	1325	C4.6			
	1425	1430	1435		SF	N17E45	8766
	1605	1607	1613	C4.4	SF	S09E18	8765
	1711	1714	1724	C8.9	1N	S15E12	8763
	1732	1735	1739		SF	S09E17	8765
	1847	1857	1916	C5.5	1F	S13E18	8765
	1941	1942	1956		SF	S13E18	8765
	2017	2024	2027		SF	N17E41	8766
	2017	2023	2028		SF	S09E16	8765
	2303	2307	0003	C5.8	SF	S12E18	8765
	2343	2344	0003		SF	N17E40	8766



Flare List-continued

Date	Time			X-ray Class.	Optical		Rgn #	
	Begin	Max	End		Imp / Brtns	Location Lat CMD		
16 November	0107	0111	0125		SF	S14E13	8765	
	0110	0111	0125		SF	N16E17	8768	
	0200	0203	0210	C2.8				
	0238	0246	0312	M3.8	1B	N17E38	8766	
	0406	0410	0420	M3.0	SN	N12W74	8760	
	0510	0510	0521	M1.8	SF	N18E43	8766	
	0618	0622	0822	M2.3	1N	S14E10	8765	
	0754	0800	0810		SF	N16E13	8768	
	0852	0952	A1025		SF	S09E08	8765	
	0910	0922	1004	M1	SN	N15E12	8768	
	1003	1035	1050	C9.4				
	1402	U1402	1508	M1.4	1N	S09E06	8765	
	1547	1603	1608	C5.3	SF	S09E05	8765	
	1643	1647	1706	C6.8	SF	S09E05	8765	
	1754	1756	1801		SF	N19E33	8766	
	1834	1835	1841		SF	S13E09	8765	
	1925	1927	1934		SF	N19E34	8766	
	1938	1940	1947		SF	N17E29	8766	
	2006	2014	2016		SF	N09W51	8759	
	2012	2017	2020		SF	N16E30	8766	
	2120	2127	2220	M2.0	1N	S11E08	8765	
	2122	2122	2128		SF	N13W39	8759	
	2122	2122	2131		SF	N17E29	8766	
	2146	2148	2150		SF	S12E69	8769	
	2223	2224	2227		SF	N17E27	8766	
	2230	2231	2309		SF	N09W52	8759	
	2256	2301	2304		SF	S13E63	8769	
	2312	2321	2334		SF	N14W45	8759	
	2332	2333	2343	C3.8	SN	S14W04	8765	
	17 November	0112	0113	0115		SF	N16W40	8759
		0206	0207	0210	C3.1	SF	S09W01	8765
		0214	0216	0218		SF	N09W53	8759
0223		0229	0233		SF	N14W47	8759	
0233		0236	0238		SF	N14W47	8759	
0237		0239	0242	C2.8	SF	S15W05	8765	
0404		0406	0410		SF	S14W05	8765	
0502		0503	0509		SF	N15E27	8766	
0507		0507	0524		SF	N16E01	8768	
0548		0552	0614	C3	SF	S14W01	8765	
0707		0709	0722		SF	N19E26	8766	
0826		0826	0835		SF	N13W45	8759	
0846	0849	0853	C3.2	SF	S17E74	8769		



Flare List-continued

Date	Time			X-ray Class.	Optical		Rgn #	
	Begin	Max	End		Imp / Brtns	Location Lat CMD		
17 November	0930	0935	A1003	C7.0	1N	S15W02	8765	
	0951	0955	A1024	M7.4	2B	N17E21	8766	
	1147	1154	1200	C4.6				
	1205	1224	1243	C5.7				
	1322	1333	1348	C7.8				
	1456	1502	1507		SF	S14E59	8769	
	1515	1516	1529		SF	S15E60	8769	
	1558	1600	1611	C3.0	SF	S11W03	8765	
	1654	1659	1703	C2.8				
	1725	1728	1735		SF	S13W34		
	1741	1741	1754	C9.2	SF	S15E60	8769	
	1755	1800	1805		SF	N19W04	8768	
	1945	1946	1948		SF	N09W63	8759	
	2016	2017	2027	C3.8	SF	S15E70	8771	
	2259	2301	2305		SF	S06W12	8765	
	2307	2310	2318		SF	N16W62	8758	
	2332	0005	0023		SF	N18W61	8759	
	2357	2358	0008		SF	N18W08	8768	
	18 November	0002	0019	0040		SF	S13W07	8765
		0144	0146	0159	M1.4	1F	S17E55	8771
0326		0335	0348		SF	S16E54	8771	
0337		0343	0354		SF	S11W41	8770	
0434		0440	0448		SF	S12W42	8770	
0451		0451	0509		SF	S11W11	8765	
0512		0518	0531		SF	S12W42	8770	
0759		0814	0827	C7.5	SF	N13W60	8759	
0807		0810	0816		SF	S13E58	8771	
0846		0847	0855		SF	S11W12	8765	
B1351		U1351	A1352		SF	N19E11	8766	
1712		1712	1719	C2.7	SF	S11W14	8765	
1849		1852	1904	C3.5	SF	S14W51	8770	
1859		1901	1921	C8.3	1F	S11W14	8765	
2207		2217	A2310	C5.1	SF	N14E03	8766	
2311		2312	2323		SF	S11W21	8765	
19 November	0007	0011	0013	C2.1				
	0123	0124	0128		SF	S09W27	8765	
	0157	0158	0200		SF	S09W28	8765	
	0315	0352	0359		SF	S09W29	8765	
	0317	0317	0343		SF	S18W39	8763	
	0317	0317	0343		SF	S14W51	8770	
	0406	0406	0409		SF	S09W29	8765	
	0420	0420	0430		SF	N17W06	8766	
	0541	0542	0545		SF	S09W30	8765	



Flare List-continued

Date	Time			X-ray Class.	Optical		Rgn #
	Begin	Max	End		Imp / Brtns	Location Lat CMD	
19 November	0624	0626	0631		1F	S09W30	8765
	0625	0626	0629		SF	S19E33	8771
	0636	0637	0700		SF	S09W30	8765
	0640	0642	0653		SF	S19E33	8771
	0706	0706	0709		SF	S19E33	8771
	0706	0708	0709		SF	S09W30	8765
	0739	0752	0814		SF	S09W31	8765
	0739	0743	0844	C2.1	1N	N18W24	8768
	0824	0825	0829		SF	S19E32	8771
	0940	0940	0952		SF	N09W85	8759
	1047	1052	1100	C1.9			
	1503	1506	1515	C1.9	SF	S11W26	8765
	1600	1601	1604	C1.9	SF	S16E38	8771
	1601	1603	1604		SF	S14W59	8770
	1847	1849	1852		SF	S14W33	8765
20 November	0055	0055	0100		SF	S09W40	8765
	0113	0113	0127		SF	S19E23	8771
	0154	0156	0204		SF	S19E22	8771
	0312	0312	0315		SF	S19E22	8771
	0334	0334	0338		SF	S09W42	8765
	0404	0404	0409		SF	S19E21	8771
	0424	0454	0542	C1.9	SF	S19E21	8771
	0427	0428	0440		SF	N18W35	8768
	0636	0640	0649	C1.9			
	1143	1148	1156	C2.1			
	1231	1234	1239	C1.8			
	1430	1436	1445		SF	S14E21	8771
	1529	1531	1545		SF	S16E19	8771
	1543	1544	1557		SF	S15E29	8773
	1545	1546	1549		SF	S16E19	8771
	1603	1603	1609		SF	S14E27	8773
	1922	1937	2005	C3.4			
2219	2232	0025	M3.2	2B	S15E19	8771	
21 November	0008	0011	0054	M1.3	1N	S09W53	8765
	0225	0229	0234		SF	S19E09	8771
	0424	0425	0430		SF	S14W50	8765
	0505	0512	0537		SF	S15W51	8765
	0511	0512	0516		SF	N15W49	8768



Flare List-continued

Date	Time			X-ray Class.	Imp / Brtns	Optical	Rgn #
	Begin	Max	End			Location Lat CMD	
21 November	0717	0718	0720		SF	S17E14	8771
	0754	0758	0807	C4.2	SF	N15W55	8768
	0823	U0828	0859	C6.0	1N	S17E14	8771
	B0841	U0841	0848		SF	S15W82	8770
	0853	0902	0916		SF	S15W52	8765
	0927	U1010	A1026	M2.2	SN	S15W53	8765
	1436	1437	1444		SF	N16W59	8768
	1724	1725	1728		SF	S15W56	8765
	1812	1822	1848	M3.4	2N	S15W56	8765
	1913	1914	1917		SF	S15W56	8765
	1930	1932	1941		SF	S14W60	8765
	1951	1952	2004		SF	S17E08	8771
	2045	2046	2053		SF	N16W62	8768
	2220	2254	2306		SF	N18W58	8768

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 8754

04 Nov S08E66	333	0050	02	HSX	001	A												
05 Nov S09E55	330	0060	03	CSO	003	B												
06 Nov S09E41	331	0060	03	CSO	005	B												
07 Nov S09E26	333	0030	04	CSO	005	B												
08 Nov S10E13	333	0030	03	CSO	002	B												
09 Nov S06E00	333	0030	01	HSX	001	A												
10 Nov S07W14	333	0020	02	HSX	001	A												
11 Nov S08W26	332	0020	02	HSX	001	A												
12 Nov S07W40	333	0000	00	AXX	001	A												
13 Nov S07W53	333																	
14 Nov S07W66	333																	
15 Nov S07W79	333																	
16 Nov S07W92	333																	

0 0 0 0 0 0 0 0 0

Crossed West Limb.

Absolute heliographic longitude: 333



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 8755

05 Nov N19E71	314	0120	08	DAO	003	B												
06 Nov N21E57	315	0080	01	HSX	001	A												
07 Nov N21E42	317	0100	03	HAX	001	A												
08 Nov N23E29	317	0080	02	HSX	001	A												
09 Nov N23E16	317	0080	02	HSX	001	A												
10 Nov N22E04	315	0080	02	HSX	001	A												
11 Nov N22W11	317	0110	04	CSO	004	B												
12 Nov N22W22	315	0070	02	HSX	002	A												
13 Nov N23W36	316	0070	02	HSX	001	A												
14 Nov N23W48	315	0070	02	HSX	001	A												
15 Nov N23W61	315	0080	02	HSX	001	A												
16 Nov N22W72	312	0070	02	HSX	001	A												
17 Nov N22W88	315	0060	02	HSX	001	A												
										0	0	0	0	0	0	0	0	0

Crossed West Limb.

Absolute heliographic longitude: 315

Region 8758

06 Nov N18E64	308	0100	04	CSO	004	B												
07 Nov N17E52	307	0080	06	CAO	005	B	1			2								
08 Nov N18E41	305	0070	10	CAO	010	B				2								
09 Nov N18E25	308	0060	05	CAO	015	B	2			1	1							
10 Nov N18E13	306	0040	04	DAO	009	B				2								
11 Nov N18W01	307	0020	03	BXO	006	B												
12 Nov N17W15	308	0000	01	AXX	003	A												
13 Nov N18W26	306	0000	00	AXX	001	A												
14 Nov N18W39	306																	
15 Nov N18W52	306																	
16 Nov N18W65	306																	
17 Nov N18W78	306									1								
							3	0	0	8	1	0	0	0	0			

Crossed West Limb.

Absolute heliographic longitude: 307



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	4		
<i>Region 8759</i>																	
06 Nov	N10E78	294	0110	05	CSO	003	B	1			1						
07 Nov	N08E70	289	0440	15	EKC	016	BG										
08 Nov	N13E58	288	0850	19	FKC	034	BG	2			6						
09 Nov	N10E45	288	0920	19	FKC	067	BGD	2	1		2	1					
10 Nov	N10E32	287	0870	18	FKC	073	BG	1	1		4	1					
11 Nov	N10E19	287	0630	18	FKC	080	BG	3			7	1					
12 Nov	N10E06	287	0390	20	FKC	082	BG	1	2		10						
13 Nov	N10W07	287	0350	20	FKC	067	BG	2			6						
14 Nov	N11W21	288	0270	22	FAI	056	BG	1	1		2	1					
15 Nov	N11W32	286	0270	21	FAI	044	BG				2						
16 Nov	N12W45	285	0200	22	FAI	034	BG		1		4	2					
17 Nov	N12W58	285	0180	20	CAO	024	BG				7						
18 Nov	N13W66	281	0120	07	DAO	008	B	1			1						
19 Nov	N12W79	281	0040	06	CSO	004	B				1						
20 Nov	N12W92	281															
								14	6	0	53	6	0	0	0	0	

Crossed West Limb.

Absolute heliographic longitude: 287

Region 8760

07 Nov	N13E35	324	0010	03	BXO	010	B										
08 Nov	N14E22	324	0090	07	DAO	025	B	2			5						
09 Nov	N14E09	324	0310	11	EAI	053	B	4			8	1					
10 Nov	N13W04	323	0520	12	EKI	060	BG	1			8	1					
11 Nov	N13W18	324	0630	15	EKI	051	BG				4						
12 Nov	N14W32	325	0580	16	FKO	048	BG				4						
13 Nov	N14W45	325	0570	15	EKO	031	BG										
14 Nov	N15W59	326	0460	16	FKO	018	B										
15 Nov	N15W70	324	0420	17	FKO	011	B										
16 Nov	N15W83	323	0450	15	EKO	010	B		1		1						
17 Nov	N17W93	320	0060	02	HAX	001	A										
								7	1	0	30	1	1	0	0	0	

Crossed West Limb.

Absolute heliographic longitude: 323



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 8761

08 Nov N22E51	295	0040	05	BXO	004	B												
09 Nov N20E36	297	0040	04	DSO	008	B												
10 Nov N20E25	294	0030	04	CSO	008	B	1				2							
11 Nov N19E11	295	0020	03	CSO	002	B					1							
12 Nov N20W01	294	0000	04	BXO	003	B												
13 Nov N20W15	295	0000	03	BXO	002	B												
14 Nov N20W28	295																	
15 Nov N20W41	295																	
16 Nov N20W54	295																	
17 Nov N20W67	295																	
18 Nov N20W80	295																	
19 Nov N20W93	295																	
										1	0	0	3	0	0	0	0	0

Crossed West Limb.

Absolute heliographic longitude: 294

Region 8763

10 Nov S13E74	245	0120	07	CAO	011	B	2				5	2						
11 Nov S14E59	247	0170	09	DAO	011	B	3				6	1						
12 Nov S15E46	247	0140	09	DSO	017	BG					5	1						
13 Nov S14E32	248	0070	08	CSO	016	BG	3	1			7	1						
14 Nov S15E18	249	0070	08	CSO	011	BG		1			4		1					
15 Nov S14E04	250	0070	06	CSO	007	B	1				1	1						
16 Nov S13W07	247	0040	04	CSO	004	B												
17 Nov S13W20	247	0010	04	BXO	005	B												
18 Nov S13W35	250	0010	01	BXO	002	B												
19 Nov S13W48	250												1					
20 Nov S13W61	250																	
21 Nov S13W74	250																	
										9	2	0	29	6	1	0	0	0

Still on Disk.

Absolute heliographic longitude: 250

Region 8764

10 Nov N17W15	334	0010	03	BXO	003	B												
11 Nov N16W28	334	0020	04	BXO	004	B												
12 Nov N18W42	335	0020	01	HRX	001	A						1						
13 Nov N18W56	336	0010	05	BXO	004	B	1				1							
14 Nov N18W69	336																	
15 Nov N18W82	336																	
										1	0	0	2	0	0	0	0	0

Crossed West Limb.

Absolute heliographic longitude: 334



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 8765</i>																		
11 Nov	S10E72	234	0150	08	CAO	008	B											
12 Nov	S12E58	235	0350	10	DAC	017	BG						2					
13 Nov	S12E45	235	0490	10	DAC	016	BG	2					8					
14 Nov	S14E32	235	0640	12	EKC	031	BG	2	1			18	1					
15 Nov	S13E19	235	0820	14	EKC	034	BG	3	1			9	1	1				
16 Nov	S12E06	234	0930	15	EKC	038	BGD	3	3			6	3					
17 Nov	S12W08	235	1190	15	EKC	041	BGD	5				6	1					
18 Nov	S12W20	235	1280	14	EKC	035	BGD	2				5	1					
19 Nov	S12W34	236	1120	14	EKC	031	BGD	1				10	1					
20 Nov	S13W47	236	0910	13	EKC	036	BGD		1			2						
21 Nov	S12W60	235	0790	12	EKC	025	BGD	1	3			7	1	1				
								19	9	0	73	9	2	0	0			

Still on Disk.

Absolute heliographic longitude: 234

<i>Region 8766</i>																		
13 Nov	N18E68	212	0060	06	DAO	005	B											
14 Nov	N17E57	210	0190	06	DAO	009	BD	1	1			13	1					
15 Nov	N17E44	210	0270	07	DKI	013	BD	2				8						
16 Nov	N18E31	209	0330	11	EKC	020	BGD		2			7	1					
17 Nov	N18E16	211	0360	12	EAC	024	BG		1			2	1					
18 Nov	N18E02	213	0300	12	EAI	020	BG	1				2						
19 Nov	N17W11	213	0250	13	EAI	025	BG					1						
20 Nov	N18W25	214	0180	13	EAI	026	BG											
21 Nov	N18W36	211	0120	10	DAO	014	B											
								4	4	0	33	1	2	0	0			

Still on Disk.

Absolute heliographic longitude: 213

<i>Region 8767</i>																		
14 Nov	N43W29	296	0020	04	CSO	004	B											
15 Nov	N42W42	296	0040	05	CSO	005	B											
16 Nov	N42W54	294	0020	07	CSO	006	B											
17 Nov	N42W68	295	0020	04	CSO	002	B											
18 Nov	N42W81	295																
19 Nov	N42W94	295																
								0	0	0	0	0	0	0	0	0	0	

Crossed West Limb.

Absolute heliographic longitude: 296



Region Summary-continued

Location		Sunspot Characteristics					Flares							
Date	(° 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	4

Region 8768

14 Nov N17E33	234	0030	05	DSO	008	B								
15 Nov N17E20	234	0030	06	DSO	007	B								
16 Nov N17E05	235	0090	09	DAO	012	B		1		3				
17 Nov N17W11	238	0180	11	EAI	018	B				3				
18 Nov N17W24	239	0180	12	EAO	010	B								
19 Nov N16W38	240	0150	13	EAO	008	B	1				1			
20 Nov N17W54	243	0120	13	CSO	005	B	1			1				
21 Nov N16W65	240	0080	11	CSO	009	B				5				
							2	1	0	12	1	0	0	0

Still on Disk.

Absolute heliographic longitude: 235

Region 8769

15 Nov S10E76	178	0030	01	HSX	001	A								
16 Nov S10E65	175	0080	01	HAX	001	A				2				
17 Nov S12E53	174	0110	02	HSX	001	A	2			4				
18 Nov S10E37	178	0070	05	CAO	004	B								
19 Nov S11E24	178	0040	04	CSO	005	B								
20 Nov S12E10	179	0020	03	CSO	003	B								
21 Nov S12W03	179													
							2	0	0	6	0	0	0	0

Still on Disk.

Absolute heliographic longitude: 179

Region 8770

16 Nov S14W23	263	0040	05	DSO	005	B								
17 Nov S14W37	264	0050	07	DSO	008	B								
18 Nov S13W51	266	0110	08	DAO	009	B	1			4				
19 Nov S14W65	267	0090	10	DSO	008	B				2				
20 Nov S13W80	269	0060	11	CSO	007	B								
21 Nov S13W93	269									1				
							1	0	0	7	0	0	0	0

Still on Disk.

Absolute heliographic longitude: 263



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 8771

17 Nov	S13E59	168	0070	16	CSO	013	B					1					
18 Nov	S14E46	169	0170	17	FAO	015	B	1	1			2	1				
19 Nov	S15E28	174	0150	09	DAI	022	BG	1				5					
20 Nov	S17E12	177	0180	09	DAI	020	BG		1			8		1			
21 Nov	S16E01	174	0220	12	EAI	032	BGD	1				3	1				
								3	2	0		19	2	1	0	0	0

Still on Disk.

Absolute heliographic longitude: 174

Region 8772

18 Nov	N05E71	144	0020	01	HAX	001	A											
19 Nov	N05E55	147	0060	04	CSO	007	B											
20 Nov	N04E42	147	0030	03	CSO	004	B											
21 Nov	N04E29	146	0020	05	CSO	008	B											
												0	0	0	0	0	0	0

Still on Disk.

Absolute heliographic longitude: 146

Region 8773

19 Nov	S14E39	163	0030	04	CSO	009	B											
20 Nov	S16E25	164	0030	03	CSO	005	B					2						
21 Nov	S15E12	163	0020	03	BXO	006	B											
												0	0	0	2	0	0	0

Still on Disk.

Absolute heliographic longitude: 163

Region 8774

19 Nov	N22E69	133	0030	12	BXO	004	B											
20 Nov	N20E56	133	0010	10	BXO	003	B											
21 Nov	N20E43	133																
												0	0	0	0	0	0	0

Still on Disk.

Absolute heliographic longitude: 133

Region 8775

19 Nov	S17W18	220	0010	01	HRX	001	A											
20 Nov	S16W31	220	0000	00	AXX	001	A											
21 Nov	S16W44	220																
												0	0	0	0	0	0	0

Still on Disk.

Absolute heliographic longitude: 220



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 8776</i>																	
20 Nov	S31E24	165	0030	04	CSO	005	B										
21 Nov	S30E08	167	0020	06	DSO	012	B										
								0	0	0	0	0	0	0	0	0	0
Still on Disk.																	
Absolute heliographic longitude: 167																	
<i>Region 8777</i>																	
21 Nov	S26E40	135	0010	01	AXX	002	A										
								0	0	0	0	0	0	0	0	0	0
Still on Disk.																	
Absolute heliographic longitude: 135																	
<i>Region 8778</i>																	
21 Nov	S14E62	113	0010	04	BXO	002	B										
								0	0	0	0	0	0	0	0	0	0
Still on Disk.																	
Absolute heliographic longitude: 113																	

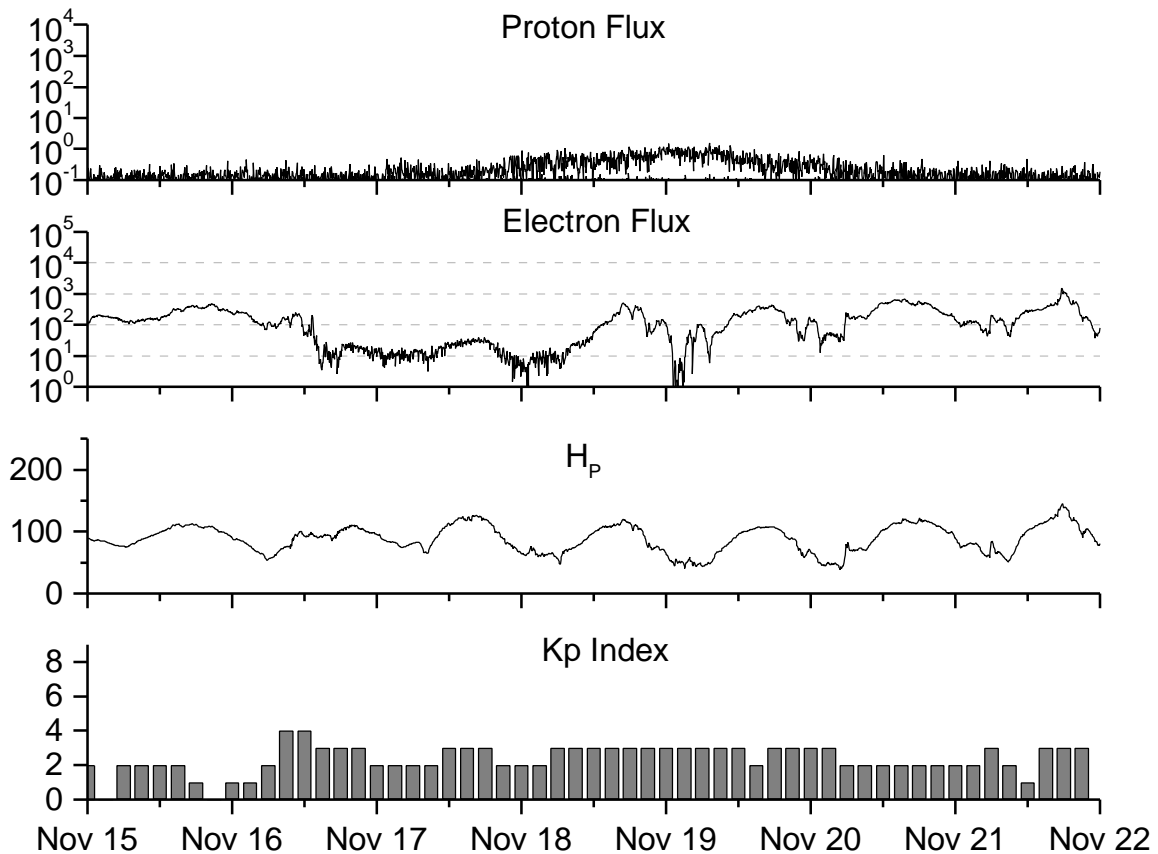


**Recent Solar Indices (preliminary)
of the observed monthly mean values**

Month	Sunspot Numbers					Radio Flux		Geomagnetic	
	Observed values		Ratio	Smooth values		*Penticton	Smooth	Planetary	Smooth
	SWO	RI	RI/SWO	SWO	RI	10.7 cm	Value	Ap	Value
1997									
November	53.5	39.0	0.73	49.3	35.0	99.5	91.3	11	09.0
December	57.9	41.2	0.71	54.2	39.0	98.8	94.2	05	09.5
1998									
January	51.8	31.9	0.62	60.6	43.7	93.4	97.5	08	09.9
February	54.4	40.3	0.74	67.4	48.8	93.4	101.7	08	10.5
March	81.8	54.8	0.67	73.3	53.4	109.1	105.8	13	11.1
April	73.6	53.4	0.73	77.7	56.5	108.3	109.1	10	11.3
May	74.3	56.3	0.76	81.4	59.3	106.7	112.4	18	11.6
June	93.6	70.7	0.76	85.9	62.4	108.4	116.2	10	11.9
July	98.3	66.2	0.67	90.3	65.4	114.0	120.3	11	12.2
August	118.6	91.7	0.77	93.7	67.8	136.0	124.1	18	12.4
September	119.0	92.9	0.78	96.1	69.4	138.4	126.8	13	12.5
October	77.0	55.5	0.72	97.7	70.5	117.3	127.9	13	12.5
November	99.5	74.0	0.74	101.3	73.0	140.2	130.0	16	12.3
December	120.8	81.9	0.69	108.8	77.9	150.1	134.3	08	11.9
1999									
January	94.3	62.4	0.66	116.5	82.6	142.6	139.0	10	11.7
February	93.4	66.3	0.71	120.2	84.6	142.0	142.6	12	11.6
March	100.5	68.8	0.68	120.5	83.8	126.3	144.0	14	11.6
April	092.9	063.9	0.69	123.8	85.4	117.2	145.8	12	12.1
May	140.5	106.3	0.76			148.6		08	
June	208.3	137.4	0.66			169.8		07	
July	169.2	113.5	0.67			165.6		10	
August	136.1	93.7	0.69			170.8		15	
September	107.4	70.9	0.66			135.7		18	
October	167.7	116.4	0.69			164.9		18	

NOTE: All smoothed values after January 1998 and monthly values after September 1998 are 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. * 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 15 November 1999

Protons plot contains the five-minute averaged integral proton flux (protons/cm²-sec -sr) as measured by GOES-8 (W75) for each of three energy thresholds: greater than 10, 50, and 100 MeV.

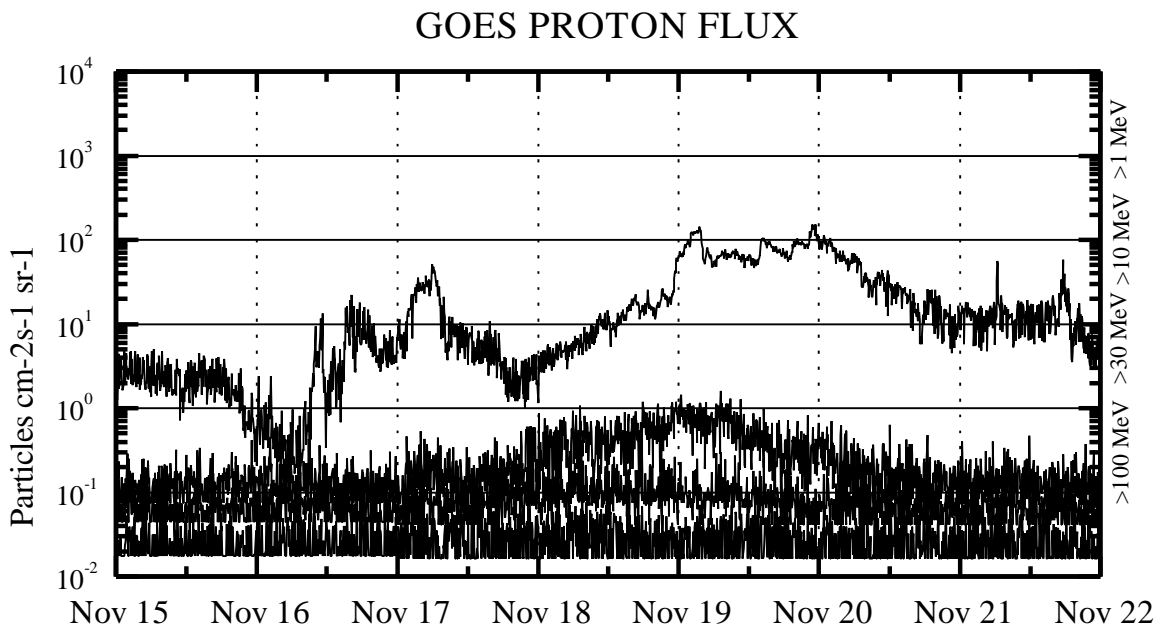
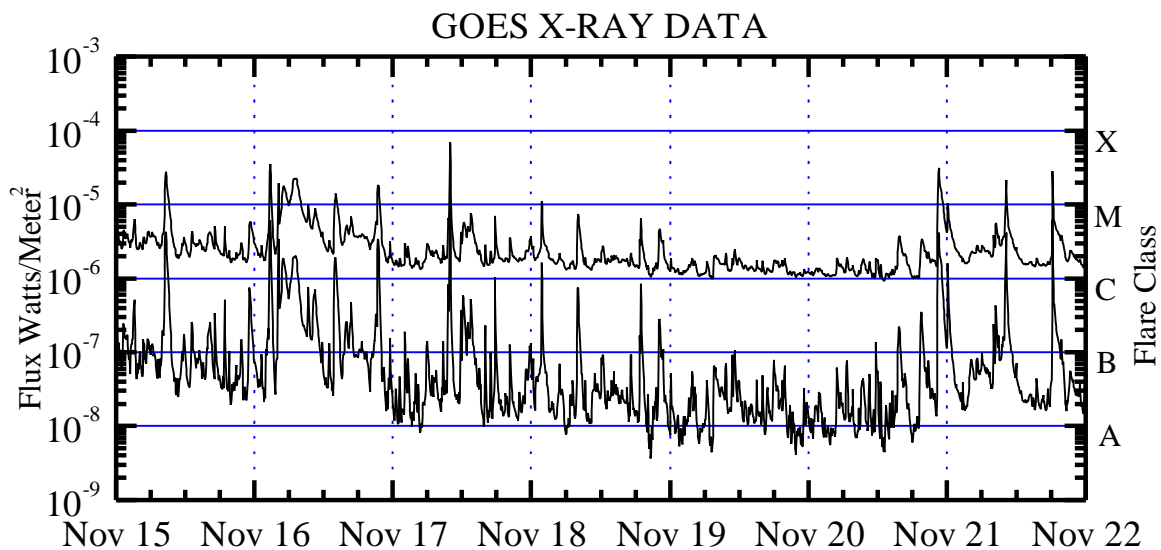
Electrons plot contains the five-minute averaged integral electron flux (electrons/cm²-sec -sr) with energies greater than 2 MeV at GOES-8.

H_p plot contains the five minute averaged magnetic field H - component in nanoteslas (nT) as measured by GOES-8. 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_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 8 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/cm² –sec –sr) as measured by GOES-8 (W75) 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.

