

Space Weather Highlights
10 December – 16 December 2007

SEC PRF 1685
18 December 2007

Solar activity was very low to low. Activity reached low levels during 13 - 14 and 16 December due to isolated C-class flares from Region 978 (S09, L = 223, class/area Dac/340 on 13 December). The largest flare was a C4/1f at 13/1003 UTC. Region 978 gradually increased in area, spot number, and magnetic complexity through 13 December (including a Beta-Gamma-Delta magnetic classification on 13 December). Region 978 gradually decayed during the rest of the period.

No proton events were observed at geosynchronous orbit.

The greater than 2 MeV electron flux at geosynchronous orbit reached high levels during 13 - 15 December.

The geomagnetic field was quiet to active on 10 December. Quiet to unsettled levels occurred during 11 - 12 December. Activity decreased to quiet levels for the rest of the period. ACE solar wind measurements indicated a recurrent co-rotating interaction region (CIR) occurred on 10 December. The CIR was associated with increased densities, velocities, and interplanetary magnetic field activity. Densities increased to a peak of 19 p/cc at 10/1621 UTC. CIR-associated IMF changes included increased Bt (peak 17 nT at 10/2047 UTC) and intermittent periods of increased southward Bz (minimum -16 nT at 10/2047 UTC). The CIR was followed by a high-speed stream. Velocities increased during 10 - 11 December, reached a peak of 686 km/sec at 11/0636Z, then gradually decreased during the remainder of the period.

Space Weather Outlook
19 December – 14 January 2008

Solar activity is expected to be very low to low. Isolated C-class flares are possible during 01 - 13 January.

No proton events are expected at geosynchronous orbit.

The greater than 2 MeV electron flux at geosynchronous orbit is expected to reach high levels during 19 - 31 December and 10 - 12 January.

The geomagnetic field is expected to be at unsettled to active levels during 19 - 20 December due to a recurrent coronal hole high-speed stream. Activity is expected to decrease to quiet to unsettled levels during 21-24 December as coronal hole effects subside. Quiet conditions are expected during 25 December – 06 January. Activity is expected to increase to unsettled levels during 06 – 08 January due to recurrence. Activity is expected to decrease to quiet levels during 09 – 12 January. Activity is expected to increase to unsettled to active levels during 13 – 14 January due to a recurrent coronal hole high-speed stream.



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 December	87	43	310	A6.0	0	0	0	2	0	0	0	0
11 December	93	44	240	A7.0	0	0	0	5	1	1	0	0
12 December	94	39	200	A7.1	0	0	0	5	0	0	0	0
13 December	94	39	340	B1.1	3	0	0	12	1	0	0	0
14 December	92	35	290	A8.4	2	0	0	4	0	0	0	0
15 December	89	39	340	A7.3	0	0	0	0	0	0	0	0
16 December	82	28	240	A7.5	1	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)		
	>1 MeV	>10 MeV	>100 MeV	>.6 MeV	>2MeV	>4 MeV
10 December	1.4E+6	1.9E+4	4.2E+3			
11 December	2.1E+6	1.8E+4	3.9E+3			
12 December	1.1E+6	1.8E+4	3.8E+3			
13 December	5.9E+5	1.7E+4	3.8E+3			
14 December	9.0E+5	1.7E+4	3.8E+3			
15 December	9.8E+5	1.7E+4	3.9E+3			
16 December	1.1E+6	1.8E+4	4.1E+3			

Daily Geomagnetic Data

Date	Middle Latitude Fredericksburg		High Latitude College		Estimated Planetary	
	A	K-indices	A	K-indices	A	K-indices
10 December	5	0-1-2-1-1-1-2-3	9	0-1-3-3-3-1-2-3	8	0-2-2-2-2-1-2-4
11 December	9	3-2-2-2-2-2-3-2	32	3-2-3-5-6-5-4-3	12	3-2-3-3-2-3-3-3
12 December	7	2-2-2-3-1-1-1-2	12	2-3-3-5-2-1-0-1	7	2-3-3-3-1-0-0-2
13 December	3	1-2-1-1-1-1-1-0	7	1-3-2-1-3-1-1-1	4	1-2-1-1-1-0-1-0
14 December	2	0-1-0-2-0-1-1-0	1	0-0-0-2-0-0-0-0	2	0-1-0-2-0-0-1-0
15 December	2	0-0-0-1-1-2-1-0	1	0-0-0-0-1-0-1-0	1	0-0-0-0-0-0-0-1
16 December	1	0-0-0-0-0-1-1-1	1	0-0-0-0-0-1-0-1	2	1-0-0-0-0-0-0-2

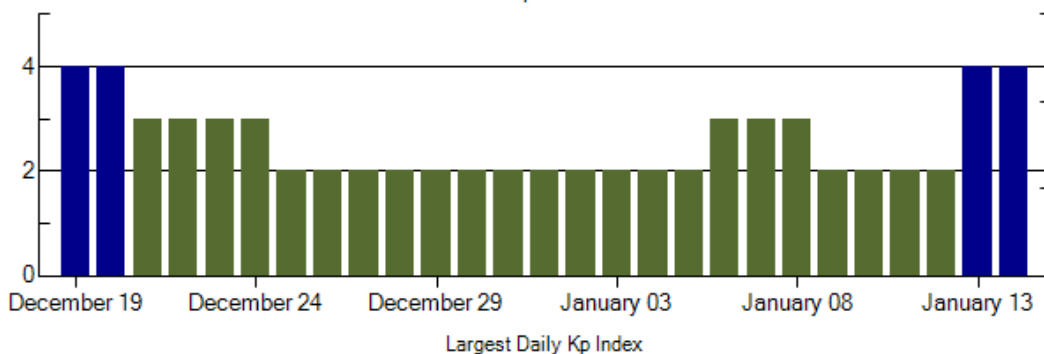
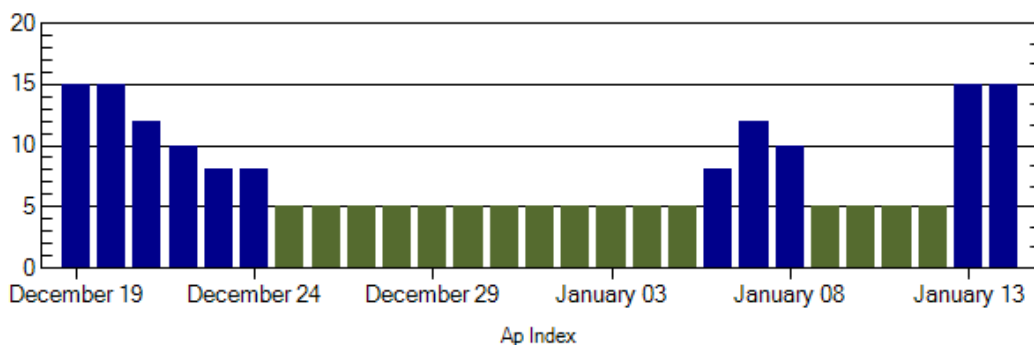
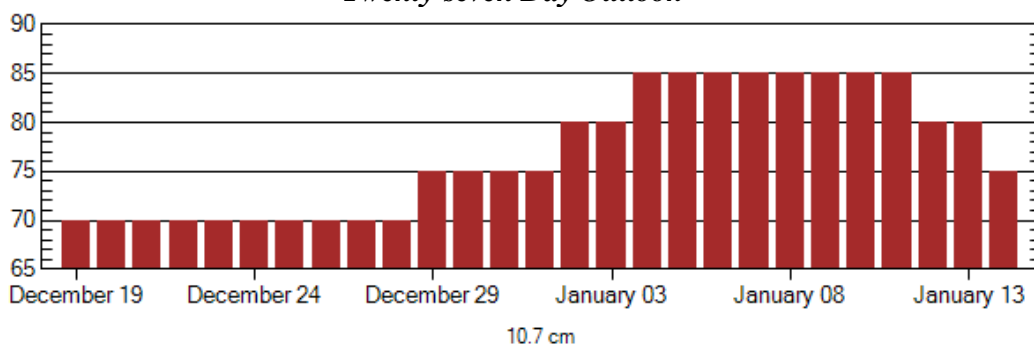


Alerts and Warnings Issued

Date & Time of Issue	Type of Alert or Warning	Date & Time of Event UTC
10 Dec 2312	ALERT: Geomagnetic K=4	10 Dec 2305
10 Dec 2319	WARNING: Geomagnetic K=4	10 Dec 2325 - 11/1600
12 Dec 1043	WARNING: Geomagnetic K=4	12 Dec 1045 - 1600
12 Dec 1054	ALERT: Geomagnetic K=4	12 Dec 1053
13 Dec 1652	ALERT: Electron 2MeV Integral Flux >1000pfu	13 Dec 1610
14 Dec 1519	ALERT: Electron 2MeV Integral Flux >1000pfu	14 Dec 1500
14 Dec 1840	WATCH: Geomagnetic A=20	17 Dec
15 Dec 1711	ALERT: Electron 2MeV Integral Flux >1000pfu	15 Dec 1645



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 Dec	70	15	4	02 Jan	80	5	2
20	70	15	4	03	80	5	2
21	70	12	3	04	85	5	2
22	70	10	3	05	85	5	2
23	70	8	3	06	85	8	3
24	70	8	3	07	85	12	3
25	70	5	2	08	85	10	3
26	70	5	2	09	85	5	2
27	70	5	2	10	85	5	2
28	70	5	2	11	85	5	2
29	75	5	2	12	80	5	2
30	75	5	2	13	80	15	4
31	75	5	2	14	75	15	4
01 Jan	75	5	2				



Energetic Events

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

No Events Observed

Flare List

Date	Time			Optical	Imp / Brtns	Location		Rgn
	Begin	Max	End	X-ray Class.		Lat	CMD	

10 December	0223	0226	0249	B1.0				
	0700	0700	0716	B7.0	Sf	S09E21		978
	0756	0810	0829	B3.6				
	0838	0840	0846		Sf	S09E21		978
	1013	1024	1033	B1.2				
	1040	1046	1059	B2.0				
	1139	1146	1156	B3.5				
	1225	1229	1233	B3.1				
	1341	1346	1349	B2.8				
11 December	0050	0053	0057	B1.0				
	0248	0251	0256		Sf	S10E06		978
	0749	0750	0753		Sf	S08E09		978
	0910	0912	0915		Sf	S06E08		978
	0927	0928	0934		1f	S06E09		978
	0941	0950	1005		Sf	S07E08		978
	1052	1055	1101	B1.2				
	1320	1326	1331	B3.3				
	1949	1956	2000	B4.0				
	2056	2110	2115	B1.7				
	2152	2156	2208	B1.3				
	2335	2337	2340	B2.7	2f	S10E01		978
	2345	2349	0003	B2.7	Sf	S07E01		978



Flare List-Continued

Date	Time			Optical X-ray Class.	Imp / Brtns	Location Lat CMD	Rgn
	Begin	Max	End				
12 December	0107	0110	0120	B1.9			
	0539	0540	0541	B2.4	Sf	S10W09	978
	1015	1016	1023		Sf	S13W09	978
	1112	1115	1118	B1.8			
	1137	1142	1149	B1.8			
	1336	1340	1349	B2.5			
	1435	1438	1443	B1.6			
	1454	1458	1501	B3.1			
	1635	1639	1653	B1.3			
	1656	1704	1710	B2.2			
	1806	1806	1812	B3.5	Sf	S09W10	978
	1901	1905	1923		Sf	S12W12	978
	2223	2254	2317	B4.7	Sf	S11W15	978
	2244	2247	2250	B2.8			
13 December	0048	0050	0056	B5.9	Sf	S09W14	978
	0102	0105	0111	B7.8	Sf	S09W14	978
	0122	0125	0128	B4.3			
	0142	0143	0152		Sf	S09W14	978
	0215	0219	0222	B2.1			
	0239	0244	0248	B3.8			
	0359	0401	0414	B7.6	Sf	S10W16	978
	0437	0441	0449	B4.6	Sf	S09W16	978
	0507	0510	0514	B3.5	Sf	S08W18	978
	0515	0516	0524		Sf	S10W23	978
	0533	0537	0547		Sf	S08W19	978
	0559	0600	0605	B3.3	Sf	S10W17	978
	0842	0842	0849	B4.9	Sf	S11W18	978
	0931	0931	0933	B2.7	Sf	S08W20	978
	0946	0951	1023	C4.5	1f	S07W21	978
	1137	1147	1152	B2.2			
	1246	1254	1300	B2.1			
	1301	1306	1313	B4.4			
	1324	1328	1332	B2.7			
	1339	1347	1354	B6.6			
	1359	1406	1412	C1.0			
	1726	1732	1737	B2.7			
	2012	2016	2019	B1.6			
	2157	2200	A2300	C1.7	Sf	S07W25	978



Flare List-Continued

Date	Time			Optical	Imp / Brtns	Location	Rgn
	Begin	Max	End	X-ray Class.		Lat CMD	
14 December	0139	0141	0144	B9.6	Sf	S10W29	978
	0751	0759	0811	B6.0	Sf	S07W32	978
	0812	0831	0909	C1.1	Sf	S07W32	978
	1044	1047	1049	B1.3			
	1203	1208	1215	B1.6			
	1411	1416	1421	C1.1			
	1516	1525	1612	B8.8	Sf	S10W42	978
	1919	1926	1933	B1.9			
	2155	2221	2231	B2.5			
15 December	0903	0923	0935	B3.8			
	1721	1732	1743	B2.8			
	2052	2056	2101	B2.1			
	2212	2216	2222	B1.2			
16 December	0031	0037	0046	B1.4			
	0349	0355	0403	C1.2			
	0620	0623	0625	B1.8			
	0836	0840	0842	B1.4			
	1555	1559	1602	B1.4			
	2027	2031	2035	B1.7			
	2216	2221	2227	B1.2			



Region Summary

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

Region 976

01 Dec S08E27	329	0030	03	Bxo	003	B
02 Dec S09E10	333	0010	02	Bxo	002	B
03 Dec S09W03	333					
04 Dec S09W16	333					
05 Dec S09W29	333					
06 Dec S09W42	333					
07 Dec S09W55	333					
08 Dec S09W68	333					
09 Dec S09W81	333					
10 Dec S09W94	333					

0 0 0 0 0 0 0 0

Crossed West Limb.

Absolute heliographic longitude: 333

Region 977

02 Dec S05E53	290	0030	04	Bxo	004	B
03 Dec S06E40	289	0030	03	Cso	003	B
04 Dec S05E26	290	0030	04	Dso	003	B
05 Dec S06E13	290	0020	03	Dso	003	B
06 Dec S05W03	293	0010	03	Bxo	004	B
07 Dec S05W16	293	0000	00		000	
08 Dec S05W29	330					
09 Dec S05W42	330					
10 Dec S05W55	330					
11 Dec S05W68	292					
12 Dec S05W81	292					

0 0 0 13 0 0 0 0

Crossed West Limb.

Absolute heliographic longitude: 293



Region Summary-Continued

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

Region 978

06 Dec S09E68	222	0070	06	Dso	005	B				1	1	1		
07 Dec S09E54	223	0090	08	Dao	014	B				15		1		
08 Dec S10E39	225	0160	10	Dkc	012	B				5				
09 Dec S09E26	225	0220	10	Dkc	020	B				7				
10 Dec S01E14	223	0250	12	Esi	022	Bg				2				
11 Dec S07E01	223	0240	12	Eai	034	Bg				5	1	1		
12 Dec S06W12	223	0200	10	Dai	029	Bg				5				
13 Dec S08W25	224	0340	10	Dac	029	Bgd	2			12	1			
14 Dec S09W40	224	0290	10	Dkc	025	B	1			4				
15 Dec S10W52	223	0340	10	Dac	029	B								
16 Dec S10W65	223	0240	10	Dai	018	Bg								
							3	0	0	56	3	3	0	0

Still on Disk.

Absolute heliographic longitude: 223

Region 979

08 Dec N07W65	329	0050	07	Dso	004	B									
09 Dec N08W78	329	0080	04	Hax	002	A									
10 Dec N08W93	330	0060	01	Hax	001	A									
								0	0	0	0	0	0	0	0

Crossed West Limb.

Absolute heliographic longitude: 329



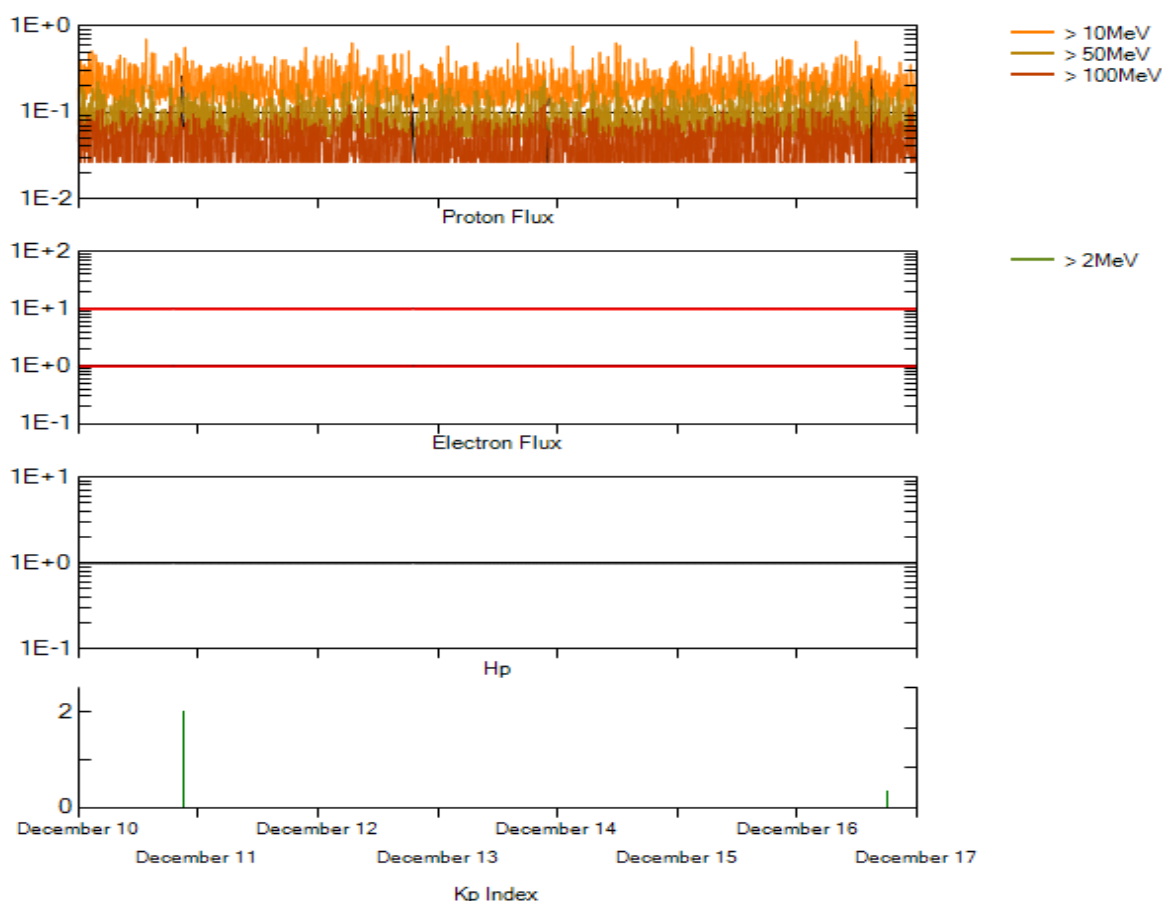
Recent Solar Indices (preliminary)
Of the observed monthly mean values

Month	Sunspot Numbers			Radio Flux		Geomagnetic			
	Observed values	Ratio	Smooth values	*Penticton	Smooth	Planetary	Smooth		
	SEC	RI	RI/SEC	SEC	RI	10.7 cm	Value	Ap	Value
2005									
November	32.2	18.0	0.56	42.1	24.9	86.3	86.7	8	11.1
December	62.6	41.2	0.66	40.1	23.0	90.8	85.4	7	10.4
2006									
January	28.0	15.4	0.55	37.2	20.8	83.8	84.0	6	9.9
February	5.3	4.7	0.89	33.4	18.7	76.6	82.6	6	9.2
March	21.3	10.8	0.51	31.0	17.4	75.5	81.6	8	8.4
April	55.2	30.2	0.55	30.6	17.1	89.0	80.9	11	7.9
May	39.6	22.2	0.56	30.7	17.3	81.0	80.8	8	7.9
June	37.7	13.9	0.37	28.9	16.3	80.1	80.6	9	8.3
July	22.6	12.2	0.54	27.2	15.3	75.8	80.3	7	8.7
August	22.8	12.9	0.57	27.6	15.6	79.0	80.3	9	8.7
September	25.2	14.5	0.58	27.7	15.6	77.8	80.2	8	8.7
October	15.7	10.4	0.66	25.2	14.2	74.3	79.4	8	8.6
November	31.5	21.5	0.68	22.3	12.7	86.4	78.5	9	8.5
December	22.2	13.6	0.61	20.7	12.1	84.3	77.9	15	8.5
2007									
January	26.6	16.9	0.64	19.7	12.0	83.5	77.5	6	8.4
February	17.2	10.6	0.62	18.9	11.6	77.8	76.9	6	8.4
March	9.7	4.8	0.49	17.5	10.8	72.3	76.0	8	8.4
April	6.9	3.7	0.54	16.0	9.9	72.4	75.2	9	8.5
May	19.4	11.7	0.60			74.5		9	
June	20.0	12.0	0.60			73.7		7	
July	15.6	10.0	0.64			71.6		8	
August	9.9	6.2	0.63			69.2		7	
September	4.8	2.4	0.50			67.1		8	
October	1.3	0.9	0.70			65.5		9	
November	2.5	1.7	0.68			69.7		5	

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 December 2007

Protons plot contains the five-minute averaged integral proton flux (protons/cm²–sec –sr) as measured by GOES-11 (W135) for each of three energy thresholds: greater than 10, 50, and 100 MeV.

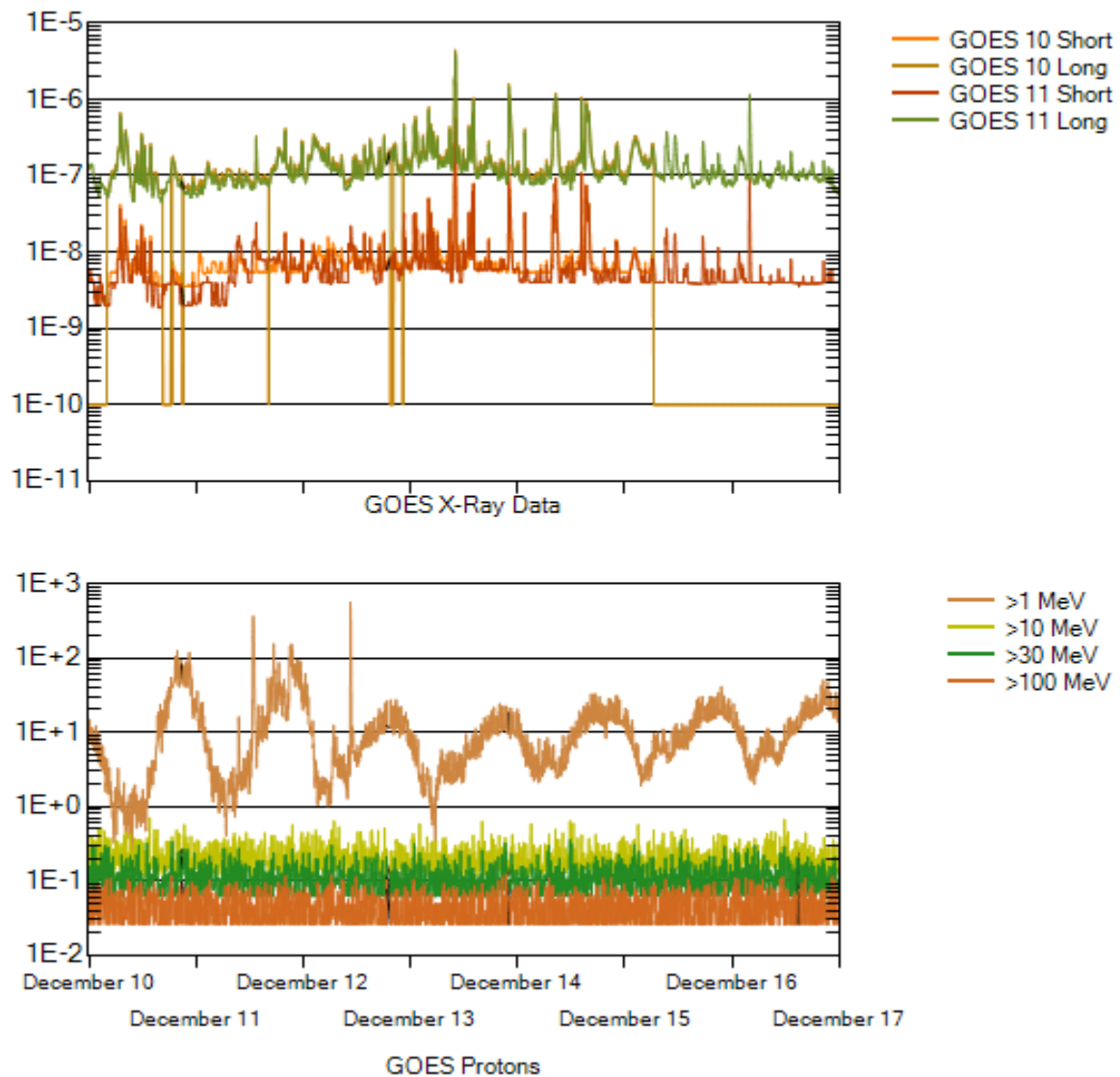
Electrons plot contains the five-minute averaged integral electron flux (electrons/cm²–sec –sr) with energies greater than 2 MeV at GOES-12 (W075).

Hp 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.

Kp 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 Kp values derived from a more extensive network of magnetometers.

The data included here are those now available in real time at the SEC 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 Kp 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/m^2) as measured by GOES 10 (W060) and GOES 11 (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 ($\text{protons/cm}^2\text{-sec-sr}$) as measured by GOES-11 (W135) for each of the energy thresholds: >1, >10, >30 and >100 MeV. P10 event threshold is 10 pfu ($\text{protons/cm}^2\text{-sec-sr}$) at greater than 10 MeV.

