

**Space Weather Highlights**  
**18 January 2010 – 24 January 2010**

**SWO PRF 1795**  
**26 January 2010**

Solar activity was at very low to moderate levels during the period. Region 1040 (N29, L=238, class/area Eki on 13 January) quietly rotated off the disk on 19 January. New Region 1041 (S25, L=052, class/area, 200/Eso on 22 January) rotated onto the disk on 19 January as a 10-spot, beta sunspot group. Prior to it rotating on the disk, the region produced an EUVI wave observed by STEREO-B at 17/0356 UTC. During this same period, SOHO C2 imagery indicated a CME had lifted off the east limb. On 19 and 20 January, Region 1041 produced a total of six M-class x-ray events; the largest a M3.4/Sf at 20/1755 UTC. Activity decayed to mostly very low levels through the remainder of the period. New Region 1042 (N22, L=131, class/area, 190/Cao on 23 January) emerged on the disk on 22 January as a beta sunspot group. The region was quiet and stable.

No proton events were observed at geosynchronous orbit.

The greater than 2 MeV electron flux at geosynchronous orbit was at normal background levels during the period.

Geomagnetic field activity was predominately quiet during the period. The exceptions consisted of an interval of generally unsettled to active levels from 20/1500 UTC - 21/1200 UTC, and brief periods of unsettled to active levels at high latitudes from 0900 – 1500 UTC on 23 January and 0600 – 1500 UTC on 24 January. Observations from the ACE spacecraft indicated the onset of a co-rotating interaction region at 20/0900 UTC in advance of a coronal hole high speed stream. Solar wind velocity increased from 288 km/s at 20/0800 UTC to a maximum of 534 km/s at 20/2327 UTC, while density peaked at 19 p/cc at 20/1959 UTC. During this period, the southward component of the interplanetary magnetic field (IMF) ranged between +15nT and -17nT. Thereafter, the magnetic field decayed, while solar wind velocity steadily decreased, ending the summary period near 380 km/s.

**Space Weather Outlook**  
**27 January 2010 – 22 February 2010**

Solar activity is expected to be at very low to low levels for the forecast period. Isolated moderate activity is possible from 14 – 22 February with the return of Region 1041 (S25, L=052

No proton events are expected at geosynchronous orbit.

The greater than 2 MeV electron flux at geosynchronous orbit is expected to be at normal levels through the period.

The geomagnetic field is expected to be at predominantly quiet levels for the forecast period. A period of unsettled to active levels are expected 16 – 17 February as a recurrent coronal hole high speed stream is expected to become geoeffective. The geomagnetic field is expected to be at predominantly quiet levels for the forecast period. A period of unsettled to active levels are expected 16 – 17 February as a recurrent coronal hole high speed stream is expected to become geoeffective



### *Daily Solar Data*

Date	Radio Flux 10.7 cm	Sun spot No.	Sunspot Area (10 <sup>-6</sup> hemi.)	X-ray Background	Flares						
					X-ray Flux			Optical			
					C	M	X	S	1	2	3 4
18 January	82	14	140	B1.9	1	0	0	1	0	0	0 0
19 January	84	0	0	B3.3	6	2	0	2	0	0	0 0
20 January	82	16	60	B5.0	9	4	0	6	0	0	0 0
21 January	83	17	190	B1.5	3	0	0	2	0	0	0 0
22 January	82	30	240	A8.4	0	0	0	0	0	0	0 0
23 January	85	40	380	A8.0	0	0	0	0	0	0	0 0
24 January	85	32	330	A9.8	0	0	0	0	0	0	0 0

### *Daily Particle Data*

Date	Proton Fluence (protons/cm <sup>2</sup> -day-sr)			Electron Fluence (electrons/cm <sup>2</sup> -day-sr)		
	>1 MeV	>10 MeV	>100 MeV	>.6 MeV	>2MeV	>4 MeV
18 January	6.0e+06	2.1e+04	4.6e+03		1.6e+05	
19 January	5.1e+06	2.0e+04	4.5e+03		9.5e+04	
20 January	2.7e+06	2.0e+04	4.3e+03		6.1e+04	
21 January	2.5e+05	2.0e+04	4.0e+03		5.6e+04	
22 January	2.1e+05	1.9e+04	3.9e+03		7.4e+04	
23 January	2.5e+05	1.9e+04	4.2e+03		5.5e+05	
24 January	1.9e+05	2.0e+04	4.4e+03		5.7e+05	

### *Daily Geomagnetic Data*

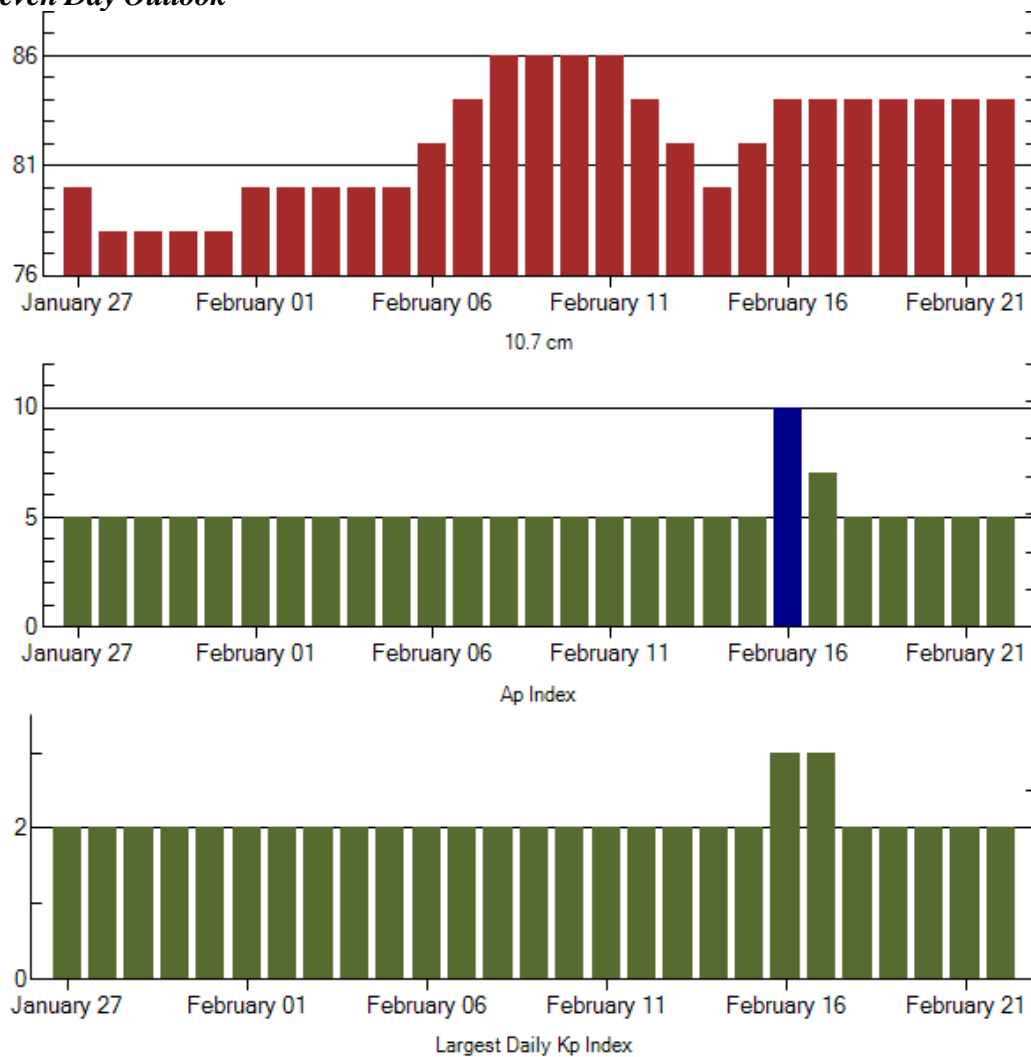
Date	Middle Latitude Fredericksburg		High Latitude College		Estimated Planetary	
	A	K-indices	A	K-indices	A	K-indices
18 January	2	0-1-0-0-1-1-0-1	1	0-0-0-0-0-1-0-0	3	0-1-1-0-1-1-1-1
19 January	2	1-0-0-0-0-2-1-0	0	0-0-0-1-0-0-0-0	1	1-0-0-0-0-0-0-1
20 January	6	1-0-2-1-2-3-2-2	14	0-0-1-0-4-5-4-2	14	1-0-1-0-2-5-4-4
21 January	4	2-2-2-1-1-1-0-0	9	2-2-3-4-3-1-0-0	4	1-3-2-1-1-0-0-0
22 January	2	1-1-0-1-1-1-0-1	1	0-0-0-2-0-0-0-0	2	1-1-0-0-0-0-0-1
23 January	4	2-1-1-2-1-0-1-1	7	1-0-2-4-3-1-0-0	4	2-1-2-2-1-0-0-1
24 January	2	0-1-1-2-1-0-0-0	10	0-1-3-4-4-2-1-0	4	1-1-2-2-1-0-0-1

### *Alerts and Warnings Issued*

Date & Time of Issue	Type of Alert or Warning	Date & Time of Event UTC
20 Jan 1647	WARNING: Geomagnetic K = 4	20 Jan 1700 - 2000
20 Jan 1714	ALERT: Geomagnetic K = 4	20 Jan 1708
20 Jan 1747	WARNING: Geomagnetic K = 5	20 Jan 1800 - 2000



## 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
27 Jan	80	5	2	10 Feb	86	5	2
28	78	5	2	11	86	5	2
29	78	5	2	12	84	5	2
30	78	5	2	13	82	5	2
31	78	5	2	14	80	5	2
01 Feb	80	5	2	15	82	5	2
02	80	5	2	16	84	10	3
03	80	5	2	17	84	7	3
04	80	5	2	18	84	5	2
05	80	5	2	19	84	5	2
06	82	5	2	20	84	5	2
07	84	5	2	21	84	5	2
08	86	5	2	22	84	5	2
09	86	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
19 Jan	1303	1341	1350	M2.3	0.039								
19 Jan	2023	2035	2046	M1.7	0.018								
20 Jan	0645	0727	0734	M1.0	0.019	SF	S24E87		1041				
20 Jan	0742	0749	0753	M1.6	0.012	SF	S24E88		1041				
20 Jan	1046	1059	1110	M1.8	0.017								
20 Jan	1750	1755	1800	M3.4	0.017	SF	S26E81		1041				

### ***Flare List***

Date	Time			X-ray Class.	Imp / Brtns	Optical		Rgn
	Begin	Max	End			Location	Lat CMD	
18 January	0040	0041	0044		SF	N28W70		1040
	0301	0330	0405	B7.5				
	0532	0554	0607	B8.4				
	1954	2039	2106	C4.9				
	2222	2225	2228	B6.8				
19 January	0128	0130	0132		SF	N24W88		1040
	0614	0618	0636	B5.8				
	0703	0711	0717	B8.3				
	0834	0845	0914	C5.2				
	1025	1029	1036	C1.1				
	1303	1341	1350	M2.3				
	1532	1536	1543	C2.3				
	1744	1755	1821	C5.1				
	2023	2035	2046	M1.7				
20 January	2223	2233	2240	C4.5				
	2314	2326	2348	C2.2	SF	S25E92		1041
	0010	0022	0030	C4.0				
	0247	0253	0302	C1.7				
	0448	0457	0503	C5.0				
	0610	0618	0628	C3.9				
	0702	0727	0735	M1.0	SF	S24E87		1041
	0742	0756	0758	M1.6	SF	S24E88		1041
	0817	0821	0824		SF	S24E88		1041
	0923	0923	0929	C3.7	SF	S24E88		1041
	1046	1059	1110	M1.8				
	1228	1232	1236	C3.9				
	1319	1325	1344	C1.3				
	1429	1441	1446	B9.2				



*Flare List - continued*

Date	Time			X-ray Class.	Imp / Brtns	Optical	
	Begin	Max	End			Location Lat CMD	Rgn
20 January	1510	1520	1528	C2.2			
	1543	1546	1548	B9.4			
	1710	1713	1718	B6.9			
	1731	1731	1737	C1.0	SF	S26E83	1041
	1753	1755	1810	M3.4	SF	S26E81	1041
	2047	2051	2055	B6.0			
	2157	2213	2253	B6.7			
21 January	0021	0026	0029	B7.9			
	0119	0121	0125	C4.9	SF	S24E79	1041
	0321	0324	0327		SF	S25E75	1041
	0349	0354	0358	C2.3			
	1042	1049	1053	C1.2			
	1653	1733	1831	B4.6			
22 January	0257	0301	0309	B1.7			
	1048	1053	1055	B5.6			
	1105	1109	1118	B3.0			
	1548	1555	1602	B3.0			
	1637	1640	1644	B2.1			
	1707	1711	1714	B9.6			
	2018	2022	2025	B1.3			
	2124	2133	2136	B2.8			
23 January	2242	2246	2251	B1.7			
	0011	0021	0028	B2.3			
	0114	0119	0124	B2.8			
	0538	0544	0549	B2.4			
	0632	0636	0644	B1.9			
	0742	0748	0754	B4.4			
	1322	1331	1338	B2.2			
	1608	1612	1617	B3.8			
	1651	1656	1659	B2.5			
	2101	2106	2111	B2.5			
24 January	2147	2152	2158	B2.5			
	0052	0104	0110	B2.1			
	1231	1245	1258	B3.1			
	2037	2051	2105	B2.0			



## Region Summary

Date	Location		Sunspot Characteristics					Flares							
	° Lat ° CMD)	Helio	Area (10 <sup>-6</sup> hemi)	Extent (helio)	Spot Class	Spot Count	Mag Class	X-ray			Optical				
		Lon						C	M	X	S	1	2	3	4
Region 1040															
07 Jan	N28E59	241	80	5	Bxo	5	B								
08 Jan	N29E47	240	40	3	Bxo	4	B								
09 Jan	N30E35	239	70	10	Cri	10	B	1							
10 Jan	N30E18	243	130	15	Eao	15	B				5				
11 Jan	N29E10	237	300	9	Dhc	25	B								
12 Jan	N28W04	238	300	12	Eao	25	B	1							
13 Jan	N28W11	236	380	13	Eki	31	B								
14 Jan	N28W30	238	290	13	Eki	24	B				2				
15 Jan	N29W41	236	350	13	Eki	16	B	1							
16 Jan	N29W57	239	290	12	Cki	14	B								
17 Jan	N30W74	242	160	8	Dso	6	B	1							
18 Jan	N26W83	238	140	5	Dho	4	B				1				
								4	0	0	8	0	0	0	0
Crossed West Limb.															
Absolute heliographic longitude: 238															
Region 1041															
19 Jan	S27E90	52						5	2		1				
20 Jan	S25E77	52	60	10	Cso	6	B	9	4		6				
21 Jan	S24E61	55	190	11	Cao	7	B	3			2				
22 Jan	S25E50	52	200	14	Eso	7	B								
23 Jan	S24E35	54	190	11	Eai	9	B								
24 Jan	S24E23	53	170	9	Dsi	7	B								
								17	6	0	9	0	0	0	0
Still on Disk.															
Absolute heliographic longitude: 53															
Region 1042															
22 Jan	N22W28	130	40	4	Cso	3	B								
23 Jan	N22W42	131	190	7	Cao	11	B								
24 Jan	N21W56	132	160	6	Dai	5	B								
								0	0	0	0	0	0	0	0
Still on Disk.															
Absolute heliographic longitude: 130															



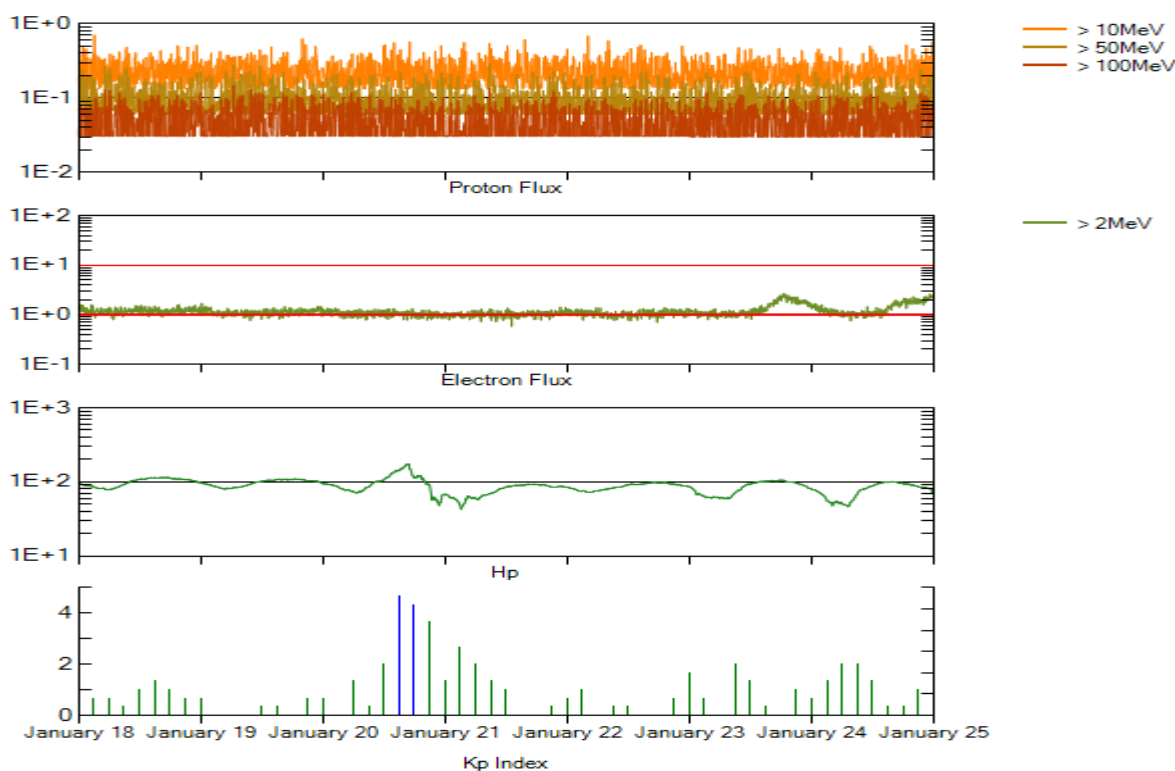
**Recent Solar Indices (preliminary)**  
**Of the observed monthly mean values**

Month	Sunspot Numbers					Radio Flux		Geomagnetic	
	Observed values			Smooth values		*Penticton	Smooth	Planetary	Smooth
	SEC	RI	RI/SEC	SEC	RI	10.7 cm	Value	Ap	Value
January	5.1	3.3	0.65	6.9	4.2	74.3	70.3	8	7.8
February	3.8	2.1	0.55	5.9	3.6	71.1	69.9	11	7.6
March	15.9	9.3	0.58	5.3	3.3	72.9	69.8	11	7.5
April	4.9	2.9	0.59	5.3	3.4	70.2	69.8	9	7.3
May	5.7	3.2	0.56	5.7	3.5	68.4	69.8	6	7.2
June	4.2	3.4	0.81	5.2	3.3	65.9	69.4	7	7.0
July	1.0	0.8	0.80	4.5	2.8	65.7	68.8	5	6.8
August	0.0	0.5	**	4.4	2.7	66.3	68.6	5	6.3
September	1.5	1.1	0.73	3.7	2.3	67.1	68.4	6	5.8
October	5.2	2.9	0.56	2.9	1.9	68.3	68.2	7	5.4
November	6.8	4.1	0.60	2.7	1.8	68.6	68.3	4	5.1
December	1.3	0.8	0.62	2.7	1.7	69.2	68.5	4	4.9
<b>2009</b>									
January	2.8	1.3	0.46	3.0	1.8	69.8	68.7	4	4.7
February	2.5	1.4	0.56	3.1	1.9	70.0	68.8	5	4.7
March	0.7	0.7	1.00	3.4	2.0	69.2	69.0	5	4.6
April	1.2	1.2	1.00	3.7	2.2	69.7	69.3	4	4.3
May	3.9	2.9	0.74	3.8	2.3	70.5	69.7	4	4.1
June	6.6	2.6	0.39	4.4	2.7	68.6	70.2	4	4.0
July	5.0	3.5	0.70			68.2		4	
August	0.3	0.0	0.00			67.4		5	
September	6.6	4.2	0.64			70.5		4	
October	7.0	4.6	0.66			72.3		3	
November	7.7	4.2	0.55			73.6		3	
December	15.7	10.6	0.68			76.8		1	

**NOTE:** Values are final except for the most recent 6 months which are considered preliminary. Cycle 23 started in May 1996 with an RI=8.0. Cycle 23 maximum was April 2000 with an RI=120.8.

\*\* SWPC sunspot number was less than RI value, so a ratio could not be computed.





*Weekly Geosynchronous Satellite Environment Summary*  
*Week Beginning 18 January 2010*

**GOES-11 designated Primary Proton and Electron Satellite.**

Protons plot contains the five-minute averaged integral proton flux (protons/cm<sup>2</sup>–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/cm<sup>2</sup>–sec–sr) with energies greater than 2 MeV at GOES-11.

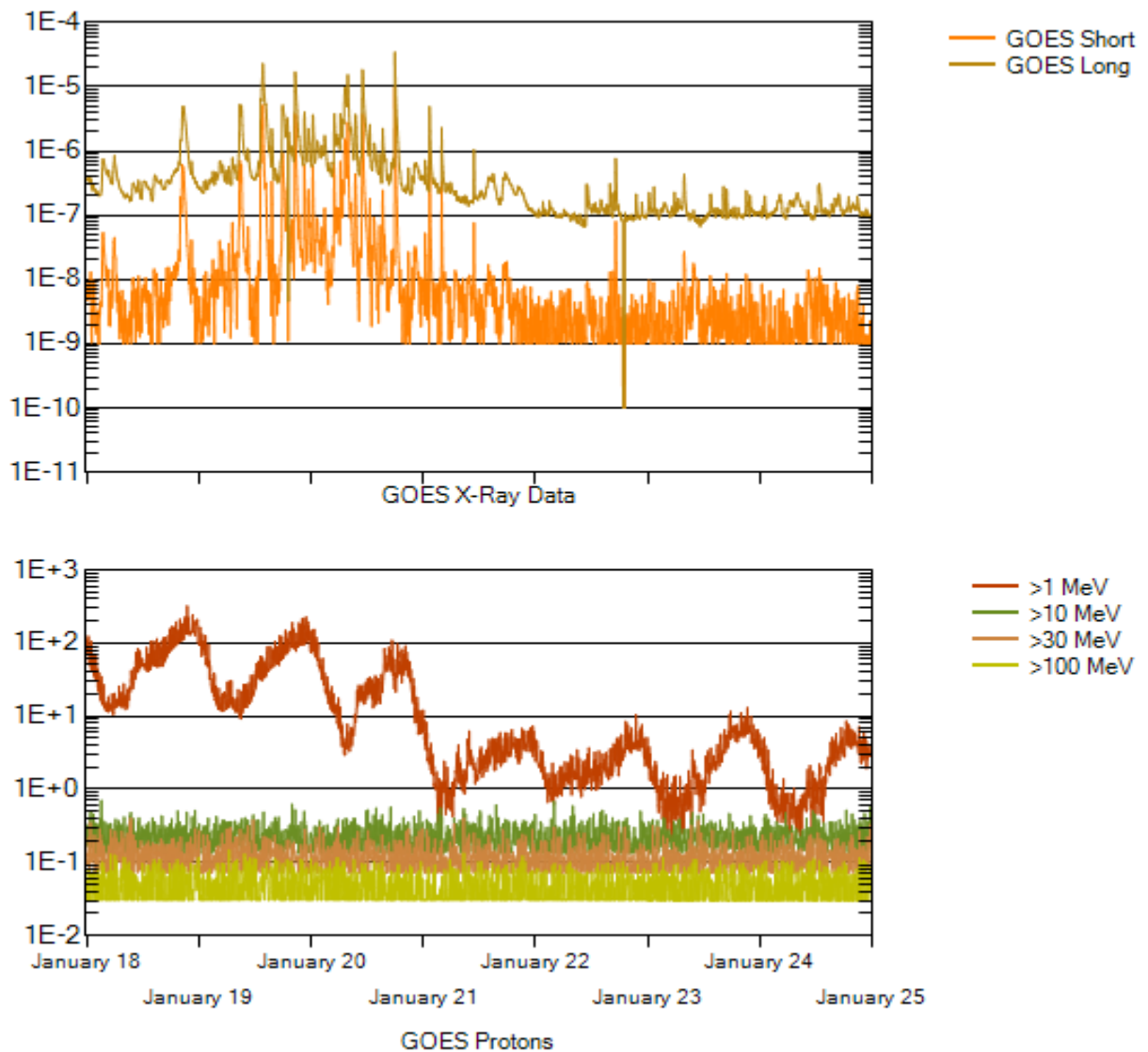
Hp plot contains the five minute averaged magnetic field H - component in nanoteslas (nT) as measured by GOES-11. The H component is parallel to the spin axis of the satellite, which is nearly parallel to the Earth's rotation axis.

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 SWPC 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 ( $\text{Watts/m}^2$ ) as measured by GOES 14 (W105) in two wavelength bands, 0.05 - 0.4 and 0.1 - 0.8 nm. The letters A, B, C, M and X refer to x-ray event levels for the 0.1 - 0.8 nm band.

Proton plot contains the five-minute averaged integral proton flux ( $\text{protons/cm}^2\text{-sec-sr}$ ) as measured by GOES-11 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.

