

Solar activity ranged from very low to low levels. Very low levels were observed during the entire period with the exception of 01 December, when Region 1130 (N14, L = 331, class/area Dai/250 on 01 December) produced an isolated C1.0 flare at 01/0622 UTC. Region 1130 began a gradual decrease in spot number and area on 01 December. Region 1129 (S26, L = 044, class/area Axx/01 on 29 November) was also in decay phase and rotated off the visible disk on 30 November. Region 1131 (N31, L = 211, class/area Hhx/390 on 03 December) rotated on the disk on 02 December as a uni-polar spot group but remained stable. Region 1133 (N14, L = 180, class/area Hhx/100 on 04 December) rotated on the disk late in the period on 04 December, also as a uni-polar spot group. Region 1132 (N11, L = 251, class/area Cro/030 on 04 December) emerged late in the forecast period producing small B-class events, before decaying.

No proton events were observed at geosynchronous orbit.

The greater than 2 MeV electron flux at geosynchronous orbit was at low levels.

The geomagnetic field was predominantly quiet for the entire forecast period. Solar wind speeds measured by the ACE spacecraft indicated a decline in wind speeds from 440 km/s on 29 November to around 290 km/s on 04 December. This gradual decline was attributed to the waning effects of a coronal hole high-speed wind stream (CH HSS) combined with a slow moving CME observed on 24 November.

### **Space Weather Outlook**

**08 December 2010 - 03 January 2011**

Solar activity is expected to be very low to low throughout the forecast period.

No proton events are expected at geosynchronous orbit.

The greater than 2 MeV electron flux at geosynchronous orbit is expected to be at low levels from 08-12 December. Activity is expected to increase from moderate to high levels from 13-18 December. Low levels are expected for the remainder of the period.

The Geomagnetic field is expected to be at predominantly quiet levels from 08-09 December. Activity is expected to increase to quiet to unsettled levels on 10-14 December, due to the combined effects of a CME observed on 06 December and recurrent CH HSS becoming geoeffective. Activity is expected to decrease to mostly quiet levels until 24-25 December, when quiet to unsettled levels are expected due to another CH HSS moving into geoeffective position. Predominantly quiet levels are expected for the remainder of the period.



### *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
29 November	83	31	90	A9.2	0	0	0	0	0	0	0 0
30 November	86	24	190	B1.1	0	0	0	0	0	0	0 0
01 December	87	25	250	B1.1	1	0	0	0	0	0	0 0
02 December	87	32	480	B1.1	0	0	0	0	0	0	0 0
03 December	87	27	540	B1.2	0	0	0	0	0	0	0 0
04 December	87	48	560	B1.1	0	0	0	0	0	0	0 0
05 December	88	47	490	B1.1	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
29 November	4.3e+05	1.4e+04	3.6e+03		1.8e+06	
30 November	4.4e+05	1.5e+04	3.7e+03		2.3e+06	
01 December	5.7e+05	1.4e+04	3.4e+03		2.6e+06	
02 December	4.6e+05	1.4e+04	3.4e+03		1.7e+06	
03 December	7.0e+05	1.4e+04	3.3e+03		2.0e+06	
04 December	5.2e+05	1.4e+04	3.6e+03		1.6e+06	
05 December	6.4e+05	1.4e+04	3.3e+03		1.5e+06	

### *Daily Geomagnetic Data*

Date	Middle Latitude Fredericksburg		High Latitude College		Estimated Planetary	
	A	K-indices	A	K-indices	A	K-indices
29 November	2	0-0-1-1-1-0-1-1	4	0-0-2-3-2-0-0-0	3	0-0-1-1-1-1-1-0
30 November	2	1-1-0-1-1-1-1-0	3	0-0-0-3-0-2-1-1	3	0-1-0-1-1-1-1-0
01 December	1	0-0-0-0-0-1-1-0	1	0-0-1-0-0-0-1-0	2	1-0-0-0-0-0-1-1
02 December	1	1-1-0-0-0-0-0-0	0	0-0-0-0-0-0-0-0	3	2-1-0-0-1-0-0-0
03 December	0	0-1-0-0-0-0-0-0	0	0-0-0-0-0-0-0-0	1	0-1-0-0-0-0-0-0
04 December	1	0-0-0-0-0-1-1-0	0	0-0-1-0-0-0-0-0	1	0-0-1-0-0-0-0-0
05 December	0	0-0-0-0-0-0-0-1	0	0-0-0-1-0-0-0-0	1	0-0-0-0-0-0-0-1

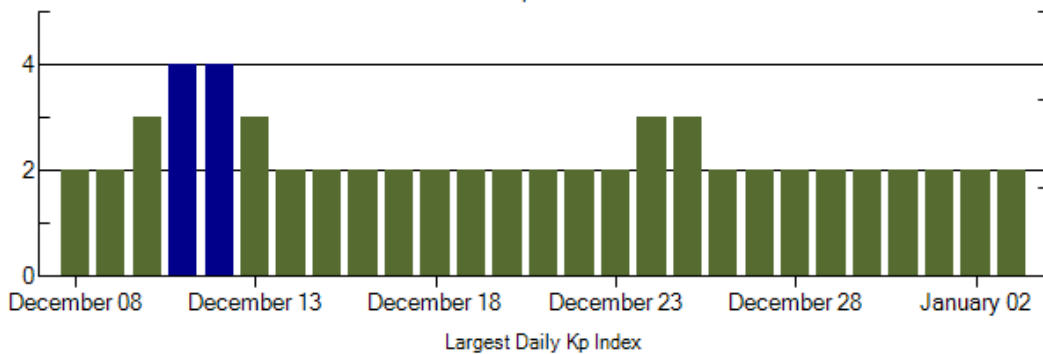
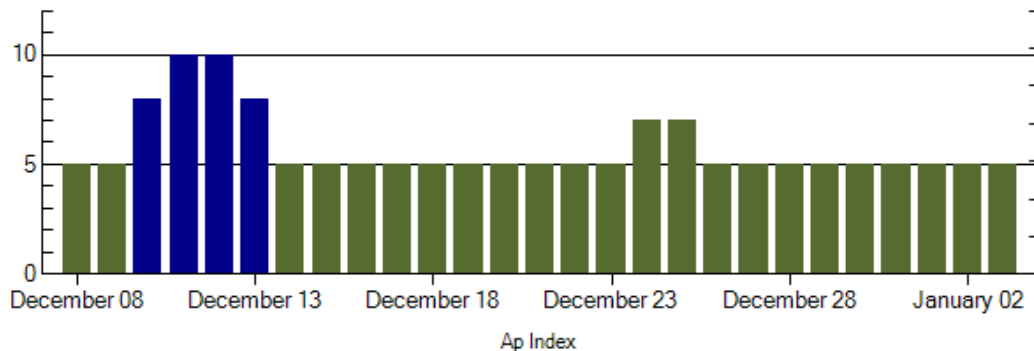
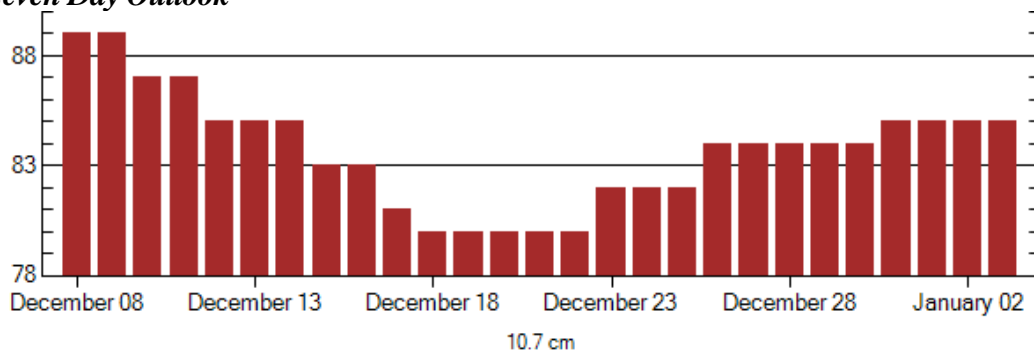
### *Alerts and Warnings Issued*

Date & Time of Issue	Type of Alert or Warning	Date & Time of Event UTC
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*No Alerts Issued*



## 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
08 Dec	89	5	2	22 Dec	80	5	2
09	89	5	2	23	82	5	2
10	87	8	3	24	82	7	3
11	87	10	4	25	82	7	3
12	85	10	4	26	84	5	2
13	85	8	3	27	84	5	2
14	85	5	2	28	84	5	2
15	83	5	2	29	84	5	2
16	83	5	2	30	84	5	2
17	81	5	2	31	85	5	2
18	80	5	2	01 Jan	85	5	2
19	80	5	2	02	85	5	2
20	80	5	2	03	85	5	2
21	80	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	Brtns	Lat CMD	#	245	2695	II	IV

No Events Observed

### ***Flare List***

Date	Time			X-ray	Imp /	Optical		Rgn
	Begin	Max	End			Location	Lat CMD	
29 November	0429	0433	0443	B1.2				1130
	0525	0530	0538	B2.4				1130
	1059	1103	1106	B1.6				1130
	0920	0923	0928	B1.6				1130
	1526	1530	1534	B1.9				1130
	1327	1339	1404	B1.9				1130
	1436	1447	1452	B2.6				1130
30 November	0129	0134	0137	B3.3				
	0816	0838	0843	B2.1				1130
	0451	0454	0458	B1.8				1130
	0529	0533	0535	B1.8				1130
	2016	2023	2029	B2.7				1130
	2036	2045	2055	B8.1				1130
01 December	0012	0016	0019	B2.7				1130
	0037	0040	0043	B2.3				
	0241	0244	0249	B2.4				1130
	0453	0500	0517	B2.6				1130
	0615	0622	0635	C1.0				1130
	0915	0918	0921	B1.9				1130
	0951	0956	1001	B3.7				1130
	1134	1148	1159	B3.9				1130
	1551	1557	1602	B2.8				
	1745	1754	1800	B3.6				1130
02 December	1836	1845	1851	B6.1				1130
	0214	0216	0217	B2.3				1131
	0256	0306	0313	B1.7				1130
	1220	1224	1229	B2.1				1130
	1255	1258	1303	B1.7				
	1305	1308	1310	B2.7				
	2224	2228	2230	B2.6				
03 December	0651	0658	0704	B5.3				1131
	0900	0903	0905	B1.9				
04 December	0501	0510	0522	B3.1				
	1356	1401	1406	B1.9				1132
	2111	2118	2121	B5.6				1132



### Flare List –Continued

Date	Time			X-ray Class.	Imp / Brtns	Optical	Rgn
	Begin	Max	End			Location Lat CMD	
05 December	0205	0208	0211	B2.5			1132
	0438	0441	0445	B1.9			
	0503	0506	0510	B2.3			1131
	0524	0530	0541	B4.2			1130
	0637	0641	0645	B2.7			1130
	0828	0832	0835	B2.0			
	1057	1103	1121	B3.0			1130
	1302	1306	1308	B2.2			1131

### 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 1127															
16 Nov	N25E71	55	120	2	HSX	1	A								
17 Nov	N25E56	59	90	2	HSX	1	A								
18 Nov	N25E43	58	60	1	HSX	1	A								
19 Nov	N24E30	58	90	2	HSX	1	A								
20 Nov	N24E18	57	70	2	HSX	1	A								
21 Nov	N25E05	57	60	2	HSX	1	A								
22 Nov	N25W08	56	80	2	HSX	1	A								
23 Nov	N25W21	57	60	4	HSX	2	A								
24 Nov	N25W34	56	50	2	HSX	1	A								
25 Nov	N24W46	56	40	2	HSX	1	A								
26 Nov	N23W59	59	30	1	HSX	1	A								
27 Nov	N24W71	54	30	2	HSX	1	A								
28 Nov	N24W84	54													
29 Nov	N24W97	54													

0 0 0 0 0 0 0 0

Crossed West Limb.

Absolute heliographic longitude: 57



### Region Summary - continued

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
<i>Region 1128</i>															
25 Nov	S16E59	310	10	1	AXX	1	A								
26 Nov	S14E46	310	10	3	BXO	2	B								
27 Nov	S14E35	310													
28 Nov	S14E22	310													
29 Nov	S14E09	310													
30 Nov	S14W04	310													
01 Dec	S14W17	310													
02 Dec	S14W30	310													
03 Dec	S14W43	310													
04 Dec	S14W56	310													

#### Region 1128

25 Nov	S16E59	310	10	1	AXX	1	A								
26 Nov	S14E46	310	10	3	BXO	2	B								
27 Nov	S14E35	310													
28 Nov	S14E22	310													
29 Nov	S14E09	310													
30 Nov	S14W04	310													
01 Dec	S14W17	310													
02 Dec	S14W30	310													
03 Dec	S14W43	310													
04 Dec	S14W56	310													

0 0 0 0 0 0 0 0

Died on Disk.

Absolute heliographic longitude: 310

#### Region 1129

27 Nov	S26W60	43	15	1	BXO	1	B								
28 Nov	S25W76	46	30	10	BXO	3	B								
29 Nov	S26W88	44	10	1	AXX	1	A								

0 0 0 0 0 0 0 0

Crossed West Limb.

Absolute heliographic longitude: 43

#### Region 1130

28 Nov	N13E00	330	60	5	CSI	11	B								
29 Nov	N13W14	331	80	6	DAI	10	B								
30 Nov	N12W27	330	190	8	DRO	14	B								
01 Dec	N14W40	331	250	9	DAI	15	B	1							
02 Dec	N14W52	330	240	10	DRI	11	B								
03 Dec	N12W67	331	150	7	CRO	6	B								
04 Dec	N12W83	336	80	3	HSX	1	A								
05 Dec	N12W94	331	40	1	HSX	1	A								

1 0 0 0 0 0 0 0

Still on Disk.

Absolute heliographic longitude: 330



### *Region Summary - continued*

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
Region 1131														
02 Dec	N30E68	208	240	5	HSX	1	A							
03 Dec	N31E53	211	390	4	HHX	1	A							
04 Dec	N30E40	211	350	5	CHO	2	B							
05 Dec	N31E28	210	310	4	HHX	1	A							
								0	0	0	0	0	0	0

Still on Disk.

Absolute heliographic longitude: 210

<i>Region 1132</i>															
04 Dec	N11W01	251	30	4	CRO	4	B								
05 Dec	N11W15	252	10	6	BXO	4	B								
								0	0	0	0	0	0	0	0

Still on Disk.

Absolute heliographic longitude: 251

<i>Region 1133</i>															
04 Dec	N14E72	180	100	2	HHX	1	A								
05 Dec	N14E58	180	80	2	HSX	1	A								
								0	0	0	0	0	0	0	0

Still on Disk.

Absolute heliographic longitude: 180



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

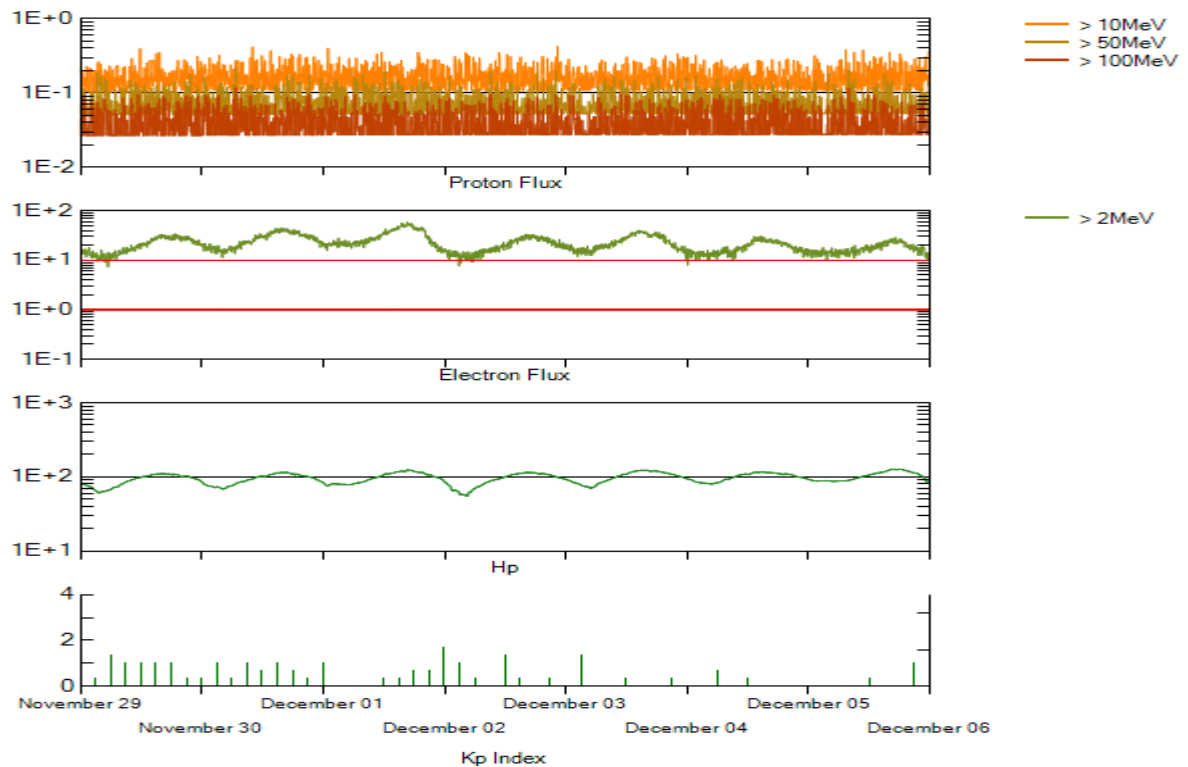
Month	of the observed monthly mean values					Radio Flux		Geomagnetic	
	Sunspot Numbers					Penticton	Smooth	Planetary	Smooth
	Observed values	Ratio		Smooth values					
SEC	RI	RI/SEC	SEC	RI	10.7 cm	Value	Ap	Value	
2008									
December	1.3	0.8	0.62	2.7	1.7	69.2	68.5	4	4.9
2009									
January	2.8	1.3	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	0.8	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	2.9	0.39	4.4	2.7	68.6	70.2	4	4.0
July	5.0	3.2	0.70	5.8	3.6	68.2	71.0	4	3.9
August	0.3	0.0	0.00	7.7	4.8	67.4	72.1	5	3.8
September	6.6	4.3	0.64	9.9	6.2	70.5	73.3	4	3.8
October	7.0	4.8	0.66	11.3	7.1	72.3	74.1	3	4.1
November	7.7	4.1	0.55	12.4	7.6	73.6	74.5	3	4.5
December	15.7	10.8	0.68	13.6	8.3	76.8	74.9	2	4.8
2010									
January	21.3	13.2	0.62	14.8	9.3	81.1	75.5	3	5.0
February	31.0	18.8	0.60	16.7	10.6	84.7	76.5	5	5.1
March	24.7	15.4	0.62	19.1	12.3	83.3	77.5	5	5.3
April	11.2	8.0	0.71	21.4	14.0	75.9	78.3	10	5.5
May	19.9	8.7	0.44	23.8	15.5	73.8	79.0	8	5.7
June	17.9	13.6	0.75			72.6		7	
July	23.1	16.1	0.70			79.9		5	
August	28.2	19.6	0.70			79.7		8	
September	35.6	25.2	0.71			81.1		5	
October	35.0	23.5	0.67			81.6		6	
November	36.1	21.6	0.60			82.5		5	

**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 29 November 2010*

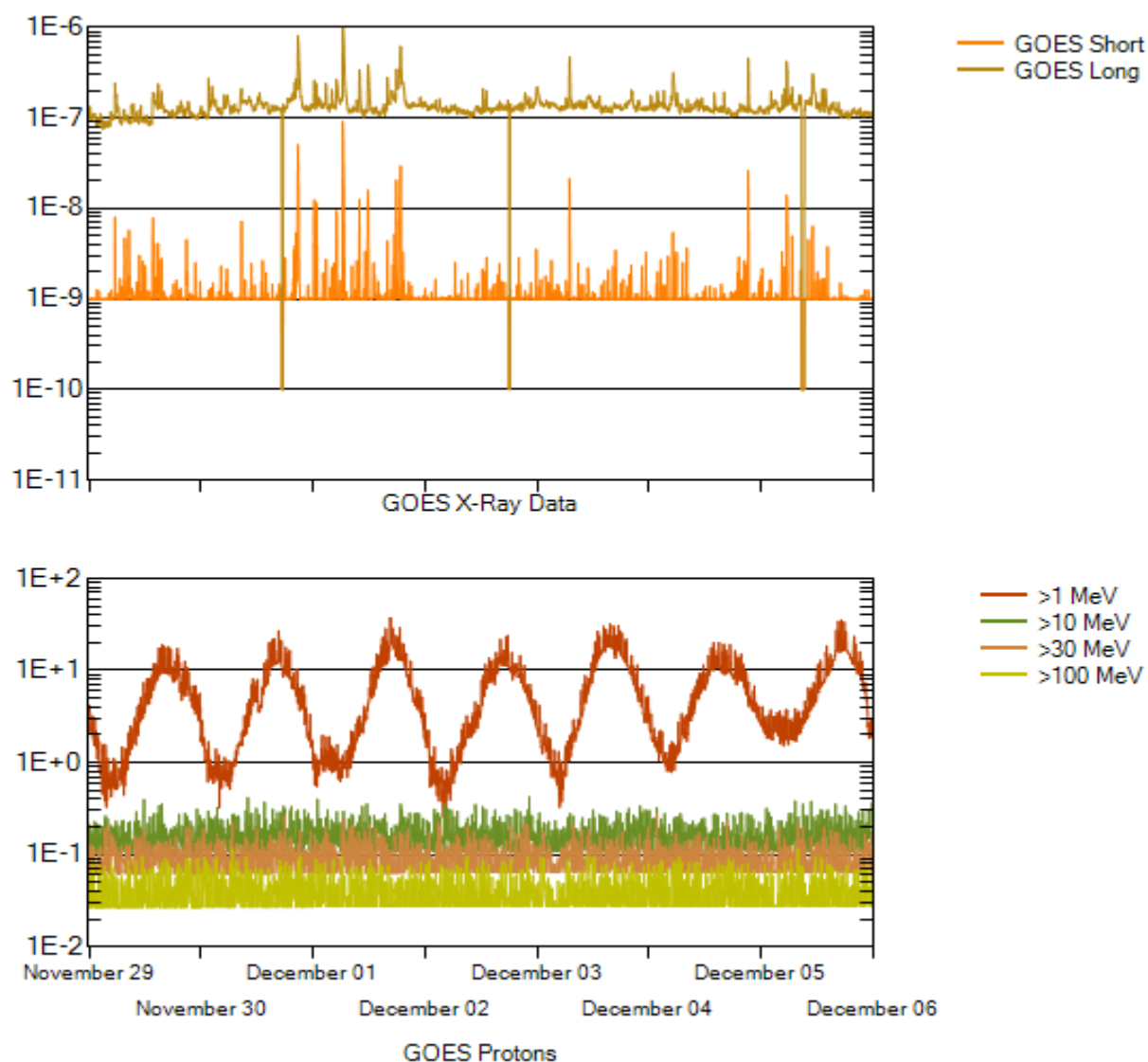
The proton flux plot contains the five-minute averaged integral proton flux (protons/cm<sup>2</sup>–sec–sr) as measured by GOES-13 (W75) for each of three energy thresholds: greater than 10, 50, and 100 MeV. The electron flux plot contains the five-minute averaged integral electron flux (electrons/cm<sup>2</sup>–sec–sr) with energies greater than 2 MeV at GOES-13.

The Hp plot contains the five minute averaged Hp magnetic field component in nanoteslas (nT) as measured by GOES-13. The Hp 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*

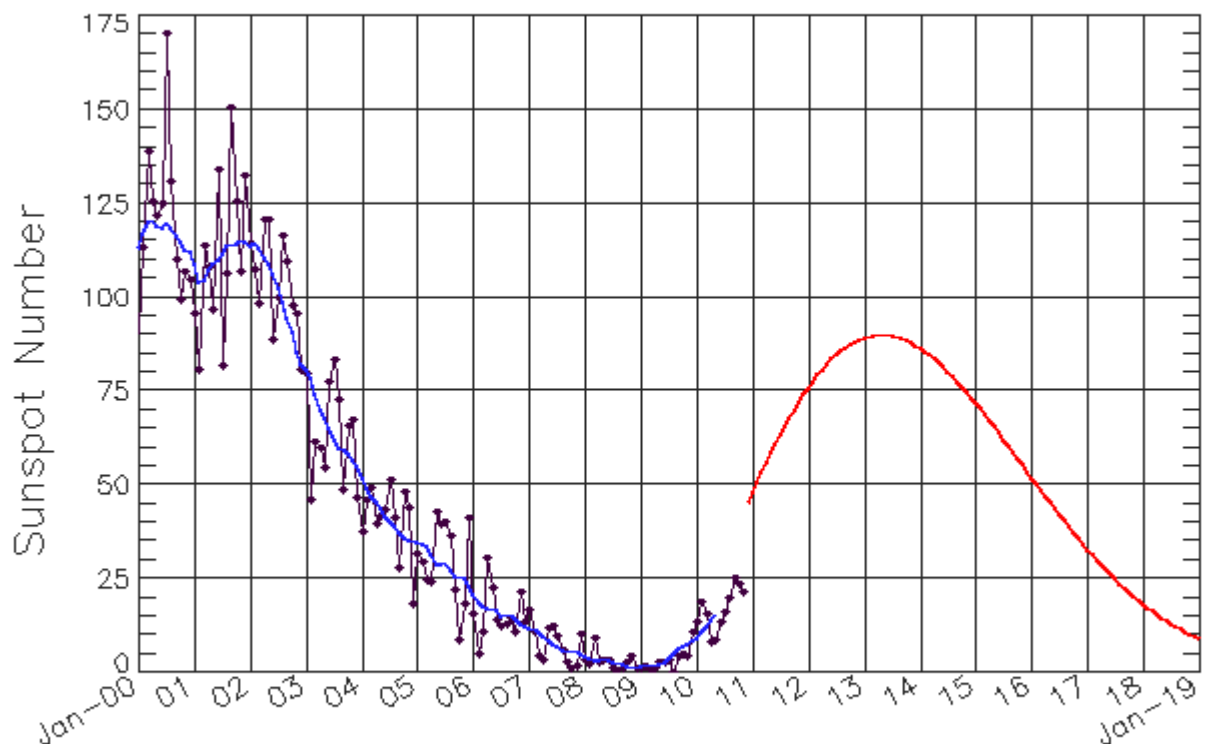
The x-ray plot contains five-minute averaged x-ray flux ( $\text{Watts/m}^2$ ) as measured by GOES 14 (W105) in two wavelength bands, 0.05 - 0.4 and 0.1 - 0.8 nm. The letters A, B, C, M and X refer to x-ray event levels for the 0.1 - 0.8 nm band.

The proton plot contains the five-minute averaged integral proton flux ( $\text{protons/cm}^2\text{-sec-sr}$ ) as measured by GOES-13 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.



# ISES Solar Cycle Sunspot Number Progression

Observed data through Nov 2010



— Smoothed Monthly Values —●— Monthly Values — Predicted Values (Smoothed)

Updated 2010 Dec 7

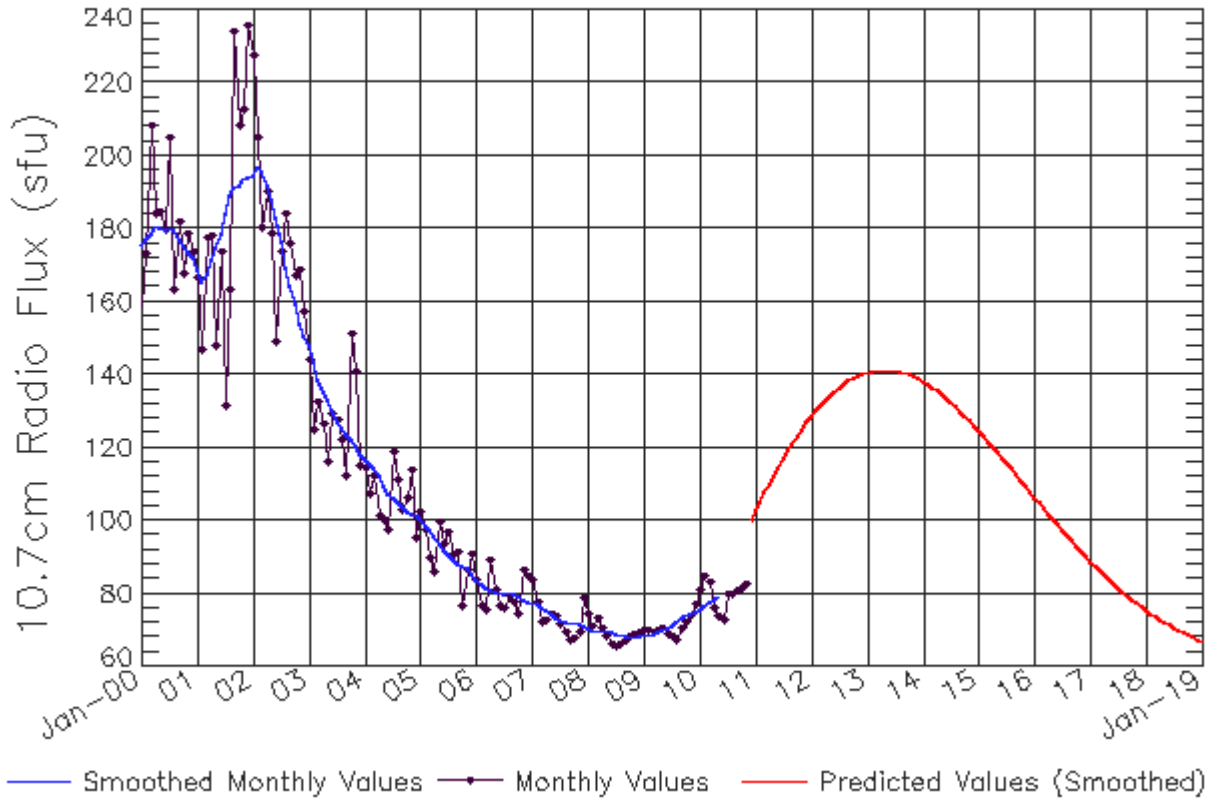
NOAA/SWPC Boulder, CO USA

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2009	2 (***)	2 (***)	2 (***)	2 (***)	2 (***)	3 (***)	4 (***)	5 (***)	6 (***)	7 (***)	8 (***)	8 (***)
2010	9 (***)	11 (***)	12 (***)	14 (***)	16 (***)	18 (1)	21 (2)	23 (3)	26 (5)	30 (5)	34 (6)	38 (7)
2011	42 (7)	46 (8)	49 (9)	53 (9)	57 (10)	61 (10)	63 (10)	66 (10)	68 (10)	70 (10)	72 (10)	74 (10)
2012	76 (10)	78 (10)	79 (10)	81 (10)	82 (10)	84 (10)	85 (10)	86 (10)	87 (10)	88 (10)	88 (10)	89 (10)
2013	89 (10)	90 (10)	90 (10)	90 (10)	90 (10)	90 (10)	90 (10)	89 (10)	89 (10)	89 (10)	88 (10)	87 (10)
2014	86 (10)	86 (10)	85 (10)	84 (10)	83 (10)	81 (10)	80 (10)	79 (10)	78 (10)	76 (10)	75 (10)	73 (10)
2015	72 (10)	70 (10)	69 (10)	67 (10)	65 (10)	64 (10)	62 (10)	60 (10)	59 (10)	57 (10)	55 (10)	54 (10)
2016	52 (10)	50 (10)	49 (10)	47 (10)	45 (10)	44 (10)	42 (10)	40 (10)	39 (10)	37 (10)	36 (10)	34 (10)
2017	33 (10)	31 (10)	30 (10)	29 (10)	27 (10)	26 (10)	25 (10)	24 (10)	23 (10)	21 (10)	20 (10)	19 (10)
2018	18 (10)	17 (10)	16 (10)	15 (10)	15 (10)	14 (10)	13 (10)	12 (10)	12 (10)	11 (10)	10 (10)	10 (10)
2019	9 (10)	8 (10)	8 (10)	7 (10)	7 (10)	6 (10)	6 (10)	6 (10)	5 (10)	5 (10)	4 (10)	4 (10)



# ISES Solar Cycle F10.7cm Radio Flux Progression

Observed data through Nov 2010



Updated 2010 Dec 7

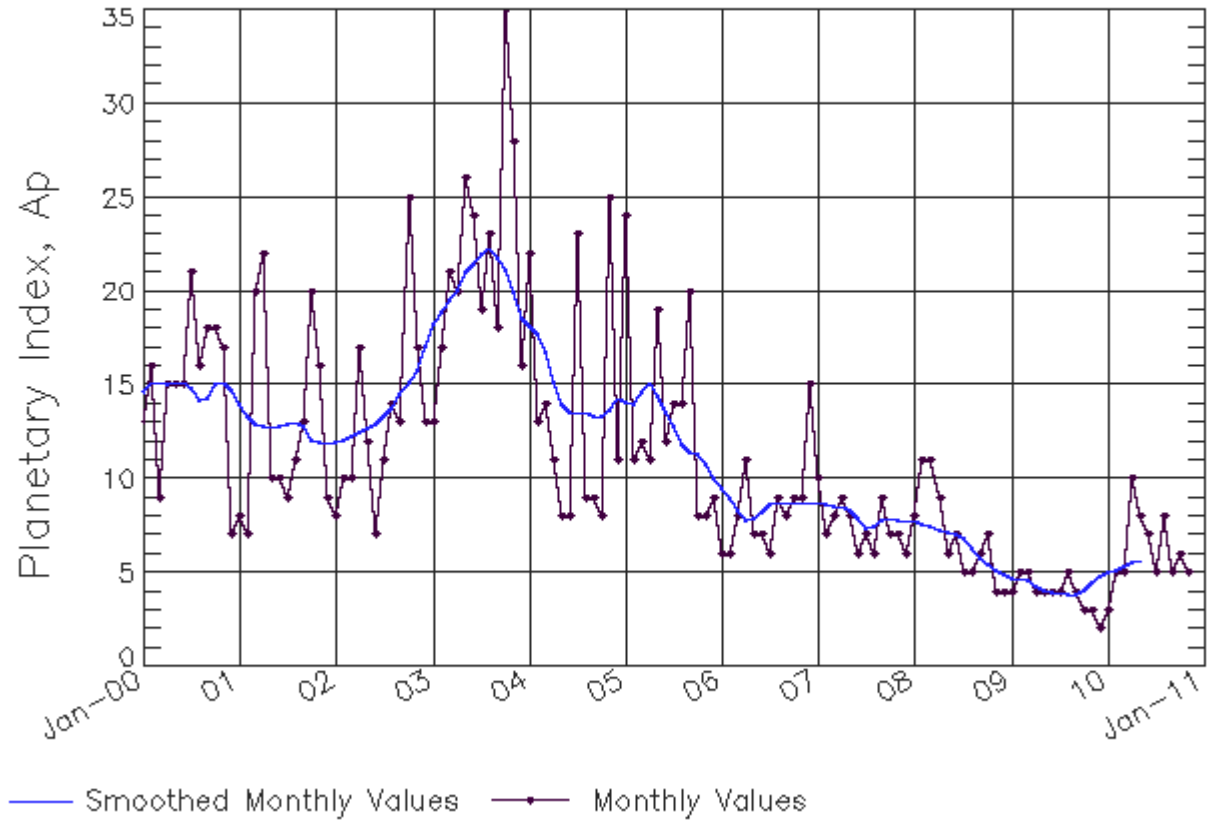
NOAA/SWPC Boulder, CO USA

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2009	69 (***)	69 (***)	69 (***)	69 (***)	70 (***)	70 (***)	71 (***)	72 (***)	73 (***)	74 (***)	75 (***)	75 (***)
2010	76 (***)	77 (***)	78 (***)	78 (***)	79 (***)	80 (1)	82 (1)	84 (2)	86 (3)	88 (4)	91 (4)	95 (5)
2011	98 (6)	101 (7)	105 (8)	108 (8)	111 (9)	115 (9)	117 (9)	119 (9)	121 (9)	123 (9)	125 (9)	127 (9)
2012	128 (9)	130 (9)	132 (9)	133 (9)	134 (9)	135 (9)	136 (9)	137 (9)	138 (9)	139 (9)	140 (9)	140 (9)
2013	141 (9)	141 (9)	141 (9)	141 (9)	141 (9)	141 (9)	141 (9)	141 (9)	140 (9)	140 (9)	139 (9)	139 (9)
2014	138 (9)	137 (9)	136 (9)	136 (9)	135 (9)	134 (9)	132 (9)	131 (9)	130 (9)	129 (9)	127 (9)	126 (9)
2015	125 (9)	123 (9)	122 (9)	120 (9)	119 (9)	117 (9)	116 (9)	114 (9)	113 (9)	111 (9)	110 (9)	108 (9)
2016	106 (9)	105 (9)	103 (9)	102 (9)	100 (9)	99 (9)	97 (9)	96 (9)	94 (9)	93 (9)	92 (9)	90 (9)
2017	89 (9)	88 (9)	86 (9)	85 (9)	84 (9)	83 (9)	82 (9)	80 (9)	79 (9)	78 (9)	77 (9)	76 (9)
2018	75 (9)	75 (9)	74 (9)	73 (9)	72 (9)	71 (9)	71 (9)	70 (9)	69 (9)	69 (9)	68 (9)	67 (9)
2019	67 (9)	66 (9)	66 (9)	65 (9)	65 (9)	65 (9)	64 (9)	64 (9)	63 (9)	63 (9)	63 (9)	63 (9)



# ISES Solar Cycle Ap Progression

Observed data through Nov 2010



Updated 2010 Dec 7

NOAA/SWPC Boulder, CO USA

