

Solar activity was at very low levels during 27 – 30 December. Activity increased to low levels on 31 December when Region 1138 (N13, L = 320, class/area Dai/060 on 28 December) produced a C1 flare at 31/0425 UTC. This event was associated with a Type II radio sweep with an estimated shock velocity of 875 km/s. Activity decreased to very low levels for the remainder of the summary period. A partial-halo CME was observed departing the southwest quadrant at around 30/0736 UTC associated with a filament eruption centered at N36W50. New Region 1140 (N32, L= 190, class/area Hsx/200 on 01 January) rotated onto the visible disk on 31 December. Two new regions emerged on the disk on 01 January; Region 1141 (N35, L = 267, class/area Dso/100 on 01 January) and Region 1142 (S14, L = 208, class/area Dso/090 on 02 January).

No proton events were observed at geosynchronous orbit.

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

Geomagnetic field activity was at quiet levels from 27 December until 28 December at 1200 UTC. During 28/1200-2100 UTC, activity increased to unsettled to minor storm levels, with two isolated periods of severe storm levels observed at high latitudes. Activity decreased to predominantly quiet levels for the rest of the period. The increased activity on 28 December was associated with the CME observed on 23 December. During this period, the Bz component of the interplanetary magnetic field (IMF) , as measured by the ACE spacecraft, reached a maximum deflection of -13nT at 28/1401 UTC, while total field (Bt) peaked at 14nT at 28/1315 UTC.

Space Weather Outlook

05 January - 31 January 2011

Solar activity is expected to be at very low levels with a chance for low levels from 05 – 13 January, as Regions 1141, 1142 and 1140 rotate off the visible disk. Activity is expected to decrease to predominantly very low levels for the remainder of the period.

No proton events are expected at geosynchronous orbit.

The greater than 2 MeV electron flux at geosynchronous orbit is expected to be at normal to moderate levels during 05 – 09 January. Flux levels are expected to increase to high levels during 10 – 14 and decrease to normal levels for the remainder of the period.

Geomagnetic field activity is expected to be at quiet levels on 05 January. Activity is expected to increase to quiet to unsettled levels during 06 - 07 January in response to a co-rotating interaction region in advance of a coronal hole high- speed stream (CH HSS). From 08-11 January, quiet to unsettled levels with isolated active levels are possible as the CH HSS moves into a geoeffective position. Activity is expected to decrease to predominantly quiet levels during 12-20 January. Quiet to unsettled levels are expected on 21-22 January in response to another CH HSS. Mostly quiet conditions are expected for the remainder of the period.



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	
27 December	80	14	50	A3.6	0	0	0	0	0	0	0	0	0
28 December	81	31	70	A4.5	0	0	0	0	0	0	0	0	0
29 December	83	37	60	A5.5	0	0	0	0	0	0	0	0	0
30 December	83	24	20	A6.5	0	0	0	0	0	0	0	0	0
31 December	91	23	190	A8.9	1	0	0	0	0	0	0	0	0
01 January	91	65	350	B1.0	0	0	0	1	0	0	0	0	0
02 January	91	38	260	A8.8	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)		
	>1 MeV	>10 MeV	>100 MeV	>.6 MeV	>2MeV	>4 MeV
27 December	2.8e+05	1.5e+04	4.2e+03		2.3e+06	
28 December	1.2e+06	1.6e+04	5.9e+03		1.7e+06	
29 December	5.6e+04	1.6e+04	5.3e+03		7.9e+05	
30 December	1.7e+05	1.4e+04	3.4e+03		8.3e+05	
31 December	6.1e+04	1.4e+04	3.3e+03		8.2e+05	
01 January	5.8e+04	1.4e+04	3.6e+03		8.2e+05	
02 January	1.3e+05	1.4e+04	3.6e+03		8.7e+05	

Daily Geomagnetic Data

Date	Middle Latitude Fredericksburg		High Latitude College		Estimated Planetary	
	A	K-indices	A	K-indices	A	K-indices
27 December	1	1-0-0-0-0-0-0-1	1	0-1-0-0-0-0-0-1	2	1-0-0-0-0-0-0-1
28 December	8	0-0-0-1-4-3-3-1	40	0-0-0-2-7-7-4-1	13	0-0-0-1-5-4-3-1
29 December	3	2-1-1-0-1-1-1-0	4	0-0-1-2-3-0-1-0	3	1-0-1-0-1-1-1-0
30 December	4	0-0-1-2-2-2-2-0	6	0-0-1-2-2-4-1-0	5	0-0-1-1-1-3-2-1
31 December	2	0-0-1-1-1-1-0-0	9	0-1-3-4-3-3-0-0	4	1-1-1-2-1-2-0-0
01 January	2	1-1-0-1-1-1-0-1	5	0-0-0-3-3-2-0-0	3	0-0-0-1-1-1-1-2
02 January	3	1-1-0-1-1-2-1-1	2	0-0-0-1-1-2-1-0	3	1-1-0-0-1-1-0-1

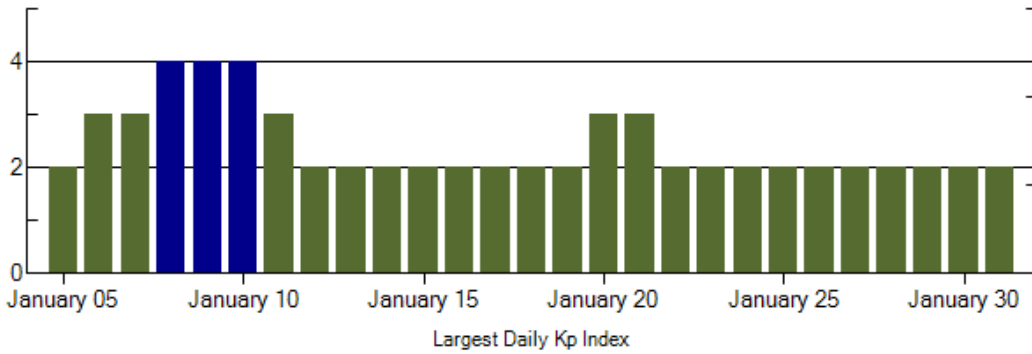
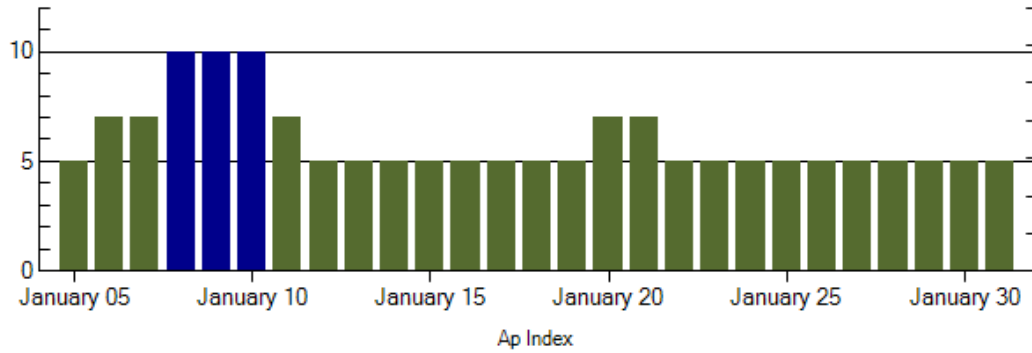
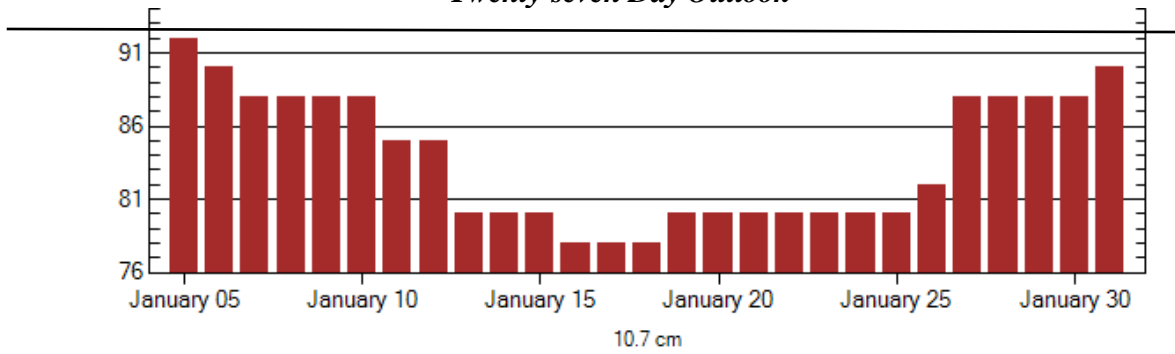


Alerts and Warnings Issued

<u>Date & Time of Issue</u>	<u>Type of Alert or Warning</u>	<u>Date & Time of Event UTC</u>
28 Dec 1317	WARNING: Geomagnetic K = 4	28 Dec 1330 - 1800
28 Dec 1340	ALERT: Geomagnetic K = 4	28 Dec 1337
28 Dec 1348	WARNING: Geomagnetic K = 5	28 Dec 1348 - 1800
28 Dec 1356	ALERT: Geomagnetic K = 5	28 Dec 1356
28 Dec 1740	EXTENDED WARNING: Geomagnetic K = 4	28 Dec 1330 - 29/0600
31 Dec 1458	ALERT: Type II Radio Emission	31 Dec 0424



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
05 Jan	92	5	2	19 Jan	80	5	2
06	90	7	3	20	80	7	3
07	88	7	3	21	80	7	3
08	88	10	4	22	80	5	2
09	88	10	4	23	80	5	2
10	88	10	4	24	80	5	2
11	85	7	3	25	80	5	2
12	85	5	2	26	82	5	2
13	80	5	2	27	88	5	2
14	80	5	2	28	88	5	2
15	80	5	2	29	88	5	2
16	78	5	2	30	88	5	2
17	78	5	2	31	90	5	2
18	78	5	2				



Energetic Events

Date	Time		X-ray		Optical Information			Peak		Sweep Freq		
	Begin	Max	Max	Class	Flux	Imp/ Brtns	Location Lat CMD	Rgn #	Radio Flux		Intensity	
									245	2695	II	IV

No Events Observed

Flare List

Date	Time			X-ray Class.	Imp/ Brtns	Optical Location Lat CMD	Rgn
	Begin	Max	End				
27 December	1237	1241	1244	B1.0			1138
	1421	1424	1427	B1.2			1138
	1714	1717	1719	B1.5			1138
	1835	1839	1845	B1.2			1138
28 December	No Flares Observed						
29 December	1403	1430	1447	B1.2			
	1737	1804	1812	B2.1			
	2104	2110	2115	B4.3			
30 December	No Flares Observed						
31 December	0418	0425	0432	C1.3			1138
	0733	0736	0738	B1.5			
	0941	0944	0949	B1.5			
	1928	1934	1939	B9.2			1140
	2330	2342	2357	B2.4			
01 January	0017	0022	0030	B2.3			
	0049	0053	0057	B2.2			1140
	1811	1814	1820	B2.1			
	1937	1944	1951	B3.1			1140
	2156	2156	2201	B8.3	SF	N30E56	1140
02 January	0903	0910	0922	B4.6			1140
	1601	1607	1610	B3.0			1140
	1906	1915	1924	B1.5			1140
	2009	2012	2016	B2.3			1140

Region Summary

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

Region 1136

25 Dec	S22W57	30	10	4	BXO	3	B										
26 Dec	S22W71	31	10	4	BXO	2	B										
27 Dec	S22W84	32															

0 0 0 0 0 0 0 0

Crossed West Limb.

Absolute heliographic longitude: 30



Region Summary - continued

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

Region 1137

25 Dec	N18E23	311	20	5	CRO	5	B										
26 Dec	N18E10	310	10	5	BXO	6	B										
27 Dec	N18E00	308															
28 Dec	N16W21	315	10	1	AXX	2	A										
29 Dec	N17W34	315	10	1	AXX	1	A										
30 Dec	N17W40	308															
31 Dec	N17W53	308															
01 Jan	N17W66	308															
02 Jan	N17W79	308															

0 0 0 0 0 0 0 0

Still on Disk.

Absolute heliographic longitude: 308

Region 1138

27 Dec	N13W12	320	50	5	DAO	4	B										
28 Dec	N13W26	320	60	7	DAI	9	BG										
29 Dec	N13W39	321	40	6	DRO	4	BG										
30 Dec	N12W55	323	20	2	HRX	3	A										
31 Dec	N12W70	324	10	2	BXO	2	B	1									
01 Jan	N17W82	323	10	5	AXX	2	A										

1 0 0 0 0 0 0 0

Crossed West Limb.

Absolute heliographic longitude: 320

Region 1139

29 Dec	S26E48	233	10	2	BXO	2	B										
30 Dec	S26E33	235			AXX	1	A										
31 Dec	S26E20	234															
01 Jan	S30E03	239		1	AXX	1	A										
02 Jan	S30W10	239															

0 0 0 0 0 0 0 0

Still on Disk.

Absolute heliographic longitude: 239



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 1140</i>																							
31 Dec	N32E67	188	180	3	HSX	1	A																
01 Jan	N32E52	190	200	4	HSX	1	A						1										
02 Jan	N32E40	189	160	3	HSX	1	A																
																					0 0 0 1 0 0 0 0		

Still on Disk.

Absolute heliographic longitude: 189

<i>Region 1141</i>																							
01 Jan	N35W25	267	100	7	DSO	6	B																
02 Jan	N34W39	268	10	10	BXO	4	B																
																						0 0 0 0 0 0 0 0	

Still on Disk.

Absolute heliographic longitude: 267

<i>Region 1142</i>																							
01 Jan	S14E33	208	40	6	DSO	5	B																
02 Jan	S12E21	207	90	8	DSO	3	B																
																						0 0 0 0 0 0 0 0	

Still on Disk.

Absolute heliographic longitude: 207

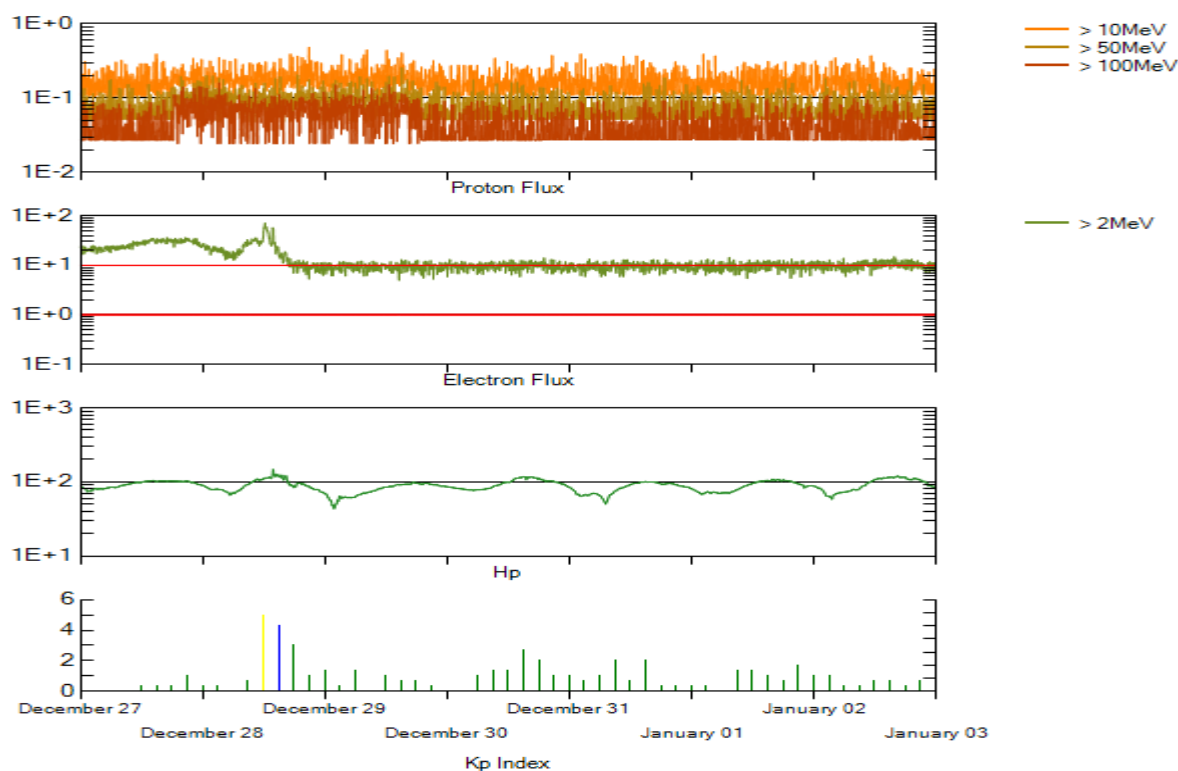


Recent Solar Indices (preliminary)
Of the observed monthly mean values

Month	Sunspot Numbers			Radio Flux		Geomagnetic			
	Observed SEC	values RI	Ratio RI/SEC	Smooth SEC	values RI	Penticton 10.7 cm	Smooth Value	Planetary Ap	Smooth Value
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	25.2	16.4	72.6	79.7	7	5.8
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	
December	22.0	14.5	0.66			84.3		3	

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. Solar minimum for cycle 23 was December 2008.





*Weekly Geosynchronous Satellite Environment Summary
Week Beginning 27 December 2010*

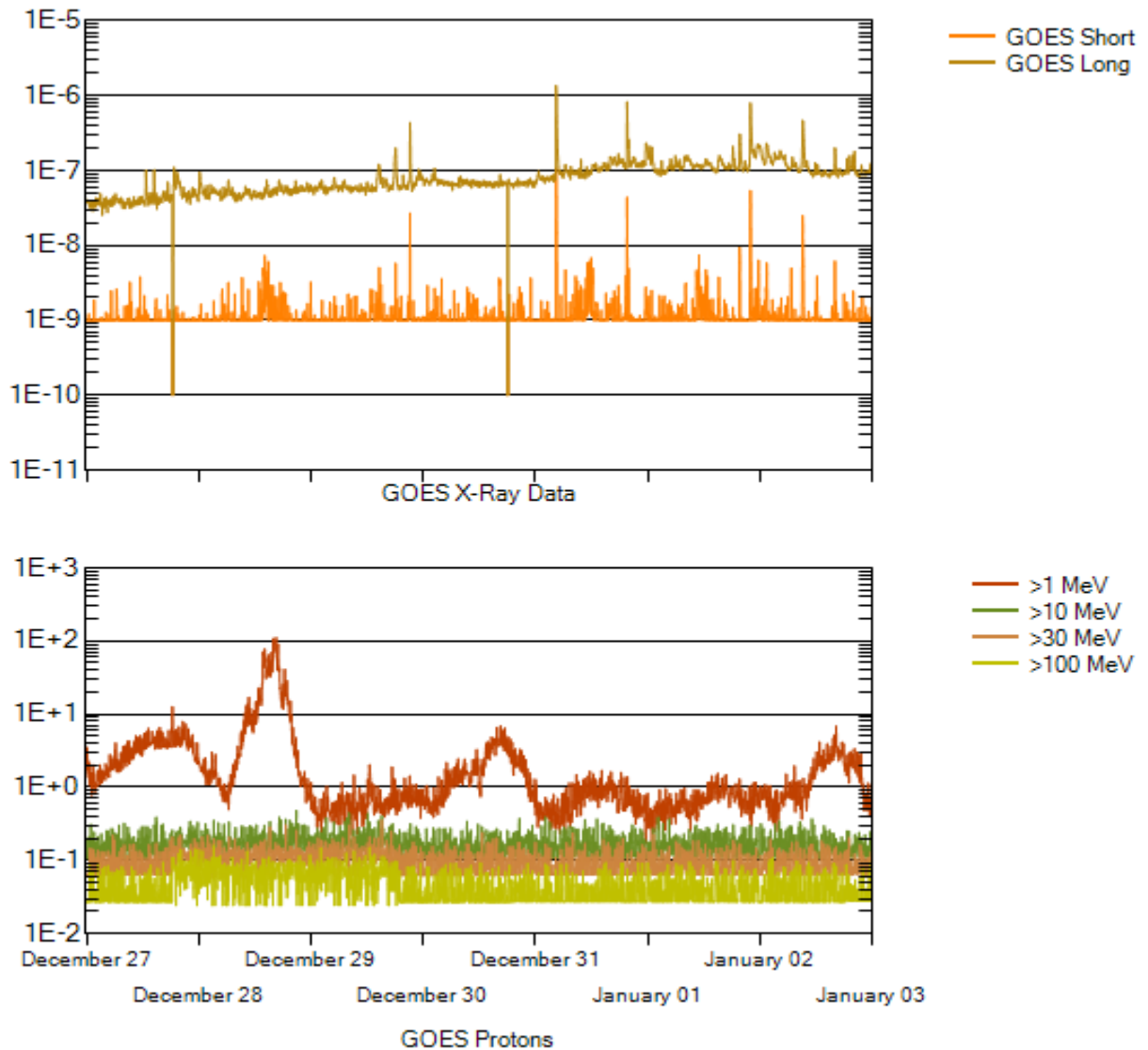
The proton flux plot contains the five-minute averaged integral proton flux (protons/cm²-sec -sr) as measured by GOES-13 (W75) for each of three energy thresholds: greater than 10, 50, and 100 MeV. The electron flux plot contains the five-minute averaged integral electron flux (electrons/cm²-sec -sr) 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
Week Beginning 27 December 2010

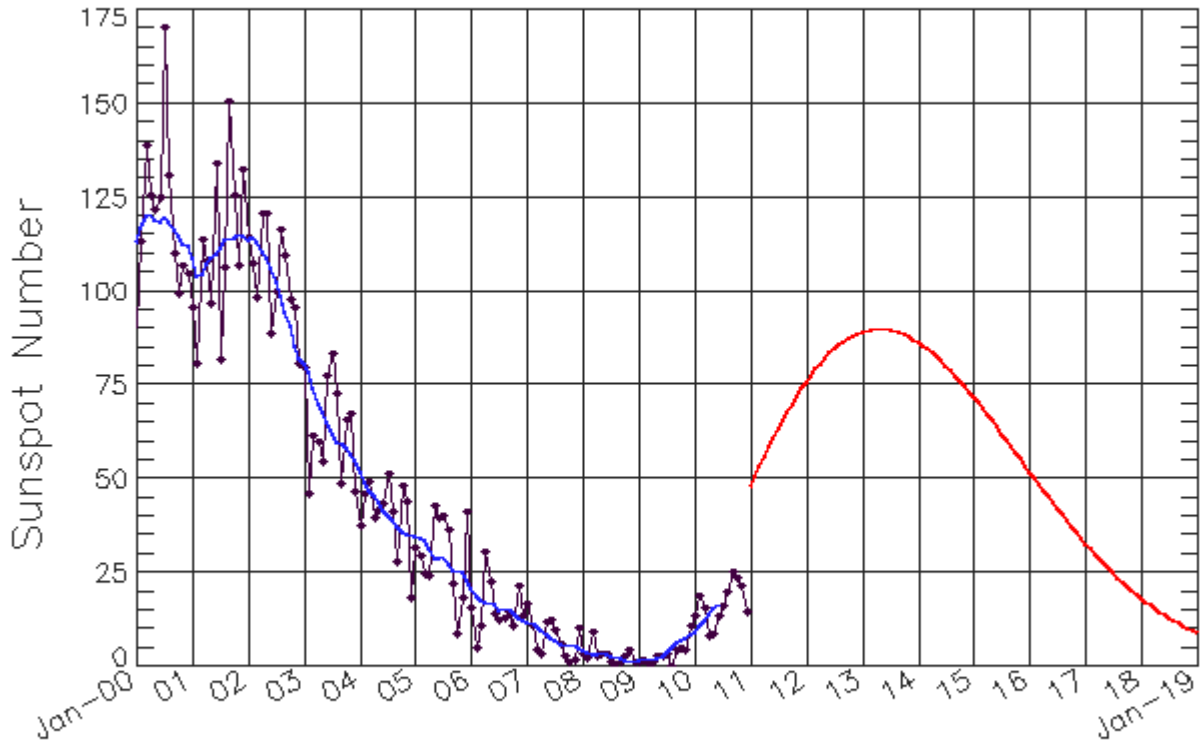
The x-ray plot contains five-minute averaged x-ray flux (Watts/m²) as measured by GOES 14 (W105) in two wavelength bands, 0.05 - 0.4 and 0.1 - 0.8 nm. The letters A, B, C, M and X refer to x-ray event levels for the 0.1 - 0.8 nm band.

The proton plot contains the five-minute averaged integral proton flux (protons/cm²-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 (protons/cm²-sec-sr) at greater than 10 MeV.



ISES Solar Cycle Sunspot Number Progression

Observed data through Dec 2010



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

Updated 2011 Jan 4

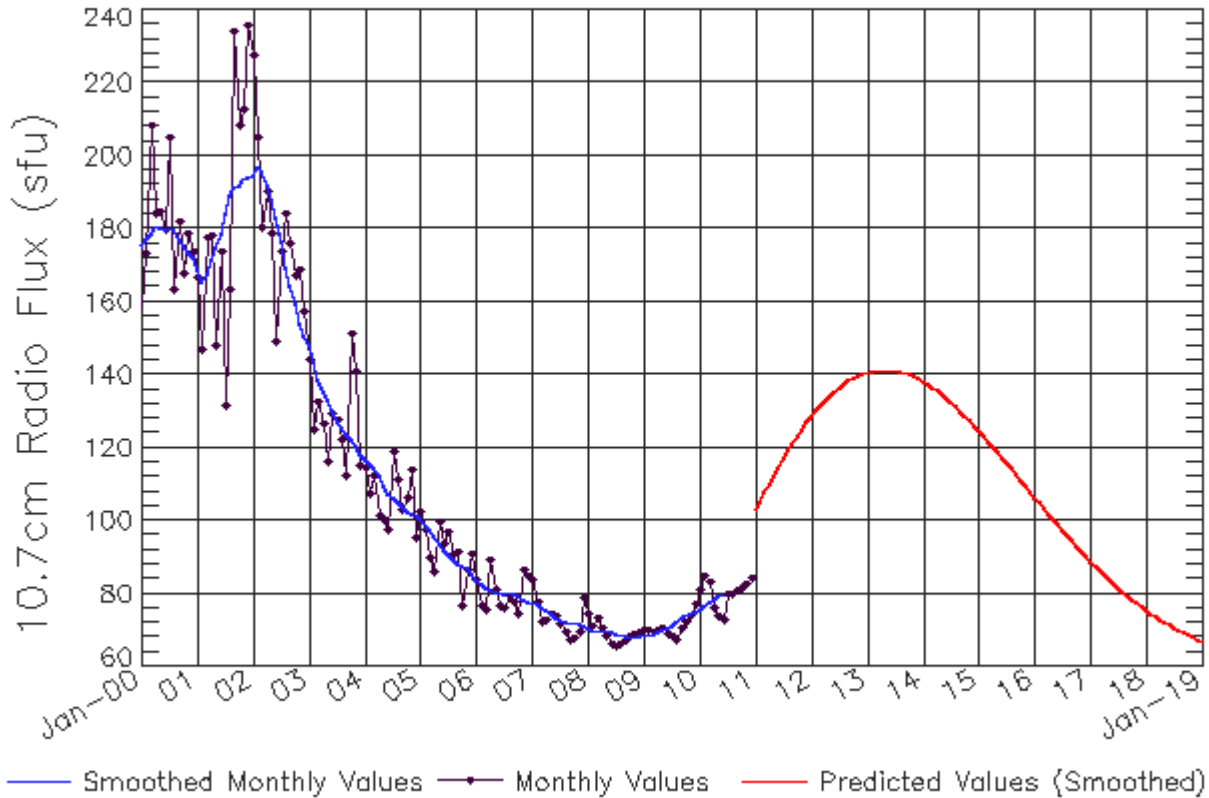
NOAA/SWPC Boulder, CO USA

	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 (***)	16 (***)	18 (1)	21 (2)	24 (3)	27 (5)	31 (5)	35 (6)
2011	39 (7)	43 (7)	47 (8)	51 (9)	55 (9)	59 (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 Dec 2010



Updated 2011 Jan 4

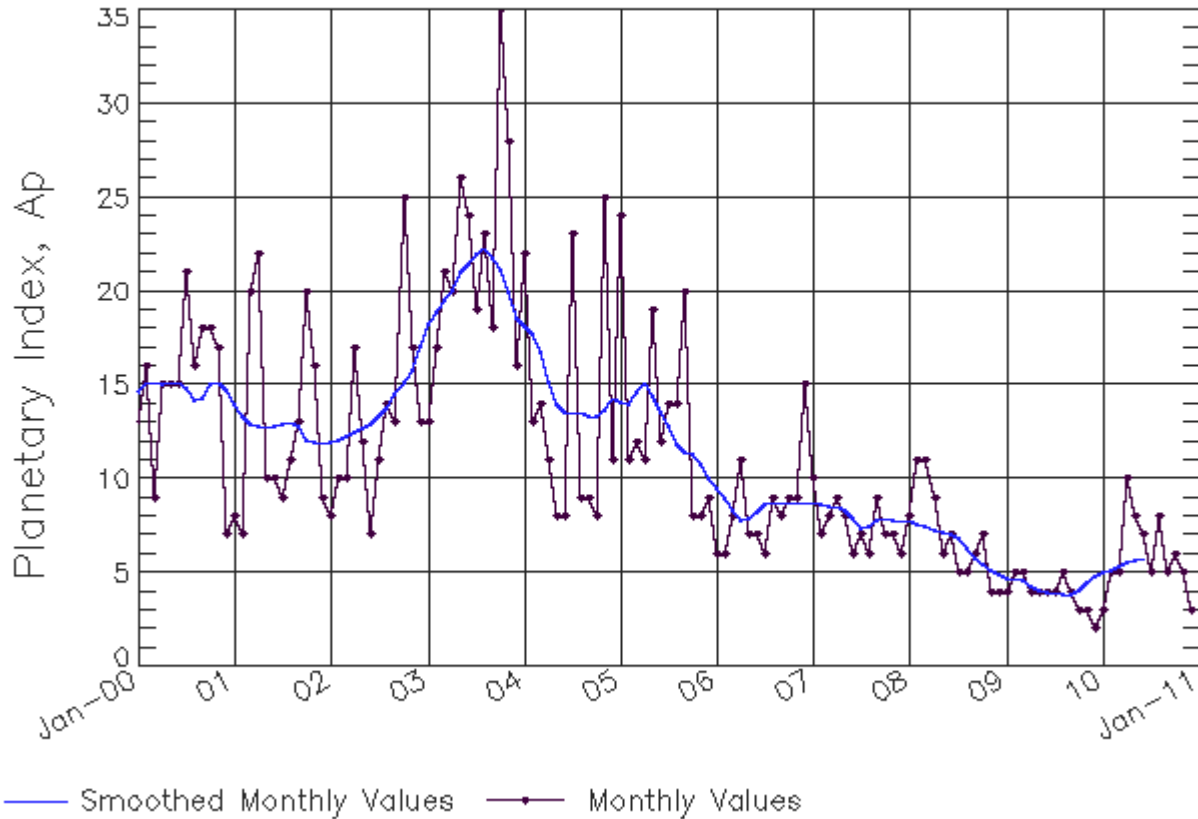
NOAA/SWPC Boulder, CO USA

	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 (***)	81 (1)	83 (1)	85 (2)	87 (3)	90 (4)	93 (4)
2011	97 (5)	100 (6)	103 (7)	107 (8)	110 (8)	114 (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 Dec 2010



Updated 2011 Jan 4

NOAA/SWPC Boulder, CO USA

The Solar Cycle Comparison charts are temporarily unavailable. 2010 charts will be published at a later date. 02 Feb 2010

