Space Weather Highlights
15 May - 21 May 2017

SWPC PRF 2177
22 May 2017

Solar activity was very low throughout the reporting period. Region 2659 (N14, L=038, class/area=Dao/040 on 21 May 2017) was the most complex region; however, it has produced no significant flare activity. No Earth-directed CMEs were observed in available coronagraph imagery.

No proton events were observed at geosynchronous orbit.

The greater than 2 MeV electron flux at geosynchronous orbit ranged from normal to high levels, with a peak flux of 13,000 pfu at 21/1710 UTC. Normal levels were observed on 15 May and moderate levels were observed on 16-19 May. In response to a negative polarity CH HSS, high levels were observed on 20-21 May.

Geomagnetic field activity was at quiet to active levels. Quiet to active levels were observed on 15 May. Conditions decreased to quiet to unsettled levels on 16-17 May under nominal solar wind conditions. A SSBC produced quiet to active levels on 18 May and quiet to unsettled levels on 19 May. The subsequent onset of a negative polarity CH HSS, with peak observed winds between 700-750 km/s, produced unsettled to active conditions on 20 May and quiet to unsettled levels on 21 May.

Space Weather Outlook
22 May - 17 June 2017

Solar activity is expected to be very low with a slight chance for C-class flare activity throughout the outlook period.

No proton events are expected at geosynchronous orbit.

The greater than 2 MeV electron flux at geosynchronous orbit is expected to range from normal to very high levels. Moderate levels are likely on 01-10 Jun and 12-15 Jun; high levels are likely on 22 May, 27-31 May, and 16-17 Jun; very high levels are likely on 23-26 May. Elevated levels of electrons are in response to multiple, recurrent, CH HSSs. The remainder of the outlook period is likely to observe normal background levels.

Geomagnetic field activity is expected to be at quiet to G1 (Minor) storm levels. Active conditions are likely on 22 May with unsettled conditions likely on 23-24 May due to the waning effects of a negative polarity CH HSS. Quiet conditions are then likely to prevail from 25 May-09 Jun under a nominal solar wind regime. An increase to active conditions is likely on 10-11 Jun from a positive polarity CH HSS. Quiet conditions are again likely on 12-13 Jun. A SSBC is expected to cause unsettled conditions on 14 Jun. A subsequent negative polarity CH HSS is likely to cause active conditions on 15 Jun, G1 (Minor) conditions on 16 Jun, then active conditions as the CH HSS wanes on 17 Jun.

Daily Solar Data

Date	Radio Flux 10.7cm	Sun spot No.	Sunspot Area (10^{-6} hemi.)	X-ray Background		Flares						
						X-ray			Optical			
				Flux		C	M	X	S	1	2	3	4
15 May	71	0	0	A3.9	0	0	0	0	0	0	0	0	0
16 May	72	11	30	A4.2	0	0	0	0	0	0	0	0	0
17 May	71	13	30	A4.8	0	0	0	0	0	0	0	0	0
18 May	72	24	30	A5.4	0	0	0	0	0	0	0	0	0
19 May	72	24	30	A5.0	0	0	0	0	0	0	0	0	0
20 May	72	22	30	A5.0	0	0	0	0	0	0	0	0	0
21 May	74	35	70	A5.6	0	0	0	1	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	>0.6 MeV	>2MeV	>4 MeV
15 May	3.4e+07	1.5e+04	3.5e+03	1.3e+06		
16 May	4.1e+07	1.5e+04	3.4e+03	3.3e+06		
17 May	4.4e+07	1.6e+04	3.9e+03	1.0e+07		
18 May	3.8e+07	1.6e+04	3.7e+03	3.1e+06		
19 May	3.9e+07	1.6e+04	3.7e+03	6.3e+06		
20 May	4.9e+07	1.6e+04	3.5e+03	3.0e+07		
21 May	5.0e+07	1.5e+04	3.7e+03	4.3e+08		

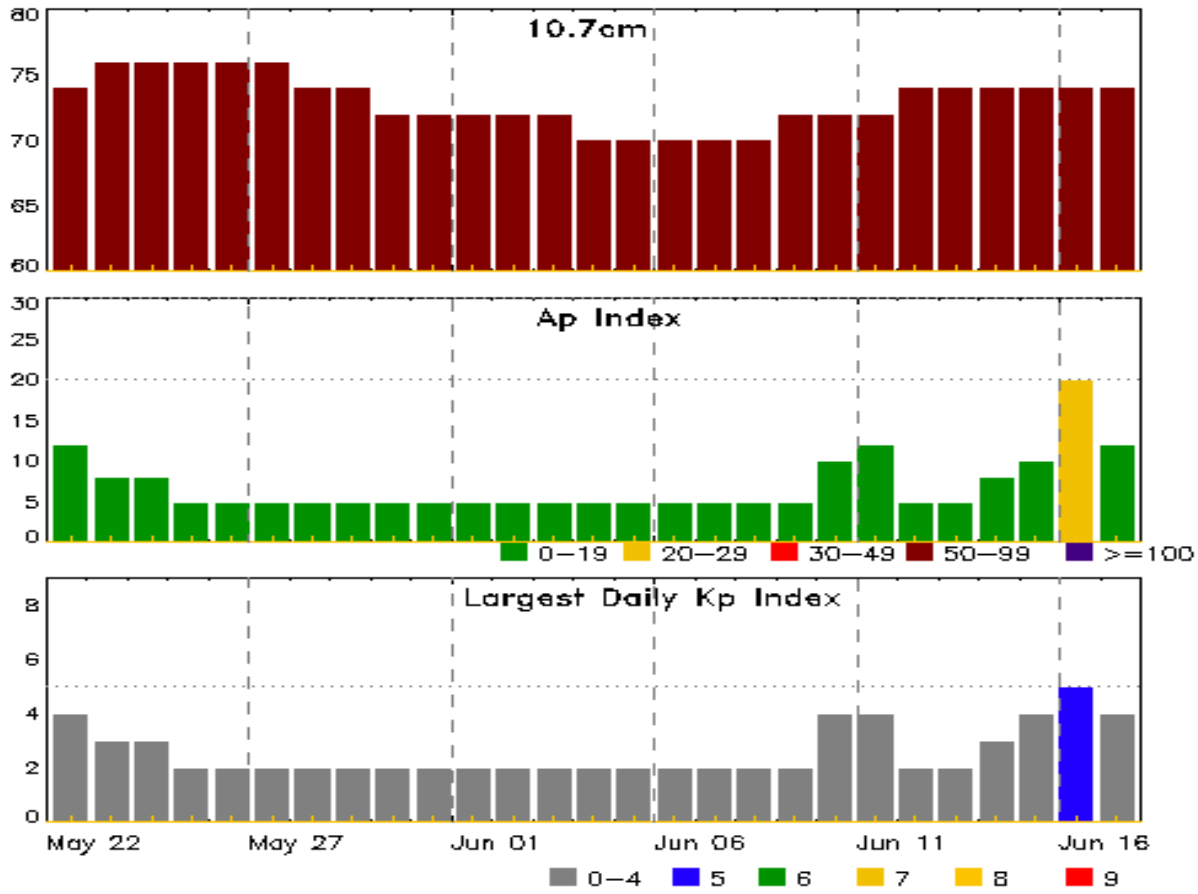
Daily Geomagnetic Data

Date	Middle Latitude Fredericksburg		High Latitude College		Estimated Planetary	
	A	K-indices	A	K-indices	A	K-indices
15 May	17	1-2-3-4-2-3-5-3	11	0-2-3-4-3-2-2-2	14	1-2-2-4-2-3-4-3
16 May	10	3-3-2-1-3-2-2-2	13	2-1-2-4-5-1-1-1	9	3-3-2-2-3-1-1-2
17 May	9	2-2-3-2-3-2-2-2	17	2-2-5-5-3-1-1-1	8	2-2-3-3-2-1-2-2
18 May	15	4-3-4-3-3-2-2-2	13	2-4-5-3-0-1-1-1	11	4-3-3-2-1-1-1-2
19 May	13	2-3-3-2-3-3-3-3	23	1-2-3-2-5-6-3-2	11	2-3-2-1-2-3-3-3
20 May	23	4-4-4-4-4-3-3-3	0	4-5-5-6-2-0-0-0	24	4-4-4-4-4-4-3-3
21 May	10	3-3-3-2-2-2-2-2	20	3-4-5-5-2-2-2-1	12	3-3-3-2-2-2-2-2

Alerts and Warnings Issued

Date & Time of Issue UTC	Type of Alert or Warning	Date & Time of Event UTC
15 May 0958	WARNING: Geomagnetic K = 4	15/0957 - 2359
15 May 1152	ALERT: Geomagnetic K = 4	15/1150
15 May 2106	WATCH: Geomagnetic Storm Category G2 predicted	
15 May 2208	EXTENDED WARNING: Geomagnetic K = 4	15/0957 - 16/2100
16 May 2126	WATCH: Geomagnetic Storm Category G2 predicted	
17 May 1748	CANCELLATION: Geomagnetic Storm Category G2 predicted	
17 May 1752	WATCH: Geomagnetic Storm Category G2 predicted	
18 May 0119	WARNING: Geomagnetic K = 4	18/0115 - 0900
18 May 0139	ALERT: Geomagnetic K = 4	18/0139
19 May 1614	WARNING: Geomagnetic K = 4	19/1614 - 20/0600
20 May 0240	ALERT: Geomagnetic K = 4	20/0235
20 May 0241	EXTENDED WARNING: Geomagnetic K = 4	19/1614 - 21/1800
20 May 0730	WARNING: Geomagnetic K = 5	20/0729 - 1500
20 May 1450	EXTENDED WARNING: Geomagnetic K = 5	20/0729 - 2100
20 May 1720	ALERT: Electron 2MeV Integral Flux >= 1000pfu	20/1705
21 May 0639	CONTINUED ALERT: Electron 2MeV Integral Flux >= 1000pfu	20/1705
21 May 1755	EXTENDED WARNING: Geomagnetic K = 4	19/1614 - 22/0300

Twenty-seven Day Outlook



Date	Radio Flux 10.7cm	Planetary A Index	Largest Kp Index	Date	Radio Flux 10.7cm	Planetary A Index	Largest Kp Index
22 May	74	12	4	05 Jun	70	5	2
23	76	8	3	06	70	5	2
24	76	8	3	07	70	5	2
25	76	5	2	08	70	5	2
26	76	5	2	09	72	5	2
27	76	5	2	10	72	10	4
28	74	5	2	11	72	12	4
29	74	5	2	12	74	5	2
30	72	5	2	13	74	5	2
31	72	5	2	14	74	8	3
01 Jun	72	5	2	15	74	10	4
02	72	5	2	16	74	20	5
03	72	5	2	17	74	12	4
04	70	5	2				

Energetic Events

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

No Events Observed

Flare List

	Time				Optical		
Date	Begin	Max	End	X-ray Class	Imp/ Brtns	Location Lat CMD	Rgn #
16 May	0407	0416	0426	B2.2			2657
16 May	1806	1809	1813	B1.2			2657
18 May	1634	1639	1644	B1.1			2656
21 May	0737	0744	0748	B1.4	SF	S06E02	2658

Region Summary

	Location		Sunspot Characteristics					Flares							
		Helio	Area	Extent	Spot	Spot	Mag	X-ray			Optical				
Date	Lat CMD	Lon	10^{-6} hemi.	(helio)	Class	Count	Class	C	M	X	S	1	2	3	4
			Region 2655												
04 May	N13E37	252	10	3	Bxo	4	B								
05 May	N14E25	251	30	3	Dro	6	B				7				
06 May	N13E11	252	20	3	Cro	5	B				1				
07 May	N14W04	253	10	5	Bxo	2	B								
08 May	N16W17	252	plage												
09 May	N16W31	254	plage												
10 May	N16W45	255	plage												
11 May	N16W59	255	plage												
12 May	N16W73	256	plage												
13 May	N16W87	257	plage												
14 May	N16W99	258	plage												
								0	0	0	8	0	0	0	0

Crossed West Limb.
Absolute heliographic longitude: 253

			Region 2656												
16 May	N12E62	67	30	1	Hrx	1	A								
17 May	N11E50	66	30	2	Cso	3	B								
18 May	N12E36	68	20	2	Hax	1	A								
19 May	N12E22	69	20	2	Hax	1	A								
20 May	N11E08	69	20	2	Hax	1	A								
21 May	N11W06	70	20	2	Hax	1	A								
								0	0	0	0	0	0	0	0

Still on Disk.
Absolute heliographic longitude: 70

			Region 2657												
16 May	N07E21	109	plage												
17 May	N07E06	111	plage												
18 May	N07W08	112	plage												
19 May	N07W22	113	plage												
20 May	N07W36	113	plage												
21 May	N07W50	114	plage												
								0	0	0	0	0	0	0	0

Still on Disk.
Absolute heliographic longitude: 111

Region Summary - continued

	Location		Sunspot Characteristics					Flares							
		Helio	Area	Extent	Spot	Spot	Mag	X-ray			Optical				
Date	Lat CMD	Lon	10^{-6} hemi.	(helio)	Class	Count	Class	C	M	X	S	1	2	3	4
			Region 2658												
18 May	S08E38	66	10	4	Bxo	3	B								
19 May	S08E24	67	10	4	Bxo	3	B								
20 May	S07E09	69	10	1	Hrx	1	A								
21 May	S07W05	69	10	1	Hrx	1	A				1				
								0	0	0	1	0	0	0	0

Still on Disk.
Absolute heliographic longitude: 69

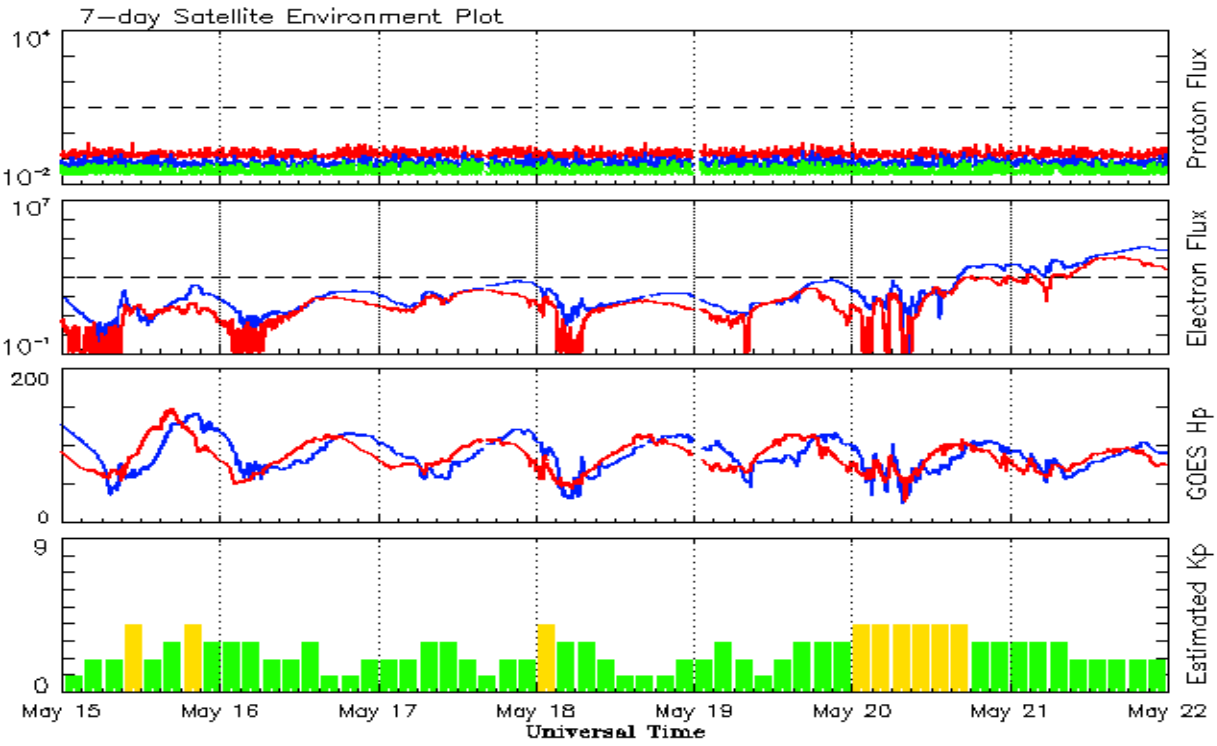
			Region 2659												
21 May	N14E26	38	40	5	Dao	3	B								
								0	0	0	0	0	0	0	0

Still on Disk.
Absolute heliographic longitude: 38

Recent Solar Indices (preliminary)
Observed monthly mean values

	Sunspot Numbers					Radio Flux		Geomagnetic	
	Observed values		Ratio	Smooth values		Penticton	Smooth	Planetary	Smooth
Month	SEC	RI	RI/SEC	SEC	RI	10.7 cm	Value	Ap	Value
				2015					
May	83.0	53.3	0.71	77.5	45.7	120.1	123.3	9	12.7
June	77.3	39.9	0.53	73.1	43.3	123.2	119.5	14	13.0
July	68.4	39.5	0.58	68.2	41.0	107.0	116.0	10	13.1
August	61.6	38.6	0.63	65.5	39.8	106.2	113.3	16	13.1
September	72.5	47.2	0.65	64.0	39.5	102.1	110.8	16	12.8
October	59.5	38.2	0.62	61.8	38.6	104.1	107.9	15	12.5
November	61.8	37.3	0.61	59.0	36.7	109.6	105.3	13	12.5
December	54.1	34.8	0.64	55.1	34.7	112.8	102.5	15	12.5
				2016					
January	50.4	34.2	0.67	51.4	32.6	103.5	99.9	10	12.3
February	56.0	33.8	0.61	49.6	31.5	103.5	98.1	10	12.0
March	40.9	32.5	0.80	47.7	30.2	91.6	96.6	11	11.8
April	39.2	22.7	0.58	45.0	28.7	93.4	95.3	10	11.8
May	48.9	30.9	0.64	42.1	26.9	93.1	93.2	12	11.7
June	19.3	12.3	0.65	39.0	24.9	81.9	90.4	9	11.4
July	36.8	19.4	0.53	36.5	23.1	85.9	87.7	10	11.2
August	50.4	30.1	0.60	34.2	21.6	85.0	85.5	10	11.2
September	37.4	26.8	0.72	32.1	19.9	87.8	83.7	16	11.3
October	30.0	20.0	0.67	31.1	18.8	86.1	82.5	16	11.6
November	22.4	12.8	0.57			78.7		10	
December	17.6	11.1	0.64			75.1		10	
				2017					
January	28.1	15.5	0.55			77.4		10	
February	22.0	15.7	0.71			76.9		10	
March	25.4	10.6	0.42			74.6		15	
April	30.4	19.6	0.64			80.9		13	

Note: Values are final except for the most recent 6 months which are considered preliminary. Cycle 24 started in Dec 2008 with an RI=1.7.



Weekly Geosynchronous Satellite Environment Summary
Week Beginning 15 May 2017

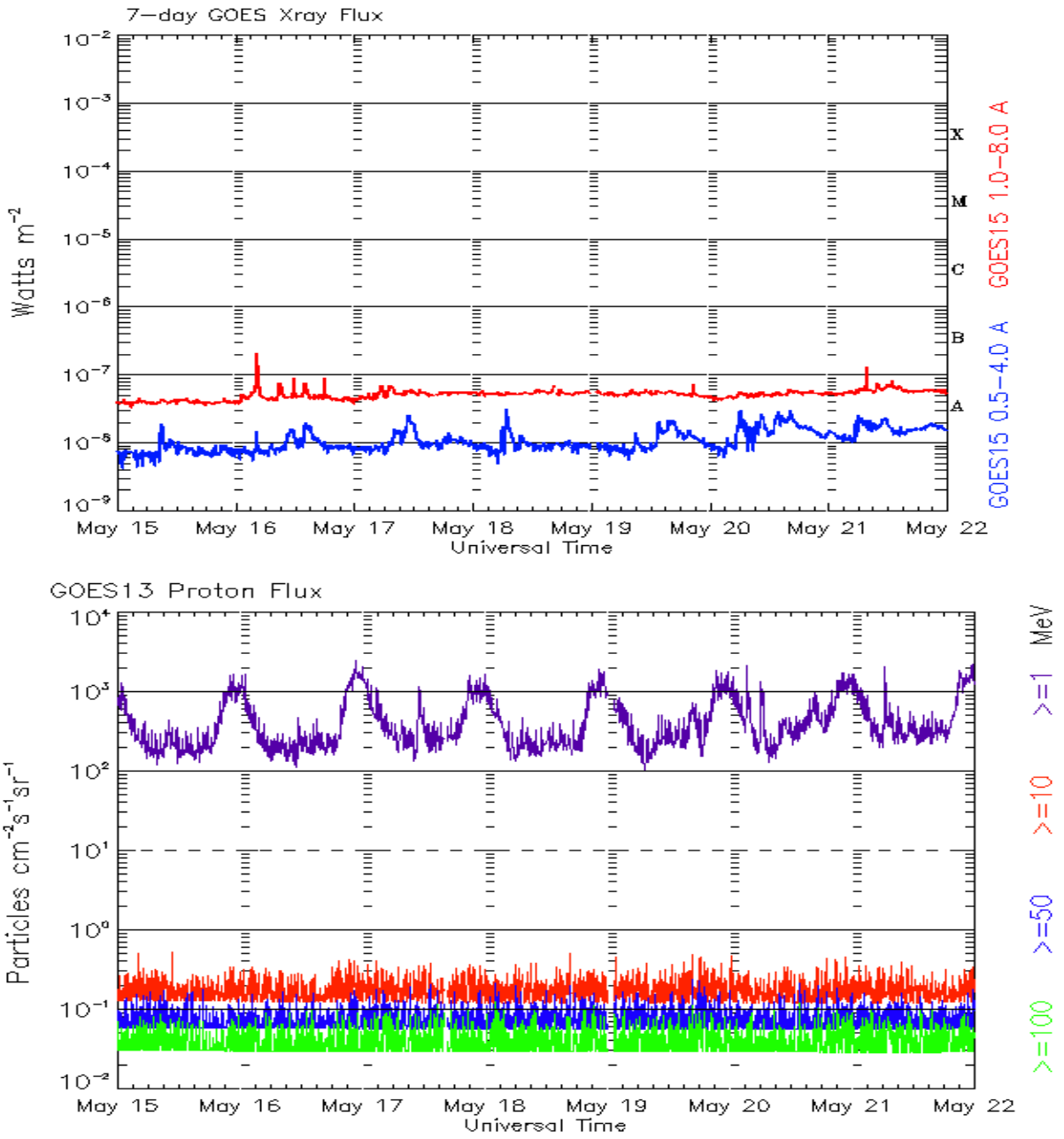
The proton flux plot contains the five-minute averaged integral proton flux (protons/cm^2-sec -sr) as measured by the SWPC Primary GOES satellite, near West 75, for each of three energy thresholds: greater than 10, 50, and 100 MeV.

The electron flux plot contains the five-minute averaged integral electron flux (electrons/cm^2-sec -sr) with energies greater than 2 MeV by the SWPC Primary GOES satellite.

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

The Estimated 3-hour Planetary Kp-index is derived at the NOAA Space Weather Prediction Center using data from the following ground-based magnetometers: Boulder, Colorado; Chambon la Foret, France; Fredericksburg, Virginia; Fresno, California; Hartland, UK; Newport, Washington; Sitka, Alaska. These data are made available thanks to the cooperative efforts between SWPC and data providers around the world, which currently includes the U.S. Geological Survey, the British Geological Survey, and the Institut de Physique du Globe de Paris.

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 15 May 2017

The x-ray plots contains five-minute averages x-ray flux (Watt/m^2) as measure by the SWPC primary GOES X-ray satellite, usually at West 105 longitude, 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 intergral flux units (pfu = protons/cm^2 -sec -sr) as measured by the primary SWPC GOES Proton satellite for each of the energy thresholds: >1, >10, >30, and >100 MeV. The P10 event threshold is 10 pfu at greater than 10 MeV.

Preliminary Report and Forecast of Solar Geophysical Data (The Weekly)

Published every Monday by the Space Weather Prediction Center.

U.S. Department of Commerce
NOAA / National Weather Service
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Notice: The 27-day Outlook, Satellite Environment, X-ray and Proton plots have been redesigned. Comments and suggestions are welcome SWPC.Webmaster@noaa.gov

The Weekly has been published continuously since 1951 and is available online since 1997.

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