

**Space Weather Highlights**  
**27 April - 03 May 2009**

**SWO PRF 1757**  
**05 May 2009**

Solar activity was very low. Region 1016 (S08, L=106, class/area, Cao/020 on 29 April) formed on the disk and decayed into spotless plage by 01 May. As the region approached the west limb, it produced a B2 x-ray flare at 01/0858 UTC.

No proton events were observed at geosynchronous orbit.

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

Geomagnetic field activity was at quiet levels during the entire period. ACE observations indicated no significant activity in the solar wind during the period.

**Space Weather Outlook**  
**06 May – 01 June 2009**

Solar activity is expected to be very low.

No proton events are expected at geosynchronous orbit.

The greater than 2 MeV electron flux at geosynchronous orbit is expected to increase to high levels during 08 - 11 May. Normal flux levels are expected during the rest of the period.

Geomagnetic field activity is expected to be at quiet to unsettled levels during 06 - 09 May, with active conditions possible on 06 May, due to a recurrent coronal hole high-speed stream. Activity is expected to decrease to predominantly quiet levels during 10 May – 01 June



**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
27 April	68	0	0	<A1.0	0	0	0	0	0	0	0	0
28 April	69	0	0	<A1.0	0	0	0	0	0	0	0	0
29 April	70	15	20	<A1.0	0	0	0	0	0	0	0	0
30 April	69	12	10	<A1.0	0	0	0	0	0	0	0	0
01 May	69	0	0	<A1.0	0	0	0	0	0	0	0	0
02 May	68	0	0	<A1.0	0	0	0	0	0	0	0	0
03 May	69	0	0	<A1.0	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
27 April	5.2e+05	2.0e+04	4.3e+03		7.4e+05	
28 April	6.7e+05	2.0e+04	4.5e+03		9.8e+05	
29 April	6.2e+05	2.1e+04	4.6e+03		7.4e+05	
30 April	5.4e+05	2.0e+04	4.5e+03		3.3e+05	
01 May	6.3e+05	2.0e+04	4.6e+03		4.2e+05	
02 May	7.1e+05	2.1e+04	4.8e+03		3.2e+05	
03 May	5.9e+05	2.0e+04	4.4e+03		2.3e+05	

**Daily Geomagnetic Data**

Date	Middle Latitude		High Latitude		Estimated	
	Fredericksburg		College		Planetary	
	A	K-indices	A	K-indices	A	K-indices
27 April	3	2-1-0-1-0-1-1-1	2	1-1-0-2-0-0-1-0	4	2-2-0-1-1-1-1-1
28 April	2	0-0-0-0-1-1-1-1	1	0-1-0-0-0-0-1-1	2	0-0-0-0-1-1-1-1
29 April	3	0-0-1-1-1-1-2-1	3	0-1-0-2-2-0-1-0	3	0-0-0-0-1-1-1-1
30 April	2	1-1-0-1-1-0-0-0	1	1-1-0-1-0-0-0-0	3	1-0-0-0-2-1-0-1
01 May	2	0-0-1-1-1-0-0-2	1	0-0-1-2-0-0-0-0	5	1-0-1-1-1-2-1-2
02 May	3	0-1-1-1-2-0-0-2	2	0-1-2-1-0-0-0-1	5	1-1-2-0-2-1-1-2
03 May	2	0-0-0-1-2-1-0-1	1	1-0-0-1-0-1-0-0	5	2-0-0-1-1-2-2-2

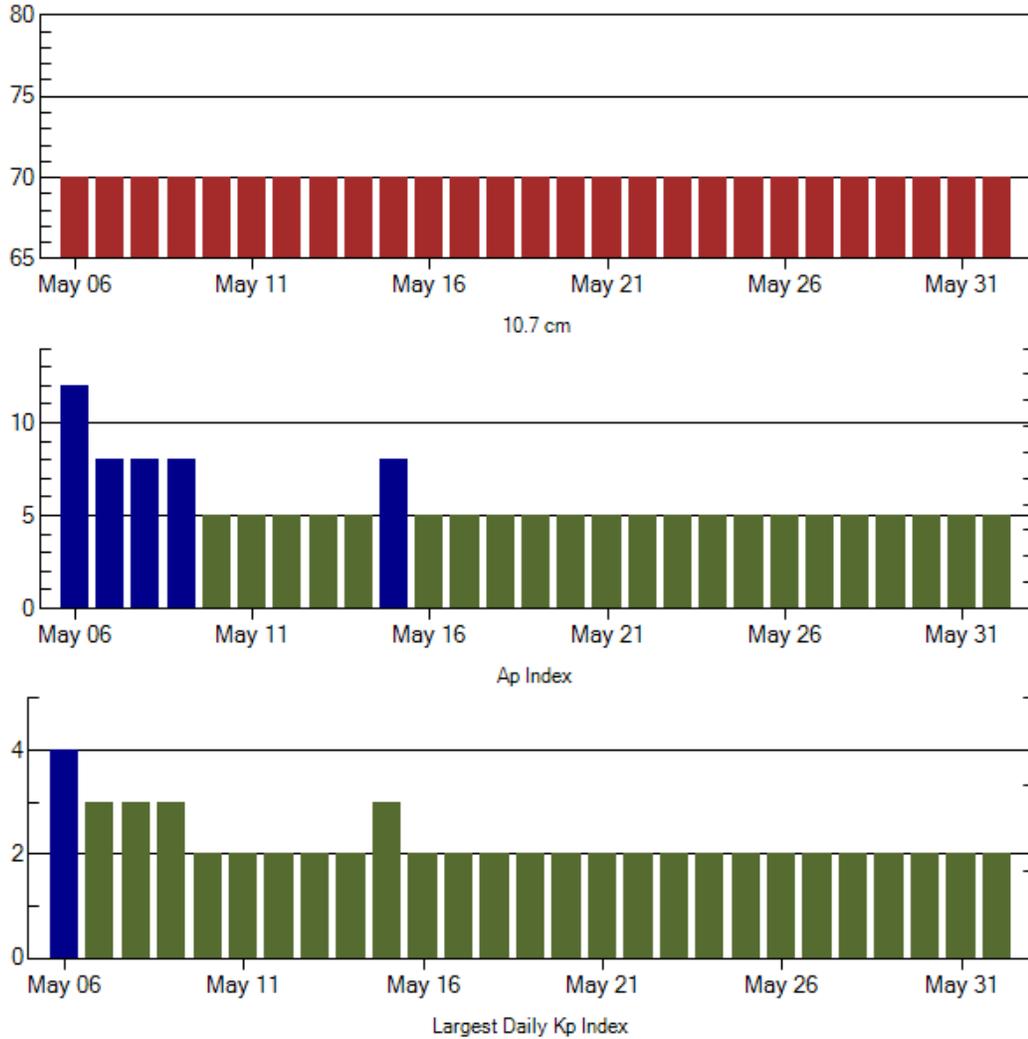
**Alerts and Warnings Issued**

Date & Time of Issue	Type of Alert or Warning	Date & Time of Event UTC
----------------------	--------------------------	--------------------------

**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
06 May	70	12	4	20 May	70	5	2
07	70	8	3	21	70	5	2
08	70	8	3	22	70	5	2
09	70	8	3	23	70	5	2
10	70	5	2	24	70	5	2
11	70	5	2	25	70	5	2
12	70	5	2	26	70	5	2
13	70	5	2	27	70	5	2
14	70	5	2	28	70	5	2
15	70	8	3	29	70	5	2
16	70	5	2	30	70	5	2
17	70	5	2	31	70	5	2
18	70	5	2	01 Jun	70	5	2
19	70	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	Class	Flux	Brtns	Lat CMD	#	245	2695	II

***No Events Observed***

***Flare List***

Date	Time			X-ray	Imp /	Optical	Rgn
	Begin	Max	End	Class.	Brtns	Location	Lat CMD
27 April	No Flares Observed						
28 April	No Flares Observed						
29 April	No Flares Observed						
30 April	No Flares Observed						
01 May	0854		0858		0900	B2.2	
02 May	No Flares Observed						
03 May	No Flares Observed						

***Region Summary***

Date	Location		Sunspot Characteristics				Flares								
	(° Lat ° CMD)	Helio Lon	Area (10 <sup>6</sup> hemi)	Extent (helio)	Spot Class	Spot Count	Mag Class	X-ray			Optical				
							C	M	X	S	1	2	3	4	
<b><i>Region 1016</i></b>															
29 Apr	S08W64	106	0020	06	Cao	005	B								
30 Apr	S07W79	108	0010	02	Axx	002	A								
01 May	S07W93	109													

Crossed West Limb.

Absolute heliographic longitude: 106



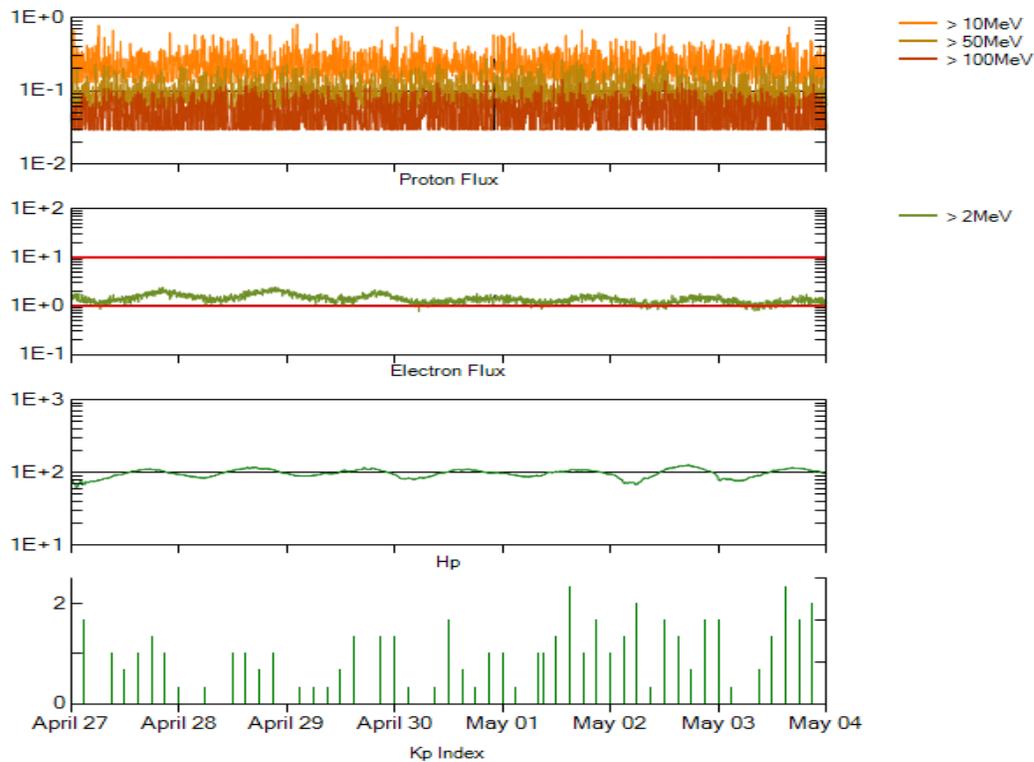
**Recent Solar Indices (preliminary)**  
**Of the observed monthly mean values**

Month	Sunspot Numbers			Radio Flux		Geomagnetic			
	Observed values SEC	Ratio RI	Ratio RI/SEC	Smooth values SEC	Smooth values RI	*Penticton 10.7 cm	Smooth Value	Planetary Ap	Smooth Value
<b>2007</b>									
May	19.4	11.7	0.60	14.2	8.7	74.5	74.2	9	8.4
June	20.0	12.0	0.60	12.8	7.7	73.7	73.2	7	7.8
July	15.6	10.0	0.64	11.6	7.0	71.6	72.5	8	7.4
August	9.9	6.2	0.63	10.2	6.1	69.2	71.8	7	7.6
September	4.8	2.4	0.50	9.9	5.9	67.1	71.5	9	7.8
October	1.3	0.9	0.70	10.0	6.1	65.5	71.5	9	7.9
November	2.5	1.7	0.68	9.4	5.7	69.7	71.1	5	7.8
December	16.2	10.1	0.62	8.1	5.0	78.6	70.5	4	7.8
<b>2008</b>									
January	5.1	3.4	0.67	6.9	4.2	72.1	70.0	6	7.7
February	3.8	2.1	0.55	5.9	3.6	71.2	69.6	9	7.6
March	15.9	9.3	0.58	5.3	3.3	72.9	69.5	10	7.4
April	4.9	2.9	0.59	5.3	3.3	70.3	69.6	9	7.1
May	5.7	2.9	0.51	5.7	3.5	68.4	69.7	6	6.9
June	4.2	3.1	0.74	5.2	3.2	65.9	69.2	7	6.8
July	1.0	0.5	0.50	4.5	2.7	65.8	68.8	6	6.6
August	0.0	0.5	**	4.4	2.6	66.4	68.6	5	6.2
September	1.5	1.1	0.73	3.7	2.2	67.1	68.4	5	5.8
October	5.2	2.9	0.56	2.9	1.8	68.3	68.2	6	5.4
November	6.8	4.1	0.60			68.6		3	
December	1.3	0.8	0.62			69.2		2	
<b>2009</b>									
January	2.8	1.5	0.54			69.8		3	
February	2.5	1.4	0.56			70.0		4	
March	0.7	0.7	1.00			69.2		4	
April	1.2	1.2	1.00			69.7		4	

**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.

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





*Weekly Geosynchronous Satellite Environment Summary*  
*Week Beginning 27 April 2009*

**GOES-11 designated Primary Electron Satellite and GOES-10 Secondary: December 1, 2008 the GOES-12 Electron sensor began experiencing periods of noise and sensor is unreliable.**

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.

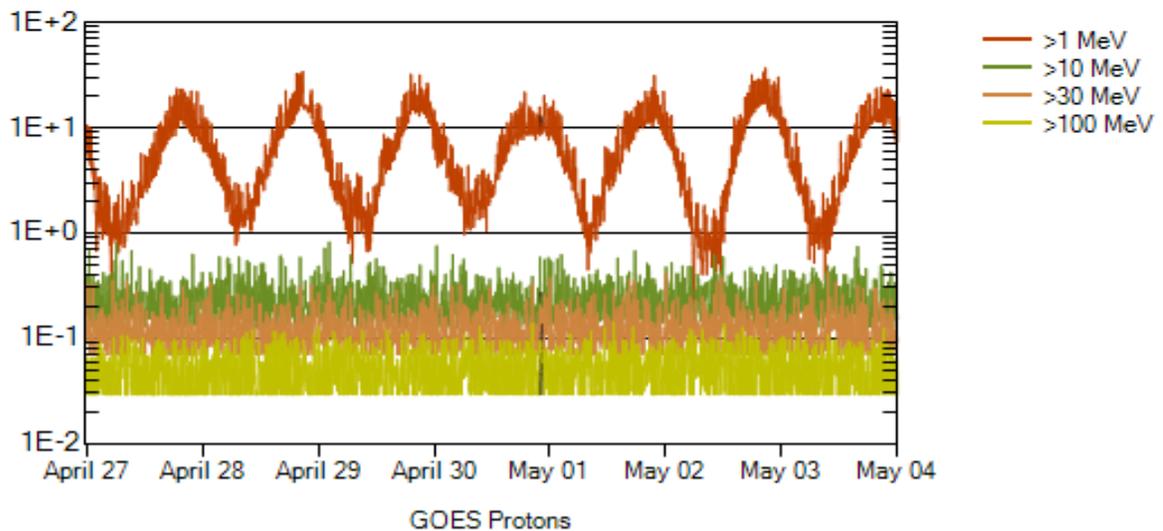
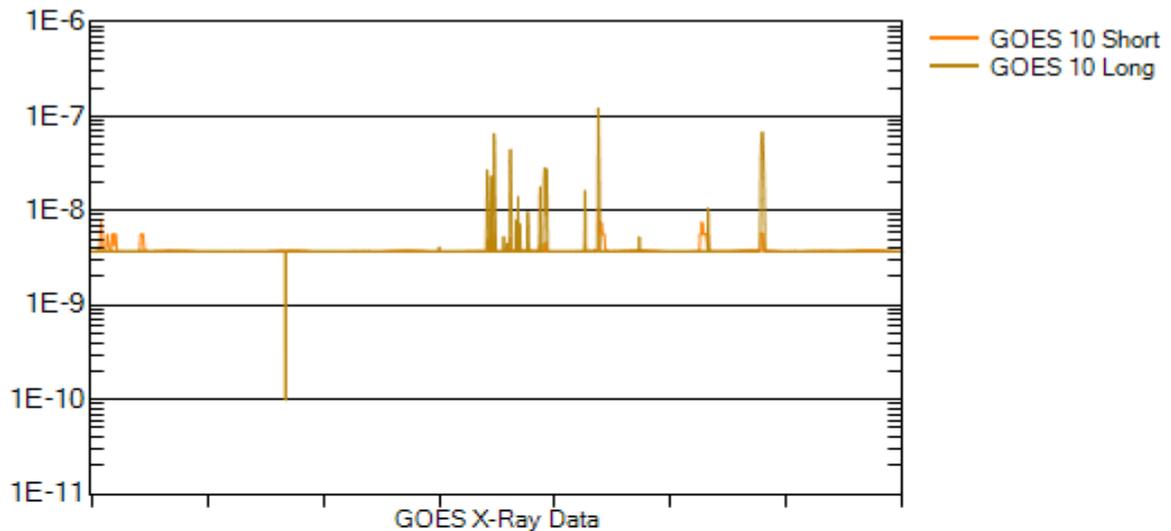
Electrons plot contains the five-minute averaged integral electron flux (electrons/cm<sup>2</sup>-sec-sr) with energies greater than 2 MeV at GOES-11 (W135).

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*

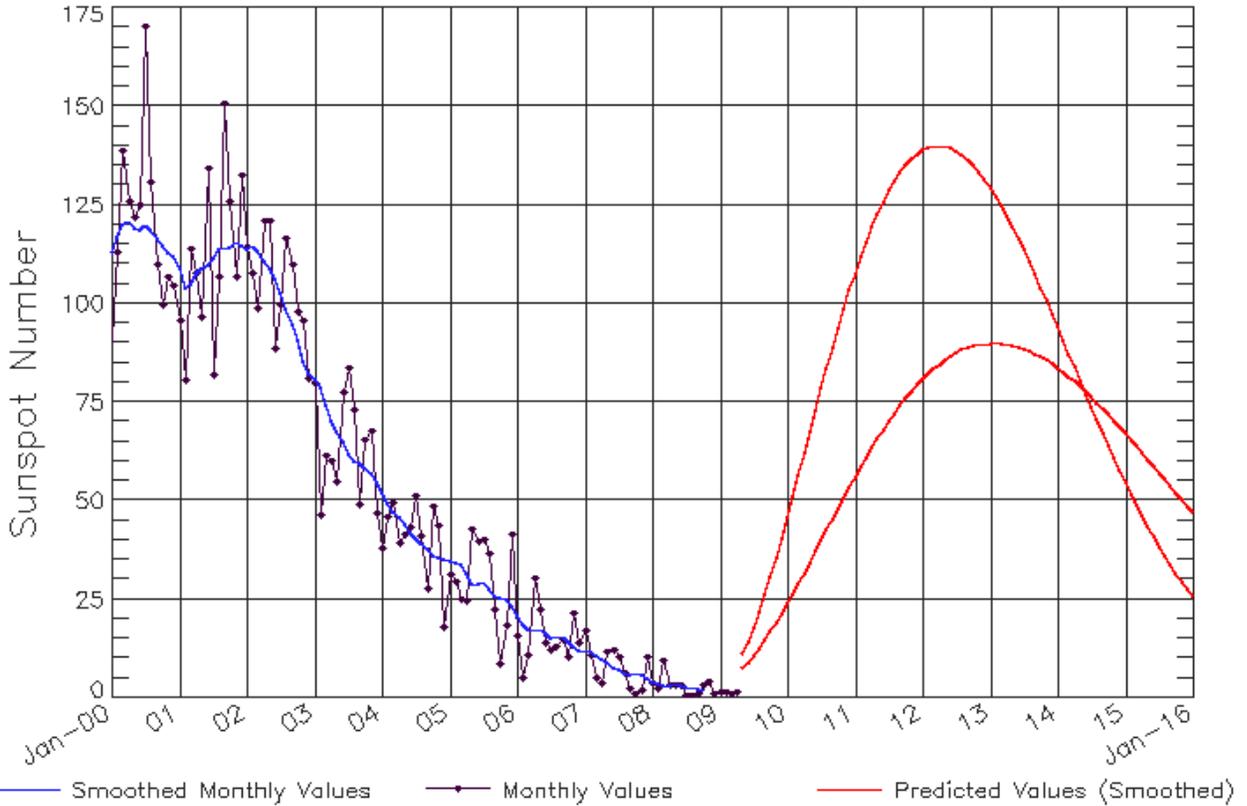
X-ray plot contains five-minute averaged x-ray flux ( $\text{watts/m}^2$ ) as measured by GOES 10 (W060) and GOES 11 (W135) in two wavelength bands, .05 - .4 and .1 - .8 nm. The letters A, B, C, M and X refer to x-ray event levels for the .1 - .8 nm band.

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.



# ISES Solar Cycle Sunspot Number Progression

Data Through 30 Apr 09



Updated 2009 May 1

NOAA/SWPC Boulder, CO USA

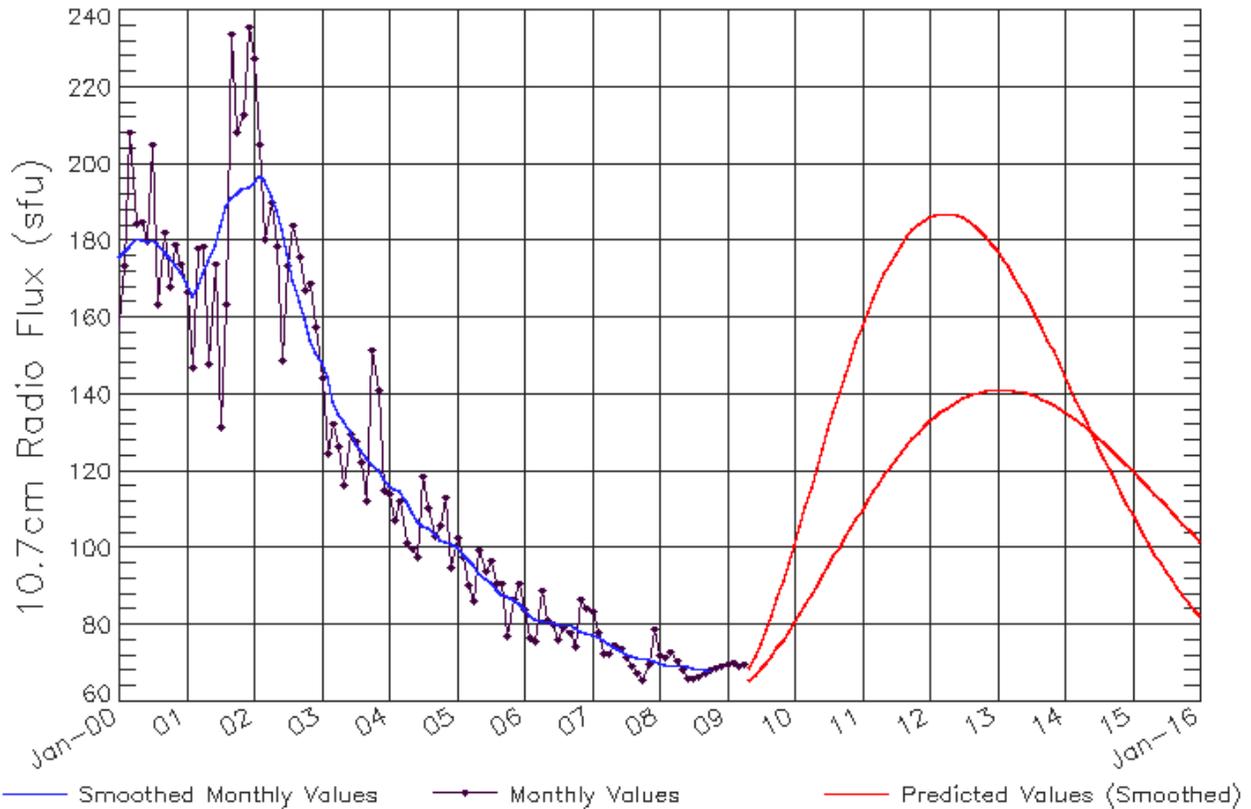
## SEC Prediction of Smoothed Sunspot Number

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	Hi/Lo											
2007	12 (***)	11 (***)	10 (***)	9 (***)	8 (***)	7 (***)	7 (***)	6 (***)	5 (***)	6 (***)	5 (***)	5 (***)
2008	4 (***)	3 (***)	3 (***)	3 (***)	3 (***)	3 (***)	2 (***)	2 (***)	2 (***)	2 (***)	2/2 (1)	3/2 (3)
2009	<b>4/3</b> (5)	<b>6/4</b> (7)	<b>8/5</b> (8)	<b>10/6</b> (9)	<b>12/7</b> (10)	<b>15/9</b> (11)	<b>19/11</b> (12)	<b>23/13</b> (13)	<b>27/15</b> (14)	<b>32/17</b> (15)	<b>36/19</b> (15)	<b>41/21</b> (15)
2010	<b>46/24</b> (15)	<b>51/26</b> (15)	<b>57/29</b> (15)	<b>62/32</b> (15)	<b>68/34</b> (15)	<b>73/37</b> (15)	<b>78/40</b> (15)	<b>84/43</b> (15)	<b>89/45</b> (15)	<b>94/48</b> (15)	<b>99/51</b> (15)	<b>103/53</b> (15)
2011	<b>108/56</b> (15)	<b>112/59</b> (15)	<b>116/61</b> (15)	<b>119/63</b> (15)	<b>123/66</b> (15)	<b>126/68</b> (15)	<b>129/70</b> (15)	<b>131/72</b> (15)	<b>133/74</b> (15)	<b>135/76</b> (15)	<b>137/78</b> (15)	<b>138/79</b> (15)
2012	<b>139/81</b> (15)	<b>140/82</b> (15)	<b>140/84</b> (15)	<b>140/85</b> (15)	<b>140/86</b> (15)	<b>139/87</b> (15)	<b>139/88</b> (15)	<b>138/88</b> (15)	<b>136/89</b> (15)	<b>135/89</b> (15)	<b>133/90</b> (15)	<b>131/90</b> (15)
2013	<b>129/90</b> (15)	<b>127/90</b> (15)	<b>125/90</b> (15)	<b>122/90</b> (15)	<b>119/89</b> (15)	<b>116/89</b> (15)	<b>114/89</b> (15)	<b>110/88</b> (15)	<b>107/87</b> (15)	<b>104/86</b> (15)	<b>101/86</b> (15)	<b>97/85</b> (15)
2014	<b>94/84</b> (15)	<b>91/83</b> (15)	<b>87/81</b> (15)	<b>84/80</b> (15)	<b>80/79</b> (15)	<b>77/78</b> (15)	<b>74/76</b> (15)	<b>70/75</b> (15)	<b>67/73</b> (15)	<b>64/72</b> (15)	<b>61/70</b> (15)	<b>58/69</b> (15)
2015	<b>55/67</b> (15)	<b>52/65</b> (15)	<b>49/64</b> (15)	<b>46/62</b> (15)	<b>44/60</b> (15)	<b>41/59</b> (15)	<b>38/57</b> (15)	<b>36/55</b> (15)	<b>34/54</b> (15)	<b>32/52</b> (15)	<b>30/50</b> (15)	<b>28/49</b> (15)
	<b>Jan</b>	<b>Feb</b>	<b>Mar</b>	<b>Apr</b>	<b>May</b>	<b>Jun</b>	<b>Jul</b>	<b>Aug</b>	<b>Sep</b>	<b>Oct</b>	<b>Nov</b>	<b>Dec</b>



# ISES Solar Cycle F10.7cm Radio Flux Progression

Data Through 30 Apr 09



Updated 2009 May 1

NOAA/SWPC Boulder, CO USA

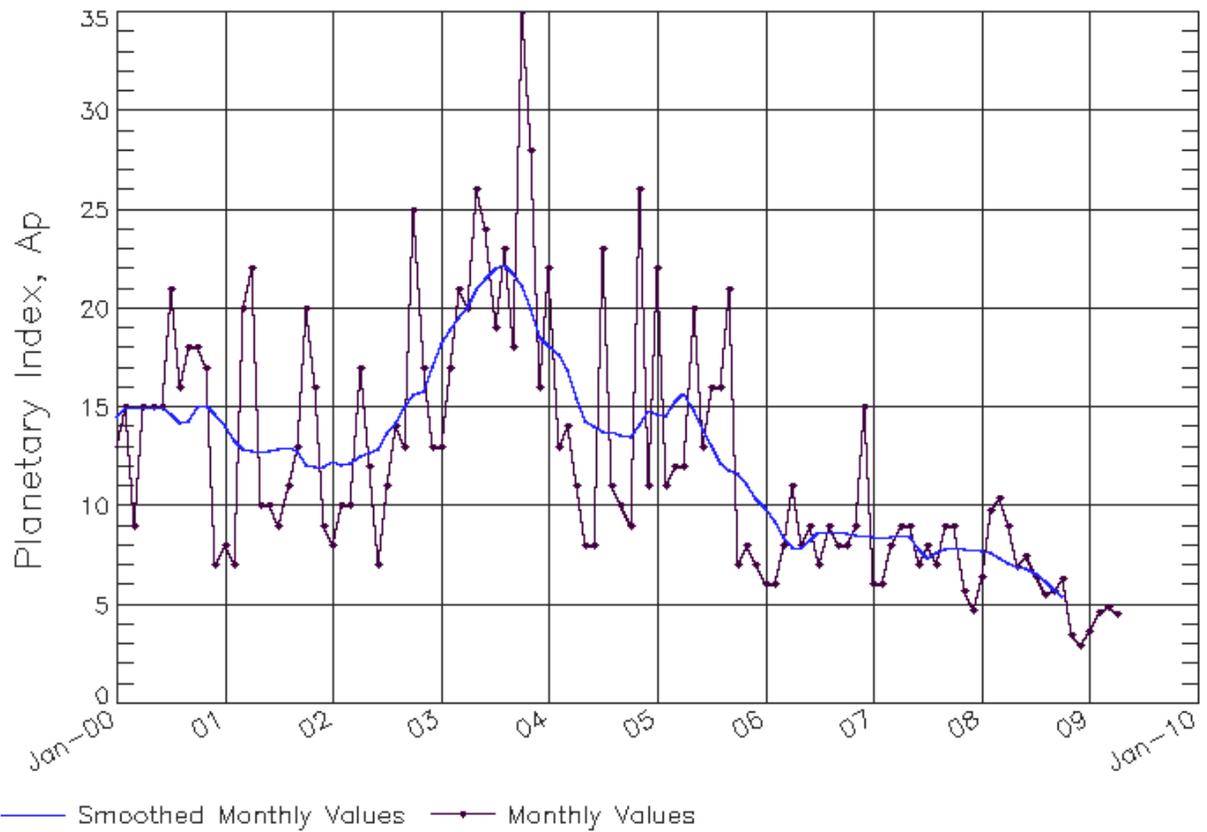
## SEC Prediction of Smoothed F10.7cm Radio Flux

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	Hi/Lo											
2007	77 (***)	76 (***)	76 (***)	75 (***)	74 (***)	73 (***)	72 (***)	71 (***)	71 (***)	71 (***)	71 (***)	70 (***)
2008	70 (***)	69 (***)	69 (***)	69 (***)	69 (***)	69 (***)	68 (***)	68 (***)	68 (***)	68 (***)	68/68 (1)	69/68 (3)
2009	69/68 (5)	70/68 (7)	71/69 (9)	73/69 (11)	74/70 (13)	76/71 (15)	79/71 (17)	82/72 (19)	85/74 (21)	88/75 (22)	91/76 (23)	96/78 (23)
2010	101/81 (23)	106/83 (23)	111/85 (23)	116/88 (23)	121/90 (23)	126/93 (23)	131/95 (23)	136/98 (23)	140/100 (23)	145/103 (23)	149/105 (23)	154/108 (23)
2011	158/110 (23)	161/112 (23)	165/115 (23)	168/117 (23)	171/119 (23)	174/121 (23)	177/123 (23)	179/125 (23)	181/127 (23)	183/128 (23)	184/130 (23)	185/132 (23)
2012	186/133 (23)	187/134 (23)	187/135 (23)	187/136 (23)	187/137 (23)	187/138 (23)	186/139 (23)	185/140 (23)	184/140 (23)	183/141 (23)	181/141 (23)	179/141 (23)
2013	177/141 (23)	175/141 (23)	173/141 (23)	171/141 (23)	168/141 (23)	166/140 (23)	163/140 (23)	160/139 (23)	157/139 (23)	154/138 (23)	151/137 (23)	148/136 (23)
2014	145/136 (23)	142/135 (23)	139/134 (23)	136/132 (23)	133/131 (23)	129/130 (23)	126/129 (23)	123/127 (23)	120/126 (23)	117/125 (23)	115/123 (23)	112/122 (23)
2015	109/120 (23)	106/119 (23)	104/117 (23)	101/116 (23)	99/114 (23)	96/113 (23)	94/111 (23)	92/110 (23)	90/108 (23)	88/106 (23)	86/105 (23)	84/103 (23)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec



# ISES Solar Cycle Ap Progression

Data Through 30 Apr 09



Updated 2009 May 1

NOAA/SWPC Boulder, CO USA



# Cosmic-Ray Ground-Level Events

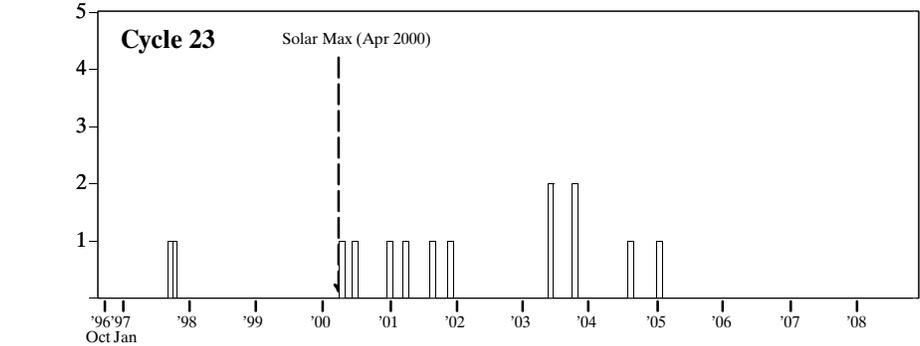
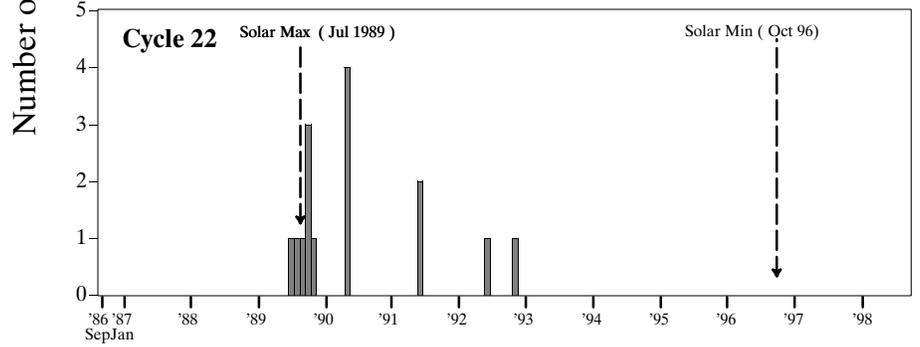
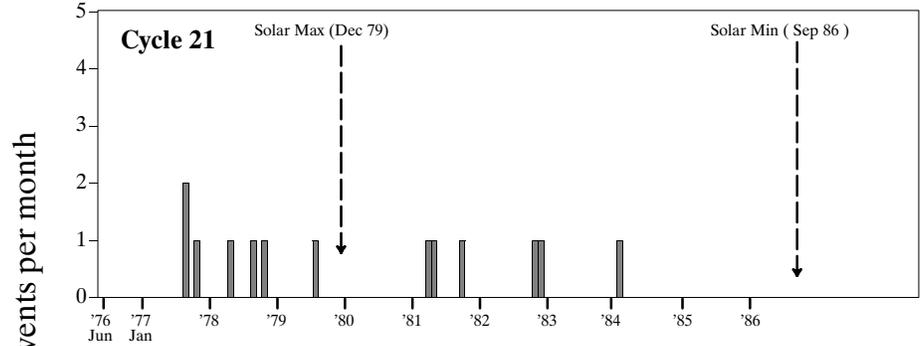
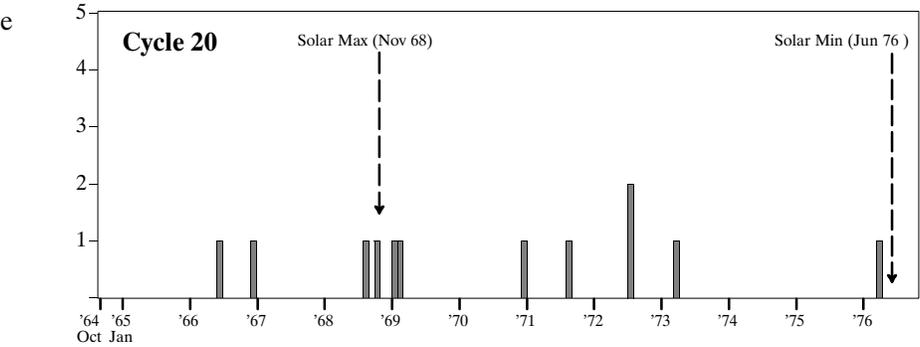
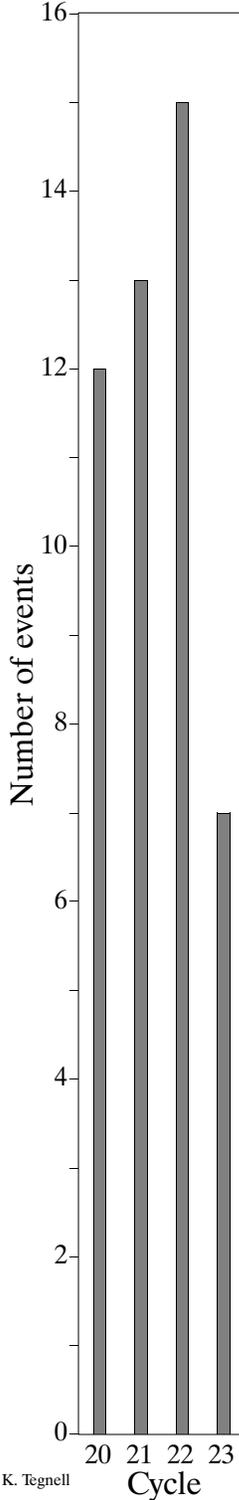


Space Environment Center

April 2009  
(Month 151)

Preliminary data

Comparison of Cycles at current month in cycle



N.Cohen