

Space Weather Highlights
09 June 1997 -15 June 1997

Solar activity was very low. No optical flares were reported.

Solar wind data were received from the WIND spacecraft a few hours per day. Solar wind velocities were around 370 km/sec through 10 June, then decreased to 300 km/sec for the remainder of the period. Particle densities generally ranged 03 - 15 p/cc. However, densities increased to peaks of 30 and 25 p/cc on 11 and 15 June, respectively. Bz hovered about zero during most of the period. Solar sector orientation was mostly toward (phi angle near 315 degrees) through 11 June becoming mostly away (phi angle near 135 degrees) during 12 - 14 June. Orientation became mostly toward on 15 June.

There were no significant proton enhancements observed at satellite altitudes.

The greater than 2 MeV electron flux reached high levels during 09 and 12 - 15 June.

The geomagnetic field was disturbed during 09 June with active to minor storm levels observed at all latitudes and brief periods of major storm levels observed at high latitudes. Mostly quiet conditions prevailed for the remainder of the period.

Space Weather
18 June 1997 - 14 July 1997

Solar activity is expected to be very low.

No significant proton enhancements are expected at satellite altitudes.

The greater than 2 MeV electron flux is expected to be normal to moderate.

The geomagnetic field is expected to be quiet to unsettled.



Daily Solar Data

Date	Radio Flux 10.7 cm	Sun spot No.	Sunspot Area (10 ⁶ hemi.)	X-ray Background	X-ray Flux			Flares				
					C	M	X	S	Optical			
									1	2	3	4
09 June	73	23	20	A1.5	0	0	0	0	0	0	0	0
10 June	72	11	10	A2.3	0	0	0	0	0	0	0	0
11 June	71	11	10	A2.2	0	0	0	0	0	0	0	0
12 June	70	26	40	<A1.0	0	0	0	0	0	0	0	0
13 June	70	27	30	A1.0	0	0	0	0	0	0	0	0
14 June	71	31	40	<A1.0	0	0	0	0	0	0	0	0
15 June	71	29	30	A1.2	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)		
	>1MeV	>10MeV	>100MeV	>.6MeV	>2MeV	>4MeV
09 June	2.7E+5	1.8E+4	4.6E+3		2.4E+7	
10 June	8.2E+4	1.7E+4	4.3E+3		1.5E+7	
11 June	2.5E+5	1.8E+4	4.1E+3		1.9E+7	
12 June	2.2E+5	1.8E+4	4.5E+3		4.9E+7	
13 June	2.7E+5	1.8E+4	4.2E+3		6.9E+7	
14 June	5.1E+5	1.8E+4	4.1E+3		7.8E+7	
15 June	2.4E+5	1.7E+4	4.3E+3		1.4E+7	

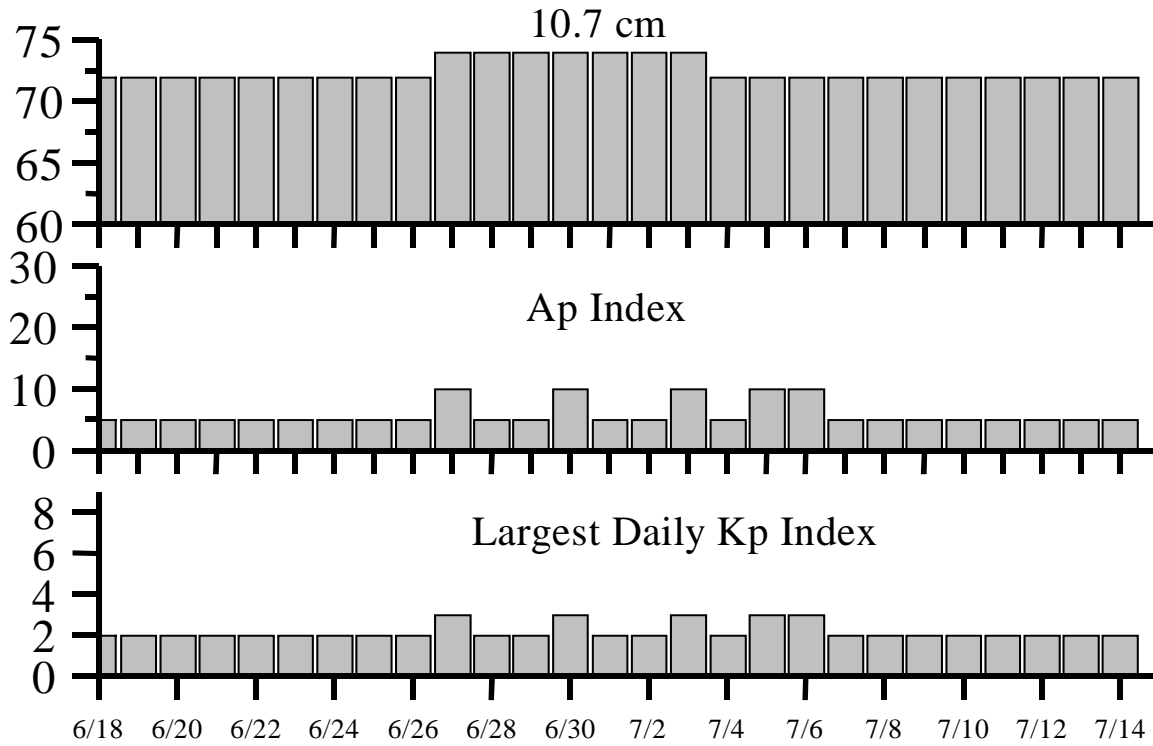
Daily Geomagnetic Data

Date	Middle Latitude Fredericksburg		High Latitude College		Estimated Planetary	
	A	K-indices	A	K-indices	A	K-indices
	09 June	25	4-5-5-4-3-2-3-3	24	3-3-6-3-5-3-1-2	33
10 June	8	2-3-2-2-2-2-2-2	5	0-3-3-2-0-1-0-0	6	2-2-3-1-1-2-2-2
11 June	4	2-1-1-1-1-1-1-2	1	1-1-0-0-0-0-0-1	3	2-1-0-0-1-1-2-1
12 June	8	3-2-2-2-2-2-2-1	3	1-1-1-3-2-0-0-0	6	2-1-1-2-2-2-2-1
13 June	6	1-1-0-1-2-2-2-3	0	0-0-0-0-0-0-0-0	3	1-0-0-0-2-1-1-2
14 June	4	1-0-0-0-2-2-2-2	0	0-0-0-0-0-0-0-0	3	0-0-0-0-1-2-2-1
15 June	9	3-2-2-2-3-2-2-2	3	1-2-0-3-1-0-1-0	6	3-2-1-2-2-2-2-2

Alerts and Warnings Issued

Date and Time of Issue (UT)	Type of Alert or Warning	Date and Time of Event (UT)
09 Jun 0308	K = 5 observed	09 Jun 00-03
09 Jun 0605	K = 5 observed	09 Jun 03-06
09 Jun 0901	A ≥ 20 observed	09 Jun 0901
09 Jun 1821	>2MeV Electron Event ≥ 1000pfu	09 Jun 1816
12 Jun 1832	>2MeV Electron Event ≥ 1000pfu	12 Jun 1747
14 Jun 0009	>2MeV Electron Event in Progress ≥ 1000pfu	12 Jun
15 Jun 0008	>2MeV Electron Event in Progress ≥ 1000pfu	14 Jun





Twenty-seven Day Outlook

Date	Radio Flux	Planetary	Largest	Date	Radio Flux	Planetary	Largest
	10.7 cm	A Index	Kp Index		10.7 cm	A Index	Kp Index
17 Jun	72	5	2	01 Jul	74	5	2
18	72	5	2	02	74	5	3
19	72	5	2	03	74	10	2
20	72	5	2	04	72	5	3
21	72	5	2	05	72	10	3
22	72	5	2	06	72	10	3
23	72	5	2	07	72	5	2
24	72	5	2	08	72	5	2
25	72	5	2	09	72	5	2
26	72	5	2	10	72	5	2
27	74	10	3	11	72	5	2
28	74	5	2	12	72	5	2
29	74	5	2	13	72	5	2
30	74	10	3	14	72	5	2



Energetic Event

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

No Event Observed

Flare List

Date	Time			X-ray	Optical		Rgn
	Begin	Max	End		Imp /	Location	
				Class.	Brtns	Lat CMD	#
09 June	0934	0940	0944	B1.7			
	1416	1422	1429	B5.0			
	1715	1720	1723	B2.1			
	2001	2013	2040	B2.0			
	2229	2238	2247	B2.3			
10 June	No Flares Observed						
11 June	No Flares Observed						
12 June	No Flares Observed						
13 June	0925	0930	0933	B3.1			
14 June	No Flares Observed						
15 June	No Flares Observed						

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			
	<i>Region</i>	<i>8047</i>																
27 May	N26E68	214	0010	07	BXO	004	B											
28 May	N26E55	214	0020	07	BXO	004	B											
29 May	N26E44	212	0050	09	CRO	006	B											
30 May	N27E31	211	0030	08	CRO	003	B											
31 May	N27E19	210	0020	08	CRO	003	B											
01 Jun	N26E08	208	0020	05	CRO	003	B											
02 Jun	N26W04	206	0000	01	AXX	002	A											
03 Jun	N26W17	206																
04 Jun	N26W30	206																
05 Jun	N26W43	206																
06 Jun	N26W56	206																
07 Jun	N26W69	206																
08 Jun	N26W82	206																

0 0 0 0 0 0 0 0

Crossed West Limb.

Absolute heliographic longitude: 206



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

Region 8048

30 May	S28E55	187	0000	00	AXX	001	A												
31 May	S29E41	188	0030	06	BXO	006	B												
01 Jun	S29E28	188	0050	06	CRO	010	B					2							
02 Jun	S28E15	187	0120	07	DSO	013	B												
03 Jun	S28E03	186	0150	09	DSO	010	B												
04 Jun	S28W13	188	0110	10	DSO	006	B												
05 Jun	S27W24	186	0120	10	DAO	005	B												
06 Jun	S28W37	186	0110	10	DAO	005	B												
07 Jun	S28W50	186	0090	10	DSO	007	B												
08 Jun	S28W65	188	0030	11	CSO	004	B												
09 Jun	S28W80	190	0020	05	CRO	002	B												
10 Jun	S28W93	190																	
												0	0	0	2	0	0	0	0

Crossed West Limb.

Absolute heliographic longitude: 186

Region 8050

08 Jun	N27E56	067	0000	01	AXX	001	A												
09 Jun	N27E43	067	0000	00	AXX	001	A												
10 Jun	N28E30	066	0010	00	AXX	001	A												
11 Jun	N28E17	065	0010	00	AXX	001	A												
12 Jun	N29E03	066	0020	04	BXO	003	B												
13 Jun	N29W10	066	0000	00	AXX	001	A												
14 Jun	N29W22	065	0010	03	BXO	003	B												
15 Jun	N28W34	063	0000	00	AXX	001	A												
												0	0	0	0	0	0	0	0

Still on Disk.

Absolute heliographic longitude: 066

Region 8051

08 Jun	N21W09	132	0000	00	AXX	001	A												
09 Jun	N21W22	132																	
10 Jun	N21W35	132																	
11 Jun	N21W48	132																	
												0	0	0	0	0	0	0	0

Died on Disk.

Absolute heliographic longitude: 132



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

Region 8052

12 Jun	N17E40	029	0020	03	CRO	003	B										
13 Jun	N17E27	029	0030	05	BXO	006	B										
14 Jun	N18E14	029	0030	05	CRO	008	B										
15 Jun	N18E02	027	0030	05	CRO	008	B										
										0	0	0	0	0	0	0	0

Still on Disk.

Absolute heliographic longitude: 27



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

Month	Sunspot Numbers				Radio Flux		Geomagnetic		
	Observed values SWO	RI	Ratio RI/SWO	Smooth values SWO	RI	**Penticton 10.7 cm	Smooth Value	Planetary Ap	Smooth Value
1995									
June	27.8	15.6	0.56	29.9	18.2	75.7	77.7	11	12.7
July	23.8	14.5	0.61	28.1	17.0	73.9	76.9	08	12.4
August	25.1	14.3	0.57	25.4	15.4	73.8	76.0	09	12.1
September	16.5	11.8	0.72	22.0	13.4	72.0	74.8	13	11.8
October	31.6	21.1	0.67	19.7	12.1	77.9	73.8	16	11.4
November	15.7	09.0	0.57	18.5	11.4	74.2	73.2	09	10.7
December	16.2	10.0	0.62	17.6	10.8	72.6	72.8	09	10.0
1996									
January	17.6	11.5	0.55	16.8	10.4	74.5	72.4	09	09.8
February	09.1	04.4	0.48	16.2	10.1	71.5	72.2	10	09.8
March	12.1	09.2	0.76	15.4	09.7	70.7	72.1	11	09.9
April	08.5	04.8	0.60	13.6	08.5*	69.3	71.6	11	09.7*
May	11.8	05.5	0.47	12.9	08.1*	70.1	71.4	07	09.5*
June	18.8	11.8	0.63	13.5	08.6*	69.6	71.8	05	09.4*
July	13.2	08.2	0.67	13.4	08.5*	71.2	72.0	07	09.3*
August	20.5	14.4	0.68	13.1	08.4*	72.4	72.1	09	09.4*
September	02.9	01.6	0.62	13.3	08.5*	69.4	72.3	15	09.3*
October	02.3	01.8*	0.78*	14.0	09.0*	69.2	72.6	13	09.1*
November	26.7	18.6*	0.70*	15.4	10.0*	78.7	73.0	08	09.1*
December	21.1	12.7*	0.60*			77.8		07	
1997									
January	09.0	06.5*	0.72*			74.0		09	
February	11.3	07.6*	0.67*			73.8		11	
March	14.4	08.8*	0.61*			73.5		08	
April	24.5	15.8*	0.64*			74.5		10	
May	28.6	18.5	0.64			74.6		08	

*Preliminary estimates.

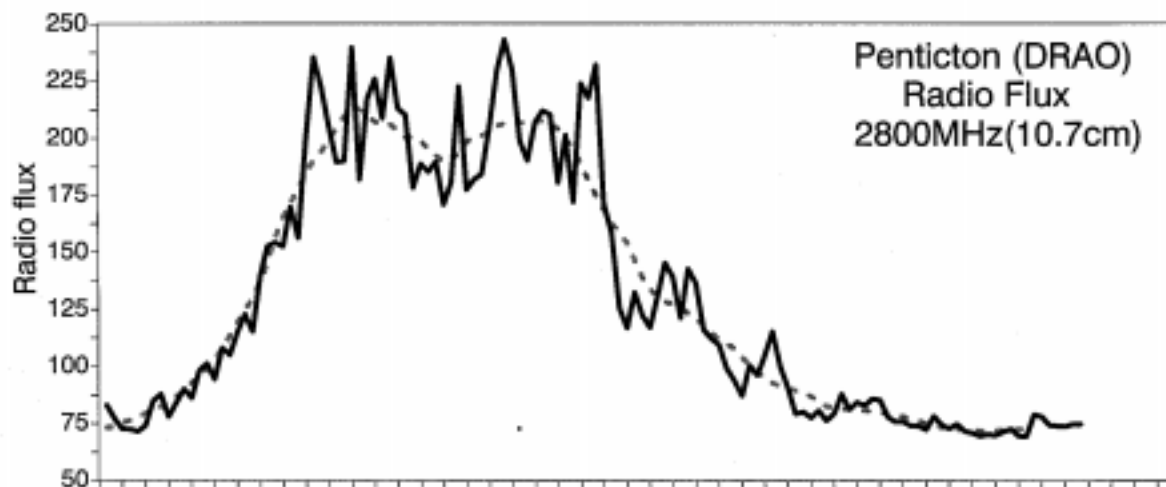
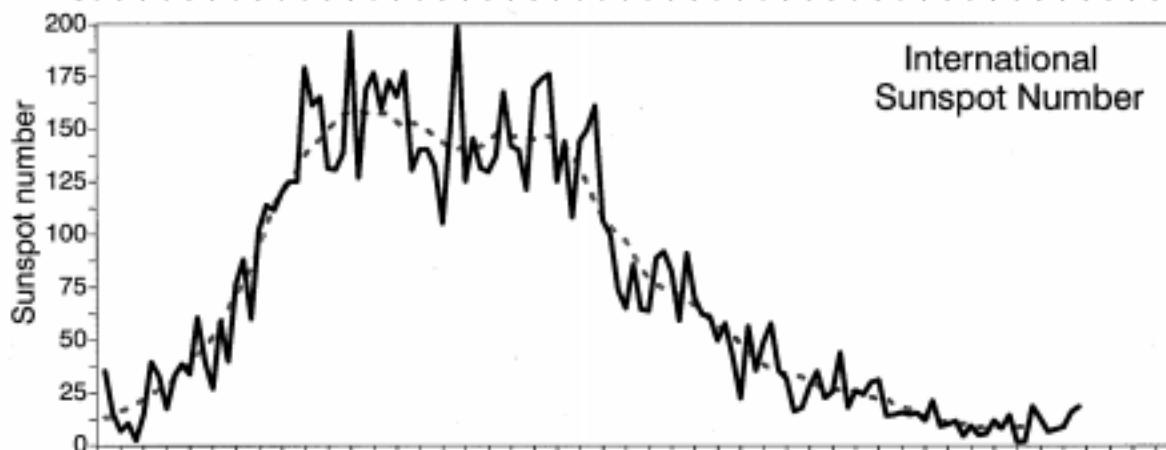
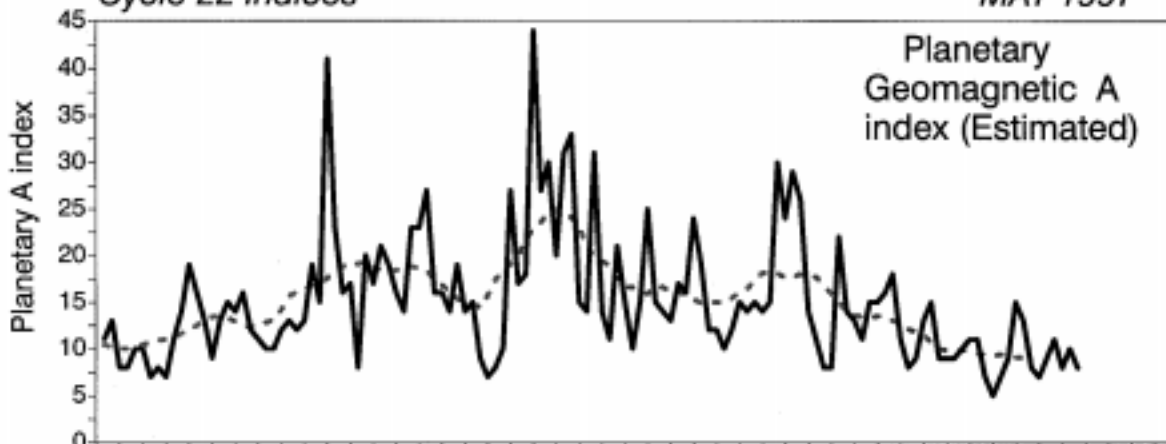
The lowest smoothed sunspot indices number for Cycle 21, RI = 12.3, occurred September 1986. The highest smoothed sunspot number for Cycle 22, RI=158.5, occurred July 1989.

** From June 1991 onward, the 10.7 cm radio flux data source is Penticton, B.C. Canada. Prior to that, it was Ottawa.



Cycle 22 Indices

MAY 1997

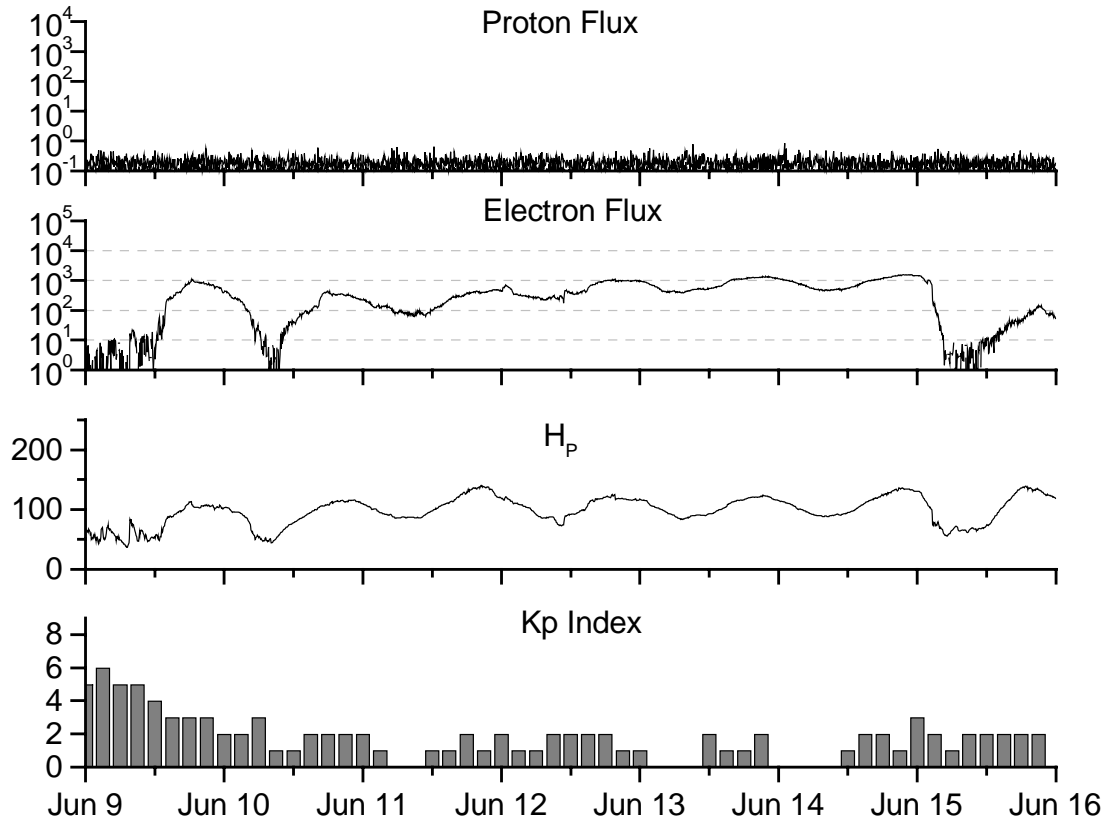


Sep '88 Mar '89 Sep '89 Mar '90 Sep '90 Mar '91 Sep '91 Mar '92 Sep '92 Mar '93 Sep '93 Mar '94 Sep '94 Mar '95 Sep '95 Mar '96 Sep '96 Mar '97

Solid--Monthly average Dashed--Smoothed average

SEC/Hirman/Nelson/Borst





Weekly Geosynchronous Satellite Environment Summary

Week Beginning 09 June 1997

Protons plot contains the five minute averaged integral proton flux (protons/ cm^2 -sec-sr) as measured by GOES-9 (W135) for each of three energy thresholds: greater than 10, 50, and 100 MeV.

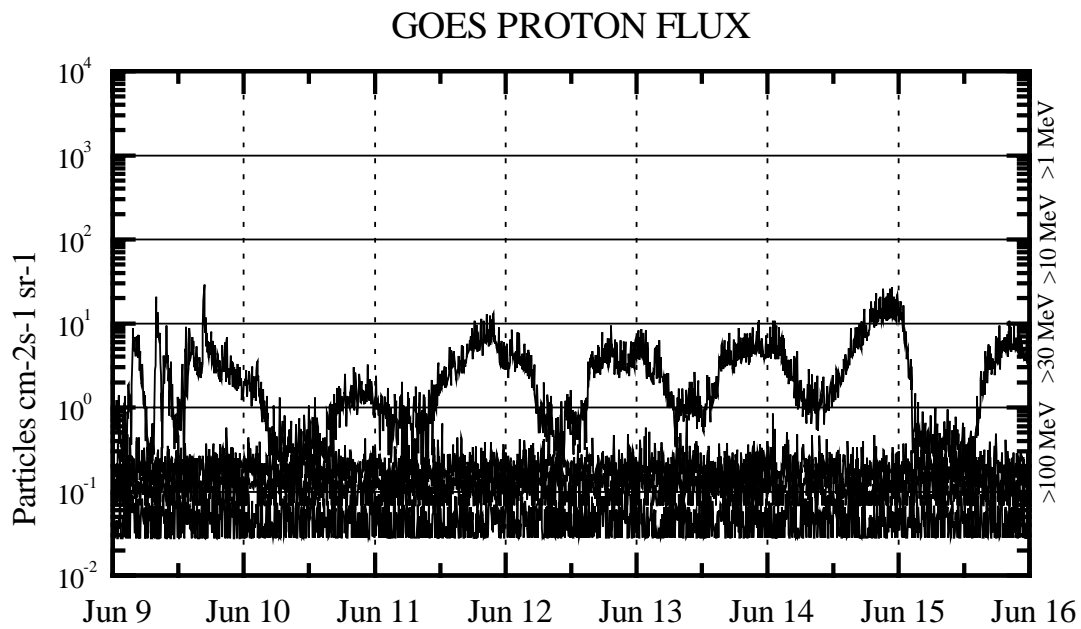
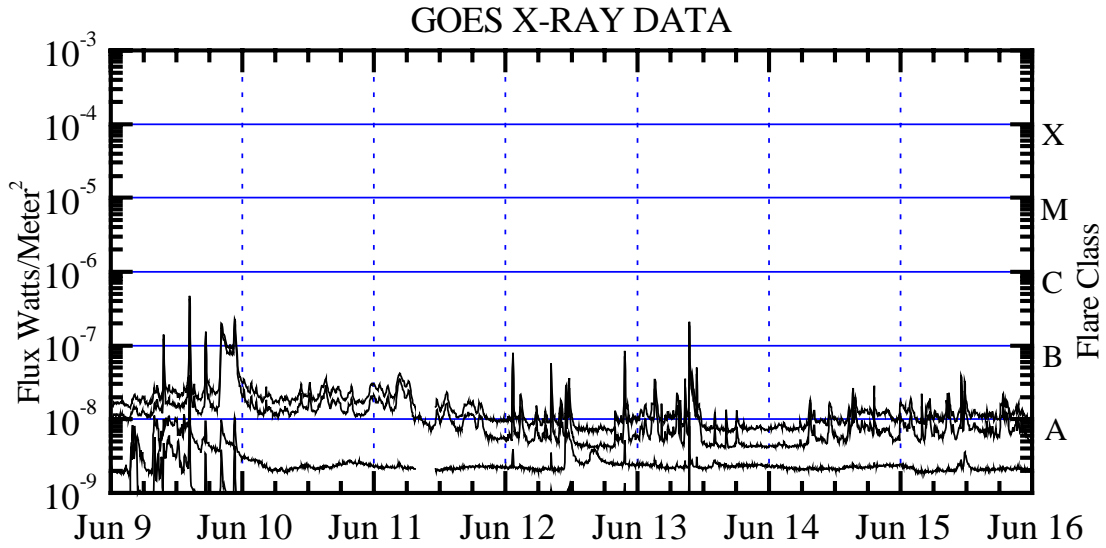
Electrons plot contains the five minute averaged integral electron flux (electrons/ cm^2 -sec-sr) with energies greater than 2 MeV at GOES-9.

H_p plot contains the five minute averaged magnetic field H component in nanoteslas (nT) as measured by GOES-9. The H component is parallel to the spin axis of the satellite, which is nearly parallel to the Earth's rotation axis.

K_p plot contains the estimated planetary 3-hour K-index (derived by the USAF 55th Space Weather Squadron) 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. These data are made available through cooperation from the Geological Survey of Canada (GSC) and the US Geological Survey. These may differ from the final K_p values derived from a more extensive network of magnetometers.

The data included here are those now available in real time at the SWO 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 K_p are "global" parameters that are applicable to a first order approximation over large areas. H_p is subject to a more localized phenomena and the measurements generally are applicable to within a few degrees of longitude of the measuring satellite.





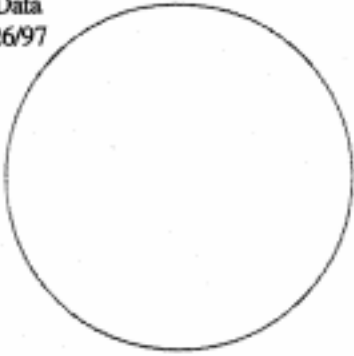
Weekly GOES Satellite X-ray and Proton Plots

Proton plot contains the five minute averaged integral proton flux (protons/cm²-sec-sr) as measured by GOES-9 (W135) 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.

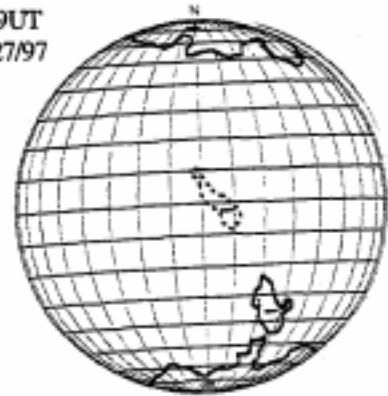
X-ray plot contains five minute averaged x-ray flux (watts/m²) as measured by GOES 8 and 9 in two wavelength bands, .05 - .4 and .1 - .8 nm. The letters A, B, C, M and X refer to x-ray event levels for the .1 - .8 nm band.



No Data
05/26/97



B=-1°
1509UT
05/27/97



B=-1°
1519UT
05/28/97



B=-1°
1553UT
05/29/97



B=-1°
1559UT
05/30/97



B=-1°
1532UT
05/31/97



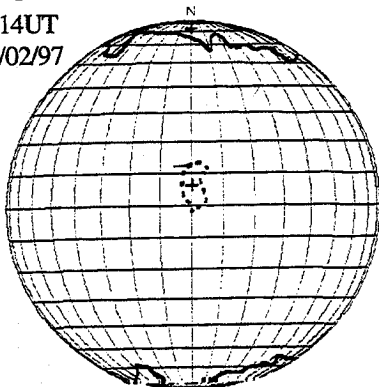
B=-1°
1547UT
06/01/97

Coronal hole maps from the National Solar Observatory, Kitt Peak, Arizona

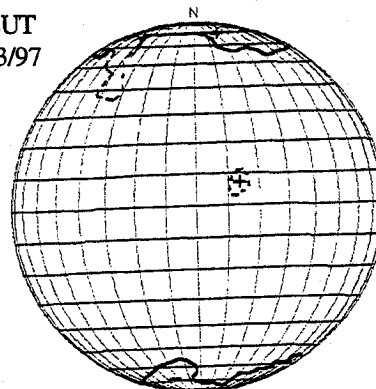
These maps are reproductions of the coronal hole contours as derived from the Kitt Peak 1083 nm raw data images. These are preliminary data, where solid (and dashed) lines are used to indicate more (and less) confidence in an inference and are printed whenever they are available at SWO.



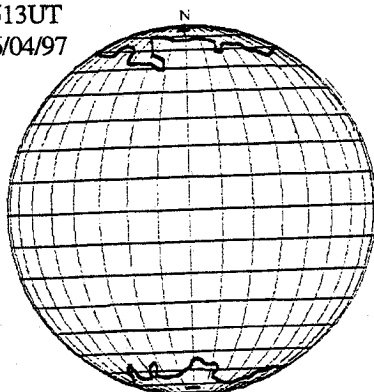
B=-1°
1514UT
06/02/97



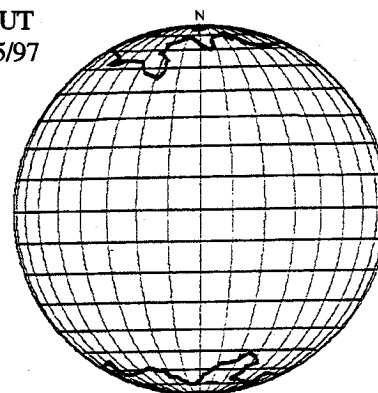
B=-1°
1538UT
06/03/97



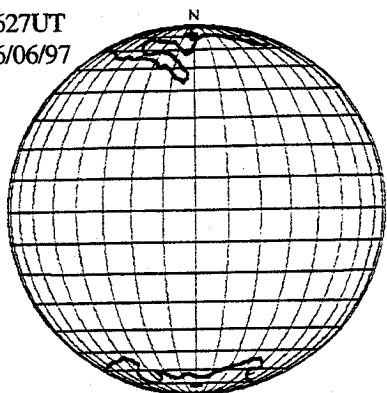
B=-0°
1513UT
06/04/97



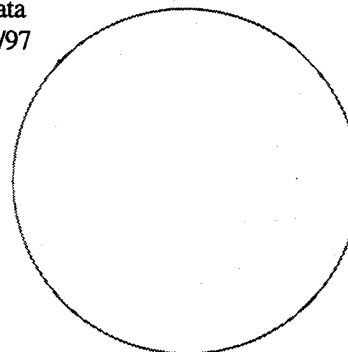
B=-0°
1833UT
06/05/97



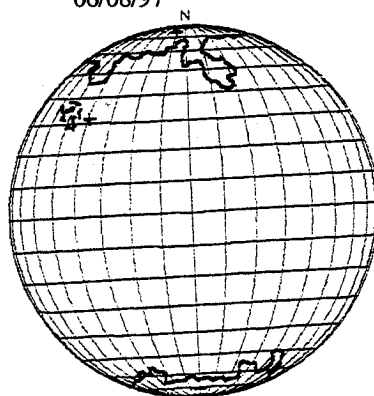
B=-0°
1627UT
06/06/97



No Data
06/07/97



B=+0°
1629UT
06/08/97

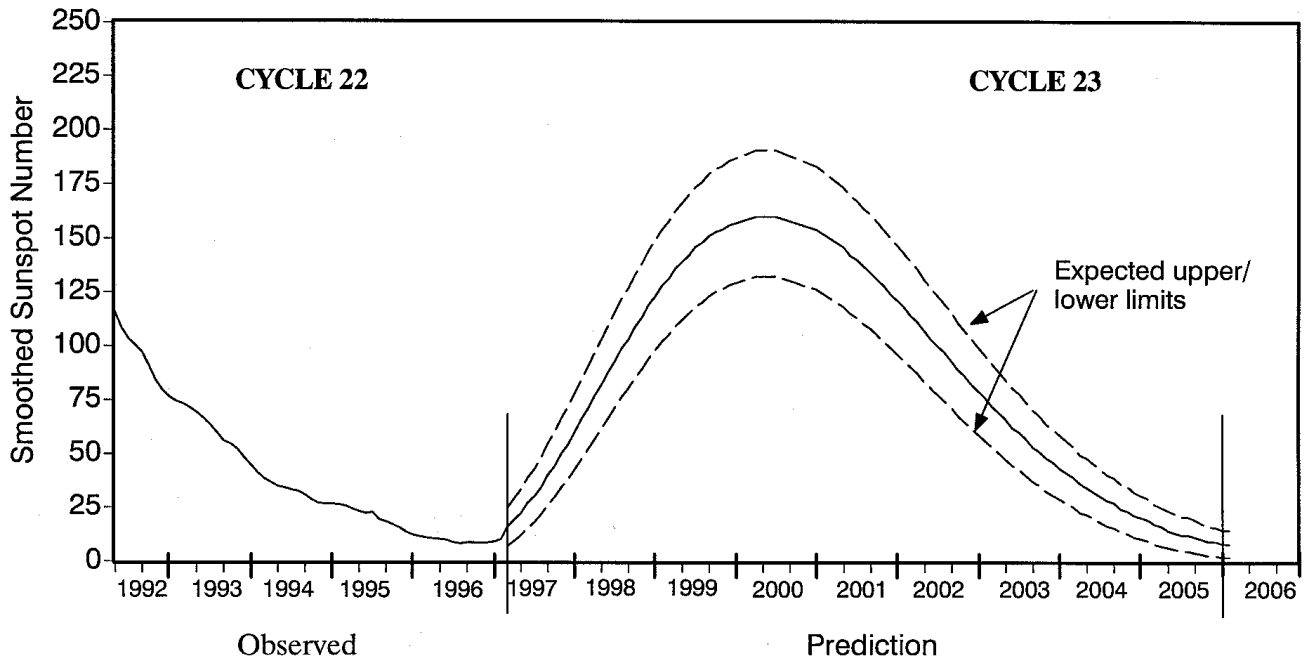


Coronal hole maps from the National Solar Observatory, Kitt Peak, Arizona

These maps are reproductions of the coronal hole contours as derived from the Kitt Peak 1083 nm raw data images. These are preliminary data, where solid (and dashed) lines are used to indicate more (and less) confidence in an inference and are printed whenever they are available at SWO.



SEC Prediction of Smoothed Sunspot Number

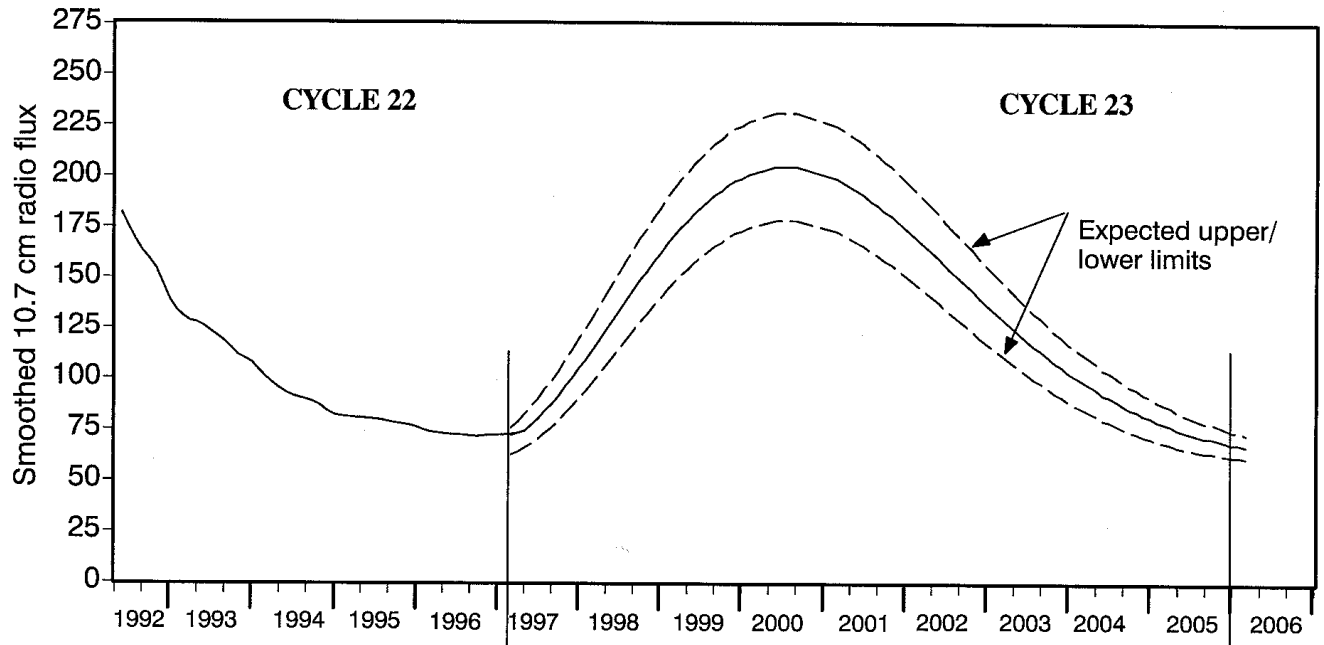


	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1996	10 (***)	10 (***)	10 (***)	9 (***)	8 (***)	9 (***)	9 (***)	8 (***)	9 (***)	9 (***)	10 (***)	16 (9)
1997	19 (10)	22 (11)	27 (12)	30 (13)	34 (14)	40 (15)	44 (16)	50 (17)	54 (18)	60 (19)	66 (20)	71 (20)
1998	77 (21)	82 (22)	88 (22)	93 (23)	99 (24)	103 (24)	109 (25)	113 (25)	119 (26)	123 (26)	128 (27)	131 (27)
1999	136 (27)	139 (28)	142 (28)	146 (28)	148 (29)	151 (29)	153 (29)	154 (29)	156 (29)	157 (29)	158 (29)	159 (29)
2000	160 (30)	160 (30)	160 (30)	160 (30)	159 (29)	158 (29)	157 (29)	156 (29)	155 (29)	154 (29)	152 (29)	150 (28)
2001	148 (28)	146 (28)	142 (28)	140 (27)	137 (27)	134 (27)	131 (27)	128 (26)	124 (26)	121 (26)	118 (25)	114 (25)
2002	111 (24)	107 (24)	103 (24)	100 (23)	97 (23)	93 (22)	89 (22)	86 (21)	82 (21)	79 (21)	76 (20)	72 (20)
2003	69 (19)	66 (19)	62 (18)	60 (18)	57 (17)	53 (17)	51 (17)	48 (16)	46 (16)	43 (15)	41 (15)	39 (14)
2004	36 (14)	34 (14)	32 (13)	30 (13)	28 (12)	27 (12)	24 (11)	23 (11)	21 (11)	20 (10)	19 (10)	17 (9)
2005	16 (9)	14 (9)	13 (8)	12 (8)	12 (8)	11 (8)	10 (7)	9 (7)	9 (7)	8 (6)	** (***)	** (***)

(##) indicates possible variations from the predictions of Solar Cycle 23's values SEC/Nelson/Borst



SEC Prediction of Smoothed 10.7 cm Radio Flux



	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1996	72 (***)	72 (***)	72 (***)	72 (***)	71 (***)	72 (***)	72 (***)	72 (***)	72 (***)	73 (***)	73 (***)	74 (8)
1997	77 (9)	80 (10)	84 (11)	87 (11)	91 (12)	96 (13)	100 (14)	105 (15)	109 (15)	114 (16)	119 (17)	124 (18)
1998	129 (18)	134 (19)	139 (20)	144 (20)	149 (21)	153 (21)	158 (22)	162 (22)	167 (23)	171 (23)	175 (24)	178 (24)
1999	182 (24)	185 (25)	188 (25)	191 (25)	193 (25)	196 (26)	198 (26)	199 (26)	201 (27)	202 (27)	203 (28)	204 (28)
2000	205 (30)	205 (30)	205 (30)	205 (30)	204 (28)	203 (28)	202 (27)	201 (27)	200 (26)	199 (26)	197 (26)	195 (26)
2001	193 (25)	191 (25)	188 (25)	186 (25)	183 (24)	181 (24)	178 (24)	175 (24)	172 (23)	169 (23)	166 (23)	163 (22)
2002	160 (22)	156 (22)	153 (21)	150 (21)	147 (21)	144 (20)	140 (20)	137 (19)	134 (19)	131 (19)	128 (18)	125 (18)
2003	122 (17)	119 (17)	116 (17)	114 (16)	111 (16)	108 (15)	106 (15)	103 (14)	101 (14)	99 (14)	97 (13)	95 (13)
2004	92 (12)	91 (12)	89 (12)	87 (11)	85 (11)	84 (11)	82 (10)	81 (10)	79 (10)	78 (9)	77 (9)	75 (9)
2005	74 (8)	73 (8)	72 (8)	71 (7)	71 (7)	70 (7)	69 (7)	68 (6)	68 (6)	67 (6)	** (***)	** (***)

(##) indicates possible variations from the predictions of Solar Cycle 23's values SEC/Nelson/Borst

