

**Space Weather Highlights
13-19 July 1998**

Solar activity ranged from very low to low during most of the period, but rose to moderate levels on 14 July. Region 8270 (S21, L = 217, class/area Dao/100 on 14 July) produced an impulsive M4/1B at 14/1259UT with an associated 250 SFU Tenflare and a Type IV radio sweep. Region 8270 displayed minor growth and some magnetic complexity prior to the M4 flare, but was otherwise a small, stable sunspot group. A weak Type II radio sweep occurred at 18/1700UT and was associated with an optically uncorrelated C-class x-ray flare.

Real-time solar wind data were available from the Advanced Composition Explorer (ACE) spacecraft during most of the period. Velocities gradually declined from 430 - 300 km/sec during 13 - 15 July. Velocities increased to a peak of 670 km/sec early on 16 July and remained elevated through 17 July then decreased to around 400 km/sec for the last two days of the period. Densities were in the 02 - 10 p/cc range during most of the period, but were enhanced during 15 - 16 July and reached a peak of 42 p/cc early on 16 July. Bz was in the plus 05 to minus 05 nT (GSM) range during most of the time, but became more variable on 16 July and ranged from plus 14 to minus 17 nT. Solar sector orientation was away (phi angle near 135 degrees) during 13 - 15 July, then shifted to toward conditions (phi angle near 315 degrees) on 16 July. Sector orientation was not discernible during 17 - 19 July.

There were no significant proton enhancements detected at geosynchronous altitude.

The greater than 2 MeV electron flux at geosynchronous altitude was at normal to moderate levels through 16 July, then increased to moderate to high levels for the remainder of the period.

The geomagnetic field was mostly quiet through 15 July. A disturbance occurred during 16 July with active to minor storm levels detected at middle latitudes and active to major storm levels at high latitudes. Field activity declined to mostly quiet levels during the remainder of the period. The 16 July disturbance was likely due to a high-speed coronal hole windstream.

**Space Weather Forecast
22 July 1998 - 17 August 1998**

Solar activity is expected to be low during most of the period with a fair chance for isolated M-class flares. No major flare activity is expected.

No proton enhancements are expected at geosynchronous altitude.

The greater than 2 MeV electron flux at geosynchronous altitude is expected to be at normal to moderate levels during most of the period.

The geomagnetic field is expected to be at mostly quiet to unsettled levels.

NOTICE: Effective Monday 27 July, the GOES-9 spacecraft will be taken out of operational status, and GOES-10 will become the primary satellite for SWO data and products.



Daily Solar Data

Date	Radio Flux	Sun spot No.	Sunspot Area	X-ray Background	X-ray Flux			Flares				
	10.7 cm	(10 ⁶ hemi.)			C	M	X	S	1	2	3	4
13 July	106	50	110	B2.6	0	0	0	2	0	0	0	0
14 July	103	58	160	B2.2	3	1	0	3	1	0	0	0
15 July	105	95	160	B1.5	6	0	0	10	0	0	0	0
16 July	106	113	190	B3.6	9	0	0	9	1	0	0	0
17 July	100	89	240	B2.0	0	0	0	4	0	0	0	0
18 July	99	76	130	B1.2	1	0	0	0	0	0	0	0
19 July	102	62	160	B1.2	1	0	0	5	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
13 July	1.7E+5	1.7E+4	4.5E+3		4.2E+6	
14 July	1.6E+5	1.6E+4	4.3E+3		3.9E+6	
15 July	3.0E+5	1.6E+4	4.2E+3		3.6E+6	
16 July	3.2E+6	1.6E+4	4.1E+3		6.6E+6	
17 July	2.7E+5	1.6E+4	4.0E+3		1.3E+8	
18 July	3.9E+5	1.6E+4	4.3E+3		2.3E+8	
19 July	3.5E+5	1.6E+4	4.3E+3		1.7E+8	

Daily Geomagnetic Data

Date	Middle Latitude Fredericksburg		High Latitude College		Estimated Planetary	
	A	K-indices	A	K-indices	A	K-indices
13 July	4	1-2-1-1-1-1-2-2	2	0-2-1-0-0-0-1-2	6	2-1-1-1-2-3-2-2
14 July	2	1-0-0-1-2-0-0-1	1	0-1-0-0-0-0-1-0	4	1-0-0-0-2-2-2-1
15 July	2	0-0-0-0-0-1-0-3	2	1-1-1-0-0-0-0-2	5	1-0-0-0-2-2-2-3
16 July	24	3-5-3-4-3-5-3-3	44	3-5-4-5-5-7-3-3	37	4-6-4-5-4-5-4-3
17 July	9	3-2-4-1-2-1-2-1	17	2-3-4-4-4-3-1-1	9	3-2-4-2-2-2-2-1
18 July	4	1-0-0-1-1-1-2-3	3	1-1-0-1-1-1-1-2	5	1-1-0-2-2-2-2-3
19 July	5	1-2-2-1-1-2-1-2	5	2-2-3-2-1-0-0-1	8	2-3-3-3-2-2-1-2

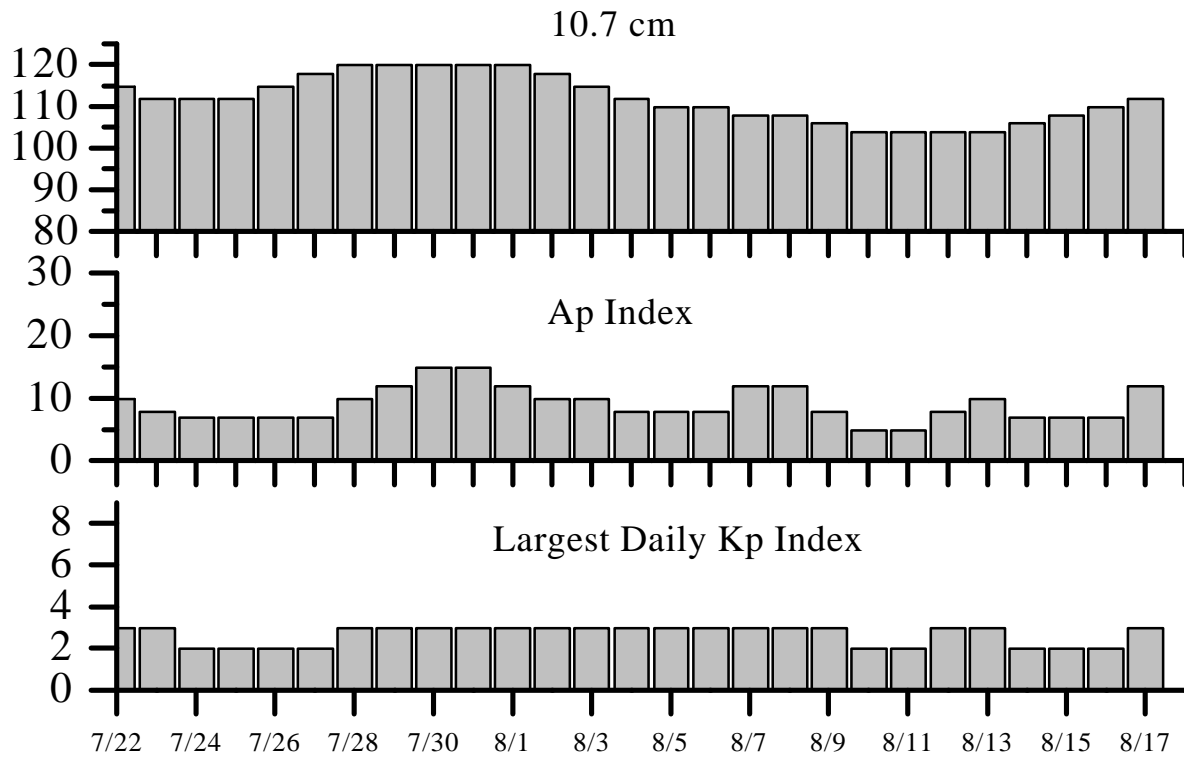


Alerts and Warnings Issued

Date and Time of Issue (UT)	Type of Alert or Warning	Date and Time of Event (UT)
14 Jul 1316	2695MHz Radio Burst 250 s.f.u.	14 Jul 1255
14 Jul 1331	Type IV Radio Emission	14 Jul 1300
16 Jul 0558	K= 5 Observed	16 Jul 03-06
16 Jul 1500	A \geq 20 Observed	16 Jul 1500
16 Jul 1800	K= 4 Observed	16 Jul 15-18
17 Jul 1443	>2 MeV Electron Event @ \geq 1000pfu	17 Jul 1349
18 Jul 1724	Type II Radio Emission	18 Jul 1700
19 Jul 0000	>2 MeV Electron Event in Progress \geq 1000pfu	18 Jul
19 Jul 2351	>2 MeV Electron Event in Progress \geq 1000pfu	19 Jul



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
22 July	115	10	3	05 Aug	110	8	3
23	112	8	3	06	110	8	3
24	112	7	2	07	108	12	3
25	112	7	2	08	108	12	3
26	115	7	2	09	106	8	3
27	118	7	2	10	104	5	2
28	120	10	3	11	104	5	2
29	120	12	3	12	104	8	3
30	120	15	3	13	104	10	3
31	120	15	3	14	106	7	2
01 Aug	120	12	3	15	108	7	2
02	118	10	3	16	110	7	2
03	115	10	3	17	112	12	3
04	112	8	3				



Energetic Events

Date	Time (UT)			X-ray		Optical Information			Peak		Sweep Freq	
	Begin	Max	½	Class	Integ	Imp	Location		Radio Flux		Intensity	
			Max		Flux		Brtns	Lat	CMD	Rgn	#	245
14 Jul	1251	1259	1303	M4.6	.016	1B	S23E20	8270	58	250		3

Flare List

Date	Time			X-ray Class.	Imp / Brtns	Optical		Rgn #
	Begin	Max	End			Location	Lat	
13 July	1605	1610	1613	B5.5				
	1651	1651	1704		SF	S22E33	8270	
	1714	1718	1721	B4.9				
	1825	1829	1832	B7.5				
	2029	2033	2040		SF	N17E32	8269	
	2357	0001	0004	B6.3				
14 July	0212	0225	0253	C2.4				
	0648	0700	0715	B5.0				
	0814	0818	0825	B4.5	SF	S22E24	8270	
	1037	1039	1043		SF	S21E22	8270	
	1053	1056	1128	C1.0	SF	N20E26	8269	
	1255	1259	1340	M4.6	1B	S23E20	8270	
	1853	1903	1911	C2.9				
	2129	2144	2159	B4.3				
15 July	0727	0728	0738		SF	S21E10	8270	
	0741	0742	0751		SF	S21E09	8270	
	1040	1042	1053	C5.7	SF	S31E65	8272	
	B1106	U1106	A1112	C2.8	SF	S23E08	8270	
	1335	1337	1342		SF	S27E26	8273	
	1515	1516	1534	C1.6	SF	S21E03	8270	
	1537	1540	1543	B8.1				
	1551	1553	1630	C3.7	SF	S21E06	8270	
	1602	1603	1607		SF	S27E25	8273	
	1914	1918	1921	B4.3				
	1951	2010	2052	C6.8	SF	S20E03	8270	
	2138	2145	2155	C1.0				
16 July	2348	2348	2354		SF	S20E00	8270	
	0022	0022	0033	C6.5	SF	S20W01	8270	
	0106	0112	0121	C1.5				
	0312	0315	0318	B4.3				
	0340	0345	0349	B7.2				
	0444	0504	0516	B7.2				
	0647	0650	0653	B4.0				
	0755	0759	0815	C2.3	SF	S20W05	8270	
	0906	0916	0932	C1.4				



Flare List-continued

Date	Time			X-ray Class.	Optical		Rgn #	
	Begin	Max	End		Imp / Brtns	Location Lat CMD		
16 July	B1023	U1025	A1037	C1.1	SF	S31E52	8272	
	1206	1212	1220	B9.2				
	1244	1252	1301	C1.4				
	1315	1319	1325	C1.6	SF	S22W06	8270	
	1349	1351	1354		SF	S28E49	8272	
	1559	1605	1614	B5.6	SF	S21W09	8270	
	1621	1624	1647	C3.5	SF	S22W07	8270	
	1907	1909	1914	B7.9	SF	S29E47	8272	
	1922	1922	1932		SF	S20W09	8270	
	2024	2034	2101	C5.0	1F	S21W10	8270	
	2227	2230	2239	B3.4				
	17 July	0004	0004	0013	B5.0	SF	S21W11	8270
		0152	0158	0207	B5.9			
0647		0655	0706	B4.4				
1514		1521	1527	B3.7	SF	S29E37	8272	
1532		1532	1544	B4.0	SF	S21W21	8270	
1718		1720	1726		SF	S19W23	8270	
18 July	0041	0044	0046	B2.0				
	1644	1656	1705	C2.7				
19 July	1113	1151	1222		SF	S19W26	8274	
	1124	1125	1130		SF	S23W44	8270	
	1325	1326	1328	B9.5	SF	S24W43	8270	
	1339	1340	1346	B7.2	SF	S24W44	8270	
	1420	1424	1427	B3.9				
	1510	1512	1525	B5.9	SF	S23W46	8270	
	1837	1845	1849	C1.4				
	2205	2214	2217	B4.6				



Region Summary

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 8265</i>																
05 Jul	N20E44	304	0010	03	BXO	002	B										
06 Jul	N19E31	303	0000	02	AXX	002	A										
07 Jul	S24E04	317	0000	00	AXX	002	A										
08 Jul	S24W09	317															
09 Jul	S24W17	312	0030	05	CSO	006	B										
10 Jul	S24W32	313	0030	03	AXX	004	A										
11 Jul	S24W46	314	0000	00	AXX	001	A										
12 Jul	S24W59	314															
								0	0	0	0	0	0	0	0	0	0

Died on Disk.

Absolute heliographic longitude: 317

	<i>Region 8266</i>																
05 Jul	N24E73	275	0000	00	AXX	001	A										
06 Jul	N22E57	277	0000	00	AXX	001	A										
07 Jul	N23E46	275	0010	00	AXX	001	A										
08 Jul	N22E33	275	0000	00	AXX	001	A										
09 Jul	N22E20	275															
10 Jul	N27E11	270	0000	01	AXX	002	A										
11 Jul	N25E00	268	0000	01	AXX	002	A										
12 Jul	N18W18	273	0010	03	BXO	002	B										
13 Jul	N18W31	273															
14 Jul	N18W44	273															
15 Jul	N18W57	273															
16 Jul	N16W65	137															
17 Jul	N16W78	137															
18 Jul	N16W91	137															
								0	0	0	0	0	0	0	0	0	0

Crossed West Limb.

Absolute heliographic longitude: 268

	<i>Region 8267</i>																
07 Jul	N33E33	288	0020	06	CRO	003	B										
08 Jul	N34E20	288	0020	06	BXO	003	B										
09 Jul	N33E09	286	0000	00	AXX	001	A										
10 Jul	N33W04	286															
11 Jul	N33W17	286															
								0	0	0	0	0	0	0	0	0	0

Died on Disk.

Absolute heliographic longitude: 286



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 8274</i>																	
15 Jul	S20E22	194	0010	03	BXO	002	B										
16 Jul	S21E08	194	0050	05	DAO	011	B										
17 Jul	S20W05	194	0150	08	DAO	011	B										
18 Jul	S20W19	195	0090	08	DSO	010	B										
19 Jul	S20W32	195	0130	09	DAO	010	B										
								0	0	0	0	0	0	0	0	0	
Still on Disk.																	
Absolute heliographic longitude: 194																	
<i>Region 8275</i>																	
16 Jul	N16E64	138	0010	03	BXO	002	B										
17 Jul	N16E51	138	0010	00	AXX	001	A										
18 Jul	N14E37	139	0000	00	AXX	001	A										
19 Jul	N14E24	139															
								0	0	0	0	0	0	0	0	0	
Still on Disk.																	
Absolute heliographic longitude: 139																	
<i>Region 8276</i>																	
19 Jul	S19E62	101	0000	00	AXX	001	A										
								0	0	0	0	0	0	0	0	0	
Still on Disk.																	
Absolute heliographic longitude: 101																	



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

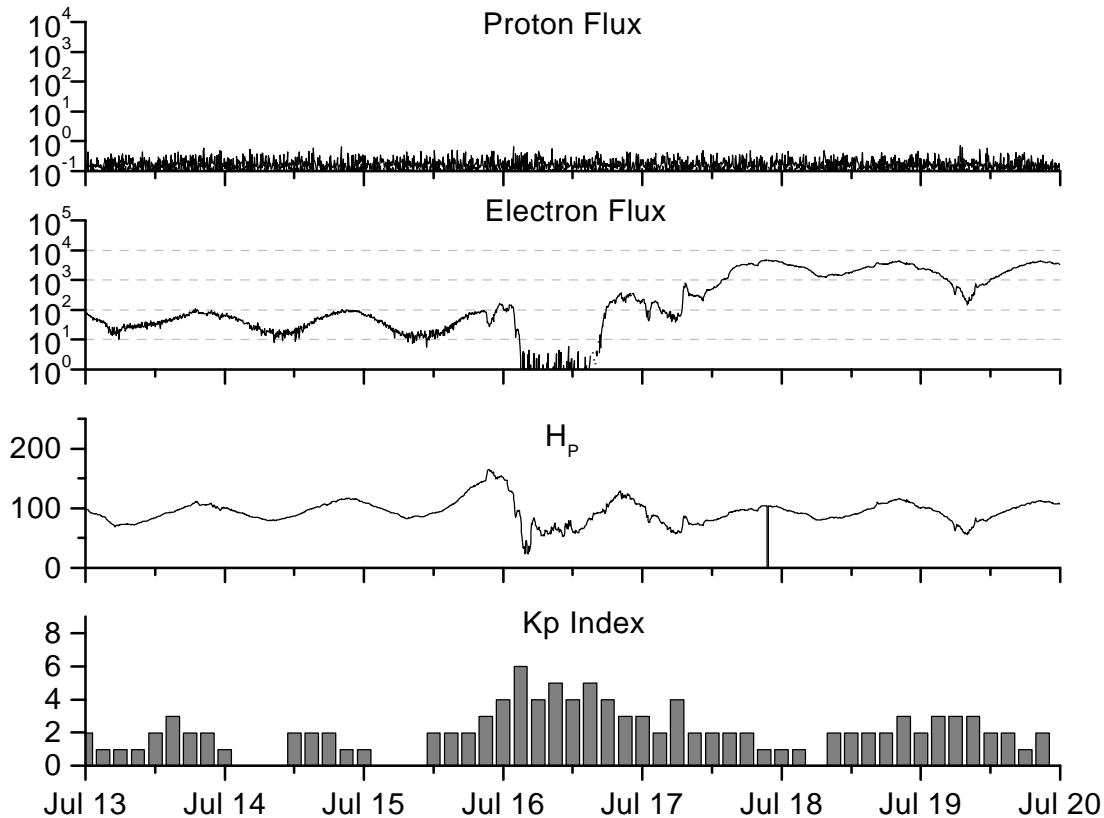
Month	Sunspot Numbers			Radio Flux		Geomagnetic			
	Observed values SWO	Ratio RI	Smooth values RI/SWO	Smooth values SWO	Ratio RI	**Penticton 10.7 cm	Smooth Value	Planetary Ap	Smooth Value
1996									
July	13.2	08.2	0.62	13.4	08.4	71.2	72.0	07	09.3
August	20.5	14.4	0.70	13.1	08.3	72.4	72.1	09	09.4
September	02.9	01.6	0.55	13.3	08.4	69.4	72.3	15	09.3
October	02.3	00.9	0.39	14.0	08.8	69.2	72.6	13	09.1
November	26.7	17.9	0.67	15.4	09.8	78.7	73.0	08	09.1
December	21.1	13.3	0.63	16.2	10.4	77.8	73.3	07	09.3
1997									
January	09.0	05.7	0.63	16.5	10.5	74.0	73.4	09	09.3
February	11.3	07.6	0.67	17.4	11.0	73.8	73.7	11	09.2
March	14.4	08.7	0.60	20.4	13.5	73.5	75.1	08	08.9
April	24.5	15.5	0.63	24.0	16.5	74.5	76.8	10	08.6
May	28.6	18.5	0.65	26.4	18.3	74.6	78.4	08	08.6
June	22.1	12.7	0.57	29.0	20.3	71.7	80.1	07	08.7*
July	17.0	10.4	0.61	32.4	22.6*	71.1	81.8*	06	08.5*
August	36.7	24.4	0.66	35.9	25.1*	79.0	83.4*	07	08.3*
September	52.8	51.3	0.88	40.5	28.4*	96.2	85.7*	10	08.2*
October	33.6	22.8	0.68	45.4	31.9*	84.9	88.6*	11	08.3*
November	53.5	39.0	0.73	49.3	35.1*	99.5	91.4*	11	08.7*
December	57.9	41.2	0.71	54.2	39.1*	98.8	94.2*	05*	09.3*
1998									
January	51.8	32.3*	0.62*			93.5*		07*	
February	54.4	40.7*	0.75*			93.6*		07*	
March	81.8	54.8*	0.67*			109.4*		11*	
April	73.6	53.3*	0.72*			108.3*		10*	
May	74.3	56.9*	0.77*			106.6*		18*	
June	93.6	70.5*	0.75*			108.4*		11*	

*Preliminary estimates.

The lowest smoothed sunspot indices number for Cycle 22, RI = 8.0, occurred in May 1996. 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.





*Weekly Geosynchronous Satellite Environment Summary
Week Beginning 13 July 1998*

Protons plot contains the five-minute averaged integral proton flux (protons/ cm²-sec-sr) as measured by GOES-9 (W135) for each of three energy thresholds: greater than 10, 50, and 100 MeV.

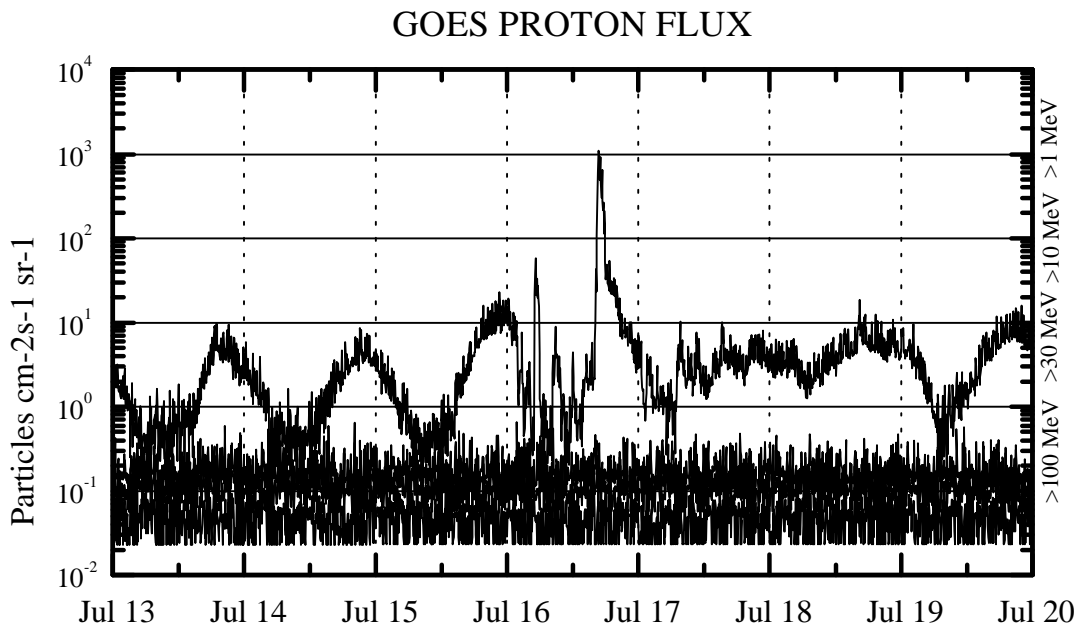
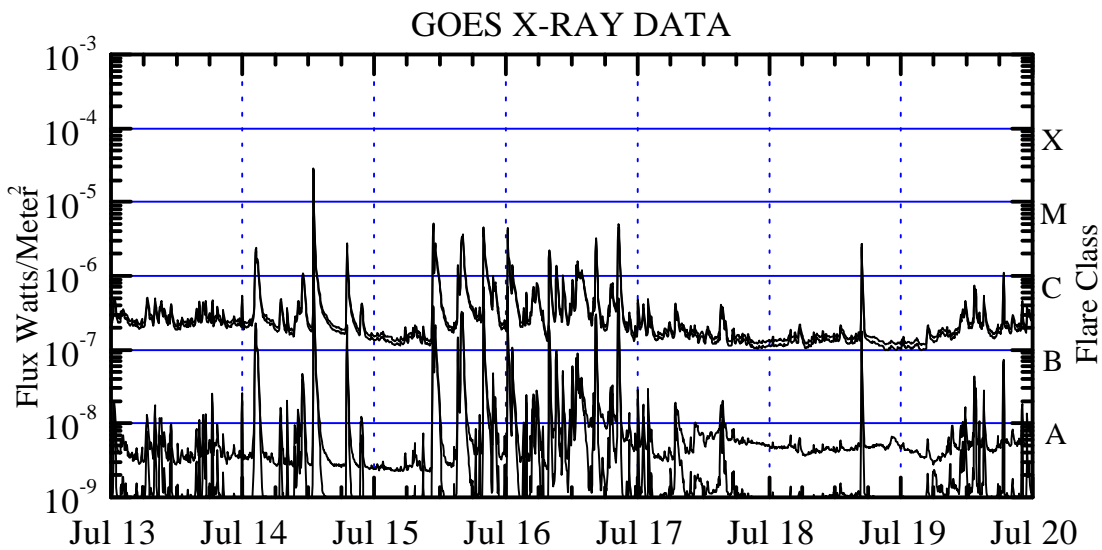
Electrons plot contains the five-minute averaged integral electron flux (electrons/ cm²-sec-sr) with energies greater than 2 MeV at GOES-9.

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 and Heartland, UK. 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

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.

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.

