

**Space Weather Highlights  
11-17 January 1999**

Solar activity ranged from low to moderate. Activity was at low levels early in the period, but began to increase as new active regions 8439 and 8440 rotated into view. Both regions were moderate in size and magnetic complexity throughout the period. Region 8440 (N19, L = 265, class/area Eai/360 on 16 January) was the dominant flare producer during most of the period and provided four low-level M-class flares during 14 - 16 January along with numerous C-class subflares (see the Energetic Events listing for details). However, none of these flares were impressive in radio aspects. Region 8439 (S24, L - 267, class/area Eai/270 on 14 January) showed increased activity on 17 January and produced C-class subflares, one of which was accompanied by a Type II radio sweep (C5/SF at 17/1955UT). Space-based images indicated enhanced coronal emission near the northeast limb at the end of the period, perhaps indicating the return of old Region 8421 (N27, L - 171).

Real-time solar wind data were available from the Advanced Composition Explorer (ACE) spacecraft during most of the period. CME effects were evident during 13 January with increased velocities and densities, and enhanced southward IMF Bz (maximum deflections to minus 19 nT (GSM)). Coronal hole effects began during 14 January as velocities increased from 440 to 620 km/sec and densities dropped to 01 - 02 p/cc.

No significant proton flux enhancements were detected at geosynchronous altitude.

The greater than 2 MeV electron flux at geosynchronous altitude was at moderate to high levels during 11 - 12 and 15 - 17 January.

The geomagnetic field was disturbed during 13 - 15 January with active to minor storm levels at middle latitudes and active to (isolated) severe storm levels at high latitudes. The 13 January disturbance followed a 14 nT sudden impulse at 13/1055UT and appeared to be CME-related. However, the 14 - 15 January disturbance appeared to be due to a high-speed coronal hole windstream.

**Space Weather Outlook  
20 January 1999 - 15 February 1999**

Solar activity is expected to be low to moderate. Regions 8439 and 8440 appear capable of isolated M-class flare production. Old Region 8421 is expected to return early in the period and may provide an increased chance for moderate activity as well.

No significant 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 with high levels possible during 11 - 15 February.

The geomagnetic field is expected to be at quiet to unsettled levels during most of the period. However, active periods are possible during 21 - 22 January and again during 10 - 11 February.



**Daily Solar Data**

Date	Radio Flux 10.7 cm	Sun spot No. (10 <sup>6</sup> hemi.)	Sunspot Area	X-ray Background	Flares							
					X-ray Flux			Optical				
					C	M	X	S	1	2	3	4
11 January	112	46	140	B2.0	4	0	0	1	0	0	0	0
12 January	113	66	290	B5.7	2	0	0	5	0	0	0	0
13 January	119	77	450	B2.2	10	0	0	14	2	0	0	0
14 January	137	86	560	B4.4	11	2	0	22	1	0	0	0
15 January	143	106	680	B5.5	25	1	0	17	5	0	0	0
16 January	159	106	720	B6.6	20	2	0	17	1	0	0	0
17 January	161	131	610	B7.4	22	0	0	22	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)		
	>1MeV	>10MeV	>100MeV	>.6MeV	>2MeV	>4MeV
11 January	7.1E+4	1.5E+4	3.7E+3		3.4E+7	
12 January	1.8E+5	1.5E+4	3.4E+3		5.5E+7	
13 January	2.7E+5	1.4E+4	3.3E+3		1.3E+6	
14 January	5.4E+5	1.4E+4	3.0E+3		8.6E+5	
15 January	9.2E+5	1.3E+4	3.0E+3		7.7E+7	
16 January	2.0E+5	1.4E+4	2.8E+3		1.6E+8	
17 January	5.0E+5	1.3E+4	3.0E+3		2.1E+8	

**Daily Geomagnetic Data**

Date	Middle Latitude Fredericksburg		High Latitude College		Estimated Planetary	
	A	K-indices	A	K-indices	A	K-indices
	11 January	4	1-1-1-2-1-1-1-1	*	0-*-1-3-2-1-*-1	4
12 January	3	1-0-1-1-2-0-2-1	*	0-0-0-*-1-1-*	6	1-0-1-1-3-1-3-2
13 January	19	2-2-1-3-4-5-3-4	43	0-1-3-5-4-7-6-4	28	2-2-1-4-4-5-5-6
14 January	17	1-2-4-5-3-3-2-3	61	2-2-6-7-7-6-3-3	26	2-2-5-4-5-4-3-4
15 January	10	3-4-2-2-2-2-2-1	28	3-4-5-5-5-4-2-2	17	3-5-3-4-3-3-3-2
16 January	5	2-3-2-1-0-1-1-0	*	*-*-*-1-1-1-*	7	2-2-3-3-1-2-1-1
17 January	5	3-2-2-0-0-1-1-1	4	1-2-2-1-2-0-2-0	5	2-2-2-1-2-2-1-1

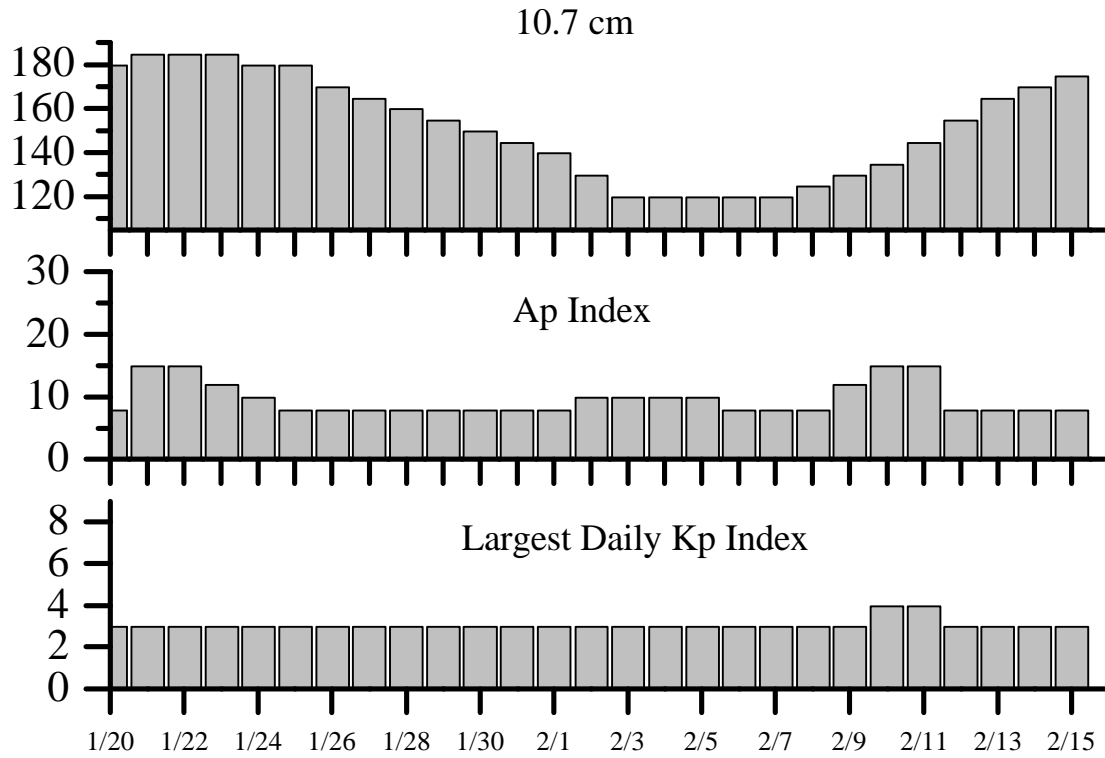


### *Alerts and Warnings Issued*

Date and Time of Issue (UT)	Type of Alert or Warning	Date and Time of Event (UT)
12 Jan 1235	>2MeV Electron Event $\geq 1000$ pfu	12 Jan 1220
13 Jan 1220	Sudden Impulse of 14nT observed Boulder	13 Jan 1055
13 Jan 1226	CONTINUED >2MeV Electron Event $\geq 1000$ pfu	12 Jan 1220
13 Jan 1416	K= 4 Warning valid	13 Jan 1400 - 14 Jan 1200
13 Jan 1501	K= 4 Observed	13 Jan 12-15
13 Jan 1801	K= 5 Observed	13 Jan 15-18
13 Jan 1804	K= 5 Warning valid	13 Jan 18:00 -14 Jan 1200
14 Jan 000	A $\geq 20$ Observed	13 Jan 23:59
14 Jan 1201	CONTINUED A $\geq 20$ Observed	13 Jan 2359
14 Jan 1454	K= 5 Observed	14 Jan 12-15
14 Jan 1454	K=4 Warning valid	14 Jan 15- 24
14 Jan 1817	K= 4 Observed	14 Jan 15- 18
15 Jan 600	K= 4 Observed	15 Jan 03- 06
15 Jan 1201	CONTINUED A $\geq 20$ Observed	13 Jan 2359
15 Jan 1201	K= 4 Observed	15 Jan 09-12
15 Jan 1505	>2MeV Electron Event $\geq 1000$ pfu	15 Jan 1450
16 Jan 1159	CONTINUED >2MeV Electron Event $\geq 1000$ pfu	15 Jan 1450
17 Jan 1200	CONTINUED >2MeV Electron Event $\geq 1000$ pfu	15 Jan 1450
17 Jan 2101	Type II Radio Emission	17 Jan 2057



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
19 Jan	180	8	3	02	130	10	3
20	185	15	3	03	120	10	3
21	185	15	3	04	120	10	3
22	185	12	3	05	120	10	3
23	185	10	3	06	120	8	3
24	180	8	3	07	120	8	3
25	180	8	3	08	125	8	3
26	170	8	3	09	130	12	3
27	165	8	3	10	135	15	4
28	160	8	3	11	145	15	4
29	155	8	3	12	155	8	3
30	150	8	3	13	165	8	3
31	145	8	3	14	170	8	3
01 Feb	140	8	3	15	175	8	3



***Energetic Events***

Date	Time (UT)			X-ray		Optical Information			Peak		Sweep Freq	
	Begin	Max	½	Class	Flux	Imp Brtns	Location Lat CMD	Rgn #	Radio Flux		Intensity	
			Max						245	2695	II	IV
14 Jan	1007	1020	1033	M3.0	.030	SN	N18E64	8440	65	32		
14 Jan	1855	1903	1914	M1.4	.010	SN	N18E57	8440	81	39		
15 Jan	0632	0721	0742	M1.3	.039	1F	N20E53	8440	120			
16 Jan	1202	1207	1210	M3.6	.008	1B	N21E36	8440		38		
16 Jan	1950	1956	2002	M1.2	.005					45		

***Flare List***

Date	Time			X-ray Class.	Optical Imp / Brtns	Location Lat CMD	Rgn #
	Begin	Max	End				
11 January	1655	1701	1708	B7.4			
	1727	1735	1749	C1.2			
	1752	1756	1802		SF	S28W03	8434
	1951	1959	2007	C2.4			
	2116	2143	2225	C1.3			
12 January	2259	2309	2317	C1.2			
	0101	0117	0134	C6.2			
	0757	0800	0803	B8.1			
	1139	1156	1224	C6.9			
	1605	1605	1611		SF	S24E84	8439
	1857	1901	1905	B7.3			
	1921	1922	1930		SF	S24E84	8439
	1932	1940	1944		SF	S24E83	8439
	2004	2005	A2006	B5.4	SF	S20E11	8438
	2040	2044	2048	B7.8			
13 January	2306	2315	2333		SF	S24E78	8439
	0335	0339	0341	B5.5			
	0552	0610	0614	C1.6			
	0710	0715	0718	B6.4			
	0721	0725	0729	C1.6			
	0832	0835	0837	B4.6			
	1238	1249	1252	C1.0			
	1255	1257	1302		SF	N21E75	8440
	1337	1355	1402	C1.2	SF	S25E74	8439
	1433	1435	1440	C2.9	SF	S24E72	8439
	1459	1503	1534	C6.9	SF	S25E74	8439
	1529	1541	1548	C2.0	SF	N20E70	8440
	1632	1633	1649		SF	N21E75	8440
	1700	1702	1704		SF	N20E68	8440
	1713	1735	1747		SF	N20E73	8440



### Flare List

Date	Time			X-ray Class	Optical			Rgn
	Begin	Max	End		Imp / Brtns	Location Lat CMD	#	
12 January	1759	1803	1807	B6.4				
	1835	1838	1848		SF	N19E68	8440	
	1855	1856	1911	C5.5	1N	N21E73	8440	
	1952	1958	2000		SF	N21E73	8440	
	2002	2021	2035	C2.9	1F	N21E72	8440	
	2047	2049	2052		SF	S23E66	8439	
	2156	2200	2208	C1.1	SF	N20E70	8440	
13 January	2233	2238	2242	B9.2	SF	N20E71	8440	
	2236	2243	2301		SF	S24E67	8439	
14 January	0051	0058	0110	C6.5	1N	N20E68	8440	
	0111	0116	0118		SF	N20E67	8440	
	0304	0304	0308		SF	N20E67	8440	
	0322	0326	0341	C1.3	SF	N20E67	8440	
	0814	0818	0822	C1.2				
	0851	0858	0905		SF	N19E60	8440	
	0906	0906	0924	C2.8	SF	S25E67	8439	
	0927	0936	0939		SF	N17E64	8440	
	0955	1015	1117	M3.0	SN	N18E64	8440	
	1120	1120	1135		SF	N17E62	8440	
	1218	1225	1233		SF	N20E63	8440	
	1348	1353	1359	C1.7	SF	N20E62	8440	
	1408	1412	1452	C2.4	SF	N19E61	8440	
	1522	1522	1528		SF	S24E58	8439	
	1536	1539	1543	C1.1				
	1556	1558	1603	C2.3	SF	S22E53	8439	
	1634	1639	1645		SF	N19E59	8440	
	1652	1656	1703	C1.3	SF	N19E63	8440	
	1751	1751	1757		SF	S21E52	8439	
	1859	1902	1936	M1.4	SN	N18E57	8440	
	2021	2024	2029		SF	N18E58	8440	
	2037	2038	2042		SF	S24E54	8439	
	2129	2131	2136	C1.4	SF	N20E58	8440	
	2241	2242	2248		SF	N19E57	8440	
	2317	2324	2334	C2.6	SF	N19E57	8440	
	15 January	0040	0046	0050	C1.2			
		0138	0140	0157	C2.1	SF	N19E56	8440
0209		0212	0215	C2.2	SF	N19E57	8440	
0228		0236	0245		SF	N19E54	8440	
0259		0300	0311	C2.9	SF	N19E56	8440	
0402		0420	0427	C1.4				
0502		0502	0507	C1.5	SF	N19E53	8440	
0527		0529	A0550	C2.2	SF	N19E53	8440	



*Flare List - continued.*

Date	Time			X-ray Class.	Optical			Rgn
	Begin	Max	End		Imp / Brtns	Location Lat CMD	#	
15 January	0602	0609	0612	C6.4				
	0707	0712	0738	M1.3	1F	N20E53	8440	
	0842	U0852	0854	C1.8	SF	N21E51	8440	
	0923	0926	0929	B9.1				
	1007	1007	1023	C1.1	SF	N19E52	8440	
	1041	1115	1120	C2.3	SF	N21E49	8440	
	1142	1145	1148	C1.1				
	1213	1224	1309	C2.1	1N	N19E51	8440	
	1249	1254	1259	C1.5				
	1306	1314	1340	C3.7	1F	S23E50	8439	
	1319	1323	1326	C2.8				
	1437	1441	1518	C9.8	1B	N20E47	8440	
	1520	1535	1557	C1.5	SF	N19E49	8440	
	1720	1724	1732		SF	N19E47	8440	
	1742	1744	1748	B9.5	SF	N19E48	8440	
	1805	1806	1835	C1.9	SF	N21E44	8440	
	1828	1838	1846		SF	N19E47	8440	
	1900	1920	2043	C4.9	1F	N20E45	8440	
	1954	2000	2007	C1.9				
	2024	2028	2035	C1.2				
	2123	2134	2237	C1.2	SF	N19E45	8440	
	2200	2204	2209	C1.4				
	2238	2240	2243		SF	S24E45	8439	
	2322	2325	2333		SF	N19E45	8440	
	2339	2343	2355	C3.0				
	16 January	0031	0038	0047	C1.0	SF	N19E44	8440
		0125	0127	0129		SF	N19E41	8440
0136		0136	0139	C1.5	SF	S24E43	8439	
0159		0201	0205	C1.3	SF	N19E43	8440	
0302		0308	0321	C2.8	SF	N19E40	8440	
0357		0359	0410	C2.9	SF	N19E42	8440	
0411		0413	0418	C2.5	SF	N19E43	8440	
0453		0504	0517	C1.3				
0800		0800	0808	C1.5	SF	N20E38	8440	
0903		U0906	0913	C2.0	SF	N19E40	8440	
0922		0923	0945	C2.2	SF	N19E41	8440	
1042		1044	1049	C2.3	SF	N19E39	8440	
1204		U1207	1347	M3.6	1B	N21E36	8440	
1258		1305	1325	C2.6				



*Flare List - continued.*

Date	Time			X-ray Brtns	Optical		Rgn	
	Max	End	Class.		Imp / Lat CMD	Location #		
16 January	1440	1441	1448	C4.0	SF	N17E33	8440	
	B1642	U1642	A1648	C2.4	SF	N19E35	8440	
	1739	1751	1805	C2.9	SF	N18E33	8440	
	1906	1911	1914	C3.0				
	1950	1956	2002	M1.2				
	2023	2025	2027	C1.9				
	2146	2146	2203	C2.2	SF	S26E30	8439	
	2251	2255	2258	C1.3				
	2327	2334	0022	C5.0	SF	N20E27	8440	
	2337	2343	2350		SF	S25E29	8439	
17 January	0053	0100	0107	C1.8	SF	N20E28	8440	
	0059	0108	0112		SF	S22E21	8439	
	0108	0110	0124	C3.2	SF	N19E28	8440	
	0158	0211	0231	C1.3				
	0334	0342	0350	C3.3	SF	N20E24	8440	
	0423	0432	0454	C2.4				
	0426	0426	0433		SF	S21E19	8439	
	0522	0522	0529	C1.9	SF	N21E25	8440	
	0750	0752	0801		SF	N19E25	8440	
	0809	0810	0816		SF	N20E23	8440	
	0823	0825	0834		SF	N19E24	8440	
	0922	0928	0934	C2.3	SF	N20E20	8440	
	1054	1108	1111	C4.9				
	B1151	U1151	1224	C4.3	SF	N20E22	8440	
	1344	1345	1357		SF	N22E20	8440	
	1427	1440	1538	C1.4	SF	N18E21	8440	
	1616	1616	1630	C2.3	SF	N18E20	8440	
	1649	1706	1724		SF	N19E21	8440	
	1701	1701	1709	C4.1	SF	S22E13	8439	
	1733	1739	1754		SF	S22E12	8439	
	1802	1834	1918	C2.5	SF	N21E18	8440	
	1806	1808	1820		SF	N18E19	8440	
	1952	1954	2006	C5.9	SF	S21E10	8439	
	2035	2039	2041	C2.0				
	2100	2103	2105	C1.2				
	2111	2116	2209	C1.6	SF	S23E17	8439	
	2136	2148	2151	C1.4				
	17 January	2230	2243	2250	C1.4			
		2317	2325	2327	C1.8			
		2340	0012	0029	C1.3	SF	S22E10	8439
2349		2353	2359	C1.1				





### Region Summary

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

#### Region 8426

31 Dec	N14E55	089	0010	00	AXX	001	A												
01 Jan	N14E41	091	0010	00	AXX	001	A												
02 Jan	N15E27	092	0010	06	BXO	006	B												
03 Jan	N15E16	090	0020	08	CRO	012	B	1				1							
04 Jan	N15E04	089	0050	07	DAO	012	B					1							
05 Jan	N15W10	089	0150	09	DAO	012	B												
06 Jan	N14W24	090	0160	11	EAO	013	B					4							
07 Jan	N15W37	090	0140	11	EAO	008	B												
08 Jan	N14W50	090	0080	12	ESO	003	B												
09 Jan	N14W64	091	0090	12	ESO	003	B												
10 Jan	N14W74	088	0050	13	CSO	003	B												
11 Jan	N14W83	083	0030	01	HSX	001	A												
								1	0	0	6	0	0	0	0	0			

Crossed West Limb.

Absolute heliographic longitude: 089

#### Region 8429

02 Jan	N34E38	081	0000	00	AXX	001	A											
03 Jan	N34E25	081																
04 Jan	N34E12	081																
								0	0	0	0	0	0	0	0	0		

Died on Disk.

Absolute heliographic longitude: 081

#### Region 8431

04 Jan	S28E69	024	0010	01	AXX	001	A											
05 Jan	S28E56	023	0030	01	HSX	001	A											
06 Jan	S28E43	023	0030	05	CRO	003	B	2				1						
07 Jan	S28E31	022	0030	03	BXO	004	B											
08 Jan	S28E19	021	0010	05	BXO	007	B	1				2						
09 Jan	S28E06	021	0040	04	DSO	006	B											
10 Jan	S28W07	021	0040	03	CAO	005	B	1				1						
11 Jan	S28W19	019	0010	00	AXX	002	A											
12 Jan	S27W32	019	0020	01	HAX	001	A											
13 Jan	S27W45	019																
14 Jan	S27W58	019																
15 Jan	S27W71	019																
16 Jan	S27W84	019																
								4	0	0	4	0	0	0	0	0		

Crossed West Limb.

Absolute heliographic longitude: 021



**Region Summary- continued.**

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

*Region 8433*

07 Jan	S28E10	043	0020	03	CRO	004	B											
08 Jan	S28W04	044	0020	05	BXO	005	B											
09 Jan	S28W18	045	0010	05	BXO	007	B											
10 Jan	S28W32	046	0020	01	HRX	002	A											
11 Jan	S28W46	046	0010	03	BXO	002	B											
12 Jan	S28W59	046																
13 Jan	S28W72	046																
																		0 0 0 0 0 0 0 0

Died on Disk.

Absolute heliographic longitude: 044

*Region 8434*

07 Jan	S26E46	007	0020	03	BXO	007	B											
08 Jan	S27E35	005	0010	03	BXO	005	B											
09 Jan	S27E22	005	0010	03	BXO	003	B											
10 Jan	S28E09	005																
11 Jan	S28W04	005											1					
12 Jan	S27W17	004	0010	03	BXO	004	B											
13 Jan	S26W27	001	0010	02	BXO	002	B											
14 Jan	S26W40	001																
15 Jan	S26W53	001																
16 Jan	S26W66	001																
																		0 0 0 1 0 0 0 0

Died on Disk.

Absolute heliographic longitude: 005

*Region 8436*

09 Jan	S30E64	323	0010	01	AXX	001	A											
10 Jan	S31E51	323	0010	01	AXX	001	A											
11 Jan	S30E38	323																
12 Jan	S30E25	323																
13 Jan	S30E12	323																
14 Jan	S30W01	322																
15 Jan	S30W14	322																
16 Jan	S30W27	322																
17 Jan	S30W40	322																
																		0 0 0 0 0 0 0 0

Still on Disk.

Absolute heliographic longitude: 322



**Region Summary - continued.**

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

*Region 8437*

10 Jan	N11E68	306	0090	02	HSX	001	A											
11 Jan	N11E55	305	0090	02	HSX	001	A											
12 Jan	N11E42	305	0080	02	HSX	001	A											
13 Jan	N11E29	305	0090	02	HSX	001	A											
14 Jan	N10E16	305	0100	02	HSX	001	A											
15 Jan	N10E03	305	0100	02	HSX	001	A											
16 Jan	N10W11	305	0080	02	HSX	001	A											
17 Jan	N10W24	305	0070	02	HSX	001	A											
																		0 0 0 0 0 0 0 0

Still on Disk.

Absolute heliographic longitude: 305

*Region 8438*

12 Jan	S18E07	340	0020	04	CSO	005	B											1
13 Jan	S18W06	340	0030	06	CRO	008	B											
14 Jan	S18W16	337	0000	02	AXX	002	A											
15 Jan	S18W28	336	0000	00	AXX	001	A											
16 Jan	S18W41	336																
17 Jan	S18W54	336																
																		0 0 0 1 0 0 0 0

Still on Disk.

Absolute heliographic longitude: 340

*Region 8439*

12 Jan	S24E75	277	0160	08	CAO	005	B											4
13 Jan	S24E65	269	0260	12	EAI	011	BG	3										5
14 Jan	S24E53	268	0270	14	EAI	019	B	2										5
15 Jan	S24E41	267	0270	14	EAI	024	BG	1					1	1				
16 Jan	S24E28	266	0270	15	EAI	031	B	2										3
17 Jan	S24E14	267	0210	16	FAO	040	B	4										7
																		12 0 0 25 1 0 0 0

Still on Disk.

Absolute heliographic longitude: 267

*Region 8440*

13 Jan	N21E70	264	0060	04	CAO	005	B	4										9 2
14 Jan	N19E56	265	0190	07	DAO	012	B	7	2									17 1
15 Jan	N20E42	266	0300	10	DAI	026	BG	14	1									16 4
16 Jan	N19E29	265	0360	12	EAI	031	BG	13	1									14 1
17 Jan	N19E16	265	0300	14	EAI	042	BG	9										15
																		47 4 0 71 8 0 0 0

Still on Disk.

Absolute heliographic longitude: 265



**Region Summary - continued.**

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
<i>Region 8441</i>														
14 Jan	N18E28	293	0000	02	AXX	002	A							
15 Jan	N17E14	294	0010	03	BXO	004	B							
16 Jan	N17E00	294	0010	03	BXO	003	B							
17 Jan	N17W13	294												
									0	0	0	0	0	0
Still on Disk.														
Absolute heliographic longitude: 294														
<i>Region 8442</i>														
17 Jan	N24W16	297	0030	04	DSO	008	B							
									0	0	0	0	0	0
Still on Disk.														
Absolute heliographic longitude: 297														



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

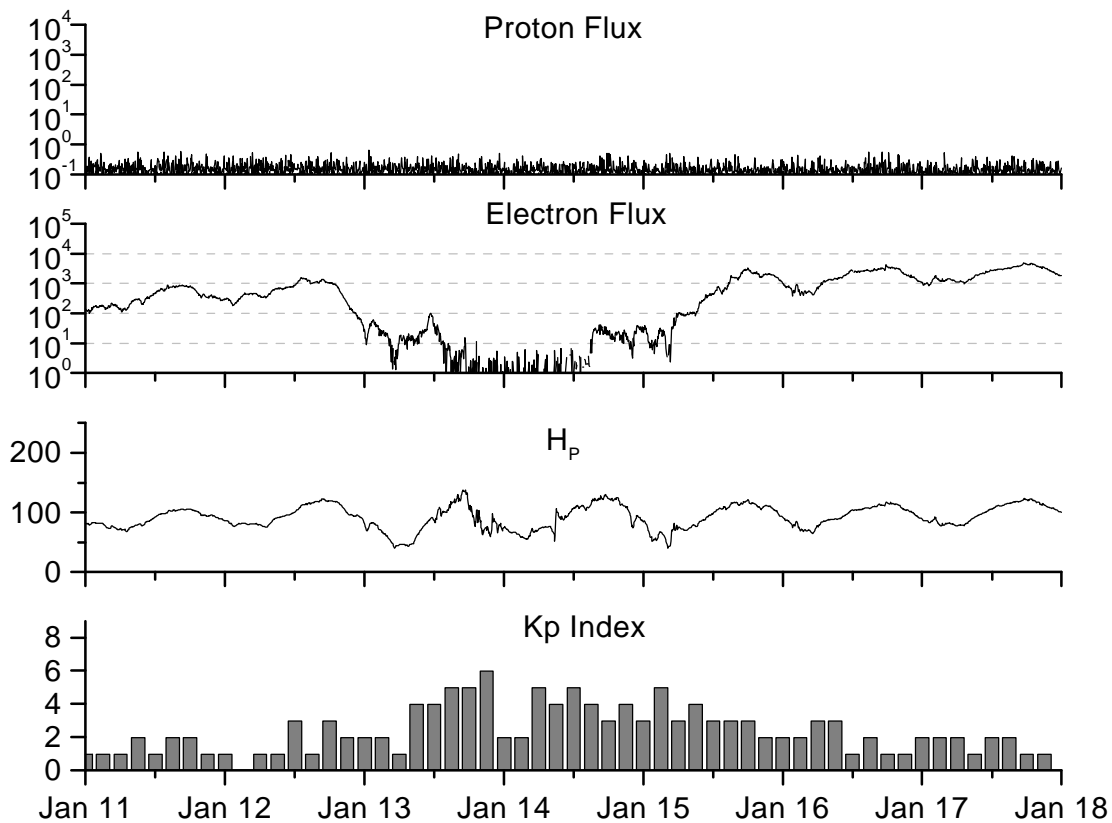
Month	Sunspot Numbers			Radio Flux		Geomagnetic			
	Observed values SWO	Ratio RI	Ratio RI/SWO	Smooth values SWO	Smooth values RI	**Penticton 10.7 cm	Smooth Value	Planetary Ap	Smooth Value
<b>1997</b>									
January	09.0	05.7	0.63	16.5	10.5	74.0	73.4	09	09.3
February	11.3	07.6	0.67	17.4	11.0	73.8	73.7	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	08.6
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	25.0	79.0	83.4	07	08.3
September	52.8	51.3	0.88	40.5	28.3	96.2	85.7	10	08.4
October	33.6	22.8	0.68	45.4	31.8	84.9	88.6	11	08.6
November	53.5	39.0	0.73	49.3	35.0	99.5	91.3	11	09.0
December	57.9	41.2	0.71	54.2	39.0*	98.8	94.2*	05	09.5
<b>1998</b>									
January	51.8	31.9	0.62	60.6	43.7*	93.4	97.5*	08	09.9*
February	54.4	40.3	0.74	67.4	48.8*	93.4	101.7*	08	10.5*
March	81.8	54.8	0.67	73.3	53.4*	109.1	105.8*	13	11.2*
April	73.6	53.4	0.73	77.7	56.5*	108.3	109.1*	10	11.4*
May	74.3	56.3	0.76			106.7		18	
June	93.6	70.7*	0.76*			108.4*		10	
July	98.3	66.2*	0.67*			114.0*		11*	
August	118.6	91.7*	0.77*			136.0*		18*	
September	119.0	92.9*	0.78*			138.4*		14*	
October	77.0	55.6*	0.72*			121.9*		13*	
November	99.5	73.6*	0.74*			140.2*		16*	
December	120.8	81.6*	0.68*			150.1*		08*	

\*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 11 January 1999*

*Protons* plot contains the five-minute averaged integral proton flux (protons/  $\text{cm}^2$ -sec-sr) as measured by GOES-8 (W75) for each of three energy thresholds: greater than 10, 50, and 100 MeV.

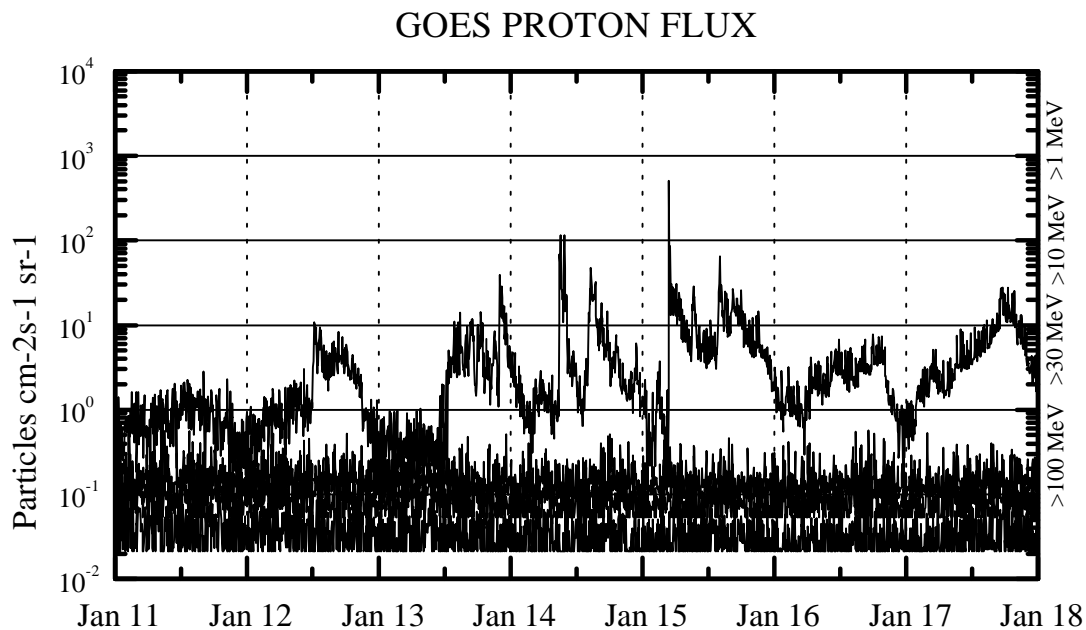
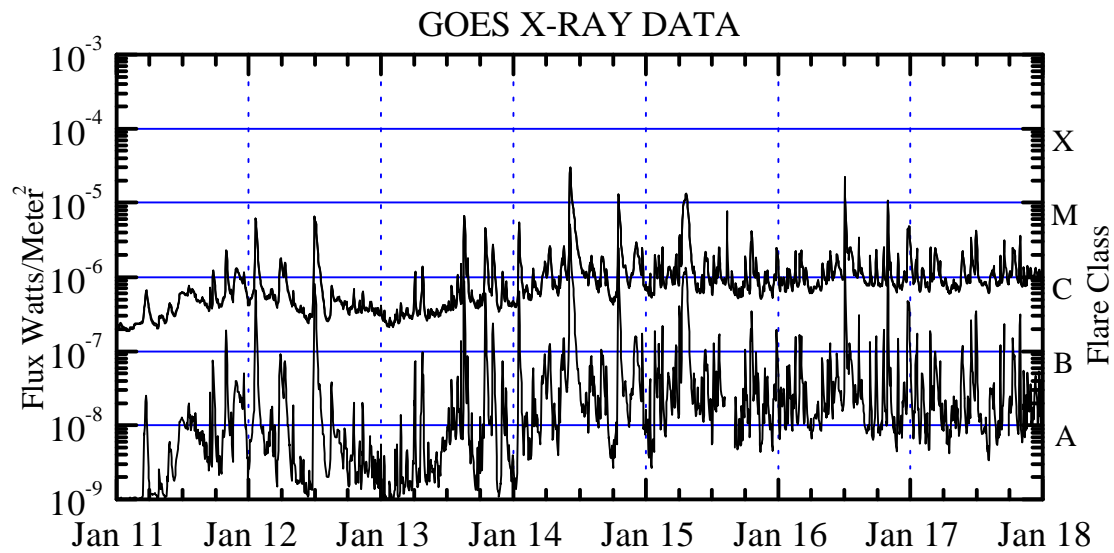
*Electrons* plot contains the five-minute averaged integral electron flux (electrons/  $\text{cm}^2$ -sec-sr) with energies greater than 2 MeV at GOES-8.

*H<sub>p</sub>* plot contains the five minute averaged magnetic field H component in nanoteslas (nT) as measured by GOES-8. The H component is parallel to the spin axis of the satellite, which is nearly parallel to the Earth's rotation axis.

*K<sub>p</sub>* plot contains the estimated planetary 3-hour K-index (derived by the USAF 55<sup>th</sup> 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<sub>p</sub> 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<sub>p</sub> are "global" parameters that are applicable to a first order approximation over large areas. H<sub>p</sub> 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/m<sup>2</sup>) as measured by GOES 8 and 10 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/cm<sup>2</sup>-sec-sr) as measured by GOES-8 (W75) for each of the energy thresholds: >1, >10, >30 and >100 MeV. P10 event threshold is 10 pfu (protons/cm<sup>2</sup>-sec-sr) at greater than 10 MeV.

