

Solar activity was at low to moderate levels during the period. Activity was low through 18 December with impulsive C-class subflares from a few moderately complex sunspots groups, which included Regions 9733, 9739, and 9742. Activity increased to moderate levels on 19 December due to an M1/Sf flare at 19/1706 UTC from Region 9739 (S13, L = 319, class/area Dko/440 on 17 December). This region rotated out of view on 20 December. Region 9733 (N14, L = 313, class/area Eki/560 on 12 December) produced isolated C-class subflares as it gradually decayed. It also rotated out of view on 20 December. Activity returned to low levels during 20 – 22 December due to occasional C-class flares, mostly from Region 9742 (N10, L = 214, class/area Fkc/900 on 23 December). This region showed a steady increase in size and complexity during the period. Activity increased to moderate levels on 23 December by virtue of an M1/Sf flare at 23/2336 UTC from Region 9748 (S11, L = 191, class/area Dao/200 on 23 December). Region 9748 was in a gradual growth phase during this flare. Note: Region 9742 produced a major flare on 26 December. Details will be provided in next week's report.

Solar wind data were available from the NASA Advanced Composition Explorer (ACE) spacecraft for most of the period. A high-speed stream associated with a coronal hole was observed during 17 – 18 December with velocities as high as 570 km/sec and elevated proton temperatures. These effects subsided late on 18 December. There was a period of increased velocities and temperatures during the latter half of 21 December. IMF Bz was southward most of 21 December, but was more strongly so during the latter half of the day with maximum deflections to minus 12 nT (GSM). There were no significant disturbances noted during the rest of the period.

There were no proton events detected at geo-synchronous orbit. Note: greater than 100 MeV and greater than 10 MeV proton events began on 26 December following a major flare from Region 9742. Details will be provided in next week's report.

The greater than 2 MeV electron flux at geosynchronous orbit was at normal levels during most of the period.

The geomagnetic field was at mostly quiet to unsettled levels through 20 December, although unsettled to minor storm conditions occurred at high latitudes during the latter half of 17 December. Activity increased to unsettled to active levels during the latter half of 21 December. Activity declined to quiet to unsettled levels during 22 – 23 December.



## **Space Weather Outlook**

### **26 December 2001 – 21 January 2002**

Solar activity is expected to be at low to moderate levels during most of the period. Isolated, low-level M-class flares are expected. There will be a chance for isolated major flare activity as well. Region 9742 could produce another major flare until it departs the visible disk around 28 December.

The greater than 100 MeV proton event that began on 26 December is expected to end late on 26 December or early on 27 December. The greater than 10 MeV proton event that began on 26 December is expected to continue for the next few days. There will be a chance for another proton event during the period.

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

Geomagnetic storm conditions may occur during 27 – 28 December due to a possible CME passage associated with the major flare activity on 26 December. Quiet to unsettled conditions are expected during most of the rest of the period. However, active conditions will be possible during 12 – 14 and 20 – 21 January due to coronal hole effects.



### *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
17 December	206	215	1720	C1.0	2	0	0	7	0	0	0	0
18 December	212	210	1470	C1.0	4	0	0	11	1	0	0	0
19 December	208	158	1160	C1.5	10	1	0	7	1	0	0	0
20 December	221	171	980	C1.5	6	0	0	12	0	0	0	0
21 December	234	215	1320	C1.6	8	0	0	16	0	0	0	0
22 December	243	234	1510	C1.2	4	0	0	9	0	0	0	0
23 December	255	220	1880	C1.2	7	1	0	13	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
17 December	2.6E+6	2.5E+4	2.4E+3		1.9E+5	
18 December	6.8E+5	1.5E+4	2.4E+3		1.2E+6	
19 December	4.8E+5	1.5E+4	2.7E+3		5.1E+6	
20 December	3.6E+5	1.4E+4	2.6E+3		5.7E+6	
21 December	3.8E+5	1.4E+4	2.7E+3		2.2E+6	
22 December	2.1E+5	1.3E+4	2.7E+3		3.4E+5	
23 December	1.3E+5	1.3E+4	2.8E+3		1.1E+6	

### *Daily Geomagnetic Data*

Date	Middle Latitude Fredericksburg		High Latitude College		Estimated Planetary	
	A	K-indices	A	K-indices	A	K-indices
	17 December	9	1-2-2-3-3-2-2-2	*	1-2-5-6-5-6-4-*	15
18 December	7	3-1-2-2-2-2-2-1	24	2-2-2-6-4-2-5-2	8	3-1-2-3-3-2-2-2
19 December	5	2-1-2-2-1-1-2-1	12	2-1-3-5-2-3-1-0	9	3-1-3-3-2-3-2-2
20 December	2	0-0-1-1-2-1-1-0	7	1-0-1-4-3-1-1-0	5	1-0-1-2-2-3-2-1
21 December	9	1-2-1-2-3-3-3-2	22	1-1-2-4-3-6-4-3	11	1-2-2-2-3-4-4-3
22 December	6	2-2-2-2-0-0-2-3	13	2-1-4-5-2-1-2-0	8	2-2-3-3-2-2-2-1
23 December	5	0-0-2-2-2-2-1-2	16	0-1-3-5-4-4-1-1	7	2-1-2-3-2-2-2-3



*Alerts and Warnings Issued*

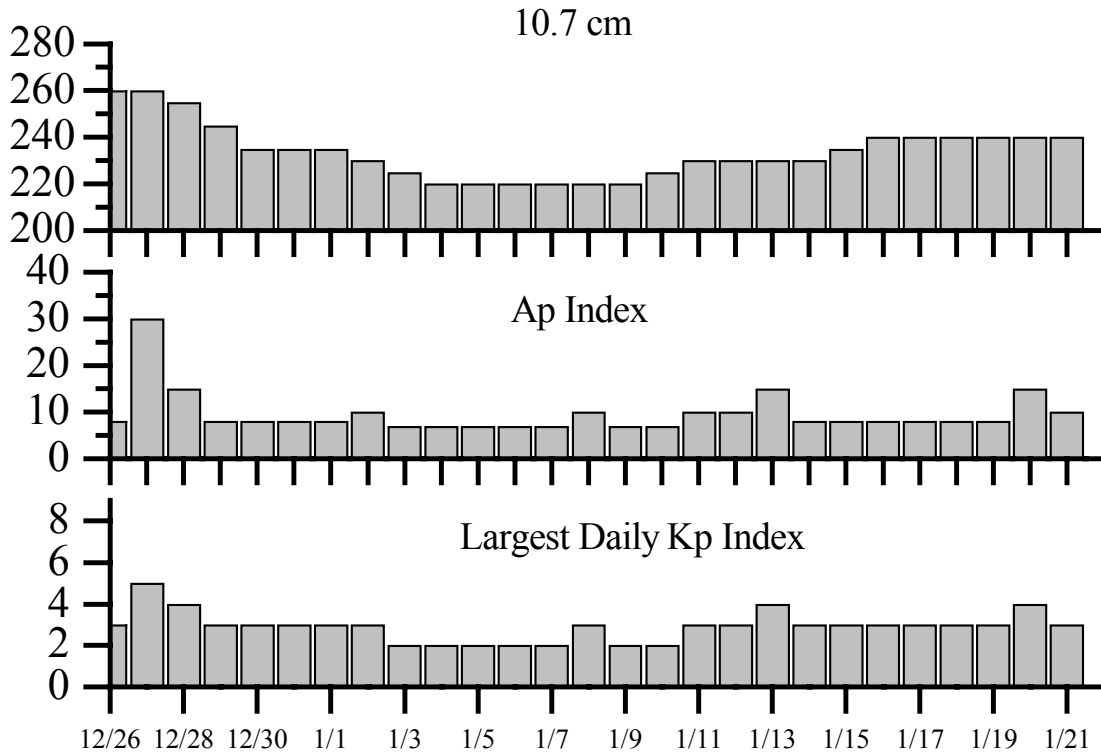
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<u>Date &amp; Time of Issue</u>	<u>Type of Alert or Warning</u>	<u>Date &amp; Time of Event UT</u>
17 Dec 1322	Stratwarm Alert Exists Stratwarm Monday	
18 Dec 1240	Stratwarm Alert Exists Stratwarm Tuesday	
19 Dec 0008	245 MHz Radio Burst	18 Dec
20 Dec 0007	4 – 245 MHz Radio Bursts	19 Dec
19 Dec 1357	Stratwarm Alert EXISTS Stratwarm Wednesday	
21 Dec 1342	Stratwarm Alert Exists Stratwarm Friday	
21 Dec 1444	K = 4 Warning	21/1445 – 22 Dec 1500
21 Dec 1812	K = 4 Observed	21 Dec 1500 – 1800
22 Dec 1249	Stratwarm Alert Exists Stratwarm Saturday	
23 Dec 1156	Stratwarm Alert Exists Stratwarm Sunday	

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**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
26 Dec	260	8	3	09 Jan	220	7	2
27	260	30	5	10	225	7	2
28	255	15	4	11	230	10	3
29	245	8	3	12	230	10	3
30	235	8	3	13	230	15	4
31	235	8	3	14	230	8	3
01 Jan	235	8	3	15	235	8	3
02	230	10	3	16	240	8	3
03	225	7	2	17	240	8	3
04	220	7	2	18	240	8	3
05	220	7	2	19	240	8	3
06	220	7	2	20	240	15	4
07	220	7	2	21	240	10	3
08	220	10	3				



### *Energetic Events*

Date	Time		X-ray		Optical Information			Peak		Sweep Freq		
	Begin	Max	½ Max	Class	Integ Flux	Imp/Location		Rgn #	Radio Flux		Intensity	
						Brtns	Lat CMD		245	2695	II	IV
19 Dec	1701	1706	1709	M1.3	.004	Sf	S15W74	9739				
23 Dec	2308	2336	2353	M1.2	.022	Sf	S14W12	9748	79			

### *Flare List*

Date	Time			X-ray Class.	Optical Imp / Brtns	Location Lat CMD	Rgn
	Begin	Max	End				
17 December	0111	0111	0133		Sf	N14W37	9733
	0210	0213	0217		Sf	N14W37	9733
	0302	0308	0315		Sf	N15W38	9733
	0311	0311	0314		Sf	N00W63	9732
	0401	0405	0416	C2.0	Sf	N13W37	9733
	0633	0634	0637		Sf	N11E56	9742
	1342	1345	1349	C1.4			
	1750	1751	1757		Sf	N03E23	9741
18 December	0111	0111	0114		Sf	S13W57	9739
	0409	0415	0421		Sf	S15W06	9738
	0435	0444	0454	C3.0	Sf	N12W50	9733
	0451	0451	0457		Sf	N16E71	9745
	0504	0505	0513		Sf	N16E71	9745
	0512	0514	0520		Sf	N12E43	9742
	0559	0600	0609		Sf	N12W55	9733
	0732	0736	0742	C1.6			
	0734	0754	0815	C4.8	1n	N12W55	9733
	0842	0844	0852		Sf	N09E41	9742
19 December	1605	1607	1616		Sf	N13E37	9742
	1931	1936	1944		Sf	N04E42	9742
	2001	2001	2011	C3.7	Sf	N10E37	9742
	0113	0116	0127	C3.9	1f	N12W63	9733
	0229	0232	0236	C4.9			9742
	0504	0509	0529	C4.6	Sf	N06E33	9742
	1035	1040	1042	C3.5			9739
	1256	1301	1303	C5.4			
	B1356	U1356	A1424	C1.6	Sf	S14W76	9739
	1704	1704	1708	M1.3	Sf	S15W74	9739
	1726	1730	1734	C2.0			9739
	1942	1943	1951	C2.2	Sf	S20W19	9738
	2043	2047	2049	C2.1			9738
20 December	2129	2130	2137		Sf	N06W08	9741
	2206	2207	2211		Sf	N10E74	9747
	2206	2207	2212		Sf	N10E31	9742
	2258	2303	2310	C2.4			
	0001	0003	0006		Sf	N13E27	9742



*Flare List- continued*

Date	Time			X-ray Class.	Optical		Rgn
	Begin	Max	End		Imp / Brtns	Location Lat CMD	
20 December	0205	0206	0209		Sf	N12E25	9742
	0227	0228	0234		Sf	N12E72	9747
	0315	0316	0318		Sf	N13E25	9742
	0432	0438	0442	C8.7			9742
	0530	0537	0556		Sf	N13E71	9747
	0727	0727	0732		Sf	S19W26	9738
	0846	0848	0856	C3.1	Sf	N06W14	9741
	1103	1106	1112	C2.4			
	1524	1527	1549	C4.4	Sf	N12E22	9742
	1711	1717	1740	C2.7	Sf	N06E17	9742
	1810	1811	1844	C5.0	Sf	N11E21	9742
	1847	1848	1855		Sf	N12E61	9747
	2116	2125	2141		Sf	N12E15	9742
	21 December	0027	0028	0034	C3.5	Sf	N13E16
0048		0053	0059	C3.7			
0326		0328	0334	C3.1	Sf	N13E14	9742
0356		0359	0409		Sf	S05E69	9749
0403		0408	0413	C2.9	Sf	N11E09	9742
0517		0520	0533	C4.0	Sf	N13E12	9742
0548		0550	0606		Sf	S05E68	9749
0625		0629	0642		Sf	S30W68	
0921		0922	0926		Sf	N13E10	9742
1005		1005	1014	C3.1	Sf	N13E06	9742
1032		1033	1039		Sf	N13E07	9742
1340		1342	1359	C3.1	Sf	N11E06	9742
1515		1515	1524		Sf	N06E02	9742
1600		1600	1609		Sf	N05E01	9742
1850		1855	1858		Sf	S27W75	
2144		2144	2153	C3.5	Sf	S10E58	9749
2154	2205	2218		Sf	S10E58	9749	
22 December	0032	0034	0037		Sf	S29W80	
	0259	0300	0306		Sf	S30W80	
	0312	0313	0320		Sf	S31W80	
	0442	0447	0502		Sf	S11E17	9748
	0538	0545	0550	C3.5			
	0726	0727	0735		Sf	S11E15	9748
	0756	0758	0803		Sf	S29W81	
	1024	1025	1030		Sf	N20E07	9745
	1152	1155	1159	C3.0			
	1514	1517	1520	C2.6			
	1631	1635	1642		Sf	S11E09	9748
1815	1822	1824		Sf	S09E46	9749	
2135	2139	2142	C2.6				







**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	4								
<i>Region 9733</i>																							
08 Dec	N14E67	316	0240	12	Eao	019	B	2				1											
09 Dec	N14E58	311	0290	15	Eai	021	B	4				1											
10 Dec	N14E44	312	0360	14	Eai	027	Bg	1				2	1										
11 Dec	N14E32	311	0470	14	Eai	031	Bg				1	1											
12 Dec	N14E18	312	0560	14	Eki	042	Bgd	1	1		4	1											
13 Dec	N14E04	313	0490	15	Ekc	046	Bg	1		1	2								1				
14 Dec	N14W10	313	0450	15	Eac	058	Bgd	1	1		9			1									
15 Dec	N14W23	313	0430	15	Eai	057	Bgd	5			6												
16 Dec	N14W36	313	0420	15	Eai	047	Bg	1	2		1	1	1										
17 Dec	N14W48	312	0420	14	Eai	044	Bg	1			4												
18 Dec	N13W65	316	0310	14	Eai	026	Bg	2			2	1											
19 Dec	N13W75	313	0310	12	Eai	015	Bg	1				1											
20 Dec	N12W83	307	0070	05	Cao	003	B																
											20	4	2	33	5	2	1	0					

Crossed West Limb.

Absolute heliographic longitude: 313

<i>Region 9734</i>																							
09 Dec	S12E81	288	0050	10	Cao	002	B	2															
10 Dec	S12E65	291	0030	02	Hsx	001	A					1											
11 Dec	S12E52	291	0070	02	Hax	001	A																
12 Dec	S12E38	292	0030	02	Cso	002	B																
13 Dec	S12E24	293	0020	01	Hsx	001	A																
14 Dec	S13E12	291	0010	01	Axx	001	A																
15 Dec	S14E01	289	0020	04	Cao	005	B																
16 Dec	S15W09	286	0010	02	Axx	002	A																
17 Dec	S15W23	287	0020	03	Bxo	002	B																
18 Dec	S16W36	287	0010	02	Axx	003	A																
19 Dec	S16W49	287																					
20 Dec	S16W62	287																					
21 Dec	S16W75	287																					
											2	0	0	1	0	0	0	0					

Crossed West Limb.

Absolute heliographic longitude: 289



**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 9737*

10 Dec	S27E52	304	0010	03	Bxo	003	B												
11 Dec	S27E39	304	0120	05	Dso	005	B												
12 Dec	S28E26	304	0080	06	Dao	008	B												
13 Dec	S28E13	304	0030	07	Dso	006	B												1
14 Dec	S28E00	303	0040	07	Dso	008	B												1
15 Dec	S27W12	302	0070	07	Dao	006	B												
16 Dec	S28W24	301	0040	06	Dso	004	B												
17 Dec	S28W37	301	0050	06	Dao	003	B												
18 Dec	S27W52	303	0020	01	Axx	001	A												
19 Dec	S27W65	303																	
20 Dec	S27W78	303																	
21 Dec	S29W83	294	0010	01	Hsx	001	A												
22 Dec	S29W92	290																	
																			0 0 0 2 0 0 0 0

Crossed West Limb.

Absolute heliographic longitude: 303

*Region 9738*

12 Dec	S21E67	263	0050	07	Cso	003	B												
13 Dec	S19E53	264	0060	08	Dao	003	B												2
14 Dec	S20E40	263	0060	11	Eso	007	B												
15 Dec	S18E27	263	0060	13	Eao	013	B												
16 Dec	S19E15	262	0060	12	Eso	012	B												
17 Dec	S18E01	263	0120	15	Eao	018	B												
18 Dec	S18W12	263	0070	10	Dao	014	Bg												1
19 Dec	S19W21	259	0040	07	Dao	008	Bg	2											1
20 Dec	S18W34	258	0020	06	Cro	003	B												1
21 Dec	S17W51	262	0010	03	Bxo	002	B												
22 Dec	S17W64	262																	
																			2 0 0 5 0 0 0 0

Still on Disk.

Absolute heliographic longitude: 263



**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 9739*

13 Dec	S13W02	319	0010	03	Cso	003	B										
14 Dec	S13W15	318	0060	07	Dao	009	B						1				
15 Dec	S13W30	320	0120	09	Dao	016	B										
16 Dec	S13W43	320	0390	09	Dao	015	B										
17 Dec	S13W57	321	0440	10	Dko	017	B										
18 Dec	S14W69	320	0440	11	Eao	013	B						1				
19 Dec	S14W82	320	0270	12	Eao	007	B	3	1				2				
20 Dec	S14W84	308															
								3	1	0	4	0	0	0	0	0	0

Crossed West Limb.

Absolute heliographic longitude: 319

*Region 9740*

13 Dec	S06E56	261	0020	03	Cso	003	B										
14 Dec	S06E42	261	0010	01	Hsx	001	A										
15 Dec	S06E29	261															
16 Dec	S06E16	261															
17 Dec	S06E03	261															
18 Dec	S06W10	261															
19 Dec	S06W23	261															
20 Dec	S06W36	261															
21 Dec	S06W49	261															
22 Dec	S06W62	261															
23 Dec	S06W75	261															

Still on Disk.

Absolute heliographic longitude: 261





**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 9744*

16 Dec	S06E25	252	0030	04	Cao	006	B												
17 Dec	S06E11	253	0030	03	Cao	003	B												
18 Dec	S05W03	254	0020	02	Bxo	002	B												
19 Dec	S05W16	254																	
20 Dec	S05W29	254																	
21 Dec	S05W42	254																	
22 Dec	S05W55	254																	
23 Dec	S05W68	254																	
																			0 0 0 0 0 0 0 0

Still on Disk.

Absolute heliographic longitude: 254

*Region 9745*

18 Dec	N18E60	191	0030	05	Bxo	005	B												2
19 Dec	N18E48	190	0030	05	Bxo	004	B												
20 Dec	N17E33	191	0030	06	Bxo	008	B												
21 Dec	N17E19	192	0020	05	Cro	006	B												
22 Dec	N17E06	192	0060	06	Dao	009	B												1
23 Dec	N17W07	192	0070	08	Dao	010	B												
																			0 0 0 3 0 0 0 0

Still on Disk.

Absolute heliographic longitude: 192

*Region 9746*

19 Dec	S18E08	230	0020	04	Bxo	002	B												
20 Dec	S18W05	230																	
21 Dec	S17W20	231	0010	03	Bxo	003	B												
22 Dec	S17W32	230	0010	04	Bxo	002	B												
23 Dec	S17W45	230																	
																			0 0 0 0 0 0 0 0

Still on Disk.

Absolute heliographic longitude: 230



**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 9747*

19 Dec	N12E71	167	0030	03	Bxo	002	B												1
20 Dec	N12E58	166	0090	06	Cao	005	B												3
21 Dec	N12E44	167	0060	08	Cao	011	B												
22 Dec	N11E30	168	0070	07	Dao	008	B												
23 Dec	N11E17	168	0050	06	Dso	005	B												
																			0 0 0 4 0 0 0 0

Still on Disk.

Absolute heliographic longitude: 168

*Region 9748*

20 Dec	S11E36	188	0030	03	Cso	004	B												
21 Dec	S12E21	190	0050	06	Dao	008	B												
22 Dec	S11E07	191	0080	09	Dao	018	B												3
23 Dec	S10W07	192	0200	09	Dao	019	B	2	1										5
								2	1	0	8	0	0	0	0	0			0

Still on Disk.

Absolute heliographic longitude: 191

*Region 9749*

20 Dec	S08E72	152	0080	08	Cso	003	B												
21 Dec	S08E56	155	0060	07	Cso	005	B	1											4
22 Dec	S08E43	155	0040	07	Dso	003	B												1
23 Dec	S07E29	156																	1
								1	0	0	6	0	0	0	0	0			0

Still on Disk.

Absolute heliographic longitude: 156

*Region 9750*

21 Dec	S16W64	275	0030	05	Dso	003	B												
22 Dec	S15W77	275	0040	07	Dro	004	B												
23 Dec	S16W86	271	0050	03	Dro	002	B												
																			0 0 0 0 0 0 0 0

Still on Disk.

Absolute heliographic longitude: 275



***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	4		
<i>Region 9751</i>																	
21 Dec	N04E68	143	0220	05	Hax	001	A										
22 Dec	N04E55	143	0330	09	Cho	003	B										
23 Dec	N04E44	141	0320	13	Eko	014	B										
								0	0	0	0	0	0	0	0	0	0
Still on Disk.																	
Absolute heliographic longitude: 141																	
<i>Region 9752</i>																	
22 Dec	S14W19	217	0010	01	Axx	001	A										
23 Dec	S14W31	216	0020	04	Dso	004	B										
								0	0	0	0	0	0	0	0	0	0
Still on Disk.																	
Absolute heliographic longitude: 217																	
<i>Region 9753</i>																	
22 Dec	S20E67	131	0030	02	Hax	001	A										
23 Dec	S20E53	132	0060	08	Cao	003	B					1					
								0	0	0	1	0	0	0	0	0	0
Still on Disk.																	
Absolute heliographic longitude: 132																	
<i>Region 9754</i>																	
23 Dec	S09E61	124	0090	11	Eao	006	B					1					
								0	0	0	1	0	0	0	0	0	0
Still on Disk.																	
Absolute heliographic longitude: 124																	



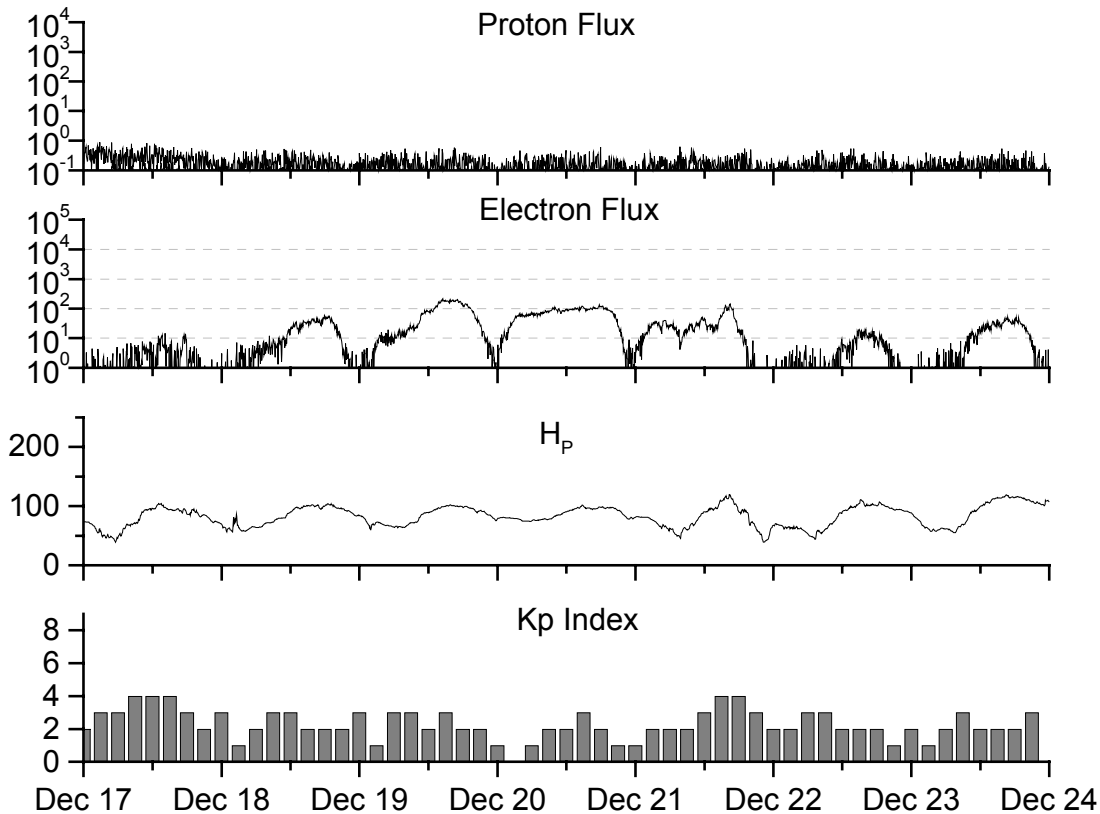
**Recent Solar Indices (preliminary)  
of the observed monthly mean values**

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>1999</b>									
December	123.5	86.4	0.69	165.9	111.1	169.8	173.4	10	13.8
<b>2000</b>									
January	140.8	90.1	0.64	168.0	112.9	158.1	175.5	13	14.5
February	161.9	112.9	0.70	172.1	116.7	173.2	176.8	15	15.0
March	203.6	138.5	0.68	175.4	119.9	208.2	178.4	09	15.0
April	193.4	125.5	0.65	176.3	120.8	184.2	180.5	15	15.0
May	188.8	121.6	0.64	173.1	119.0	184.5	180.0	15	15.0
June	190.3	124.9	0.66	172.0	118.7	179.8	179.7	15	15.1
July	236.7	169.1	0.71	173.0	119.7	204.7	180.2	21	14.8
August	166.6	130.5	0.78	171.8	118.6	163.1	179.5	16	14.2
September	157.9	109.9	0.70	169.0	116.2	182.1	177.1	18	14.2
October	138.9	100.1	0.72	166.2	114.4	167.7	175.6	18	14.6
November	149.9	106.5	0.71	162.7	112.7	178.8	173.6	17	14.6
December	146.4	104.5	0.71	160.8	112.1	173.6	172.0	08	14.4
<b>2001</b>									
January	142.7	95.1	0.67	156.3	108.8	166.7	168.8	08	13.8
February	131.0	80.1	0.61	151.4	104.2	147.3	165.8	06	13.3
March	166.7	114.2	0.69	154.0	104.9	177.7	167.9	17	12.9
April	163.6	108.2	0.66	159.4	107.7	178.3	171.7	18	12.7
May	135.1	97.3	0.72	163.1	108.8	148.7	174.8	12	12.5
June	196.7	134.0	0.68			173.7		12	
July	124.6	82.2	0.66			131.3		11	
August	159.4	106.8	0.67			163.2		13	
September	229.1	150.7	0.66			233.3		12	
October	197.4	125.6	0.64			208.2		18	
November	178.6	106.5	0.60			212.5		14	

**NOTE:** All smoothed values after June 1999 and monthly values after December 2000 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 22, RI= 158.5, occurred July 1989. \*After June 1991, 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 17 December 2001*

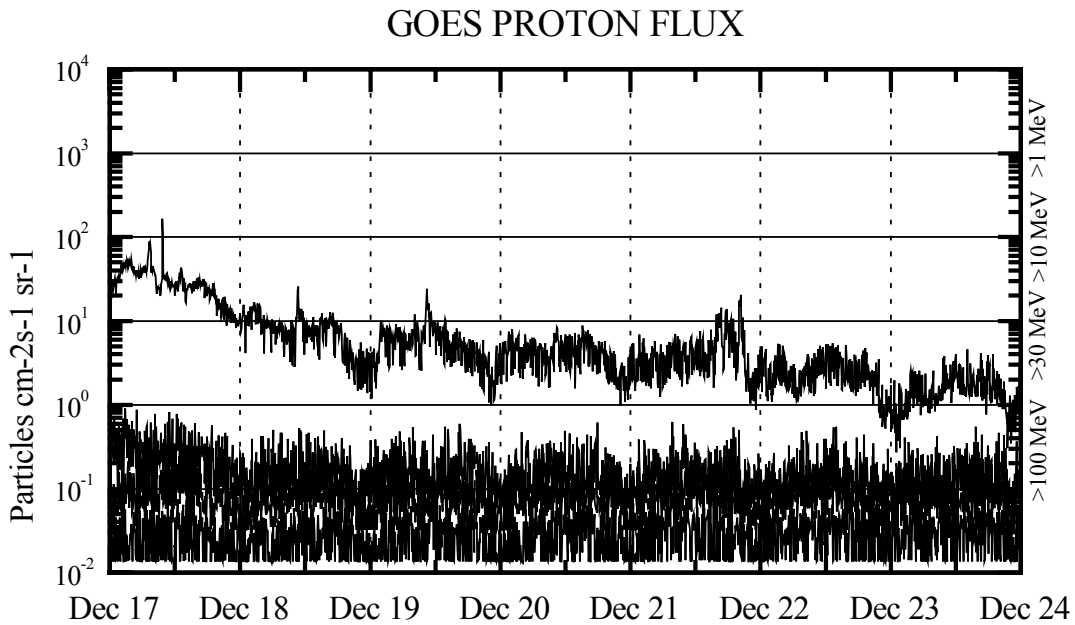
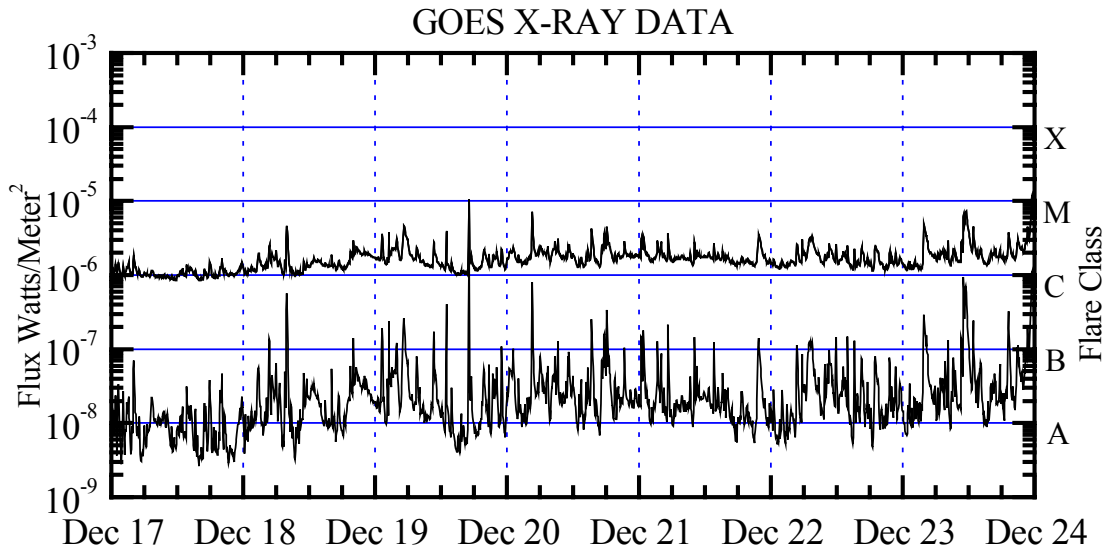
*Protons* plot contains the five-minute averaged integral proton flux (protons/cm<sup>2</sup>-sec -sr ) as measured by GOES-8 (W75) for each of three energy thresholds: greater than 10, 50, and 100 MeV.

*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-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 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 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 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.

