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Data for October 1996

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SOLAR-GEOPHYSICAL DATA

Number 632

(Issued in Two Parts)

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The entry "626A 42" under Aug 96, for example, means that the sunspot drawings for Aug 1996 appear in SOLAR-GEOPHYSICAL DATA No. 626, Part I, and that they begin on page 42. "A" denotes Part I and "B", Part II. Blanks indicate data not yet received and dashes mark unavailable data.

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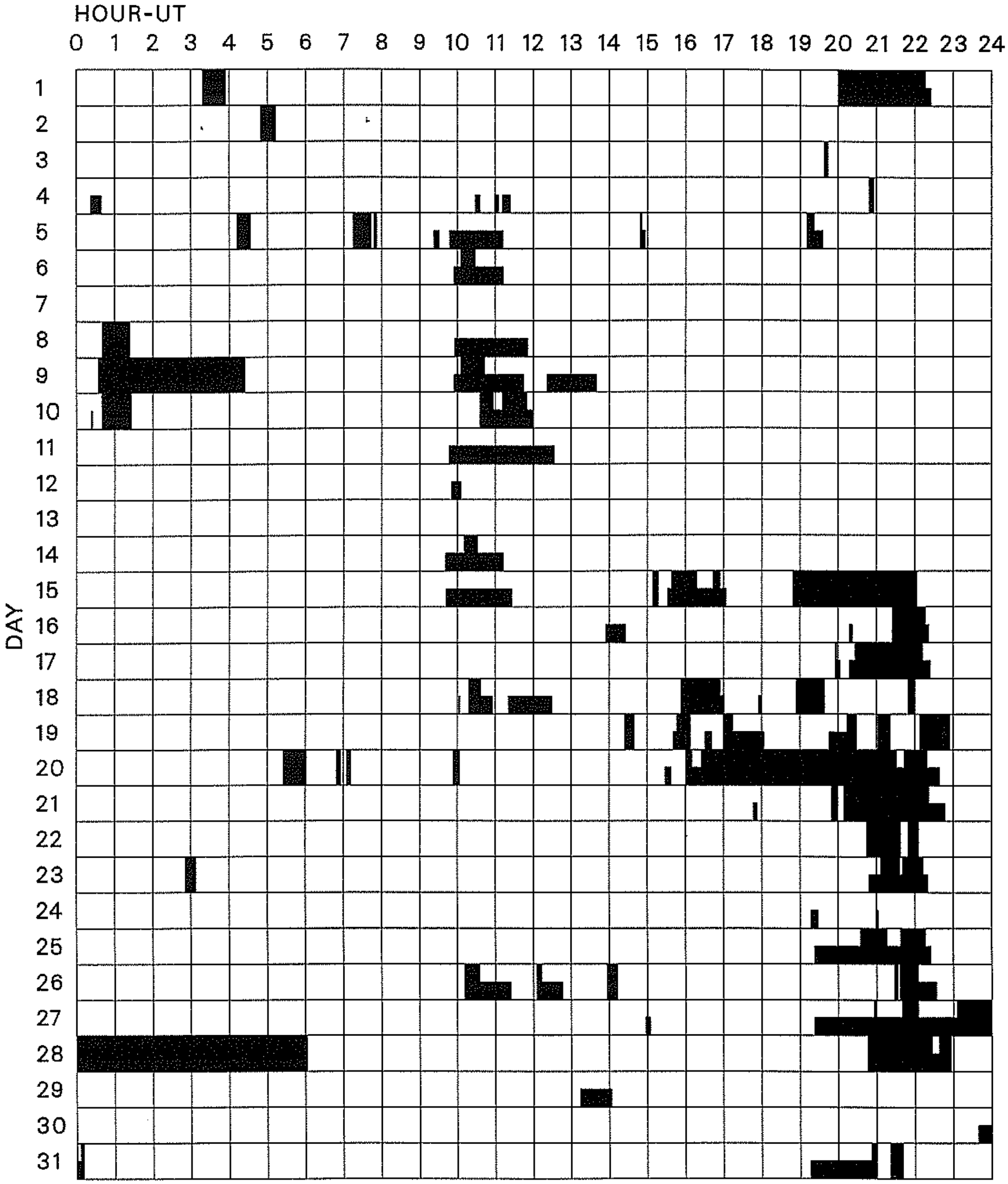
DATA FOR OCTOBER 1996

INTERVALS OF NO FLARE PATROL OBSERVATION
FOR PRECEDING SOLAR FLARE TABLE

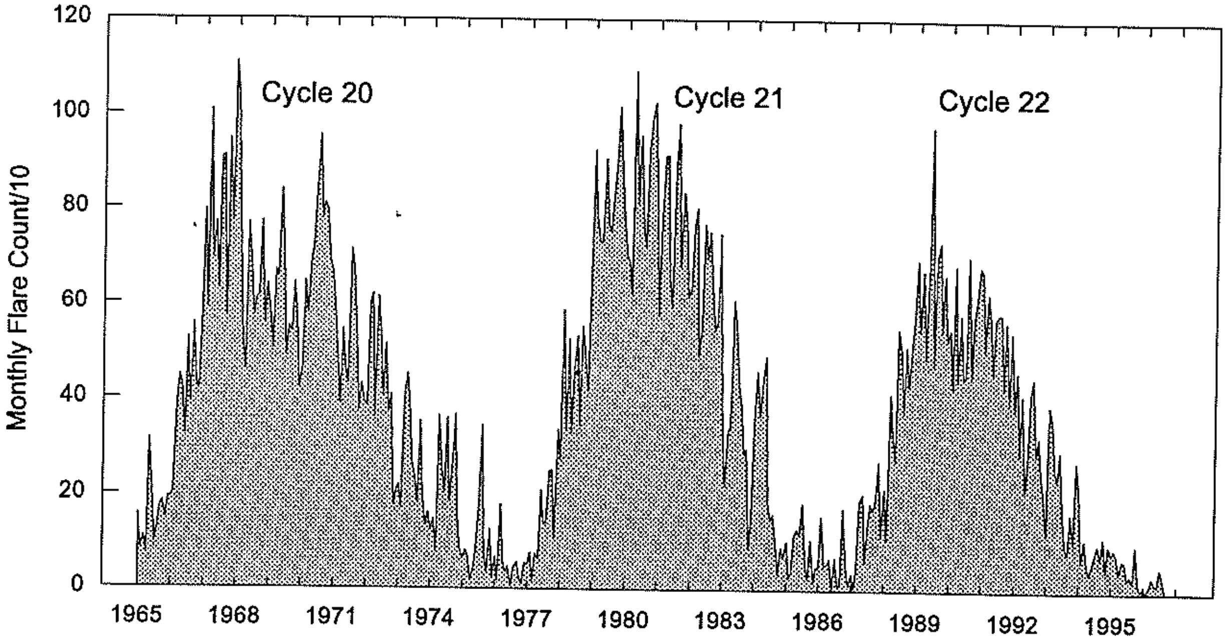
OCTOBER 1996



Times of no flare patrol, shown here as shaded areas, combine reports from the stations listed below. Portions of a panel completely shaded mark dates and times of no patrol of any kind (neither visual nor cinematographic); portions of a panel with only the bottom half shaded mark times of only visual patrol.

Bucharest	Kharkov	Mitaka	Ramey
Holloman	Learmonth	Palehua	San Vito
Kanzelhoehe	Meudon		

Monthly Counts of Grouped Solar Flares
Jan 1965 - Sep 1996



Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
1965	158	85	110	74	315	231	99	127	173	184	150	193	1899
1966	194	205	390	449	429	323	528	391	558	432	417	543	4859
1967	796	589	1009	694	771	629	907	911	573	946	775	1109	9709
1968	1037	773	519	460	768	697	573	611	616	772	556	640	8022
1969	581	504	669	655	839	694	489	551	540	643	566	422	7153
1970	466	646	578	688	722	836	954	780	811	797	687	667	8632
1971	598	505	387	546	461	430	713	673	518	375	431	394	6031
1972	384	599	621	361	614	541	404	515	371	408	175	210	5203
1973	221	171	410	453	388	270	232	182	353	201	136	163	3180
1974	127	148	79	364	255	204	360	187	270	366	153	81	2594
1975	68	82	69	19	42	85	196	346	68	38	127	25	1165
1976	69	18	180	60	38	48	6	47	57	23	13	55	614
1977	54	77	18	76	64	210	140	140	250	252	107	336	1724
1978	274	588	338	526	330	460	533	346	554	499	418	648	5514
1979	926	781	731	731	907	772	750	821	901	1018	888	786	10012
1980	703	689	621	1092	811	956	763	720	924	988	1027	838	10132
1981	578	782	914	915	658	592	893	982	680	836	773	615	9218
1982	631	766	803	490	553	769	696	753	615	544	564	748	7932
1983	332	220	337	346	609	561	427	389	289	298	88	152	4048
1984	353	461	366	440	492	185	151	161	95	36	92	69	2901
1985	104	29	38	119	129	116	185	53	25	108	19	50	975
1986	51	158	54	56	68	3	71	12	14	174	56	13	730
1987	36	7	52	192	205	61	132	185	172	198	273	114	1627
1988	217	109	413	328	274	551	502	375	513	429	518	587	4816
1989	695	544	672	488	691	977	474	699	733	547	665	526	7711
1990	550	424	684	442	580	445	454	703	449	574	623	682	6610
1991	672	503	625	570	458	574	582	581	425	565	396	544	6495
1992	380	462	287	412	214	271	413	447	287	325	248	206	3952
1993	123	392	357	262	237	296	154	92	82	167	104	275	2541
1994	217	67	111	60	40	56	81	101	72	117	45	99	1066
1995	82	95	77	42	69	66	29	37	23	99	14	6	639
1996	14	3	15	34	21	16	54	31	3	0			191

The term 'grouped' means observations of the same event by different sites were lumped together and counted as one.

SOLAR RADIO EMISSION
Outstanding Occurrences

OCTOBER 1996

Day	Freq Sta	Type		Start (UT)	Time of Maximum (UT)	Duration (Min)	Flux Density Peak	Flux Density Mean	Int	Remarks
							(10 -22 W/m 2 Hz)			
13	410 LEAR	8	S	0042.0	0043.0	2.0	5.0			QL=4 ST=3 TYP=3
23	127 TORN	4	S/F	1042.3	1043.6	2.0	7.0	4.0		
29	127 TORN	46	C	0824.0	0826.0	3.3	28.0	4.0		
	127 TORN	7	C	0841.8	0842.2	2.3	22.0	3.0		

Reports are received routinely from the following observatories:

BERN = Berne	HUMN = Humain	ONDR = Ondrejov	SVTO = San Vito
CRIM = Crimea	IZMI = IZMIRAN	PEKG = Peking	TORN = Torun
CUBA = Havana	KISV = Kislovodsk	PALE = Palehua	TRST = Trieste
GORK = Gorky	KRAK = Krakow	PENT = Penticton	TYKW = Toyokawa
HIRA = Hiraiso	LEAR = Learmonth	POTS = Potsdam	UPIC = Upice
HUAN = Huancayo	NOBE = Nobeyama	SGMR = Sagamore Hill	

Explanation of Type Code:

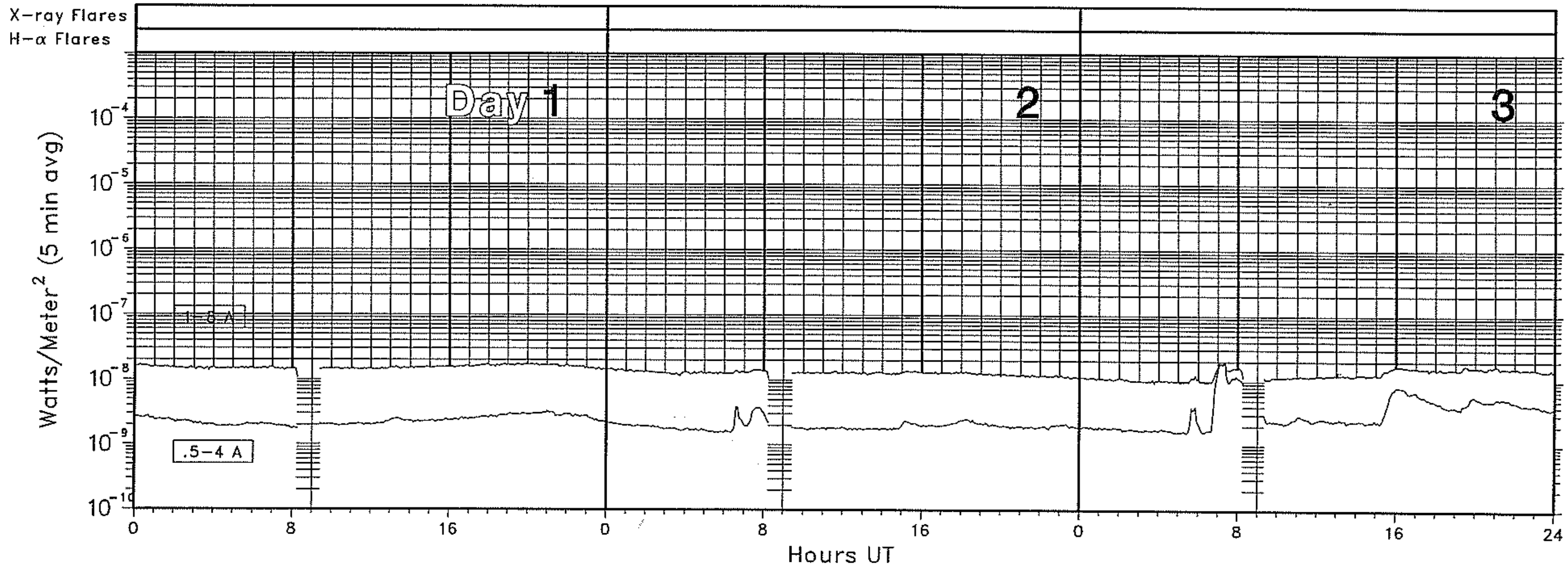
1 Simple 1	7 Minor +	24 Rise	30 Post Burst Increase A	43 Onset of Noise Storm
2 Simple 1F	8 Spike	25 Rise A	31 Post Burst Decrease	44 Noise Storm in Progress
3 Simple 2	20 Simple 3	26 Fall	33 Absorption	45 Complex
4 Simple 2F	21 Simple 3A	27 Rise and Fall	40 Fluctuation	46 Complex F
5 Simple	22 Simple 3F	28 Precusor	41 Group of Bursts	47 Great Burst
6 Minor	23 Simple 3AF	29 Post Burst Increase	42 Series of Bursts	48 Major

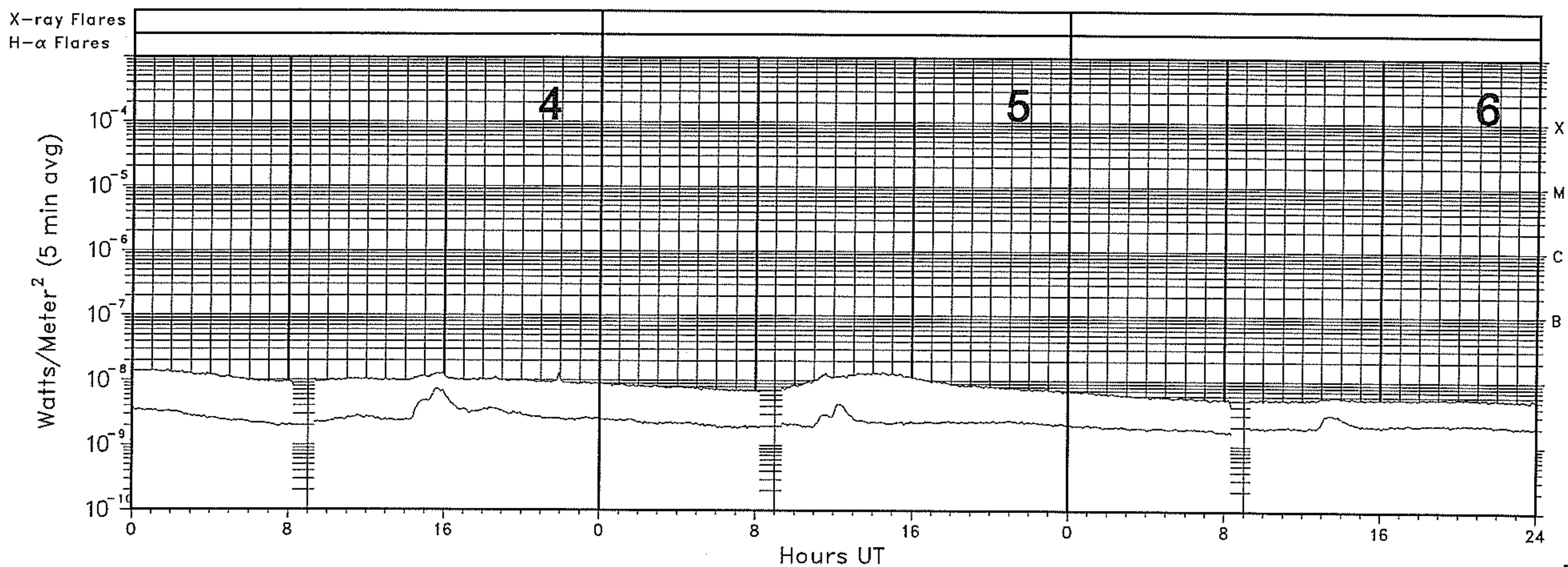
1A Simple 1A	4A Simple 2AF	24PF Post Rise F	27F Rise and Fall F
3A Simple 2A	40 Rise Only	16A Fall A	27AF Rise and Fall AF
21A Simple 3A GRF	40F Rise Only F	260 Fall Only	31A Post Burst Decrease A
2A Simple 1AF	4P Post Rise	26F Fall F	32A Absorption A

RSTN Site Information: Beginning in April 1986, the RSTN sites LEAR, PALE, SGMR, and SVTO fixed frequency solar radio data are periodically adjusted to several world standard stations. These world standard stations include: Kislovodsk, USSR 15,500 MHz; Penticton, Canada 2800 MHz; Hiraiso, Japan 500 and 200 MHz; and Toyokawa, Japan 9400, 3750, 2000 and 1000 MHz.

GOES-7 X-RAY DETECTOR

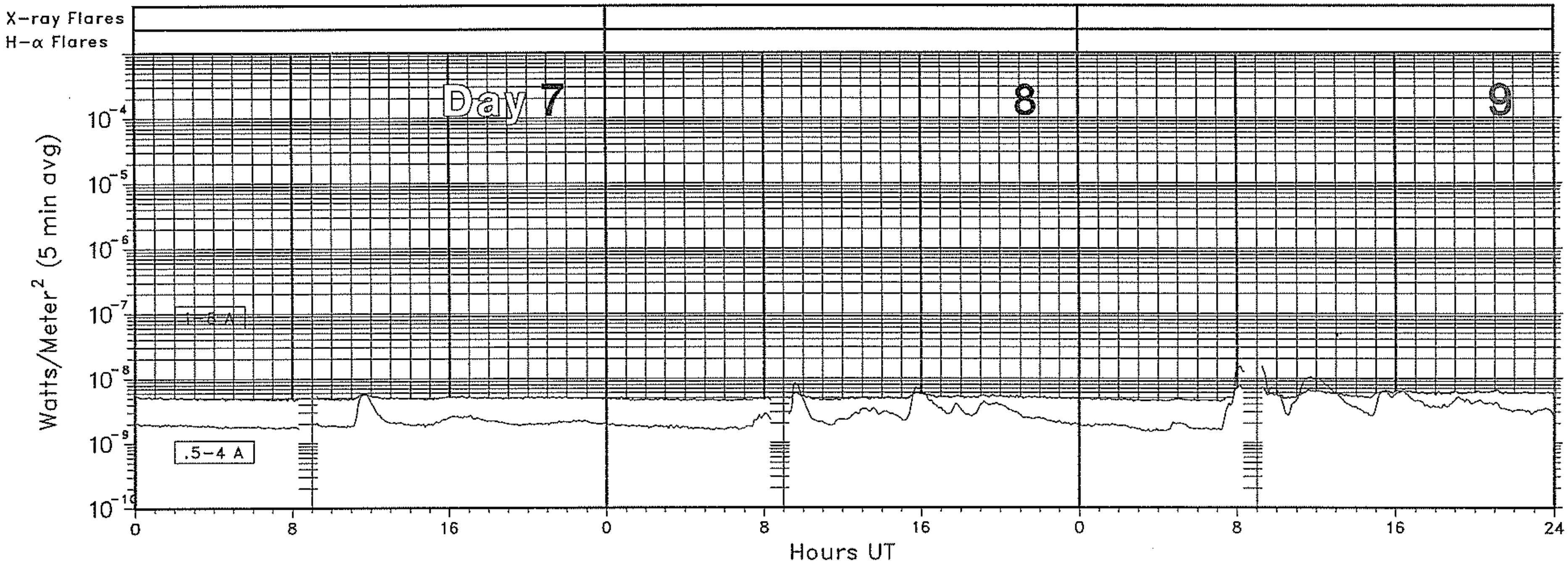
October 1996

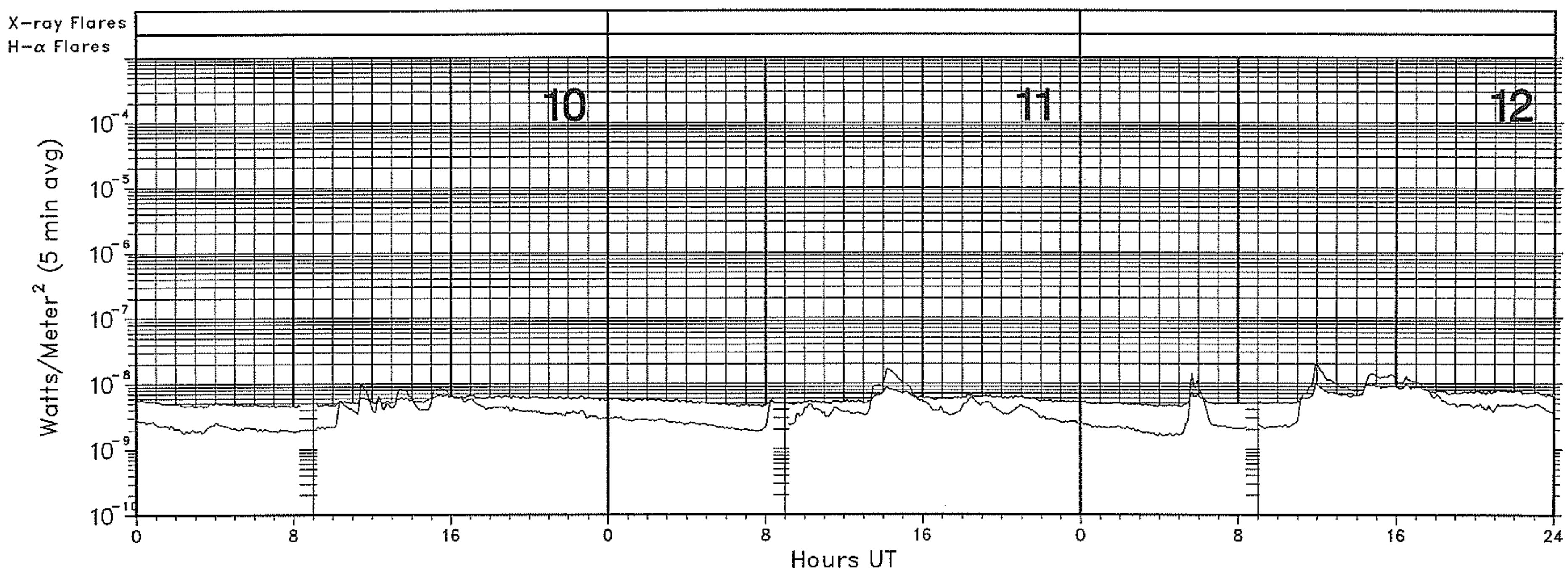




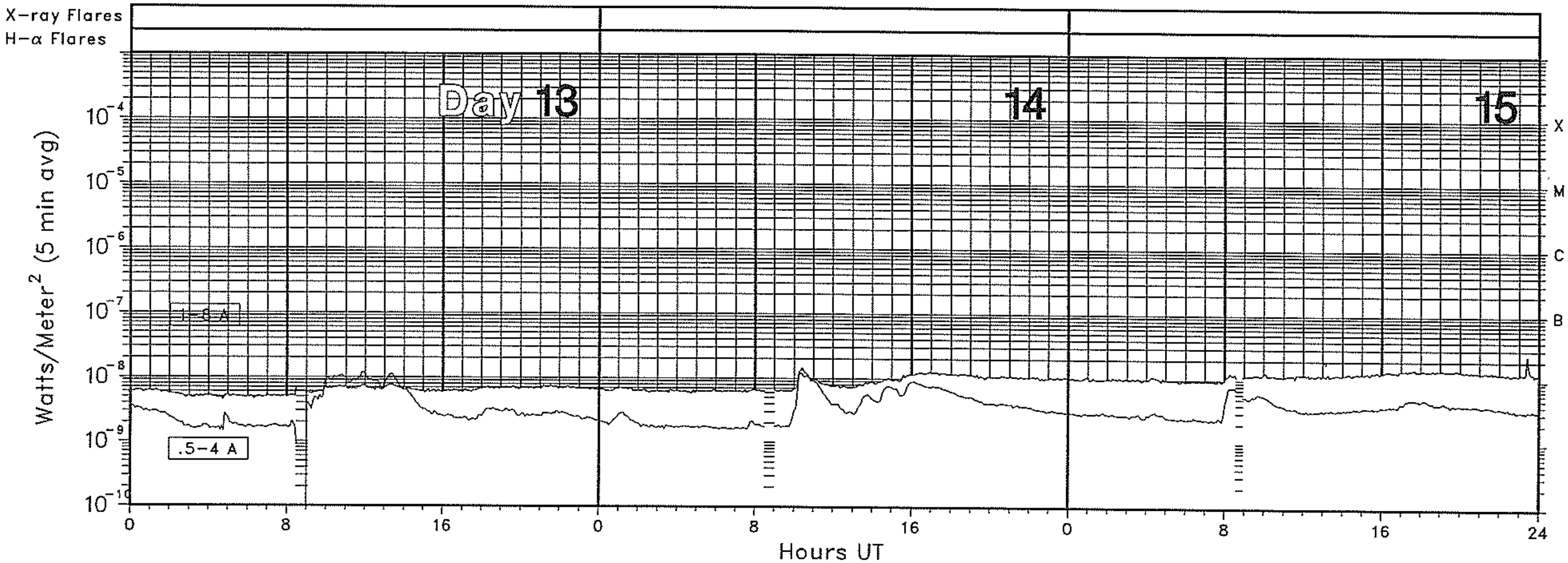
GOES-7 X-RAY DETECTOR

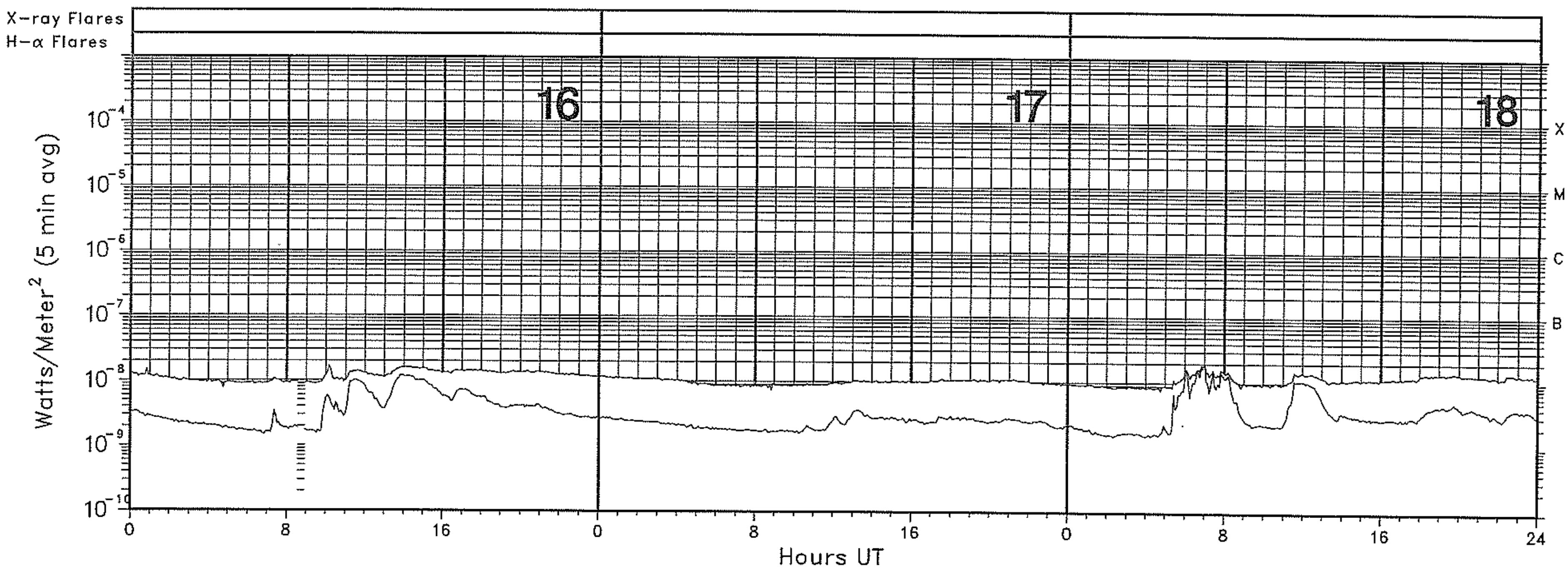
October 1996





GOES-7 X-RAY DETECTOR
October 1996





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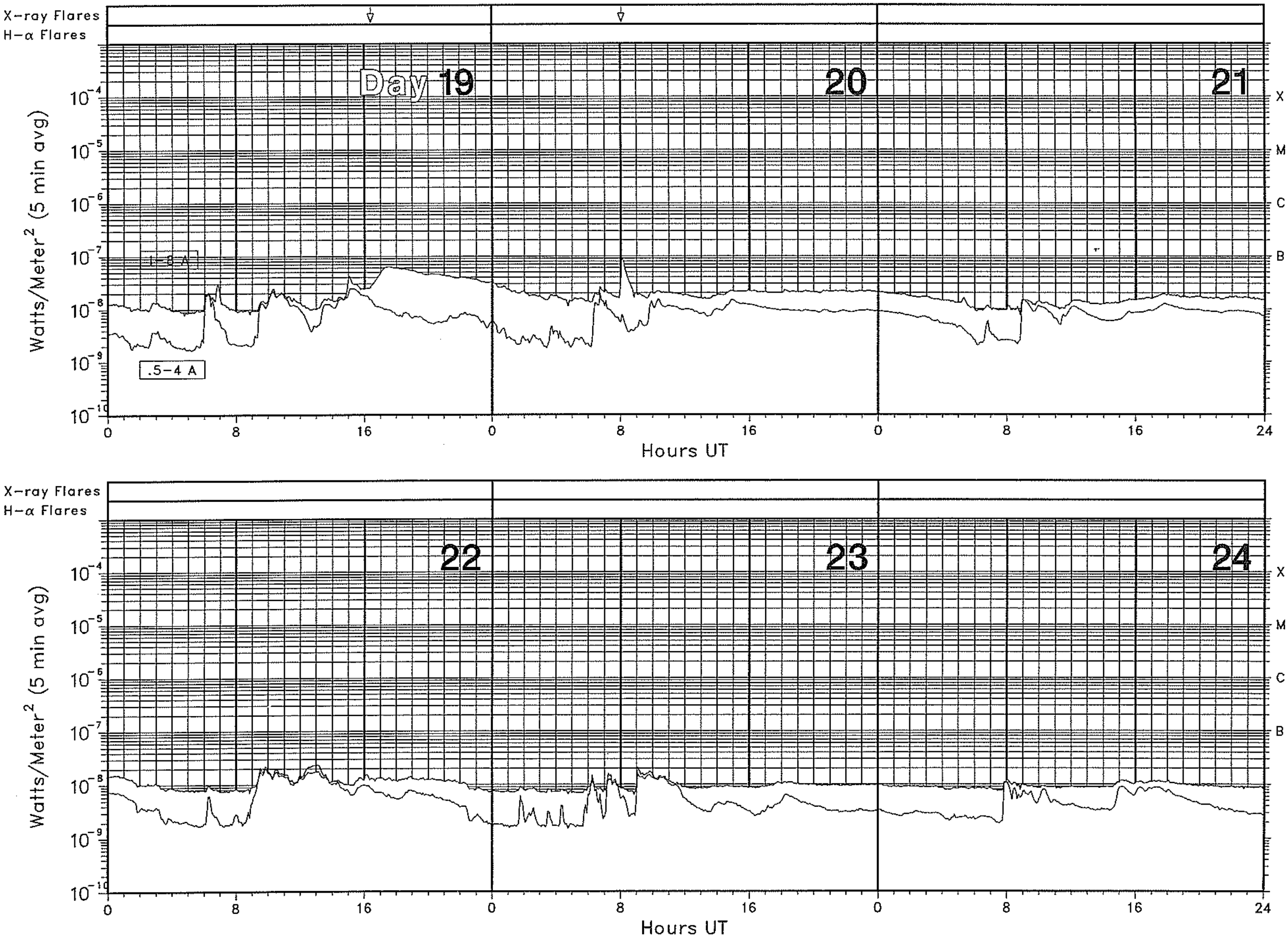
October 1996



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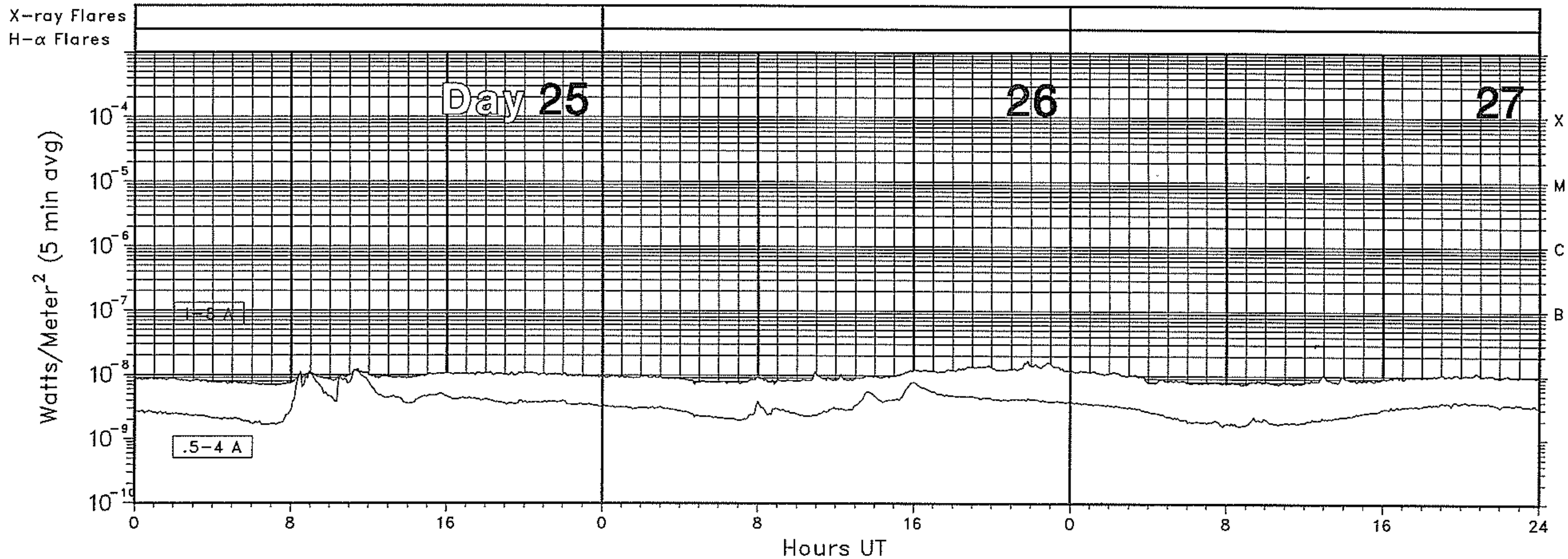
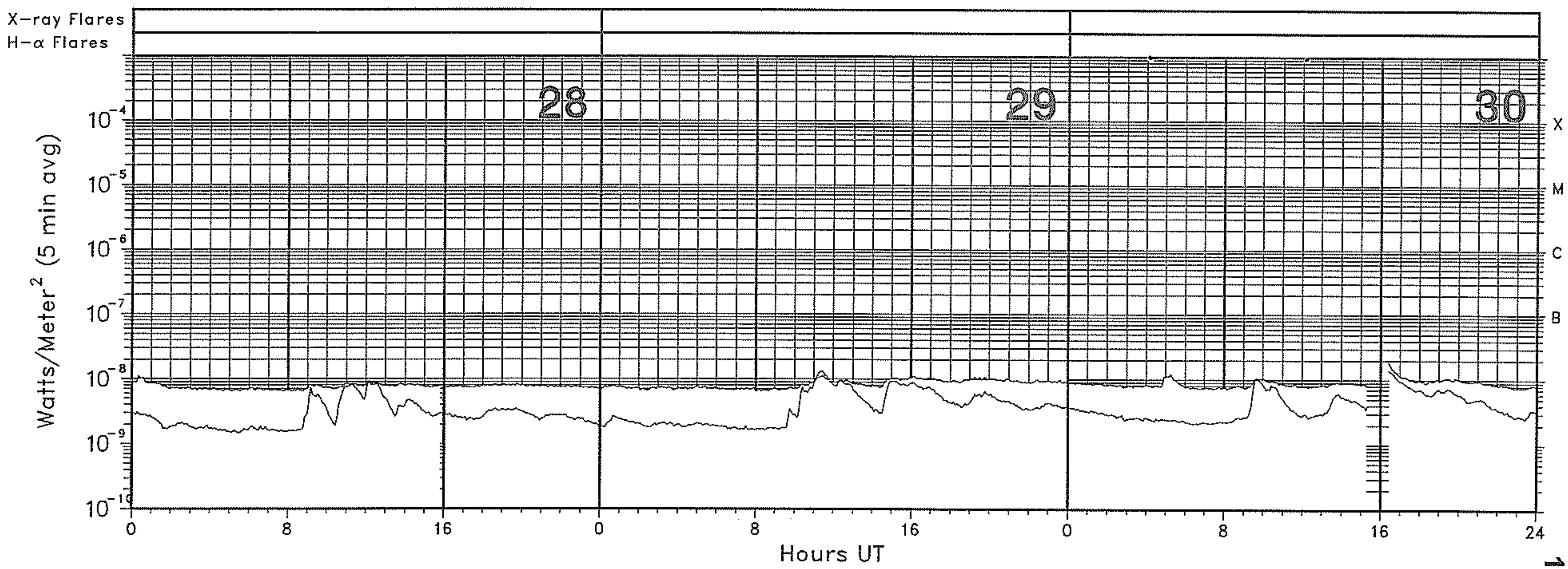
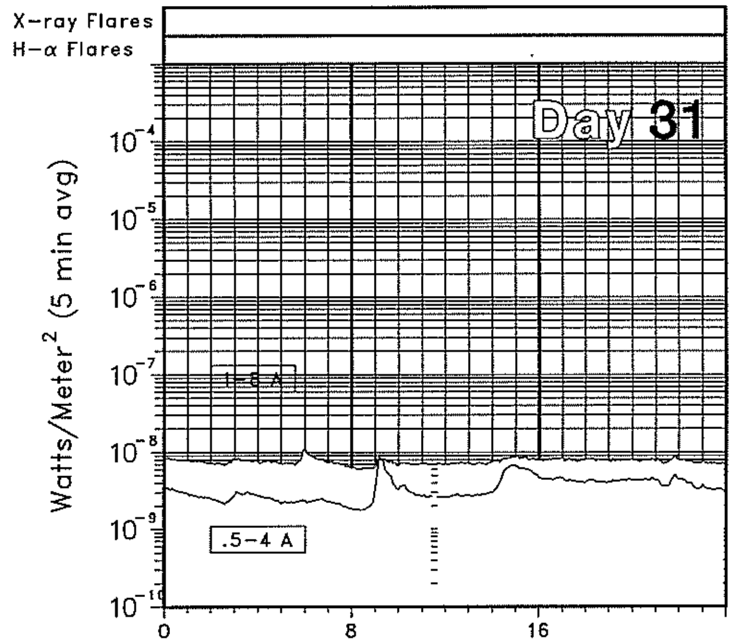
October 1996





GOES-7 X-RAY DETECTOR
October 1996



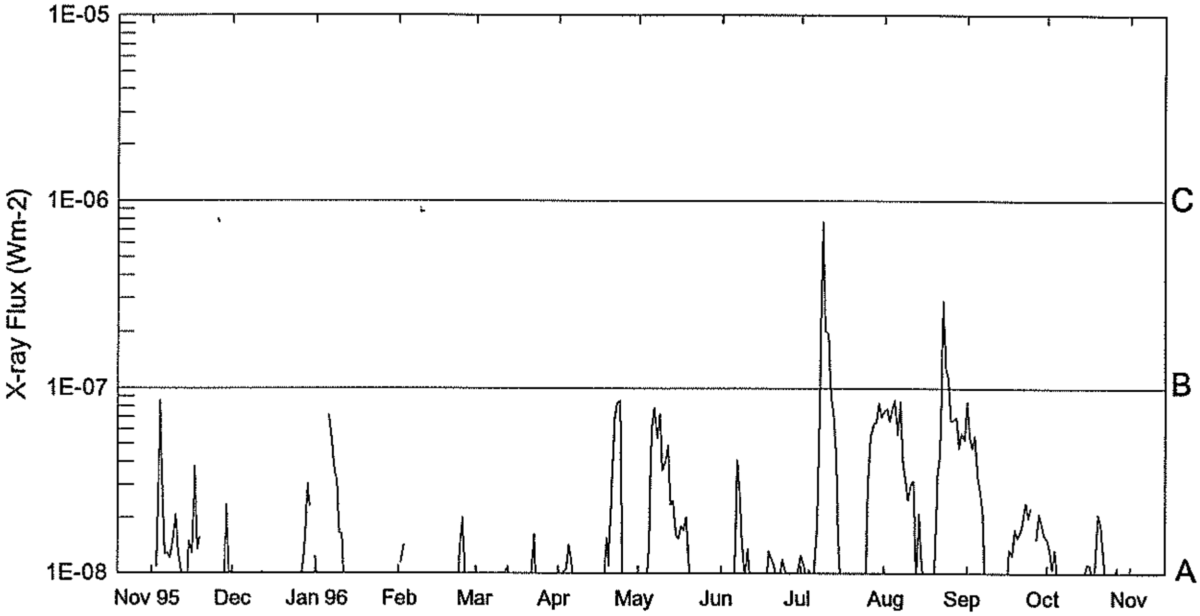
GOES S O L A R X-RAY F L A R E S
Preliminary Listing

October 1996

Day	Start (UT)	Max (UT)	End (UT)	Lat CMD	Imp Opt	Imp Xray	NOAA/ USAF Region
19	1625	1738	2321			B0.6	
20	0805	0808	0812			B1.0	

EDITOR's NOTE: Please note that whenever optical flares are given, the times given are times of the optical flares and not the times of the X-ray flares. These data are taken directly from the NOAA SEC "Preliminary Report and Forecast of Solar Geophysical Data" weekly report.

Preliminary GOES Satellite Daily X-Ray Background
Nov 95 - Oct 96



Day	Nov 95	Dec	Jan 96	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct
1	---	<A1.0	A1.0	---	<A1.0	<A1.0	<A1.0	<A1.0	A1.2	A7.4	A8.5	A1.5
2	---	---	<A1.0	A1.1	<A1.0	<A1.0	<A1.0	<A1.0	A1.1	A7.7	A5.5	A1.3
3	A .0	---	<A1.0	A1.4	<A1.0	A1.0	<A1.0	<A1.0	<A1.0	A6.6	A4.7	A1.0
4	A8.5	<A1.0	---	---	<A1.0	A1.0	<A1.0	<A1.0	A1.0	A7.8	A5.5	A1.3
5	A2.6	<A1.0	---	---	<A1.0	A1.4	A1.3	<A1.0	<A1.0	A8.5	A3.2	<A1.0
6	A1.2	<A1.0	A7.1	---	<A1.0	A1.1	A5.9	A1.0	A1.0	A5.6	A2.7	<A1.0
7	A1.2	<A1.0	A5.0	<A1.0	---	<A1.0	A7.8	A4.1	A1.8	A8.4	A2.1	<A1.0
8	A1.2	<A1.0	A3.6	<A1.0	<A1.0	<A1.0	A5.3	A2.6	B1.2	A4.0	<A1.0	<A1.0
9	A1.5	<A1.0	A3.1	<A1.0	<A1.0	<A1.0	A7.2	A1.4	B7.7	A3.0	<A1.0	<A1.0
10	A2.0	<A1.0	A1.6	<A1.0	<A1.0	<A1.0	A3.6	<A1.0	B2.0	A2.4	<A1.0	<A1.0
11	A1.2	<A1.0	A1.6	<A1.0	<A1.0	<A1.0	A4.0	A1.3	B1.9	A3.0	<A1.0	<A1.0
12	A1.0	A1.0	<A1.0	<A1.0	A1.0	<A1.0	A4.9	<A1.0	A9.0	A3.1	<A1.0	<A1.0
13	<A1.0	<A1.0	<A1.0	<A1.0	A1.0	<A1.0	A2.3	<A1.0	A7.4	<A1.0	<A1.0	<A1.0
14	<A1.0	<A1.0	<A1.0	<A1.0	<A1.0	<A1.0	A2.4	<A1.0	A3.9	A2.1	<A1.0	<A1.0
15	A1.4	<A1.0	<A1.0	<A1.0	<A1.0	<A1.0	A1.6	<A1.0	A1.5	A1.1	<A1.0	<A1.0
16	A1.2	<A1.0	---	<A1.0	<A1.0	<A1.0	A1.5	<A1.0	<A1.0	<A1.0	<A1.0	A1.1
17	A3.7	<A1.0	<A1.0	<A1.0	<A1.0	<A1.0	A1.8	<A1.0	<A1.0	<A1.0	A1.3	A1.1
18	A1.3	<A1.0	<A1.0	<A1.0	<A1.0	<A1.0	A1.7	<A1.0	<A1.0	<A1.0	A1.2	<A1.0
19	A1.5	---	<A1.0	<A1.0	<A1.0	A1.5	A2.0	A1.3	<A1.0	<A1.0	A1.7	A1.1
20	---	<A1.0	<A1.0	---	<A1.0	A1.1	A1.0	A1.1	<A1.0	A1.0	A1.5	A2.1
21	<A1.0	<A1.0	<A1.0	<A1.0	<A1.0	A3.0	<A1.0	A1.1	<A1.0	A3.3	A1.7	A1.8
22	<A1.0	<A1.0	<A1.0	<A1.0	A1.0	A6.8	<A1.0	<A1.0	<A1.0	A4.3	A1.8	A1.2
23	<A1.0	---	<A1.0	<A1.0	A1.6	A8.3	<A1.0	<A1.0	<A1.0	B2.9	A2.4	<A1.0
24	<A1.0	<A1.0	<A1.0	A1.3	<A1.0	A8.5	<A1.0	A1.2	<A1.0	B1.2	A1.9	<A1.0
25	<A1.0	<A1.0	<A1.0	A2.0	<A1.0	A1.0	<A1.0	A1.0	<A1.0	B1.1	A2.2	<A1.0
26	<A1.0	<A1.0	<A1.0	<A1.0	<A1.0	<A1.0	<A1.0	<A1.0	A3.1	A6.6	---	<A1.0
27	<A1.0	<A1.0	<A1.0	---	<A1.0	<A1.0	<A1.0	<A1.0	A5.5	A6.7	A1.5	A1.0
28	<A1.0	A1.3	<A1.0	<A1.0	<A1.0	<A1.0	<A1.0	<A1.0	A6.4	A6.9	A2.1	<A1.0
29	A2.3	A3.0	<A1.0	<A1.0	<A1.0	<A1.0	<A1.0	<A1.0	A6.5	A4.7	A1.8	<A1.0
30	<A1.0	A2.2	<A1.0	---	<A1.0	<A1.0	<A1.0	A1.0	A8.3	A5.7	A1.6	<A1.0
31		---	---		<A1.0		<A1.0		A7.0	A5.2		<A1.0

ACTIVE PROMINENCES AND FILAMENTS

OCTOBER 1996

Day	Event Type	Start (UT)	End (UT)	Lat	CMD	CMP Mo	CMP Day	Imp	Extent	Blue Shift (.1 A)	Red Shift (.1 A)	Obs Type	Sta	NOAA/ USAF Reg#	Remarks
02	AFS	1456E	1958D	N05	E06	10	3.1		01	7	8	E	RAMY		
02	AFS	1830E	2120	N05	E03	10	3.0		01	5	6	E	PALE		
02	DSD	1940E	2200	N03	E04	10	3.1		01	7	5	E	RAMY		
03	DSD	1135E	1410D	N02	W27	10	1.5		01	5	4	E	RAMY		
04	APR	0838E	1219D	S40	W90	09	27.1	1	11			P	WROC		
04	AFS	2350E	0058D	N26	E34	10	7.6		01	5	9	E	LEAR		
05	ASR	1538E	1548D	S22	W84	09	29.3			0	0	E	RAMY		
08	DSD	1409E	1732D	N03	W28	10	6.5		01	8	9	E	RAMY		
13	APR	0851E	1156D	S31	E90	10	20.5	1	9			P	WROC		
15	APR	1147E	1523D	S31	E90	10	22.6	1		9	9	E	RAMY		
15	ADF	1153E	1830	S38	E04	10	15.8	1	06	7	6	E	RAMY		
15	ADF	1655E	2204D	S38	E01	10	15.8	1	04	5	6	E	PALE		
16	DSD	1428E	1613D	S05	E22	10	18.2		02	9	9	E	RAMY		
17	AFS	1450E	2001D	S11	E02	10	17.8		01	9	9	E	RAMY		
18	DSD	1435E	1520D	S01	E48	10	22.2		01	7	7	E	RAMY		
18	DSF	2030U	1158U	S31	E37	10	21.8	2	02	0	0	E	RAMY		
19	DSF	0313U	1725U	S08	E47	10	22.6	3	34	0	0	E	PALE		
19	DSF	1008U	0121U	S08	E47	10	22.9	3	34	0	0	E	LEAR		
19	ADF	1305E	2013	S09	E41	10	22.6	1	35	9	9	E	RAMY		
19	DSF	1421U	0932U	S33	E82	10	26.1		29	0	0	E	SVTO		
19	APR	1608E	1725D	S28	E90	10	26.7	2		9	9	E	RAMY		
19	DSF	1608U	1700U	S19	E55	10	23.9	3	35	9	9	E	RAMY		
19	EPL	1648E	1725D	S28	E90	10	26.7	3		9	9	E	RAMY		
19	ASR	2045E	0012	N15	E90	10	26.7			9	9	E	PALE		
20	AFS	1225E	2142	N15	E33	10	23.0		01	9	9	E	RAMY	7990	
20	AFS	1225E	1542	N13	E31	10	22.8		01	9	9	E	SVTO		
20	AFS	1225E	1542	N13	W31	10	18.2		01	9	9	E	SVTO		
20	ASR	1347E	1451D	S21	W90	10	13.7			8	7	E	RAMY		
20	DSF	1421U	0932U	S33	E82	10	27.1		29	0	0	E	SVTO		
21	DSD	1113E	1900D	N02	W18	10	20.1		02	6	8	E	RAMY		
21	DSD	1120E	1601D	N13	E23	10	23.2		02	3	4	E	RAMY	7990	
21	ADF	1657E	1815D	S17	E23	10	23.4	1	14	9	9	E	RAMY		
21	DSD	1915E	1942	S13	E17	10	23.1		01	7	8	E	RAMY	7990	
22	DSD	1627E	2044	N12	E03	10	22.9		01	8	9	E	RAMY	7990	
22	AFS	1734E	2044	N24	E36	10	25.5		01	8	9	E	RAMY		
22	AFS	1750E	2044	N25	W22	10	21.0		01	7	6	E	RAMY		
23	ADF	0405E	0700D	S12	W02	10	23.0	1	18	5	5	E	LEAR		
23	ADF	0405E	0700D	S12	W04	10	22.9	1	18	5	5	E	LEAR		
23	ADF	1738E	2105	N47	E04	10	24.1	1	37	7	9	E	RAMY		
24	ADF	0225E	0330	N46	E10	10	24.9	1	20	6	6	E	PALE		
24	ADF	0230E	0540D	N47	E36	10	27.1	1	36	5	7	E	LEAR		
24	AFS	0900E	1200	N07	E51	10	28.2		02	9	9	E	SVTO		
24	DSD	1240E	1506D	S13	E06	10	25.0		01	9	9	E	RAMY		
24	AFS	1245E	1947D	S14	E06	10	25.0		01	9	9	E	RAMY		
24	DSD	1510E	1548D	S15	E02	10	24.8		01	9	9	E	RAMY		
24	DSD	1612E	2118D	S16	E04	10	25.0		01	7	8	E	RAMY		
25	ADF	0100E	0256D	N06	E43	10	28.3	1	06	4	9	E	LEAR		
25	DSF	0145U	0256U	N06	E43	10	28.3	2	06	4	9	E	LEAR		
25	ADF	0255E	1015D	S19	W22	10	23.4	1	10	5	8	E	LEAR		
25	AFS	0440E	0755D	N29	E21	10	26.8		01	9	9	E	LEAR		
25	AFS	1201E	2137	N30	E16	10	26.7		01	8	9	E	RAMY	7991	
25	ADF	1255E	2137	S13	W38	10	22.7	1	23	6	7	E	RAMY		
25	DSD	1510E	1733D	S13	W12	10	24.7		02	9	9	E	RAMY		
25	ADF	1620E	2137	S08	W44	10	22.4	1	02	4	4	E	RAMY		

ACTIVE PROMINENCES AND FILAMENTS

OCTOBER 1996

Day	Event Type	Start (UT)	End (UT)	Lat	CMD	CMP Mo	CMP Day	Imp	Extent	Blue Shift (.1 A)	Red Shift (.1 A)	Obs Type	Sta	NOAA/ USAF Reg#	Remarks
26	DSD	1112E	1711D	N05	E28	10	28.6		01	9	9	E	RAMY	7991	
26	DSD	1113E	1416D	S13	W21	10	24.9		01	9	9	E	RAMY	7992	
26	AFS	1331E	2044	S14	W24	10	24.7		01	8	9	E	RAMY	7992	
26	AFS	1340E	1707D	N06	E46	10	30.0		01	9	9	E	RAMY		
26	DSD	1434E	2044	S13	W26	10	24.6		03	9	9	E	RAMY	7992	
26	DSD	1454E	1703D	S14	W25	10	24.7		01	9	9	E	RAMY	7992	
26	BSD	1528E	1630D	S15	W24	10	24.8		02	8	7	E	RAMY	7992	
26	AFS	1705E	0126	S14	W25	10	24.8		02	8	8	E	PALE	7992	
26	DSD	1800E	0126	S14	W26	10	24.8		02	9	9	E	PALE	7992	
26	DSD	2249E	2328D	S12	W29	10	24.8		03	8	5	E	LEAR	7992	
26	ADF	2325E	0130D	N30	W02	10	26.8	1	04	8	9	E	LEAR	7991	
27	DSF	0130U	0230U	N27	W03	10	26.8	2	01	0	0	E	LEAR	7991	
27	AFS	0530E	1013	S14	W32	10	24.8		02	4	3	E	LEAR	7992	
27	AFS	0620E	1359	S14	W31	10	24.9		02	7	7	E	SVTO	7992	
27	AFS	1106E	2139	S14	W34	10	24.9		01	7	7	E	RAMY	7992	
27	DSD	1255E	1945D	N04	E34	10	30.1		01	5	7	E	RAMY		
27	AFS	1550E	2055	S14	W34	10	25.1		01	6	8	E	HOLL	7992	
27	AFS	1715E	1950D	N02	W01	10	27.6		01	9	9	E	RAMY		
28	AFS	0625E	1210D	S15	W45	10	24.9		01	6	6	E	SVTO	7992	
28	DSD	1102E	1855	S13	W48	10	24.8		02	4	5	E	RAMY	7992	
28	DSD	1745E	1855	N05	E18	10	30.1		01	7	8	E	RAMY		

ADF = Active Dark Filament
AFS = Arch Filament System
APR = Active Prominence
ASR = Active Surge Region
BSD = Bright Surge on Disk
BSL = Bright Surge on Limb
CAP = CAP Prominence (Tandberg-Hanssen)
CRN = Coronal Rain
DSD = Dark Surge on Disk
DSF = Disappearing Solar Filament
EPL = Eruptive Prominence on Limb
LPS = Loops
MDP = Mound Prominence
SDF/DSF = Sudden Disappearing Filament
SPY = Spray
SSB = Solar Sector Boundary

For SOLAR SECTOR BOUNDARY REPORTS, the latitude field contains the Carrington longitude of the point where a neutral line crosses the solar equator. The comments field may contain the Carrington longitude and central meridian distance of two more intersection points.

The EXTENT field for limb events is the radial extent above the limb in hundredths of solar radius. For disk events this field contains the heliographic extent in whole degrees.

The remark "Bright Emission 1/3" indicates that bright emission was observed 1/3 of time.
The remark "Normal Emission 1/3" indicates that normal emission was observed 1/3 of time.

Observation Type: C= Cinematographic, E= Electronic, P= Photographic, V= Visual.

ABST = Abastumani
ATHN = Athens
BUCA = Bucharest
CATA = Catania
HOLL = Holloman
KHAR = Kharkov
LEAR = Learmonth
PALE = Palehua
RAMY = Ramey
SVTO = San Vito
VORO = Voroshilov
VALA = Valasske Mezirici
WROC = Wroclaw

1996 SOLAR IRRADIANCE INSTANTANEOUS VALUES
EARTH RADIATION BUDGET EXPERIMENT

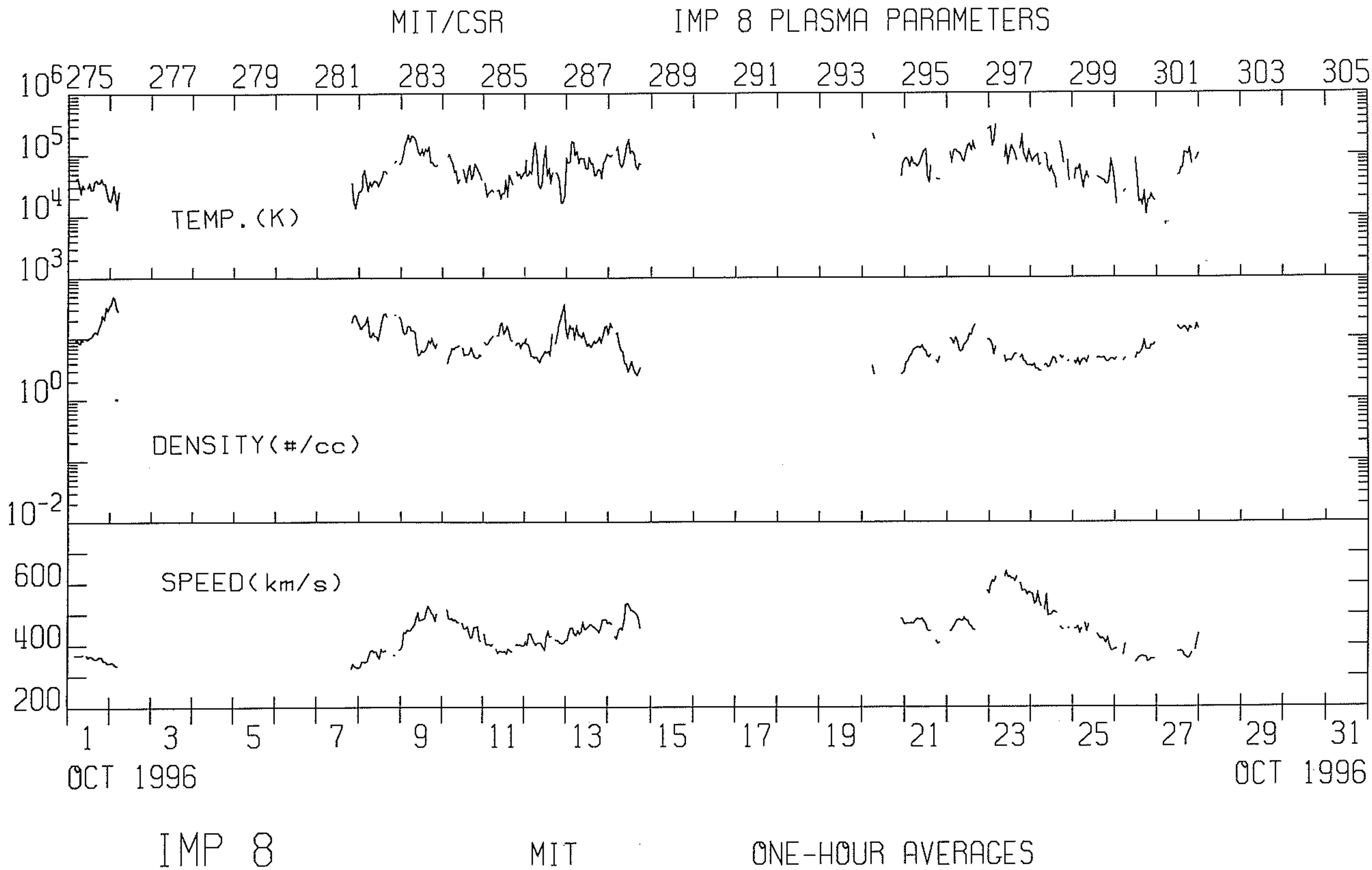
NASA LANGLEY RESEARCH CENTER

WATTS/m^2

Day	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1	---	---	---	---	---	---	---	---	---	---	---	---
2	---	---	---	---	---	---	---	---	---	---	---	---
3	1364.9	---	---	---	---	---	1364.7	1364.6	---	---	---	---
4	---	1365.5	---	---	---	---	---	---	---	---	---	1364.8
5	---	---	---	---	---	1365.5	---	---	---	---	---	---
6	1365.2	---	---	---	---	---	---	---	---	---	1365.0	---
7	---	---	---	---	---	---	---	---	---	---	---	1365.3
8	---	---	---	---	1365.0	---	1364.4	---	---	---	1365.0	---
9	---	---	---	---	---	1364.8	---	---	---	1364.8	---	---
10	---	---	---	1365.1	1364.5	---	---	---	---	---	---	---
11	---	---	---	---	---	---	---	---	1365.0	---	---	---
12	1364.6	---	---	---	---	---	---	---	---	---	---	---
13	---	---	---	---	---	---	---	---	---	---	---	---
14	---	---	---	---	---	---	---	1365.3	---	---	---	---
15	---	1365.5	---	---	---	---	---	---	---	---	---	---
16	---	---	---	---	---	---	---	---	---	---	---	---
17	1364.9	---	---	---	---	---	1364.8	---	---	---	---	---
18	---	---	---	---	---	---	---	---	1364.4	---	---	1364.7
19	---	---	---	---	---	1364.7	---	---	---	---	---	---
20	---	1365.4	---	---	---	---	---	---	---	---	1365.0	---
21	---	---	1365.9	---	---	---	1364.6	---	---	---	---	---
22	1364.9	---	---	---	---	---	---	---	1364.8	---	---	---
23	---	---	---	---	1364.5	---	---	---	---	1366.0	---	---
24	---	---	---	1365.1	1364.7	---	---	---	---	---	---	---
25	---	---	---	---	---	---	---	---	1365.0	1366.3	---	---
26	---	---	---	---	---	---	---	---	---	---	---	---
27	---	---	1364.7	---	---	---	---	---	---	---	---	---
28	---	1364.9	---	---	---	---	---	1364.6	---	1365.2	---	---
29	---	---	---	---	---	---	---	---	---	---	---	---
30	---	---	---	1365.3	---	---	---	---	---	---	---	---
31	---	---	---	---	---	---	---	---	---	---	---	---

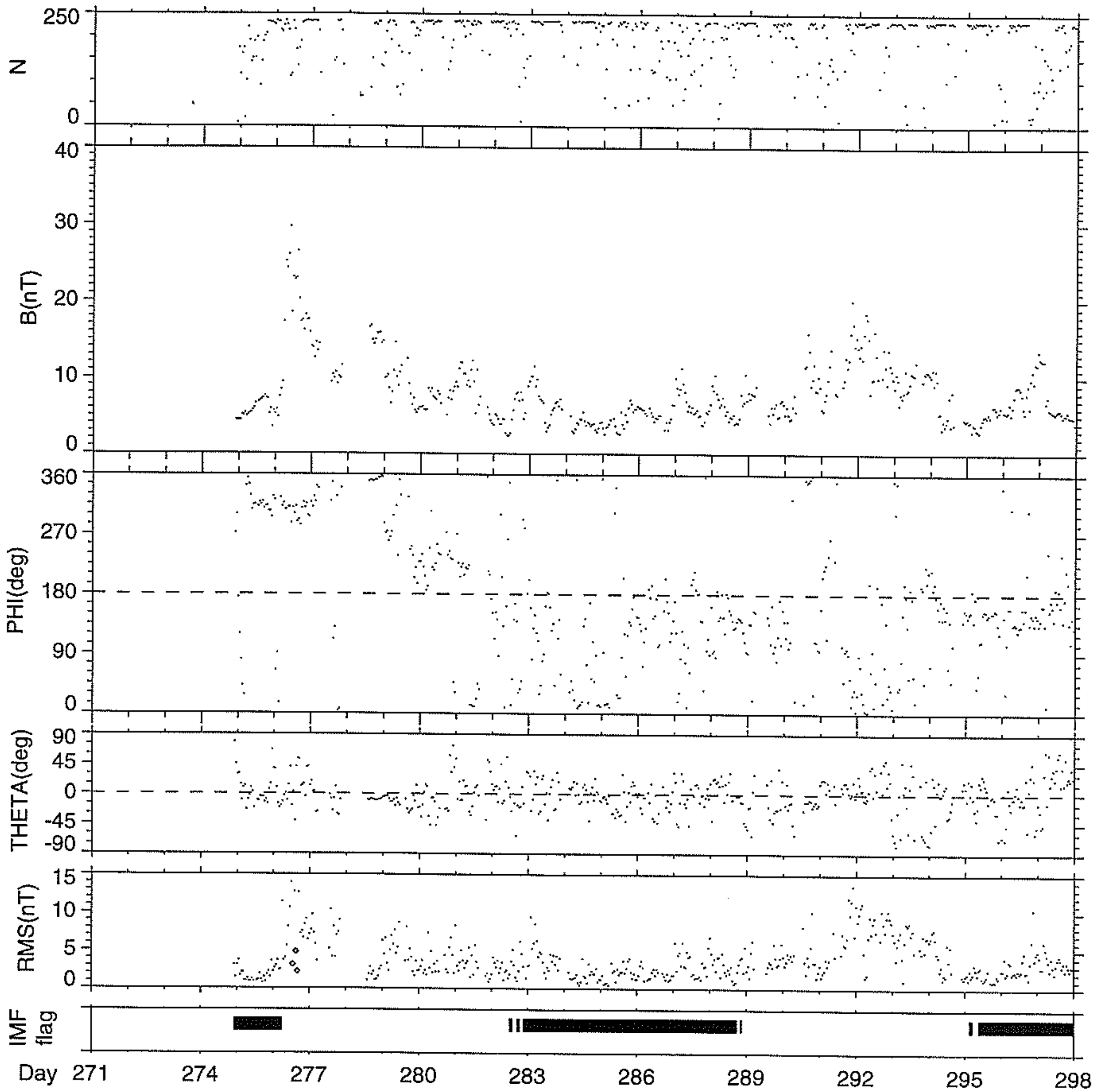
* Solar Irradiance = Instantaneous values are cosine-corrected for any off-axis positioning of the sun in the telescope aperture.
All values are normalized to 1 astronomical unit.

IMP 8 SOLAR WIND PLASMA
OCTOBER 1996



IMP-8 Magnetic Field Data in GSE Coordinates

1 Hour Averages (c) DOY 274 - 298 September 30 1996 - October 24 1996

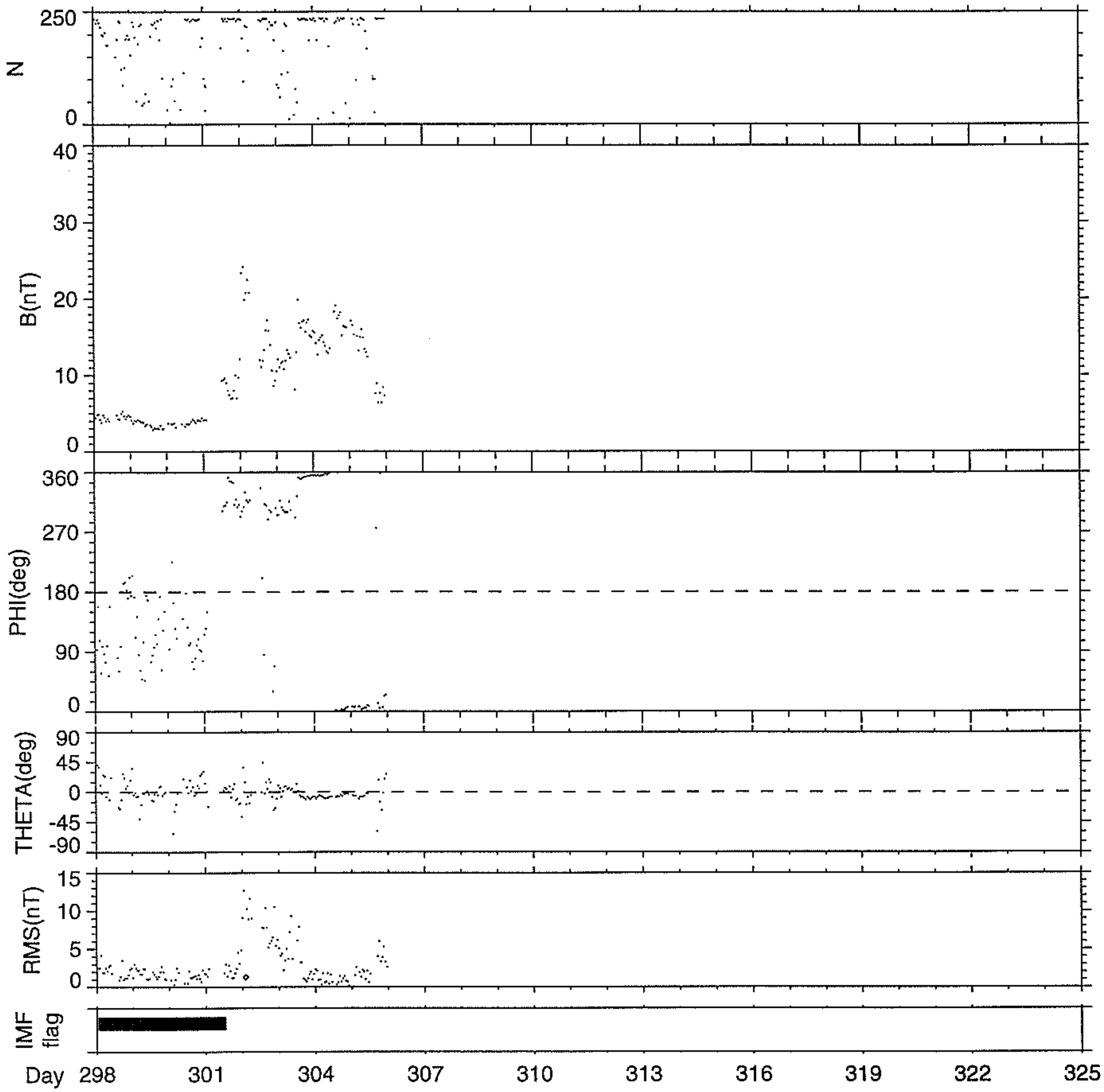


Generation Date : Wed Apr 16 07:56:11 1997

NOTE: The IMF "flag" (black boxes at the bottom of the plots) indicates where the interplanetary magnetic field regions are according to a dynamic model of the location of the bow shock. At all other times IMP-8 is in the magnetosphere.

IMP-8 Magnetic Field Data in GSE Coordinates

1 Hour Averages (c) DOY 298 - 305 October 24 1996 - October 31 1996



Generation Date : Wed Apr 16 07:56:13 1997

NOTE: The IMF "flag" (black boxes at the bottom of the plots) indicates where the interplanetary magnetic field regions are according to a dynamic model of the location of the bow shock. At all other times IMP-8 is in the magnetosphere.

CONTENTS

Comprehensive Reports Number 632 Part II

MISCELLANEOUS DATA

Notes on Interplanetary Fluxes of Energetic Particles from SAMPEX.

This issue contains new interplanetary measurements of the flux of energetic electrons, protons, helium nuclei, and heavy ions with Z>6 for the period July to December, 1996. These plots are derived from measurements made on NASA's Solar, Anomalous, and Magnetospheric Particle Explorer (SAMPEX), the first of these series of plots appeared in March 1994, along with the original version of these notes. The next few issues will contain the plots from 1996.

Two main revisions have occured since March 1994. One revision is to the 0.5 - 6.6 MeV/nuc He flux, where it has since been recognized that a time-dependent correction is necessary to account for variations in the instrumental efficiency for detecting He. This change was implemented in the republication of data from January to June 1993 and the new publication of data from July to December 1993.

The medium energy proton rate undergoes a change between April and May 1994. Up through April, the data are derived as before from the MAST M12 counting rate, covering an energy range of ~5-10 MeV. The rate for May and later is derived from the MAST Z1sec counting rate, covering a range from ~7-13 MeV. Caution should be used in comparing the absolute fluxes of the medium energy proton rate from before and after the change. The (older) M12-derived rate is systematically higher than the Z1sec-derived rate, both because the older rate included He and heavy ion counts and because of the different energy range. In addition, however, the geometry factor and efficiency factor used for the M12 rate may have been slightly underestimated; the Z1sec rate is expected to be more reliable. This revision was implemented in the publication of the plots from 1994. We have no plans to revise the previously published data, however.

For the convenience of the user, we repeat the following description of these plots, essentially as published in March, 1994, with revisions for the current data set.

SAMPEX, the first of NASA's Small Explorer series, was launched in July, 1992 into an 82° inclination orbit with an altitude of 520 x 670 km. SAMPEX carries four instruments designed to measure heavy ion composition from ~0.4 to 300 MeV/nuc, proton intensity from ~2 to 85 MeV, and electron intensity from ~0.5 to 30 MeV. The Heavy Ion Large-area Telescope (HILT), built by the Max Planck Institut (Garching) and the Aerospace Corp., is a gas proportional counter, silicon solid-state detector, and scintillating crystal detector system that measures particle energy loss (ΔE) and total energy. The Low-energy Ion Composition Analyzer (LICA), built by the University of Maryland, uses microchannel plates and silicon detectors to measure time-of-flight and total energy. The Mass Spectrometer Telescope (MAST) and the Proton Electron Telescope (PET), built by Caltech and Goddard Space Flight Center, are all-silicon detector stacks which measure ΔE - total energy. The instruments and spacecraft are more fully described in IEEE Transactions on Remote Sensing, volume 31, issue 3, 1993.

SAMPEX has access to interplanetary fluxes of solar energetic particles and galactic cosmic rays over the polar portions of its orbit. The intensities displayed here are obtained by averaging selected counting rates (time resolution of 6 seconds) over two polar cap passes, one north and one south, of one orbit, giving a ~90 minute average with a typical duty cycle of ~20%. For the proton, helium, and heavy ion fluxes, the polar cap was defined by averaging data above 70° invariant latitude. For the electron intensity and the 3.2 - 11 MeV proton intensity, the polar cap was defined by averaging above 78° invariant latitude in order to avoid contributions from particles in the radiation belts. Note that because some orbits do not reach 78° latitude, there are periodic gaps in the electron and 3.2 - 11 MeV proton data.

To derive these particle fluxes, the instrument count rates were divided by the appropriate energy interval (in MeV or MeV/nuc) and the effective geometry factor (in cm2 sr). Each point represents one or more complete orbits. When fluxes are low enough so that fewer than 25 counts are accumulated in a given rate, a point may represent more than one orbit. A horizontal bar indicates the appropriate time interval. The first onset of high intensities is always plotted as an independent point. When an instrument is off or data are not available from an orbit, no point is plotted. Vertical error bars represent statistical uncertainties only.

The user of these data should be warned that while an effort has been made to ensure that the absolute flux levels displayed here are correct, there may be instrumental background that affects the lowest measured flux levels, and instrumental dead-time effects at the very highest flux levels reported here (see also discussion below). As a result, these data are appropriate for identifying the occurrence and magnitude of solar and interplanetary particle events, but caution should be exercised in any quantitative application of the plotted fluxes.

There are several instrumental and spacecraft operations issues that affect the availability of data. Operation of MAST and PET often includes periodic turnoffs for periods of 12 or 24 hours. The HILT sensor is sometimes turned off for a month or more to conserve proportional counter gas. Because of its large geometry factor, HILT cannot operate at the peaks of the largest solar particle events observed.

Since February, 1996 SAMPEX has been rotating at 1 RPM in order to investigate angular distributions of trapped particles. All rates have been corrected by a factor of 0.64 to account for the reduction of exposure to interplanetary particles.

- The 2 - 6 MeV electron flux is derived from the PET ELO rate, based on coincidences between the front two 2-mm-thick silicon detectors with pulse-height limits designed to select electrons exclusively. There is possible background from radiation belt electrons when on some orbits the > 78° invariant latitude selection does not exclude them.
- The 3.2 - 11 MeV proton flux is derived from the HILT PCFE rate, based on measurements in a gas proportional counter which responds to all ions, and to electrons with a much smaller efficiency. HILT has now used up its consumable gas.
- The 7 - 13 MeV proton flux is based on the MAST Z1sec rate, based on coincidences between the 2nd and 3rd 115 μm silicon detectors in the MAST detector stack, with a pulse-height and range limit. This rate responds almost exclusively to protons
- The 19 - 28 MeV proton flux is derived from the PET PLO rate, based on coincidences between the front two 2-mm silicon detectors with pulse height restrictions designed to select protons exclusively.
- The 0.5 - 6.6 MeV/nuc helium flux is derived from the LICA LOPRI rate. This rate responds to lower-energy heavy ions ($Z \geq 3$) as well as to helium. In some types of solar energetic particle events, these heavy ions may compose up to 50% of the "helium" flux. There is some saturation at peak intensities in the large solar energetic particle event in October-November 1992. The plotted intensity has not been corrected for this effect.
- The 8 - 15 MeV/nuc helium flux is derived from the MAST Z2 rate, which responds only to helium nuclei.
- The 0.5 - 8.2 MeV/nuc heavy ion flux is derived from the LICA HIPRI rate, which responds only to nuclei with $Z \geq 3$ and is typically dominated by C, N, and O. The quoted energy range is for oxygen nuclei.
- The 8.2 - 42 MeV/nuc heavy ion flux is derived from the HILT HiZ1 rate, which responds primarily to nuclei with $Z \geq 6$ and is typically dominated by C, N, and O. The HILT sensor has used up its consumable gas and its rates appear only briefly in the most recent plots.
- The 18 - 50 MeV/nuc heavy ion flux is derived from the combination of the MAST HIZR1, HIZR2, and HIZR3 rates, which respond only to nuclei with $Z \geq 3$ and are typically dominated by C, N, and O. The quoted energy range is for oxygen nuclei.

Further information is at: http://lepsam.gsfc.nasa.gov/www/sampex.html. Specific questions on:

MAST, PET or these plots:
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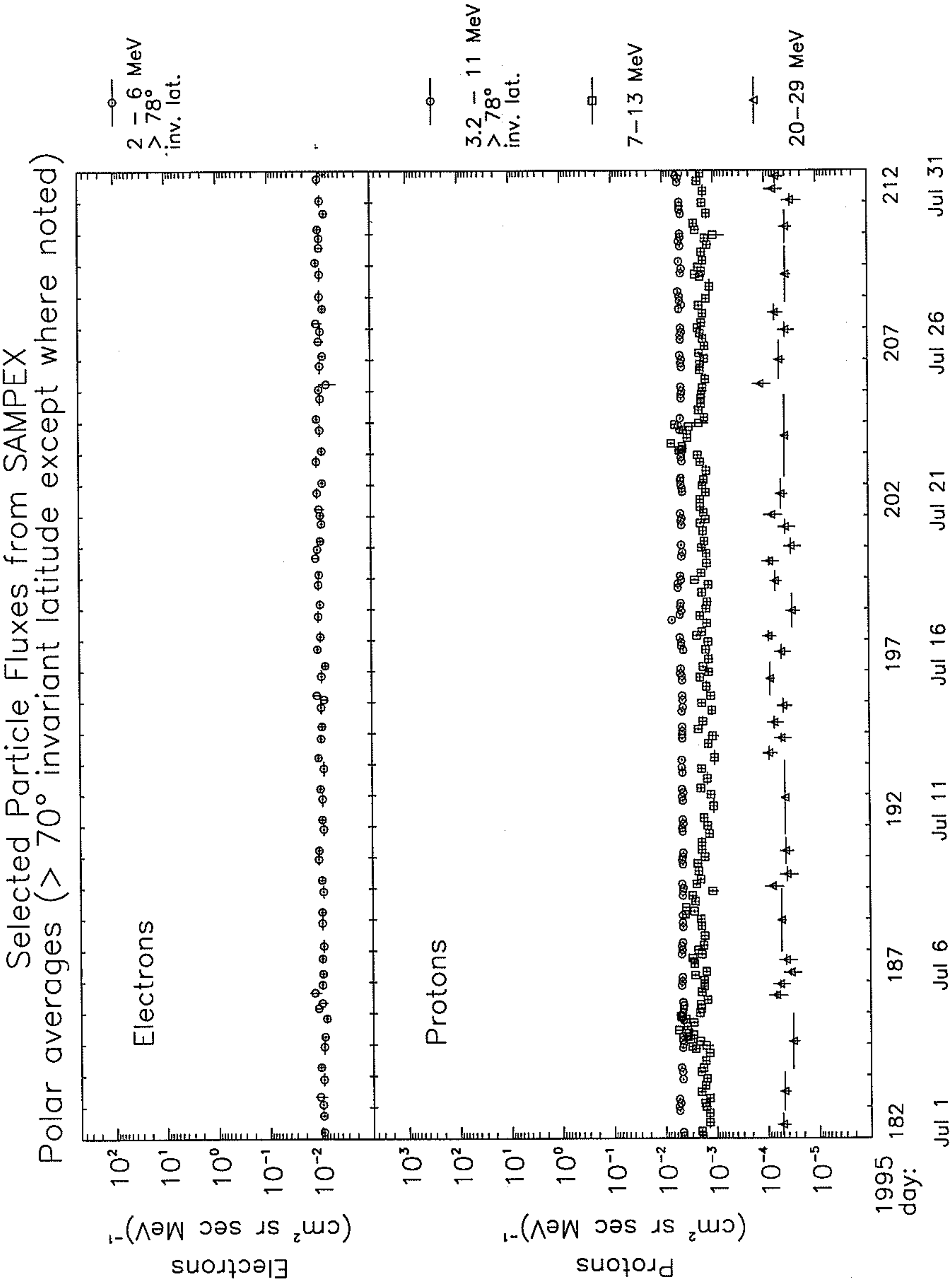
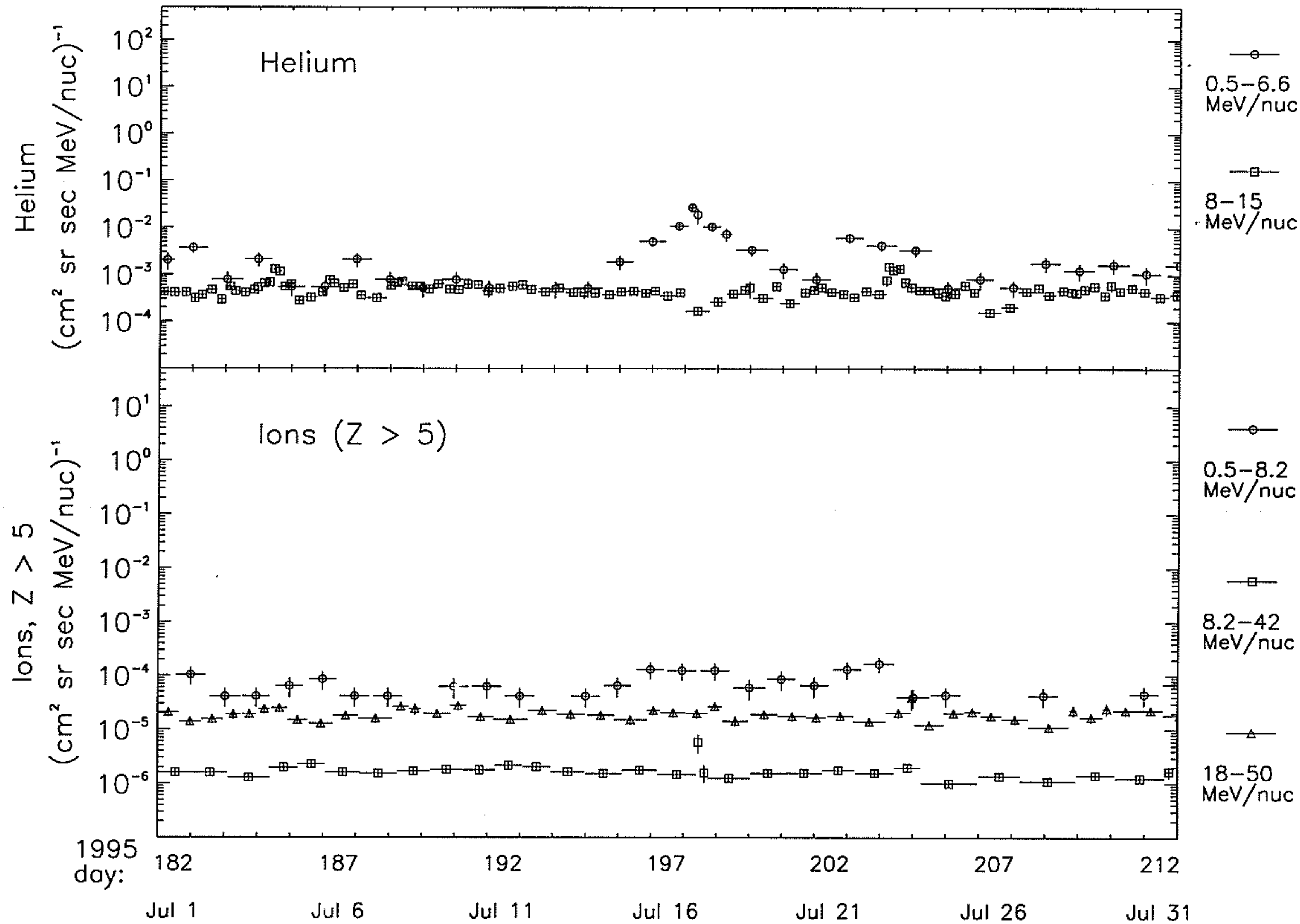
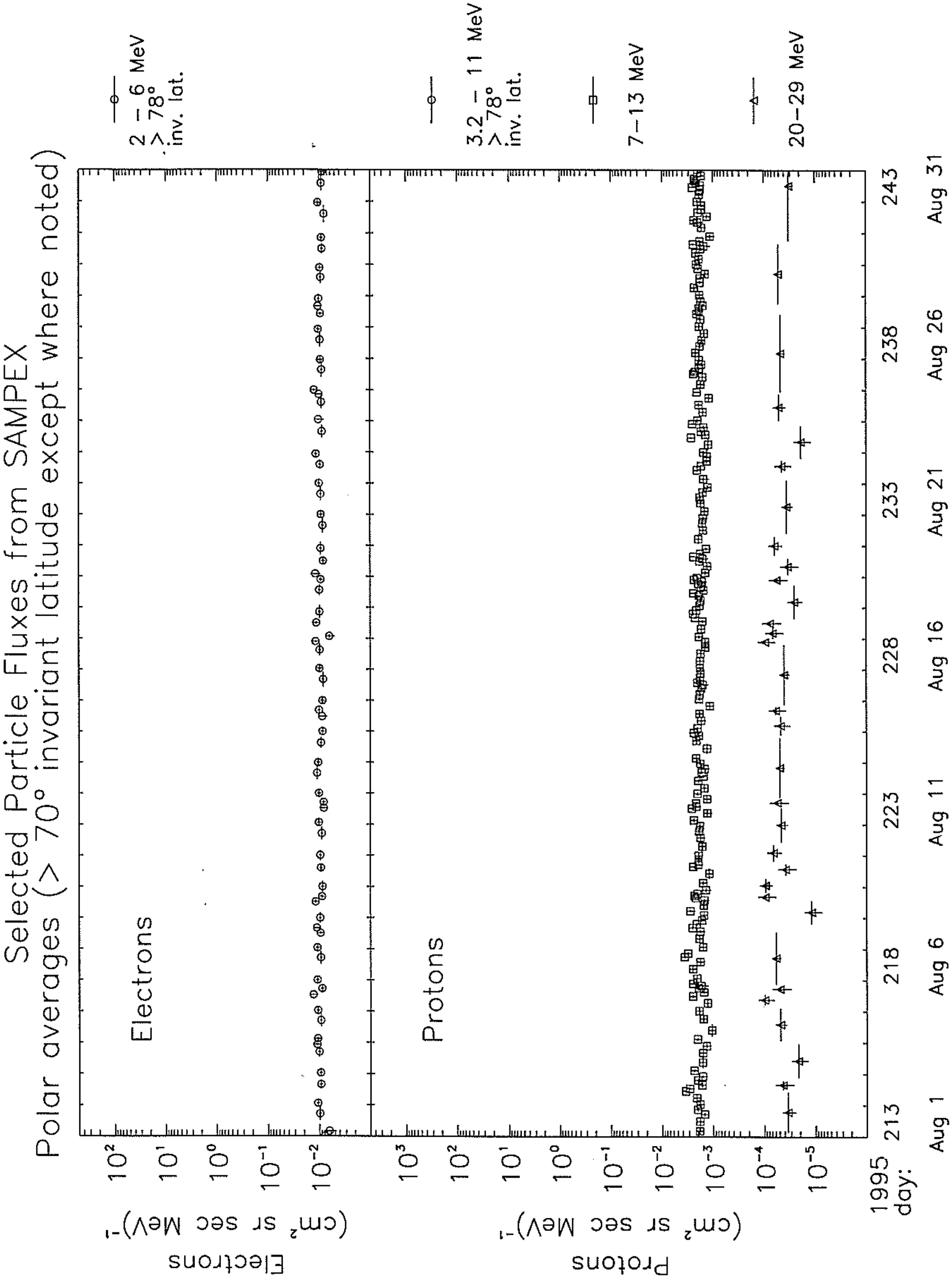
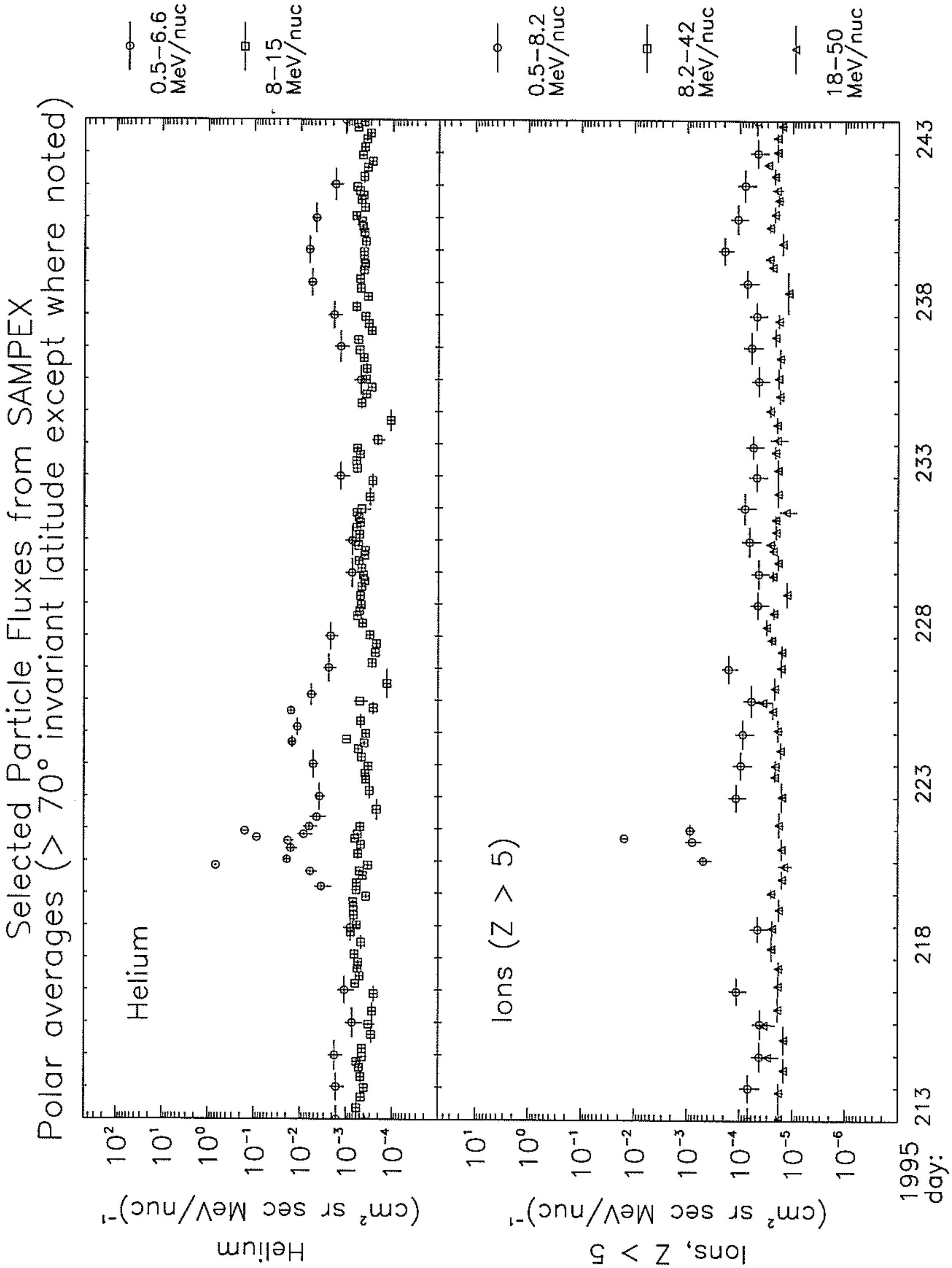

Selected Particle Fluxes from SAMPEX
Polar averages (> 70° invariant latitude except where noted)
Electrons
Protons
Electrons (cm² sr sec MeV)⁻¹
Protons (cm² sr sec MeV)⁻¹
2 – 6 MeV
> 78°
inv. lat.
3.2 – 11 MeV
> 78°
inv. lat.
7–13 MeV
20–29 MeV
1995
day:
182
187
192
197
202
207
212
Jul 1
Jul 6
Jul 11
Jul 16
Jul 21
Jul 26
Jul 31

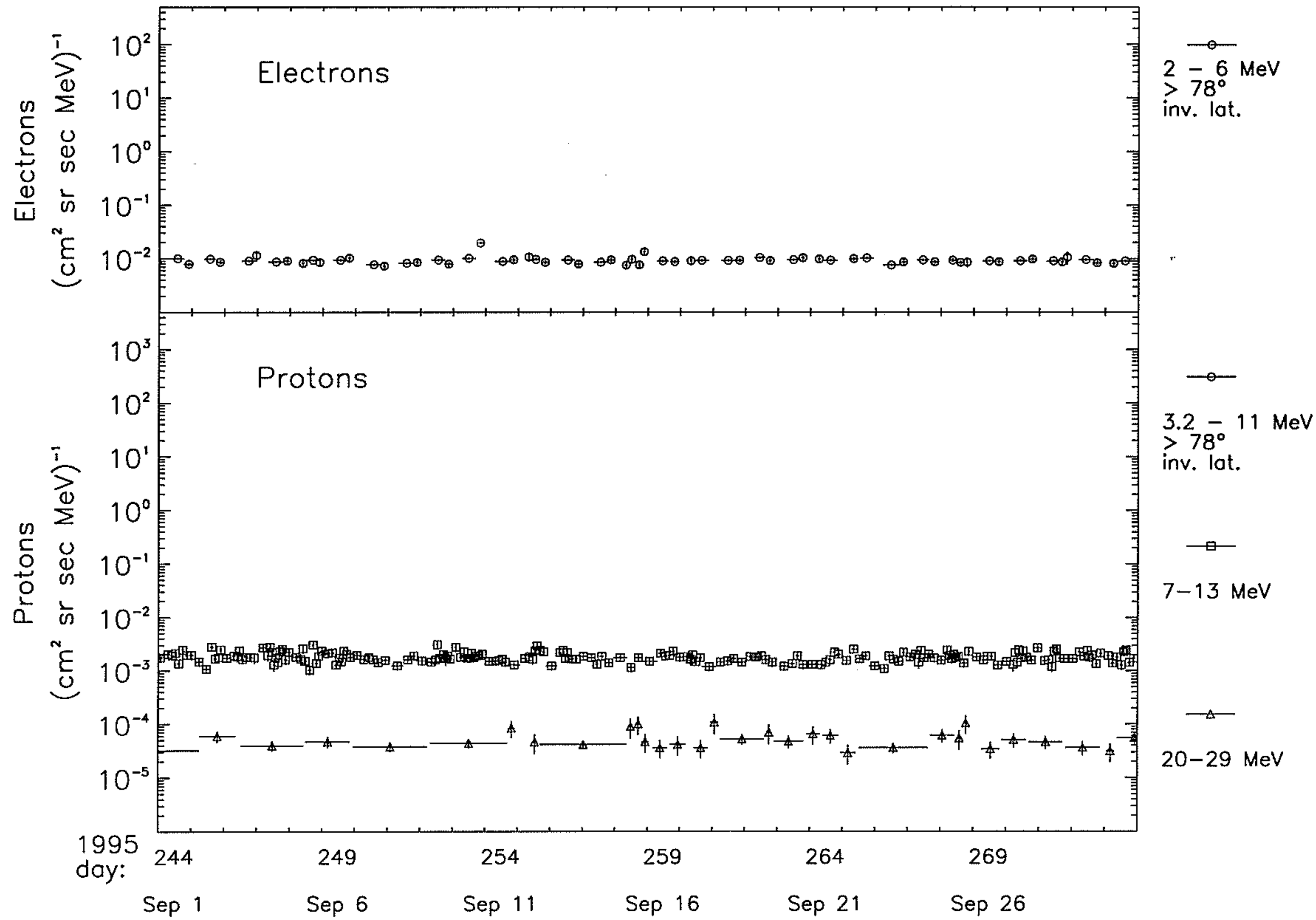
Selected Particle Fluxes from SAMPEX
Polar averages (> 70° invariant latitude except where noted)

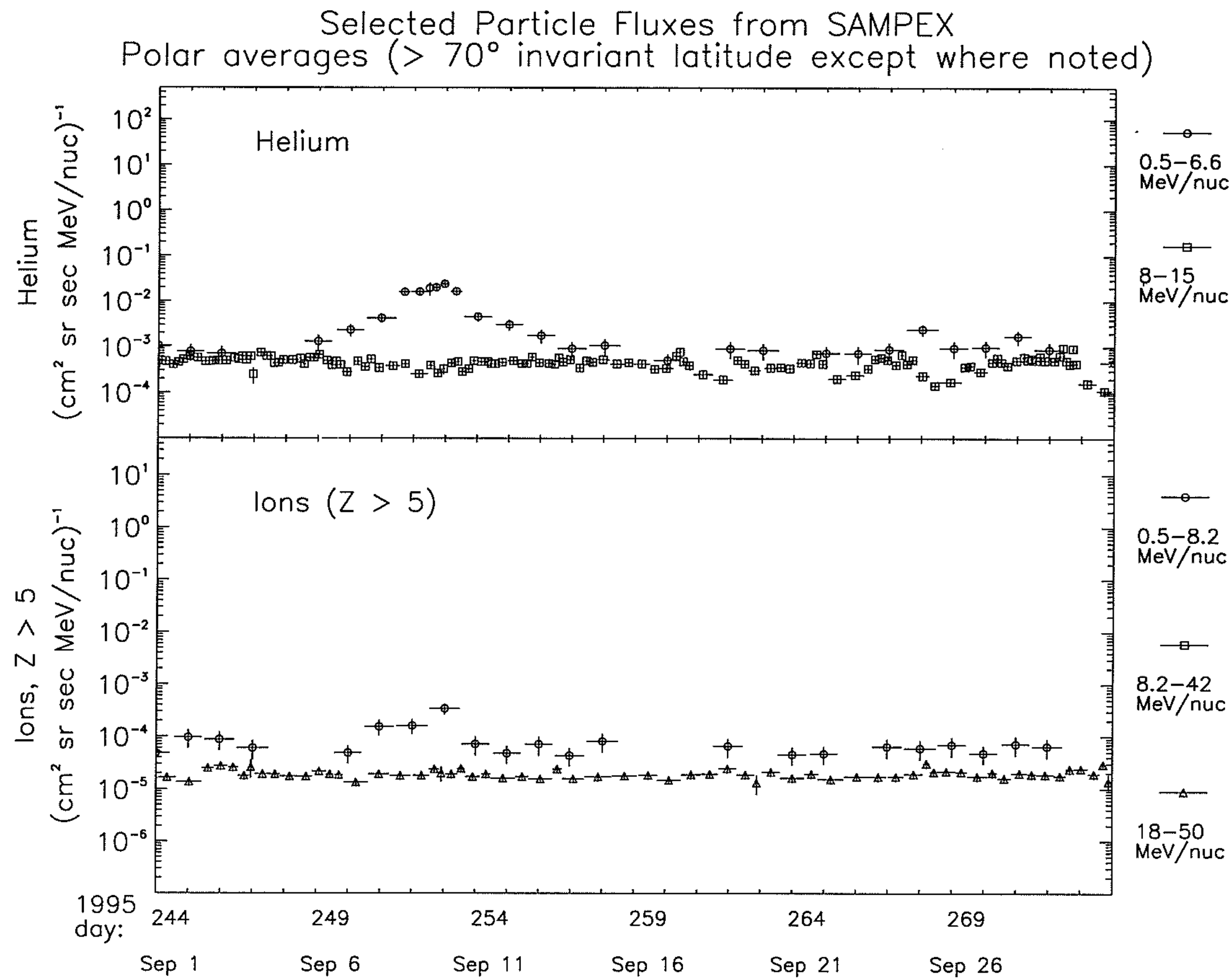



Selected Particle Fluxes from SAMPEX
Polar averages (> 70° invariant latitude except where noted)
Electrons
Protons
2 – 6 MeV
> 78°
inv. lat.
3.2 – 11 MeV
> 78°
inv. lat.
7–13 MeV
20–29 MeV
Electrons (cm² sr sec MeV)⁻¹
Protons (cm² sr sec MeV)⁻¹
1995 day:
213
218
223
228
233
238
243
Aug 1
Aug 6
Aug 11
Aug 16
Aug 21
Aug 26
Aug 31

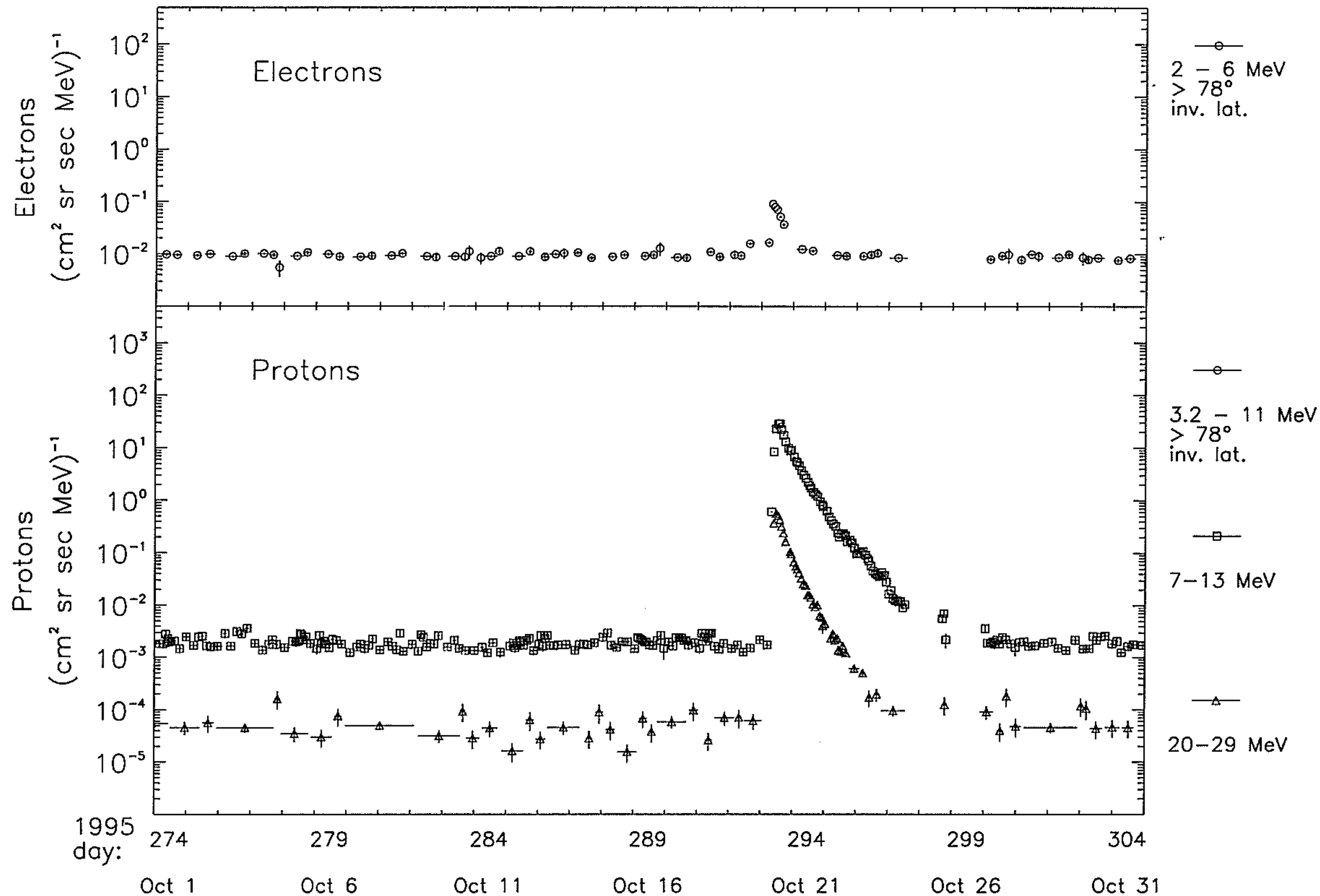

Selected Particle Fluxes from SAMPEX
Polar averages (> 70° invariant latitude except where noted)
Helium
Ions (Z > 5)
0.5–6.6 MeV/nuc
8–15 MeV/nuc
0.5–8.2 MeV/nuc
8.2–42 MeV/nuc
18–50 MeV/nuc
Helium (cm² sr sec MeV/nuc)⁻¹
Ions, Z > 5 (cm² sr sec MeV/nuc)⁻¹
1995 day:
213 Aug 1
218 Aug 6
223 Aug 11
228 Aug 16
233 Aug 21
238 Aug 26
243 Aug 31

Selected Particle Fluxes from SAMPEX
Polar averages (> 70° invariant latitude except where noted)

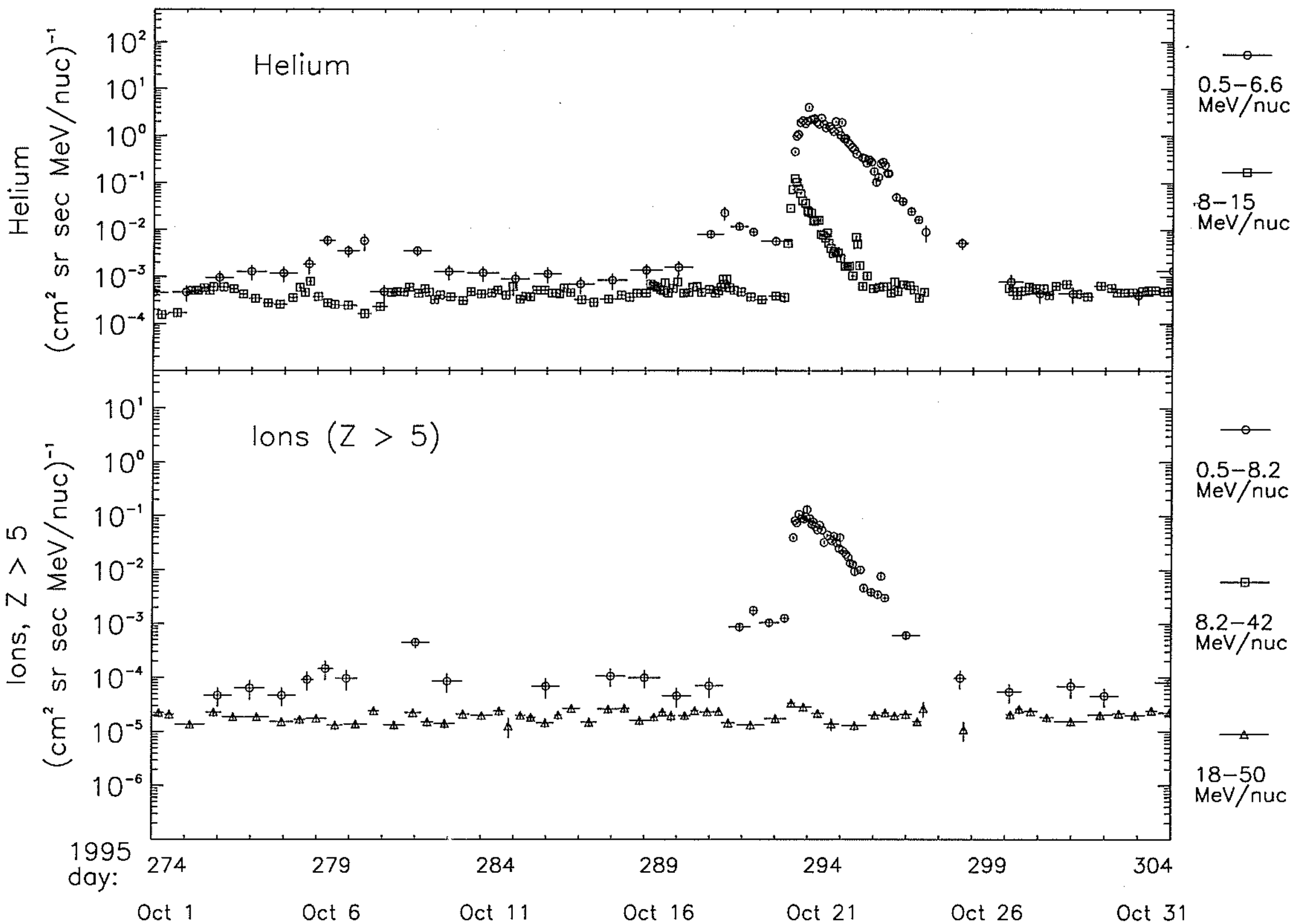


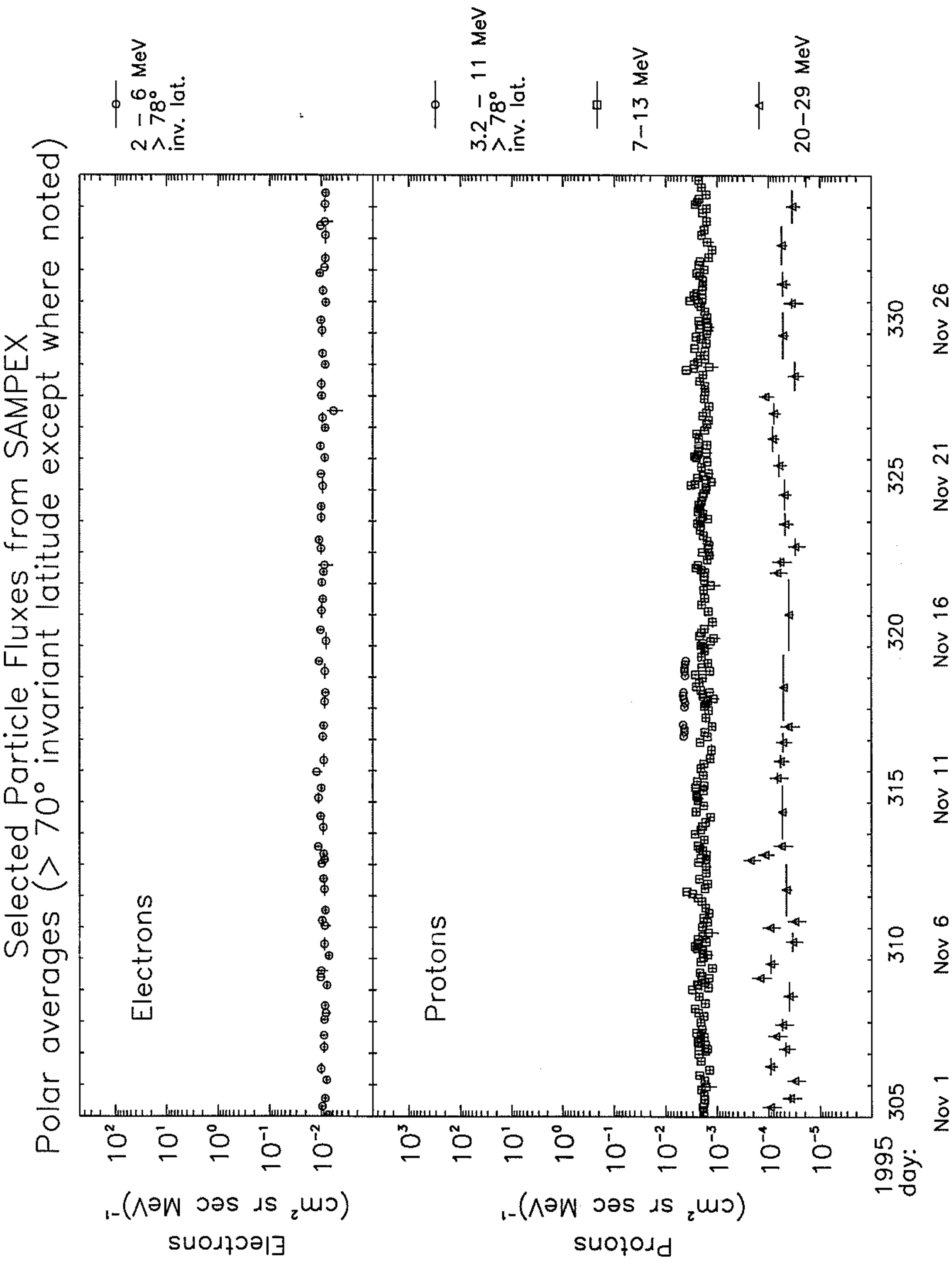

Selected Particle Fluxes from SAMPEX
Polar averages (> 70° invariant latitude except where noted)
Helium
Helium (cm² sr sec MeV/nuc)⁻¹
10²
10¹
10⁰
10⁻¹
10⁻²
10⁻³
10⁻⁴
0.5–6.6 MeV/nuc
8–15 MeV/nuc
Ions (Z > 5)
Ions, Z > 5 (cm² sr sec MeV/nuc)⁻¹
10¹
10⁰
10⁻¹
10⁻²
10⁻³
10⁻⁴
10⁻⁵
10⁻⁶
0.5–8.2 MeV/nuc
8.2–42 MeV/nuc
18–50 MeV/nuc
1995 day:
244
249
254
259
264
269
Sep 1
Sep 6
Sep 11
Sep 16
Sep 21
Sep 26

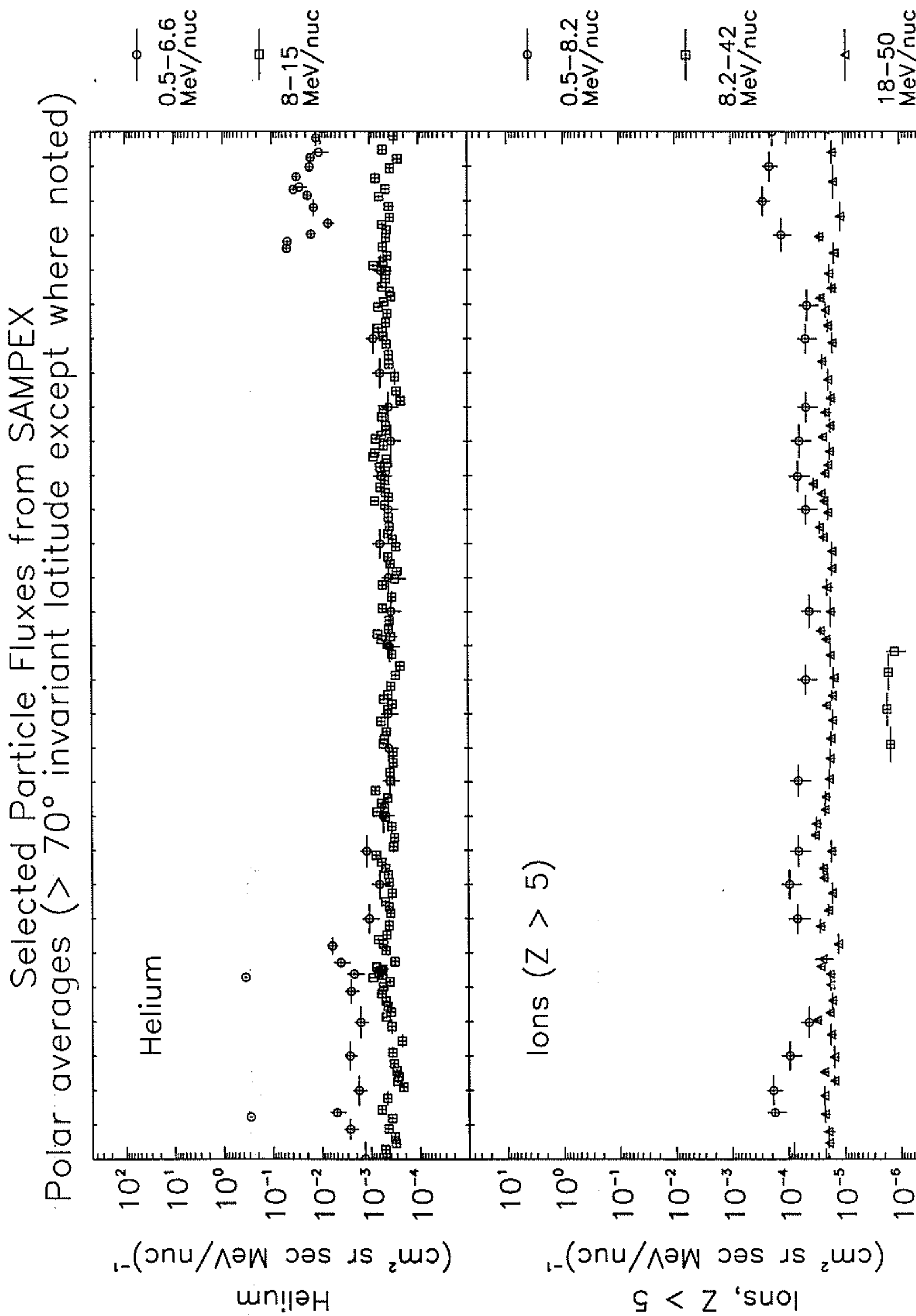
Selected Particle Fluxes from SAMPEX
Polar averages (> 70° invariant latitude except where noted)

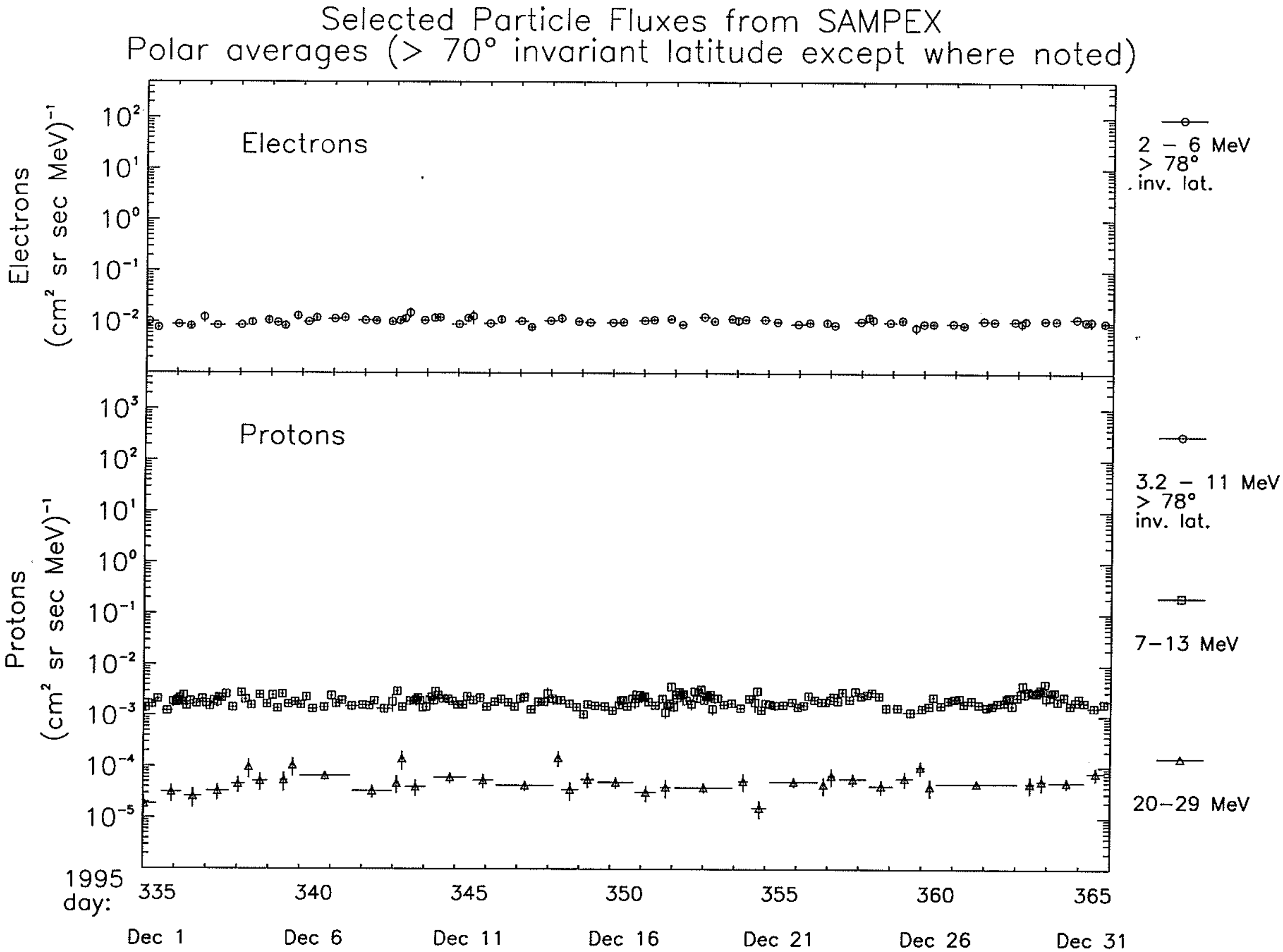


Selected Particle Fluxes from SAMPEX
Polar averages (> 70° invariant latitude except where noted)

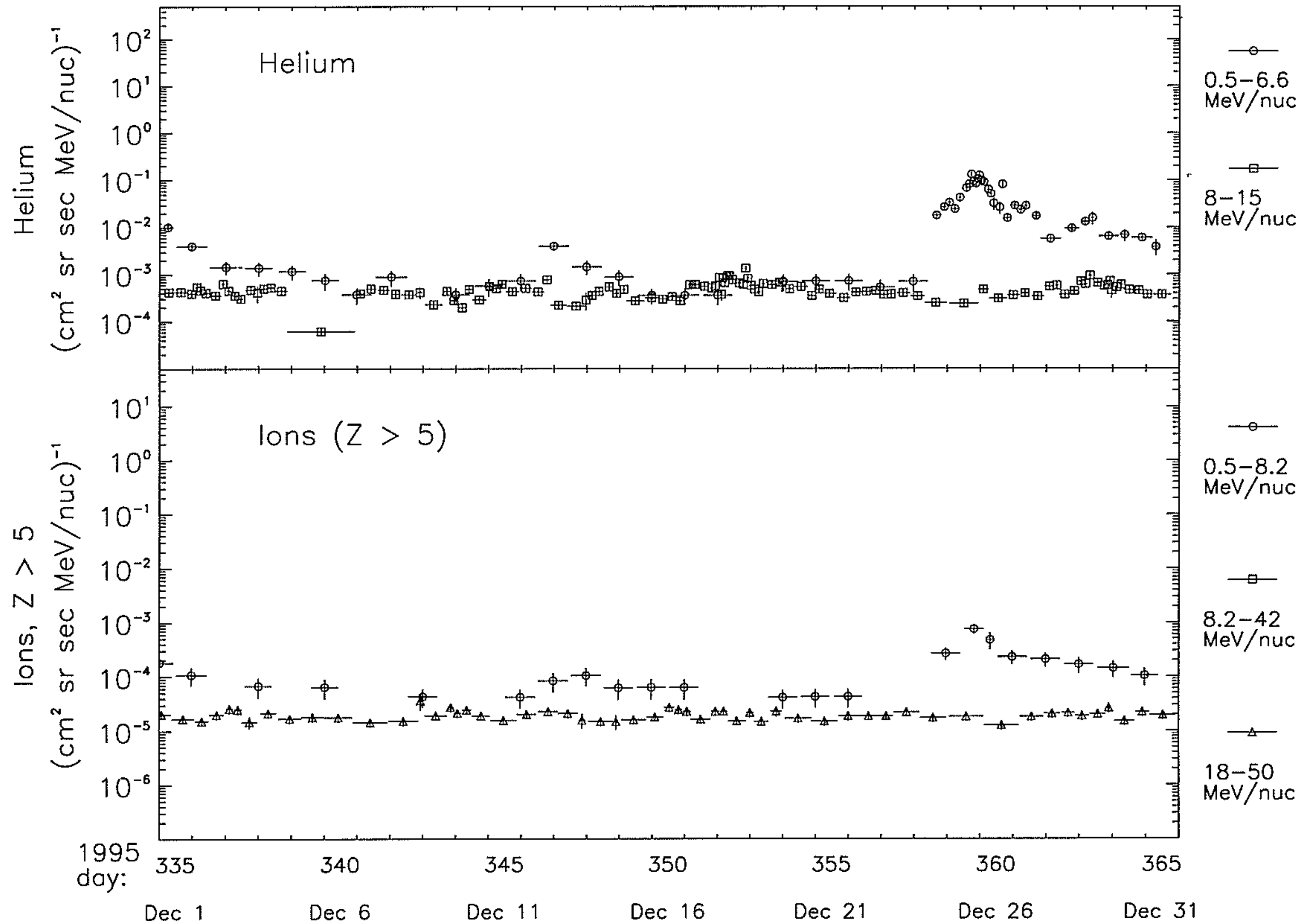



Selected Particle Fluxes from SAMPEX
Polar averages (> 70° invariant latitude except where noted)
Electrons
Protons
Electrons (cm² sr sec MeV)⁻¹
Protons (cm² sr sec MeV)⁻¹
2 – 6 MeV
> 78°
inv. lat.
3.2 – 11 MeV
> 78°
inv. lat.
7–13 MeV
20–29 MeV
1995
day:
305 310 315 320 325 330
Nov 1 Nov 6 Nov 11 Nov 16 Nov 21 Nov 26

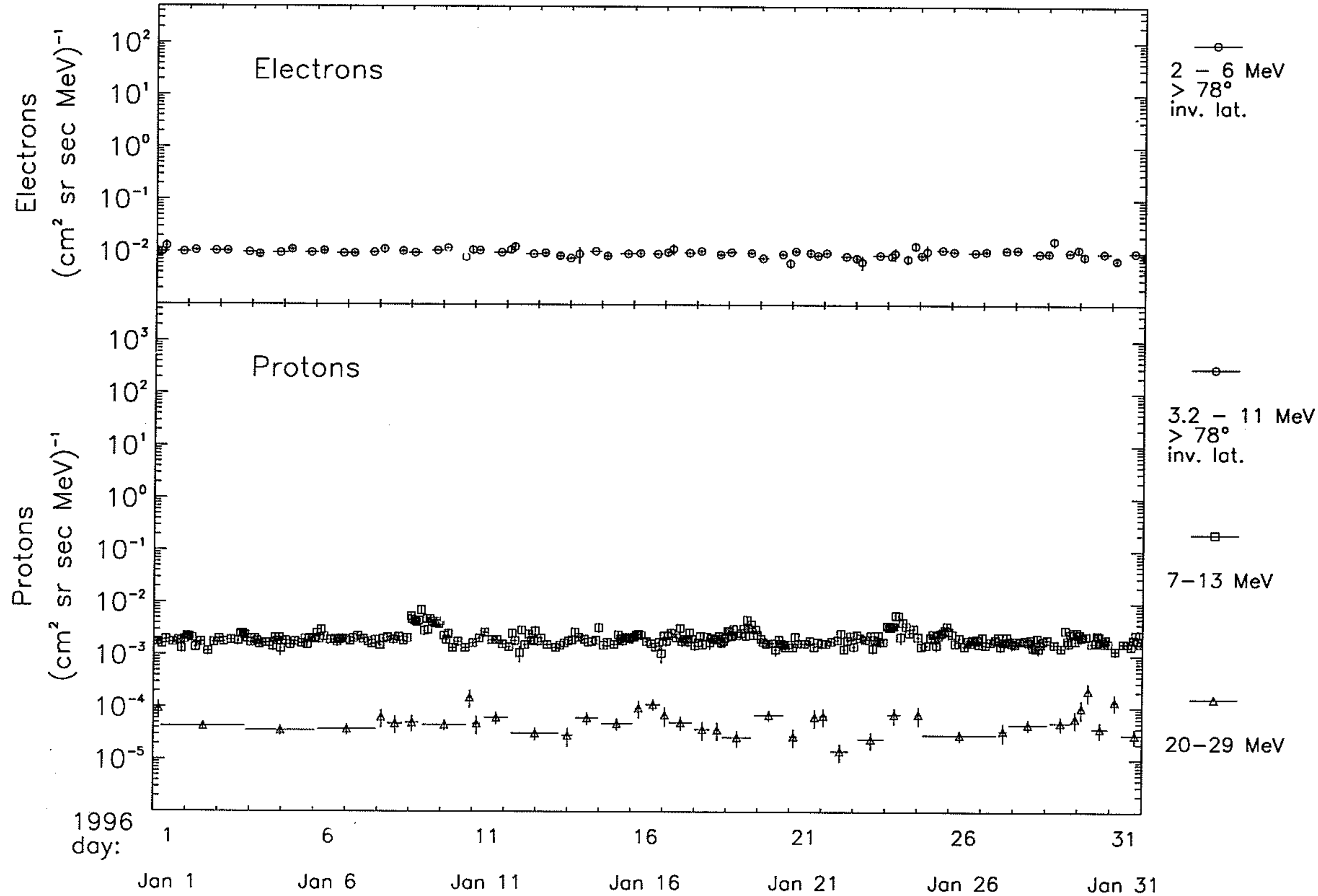

Selected Particle Fluxes from SAMPEX
Polar averages (> 70° invariant latitude except where noted)
Helium
Ions (Z > 5)
0.5–6.6 MeV/nuc
8–15 MeV/nuc
0.5–8.2 MeV/nuc
8.2–42 MeV/nuc
18–50 MeV/nuc
Helium (cm² sr sec MeV/nuc)⁻¹
Ions, Z > 5 (cm² sr sec MeV/nuc)⁻¹
1995 day:
305 310 315 320 325 330
Nov 1 Nov 6 Nov 11 Nov 16 Nov 21 Nov 26

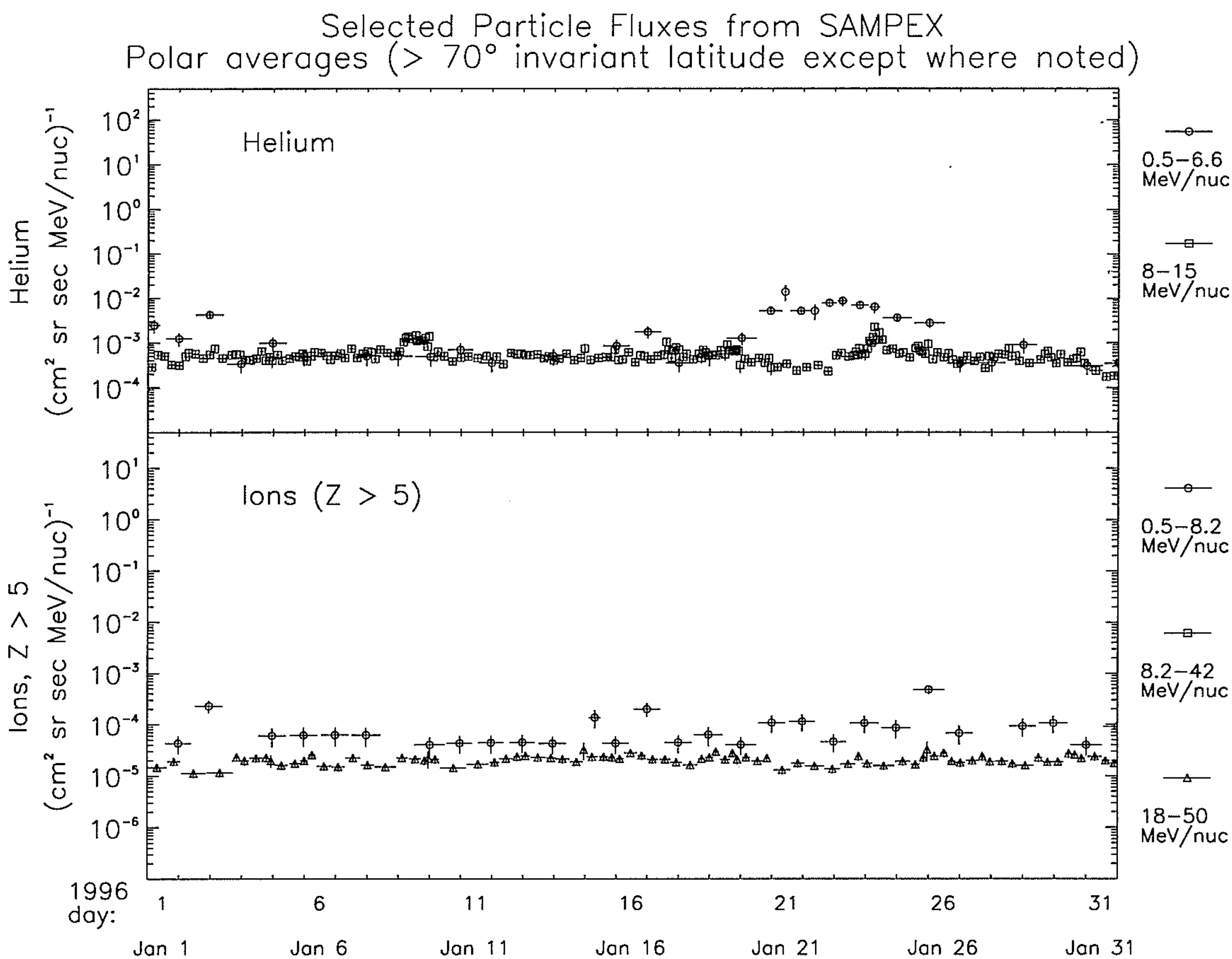

Selected Particle Fluxes from SAMPEX
Polar averages (> 70° invariant latitude except where noted)
Electrons
Electrons (cm² sr sec MeV)⁻¹
10²
10¹
10⁰
10⁻¹
10⁻²
2 – 6 MeV
> 78°
inv. lat.
Protons
Protons (cm² sr sec MeV)⁻¹
10³
10²
10¹
10⁰
10⁻¹
10⁻²
10⁻³
10⁻⁴
10⁻⁵
3.2 – 11 MeV
> 78°
inv. lat.
7–13 MeV
20–29 MeV
1995
day:
335
340
345
350
355
360
365
Dec 1
Dec 6
Dec 11
Dec 16
Dec 21
Dec 26
Dec 31

Selected Particle Fluxes from SAMPEX
Polar averages (> 70° invariant latitude except where noted)

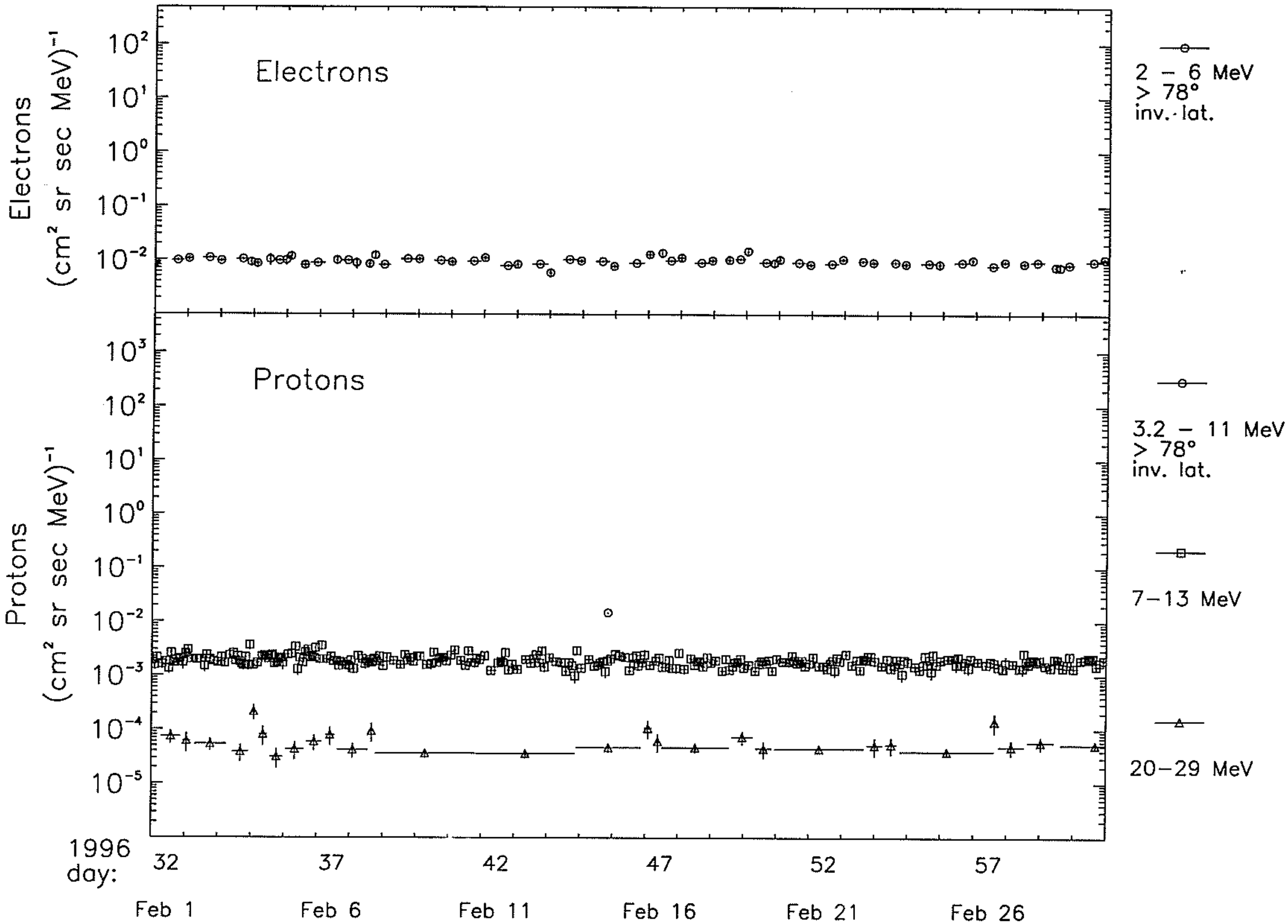


Selected Particle Fluxes from SAMPEX
Polar averages (> 70° invariant latitude except where noted)

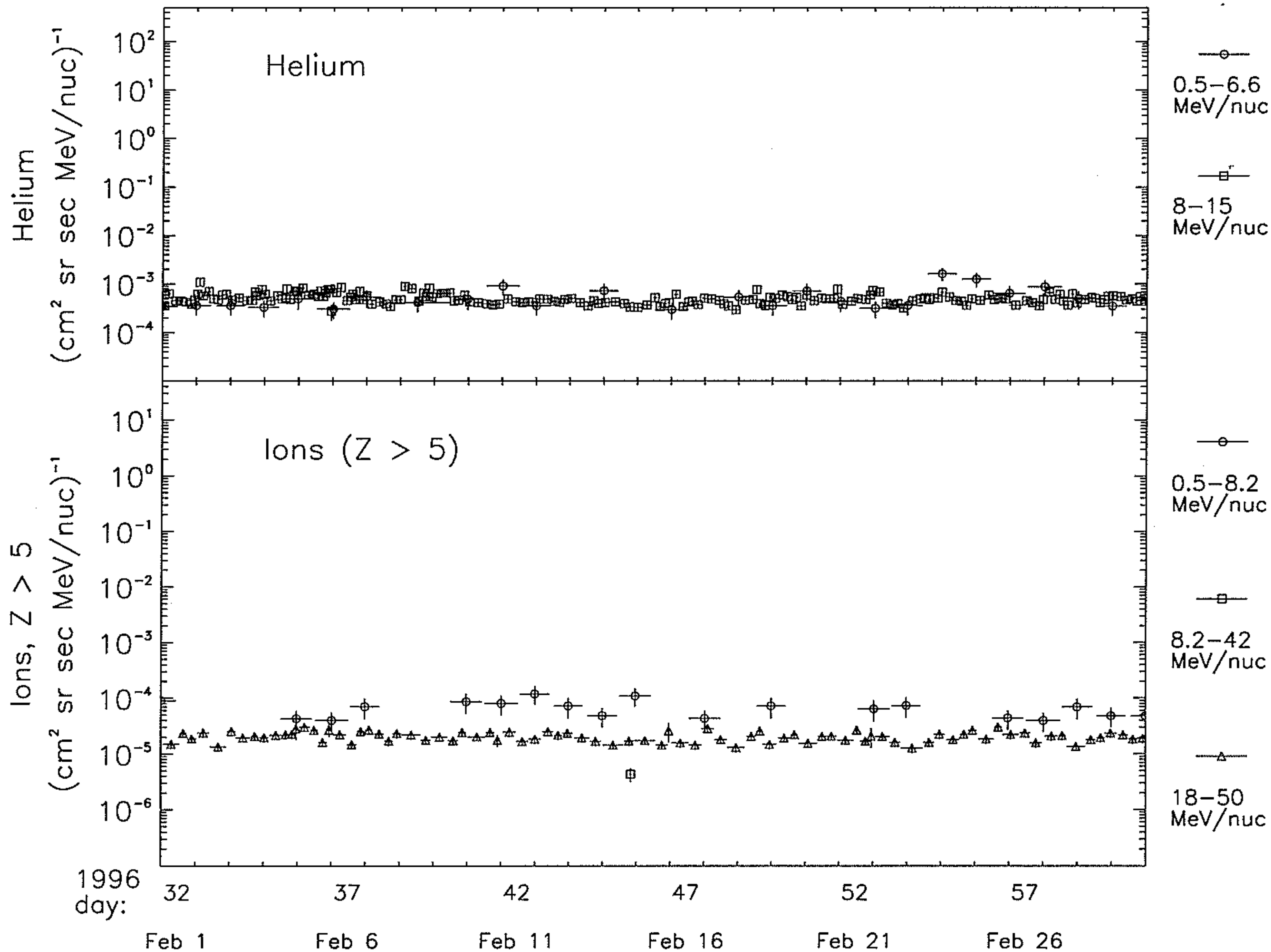


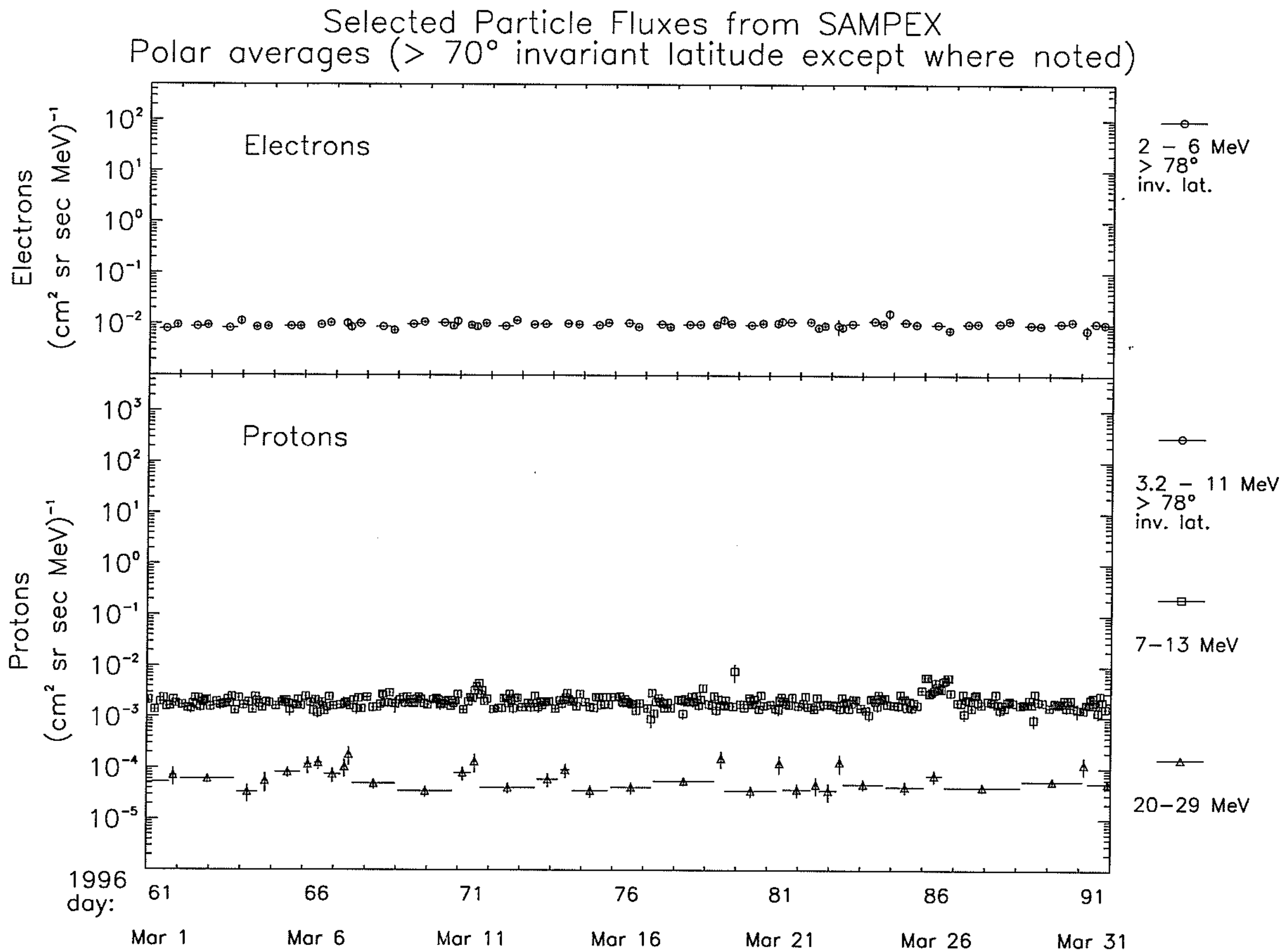

Selected Particle Fluxes from SAMPEX
Polar averages (> 70° invariant latitude except where noted)
Helium
Helium (cm² sr sec MeV/nuc)⁻¹
10²
10¹
10⁰
10⁻¹
10⁻²
10⁻³
10⁻⁴
0.5–6.6 MeV/nuc
8–15 MeV/nuc
Ions (Z > 5)
Ions, Z > 5 (cm² sr sec MeV/nuc)⁻¹
10¹
10⁰
10⁻¹
10⁻²
10⁻³
10⁻⁴
10⁻⁵
10⁻⁶
0.5–8.2 MeV/nuc
8.2–42 MeV/nuc
18–50 MeV/nuc
1996 day:
1
6
11
16
21
26
31
Jan 1
Jan 6
Jan 11
Jan 16
Jan 21
Jan 26
Jan 31

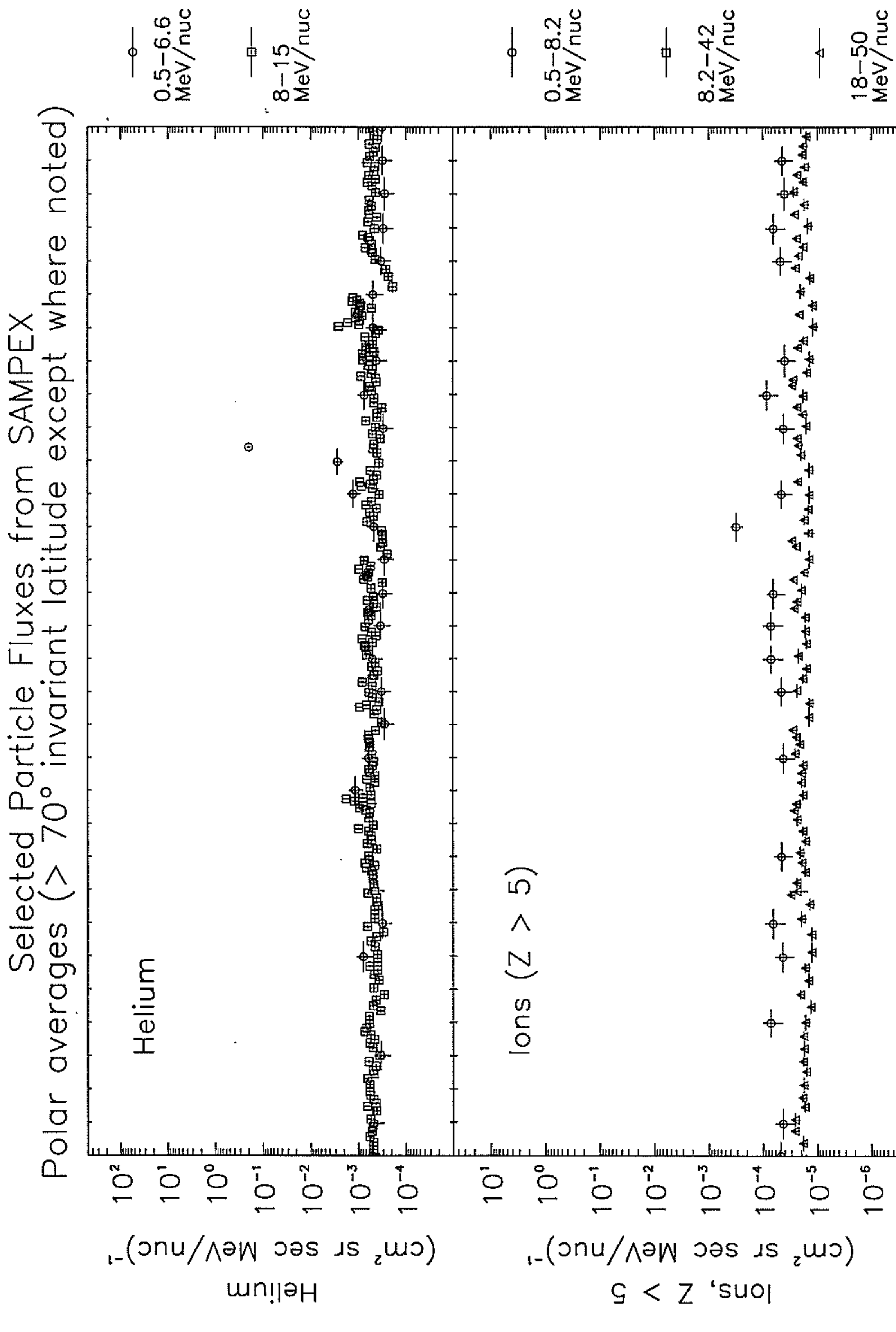
Selected Particle Fluxes from SAMPEX
Polar averages (> 70° invariant latitude except where noted)



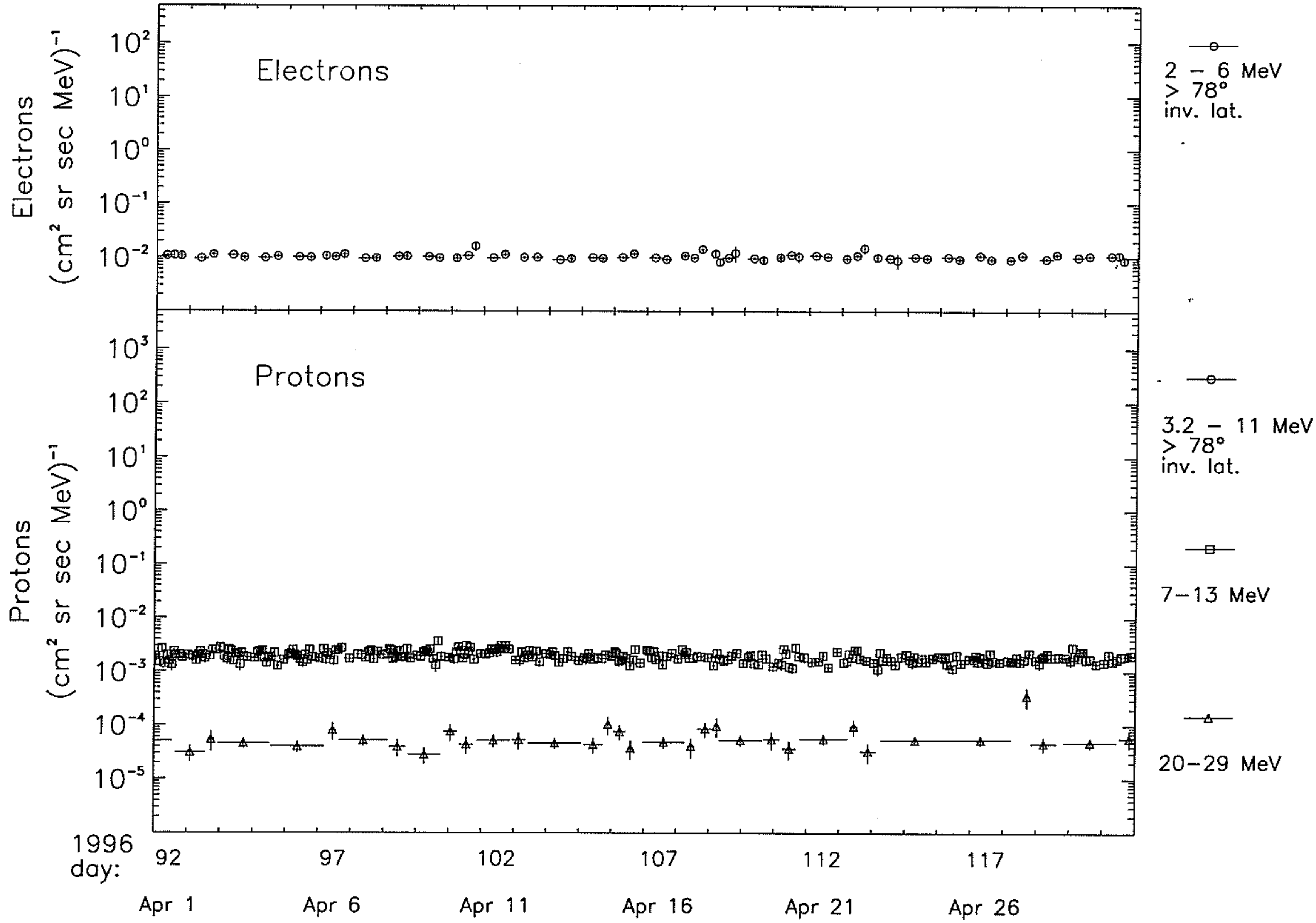
Selected Particle Fluxes from SAMPEX
Polar averages (> 70° invariant latitude except where noted)

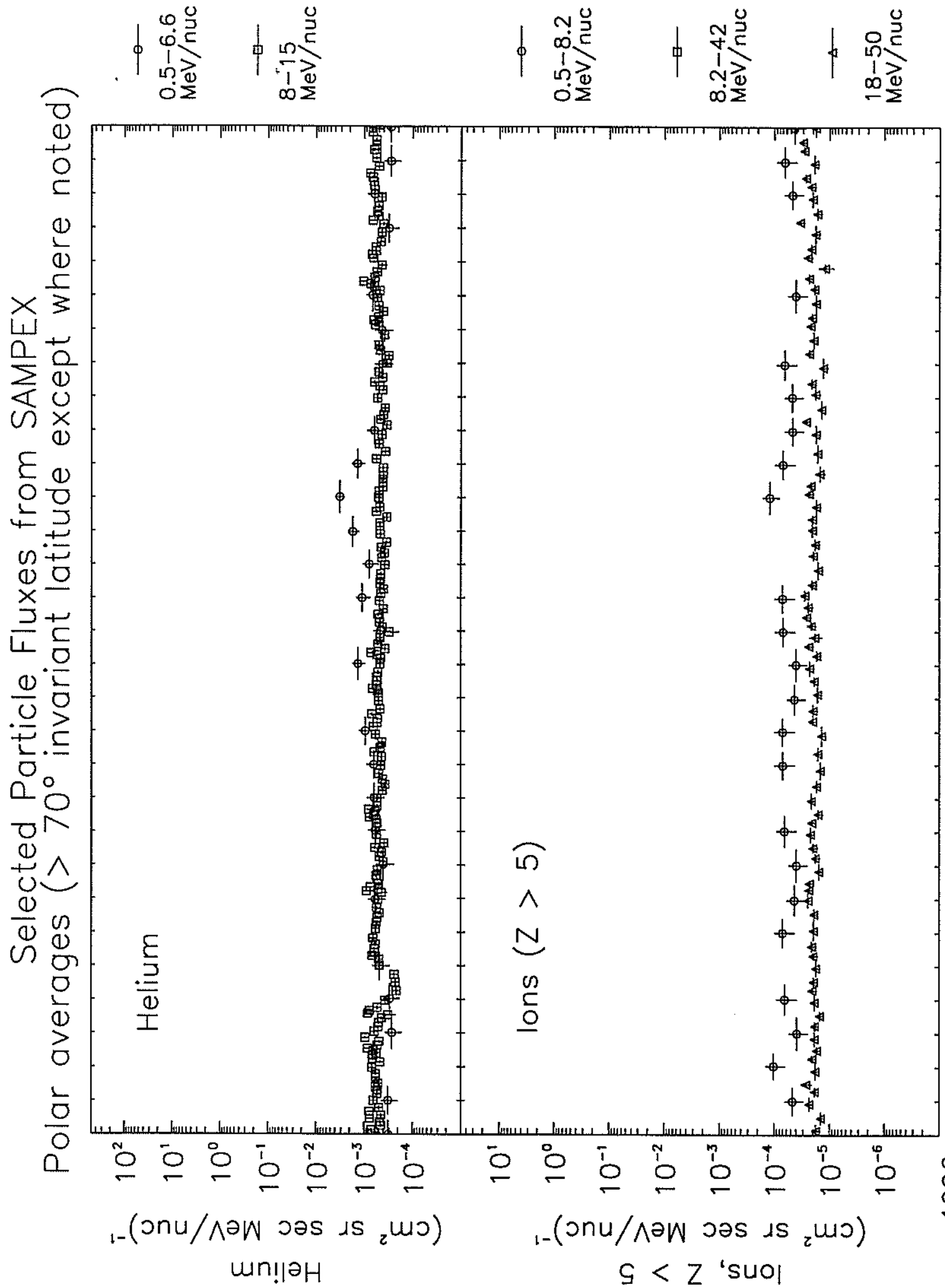



Selected Particle Fluxes from SAMPEX
Polar averages (> 70° invariant latitude except where noted)
Electrons
Electrons (cm² sr sec MeV)⁻¹
10²
10¹
10⁰
10⁻¹
10⁻²
2 – 6 MeV
> 78°
inv. lat.
Protons
Protons (cm² sr sec MeV)⁻¹
10³
10²
10¹
10⁰
10⁻¹
10⁻²
10⁻³
10⁻⁴
10⁻⁵
3.2 – 11 MeV
> 78°
inv. lat.
7–13 MeV
20–29 MeV
1996
day:
61
66
71
76
81
86
91
Mar 1
Mar 6
Mar 11
Mar 16
Mar 21
Mar 26
Mar 31

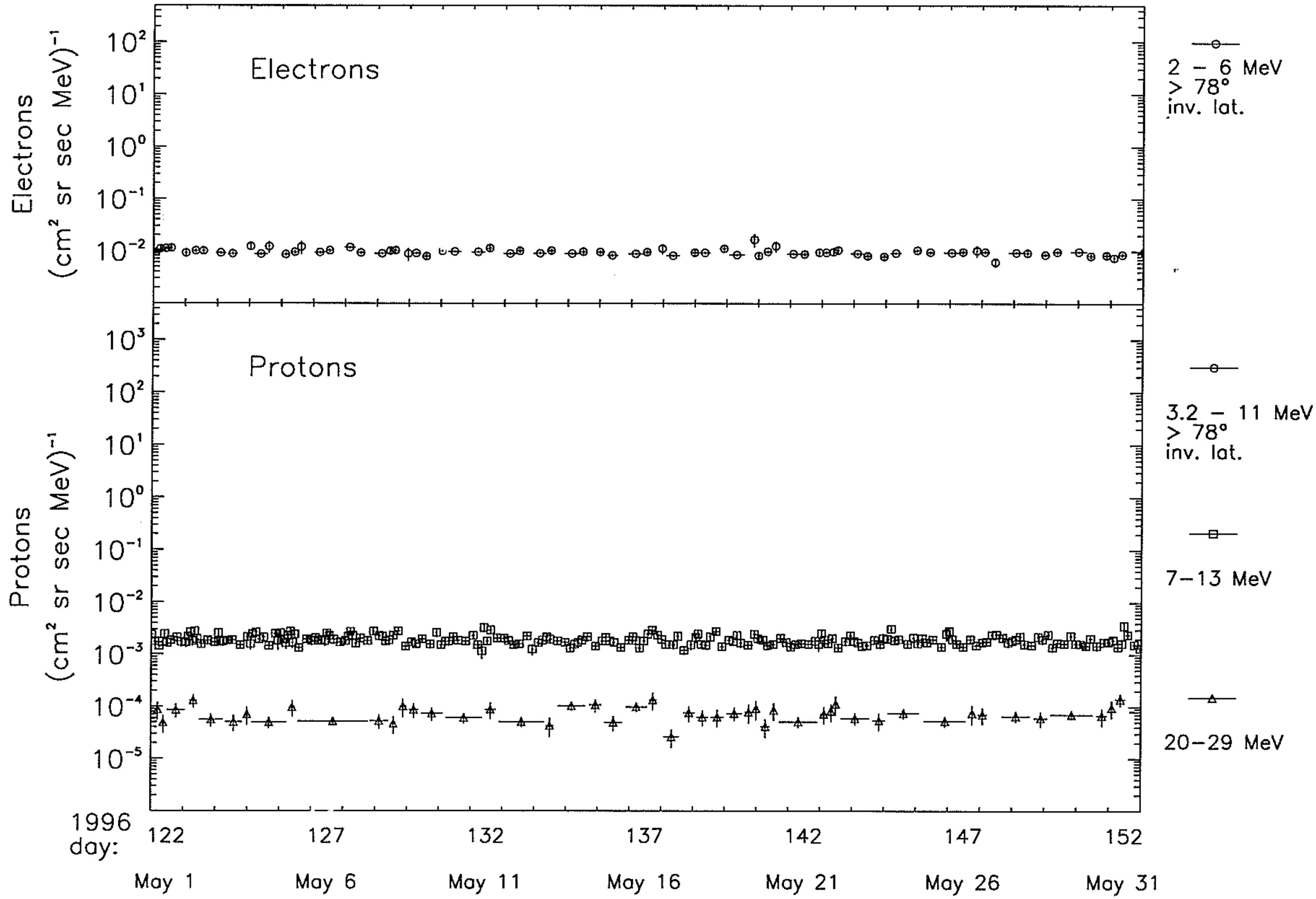

Selected Particle Fluxes from SAMPEX
Polar averages (> 70° invariant latitude except where noted)
Helium
Helium (cm² sr sec MeV/nuc)⁻¹
0.5–6.6 MeV/nuc
8–15 MeV/nuc
Ions (Z > 5)
Ions, Z > 5 (cm² sr sec MeV/nuc)⁻¹
0.5–8.2 MeV/nuc
8.2–42 MeV/nuc
18–50 MeV/nuc
1996 day:
61 66 71 76 81 86 91
Mar 1 Mar 6 Mar 11 Mar 16 Mar 21 Mar 26 Mar 31

Selected Particle Fluxes from SAMPEX
Polar averages (> 70° invariant latitude except where noted)

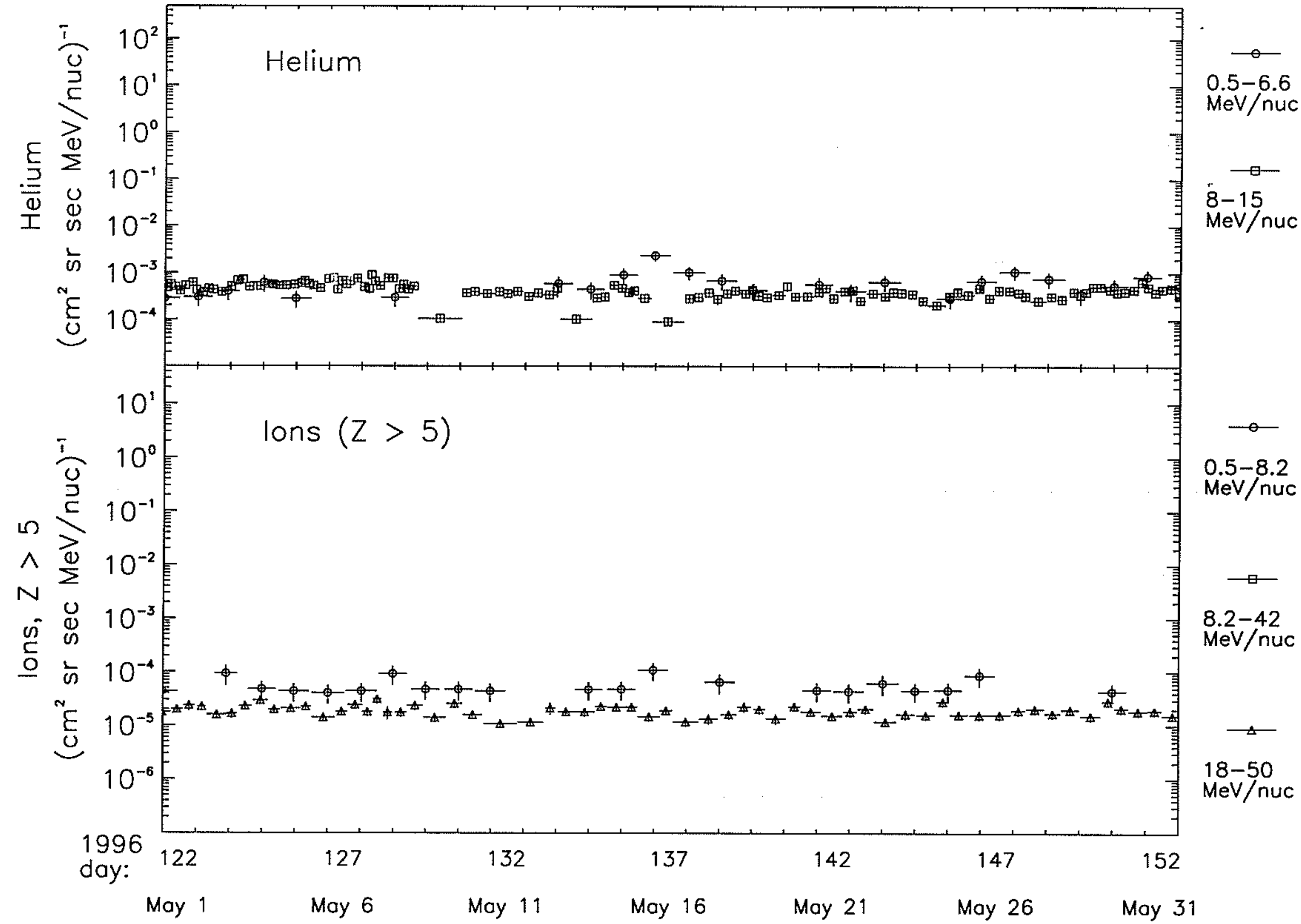


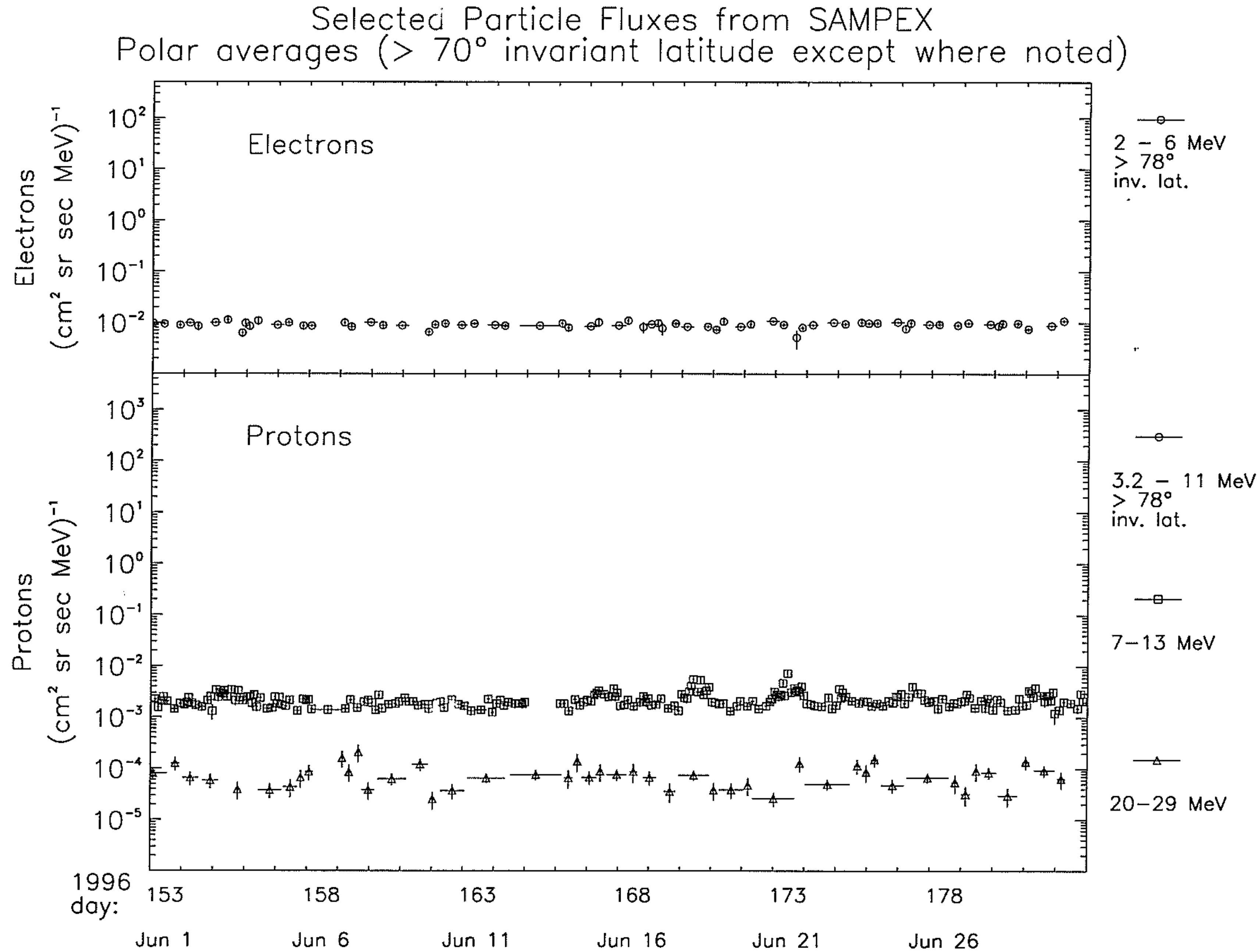

Selected Particle Fluxes from SAMPEX
Polar averages (> 70° invariant latitude except where noted)
Helium
Ions (Z > 5)
0.5–6.6 MeV/nuc
8–15 MeV/nuc
0.5–8.2 MeV/nuc
8.2–42 MeV/nuc
18–50 MeV/nuc
Helium (cm² sr sec MeV/nuc)⁻¹
Ions, Z > 5 (cm² sr sec MeV/nuc)⁻¹
1996 day:
92 97 102 107 112 117
Apr 1 Apr 6 Apr 11 Apr 16 Apr 21 Apr 26

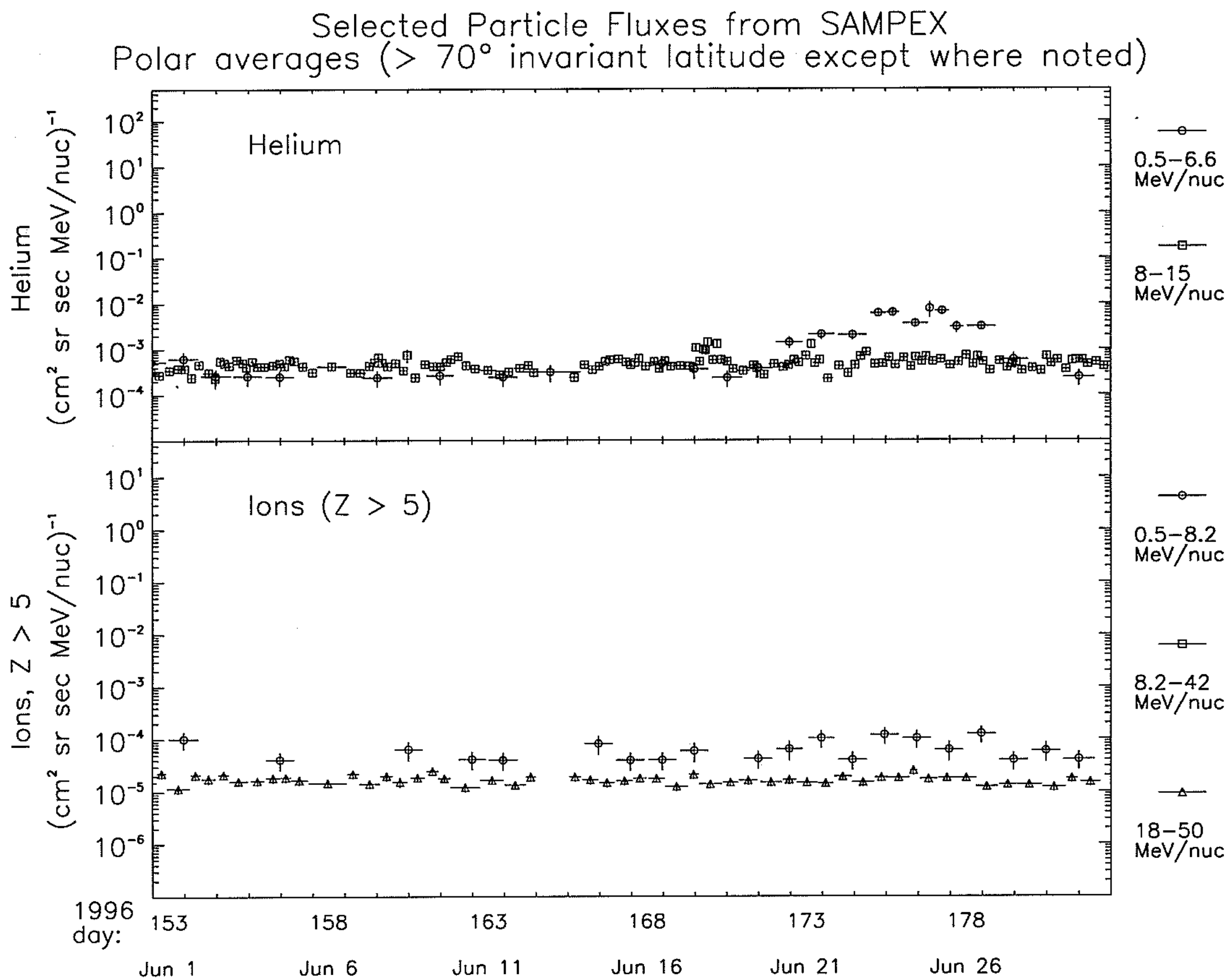
Selected Particle Fluxes from SAMPEX
Polar averages (> 70° invariant latitude except where noted)



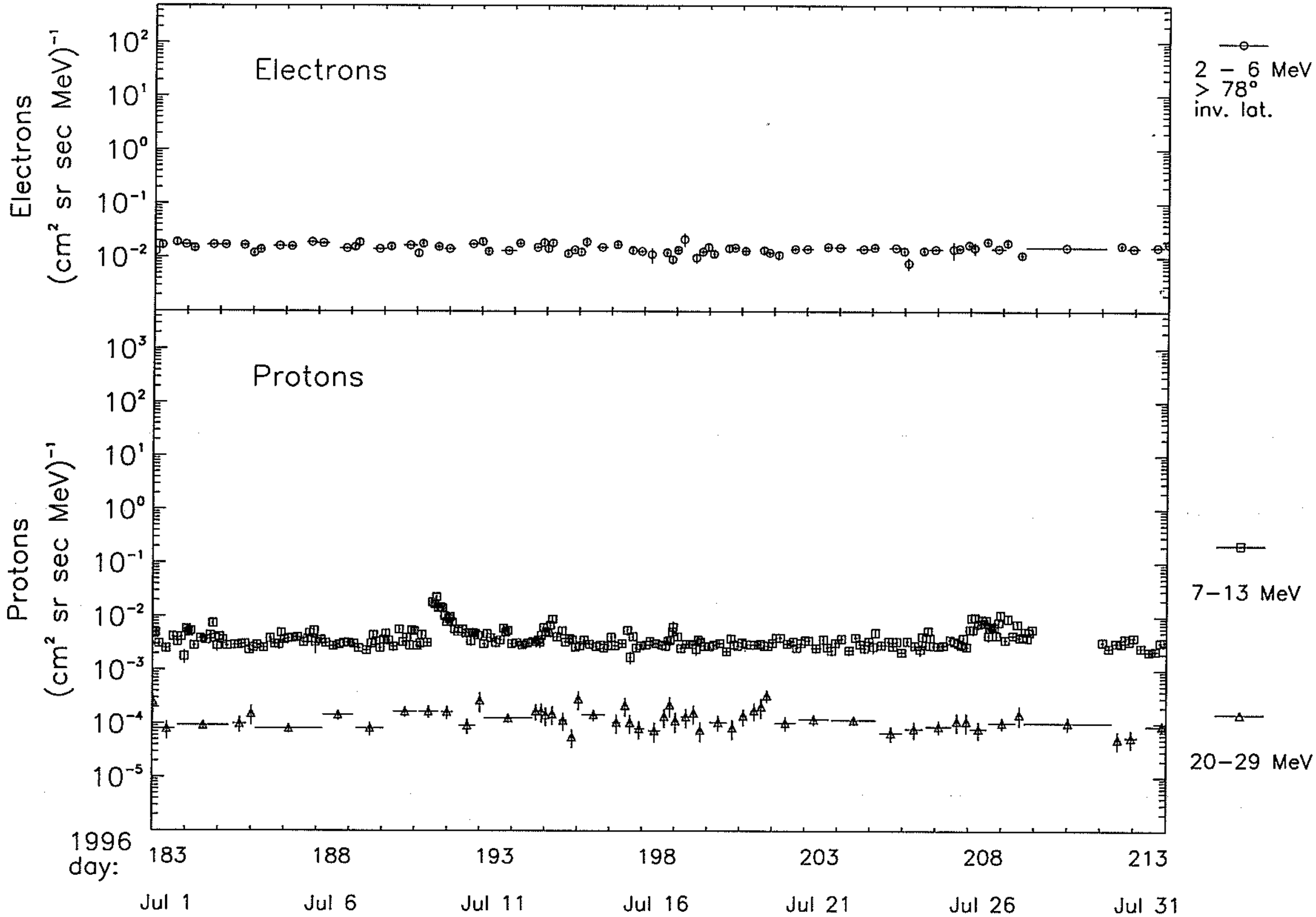
Selected Particle Fluxes from SAMPEX
Polar averages (> 70° invariant latitude except where noted)



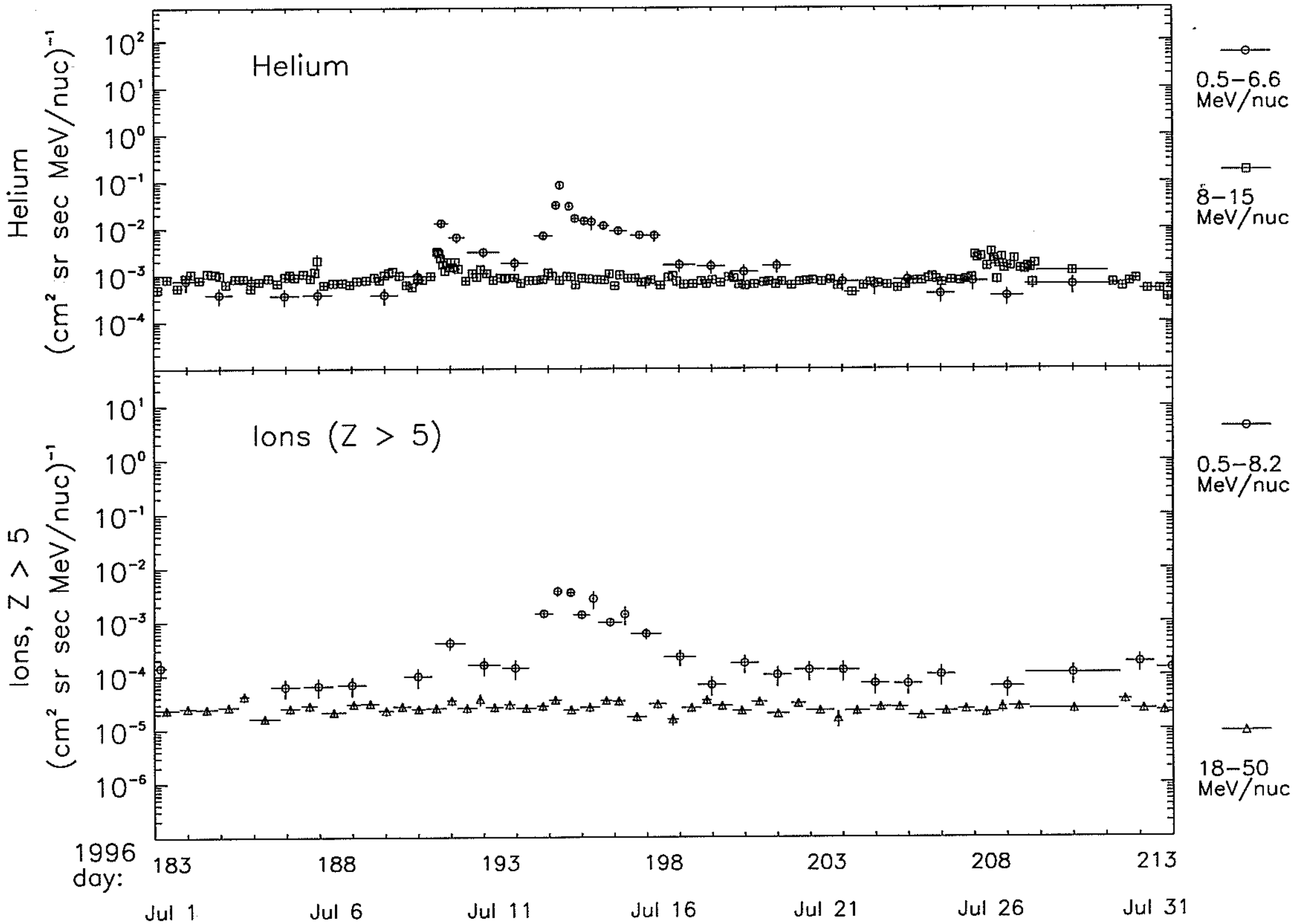

Selected Particle Fluxes from SAMPEX
Polar averages (> 70° invariant latitude except where noted)
Electrons
Protons
Electrons (cm² sr sec MeV)⁻¹
Protons (cm² sr sec MeV)⁻¹
10²
10¹
10⁰
10⁻¹
10⁻²
10³
10⁻³
10⁻⁴
10⁻⁵
1996 day:
153
158
163
168
173
178
Jun 1
Jun 6
Jun 11
Jun 16
Jun 21
Jun 26
2 – 6 MeV > 78° inv. lat.
3.2 – 11 MeV > 78° inv. lat.
7–13 MeV
20–29 MeV

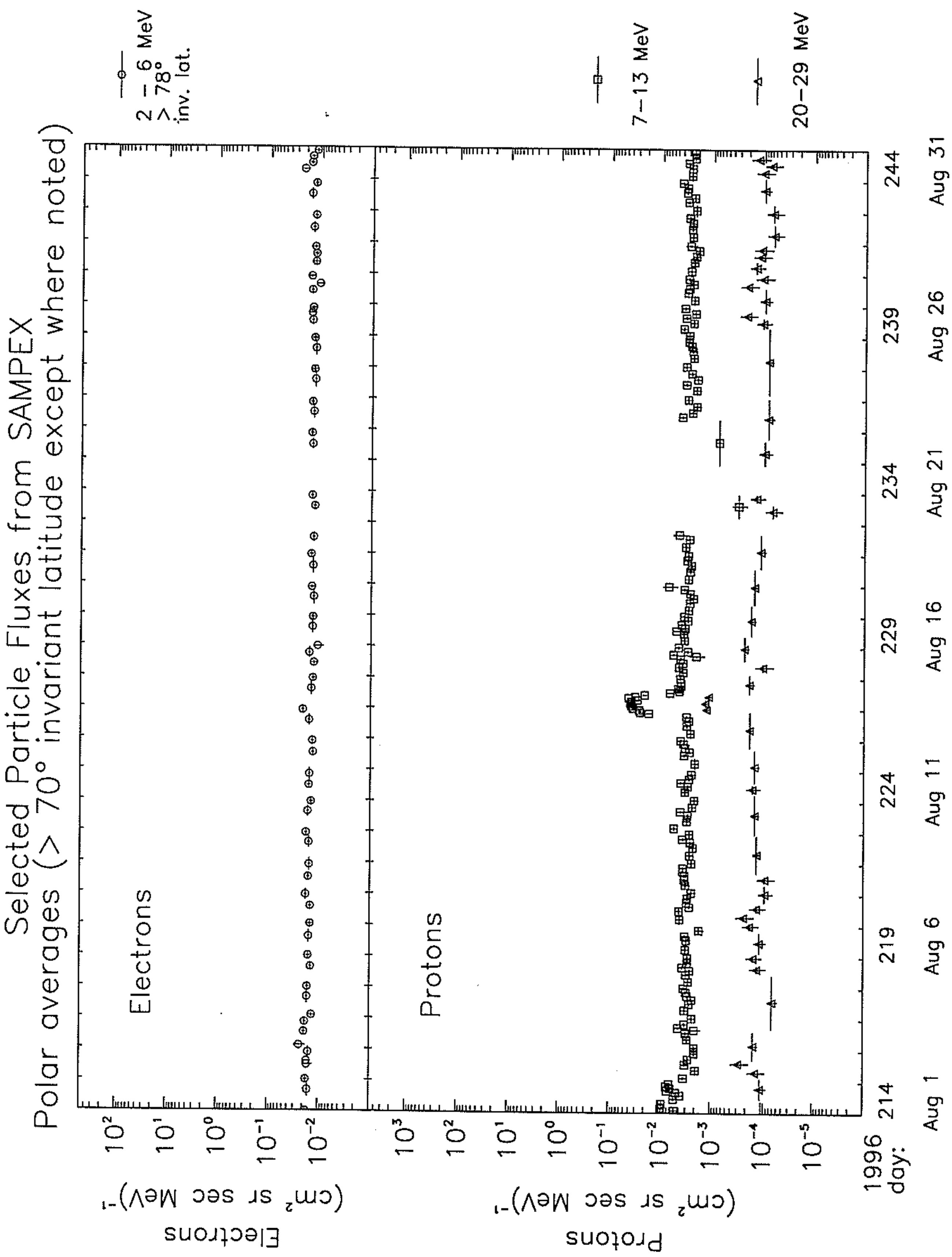

Selected Particle Fluxes from SAMPEX
Polar averages (> 70° invariant latitude except where noted)
Helium
Helium (cm² sr sec MeV/nuc)⁻¹
10²
10¹
10⁰
10⁻¹
10⁻²
10⁻³
10⁻⁴
0.5–6.6 MeV/nuc
8–15 MeV/nuc
Ions (Z > 5)
Ions, Z > 5 (cm² sr sec MeV/nuc)⁻¹
10¹
10⁰
10⁻¹
10⁻²
10⁻³
10⁻⁴
10⁻⁵
10⁻⁶
0.5–8.2 MeV/nuc
8.2–42 MeV/nuc
18–50 MeV/nuc
1996 day:
153
158
163
168
173
178
Jun 1
Jun 6
Jun 11
Jun 16
Jun 21
Jun 26

Selected Particle Fluxes from SAMPEX
Polar averages (> 70° invariant latitude except where noted)

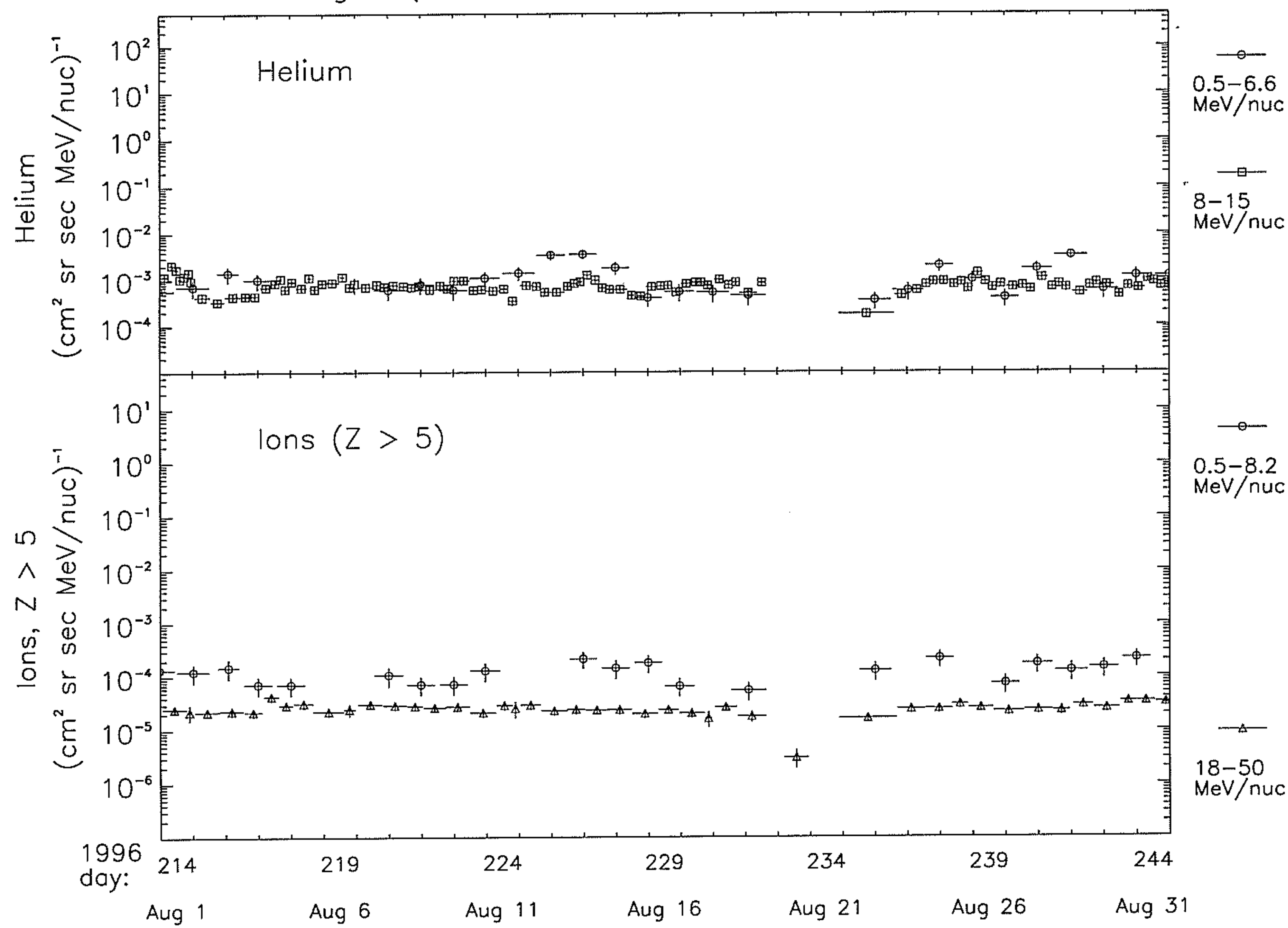


Selected Particle Fluxes from SAMPEX
Polar averages (> 70° invariant latitude except where noted)

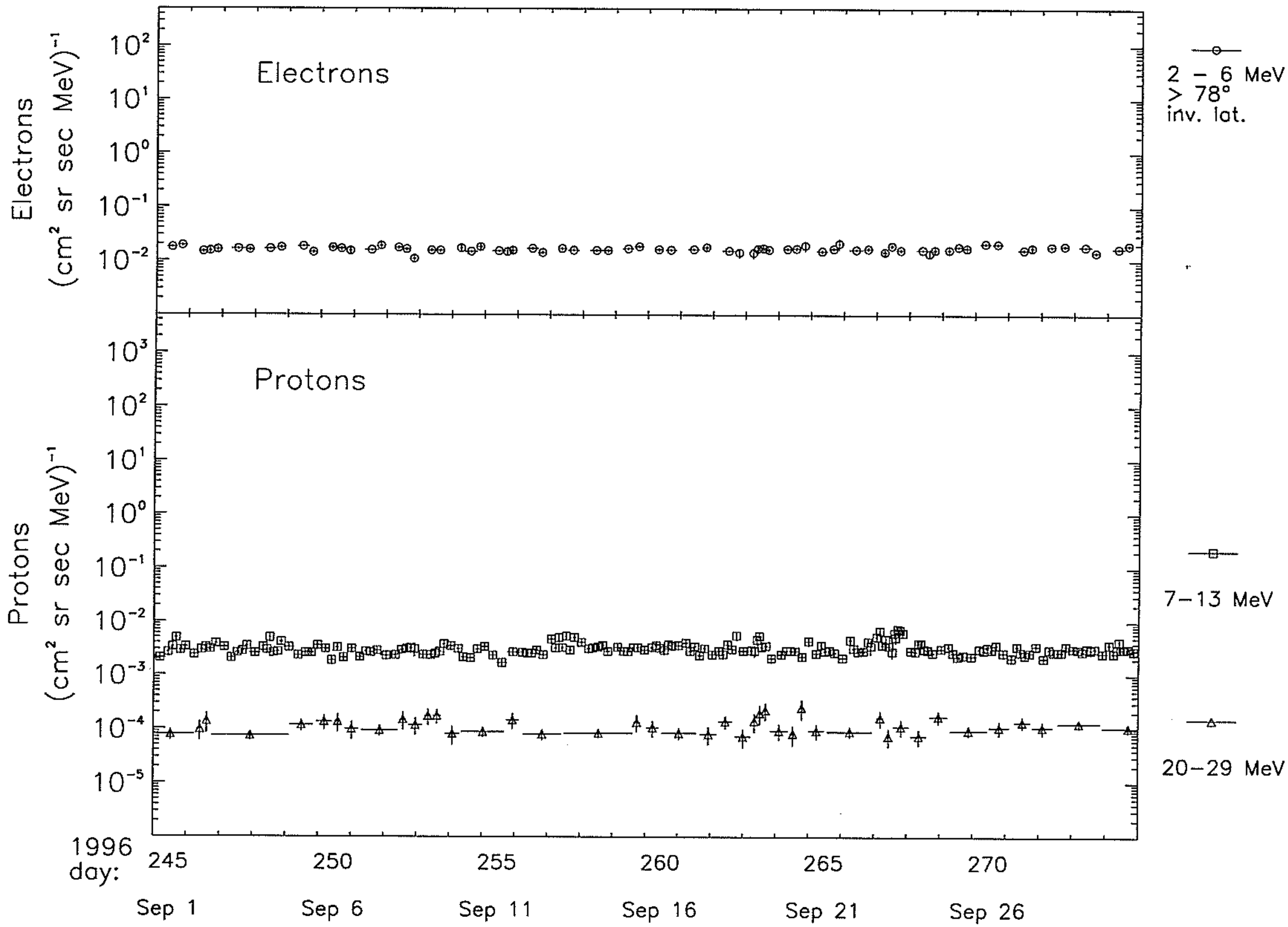


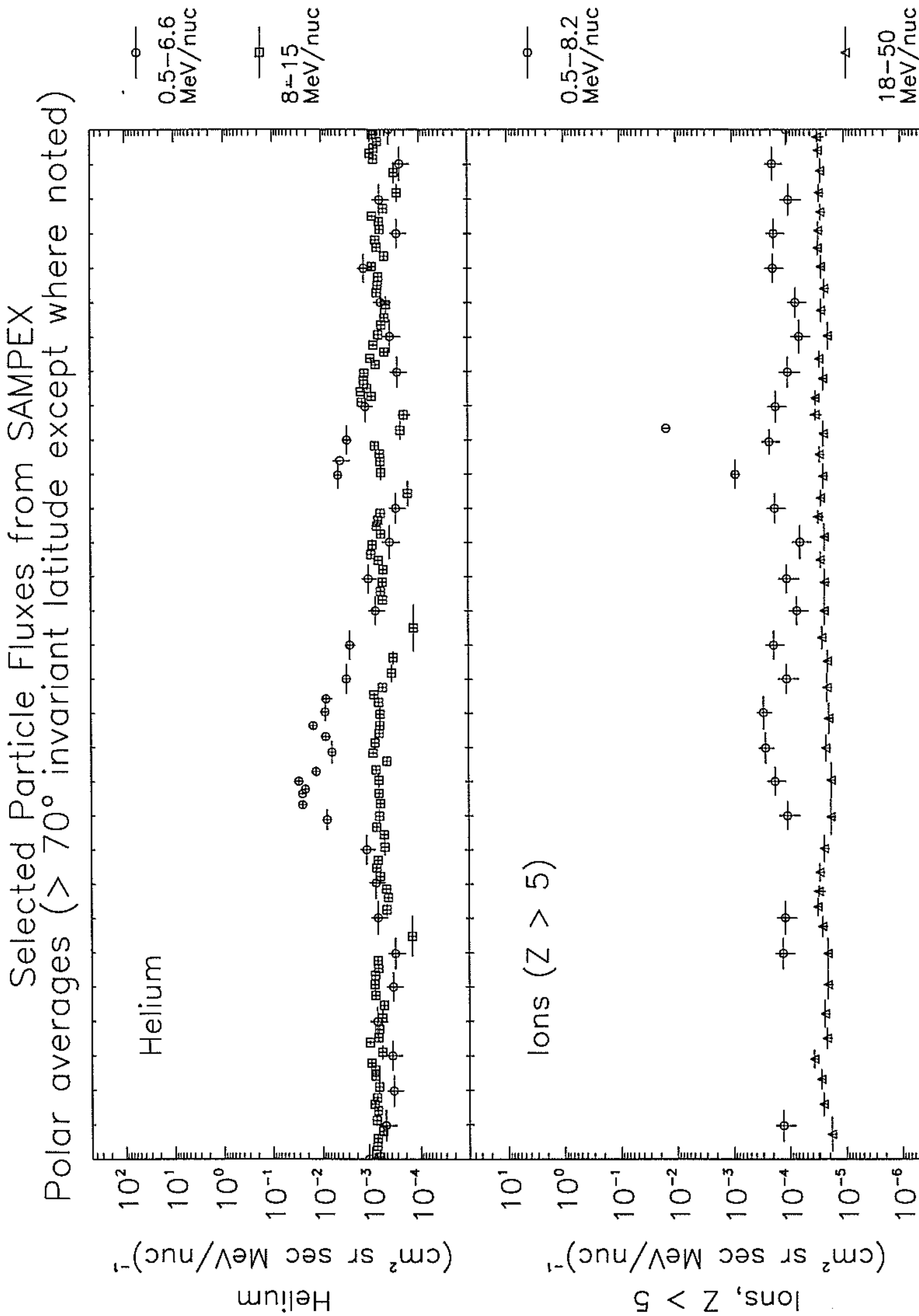

Selected Particle Fluxes from SAMPEX
Polar averages (> 70° invariant latitude except where noted)
Electrons
Protons
2 – 6 MeV
> 78°
inv. lat.
7–13 MeV
20–29 MeV
Electrons (cm² sr sec MeV)⁻¹
Protons (cm² sr sec MeV)⁻¹
1996 day:
214 Aug 1
219 Aug 6
224 Aug 11
229 Aug 16
234 Aug 21
239 Aug 26
244 Aug 31

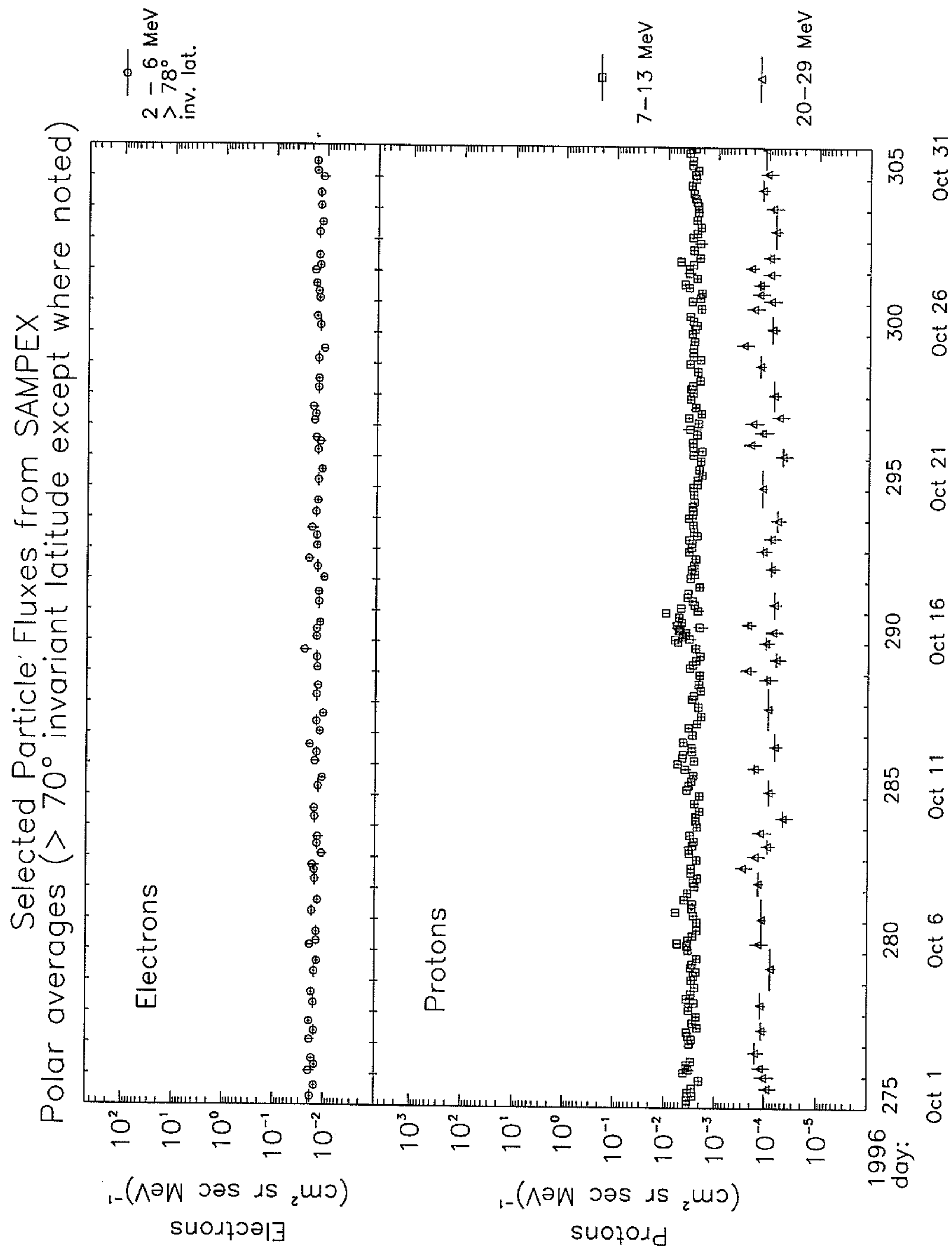
Selected Particle Fluxes from SAMPEX
Polar averages (> 70° invariant latitude except where noted)

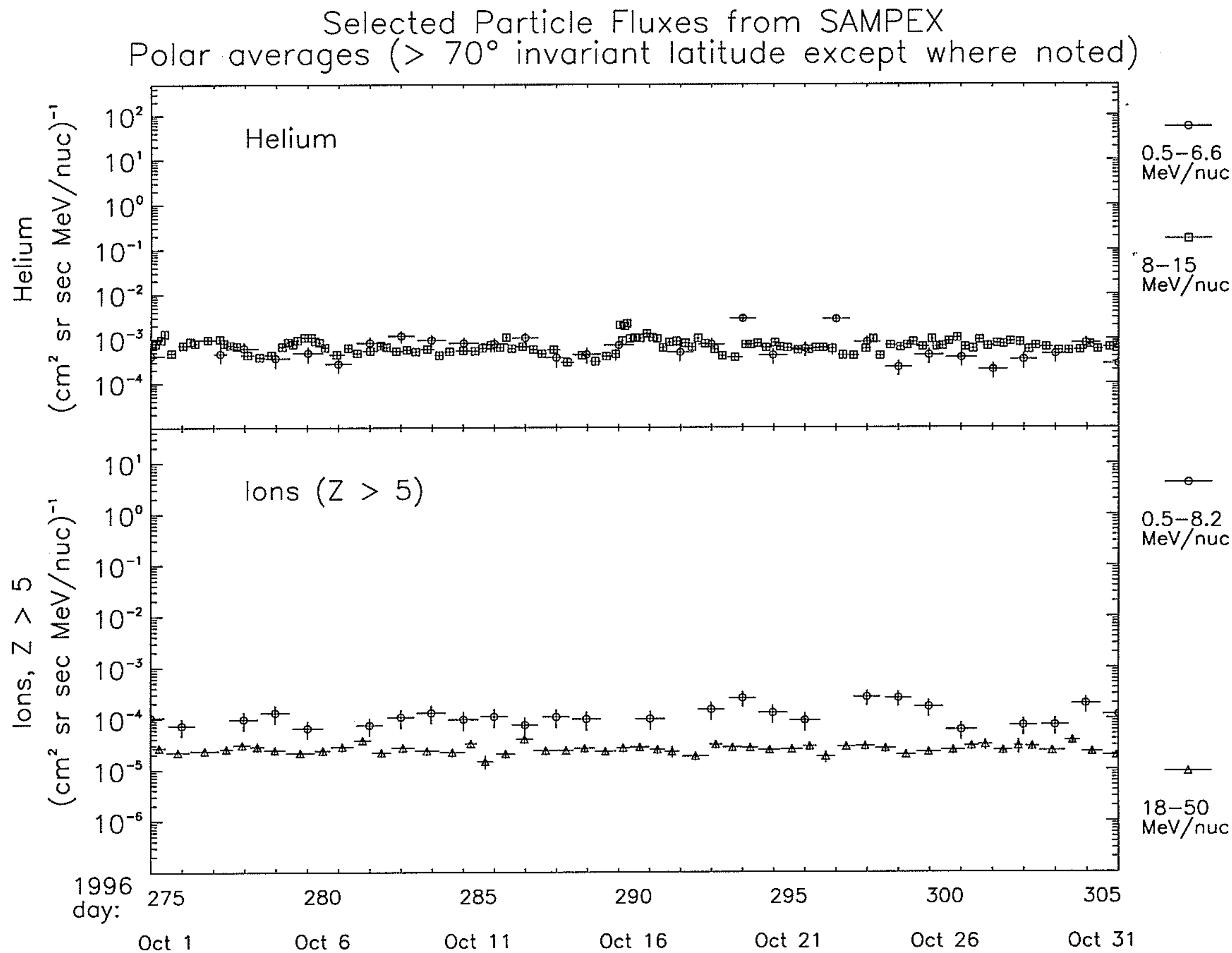


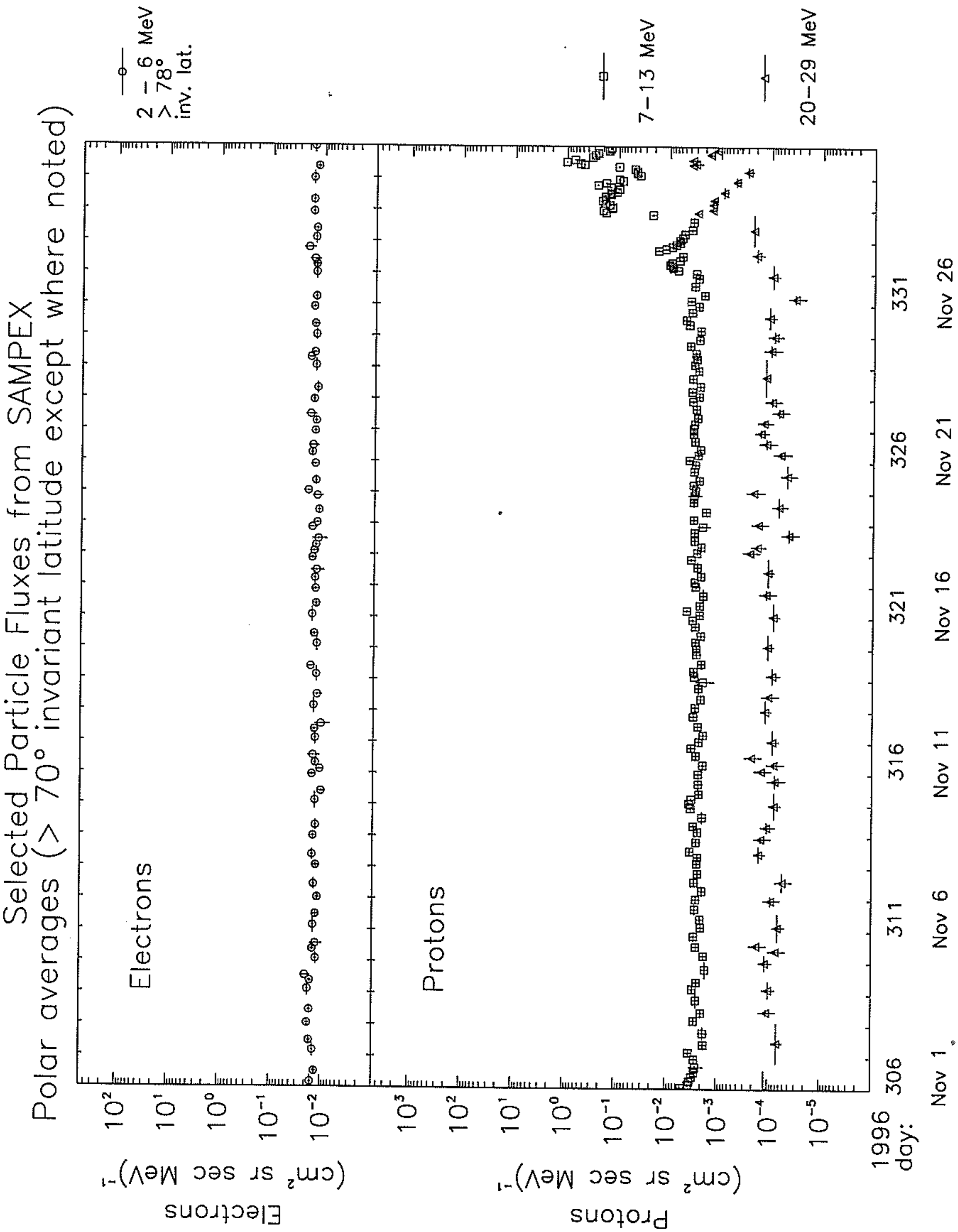
Selected Particle Fluxes from SAMPEX
Polar averages (> 70° invariant latitude except where noted)

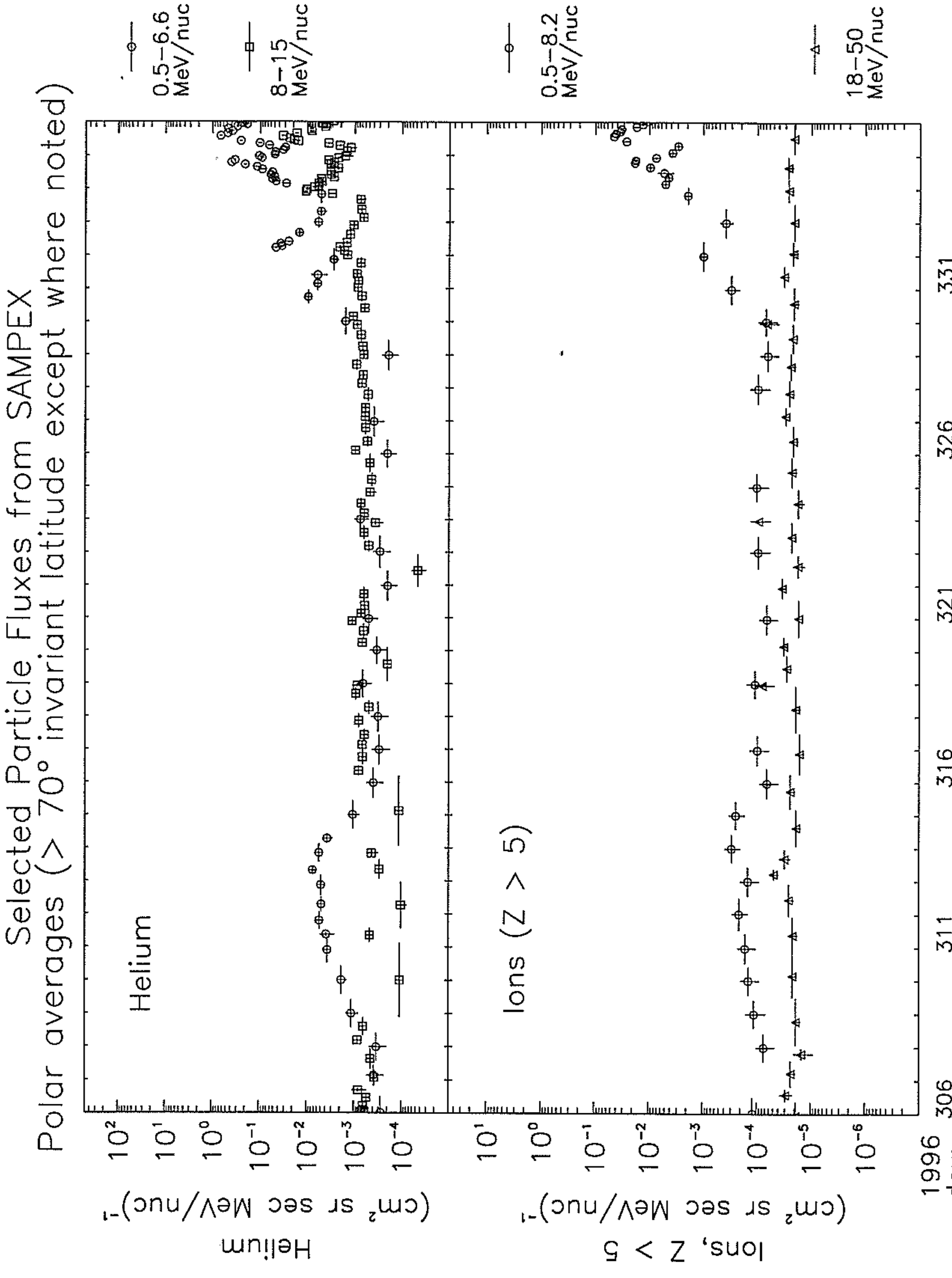


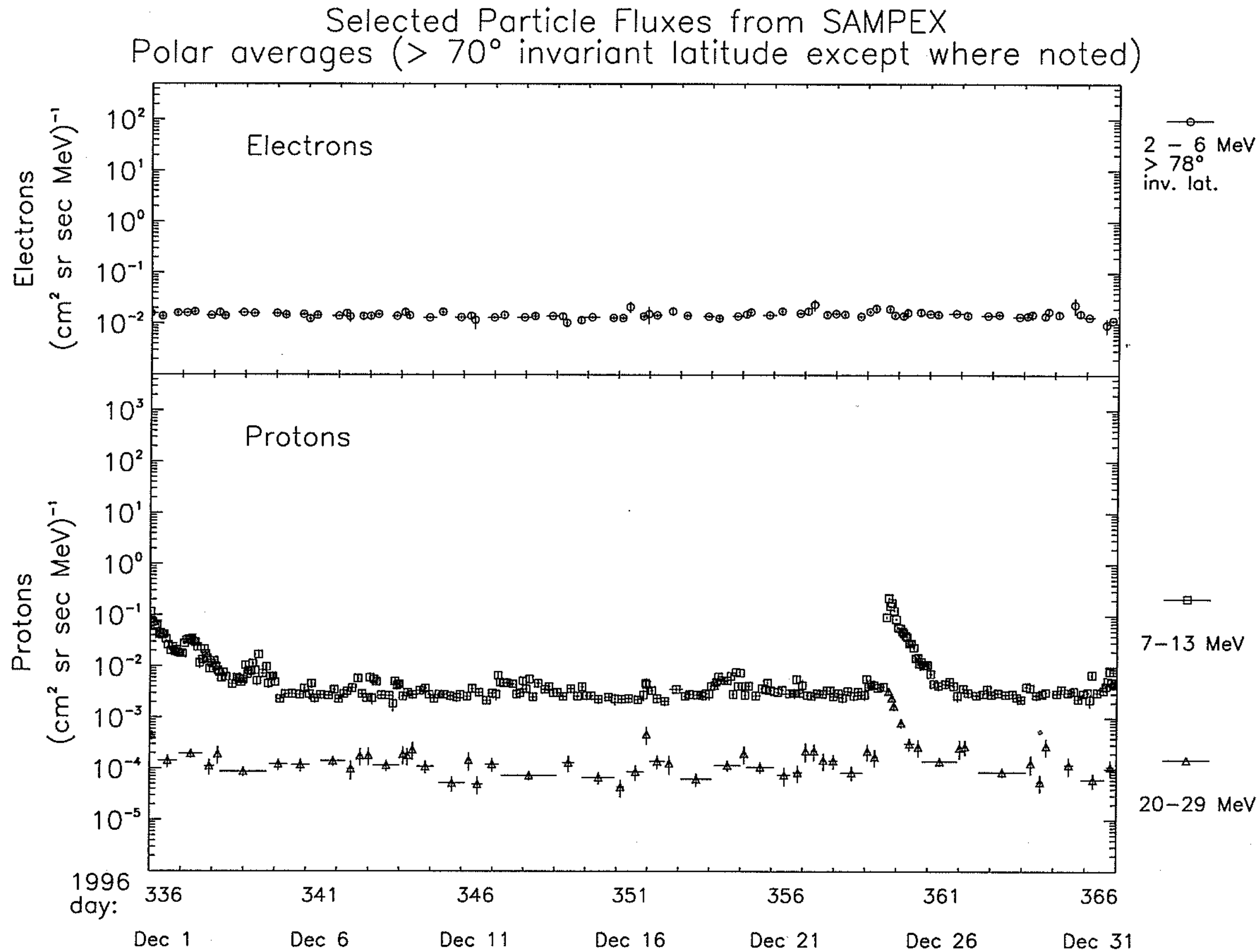

Selected Particle Fluxes from SAMPEX
Polar averages (> 70° invariant latitude except where noted)
Helium
Helium (cm² sr sec MeV/nuc)⁻¹
0.5–6.6 MeV/nuc
8–15 MeV/nuc
Ions (Z > 5)
Ions, Z > 5 (cm² sr sec MeV/nuc)⁻¹
0.5–8.2 MeV/nuc
18–50 MeV/nuc
1996 day:
245 250 255 260 265 270
Sep 1 Sep 6 Sep 11 Sep 16 Sep 21 Sep 26

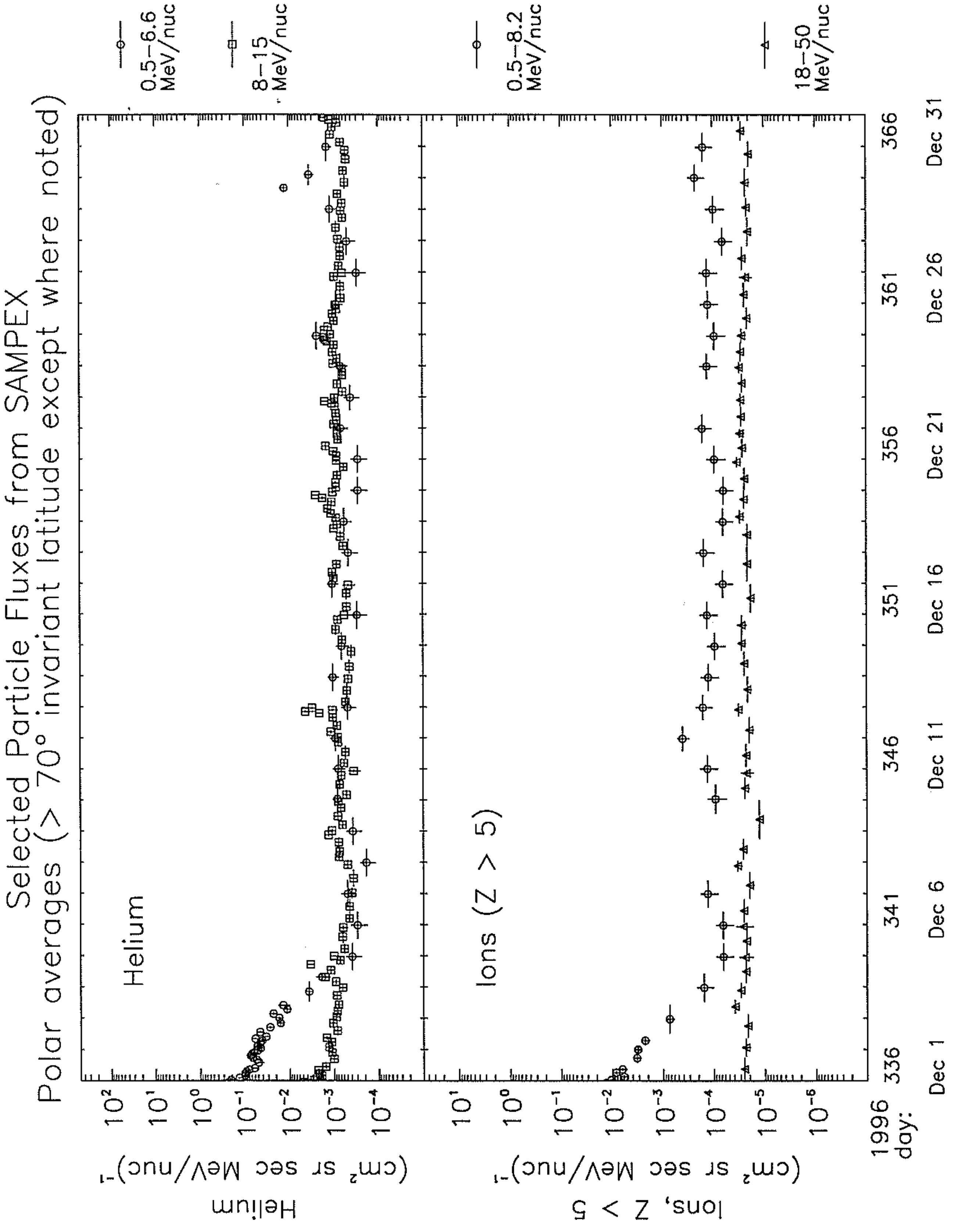

Selected Particle Fluxes from SAMPEX
Polar averages (> 70° invariant latitude except where noted)
Electrons
Protons
2 – 6 MeV
> 78°
inv. lat.
7–13 MeV
20–29 MeV
Electrons (cm² sr sec MeV)⁻¹
Protons (cm² sr sec MeV)⁻¹
10²
10¹
10⁰
10⁻¹
10⁻²
10³
10⁻³
10⁻⁴
10⁻⁵
1996
day:
275
280
285
290
295
300
305
Oct 1
Oct 6
Oct 11
Oct 16
Oct 21
Oct 26
Oct 31


Selected Particle Fluxes from SAMPEX
Polar averages (> 70° invariant latitude except where noted)
Helium
(cm² sr sec MeV/nuc)⁻¹
10²
10¹
10⁰
10⁻¹
10⁻²
10⁻³
10⁻⁴
0.5–6.6 MeV/nuc
8–15 MeV/nuc
Ions (Z > 5)
Ions, Z > 5
(cm² sr sec MeV/nuc)⁻¹
10¹
10⁰
10⁻¹
10⁻²
10⁻³
10⁻⁴
10⁻⁵
10⁻⁶
0.5–8.2 MeV/nuc
18–50 MeV/nuc
1996 day:
275
280
285
290
295
300
305
Oct 1
Oct 6
Oct 11
Oct 16
Oct 21
Oct 26
Oct 31


Selected Particle Fluxes from SAMPEX
Polar averages (> 70° invariant latitude except where noted)
Electrons
Protons
2 – 6 MeV
> 78°
inv. lat.
7–13 MeV
20–29 MeV
Electrons (cm² sr sec MeV)⁻¹
Protons (cm² sr sec MeV)⁻¹
10²
10¹
10⁰
10⁻¹
10⁻²
10³
10⁻³
10⁻⁴
10⁻⁵
1996 day:
306
311
316
321
326
331
Nov 1
Nov 6
Nov 11
Nov 16
Nov 21
Nov 26


Selected Particle Fluxes from SAMPEX
Polar averages (> 70° invariant latitude except where noted)
Helium
Ions (Z > 5)
0.5–6.6 MeV/nuc
8–15 MeV/nuc
0.5–8.2 MeV/nuc
18–50 MeV/nuc
Helium (cm² sr sec MeV/nuc)⁻¹
Ions, Z > 5 (cm² sr sec MeV/nuc)⁻¹
1996 day:
306 Nov 1
311 Nov 6
316 Nov 11
321 Nov 16
326 Nov 21
331 Nov 26


Selected Particle Fluxes from SAMPEX
Polar averages (> 70° invariant latitude except where noted)
Electrons
Electrons (cm² sr sec MeV)⁻¹
10²
10¹
10⁰
10⁻¹
10⁻²
2 – 6 MeV
> 78°
inv. lat.
Protons
Protons (cm² sr sec MeV)⁻¹
10³
10²
10¹
10⁰
10⁻¹
10⁻²
10⁻³
10⁻⁴
10⁻⁵
7–13 MeV
20–29 MeV
1996
day:
336
341
346
351
356
361
366
Dec 1
Dec 6
Dec 11
Dec 16
Dec 21
Dec 26
Dec 31


Selected Particle Fluxes from SAMPEX
Polar averages (> 70° invariant latitude except where noted)
Helium
Ions (Z > 5)
0.5–6.6 MeV/nuc
8–15 MeV/nuc
0.5–8.2 MeV/nuc
18–50 MeV/nuc
Helium (cm² sr sec MeV/nuc)⁻¹
Ions, Z > 5 (cm² sr sec MeV/nuc)⁻¹
1996 day:
336 341 346 351 356 361 366
Dec 1 Dec 6 Dec 11 Dec 16 Dec 21 Dec 26 Dec 31

EARTH RADIATION BUDGET SATELLITE (ERBS) TOTAL SOLAR IRRADIANCE MEASUREMENTS

OCTOBER 1984 THROUGH DECEMBER 1996

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From 1984 to the present, total solar irradiance values were obtained from the solar monitor on the Earth Radiation Budget Satellite (ERBS) nonscanner instrument. The ERBS solar monitor is an active cavity radiometer similar in design to the Active Cavity Radiometer Irradiance Monitors (ACRIM) which have flown on the NASA Solar Maximum Mission (SMM), Upper Atmosphere Research Satellite (UARS), and Atmospheric Laboratory for Applications and Science (ATLAS) spacecraft missions. The ERBS satellite was placed into orbit on October 5, 1984 and the solar monitor is operating properly. In Figure 1, the ERBS solar monitor time series covers the period from October 25, 1984 through December 18 1996. Data for October 1984-December 1995 were published in SGD 620 Part 2, April 1996. The measurement precision is approximately 0.01 percent while the accuracy is 0.2 percent.

The ERBS data reduction model is described in considerable detail in Reference 1. In Reference 2, analyses of the ERBS time series have been presented as well as intercomparisons of the ERBS time series with those of the ACRIM Solar Maximum Mission and the Nimbus 7 Earth Radiation Budget (ERB) Channel 10c pyrheliometers as well as those from the Nimbus 6, Mariner VI, Mariner VII, Space Lab I, ERBS, NOAA-9 and NOAA-10 pyrheliometers.

In Figure 1, the individual total solar irradiance values represent orbital averages of the instantaneous measurements which are corrected for the angle between the instrument optical axis and the Sun and which are normalized to the mean Earth/Sun distance. At least once every 2 weeks, the Sun is observed by the monitor for several 64-second measurement intervals. Each interval is separated into two 32-second periods. During the first period, the Sun drifts across the 9.2-degree unocculted field of view, and its radiation field is measured. During the second period, a low-emittance shutter, representative of a near-zero irradiance source, is cycled into the field of view, and the low irradiance from the back of the shutter is measured. The resulting measurements from the two different periods are used to define the irradiance, using the model that is described in Reference 1. Typically, two to eight values of the irradiance are determined during an orbit. Considering that these irradiance values are derived typically during a single orbit for a few minutes, the averaged irradiance values represent an almost instantaneous level, and not a daily average.

Between 1984 and 1993, the solar monitor was operated continuously with the exception of the July 2-3, 1987, September 4-9, 1992, and July 2-3, 1993 when spacecraft attitude control or battery cell failure problems caused the monitor to be turned off. Between July 18, 1993 and November 21, 1993, the monitor was turned off because the spacecraft battery system and the flight operations procedures could not provide sufficient power to all of the spacecraft sensors. Therefore, there are no data available for this period. The 14-day measurement schedule was resumed after November 22, 1993 when flight procedures were revised to provide sufficient power to the monitor. In Table 1, the solar monitor power-on days in 1993, 1994, 1995 and through December 1996 are presented. In the data and in Figure 1, the measurement standard

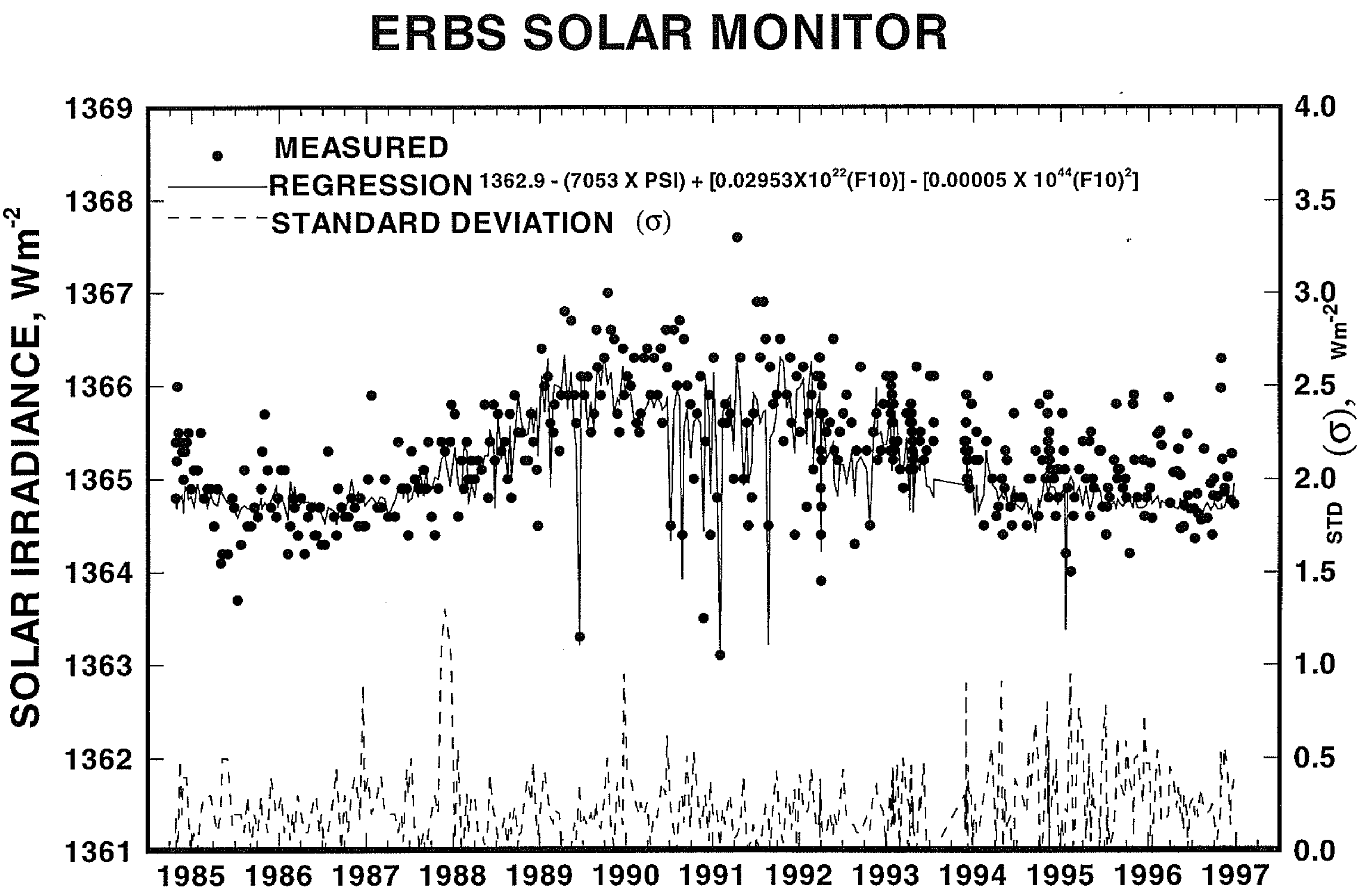

Fig. 1. Earth Radiation Budget Satellite (ERBS) total solar irradiance values and the standard deviations for each value with an empirical model fit represented by solid line.

TABLE 1 ERBS Nonscanner Instrument Days of Operation

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
Jun 93	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	
Jul 93	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x							x		x	x	x	x	x	x	x	
Aug 93																															
Sep 93																															
Oct 93																															
Nov 93																						x	x	x	x	x	x	x	x	x	
Dec 93	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Jan 94	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x							x		x	x	x	x	x	x	x	x
Feb 94	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x							x	x			
Mar 94	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x				
Apr 94				x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	
May 94								x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Jun 94	x	x	x	x	x	x	x	x	x	x	x						x	x	x	x	x	x	x	x	x	x	x	x	x	x	
Jul 94	x	x	x	x	x	x	x	x	x	x	x				x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Aug 94	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x						x	x	x	x	x	x
Sep 94	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x						x	
Oct 94	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x		
Nov 94				x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	
Dec 94	x	x	x	x	x	x	x	x	x						x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Jan 95	x	x	x	x	x	x	x	x					x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Feb 95	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x					x	x	x	x	x	x			
Mar 95	x				x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x				x	x	x
Apr 95	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x		
May 95		x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Jun 95	x	x	x	x	x	x	x	x	x				x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	
Jul 95	x	x	x	x	x	x	x	x	x			x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	
Aug 95	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x		x	x	x	x	x	x	x	x	x	x
Sep 95	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x			x	x	x	x	x	
Oct 95	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x			x
Nov 95	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	
Dec 95	x	x	x	x	x	x	x	x			x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Jan 96	x	x	x	x	x	x				x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Feb 96	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x				x	x	x	x	x	x	x	x	x	x			
Mar 96	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x			x	x	x	x	x	x	x
Apr 96	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x			x	x	x	
May 96	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Jun 96	x	x	x	x	x			x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	
Jul 96	x	x	x	x			x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Aug 96	x	x	x	x	x	x	x	x	x	x	x	x	x	x			x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Sep 96	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x			x	x	x	x	x	x	x	x	x	x	
Oct 96	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x		x	x	x	x	x
Nov 96	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	
Dec 96	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x

deviations (STD) increased significantly when the power was turned off for 1 to 8 days [an average of 4 days] periods every 22 to 40 days [an average of 30 days].

In Figure 1, the ERBS irradiance values are compared with an empirical regression fit which serves as a quality assurance diagnostic tool. The fit was derived from least squares analyses between the ERBS irradiances, photometric sunspot index (PSI), and 10.7-cm solar flux (F10), using March 1985 through August 1989 values. PSI is a proxy for irradiance decreases which are caused by the presence of large groups and numbers of sunspots. F10 is a proxy for irradiance brightening which is caused by the presence of faculae. Lee et al. (1995) describes the derivation of the regression fit.

Specialized irradiance measurement missions were conducted during March 23, 1992 through April 2, 1992, January 16, 1993 through January 30, 1993, April 6, 1993 through April 22, 1993, and November 4, 1994 through December 13, 1994. The specialized missions included increased measurement opportunities over three to six orbits each day compared to the typical single orbit measurements. The missions were extended to as much as 10 consecutive days of measurements.

These daily data are available on-line at the NOAA NGDC website:
http://www.ngdc.noaa.gov/stp/SOLAR/solar.html. The digital format for the solar irradiance values is :

Column 1: Calibration date - year/month/day
Column 2: Measurement time (universal) - hour:min:sec
Column 3: Total Solar Irradiance (Watts/meters squared) at 1 AU
Corrected for Off-axis viewing and normalized to
Astronomical Almanac Earth-Sun Distance tables
Column 4: Standard Deviation of averaged samples (Watts/meters squared)
0.0 indicates 1 sample or very close instantaneous samples

References

[1] R. B. Lee III, B. R. Barkstrom, and R. D. Cess, "Characteristics of the Earth Radiation Budget Experiment Solar Monitors," Appl. Optics, 26 (15) 3090-3096, 1987.

[2] R. B. Lee III, M. A. Gibson, R. S. Wilson, S. Thomas, "Long-term Total Solar Irradiance Variability During Sunspot Cycle 22," Journal of Geophysical Research, Vol. 100, No. A2, pp. 1667-1675, February 1, 1995.

1996 SOLAR IRRADIANCE INSTANTANEOUS VALUES
EARTH RADIATION BUDGET EXPERIMENT

NASA LANGLEY RESEARCH CENTER

WATTS/m^2

Day	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1	---	---	---	---	---	---	---	---	---	---	---	---
2	---	---	---	---	---	---	---	---	---	---	---	---
3	1364.9	---	---	---	---	---	1364.7	1364.6	---	---	---	---
4	---	1365.5	---	---	---	---	---	---	---	---	---	1364.8
5	---	---	---	---	---	1365.5	---	---	---	---	---	---
6	1365.2	---	---	---	---	---	---	---	---	---	1365.0	---
7	---	---	---	---	---	---	---	---	---	---	---	1365.3
8	---	---	---	---	1365.0	---	1364.4	---	---	---	1365.0	---
9	---	---	---	---	---	1364.8	---	---	---	1364.8	---	---
10	---	---	---	1365.1	1364.5	---	---	---	---	---	---	---
11	---	---	---	---	---	---	---	---	1365.0	---	---	---
12	1364.6	---	---	---	---	---	---	---	---	---	---	---
13	---	---	---	---	---	---	---	---	---	---	---	---
14	---	---	---	---	---	---	---	1365.3	---	---	---	---
15	---	1365.5	---	---	---	---	---	---	---	---	---	---
16	---	---	---	---	---	---	---	---	---	---	---	---
17	1364.9	---	---	---	---	---	1364.8	---	---	---	---	---
18	---	---	---	---	---	---	---	---	1364.4	---	---	1364.7
19	---	---	---	---	---	1364.7	---	---	---	---	---	---
20	---	1365.4	---	---	---	---	---	---	---	---	1365.0	---
21	---	---	1365.9	---	---	---	1364.6	---	---	---	---	---
22	1364.9	---	---	---	---	---	---	---	1364.8	---	---	---
23	---	---	---	---	1364.5	---	---	---	---	1366.0	---	---
24	---	---	---	1365.1	1364.7	---	---	---	---	---	---	---
25	---	---	---	---	---	---	---	---	1365.0	1366.3	---	---
26	---	---	---	---	---	---	---	---	---	---	---	---
27	---	---	1364.7	---	---	---	---	---	---	---	---	---
28	---	1364.9	---	---	---	---	---	1364.6	---	1365.2	---	---
29	---	---	---	---	---	---	---	---	---	---	---	---
30	---	---	---	1365.3	---	---	---	---	---	---	---	---
31	---	---	---	---	---	---	---	---	---	---	---	---

* Solar Irradiance = Instantaneous values are cosine-corrected for any off-axis positioning of the sun in the telescope aperture.
All values are normalized to 1 astronomical unit.

*U.S. GOVERNMENT PRINTING OFFICE: 1997 573-001/29000

WORLD DATA CENTER A

FOR

SOLAR-TERRESTRIAL PHYSICS

The ICSU Panel on WDCs has recommended that it would be appropriate courtesy to acknowledge in publications that data were obtained from the originating station or investigator through the intermediary of the WDCs. The following statement is suggested:

"Data used in this study were provided by WDC-A for Solar-Terrestrial Physics, NOAA E/GC2, 325 Broadway, Boulder Colorado 80303, USA."