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Solar - Geophysical Data

NO. 409 SEPTEMBER 1978

Part I (Prompt Reports)

DATA FOR
AUGUST 1978
JULY 1978

NATIONAL GEOPHYSICAL AND SOLAR - TERRESTRIAL DATA CENTER
BOULDER, COLORADO

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SOLAR-GEOPHYSICAL DATA

No. 409

Issued in two parts

Helen E. Coffey, Editor

J. Virginia Lincoln, Chief
Solar-Terrestrial Physics Division

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A = Part I, B = Part II.

----- = no data available.
blank = data not yet received.

AUGUST 1978 DATA

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ALERT PERIODS

INTERNATIONAL URSIGRAM
AND WORLD DAYS SERVICE
AUGUST 1978

PRESTO MESSAGES (THE RAPID REPORT OF MAJOR EVENTS).

28 AUGUST 1978, BOULDER 28/1300Z STRONG MAGSTORM IN PROGRESS 28/1300Z.
30 AUGUST 1978, BOULDER 30/1745Z TENFLARE 170 FLUX UNITS 30/1630Z 43 MINUTES DURATION. NOTE: NO OPTICAL, NO RISE IN X-RAY LEVEL.

SUMMARY OF THE GEOALERT WWA MESSAGES

Message serial number	Date of issue	Date of observation	Wolf number	10 cm solar flux	A index	Active Regions: Location Lat-Long	Active Regions: No. of Flares Total	Active Regions: No. of Flares M	Active Regions: No. of Flares X	Outstanding events	Forecasts: Date	Forecasts: Location Lat-Long	Forecasts: Desc*	Alert Situations
213	1	31	047	106	02	N37E27	0	0	0		31	N37E27	Q	SOLQUIET MAGQUIET
						N21E27	0	0	0			N21E27	Q	
						S22E35	0	0	0			S22E35	Q	
214	2	1	062	103	07	N36E15	1	0	0		1	N36E15	Q	SOLQUIET MAGQUIET
						N20E14	0	0	0			N20E14	Q	
						S22E20	0	0	0			S22E20	Q	
						N25W23	0	0	0			N25W23	Q	
215	3	2	055	103	02	N35E04	0	0	0		2	N35E04	Q	SOLQUIET MAGALERT MINOR 04/XX
						N19E00	0	0	0			N19E00	Q	
						S22E07	0	0	0			S22E07	Q	
						N25W34	0	0	0			N25W34	Q	
						S26W64	0	0	0			S26W64	Q	
216	4	3	059	106	10	N37W12	0	0	0		3	N37W12	Q	SOLQUIET MAGNIL
						N19W13	0	0	0			N19W13	Q	
						S23W07	0	0	0			S23W07	Q	
						N27W47	0	0	0			N27W47	Q	
217	5	4	118	109	24	N36W22	0	0	0		4	N36W22	C,A	SOLQUIET MAGQUIET
						N18W25	0	0	0			N18W25	Q	
						S22W18	2	0	0			S22W18	C,A	
						N25W59	0	0	0			N25W59	Q	
						S17E43	0	0	0			S17E43	D,E	
						S22E59	0	0	0			S22E59	Q	
						S26E74	0	0	0			S26E74	Q	
						N18E82	0	0	0			N18E82	D,E	
						S31E41	0	0	0			S31E41	Q	
218	6	5	123	114	22	N35W34	0	0	0		5	N35W34	Q	SOLQUIET MAGQUIET
						N18W38	0	0	0			N18W38	Q	
						S22W32	2	0	0			S22W32	E	
						N25W73	0	0	0			N25W73	Q	
						S18E28	0	0	0			S18E28	Q	
						S20E44	0	0	0			S20E44	Q	
						S26E59	0	0	0			S26E59	E	
						N18E69	0	0	0			N18E69	C,E	
						S31E27	0	0	0			S31E27	Q	
219	7	6	134	119	14	N18W53	0	0	0		6	N18W53	Q	SOLOUIET MAGQUIET
						S23W48	1	0	0			S23W48	E	
						S18E16	0	0	0			S18E16	Q	
						S27E47	0	0	0			S27E47	E	
						N18E55	0	0	0			N18E55	C,E	
						N25W38	0	0	0			N25W38	Q	
						N16E39	0	0	0			N16E39	Q	
220	8	7	097	125	06	S23W60	0	0	0		7	S23W60	Q	SOLQUIET MAGQUIET
						S27E36	6	0	0			S27E36	E	
						N17E45	0	0	0			N17E45	Q	
						N17E32	0	0	0			N17E32	Q	
221	9	8	138	127	07	S22W74	0	0	0		8	S22W74	Q	SOLQUIET MAGQUIET
						S26E21	2	0	0			S26E21	C,E	
						N17E32	1	0	0			N17E32	Q	
						N16E18	0	0	0			N16E18	Q	
						N23W21	0	0	0			N23W21	Q	
						N23E29	0	0	0			N23E29	Q	
						N21E31	0	0	0			N21E31	Q	
222	10	9	100	128	06	S22W87	0	0	0		9	S22W87	Q	SOLQUIET MAGQUIET
						S26E09	1	0	0			S26E09	C,E	
						N16E24	0	0	0			N16E24	Q	
						N15E05	1	0	0			N15E05	Q	
						N21E17	0	0	0			N21E17	Q	
223	11	10	101	125	09	S26W04	3	0	0		10	S26W04	Q	SOLQUIET MAGQUIET
						N16E11	0	0	0			N16E11	Q	
						N15W07	5	0	0			N15W07	C,E	
224	12	11	089	119	10	S29W16	2	0	0		11	S29W16	Q	SOLQUIET MAGQUIET
						N16W01	0	0	0			N16W01	Q	
						N15W22	2	0	0			N15W22	Q	
225	13	12	126	121	21	S28W30	1	0	0		12	S28W30	Q	SOLQUIET MAGQUIET
						N17W15	0	0	0			N17W15	Q	
						N16W35	0	0	0			N16W35	Q	
						S33W44	2	0	0			S33W44	Q	
						N14E09	0	0	0			N14E09	Q	
						N10E26	0	0	0			N10E26	Q	
						S22W62	2	0	0			S22W62	Q	
226	14	13	166	132	12	S27W43	5	0	0		13	S27W43	E	SOLQUIET MAGQUIET
						N17W28	0	0	0			N17W28	Q	
						N16W46	0	0	0			N16W46	Q	
						S33W57	0	0	0			S33W57	Q	
						N14W03	0	0	0			N14W03	Q	
						S22W75	8	0	0			S22W75	E	
						N22W62	0	0	0			N22W62	Q	
						N45E58	0	0	0			N45E58	Q	
						N38E78	0	0	0			N38E78	Q	

ALERT PERIODS

INTERNATIONAL URSIGRAM
AND WORLD DAYS SERVICE

AUGUST 1978

SUMMARY OF THE GEOALERT WWA MESSAGES

Message serial number	Date of issue	Date of obser-vation	Wolf number	10 cm solar flux	A index	Active Regions Location Lat-Long	No. of Flares Total	M	X	Outstanding events	Forecasts Date	Location Lat-Long	Desc*	Alert Situations
227	15	14	134	130	07	S27W56	5	0	0		14	S27W56	E	SOLQUIET MAGQUIET
						N17W39	0	0	0			N17W39	Q	
						N16W59	0	0	0			N16W59	Q	
						N25W47	0	0	0			N25W47	Q	
						S32W69	3	0	0			S32W69	E	
						S22W85	0	0	0			S22W85	Q	
						N44E44	0	0	0			N44E44	Q	
						N38E66	0	0	0			N38E66	Q	
						N27W07	0	0	0			N27W07	Q	
228	16	15	111	129	08	S28W69	3	0	0		15	S28W69	E	SOLQUIET MAGQUIET
						N46E27	2	0	0			N46E27	E	
						N39E52	1	0	0			N39E52	Q	
						N24W23	0	0	0			N24W23	Q	
						S21E70	0	0	0			S21E70	Q	
						N09W42	0	0	0			N09W42	Q	
229	17	16	075	121	05	S28W80	3	1	0		16	S28W80	E	SOLQUIET MAGQUIET
						N45E16	4	0	0			N45E16	E	
						N38E39	0	0	0			N38E39	Q	
						N25W35	0	0	0			N25W35	Q	
						S19E58	0	0	0			S19E58	Q	
230	18	17	056	118	05	N44W00	2	0	0		17	N44W00	E	SOLQUIET MAGQUIET
						N22W43	1	0	0			N22W43	C,E	
						S18E42	2	0	0			S18E42	E	
231	19	18	051	113	11	N45W14	0	0	0		18	N45W14	Q	SOLQUIET MAGQUIET
						N21W58	0	0	0			N21W58	E	
						S19E33	6	0	0			S19E33	E	
232	20	19	055	109	10	N44W29	0	0	0		19	N44W29	Q	SOLQUIET MAGQUIET
						N20W72	0	0	0			N20W72	C,E	
						S18E18	1	0	0			S18E18	E	
						S31W38	0	0	0			S31W38	Q	
233	21	20	079	105	03	N44W39	0	0	0		20	N44W39	Q	SOLQUIET MAGQUIET
						N21W84	2	0	0			N21W84	Q	
						S18E02	0	0	0			S18E02	Q	
						S27W08	0	0	0			S27W08	Q	
						S14E37	0	0	0			S14E37	Q	
						S24E48	0	0	0			S24E48	Q	
234	22	21	059	102	04	N43W54	0	0	0		21	N43W54	Q	SOLQUIET MAGQUIET
						S18W09	2	0	0			S18W09	Q	
						S23E33	0	0	0			S23E33	Q	
						S24E62	0	0	0			S24E62	Q	
235	23	22	053	104	06	S19W22	2	0	0		22	S13W22	Q	SOLQUIET MAGQUIET
						S24E24	0	0	0			S24E24	Q	
						S24E46	0	0	0			S24E46	Q	
						N20W13	1	0	0			N20W13	Q	
236	24	23	058	102	05	S20W32	4	0	0		23	S20W32	E	SOLQUIET MAGQUIET
						S23E36	0	0	0			S23E36	Q	
						N20W25	0	0	0			N20W25	Q	
						S16E47	0	0	0			S16E47	Q	
237	25	24	080	103	04	S18W49	0	0	0		24	S18W49	Q	SOLQUIET MAGQUIET
						S22W06	0	0	0			S22W06	Q	
						S23E19	0	0	0			S23E19	Q	
						N21W35	0	0	0			N21W35	Q	
						S17E31	3	0	0			S17E31	E	
238	26	25	105	102	06	S19W63	0	0	0		25	S19W63	Q	SOLQUIET MAGQUIET
						S24E07	0	0	0			S24E07	Q	
						N21W49	0	0	0			N21W49	Q	
						S17E19	1	0	0			S17E19	E	
						N26W39	0	0	0			N26W39	Q	
						S23W02	0	0	0			S23W02	Q	
						N10E50	0	0	0			N10E50	Q	
239	27	26	104	099	02	S19W77	0	0	0		26	S19W77	Q	SOLQUIET MAGQUIET
						S24W05	0	0	0			S24W05	Q	
						N21W60	0	0	0			N21W60	Q	
						S17E07	0	0	0			S17E07	Q	
						S24E19	0	0	0			S24E19	Q	
						N10E29	0	0	0			N10E29	Q	
						N19E67	3	0	0			N19E67	E	
						N23E73	0	0	0			N23E73	Q	
240	28	27	117	109	22	N21W74	0	0	0	SUDDEN COMMENCEMENT	27	N21W74	Q	SOLQUIET MAGALERT 28
						S16W07	0	0	0	OBSERVED 27/0247Z		S16W07	Q	
						N11E15	1	0	0	FOLLOWED BY WEAK		N11E15	Q	
						N19E53	10	0	0	MAGSTORM		N19E53	C,A	
						N34E63	0	0	0			N34E63	Q	
						S20W44	1	0	0			S20W44	Q	
						N20W35	0	0	0			N20W35		

ALERT PERIODS

INTERNATIONAL URSIGRAM
AND WORLD DAYS SERVICE

AUGUST 1978

SUMMARY OF THE GEOALERT WWA MESSAGES

Message serial number	Date of issue	Date of observation	Wolf number	10 cm solar flux	A index	Active Regions: Location Lat-Long	Active Regions: No. of Flares Total	Active Regions: No. of Flares M	Active Regions: No. of Flares X	Outstanding events	Forecasts: Date	Forecasts: Location Lat-Long	Forecasts: Desc*	Alert Situations
241	29	28	078	107	75	S17W18	0	0	0	A MAJOR MAGNETIC	28	S17W18	Q	SOLQUIET MAGALERT MINOR 29/31
						N10E02	5	0	0	STORM REACHED PEAK		N10E02	E	
						N20E42	0	0	0	INTENSITY 0600-		N20E42	Q	
						S21W55	0	0	0	0900Z ON 28 AUGUST		S21W55	Q	
						S19E74	0	0	0	PRESTO BOULDER		S19E74	Q	
										STRONG MAGSTORM IN PROGRESS 1300Z				
242	30	29	106	114	35	S22W63	1	0	0		29	S22W63	Q	SOLQUIET MAGALERT MINOR 30/02
						N10W11	0	0	0			N10W11	Q	
						N20E26	0	0	0			N20E26	Q	
						N12W62	1	0	0			N12W62	Q	
						S20E54	0	0	0			S20E54	Q	
						N15E74	8	0	0			N15E74	E	
						S30E75	2	0	0			S30E75	E	
243	31	30	108	121	25	N20E17	0	0	0	PRESTO BOULDER	30	N20E17	Q	SOLALERT MINOR 31/02 MAGALERT
						N33E25	1	0	0	30/1745Z TENFLARE		N33E25	Q	MINOR 31/02
						N10W76	0	0	0	170 FLUX UNITS		N10W76	Q	
						S21E44	0	0	0	30/1630Z 43 MINUTES		S21E44	Q	
						N17E61	11	1	0	(NOTE: NO OPTICAL,		N17E61	C,A	
						S30E67	9	0	0	NO RISE IN X-RAY		S30E67	C,A	
										LEVEL)				
244	01	31	187	137	31	N20W64	0	0	0		31	N20W64	Q	SOLALERT 01/XX MAGALERT MINOR 01/02
						N15W23	0	0	0			N15W23	Q	
						N20E04	3	0	0			N20E04	E	
						N32E12	0	0	0			N32E12	Q	
						S20E32	1	0	0			S20E32	Q	
						N17E47	5	0	0			N17E47	C,A	
						S30E54	5	0	0			S30E54	D,A	
						S19E75	0	0	0			S19E75	Q	

* Q=Quiet E=Eruptive A=Active P=Proton C=Caution D=Doubtful O.G.=Other Groups MF=Major Flare

RELATIVE SUNSPOT NUMBERS

ZURICH, R_Z

	1977 FINAL				1978 PROVISIONAL							
DAY	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG
1	22	43	44	20	84	128	93	70	77	119	46	42
2	29	37	40	20	88	120	83	68	85	93	61	48
3	29	47	25	31	102	131	95	71	91	74	47	38
4	25	47	22	47	102	138	103	75	76	60	34	62
5	20	48	25	58	73	137	76	94	74	51	54	74
6	26	55	27	58	69	129	67	92	73	29	57	66
7	25	57	34	55	42	121	90	88	70	39	84	58
8	18	52	27	45	36	89	99	105	56	45	105	62
9	30	47	31	58	36	94	85	126	59	36	108	64
10	40	38	25	75	15	96	92	111	57	29	115	67
11	45	28	26	71	18	95	85	109	63	57	127	58
12	51	33	27	62	26	92	78	107	65	62	111	71
13	48	53	28	44	26	93	65	93	72	56	114	85
14	47	48	31	37	36	82	62	75	72	62	109	93
15	53	54	39	41	30	59	72	61	78	89	102	72
16	56	53	49	39	23	64	70	85	91	97	110	42
17	53	51	51	29	24	56	66	99	79	103	98	49
18	60	50	54	33	14	55	72	100	85	115	78	53
19	59	54	52	40	8	53	64	107	84	109	74	42
20	60	54	38	23	7	52	51	115	74	109	76	28
21	58	42	32	23	20	63	77	112	73	154	77	26
22	42	35	28	17	30	74	82	109	73	158	48	36
23	41	30	24	23	43	69	85	105	72	158	33	45
24	48	29	18	31	37	78	82	102	82	154	38	45
25	46	28	10	35	32	94	70	139	86	135	30	54
26	49	30	9	41	47	86	53	115	84	152	13	37
27	54	38	14	50	69	79	50	90	97	134	21	55
28	61	37	9	45	79	88	49	75	90	130	31	58
29	64	42	10	58	90		48	72	103	115	48	59
30	60	45	23	64	104		44	70	107	99	35	70
31		52		67	118		70		109		36	100
MEAN	44.0	43.8	29.1	43.2	49.3	89.8	73.5	94.7	79.3	94.1	68.4	56.7

*1977 yearly mean = 27.5

DAILY SOLAR FLUX AT 2800 MHz
OTTAWA ARO

FLUX ADJUSTED TO 1 A.U., S_a

	1977				1978							
DAY	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG
1	83.1	93.8*	94.4	88.4	126.9*	139.1	136.3	130.0	181.4	149.1	142.9	106.0
2	84.2	93.2	93.6	91.2	133.9	152.6	141.1	129.8	183.0	147.0*	127.6	106.0
3	87.2	97.4	90.4	93.7	130.2	156.6*	146.6	134.5	182.2A	130.8	116.5	109.6
4	84.2	98.8	89.4	95.9	124.8	154.0	148.4	143.3*	178.4	118.6	117.4	112.3
5	85.6	104.0*	90.6	96.9	119.2	159.0	154.5	146.7*	173.9*	116.9	118.9	117.6
6	84.9	103.5	91.1	102.0*	118.7*	156.1	162.8	145.3*	173.1	109.8	119.3*	122.6
7	89.3	105.5	90.2	105.5	111.6	157.3	165.2	146.9	162.6*	110.6	128.9	128.2
8	91.6	103.8	90.3	106.7	102.8	157.0*	168.7	148.6	143.4	109.3	135.9	130.6
9	95.9	100.7	91.1	112.6*	97.0	155.2	183.7	156.1	135.1	106.5	147.1*	128.1*
10	99.8	96.4	93.1	114.7	93.5	148.7	179.1	155.4	129.5	108.4	156.0*	127.5
11	104.6	95.3	94.9	107.4	93.1	154.2	175.2	162.8*	133.8	113.2	163.2*	121.7
12	107.8	100.8	91.4	111.0	92.1	159.0	169.8	156.2	138.2	116.4*	174.2*	124.5
13	112.9	98.5	94.0	100.6	90.3	151.2	160.9	145.6	140.2	120.3*	165.5	134.9
14	118.2	98.9	97.9	93.7*	88.6	148.4	160.5	139.1	143.7	126.4*	163.1	132.7
15	120.7	98.2	97.9	92.5	89.6	136.8	154.2	141.4	146.1	132.5	169.5	130.0*
16	120.4	96.8	95.9	92.5	86.4	130.2	143.3	137.6	147.8*	139.5*	163.4	123.6
17	120.6	94.9	100.4	91.1	83.8	125.9	135.4	133.4	143.8	149.0	159.5	119.3*
18	120.5	95.4	102.0*	93.6	84.7	124.9	132.3	134.1	135.6	153.5*	154.1*	115.6
19	104.5	105.0	99.2	91.0	85.4	119.1	128.1	139.5*	133.6	162.0*	148.6	111.6
20	108.8	99.6*	95.7*	88.7	87.0	122.2	125.3	138.1	132.3*	174.2	142.9*	107.5
21	104.9*	98.6*	92.8	87.8	91.4	122.2	118.2	138.4*	132.7	185.4*	140.2	104.8
22	102.4	93.9	89.3	89.9	96.9	127.7	117.0	146.4	135.7*	190.3	127.0	106.0
23	99.3	87.3	88.0	91.2	99.6	131.8	116.4	162.9	142.9*	196.7	123.4*	104.1
24	100.6	88.3	86.7	93.9	100.4	135.6	117.5	159.8	146.5*	194.8	118.5	105.4
25	98.8	88.1	84.7	96.3	103.3	139.3	118.2	159.1*	147.6	183.5	113.7	104.2
26	99.4	88.6	84.1	99.3	112.7	134.8	112.5	166.7	152.8	182.4*	112.2	100.7
27	100.0	88.5	83.8	98.3	116.4	137.5	114.1	172.8	150.6*	179.5	110.8	107.3*
28	100.0	90.3*	85.6	98.9	127.7*	135.4	112.7	176.6*	147.1*	174.1	109.9	107.7*
29	99.4	90.3	85.6	105.6*	132.2*		111.1	185.2	148.6	167.4	109.2	116.2
30	97.7	94.9	85.3	114.7	134.9		115.4*	182.1*	147.2*	154.6*	109.2	124.1
31		95.9		120.2	133.3*		124.5		152.6		108.8	133.9*
MEAN	100.9	96.3	91.6	98.9	106.1	141.8	140.3	150.5	149.7	146.8	135.4	116.9

* adjusted for burst
A = interpolated data point

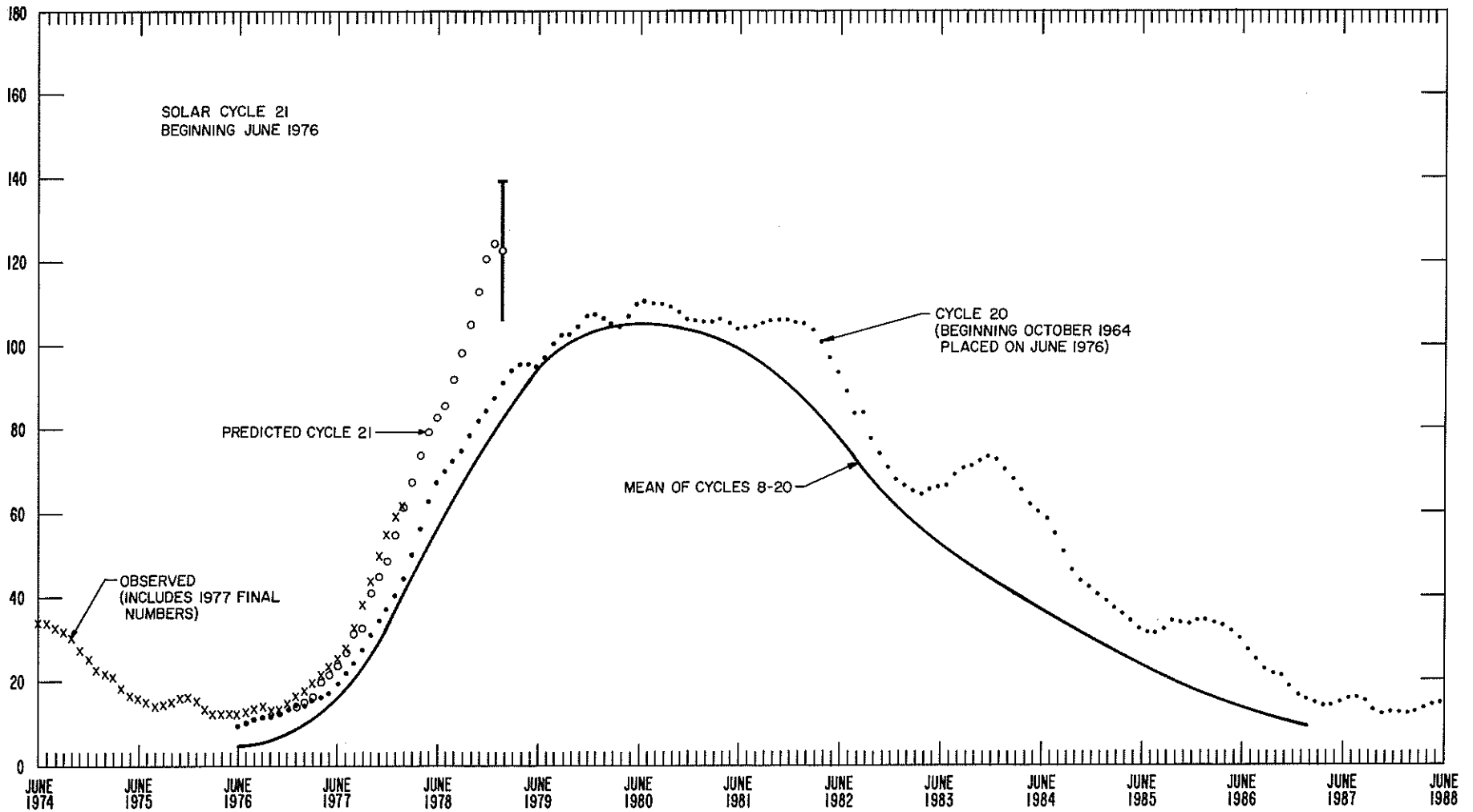
DAILY SOLAR INDICES

AUGUST 1978

AUG 1978	YEAR DAY	BARTELS 27-DAY CYCLE NUMBER	SUNSPOT NUMBERS		OBSERVED FLUX OTTAWA 2800	SOLAR FLUX ADJUSTED TO 1 A.U.								
			R_Z	$R_{A'}$		AFGL 15400	AFGL 8800	AFGL 4995	OTTAWA 2800	AFGL 2695	AFGL 1415	AFGL 606	AFGL 410	AFGL 245
1	213	14	42	36	102.9	555	296	138	106.0	101.8	82.3	64.1	26.1	11.1
2	214	15	48	35	102.9	558	292	137	106.0	101.5	80.9	59.4	25.7	10.9
3	215	16	38	35	106.4	560	295	142	109.6	101.8	82.0	59.8	27.5	10.6
4	216	17	62	61	109.1	563	308	139	112.3	111.8	86.1	60.7	28.4	10.2
5	217	18	74	52	114.3	567	303	147	117.6	117.0	86.3	61.1	27.9	10.2
6	218	19	66	54	119.1	563	301	155	122.6	123.1	87.9	59.3	26.1	9.4
7	219	20	58	52	124.7	560	306	166	128.2	130.2	90.6	63.4	29.8	10.0
8	220	21	62	44	127.0	557	301	160	130.6	137.3	93.2	60.0	29.1	10.1
9	221	22	64	45	124.6*	567	311	165	128.1*	140.0	94.0	65.8	29.0	10.2
10	222	23	67	49	124.1	557	303	159	127.5	129.3	91.8	65.2	29.9	10.0
11	223	24	58	40	118.5	566	305	150	121.7	121.6	91.0	65.3	29.9	10.5
12	224	25	71	59	121.2	565	307	152	124.5	122.2	92.8	63.2	29.2	9.9
13	225	26	85	83	131.5	564	310	162	134.9	134.2	93.2	63.6	27.5	12.0
14	226	27	93	76	129.3	563	314	166	132.7	129.5	90.0	63.8	29.5	11.2
15	227	1	72	62	126.7*	572	319	167	130.0*	131.0	92.5	68.2	31.3	13.9
16	228	2	42	44	120.6	559	308	154	123.6	120.5	88.7	70.2	28.8	12.1
17	229	3	49	43	116.4*	556	297	153	119.3*	118.4	89.2	70.8	28.7	11.2
18	230	4	53	39	112.8	557		145	115.6	112.7	83.5	65.9	29.7	10.2
19	231	5	42	34	109.0	559		145	111.6	110.0	80.7	66.0	27.7	11.7
20	232	6	28	29	105.0	560		140	107.5	104.2	80.2	62.6		11.8
21	233	7	26	14	102.4	560		139	104.8	104.5	76.2	60.8	29.3	12.0
22	234	8	36	23	103.6	554		137	106.0	101.9	74.3	60.0	26.4	12.0
23	235	9	45	31	101.9	559		138	104.1	102.3	74.9	60.8	27.9	12.7
24	236	10	45	48	103.1	560	282	139	105.4	106.5	78.8	60.7	28.9	12.9
25	237	11	54	42	102.0	561	284	138	104.2	103.4	76.6	58.0	28.1	12.2
26	238	12	37	42	98.6	563	297	136	100.7	101.5	71.6	56.9	27.1	12.5
27	239	13	55	58	105.1*	565	304	145	107.3*	109.5	73.6	60.2	28.1	13.6
28	240	14	58	46	105.6*	565	303	149	107.7*	111.0	79.5	57.9	26.3	12.9
29	241	15	59	60	113.9	566	302	152	116.2	113.0	80.4	59.1	27.7	13.6
30	242	16	70	69	121.8	570	314	164	124.1	127.1	90.2	62.9	32.6	14.5
31	243	17	100	87	131.4*	575	328	185	133.9*	140.0	95.6	62.9	27.6	13.2
MEAN			56.7	48.1	114.0	562	304	150	116.9	116.7	84.8	62.5	28.4	11.6

* Adjusted for burst.

Note: Data gaps in AFGL Sagamore Hill are due to equipment problems.



OBSERVED AND PREDICTED SUNSPOT NUMBERS

SMOOTHED OBSERVED AND PREDICTED SUNSPOT NUMBERS
CYCLE 21

MONTH	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1976	15.2	13.2	12.2	12.6	12.5	12.2	12.9	14.0	14.3	13.4	13.5	14.8
1977	16.7	18.1	20.0	22.2	24.2	26.3	28.8	33.0	38.5	44.6	50.5	55.4
1978	59.6	62.1	67.8	73.8	80.4	86.3	91.1	95.4	99.4	103.1	107.4	113.4
			(2)	(4)	(7)	(10)	(13)	(16)	(18)	(19)	(18)	(17)
1979	118.4	122.7	126.7	129.4	132.0	136.3	140.4	143.2	144.9	145.7	145.8	145.2
	(16)	(17)	(20)	(24)	(27)	(29)	(31)	(33)	(36)	(38)	(40)	(42)
1980	143.9	142.7	142.2	142.6	142.0	139.0	135.7	133.1	131.7	130.9	129.5	128.1
	(42)	(42)	(40)	(40)	(41)	(43)	(45)	(46)	(45)	(46)	(48)	(50)
1981	127.7	127.0	124.7	121.9	119.7	117.6	116.7	116.6	115.8	114.5	112.4	109.5
	(53)	(53)	(51)	(50)	(50)	(49)	(47)	(46)	(45)	(45)	(43)	(41)
1982	106.5	103.4	101.0	99.0	96.8	94.2	90.5	86.3	82.5	78.4	75.4	72.0
	(39)	(38)	(37)	(36)	(34)	(33)	(31)	(29)	(27)	(23)	(22)	(21)
1983	68.1	65.3	63.4	61.3	59.3	57.1	55.1	53.3	51.5	50.1	49.1	48.3
	(21)	(21)	(22)	(22)	(22)	(23)	(24)	(26)	(27)	(29)	(30)	(30)
1984	47.2	45.5	43.0	39.8	37.4	36.1	35.0	33.5	32.1	31.1	30.0	28.5
	(31)	(30)	(29)	(28)	(29)	(31)	(31)	(31)	(30)	(29)	(27)	(27)
1985	27.4	26.5	25.6	25.1	24.5	23.6	22.8	22.0	21.2	20.3	19.4	18.8
	(26)	(26)	(26)	(26)	(25)	(24)	(23)	(22)	(22)	(23)	(23)	(24)
1986	18.5	17.9	17.2	16.3	15.2	14.1	13.3	12.8	12.5	12.2	12.0	11.9
	(24)	(24)	(23)	(22)	(21)	(20)	(19)	(18)	(17)	(16)	(15)	(13)
1987	12.2	12.7	13.4	14.3	15.3							
	(11)	(11)	(11)	(11)	(12)							

The table gives observed Zürich smoothed sunspot numbers for Cycle 21 up to the one calculated from the latest observed data, marked by a vertical bar. They are based on final Zürich numbers through 1977 and provisional Zürich numbers thereafter. Some of these data after the June 1976 value will change slightly when final data for 1978 are received. The numbers after the vertical bar are predictions by the McNish-Lincoln method (see *Explanation of Data Reports*, February 1978). Shown in parentheses are the corresponding absolute values of the 90% confidence interval, an indication of the uncertainty above and below the predicted number.

The McNish-Lincoln method is very sensitive to the identification of a minimum epoch. In SGD 390-401 issues, the Cycle 21 predictions were based on March 1976 as the minimum epoch. Latest studies, including one published by Waldmeier, show that June 1976 is the more appropriate epoch of minimum. Thus, we have adopted a June 1976 mimimum.

*Prediction of Sunspot Maximum -- The McNish-Lincoln prediction method is recommended for predictions up to only one year ahead. From that point, the predictions regress rapidly towards the mean value. Combining this McNish-Lincoln prediction of sunspot maximum with the Ohl method (as done by Sargent, see *Explanation of Data Reports*, February 1978) indicates that the most probable value for sunspot maximum is 150 ± 35.

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OBSERVATORY	OBSERVED UT				LOCATION					DURATION	IMPORTANCE	OBS.		MEASUREMENTS			REMARKS
	DATE AUG	START	MAX. PHASE	END	APPROX. LAT.	APPROX. MER. DIST.	CENTRAL DISTANCE	MCMATH PLAGE REGION	CMP DAY	MIN.		CORD.	TYPE	TIME UT	MEAS. AREA Mill. of Disk	CORR. AREA Sq. Deg.	
TEHR	04	1130E	1132U	1148	S21	E16	.365		5.7	18D	SB	2	C		159		U H
PALE	04	1849	1857	1901	S21	W22	.437		3.1	12	SN	3	C		39		DE
ISTA	05	0620E		0645D	S25	E65	.904		10.1	25D	SN						K
ISTA	05	0755E		0759	S25	E65	.904		10.2	4D	SF						
RAMY	05	1251	1253	1304	S20	W27	.494		3.5	13	SN	3	C		48		FDE
RAMY	06	1251	1252	1259	S23	W38	.645		3.7	8	SB	3	C		60		F
RAMY	07	1126E	1126U	1135	S28	E39	.679		10.4	9D	SB	2	C		42		F
RAMY	07	1126E	1126U	1147	S22	E26	.493		9.4	21D	SN	2	C		28		F
RAMY	07	1629	1631	1633	S26	E38	.658		10.5	4	SN	3	C		25		F
HOLL	07	1736	1749	1758D	S26	E40	.680		10.7	22D	SF	3	C		50		FDE
PALE	07	1912	1912U	2005D	S26	E38	.658		10.7	53D	SN	3	C		20		DE
HOLL	07	2010	2018	2022	S26	E38	.658		10.7	12	SN	3	C		56		DE
PALE	07	2014		2046	S26	E37	.647		10.6	32	SN	2	C		0		DE
HOLL	07	2215	2218	2225	S26	E37	.647		10.7	10	SN	3	C		36		DE
HOLL	07	2311	2316	0003	S26	E36	.636		10.7	52	SB	3	C		93		F H
RAMY	08	1414	1415	1424	S26	E27	.535		10.6	10	SN	3	C		30		F
RAMY	08	1438	1438	1442	N20	E35	.687		11.2	4	SN	3	C		32		
RAMY	08	1444	1510	1519	S26	E26	.523		10.6	35	SN	3	C		35		F
ISTA	09	0655		0700	S29	E21	.499		10.9	5	SB			0658			
PALE	09	2329	2329	2342	N16	E 6	.396		10.4	13	SN	3	C		62		DE
HOLL	10	1541	1547	1611	S26	E 2	.334		10.8	30	SB	3	C		107		F
HOLL	10	1621	1641	1647	S26	E 1	.333		10.8	26	SN	3	C		48		
HOLL	10	1656	1656	1715	S26	E 1	.333		10.8	19	SN	3	C		29		
HOLL	10	1734	1735	1741	N16	W 4	.390		10.4	7	SN	3	C		34		
HOLL	10	1751	1751	1758	S26	E 1	.333		10.8	7	SN	3	C		26		
PALE	11	0038	0038	0042	N15	W 8	.391		10.4	4	SN	3	C		22		DE
PALE	11	0341	0345	0353	S26	W 7	.350		10.6	12	SB	3	C		44		DE
TEHR	11	0341E	0343	0356	S27	W 6	.361		10.7	15D	SB	2	C		127		DE
ISTA	11	0734		0755	N19	E42	.751		14.5	21	SF						D
ISTA	11	0800		0808	S24	W08	.325		10.7	8	SF						D
RAMY	11	1211	1213	1223	S26	W11	.375		10.7	12	SB	2	C		44		FDE
PALE	11	2025	2025	2030	N16	W19	.491		10.4	5	SB	3	C		42		DE
PALE	12	0002	0002	0010	S26	W18	.436		10.7	8	SN	3	C		20		DE
RAMY	12	1900	1915	1944	S23	W58	.848		8.4	44	SN	3	C		47		
PALE	12	1913	1918	1930	S20	W59	.854		8.4	17	SN	3	C		63		DE
RAMY	12	1925	1927	1934	S34	W41	.727		9.7	9	SN	3	C		16		
RAMY	12	1959	2000	2005	S23	W58	.848		8.5	6	SN	3	C		18		
PALE	13	0224E	0231U	0245D	S20	W63	.886		8.4	21D	SN	2	C		25		F
RAMY	13	1104E	1104U	1115	S23	W66	.909		8.5	11D	SB	3	C		35		F
RAMY	13	1109	1115	1120	N46	E59	.963		17.9	11	SF	3	C		29		F
TEHR	13	1220	1227	1250	S21	W65	.901		8.6	30	SB	2	C		111	00.0	
RAMY	13	1221	1223	1250	S22	W67	.915		8.5	29	SB	3	C		77		F
RAMY	13	1254	1255	1404	S25	W37	.640		10.8	70	SB	3	C		21		F
RAMY	13	1410	1412	1425	S27	W37	.650		10.8	15	SB	3	C		24		F
RAMY	13	1423	1424	1430	S22	W67	.915		8.6	7	SN	3	C		18		
RAMY	13	1443	1444	1450	S27	W37	.650		10.8	7	SB	3	C		23		F
RAMY	13	1526	1534	1546	S22	W68	.921		8.5	20	SB	3	C		31		
HOLL	13	1526	1534	1539	S24	W69	.928		8.5	13	SN	3	C		20		
RAMY	13	1616	1616	1624	S28	W37	.655		10.9	8	SN	3	C		16		
RAMY	13	1639	1655	1712	S23	W70	.934		8.4	33	SB	3	C		41		
HOLL	13	1653	1656	1703	S24	W70	.934		8.5	10	SN	3	C		18		
RAMY	13	1655	1655	1703	S28	W37	.655		10.9	8	SN	3	C		17		
RAMY	13	1755	1800	1817	S23	W70	.934		8.5	22	SB	3	C		67		
HOLL	13	1756	1759	1811	S24	W71	.939		8.4	15	SB	3	C		32		U F
PALE	13	1758	1800	1832	S20	W71	.939		8.4	34	SB	3	C		30		FDE
PALE	13	1759	1800	1803D	S20	W71	.939		8.4	4D	SB	3	C		30		FDE
RAMY	14	1152	1248	1308	N19	W80	.992		8.5	76	SN	3	C		12		
RAMY	14	1247	1250	1310	S34	W63	.898		9.8	23	SB	3	C		14		
RAMY	14	1320	1325	1348	S34	W63	.898		9.8	28	SN	3	C		14		
RAMY	14	1329	1329	1337	N19	W80	.992		8.6	8	SN	3	C		8		
PALE	14	1736	1738	1759	S27	W52	.801		10.8	23	SN	3	C		42		DE
PALE	14	2105	2106	2111	S27	W53	.810		10.9	6	SN	3	C		37		DE

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OBSERVATORY	OBSERVED UT				LOCATION					DURATION	IMPORTANCE	OBS.		MEASUREMENTS			REMARKS
	DATE AUG	START	MAX. PHASE	END	APPROX. LAT.	APPROX. MER. DIST.	CENTRAL DISTANCE	MCMATH PLAGE REGION	CMP DAY	MIN.		COND.	TYPE	TIME UT	MEAS. AREA Mill of Disk	CORR. AREA Sq. Deg.	
TEHR	15	0330E	0334	0336	N44	E44	.902		18.4	6D	SN	2	C		127		
TEHR	15	1020E	1023U	1037	S27	W65	.904		10.6	17D	SB	2	C		159		F
HOLL	15	1547	1550	1611	S29	W65	.905		10.8	24	SN	3	C		24		F
RAMY	15	1547	1548	1607	S28	W62	.884		11.0	20	SB	3	C		28		F
RAMY	15	1621	1623	1625	N44	E31	.848		18.0	4	SN	3	C		18		
RAMY	15	1827	1836	1854	N36	E58	.935		20.1	27	SB	3	C		54		FDE
HOLL	15	1830	1836	1855	N39	E57	.938		20.0	25	SN	3	C		55		F
PALE	15	2205	2214	2221	S35	W88	.995		9.3	16	SN	3	C		18		F
ISTA	16	0600E		0645	N45	E31	.856		18.6	45D	SN						K
TEHR	16	0621	0629	0639	N45	E27	.841		18.3	18	SN	2	C		127		U
ISTA	16	0640E		0710D	S33	W75	.960		10.7	30D	SN						
TEHR	16	0641E	0642U	0650	S27	W73	.950		10.8	9D	SB	2	C		63		
HOLL	16	1326	1337	1406	S28	W76	.963		10.9	40	SB	3	C		70		F
HOLL	16	1729	1732	1736	N45	E17	.810		18.0	7	SN	3	C		21		
PALE	16	2029	2030	2034	N44	E14	.793		17.9	5	SN	3	C		22		DE
PALE	17	0005	0006	0009	S15	E56	.823		21.2	4	SN	3	C		47		F
HOLL	17	0006E	0006U	0010D	S14	E57	.833		21.3	4D	SN	2	C		29		
PALE	17	0055E	0055U	0057D	N20	W33	.671		14.6	2D	SN	3	C		27		F
TEHR	17	0343	0345	0357	N45	E10	.795		17.9	14	SB	2	C		127		R
MANI	17	0343	0345	0359	N44	E10	.785		17.9	16	SN	3	C		80	1.0	
PALE	17	0345E	0345U	0405D	N44	E10	.785		17.9	20D	SB	3	C		143		F
PALE	17	1907	1907U	1911D	N44	E 3	.777		18.0	4D	SN	3	C		30		DE
HOLL	17	1907	1908	1913	N45	E 4	.788		18.1	6	SN	3	C		71		FDE
HOLL	17	1907	1911	1919	N39	E32	.816		20.2	12	SB	3	C		27		FDE
PALE	17	1943	1945	1954	S17	E47	.731		21.3	11	SN	3	C		35		DE
ISTA	18	0714		0730	S19	E41	.664		21.4	16	SN						K
BUCA	18	0715	0719	0733	S19	E38	.627		21.2	18	SN		C	0719	53	.8	D
TEHR	18	0717E	0719U	0731	S20	E39	.643		21.2	14D	SN	2	C		63		
ISTA	18	0740		0755	N30	E73	.982		23.8	15	SN						
RAMY	18	1119E	1123U	1137	S17	E35	.582		21.1	18D	SB	2	C		75		H
RAMY	18	1149	1157	1215	S17	E38	.622		21.3	26	SB	3	C		55		F
RAMY	18	1237	1242	1333	S17	E38	.622		21.4	56	SB	3	C		62		F
RAMY	18	1346	1352	1358	S16	E35	.580		21.2	12	SB	3	C		46		F H
RAMY	18	1419	1420	1434	S17	E35	.582		21.2	15	SB	3	C		38		F H
PALE	18	1929	1941	1954	S18	E34	.572		21.4	25	SN	3	C		46		DE
PALE	19	1852	1907	1914	S18	E21	.395		21.4	22	SN	3	C		47		DE
RAMY	20	1313	1313	1318	N20	W80	.993		14.6	5	SN	3	C		10		
RAMY	20	1647	1647	1650	N20	W81	.995		14.6	3	SN	3	C		9		
PALE	21	0239	0240	0243	S18	E 6	.215		21.6	4	SN	3	C		42		DE
RAMY	21	1450	1451	1459	S18	W 4	.202		21.3	9	SN	3	C		22		
HOLL	21	1728	1738	1757	S27	W18	.443		20.4	29	SN	3	C		63		F
HOLL	22	1349	1353	1356	N21	W 9	.491		21.9	7	SF	2	C		34		F
ISTA	23	0710		0747	S20	W21	.408		21.7	37	SN			0719			F
BUCA	23	0710		0729	S18	W24	.435		21.5	19	SF		C	0716	107	1.3	E
RAMY	23	1524	1532	1611	S19	W29	.509		21.5	47	SB	3	C		85		FDE
HOLL	23	1525	1533	1546	S18	W29	.504		21.5	21	SN	3	C		66		
HOLL	23	1555	1557	1606	S18	W29	.504		21.5	11	SN	3	C		33		
RAMY	23	1635	1635	1646	S21	W30	.532		21.4	11	SN	3	C		40		
RAMY	23	1746	1748	1756	S21	W30	.532		21.5	10	SN	3	C		74		FDE
TEHR	24	0311	0315	0347	N11	E68	.940		1.2	36	SF	2	C		31		
TEHR	24	0602	0604	0636	S16	E42	.669		27.4	34	SN	2	C		95		F H
RAMY	24	1823	1823	1843	S16	E36	.592		27.5	20	SN	3	C		18		
RAMY	24	1933	1933	1945	S16	E35	.579		27.4	12	SN	3	C		18		
RAMY	25	1154	1209	1230	S16	E26	.453		27.4	36	SB	3	C		109		FDE
MITK	25	2334E	2336	2407	S24	E10	.332		26.7	33D	SN		C	2336			E
HOLL	26	2110	2112	2121	N22	E71	.968		4.2	11	SN	3	C		59		U F
PALE	26	2111	2114	2125	N20	E71	.965		4.2	14	SN	2	C		48		F
HOLL	26	2152	2154	2219	N22	E70	.963		4.2	27	SN	3	C		59		U F
PALE	26	2155	2155	2206	N20	E71	.965		4.2	11	SN	3	C		23		F

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OBSERVATORY	OBSERVED UT				LOCATION					DURATION	IMPORTANCE	OBS.		MEASUREMENTS			REMARKS
	DATE AUG	START	MAX. PHASE	END	APPROX. LAT.	APPROX. MER. DIST.	CENTRAL DISTANCE	MCMATH PLAGE REGION	CMP DAY	MIN.		COND.	TYPE	TIME UT	MEAS. AREA Mill. of Disk	CORR. AREA Sq. Deg.	
PALE	27	0306	0313	0316	N20	E68	.952		4.2	10	SN	3	C		24		F
MITK	27	0724E	0729	0739	N19	E67	.945	15496	4.3	15D	1N		C	0729	180		
RAMY	27	1136	1205	1211	N20	E62	.919		4.1	35	SN	3	C		30		
RAMY	27	1214	1217	1319	N20	E62	.919		4.2	65	SB	3	C		109		
RAMY	27	1417	1418	1422	S22	W38	.636		24.7	5	SN	3	C		22		
HOLL	27	1545	1548	1551	N23	E61	.919		4.2	6	SB	3	C		32		FDE
HOLL	27	1559	1625	1657	N23	E60	.913		4.2	58	SB	3	C		128		F
RAMY	27	1631	1633	1659	N20	E59	.899		4.1	28	SB	3	C		38		
RAMY	27	1701	1709	1728	N20	E59	.899		4.1	27	SN	3	C		22		
HOLL	27	1701	1719	1730	N23	E60	.913		4.2	29	SN	3	C		48		F
HOLL	27	1841	1847	1910	N23	E59	.907		4.2	29	SB	3	C		45		
PALE	27	1845	1850	1900	N21	E58	.895		4.1	15	SB	3	C		22		F
HOLL	27	1940	1944	1951	N11	E21	.465		1.4	11	SB	3	C		132		
PALE	27	1941	1945	1959	N11	E18	.431		1.2	18	SB	3	C		145		F
HOLL	27	2036	2038	2054	N23	E58	.900		4.2	18	SB	3	C		113		
PALE	27	2037	2039	2055	N21	E57	.888		4.1	18	SB	3	C		89		F
HOLL	27	2308	2313	0003	N22	E69	.959		5.1	55	SF	3	C		45		U F
HOLL	27	2330	2334	2357	N23	E56	.887		4.2	27	SB	3	C		70		F
MITK	28	0208	0217	0232D	N10	E13	.367		1.1	24D	SB		C	0217			E
PALE	28	0208E	0217U	0235D	N11	E15	.399		1.2	27D	SN	3	C		87		U F
MITK	28	0343	0351	0409	N20	E56	.878		4.4	26	SF		C	0351			E
RAMY	28	1559	1607	1644	N10	E 6	.312		1.1	45	SB	4	C		54		FDE
HOLL	28	1605	1606	1613	N10	E 9	.332		1.3	8	SB	3	C		80		F
RAMY	28	1707	1707	1722	N10	E 5	.307		1.1	15	SB	4	C		35		
PALE	28	1708	1708	1718	N11	E 6	.328		1.2	10	SN	3	C		62		F
HOLL	29	0047	0048	0052	S25	W31	.567		26.7	5	SN	2	C		21		F
ISTA	29	0730		0900	N10	W53	.824		25.3	90	SF						B
WEND	29	0842		0936	N12	W55	.848		25.2	54	SF		V				O
RAMY	29	1241	1243	1251	N17	E78	.987		7.4	10	SF	3	C		0		
RAMY	29	1412	1414	1432	S30	E79	.974		7.5	20	SF	4	C		0		
RAMY	29	1532	1537	1546	N17	E77	.984		7.4	14	SN	4	C		0		
RAMY	29	1717	1717	1735	S25	W57	.840		25.4	18	SN	4	C		13		
RAMY	29	1803	1804	1811	N17	E75	.978		7.4	8	SB	4	C		19		FDE
RAMY	29	1913	1913	1925	N17	E75	.978		7.4	12	SF	4	C		9		FDE
RAMY	29	1933	1933	1941	N17	E74	.974		7.4	8	SF	4	C		10		FDE
RAMY	29	2025	2033	2047	N17	E74	.974		7.4	22	SN	3	C		17		FDE
TEHR	30	0534E	0537	0546	N15	E74	.973		7.8	12D	SN	2	C		95		
TEHR	30	0734E	0737	0746	N15	E74	.973		7.9	12D	SN	2	C		95		
ISTA	30	0759		0809	N19	E71	.964		7.7	10	SF						Z
RAMY	30	1137	1200	1249	N19	E65	.935		7.4	72	SB	4	C		33		FDE
RAMY	30	1145	1157	1217	S27	E70	.933		7.7	32	SB	3	C		37		FDE
RAMY	30	1148	1148	1204	N35	E33	.793		5.0	16	SN	3	C		19		
RAMY	30	1309	1309	1324	S25	W67	.915		25.5	15	SN	4	C		14		
RAMY	30	1338	1340	1344	N19	E65	.935		7.4	6	SB	4	C		44		
RAMY	30	1418	1419	1440	N19	E64	.929		7.4	22	SB	4	C		40		FDE
HOLL	30	1418	1419	1427	N18	E67	.944		7.6	9	SB	3	C		50		
HOLL	30	1431	1437	1444	N18	E66	.939		7.6	13	SB	3	C		19		
RAMY	30	1503	1544	1702	N19	E64	.929	15508	7.4	119	1B	4	C		180		F
RAMY	30	1510	1512	1522	S27	E68	.922		7.7	12	SN	4	C		13		
HOLL	30	1530	1548	1703	N18	E65	.933	15508	7.5	93	1B	3	C		191		U F
HOLL	30	1530	1544	1545D	N18	E66	.939	15508	7.6	15D	1B	3	C		214		U F
RAMY	30	1534	1544	1550D	N19	E64	.929	15508	7.4	16D	1B	3	V		180		
RAMY	30	1727	1727	1732	N19	E63	.923		7.5	5	SN	4	C		13		
HOLL	30	1741	1746	1803	N18	E65	.933		7.6	22	SB	3	C		27		
RAMY	30	1746	1746	1819	N19	E62	.917		7.4	33	SB	3	C		19		F
HOLL	30	1832	1838	1856	N18	E64	.927		7.6	24	SB	3	C		31		
PALE	30	1837E	1838	1905D	N18	E63	.921		7.5	28D	SB	3	C		23		FDE
HOLL	30	1908	1908	1918	S30	E72	.945		8.2	10	SN	3	C		8		
PALE	30	1909E	1915U	1933D	N18	E63	.921		7.5	24D	SN	3	C		14		DE
HOLL	30	1911	1914	1918	N18	E64	.927		7.6	7	SN	3	C		19		FDE
HOLL	30	2040	2045	2051	S30	E72	.945		8.3	11	SN	3	C		18		
PALE	30	2131	2131	2135	S30	E67	.917		7.9	4	SN	3	C		21		DE
HOLL	30	2213	2217	2224	S30	E71	.939		8.3	11	SN	3	C		46		
PALE	30	2217	2218	2222	S30	E67	.917		8.0	5	SN	3	C		48		DE
HOLL	30	2238	2243	2256	S30	E70	.934		8.2	18	SB	2	C		70		
HOLL	30	2313	2317	2322	S30	E70	.934		8.2	9	SN	2	C		19		
PALE	30	2316	2317	2322	S30	E66	.911		7.9	6	SN	3	C		21		DE

Hα SOLAR FLARES

AUGUST 1978

OBSERVATORY	OBSERVED UT				LOCATION					DURATION	IMPORTANCE	OBS.		MEASUREMENTS			REMARKS
	DATE AUG	START	MAX. PHASE	END	APPROX. LAT.	APPROX. MER. DIST.	CENTRAL DISTANCE	MCMATH PLAGE REGION	CMP DAY	MIN.		COND.	TYPE	TIME UT	MEAS. AREA Mill of Disk	CORR. AREA Sq. Deg.	
PALE	30	2316	2319	2337	N17	E60	.899		7.5	21	SN	3	C		47		DE
HOLL	30	2331	2345	2352	S30	E70	.934		8.2	21	SN	2	C		24		
PALE	30	2332	2337	2346	S30	E66	.911		7.9	14	SN	3	C		16		DE
PALE	31	0137	0139	0144	S30	E65	.905		7.9	7	SN	3	C		48		DE
TEHR	31	0527	0533	0603	N17	E57	.877		7.5	36	SB	2	C		95		F
RAMY	31	1306	1306	1343	N10	W32	.591		1.1	37	SB	4	C		23		U
RAMY	31	1324	1328	1345	N21	E 8	.489		4.2	21	SN	4	C		51		
UPIC	31	1400E		1435D	S25	E90	.999	15518	10.3	35D	2B		P	1400			
RAMY	31	1548	1549	1607	N21	E 7	.486		4.2	19	SB	4	C		64		FDE
HOLL	31	1549	1551	1605	N22	E 6	.497		4.1	16	SB	3	C		90		F
HOLL	31	1626	1701	1730	S30	E61	.878	15509	8.3	64	1B	3	C		177		U F
RAMY	31	1629	1629	1643	N21	E 7	.486		4.2	14	SN	4	C		21		F
RAMY	31	1633	1633	1652	S27	E55	.826		7.8	19	SN	4	C		13		F
RAMY	31	1657	1702	1726	S27	E55	.826	15510	7.8	29	1B	4	C		154		
RAMY	31	1900	1900	1902D	N18	E49	.815		7.5	2D	SN	3	C		18		
PALE	31	2129	2143	2157	N18	E42	.749		7.0	28	SN	3	C		38		FDE
PALE	31	2156	2157	2202	S21	E33	.570		6.4	6	SN	3	C		57		
HOLL	31	2156E	2157U	2206	S20	E32	.552		6.3	10D	SN	2	C		54		F
PALE	31	2222	2237	2242	N17	E48	.801		7.5	20	SN	3	C		134		DE
PALE	31	2250	2254	2318	N17	E48	.801		7.6	28	SB	3	C		128		DE
PALE	31	2321	2354	0006	N17	E47	.792		7.5	45	SN	3	C		22		DE

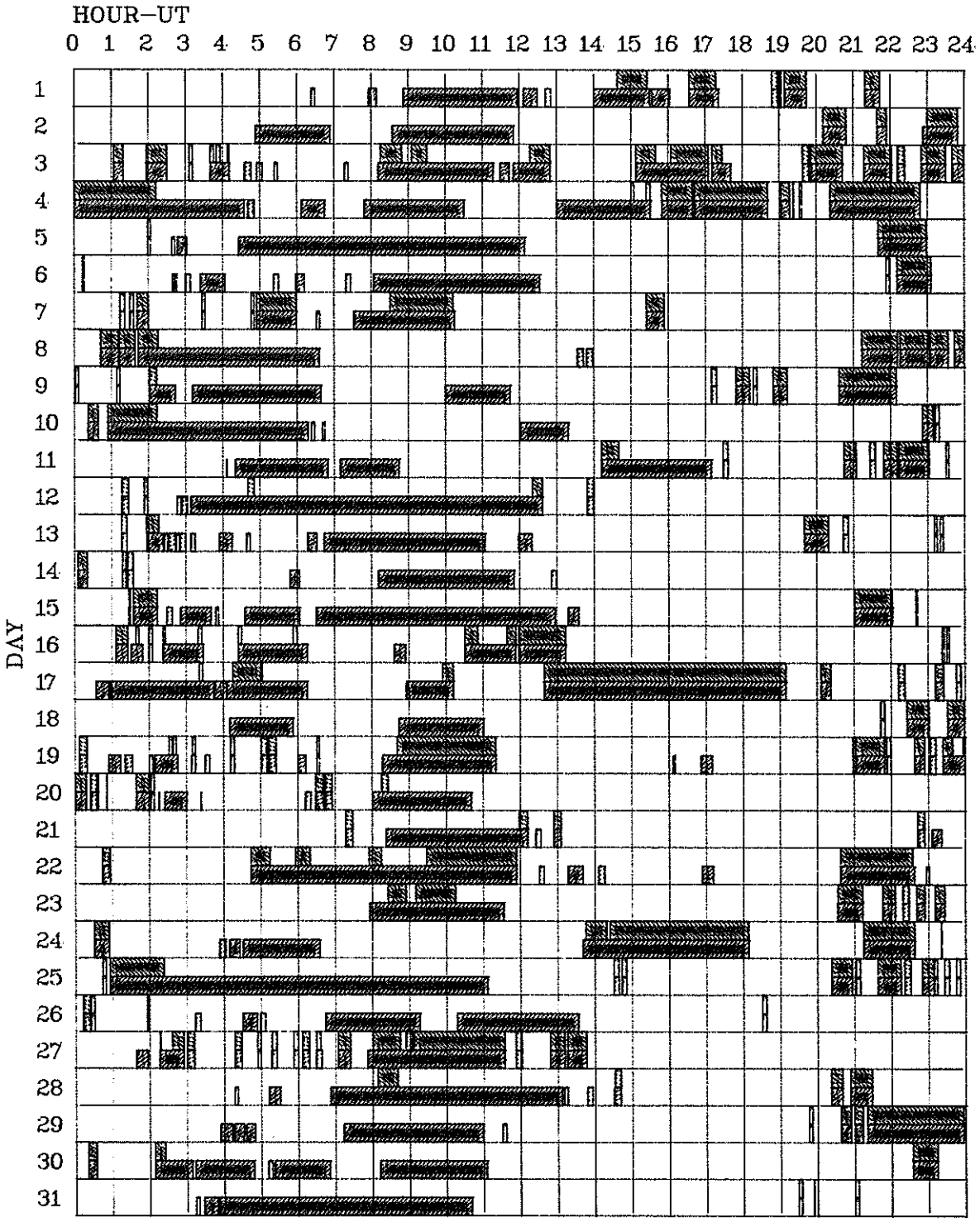
"Remarks":

A = Eruptive prominence whose base is less than 90° from central meridian.
B = Probably the end of a more important flare.
C = Invisible 10 minutes before.
D = Brilliant point.
E = Two or more brilliant points.
F = Several eruptive centers.
G = No visible spots in the neighborhood.
H = Flare accompanied by a high speed dark filament.
I = Active region very extended.
J = Distinct variations of plage intensity before or after the flare.
K = Several intensity maxima.
L = Existing filaments show signs of sudden activity.
M = White-light flare.
N = Continuous spectrum shows effects of polarization.
O = Observations have been made in the calcium II lines H and K.
P = Flare shows helium D_3 in emission.
Q = Flare shows the Balmer continuum in emission.
R = Marked asymmetry in Hα line suggests ejection of high velocity material.
S = Brightness follows disappearance of filament (same position).
T = Region active all day.
U = Two bright branches, parallel (||) or converging (Y).
V = Occurrence of an explosive phase: important and abrupt expansion in about a minute with or without important intensity increase.
W = Great increase in area after time of maximum intensity.
X = Unusually wide Hα line.
Y = System of loop-type prominences.
Z = Major sunspot umbra covered by flare.

INTERVALS OF NO FLARE PATROL OBSERVATION

FOR PRECEDING SOLAR FLARE TABLE

AUGUST 1978



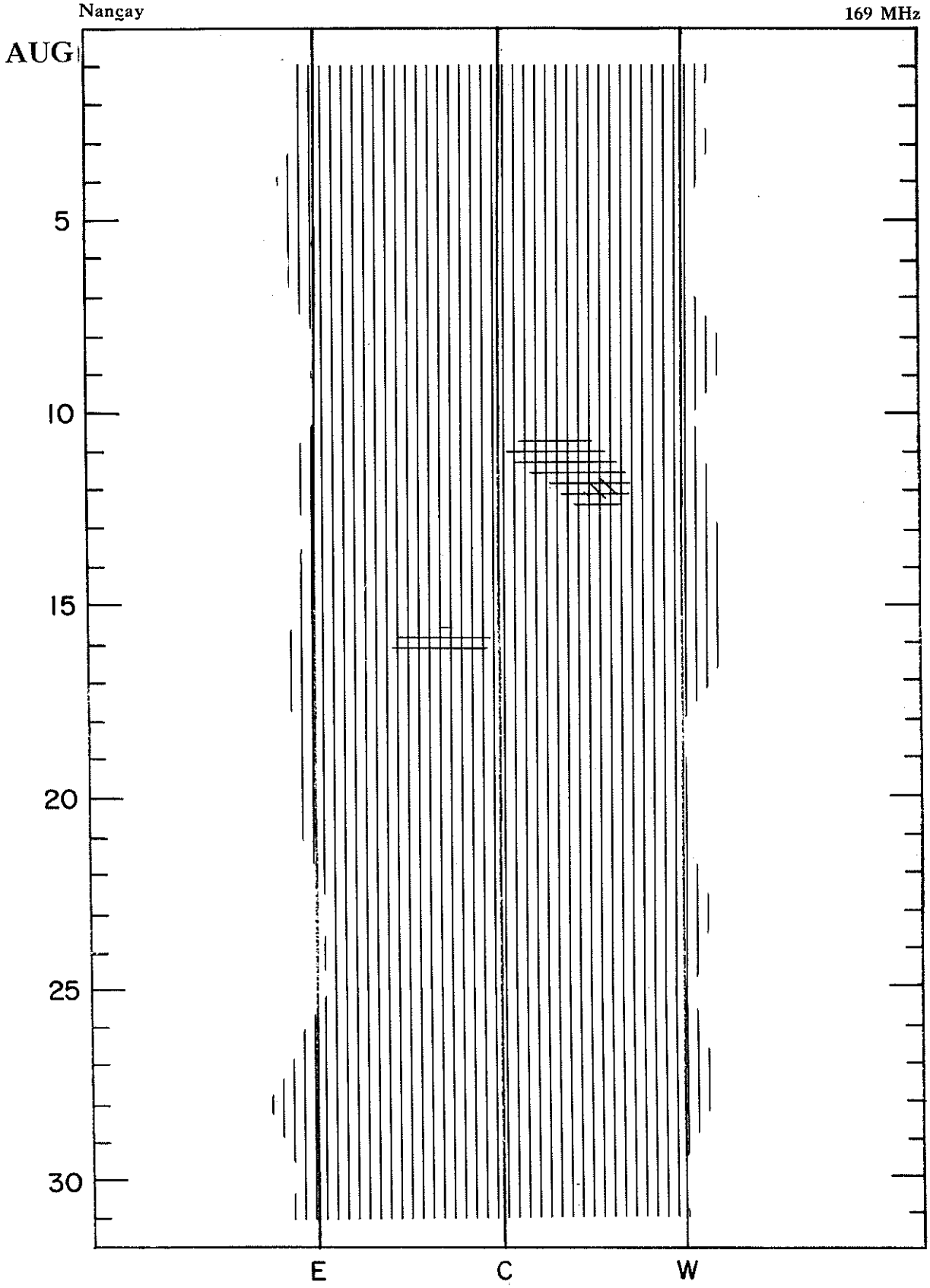
Observatories included in total patrol:

Bucharest	Holloman	Kandilli	Mitaka	Ramey	Upice
Herstmonceux	Istanboul	Manila	Palehua	Tehran	Wendelstein

Times of no flare patrol are shown by the shaded area for each day, divided into times of no cinematographic patrol (bottom half of day) and times of neither visual nor cinematographic patrol (top half of day).

SOLAR RADIO EMISSION
INTERFEROMETRIC OBSERVATION

AUGUST 1978

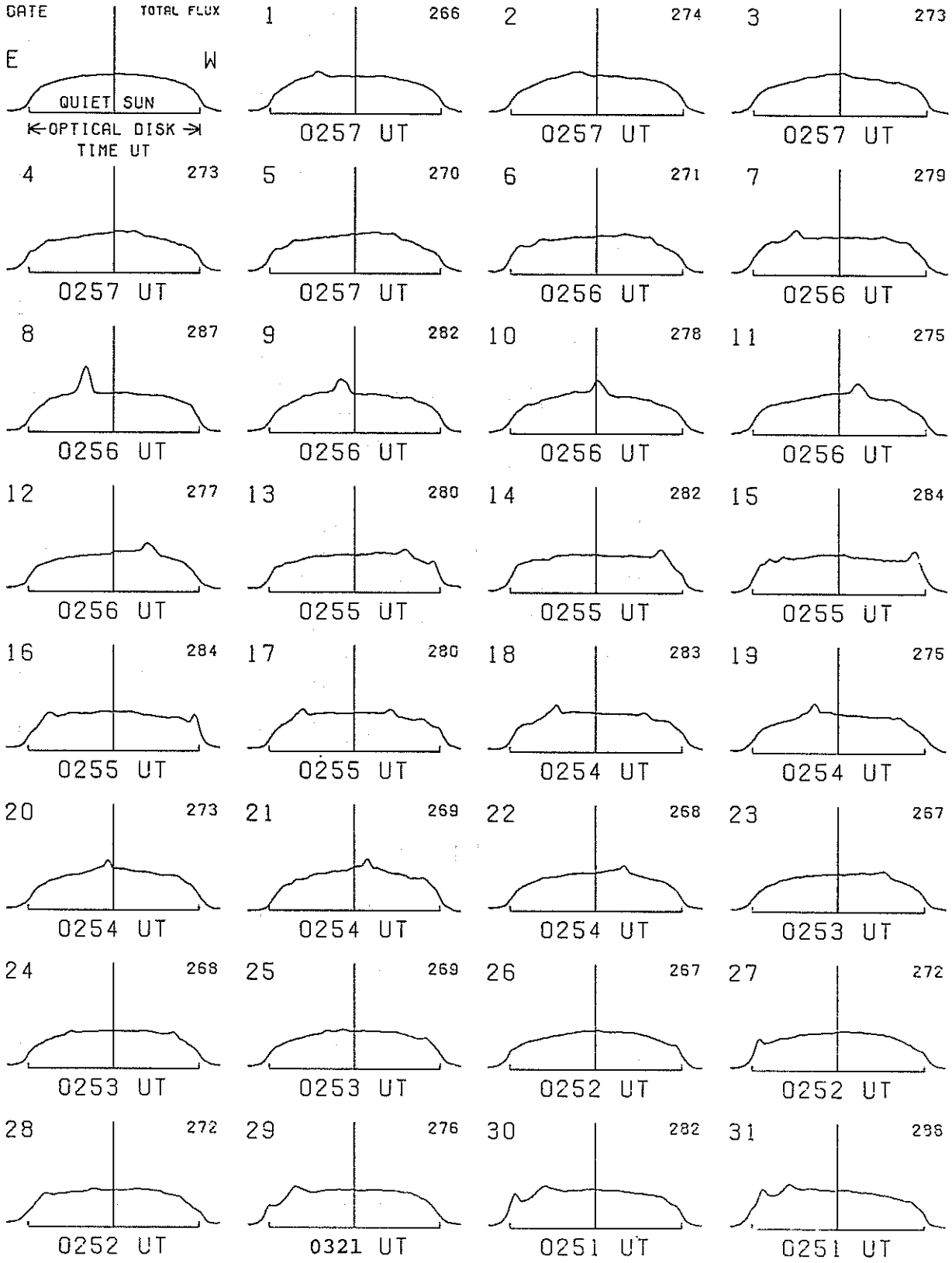


18
Aug 78

EAST-WEST SOLAR SCANS
AUGUST 1978

TOYOKAWA, JAPAN

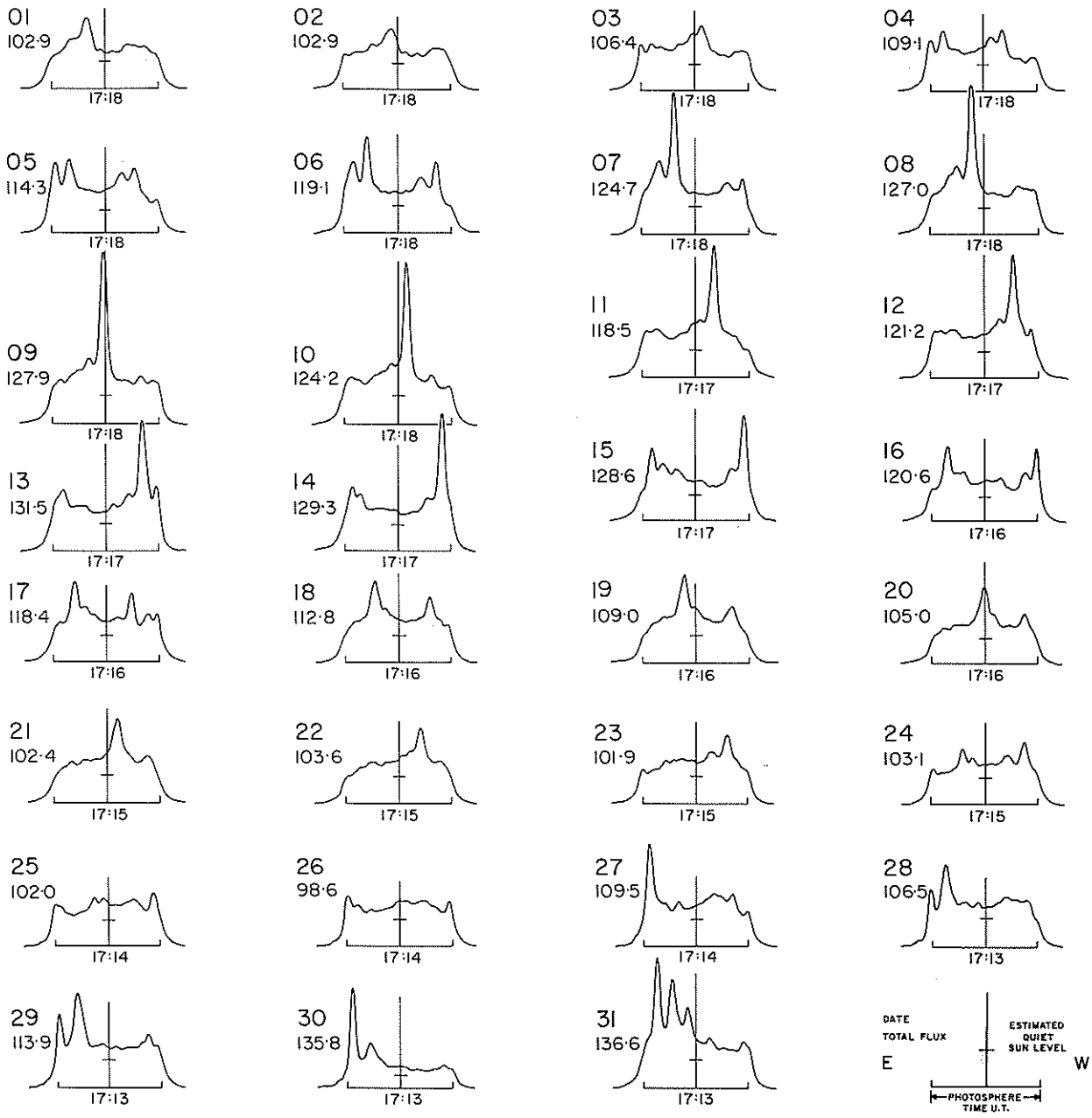
3 CM
FAN BEAM WITH 1.1 MINUTES OF ARC



EAST-WEST SOLAR SCANS
AUGUST 1978

ALGONQUIN RADIO OBSERVATORY
CANADA

10·7cm
Fan Beam with 1·5 minutes of arc
E-W Resolution



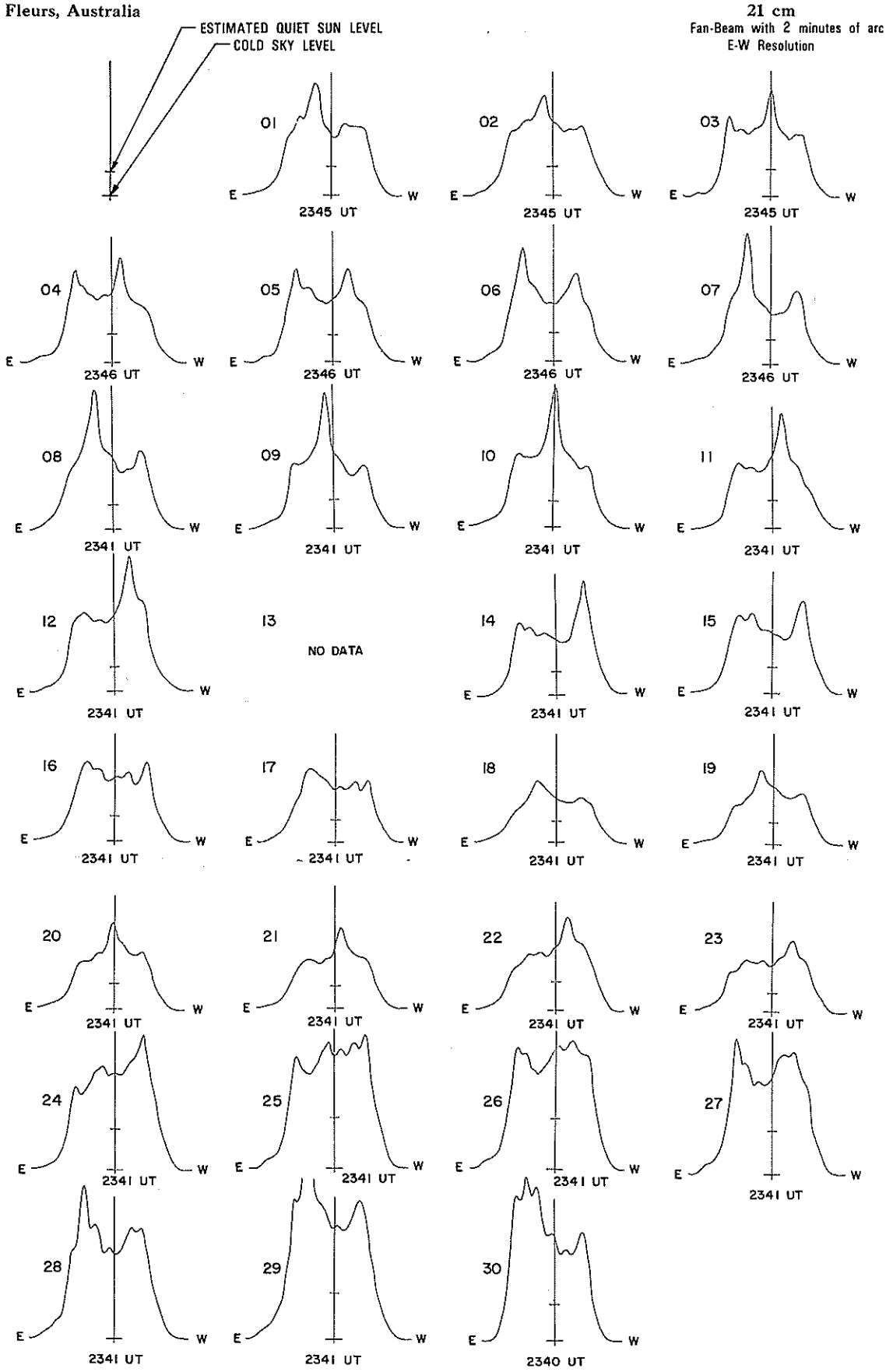
20
Aug 78

EAST-WEST SOLAR SCANS

AUGUST 1978

Fleurs, Australia

21 cm
Fan-Beam with 2 minutes of arc
E-W Resolution

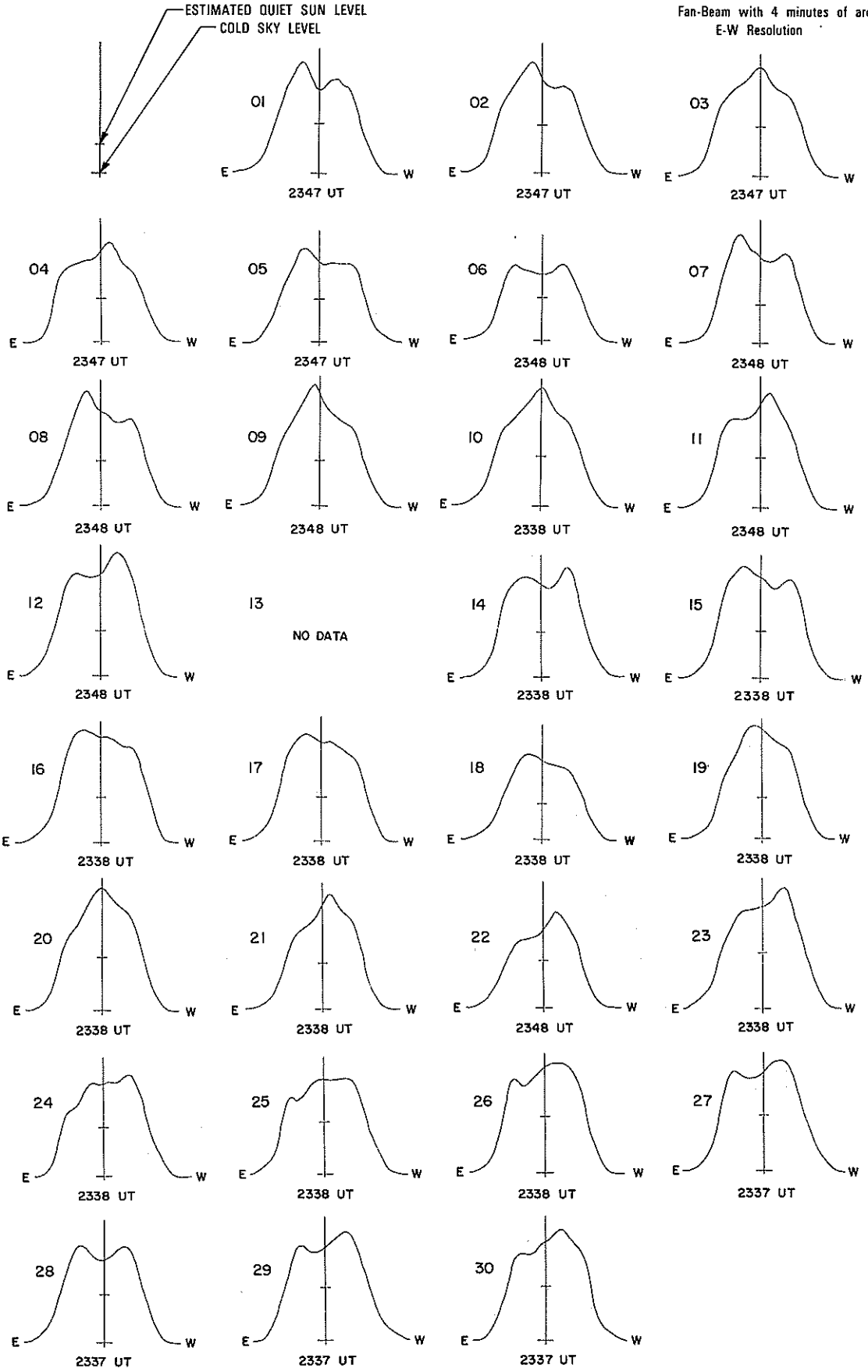


EAST-WEST SOLAR SCANS

AUGUST 1978

Fleurs, Australia

43 cm
Fan-Beam with 4 minutes of arc
E-W Resolution



SOLAR RADIO EMISSION
SELECTED FIXED FREQUENCY EVENTS

AUGUST 1978

AUG 1978	FREQUENCY STATION	TYPE	STARTING TIME UT	TIME OF MAXIMUM UT	DURATION MINUTES	FLUX DENSITY $10^{-22} Wm^{-2} Hz^{-1}$ PEAK	MEAN	INT	REMARKS
1	2800 OTTA	240 R	2035	2300	145	3.6	1.5		
3	2695 BOUL	40 F	1840	1841.5	6.5	9	3		
	2695 PENT	240 R	2310	2400	50	2.2	.8		
4	2800 OTTA	40 F	1335.5	1338.9	6.5	13.2			
	2800 OTTA	8 S	1625	1625	.1	2.2			
6	2695 BOUL	2 SF	0115.5	0116.5	2.5	5	2		
	2800 OTTA	1 S	1251.5	1252	3	5.6	1.9		
	2695 BOUL	1 S	1252	1252.5	1	3	1		
	2800 OTTA	27 RF	1955		265	2.2	1.9		
	2800 OTTA	24 R	1955	2045	50	2.2	1.1		
	2800 OTTA	24P R	2045		195	2.2			
	2695 PENT	26 FAL	2400	2410	20	-2.2	-1.1		
7	2800 OTTA	20 GRF	1228	1303	65	2	1.6		
	2800 OTTA	240 R	1335	1350	15	2	1		
	2800 OTTA	20 GRF	1425	1432	12	2	1		
	2800 OTTA	240 R	1500	1545	45	3.2	1.6		
	2800 OTTA	21 GRF	1705	1753	85	2.4	1.2		
	8800 SGMR	3 S	1754.7	1755	7	27	10.8		2
	2800 OTTA	4 S/F	1754.8	1755.1	5	29	10		
	2695 SGMR	3 S	1755	1755.3	10.4	18.6	7.5		2
	2695 BOUL	4 SF	1755	1755.5	3	30	10		
	2695 PENT	21 GRF	2110	2325	250	7	2.7		
	2695 PENT	8 S	2310.5	2310.5	.1	2.2			
	8800 MANI	3 S	2313.6	2315.6	3.6	131.5	43.8		
	2695 MANI	3 S	2313.9	2315.2	2.4	32.7	10.9		
	2695 PENT	3 S	2313	2315.5	7	23.4	5.2		
	2695 BOUL	4 SF	2314	2316	4.5	19	6		
9	2800 OTTA	20 GRF	1535	1610	240	6.2	3.1		
	2800 OTTA	1 S	2146	2148	8	1.6	.8		
10	2800 OTTA	20 GRF	1325	1328	13	2.6	1.3		
	2800 OTTA	20 GRF	1540	1550	20	1.8	.9		
	2800 OTTA	20 GRF	1740	1755	30	1.4	.7		
	2800 OTTA	20 GRF	1940	1952	15	1.6	.8		
11	2800 OTTA	20 GRF	1211.5	1212	18	3	1		
12	2800 OTTA	1 S	2121.8	2123	4	1.2	.6		
13	2800 OTTA	24 R	1103	1126	23	2.6	1.3		
	2800 OTTA	27 RF	1103		170	2.6	1.8		
	2800 OTTA	24P R	1126		59	2.6			
	2800 OTTA	26 FAL	1225	1353	88	-2.6	-1.3		
	2800 OTTA	24 R	1425	1455	30	2.2	1.1		
	2800 OTTA	27A RF	1425		485	2.2	2		
	2800 OTTA	24P R	1455		405	2.2			
	2800 OTTA	27 RF	1731		134	2	1.7		
	2800 OTTA	24 R	1731	1733	2	2	1		
	2800 OTTA	24P R	1733		97	2			
	2800 OTTA	26 FAL	1910	1945	35	-2	-1.2		
	2800 OTTA	26 FAL	2140	2230	50	-1.8	-.9		
14	2695 PENT	1 S	0016.3	0017	2	3.6	1.8		
	2800 OTTA	1 S	1618	1618.9	2	2	.7		
	2800 OTTA	22 GRF	1730	1855	225	3.8	2.2		
	2695 PENT	26 FAL	2350	2430	40	-2.2	-1.1		
15	10400 BERN	4	1013.6	1015.4	19	50			
	2800 OTTA	20 GRF	1330	1550	240	5.6	3		
	2800 OTTA	20 GRF	1825	1839	35	3.4	1.6		
	2800 OTTA	20 GRF	1925	1950	95	2.2	1.1		
	2695 PENT	20 GRF	2200	2300	90	2.2	1.1		
16	8400 BERN	23	1203.2	1205.2	5	17			OPR
	10400 BERN	23	1203.2	1205.2	5	8 U			OPR
	8900 BERN	23	1203.2	1205.2	5	14			OPR
	2800 OTTA	21 GRF	1322	1325	70	4			
	8900 BERN	23	1324.3	1327.7	11	20			OPR
	8400 BERN	23	1324.3	1327.7	11	25			OPR
	10400 BERN	23	1324.3	1327.7	11	9 U			OPR
	2800 OTTA	1 S	1330	1333.5	5	3.2	1.5		
	2800 OTTA	20 GRF	1955	2035	155	2.8	1.4		
17	2800 OTTA	21 GRF	1310		270	4.4	2.2		
	2800 OTTA	1 S	1630.5	1632	5	1.4	.7		
	2800 OTTA	21 GRF	1903	1955	180	5	2.5		
	2800 OTTA	1 S	1935	1937	9	3.6	1.7		
18	2800 OTTA	21 GRF	1115	1243	360	3.2	1.6		

SOLAR RADIO EMISSION
SELECTED FIXED FREQUENCY EVENTS

AUGUST 1978

AUG 1978	FREQUENCY	STATION	TYPE	STARTING TIME UT	TIME OF MAXIMUM UT	DURATION MINUTES	FLUX DENSITY $10^{-22} Wm^{-2} Hz^{-1}$ PEAK	MEAN	INT	REMARKS
	2800	OTTA	20 GRF	1154	1156	20	2	1		
21	2800	OTTA	20 GRF	1705	1800	175	3.6	2		
22	2800	OTTA	20 GRF	1525	1550	35	1.4	.7		
	2800	OTTA	240 R	2147	2150	3	1.2	.6		
23	2800	OTTA	20 GRF	1120	1250	330	4.2	2.1		
24	2800	OTTA	20 GRF	1727	1810	110	1.2	.7		
25	2800	OTTA	20 GRF	1200	1207	90	3.6	1.2		
27	2800	OTTA	240 R	1237	1357	80	2.8	1.4		
	2800	OTTA	20 GRF	1545	1725	175	5.2	3.3		
	2800	OTTA	27A RF	1924		135	1.2	1		
	2800	OTTA	24 R	1924	1946	22	1.2	.6		
	2800	OTTA	1 S	1944	1945.3	2.5	2.2	.8		
	2800	OTTA	24P R	1946		96	1.2			
	2800	OTTA	2 S/F	2037	2037.5	5	5.4	1.8		
	2695	BOUL	45 C	2038	2038	2	3	1		
	2800	OTTA	26 FAL	2122	2139	17	-1.2	-.6		
28	2800	OTTA	240 R	1455	1500	5	1.6	.8		
	2800	OTTA	20 GRF	1545	1640	115	1.8	.9		
29	2695	MANI	3 S	0252.5	0252.9	2.5	41.6	13.5		
	8800	MANI	3 S	0253.3	0252.9	1.5	8.5	3.6		
	8400	BERN	22	1411.1	1411.8	3	13 U			
	10400	BERN	22	1411.1	1411.8	3	8 U			
	8900	BERN	22	1411.1	1411.8	3	12 U			
	2695	BOUL	4 SF	1412	1413	3	13	4		
	2800	OTTA	1 S	1801	1801.2	1	1.4	.7		
	2695	PENT	240AR	2005	2030	25	2.2	1.1		
	2695	PENT	1 S	2024.5	2026.5	3.5	4	2		
	2695	BOUL	2 SF	2026 E	2027.5	3 D	4	1		
30	2800	OTTA	2 S/F	1339	1340	7	3	1		
	2800	OTTA	240 R	1440	1510	30	2.6	1		
	10400	BERN	46	1536	1542.9	54	119			
	8900	BERN	46	1536	1542.9	54	169			
	8400	BERN	46	1536	1542.9	54	162			
	10400	BERN	46	1536	1538.3	54	53			
	8900	BERN	46	1536	1538.3	54	68			
	8400	BERN	46	1536	1538.3	54	70			
	2800	OTTA	240AR	1536	1800	144	4.4			
	8800	SGMR	3 S	1537	1542.6	26	165	66		SWF
	2800	OTTA	45 C	1537	1544	23	84	18.6		
	2800	OTTA	30 PBI	1600	1600	115	9.8	4.9		
	2695	SGMR	3 S	1538	1545.3	25	93	37.2		SWF
	2695	BOUL	41 F	1538.5	1645.5	114.50	153	51		
	2800	OTTA	2 S/F	1610.5	1611.3	2	4.4	2		
	2800	OTTA	3 S	1612.9	1613.5	4	12	3.4		
	2695	SGMR	3 S	1613	1613.7	4.5	10.5	3.2		CONT
	2800	OTTA	1 S	1618.2	1618.7	1.8	2.6	1.3		
	2695	SGMR	3 S	1630.6	1650.3	52.6	166	66.4		CONT
	2800	OTTA	4 S/F	1630	1645	65	170	39		
	8800	SGMR	3 S	1631.2	1644.8	48.1	132	52.8		CONT
	8900	BERN	4	1633.2	1644.4	60	103			
	8400	BERN	4	1633.2	1644.4	60	112			
	10400	BERN	4	1633.2	1644.4	60	112			
	2800	OTTA	1 S	2059	2059.5	1	7.6	3		
	2695	BOUL	1 S	2100	2100.5	1	8	3		
31	2800	OTTA	20 GRF	1300	1350	140	4.4	2.6		
	2800	OTTA	22 GRF	1530	1600	205	4	2		
	2800	OTTA	22 GRF	1920	2035	160	4.6	2.6		

Observatories:

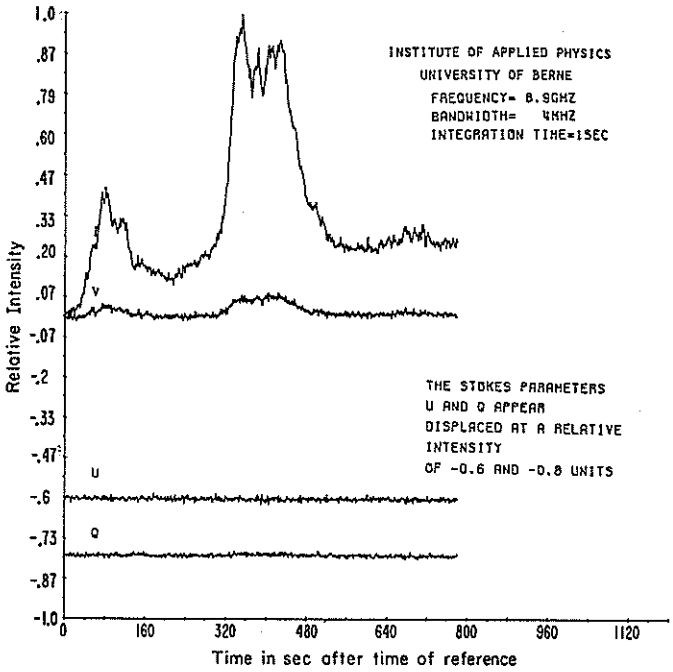
BERN = Berne BOUL = Boulder MANI = Manila OTTA = Ottawa ARO PENT = Penticton SGMR = Sagamore Hill

Explanation of Type Code:

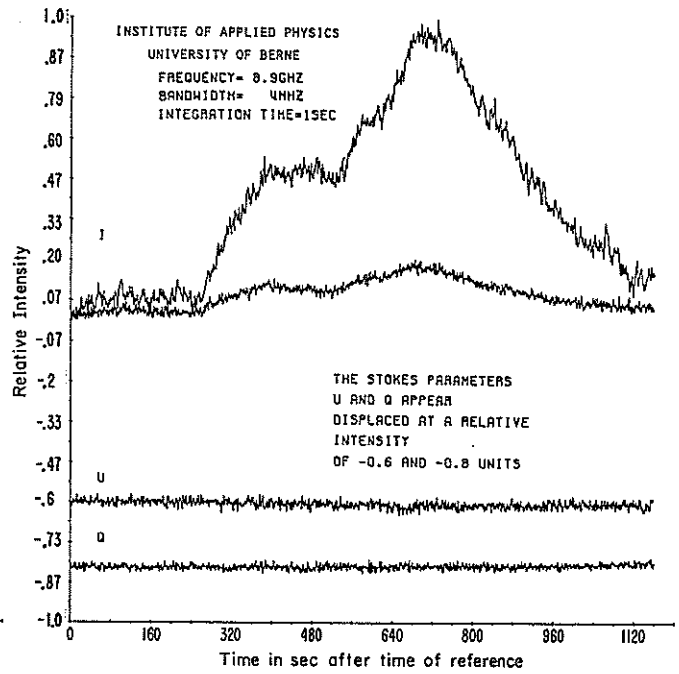
1 Simple 1	6 Minor	22 Simple 3F	27 Rise and Fall	32 Absorption	44 Noise Storm in Progress
2 Simple 1F	7 Minor +	23 Simple 3AF	28 Precursor	40 Fluctuation	45 Complex
3 Simple 2	8 Spike	24 Rise	29 Post Burst Increase	41 Group of Bursts	46 Complex F
4 Simple 2F	20 Simple 3	25 Rise A	30 Post Burst Increase A	42 Series of Bursts	47 Great Burst
5 Simple	21 Simple 3A	26 Fall	31 Post Burst Decrease	43 Onset of Noise Storm	48 Major
					49 Major +

SELECTED SOLAR NOISE BURSTS

30 August 1978



30 Aug 1978 1537 UT
1 Unit = 159 SFU



30 Aug 1978 1633 UT
1 Unit = 112 SFU

SOLAR X-RAYS BY SATELLITE
SMS GOES
AUGUST 1978

.5 - 4Å Hourly Averages (10^{-5} watts/m^2)

MO DA	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Mean
8/ 1	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
8/ 2	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
8/ 3	B	B	B	B	.001	B	B	B	B	B	.004	B	B	B	.001	B	B	B	B	B	B	B	B	B	B
8/ 4	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
8/ 5	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
8/ 6	B	B	B	B	B	B	B	B	B	B	.001	.002	.001	B	B	B	B	B	B	B	.001	.001	B	B	B
8/ 7	B	B	B	B	B	B	B	B	B	B	B	.004	B	B	.002	.004	.002	.005	.002	.001	.001	.002	.002	.023	.004
8/ 8	.002	.001	.002	.002	.002	.003	.002	B	B	B	B	B	B	B	.001	B	B	B	.001	B	B	.001	B	B	B
8/ 9	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	.001	.002	B	B	B	B	B	B	B	B
8/10	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
8/11	B	B	B	.001	B	B	B	B	B	B	B	.001	B	B	B	B	B	B	B	B	B	B	.001	B	B
8/12	B	B	B	B	B	B	B	B	B	B	B	.002	B	B	B	B	B	B	B	B	B	B	B	B	B
8/13	B	B	B	B	B	B	B	B	B	B	.001	.003	.002	B	B	.002	B	.002	.003	.001	B	B	B	B	.001
8/14	.004	.001	B	B	B	B	.006	B	.008	.005	.001	B	B	B	B	B	.001	.003	.002	.001	.002	.003	B	B	.001
8/15	B	.004	.002	.002	B	B	B	B	.001	B	.010	B	B	.001	B	.007	.001	B	.003	B	B	B	.003	B	.002
8/16	B	B	B	B	B	.001	.004	B	B	.003	B	B	.002	.033	B	B	B	.002	B	B	.002	B	B	B	.004
8/17	.002	B	B	.003	B	B	B	B	B	B	B	B	.041	.002	.002	B	B	B	B	.003	.001	B	B	B	.004
8/18	B	M	B	B	B	B	B	B	B	B	B	B	.002	B	B	B	B	B	B	B	B	B	B	B	B
8/19	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
8/20	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
8/21	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
8/22	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
8/23	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
8/24	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
8/25	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
8/26	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	.001	B	B	B
8/27	B	B	.001	B	B	.002	B	.001	.002	.007	B	B	.002	B	B	.001	.017	.002	.003	B	.004	B	B	.002	.003
8/28	B	B	B	B	B	.001	B	B	B	B	.002	B	B	B	B	B	.002	B	B	B	B	B	B	B	B
8/29	B	.006	B	B	B	B	.002	B	B	B	B	B	B	B	B	B	B	B	.003	.002	.006	.002	.001	B	.001
8/30	B	B	B	.002	B	B	B	.002	B	B	B	B	B	B	B	.130	.034	.006	.005	.004	.002	.001	.002	.003	.015
8/31	B	.002	.001	.003	.015	.019	.002	.001	.001	.001	B	B	.001	.002	B	B	.002	.007	.002	.003	.002	.001	.001	.001	.002

Note: "B" indicates the flux was below the cut-off levels.
"M" denotes periods of missing data.

SOLAR X-RAYS BY SATELLITE
SMS GOES
AUGUST 1978

1 - 8Å Hourly Averages (10^{-4} watts/m^2)

MO DA	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Mean
8/ 1	.001	.002	.001	.002	.001	.002	.002	.001	.001	.001	.001	.001	.001	.001	.001	.001	.002	.001	.001	.001	.001	.001	.003	.002	B
8/ 2	.002	.002	.001	.001	.001	.002	.001	.001	.001	.001	.001	.002	.002	.001	.001	.002	.002	.002	.002	.002	.002	.002	.002	.002	B
8/ 3	.002	.002	.004	.003	.005	.005	.003	.003	.002	.003	.002	.003	.002	.002	.004	.003	.002	.002	.003	.004	.003	.004	.002	.005	.002
8/ 4	.005	.005	.005	.003	.003	.003	.003	.003	.003	.002	.002	.002	.002	.002	.002	.002	.003	.002	.002	.003	.002	.002	.002	.002	.001
8/ 5	.002	.002	.002	.003	.002	.002	.002	.002	.003	.002	.003	.004	.003	.004	.003	.003	.003	.004	.004	.004	.003	.003	.003	.003	.002
8/ 6	.004	.003	.003	.005	.003	.003	.004	.004	.003	.004	.006	.009	.006	.004	.003	.004	.004	.004	.004	.004	.006	.006	.005	.004	.003
8/ 7	.003	.003	.003	.003	.003	.003	.004	.003	.004	.004	.004	.010	.006	.005	.002	.012	.010	.010	.007	.005	.005	.002	.007	.009	.007
8/ 8	.010	.006	.006	.002	.002	.009	.009	.006	.003	.003	.003	.004	.005	.004	.006	.005	.004	.004	.003	.003	.004	.005	.004	.004	.002
8/ 9	.003	.003	.004	.004	.004	.004	.004	.004	.003	.003	.003	.003	.003	.003	.003	.005	.002	.004	.003	.003	.003	.003	.003	.003	.002
8/10	.003	.003	.004	.004	.004	.004	.003	.003	.003	.003	.003	.003	.003	.004	.003	.004	.004	.004	.003	.003	.003	.003	.002	.003	.002
8/11	.003	.003	.004	.005	.004	.003	.002	.003	.004	.003	.003	.005	.005	.003	.003	.003	.003	.003	.003	.003	.003	.003	.004	.003	.002
8/12	.003	.004	.003	.003	.003	.003	.002	.002	.003	.003	.003	.002	.003	.003	.003	.003	.003	.004	.005	.004	.004	.004	.004	.005	.002
8/13	.004	.005	.005	.004	.005	.003	.004	.004	.006	.006	.007	.011	.010	.006	.007	.009	.007	.009	.011	.006	.005	.005	.005	.005	.004
8/14	.011	.007	.005	.005	.005	.005	.014	.006	.020	.021	.010	.002	.007	.016	.005	.005	.007	.010	.010	.002	.009	.010	.007	.006	.005
8/15	.006	.011	.002	.007	.005	.006	.006	.007	.002	.007	.014	.005	.005	.006	.007	.013	.002	.005	.010	.007	.006	.005	.012	.006	.005
8/16	.004	.004	.005	.005	.006	.006	.014	.007	.004	.009	.005	.004	.007	.035	.007	.003	.004	.004	.005	.005	.002	.005	.004	.005	.006
8/17	.009	.006	.005	.002	.004	.005	.004	.005	.005	.004	.004	.004	.004	.009	.009	.005	.005	.004	.004	.009	.007	.004	.004	.004	.005
8/18	.004	M	.005	.005	.004	.004	.004	.004	.003	.006	.003	.003	.006	.006	.003	.002	.002	.003	.002	.003	.002	.002	.003	.002	.002
8/19	.002	.002	.003	.003	.002	.002	.002	.002	.002	.002	.002	.002	.002	.002	.002	.002	.001	.002	.001	.002	.002	.001	.001	.001	B
8/20	.002	.002	.002	.003	.001	.002	.002	.001	.001	.001	.001	.001	.002	.002	.002	.001	.002	.001	.002	.002	.002	.002	.001	.001	B
8/21	.001	.001	.001	.001	.001	.001	.001	.001	.001	.001	.001	.001	.001	.002	.001	.001	.001	.004	.003	.002	.002	.001	.001	.001	B
8/22	.002	.001	.001	.001	.002	.002	.002	.002	.002	.001	.002	.001	.001	.001	.001	.002	.004	.002	.002	.002	.002	.002	.002	.002	B
8/23	.002	.002	.002	.001	.002	.001	.001	.002	.002	.002	.002	.002	.003	.002	.002	.002	.001	.001	.001	.001	.001	.001	.003	.002	B
8/24	.002	.002	.002	.002	.002	.002	.003	.002	.002	.002	.001	.002	.001	.002	.002	.002	.002	.002	.003	.002	.002	.002	.001	.002	B
8/25	.001	.001	.002	.001	.002	.002	.001	.002	.001	.002	.002	.002	.004	.002	.002	.002	.002	.002	.002	.001	.001	.001	.001	.002	.001
8/26	.002	.002	.001	.001	.001	.002	.001	.001	.002	.001	.001	.001	.001	.001	.001	.002	.001	.001	.001	.001	.002	.003	.003	.003	.001
8/27	.002	.003	.003	.004	.003	.006	.003	.004	.006	.015	.007	.004	.007	.005	.004	.005	.029	.013	.009	.009	.002	.003	.003	.005	.006
8/28	.003	.003	.004	.005	.003	.005	.004	.004	.004	.004	.006	.003	.004	.003	.003	.004	.006	.004	.004	.004	.004	.004	.004	.004	.002
8/29	.005	.013	.005	.005	.007	.006	.006	.004	.005	.005	.005	.004	.004	.003	.005	.004	.004	.004	.007	.005	.011	.006	.006	.005	.003
8/30	.004	.005	.004	.006	.005	.006	.005	.007	.005	.005	.006	.005	.005	.006	.006	.003	.049	.016	.014	.012	.010	.009	.009	.012	.017
8/31	.007	.007	.007	.009	.026	.021	.007	.008	.002	.002	.007	.007	.008	.013	.010	.010	.012	.015	.002	.009	.002	.007	.009	.002	.006

Note: "B" indicates the flux was below the cut-off levels.
"M" denotes periods of missing data.

SOLAR X-RAYS BY SATELLITE

GOES

AUGUST 1978

DAY	BEGIN TIME	.5-4A Wm^{-2}	1-8A Wm^{-2}	MAX TIME	.5-4A Wm^{-2}	1-8A Wm^{-2}	1/2P TIME	.5-4A Wm^{-2}	1-8A Wm^{-2}
3	0957	1.7E-08	4.8E-07	1005	2.5E-07	2.7E-06	1010	7.7E-08	1.5E-06
5	1348	0.0E+00	2.6E-07	1356	1.0E-07	1.8E-06	1359	2.8E-08	9.4E-07
6	1250	4.1E-09	5.1E-07	1253	8.5E-08	1.4E-06	1258	2.2E-08	9.3E-07
7	1107	1.1E-08	5.2E-07	1123	8.8E-08	1.8E-06	1133	3.6E-08	1.1E-06
7	1753	2.7E-08	9.4E-07	1758	4.2E-07	3.5E-06	1802	8.8E-08	1.8E-06
7	2307	7.0E-08	1.2E-06	2322	6.9E-07	5.1E-06	2341	1.4E-07	3.1E-06
8	0157	1.1E-08	5.1E-07	0201	8.1E-08	1.3E-06	0203	2.9E-08	8.1E-07
11	0339	4.9E-09	4.0E-07	0344	7.2E-08	1.1E-06	0348	1.9E-08	7.3E-07
12	1108	6.4E-09	3.7E-07	1119	8.4E-08	2.0E-06	1126	3.9E-08	1.1E-06
13	1055	1.3E-08	7.7E-07	1101	7.6E-08	2.0E-06	1120	3.9E-08	1.4E-06
13	1218	5.7E-09	6.8E-07	1223	1.1E-07	1.9E-06	1232	3.2E-08	1.2E-06
13	1422	5.4E-09	4.9E-07	1537	2.4E-08	1.1E-06	1600	7.6E-09	8.2E-07
13	1755	1.6E-08	8.2E-07	1801	1.5E-07	2.8E-06	1805	5.8E-08	1.7E-06
14	0003	3.9E-09	5.2E-07	0020	1.3E-07	2.2E-06	0030	3.9E-08	1.3E-06
14	0122	3.9E-09	5.6E-07	0128	7.1E-08	1.4E-06	0132	1.6E-08	9.3E-07
14	0609	2.7E-08	8.0E-07	0621	1.9E-07	3.0E-06	0631	5.2E-08	1.9E-06
14	0819	1.9E-08	8.9E-07	0841	1.4E-07	3.4E-06	0933	4.4E-08	2.1E-06
14	1734	7.2E-09	6.9E-07	1742	1.3E-07	2.4E-06	1749	3.8E-08	1.5E-06
14	2011	2.1E-08	8.7E-07	2017	6.4E-08	1.4E-06	2024	2.3E-08	1.1E-06
14	2056	2.3E-08	8.5E-07	2106	9.4E-08	1.9E-06	2112	3.2E-08	1.3E-06
15	0125	3.1E-08	9.1E-07	0134	1.3E-07	2.4E-06	0142	5.2E-08	1.6E-06
15	0239	8.6E-09	7.3E-07	0243	4.7E-08	1.1E-06	0246	2.4E-08	9.0E-07
15	0320	1.2E-08	7.4E-07	0323	3.8E-08	1.0E-06	0326	2.3E-08	8.4E-07
15	0842	5.1E-09	7.4E-07	0847	3.8E-08	1.2E-06	0852	1.2E-08	9.7E-07
15	1011	6.4E-09	6.0E-07	1017	1.1E-06	6.4E-06	1023	1.5E-07	3.3E-06
15	1542	2.3E-08	9.3E-07	1549	3.5E-07	3.4E-06	1602	6.2E-08	1.9E-06
15	1829	2.4E-08	7.7E-07	1844	1.3E-07	2.6E-06	1849	3.7E-08	1.6E-06
15	2201	2.9E-08	9.6E-07	2205	7.5E-08	1.9E-06	2220	4.2E-08	1.4E-06
16	0551	1.0E-08	6.2E-07	0557	8.1E-08	1.4E-06	0605	2.4E-08	1.0E-06
16	0632	2.9E-08	1.1E-06	0641	1.3E-07	2.5E-06	0649	4.4E-08	1.8E-06
16	0908	2.1E-09	4.1E-07	0928	7.3E-08	1.5E-06	0938	1.5E-08	8.6E-07
16	1201	4.4E-09	4.7E-07	1206	9.3E-08	1.4E-06	1220	2.5E-08	9.2E-07
16	1321	1.8E-08	6.6E-07	1334	1.5E-06	1.0E-05	1346	2.6E-07	5.5E-06
17	0003	2.7E-08	1.1E-06	0006	6.1E-08	1.8E-06	0008	2.9E-08	1.1E-06
17	0337	5.6E-09	5.5E-07	0343	3.3E-07	3.5E-06	0348	4.5E-08	1.6E-06
17	1935	6.1E-09	5.5E-07	1944	7.6E-08	1.4E-06	2011	2.1E-08	9.7E-07
18	1237	2.2E-08	5.6E-07	1246	4.6E-08	1.0E-06	1308	1.7E-08	8.0E-07
25	1154	6.2E-10	1.7E-07	1208	6.4E-08	1.0E-06	1213	1.4E-08	5.5E-07
26	2149	2.9E-09	1.6E-07	2155	1.4E-07	1.7E-06	2201	2.8E-08	9.0E-07
27	0004	2.3E-09	1.6E-07	0007	1.2E-07	1.2E-06	0009	1.5E-08	4.2E-07
27	0135	2.9E-09	1.6E-07	0138	1.3E-07	1.3E-06	0140	2.4E-08	5.9E-07
27	0504	6.2E-09	3.2E-07	0527	1.2E-07	1.7E-06	0529	3.2E-08	9.1E-07
27	0820	3.1E-09	2.4E-07	0833	1.5E-07	1.9E-06	0836	4.6E-08	1.0E-06
27	0909	1.8E-08	6.5E-07	0926	2.3E-07	3.5E-06	0933	5.8E-08	1.9E-06
27	1213	2.9E-09	3.5E-07	1219	1.2E-07	1.8E-06	1225	3.5E-08	1.0E-06
27	1557	6.2E-09	5.0E-07	1628	9.1E-07	8.3E-06	1635	2.0E-07	4.3E-06
27	1840	5.9E-09	4.0E-07	1849	1.4E-07	2.3E-06	1900	4.2E-08	1.3E-06
27	2034	2.8E-09	3.0E-07	2039	4.8E-07	4.3E-06	2044	8.2E-08	2.1E-06
27	2332	3.2E-09	2.5E-07	2346	6.2E-08	1.1E-06	2355	1.3E-08	6.7E-07
28	0341	2.6E-09	3.2E-07	0350	4.4E-08	1.0E-06	0355	1.3E-08	6.7E-07
28	0533	3.4E-09	2.7E-07	0539	6.4E-08	1.0E-06	0551	1.2E-08	5.8E-07
28	0859	2.8E-08	6.7E-07	0108	1.3E-07	2.1E-06	0128	5.2E-08	1.3E-06
28	0602	1.1E-08	5.0E-07	0608	7.1E-08	1.0E-06	0615	2.5E-08	7.8E-07
29	1408	0.0E+00	2.9E-07	1413	7.5E-08	1.9E-06	1417	2.6E-08	1.0E-06
29	1800	8.9E-10	4.3E-07	1807	1.1E-07	1.3E-06	1822	1.0E-08	8.3E-07
29	2022	2.0E-08	5.6E-07	2033	1.8E-07	2.5E-06	2044	6.1E-08	1.5E-06
30	0259	1.5E-08	5.1E-07	0303	7.3E-08	1.2E-06	0306	3.3E-08	8.3E-07
30	1415	0.0E+00	5.1E-07	1419	9.4E-08	1.8E-06	1422	2.9E-08	9.9E-07
30	1501	3.3E-10	5.4E-07	1549	5.1E-06	2.9E-05	1559	1.4E-06	1.5E-05
30	1829	3.7E-08	1.2E-06	1836	1.5E-07	2.5E-06	1841	4.1E-08	1.7E-06
30	2237	7.3E-09	7.1E-07	2243	2.8E-07	2.4E-06	2245	5.5E-08	1.4E-06
30	2333	2.9E-08	1.2E-06	2336	6.4E-08	1.9E-06	2338	6.9E-08	1.6E-06
31	0059	5.1E-09	5.9E-07	0104	6.7E-08	1.3E-06	0107	1.6E-08	9.0E-07
31	0339	3.8E-08	1.0E-06	0342	9.0E-08	2.0E-06	0347	5.5E-08	1.4E-06
31	0402	3.4E-08	1.2E-06	0416	2.6E-07	3.5E-06	0425	9.7E-08	2.3E-06
31	0438	4.5E-08	1.6E-06	0441	4.6E-07	4.4E-06	0445	1.4E-07	2.7E-06
31	0503	1.5E-10	2.7E-08	0532	9.5E-07	6.3E-06	0542	1.5E-07	3.0E-06
31	0637	7.9E-09	5.9E-07	0641	1.1E-07	1.9E-06	0643	4.6E-08	1.2E-06
31	1547	6.9E-09	8.3E-07	1551	4.4E-08	1.9E-06	1601	1.9E-08	1.3E-06
31	1627	2.9E-08	1.3E-06	1630	4.5E-08	1.8E-06	1639	3.8E-08	1.6E-06
31	1656	1.7E-08	1.1E-06	1703	5.9E-07	5.5E-06	1709	1.2E-07	3.0E-06
31	1857	2.1E-08	7.5E-07	1907	3.9E-08	1.1E-06	1910	2.2E-08	9.2E-07
31	2248	5.2E-09	7.4E-07	2253	4.7E-08	1.7E-06	2255	2.7E-08	1.1E-06
31	2340	6.1E-09	7.2E-07	2347	4.5E-08	1.3E-06	2357	1.5E-08	1.0E-06

28
Aug 78

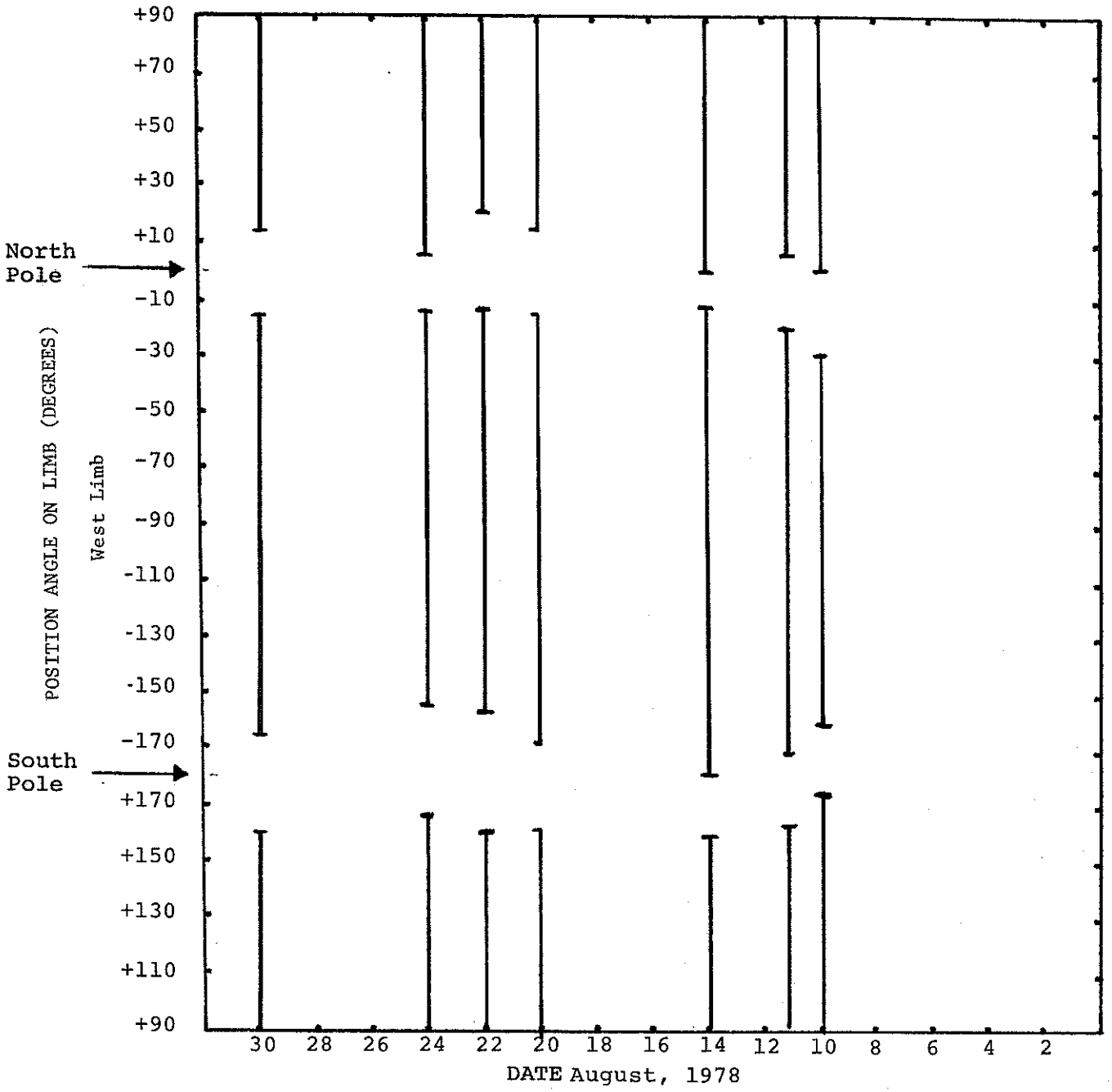
CORONAL HOLES

Helium D3 Chromosphere at Solar Limb

AUGUST 1978

Big Bear Solar Observatory

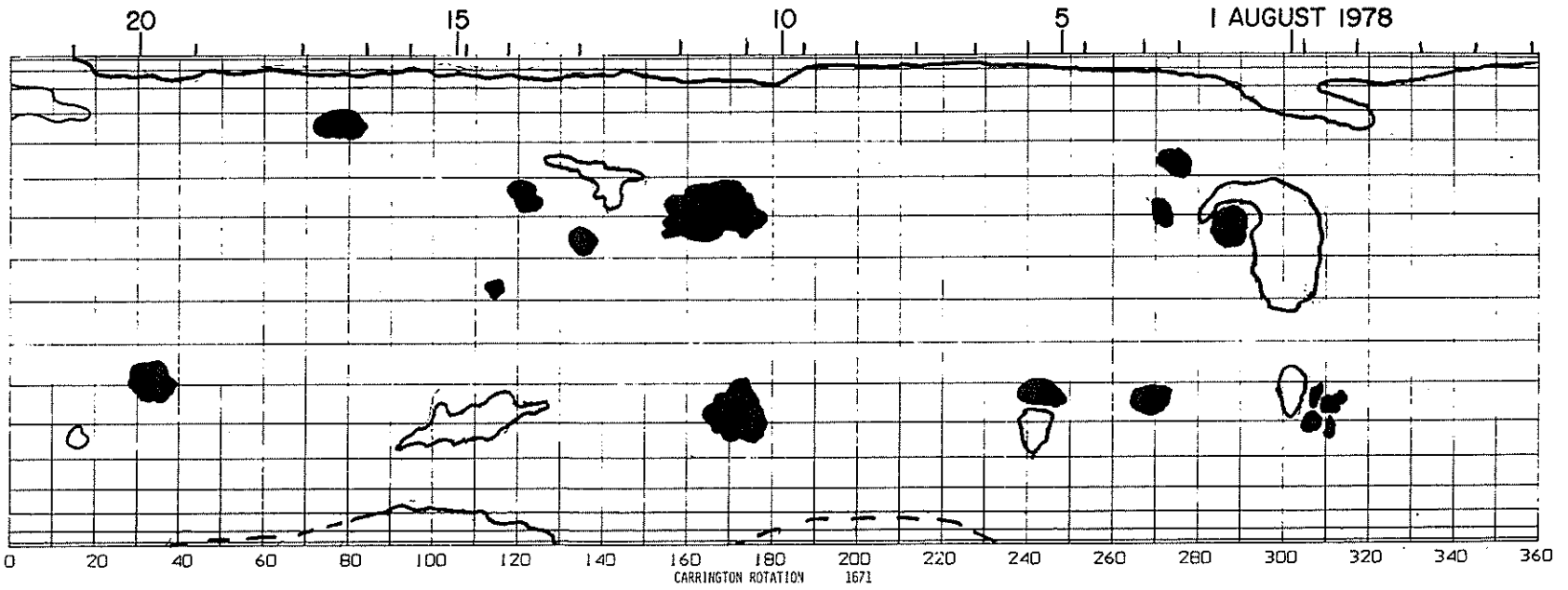
OBSERVATIONS OF D3 CHROMOSPHERE AT SOLAR LIMB



HELIUM 10830Å SYNOPTIC MAPS

CARRINGTON ROTATION 1671

KITT PEAK NATIONAL OBSERVATORY



29
Aug 78

INFERRED IP MAGNETIC FIELD

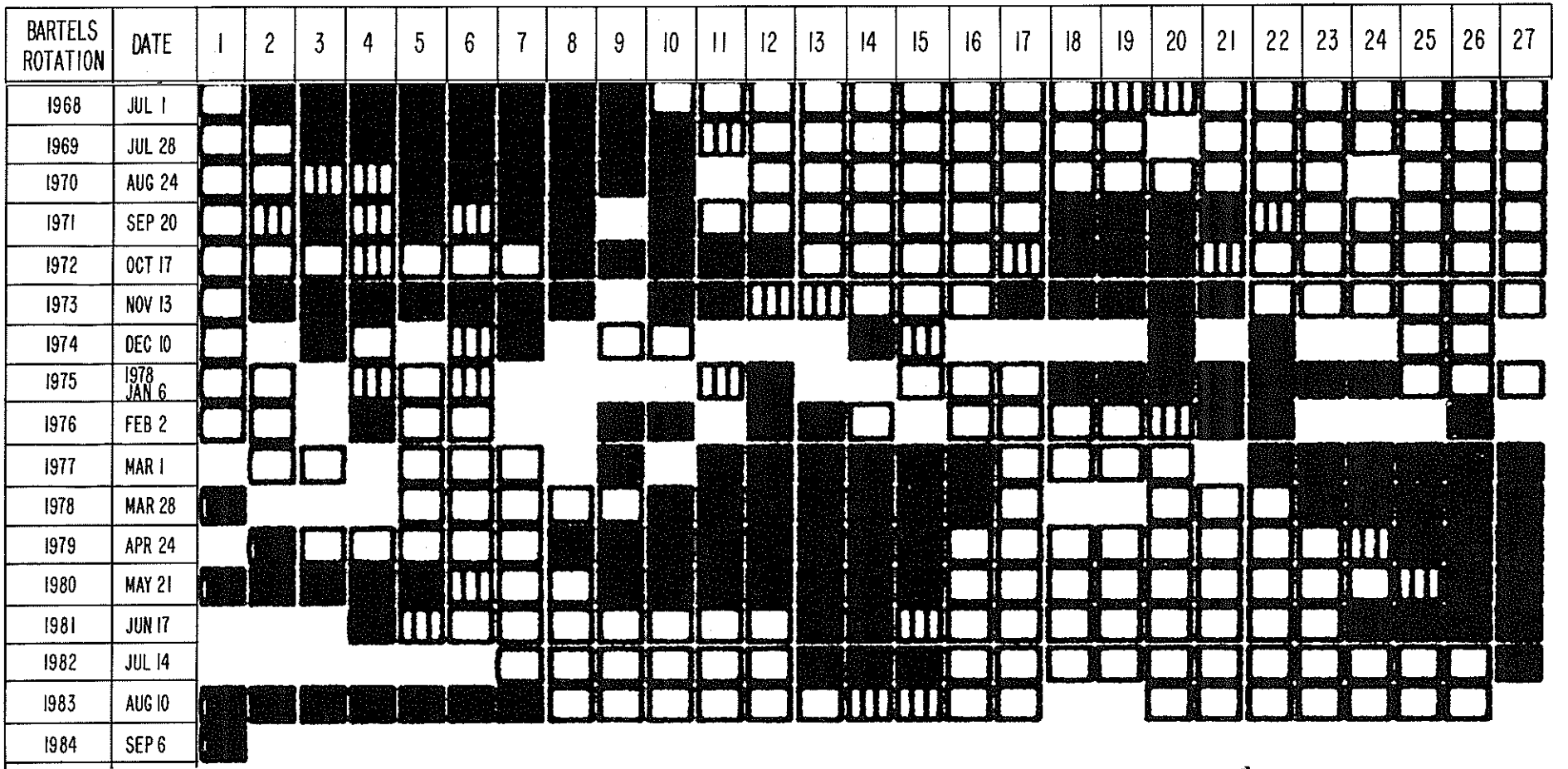
BARTELS ROTATION	DATE	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27
1967	JUN 9								TA		-			TA						AT A*					AT *	A*		TA TA
1968	JUL 6										A*			T*	TA	TA		T*			AT			-	AT		-	
1969	AUG 2		TA						TA	-			TA	*								AT	TA					
1970	AUG 29			-	-	-		TA										AT	AT			AT	TA	TA -	AT	AT		
1971	SEP 25						-	-	-	-	-	-					TA				TA							
1972	OCT 22					-	AT														AT AT					*		
1973	NOV 18			TA	AT						-		AT							*			*		*			
1974	DEC 15				-	-	-		AT -		AT				AT	AT		AT		TA		TA		TA			*	
1975	1978 JAN 11		*	*					*		*	*						*			TA	-	AT			-		-
1976	FEB 7						*	TA				-			-						-		*			TA	A*	TA
1977	MAR 6	TA		-					AT			T*	*					TA			AT AT		AT	AT	*	TA		
1978	APR 2							*	-		AT											AT AT						
1979	APR 29		TA		*		TA	AT AT	TA		-	-	T*							TA TA			AT					
1980	MAY 26				TA		AT	AT				-				AT	TA				-					-	-	-
1981	JUN 22	TA					A*					—	TA	TA TA		AT			*				*	AT	AT -		AT	
1982	JUL 19									TA							-	-		TA				AT	AT *		TA	
1983	AUG 15					TA			AT		AT AT			AT	TA													

= definitely towards the sun = definitely away from the sun

T = towards the sun A = away from the sun * = effect doubtful or not discernible - = missing data

The table shows daily inferences of the polarity of the interplanetary magnetic field. The first half of the day is based principally on magnetograms produced by the magnetometer at the Vostok Antarctic Station of the USSR. The magnetometer of the U.S. Air Weather Service now operated at Thule by the Danish Meteorological Institute is used for the second half of the day.

STANFORD MEAN SOLAR MAGNETIC FIELD



POLARITY OF THE MEAN SOLAR MAGNETIC FIELD: □ = FIELD >2μT, ▥ = -2μT ≤FIELD ≤2μT, ■ = FIELD <-2μT

No box visible indicates no data available for that day.

Note: Data are taken daily at 2000 UT. Dates given are not Bartels Rotation dates. These earlier dates correspond to the occurrence of phenomena on the sun which affect the Earth during the given Bartels Rotation.

STANFORD MEAN SOLAR MAGNETIC FIELD (MICROTESLA)

	1977				1978							
	SEPT.	OCT.	NOV.	DEC.	JAN.	FEB.	MARCH	APRIL	MAY	JUNE	JULY	AUG.
DAY												
01	-9	9	6	-14	.	16	.	52	-12	-28	1	40
02	-13	6	1	-10	.	31	22	46	-34	-22	13	39
03	.	3	-14	-7	14	26	12	43	-27	-12	15	42
04	3	13	-16	8	31	.	.	13	-27	-5	18	39
05	12	13	-11	26	.	-5	8	4	-29	6	24	31
06	18	11	-1	46	27	4	11	-15	-27	5	43	29
07	22	-6	11	55	15	9	4	-32	-23	21	42	30
08	17	-13	31	53	.	.	.	-53	-12	33	36	17
09	8	-13	46	46	-1	.	-31	-52	3	41	16	-11
10	4	-4	48	26	11	-28	.	-41	24	40	-11	-10
11	6	2	51	.	0	-43	-70	-32	41	23	-17	-15
12	13	12	32	-2	.	.	-78	-4	50	12	-12	-22
13	19	28	14	10	.	-41	-56	22	47	8	-38	-33
14	23	35	-4	.	.	-23	-49	.	30	0	.	-43
15	40	46	-10	1	.	3	-28	.	16	-24	.	-31
16	.	39	-18	-6	0	.	-3	58	5	-38	.	-9
17	38	20	-24	.	-3	31	18	37	1	.	.	5
18	41	6	-5	6	.	22	54	11	-29	.	.	13
19	31	6	-11	8	.	37	48	-9	-49	.	.	7
20	17	1	-12	.	18	22	24	-30	-75	-16	23	7
21	2	3	.	.	39	-1	.	-49	-79	0	21	5
22	-3	7	-7	.	10	-18	-23	-50	-59	24	16	4
23	-2	3	-4	-5	-4	-49	-49	-62	-37	51	6	-1
24	-6	-3	0	-1	-15	.	-69	.	-21	52	3	1
25	-1	-9	2	.	-17	.	-79	-13	-9	48	3	5
26	-3	-5	4	.	-36	.	-73	10	1	30	-7	18
27	-8	-5	7	.	-48	-34	-53	13	27	12	-13	.
28	.	-6	5	.	-33	.	-28	6	14	3	-6	.
29	-8	5	-2	-9	-15		.	13	-10	-5	14	41
30	3	6	-11	.	14		.	18	-20	-10	27	41
31		8		-20	10		.		-27		33	35

Dot symbol entry indicates no data available for the day.

SOLAR WIND

Interplanetary Scintillations

AUGUST 1978

DAY	3C48 VEL	3C48 ERR	3C144 VEL	3C144 ERR	3C147 VEL	3C147 ERR	3C161 VEL	3C161 ERR	3C237 VEL	3C237 ERR	3C273 VEL	3C273 ERR	3C298 VEL	3C298 ERR	3C459 VEL	3C459 ERR
1			232	8							368	9	264	37		
3			240	8			424	8			550	32	391	5		
4					347	13	435	59			429	48	480	10		
5	350	33	387	8	350	60					326	28	424	71		
6											412	16	339	32		
7	323	28									337	6				
8			430	11			327	21					319	33		
10			479	17	354	9	306	11					346	7		
11	368	6			288	8	274	8					367	6		
12	422	50	395	9	446	39	312	5			387	47	409	20		
13											338	14	336	19		
14	332	20	386	10			308	59			345	5	318	16		
15	369	64	373	12			384	6			304	29	368	5		
16			407	10							351	24	429	8		
17			379	11	271	15	361	12			416	7				
18	379	7	388	9	421	8	409	6					350	5		
19											333	53				
20	363	9	410	14	369	22	527	21					243	7		
21	331	17	417	*			362	*			318	6	274	6		
22	292	16	323	14	421	101	532	36			406	9	363	30		
23	464	113	372	21	273	59	457	18			322	*	294	8		
24			356	*	420	*	355	*			307	*	319	*		
25	359	46	285	7			302	5			424	15	315	5		
26			244	9	495	9	340	13			313	4	323	8		
27	425	36	399	9	316	4	370	10			274	3	406	4		
28			428	7	467	29	396	7			405	6	405	4		
29	434	5	398	8	355	6	389	36			407	12	504	16		
30	451	36	452	10			429	9			371	19	475	12		
30													464	23		
31	559	13	391	10			600	23					359	51		

AUGUST	5 UT	5 LAT	5 DIST	5 DLON	15 UT	15 LAT	15 DIST	15 DLON	25 UT	25 LAT	25 DIST	25 DLON
3C48	13.	12.	1.08	15.	12.	12.	1.12	14.	12.	12.	1.16	12.
3C144	17.	6.	0.76	41.	16.	6.	0.86	31.	15.	6.	0.93	21.
3C147	16.	27.	0.79	33.	15.	21.	0.87	26.	15.	17.	0.93	19.
3C161	18.	-21.	0.71	36.	17.	-14.	0.79	31.	17.	-9.	0.87	25.
3C237	22.	-13.	0.31	-70.	21.	-25.	0.15	-77.	20.	-62.	0.07	67.
3C273	24.	6.	0.79	-38.	23.	7.	0.68	-47.	22.	9.	0.55	-57.
3C298	1.	10.	0.98	-17.	1.	12.	0.93	-21.	0.	16.	0.86	-30.
3C459	10.	8.	1.25	8.	9.	8.	1.27	6.	9.	9.	1.29	4.

* Indicates data for which no error estimate is available since only two antennas were operating.

3C298 observed at 0 hr. UT before August 30 and at 24 hr. UT after August 30.

BOULDER GEOMAGNETIC SUBSTORM LOG

AUGUST 1978

DATE	TIME OF ONSET	DIR.	COMMENTS
1			Quiet day
2			Quiet day
3			Mildly disturbed - no distinct onset
4	0250	East	
	0935	West	
5	0400	East	
	0640	East	
	0715	East	
	0835	East	
	1030	West	
6	0255	East	
	0555	West	
	0615	West	
	0640	West	
7	0740	West	
	1340		Oval stations only; Eskimo Pt. to Ft. Smith to Arctic Village
	1405		Oval stations only; Eskimo Pt. to Ft. Smith to Arctic Village
8	0235	East	Weak
	0700	≈center	Weak
	0735	≈center	Weak
	1115		Weak
	1420		Response NW Canada and Alaska
9	0425	East	Localized SS Lynn Lake eastward
	0900	West	
10	0745	West	
	1400		Confined to oval stations, Ft. Simpson westward
	1440		Confined to oval stations, Ft. Simpson westward
11	0510	East	Weak
	0530	East	Weak
	0610	East	Weak
	1350		Moderate
	1520		Moderate, slow onset
	1600		Moderate, slow onset
12	0520	East	Weak
	0555	East	Weak
	0650	Centered	Strong SS
	0935		
	1055		Moderate SS, strong Lynn Lake to Back
	1115		Moderate SS, strong Lynn Lake to Back
13	0225	East	
	0655	≈center	Weak
	1025	West	Moderate SS, strong at College
	1215	West	Weak
	1250	West	Moderate SS, strong at College
14	0500	East	
15			Quiet day
16			Quiet day
17	1045	West	Weak
	1110	West	Moderate
18	0010	East	Weak
	0340	East	Weak
	1210		Small H-component impulse at low latitude stations; network disturbed through 19/0235 with no distinct SS onsets
19	0820	West	1st of multiple onset SS
	0845	West	2nd of multiple onset SS
	0910	West	3rd of multiple onset SS
	1215		SS effect limited to Alaska
	1400		
20			Quiet day
21	0955	West	Weak; Lynn Lake to Norman Wells to Inuvik
	1520		Slow onset-decay; Norman Wells to Arctic Village to Cape Parry
	2100		Onset of unsettled period lasting through 22/0400 UT
22			Quiet day after 0400 UT
23			Quiet day
24	1125	West	Weak; oval stations only, Ft. Smith to College-Arctic Village
	1215	West	
25	0307		Weak positive impulse all mid and low latitude stations
	0650	West	Moderate
	0810	West	Weak
	0910	West	Weak
	1000	West	Moderate
	1205		Weak
	1310		Weak
26			Quiet day
27	0247		SSC - 40 gamma at Boulder; 34 gamma at Eusebio; 28 gamma at Wake; 23 gamma at Tahiti Mag storm follows
28			Major storm conditions near 06-17 UT
29			Mag storm through 1600 UT; significant SS listed
	0100	East	
	0350	East	
	0750	West	
	1035	West	
	1315		
30	0200	East	
	0355	East	
	0625	≈center	
	0955	West	Moderately strong SS vicinity College,
	1015		Weak SS at Island Lake
	1035	West	Onset of major SS at Ft. Smith with onset delayed westward - onset at College 1100 UT
	1330		
	1530		
	1925		
	2025		
31	0015	East	
	0045	East	
	0450	East	Weak
	0530	≈center	1st of double onset; SS center Lynn Lake
	0555	≈center	2nd of double onset; SS center Lynnn Lake
	0740	West	
	0830	West	Strong SS; center Ft. Smith
	1205	West	
	1405		1st of double onset
	1505		2nd of double onset

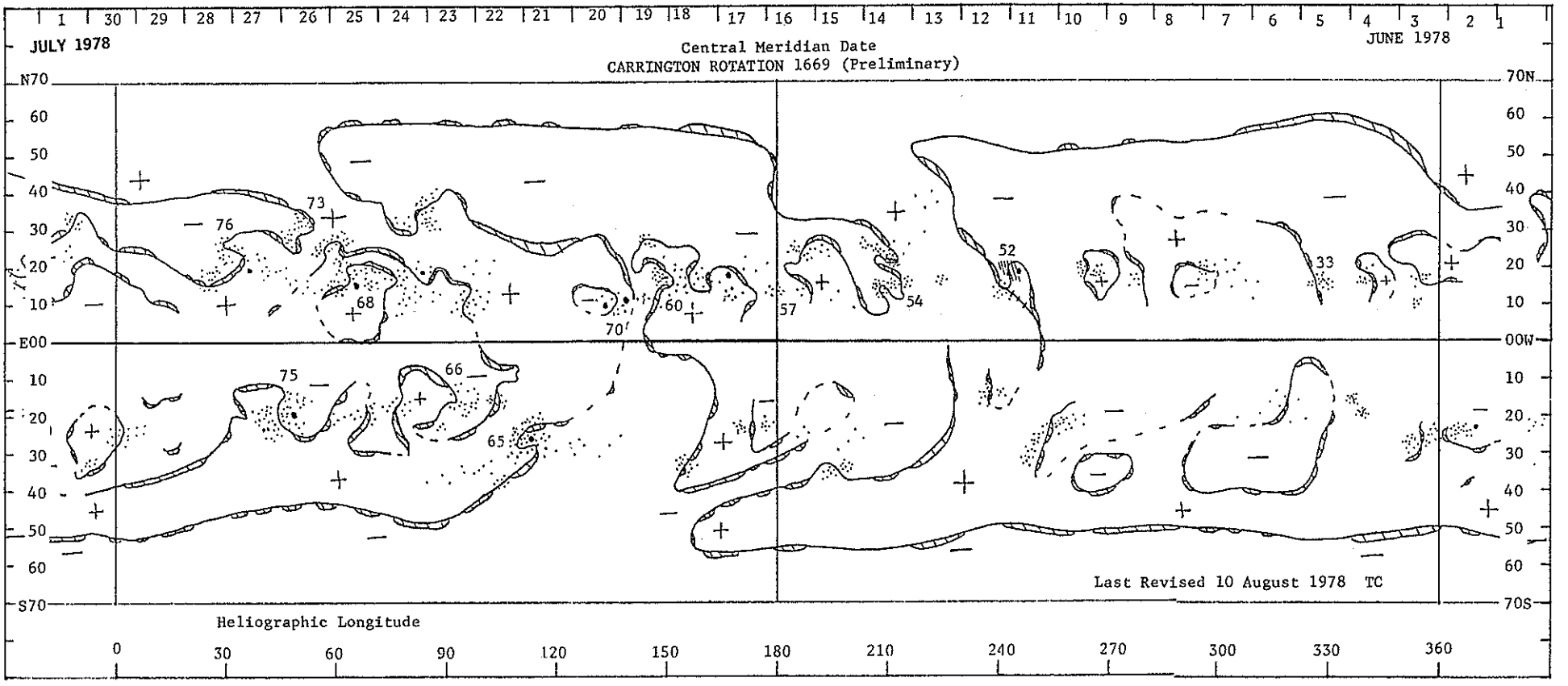
SGD 409 Part I (Prompt)

JULY 1978 DATA

Contents

Hα SYNOPTIC CHART

CARRINGTON ROTATION 1669 (PRELIMINARY)



Hα SYNOPTIC CHART

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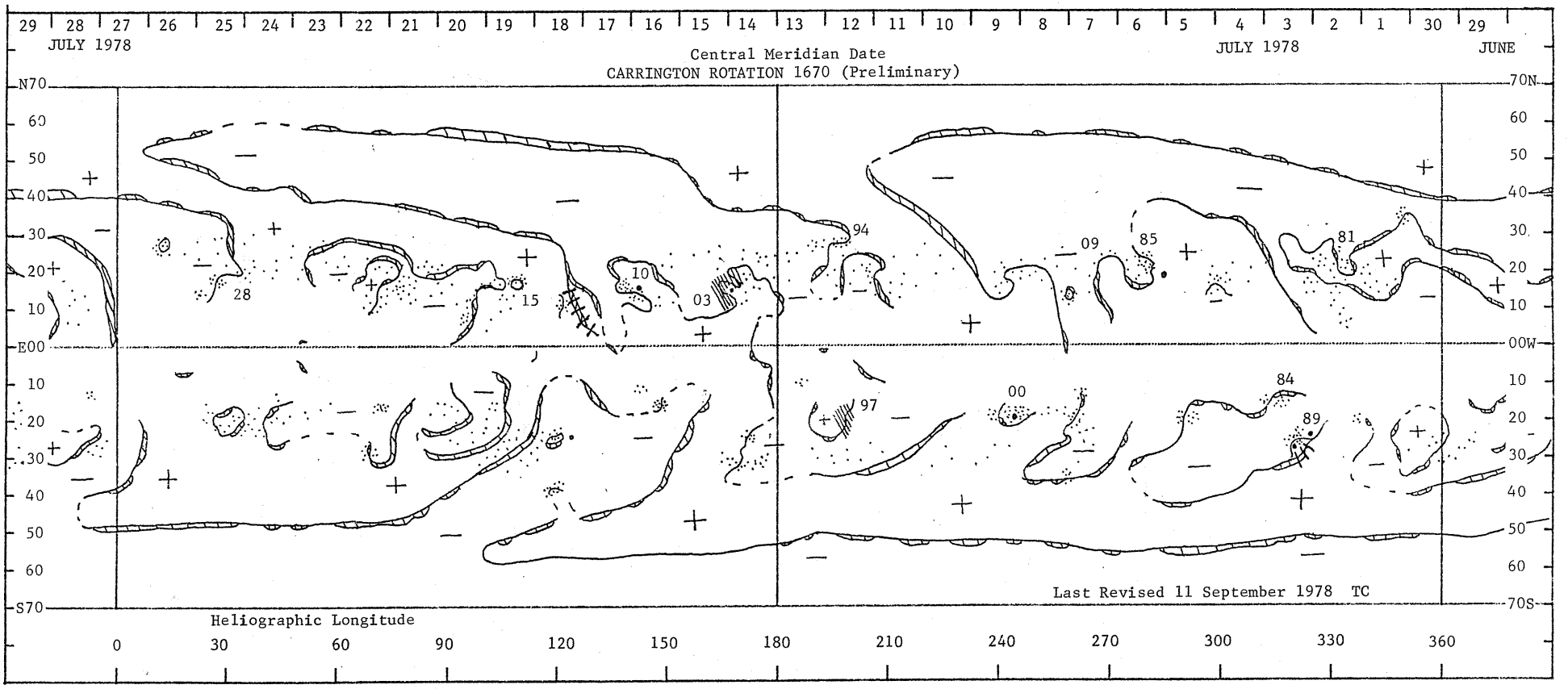

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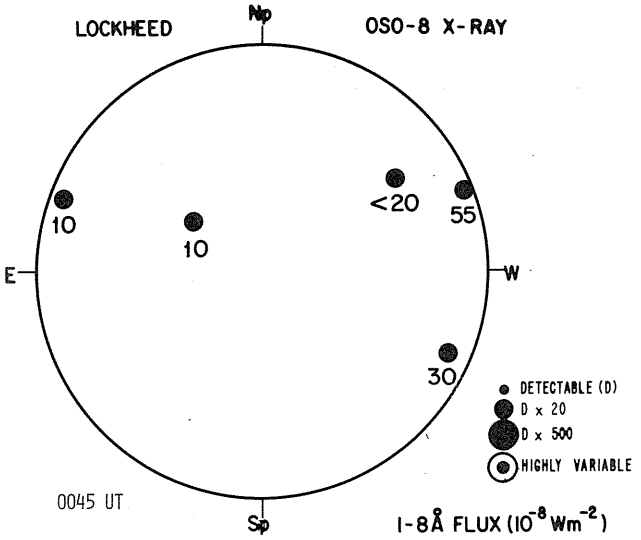
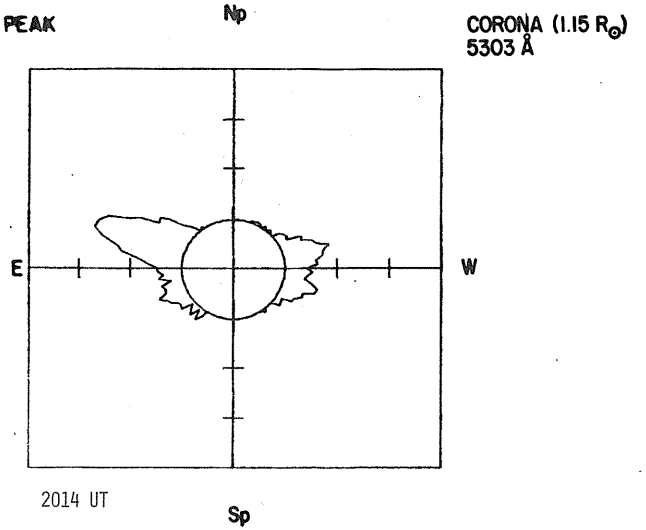
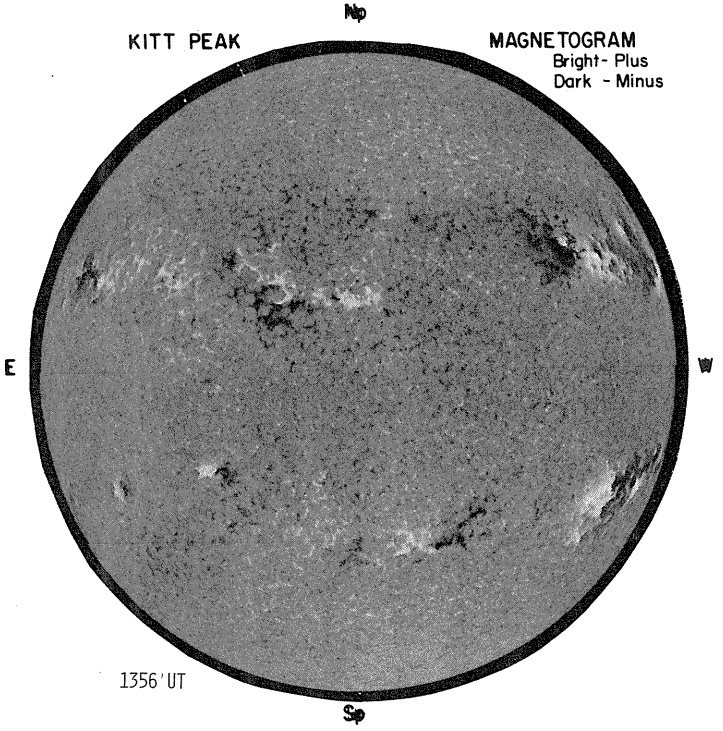
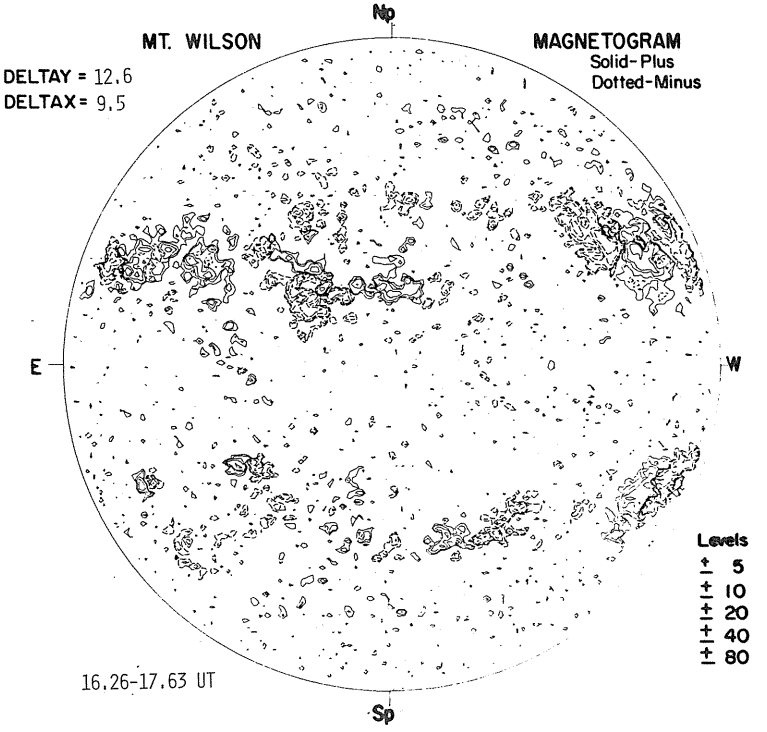
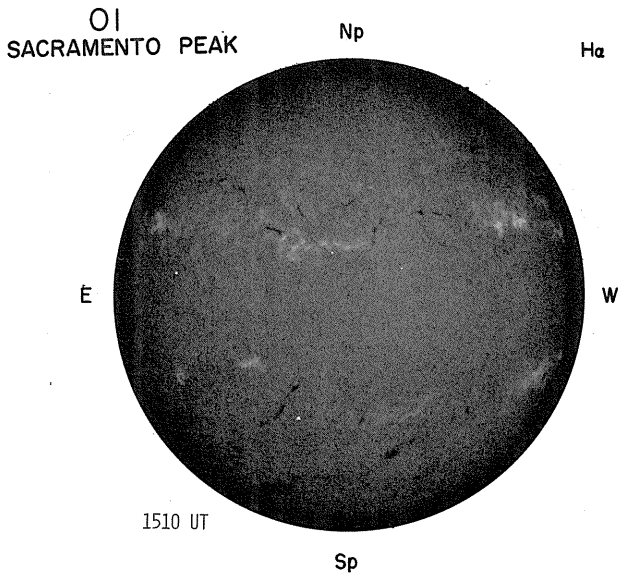
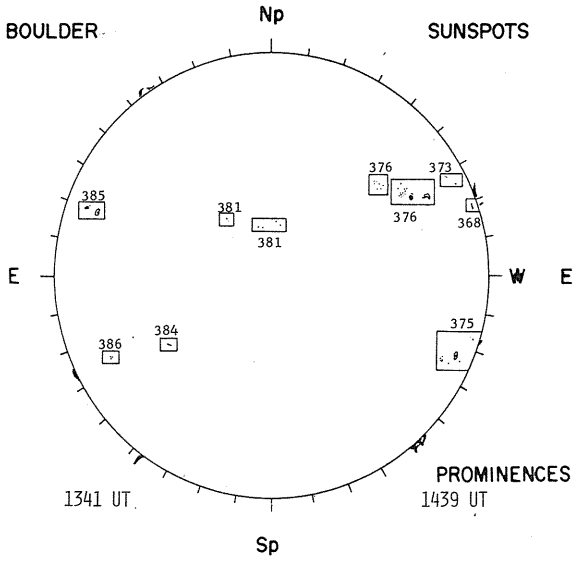









OI
SACRAMENTO PEAK
Np
Hα
E
W
Sp
1510 UT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SUNSPOTS
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384
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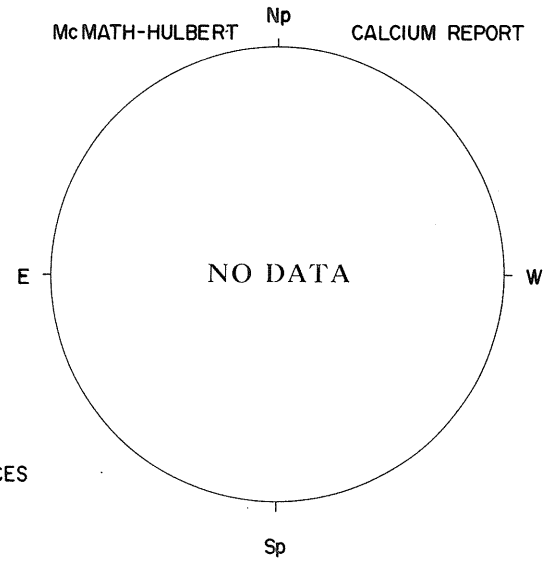
PROMINENCES
1341 UT
1439 UT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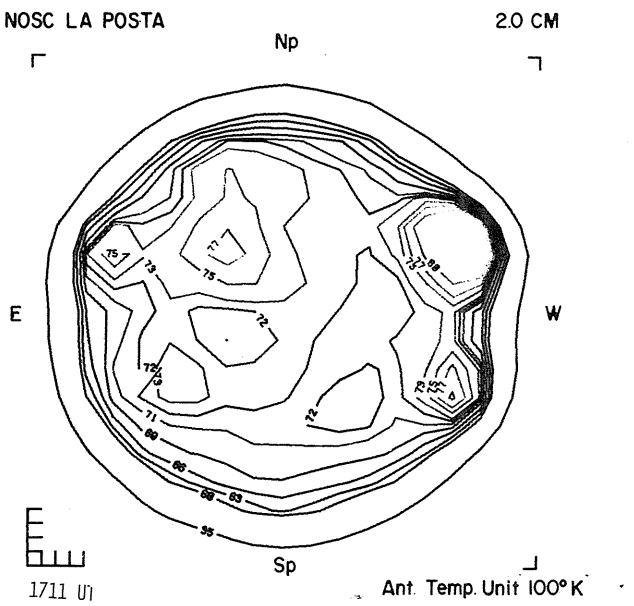
CALCIUM REPORT
E
W
Sp
NO DATA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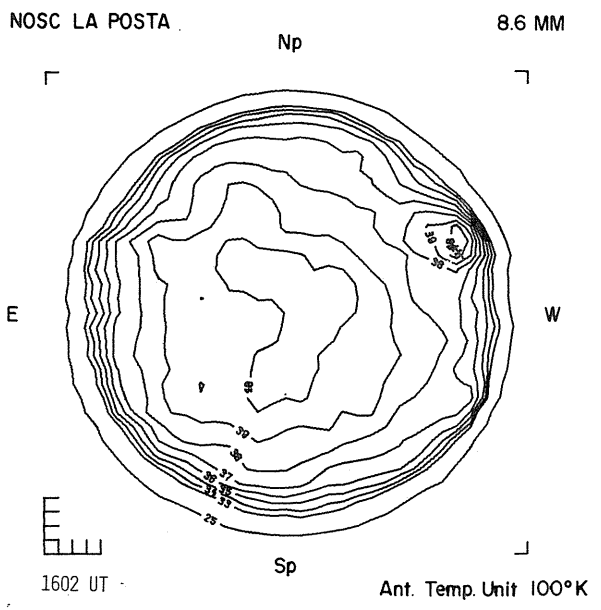
E
W
Sp
1711 UT
Ant. Temp. Unit 100° K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8.6 MM
Np
E
W
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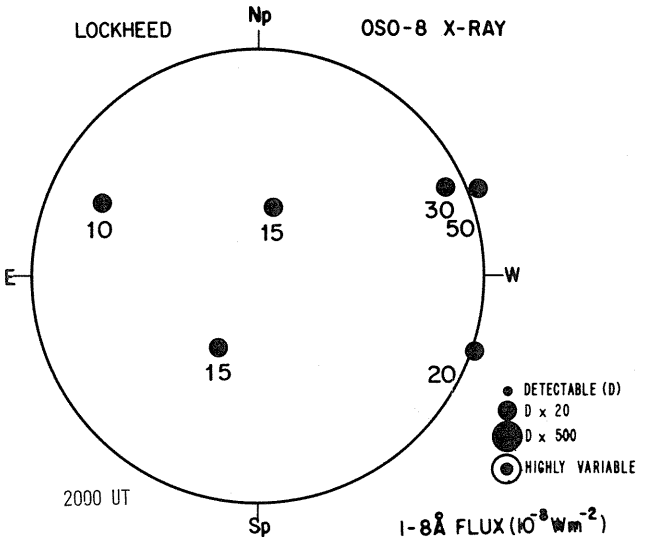
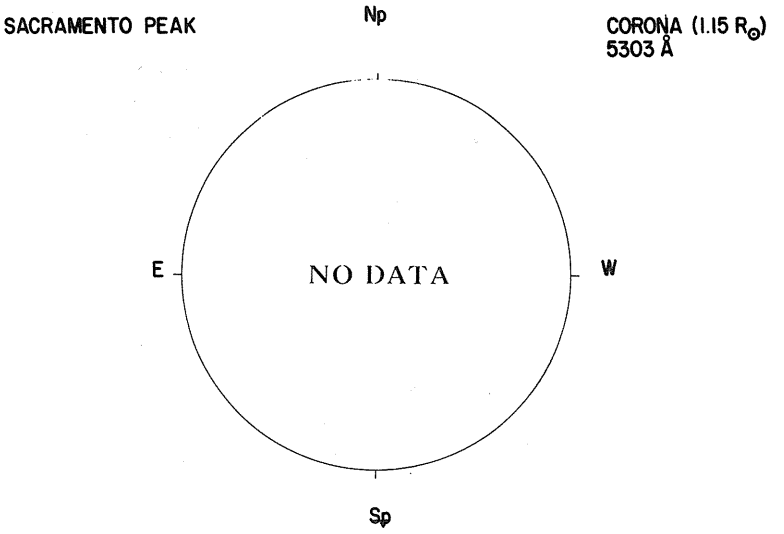
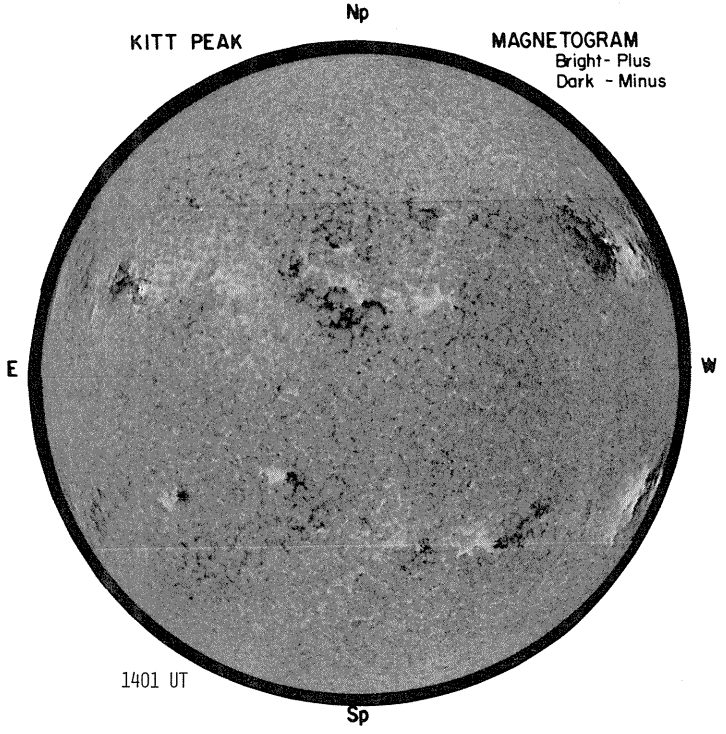
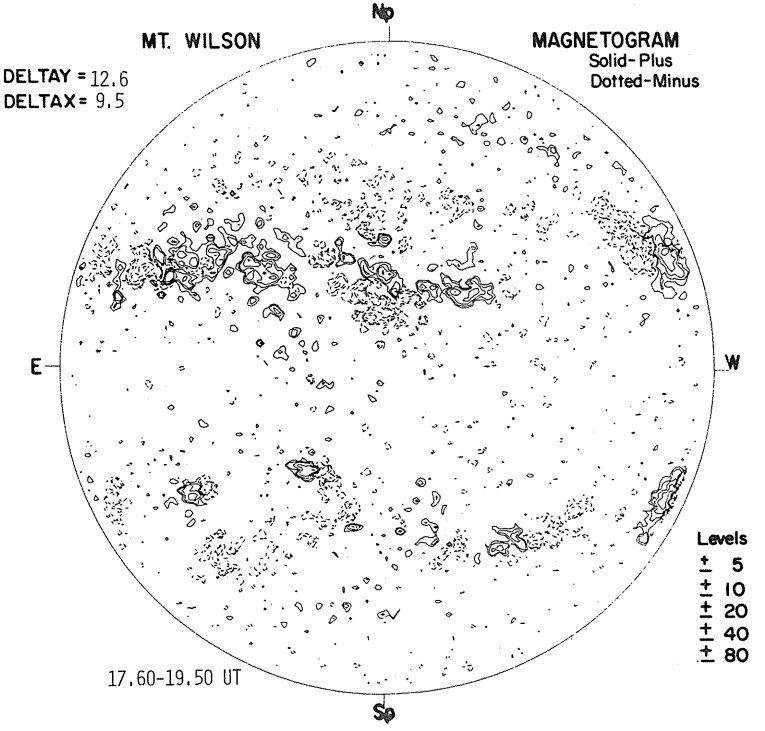


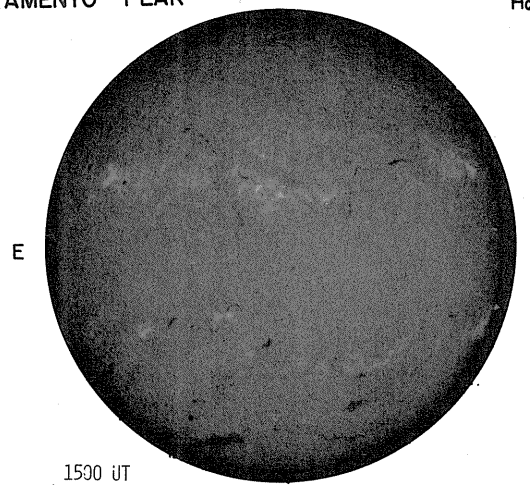






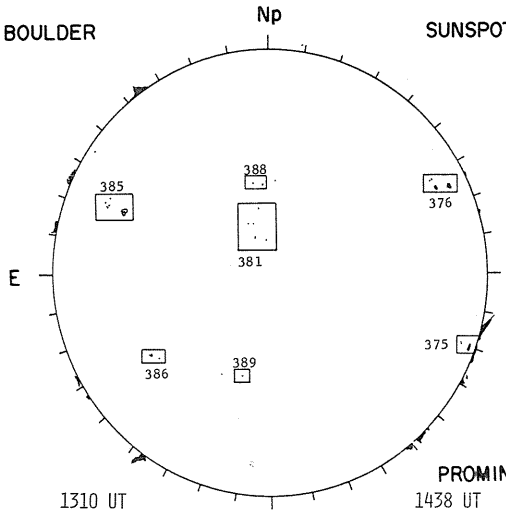
02

SACRAMENTO PEAK Hα



1500 UT

BOULDER SUNSPOTS

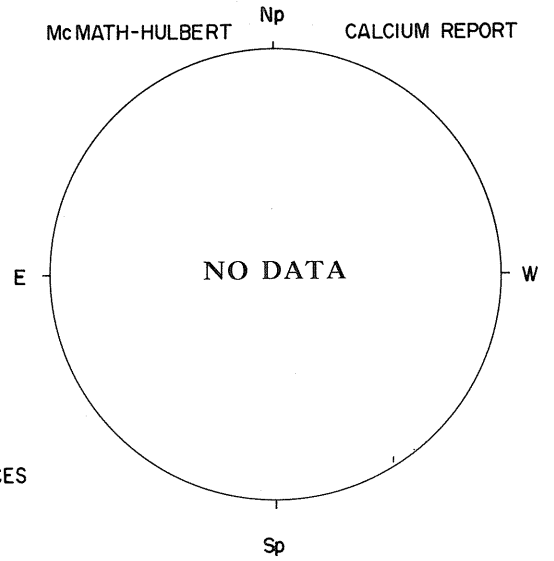


1310 UT

PROMINENCES

1438 UT

McMATH-HULBERT CALCIUM REPORT



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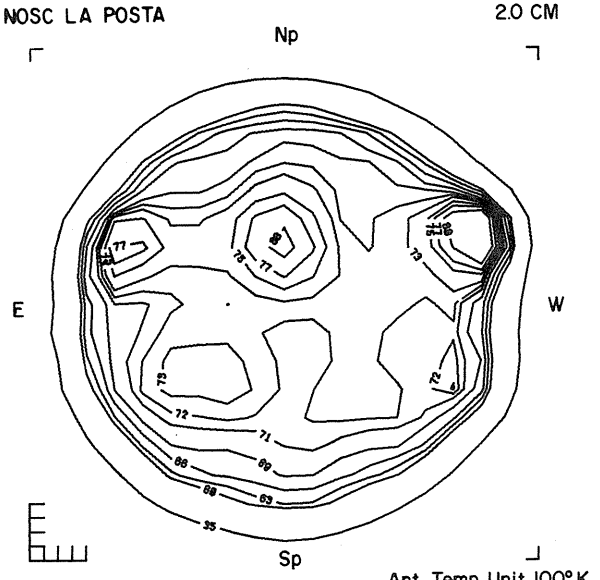
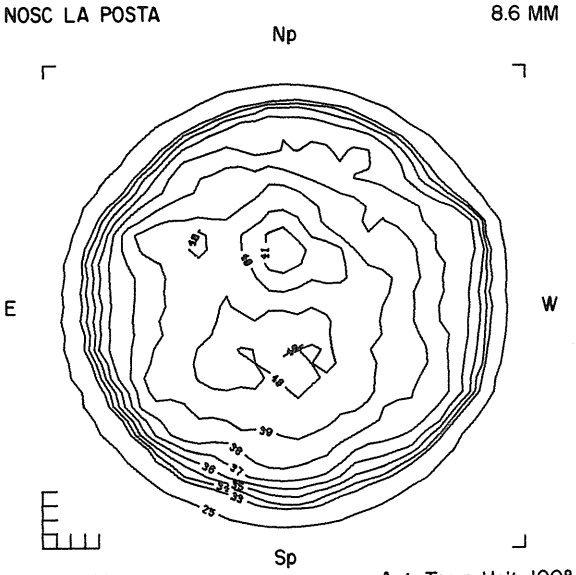


1646 UT

Ant. Temp. Unit 100° K

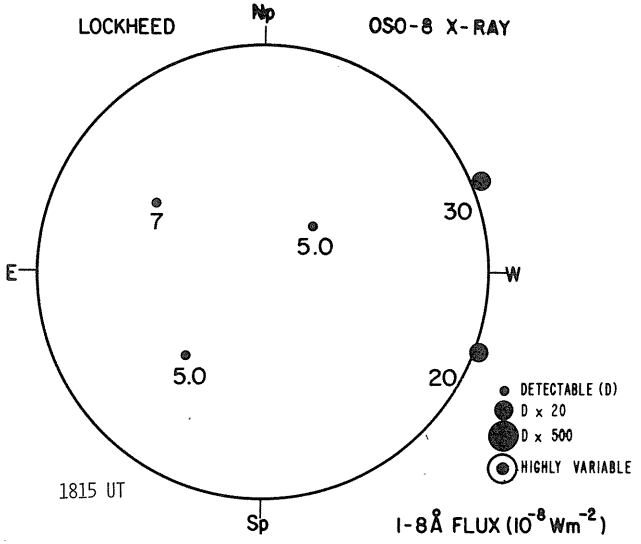
NOSC LA POSTA 8.6 MM

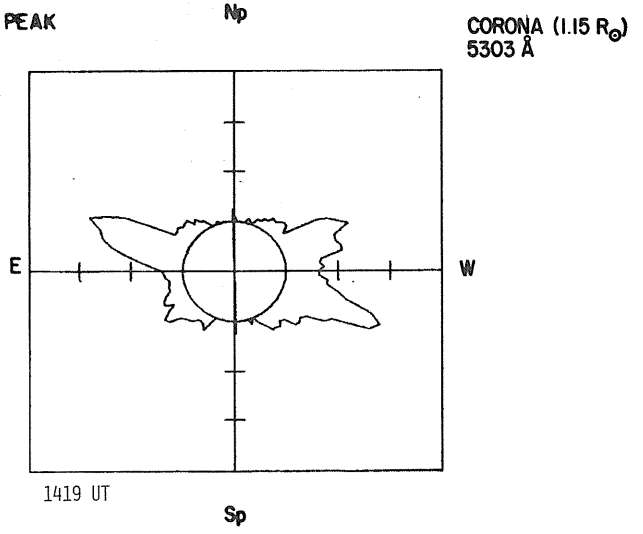


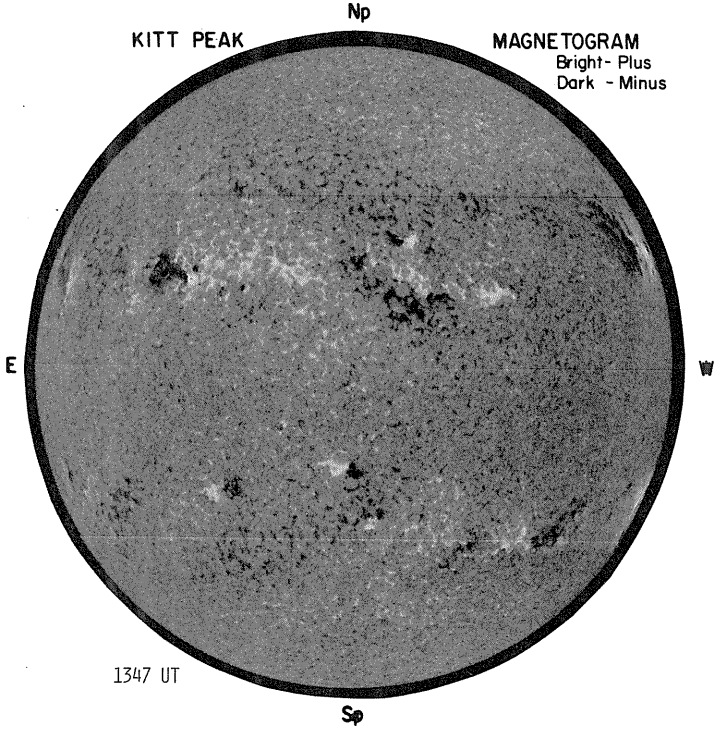
1545 UT

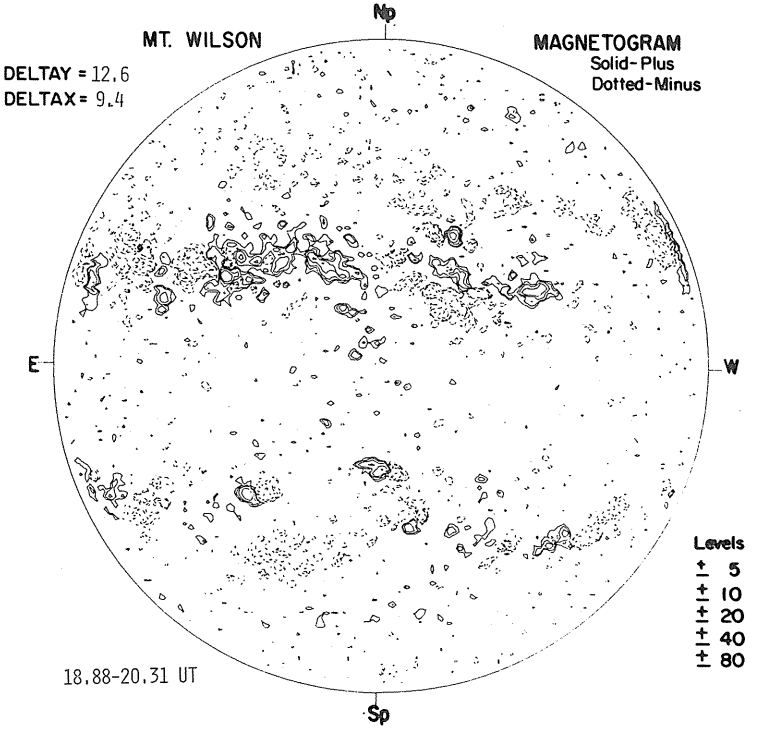
Ant. Temp. Unit 100° K

JULY 3, 1978 (P = -1.95, B_o = 3.09, L_o = 325.08)

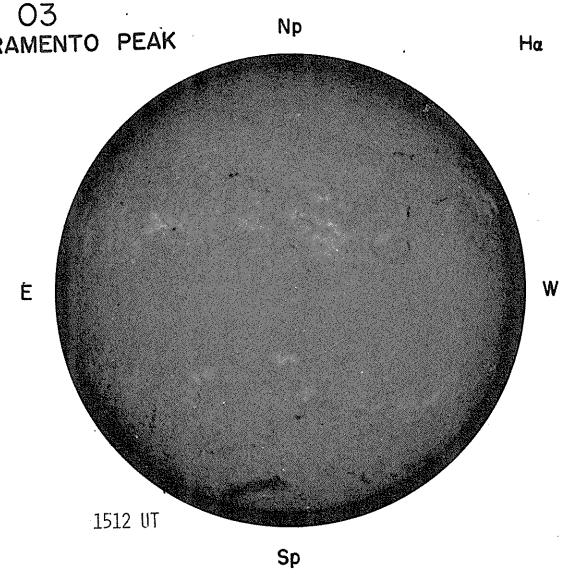






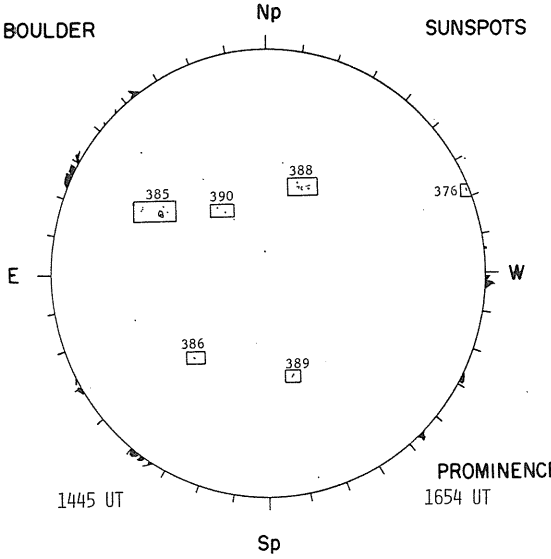


03
SACRAMENTO PEAK



1512 UT

Hα BOULDER

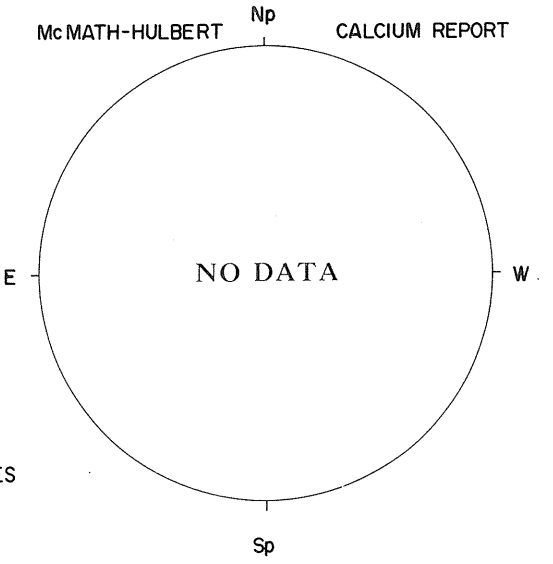


1445 UT

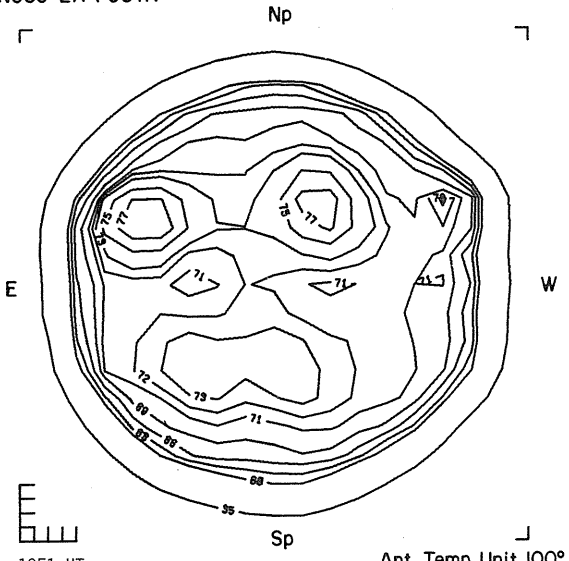
SUNSPOTS

PROMINENCES
1654 UT

McMATH-HULBERT CALCIUM REPORT



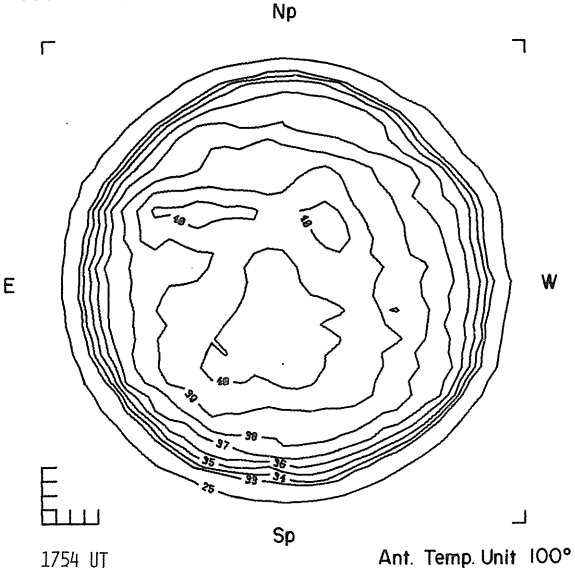
NOSC LA POSTA 2.0 CM



1851 UT

Ant. Temp. Unit 100° K

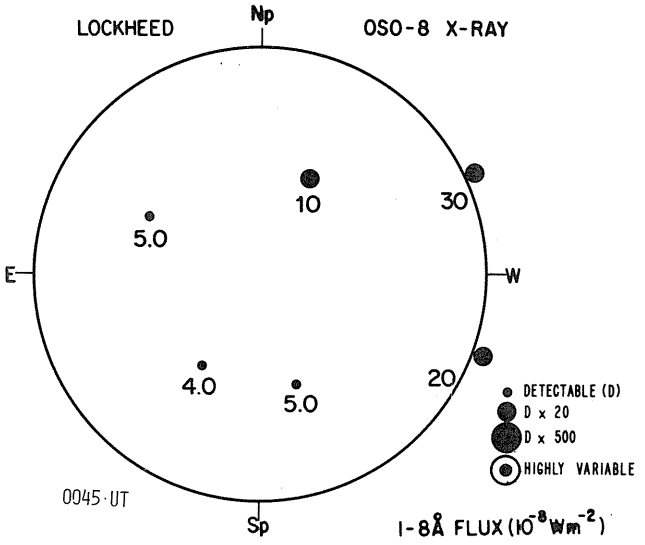
NOSC LA POSTA 8.6 MM

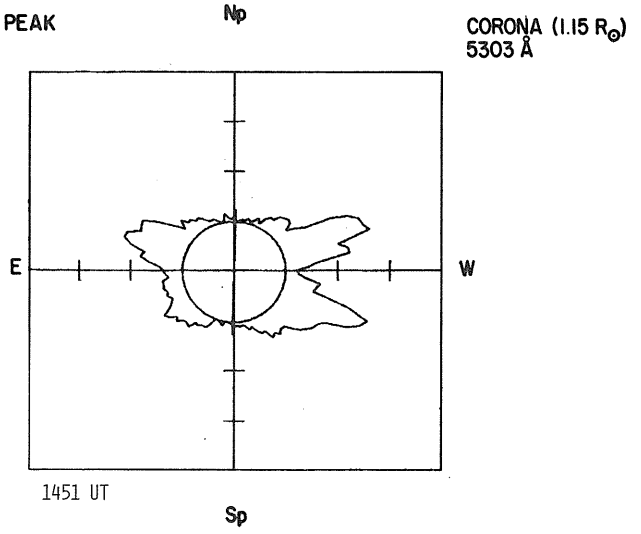


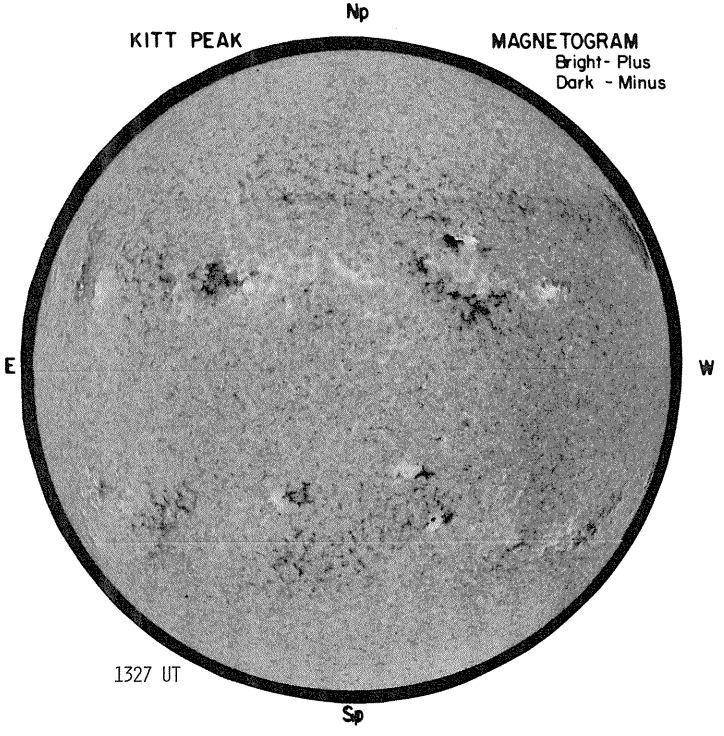
1754 UT

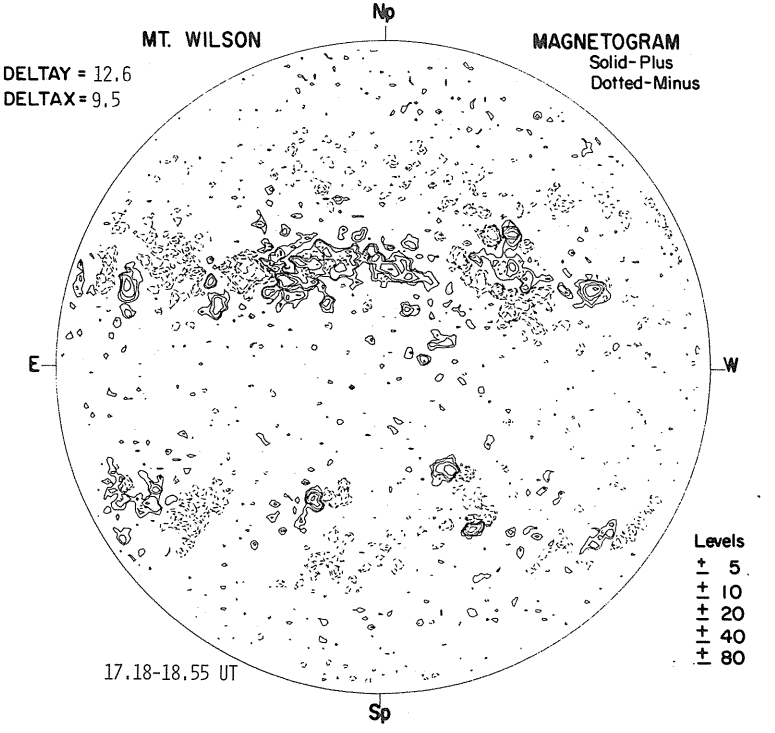
Ant. Temp. Unit 100° K

JULY 4, 1978 (P = -1.50, B_o = 3.20, L_o = 311.84)

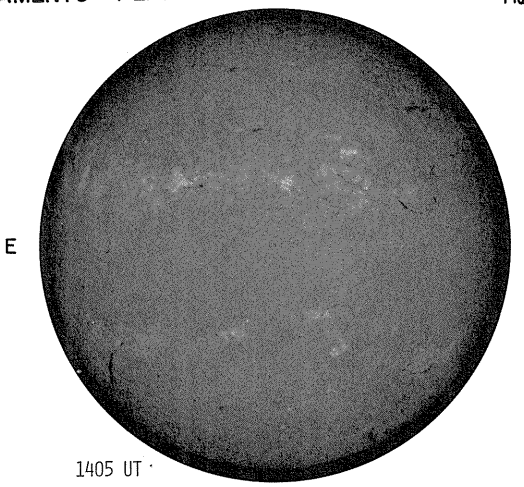






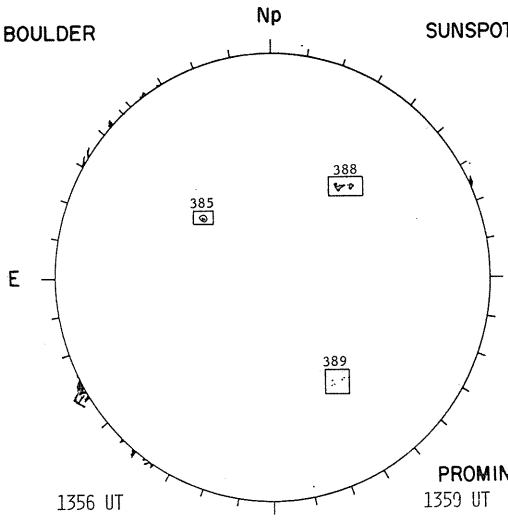


04
SACRAMENTO PEAK Hα



1405 UT

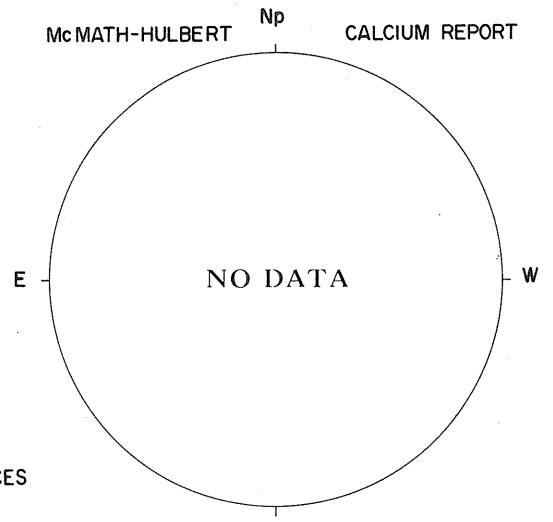
BOULDER SUNSPOTS



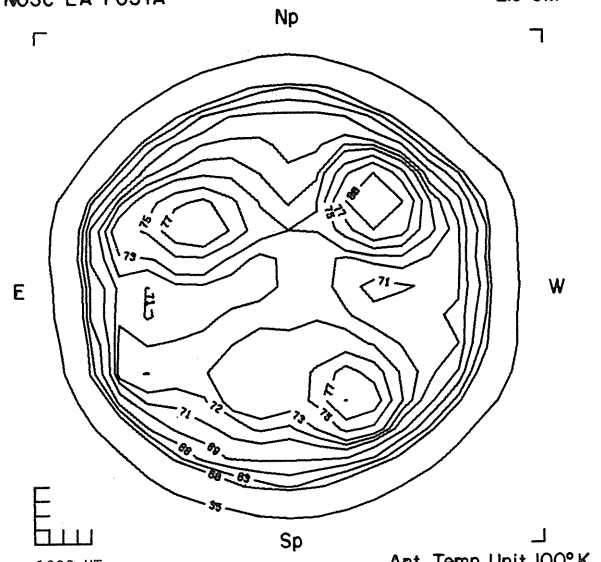
1356 UT

PROMINENCES
1359 UT

McMATH-HULBERT CALCIUM REPORT



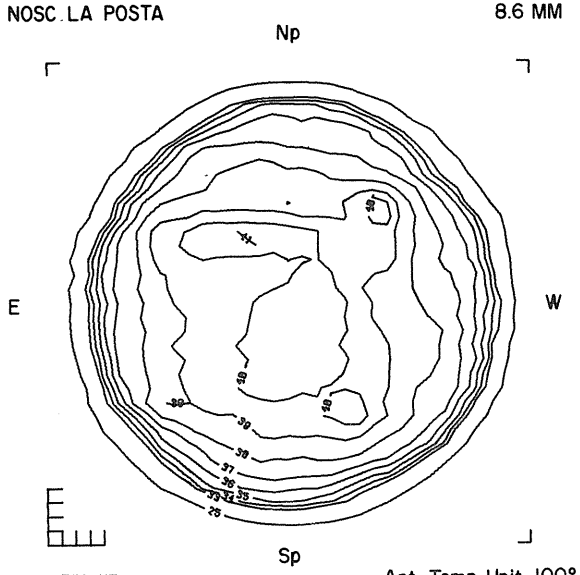
NOSC LA POSTA 2.0 CM



1906 UT

Ant. Temp. Unit 100°K

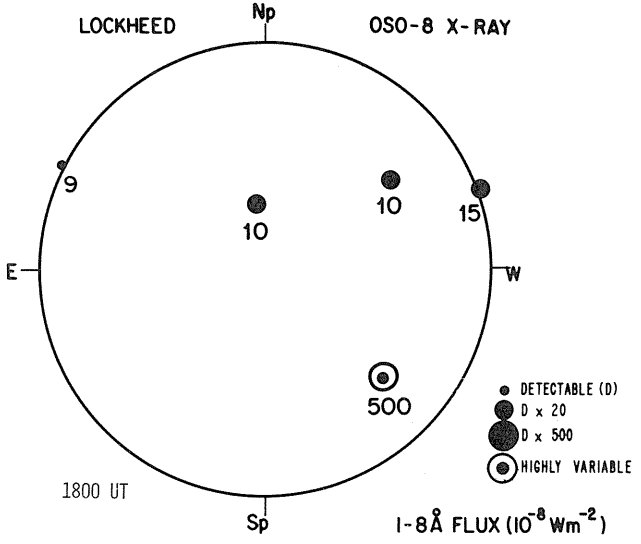
NOSC LA POSTA 8.6 MM

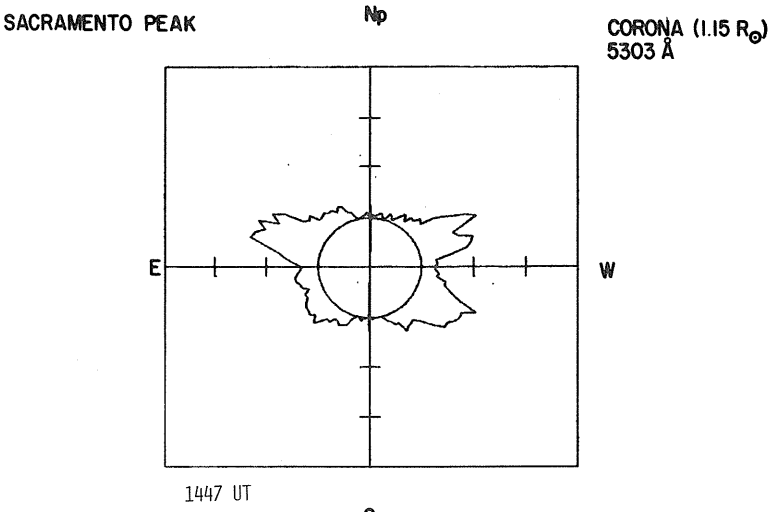


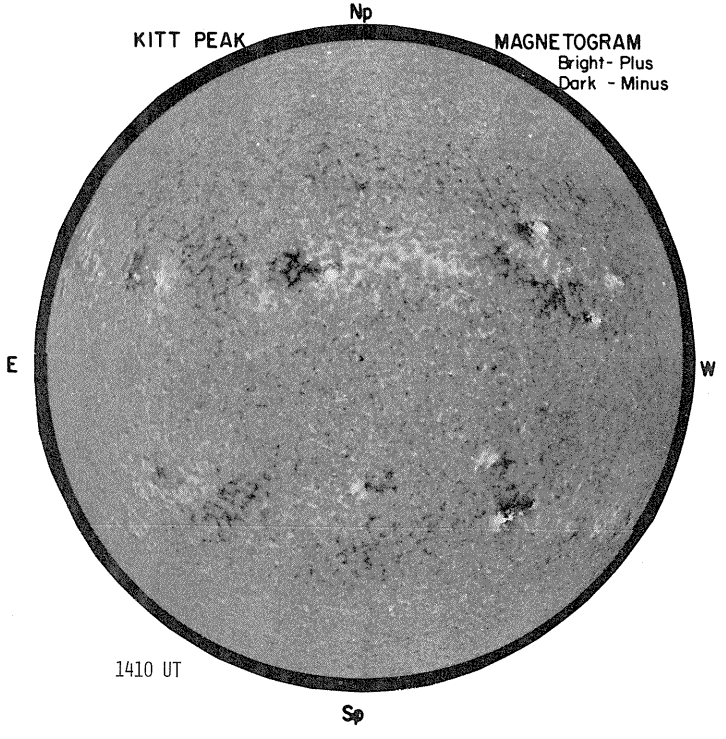
1738 UT

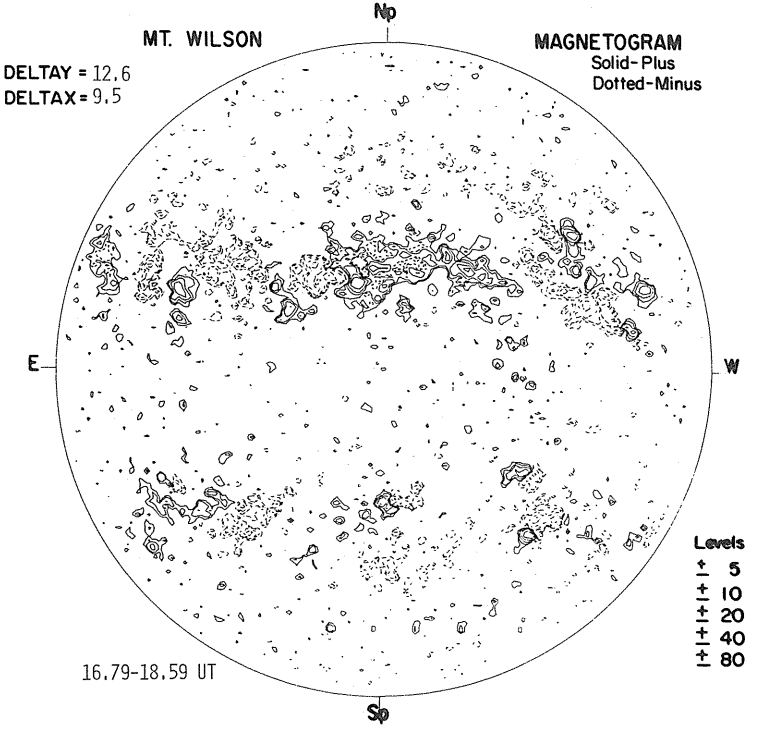
Ant. Temp. Unit 100°K

JULY 5, 1978 (P =-1.04, B_o = 3.30, L_o = 298.61)

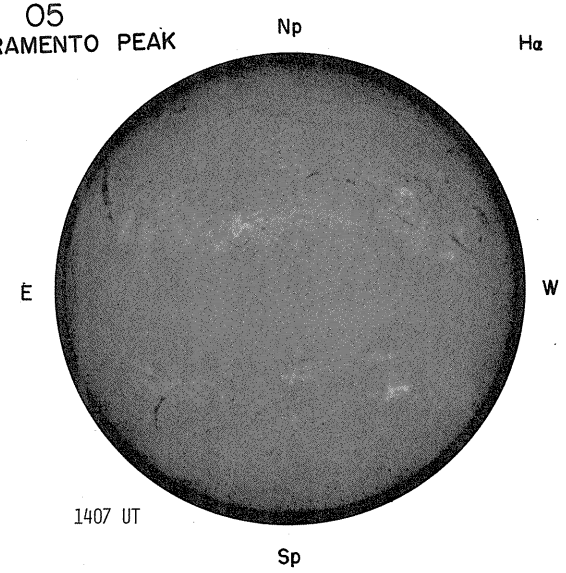






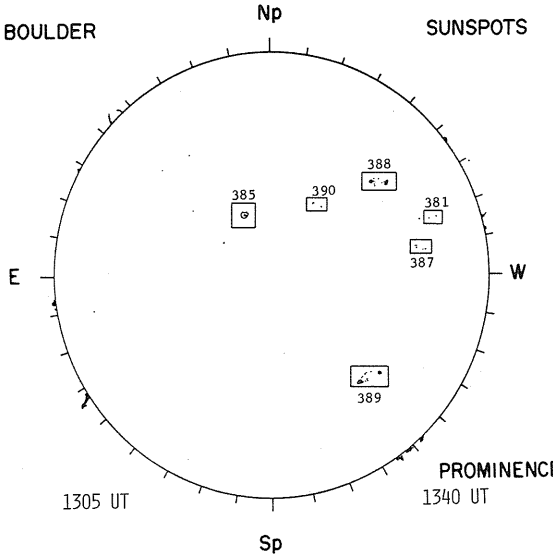


05
SACRAMENTO PEAK



1407 UT

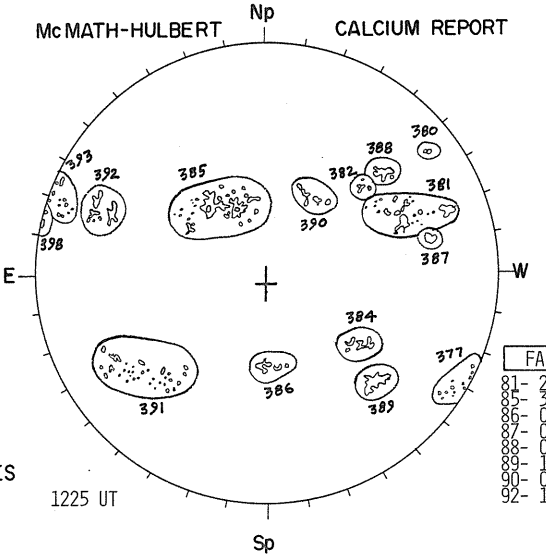
BOULDER



1305 UT

SUNSPOTS

McMATH-HULBERT



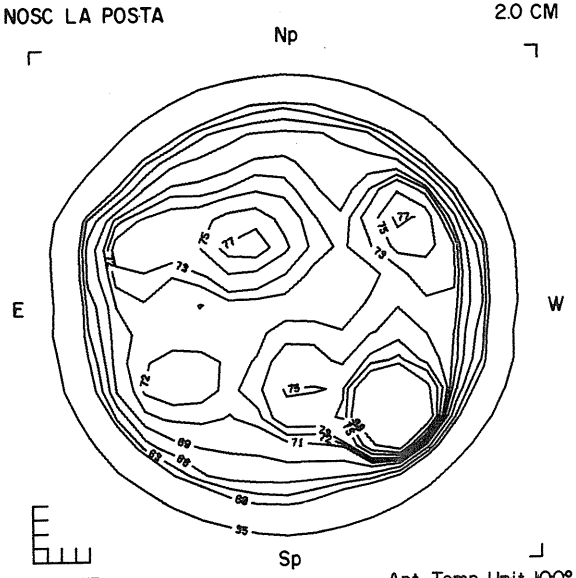
1225 UT

CALCIUM REPORT

FAIR	S
81- 2400-2.5	
85- 3000-3.0	
86- 0400-2.5	
87- 0400-3.0	
88- 0700-3.5	
89- 1100-4.5	
90- 0500-2.5	
92- 1200-2.5	

PROMINENCES
1340 UT

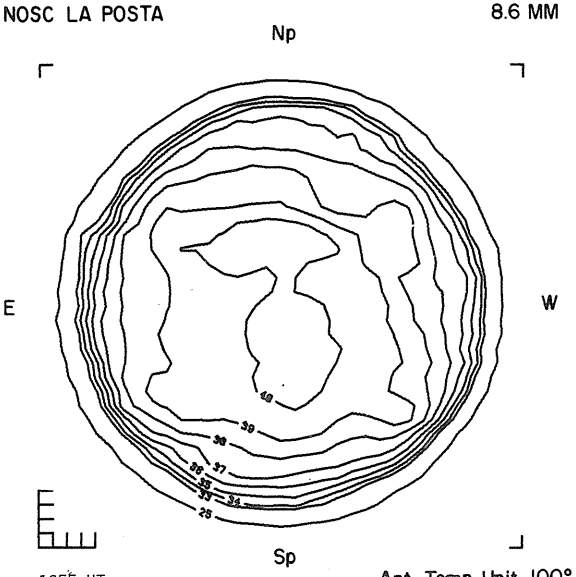
NOSC LA POSTA



1757 UT

Ant. Temp. Unit 100° K

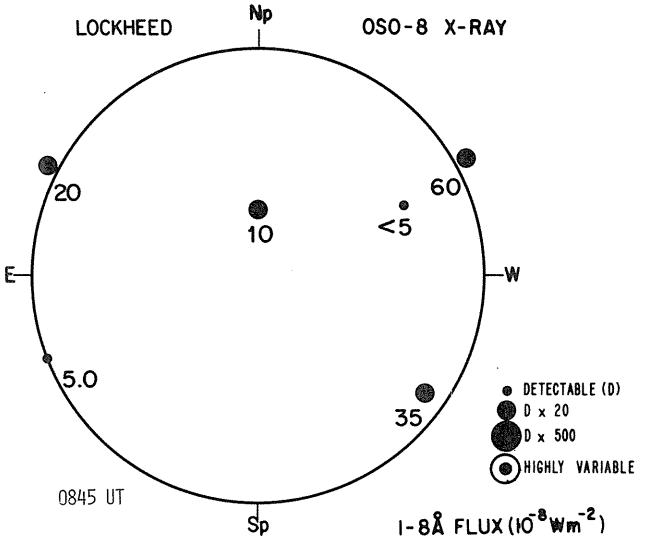
NOSC LA POSTA

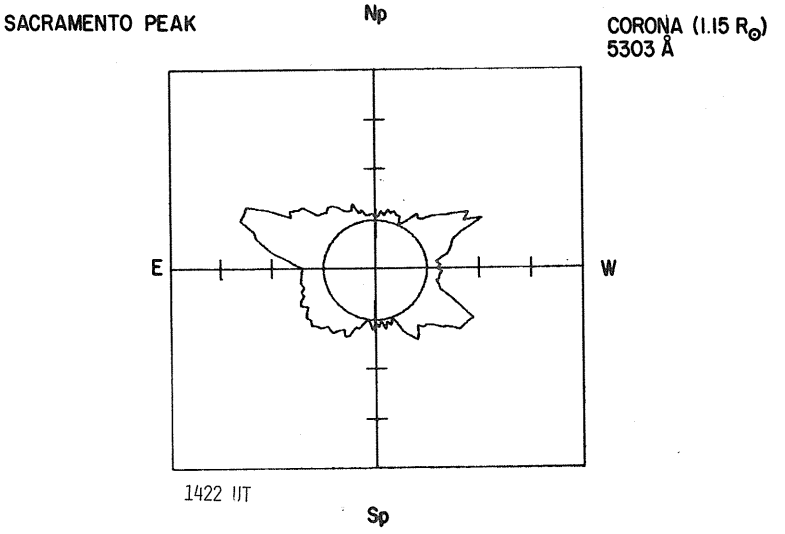


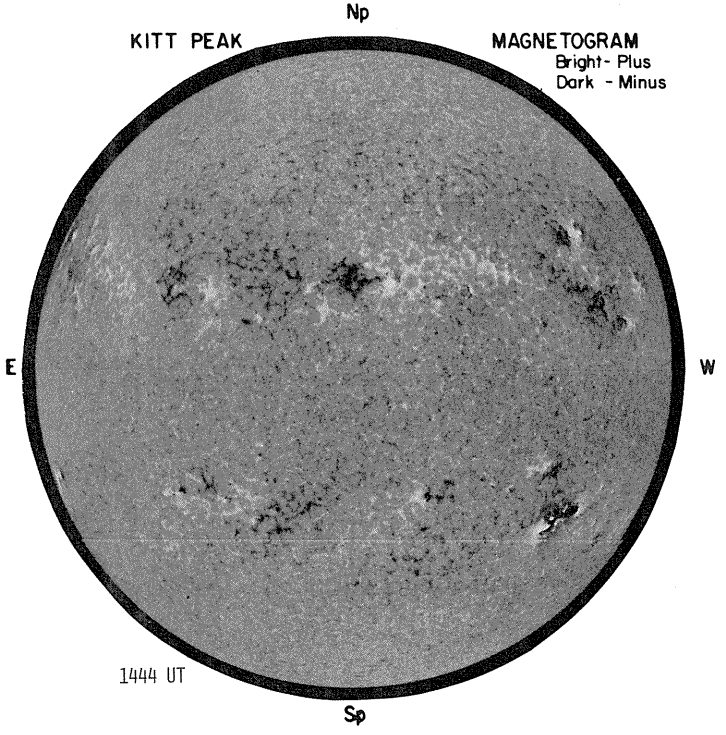
1655 UT

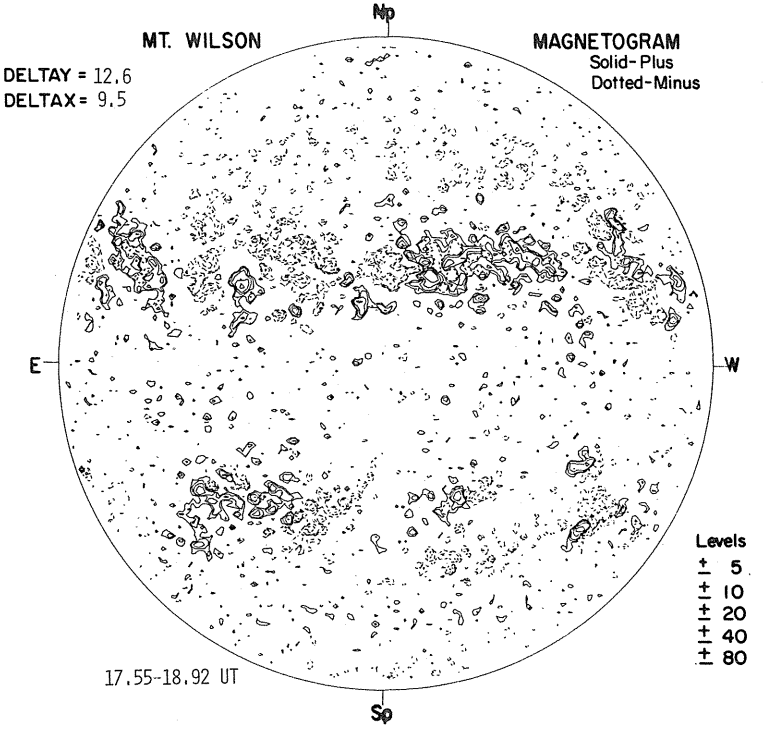
Ant. Temp. Unit 100° K

JULY 6, 1978 (P = -0.59, B_o = 3.41, L_o = 285.37)



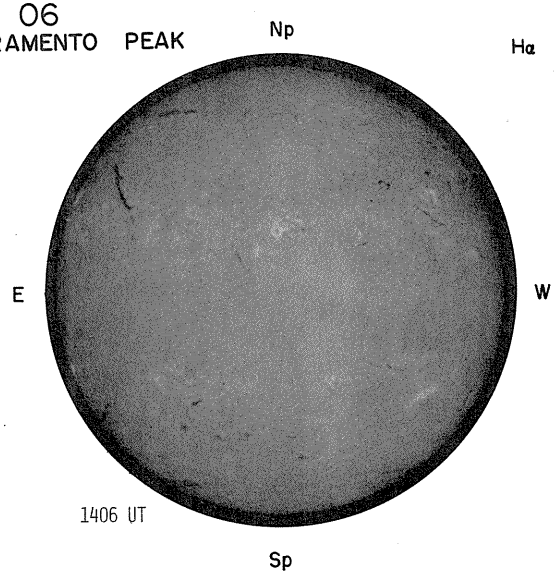






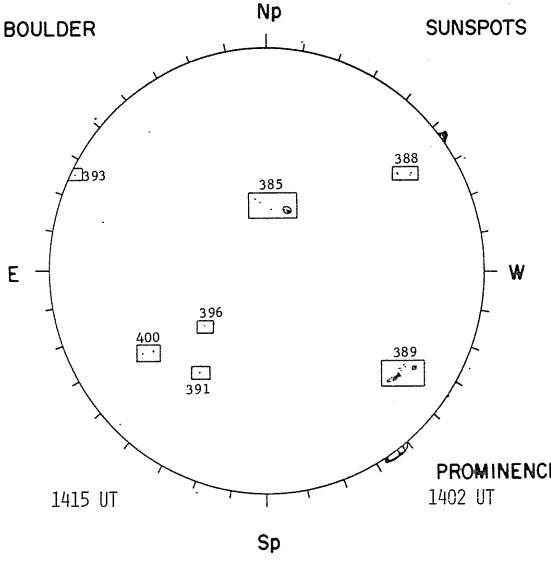
06

SACRAMENTO PEAK Hα



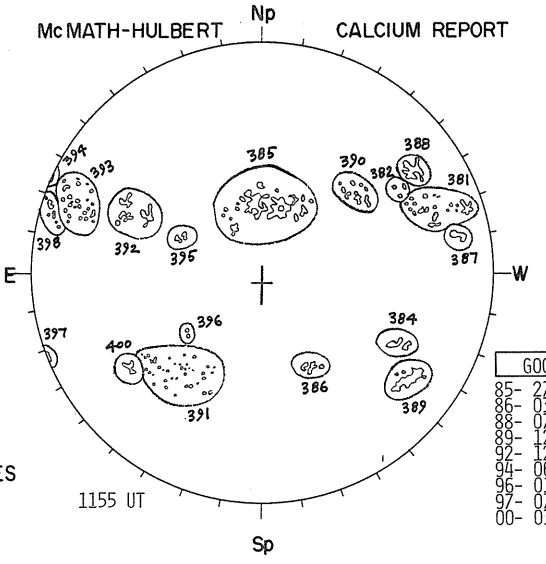
1406 UT

BOULDER SUNSPOTS



1415 UT

McMATH-HULBERT CALCIUM REPORT

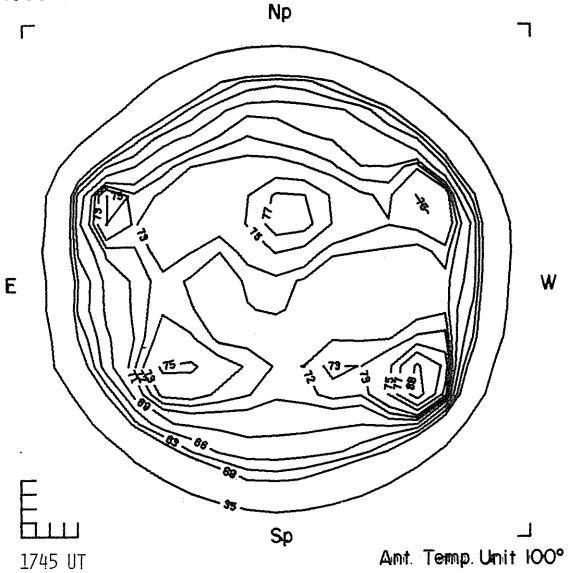


GOOD	M
85- 2700-3.0	
86- 0300-2.5	
88- 0700-3.0	
89- 1200-3.5	
92- 1200-2.5	
94- 0600-3.0	
96- 0100-2.5	
97- 0700-3.0	
00- 0300-2.5	

PROMINENCES

1402 UT

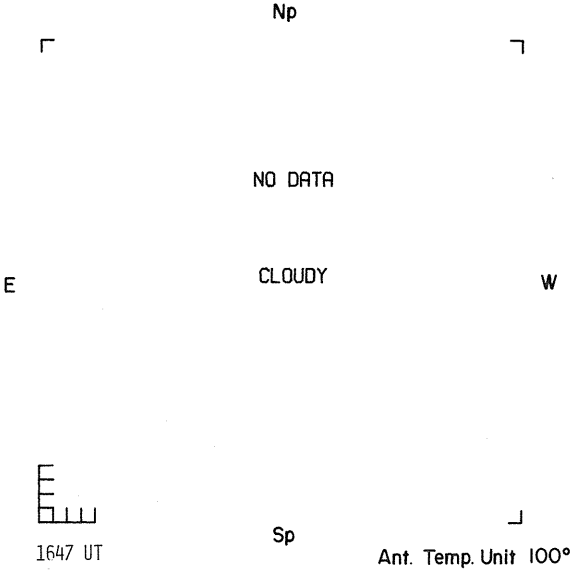
NOSC LA POSTA 2.0 CM



1745 UT

Ant. Temp. Unit 100° K

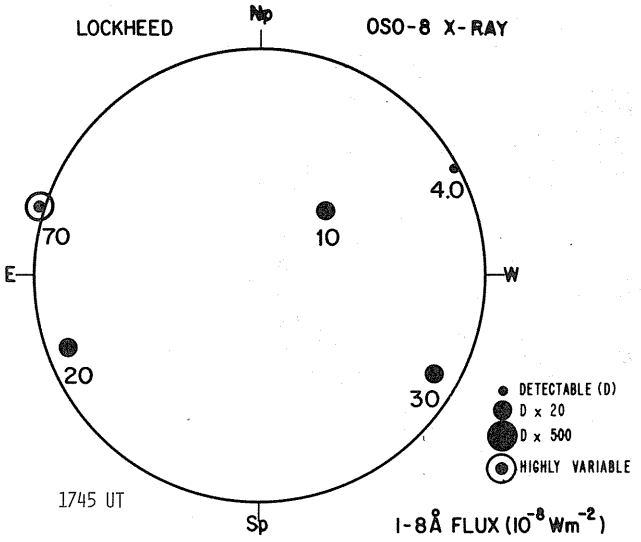
NOSC LA POSTA 8.6 MM

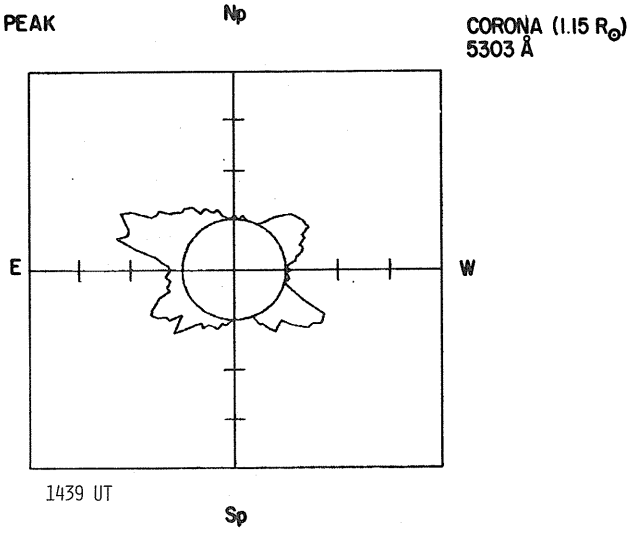


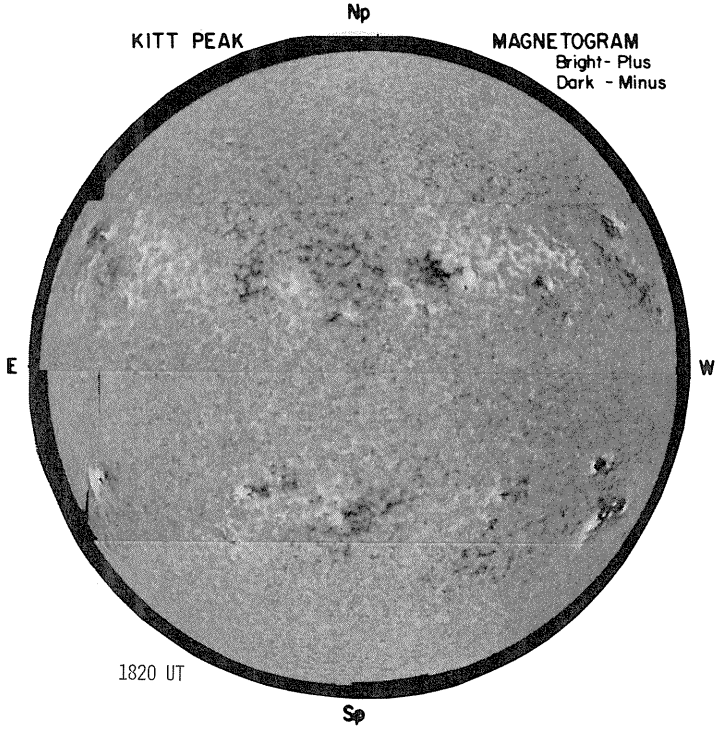
1647 UT

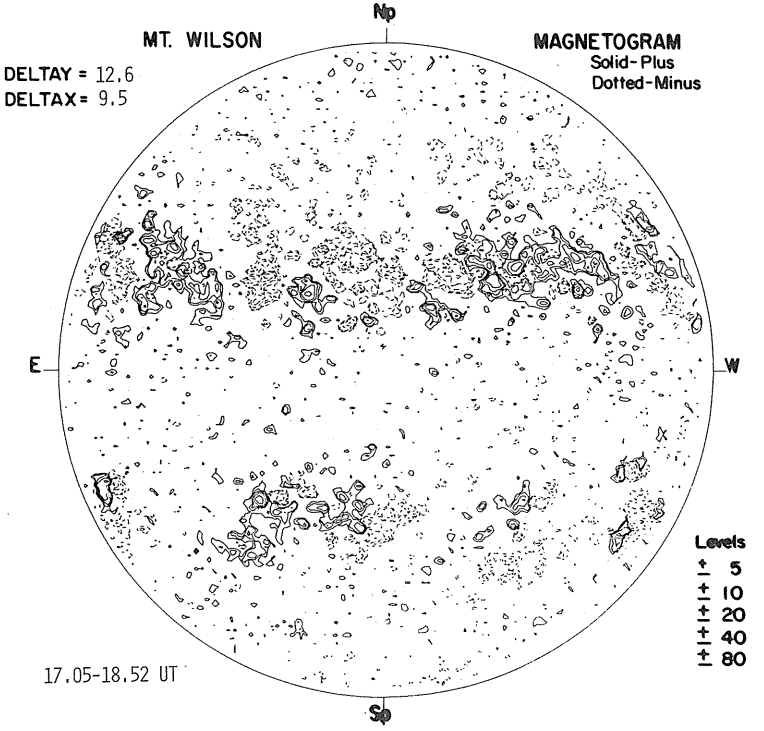
Ant. Temp. Unit 100° K

JULY 7, 1978 (P = -0.13, B_o = 3.52, L_o = 272.14)



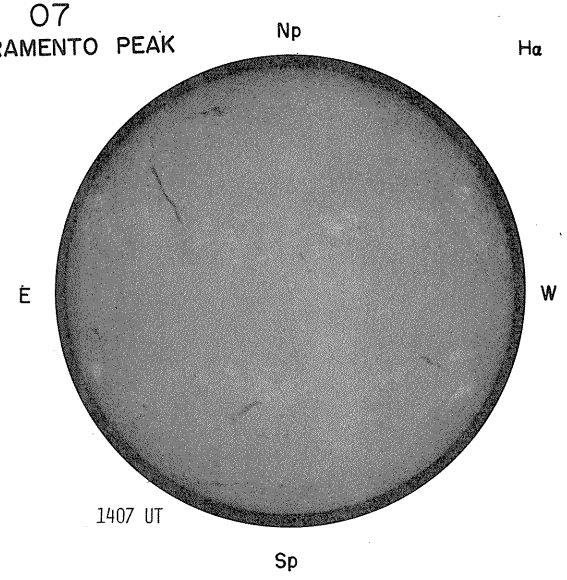




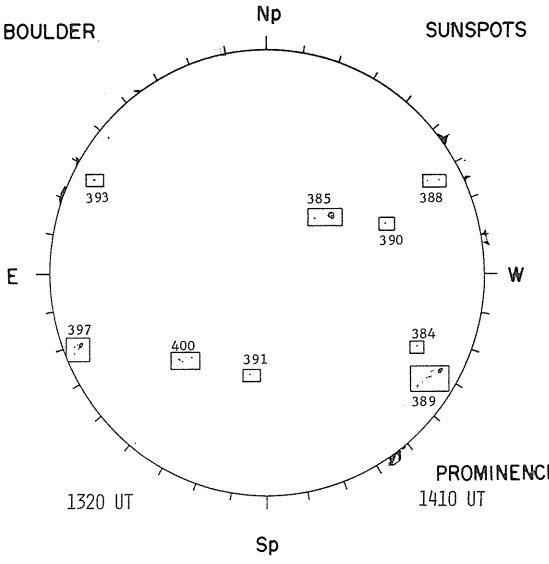


07

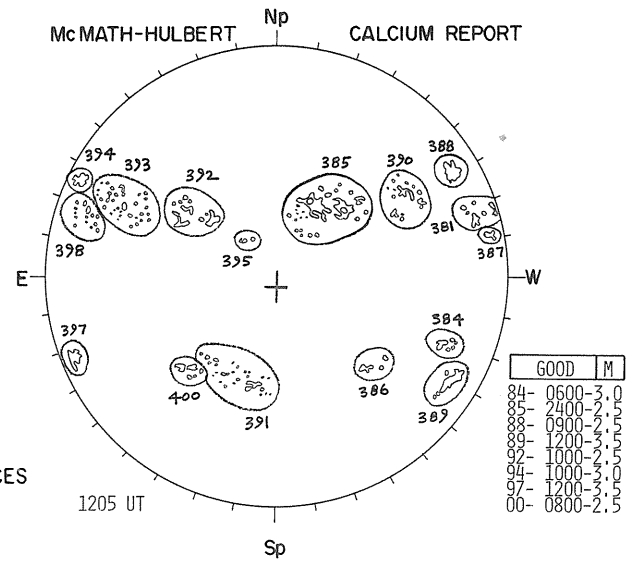
SACRAMENTO PEAK



BOULDER SUNSPOTS



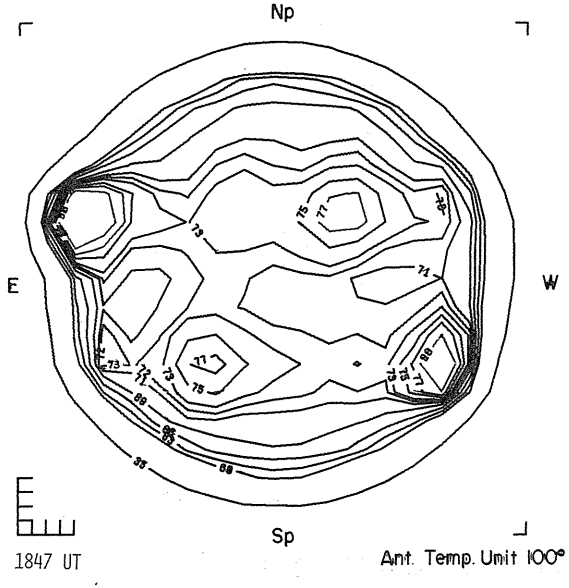
McMATH-HULBERT CALCIUM REPORT



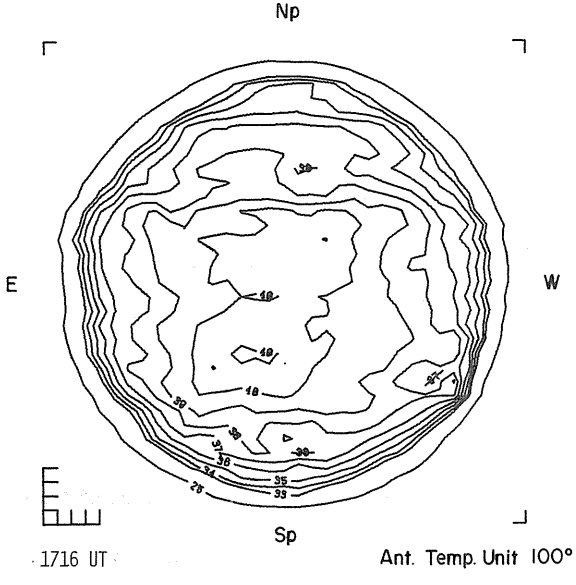
PROMINENCES

1410 UT

NOSC LA POSTA 2.0 CM

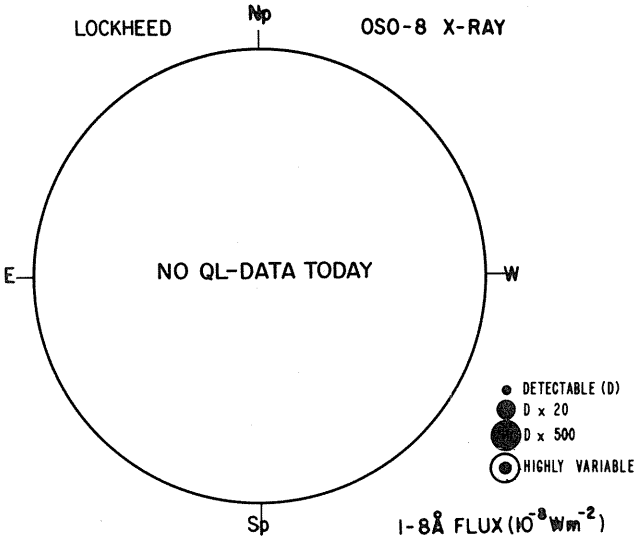


NOSC LA POSTA 8.6 MM

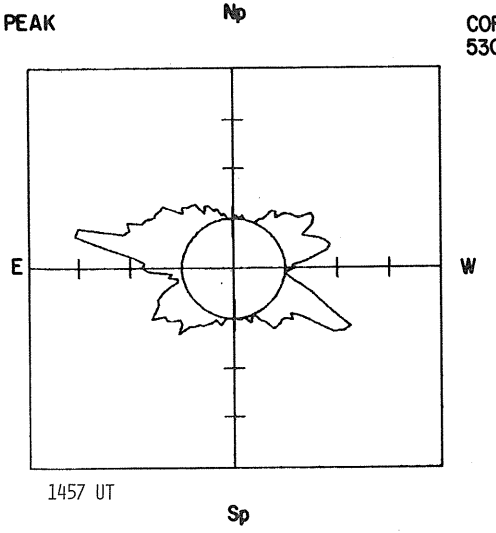


JULY 8, 1978 (P = 0.32, B_o = 3.62, L_o = 258.90)

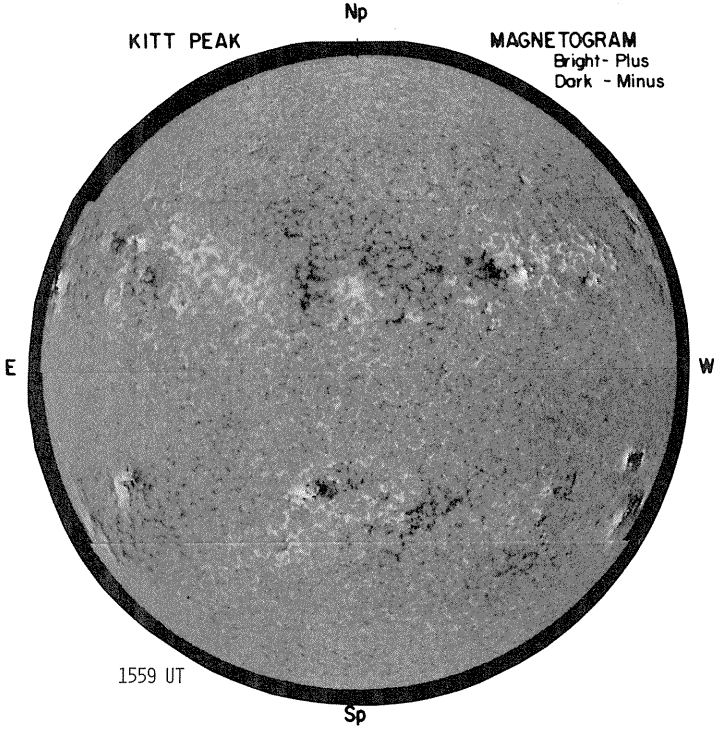
LOCKHEED OSO-8 X-RAY



SACRAMENTO PEAK CORONA (1.15 $R_\odot$) 5303 Å

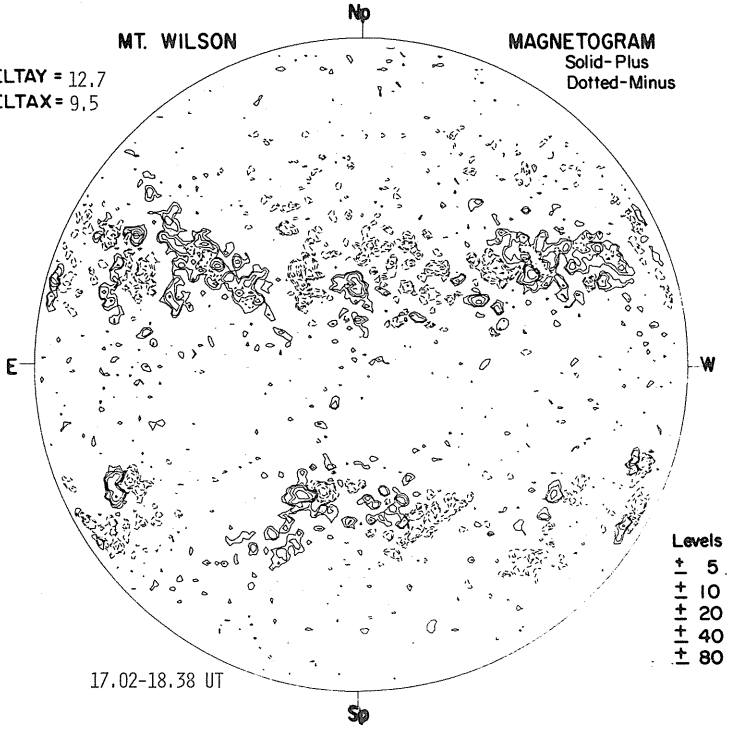


KITT PEAK MAGNETOGRAM Bright - Plus Dark - Minus



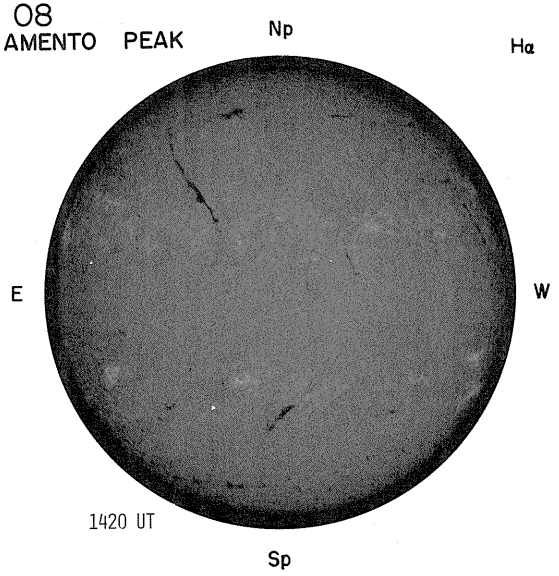
MT. WILSON MAGNETOGRAM Solid - Plus Dotted - Minus

DELTAY = 12.7
DELTAX = 9.5

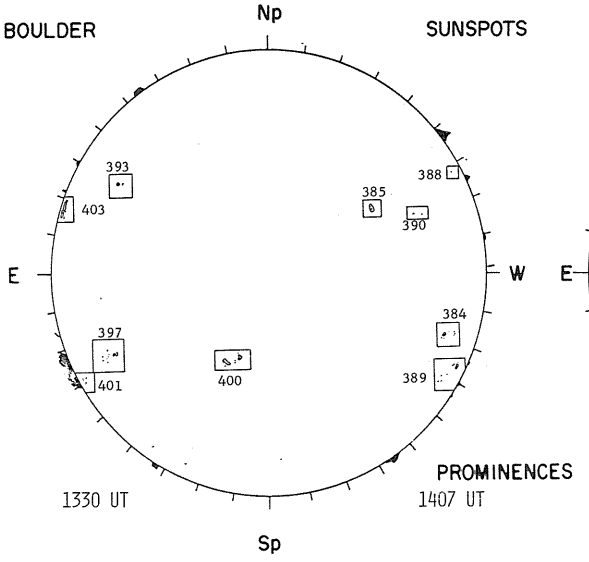


08

SACRAMENTO PEAK



BOULDER

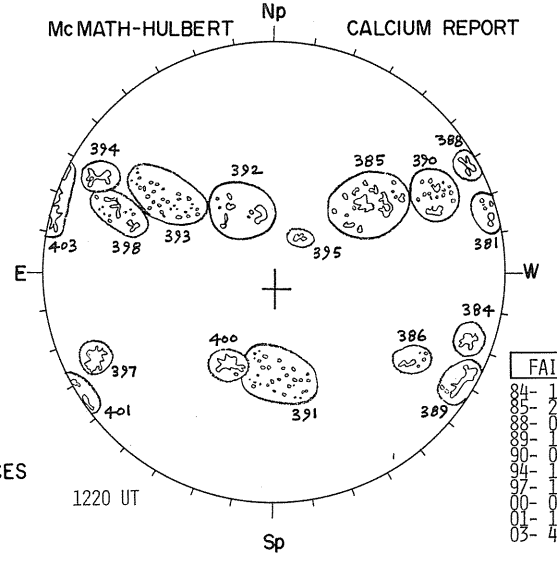


SUNSPOTS

PROMINENCES

1407 UT

McMATH-HULBERT

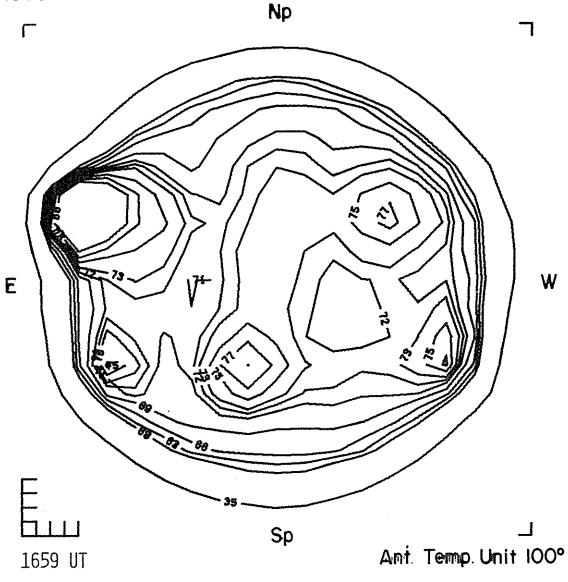


CALCIUM REPORT

FAIR	M
84- 1000-3.5	
85- 2400-2.5	
88- 0900-2.5	
89- 1800-3.5	
90- 0700-2.5	
94- 1100-3.0	
97- 1500-3.5	
00- 0900-3.0	
01- 1500-2.5	
03- 4500-3.0	

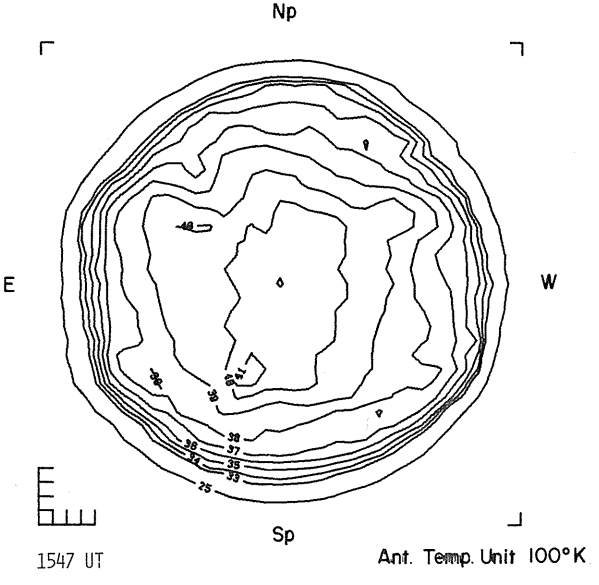
NOSC LA POSTA

2.0 CM

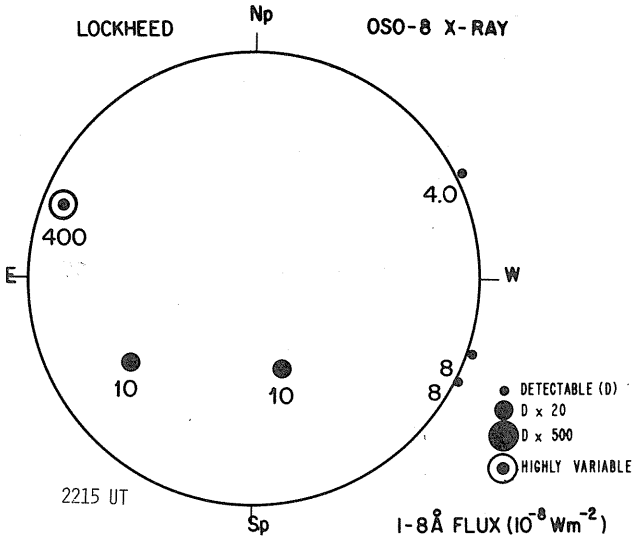


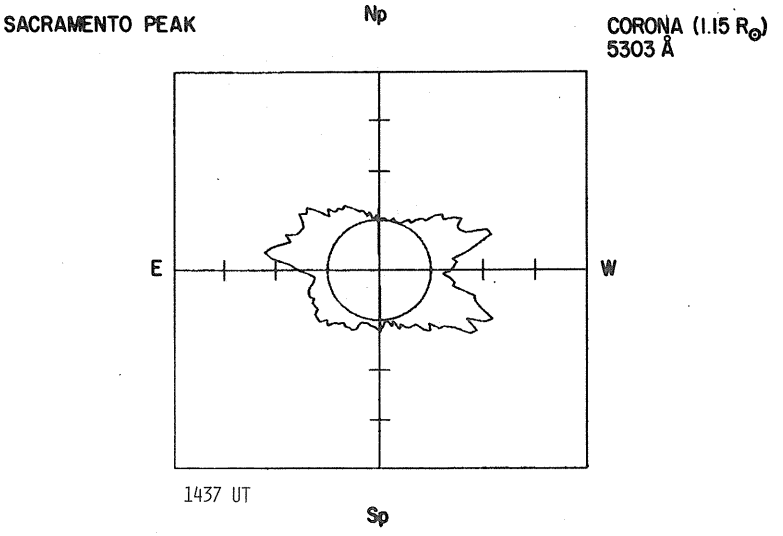
NOSC LA POSTA

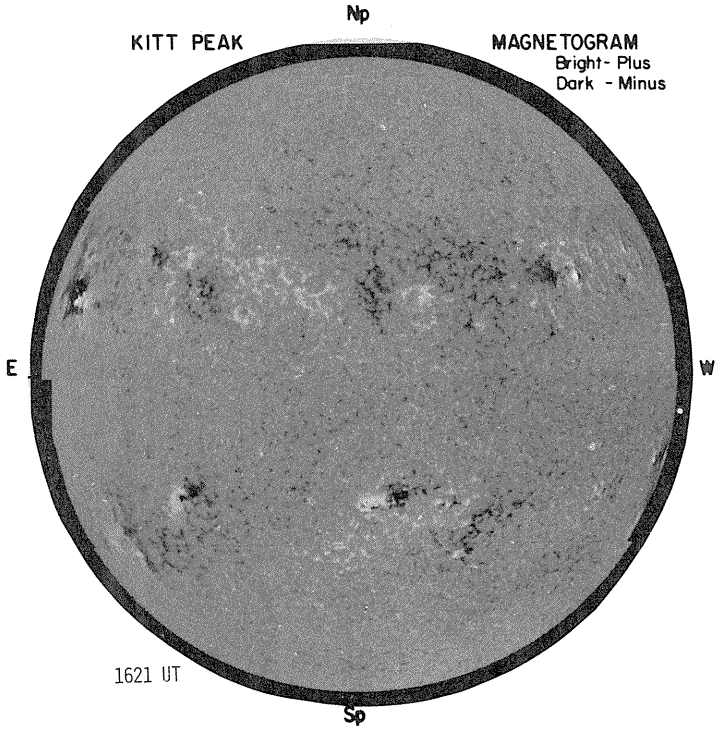
8.6 MM

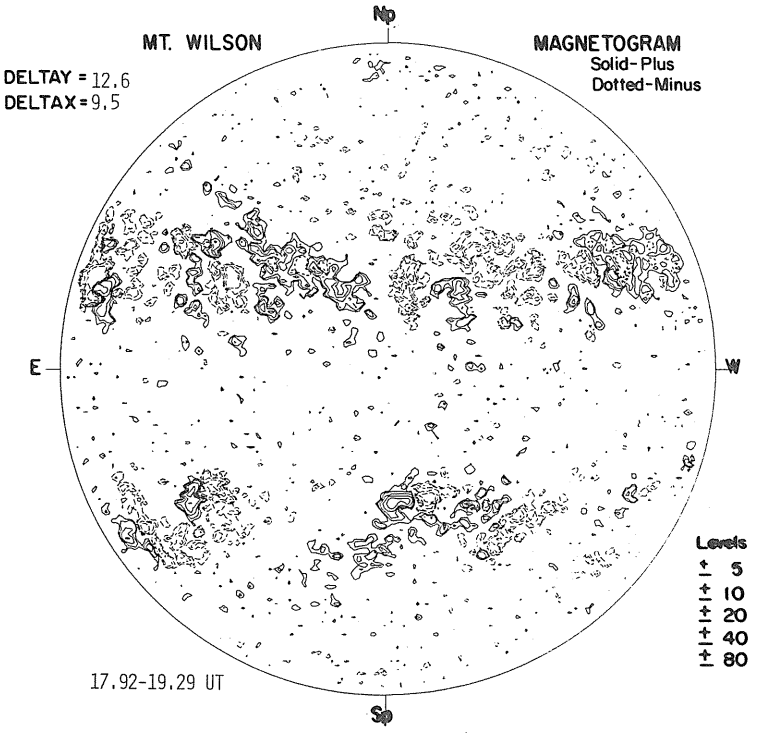


JULY 9, 1978 (P = 0.77, B_o = 3.73, L_o = 245.67)

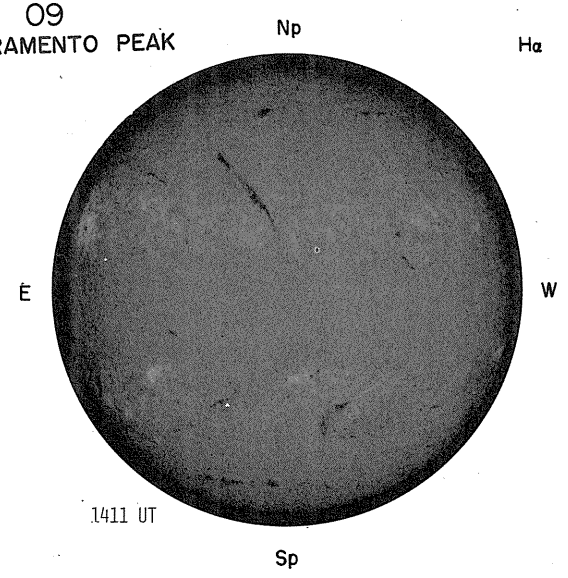






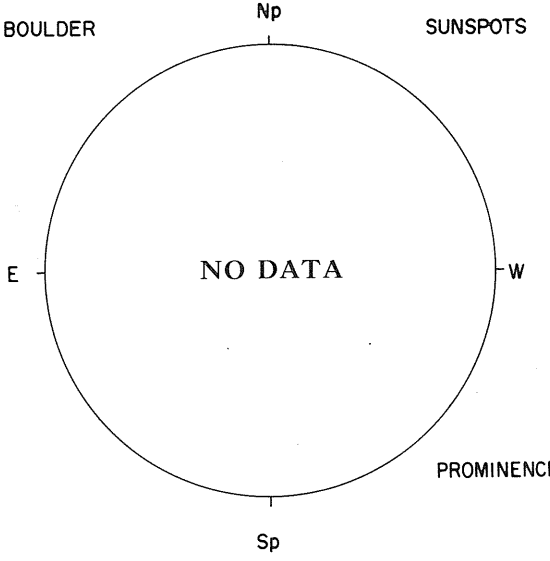


09
SACRAMENTO PEAK



Hα

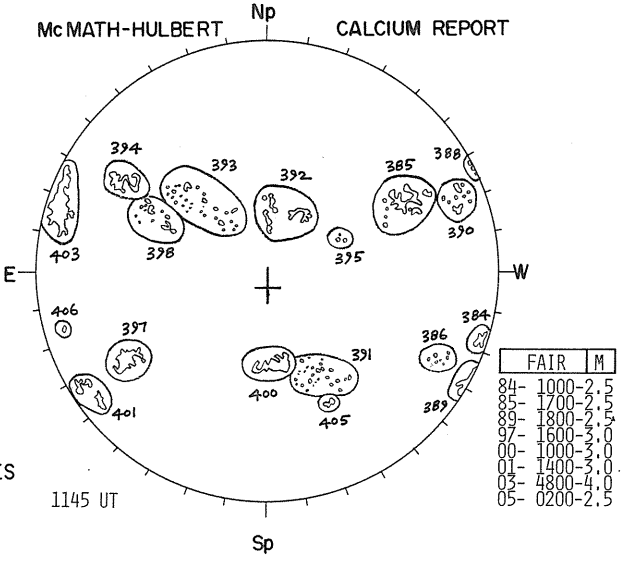
BOULDER



SUNSPOTS

McMATH-HULBERT

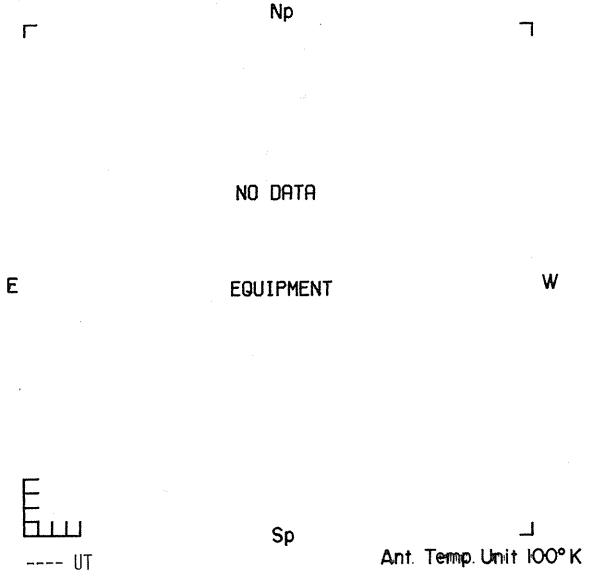
CALCIUM REPORT



PROMINENCES

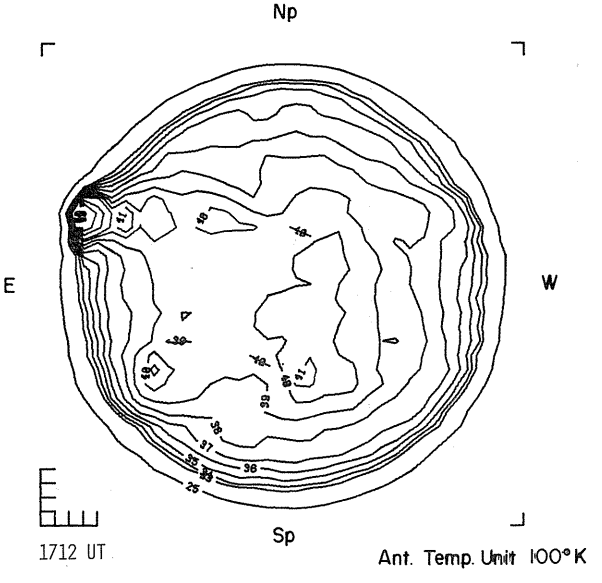
NOSC LA POSTA

2.0 CM



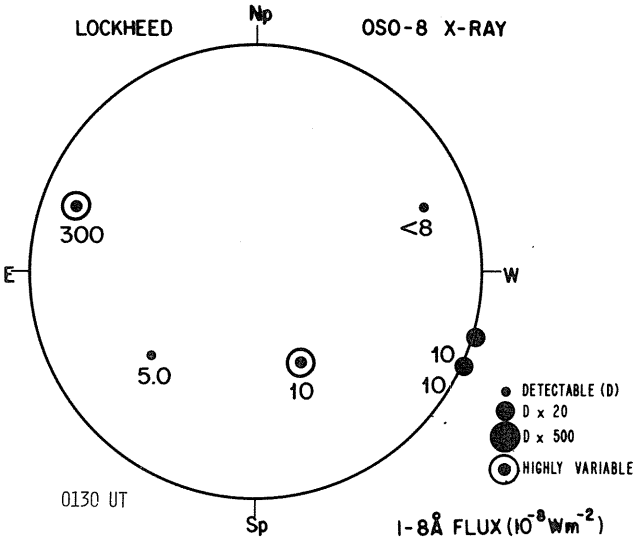
NOSC LA POSTA

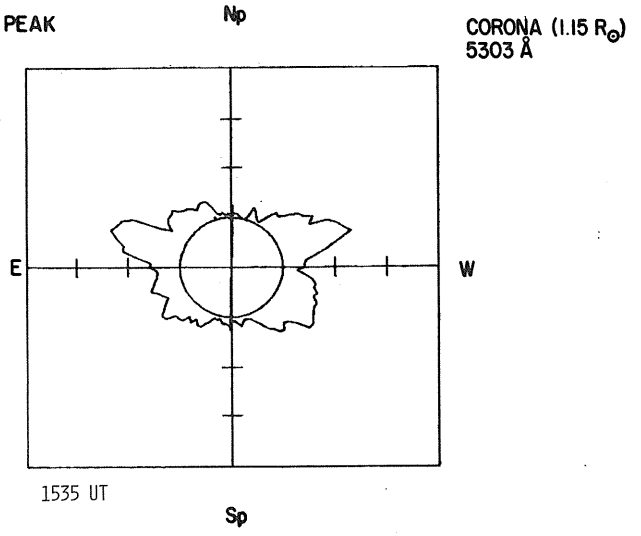
8.6 MM

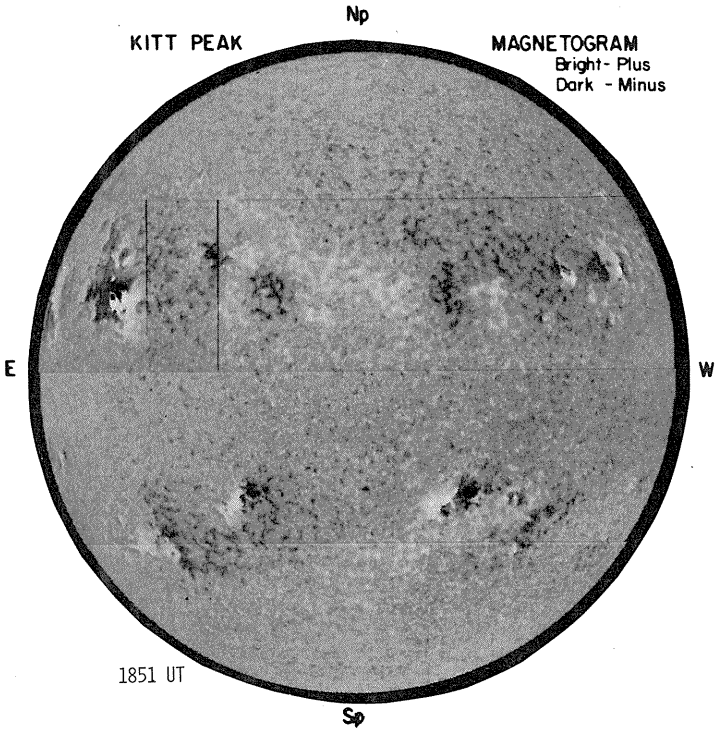


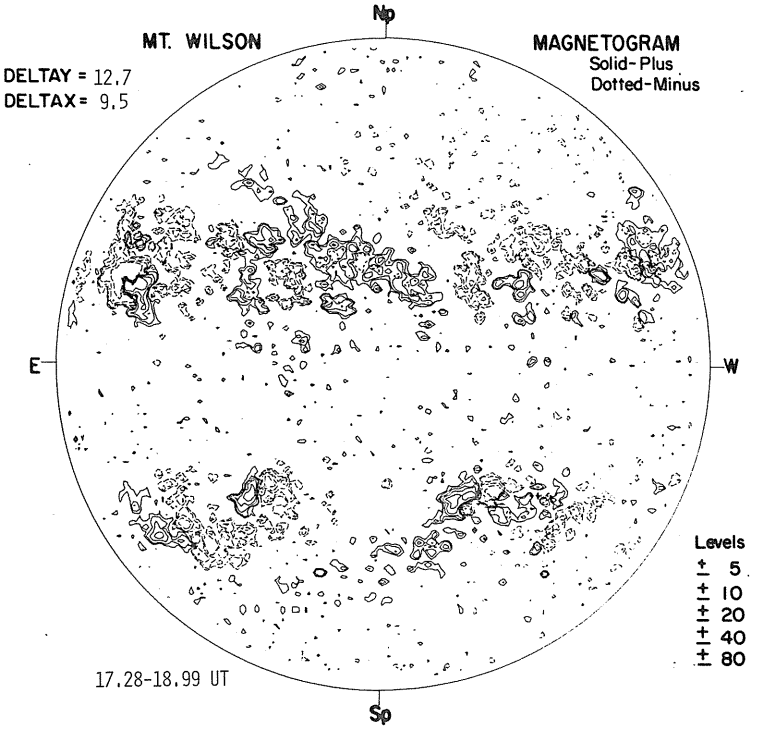
55
Jul 78

JULY 10, 1978 (P = 1.23, B_o = 3.83, L_o = 232.43)



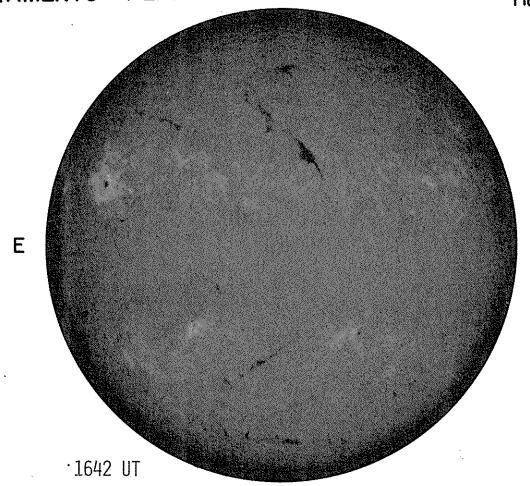






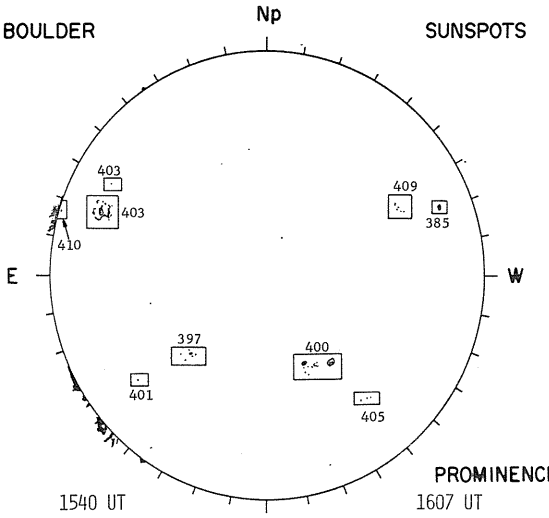
10

SACRAMENTO PEAK Hα



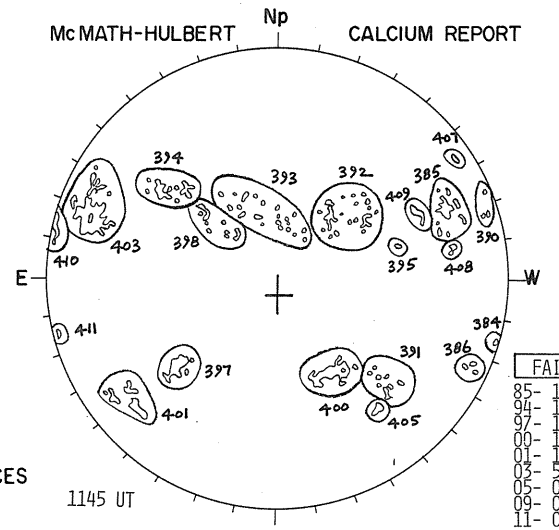
1642 UT

BOULDER SUNSPOTS



1540 UT

McMATH-HULBERT CALCIUM REPORT



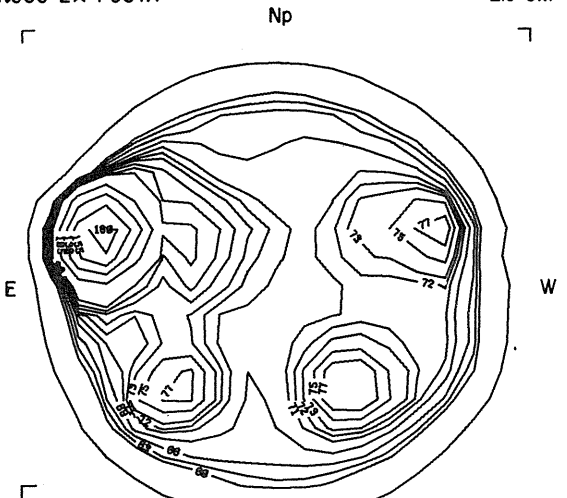
FAIR	D
85- 1600-2.5	
94- 1100-2.5	
97- 1500-3.5	
00- 1300-2.5	
01- 1500-2.5	
03- 5000-4.0	
05- 0300-2.5	
09- 0400-2.5	
11- 0300-2.5	

PROMINENCES

1607 UT

1145 UT

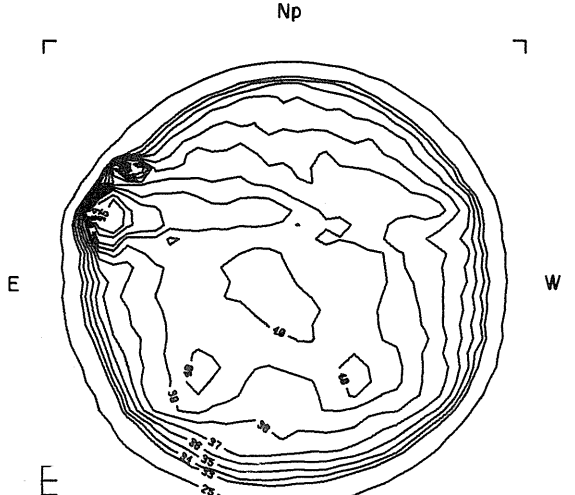
NOSC LA POSTA 2.0 CM



1600 UT

Ant. Temp. Unit 100°K

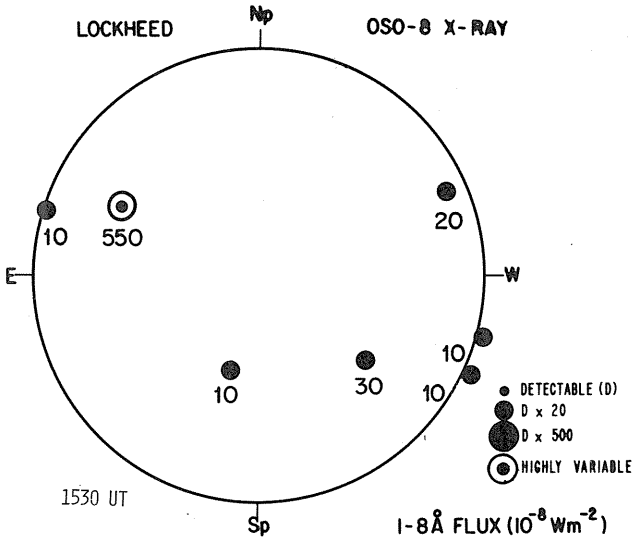
NOSC LA POSTA 8.6 MM

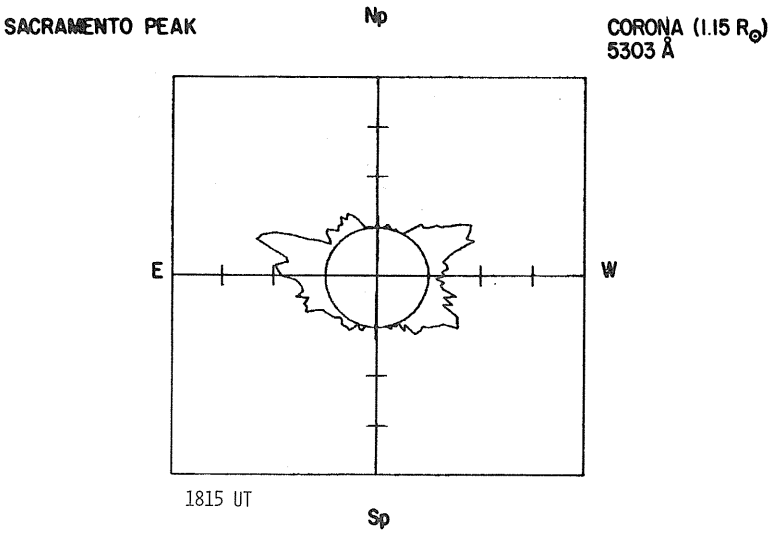


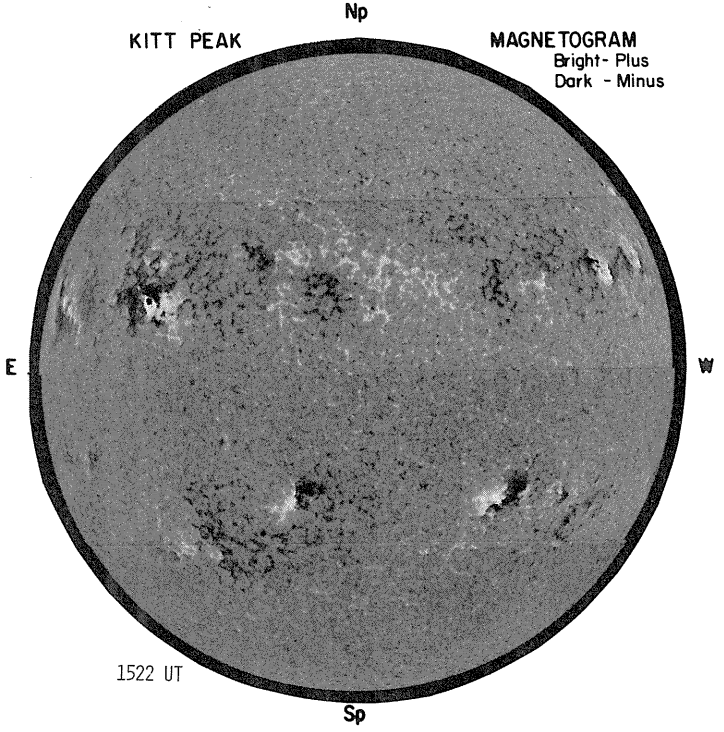
1635 UT

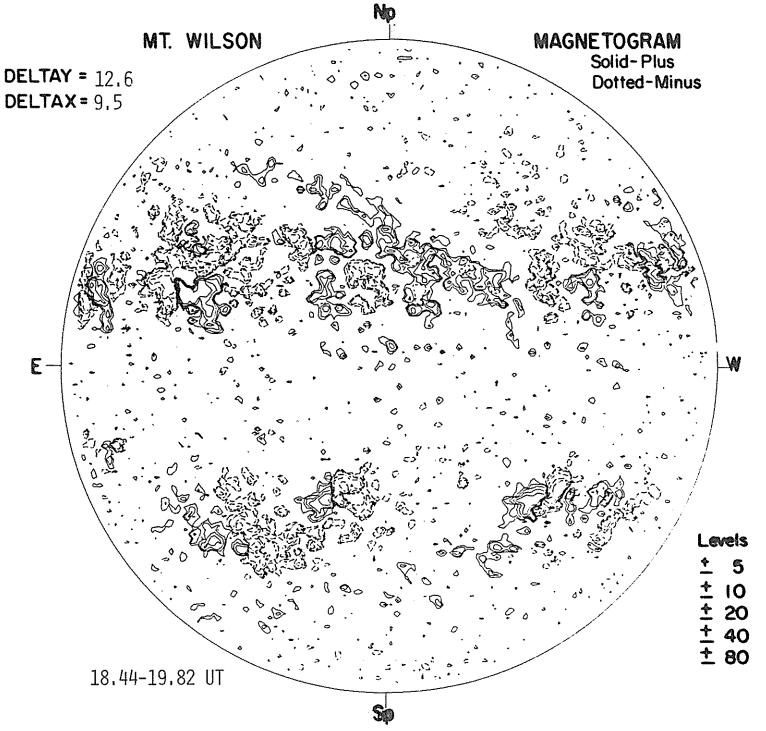
Ant. Temp. Unit 100°K

JULY 11, 1978 (P = 1.68, B_o = 3.93, L_o = 219.20)

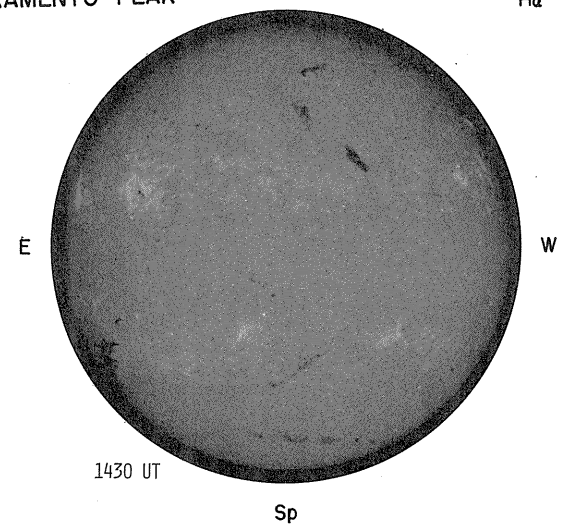






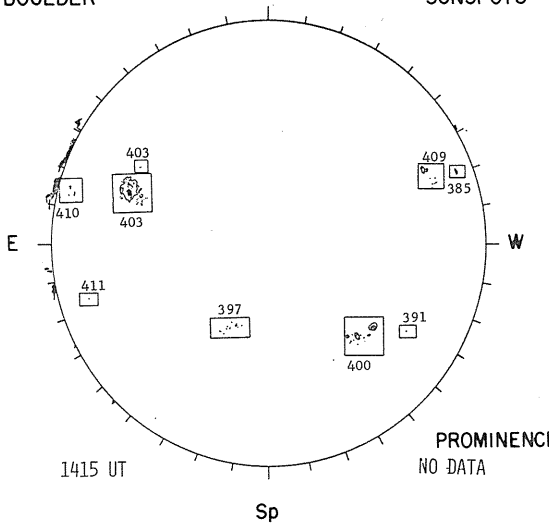


SACRAMENTO PEAK — Hα



1430 UT

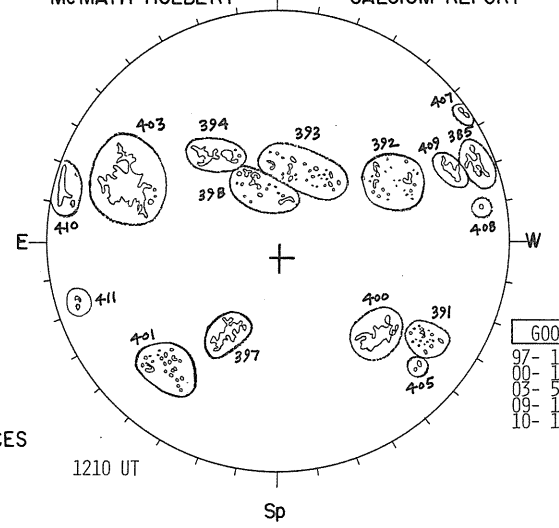
BOULDER — SUNSPOTS



1415 UT

PROMINENCES
NO DATA

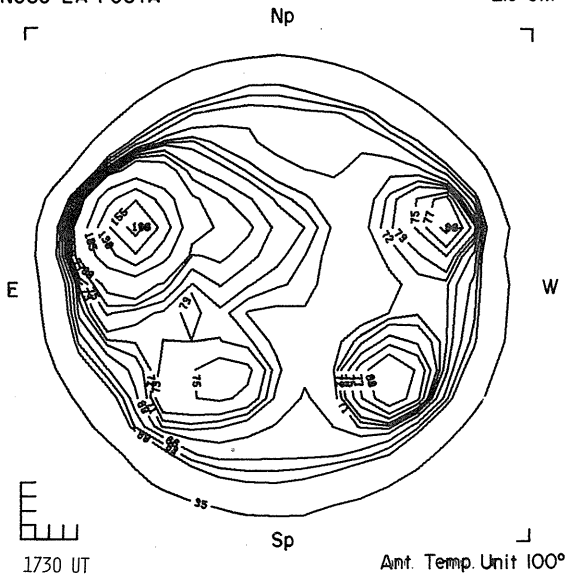
McMATH-HULBERT — CALCIUM REPORT



1210 UT

GOOD	S
97-	1200-3.0
00-	1600-2.5
03-	5000-4.0
09-	1000-3.0
10-	1500-3.5

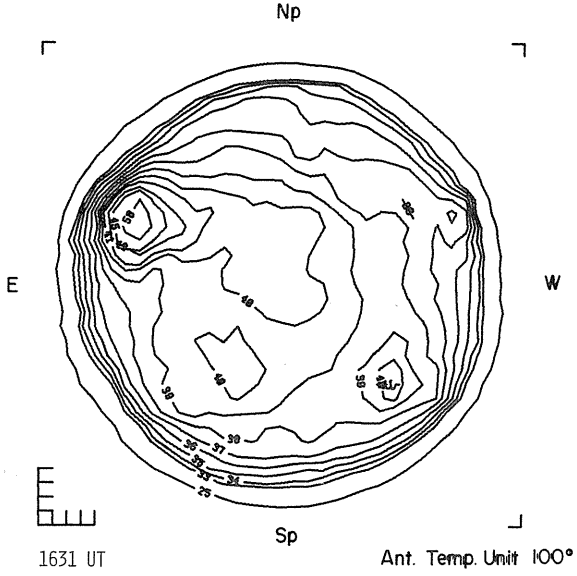
NOSC LA POSTA — 2.0 CM



1730 UT

Ant. Temp. Unit 100° K

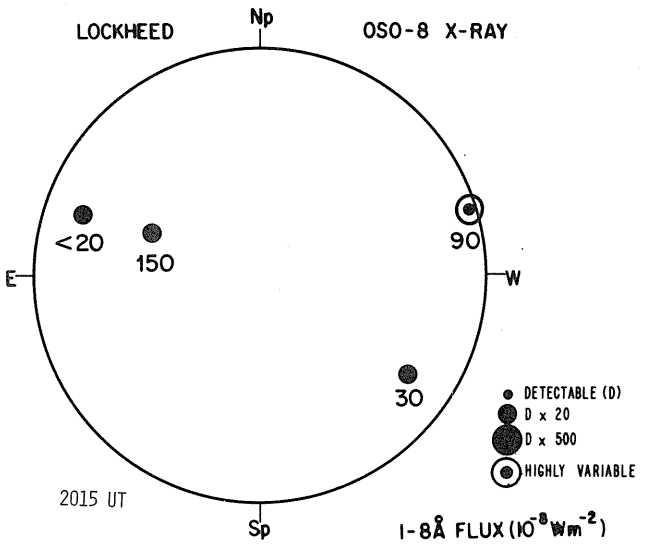
NOSC LA POSTA — 8.6 MM

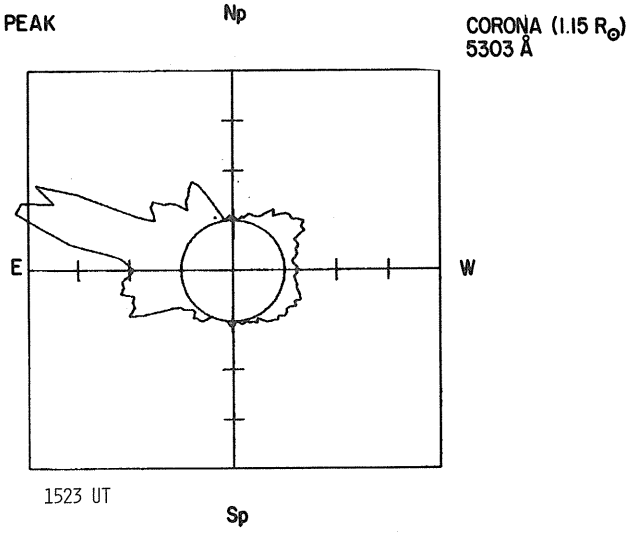


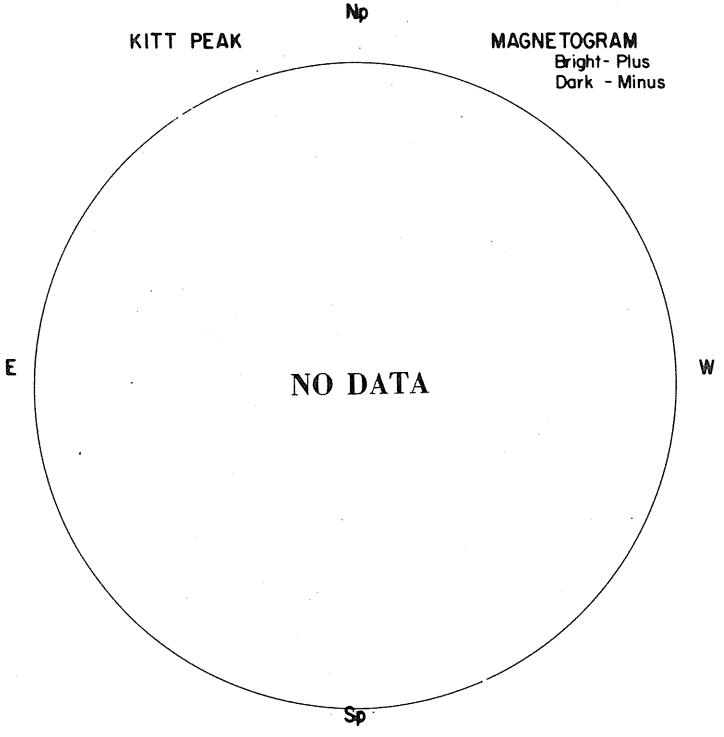
1631 UT

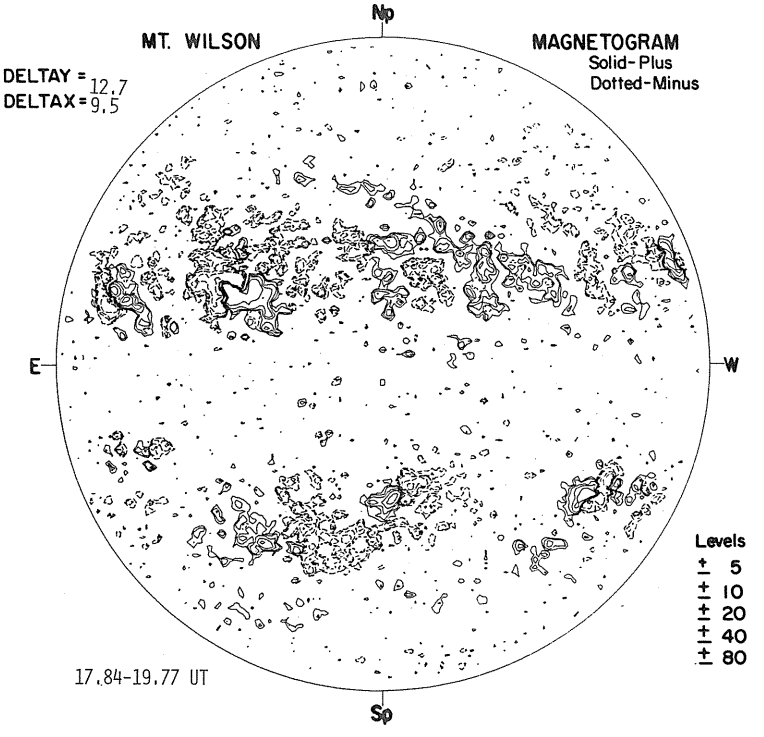
Ant. Temp. Unit 100° K

JULY 12, 1978 (P = 2.13, B_o = 4.03, L_o = 205.97)



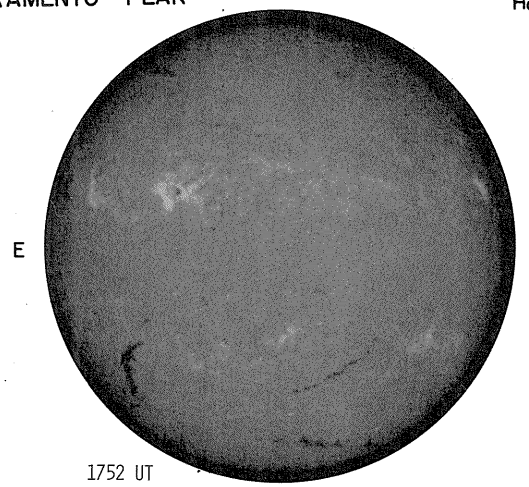






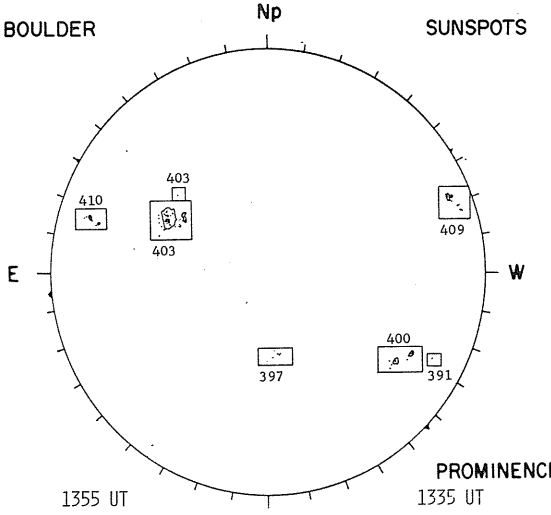
12

SACRAMENTO PEAK



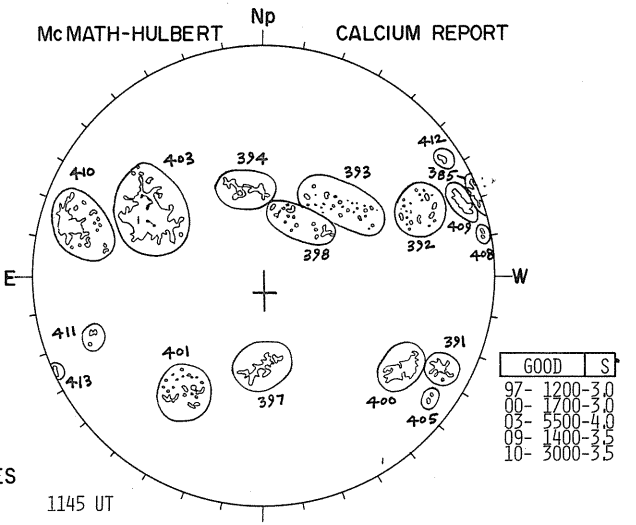
1752 UT

BOULDER SUNSPOTS



1355 UT

McMATH-HULBERT CALCIUM REPORT

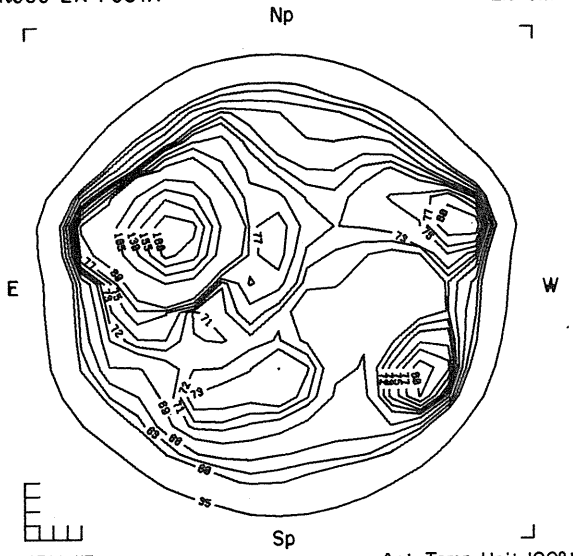


PROMINENCES

1335 UT

1145 UT

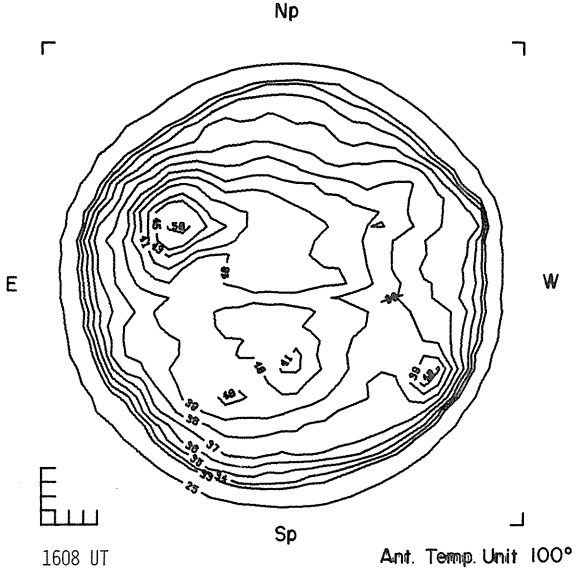
NOSC LA POSTA 2.0 CM



1711 UT

Ant. Temp. Unit 100° K

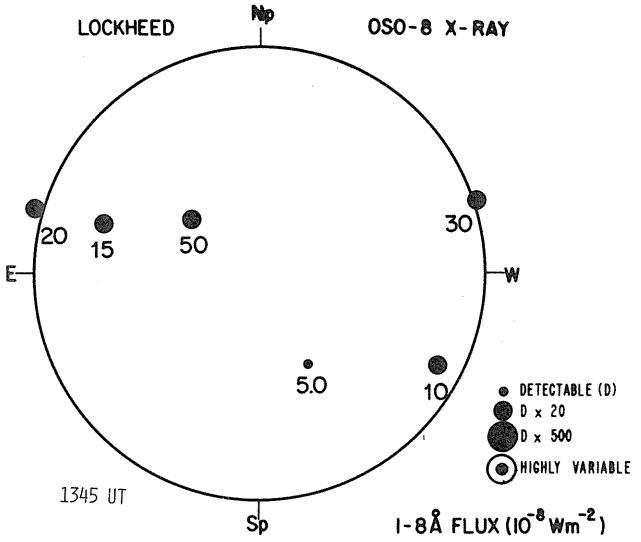
NOSC LA POSTA 8.6 MM

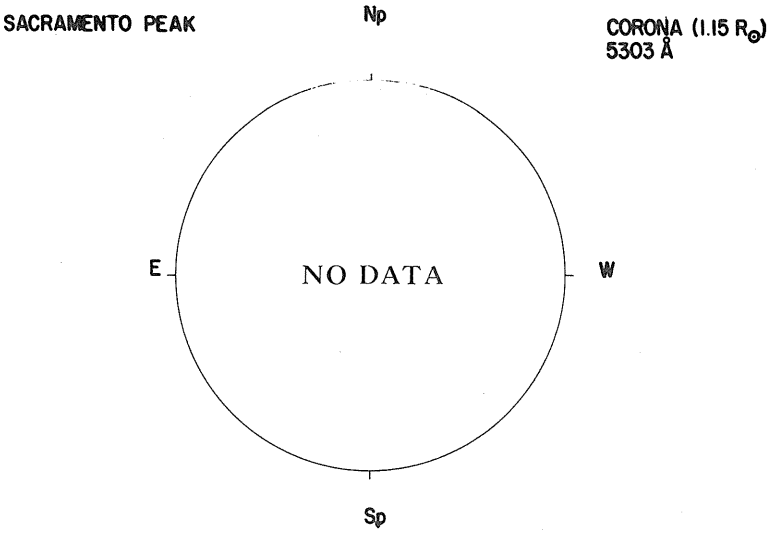


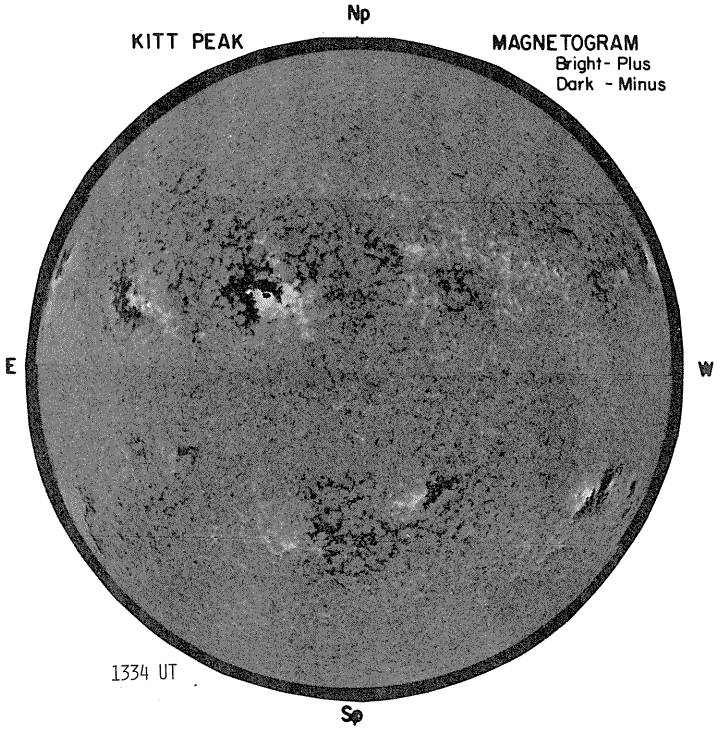
1608 UT

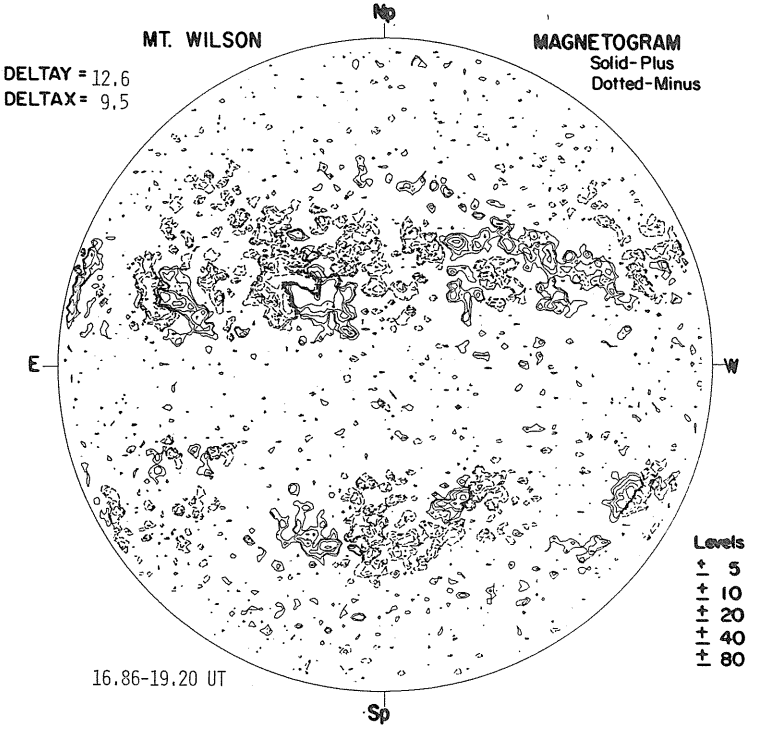
Ant. Temp. Unit 100° K

JULY 13, 1978 (P = 2.57, B_o = 4.13, L_o = 192.73)



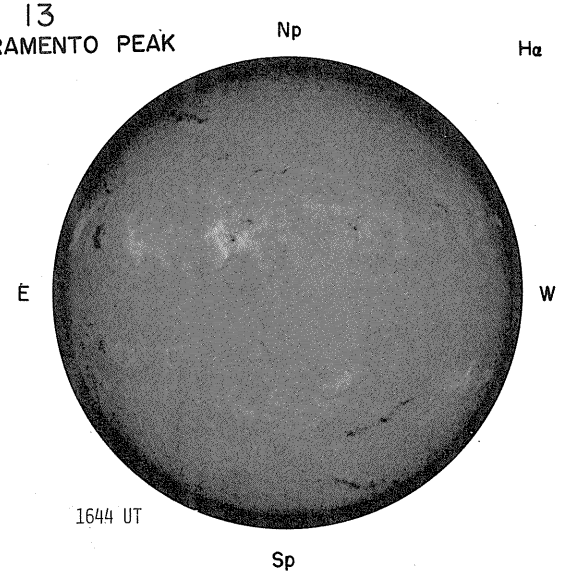




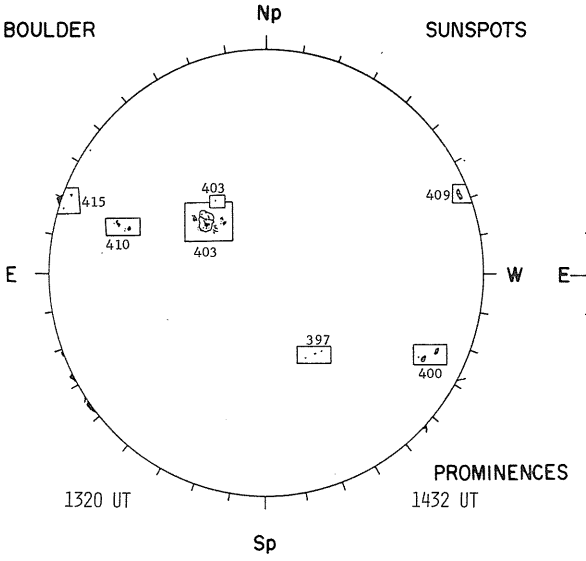


13

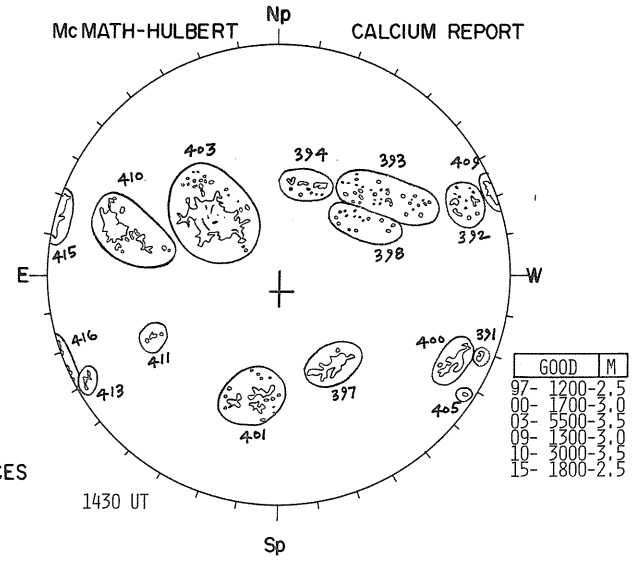
SACRAMENTO PEAK



BOULDER SUNSPOTS



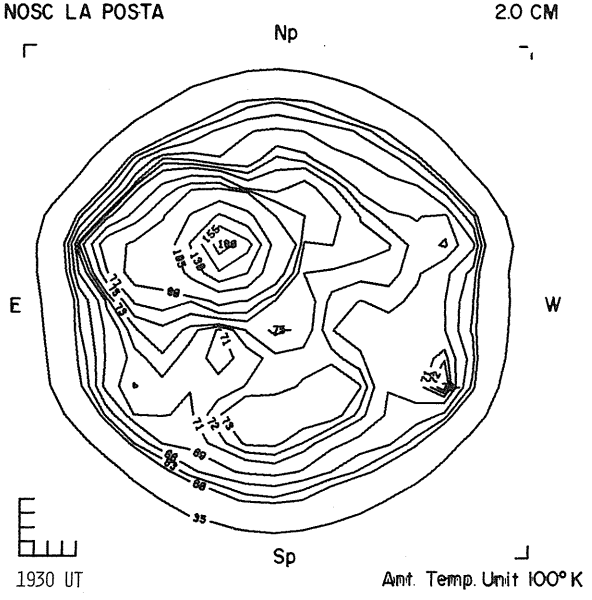
McMATH-HULBERT CALCIUM REPORT



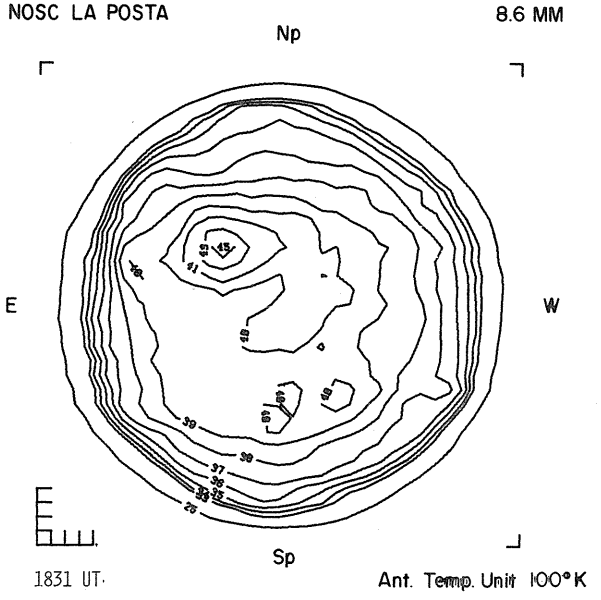
PROMINENCES

1432 UT

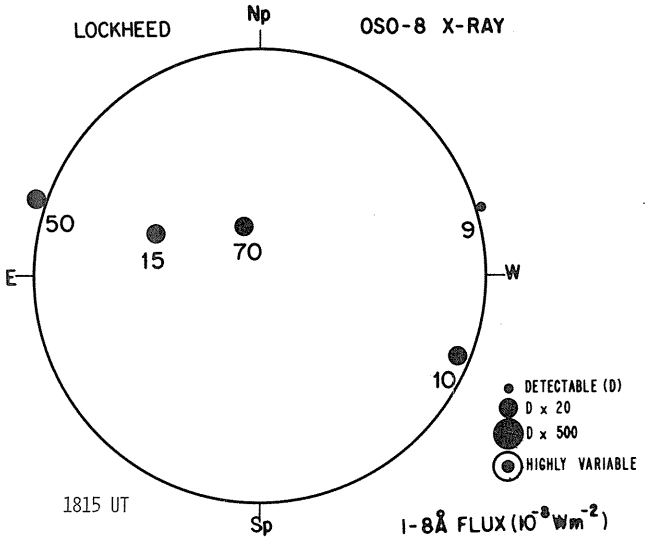
NOSC LA POSTA 2.0 CM

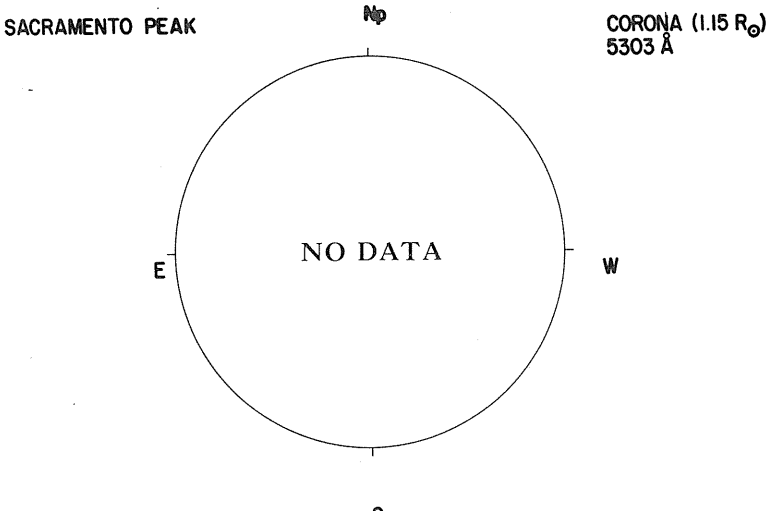


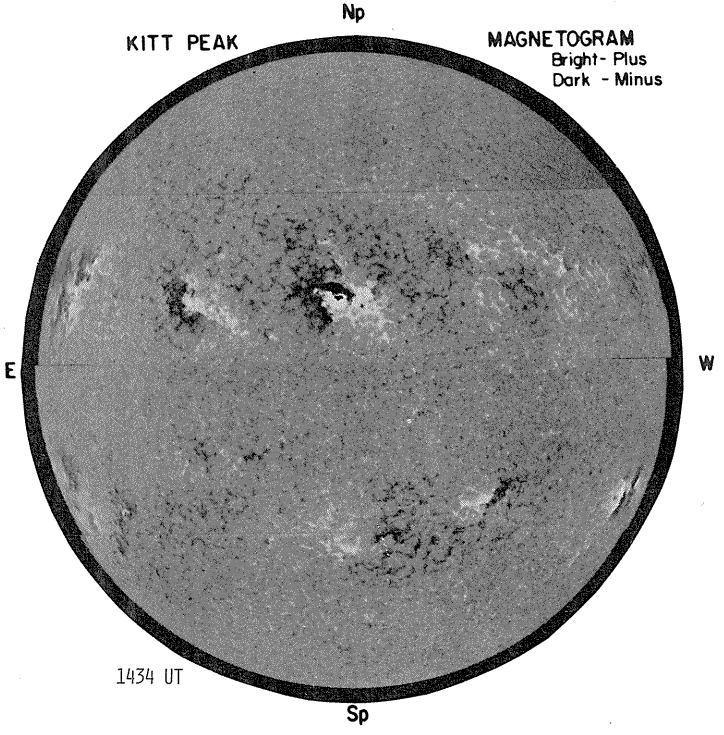
NOSC LA POSTA 8.6 MM

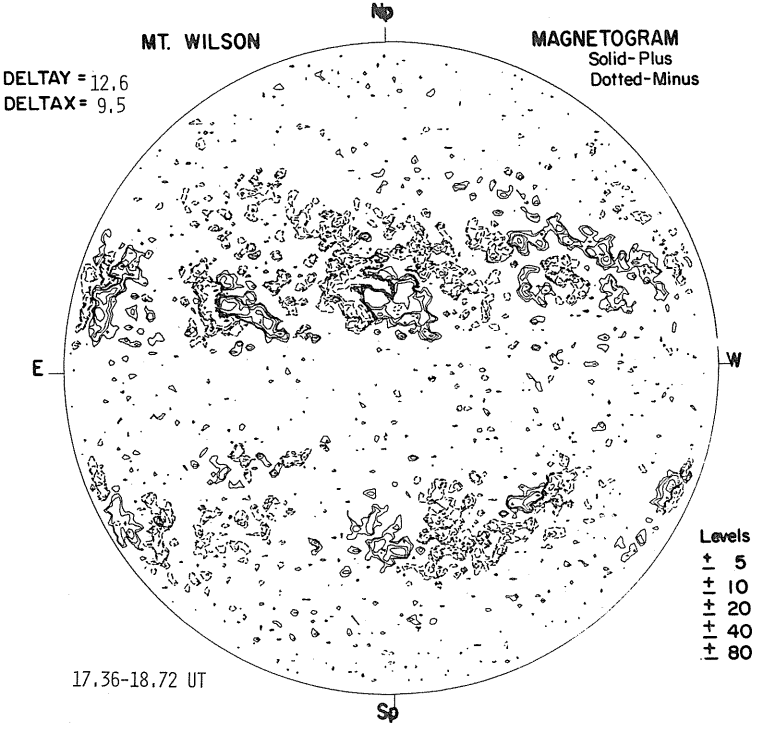


JULY 14, 1978 (P = 3.02, B_o = 4.23, L_o = 179.50)







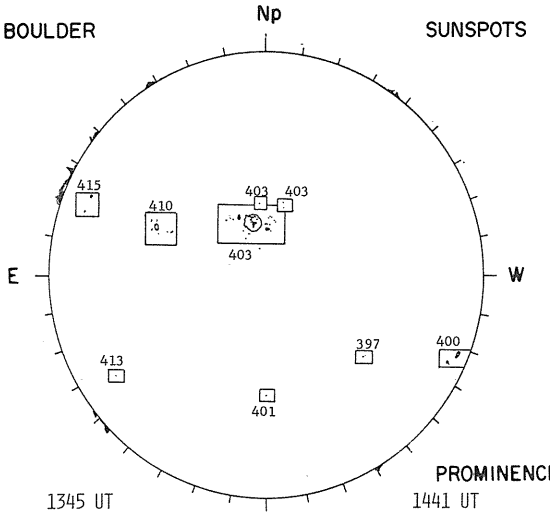


14

SACRAMENTO PEAK Hα

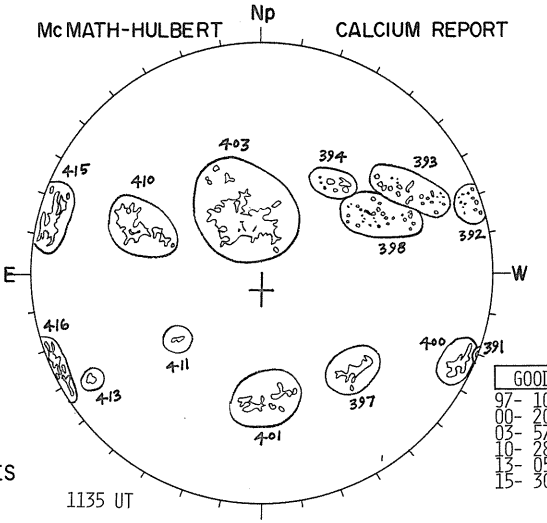
1527 UT

BOULDER SUNSPOTS



1345 UT

McMATH-HULBERT CALCIUM REPORT



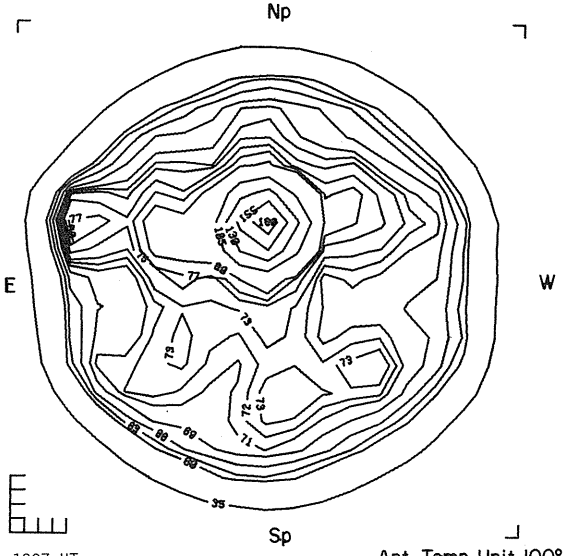
GOOD	S
97- 1000-	2.5
00- 2000-	2.5
03- 5700-	3.5
10- 2800-	3.5
13- 0500-	2.5
15- 3000-	2.5

PROMINENCES

1441 UT

1135 UT

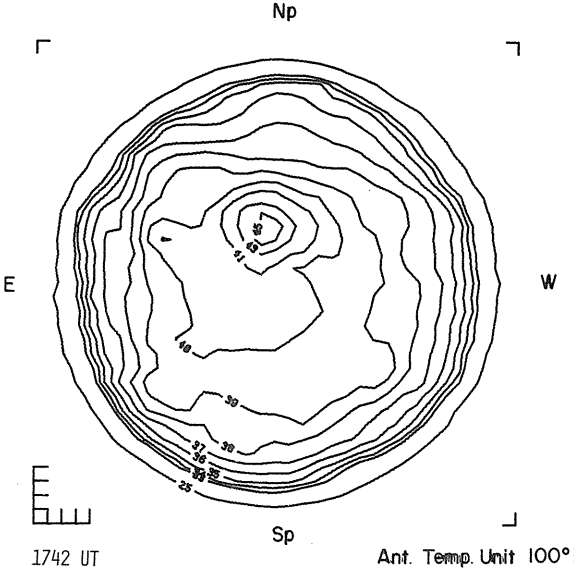
NOSC LA POSTA 2.0 CM



1903 UT

Ant. Temp. Unit 100° K

NOSC LA POSTA 8.6 MM

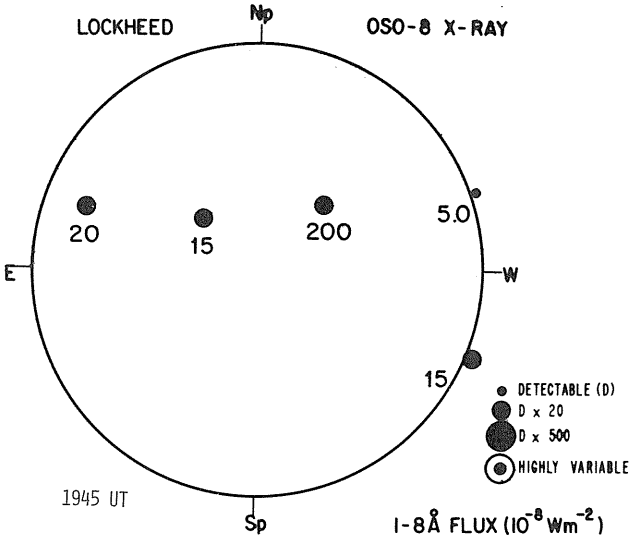


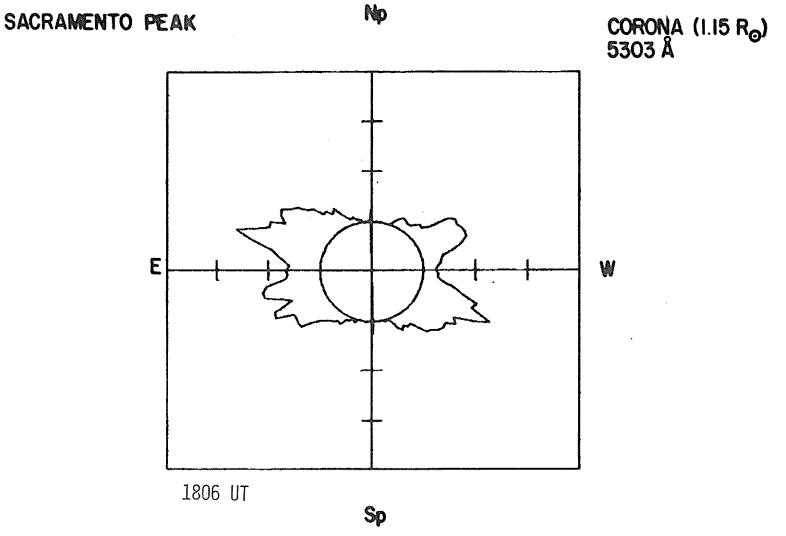
1742 UT

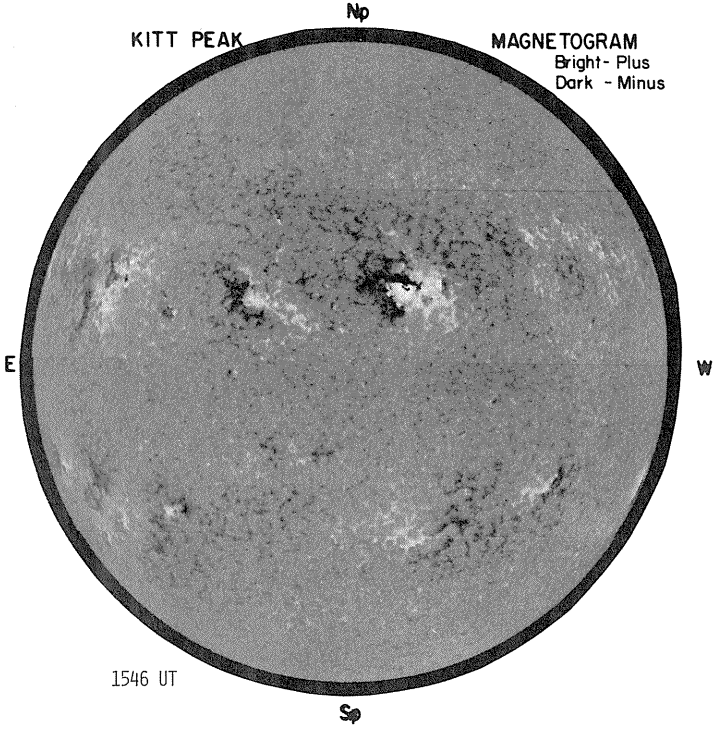
Ant. Temp. Unit 100° K

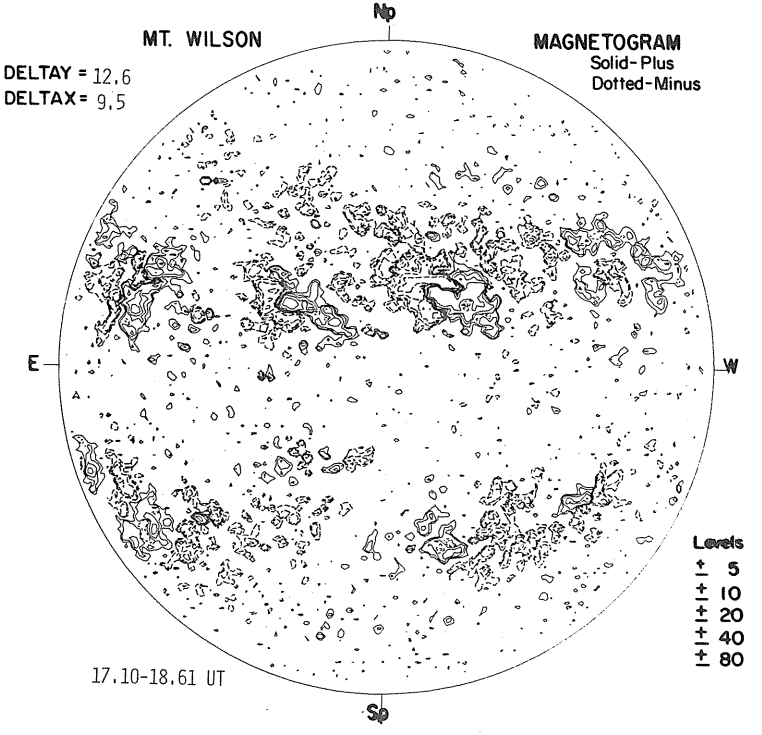
65
Jul 78

JULY 15, 1978 (P = 3.47, B_o = 4.33, L_o = 166.27)

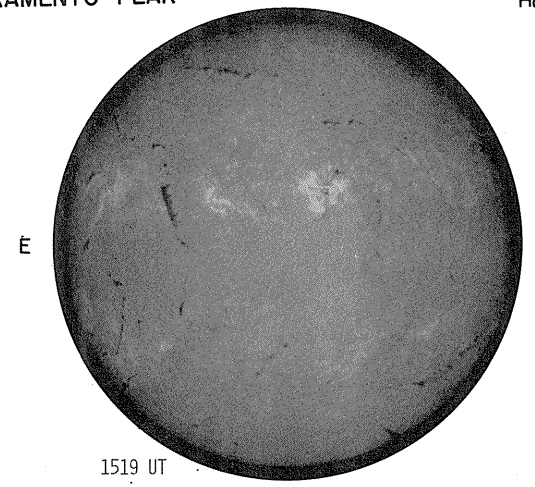






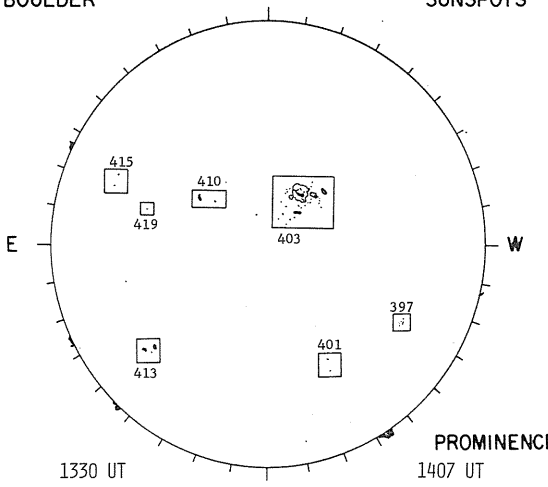


SACRAMENTO PEAK Hα



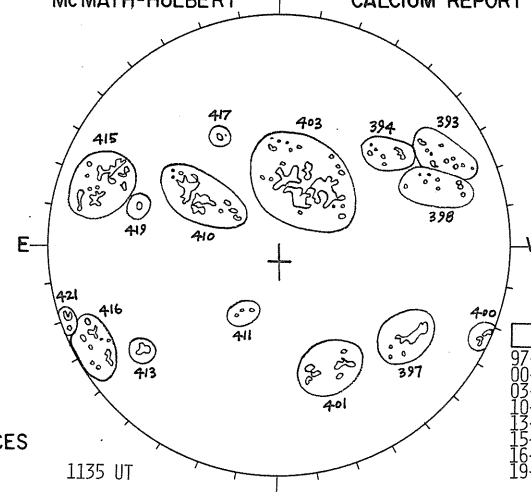
1519 UT

BOULDER SUNSPOTS



1330 UT

McMATH-HULBERT CALCIUM REPORT

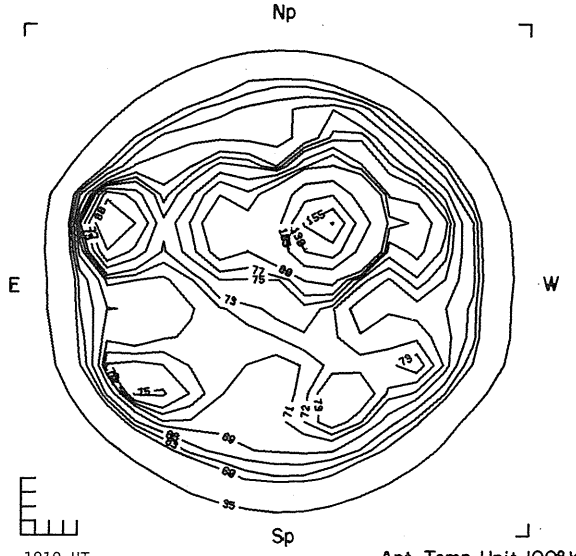


POOR	D
97- 1200-	3.0
00- 0800-	2.5
03- 5500-	3.0
10- 2600-	3.0
13- 0600-	2.5
15- 3500-	3.0
16- 1800-	2.5
19- 0200-	2.5

PROMINENCES

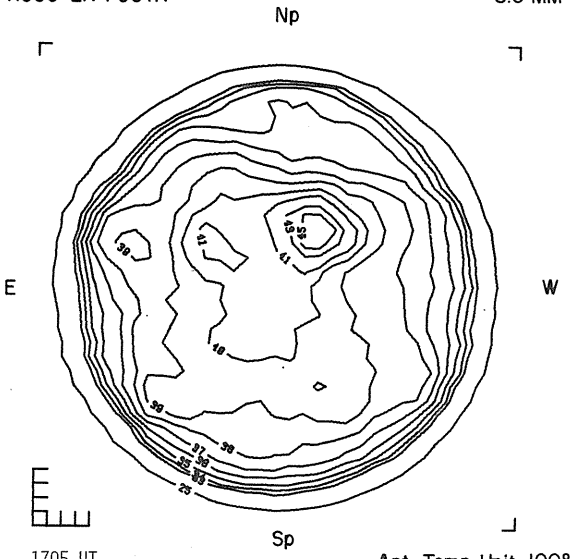
1407 UT

NOSC LA POSTA 2.0 CM



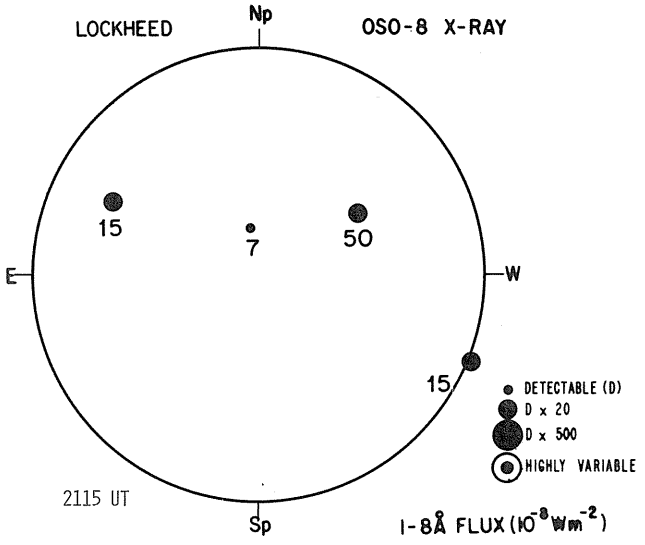
1818 UT Ant. Temp. Unit 100° K

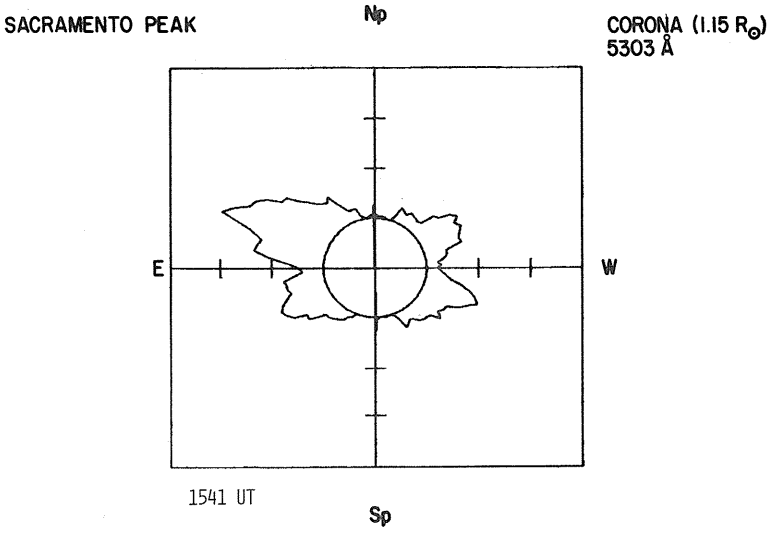
NOSC LA POSTA 8.6 MM

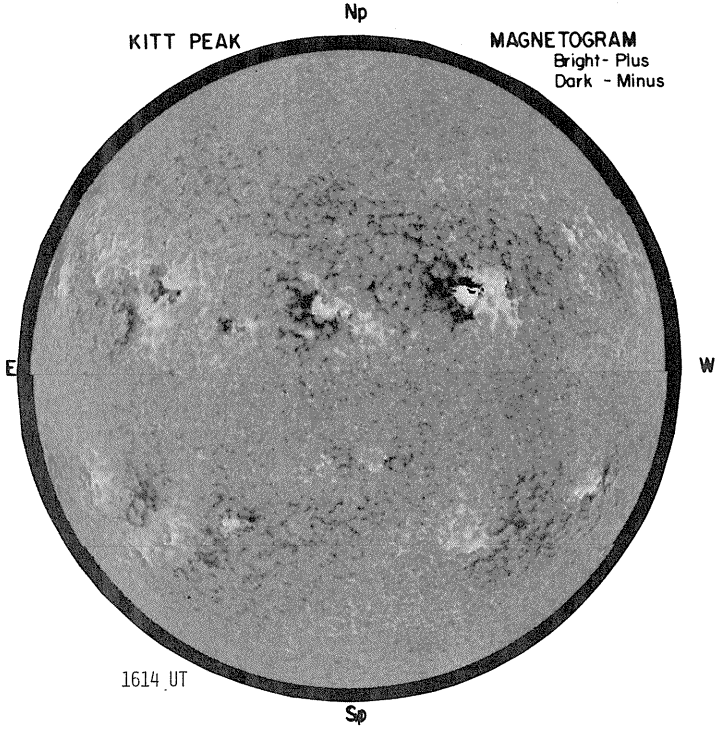


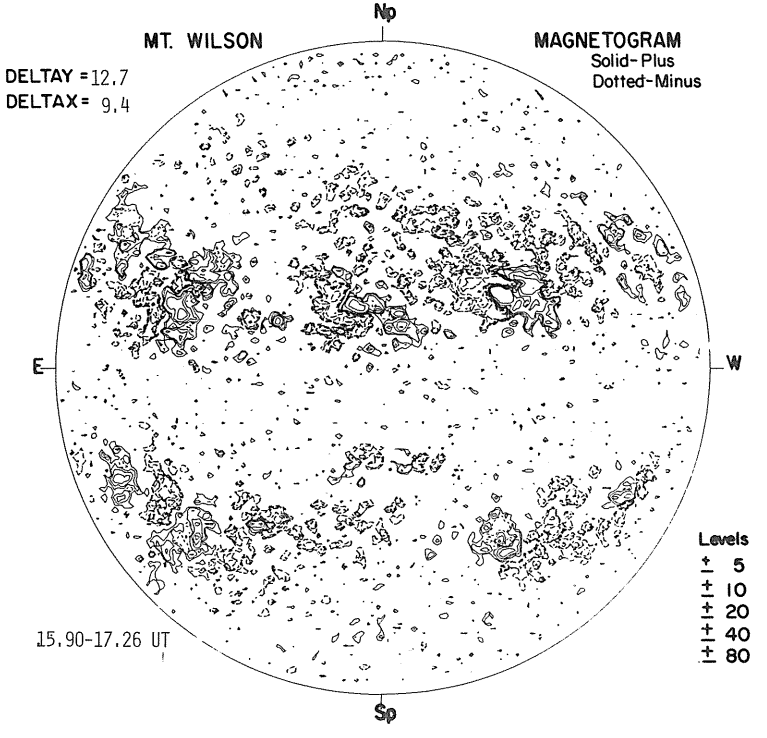
1705 UT Ant. Temp. Unit 100° K

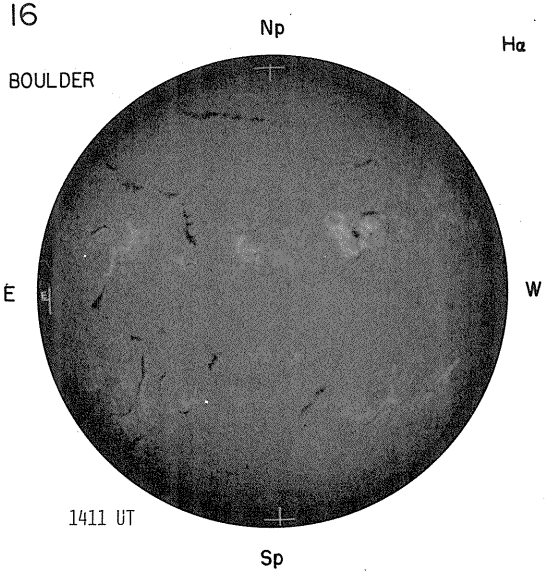
JULY 16, 1978 (P = 3.91, B_o = 4.42, L_o = 153.03)

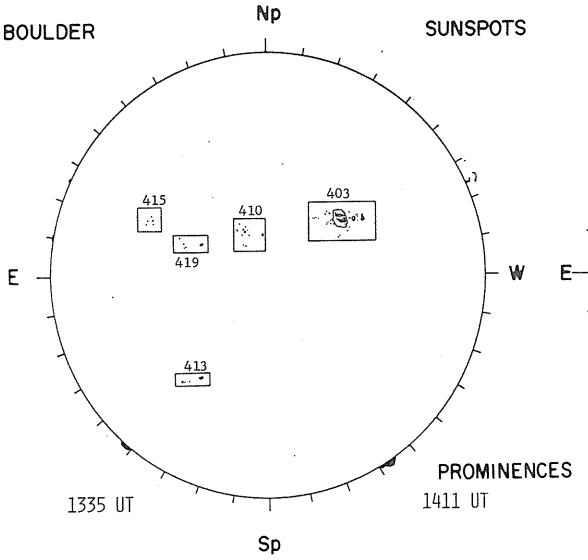


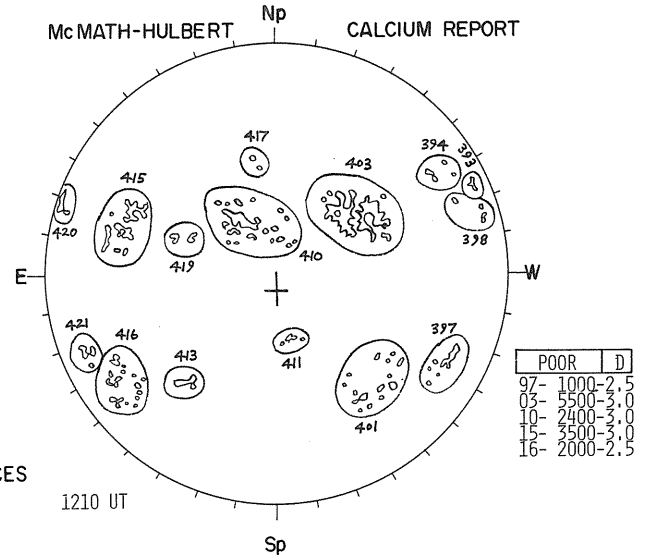







BOULDER
Hα
Np
E
W
Sp
1411 UT


BOULDER
SUNSPOTS
Np
E
W
Sp
415
419
410
403
413
1335 UT
PROMINENCES
1411 UT


McMATH-HULBERT
CALCIUM REPORT
Np
E
W
Sp
417
415
403
394
393
420
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410
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421
416
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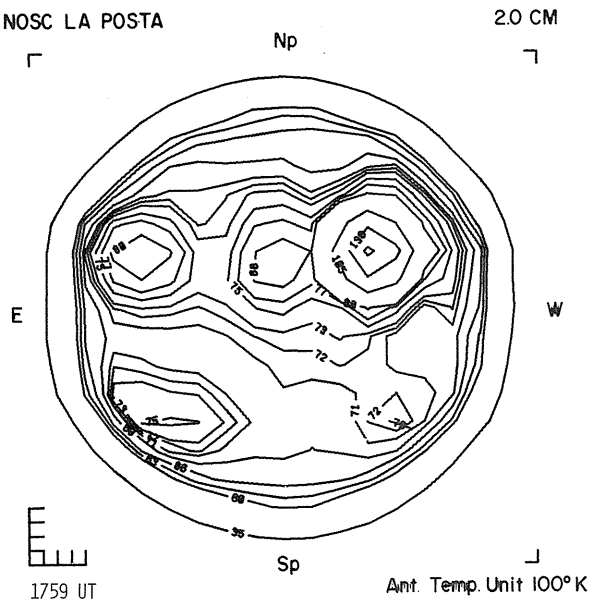
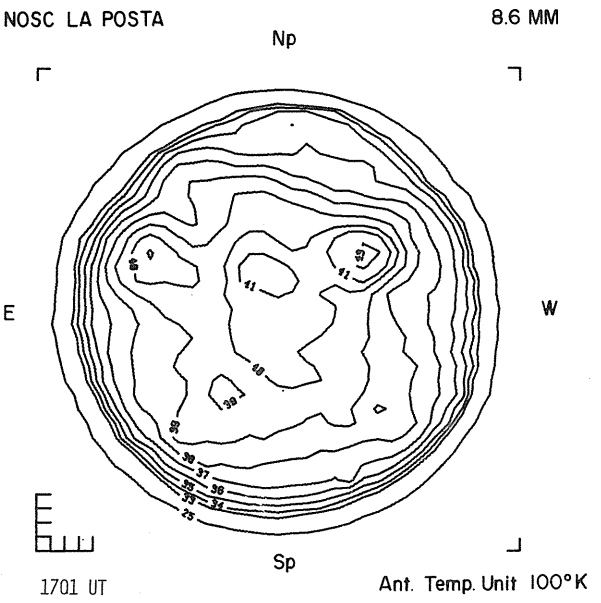
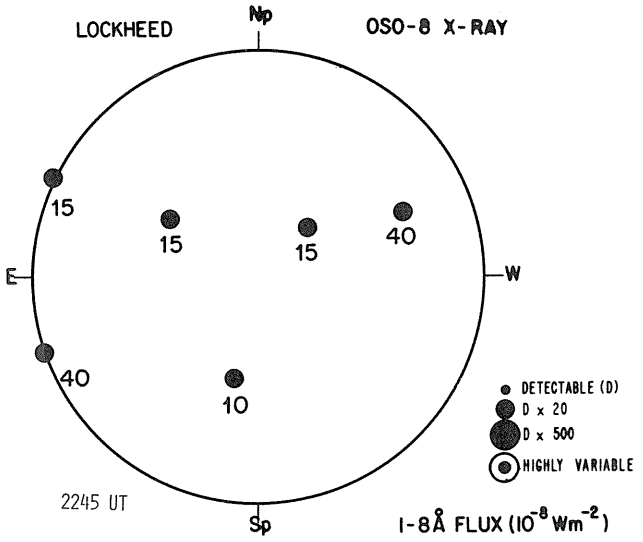
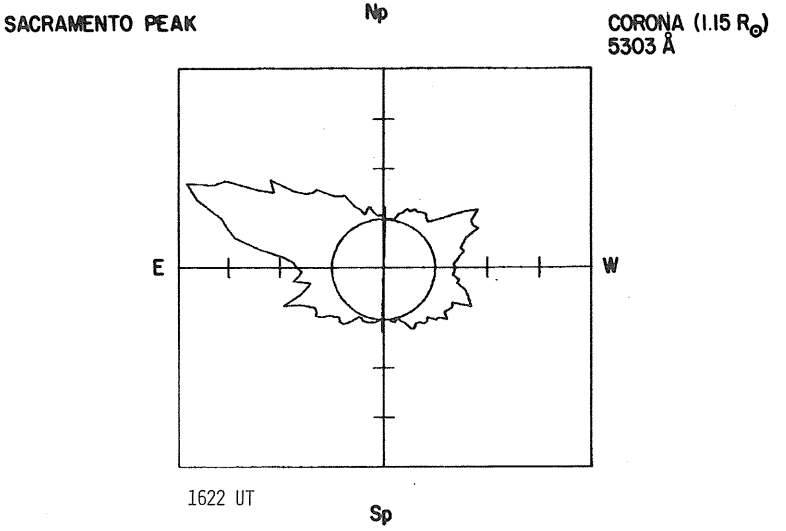
411
397
401
1210 UT
POOR D
97- 1000-2.5
03- 5500-3.0
10- 2400-3.0
15- 3500-3.0
16- 2000-2.5

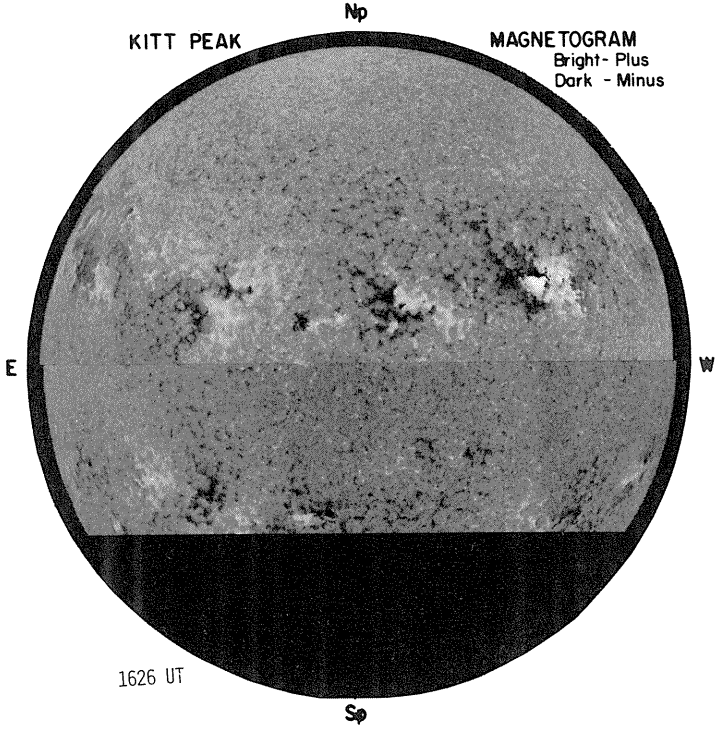

NOSC LA POSTA
2.0 CM
Np
E
W
Sp
1759 UT
Ant. Temp. Unit 100° K

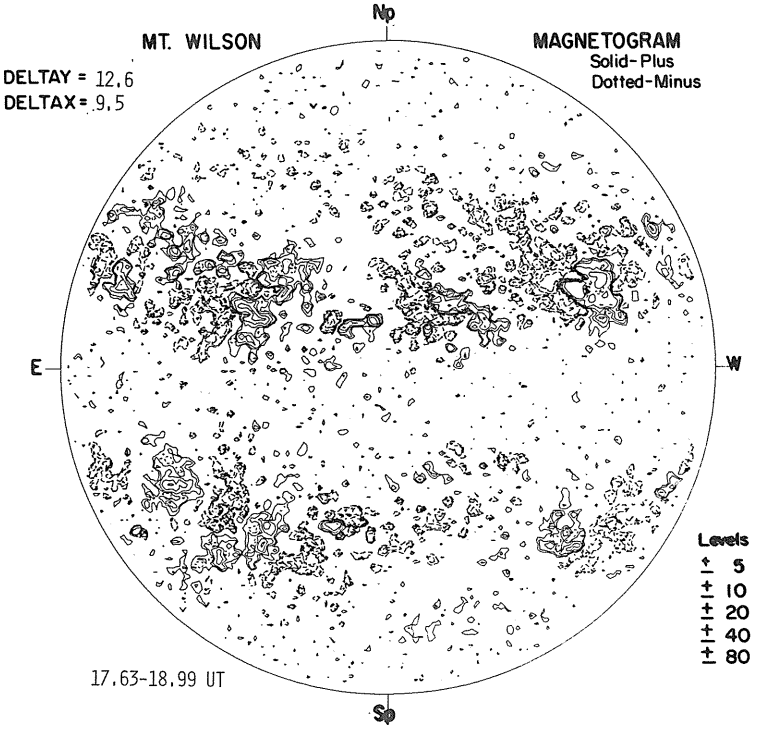

NOSC LA POSTA
8.6 MM
Np
E
W
Sp
1701 UT
Ant. Temp. Unit 100° K

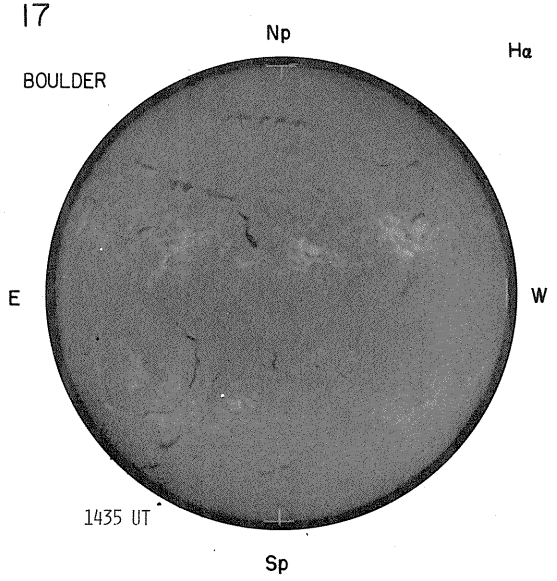
JULY 17, 1978 (P = 4.35, B_o = 4.52, L_o = 139.80)

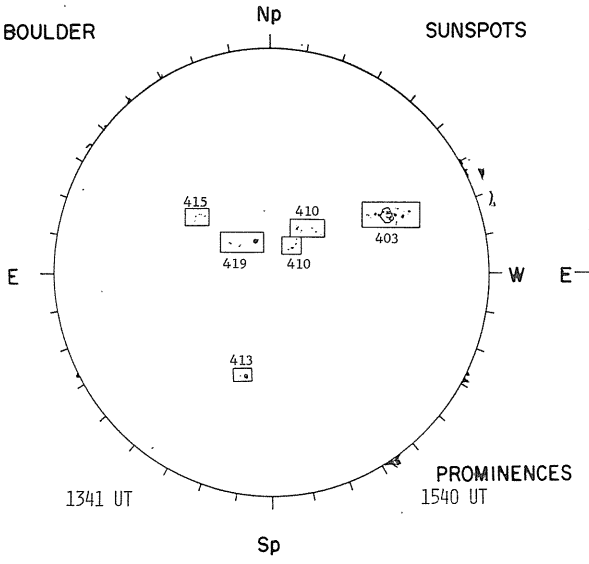









BOULDER
Np
Hα
E
W
1435 UT
Sp


BOULDER
Np
SUNSPOTS
E
W
415
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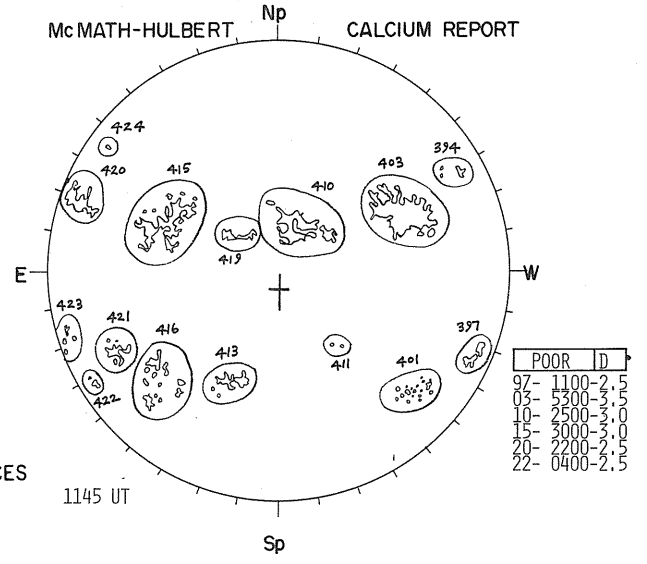
410
410
403
413
1341 UT
Sp


McMATH-HULBERT
Np
CALCIUM REPORT
E
W
424
420
415
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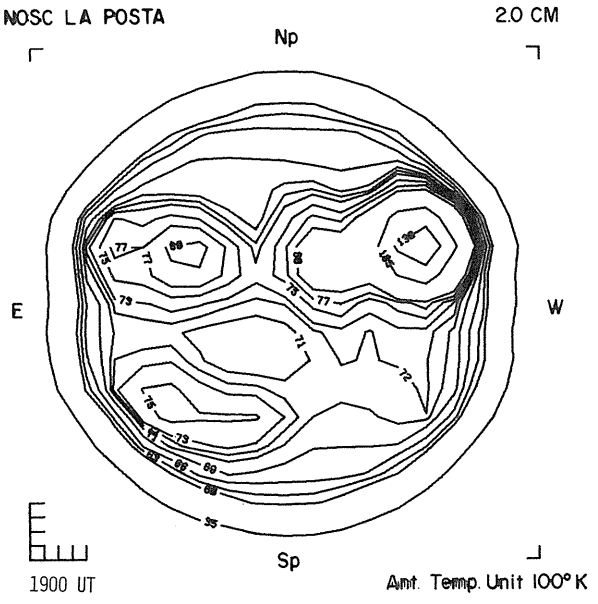
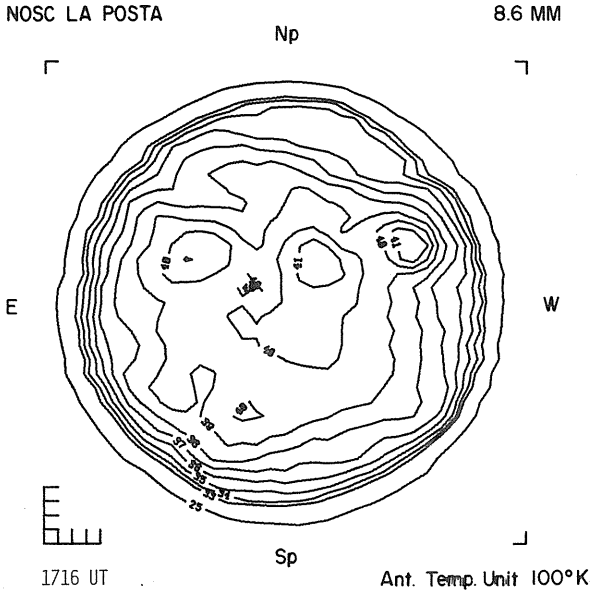
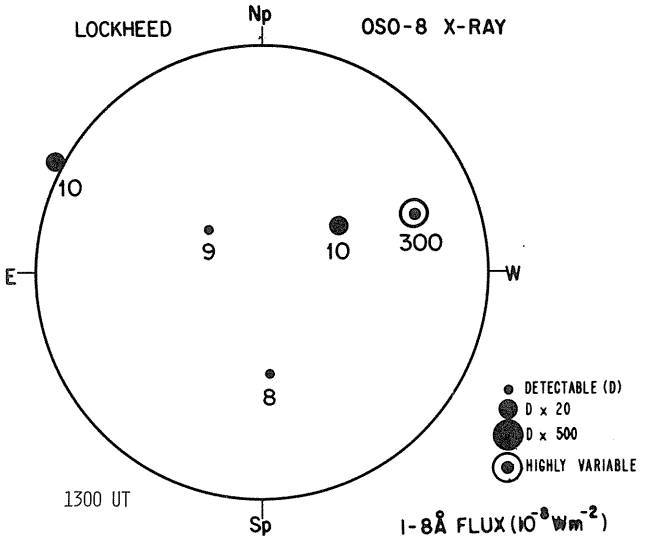
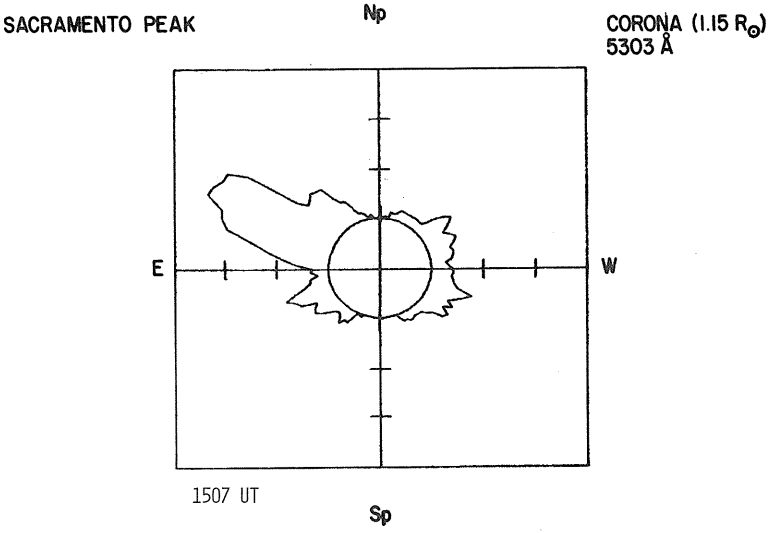
397
422
POOR D
97- 1100-2.5
03- 5300-3.5
10- 2500-3.0
15- 3000-3.0
20- 2200-2.5
22- 0400-2.5
PROMINENCES
1540 UT
1145 UT
Sp

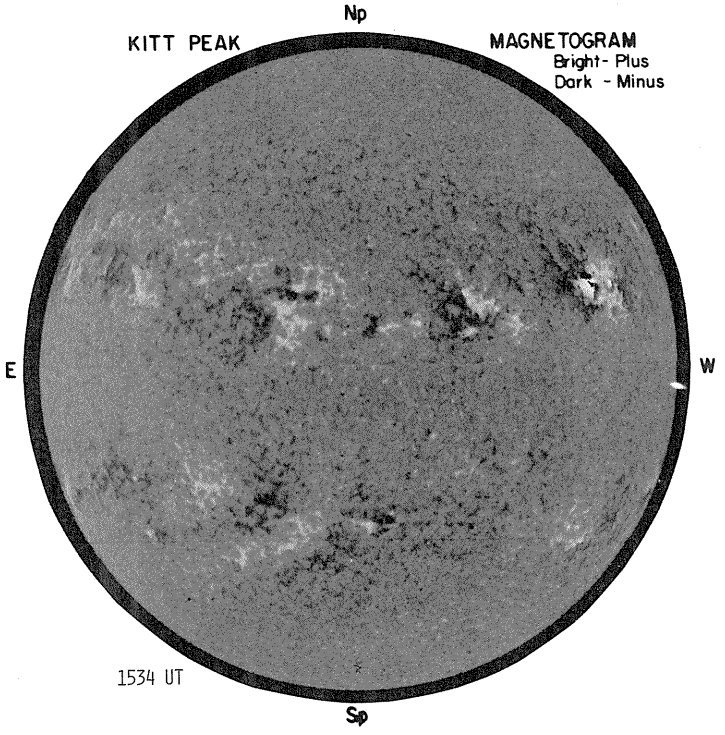

NOSC LA POSTA
2.0 CM
Np
E
W
Sp
1900 UT
Ant. Temp. Unit 100°K

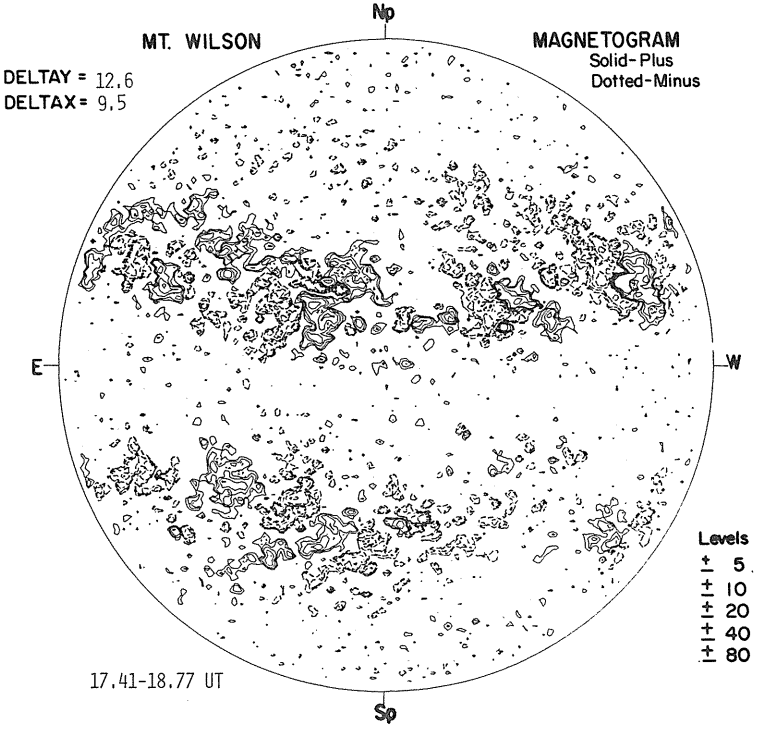

NOSC LA POSTA
8.6 MM
Np
E
W
Sp
1716 UT
Ant. Temp. Unit 100°K

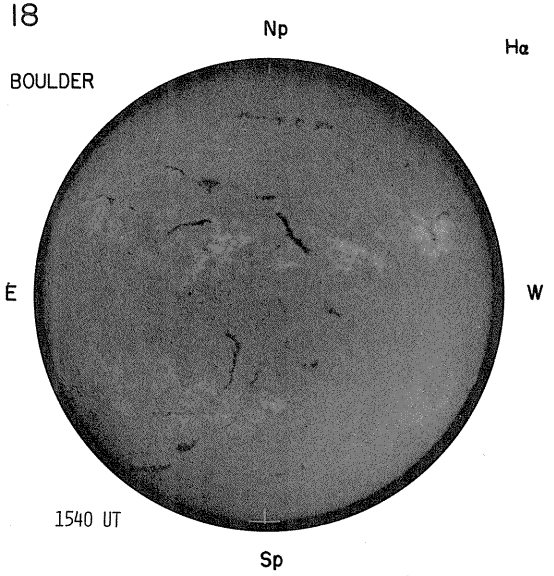
JULY 18, 1978 (P = 4.79, B_o = 4.61, L_o = 126.57)

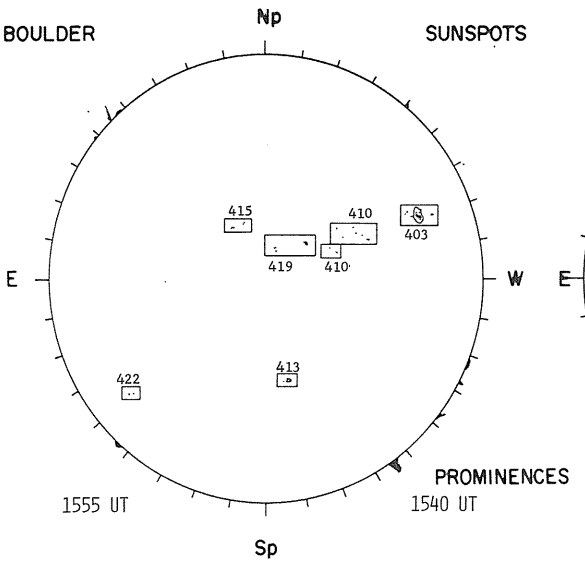









BOULDER
Np
Hα
E
W
Sp
1540 UT


BOULDER
SUNSPOTS
Np
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Sp
415
410
403
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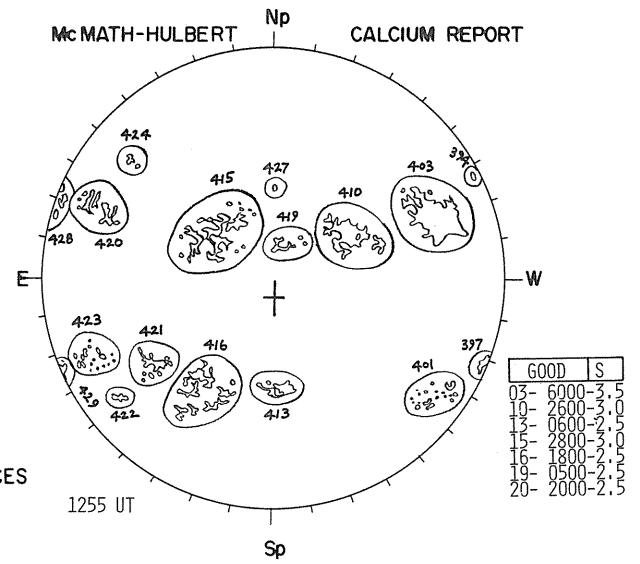
410
422
413
PROMINENCES
1555 UT
1540 UT


McMATH-HULBERT
CALCIUM REPORT
Np
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424
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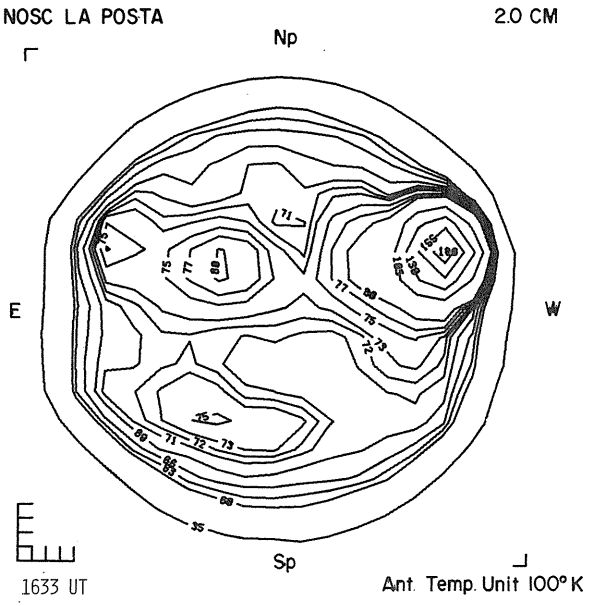
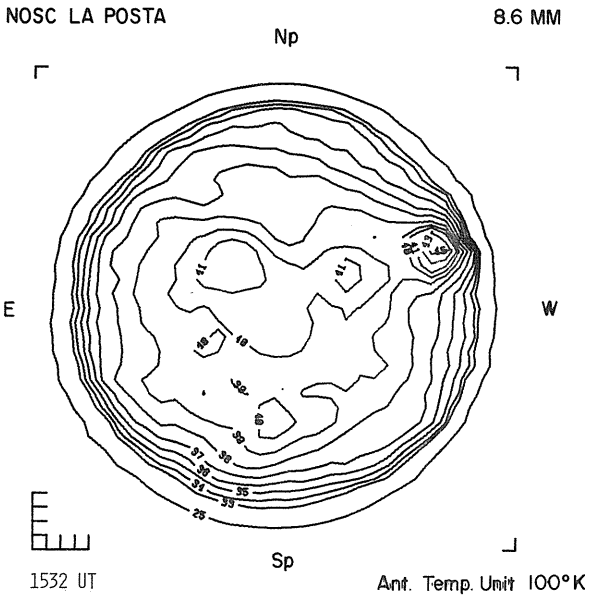
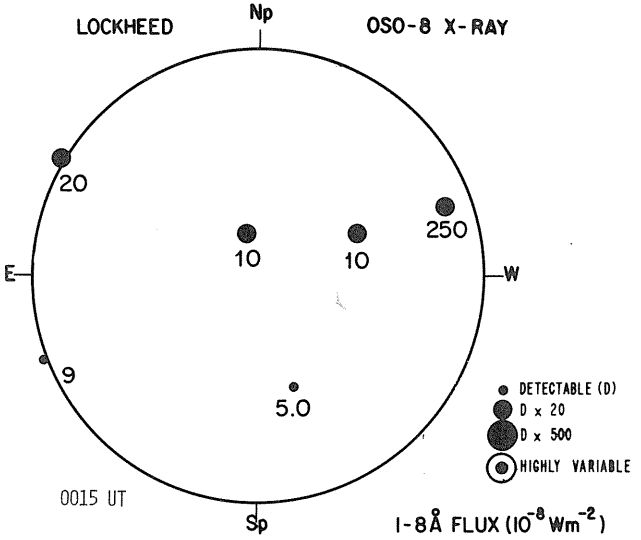
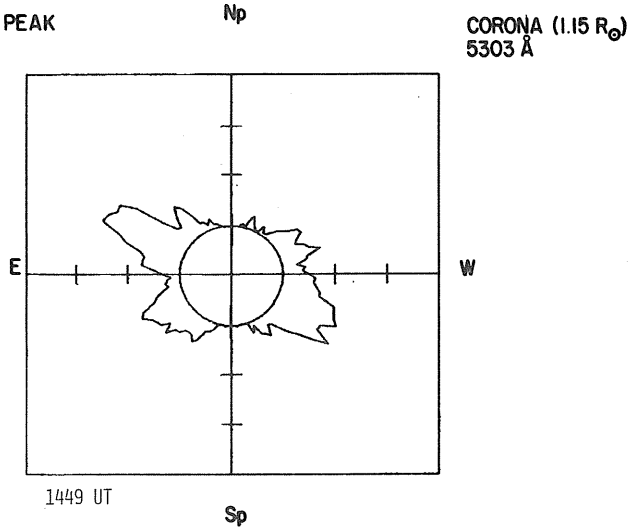
1255 UT
GOOD S
03- 6000-3.5
10- 2600-3.0
13- 0600-2.5
15- 2800-3.0
16- 1800-2.5
19- 0500-2.5
20- 2000-2.5

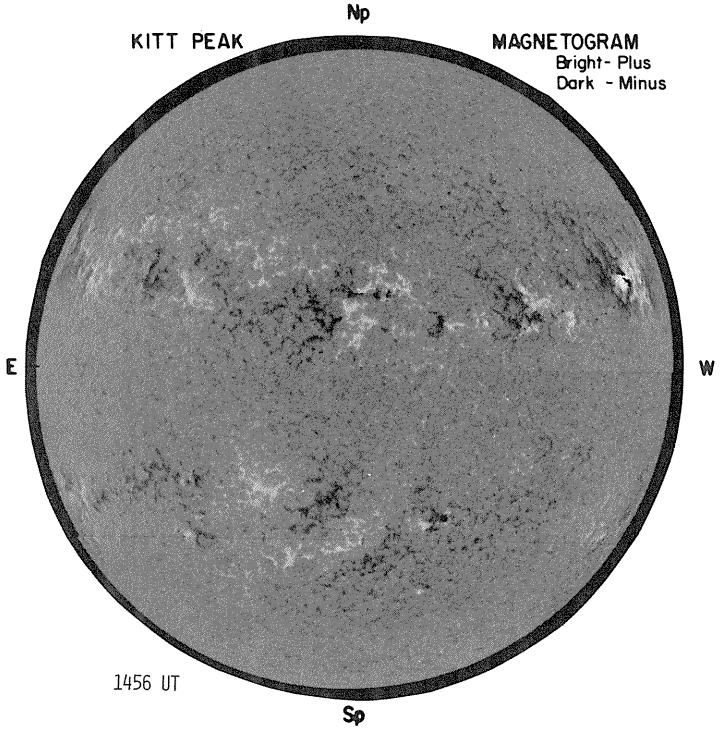

NOSC LA POSTA
2.0 CM
Np
E
W
Sp
1633 UT
Ant. Temp. Unit 100°K

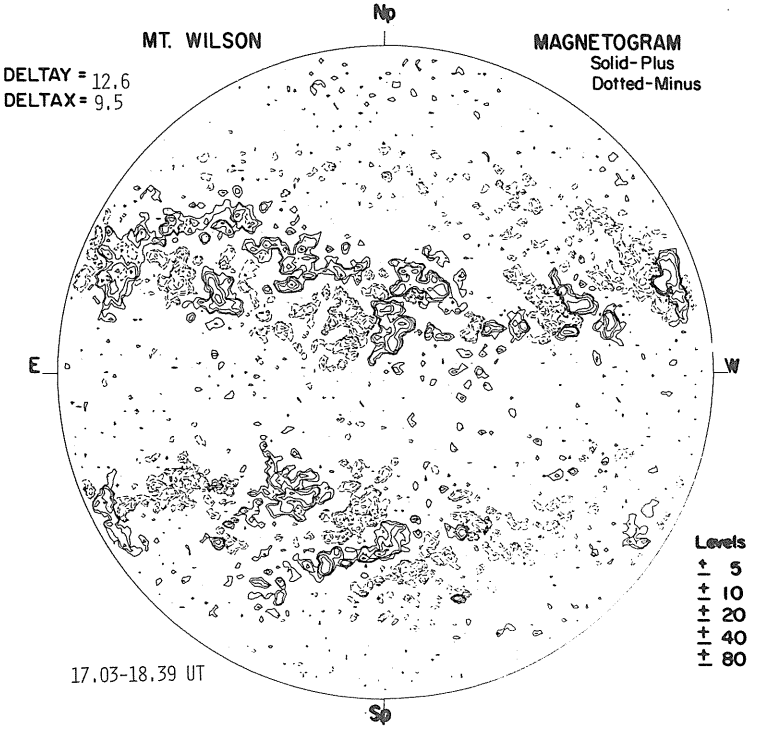

NOSC LA POSTA
8.6 MM
Np
E
W
Sp
1532 UT
Ant. Temp. Unit 100°K

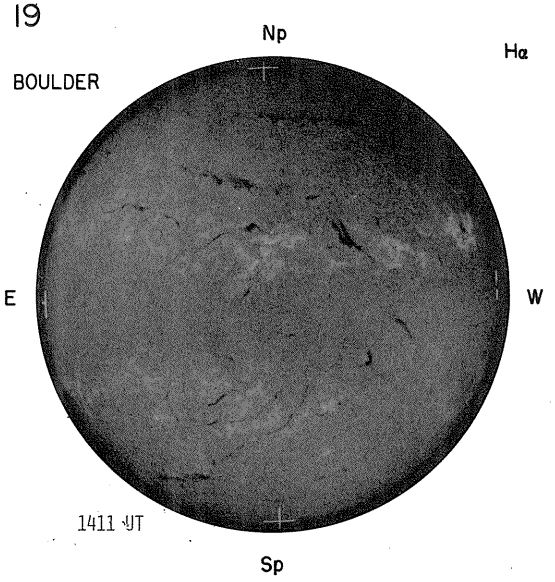
JULY 19, 1978 (P = 5.23, B_o = 4.70, L_o = 113.34)

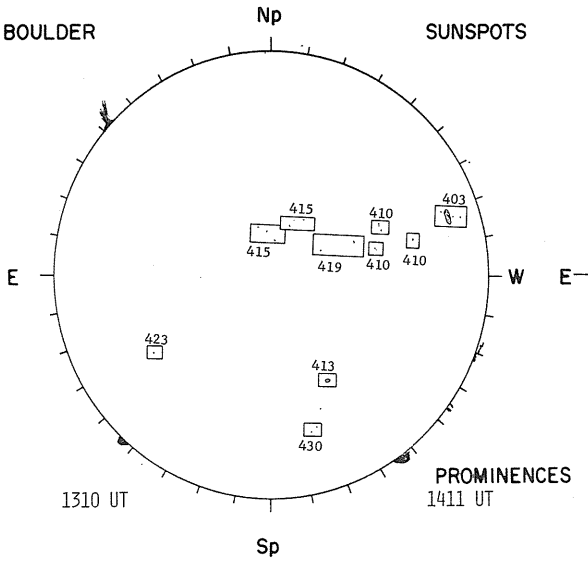









BOULDER
Hα
Np
E
W
Sp
1411 UT


BOULDER
SUNSPOTS
Np
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415
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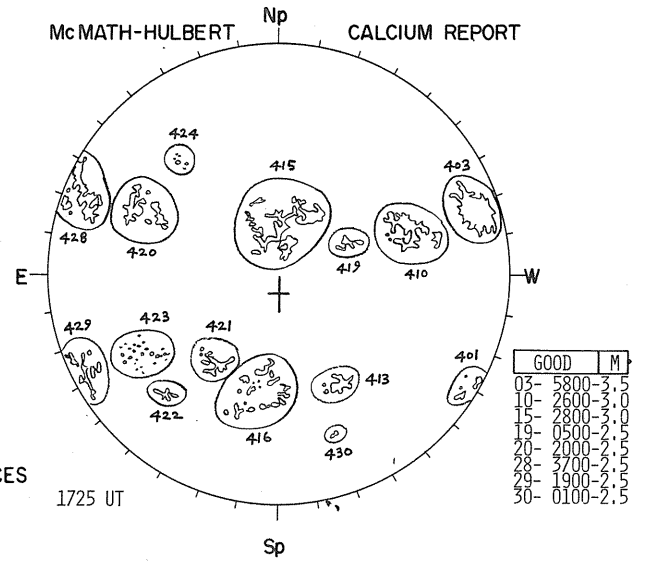
413
430
1310 UT
PROMINENCES
1411 UT


McMATH-HULBERT
CALCIUM REPORT
Np
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Sp
424
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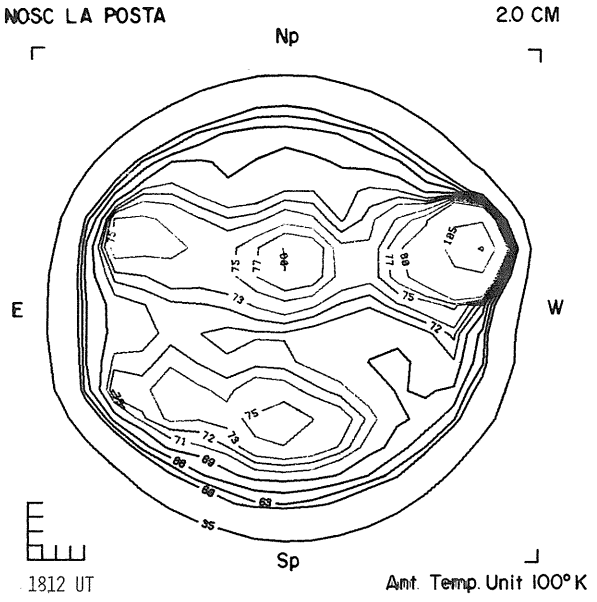
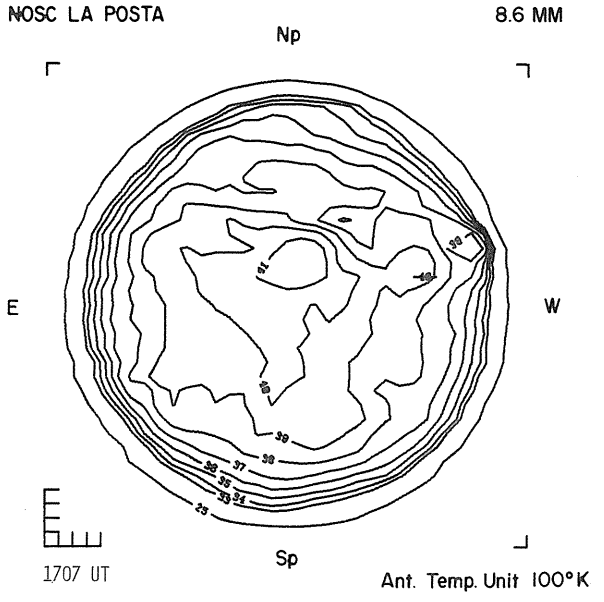
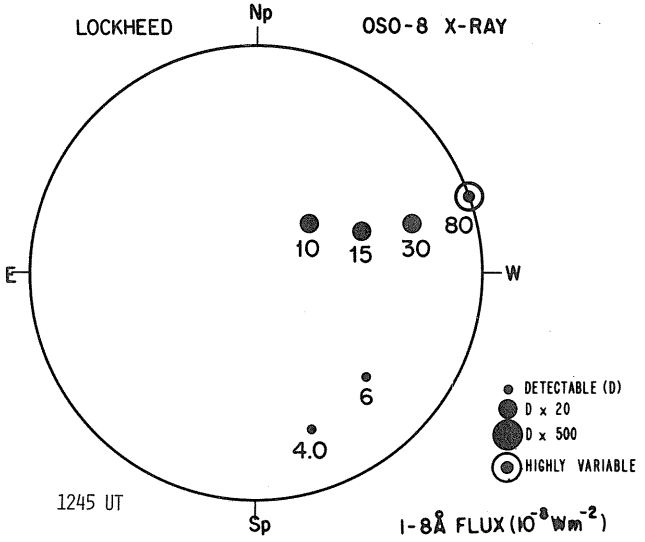
416
413
430
401
1725 UT
GOOD | M
03- 5800-3.5
10- 2600-3.0
15- 2800-3.0
19- 0500-2.5
20- 2000-2.5
28- 3700-2.5
29- 1900-2.5
30- 0100-2.5

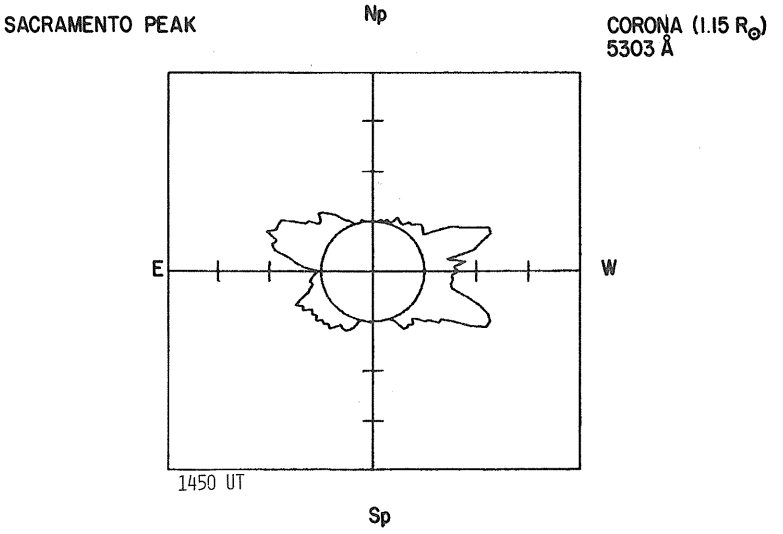

NOSC LA POSTA
2.0 CM
Np
E
W
Sp
1812 UT
Ant. Temp. Unit 100°K

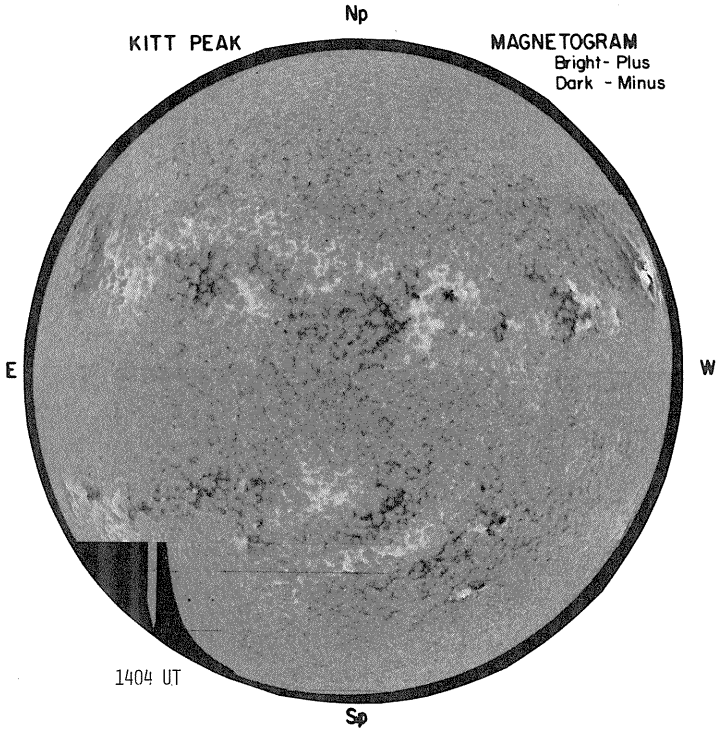

NOSC LA POSTA
8.6 MM
Np
E
W
Sp
1707 UT
Ant. Temp. Unit 100°K

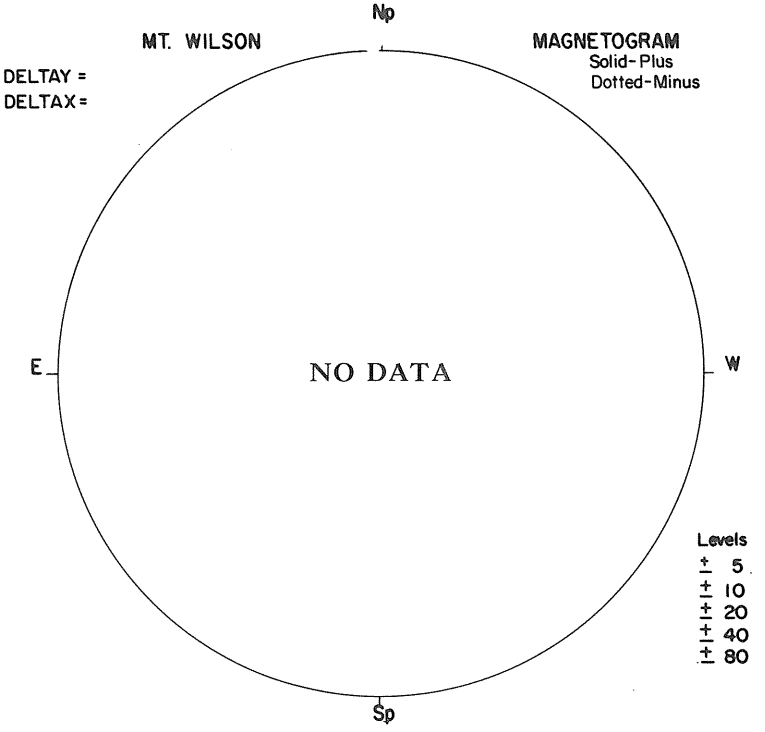
75
Jul 78

JULY 20, 1978 (P = 5.67, B_o = 4.79, L_o = 100.11)

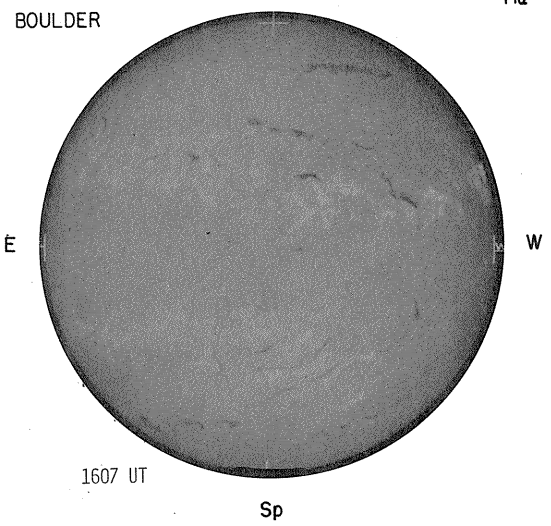




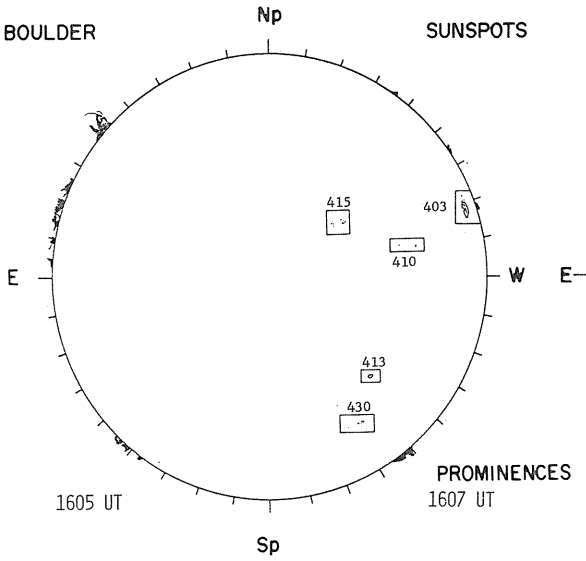




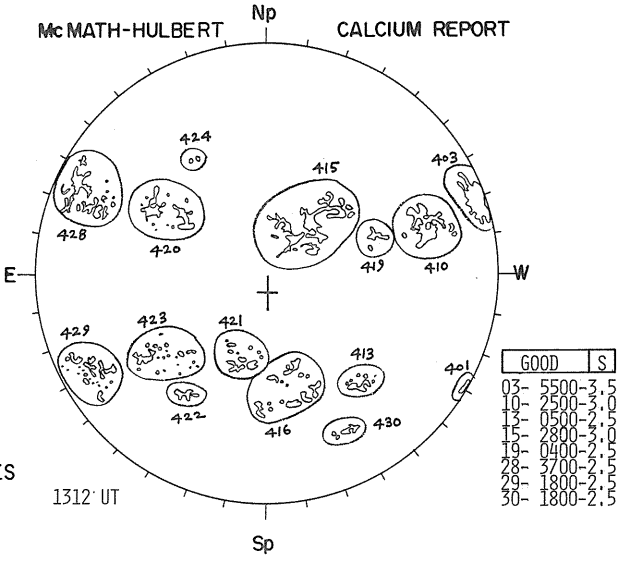
BOULDER Hα



BOULDER SUNSPOTS

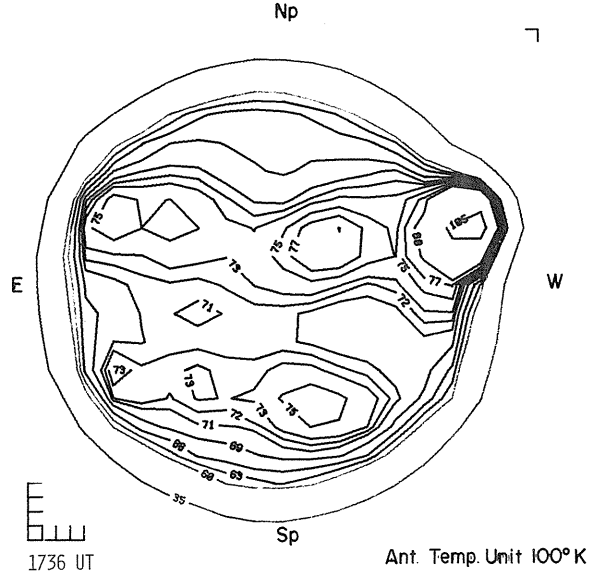


McMATH-HULBERT CALCIUM REPORT

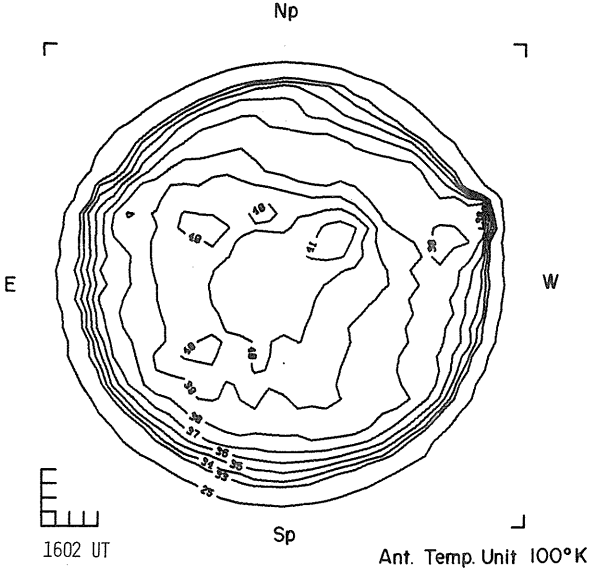


PROMINENCES
1607 UT

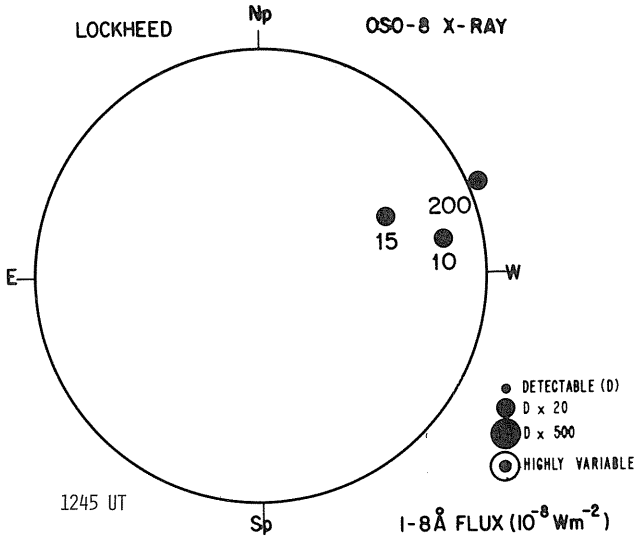
NOSC LA POSTA 2.0 CM

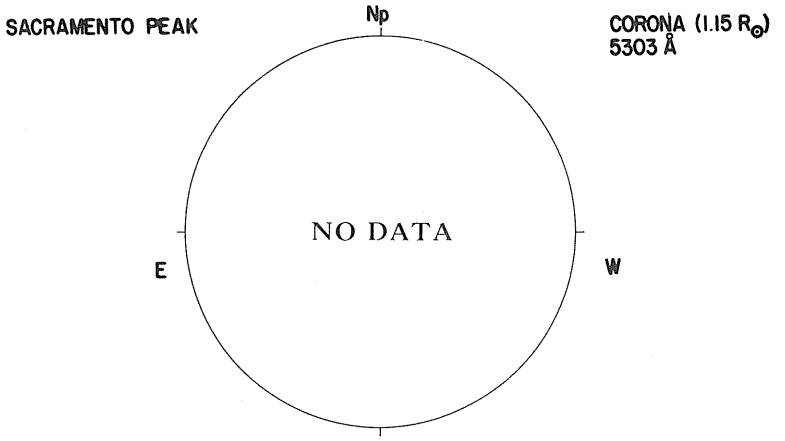


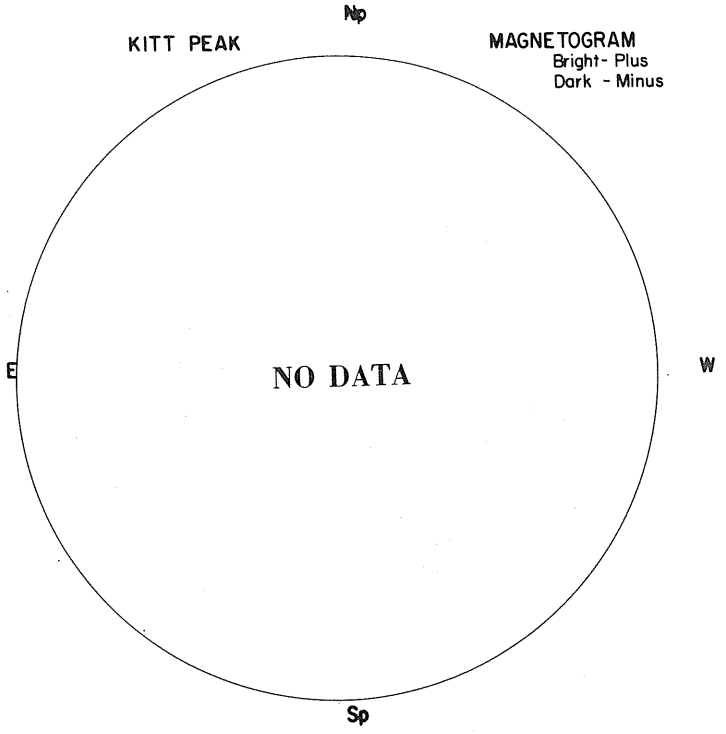
NOSC LA POSTA 8.6 MM

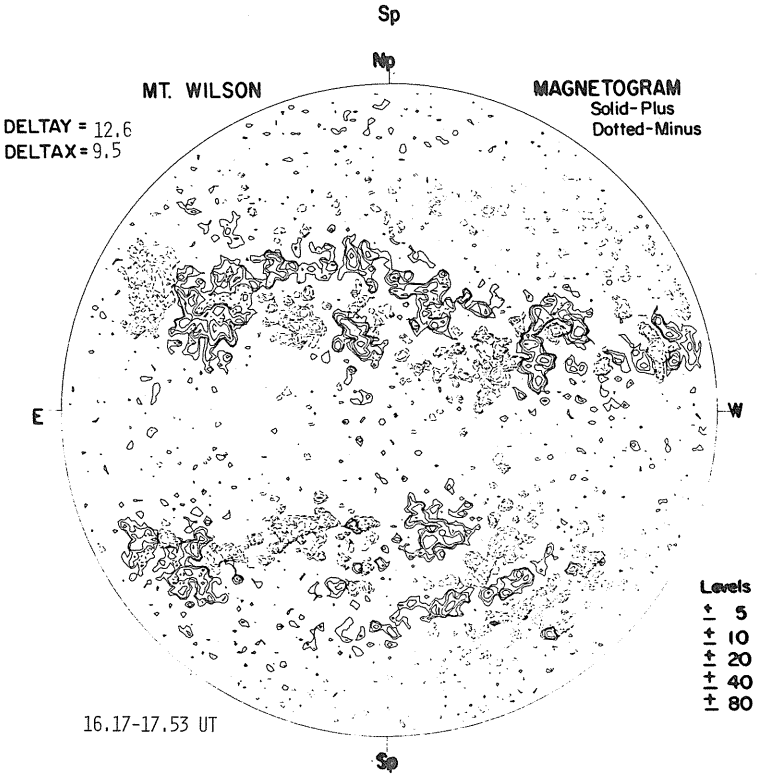


JULY 21, 1978 (P = 6.10, B_o = 4.88, L_o = 86.87)

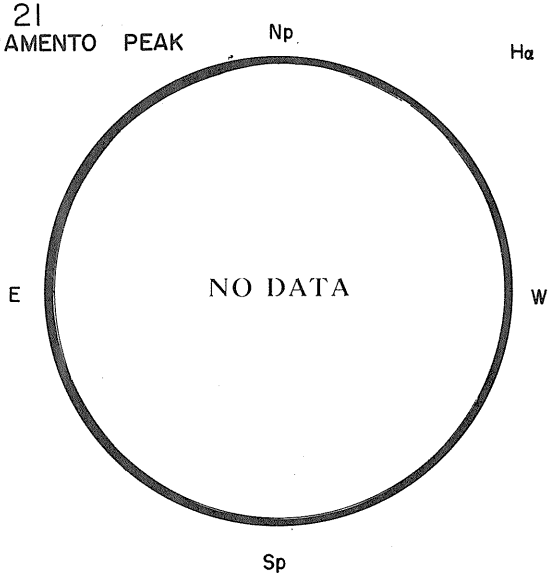




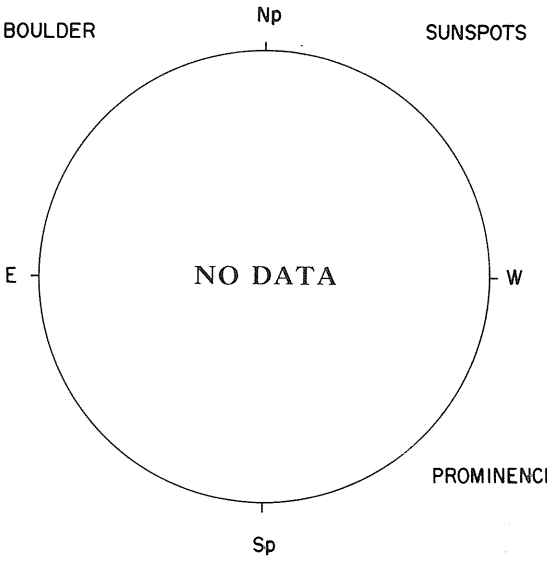




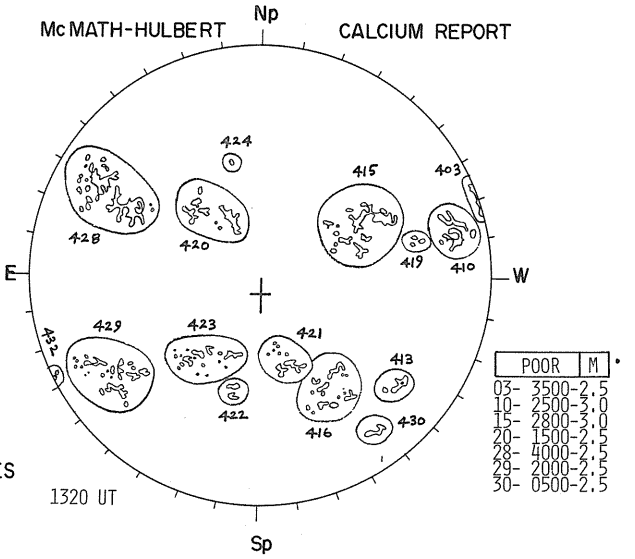
SACRAMENTO PEAK Hα



BOULDER SUNSPOTS



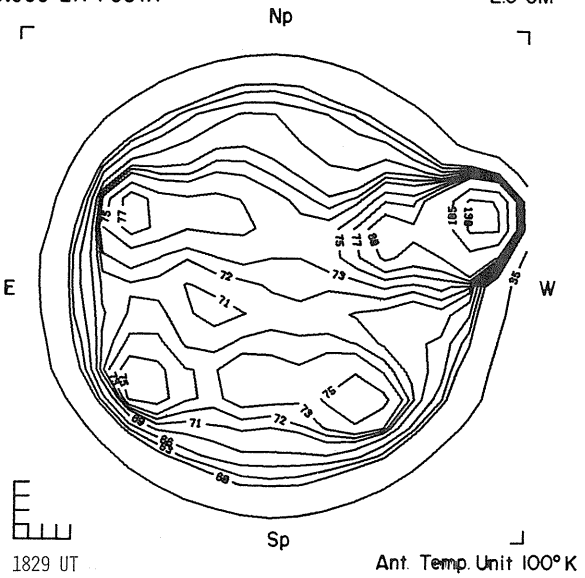
McMATH-HULBERT CALCIUM REPORT



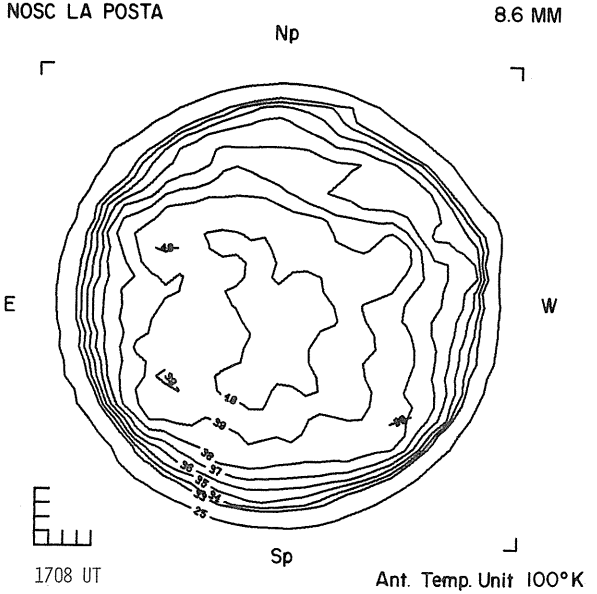
POOR	M
03- 3500-2.5	
10- 2500-3.0	
15- 2800-3.0	
20- 1500-2.5	
28- 4000-2.5	
29- 2000-2.5	
30- 0500-2.5	

PROMINENCES

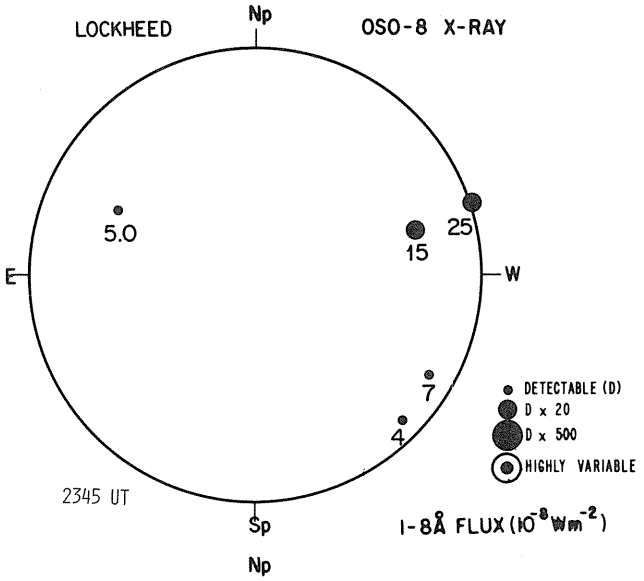
NOSC LA POSTA 2.0 CM

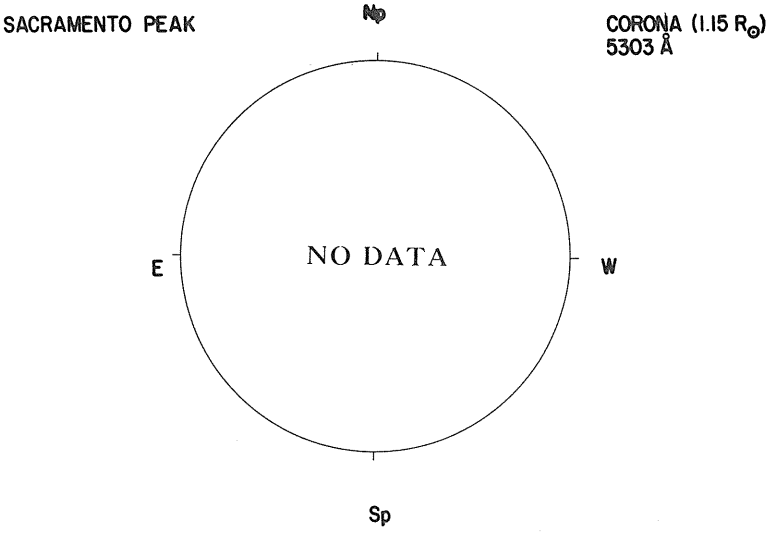


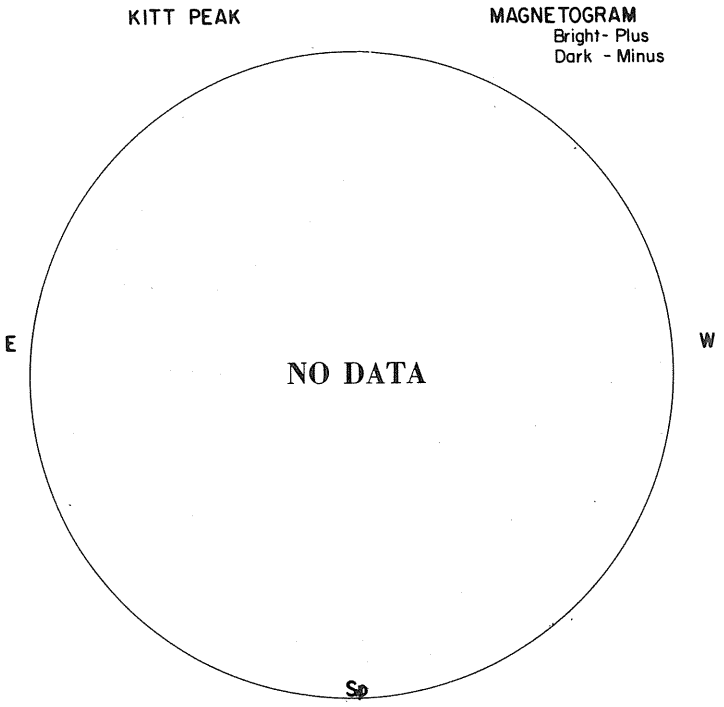
NOSC LA POSTA 8.6 MM

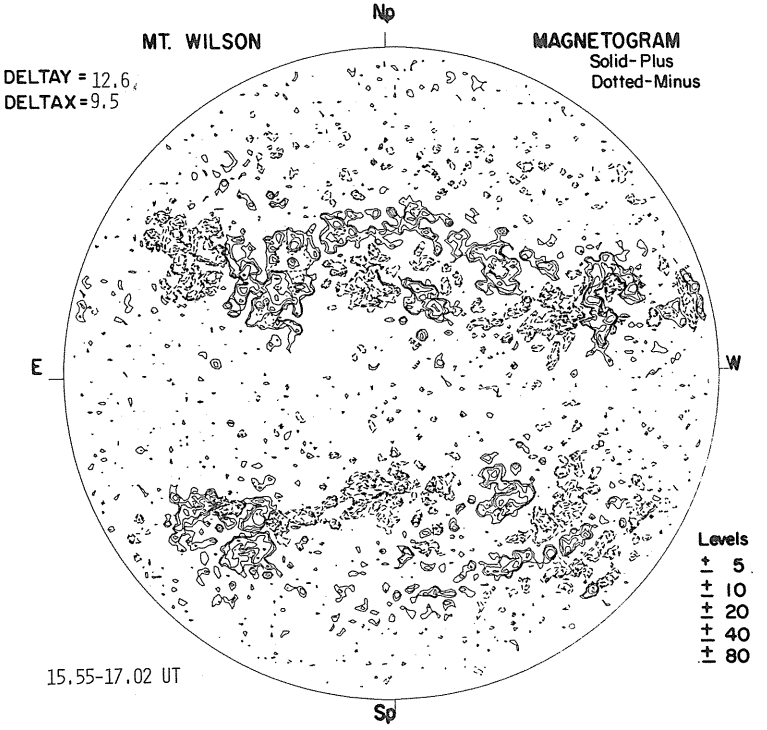


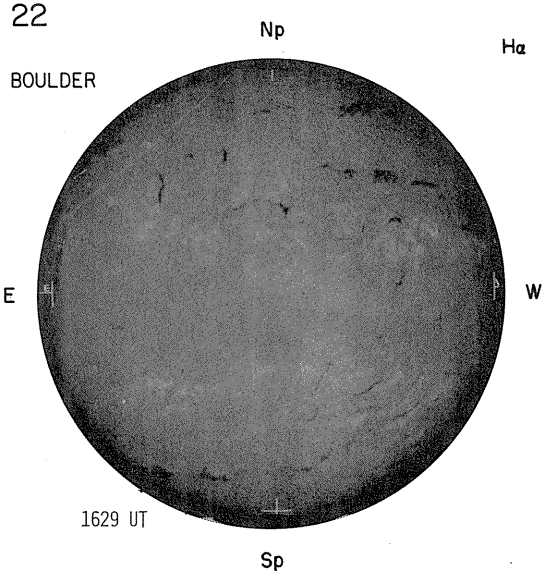
JULY 22, 1978 (P = 6.53, B_o = 4.97, L_o = 73.64)

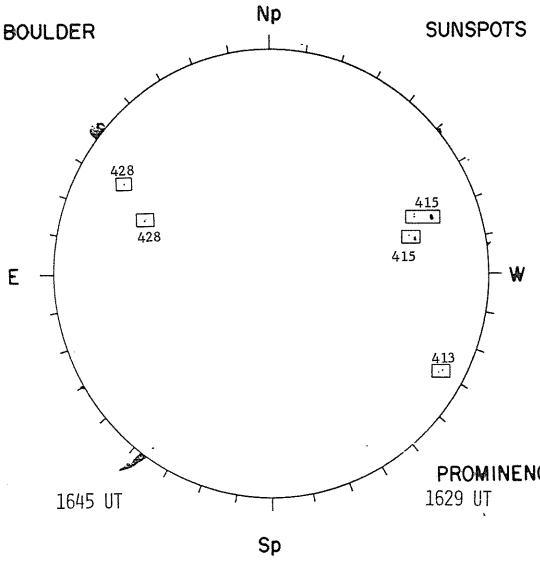


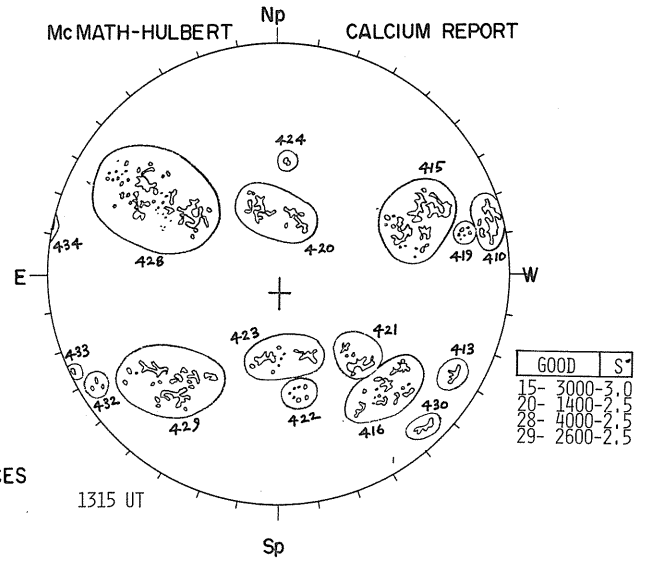







BOULDER
Hα
Np
E
W
Sp
1629 UT


BOULDER
SUNSPOTS
Np
E
W
Sp
428
428
415
415
413
1645 UT


McMATH-HULBERT
CALCIUM REPORT
PROMINENCES
1629 UT
Np
E
W
Sp
1315 UT
424
415
434
428
420
419
410
423
421
413
433
432
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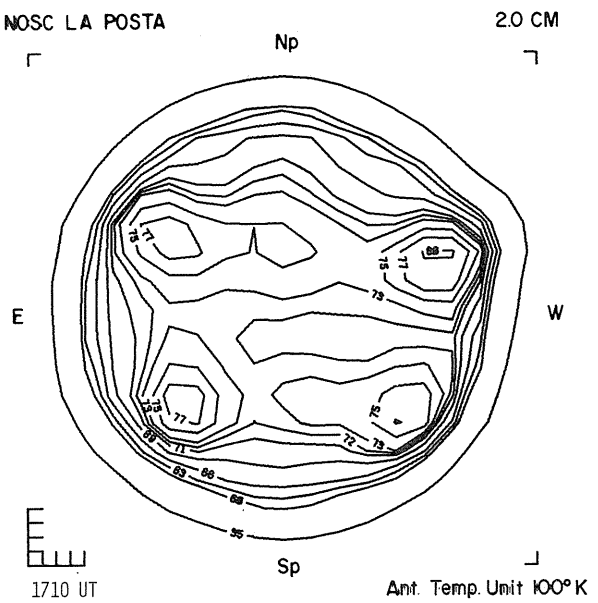
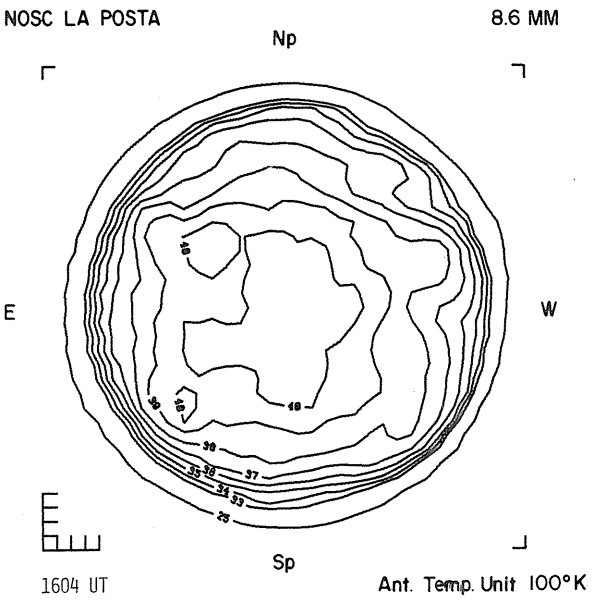
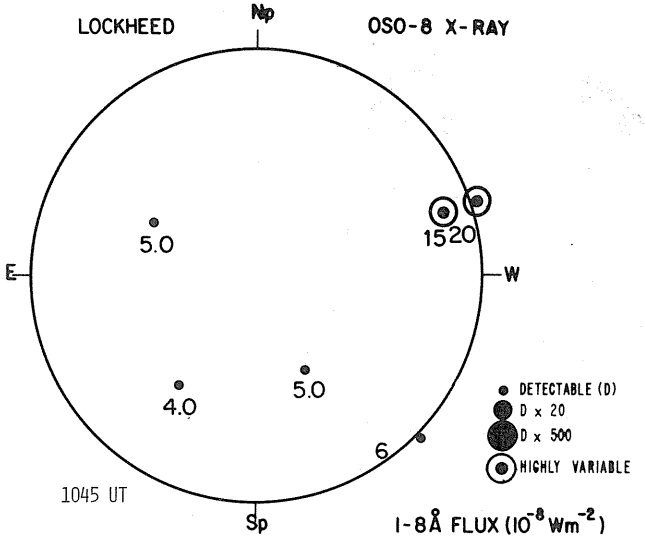
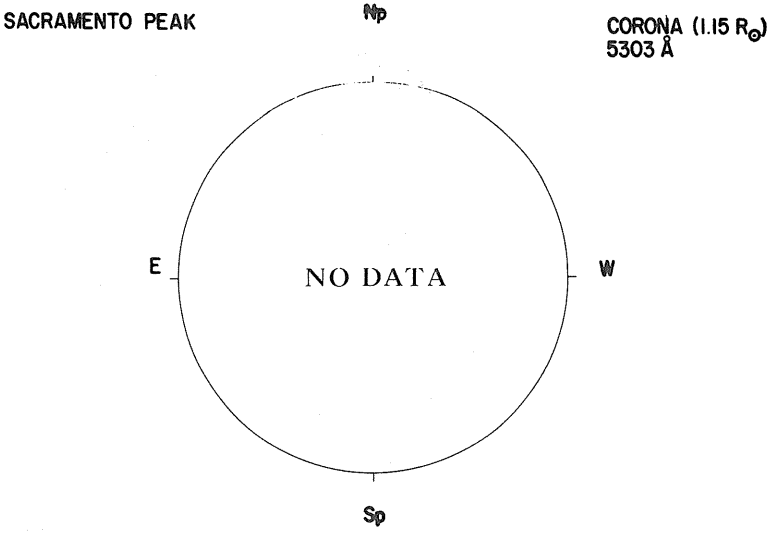
416
430
GOOD
S
15- 3000-3.0
20- 1400-2.5
28- 4000-2.5
29- 2600-2.5

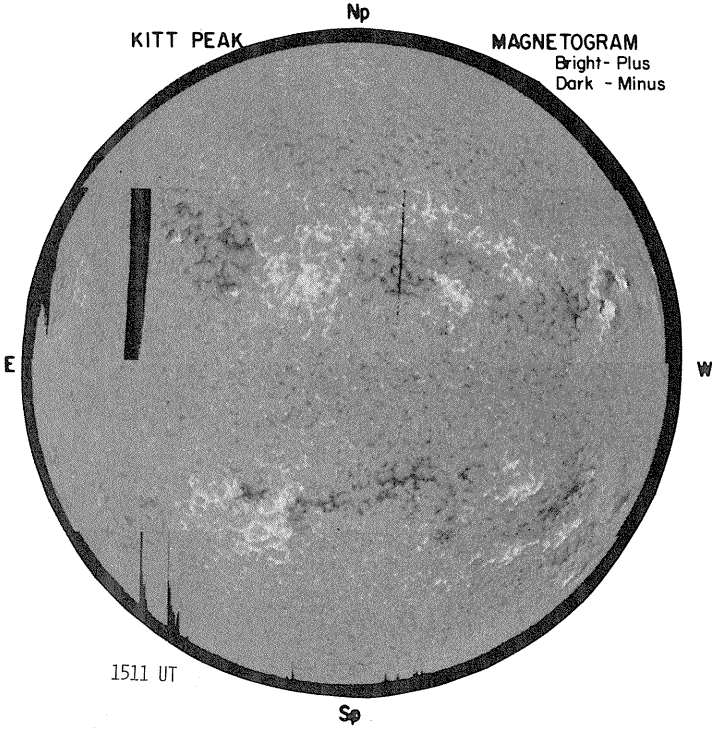

NOSC LA POSTA
2.0 CM
Np
E
W
Sp
1710 UT
Ant. Temp. Unit 100° K

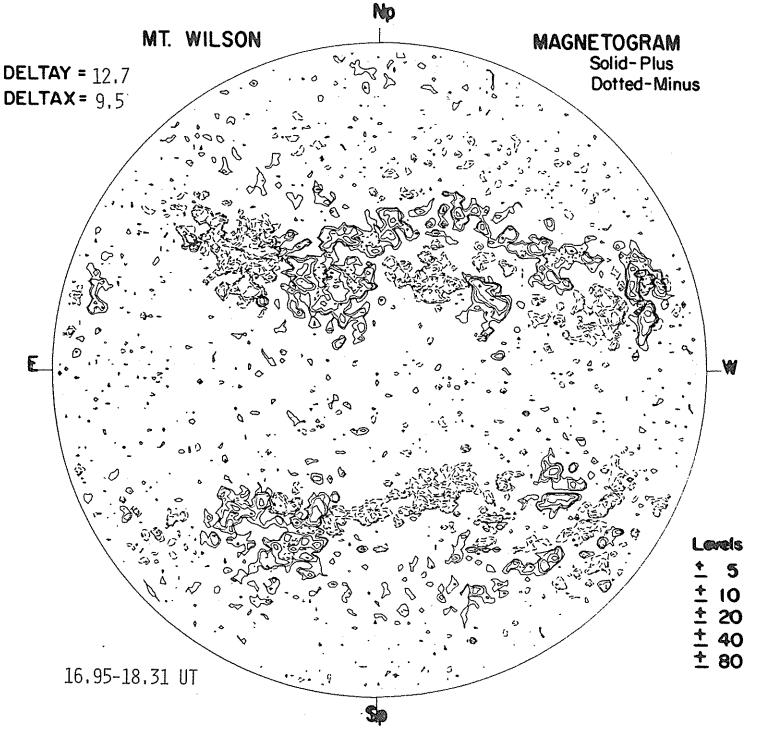

NOSC LA POSTA
8.6 MM
Np
E
W
Sp
1604 UT
Ant. Temp. Unit 100° K

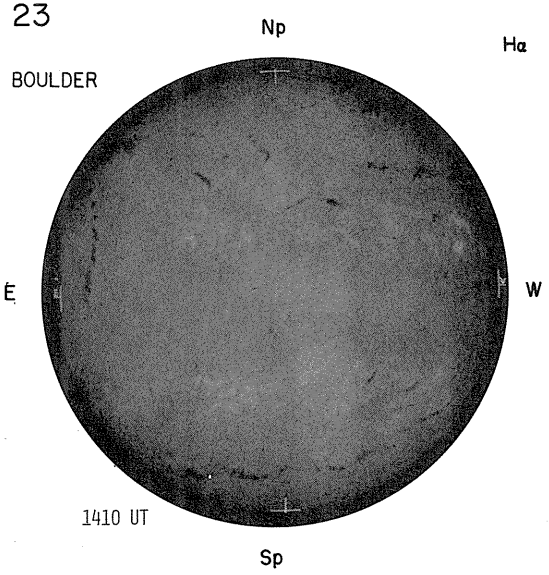
JULY 23, 1978 (P = 6.96, B_o = 5.06, L_o = 60.41)

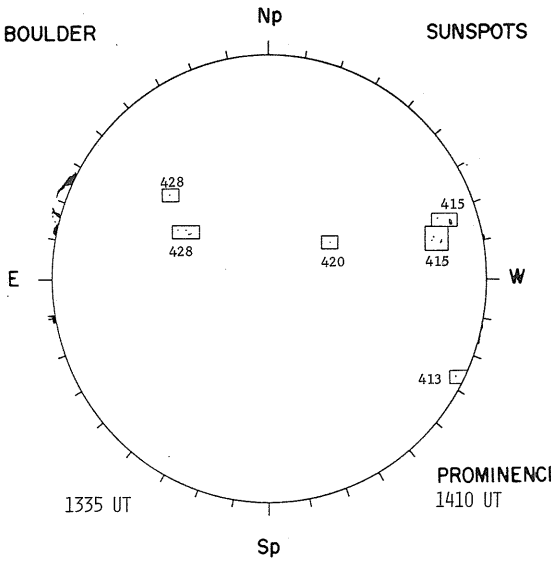


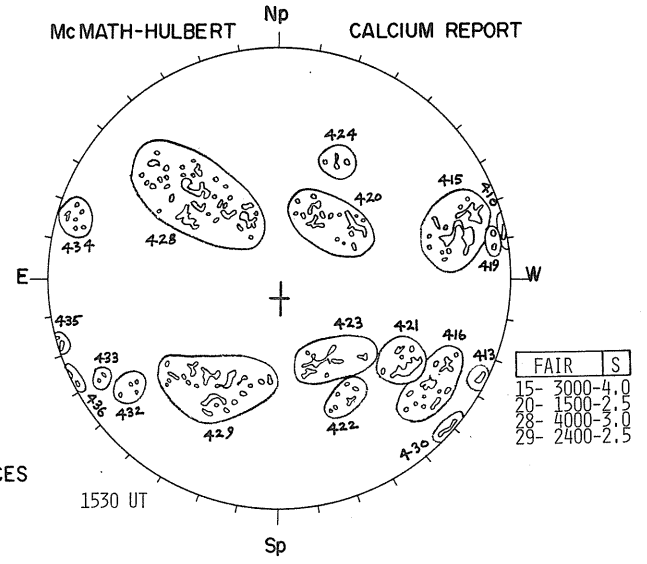


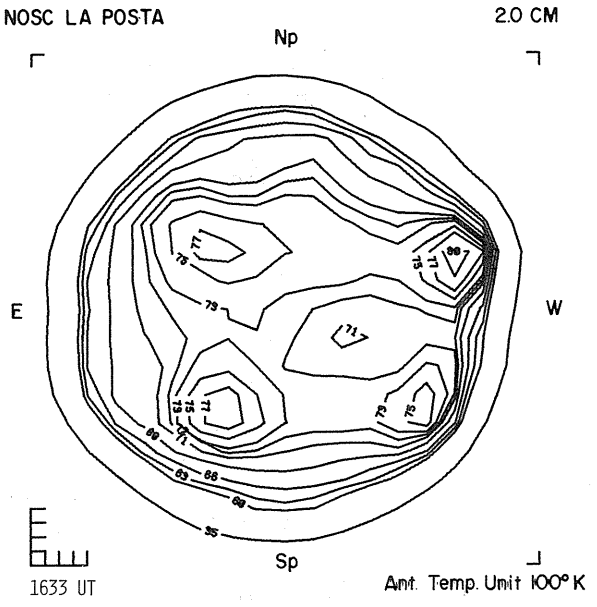


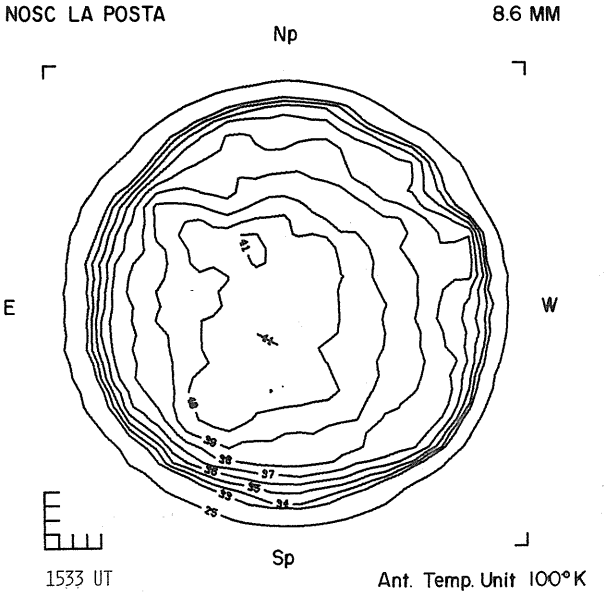



BOULDER
Np
Hα
E
W
1410 UT
Sp


BOULDER
Np
SUNSPOTS
E
W
428
428
420
415
415
413
1335 UT
Sp
PROMINENCES
1410 UT

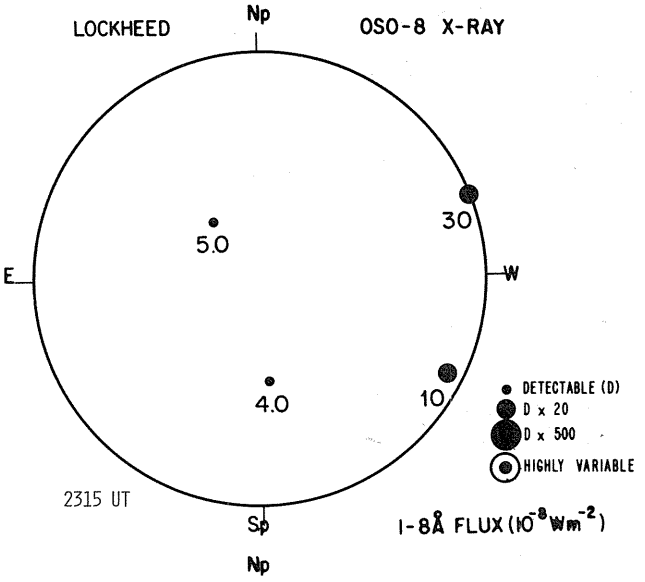

McMATH-HULBERT
Np
CALCIUM REPORT
E
W
424
420
415
418
419
428
434
435
433
436
432
429
423
421
416
413
422
430
1530 UT
Sp
FAIR S
15- 3000-4.0
20- 1500-2.5
28- 4000-3.0
29- 2400-2.5


NOSC LA POSTA
2.0 CM
Np
E
W
Sp
1633 UT
Ant. Temp. Unit 100° K

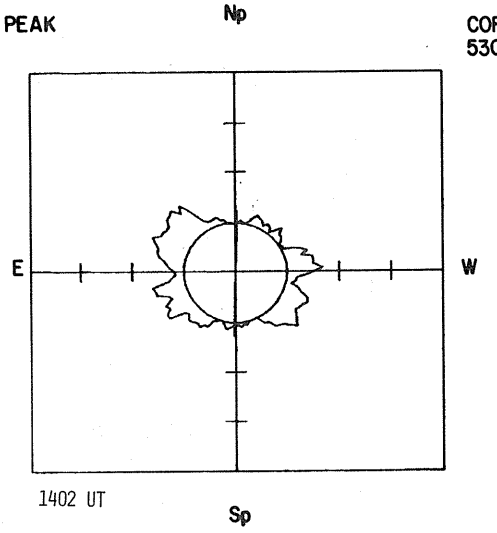

NOSC LA POSTA
8.6 MM
Np
E
W
Sp
1533 UT
Ant. Temp. Unit 100° K

JULY 24, 1978 (P = 7.39, B_o = 5.15, L_o = 47.18)

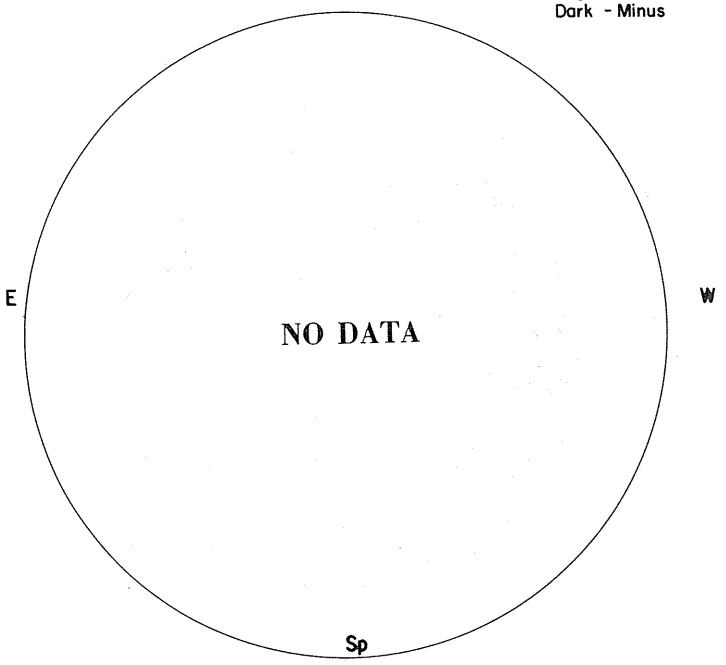
LOCKHEED OSO-8 X-RAY



SACRAMENTO PEAK CORONA (1.15 $R_\odot$) 5303 Å

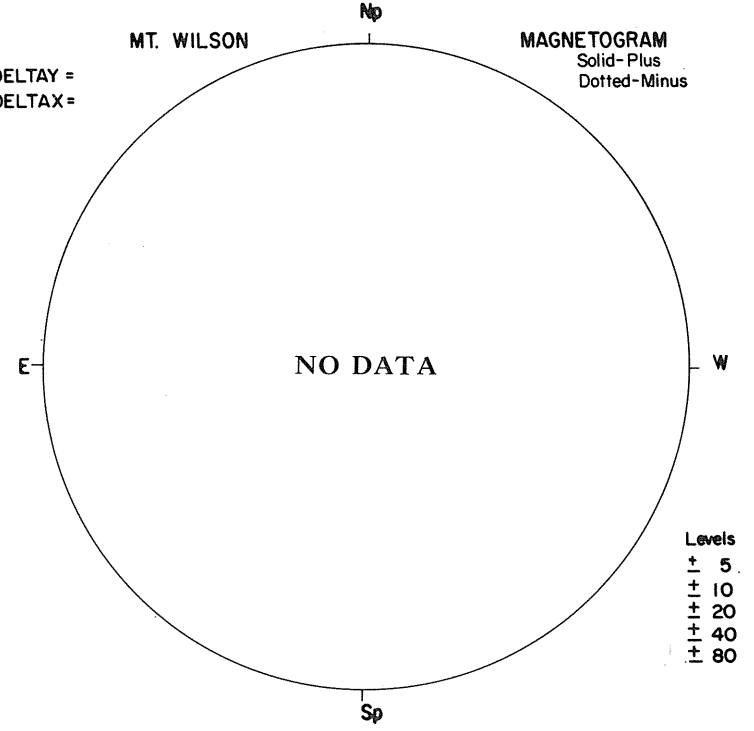


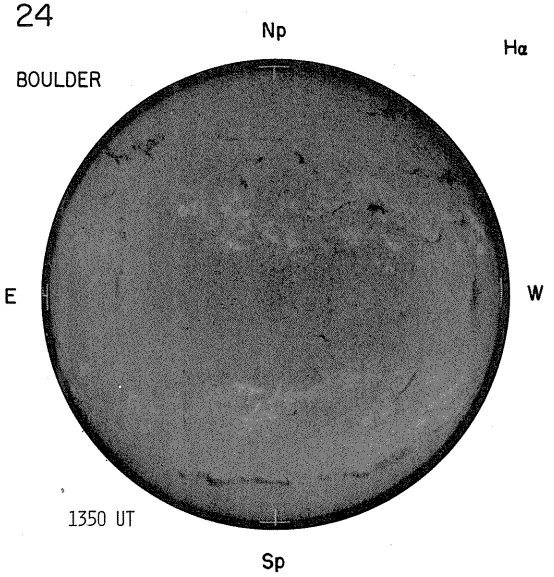
KITT PEAK MAGNETOGRAM
Bright- Plus
Dark - Minus

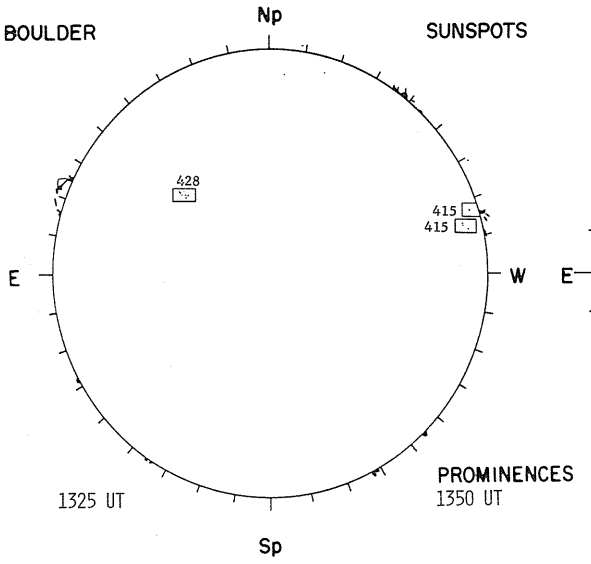


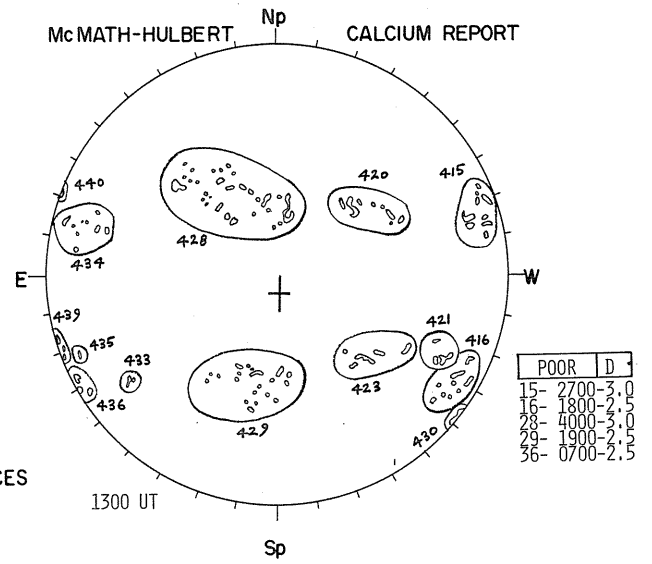
MT. WILSON MAGNETOGRAM
Solid-Plus
Dotted-Minus

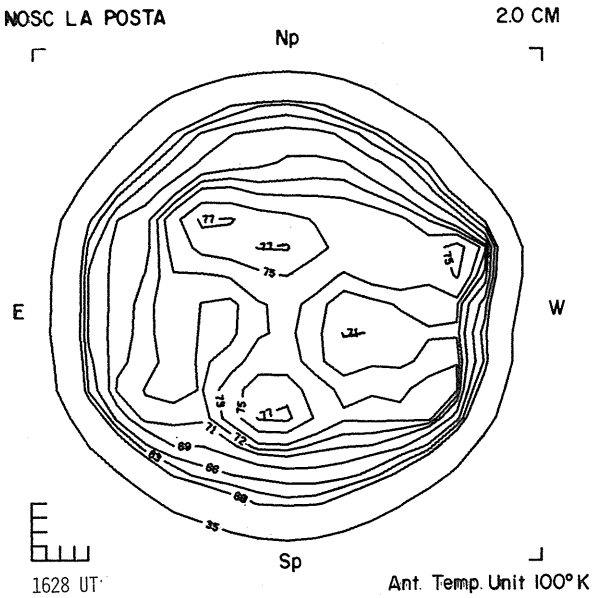
DELTAY =
DELTAX =

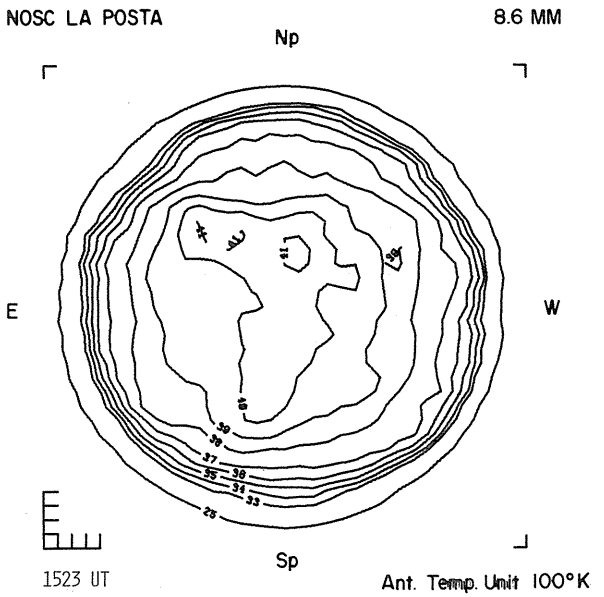



BOULDER
Np
Hα
E
W
1350 UT
Sp


BOULDER
Np
SUNSPOTS
428
415
415
E
W
1325 UT
Sp
PROMINENCES
1350 UT

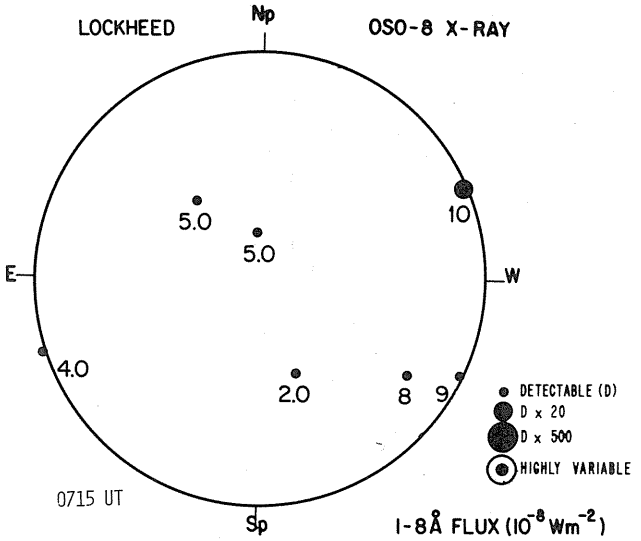

McMATH-HULBERT
Np
CALCIUM REPORT
440
434
428
420
415
439
435
433
436
429
423
421
416
430
E
W
1300 UT
Sp
POOR D
15- 2700-3.0
16- 1800-2.5
28- 4000-3.0
29- 1900-2.5
36- 0700-2.5

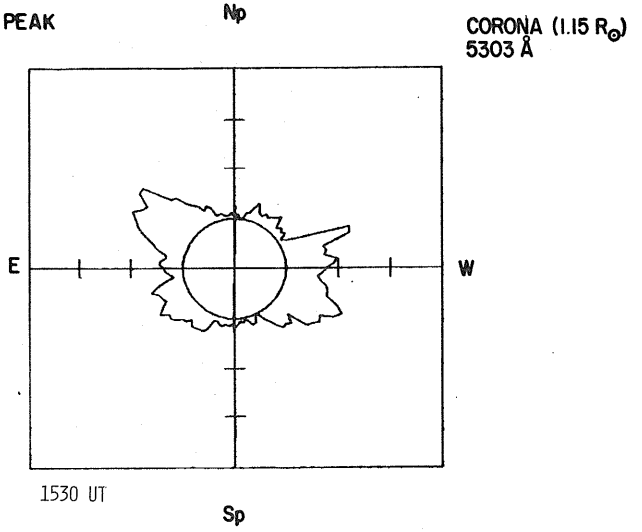

NOSC LA POSTA
2.0 CM
Np
E
W
Sp
1628 UT
Ant. Temp. Unit 100° K

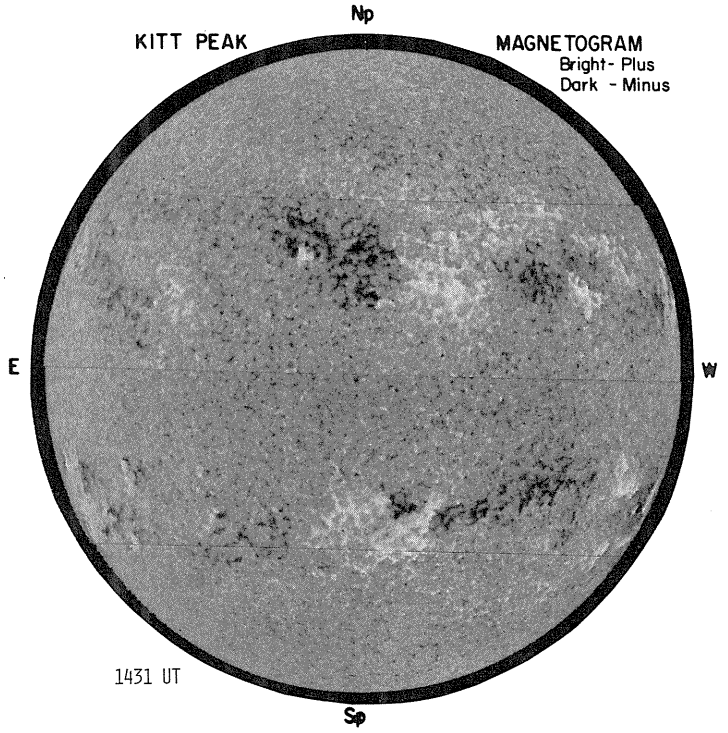

NOSC LA POSTA
8.6 MM
Np
E
W
Sp
1523 UT
Ant. Temp. Unit 100° K

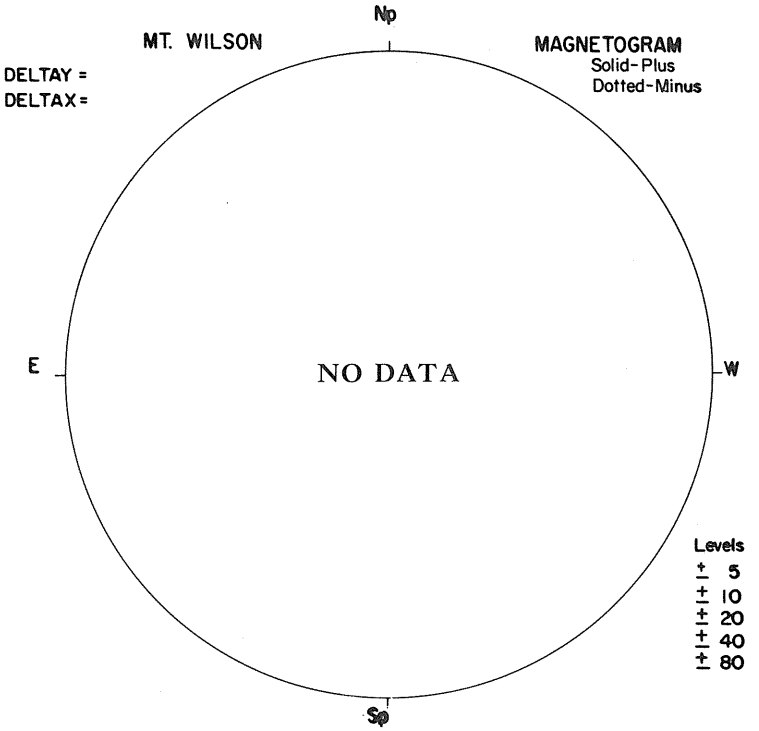
85
Jul 78

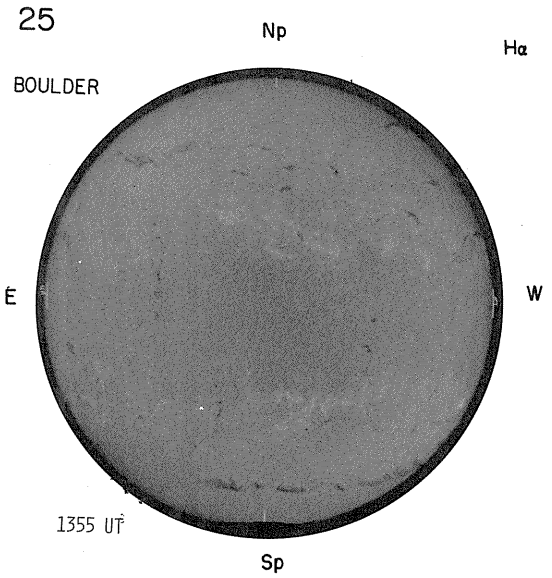
JULY 25, 1978 (P = 7.81, B_o = 5.23, L_o = 33.95)

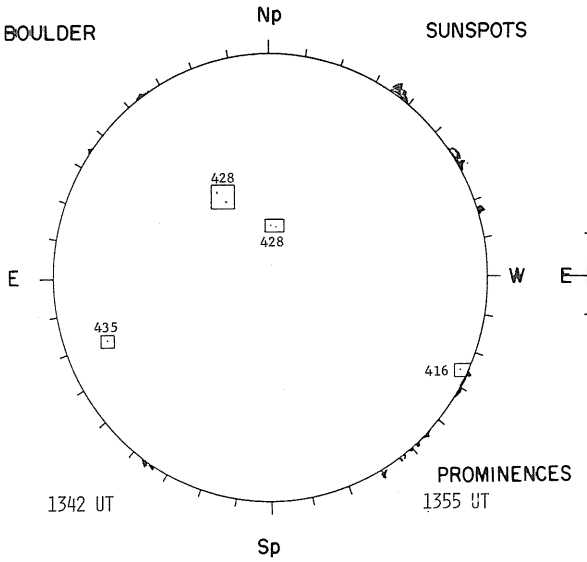


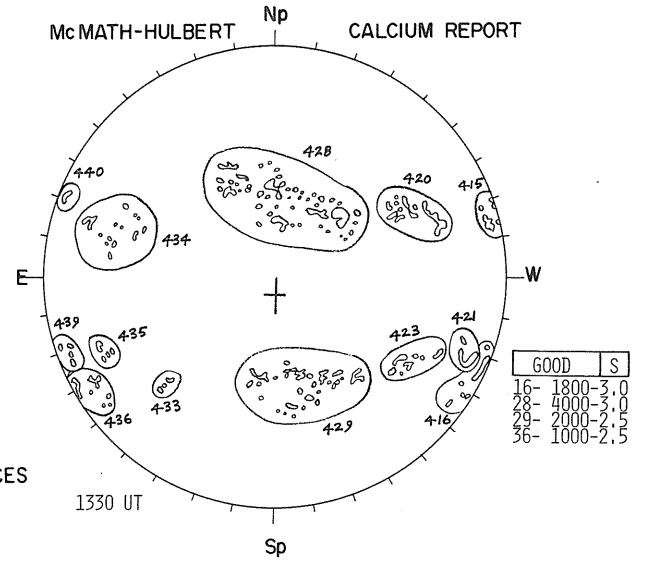







BOULDER
Hα
Np
E
W
Sp
1355 UT


BOULDER
SUNSPOTS
Np
E
W
Sp
428
428
435
416
1342 UT
PROMINENCES
1355 UT


McMATH-HULBERT
CALCIUM REPORT
Np
E
W
Sp
440
428
420
415
434
439
435
423
421
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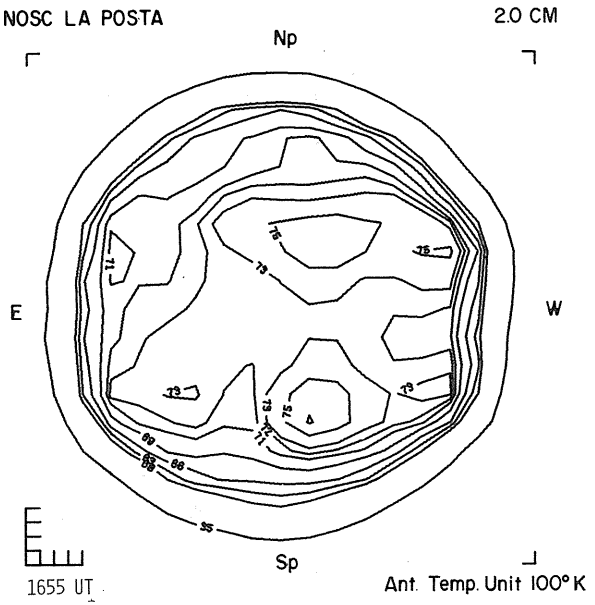
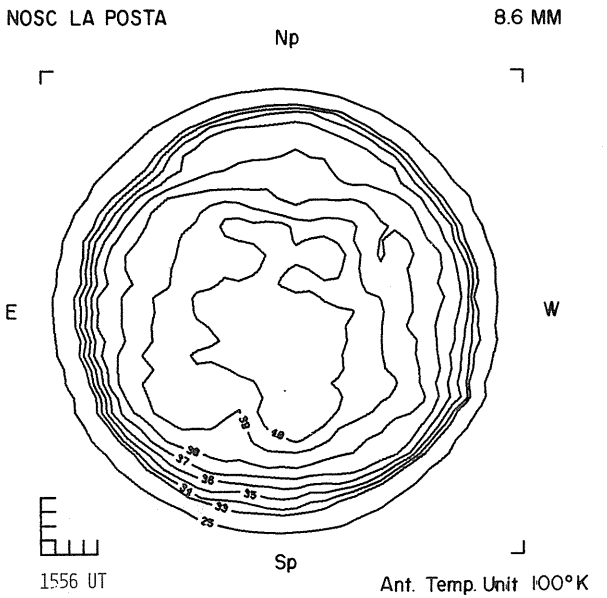
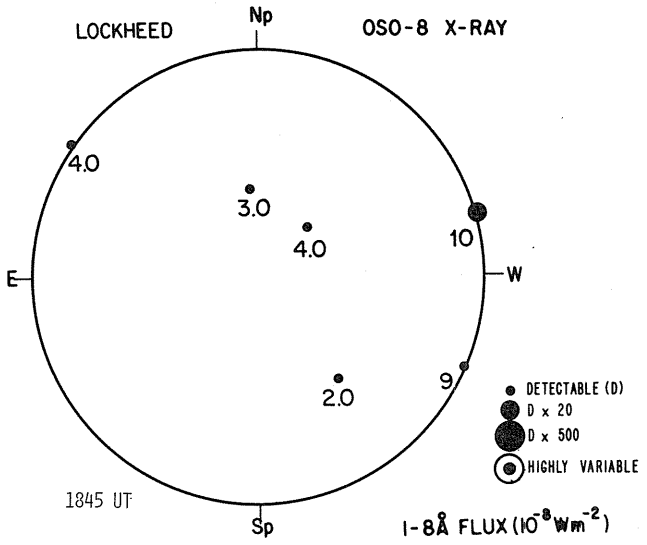
436
429
416
1330 UT
GOOD | S
16- 1800-3.0
28- 4000-3.0
29- 2000-2.5
36- 1000-2.5

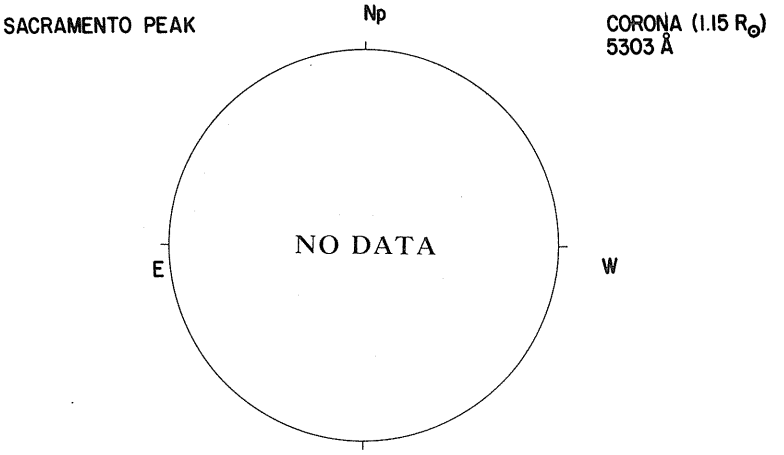

NOSC LA POSTA
2.0 CM
Np
E
W
Sp
1655 UT
Ant. Temp. Unit 100°K

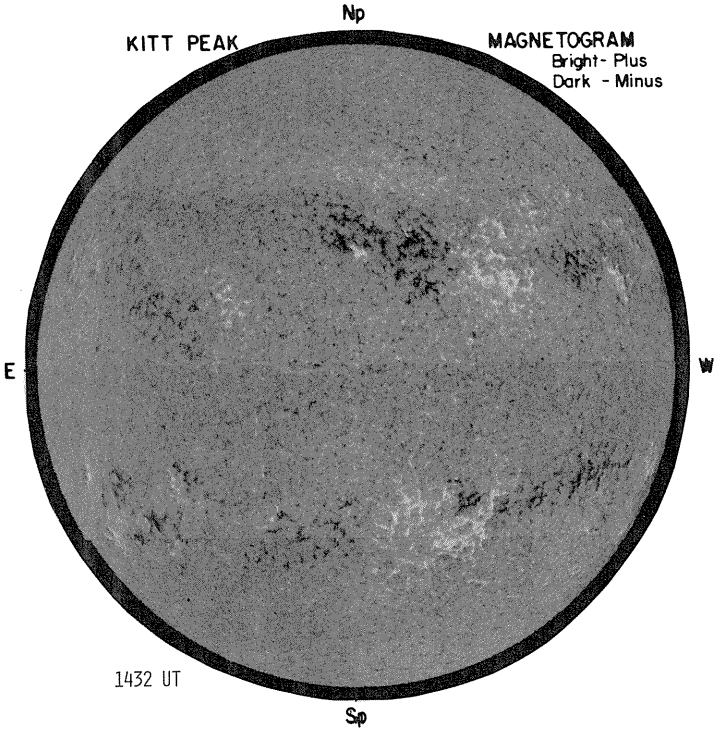

NOSC LA POSTA
8.6 MM
Np
E
W
Sp
1556 UT
Ant. Temp. Unit 100°K

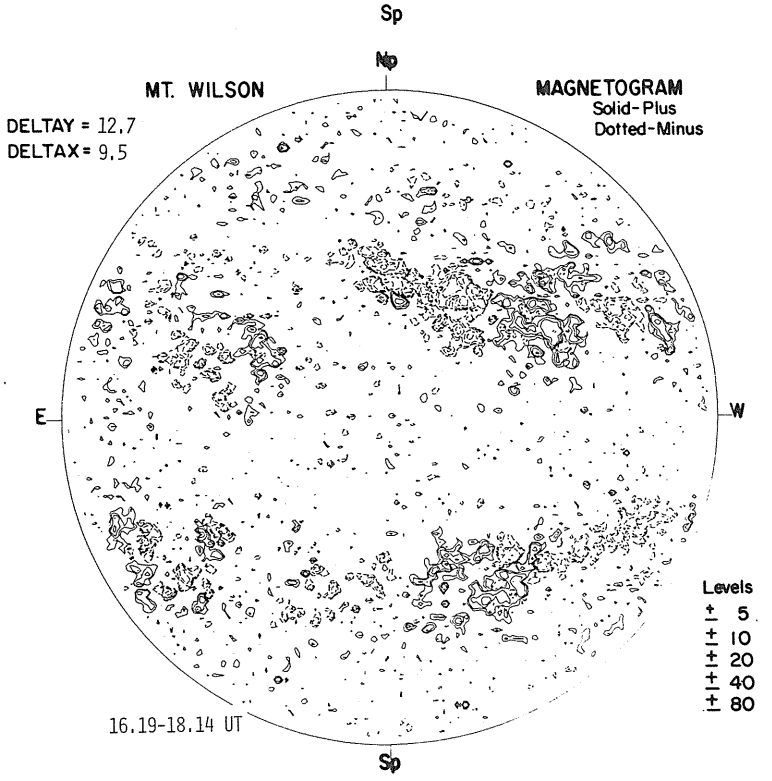
87
Jul 78

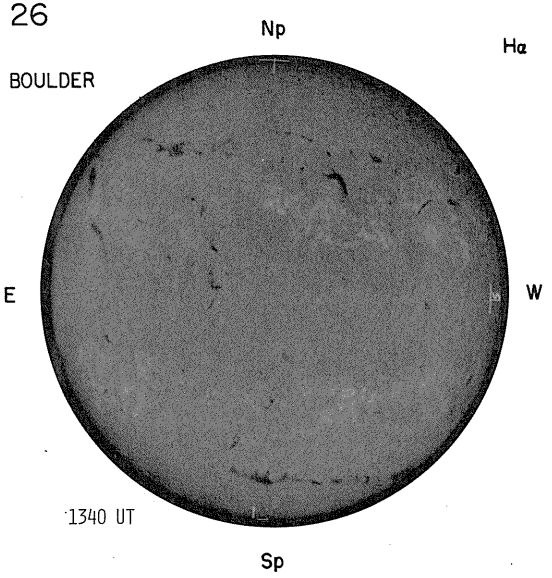
JULY 26, 1978 (P = 8.23, B_o = 5.31, L_o = 20.73)

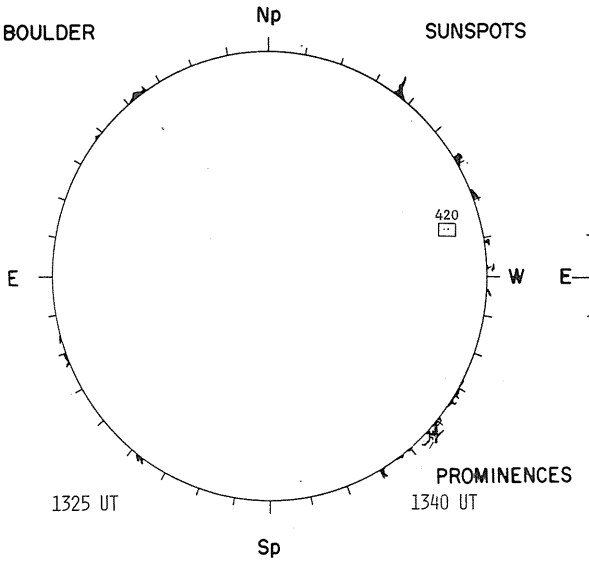


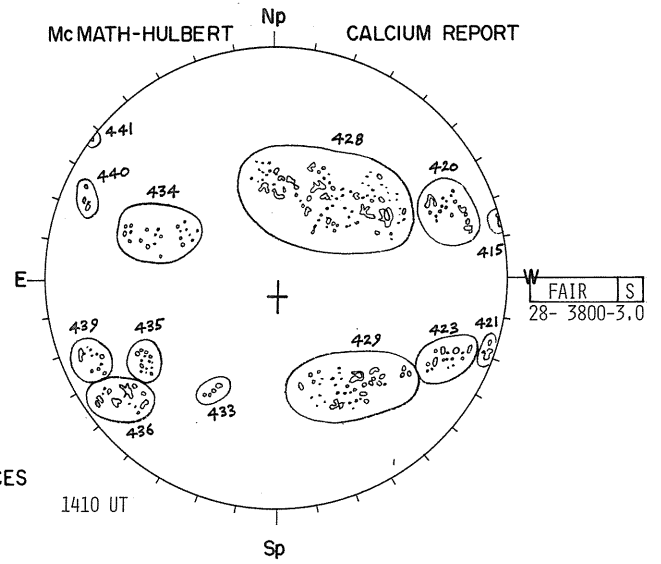


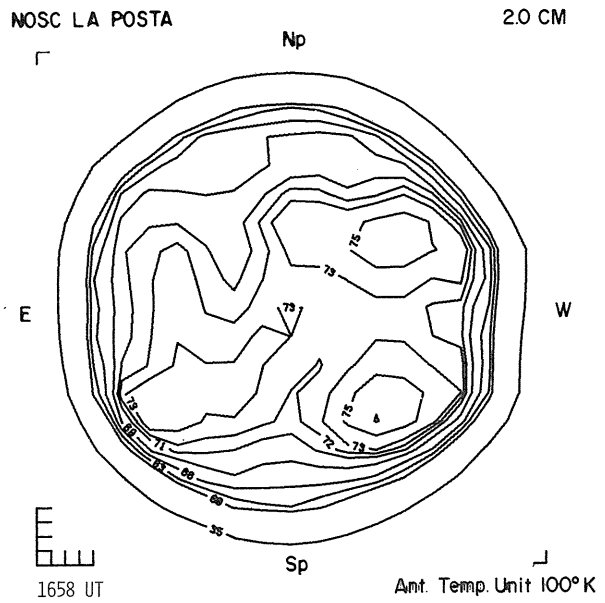


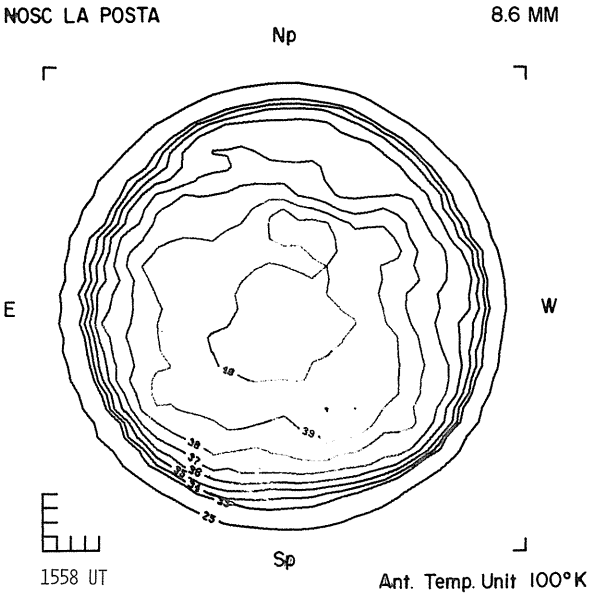



BOULDER
Np
Hα
E
W
1340 UT
Sp


BOULDER
Np
SUNSPOTS
420
E
W
1325 UT
Sp
PROMINENCES
1340 UT

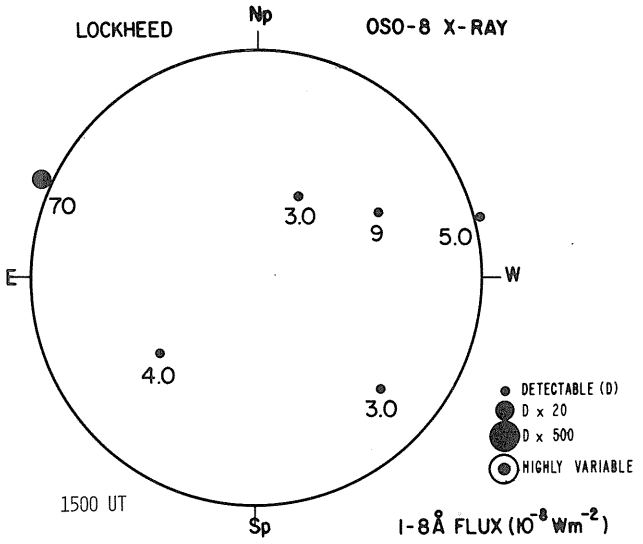

McMATH-HULBERT
Np
CALCIUM REPORT
441
440
434
428
420
415
439
435
436
433
429
423
421
E
W
FAIR
S
28- 3800-3.0
1410 UT
Sp

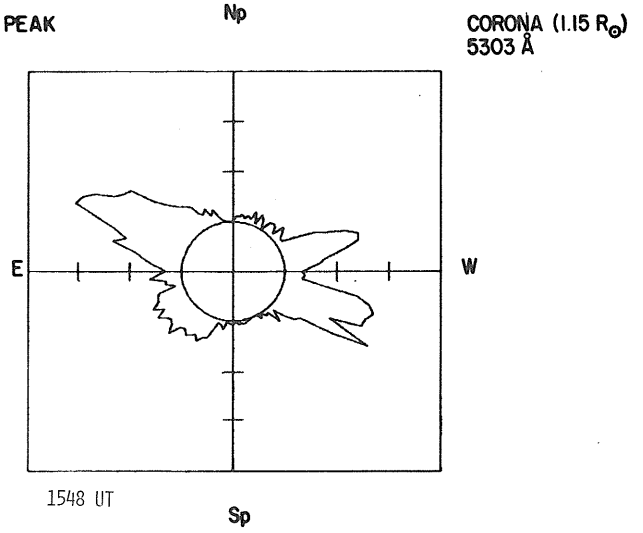

NOSC LA POSTA
2.0 CM
Np
E
W
Sp
1658 UT
Ant. Temp. Unit 100° K

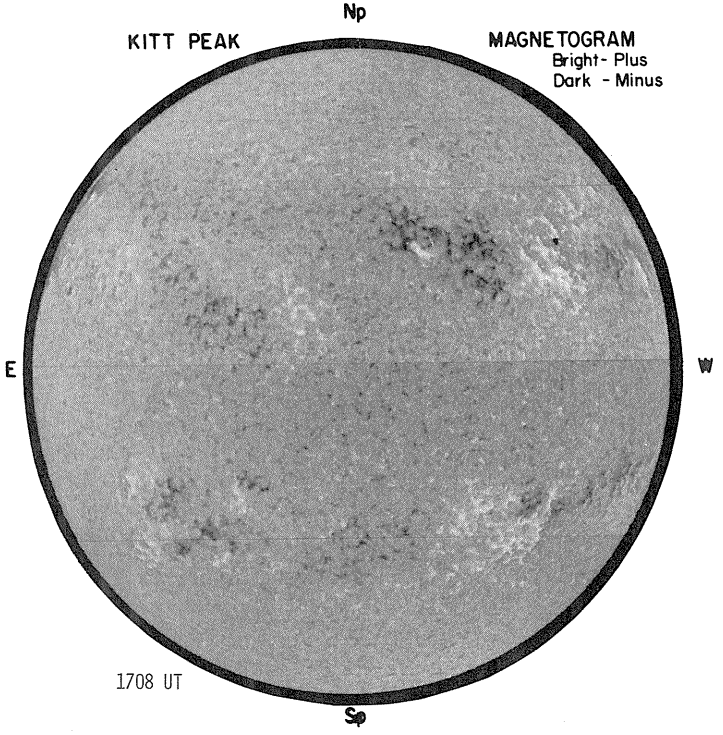

NOSC LA POSTA
8.6 MM
Np
E
W
Sp
1558 UT
Ant. Temp. Unit 100° K

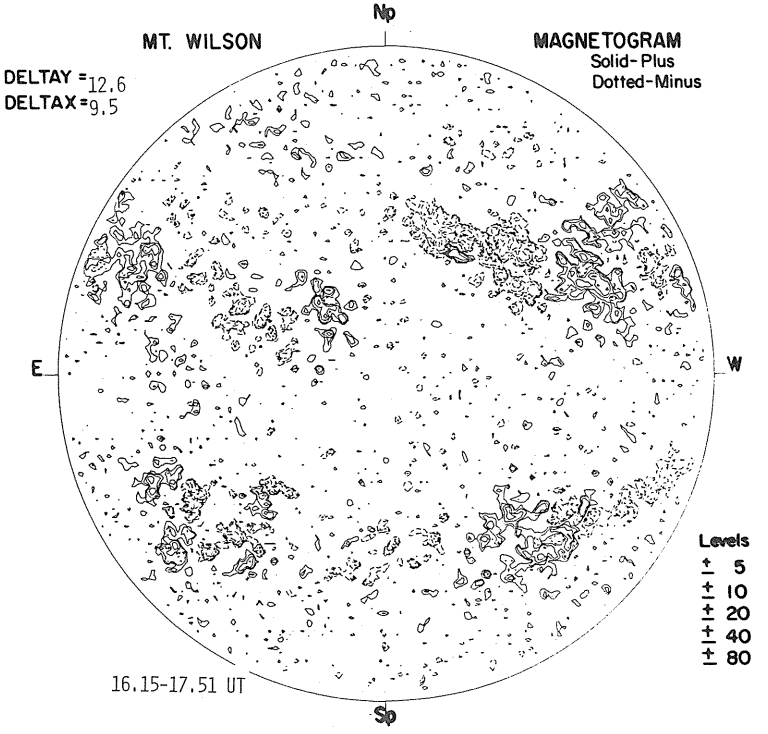
89
Jul 78

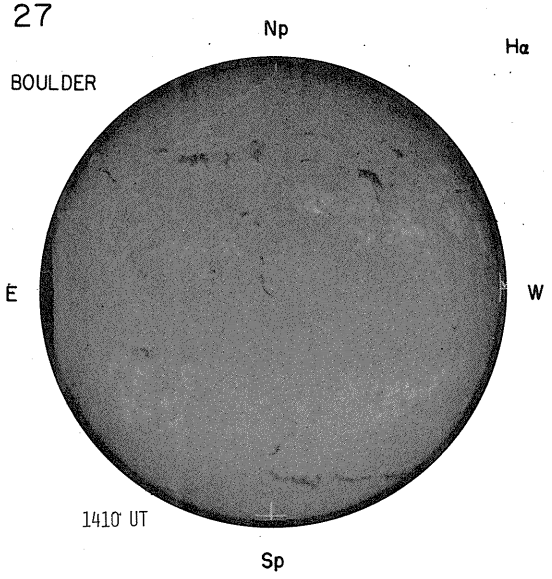
JULY 27, 1978 (P = 8.65, B_o = 5.39, L_o = 7.50)

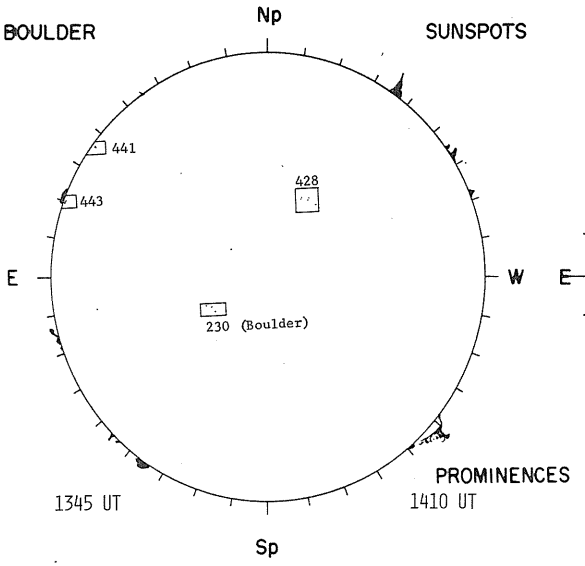


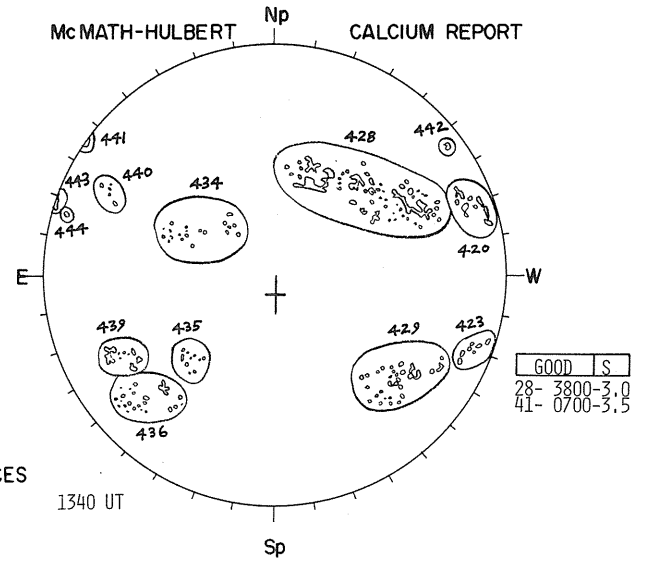







BOULDER
Hα
Np
E
W
Sp
1410 UT


BOULDER
SUNSPOTS
Np
E
W
Sp
441
443
428
230 (Boulder)
1345 UT
PROMINENCES
1410 UT


McMATH-HULBERT
CALCIUM REPORT
Np
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Sp
441
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420
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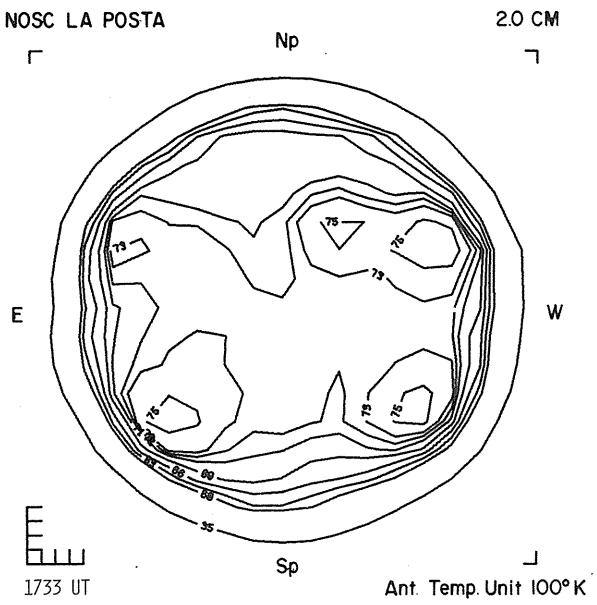
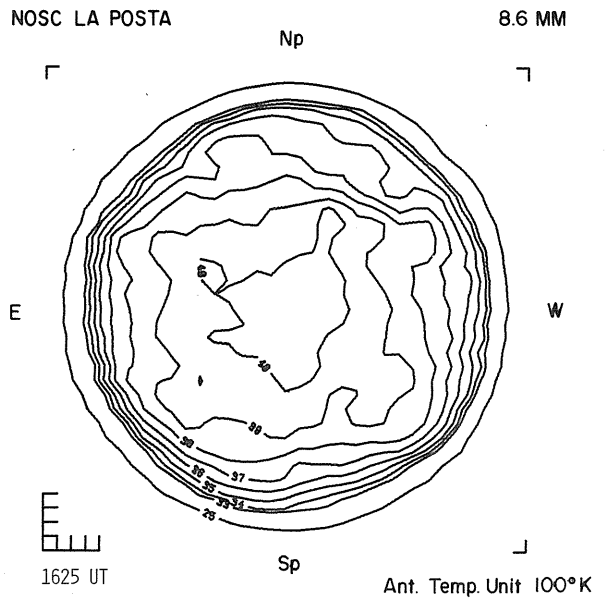
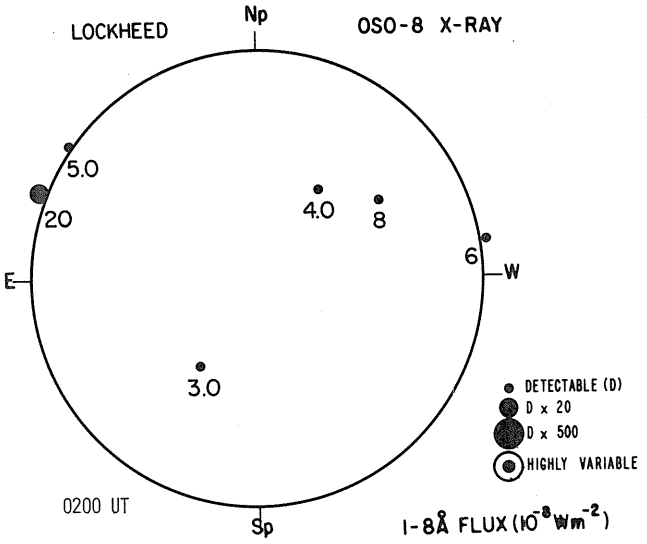
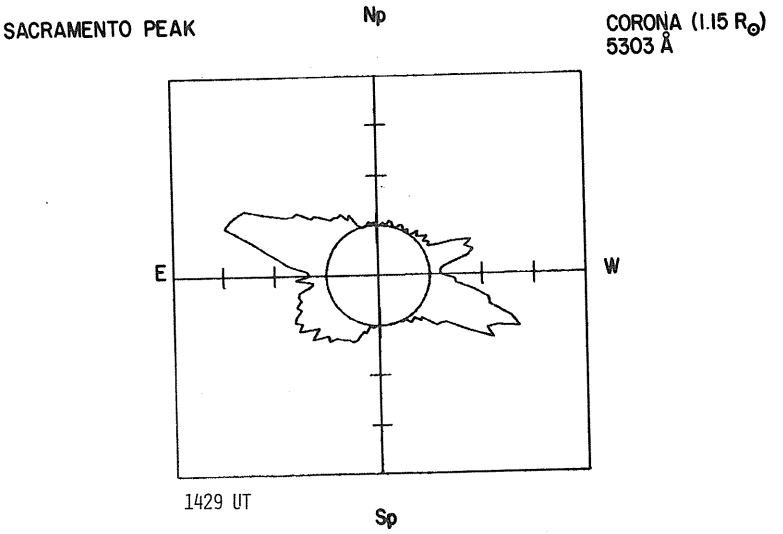
435
429
423
436
GOOD S
28- 3800-3.0
41- 0700-3.5
1340 UT

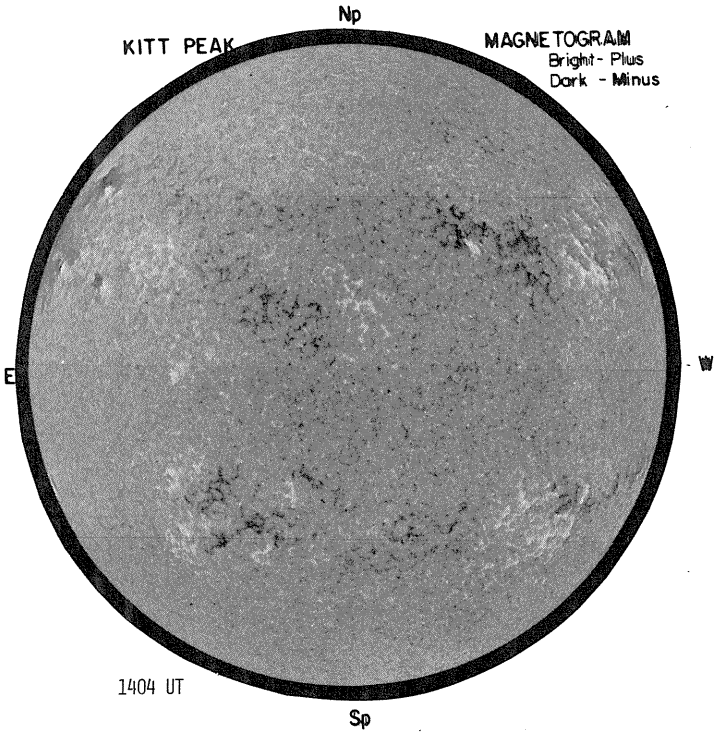

NOSC LA POSTA
2.0 CM
Np
E
W
Sp
1733 UT
Ant. Temp. Unit 100° K

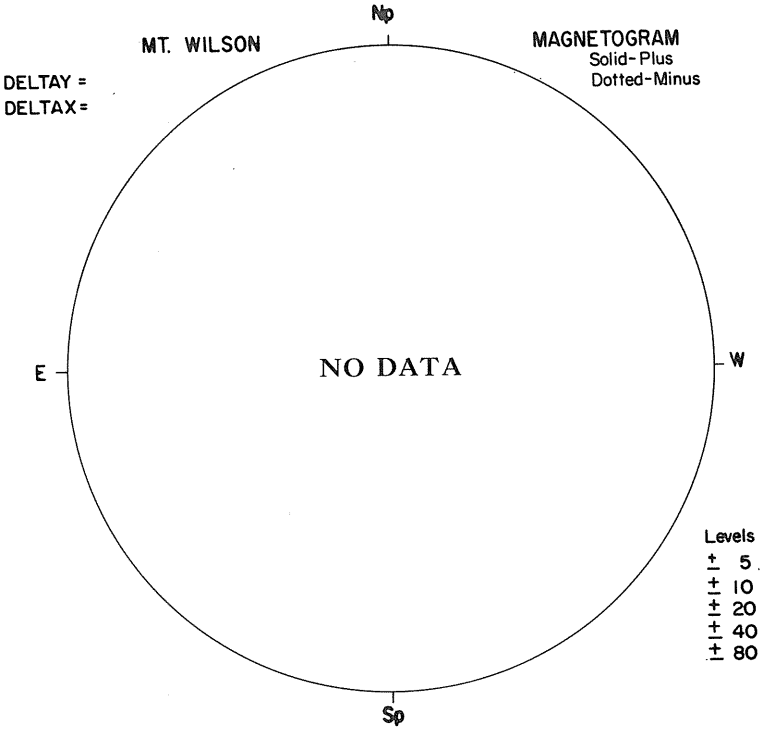

NOSC LA POSTA
8.6 MM
Np
E
W
Sp
1625 UT
Ant. Temp. Unit 100° K

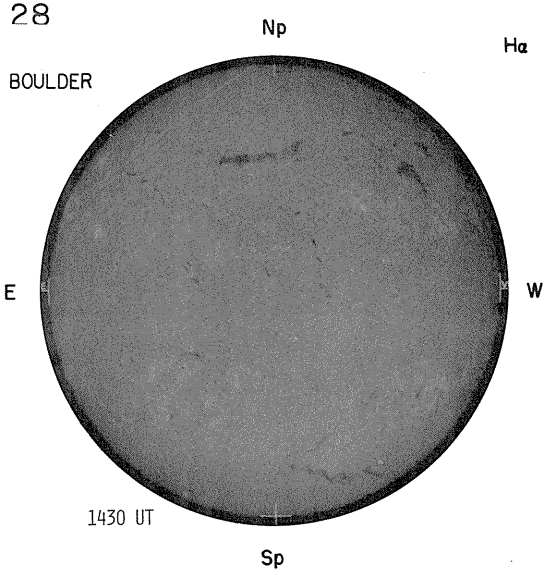
JULY 28, 1978 (P = 9.06, B_o = 5.47, L_o = 354.27)

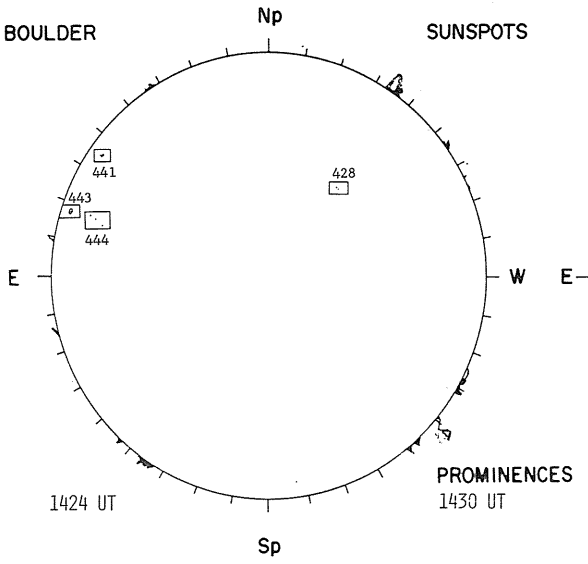


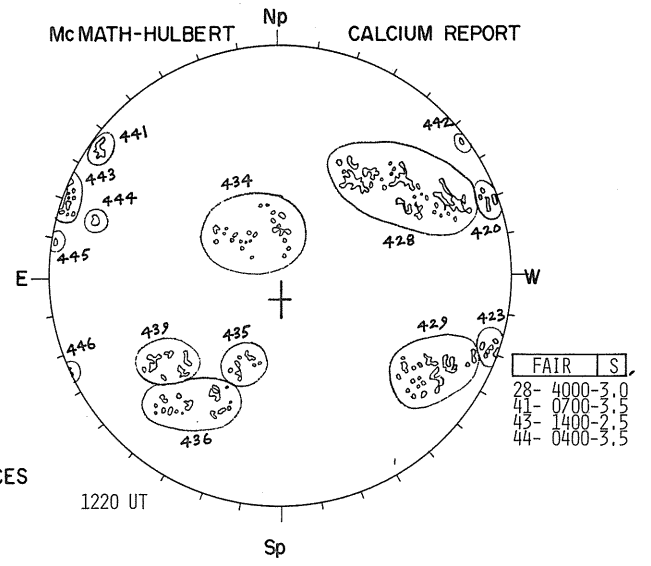







BOULDER
Hα
Np
E
W
Sp
1430 UT


BOULDER
SUNSPOTS
Np
E
W
Sp
441
443
444
428
1424 UT
PROMINENCES
1430 UT


McMATH-HULBERT
CALCIUM REPORT
Np
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W
Sp
441
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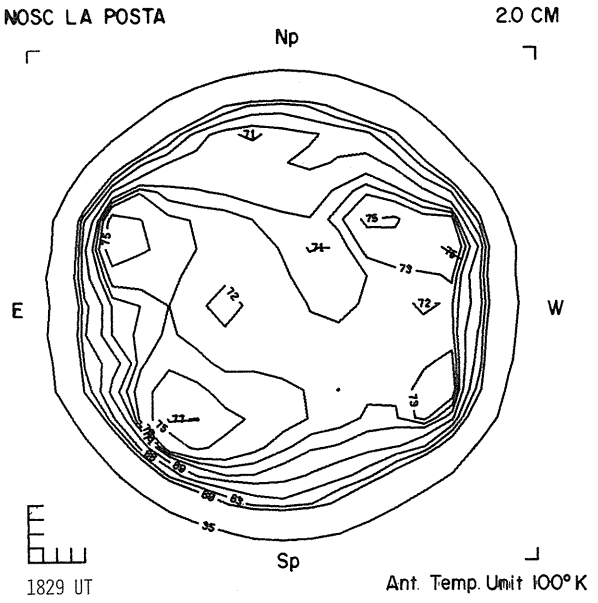
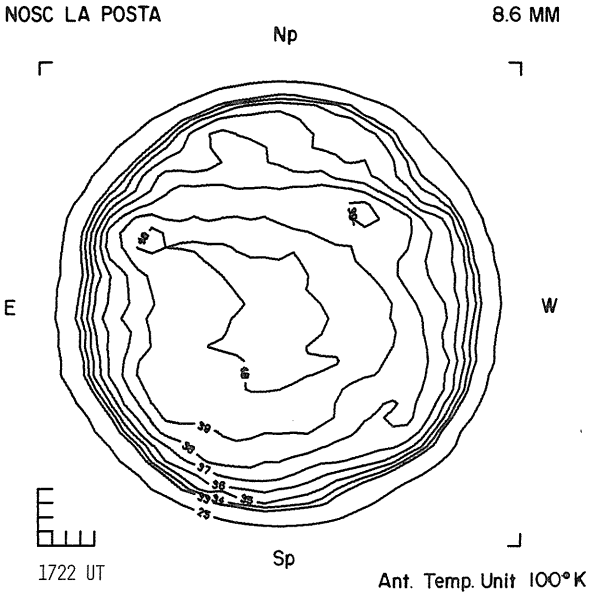
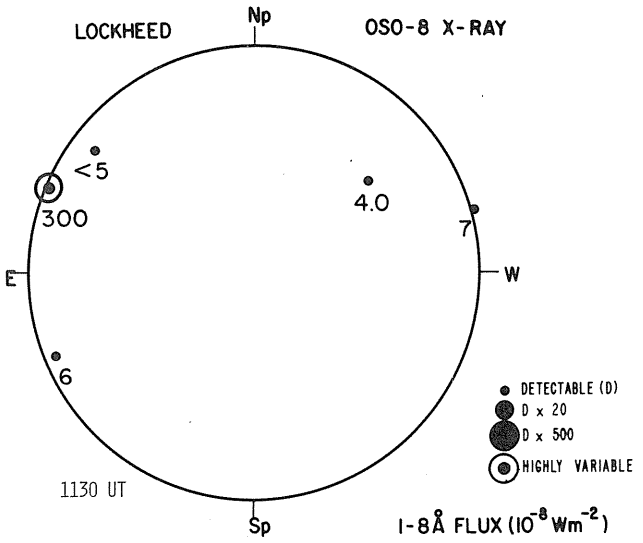
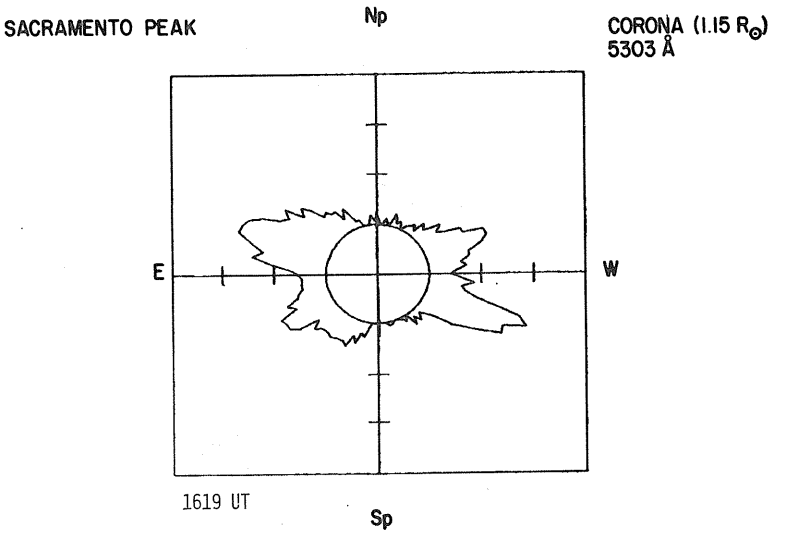
436
442
428
420
429
423
1220 UT
FAIR S
28- 4000-3.0
41- 0700-3.5
43- 1400-2.5
44- 0400-3.5

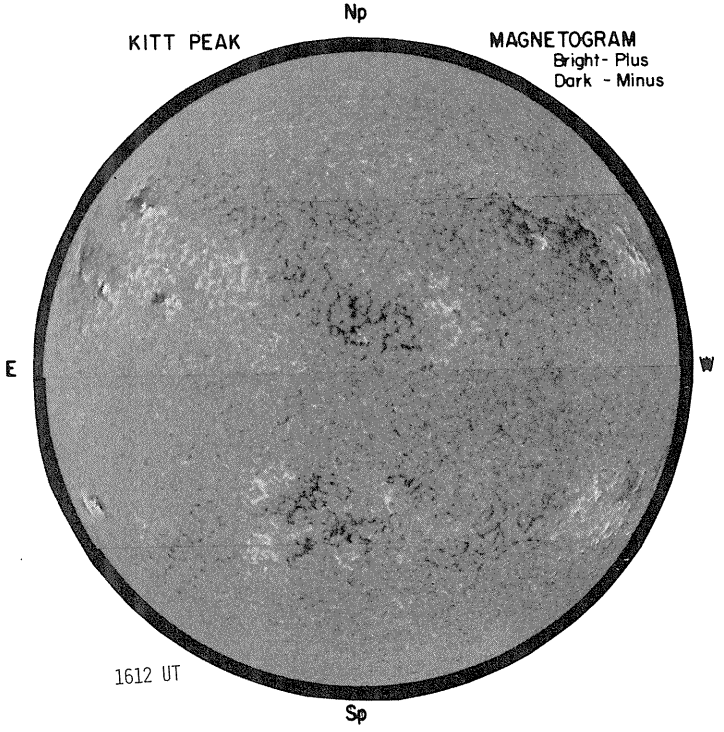

NOSC LA POSTA
2.0 CM
Np
E
W
Sp
1829 UT
Ant. Temp. Unit 100° K

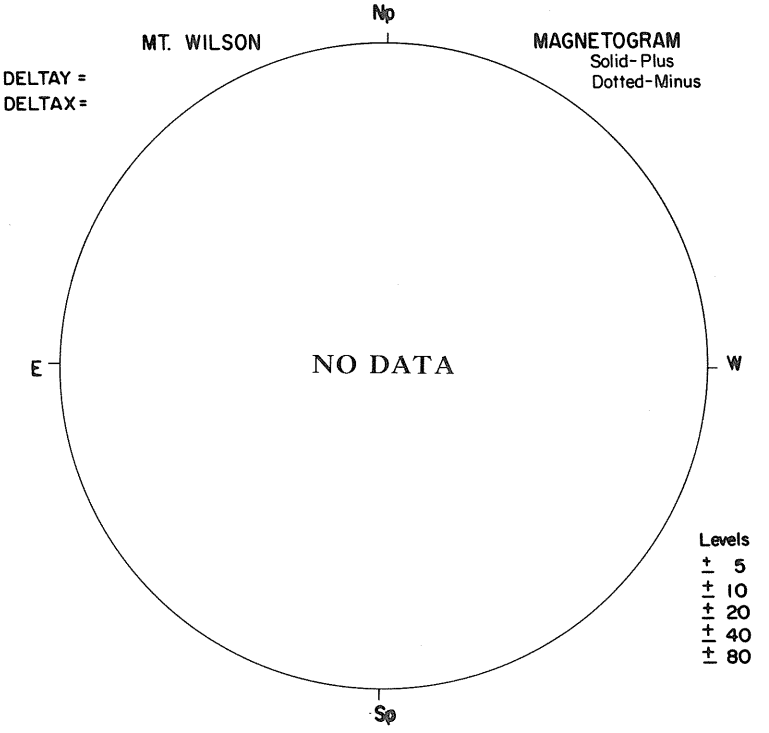

NOSC LA POSTA
8.6 MM
Np
E
W
Sp
1722 UT
Ant. Temp. Unit 100° K

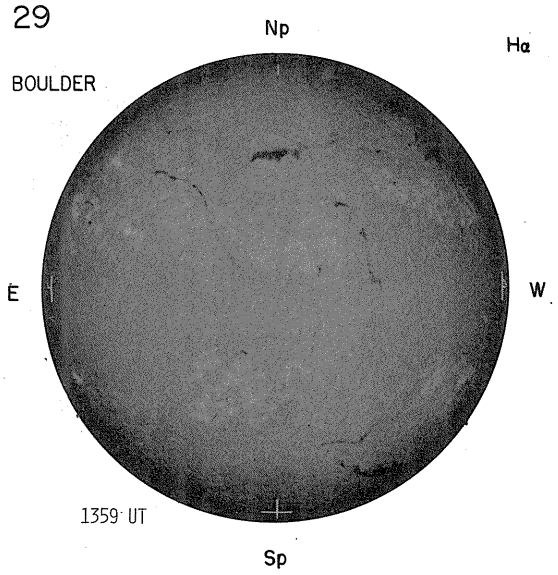
JULY 29, 1978 (P = 9.47, B_o = 5.55, L_o = 341.04)

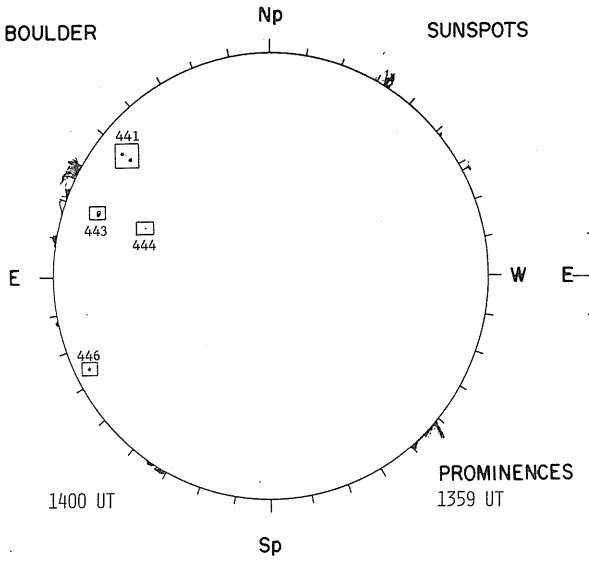


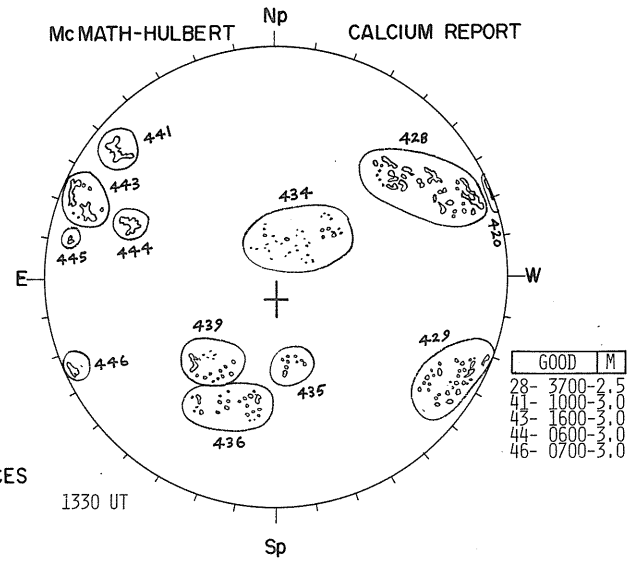







BOULDER
Hα
Np
E
W
Sp
1359 UT


BOULDER
SUNSPOTS
Np
E
W
Sp
441
443
444
446
1400 UT
PROMINENCES
1359 UT


McMATH-HULBERT
CALCIUM REPORT
Np
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Sp
441
443
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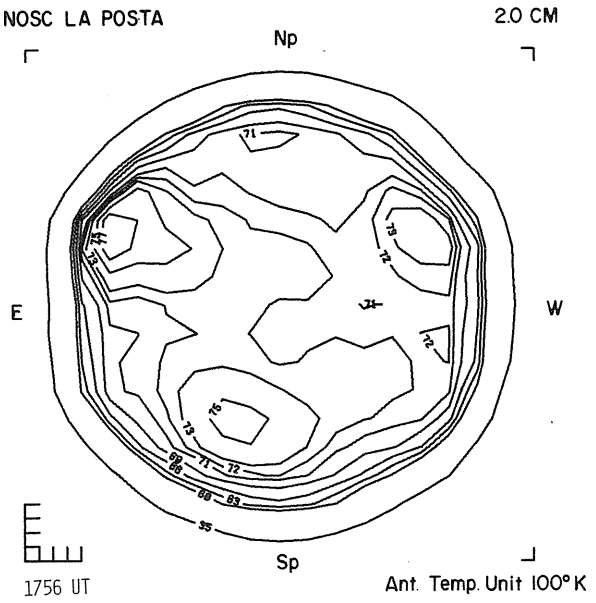
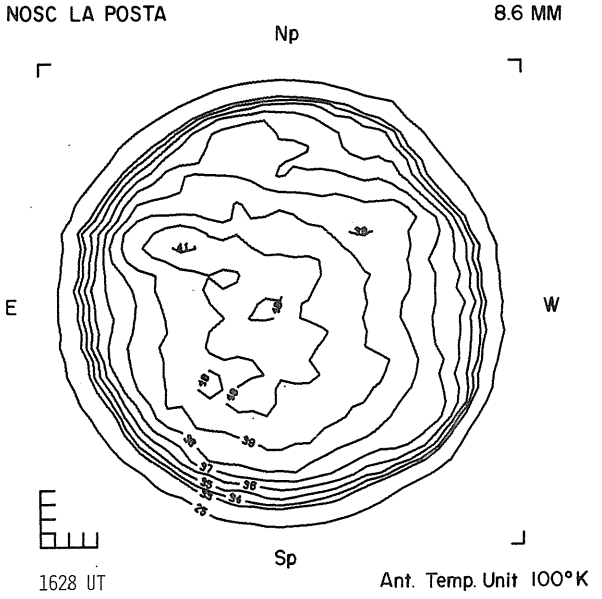
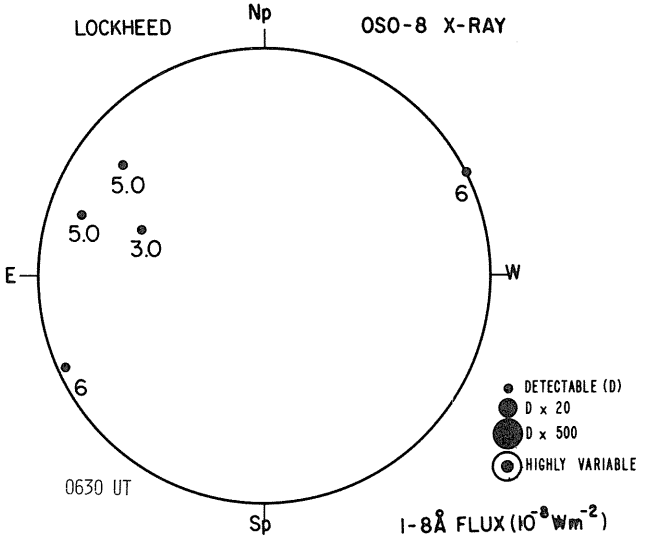
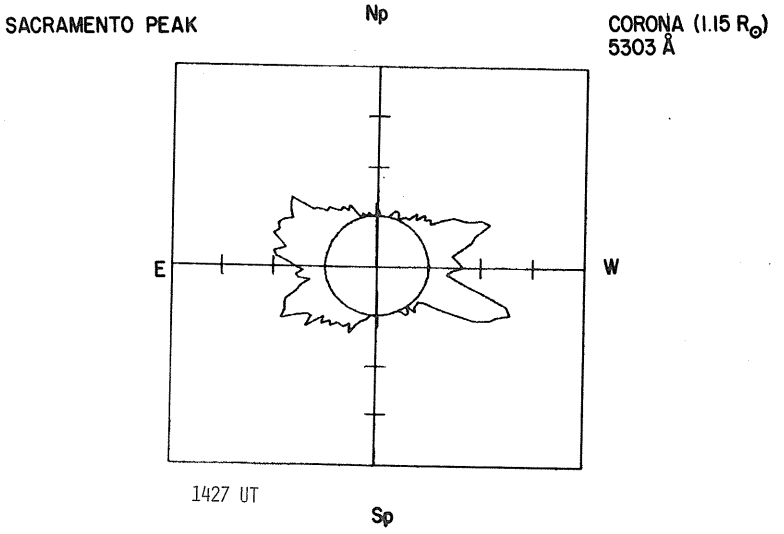
445
446
434
428
420
439
436
435
429
1330 UT
GOOD | M
28- 3700-2.5
41- 1000-3.0
43- 1600-3.0
44- 0600-3.0
46- 0700-3.0

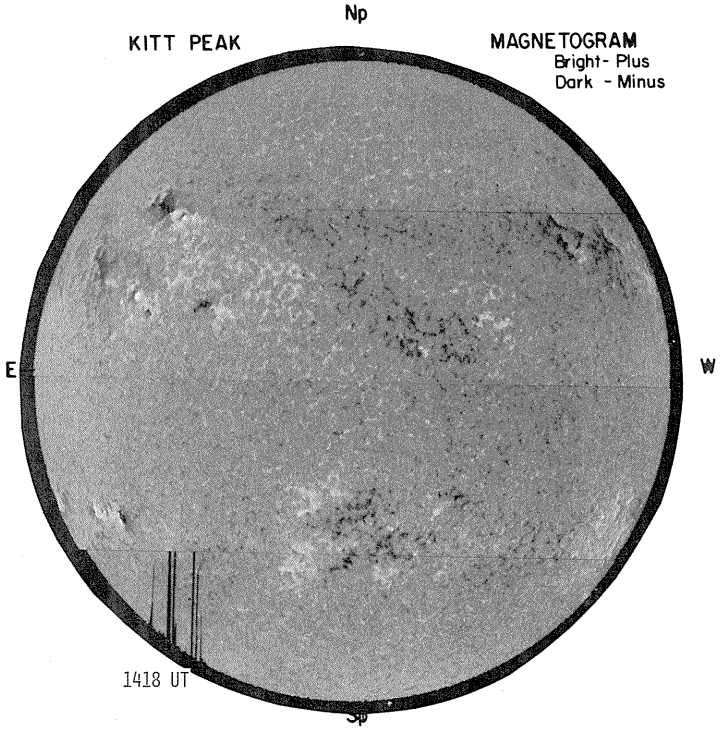

NOSC LA POSTA
2.0 CM
Np
E
W
Sp
1756 UT
Ant. Temp. Unit 100° K

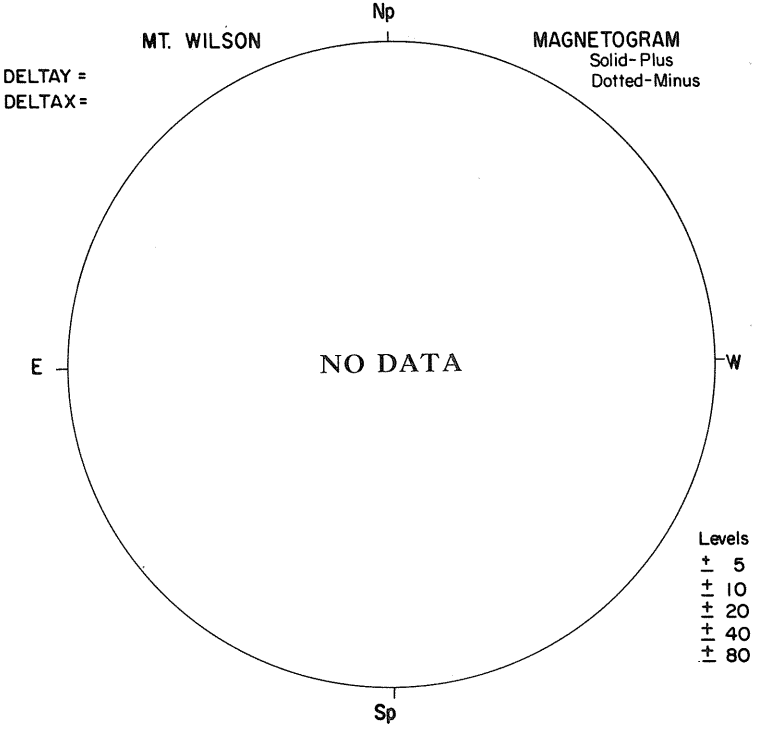

NOSC LA POSTA
8.6 MM
Np
E
W
Sp
1628 UT
Ant. Temp. Unit 100° K

JULY 30, 1978 (P = 9.88, B_o = 5.63, L_o = 327.82)



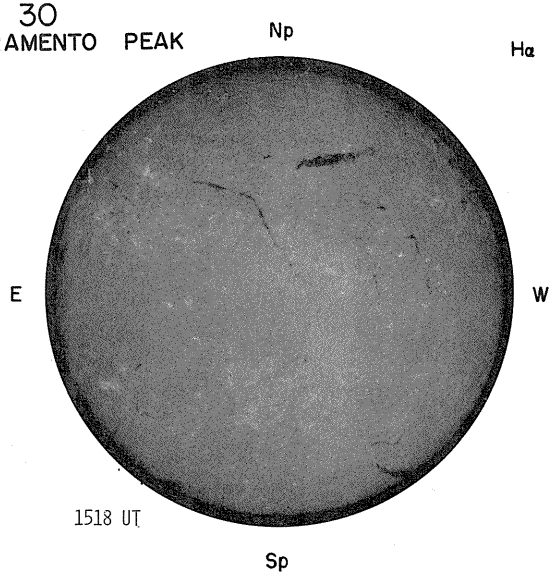




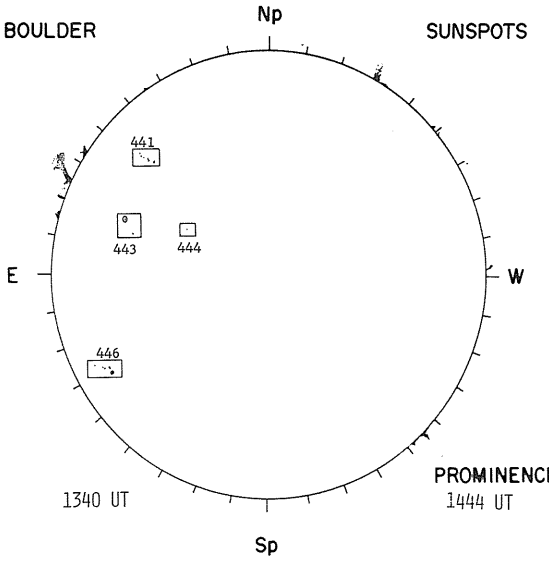


30

SACRAMENTO PEAK

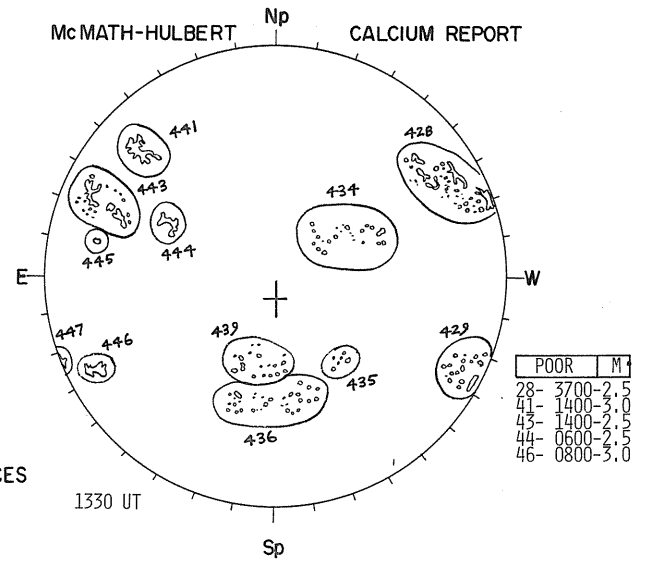


BOULDER



SUNSPOTS

McMATH-HULBERT



CALCIUM REPORT

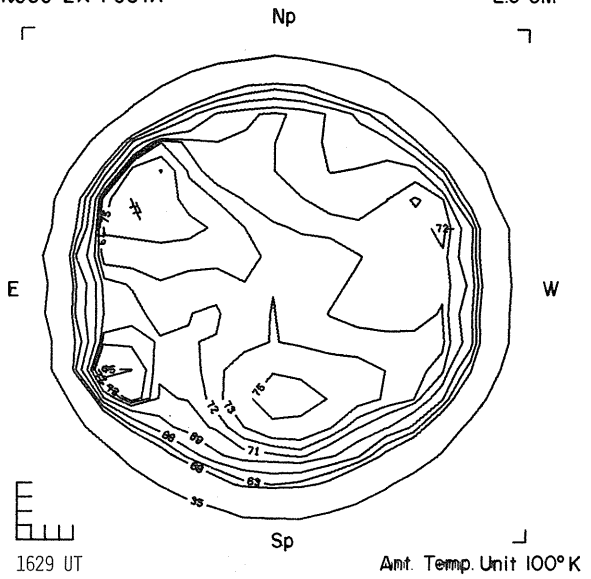
POOR	M
28- 3700-2.5	
41- 1400-3.0	
43- 1400-2.5	
44- 0600-2.5	
46- 0800-3.0	

PROMINENCES

1444 UT

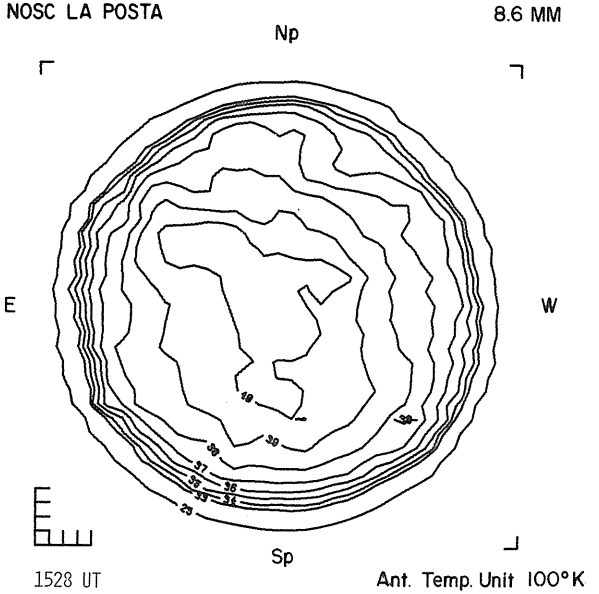
NOSC LA POSTA

2.0 CM



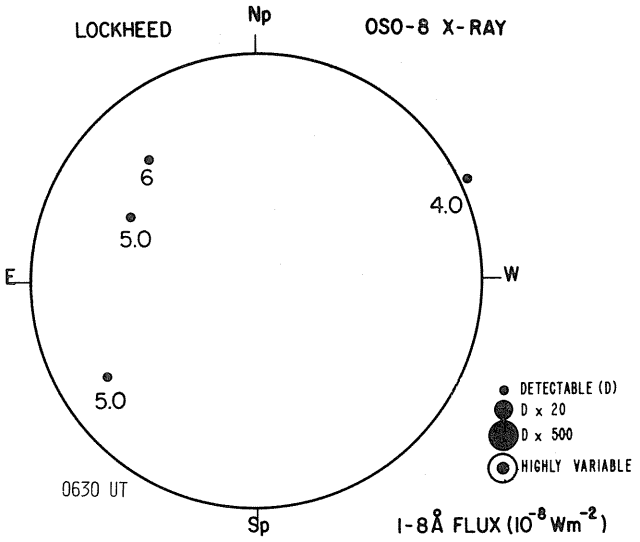
NOSC LA POSTA

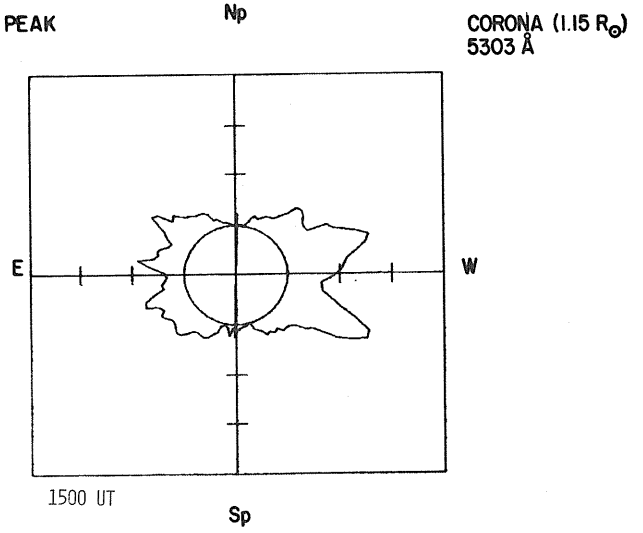
8.6 MM

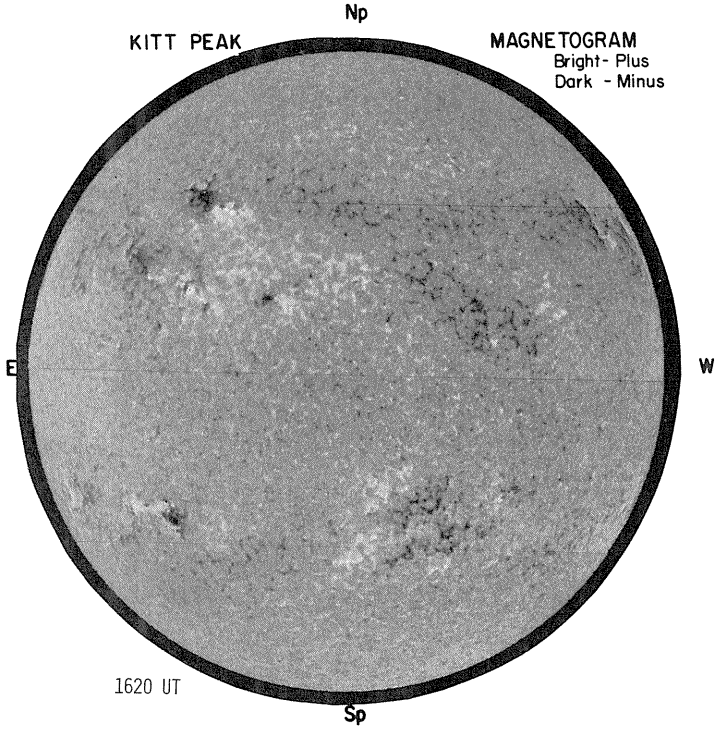


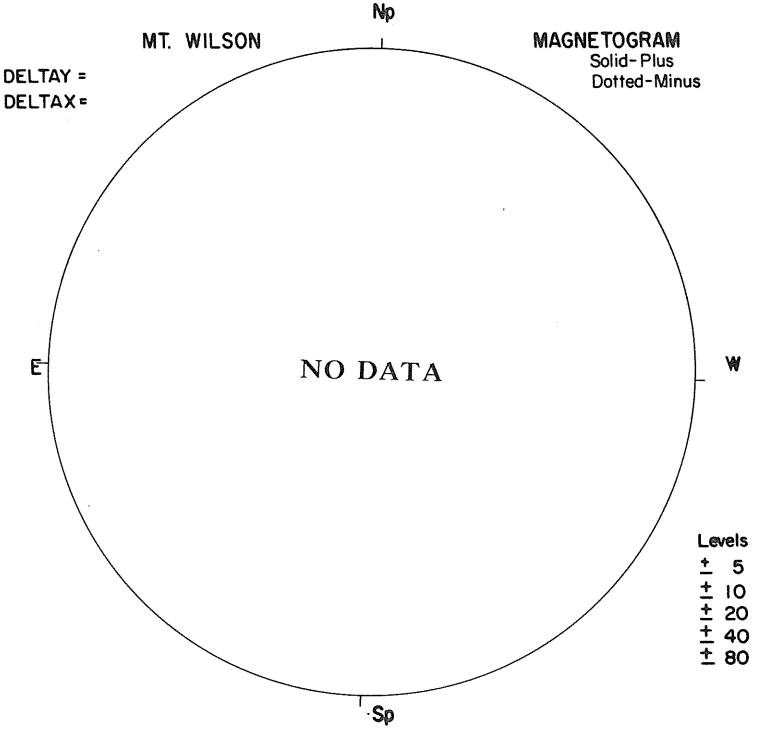
97
Jul 78

JULY 31, 1978 (P = 10.29, B_o = 5.71, L_o = 314.59)



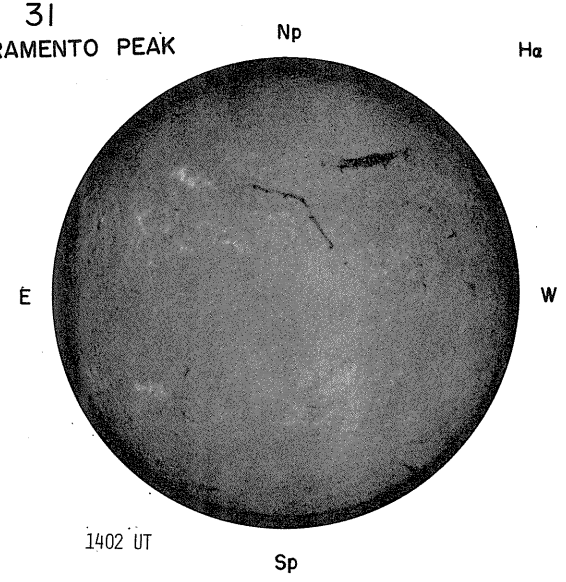






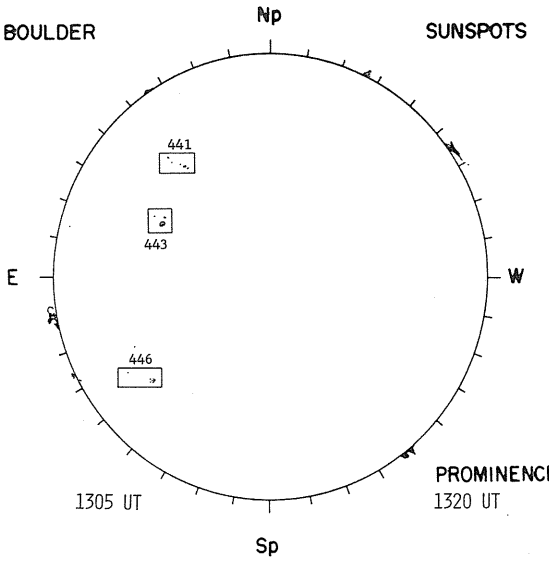
31

SACRAMENTO PEAK



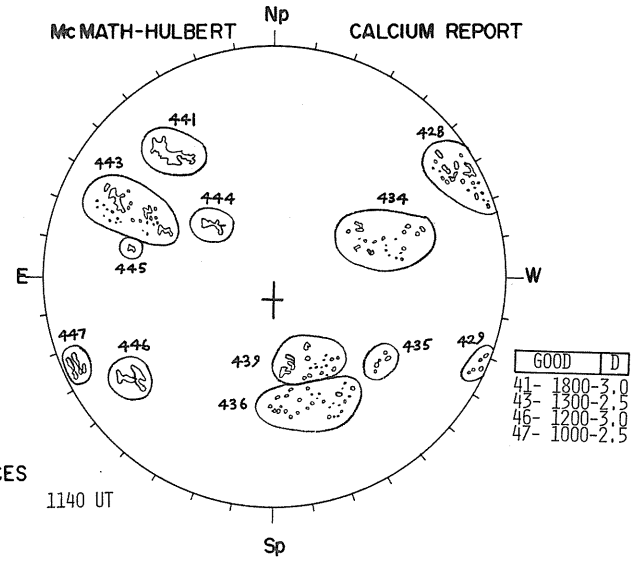
1402 UT

BOULDER SUNSPOTS



1305 UT

McMATH-HULBERT CALCIUM REPORT

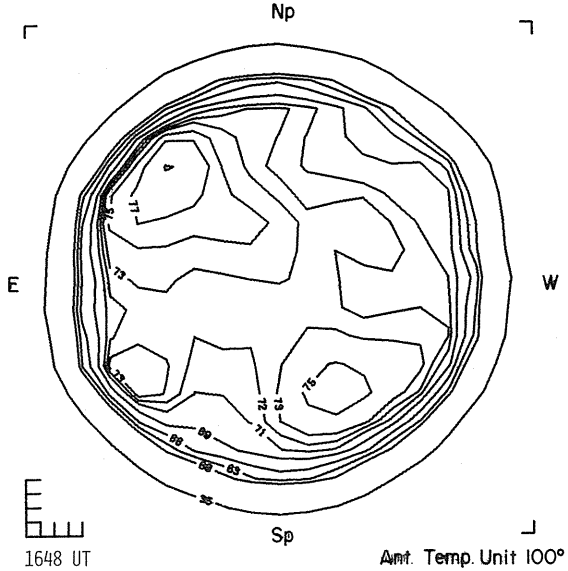


PROMINENCES

1320 UT

1140 UT

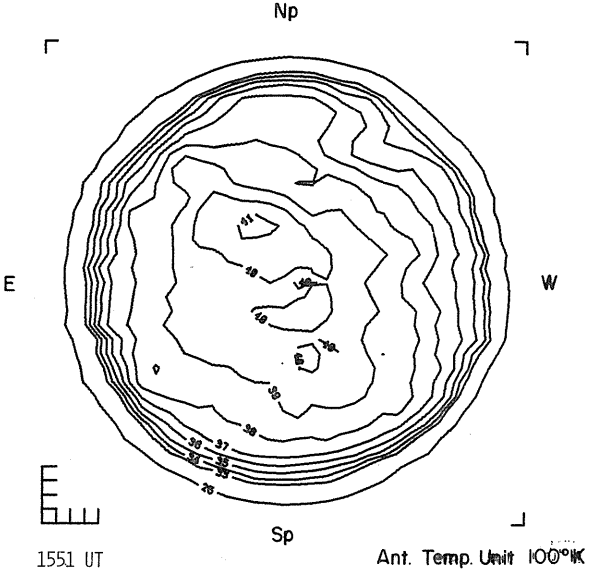
NOSC LA POSTA 2.0 CM



1648 UT

Ant. Temp. Unit 100° K

NOSC LA POSTA 8.6 MM



1551 UT

Ant. Temp. Unit 100° K

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MCMATH REGION 15380 CMP DATE 1.3

CALCIUM PLAGE DATA								SUNSPOT DATA								
YR	MO	DA	MC NO.	LAT CMD	L	AREA	INT	MW NO.	LAT CMD	L	MAG.	H	STA	AREA	CNT	CLASS
78	6	26	15380	N30 E63	350	300	2.0									
78	6	27	15380	N31 E50	350	200	2.5									
78	6	28	15380	N32 E36	351	400	3.0									
78	6	29	15380	N32 E23	351	300	2.5									
78	6	30	15380	N32 E10	350	300	2.5									
78	7	5	15380	N32 W56	348	100	1.0									

MCMATH REGION 15387 CMP DATE 2.0

CALCIUM PLAGE DATA								SUNSPOT DATA								
YR	MO	DA	MC NO.	LAT CMD	L	AREA	INT	MW NO.	LAT CMD	L	MAG.	H	STA	AREA	CNT	CLASS
78	7	5	15387	N11 W46	338	400	3.0		N09 W44				B	10	5	BXO
78	7	6	15387	N11 W59	338	400	2.0									
78	7	7	15387	N11 W72	337	400	1.5									

MCMATH REGION 15381 CMP DATE 2.3 RETURN OF REGION 15355 ROTATION 2

CALCIUM PLAGE DATA								SUNSPOT DATA								
YR	MO	DA	MC NO.	LAT CMD	L	AREA	INT	MW NO.	LAT CMD	L	MAG.	H	STA	AREA	CNT	CLASS
78	6	26	15381	N14 E82	331	1700	3.5	20102	N16 E78	129	B	2				
78	6	27	15381	N15 E69	331	3000	3.5									
78	6	28	15381	N15 E50	337	2800	3.5	20102	N16 E43	342	(BP)	3	B	60	5	CSO
78	6		15381					20104	N19 E50	335	(AP)	1	B	0	1	AXX
78	6	29	15381	N17 E38	336	3000	3.5	20102	N17 E26	346	(BP)	3	B	20	8	BXI
78	6		15381					20104	N19 E37	335	(AP)	2	B	10	1	AXX
78	6	30	15381	N17 E24	336	3400	3.0	20102	N16 E12	347	(AP)	3				
78	6		15381					20104	N19 E25	334	(AP)	1				
78	7	5	15381	N17 W43	335	2400	2.5		N16 W51				B	0	2	BXO
78	7	6	15381	N17 W56	335	2000	2.0									
78	7	7	15381	N17 W70	335	1500	1.5									
78	7	8	15381	N17 W82	334	900	1.5									

MCMATH REGION 15388 CMP DATE 2.9

CALCIUM PLAGE DATA								SUNSPOT DATA								
YR	MO	DA	MC NO.	LAT CMD	L	AREA	INT	MW NO.	LAT CMD	L	MAG.	H	STA	AREA	CNT	CLASS
78	7	1	15388					20108	N27 E11		(AP)	1				
78	7	2	15388					20108	N26 E03		(B)	3				
78	7	3	15388					20108	N26 W11		(B)	4				
78	7	4	15388					20108	N26 W24		(B)	4				
78	7	5	15388	N27 W35	327	700	3.5	20108	N26 W36		(B)	3				
78	7	6	15388	N28 W47	326	700	3.0	20108	N27 W50		(B)	4				
78	7	7	15388	N28 W60	325	900	2.5	20108	N28 W62		(B)	3				
78	7	8	15388	N28 W74	326	900	2.5		N28 W76				B	10	1	AXX
78	7	9	15388	N28 W87	326	400	1.0									

MCMATH REGION 15389 CMP DATE 3.2

CALCIUM PLAGE DATA								SUNSPOT DATA								
YR	MO	DA	MC NO.	LAT CMD	L	AREA	INT	MW NO.	LAT CMD	L	MAG.	H	STA	AREA	CNT	CLASS
78	7	3	15389					20111	S24 W07	323	(AP)	3				
78	7	4	15389					20111	S26 W19	322	(BY)	4				
78	7	5	15389	S26 W31	323	1100	4.5	20111	S26 W32	323	(BY)	4	B	100	15	DSI
78	7	6	15389	S25 W44	323	1200	3.5	20111	S26 W45	322	(D)	4	B	130	18	DAI
78	7	7	15389	S25 W56	321	1200	3.5	20111	S26 W58	321	(BP)	3	B	900	12	CSI
78	7	8	15389	S26 W68	320	1800	3.5	20111	S26 W70	320	(B)	2	B	90	9	ERO
78	7	9	15389	S27 W81	320	1800	2.5		S25 W75				M	20	2	BXO

MCMATH REGION 15382 CMP DATE 3.4

CALCIUM PLAGE DATA								SUNSPOT DATA								
YR	MO	DA	MC NO.	LAT CMD	L	AREA	INT	MW NO.	LAT CMD	L	MAG.	H	STA	AREA	CNT	CLASS
78	6	27	15382	N22 E85	315	500	2.5									
78	6	28	15382	N23 E68	319	600	3.5	20105	N22 E66	319	AF	1	B	10	1	AXX
78	6	29	15382	N23 E53	321	500	2.5	20105	N23 E52	320	(AF)	1	B	10	2	AXX
78	6	30	15382	N23 E39	321	600	2.0									
78	7	5	15382	N23 W28	320	300	2.0									

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MCMATH REGION 15382 (CONT) CMP DATE 3.4

				CALCIUM PLAGE DATA					SUNSPOT DATA								
YR	MO	DA	MC NO.	LAT CMD	L	AREA	INT		MW NO.	LAT CMD	L	MAG.	H	STA	AREA	CNT	CLASS
78	7	6	15382	N23 W40	319	300	2.0										

MCMATH REGION 15384 CMP DATE 3.7 RETURN OF REGION 15349 ROTATION 2

				CALCIUM PLAGE DATA					SUNSPOT DATA								
YR	MO	DA	MC NO.	LAT CMD	L	AREA	INT		MW NO.	LAT CMD	L	MAG.	H	STA	AREA	CNT	CLASS
78	6	27	15384	S14 E86	314	400	2.0										
78	6	28	15384	S16 E70	317	600	3.5		20106	S15 E66	319	B	1	B	0	1	AXX
78	6	29	15384	S16 E57	317	800	3.5		20106	S15 E53	319	(B)	3	B	20	6	BXI
78	6	30	15384	S16 E43	317	900	3.5		20106	S16 E43	316	(AF)	3				
78	7	5	15384	S15 W24	316	500	2.0										
78	7	6	15384	S15 W37	316	500	2.0										
78	7	7	15384	S15 W50	315	600	3.0		20120	S16 W48	311	(BF)	3	B	10	3	BXO
78	7	8	15384	S15 W63	315	1000	3.5		20120	S15 W63	313	(B)	3	B	50	7	DRO
78	7	9	15384	S15 W76	315	1000	2.5		20120	S15 W75	311	B	1	M	60	4	DRO
78	7	10	15384	S15 W85	311	200	1.0										

MCMATH REGION 15390 CMP DATE 4.5

				CALCIUM PLAGE DATA					SUNSPOT DATA								
YR	MO	DA	MC NO.	LAT CMD	L	AREA	INT		MW NO.	LAT CMD	L	MAG.	H	STA	AREA	CNT	CLASS
78	6	30	15390	N23 E53	307	300	2.0										
78	7	3	15390						20112	N22 E15		(AP)	3				
78	7	5	15390	N23 W13	305	500	2.5		20112	N20 W14		(AP)	3				
78	7	6	15390	N23 W25	304	500	2.0										
78	7	7	15390	N23 W37	302	700	2.0		20121	N17 W37	300	(AP)	4	B	10	1	AXX
78	7	8	15390	N23 W50	302	700	2.5		20121	N18 W49	299	(B)	2	B	10	3	CRO
78	7	9	15390	N21 W64	303	600	2.0										
78	7	10	15390	N21 W75	301	600	1.0										

MCMATH REGION 15386 CMP DATE 5.4

				CALCIUM PLAGE DATA					SUNSPOT DATA								
YR	MO	DA	MC NO.	LAT CMD	L	AREA	INT		MW NO.	LAT CMD	L	MAG.	H	STA	AREA	CNT	CLASS
78	6	30	15386	S21 E66	294	400	2.5										
78	7	1	15386						20109	S19 E46		(AP)	3				
78	7	2	15386						20109	S19 E36		(AP)	3				
78	7	3	15386						20113	S20 E22		(AP)	3				
78	7	5	15386	S20 W01	293	400	2.5										
78	7	6	15386	S20 W13	292	300	2.5										
78	7	7	15386	S20 W26	291	300	2.0										
78	7	8	15386	S20 W39	291	300	1.5										
78	7	9	15386	S20 W52	291	200	1.0										
78	7	10	15386	S20 W65	291	300	1.5										

MCMATH REGION 15407 CMP DATE 5.4

				CALCIUM PLAGE DATA					SUNSPOT DATA								
YR	MO	DA	MC NO.	LAT CMD	L	AREA	INT		MW NO.	LAT CMD	L	MAG.	H	STA	AREA	CNT	CLASS
78	7	10	15407	N34 W67	293	700	2.0										
78	7	11	15407	N34 W80	293	300	2.0										

MCMATH REGION 15385 CMP DATE 6.4

				CALCIUM PLAGE DATA					SUNSPOT DATA								
YR	MO	DA	MC NO.	LAT CMD	L	AREA	INT		MW NO.	LAT CMD	L	MAG.	H	STA	AREA	CNT	CLASS
78	6	29	15385	N18 E89	285	700	2.0		20107	N19 E85	287	AP	3	B	40	1	HSX
78	6	30	15385	N20 E78	282	1600	3.5		20107	N19 E75	284	(B)	4				
78	7	1	15385						20107	N19 E56	283	(BP)	4				
78	7	2	15385						20107	N19 E47	282	(BP)	4				
78	7		15385						20110	N34 E36		(AP)	1				
78	7	3	15385						20107	N19 E34	282	(BY)	4				
78	7	4	15385						20107	N19 E19	284	(AP)	4				
78	7	5	15385	N20 E11	281	3000	3.0		20107	N18 E07	284	(AP)	4	B	100	1	HSX
78	7		15385						20115	N20 E26	265	(AF)	1				
78	7	6	15385	N20 W02	281	2700	3.0		20107	N19 W07	284	(BP)	4	B	130	5	CSO
78	7	7	15385	N20 W15	280	2400	2.5		20107	N20 W20	283	(AP)	5	B	100	5	CSO
78	7	8	15385	N20 W28	280	2400	2.5		20107	N20 W33	283	(AP)	4	B	100	3	HAX

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MCMATH REGION 15385 (CONT) CMP DATE 6.4

			CALCIUM PLAGE DATA					SUNSPOT DATA								
YR	MO	DA	MC NO.	LAT CMD	L	AREA	INT	MW NO.	LAT CMD	L	MAG.	H	STA	AREA	CNT	CLASS
78	7	9	15385	N20 W41	280	1700	2.5	20107	N20 W46	282	(AP)	5	M	100	1	HSX
78	7	10	15385	N20 W53	279	1600	2.5	20107	N20 W59	283	(AP)	4	B	60	1	HSX
78	7	11	15385	N20 W66	279	1600	2.0	20107	N19 W72	282	(AP)	3	B	50	1	HRX
78	7	12	15385	N20 W80	279	1700	1.5									

MCMATH REGION 15408 CMP DATE 6.7

			CALCIUM PLAGE DATA					SUNSPOT DATA								
YR	MO	DA	MC NO.	LAT CMD	L	AREA	INT	MW NO.	LAT CMD	L	MAG.	H	STA	AREA	CNT	CLASS
78	7	10	15408	N11 W50	276	300	1.5									
78	7	11	15408	N11 W64	277	100	1.0									
78	7	12	15408	N11 W78	277	200	1.0									

MCMATH REGION 15412 CMP DATE 7.4

			CALCIUM PLAGE DATA					SUNSPOT DATA								
YR	MO	DA	MC NO.	LAT CMD	L	AREA	INT	MW NO.	LAT CMD	L	MAG.	H	STA	AREA	CNT	CLASS
78	7	12	15412	N33 W67	266	300	1.5									

MCMATH REGION 15409 CMP DATE 7.5

			CALCIUM PLAGE DATA					SUNSPOT DATA								
YR	MO	DA	MC NO.	LAT CMD	L	AREA	INT	MW NO.	LAT CMD	L	MAG.	H	STA	AREA	CNT	CLASS
78	7	10	15409	N20 W40	266	400	2.5	20128	N21 W41	265	(BF)	3	B	30	6	BXO
78	7	11	15409	N20 W53	266	1000	3.0	20128	N20 W57	267	(BF)	3	B	170	10	CRO
78	7	12	15409	N20 W67	266	1400	3.5	20128	N20 W70	267	(B)	4	B	200	13	CAO
78	7	13	15409	N20 W80	265	1300	3.0		N21 W76				B	180	5	HKX

MCMATH REGION 15396 CMP DATE 7.9

			CALCIUM PLAGE DATA					SUNSPOT DATA								
YR	MO	DA	MC NO.	LAT CMD	L	AREA	INT	MW NO.	LAT CMD	L	MAG.	H	STA	AREA	CNT	CLASS
78	7	6	15396	S11 E19	260	100	2.5		S11 E17				B	0	1	AXX

MCMATH REGION 15405 CMP DATE 8.0

			CALCIUM PLAGE DATA					SUNSPOT DATA								
YR	MO	DA	MC NO.	LAT CMD	L	AREA	INT	MW NO.	LAT CMD	L	MAG.	H	STA	AREA	CNT	CLASS
78	7	9	15405	S30 W19	258	200	2.5	20124	S30 W20	256	(B)	2				
78	7	10	15405	S30 W31	257	300	2.5	20124	S30 W34	258	(B)	2	B	10	3	BXO
78	7	11	15405	S30 W44	257	200	2.0									
78	7	12	15405	S30 W56	255	200	1.0									
78	7	13	15405	S30 W70	255	100	1.0									

MCMATH REGION 15395 CMP DATE 8.1

			CALCIUM PLAGE DATA					SUNSPOT DATA								
YR	MO	DA	MC NO.	LAT CMD	L	AREA	INT	MW NO.	LAT CMD	L	MAG.	H	STA	AREA	CNT	CLASS
78	7	6	15395	N12 E21	258	200	1.5									
78	7	7	15395	N12 E08	257	100	1.5									
78	7	8	15395	N12 W06	258	100	1.5									
78	7	9	15395	N12 W19	258	100	1.0									
78	7	10	15395	N12 W32	258	100	2.0									

MCMATH REGION 15391 CMP DATE 8.5 RETURN OF REGION 15345 ROTATION 3

			CALCIUM PLAGE DATA					SUNSPOT DATA								
YR	MO	DA	MC NO.	LAT CMD	L	AREA	INT	MW NO.	LAT CMD	L	MAG.	H	STA	AREA	CNT	CLASS
78	7	5	15391	S22 E35	257	1400	2.0									
78	7	6	15391	S23 E22	257	1100	2.0	20116	S25 E19	258	(B)	2	B	0	1	AXX
78	7		15391					20117	S20 E25	252	(AF)	1				
78	7	7	15391	S23 E13	252	1000	1.5	20116	S24 E04	259	(AP)	2	B	0	2	AXX

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MCMATH REGION 15391 (CONT) CMP DATE 8.5 RETURN OF REGION 15345 ROTATION 3

CALCIUM PLAGE DATA								SUNSPOT DATA								
YR	MO	DA	MC NO.	LAT CMD	L	AREA	INT	MW NO.	LAT CMD	L	MAG.	H	STA	AREA	CNT	CLASS
78	7	8	15391	S23 W01	253	1000	1.5									
78	7	9	15391	S23 W12	251	800	1.5	20125	S20 W16	252	(B)	2				
78	7	10	15391	S23 W30	256	800	1.5									
78	7	11	15391	S23 W44	257	700	2.0		S21 W43				B	0	1	AXX
78	7	12	15391	S23 W56	255	800	2.0	20132	S20 W56	253	(AF)	2	B	0	1	AXX
78	7	13	15391	S20 W70	255	400	2.0									
78	7	14	15391	S20 W82	255	300	1.0									

MCMATH REGION 15392 CMP DATE 9.3 RETURN OF REGION 15352 ROTATION 2

CALCIUM PLAGE DATA								SUNSPOT DATA								
YR	MO	DA	MC NO.	LAT CMD	L	AREA	INT	MW NO.	LAT CMD	L	MAG.	H	STA	AREA	CNT	CLASS
78	7	4	15392					20114	N16 E61		(AF)	1				
78	7	5	15392	N17 E47	245	1200	2.5									
78	7	6	15392	N17 E35	244	1200	2.5									
78	7	7	15392	N17 E23	242	1000	2.5									
78	7	8	15392	N18 E10	242	700	2.0									
78	7	9	15392	N18 W04	243	700	2.0									
78	7	10	15392	N19 W18	244	1000	2.0									
78	7	11	15392	N19 W32	245	800	1.5									
78	7	12	15392	N19 W44	243	800	1.5									
78	7	13	15392	N19 W59	244	700	1.5									
78	7	14	15392	N19 W72	245	700	1.0									

MCMATH REGION 15400 CMP DATE 9.3

CALCIUM PLAGE DATA								SUNSPOT DATA								
YR	MO	DA	MC NO.	LAT CMD	L	AREA	INT	MW NO.	LAT CMD	L	MAG.	H	STA	AREA	CNT	CLASS
78	7	6	15400	S20 E36	243	300	2.5		S18 E35				B	10	3	BXX
78	7	7	15400	S20 E24	241	800	2.5	20122	S19 E23	240	(BF)	4	B	20	6	BXO
78	7	8	15400	S19 E11	241	900	3.0	20122	S19 E10	240	(B)	4	B	140	15	DKI
78	7	9	15400	S19 W02	241	1000	3.0	20122	S20 W04	240	(B)	4	H	120	26	DAI
78	7	10	15400	S20 W15	241	1300	2.5	20122	S20 W16	240	(B)	4	B	120	21	DSO
78	7	11	15400	S21 W27	240	1600	2.5	20122	S20 W30	240	(B)	4	B	260	22	DSI
78	7	12	15400	S21 W40	239	1700	3.0	20122	S20 W43	240	(B)	4	B	160	11	DSO
78	7	13	15400	S21 W54	239	1700	3.0		S20 W54				B	170	4	DSO
78	7	14	15400	S21 W66	239	2000	2.5	20122	S20 W68	239	(B)	3	B	50	6	DSO
78	7	15	15400	S21 W78	238	800	2.5	20122	S21 W78	236	AF	2	B	30	1	HXX

MCMATH REGION 15393 CMP DATE 10.9 RETURN OF PART OF REGION 15354 ROTATION 4

CALCIUM PLAGE DATA								SUNSPOT DATA								
YR	MO	DA	MC NO.	LAT CMD	L	AREA	INT	MW NO.	LAT CMD	L	MAG.	H	STA	AREA	CNT	CLASS
78	7	5	15393	N20 E73	219	800	1.0									
78	7	6	15393	N19 E63	216	1500	1.5									
78	7	7	15393	N20 E47	218	1200	1.0									
78	7	8	15393	N21 E33	219	1000	1.5									
78	7	9	15393	N21 E19	220	1100	1.5									
78	7	10	15393	N21 E05	221	1100	1.5									
78	7	11	15393	N21 W07	220	1100	1.5									
78	7	12	15393	N21 W19	218	1100	1.0									
78	7	13	15393	N22 W33	218	1000	1.0									
78	7	14	15393	N23 W46	219	900	1.0									
78	7	15	15393	N23 W57	217	700	1.0									
78	7	16	15393	N23 W70	217	400	1.0									

MCMATH REGION 15398 CMP DATE 11.7 RETURN OF PART OF REGION 15354 ROTATION 4

CALCIUM PLAGE DATA								SUNSPOT DATA								
YR	MO	DA	MC NO.	LAT CMD	L	AREA	INT	MW NO.	LAT CMD	L	MAG.	H	STA	AREA	CNT	CLASS
78	7	5	15398	N17 E85	207	500	1.0									
78	7	6	15398	N18 E70	209	600	1.5									
78	7	7	15398	N15 E58	207	700	1.5									
78	7	8	15398	N16 E47	205	1300	2.0									
78	7	9	15398	N17 E31	208	1000	2.0									
78	7	10	15398	N17 E16	210	900	2.0									
78	7	11	15398	N17 E03	210	700	1.5									
78	7	12	15398	N17 W10	209	700	1.5									
78	7	13	15398	N17 W23	208	600	1.5									
78	7	14	15398	N17 W35	208	600	1.5									
78	7	15	15398	N17 W46	206	500	1.0									

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MCMATH REGION 15398 (CONT) CMP DATE 11.7 RETURN OF REGION 15354 ROTATION 4

CALCIUM PLAGE DATA								SUNSPOT DATA								
YR	MO	DA	MC NO.	LAT CMD	L	AREA	INT	MW NO.	LAT CMD	L	MAG.	H	STA	AREA	CNT	CLASS
78	7	16	15398	N17 W59	206	400	1.0									

MCMATH REGION 15397 CMP DATE 12.6

CALCIUM PLAGE DATA								SUNSPOT DATA								
YR	MO	DA	MC NO.	LAT CMD	L	AREA	INT	MW NO.	LAT CMD	L	MAG.	H	STA	AREA	CNT	CLASS
78	7	6	15397	S20 E82	197	700	3.0	20118	S18 E75	202	(AP)	3				
78	7	7	15397	S20 E68	197	1200	3.5	20118	S18 E62	201	(B)	4	B	70	8	CRO
78	7	8	15397	S20 E55	197	1500	3.5	20118	S18 E50	200	(BP)	3	B	60	11	DAO
78	7	9	15397	S20 E41	198	1600	3.0	20118	S19 E36	200	(AP)	3	M	70	15	DSO
78	7	10	15397	S20 E28	198	1500	3.5	20118	S19 E23	201	(AP)	3	B	40	14	DRO
78	7	11	15397	S20 E14	199	1200	3.0	20118	S19 E10	200	(AP)	3	B	20	19	CRI
78	7	12	15397	S20 E01	198	1200	3.0	20118	S18 W04	201	(AP)	2	B	20	6	BXO
78	7	13	15397	S19 W15	200	1200	2.5		S17 W13				B	10	3	BXO
78	7	14	15397	S20 W26	199	1000	2.5	20118	S19 W29	200	(B)	3	B	10	2	AXX
78	7	15	15397	S20 W38	198	1200	3.0		S18 W40				B	10	6	BXO
78	7	16	15397	S20 W50	197	1000	2.5									
78	7	17	15397	S20 W64	197	1100	2.5									
78	7	18	15397	S21 W77	196	1200	1.0									

MCMATH REGION 15394 CMP DATE 12.9 RETURN OF REGION 15363 ROTATION 2

CALCIUM PLAGE DATA								SUNSPOT DATA								
YR	MO	DA	MC NO.	LAT CMD	L	AREA	INT	MW NO.	LAT CMD	L	MAG.	H	STA	AREA	CNT	CLASS
78	7	6	15394	N25 E84	195	600	3.0	20119	N26 E79	198	(AP)	2	B	10	1	AXX
78	7	7	15394	N26 E70	195	1000	3.0	20119	N26 E64	199	(AP)	3	B	20	2	AXX
78	7	8	15394	N27 E57	195	1100	3.0	20119	N26 E50	200	(AP)	3	B	20	3	CRO
78	7	9	15394	N27 E44	195	1100	2.0	20119	N26 E36	200	(AP)	3	M	20	3	DSO
78	7	10	15394	N27 E31	195	1100	2.5	20119	N26 E24	200	(AP)	2				
78	7	11	15394	N27 E18	195	1000	2.0									
78	7	12	15394	N27 E05	194	800	2.0									
78	7	13	15394	N27 W08	193	700	2.0									
78	7	14	15394	N27 W21	194	500	2.0									
78	7	15	15394	N27 W32	192	500	1.5									
78	7	16	15394	N27 W46	193	500	1.5									
78	7	17	15394	N27 W58	191	400	2.0									
78	7	18	15394	N27 W72	191	300	1.5									

MCMATH REGION 15401 CMP DATE 14.2 RETURN OF REGION 15356 ROTATION 5

CALCIUM PLAGE DATA								SUNSPOT DATA								
YR	MO	DA	MC NO.	LAT CMD	L	AREA	INT	MW NO.	LAT CMD	L	MAG.	H	STA	AREA	CNT	CLASS
78	7	8	15401	S30 E75	177	1500	2.5		S27 E75				B	10	4	BXO
78	7	9	15401	S30 E60	179	1400	3.0	20126	S32 E55	181	(B)	2				
78	7		15401					20127	S26 E56	180	(AP)	3	M	10	1	AXX
78	7	10	15401	S30 E47	179	1500	2.5	20127	S26 E42	182	(AP)	2	B	10	1	AXX
78	7	11	15401	S30 E35	178	1300	2.0									
78	7	12	15401	S27 E22	177	1300	2.0									
78	7	13	15401	S28 E08	177	1300	2.0									
78	7	14	15401	S28 W03	176	1200	2.0		S28 E00				B	0	1	AXX
78	7	15	15401	S28 W15	175	1200	2.0		S28 W20				B	10	2	BXO
78	7	16	15401	S28 W28	175	1100	2.0									
78	7	17	15401	S28 W42	175	800	2.0									
78	7	18	15401	S28 W55	174	900	2.0									
78	7	19	15401	S28 W70	174	800	1.5									
78	7	20	15401	S28 W81	174	500	1.5									

MCMATH REGION 15406 CMP DATE 14.4

CALCIUM PLAGE DATA								SUNSPOT DATA								
YR	MO	DA	MC NO.	LAT CMD	L	AREA	INT	MW NO.	LAT CMD	L	MAG.	H	STA	AREA	CNT	CLASS
78	7	9	15406	S12 E65	174	100	1.5									

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MCMATH REGION 15403 CMP DATE 14.9 RETURN OF PART OF REGION 1536Ø ROTATION 2

CALCIUM PLAGE DATA

YR	MO	DA	MC NO.	LAT	CMD	L	AREA	INT
78	7	8	15403	N18	E80	172	4500	3.0
78	7	9	15403	N17	E70	169	4800	4.0
78	7	10	15403	N17	E57	169	5000	4.0
78	7		15403					
78	7	11	15403	N17	E44	169	5000	4.0
78	7		15403					
78	7	12	15403	N18	E31	168	5500	4.0
78	7		15403					
78	7	13	15403	N18	E17	168	5500	3.5
78	7	14	15403	N18	E05	168	5700	3.5
78	7	15	15403	N18	W07	167	5500	3.0
78	7	16	15403	N18	W20	167	5500	3.0
78	7	17	15403	N18	W34	167	5300	3.5
78	7	18	15403	N18	W48	167	6000	3.5
78	7	19	15403	N18	W63	167	5800	3.5
78	7	20	15403	N19	W75	168	5500	3.5
78	7	21	15403	N19	W87	167	3500	2.5

SUNSPOT DATA

MW NO.	LAT	CMD	L	MAG.	H	STA	AREA	CNT	CLASS
20123	N17	E82	168	(D)	3	B	450	5	DKI
20123	N18	E68	168	(D)	5	M	760	7	DKO
20123	N18	E55	169	(D)	5	B	1080	16	EKC
20129	N25	E54	170	(AP)	3	B	10	1	AXX
20123	N18	E41	169	(D)	5	B	1330	51	EKC
20129	N24	E40	170	(AP)	3	B	10	2	AXX
20123	N18	E29	168	(D)	5	B	950	38	DKC
20129	N24	E28	169	(AP)	3	B	10	1	AXX
	N18	E16				B	1040	40	EKC
20123	N18	E02	169	(D)	5	B	900	75	EKC
20123	N17	W11	169	(D)	6	B	860	50	EKC
20123	N18	W25	169	(D)	5	B	780	36	EKC
20123	N18	W38	169	(D)	5	B	580	33	FKC
20123	N18	W50	168	(D)	5	B	630	19	EKC
20123	N18	W63	168	(D)	5	B	520	8	EKC
20123	N18	W74	167	(D)	5				
	N17	W82				M	1400	1	EKI

MCMATH REGION 15411 CMP DATE 16.0

CALCIUM PLAGE DATA

YR	MO	DA	MC NO.	LAT	CMD	L	AREA	INT
78	7	10	15411	S13	E80	146	300	2.5
78	7	11	15411	S13	E63	150	300	2.0
78	7	12	15411	S13	E50	149	300	1.5
78	7	13	15411	S13	E34	151	200	1.0
78	7	14	15411	S13	E21	152	200	1.5
78	7	15	15411	S13	E07	153	300	1.0
78	7	16	15411	S13	W03	150	300	1.0
78	7	17	15411	S13	W15	148	100	1.0

SUNSPOT DATA

MW NO.	LAT	CMD	L	MAG.	H	STA	AREA	CNT	CLASS
20130	S12	E73	151	(AP)	1				
20130	S12	E58	152	(AP)	2	B	10	1	AXX

MCMATH REGION 15410 CMP DATE 17.0 RETURN OF REGION 15370 ROTATION 2

CALCIUM PLAGE DATA

YR	MO	DA	MC NO.	LAT	CMD	L	AREA	INT
78	7	10	15410	N13	E87	139	1200	2.0
78	7	11	15410	N14	E74	139	1500	3.5
78	7	12	15410	N15	E60	139	3000	3.5
78	7	14	15410	N15	E33	140	2800	3.5
78	7	15	15410	N15	E20	140	2600	3.0
78	7	16	15410	N15	E07	140	2400	3.0
78	7		15410					
78	7	17	15410	N15	W06	139	2500	3.0
78	7		15410					
78	7	18	15410	N15	W20	139	2600	3.0
78	7		15410					
78	7	19	15410	N15	W36	140	2600	3.0
78	7		15410					
78	7	20	15410	N15	W47	140	2500	3.0
78	7	21	15410	N15	W60	140	2500	3.0
78	7	22	15410	N15	W73	139	2700	2.0
78	7	23	15410	N15	W85	137	1500	1.0

SUNSPOT DATA

MW NO.	LAT	CMD	L	MAG.	H	STA	AREA	CNT	CLASS
20131	N15	E85	139	AP	1	B	40	1	HSX
20131	N15	E69	141	(B)	2	B	30	8	DRO
20131	N15	E56	141	(AP)	3	B	100	8	DRO
20131	N15	E30	141	(AP)	4	B	80	11	CAI
20131	N15	E16	142	(AP)	4	B	50	3	DRO
20131	N16	E02	142	(AP)	4	B	40	11	DRO
20138	N11	E08	136	(BY)	3				
20131	N16	W11	142	(AP)	4	B	40	9	CSO
20138	N12	W07	138	(AP)	3	B	10	5	BXO
20131	N16	W25	143	(BY)	4	B	30	7	BXO
20138	N12	W19	137	(AF)	3	B	10	3	BXO
20131	N17	W35	140	(B)	3	B	10	4	BXO
20138	N11	W31	136	(BF)	4	B	10	2	AXX
20138	N11	W44	137	(AF)	2	B	10	3	BXO
20138	N12	W57	137	(B)	3	M	0	1	AXX

MCMATH REGION 15417 CMP DATE 17.0

CALCIUM PLAGE DATA

YR	MO	DA	MC NO.	LAT	CMD	L	AREA	INT
78	7	15	15417	N31	E18	142	100	2.0
78	7	16	15417	N31	E06	141	200	1.0

SUNSPOT DATA

MW NO.	LAT	CMD	L	MAG.	H	STA	AREA	CNT	CLASS
20136	N31	E15	143	(B)	1				

MCMATH REGION 15419 CMP DATE 18.2

CALCIUM PLAGE DATA

YR	MO	DA	MC NO.	LAT	CMD	L	AREA	INT
78	7	15	15419	N12	E36	124	200	2.5
78	7	16	15419	N12	E24	123	400	2.0
78	7	17	15419	N13	E10	123	500	2.0
78	7	18	15419	N13	W03	122	500	2.5
78	7	19	15419	N13	W18	122	500	2.5

SUNSPOT DATA

MW NO.	LAT	CMD	L	MAG.	H	STA	AREA	CNT	CLASS
20137	N12	E35	123	(B)	2	B	0	1	AXX
20137	N13	E19	125	(BP)	4	B	20	5	CRO
20137	N13	E06	125	(BP)	4	B	50	6	CRO
20137	N13	W07	125	(B)	4	B	40	6	CAO
20137	N12	W26	131	(AP)	3	B	10	3	BXO

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MCMATH REGION 15419 (CONT) CMP DATE 18.2

CALCIUM PLAGE DATA									SUNSPOT DATA								
YR	MO	DA	MC NO.	LAT CMD	L	AREA	INT	MW NO.	LAT CMD	L	MAG.	H	STA	AREA	CNT	CLASS
78	7	20	15419	N13 W29	122	400	2.5	20137	N12 W38	131	(AP)	2				
78	7	21	15419	N13 W43	123	400	2.0	20137	N12 W52	132	(AP)	2				
78	7	22	15419	N13 W56	122	300	1.0									
78	7	23	15419	N13 W70	122	200	1.0									

MCMATH REGION 15430 CMP DATE 18.3

CALCIUM PLAGE DATA									SUNSPOT DATA								
YR	MO	DA	MC NO.	LAT CMD	L	AREA	INT	MW NO.	LAT CMD	L	MAG.	H	STA	AREA	CNT	CLASS
78	7	19	15430	S39 W19	123	100	2.5	20143	S38 W17	122	(B)	2	B	0	2	BXO
78	7	20	15430	S39 W28	121	500	2.5	20143	S38 W28	121	(B)	2	B	10	6	BXO
78	7	21	15430	S39 W41	121	500	2.5	20143	S38 W43	123	(B)	2	M	30	7	BXO
78	7	22	15430	S39 W54	120	500	2.0									
78	7	23	15430	S38 W66	118	500	2.0									
78	7	24	15430	S38 W79	119	500	1.5									

MCMATH REGION 15413 CMP DATE 18.4

CALCIUM PLAGE DATA									SUNSPOT DATA								
YR	MO	DA	MC NO.	LAT CMD	L	AREA	INT	MW NO.	LAT CMD	L	MAG.	H	STA	AREA	CNT	CLASS
78	7	12	15413	S25 E80	119	600	1.0									
78	7	13	15413	S24 E65	120	500	1.5									
78	7	14	15413	S23 E52	121	500	2.5	20133	S24 E50	121	(AP)	3	B	0	1	AXX
78	7	15	15413	S23 E38	122	600	2.5	20133	S24 E37	121	(B)	4	B	70	8	DRO
78	7	16	15413	S23 E24	123	600	2.0	20133	S23 E21	123	(BP)	4	B	40	6	DSO
78	7	17	15413	S23 E12	121	700	2.0	20133	S23 E07	124	(AP)	4	B	20	2	CSO
78	7	18	15413	S23 W03	122	600	2.5	20133	S23 W06	124	(AP)	4	B	50	3	CAO
78	7	19	15413	S23 W17	121	600	2.0	20133	S24 W19	124	(AP)	4	B	40	1	HSX
78	7	20	15413	S24 W30	123	500	2.5	20133	S24 W31	124	(AP)	3	B	30	1	HSX
78	7	21	15413	S24 W43	123	500	2.0	20133	S24 W44	124	(AP)	3	M	20	1	HSX
78	7	22	15413	S24 W57	123	700	2.0	20133	S24 W57	123	(AP)	3	B	20	2	CRO
78	7	23	15413	S24 W72	124	700	1.5	20133	S23 W70	122	(AP)	2	B	10	1	HRX

MCMATH REGION 15427 CMP DATE 18.5

CALCIUM PLAGE DATA									SUNSPOT DATA								
YR	MO	DA	MC NO.	LAT CMD	L	AREA	INT	MW NO.	LAT CMD	L	MAG.	H	STA	AREA	CNT	CLASS
78	7	18	15427	N29 W01	120	100	1.5									

MCMATH REGION 15415 CMP DATE 19.7

CALCIUM PLAGE DATA									SUNSPOT DATA								
YR	MO	DA	MC NO.	LAT CMD	L	AREA	INT	MW NO.	LAT CMD	L	MAG.	H	STA	AREA	CNT	CLASS
78	7	13	15415	N15 E83	102	1800	2.5		N20 E79				B	60	2	CSO
78	7	14	15415	N15 E71	102	3000	2.5	20134	N22 E61	110	(AP)	3				
78	7		15415					20135	N19 E62	109	(AF)	3	B	30	2	CSO
78	7	15	15415	N16 E56	104	3500	3.0	20134	N21 E48	110	(AP)	2				
78	4		15415					20135	N18 E48	110	(AF)	3				
78	7	16	15415	N16 E44	103	3500	3.0	20139	N14 E38	106	(AP)	1				
78	7		15415					20135	N19 E34	110	(BF)	2	B	10	5	CRO
78	7	17	15415	N16 E31	102	3000	3.0	20139	N13 E27	104	(B)	2				
78	7		15415					20135	N19 E20	111	(B)	1	B	10	5	BXO
78	7	18	15415	N15 E16	103	2800	3.0	20135	N19 E07	111	(B)	3	B	10	6	BXO
78	7	19	15415	N15 E00	104	2800	3.0	20135	N19 W09	114	(B)	3	B	10	5	BXO
78	7	20	15415	N15 W11	104	2800	3.0	20135	N18 W20	113	(B)	3	B	660	4	DKC
78	7	21	15415	N15 W25	105	2800	3.0	20135	N18 W35	115	(B)	4	M	60	9	CRO
78	7	22	15415	N15 W39	105	3000	3.0	20145	N13 W43	109	(AP)	3	B	20	6	CRO
78	7		15415					20135	N18 W48	114	(B)	4	B	50	3	DSO
78	7	23	15415	N15 W54	106	3000	4.0	20145	N14 W56	108	(B)	2	B	50	1	DSO
78	7		15415					20135	N18 W66	118	(AP)	3				
78	7	24	15415	N16 W67	107	2700	3.0	20145	N13 W70	110	(AP)	2	B	10	3	BXO
78	7		15415					20135	N17 W77	117	(AP)	2	B	30	1	HSX
78	7	25	15415	N16 W80	107	1800	2.0									
78	7	26	15415	N15 W90	104	500	1.0									

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MCMATH REGION 15416 CMP DATE 20.2 RETURN OF PART OF REGION 15366 ROTATION 3

				CALCIUM PLAGE DATA					SUNSPOT DATA								
YR	MO	DA	MC NO.	LAT CMD	L	AREA	INT	MW NO.	LAT CMD	L	MAG.	H	STA	AREA	CNT	CLASS
78	7	13	15416	S25 E85	100	1000	1.5									
78	7	14	15416	S24 E75	98	2000	1.5									
78	7	15	15416	S24 E62	98	1800	2.5									
78	7	16	15416	S24 E48	99	2000	2.5									
78	7	17	15416	S24 E36	97	2000	2.0									
78	7	18	15416	S24 E21	98	1800	2.5									
78	7	19	15416	S24 E06	98	1800	2.0									
78	7	20	15416	S24 W05	98	1500	2.0									
78	7	21	15416	S24 W19	99	1500	2.0									
78	7	22	15416	S25 W31	97	1800	2.0									
78	7	23	15416	S25 W48	100	1800	2.0									
78	7	24	15416	S25 W61	101	1800	2.5									
78	7	25	15416	S25 W73	100	1800	3.0	20148	S24 W75	101	X	1	B	10	1	AXX

MCMATH REGION 15421 CMP DATE 21.0 RETURN OF PART OF REGION 15366

				CALCIUM PLAGE DATA					SUNSPOT DATA								
YR	MO	DA	MC NO.	LAT CMD	L	AREA	INT	MW NO.	LAT CMD	L	MAG.	H	STA	AREA	CNT	CLASS
78	7	15	15421	S19 E75	85	500	1.5									
78	7	16	15421	S18 E60	87	600	2.0									
78	7	17	15421	S18 E47	86	700	2.0									
78	7	18	15421	S18 E34	85	800	2.0									
78	7	19	15421	S18 E18	86	700	2.0									
78	7	20	15421	S18 E06	87	900	2.0									
78	7	21	15421	S18 W07	87	900	1.5									
78	7	22	15421	S18 W20	86	1000	2.0									
78	7	23	15421	S18 W36	88	1200	2.0									
78	7	24	15421	S18 W49	89	800	2.0									
78	7	25	15421	S18 W61	88	1000	1.5									
78	7	26	15421	S18 W75	89	600	1.0									

MCMATH REGION 15422 CMP DATE 22.2

				CALCIUM PLAGE DATA					SUNSPOT DATA								
YR	MO	DA	MC NO.	LAT CMD	L	AREA	INT	MW NO.	LAT CMD	L	MAG.	H	STA	AREA	CNT	CLASS
78	7	17	15422	S27 E61	72	400	2.5									
78	7	18	15422	S28 E48	71	400	2.0	20141	S27 E46	72	(B)	2	8	10	2	BXO
78	7	19	15422	S28 E33	71	400	2.0									
78	7	20	15422	S28 E23	70	400	2.0									
78	7	21	15422	S26 E08	72	400	2.0									
78	7	22	15422	S26 W06	72	300	1.5									
78	7	23	15422	S26 W20	72	300	2.0									

MCMATH REGION 15424 CMP DATE 22.3

				CALCIUM PLAGE DATA					SUNSPOT DATA								
YR	MO	DA	MC NO.	LAT CMD	L	AREA	INT	MW NO.	LAT CMD	L	MAG.	H	STA	AREA	CNT	CLASS
78	7	17	15424	N34 E62	71	100	2.0	20140	N33 E56	75	(AP)	2				
78	7	18	15424	N34 E49	70	200	1.0									
78	7	19	15424	N34 E34	70	200	1.0									
78	7	20	15424	N34 E23	70	100	1.0									
78	7	21	15424	N34 E10	70	100	1.0									
78	7	22	15424	N34 W02	68	100	1.5									
78	7	23	15424	N35 W16	68	300	1.0									

MCMATH REGION 15442 CMP DATE 22.3

				CALCIUM PLAGE DATA					SUNSPOT DATA								
YR	MO	DA	MC NO.	LAT CMD	L	AREA	INT	MW NO.	LAT CMD	L	MAG.	H	STA	AREA	CNT	CLASS
78	7	27	15442	N36 W69	69	200	2.0									
78	7	28	15442	N36 W80	69	100	1.5									

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MCMATH REGION 15420 CMP DATE 22.6 RETURN OF PART OF REGION 15368 ROTATION 4

CALCIUM PLAGE DATA								SUNSPOT DATA								
YR	MO	DA	MC NO.	LAT	CMD	L	AREA	INT	MW NO.	LAT	CMD	L	MAG.	H	STA	AREA	CNT	CLASS
78	7	16	15420	N19	E78	69	1500	2.0										
78	7	17	15420	N19	E65	68	2200	2.5										
78	7	18	15420	N19	E53	66	2000	2.5	20142	N20	E57	61	(AF)	1				
78	7	19	15420	N19	E38	66	2000	2.5										
78	7	20	15420	N19	E27	66	1600	2.0										
78	7	21	15420	N19	E14	66	1500	2.5										
78	7	22	15420	N19	E00	66	1400	2.5										
78	7	23	15420	N19	W12	64	1500	2.5		N14	W17				B	0	1	AXX
78	7	24	15420	N19	W25	65	1300	2.0										
78	7	25	15420	N19	W39	66	1500	2.0										
78	7	26	15420	N19	W54	68	1200	2.0	20150	N14	W59	72	(B)	3	R	20	2	BXO
78	7	27	15420	N19	W67	67	1200	2.0										
78	7	28	15420	N19	W78	67	1200	1.5										
78	7	29	15420	N22	W90	65	600	1.0										

MCMATH REGION 15423 CMP DATE 22.6 RETURN OF REGION 15374 ROTATION 3

CALCIUM PLAGE DATA								SUNSPOT DATA								
YR	MO	DA	MC NO.	LAT	CMD	L	AREA	INT	MW NO.	LAT	CMD	L	MAG.	H	STA	AREA	CNT	CLASS
78	7	17	15423	S16	E72	61	600	1.0										
78	7	18	15423	S17	E57	62	700	2.0										
78	7	19	15423	S16	E40	64	600	1.5		S16	E34				B	0	1	AXX
78	7	20	15423	S16	E28	65	800	1.5										
78	7	21	15423	S16	E14	66	900	2.0	20144	S15	E05	75	(AP)	2				
78	7	22	15423	S16	E00	66	800	2.0										
78	7	23	15423	S16	W13	65	900	2.0										
78	7	24	15423	S16	W26	66	800	2.0										
78	7	25	15423	S17	W39	66	700	2.0										
78	7	26	15423	S17	W53	67	800	1.5										
78	7	27	15423	S17	W65	65	800	1.5										
78	7	28	15423	S17	W77	66	800	1.5										

MCMATH REGION 15429 CMP DATE 24.8 RETURN OF REGION 15375 ROTATION 2

CALCIUM PLAGE DATA								SUNSPOT DATA								
YR	MO	DA	MC NO.	LAT	CMD	L	AREA	INT	MW NO.	LAT	CMD	L	MAG.	H	STA	AREA	CNT	CLASS
78	7	18	15429	S24	E84	35	1500	2.0										
78	7	19	15429	S23	E68	36	1900	2.5										
78	7	20	15429	S23	E58	35	1800	2.5										
78	7	21	15429	S23	E45	35	2000	2.5										
78	7	22	15429	S23	E31	35	2600	2.5										
78	7	23	15429	S23	E16	36	2400	2.5										
78	7	24	15429	S23	E03	37	1900	2.5										
78	7	25	15429	S23	W09	36	2000	2.5										
78	7	26	15429	S23	W22	36	2400	2.0										
78	7	27	15429	S23	W35	35	2200	2.0										
78	7	28	15429	S23	W47	36	2200	2.0										
78	7	29	15429	S24	W60	35	2000	2.0										
78	7	30	15429	S23	W73	35	1300	1.0										
78	7	31	15429	S24	W85	35	600	1.0										

MCMATH REGION 15428 CMP DATE 25.1 RETURN OF REGION 15373 AND 15376 ROTATION 2 AND 3

CALCIUM PLAGE DATA								SUNSPOT DATA								
YR	MO	DA	MC NO.	LAT	CMD	L	AREA	INT	MW NO.	LAT	CMD	L	MAG.	H	STA	AREA	CNT	CLASS
78	7	18	15428	N20	E80	39	2000	1.5										
78	7	19	15428	N23	E68	36	3700	2.5										
78	7	20	15428	N23	E58	35	3700	2.5										
78	7	21	15428	N23	E46	34	4000	2.5										
78	7	22	15428	N23	E34	32	4000	2.5	20146	N18	E40	26	(AF)	3	B	10	2	HRX
78	7		15428						20147	N27	E51	15	(AP)	2	B	0	1	AXX
78	7	23	15428	N23	E21	31	4000	3.0	20146	N18	E23	29	(AP)	3	B	20	6	BXO
78	7		15428							N27	E31				B	0	1	AXX
78	7	24	15428	N23	E08	32	4000	3.0	20147	N27	E27	13	(B)	3	B	20	7	BXI
78	7	25	15428	N23	W05	32	4000	3.0	20146	N18	W03	29	(B)	2	B	0	2	AXX
78	7		15428						20147	N27	E13	13	(B)	3	B	10	6	BXO
78	7	26	15428	N23	W17	31	3800	3.0										
78	7	27	15428	N23	W29	29	3800	3.0	20147	N26	W13	12	(B)	3	B	10	6	BXO
78	7	28	15428	N24	W40	29	4000	3.0	20147	N28	W23	10	(AF)	3	H	20	2	CRO
78	7	29	15428	N25	W52	27	3700	2.5	20147	N28	W35	10	(AF)	2				
78	7	30	15428	N25	W65	27	3700	2.5										
78	7	31	15428	N26	W77	27	2500	2.0										
78	8	1	15428	N30	W90		1000	1.0										

REGIONS OF SOLAR ACTIVITY

JULY 1978

MCMATH REGION 15432 CMP DATE 27.1 RETURN OF PART OF REGION 15377 ROTATION 3

				CALCIUM PLAGE DATA					SUNSPOT DATA							
YR	MO	DA	MC NO.	LAT	CMD	L	AREA	INT	MW NO.	LAT	CMD	L	MAG.	H	STA	AREA	CNT	CLASS
78	7	21	15432	S27	E75	5	200	1.0										
78	7	22	15432	S26	E62	4	200	1.0										
78	7	23	15432	S26	E46	6	200	1.5										

MCMATH REGION 15433 CMP DATE 27.9

				CALCIUM PLAGE DATA					SUNSPOT DATA							
YR	MO	DA	MC NO.	LAT	CMD	L	AREA	INT	MW NO.	LAT	CMD	L	MAG.	H	STA	AREA	CNT	CLASS
78	7	22	15433	S24	E75	352	300	1.5										
78	7	23	15433	S24	E60	353	200	1.5										
78	7	24	15433	S24	E45	356	200	2.0										
78	7	25	15433	S24	E31	357	300	2.0										
78	7	26	15433	S23	E17	358	200	1.0										

MCMATH REGION 15434 CMP DATE 29.2 RETURN OF REGION 15381 AND 15387 ROTATION 2 AND 3

				CALCIUM PLAGE DATA					SUNSPOT DATA							
YR	MO	DA	MC NO.	LAT	CMD	L	AREA	INT	MW NO.	LAT	CMD	L	MAG.	H	STA	AREA	CNT	CLASS
78	7	22	15434	N14	E85	342	400	1.0										
78	7	23	15434	N16	E69	344	600	1.5										
78	7	24	15434	N16	E59	342	600	1.5										
78	7	25	15434	N15	E48	340	700	2.0										
78	7	26	15434	N15	E34	341	700	1.5										
78	7	27	15434	N15	E21	340	700	1.5										
78	7	28	15434	N15	E09	340	700	1.5										
78	7	29	15434	N15	W05	340	700	1.5										
78	7	30	15434	N15	W18	340	700	1.5										
78	7	31	15434	N15	W30	340	800	1.5										
78	8	1	15434	N15	W43		800	1.5										
78	8	2	15434	N15	W56		800	1.5										
78	8	3	15434	N15	W70		800	1.0										

MCMATH REGION 15435 CMP DATE 29.3

				CALCIUM PLAGE DATA					SUNSPOT DATA							
YR	MO	DA	MC NO.	LAT	CMD	L	AREA	INT	MW NO.	LAT	CMD	L	MAG.	H	STA	AREA	CNT	CLASS
78	7	23	15435	S16	E78	335	300	1.5										
78	7	24	15435	S16	E64	337	200	2.0										
78	7	25	15435	S16	E50	338	500	2.0	20149	S14	E56	331	(AF)	3	B	0	1	AXX
78	7	26	15435	S16	E36	339	500	1.5										
78	7	27	15435	S16	E23	338	500	2.0										
78	7	28	15435	S16	E10	339	500	2.0										
78	7	29	15435	S16	W04	339	300	1.0										
78	7	30	15435	S16	W17	339	300	1.5										
78	7	31	15435	S16	W30	340	200	1.5										
78	8	1	15435	S16	W43		200	1.5										
78	8	2	15435	S16	W56		100	1.0										
78	8	3	15435	S16	W70		200	1.5										

MCMATH REGION 15436 CMP DATE 30.7 RETURN OF REGION 15389 ROTATION 2

				CALCIUM PLAGE DATA					SUNSPOT DATA							
YR	MO	DA	MC NO.	LAT	CMD	L	AREA	INT	MW NO.	LAT	CMD	L	MAG.	H	STA	AREA	CNT	CLASS
78	7	23	15436	S27	E85	328	300	1.0										
78	7	24	15436	S27	E80	321	700	2.5										
78	7	25	15436	S27	E66	322	1000	2.5										
78	7	26	15436	S27	E53	322	1000	2.0										
78	7	27	15436	S27	E40	321	1200	2.0										
78	7	28	15436	S26	E27	322	1200	2.0										
78	7	29	15436	S26	E15	320	900	1.5										
78	7	30	15436	S27	E02	320	900	1.5										
78	7	31	15436	S27	W10	320	900	1.5										
78	8	1	15436	S27	W24		900	1.5										
78	8	2	15436	S27	W38		900	1.5										
78	8	3	15436	S27	W53		1000	1.5										
78	8	4	15436	S27	W65		1000	1.5										
78	8	5	15436	S27	W77		300	1.0										
78	8	6	15436	S27	W82		300	1.0										

REGIONS OF SOLAR ACTIVITY

JULY 1978

MCMATH REGION 15439 CMP DATE 30.9 RETURN OF REGION 15384 ROTATION 3

				CALCIUM PLAGE DATA					SUNSPOT DATA							
YR	MO	DA	MC NO.	LAT CMD	L	AREA	INT	MW NO.	LAT CMD	L	MAG.	H	STA	AREA	CNT	CLASS
78	7	24	15439	S18 E85	316	600	1.5									
78	7	25	15439	S18 E70	318	400	1.5									
78	7	26	15439	S18 E56	319	600	2.0									
78	7	27	15439	S17 E43	318	900	2.0									
78	7	28	15439	S17 E31	318	1000	2.0									
78	7	29	15439	S17 E17	318	900	2.0									
78	7	30	15439	S17 E05	317	800	1.5									
78	7	31	15439	S17 W09	319	700	1.5									
78	8	1	15439	S17 W22		600	1.5									
78	8	2	15439	S17 W35		600	1.5									
78	8	3	15439	S17 W49		600	1.5									
78	8	4	15439	S17 W62		600	1.5									
78	8	5	15439	S17 W73		400	1.0									

MCMATH REGION 15448 CMP DATE 31.3

				CALCIUM PLAGE DATA					SUNSPOT DATA							
YR	MO	DA	MC NO.	LAT CMD	L	AREA	INT	MW NO.	LAT CMD	L	MAG.	H	STA	AREA	CNT	CLASS
78	8	2	15448	N27 W28		300	2.0									
78	8	3	15448	N27 W43		700	2.0	20155	N24 W44		(AP)	7				
78	8	4	15448	N27 W54		700	2.0	20155	N25 W55		(B)	2				
78	8	5	15448	N27 W66		500	2.0	20155	N25 W70							
78	8	6	15448	N27 W80		400	1.5									

MCMATH REGION 15440 CMP DATE 31.4 RETURN OF REGION 15390 ROTATION 2

				CALCIUM PLAGE DATA					SUNSPOT DATA							
YR	MO	DA	MC NO.	LAT CMD	L	AREA	INT	MW NO.	LAT CMD	L	MAG.	H	STA	AREA	CNT	CLASS
78	7	24	15440	N21 E88	313	200	1.0									
78	7	25	15440	N22 E77	311	600	1.5									
78	7	26	15440	N23 E62	313	500	1.5									
78	7	27	15440	N24 E51	310	300	1.0									

Note: No calcium spectroheliograms were secured at the McMath-Hulbert Observatory on July 1, 2, 3, and 4, 1978.
No sunspot observations were made at Mt. Wilson on July 13, 1978.

DAILY CALCIUM PLAGE INDEX

JULY 1978

YR	MO	DAY	INDEX	YR	MO	DAY	INDEX	YR	MO	DAY	INDEX
78	7	1	*	78	7	11	32.6	78	7	21	32.1
78	7	2	*	78	7	12	39.3	78	7	22	32.1
78	7	3	*	78	7	13	37.0	78	7	23	33.4
78	7	4	*	78	7	14	38.8	78	7	24	25.8
78	7	5	26.7	78	7	15	38.2	78	7	25	24.3
78	7	6	23.4	78	7	16	38.9	78	7	26	19.8
78	7	7	20.8	78	7	17	40.3	78	7	27	18.8
78	7	8	25.3	78	7	18	41.5	78	7	28	18.6
78	7	9	25.6	78	7	19	39.2	78	7	29	15.6
78	7	10	32.2	78	7	20	35.0	78	7	30	14.0
								78	7	31	14.3

* NO OBSERVATIONS

SUDDEN IONOSPHERIC DISTURBANCES

JULY 1978

DAY	UNIVERSAL TIME START	END	MAX	IMP	WIDE SPREAD INDEX	NUMBER OF STATION REPORTS BY TYPE SWF	SCNA	SEA	SPA	LF-SPA	SES	SFD	KNOWN FLARE	McMATH REGION
01	0304	0401	0307	1-	1				1				0304	15376
01	0525	0705	0542	1-	1				1				0532	X-RAY
01	1036	1055	1045	1-	1			1	1				1033	X-RAY
01	1341	1450	1353	2-	5	3	1	6	3		14		1330	X-RAY
01	1450	1703	1506	1	5	1		1	1		10		NF	
02	0130	0222	0150	1-	1				1				0219	X-RAY
02	0843U	0905	0849	1-	1			1					*	
02	1404	1552	1417	2	5	5	2	4	2		16		1400	X-RAY
02	2028	2148D	2046	1-	3				1		3		2024	X-RAY
02	2148	2230	2154	1-	3				1		1		2146E	X-RAY
02	2250	2330	2255	1-	1			1					2251	X-RAY
03	0037	0114	0043	1-	1				1				0034	X-RAY
03	0616	0732	0642	1-	1				1				0612	X-RAY
04	0005	0110	0008	1-	1				1				0005	X-RAY
04	0912	1042	0949	1-	1				1				*	
04	0942	1030	0951	1+	3	2		3	1		1		*	
04	2045	2123	2048	1-	1				1				*	
05	1139	1410	1216	2	5	3	1	1	2		2		1139	15389
05	1749	2035	1805	1-	3						4		1748	15389
06	1207	1321	1216	1	5	2		3	3		2		1206	15389
06	1441	1500	1450	1-	1			1					1439	15391
06	1511	1612	1517	2	3	5	2	6	3	1	12		1510	15389
06	2027	2115	2035	1-	3						2		2028	15389
07	0152	0258	0159	1-	1				1				0151	15389
07	0401	0530D	0415	1-	1				1				0400	15389
07	0533	0640	0547	2	5	4		5	3		3		0528	X-RAY
07	0757E	0929D	0810	1-	1				1				0756	X-RAY
07	0933	1149	0949	3-	5	4		4	4		2		0928	X-RAY
07	1211	1348	1219	2-	5	3	1	4	4		10		1211	15397
07	1442	1556	1450	1	5	5		2	3		15		1437	15389
07	1641	1715	1644	1-	5			1			11		1656	15397
07	1758	2000	1812	1+	5	2	1	1	2	1	13		1802	15389
08	1946	2052	1958	2+	5	3			2	1	11		1947E	15403
09	0059	0130	0105	1-	1				1				0059	X-RAY
09	0506E	0543D	0510	1-	1				1				0506	X-RAY
09	0712	0732	0717	1	5	3		5	4		3		0707	X-RAY
09	0850	0935	0857	1	5			4	3		2		0848	X-RAY
09	1010	1125	1016	1	5	3		5	4		4		1007	X-RAY
09	1136	1157D	1157	1	5	2		2	2		1		1133E	15403
09	1209	1400	1240	2	5	2	1	3	4		9		1211	X-RAY
09	1239	1250D	1250	2	5	1			1		8		NF	
09	1424	1543	1436	1+	5	1		2	2		9		NF	
09	1649	1739	1654	1	5	4	1	2	3		11		1640E	15403
09	1736	1803	1742	1-	5	1			1		8		1737	15397
09	1818	2118D	1832	2+	5	6	1	5	4		15		1811E	15403
09	2223E	2307D	2233	1-	5				1		5		2223	X-RAY
09	2308	0012D	2313	1-	5	1			1		6		2301	15403
10	0011	0056	0019	1-	1				1				0012	X-RAY
10	0135	0446D	0147	3-	5	1		1	1		3		0137	15403
10	0232	0308D	0242	1-	3	1		1			1		0225	15409
10	0308	0344	0319	1	3	1		1			1		0307	X-RAY
10	0350	0418	0400	1-	1	1							*	
10	0520	0606D	0530	1-	3			1	1				0520	X-RAY
10	0605	0805	0625	3	5	4	1	6	2		3		0606	15390
10	0924	0945	0928	1+	3	2		1	1		2		0922	X-RAY
10	1315	1446	1332	2-	5	6	1	5	3		12		1312	15403
10	1550	1610	1554	1-	3			1	2		1		1550	15403
10	1705	1715D	1715	1+	5	6	2	5	4		12		1700	15403
10	1728	1915	1735	2-	5	4		1	4	1	8		1729E	15403
10	1830U	2028D	1920	1	1						1		1826	15403
10	1914	2006	1924	1+	5	2	1		3	1	10		1913E	15403
10	2029E	2133D	2051	1	5	3	1		2	1	7		2028	15403
10	2133E	2247D	2143	1-	5				1		6		2136	15403
10	2246	2350	2251	1-	5	1			1		3		2246	15403
10	2353E	0034	0008	1-	1				1				2358	15397

SUDDEN IONOSPHERIC DISTURBANCES

JULY 1978

DAY	UNIVERSAL TIME START	END	MAX	IMP	WIDE SPREAD INDEX	NUMBER OF STATION REPORTS BY TYPE SWF	SCNA	SEA	SPA	LF-SPA	SES	SFD	KNOWN FLARE	McMATH REGION
11	0053	0246	0106	2	5	2		1	1		3		0054	15403
11	0338	0825	0546	2	1				1				0335	X-RAY
11	0400	0425	0403	1	5	1		1			2		0359E	15403
11	0428	0530	0442	2	5	4		4	1		2		0421	X-RAY
11	0540	0630	0549	2	5	4		6	3		3		0539	X-RAY
11	0705	0730	0712	1-	5	1		2	2				0705E	15403
11	0931	1117	0942	2-	5	3		4	3		1		0935	15403
11	1049	1320	1056	3	5	3	2	5	2		10		1049	15403
11	1455	1523	1510	1-	1			1	1				1455E	15403
11	1539	1610	1553	1-	5	1			2		7		1529	15403
11	1615	1630	1619	1-	5			1	2		5		1613	15403
11	1649	1805	1655	1-	5	3		3	4	1	15		1645	15403
11	2022	2156	2039	1	5	1	1	1	2	1	15		2017	15403
11	2227	2400	2232	2+	5	3		1	1		13		2228	15392
12	0012E	0110D	0022	1-	5	1		1	1		2		0012	15403
12	0110	0154	0117	1-	5			1	1		2		0110	15403
12	0240	0424	0301	2+	5	1		1	1		2		0249E	15403
12	0520	0624	0528	1-	1				1				0521	15403
12	0555E	0646	0600	1-	1				1				0556E	15410
12	0810	0835	0817	1-	5			1	2		1		0810	15403
12	0903E	0953	0910	2	5	3	1	4	3		1		0905	15403
12	0921	0935	0925	1-	1			1	1				0922	15403
12	1013	1130	1024	2	5	3		4	4		3		1013	15403
12	1321	1426	1334	1	5	3		2	3		12		1319	15403
12	1354	1450	1400	1	5	2		1	2		12		1354E	15409
12	1535	1540D	1540	1-	1		1						1530	15403
12	1601	1655	1616	1+	5	6	1	3	3	1	16		1555	15403
12	1737	1747D	1747	1-	3						5		1739	15409
12	1800	1830	1805	1-	5	1					9		1759	15403
12	2052	2236	2100	2	5	4	1	1	2	1	11		2049	15403
13	0222	0305	0235	1-	1				1				0225E	15415
13	0320E	0354	0326	1-	1				1				0320	15403
13	0444	0525	0455	1-	1				1				0445	15409
13	0531E	0601	0541	1-	1				1				0540	15403
13	0624E	0643	0627	1-	1				1				0625	15403
13	0736	0814	0749	1-	1				1				0742	15403
13	0833	0845	0837	1-	3	1		1	2		1		0829	15409
13	1016	1025	1020	1-	1			1	1				1018	15403
13	1458	1507	1503	1-	1			1	1				1456	X-RAY
13	1820	1856	1824	1-	1			1					*	
13	2308	2347	2315	1-	1				1				2300	15403
14	0521	0600	0532	1-	1				1				0527	15403
14	1100	1305	1110	1-	5			1	4		2		1100	15403
14	1134	1150	1139	1-	1			1	1				1133	15415
14	1626	1717	1638	1-	5	1	1	1	1		10		1625E	15403
15	0053	0252	0100	2	5	2		1	1		4		0053E	15403
15	0405	0522	0415	1-	1				1				0405E	15403
15	1425	1602	1438	1+	5	6		5	3	1	12		1425	15403
15	1520	1606	1523	1-	3						5		1516	X-RAY
15	1950	2030	1955	1-	5						8		1950	15403
17	0154	0235	0202	1-	1				1				0156	15403
17	0246	0324	0253	1-	1				1				0246E	15403
17	0936	1001	0942	1	1			1					0939	15397
17	1403	1525	1438	1-	5			3	2		8		1350	15403
17	1430	1515	1435	1-	5			1	2		7		1425	15403
17	1843	1902	1847	1	1	1							1839	15410
17	2130	2244	2144	1-	5	1	1	1	2	1	13		2133	15403
18	0019	0114	0026	1	3	1			1		2		0018	15403
18	0855	0955	0906	2	5	3		5	3		2		0845	15403
18	1307	1345	1315	1-	5	1		1	3		8		1306	15403
18	1538	1555	1542	1-	5			1	1		7		1534	15415
18	1722	1915	1732	1	5	3	1	3	4	1	11		1719	15403
18	1947	2247	2024	3	5	3	1	1	1		12		1948E	15403
18	2018	2200	2024	1-	5						5		NF	
19	0511	0627	0520	1-	1				1				0513E	15403
19	0938	1053	1007	1	3			2					0945	15410
19	1321	1430	1341	1	3	1			1		1		1321	15403

SUDDEN IONOSPHERIC DISTURBANCES

JULY 1978

DAY	UNIVERSAL TIME START	END	MAX	IMP	WIDE SPREAD INDEX	NUMBER OF STATION REPORTS BY TYPE SWF	SCNA	SEA	SPA	LF-SPA	SES	SFD	KNOWN FLARE	McMATH REGION
20	0010	0154	0022	2	5	2			1		2		0006E	15403
20	0316	0346	0322	1-	3				1		1		0313	X-RAY
20	0551	0647	0556	1-	3				1		1		0550	X-RAY
20	1515	1605	1524	1-	5	1		1	1		7		1510E	15403
20	1610	1640	1615	1-	5	4		2	3	1	15		1606	15403
20	1702	1723	1709	1-	5						5		1705E	15410
20	1859	1925	1904	1-	3						3		1854	X-RAY
20	2122	2218	2138	1-	1				1				2126	X-RAY
21	0111	0150	0124	1-	3	1			1				0109	X-RAY
21	0431	0607D	0454	1+	1				1				0428	X-RAY
21	0449	0600	0455	1-	3	1			1				0451E	15403
21	0607E	0648	0612	1-	1				1				0604	15403
21	0829	0914	0832	1-	3			1	1				0824	X-RAY
21	1044	1108	1150	1-	5			1	2		2		1041	X-RAY
21	1114	1147	1131	1-	5	1		1	2		1		1117	X-RAY
21	1125	1223	1137	1-	1				1		1		1123	15403
21	1150	1225	1158	1-	5	2		1	2		3		1146	X-RAY
21	1300	1345	1326	1-	1				1		1		1258	X-RAY
21	1519	1537	1526	1-	5	1		2	2		9		1507	15410
21	1541	1635	1556	1	5	6	1	3	3	1	15		1538	X-RAY
21	1826	2130	1909	1	5	1			1		5		1822	X-RAY
21	1853	2100	1908	2	5	3	1	2	3	1	12		1843	15410
22	1259	1450	1338	1	5	2		3	3		11		1250	X-RAY
22	1315	1520	1335	2	5			1	2		5		NF	
23	0502	0545	0520	1-	1				1				0511	X-RAY
23	1635	1930	1708	1+	5	3		1	3		10		1639	X-RAY
23	2008	2050	2011	1-	1	1							*	
29	1040	1140	1110	1-	1				1		1		1045E	15443

PERIODS OF NO OBSERVATIONS:

DATE	TIME (UT) and STATION
01	0000-2400 A3
03-06	0000-2400 A3
03	1658-1810 TM
05	2146-2200 TM
08-09	0000-2400 A1
10	0000-2400 A3
11	0000-2400 TN, 0000-2400 A1, 1011-1332 UM (16 kHz)
12	0000-2400 TN, 0000-2400 A3
13	0000-2400 A3
15-16	0000-2400 A3
18	1010-1340 UM (16 kHz)
20	1047-1412 TM
21	0752-0807 Um (16 kHz)
22-31	0000-2400 A3
25	0000-2400 TN, 1003-1338 UM (16 kHz)

STATIONS REPORTING FOR JULY 1978

AAVSO (A1, A3, A5, A19, A21, A26, A28, A31, A34, A37, A40, A45, A46) (SES) (A1, A31) (SEA (A31) (SWF)
CHILWORTH (CL) (SCNA
DARMSTADT (DA) (SWF)
HIRAISO (HI) (SWF)
HOBART (TA) (SEA, SES)
HUANCAYO (HU) (SWF)
INUBO (IN) (SPA)
JULIUSHUH (JH) (SWF)
KUHLUNGSBORN (KU) (SEA, SPA)
MCMATH (MC) (SWF, SCNA)
NEW JERSEY (NJ) (SES)
PANSKA VES (PU) (SWF, SEA, SES)
PRESTON (LO) (SEA)
SAO PAULO (UM) (SES, SPA)
SOFIA (SF) (SES)
ST CLOUD (SC) (SES)
TABLE MOUNTAIN (TM) (SPA, LF-SPA)
TORINO (TN) (SPA)
UPICE (UI) (SEA)
VSETIN (VS) (SEA)

SIDs BY McMATH REGION
JULY 1978

DAY	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
REGION																															
15376	1																														
15389					2	3	4																								
15390										1																					
15391						1																									
15392											1																				
15397							2		1	1							1														
15403								1	4	10	10	13	6	3	4		5	5	2	3	3										
15409										1		2	2																		
15410												1					1		1	1	2										
15415													1	1				1													
15443																													1		
X-RAY	3	5	2	1			3		7	4	3		1		1					4	9	1	2								
UNKNOWN	1								2	1								1				1									
NO FP		1		3									1										1								

SOLAR RADIO EMISSION
SPECTRAL OBSERVATIONS

JULY 1978

JUL 1978	TIMES OF OBSERVATION START UT	TIMES OF OBSERVATION END UT	STATION	EVENTS DECIMETRIC BAND START UT	DECIMETRIC BAND END UT	DECIMETRIC BAND INT	METRIC BAND START UT	METRIC BAND END UT	METRIC BAND INT	DEKAMETRIC BAND START UT	DEKAMETRIC BAND END UT	DEKAMETRIC BAND INT	SPECTRAL TYPE
01	0000	0738	MANI										
	0000	0718	CULG				0210.5						IIIB,W
			CULG				0212						IIIB,W
			CULG	0227	0315	1							IS
			CULG	0303	0304.5	1							IIIG
			CULG				0336.5	0344					IIIGG,W
			CULG				0338	0342	1				IIIG,V
			CULG				0357	0358.5					IIIG,W
			CULG				0409						IIIB,W
			CULG				0509.5	0512	1				IIIGG
	0409	1842	WEIS				0509.8	0511.6	2				IIIG
			WEIS				0529.5	0529.7	1				IIIG
			CULG				0529.5	0530	1				IIIG
			WEIS				0604.2	0604.5	1				IIIG
	0430	1821	DURN	0604.4	0604.7	1	0604.4	0604.7	1				IIIG
			CULG	0604	0605	1							IIIG
			WEIS				0637.3	0640.7	3				IIIGG,RS
			CULG				0637.5	0642	3				IIIGG,V,UN
			CULG	0637.5	0639	1							RD
			DURN				0637.5	0640.5	3				IIIGG,V
			CULG	0639.5	0640.5	1							FAST DRIFT
			WEIS				0658.3	0658.4	1				IIIB
	0854	0945	MANI										
			WEIS				0933.8	0938.5	1				IIIG
			DURN				1048.0	1048.0	1				III
			WEIS				1532.2	1533.2	1				IIIG
			WEIS				1537.9	1538.1	1				IIIB
			WEIS				1618.3	1622.7	1				IIIG
			WEIS				1746.6	1746.7	1				IIIB
			WEIS				1801.8	1802.0	1				IIIG
			DURN				1802.0	1802.3	2				IIIG
	0914	2420	SGMR				1856.4	1857.7	1				IIIG
	2128	2400	MANI										
	2100	2400	CULG	2229	2340.5	1							IN
			CULG				2250.5	2252					IIIG,W
02	0000	0950	MANI										
	0000	0703	CULG	0145	0235.5								IS,W
			CULG				0149	0151.5	1				IIIG,U
			CULG				0216						IIIB,W
			CULG				0217.5	0218.5					IIIG,W
			CULG				0457	0507					IIIN,W
			CULG				0616	0643.5					IIIN,W
	0410	0740	WEIS				0618.6	0619.6	2				IIIG
			CULG				0618	0620	1				IIIG,U
			CULG				0630.5	0640.5	1				IS
			WEIS				0631.2	0631.4	1				IIIG
			CULG				0631	0631.5	1				IIIG
			WEIS				0634.7	0635.2	1				IIIG
			CULG				0635	0643	1				IIIG
			WEIS				0637.1	0637.3	1				IIIG
	0809	1842	WEIS				0957.1	0957.4	1				IIIG
	0429		DURN	1128.5	1129.5	1							IIIG
			DURN	1320	1755 D	1							I
			WEIS				1402.8	1422.6	3				IIIGG/V
	0914	2420	SGMR				1403.8	1414.0	3				IV
			SGMR				1414.0	2250.0	1				CONT
			WEIS				1457.6	1503.0	3				IIIG/V
			WEIS				1523.6	1523.7	1				IIIB
			WEIS				1611.9	1612.3	2				IIIG
	2058	2400	CULG	2147.5	2149.5	1							FAST DRIFT
	2219	2400	MANI										
			CULG				2232		1				IIIB
			CULG				2309	2400					IIIN,W
03	0000	0703	CULG	0003.5	0004	1							IIIG
			CULG				0026.5	0027.5	1				IIIG,U
			CULG				0028		1				IIIB,U
			CULG				0033	0044					IIIN,W
			CULG				0036	0039	2	0037	0038.5	2	IIIGG,V,SL

SOLAR RADIO EMISSION
SPECTRAL OBSERVATIONS

JULY 1978

JUL 1978	TIMES OF OBSERVATION		STATION	EVENTS									SPECTRAL TYPE
				DECIMETRIC BAND			METRIC BAND			DEKAMETRIC BAND			
	START UT	END UT		START UT	END UT	INT	START UT	END UT	INT	START UT	END UT	INT	
03	0000	0958	MANI							0037.0	0037.6	1	III
			CULG				0310	0657					IIIN,W
			CULG	0342.5	0343	1	0342.5	0343.5	2				IIIG,U
	0410	1320	WEIS				0446.3	0446.4	1				IIIB
			WEIS				0507.3	0507.6	2				IIIG
			CULG				0507.5	0508	2				IIIG,U
			WEIS				0613.5	0617.8	3				IIIGG/V
			CULG				0613	0618	2				IIIGG,REVE
	0430	1821	DURN	0620.0	0624	1	0620.0	0624	1				DCIM
			CULG	0620.5	0624	1	0619.5	0626.5	1				IIIGG
			CULG	0620.5	0624	1	0614.5	0641	1				IV
			WEIS				0620.5	0630.0	1				IIH B
			WEIS				0620.6	0631.0	2				IIIG
			CULG				0624.5	0641	2				II
			WEIS				0635.8	0641.5	1				II
			WEIS				0635.9	0641.5	2				IIIG
			CULG				0636	0641	1				IIIGG
			WEIS				0656.7	0656.8	1				IIIB
	0915	2420	SGMR										
	1408	1842	WEIS										
	2058	2400	CULG										
	2200	2400	MANI										
04	0000	0950	MANI										
	0000	0703	CULG										
			CULG	0227									IIIB,W
	0431	1820	DURN										
	0412	1842	WEIS				1452.7	1452.9	2				IIIB
	0915	2419	SGMR				1453.1	1453.4	1				III
			WEIS				1603.7	1604.4	1				IIIG
	2058	2400	CULG				2225.5	2227	2				IIIG,U
			CULG				2335	2339.5					IIIG,W,U
			CULG				2339.5		1				UNCLF
			CULG				2341	2341.5	1				IIIG,RS
			CULG				2346.5	2400	2	2349.5	2352	2	II, HB
	2152	2400	MANI							2346.5	2351.2	1	IIIG
05	0000	0950	MANI										
	0000	0703	CULG				0000	0003.5					II
			CULG				0011						IIIB,W
			CULG				0014	0015					IIIG,W
			CULG				0144						IIIB,W
	0411	0525	WEIS										
			CULG	0552	0630								IN,W
	0916	2419	SGMR				1154.7	1155.0	1				V
	0431	1818	DURN	1154	1205	2	1154	1205	2				DCIM,II
			SGMR				1200.5	1545.0	1				CONT
			DURN	1259.8	1301	1							DCIM
	0743	1842	WEIS				1530.2	1530.6	2				IIIG
			DURN	1530.6	1530.7	2	1530.6	1530.7	3				IIIG
			SGMR				1530.7	1531.0	3				III
			WEIS				1555.2	1555.5	2				IIIB
			SGMR				1807.5	1815.2	1				II
			SGMR				1808.0	2020.0	1				CONT
	2058	2400	CULG				2059	2400					IIIN,W
			CULG				2127.5	2131.5					POSSII,W
			CULG				2150	2151	1				UNCLF
	2150	2400	MANI										
			CULG				2220.5		1				IIIB
			CULG				2227	2228	2				IIIG,V,SLO
			CULG				2232		1				IIIB
			CULG				2233		1				IIIB
			CULG				2352.5	2354	1				IIIG
06	0000	0710	CULG				0051	0052					IIIG,W
			CULG				0109	0110.5	1	0109	0109.5	1	IIIGG
			CULG				0111	0111.5	1	0111	0111.5	1	IIIG
	0000	0945	MANI							0112.0	0112.2	1	III
			CULG	0112		1	0112	0112.5	2	0112	0112.5	2	IIIB
			CULG	0113.5	0114	2	0113.5	0114	1	0114	0114.5	1	IIIG

SOLAR RADIO EMISSION
SPECTRAL OBSERVATIONS

JULY 1978

JUL 1978	TIMES OF OBSERVATION START UT	TIMES OF OBSERVATION END UT	STATION	EVENTS DECIMETRIC BAND START UT	DECIMETRIC BAND END UT	DECIMETRIC BAND INT	METRIC BAND START UT	METRIC BAND END UT	METRIC BAND INT	DEKAMETRIC BAND START UT	DEKAMETRIC BAND END UT	DEKAMETRIC BAND INT	SPECTRAL TYPE
06			CULG				0117.5	0118.5	2				IIIG
			CULG				0150.5	0151		0150.5			IIIG,W
			CULG				0402	0710					IS,W
			CULG				0403	0710					IIIN,W
	0413	1330	WEIS										
			CULG				0603	0604.5	1				UNCLF
	1442	1548	WEIS				1511.7	1512.3	2				IIIG
	0432	1802	DURN	1511.8	1512.3	2	1511.8	1512.3	2				III,V
	0917	2419	SGMR				1512.1	1515.0	3				V
			WEIS				1528.9	1536.5	3				V
			DURN	1529.0	1534.0	2	1529.0	1535.0	3				IC,II
			SGMR				1529.9	1542.4	3			IV	
			WEIS				1535.5	1547.5	3				IIIGG
			SGMR				1542.4	1712.0	1				CONT
			WEIS				1542.7	1557.0	2			II	
	1551	1841	WEIS										
	2037	2400	CULG				2057	2059.5	2				UNCLF
			SGMR				2058.2	2111.0	3				IIIG
			CULG				2109	2357					IIIN,W
			CULG				2133.5	2134	1				IIIG
			CULG				2135	2136	1				IIIG
	2150	2400	MANI										
			CULG				2158		1				IIIB
			CULG				2205.5		2				IIIB
			CULG				2300.5	2309	2				IIIGG
07	0000	0736	CULG				0021.5	0023.5	2	0022		1	IIIG
			CULG				0135	0454					IIIN,W
	0000	0715	MANI							0153.2	0153.5	1	III
			CULG				0153	0153.5	3	0153	0153.5	1	IIIB,V
			CULG				0156.5	0157	1				IIIG
			CULG	0228		1							IIIB
			CULG				0410	0410.5	2				IIIG
			CULG	0533.5	0536	2	0533.5	0545	1			II,	HB
	0413	1841	WEIS				0533.6	0544.0	2			II	
			CULG				0534	0633					IIIS,W
			CULG							0535	0555	1	S.W.F.
			WEIS				0536.7	0541.0	3				IIIGG,RS
			MANI							0537.8-	0540.9	1	IIIG
			CULG				0537	0549	1			IV	
			CULG	0539.5	0541.5	2							FAST DRIFT
			WEIS				0546.9	0551.7	2				IIIG
			CULG				0547	0547.5	2				IIIG
			CULG				0549	0556	2			IV	
			CULG				0556	0645	1			IV	
			WEIS				0629.0	0630.1	1				IIIG
			WEIS				0725.7	0727.0	1				IIIB
			WEIS				0933.4	0939.5	3				IIIGG/V
	0614	1820	DURN	0933.8	0935.3	1	0933.8	0935.3	2				IIIG
	0917	2419	SGMR				0934.0	0936.3	3				V
			WEIS				0938.0	0950.0	2			IV	
			DURN	0938.7	0946.0	3	0938.7	0950.0	3				IC,DCIM
			WEIS				1014.3	1015.8	2				IIIG
			WEIS				1117.3	1119.5	1				IIIG
			SGMR				1812.0	1945.0	1				CONT
	2037	2400	CULG				2104	2213	1				IS,C
	2150	2400	MANI										
			CULG				2204	2339					IIIN,W
			CULG				2213	2400	1				IS
			CULG				2301	2301.5	1				IIIG
			CULG	2305.5	2306	1	2305.5	2307	2				IIIG,V
			CULG				2309.5	2310.5					IIIG,W
08	0000	0737	CULG				0000	0128.5	1				IS
	0000	1001	MANI										
			CULG				0026	0705					IIIN,W
			CULG	0045.5	0047.5		0045.5	0046.5					IIIG,W
			CULG				0057		1	0057		1	IIIB
			CULG				0118.5		1				IIIB
			CULG				0128	0224	2				IS

SOLAR RADIO EMISSION
SPECTRAL OBSERVATIONS

JULY 1978

JUL 1978	TIMES OF OBSERVATION START UT	TIMES OF OBSERVATION END UT	STATION	EVENTS DECIMETRIC BAND START UT	DECIMETRIC BAND END UT	DECIMETRIC BAND INT	METRIC BAND START UT	METRIC BAND END UT	METRIC BAND INT	DEKAMETRIC BAND START UT	DEKAMETRIC BAND END UT	DEKAMETRIC BAND INT	SPECTRAL TYPE
08			CULG	0217.5	0218	1	0217.5	0218	2				IIIG
			CULG				0224	0712	1				IS
			CULG	0231	0251	1							IS
			CULG				0253.5	0254	2	0253.5	0254	1	IIIB
			CULG	0301	0303	2	0301	0303	2				IIIG,U
			CULG	0303	0306	1	0306		1				IIIG
			CULG				0305	0705	1				IIIN
			CULG	0330	0710								IN,W
			CULG	0428.5	0429.5	1							IIIG
			DURN	0443.8	0443.8	2	0443.8	0443.8	2				III
	0433	1817	DURN	0443	1817 D	1	0443	1817 D	1				IC,DC
			DURN	0451.3	0451.3	1							III
	0506	1840	WEIS				0541.8	0542.9	1				IIIB
			DURN				0542.2	0542.2	3				III
			WEIS				0544.8	0546.1	2				IIIB
			DURN	1241.1	1241.2	3	1241.1	1241.2	3				IIIG
			WEIS				1448.2	1449.3	1				IIIB
			WEIS				1619.7	1620.4	2				IIIG
			WEIS				1652.2	1652.8	2				IIIG
			WEIS				1747.0	1824.0	2				IS
	0918	2418	SGMR				1835.5	1859.4	2				IIIG
			SGMR				1954.2	1957.1	3				V
			SGMR				1958.0	2019.0	2				IIIG
			SGMR				2019.0	2230.0	1				CONT
	2037	2400	CULG				2101	2159					IIIN,W
			CULG	2106.5	2234.5	1	2110	2325	1				IS,DC
			CULG				2106	2241	1				IV
			CULG				2106	2111	1				POSSIBLEII
			CULG				2159	2215	1				IIIS
			CULG				2215	2400					IIIS,W
			CULG	2234.5	2400	1							IS
	2150	2400	MANI							2313.4	2313.6	1	III
			CULG				2325	2400	2				IS,DC
09	0000	0737	CULG	0000	0030	1	0000	0304	2				IS,DC
			CULG				0000	0610					IIIN,W
			CULG	0030	0115	1							IS
			CULG	0115	0620	1							IN
			CULG				0138.5	0155.5	1				IIIGG
	0000	0948	MANI							0145.9	0148.4	1	IIIG
			CULG	0148	0150	1	0144.5	0150	3	0145	0150	2	IIIGG
			CULG				0427.5	0430					IIIGG,W
			CULG	0432.5	0434.5								IIIG,W
			CULG				0432	0434	1				IIIG
			CULG	0433.5		2							IIIG
			DURN				0433.6	0433.7	2				IIIG
	0433	1820	DURN	0433 E	1820 D	1	0433 E	1820 D	1				IC,DC
			CULG				0442	0446.5	2	0442	0446	2	IIIGG
			MANI							0500.5	0500.6	1	III
			CULG	0508.5		1	0508.5	0509.5	2				IIIG
			MANI							0508.9	0509.0	1	III
	0517	1102	WEIS				0521.4	0522.1	2				IIIG
			CULG				0521.5	0522.5	3				IIIG,V,U
			MANI							0522.0	0522.2	1	III
			WEIS				0542.1	0542.3	1				IIIG
			WEIS				0548.0	0548.4	2				IIIG
			MANI							0548.8	0549.0	1	III
			CULG	0548	0548.5								IIIG,W
			CULG				0548	0548.5	2				IIIG
			WEIS				0552.6	0554.2	3				IIIG
			CULG	0553		1	0553	0554.5	1				IIIG
			CULG	0611									IIIB,W
			DURN	0612.6	0612.6	2							IIIG
			CULG				0619	0713					IIIS,W
			CULG	0620	0713	1							IS
			WEIS				0633.5	0637.3	1				IIIG
			WEIS				0659.3	0659.4	1				IIIB
			WEIS				0704.8	0719.3	3				IIIGG
			CULG				0705	0714	1				IIIGG
			DURN	0707.1	0717.1	2	0707.1	0717.1	3				IIIGG

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JUL 1978	TIMES OF OBSERVATION START UT	TIMES OF OBSERVATION END UT	STATION	EVENTS DECIMETRIC BAND START UT	DECIMETRIC BAND END UT	DECIMETRIC BAND INT	METRIC BAND START UT	METRIC BAND END UT	METRIC BAND INT	DEKAMETRIC BAND START UT	DEKAMETRIC BAND END UT	DEKAMETRIC BAND INT	SPECTRAL TYPE
09			CULG	0707		2	0707		2				IIIB
			MANI							0712.6	0713.3	1	III
			CULG	0712	0713	2	0712	0713.5	2				IIIG,V
			WEIS				0719.6	0726.0	2				II
			WEIS				0915.1	0920.8	3				IIIGG
			DURN				0915.9	0920.3	2				IIIG
			WEIS				1008.3	1019.5	3				IIIGG
	0919	2418	SGMR				1008.9	1020.2	1				IIIG
			DURN	1009.4	1013.4	2	1009.4	1013.4	2				IIIG
			WEIS				1015.0	1021.0	3				II
			WEIS				1023.6	1023.9	2				IIIG
			DURN				1115.6	1115.6	3				IIIG
			WEIS				1140.8	1900.0	2				IS
	1121	1900	WEIS				1145.3	1148.0	3				IIIG
			SGMR				1145.9	1147.0	3				V
			WEIS				1201.8	1202.0	2				IIIG
			DURN	1212.4	1213.4	2	1212.4	1213.4	2				IIIG
			WEIS				1220.0	1445.0	3				IV
			SGMR				1221.5	1225.9	2				II
			WEIS				1222.5	1225.5	2				II
			SGMR				1224.1	1554.0	2				IV
			DURN	1232.1	1232.3	2							III
			DURN	1236.3	1240.2	2							IIIG
			SGMR				1554.0	2418.00	1				CONT
			WEIS				1647.2	1649.7	3				IIIG
			SGMR				1647.7	1649.3	3				V
			DURN	1647.7	1648.3	2	1647.7	1648.3	2				DCIM
			DURN	1704.1	1704.1	2							IIIG
			DURN				1755.0	1756.2	2				IIIG
			WEIS				1755.6	1756.3	1				IIIG
			WEIS				1832.0	1839.2	3				IIIGG
			SGMR				1832.8	1925.0	3				IV
	2037	2400	CULG	2104	2400								IN,W
			CULG				2106.5	2400					IS,W
			CULG				2112	2400					IIIN,W
			CULG	2143.5	2144	1							IIIG
	2145	2400	MANI										
			CULG				2156.5		2				IIIB
			CULG				2201	2201.5	1				IIIG
			CULG	2244	2244.5								IIIG,W
			CULG	2246.5	2247	2							IIIG
10	0000	0737	CULG				0000	0448					IIIN,W
			CULG	0037	0613		0020	0448					IN,W
			CULG							0141	0344	1	S.W.F.
			CULG				0310	0310.5	2	0310.5	0311	1	IIIG
			CULG				0316	0317	3	0316.5	0317	1	IIIG
	0435	1820	DURN	0435 E	1820 D	1	0435 E	1820 D	1				IC,DC
			CULG				0448	0730					IS,W
			CULG				0448	0521					IIIS,W
	0517	0522	WEIS				0519.9	0522.0	1				IIIG
	0000	0947	MANI							0521.4	0523.5	1	IIIG
			DURN	0521.9	0524.5	1	0521.9	0524.5	3				DCIM,IIIG
			CULG	0522	0524	2	0521	0525	3				IIIGG,V
			CULG				0530.5	0543.5	1				II
			CULG							0612	0715	1	S.W.F.
			CULG	0613	0715	3	0613	0730	3				IV
			DURN	0613	0810	3	0613	0810	3				IV, F
	0533	0745	WEIS				0614.7	0618.5	3				IIIGG
			CULG				0615	0615.5	1				IIIG
			CULG				0616	0617	1				IIIG
			WEIS				0618.0	0745.0	3				IV
			CULG				0620.5	.0622.5	3				IIIGG,V
			MANI							0622.0	0629.2	1	IV
			CULG				0622.5	0630	3	0625	0627.5	3	II
			CULG				0630	0643	2				IIIS
			MANI							0641.0	0727.2	1	CONT
			WEIS				0825.0	1843.0	3				IIIS
	0825	1843	WEIS				0825.0	1843.0	3				ISDC
	0919	2417	SGMR				1032.5	2417.00	2				CONT

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10			SGMR				1304.0	1305.1	3				V
			WEIS				1530.0	1843.0	1				CONT
			WEIS				1653.3	1655.8	3				IIIGG
			DURN	1653.7	1654.5	3	1653.7	1654.5	3				IIIG
			SGMR				1653.8	1730.0	2				IIIS
			SGMR				1730.0	1736.0	3				IIIG
			WEIS				1730.2	1737.2	3				IIIGG
			DURN	1731.7	1738.6	3	1731.7	1738.6	3				IIIG,DCIM
			SGMR				1736.0	1738.6	3				IV
			WEIS				1819.7	1821.3	3				IIIG
			SGMR				1820.2	1821.9	3				IIIG
			SGMR				1859.8	1900.4	3				V
			SGMR				2018.2	2021.0	3				V
	2037	2400	CULG				2101	2400	2				IIIS
			CULG				2103	2400	2				IS,C
			CULG	2116	2117.5	2	2116	2117.5	2				IIIG
			CULG	2117	2400	1							IIIN
			CULG	2119	2120	2	2119	2120	1				IIIG
			CULG	2134	2136	2							IIIGG
	2144	2400	MANI										
			CULG				2225	2225.5	3				IIIG
			SGMR				2227.2	2227.5	3				V
			CULG				2227	2227.5	3				IIIG
			CULG	2327.5	2329.5	2	2328	2329	3	2328	2328.5	2	IIIG
			CULG				2341.5	2342	1	2341.5	2342	1	IIIG
			CULG				2355.5	2356	3	2355.5	2356	1	IIIG
11			CULG				0000	0222.5	2				IS,C,DC
	0000	0737	CULG				0000	0054	2				IIIS
			CULG				0036	0036.5	1	0036	0036.5	1	IIIG
			CULG				0046.5	0048	3	0046.5	0047.5	3	IIIG,V
	0000	0950	MANI							0046.5	0047.0	2	III
			CULG				0049.5	0050	1	0049.5	0050	1	IIIG
			CULG				0054	0136	2				IIIS
			CULG							0055	0120	1	S.W.F.
			MANI							0122.8	0125.8	2	IIIG
			CULG	0123	0127	3	0122.5	0126.5	3	0123	0126	3	IIIGG
			CULG				0128	0139	1				II
			CULG				0128	0129.5	3	0128.5	0129	2	IIIG
			CULG				0136	0448	1				IIIS
			CULG				0153.5	0448	1				IIIN
			CULG				0213.5	0214	2				IIIG
			CULG				0222	0630	2				IS,DC
			CULG	0224	0225.5	1							FAST DRIFT
			CULG				0313	0316	2				IIIGG
			CULG	0336	0347.5	3	0336	0346.5	3	0336	0346	3	IIIGG,V
			CULG	0338.5	0339	1							UNCLF,SLOW
			CULG				0343.5	0354.5	1				II
			MANI							0347.5	0350.2	2	IIIG
			CULG	0349	0349.5	1	0349	0351	3				IIIGG
			CULG	0427	0439	1							IV
	0408	1407	WEIS				0428.3	0453.0	3				II
			CULG	0428.5	0431.5	3	0428.5	0450.5	3	0436	0438.5	2	II, HB
	0428		DURN				0428.7	0429.4	3				II
			WEIS				0428.8	0430.3	3				IIIG
			CULG							0428	0555	1	S.W.F.
			MANI							0429.4	0429.5	1	III
			CULG				0429	0430.5	3	0429	0429.5	1	IIIG
			CULG				0438	0522	1				IV
			MANI							0439.0	0443.0	1	IIIG
			CULG				0448	0654	1				IIIS
			WEIS				0456.3	0505.7	2				IIIG
			DURN	0458	0511 D	1	0458	0511 D	1				IC
			WEIS				0512.6	0512.8	2				IIIB
			CULG				0545	0545.5	1				IIIB,V
	0550	1818	DURN	0550 E	1818 D	1	0550 E	1818 D	1				IC
			CULG				0630	0710	1				IS,DC
			WEIS				0701.3	0707.8	3				IIIGG
			MANI							0702.1	0702.3	1	III
			CULG	0703	0708.5	2	0701	0708.5	2				IIIGG

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JUL 1978	TIMES OF OBSERVATION START UT	TIMES OF OBSERVATION END UT	STATION	EVENTS DECIMETRIC BAND START UT	DECIMETRIC BAND END UT	DECIMETRIC BAND INT	METRIC BAND START UT	METRIC BAND END UT	METRIC BAND INT	DEKAMETRIC BAND START UT	DEKAMETRIC BAND END UT	DEKAMETRIC BAND INT	SPECTRAL TYPE
11			DURN	0708.0	0708.2	2	0708.0	0708.2	3				IIIG
			DURN	1051.3	1250	3	1052.4	1250	3				IV, F
			WEIS				1051.3	1407.0	3				IV
			WEIS				1051.3	1059.0	3				II
			WEIS				1051.9	1054.5	2				IIIG
	0920	2417	SGMR				1053.4	1059.3	2				IIIG
			SGMR				1059.3	1352.2	3				IV
			SGMR				1352.2	1615.5	2				IV
			SGMR				1352.2	2417.0D	2				IIIS
			WEIS				1424.0	1843.0	3				IIIS
	1424	1843	WEIS				1424.0	1843.0	3				IS
			WEIS				1611.3	1631.5	3				IIIGG
			SGMR				1611.3	1631.4	3				V
			DURN	1612.0	1613.0	2							DCIM
			DURN	1617.1	1646.3	3	1617.1	1646.3	3				IIIG,N
			SGMR				1621.5	2013.0	2				IV
			WEIS				1657.3	1659.5	3				IIIGG
			SGMR				1658.8	1659.2	3				V
			DURN	1658.9	1659.5	3	1658.9	1659.5	3				DCIM
			WEIS				1724.8	1725.0	2				IIIB
			DURN	1725.2	1725.2	2							III
			WEIS				1802.3	1802.7	3				IIIG
			WEIS				1824.0	1824.9	3				IIIG
			WEIS				1842.2	1842.5	2				IIIG
			SGMR				2005.9	2006.5	3				V
	2037	2400	CULG				2103	2400	2				IS,C
			CULG	2104	2400	1							N,FASTDRIF
			CULG				2110	2400	1				IIIS
			CULG				2140.5	2400	2				IIIN
			CULG	2205	2206.5	1	2205	2206	3	2205	2205.5	2	IIIG,V
			CULG							2228	2330	1	S.W.F.
			CULG	2236	2400	1							IIIG,N
			CULG	2301.5	2304.5	2	2301.5	2303.5	3				IIIGG,V
	2140	2400	MANI							2301.8	2302.6	1	IIIG
			CULG				2319.5	2320	1	2319.5	2320	1	IIIG
			CULG	2358.5	2359	2	2358.5	2359.5	3	2359	2359.5	2	IIIG
			MANI							2358.9	2359.3	2	III
12	0000	0737	CULG				0000	0145	2				IS,C
			CULG				0000	0258	1				IIIS
			CULG				0007.5	0228	2	0013	0228	1	IIIG,N
			CULG	0013	0601	1							N,FASTDRIF
			CULG	0013	0013.5	3	0013	0013.5	2	0013	0013.5	1	IIIG
	0000	1002	MANI							0042.3	0051.5	2	IIIG
			CULG	0042	0050	1							IIIG
			CULG	0050	0053	2	0042	0052	3	0042	0052	3	IIIGG,V
			CULG	0059.5	0104	1	0059	0104	3	0059.5	0104	3	IIIGG,V
			MANI							0059.7	0104.0	2	IIIG
			CULG				0145	0551	2				IS,DC
			CULG				0215.5	0228	3	0215.5	0227.5	3	IIIGG
			MANI							0215.8	0220.3	2	IIIG
			CULG							0250	0313	1	S.W.F.
			CULG				0258	0716	2				IIIS
			MANI							0300.3	0301.5	2	IIIG
			CULG				0300	0710	3	0300	0549	3	IIIG,N
			MANI							0308.0	0308.2	1	III
			MANI							0313.4	0313.9	1	III
			MANI							0317.0	0317.1	1	III
			MANI							0329.5	0329.7	1	III
			MANI							0331.4	0331.8	1	III
			MANI							0335.9	0336.0	1	III
			MANI							0340.4	0343.7	1	IIIG
	0408	1843	WEIS				0409.0	1559.0	2				INDC
			WEIS				0418.0	1838.7	3				IIIN
			MANI							0419.1	0419.3	1	III
			MANI							0428.0	0428.3	1	III
	0430	1821	DURN	0430 E	1821 D	1	0430 E	1821 D	1				IC,DC
			MANI							0443.4	0443.9	1	III
			DURN	0501.6	0505.6	3	0501.6	0505.6	3				IIIG
			MANI							0508.6	0510.0	1	III

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JULY 1978

JUL 1978	TIMES OF OBSERVATION		STATION	EVENTS									SPECTRAL TYPE
				DECIMETRIC BAND			METRIC BAND			DEKAMETRIC BAND			
	START UT	END UT		START UT	END UT	INT	START UT	END UT	INT	START UT	END UT	INT	
12			MANI							0523.0	0523.3	1	III
			MANI							0536.9	0537.0	1	IIIG
			MANI							0545.9	0548.3	1	IIIG
			CULG				0551	0716	2				IS,C,DC
			DURN	0556.8	0600.7	3	0556.8	0600.7	3				IIIG,DCIM
			MANI							0625.7	0625.9	1	III
			MANI							0709.0	0710.0	1	III
			MANI							0713.8	0714.0	1	III
			MANI							0736.2	0736.9	1	III
			MANI							0742.4	0742.8	1	III
			MANI							0822.3	0822.7	1	III
	0921	2416	SGMR				0925.5	1031.5	2				IIIS
			DURN	1006.1	1014.2	2	1006.1	1014.2	3				IIIG
			SGMR				1143.9	1150.6	3				V
			SGMR				1150.6	1331.9	2				IIIS
			SGMR				1150.6	1331.9	2				IIIS
			DURN				1207.9	1212.6	3				IIIGG
			WEIS				1208.3	1212.3	3				IIIGG
			SGMR				1209.0	1210.9	3				V
			SGMR				1209.0	1210.9	3				V
			SGMR				1221.8	1225.1	3				V
			SGMR				1228.8	1230.6	3				V
			DURN				1238.1	1238.6	3				IIIG
			SGMR				1240.0	2416.0D	3				IIIS
			DURN	1307.0	1337.4	3	1307.0	1337.4	3				IIIG,N
			SGMR				1331.9	2416.0D	2				CONT
			DURN	1452.9	1459.5	2	1452.5	1459.5	3				IIIGG
			DURN	1530.5	1530.5	3	1530.5	1530.5	3				III
			SGMR				1556.0	1607.0	3				IIIG
			WEIS				1559.8	1603.8	3				IIIGG/V
			DURN	1601	1606.5	3	1601	1606.5	3				IIIG,DCIM
			WEIS				1604.7	1606.6	3				IIIG/V,RS
			WEIS				1758.8	1802.3	3				IIIG/V
			DURN	1759.4	1800.9	3	1759.2	1800.9	3				IIIG,DCIM
			SGMR				1759.8	1801.2	3				IIIG
	2037	2400	CULG				2103	2400	2				IS,C
			CULG				2114	2400					IIIS,W
			CULG	2117	2117.5	1	2116	2119.5	2				IIIGG,V
			CULG				2127	2400	2				IIIG,N
			CULG				2133	2134.5	3				IIIG,V
			CULG				2212.5	2213	2				IIIB,U
	2204	2400	MANI							2302.9	2306.1	1	IIIG
			MANI							2309.0	2309.1	1	III
			MANI							2320.0	2320.3	1	III
			MANI							2322.0	2322.3	1	III
			MANI							2344.6	2344.8	1	III
13	0000	0737	CULG				0000	0327	1				IS,C,DC
			CULG				0000	0704	1				IIIS
	0000	0952	MANI							0019.7	0020.7	2	III
			CULG	0019	0019.5	1	0019	0021	3	0019.5	0021	3	IIIG,V
			CULG	0058		1							IIIB
			CULG				0211.5	0212	2				IIIG
			CULG	0236	0236.5	1							FAST DRIFT
			CULG				0304	0304.5	2	0304	0304.5	1	IIIB
			CULG				0327	0706	1				IS,DC
			CULG	0409.5	0411	1							FAST DRIFT
	0430	1820	DURN	0430 E	1820 D	1	0430 E	1820 D	1				IC
			DURN	0502.7	0502.7	2							III
	0409	1551	WEIS				0517.0	0713.0	1				IIIN
			DURN	0734.0	0734.2	3	0734.0	0734.2	3				IIIG
			DURN	0811.2	0811.4	3	0811.2	0811.4	3				IIIG
			WEIS				0811.5	0811.6	2				IIIG
			DURN	0837.1	0837.3	2							IIIG
			WEIS				0900.5	0900.8	2				IIIG
			WEIS				1451.1	1452.2	2				IIIB
			DURN	1511.0	1511.2	2							IIIG
	0922	2416	SGMR				1630.2	1630.4	1				III
			SGMR				1722.8	1722.9	1				III
	2038	2400	CULG				2117	2319					IIIN,W

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13			CULG				2134	2400	1				IN
	2142	2400	MANI										
			CULG				2151.5		1				IIIG
			CULG				2254	2255					IIIG,V,H
			CULG				2309.5		2				IIIB
			CULG	2329	2331.5	1	2329	2331.5	1				IIIG
			CULG	2336	2336.5	1	2336	2336.5	1				IIIG
			CULG	2348.5	2349	1	2348.5	2349	1				IIIG
14	0000	0737	CULG				0000	0233	1				IN
	0000	0951	MANI										
			CULG				0035	0626					IIIN,H
			CULG	0133	0134	1	0133	0134	2				IIIG,U
			CULG				0236.5	0237	1				IIIG
			CULG	0316.5	0317.5	1	0316.5	0317	1				IIIG
	0430	1817	DURN	0430 E	1817 D	2	0430 E	1817 D	2				IC
			CULG	0527	0527.5		0527	0527.5					IIIG,H
			CULG	0612.5	0613.5	2	0612.5	0613	1				IIIGG
			CULG	0640	0641	1							IIIG
	0409	1158	WEIS				0810.3	0810.5	1				IIIB
			WEIS				0843.5	0843.6	1				IIIB
			WEIS				1012.7	1012.8	1				IIIB
			WEIS				1105.1	1105.9	2				IIIG
	0922	2415	SGMR				1105.4	1105.6	1				III
	1213	1842	WEIS				1322.4	1322.6	2				IIIU
			WEIS				1331.7	1331.8	2				IIIRS
			DURN	1331.7	1331.9	3	1331.7	1331.9	3				IIIG
			WEIS				1337.9	1338.2	1				IIIB
			WEIS				1345.2	1345.4	1				IIIB
			SGMR				1345.4	1345.6	1				III
			WEIS				1513.7	1513.9	2				IIIRS
			WEIS				1535.4	1536.9	3				IIIG
			SGMR				1535.5	1536.7	3				IIIG
			DURN				1559.0	1559.4	3				IIIG,U
			WEIS				1559.1	1559.3	2				IIIU
			WEIS				1729.3	1729.4	2				IIIG
			WEIS				1731.3	1736.5	3				IIIGG/V
			SGMR				1731.4	1735.4	3				V
			WEIS				1736.7	1747.5	3				II
			SGMR				1736.9	1746.0	3				II
			WEIS				1800.3	1800.5	1				IIIB
			CULG	2106	2106.5	1							IIIG
	2038	2400	CULG				2106	2400					IIIN,H
			CULG				2114	2400					IN,H
	2140	2400	MANI										
			CULG	2158.5	2159	1							FAST DRIFT
			CULG	2208.5		1							IIIB
			CULG	2215.5	2216.5		2215.5	2216.5					IIIG,H
15	0000	0738	CULG				0045	0655					IIIN,H
			CULG	0054	0055.5	3	0054	0055.5	3				IIIGG,V
			CULG							0054	0120	1	S.W.F.
			CULG	0149	0149.5	2	0149	0149.5	2				IIIG
			CULG				0350.5	0435.5	2				II
			CULG	0403.5	0405	2	0404.5	0405	1	0406	0406.5	1	IIIGG
	0000	1002	MANI							0405.8	0408.4	1	III
	0430	0516	DURN										
			CULG				0525.5	0531	1				IIIGG
	0410	0857	WEIS				0526.2	0529.2	1				IIIG
	0919	1842	WEIS				1055.4	1125.1	2				IIIGG
			WEIS				1305.5	1306.3	2				IIIG
	0923	2415	SGMR				1424.0	1431.5	3				V
			WEIS				1424.4	1429.5	3				IIIG/V,RS
			WEIS				1433.0	1344.4	1				IIIG
			WEIS	1445.7	1445.8	2							IIIG
	1631	1821	DURN										
	2138	2400	MANI										
	2038	2400	CULG				2214	2217					IIIG,H
			CULG				2247.5						IIIB,H
16	0000	0305	MANI										

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16	0000	0737	CULG				0106	0107.5					IIIG,W
			CULG				0127	0130					IIIGG,W
			CULG				0129	0129.5	1	0129	0129.5	1	IIIG
			CULG				0315.5	0344	2				II
			CULG				0317	0433					IIIN,W
			CULG				0421.5	0422.5	2				IIIG,U
	0412	1501	WEIS				0421.8	0422.5	1				IIIUU
			WEIS				0430.6	0432.4	3				IIIGU
	0307	0940	MANI							0430.9	0431.5	1	III
			CULG	0431	0431.5	1	0431	0432.5	3				IIIGG,V
	1432	1820	DURN	0432 E	1820 D	1	0432 E	1820 D	1				IC,DC
			CULG				0707.5	0711	1				IIIG
			WEIS				0708.4	0708.6	2				IIIU
			WEIS				0719.8	0721.3	2				IIIG
			WEIS				0941.3	0941.4	1				IIIB
	1516	1842	WEIS										
	0924	2414	SGMR				2004.8	2005.0	2				III
	2039	2400	CULG	2117.5	2118	1	2117.5	2118	1				IIIG
			CULG				2119	2120					IIIG,W
			CULG				2139.5	2157.5	1				IS
	2149	2210	MANI										
			CULG				2153						IIIB,W
			CULG				2305	2305.5	2				IIIG
	2306	2400	MANI										
			CULG	2349	2351.5		2349	2352					IIIG,W
17	0000	0738	CULG	0012.5	0020.5	1							CONT.
			CULG				0014.5	0022.5					IIIGG,W
			CULG				0015.5	0016.5	1				IIIG,U
			CULG				0023.5	0051					II, W
			CULG				0025.5	0636					IIIN,W
			CULG				0035.5		1				IIIB
			CULG	0138.5	0139	1	0138.5	0139.5	1				IIIG
			CULG	0155.5	0156.5	1	0155.5	0156.5	1				IIIG
			CULG				0405	0406.5	1				IIIG
	0434	1817	DURN	0434 E	1817 D	1	0434 E	1817 D	1				IC
	0412	1833	WEIS				0505.4	0505.9	3				IIIB
			CULG				0505.5	0506.5	2				IIIB,V
	0000	0955	MANI							0505.8	0506.2	1	III
			WEIS				0519.4	0519.5	1				IIIG
			WEIS				0521.2	0521.3	1				IIIG
			DURN	0521.4	0521.9	3	0521.4	0521.9	3				IIIG
			CULG	0521	0522	1	0519.5	0521	1				IIIG
			WEIS				0557.3	0557.7	2				IIIG
			CULG				0557.5	0558	1				IIIG
			WEIS				0922.5	0936.5	2				II
			WEIS				1001.5	1001.9	1				IIIG
			WEIS				1300.1	1300.3	1				IIIB
			WEIS	1355.0	1355.3	2							IIIG
			WEIS	1427.7	1428.1	2							IIIG
			WEIS				1432.5	1432.6	1				IIIB
			WEIS				1537.0	1537.1	1				IIIB
			WEIS				1543.9	1544.0	2				IIIRS
			WEIS				1706.2	1706.3	2				IIIB
			WEIS				1710.0	1710.2	1				IIIB
			WEIS				1717.8	1717.9	1				IIIB
			WEIS				1741.1	1741.3	2				IIIB
	0925	2413	SGMR				1741.2	1741.4	1				III
	2038	2400	CULG				2127	2136.5	1				IIIGG
			SGMR				2130.0	2135.5	1				IIIG
			CULG				2133		2				IIIB
			CULG				2135		2				IIIB
	2145	2400	MANI										
			CULG				2207	2312					IIIN,W
			CULG				2303	2309	1				IIIG
			CULG				2303	2309	1				UNCLF,SLOW
18	0000	0148	MANI										
	0000	0738	CULG				0043	0049					IIIN,W
	0155	0953	MANI										

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				DECIMETRIC BAND			METRIC BAND			DEKAMETRIC BAND			
	START UT	END UT		START UT	END UT	INT	START UT	END UT	INT	START UT	END UT	INT	
18	0427	0716	WEIS										
	0438	1820	DURN	0438 E	1820 D	1	0438 E	1820 D	1				IC
			CULG	0547.5	0549.5	1							FAST DRIFT
			CULG				0657						IIIB,W
	0735	1833	WEIS										
	0926	2345	SGMR										
	2038	2400	CULG	2100	2137.5	1	2100	2400	2				IS,DC
			CULG				2108.5	2400					IIIN,W
			CULG				2122	2122.5	1				IIIB,U
			CULG	2137.5	2400								IN,W
	2150	2400	MANI										
			CULG	2346.5	2347	1	2346.5	2347	1				IIIG
19	0000	0738	CULG				0000	0214	1				IS,DC
	0000	0955	MANI										
			CULG				0059	0652					IIIN,W
			CULG	0141.5	0142	1							IIIG
			CULG				0214	0407					IS,W,DC
			CULG	0233	0234.5	1							FAST DRIFT
			CULG	0318	0404								IS,W
			CULG	0404	0458	1	0407	0438	1				IS,DC
			CULG				0438	0520					IS,W
	0438	1607	DURN	0438 E	1607 D	3	0438 E	1607 D	3				IC,DC
			CULG	0458	0715	1							IN
			DURN				0500.2	0500.7	3				IIIG
	0425	1340	WEIS				0500.3	0501.8	2				IIIG
			CULG	0500	0501	2							IIIG
	0927	2412	SGMR										
			WEIS				1051.9	1052.1	1				IIIG
	1355	1833	WEIS										
	2143	2400	MANI										
	2038	2400	CULG				2155	2155.5					IIIG,W
20	0000	0738	CULG				0012	0312					IIIN,W
			CULG							0013	0030	1	S.W.F.
			CULG	0029.5	0030	2	0029.5	0030	1				IIIG
			CULG				0056.5	0057	2				IIIG
			CULG				0107.5	0108	1				IIIG
			CULG				0209	0209.5	1				IIIG
	0000	0958	MANI							0232.1	0234.5	1	IIIG
			CULG	0232	0236.5	1	0230.5	0241.5	3	0232	0237	2	IIIGG
			CULG				0247	0436	1				IS
			CULG	0254	0626								IN,W
			CULG				0311	0315.5					IIIS,W
			CULG				0315.5	0323	2				IIIS
			MANI							0316.9	0322.0	2	IIIG
			CULG				0323	0340	1				IIIS
			CULG				0340	0405					IIIS,W
	0440	1818	DURN										
			CULG				0509	0550					IN,W
			CULG				0550	0715	1				IS
	0425	1832	WEIS				1147.9	1148.0	1				IIIB
			WEIS				1319.3	1320.1	2				IIIG
	0928	2411	SGMR				1319.4	1320.2	1				IIIG
	2039	2400	CULG	2126.5	2127.5	2	2126.5	2127.5	1				IIIGG
	2143	2400	MANI										
21	0000	0218	MANI										
	0000	0720	CULG				0003	0322					IIIN,W
	0219	0954	MANI										
			CULG				0320	0403					IS,W
	0425	0620	WEIS										
	0705	1038	WEIS										
	0928	2410	SGMR										
	1126	1832	WEIS				1203.4	1203.6	2				IIIG
	0440	1820	DURN	1245.8	1245.8	1	1245.8	1245.8	1				III
			DURN	1300	1820	2	1300	1820	2				IC,DC
			DURN	1426.2	1426.4	2	1426.2	1426.4	2				IIIG,U
			WEIS				1426.2	1426.6	1				IIIG
	2136	2400	MANI										

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				DECIMETRIC BAND			METRIC BAND			DEKAMETRIC BAND			
	START UT	END UT		START UT	END UT	INT	START UT	END UT	INT	START UT	END UT	INT	
21	2039	2400	CULG				2232	2400	1				IS
22	0000	0738	CULG				0000	0019	1				IS
			CULG				0008	0646					IIIN,W
			CULG	0009	0536								IN,W
			CULG				0011.5	0012	1	0011.5	0012	1	IIIB
			CULG				0019	0119					IN,W
			CULG				0119	0223					IS,W
			CULG				0223	0253	1				IS
			CULG				0253	0350					IN,W
			CULG				0424	0439					IIIS
	0426	1336	WEIS				0431.0	0431.7	1				IIIB E
			CULG				0431.5	0432	1	0431.5	0432	1	IIIG
	0000	0950	MANI							0437.4	0437.6	1	III
			CULG				0437.5	0438	2	0437.5	0438	2	IIIG
			WEIS				0437.7	0438.5	2				IIIG
	0450	1820	DURN	0450 E	1820	1	0450 E	1820	1				IC,DC
			WEIS				0943.0	0943.2	1				IIIB
			WEIS				1016.7	1017.3	3				IIIG
	0929	2409	SGMR				1016.9	1018.2	2				V
			DURN				1017.8	1017.8	2				III
			WEIS				1124.1	1128.7	2				IIIG
			WEIS				1126.0	1126.2	1				IIIB
			WEIS				1127.8	1128.1	1				IIIB
			SGMR				1224.3	1229.0	2				IIIG
			WEIS				1306.5	1306.6	2				IIIB
			WEIS				1320.6	1320.9	2				IIIG
			SGMR				1320.7	1321.0	1				V
	1351	1831	WEIS				1352.2	1352.7	1				IIIG
			WEIS				1400.5	1400.7	1				IIIB
			WEIS				1411.7	1411.9	2				IIIG
			SGMR				1411.8	1730.0	1				IIIS
			WEIS				1421.9	1423.4	2				IIIG
			WEIS				1443.2	1443.4	1				IIIB
			WEIS				1511.7	1512.8	1				IIIG
			WEIS				1649.2	1649.4	1				IIIB
			WEIS				1738.7	1744.1	2				IIIGG
			SGMR				1740.2	1740.8	1				IIIG
			WEIS				1753.2	1753.3	1				IIIB
	2038	2400	CULG				2144	2400					IIIN,W
			CULG				2236	2237	1				IIIG
			CULG				2309	2309.5	1				IIIG
			CULG	2338.5	2342	1	2338.5	2345	1				IIIGG
			CULG				2339.5	2342	2	2340	2342	2	IIIGG
	2130	2400	MANI							2340.1	2342.0	1	IIIG
23	0000	0738	CULG				0028.5	0032					IIIG,W
			CULG				0137						IIIB,W
			CULG				0145.5	0146	1	0146		1	IIIG
			CULG	0208	0209	1	0207	0209	1	0207	0207.5	1	IIIGG
			CULG				0234.5	0235.5	2	0235	0235.5	1	IIIG,V
	0000	0950	MANI							0234.8	0235.1	1	III
			CULG				0327	0327.5	1				IIIG
			CULG				0340	0342.5	1	0342	0342.5	1	IIIG
			MANI							0427.5	0427.8	1	III
			CULG	0427		1	0427	0428	3				IIIB,V
			CULG	0520.5		1							FAST DRIFT
	0440	1808	DURN	0520.6	0520.6	3	0520.6	0520.6	1				III
			CULG	0525.5	0526.5		0525.5	0526					IIIG,W
			CULG	0541.5	0542	1	0541	0542.5	1				IIIG
			DURN				0541.6	0541.6	2				IIIG
	0428	1829	WEIS				0541.7	0541.9	2				IIIG
			CULG				0549						IIIB,W
			CULG	0607.5	0608.5	1							FAST DRIFT
			WEIS				0751.4	0753.2	1				IIIG
			WEIS				0927.3	0930.9	2				IIIG
			WEIS				0945.5	0946.0	1				IIIG
			WEIS				0947.7	0947.8	1				IIIB
			WEIS				0950.7	0951.0	1				IIIB
			WEIS				0953.1	0953.4	1				IIIG

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				DECIMETRIC BAND			METRIC BAND			DEKAMETRIC BAND			
	START UT	END UT		START UT	END UT	INT	START UT	END UT	INT	START UT	END UT	INT	
23			WEIS				0955.8	0956.3	1				IIIG
			WEIS				1042.5	1043.0	1				IIIG
			WEIS				1125.9	1126.6	1				IIIG
			DURN	1200	1808	1	1200	1808	1				I
			WEIS				1425.0	1427.6	2				IIIG
	0930	2408	SGMR				1425.1	1427.7	3				V
			WEIS				1544.5	1546.2	1				IIIG
			WEIS				1723.0	1724.7	2				IIIG
			SGMR				1724.9	1725.0	1				III
	2038	2400	CULG				2059	2155	1				IS,DC
			CULG				2120	2216					IIIS,W
	2137	2400	MANI										
			CULG				2155	2241					IS,W
			CULG				2216.5	2400					IIIN,W
24	0000	0950	MANI										
	0000	0738	CULG				0316	0316.5					IIIG,W
			CULG				0318	0318.5	1				IIIG
	0430	0627	WEIS										
	0442	1820	DURN										
			CULG				0539						IIIB,W
	0714	1828	WEIS				1324.7	1325.8	2				IIIG
			WEIS				1354.3	1354.5	2				IIIB
			WEIS				1356.6	1357.1	3				IIIG
	2142	2400	MANI										
	2038	2400	CULG				2258						IIIB,W
			SGMR										
25	0000	0950	MANI										
	0000	0738	CULG	0016	0016.5								FAST DRIFT
			CULG	0020.5									FAST DRIFT
	0430	1331	WEIS										
	0450	1820	DURN										
	1402	1827	WEIS										
	1545	2407	SGMR										
	2038	2400	CULG										
	2144	2400	MANI										
26	0000	0115	MANI										
	0000	0730	CULG				0034	0035					IIIG,W
			CULG				0102.5	0103					IIIG,W
			CULG				0104	0105					IIIG,W
	0126	1003	MANI										
	0450	1818	DURN										
			CULG				0533.5	0534					IIIG,W
			CULG				0536	0536.5	1				IIIG
	0742	1826	WEIS										
	0933	2406	SGMR										
	2122	2400	MANI										
	2039	2400	CULG				2136	2141.5	2				IIIG
27	0000	0950	MANI										
	0000	0738	CULG				0152	0153					IIIG,W
	0431	1000	WEIS										
	0934	2405	SGMR										
	1006	1826	WEIS										
	0450	1810	DURN	1118.5	1119.3	1	1118.5	1119.3	1				IIIG
	2136	2400	MANI										
	2038	2400	CULG				2235.5	2236.5	1				UNCLF
28	0000	0955	MANI										
	0000	0738	CULG				0317.5	0318					IIIG,W
			CULG				0352	0352.5					IIIG,W
			CULG				0354.5	0358					IIIG,W
			CULG				0402.5						IIIB,W
			CULG				0409						IIIB,W
			CULG				0614	0617					IIIG,W
			CULG				0643.5	0644					IIIG,W
	0935	2404	SGMR										
	0433	1625	WEIS				1044.3	1045.4	1				IIIG

SOLAR RADIO EMISSION SPECTRAL OBSERVATIONS

JULY 1978

JUL 1978	TIMES OF OBSERVATION		STATION	EVENTS									SPECTRAL TYPE
				DECIMETRIC BAND			METRIC BAND			DEKAMETRIC BAND			
	START UT	END UT		START UT	END UT	INT	START UT	END UT	INT	START UT	END UT	INT	
28			WEIS				1137.3	1137.4	1				IIIB
	0450	1820	DURN				1410	1820	1				IC,DC
	1646	1825	WEIS										
	2038	2400	CULG										
	2146	2400	MANI										
29	0000	0958	MANI										
	0000	0738	CULG	0133.5	0139		0133	0140.5					IIIGG,W
			CULG				0218.5	0221.5					IIIG,W
	0434	1824	WEIS				0959.6	1003.4	2				IIIG
			WEIS				1543.4	1546.0	1				IIIG
	0936	2403	SGMR				1543.5	1546.0	2				V
	0450	1817	DURN	1718.4	1718.6	3	1718.4	1718.6	3				IIIG
	2038	2400	CULG	2111.5	2112.5		2111.5	2112.5					IIIG,W
	2145	2400	MANI										
30	0000	1005	MANI										
	0000	0738	CULG				0118	0657					III,W
	0450	1820	DURN										
	0435	0943	WEIS				0652.7	0652.8	1				IIIB
			WEIS				0741.3	0743.3	2				IIIG
	0937	2402	SGMR										
	0958	1823	WEIS										
	2135	2400	MANI										
	2038	2400	CULG	2251.5	2252	1							FAST DRIFT
31	0000	1000	MANI										
	0000	0738	CULG				0052						IIIB,W
			CULG				0056.5						IIIB,W
			CULG				0342.5						IIIB,W
			CULG				0355						IIIB,W
	0650	1820	DURN				0740	0900	1				IN
	0938	2400	SGMR										
	0435	1618	WEIS				1213.5	1213.7	2				IIIB
	1635	1830	WEIS										
	2038	2400	CULG	2116	2116.5		2116	2116.5					IIIG,W
	2139	2400	MANI										
			CULG	2156			2155.5	2156					IIIG,W,U

The symbols used in connection with the spectral type in describing the important bursts are as follows:

B = Single burst
G = Small group (< 10) of bursts
GG = Large group (> 10) of bursts
C = Underlying continuum (particularly with type I)
S = Storm in the sense of intermittent but apparently connected activity
N = Intermittent activity in this period
U = U-shaped burst of Type III

RS = Reverse slope burst
DP = Drifting pairs
DC = Drifting Chains
H = Herringbone
W = Weak
P = Pulsations
CONT = Continuum
UNCLF = Unclassified activity

Note: The 25-580 MHz solar radio burst observations are being continued at the Harvard Radio Astronomy Station at Fort Davis, Texas, but the preparation of data summaries will be delayed somewhat.

SELECTED SOLAR EVENTS

JULY 1978

Culgoora

UT Date 1978 JULY	HELIOGRAPH EVENT Start (UT)	End (UT)	Freq. (MHz)	Positions: Central Dist. ($R_\odot$)	Positions: Position Angle (Deg.)	Polarization	Intensity (1-3)	Spectral Type	REMARKS
1	0338	0340	43.25)	1.2)			3)		
			80)	1.1)	245	-	2)	IIIG,V	*
			160)	1.0)			1)		
3	0036	0039	43.25)	1.0	290	-	3)	IIIGG,V, SLOW DRIFT	
			80)				2)		
	0507	0508	43.25)	.9	80	-	2)		
			80)				2)	IIIG,U	
			160)				1)		
4	2345	2352	43.25)	1.4)			3)		Complex source structure.
			80)	1.2)	280	-	3)		
			160)	1.0)			1)	II	
							)		
			80	1.2	290		3)		
6	0109	0110	43.25)				3)		
			80)	.7	240	-	2)	IIIGG	*
			160)				1)		
	0117	0118	43.25	1.2	140	-	2	IIIG	

Days without Heliograph observations: .....

* Other type III's observed from same position during the day.

UT Date 1978 JULY	HELIOGRAPH EVENT Start (UT)	End (UT)	Freq. (MHz)	Positions: Central Dist. ($R_\odot$)	Positions: Position Angle (Deg.)	Polarization	Intensity (1-3)	Spectral Type	REMARKS
7	0153	0154	43.25)				3)		
			80)	.6	130	-	2)	IIIB,V	
			160)				2)		
7/8	2300	0500	80)	.9	90	Varying	1	I	Type I activity persisted from this region until 12th.
			160)						
	0217	0218	80)	.6	220	-	1)	IIIG	
			160)		190		3)		
	0400	0401	80)	1.1	90	-	1)	IIIB	
			160)				2)		
	2313	2314	43.25)	1.3)	300	-	3)	IIIB,V	*
			80)	1.1)			2)		
9	0442	0447	43.25)	.7)			3)		
			80)	.9)	60	-	3)	IIIGG	*
			160)	.9)			2)		
	0521	0522	43.25)	1.1	240	-	3)	IIIG,V,U	*
			80)				2)		

Days without Heliograph observations: .....

* Other type III's observed from same position during the day-

SELECTED SOLAR EVENTS

JULY 1978

Culgoora

UT Date 1978 JULY	HELIOGRAPH EVENT Start (UT)	End (UT)	Freq. (MHz)	Positions Central Dist. ($R_\odot$)	Positions Position Angle (Deg.)	Polarization	Intensity (1-3)	Spectral Type	REMARKS
10	0521	0524	43.25)				3)		
			80)	1.0	90	-	3)	IIIGG,V	*
			160)				2)		
11	0122	0127	43.25)						
			80)	.7	70	-	3	IIIGG	*
			160)						
	0128	0130	43.25)						
			80)	.7	70	-	3	II	
			160)						
	0336	0340	43.25)						
			80)	.7	70	-	3	IIIGG,V	
			160)						
	0344	0354	43.25)						
			80)	.7	70	-	3	II	
			160)						
	0428	0450	43.25)				)		
			80)	.7	70	-	3)	II,IIIG	
			160)				)		

Days without Heliograph observations: .....

* Other type III's observed from same position during the day.

UT Date 1978 JULY	HELIOGRAPH EVENT Start (UT)	End (UT)	Freq. (MHz)	Positions Central Dist. ($R_\odot$)	Positions Position Angle (Deg.)	Polarization	Intensity (1-3)	Spectral Type	REMARKS
12	0042	0052	43.25)						
			80)	.3	90	-	3	IIIGG,V	*
			160)						
12/13	2300	0500	43.25)						
			80)	0	0	-	2	IIIS	
			160)						
13	0019	0021	43.25)						
			80)	.1	90	-	3	IIIG,V	
			160)						
13/14	2348	2349	80)	0	0	-	1)	IIIG	
			160)				2)		
15	0054	0057	80)	0	0	-	2)	IIIGG,V	*
			160)				3)		
	0359	0410	43.25)				3)	II	Due to equipment failure the early part of the type II (0352-0359) was missed. The type II was suspected to be from a region behind the limb.
			80)	1.0	90	-	2)		
			160)				2)		

Days without Heliograph observations: .....

* Other type III's observed from same position during the day.

SELECTED SOLAR EVENTS

JULY 1978

Culgoora

UT Date 1978. JULY	HELIOGRAPH EVENT Start (UT)	End (UT)	Freq. (MHz)	Positions Central Dist. ($R_\odot$)	Positions Position Angle (Deg.)	Polar-ization	Inten-sity (1-3)	Spectral Type	REMARKS
15	0404	0406	160	0	0	-	2	IIIGG	
16	0316	0331	43.25)	1.3	300	-	3	II	The type II was suspected to be from a region behind the limb.
			80)						
17	0014	0310	43.25)	.6	110	-	3)	CONT. II,IIIG	The type IV continuum moved from position A to B at times indicated.
			(A) 80)	.6	130		2)		
			160)				2)		
			(B) 80)	1.0	130	R	1	IV	
			160)						
	0034	0036	43.25)				2)		
			80)	.5	225	-	2)	IIIG	
			160)				1)		
	2305	2308	43.25)	.4)					
			80)	.3)	120	-	2	IIIG, uncl f, slow drift.	
			160)	.3)					
18/19	2300	0500	80)	1.0	300	L	1	IS	
			160)						

Days without Heliograph observations: .....

* Other type III's observed from same position during the day.

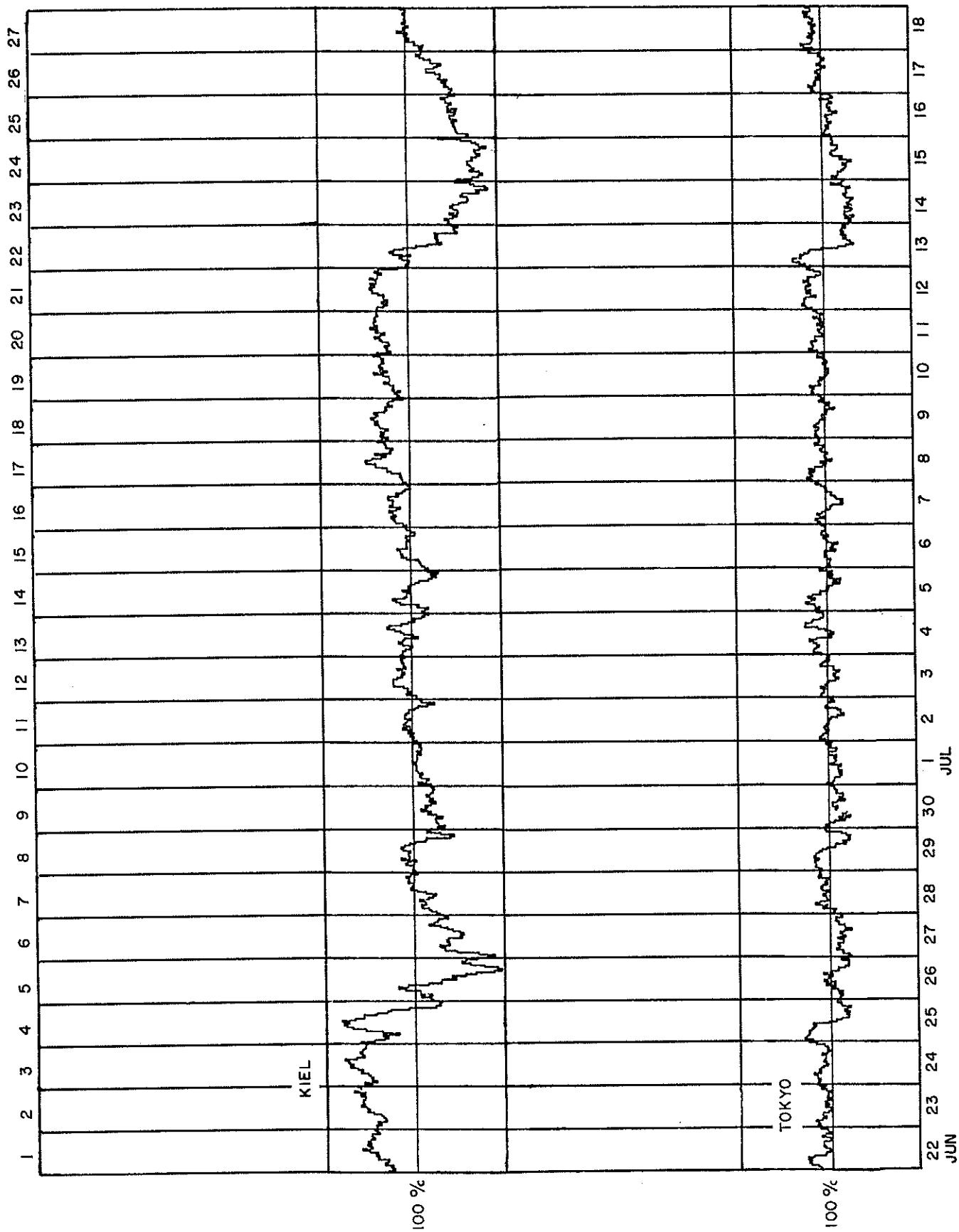
UT Date 1978. JULY	HELIOGRAPH EVENT Start (UT)	End (UT)	Freq. (MHz)	Positions Central Dist. ($R_\odot$)	Positions Position Angle (Deg.)	Polar-ization	Inten-sity (1-3)	Spectral Type	REMARKS
18/19	2300	0500	160	.2	180	R	1	IS	Type I activity persisted from this region until 20th.
20	0056	0057	43.25)	1.1)			3)		
			80)	1.0)	300	-	2)	IIIG	
			160)	.9)			2)		
	0230	0241	43.25)	.6)			3)		
			80)	.4)	260	-	2)	IIIGG	*
			160)	.3)			2)		
22	0120	0500	160	.5	310	L	2	IS	
	0431	0433	43.25)				2)		
			80)	.5	310	-	2)	IIIG	*
			160)				1)		
23	0234	0236	43.25)	1.2)			3)		
			80)	1.0)	260	-	3)	IIIG,V	
			160)	.9)			2)		
29	0134	0136	43.25)						
			80)	.8	340	-	2	IIIGG,W	*
			160)						
	0218	0220	43.25)	.9	310	-	2	IIIG,W	Type III's persisted from this region until 30th.
			80)						

Days without Heliograph observations: .....

* Other type III's observed from same position during the day.

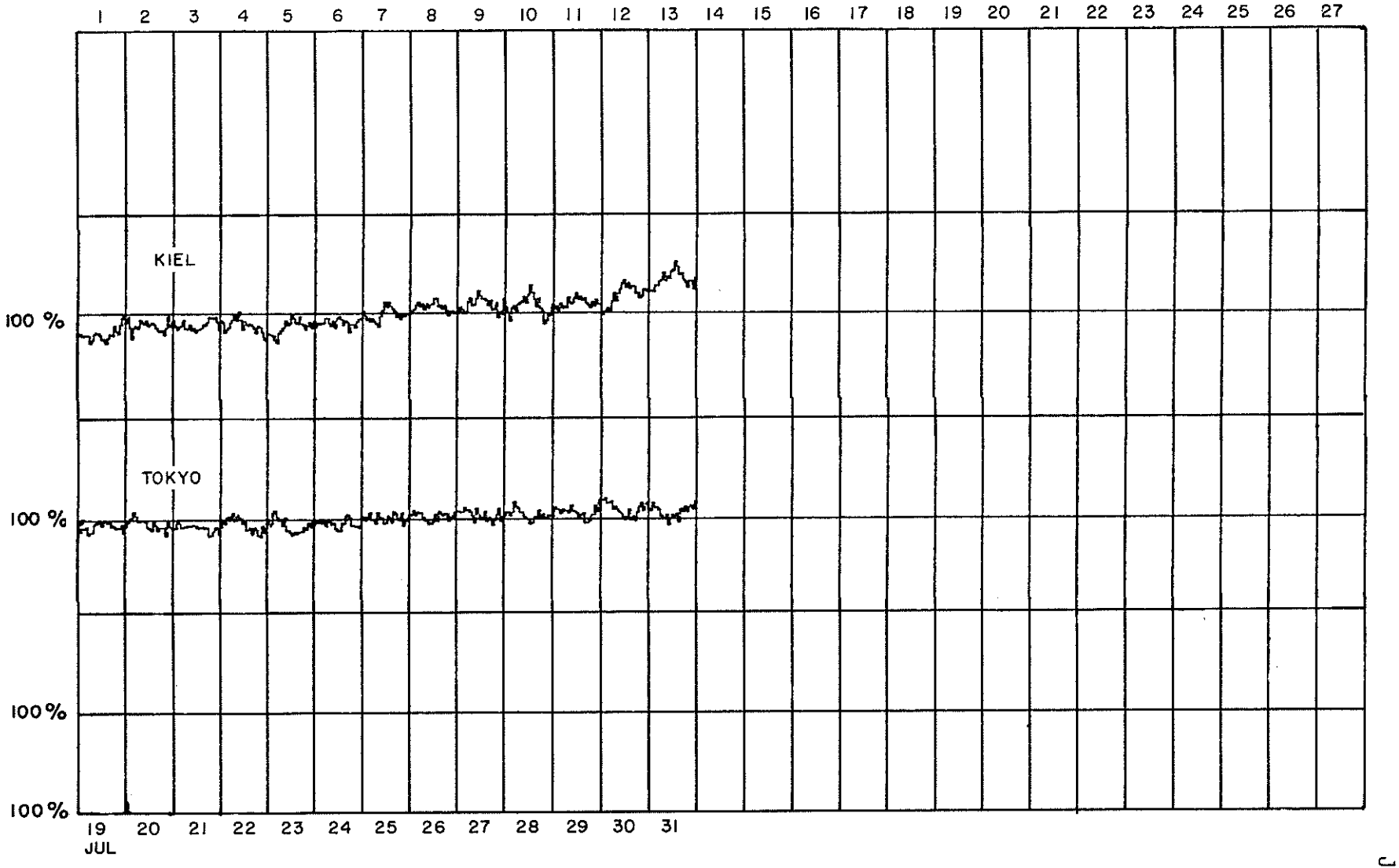
COSMIC RAY INDICES
(Neutron Monitors)

Bartels Rotation 1981 (June-July 1978)



COSMIC RAY INDICES
(Neutron Monitors)

Bartels Rotation 1982 (July 1978)



COSMIC RAY INDICES
(Neutron Monitors)

	THULE	ALERT	DEEP RIVER	CALGARY	SULPHUR MT	KIEL	CLIMAX	TOKYO	KULA
July 1978	Average cts/hr	Average cts/hr	Average cts/hr	Average cts/hr	Average cts/hr	Average cts/hr	Average cts/hr	Average cts/hr	Average cts/hr
1	Data not available at time of publication.	Data not available at time of publication.	Data not available at time of publication.	Data not available at time of publication.	Data not available at time of publication.	6046.7	Data not available at time of publication.	3535.8	Data not available at time of publication.
2						6069.4		3544.0	
3						6100.0		3546.2	
4						6086.1		3565.1	
5						6052.8		3555.5	
6						6070.3		3545.2	
7						6112.2		3545.7	
8						6147.1		3560.3	
9						6157.9		3554.0	
10						6143.5		3554.8	
11						6165.1		3561.4	
12						6166.8		3576.2	
13						6015.4		3538.8	
14						5885.0		3500.0	
15						5849.0		3516.1	
16						5911.5		3534.2	
17						5967.4		3554.9	
18						6061.4		3567.8	
19						6088.5		3568.7	
20						6112.5		3572.1	
21						6114.2		3564.8	
22						6112.3		3570.7	
23						6107.2		3568.7	
24						6120.6		3571.6	
25						6145.4		3580.9	
26						6167.4		3584.4	
27						6175.0		3586.3	
28						6170.2		3586.9	
29						6179.6		3590.6	
30						6204.6		3596.8	
31						6252.1		3591.3	
MEAN						6095.4		3561.0	

( ) Number of hours for which data are available if less than 24. Number of Section Hours at Climax if sum of both sections is less than 40 hours.

Notes: Thule, Alert, Calgary, Sulphur Mountain, Kiel, Climax and Kula Scaling Factors = 100. Deep River Scaling Factor = 300. Tokyo Scaling Factor = 256.

ERRATA: May 1978 Deep River and Alert graphical plots were reversed in SGD 407 Part I, page 156, July 1978 issue. The upper curve is actually Deep River data and the lower curve is Alert data. Drs. S. P. Agrawal and D. Venkatesan (The University of Calgary) kindly brought this unfortunate error to our attention.

GEOMAGNETIC ACTIVITY INDICES

JULY 1978

Day		Three-Hourly Indices Kp									Three-Hourly Indices Km								Ap	aa * *					Cp
		1	2	3	4	5	6	7	8	Sum	1	2	3	4	5	6	7	8		N	S	M			
1		2-	1+	1	2+	2+	2-	0+	1-	11+	2-	1+	1+	2+	2	1+	0+	1-	6	12	12	13	11	C	0.2
2	Q8	2	1-	2	2-	1+	2	1	1	12-	2-	1-	2	2	1+	1+	1	1	5	12	10	12	10	CC	0.2
3		1	1	2+	2	2-	1	2	5	16	1	1-	2+	2	2-	1+	2	4	11	18	13	11	21		0.6
4	D1	6	4-	4	4	8-	8	4-	6	43	5+	3+	4+	4-	6-	6-	3+	5	80	95	71	64	103		1.8
5	D3	6-	7	7-	4+	4	4-	4-	3-	38-	4	6	6-	5-	4	3	3	2+	53	68	69	98	40		1.6
6		3-	2	3+	2-	3	4-	3-	2+	21+	2	2+	4-	2-	2+	3+	3-	2-	13	25	21	23	23		0.7
7		3-	2+	2	4-	3+	3+	4-	2	23	3	2	2+	3	3-	3-	3	2	14	26	23	22	27		0.8
8		3-	3-	3-	2-	3+	4+	3	2+	23-	3-	3-	2+	2-	3-	4-	3-	2	14	33	16	20	31		0.8
9		3	1	1	1	2	3+	2+	2	16-	3-	1+	1+	1+	2-	3-	2-	1+	8	17	8	10	15	C	0.5
10		2	2+	3+	2	3-	2-	2+	2+	19-	2-	2+	3	2-	2+	1+	2-	2+	10	21	18	21	18		0.5
11	Q0	2	2-	1+	3-	1+	1	1-	1-	11+	2	2-	1+	3-	1	1-	0+	1	6	11	10	14	8	CC	0.3
12	Q5	0+	0+	0+	1-	1	2+	2	2	9	0+	1-	0+	1-	1-	2-	1+	2-	4	12	8	5	15	C	0.2
13	Q4	3	3	4+	2	4	3	2-	5-	26-	3	3	4-	2+	3	2	2-	4-	20	38	23	32	29		1.0
14	D2	6-	5	4	5+	6-	5+	5	3+	39+	5	4+	3+	5	5-	4	4	3	48	48	56	53	51		1.6
15		3+	2+	1+	1-	0+	1-	1+	1+	11+	3	3	2	1-	1-	0+	1	1	6	11	12	19	4	K	0.3
16		4-	1-	0+	1-	1+	1	1+	2-	11-	3+	1	0+	1-	1+	2-	1	1+	6	15	11	15	11	KK	0.3
17	Q9	2-	1+	1-	2+	1	1+	2-	2-	12-	2-	1	1	2+	1	1	2-	1+	6	10	7	9	9	CC	0.2
18	D5*	2	2+	1-	1+	3	4+	4	5	23-	2	3-	1+	2	3	4-	3	5-	18	33	32	17	48		1.0
19		3	3	4-	2+	2+	2-	1+	1	18+	3-	4-	4-	2	2+	2	1	1+	11	21	19	29	11		0.6
20	Q6	1+	2-	2	1+	1	1+	1+	1	11	1+	2-	2+	1+	1-	1	1	1	5	11	8	12	8	CC	0.2
21		2-	1+	2-	2-	2-	1+	2-	2-	13-	2-	1+	2-	2	1+	1+	1+	1+	6	13	9	11	11	CC	0.3
22		2+	3	2+	2-	1	1	2+	3-	16+	2	3-	2+	1+	1	1+	2	3-	8	21	12	16	17		0.5
23		2+	2+	2	1	1-	2	3-	3-	16-	2-	3-	2	1	0+	1+	3-	3-	8	21	13	14	20		0.4
24		1+	1	1+	1	1+	1	2	3-	12-	2-	1-	1	1	1+	2-	2-	2+	6	15	9	8	16	C	0.3
25		2+	2-	1	1+	2-	2-	3	3	16-	2	2	1	1+	2-	2-	3	3	8	19	15	14	21		0.4
26	Q7	2-	2-	1-	1-	2-	1+	2	2	12-	2-	2-	1+	1-	1+	1+	2-	2-	5	14	10	12	12	CK	0.2
27	Q4	1	0+	0+	2-	2-	1-	1	2	9-	1	0	0+	2-	1+	0+	1	2	4	9	8	9	9	CC	0.1
28		2-	2+	3-	2+	2-	1-	0+	0+	12	2-	2+	3-	2+	1+	0+	0	0	6	10	10	14	6	CC	0.3
29	Q3	0	0+	1	1+	1	1	1	2	8-	0+	0+	1	1+	1+	1	1	2-	4	9	9	5	12	CC	0.1
30	Q2	2-	1-	0+	1	1	1	0+	0+	6+	2-	1-	0+	0+	1-	1-	0+	0	3	8	4	7	5	CC	0.1
31	Q1	0	0	0+	0+	0+	1-	1-	0+	3-	0	0	0	0	0+	0+	0+	0	2	3	3	2	4	CC	0.0
																		Mean	13	21.9	17.7	19.9			0.52

Day	Three-Hourly Indices Kn								Three-Hourly Indices Ks							
	1	2	3	4	5	6	7	8	1	2	3	4	5	6	7	8
1	2	1+	1+	2+	2+	2-	0+	1	1	1	1+	2	1+	1+	0	0+
2	2-	1-	2+	2+	2-	2	1+	1-	1+	1-	2-	1+	1-	1-	1-	1+
3	1-	1-	3-	2+	2	1+	2	4+	1	1	2-	1+	1+	1	2	4
4	6-	3+	4	4	6	6-	3+	5-	5	3+	4+	3+	5	6	3+	5+
5	4	6	6	5-	4	3	3	3-	4	6-	6-	5-	4-	3-	3	2
6	2+	2+	4	2	3-	3+	3-	2	2	2	3+	1+	1+	3+	3-	1+
7	3-	2	3-	3+	3-	3-	3	2	3	2+	2+	3-	3-	3-	3+	2
8	2+	2+	2+	2+	3	4	3-	2+	3-	3-	2	1+	2	4-	2+	2
9	3-	1+	1+	1+	2	3	2+	2-	3-	1+	1+	1+	1	2+	1+	1
10	2-	3-	3+	2	3-	2	2	2+	1+	2	3-	2-	2	1-	1	2
11	2	2-	2-	3	1+	1	1-	1+	2	1+	1-	2+	1-	0+	0	0+
12	1-	1	0+	1-	1-	2+	2	2	0	0+	0+	1-	1-	1	1-	1+
13	3+	3	4	2+	4-	3-	2	4	3-	3	4-	2	2	1+	1+	3
14	5	5-	4-	5	5-	4	4	3+	5	4+	3	5-	4+	4	4+	3-
15	3+	3	2+	1+	1	0+	1+	1+	3-	3	2-	0	0	0	0+	0+
16	3-	1-	0+	1+	2-	2-	1+	2-	4-	1	0+	0+	0+	2-	1-	1
17	2-	1+	1	3-	1+	1+	2	2	2-	1-	1	2-	1-	0+	1+	1-
18	2	3-	1+	2+	3	4-	3	5-	2	3-	1+	2	3-	3+	3	4+
19	3-	3+	4	2+	3-	2	1	1+	3	4-	4-	2-	1+	2-	1	1+
20	1+	2	2+	1+	1+	1+	1+	1	1	1+	2+	1	0+	0+	1-	1+
21	2-	1+	2+	2+	2	2-	2-	2-	2-	2-	1+	1+	1	0+	1-	1-
22	2	3-	2+	2-	1+	1+	2	2+	2	3-	2+	1	1-	1	2	3-
23	2	3-	2+	1+	1-	2	3-	3-	1+	3-	2-	1-	0+	1-	3-	3
24	1+	1-	1+	1+	2-	1+	2	2+	2	1-	1	1-	1-	2-	2-	2+
25	2	2	1	1+	2	2	3-	3-	2	2	1	1+	1+	1	3+	3
26	2-	2-	1+	1	2	2-	2	2+	2-	1+	1+	1-	1-	1-	1+	1+
27	1	0	0+	2-	2	0+	1	2	1	0	0+	1+	1-	0	1-	2
28	2-	2+	3	3-	2	0+	0+	0	1+	2+	2+	2-	1	0+	0	0
29	0+	1-	1+	1+	1+	1+	2-	2-	0+	0+	1-	1	1	1	0+	2-
30	2-	1-	0+	1	1	1	1-	0	1+	0+	0+	0	0	0+	0+	0
31	0+	0	0	0+	1-	1-	1-	0	0	0	0	0	0	0	0+	0

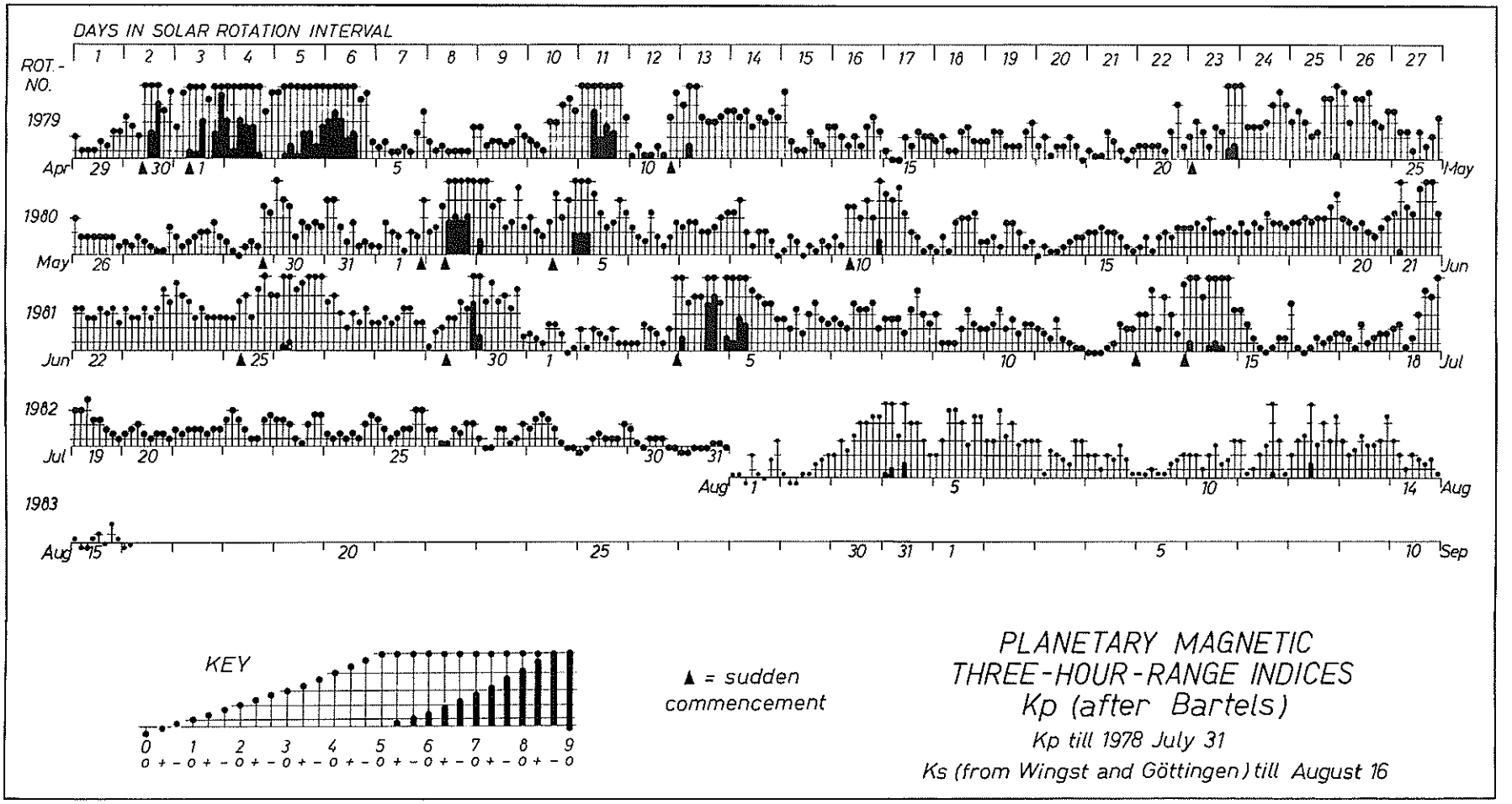
Quiet days (Q) and disturbed days (D), geomagnetic planetary three-hour-range indices (Kp) (integers alone are equivalent to those normally given with a small zero), magnetic character figures (Cp), and average amplitude (Ap) (unit 2γ) prepared by Geophysikalisches Institut at the University of Göttingen, F.R. of Germany for the International Service of Geomagnetic Indices. Ten most quiet days [Q1-Q0(10)] and five most disturbed days [D1-D5] are ordered from most quiet or disturbed, respectively. A or K means "not really quiet" (A = "Ap>6", K = "Ap ≤6 but one Kp ≥3o or two Kp values ≥3-"). An * means "not really disturbed" (Ap<20).

Geomagnetic three-hourly indices (Kn), (Ks) and (Km) as in IAGA-Bulletin No. 32 and indices (aa), "antipodal", as in IAGA-Bulletin No. 33 prepared by P. N. Mayaud of the Institut de Physique du Globe, Paris, France. Really quiet (C) and quiet but slightly disturbed three-hourly intervals (K) are given for 24-hour and 48-hour intervals centered on 12 UT.

DAILY AVERAGE INDICES Ap

	1977					1978						
DAY	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL
1	6	4	4	5	6	7	15	33	12	88	9	6
2	4	6	5	6	69	8	14	27	15	94	82	5
3	7	8	10	4	9	13	14	15	41	83	31	11
4	9	6	7	8	14	89	11	3	55	96	26	80
5	40	3	8	10	18	31	17	6	21	7	38	53
6	21	4	8	7	5	34	14	7	9	5	8	13
7	17	6	3	5	3	13	7	9	5	7	11	14
8	12	8	6	3	2	19	10	20	5	16	10	14
9	20	11	2	3	3	23	16	14	6	85	4	8
10	12	13	4	9	4	21	7	12	36	10	24	10
11	28	19	12	6	38	7	5	7	64	30	17	6
12	11	6	28	18	21	4	10	3	29	18	10	4
13	11	28	14	26	16	8	8	12	24	11	7	20
14	12	10	13	42	8	3	11	10	51	9	4	48
15	11	9	19	25	5	2	48	17	19	5	6	6
16	9	7	8	14	9	14	11	24	8	7	6	6
17	29	10	12	8	12	9	10	25	7	8	9	6
18	13	6	22	6	3	12	10	24	19	5	11	18
19	24	42	28	6	3	6	12	15	38	4	17	11
20	8	44	7	4	4	3	12	9	23	8	11	5
21	5	64	5	5	6	1	12	7	9	26	33	6
22	5	63	22	3	6	3	22	13	8	24	15	8
23	6	21	6	2	4	2	6	15	22	24	18	8
24	10	12	6	2	5	6	5	6	48	26	19	6
25	27	10	4	15	5	12	12	3	17	10	24	8
26	13	18	6	19	11	12	37	49	18	7	46	5
27	14	24	62	12	6	5	42	70	16	5	15	4
28	7	9	47	5	10	9	46	17	12	7	12	6
29	6	3	9	6	8	36		14	6	8	32	4
30	5	4	9	12	5	36		16	58	18	31	3
31	4		6		6	23		8		12		2
MEAN	13	16	13	10	10	15	16	16	23	25	20	13

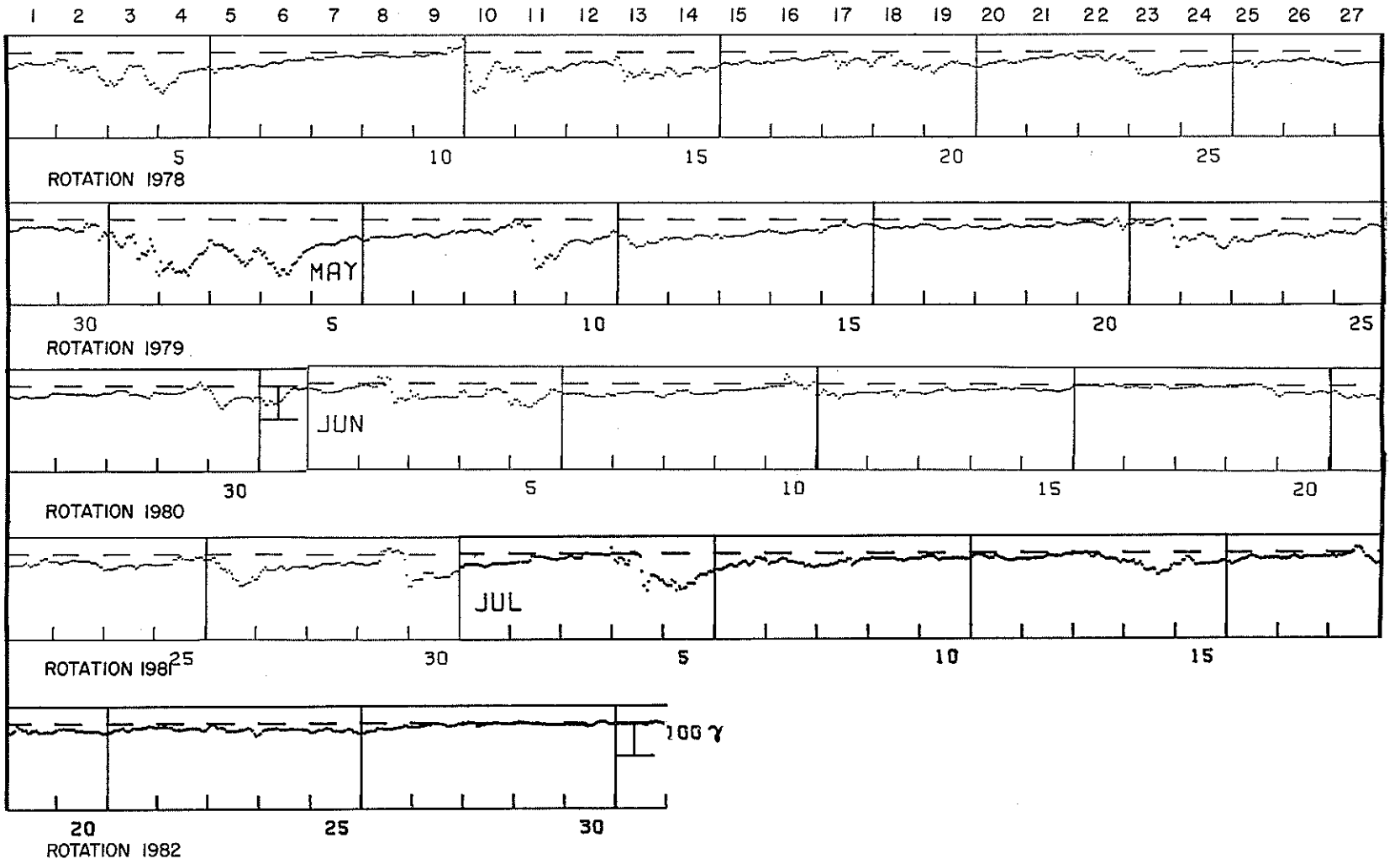
GEOMAGNETIC ACTIVITY INDICES



GEOMAGNETIC ACTIVITY INDICES

Hourly Equatorial Dst

by Bartels Rotation



Note: Both the sensitivity indicator placed on the last day of the month and the zero reference level change from month to month.

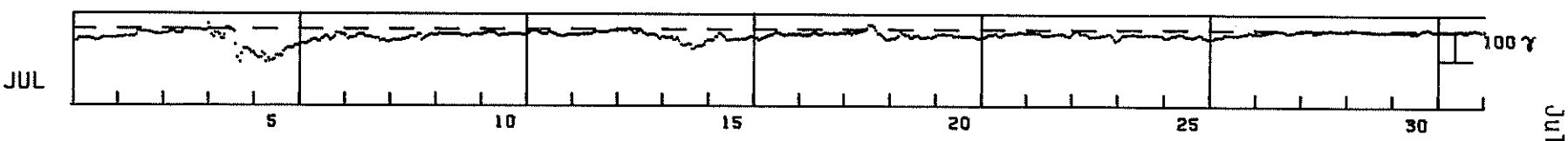
HOURLY EQUATORIAL Dst VALUES (PROVISIONAL)

JULY 1978

NASA/GODDARD SPACE FLIGHT CENTER

(Time-UT) (Units-Gammas)

DAY	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
1	-45	-41	-35	-35	-35	-35	-35	-33	-35	-38	-38	-43	-42	-40	-36	-32	-31	-33	-33	-32	-32	-32	-32	-30
2	-29	-29	-29	-27	-26	-27	-26	-26	-30	-21	-10	-12	-13	-12	-13	-15	-16	-17	-19	-22	-22	-23	-20	-16
3	-19	-18	-14	-11	-10	-12	-17	-18	-18	-17	-7	-1	-2	-6	-6	-7	-6	-7	-6	-8	-10	-9	-9	15
4	-4	-24	-32	-14	-17	-24	-37	-38	-23	2	2	-6	-9	-13	-58	-100	-114	-85	-66	-68	-72	-76	-84	-83
5	-92	-98	-100	-98	-81	-90	-113	-100	-111	-105	-102	-90	-92	-92	-92	-76	-68	-63	-65	-67	-63	-56	-55	-57
6	-50	-48	-50	-50	-45	-42	-38	-35	-37	-43	-41	-33	-30	-25	-24	-36	-39	-33	-25	-14	-14	-16	-21	-17
7	-26	-35	-30	-29	-28	-26	-20	-17	-17	-20	-27	-30	-28	-31	-34	-36	-33	-35	-41	-38	-37	-44	-46	-41
8	-39	-37	-41	-39	-38	-40	-35	-36	-32	-31	-25	-26	-30	-26	-19	-22	-40	-33	-27	-24	-20	-18	-23	-24
9	-21	-14	-20	-20	-20	-21	-19	-17	-20	-20	-18	-17	-22	-26	-24	-23	-29	-24	-21	-18	-19	-19	-21	-19
10	-18	-13	-15	-11	-11	-14	-9	-16	-24	-27	-21	-19	-22	-21	-18	-17	-20	-21	-20	-19	-21	-23	-24	-19
11	-15	-11	-6	-5	-7	-9	-13	-18	-21	-19	-17	-9	-14	-17	-20	-23	-25	-27	-28	-28	-26	-21	-21	-22
12	-24	-24	-24	-20	-18	-17	-18	-18	-19	-19	-15	-12	-9	-11	-13	-14	-13	-12	-13	-8	-6	-6	-6	-7
13	-2	-5	-6	-4	-3	-1	1	-7	-17	-18	-10	-6	-9	-16	-19	-24	-22	-19	-20	-24	-26	-31	-36	-27
14	-30	-33	-29	-29	-27	-39	-36	-30	-42	-54	-57	-56	-53	-50	-55	-69	-68	-60	-56	-57	-56	-52	-43	-37
15	-38	-41	-37	-28	-25	-15	-15	-23	-30	-39	-38	-36	-35	-36	-34	-34	-34	-33	-35	-34	-31	-27	-25	-26
16	-32	-32	-39	-35	-31	-28	-25	-21	-20	-19	-14	-12	-15	-17	-19	-23	-24	-19	-17	-17	-19	-19	-18	-16
17	-20	-24	-23	-22	-23	-20	-15	-12	-13	-18	-22	-20	-14	-13	-14	-16	-17	-16	-14	-16	-16	-13	-13	-14
18	-15	-12	-14	-20	-12	-14	-12	-9	-6	-5	-4	2	13	10	10	5	-7	-16	-17	-23	-29	-37	-39	-35
19	-33	-31	-31	-27	-23	-7	-16	-20	-23	-24	-31	-31	-24	-22	-21	-29	-32	-29	-28	-26	-27	-32	-27	-23
20	-20	-16	-18	-15	-17	-17	-17	-18	-21	-26	-24	-24	-25	-28	-28	-25	-27	-26	-25	-24	-29	-34	-35	-33
21	-30	-26	-24	-19	-19	-19	-16	-13	-21	-26	-24	-19	-15	-15	-14	-17	-14	-13	-13	-10	-9	-13	-15	-13
22	-12	-13	-12	-11	-15	-16	-15	-21	-24	-23	-22	-20	-18	-17	-16	-15	-18	-17	-17	-20	-25	-26	-23	-15
23	-9	-4	-6	-13	-18	-16	-15	-21	-27	-27	-24	-24	-25	-24	-21	-20	-20	-17	-15	-16	-23	-35	-41	-36
24	-31	-23	-19	-19	-17	-17	-16	-15	-15	-21	-19	-21	-22	-21	-17	-20	-21	-21	-21	-19	-20	-23	-24	-28
25	-32	-31	-27	-22	-21	-22	-19	-15	-17	-20	-25	-28	-27	-28	-30	-27	-24	-19	-18	-24	-31	-30	-35	-36
26	-36	-33	-28	-26	-25	-26	-24	-17	-17	-19	-20	-22	-22	-22	-21	-17	-16	-14	-13	-13	-9	-12	-15	-15
27	-16	-13	-13	-12	-11	-10	-7	-7	-7	-2	-6	-6	-7	-6	-9	-11	-14	-11	-10	-10	-8	-4	-6	-5
28	-5	-3	1	0	-1	-4	-14	-11	-8	-9	-5	-2	-4	-3	-1	-1	-4	-6	-7	-7	-6	-5	-5	-6
29	-5	-1	2	0	-4	-4	-5	-7	-5	-5	-8	-9	-9	-9	-9	-11	-10	-9	-9	-9	-9	-9	-7	-7
30	-6	-7	-7	-9	-7	-7	-8	-8	-9	-13	-12	-12	-11	-8	-3	1	2	3	2	-2	-6	-8	-8	-6
31	-4	-5	-8	-7	-7	-8	-7	-5	-3	-3	-2	-5	-8	-11	-7	-1	1	1	2	-1	-4	-6	-5	-5



NOTE: Hourly values of the provisional equatorial Dst index for July 1978 are based on data from Hermanus, Kakioka, and San Juan. The magnetometer at Honolulu was not operating during May, June and July 1978.

PRINCIPAL MAGNETIC STORMS

JULY 1978

OBS. 3 letter IAGA code	GEOMAGNETIC LATITUDE	COMMENCEMENT DAY	hr min (UT)	TYPE	SC - AMPLITUDES D(')	H(γ)	Z(γ)	MAXIMUM 3 HOUR - INDEX K DAY(3 HOUR PERIOD)	K	RANGES D(')	H(γ)	Z(γ)	UT END DAY	HOUR
COL	64.6N	3	2304	SC*	+30	+70	+29	04(6)	8	457	2340	1600	05	20
NEW	55.1N	3	2305	SC*	5	66	3	05(3)	8	78	580	510	06	10
WIT	54.2N	3	2305	SC*	- 4 *	+85 *	+ 3	04(5)	8	40	415	230	05	13
FRD	49.6N	3	2305	SC*	- 2	+80	- 9	04(5,6)	7	35	325	155	07	03
SJG	29.9N	3	2305	SC	- .5	+44	+10	04(1)	6	12	153	66	05	12
GUL	24.5N	3	2305	SC	- .7	38	- 2	--	-	12	211	63	06	02
JAI	17.3N	3	2305	SC	- .7	34	- 6	--	-	10	196	50	06	02
SHL	14.6N	3	2305	SC	..	29	6	--	-	8	202	36	06	02
UJJ	13.5N	3	2305	SC	- .2	42	- 9	--	-	8	221	50	06	02
ABG	09.5N	3	2305	SC	- .3	33	- 4	04(5)	6	9	215	65	06	02
HYB	07.6N	3	2306	SC	- .2	+33	- 2	04(6)	7	7	225	36	06	01
GUA	04.0N	3	2306	SC*	1	35	-12	04(5)	6	10	250	40	05	19
ANN	01.4N	3	2305	SC	- .8	34	18	--	-	7	256	65	06	02
HUA	00.6S	3	2305	SC	1	48	10	04(6)	7	15	471	63	05	20
TRD	01.2S	3	2305	SC	.3	25	39	--	-	5	281	121	06	02
PMG	18.7S	3	2305	SC	+ .4	+29	+24	04(5) 05(4)	6	8	240	80	05	21
HER	33.7S	3	2308	SC	+ 2	+23	+23	04(6) 05(2)	6	46	186	160	06	16
GNA	43.3S	3	2305	SC*	+ 4.8*	+14	+19 *	04(6,8) 05(4)	6	23	180	160	05	20
TOO	46.7S	3	2306	SC	-19	+13	--	04(3)	4	38	55	16		
TOO	46.7S	4	0847	SC	- 4	+20	--	05(6)	6	171	92	60	05	20
HYB	07.6N	6	0617	SC	- .5	+31	- 5	06(3,6) 07(3,4)	4	6	85	22	07	20
HUA	00.6S	6	0110	..	..	..	..	06(6)	5	6	186	43	07	21
IRK	41.0N	30	2306	SC*	- 2.1	24	5	04(4,5,6)	6	26	226	86	05	21
COL	64.6N	13	2328	SC*	+ 6	+124	..	14(4,5,6)	6	143	1490	760	15	06
NEW	55.1N	13	2328	SC	6	84	6	14(2,4,5)	6	63	239	348	15	08
WIT	54.2N	13	2328	SC	-10	+62		14(1,5,6,7)	5	20	175	115	15	01
FRD	49.6N	13	0015	SC*	- 1	+28	- 6	14(1,4)	6	32	152	71	16	03
GUL	24.5N	13	2328	SC	- .2	22	- 1	--	-	8	118	42	15	01
JAI	17.3N	13	2328	SC	- .2	19	- 2	--	-	9	163	42	15	01
SHL	14.6N	13	2328	SC	2.1	18	4	--	-	7	139	27	15	01
UJJ	13.5N	13	2328	SC	- .1	25	- 3	--	-	6	131	31	15	01
ABG	09.5N	13	2328	SC	- .1	20	6	14(4)	5	6	129	32	15	01
HYB	07.6N	13	2328	SC	+ .9	+24	- 1	14(5)	6	5	179	22	15	10
HYB	07.6N	13	0016	SC	- .1	+12	- 1	13(2,3)	4	5	112	14	13	18
GUA	04.0N	13	2337	SC	1	35	-10	13(3)	5	10	120	36	15	10
ANN	01.4N	13	2328	SC	- .1	19	8	--	-	5	174	77	15	01
HUA	00.6S	13	0015	SC	1	17	3	14(5,6,7)	5	9	208	54	15	06
TRD	01.2S	13	2328	SC	.7	14	25	--	-	3	201	67	15	01
PMG	18.7S	13	2327	SC	+ .3	+24	+21	14(2,3,4)	5	6	110	70	15	09
GNA	43.3S	13	2328	SC	+ 1.0	+ 8	+ 4	14(2,4,5,6,7)	5	13	100	90	15	07
TOO	46.7S	13	2330	SC	-15	+11	--	14(4)	5	99	116	36	15	08
TOO	46.7S	13	0012	SC	-11	+ 5	--	13(3)	4	19	51	19	13	15
NEW	55.1N	18	0418	SC*	1	22	--	18(8)	5	25	101	71	20	12
HYB	07.6N	18	0100	..				19(2,3)	5	7	112	37	19	19
GNA	43.3S	18	0417	SC*	- 1.3	- 9 *	- 6	18(8)	5	13	50	70	19	09
TOO	46.7S	18	0418	SC	+ 5	- 3	--	18(6)	4	12	46	11	19	18

Reports were received from the following observatories:

Alibag Annamalainagar College Fredericksburg Gnangara Guam Gulmarg Hermanus Huancayo
Hyderabad Irkutsk Jaipur Newport Port Moresby San Juan Shillong Toolangi Trivandrum
Ujjain Witteveen

Please note: The Boulder Geomagnetic Observatory converted to digital format in March 1978. Since that time, data which were reduced from the anolog recordings are no longer available, e.g., Principal magnetic storms and K indices.

SUDDEN COMMENCEMENTS AND SOLAR FLARE EFFECTS

JULY 1978

PRELIMINARY REPORT ON RAPID MAGNETIC VARIATIONS (by Dr. A. Romaná).

The meaning of the station symbols is given in the IAGA-News No. 16.
Times of ssc are mean values.

Sudden commencements followed by a magnetic storm or a period of storminess (ssc).

03	2305	A: SOD WNG WIT ESK DOU VIC FUR OTT AQU EBR COI TOL FRD HUA LMM LAS TRW PAF DRV
		B: NGK HAD MMB KAK KNY CZT
13	0015	A: VIC OTT FRD HUA
		B: ESK WNG WIT HAD FUR AQU EBR TOL FRD LMM LAS TRW PAF DRV
		C: NGK MMB CZT
13	2328	A: VIC FUR AQU EBR COI TOL HUA LMM LAS TRW
		B: WNG WIT HAD MMB KAK KNY
		C: NGK CZT PAF DRV
18	0418	B: FUR HUA DRV
		C: VIC MMB CZT PAF

Solar-flare effects (sfe)

Effects confirmed by ionospheric or solar observations are underlined.

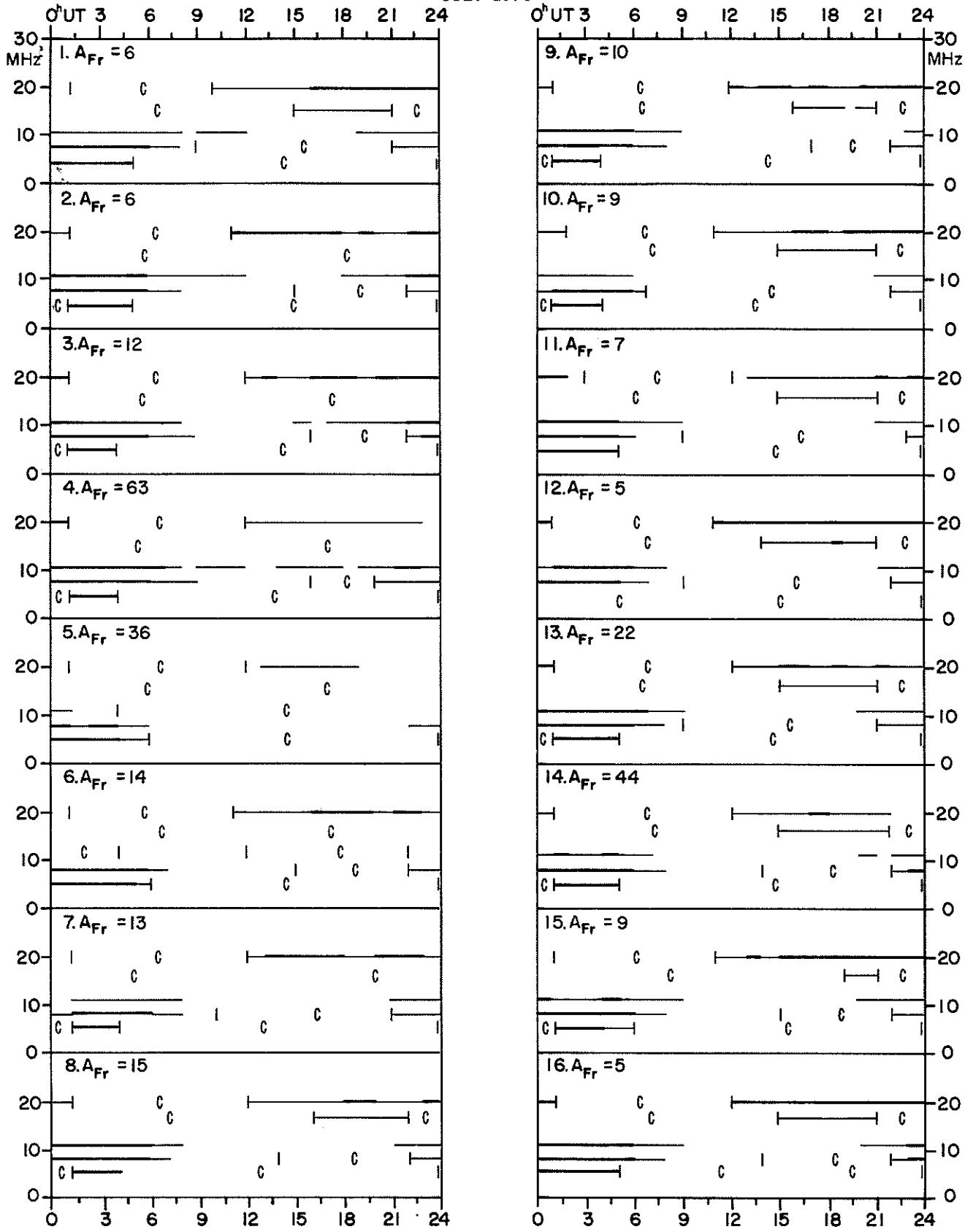
06	1113 - 1131	NGK (ssc: B: TOL; C: PAF)
06	1512 -	WNG (si: A: HUA; C: NGK)
07	0534 - 0606	KAK
07	1440 - 1455	HUA
08	1946 - 2010	HUA
09	1819 - 1845	HUA
10	0607 - 0640	WNG WIT MMB KAK KNY (bp: B: LMM)
10	1724 - 1748	HUA
11	0359 - 0415	MMB KAK
11	0426 - 0511	MMB KAK KNY
11	0542 - 0609	MMB KAK KNY (b: A: LMM)
11	1051 - 1130	WNG WIT NGK FUR AQU EBR HUA LAS (ssc: B: TOL? - bs: A: LMM)
11	2021 - 2030	HUA
11	2227 - 2300	MMB KAK KNY HUA
12	0242 - 0340	MMB
13	1349 - 1434	NGK
15	0052 - 0118	KNY
21	1854 - 1906	HHUA

Very unusual events

04	1440 - 1630	pg FUR (∿700s∿20nT)
	1443	si HUA (+ + +)
	1452	bp CZT (-64 +98 -110) PAF (+557 +450 -220) DRV (+273 +173 -380)
09	0500 - 1400	pc3 FUR (20/25s 5nT very clear)
	0657 - 1305	pc3 TOL

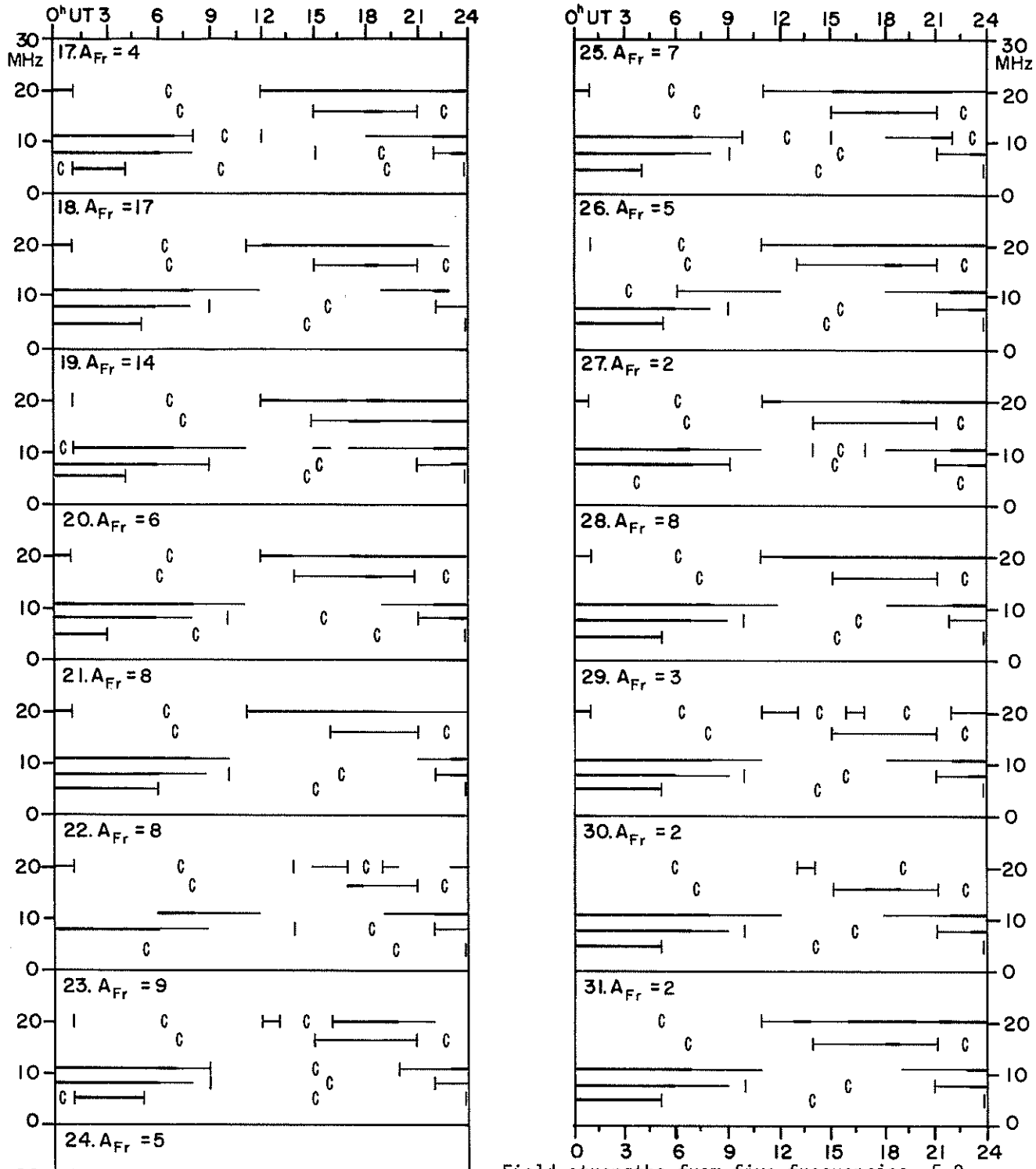
TRANSMISSION FREQUENCY RANGES -- NORTH ATLANTIC PATH

JULY 1978



TRANSMISSION FREQUENCY RANGES -- NORTH ATLANTIC PATH

JULY 1978



Field strengths from five frequencies, 5.0, 8.1, 10.9, 16.4 and 20.0 MHz, observed on a Lüchow -Norfolk circuit are represented above. Heavy solid lines represent field strengths -12 dB above 1 μv/m (transmitter power reduced to 1 kW). Observed field strengths between -12 dB above 1 μv/m and -40 dB above 1 μv/m are represented by the fine line. Adapted from Observations by Deutsche Bundespost

RADIO PROPAGATION QUALITY INDICES

JULY 1978

Quality indices calculated for reception at Lüchow

DAY	TOKYO	NORFOLK	MOSCOW	CANBERRA	BRACKNELL
1	8.3	4.6	12.5	4.4	13.1
2	6.9	5.2	11.5	5.0	12.7
3	7.1	4.7	12.7	5.1	13.1
4	2.8	4.0	11.7	3.3	12.0
5	2.1	3.9	11.3	4.3	11.4
6	4.9	4.3	11.7	3.9	12.4
7	5.1	4.8	11.4	4.0	12.0
8	4.4	4.0	11.6	4.2	12.5
9	5.3	4.3	11.1	3.9	11.5
10	5.7	4.2	11.0	3.9	11.5
11	6.6	3.7	10.3	4.3	12.5
12	7.3	5.4	12.6	4.3	12.8
13	5.0	4.4	11.3	4.8	12.4
14	3.2	3.6	11.2	5.5	12.1
15	5.7	5.1	11.4	5.0	12.7
16	7.2	5.7	11.6	5.2	12.3
17	6.7	5.5	11.6	4.5	12.6
18	5.6	5.6	12.0	4.6	12.6
19	6.0	5.4	11.3	5.3	12.2
20	7.3	5.1	11.4	4.6	12.9
21	7.6	4.8	11.8	4.8	12.8
22	5.8	4.1	11.0	5.1	12.5
23	5.3	4.5	12.1	4.6	12.5
24	5.4	5.3	11.5	4.3	12.4
25	5.3	5.1	11.8	4.5	12.7
26	6.0	5.1	11.4	5.2	12.9
27	5.6	4.7	11.5	5.0	12.5
28	7.5	5.4	11.3	4.9	12.4
29	7.3	5.1	11.6	4.5	12.5
30	7.2	4.4	11.9	4.2	12.4
31	7.2	4.9	12.0	4.2	12.9
MEAN	5.9	4.7	11.6	4.6	12.4

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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."