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Solar-Geophysical Data

(Prompt Reports)

NUMBER 318-PART I
DATA FOR
JANUARY 1971
DECEMBER 1970

DATA COMPILED BY AERONOMY AND SPACE DATA CENTER
BOULDER, COLORADO

WASHINGTON, D.C.
FEBRUARY 1971

SOLAR-GEOPHYSICAL DATA

Table of Contents

	Page
Part I	
Index for 1970 and 1971	2
Data for January 1971	3-24
Data for December 1970	27-110
Part II	
Index for 1970 and 1971	2
Data for August 1970	3-84
Data for July 1970	85-92
Miscellaneous Data Sudden Commencements and Solar Flare Effects October - November 1970 Solar Radio Waves - Spectral Observations Weissenau - November 1970	93-97

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299 Part I or 299 Part II to number of current issue

INDEX FOR 1970 - 1971 DATA PUBLISHED IN "SOLAR-GEOPHYSICAL DATA"

		1970 Sep	Oct	Nov	Dec	1971 Jan
A.	Solar and Interplanetary Phenomena					
A.1	Sunspot Drawings	315	316	317	318	
A.2a	Zürich Provisional Relative Sunspot Numbers R_Z	314	315	316	317	318
A.2b	Zürich Final Sunspot Numbers R_Z					
A.2c	American Relative Sunspot Numbers R_A,	314	315	316	317	318
A.3a	Mt. Wilson Magnetograms	315	316	317	318	
A.3b	Mt. Wilson Magnetic Characteristics of Sunspots	315	316	317	318	
A.4	Hα Spectroheliograms	315	316	317	318	
A.5	Calcium Plage Drawings - McMath (or Catania)	315	316	317	318	
A.5a	Calcium Plage (McMath) and Sunspot Regions	315	316	317	318	
A.5b	McMath Daily Calcium Plage Index					
A.7b	Coronal Line Emission	315	316	317	318	
A.8aa	2800 MHz - Daily Values of Solar Flux (ARO-Ottawa)	314	315	316	317	318
A.8ac	2800 MHz - Daily Values of Adjusted Solar Flux (ARO-Ottawa)	314	315	316	317	318
A.8g	15,400, 8800, 4995, 2695, 1415, 606, 245 MHz Adj. Solar Flux (AFCRL)	314	315	316	317	318
A.9a	9.1 cm Radio Maps of the Sun (Stanford)	315	316	317	318	
A.9b	21 cm Radio Maps of the Sun (Fleurs)	315	316	317	318	
A.9c	8.6 mm Radio Maps of the Sun (Prospect Hill)	315	316	317	318	
A.10a	169 MHz - Interferometric Observations (Nançay)	314	315	316	318	318
A.10b	408 MHz - Interferometric Observations (Nançay)	314	315	316	318	318
A.10c	21 cm East-West Solar Scans (Fleurs)	314	315	316	317	318
A.10d	43 cm East-West Solar Scans (Fleurs)	314	315	316	317	318
A.10e	10.7 cm East-West Solar Scans (Ottawa-ARO)	314	315	316	317	318
A.11aa	Solar X-ray Radiation (Explorer 37)	315	316	317	318	
A.11ab	Solar X-ray Radiation (Explorer 37) (Graphs)					
A.11e	Solar X-ray Spectroheliograms (OSO-5)	316	316	317		
A.12aa	Solar Protons (Explorer 41) Daily hourly values					
A.12ab	Solar Protons (Explorer 41) Graphs					
A.12ba	Cosmic Ray Protons (Pioneers 6 & 7)	314	315	316	317	318
A.12bb	Cosmic Ray Protons (Pioneers 8 & 9)	314	315	316	317	318
A.12c	Cosmic Ray Protons (ATS-1)	314	315	316	317	318
A.13a	Solar Wind (Pioneers 6 & 7)	314	315	316	317	318
A.13b	Solar Wind (Vela 3 & 5)	314	315	316	317	318
B.	Ionospheric (and Radio Wave Propagation) Phenomena					
B.51ca	High Latitude Quality Figures and Forecasts	315	316	317	318	
B.51cb	High Latitude Comparison Graphs	315	316	317	318	
B.52	Graphs of Transmission Frequency Range	315	316	317	318	
B.53	Quality Figures based on Frequency Ranges	314	315	316	317	318
C.	Flare-Associated Events					
C.1a	Optical Observations Flares	314	315	316	317	318
C.1ba	Optical Observations Flares (Including Standardized Data)					
C.1d	Flare Patrol Observations	314	315	316	317	318
C.1e	Flare Indices (by day)					
C.1f	Flare index by region					
C.3	Solar Radio Waves - Fixed Frequencies - Outstanding Occurrences					
C.4aa	10-2000 MHz - (Fort Davis)	315	316	317	318	
C.4b	7.6-80 MHz - (University of Colorado)	---	317	317	318	
C.4d	8-8000 MHz - (Culgoora)	315	316	317	318	
C.4e	30-1000 MHz - (Weissenau, G.F.R.)	315	316	318	318	
C.4f	24-48 MHz - (AFCRL, Sagamore Hill)	315	316	317	318	
C.4g	20-60 MHz - (Clark Lake Radio Observatory)	315				
C.5b	Solar X-ray Radiation (Explorers 33 & 35)					
C.5c	Solar X-ray Radiation (Explorer 37)	315	316	317	318	
C.6	Sudden Ionospheric Disturbances	314	315	316	317	318
D.	Geomagnetic and Magnetospheric Phenomena					
D.1a	Geomagnetic Indices Ci, Cp, Kp, Ap - Selected Days	315	316	317	318	
D.1b	27-Day Chart of Kp Indices for Year	318	318	318	318	
D.1c	27-Day Chart of C9 for Year	318	318	318	318	
D.1d	Principal Magnetic Storms	315	316	317	318	
D.1e	Reduced Magnetograms					
D.1f	Sudden Commencement and Solar Flare Effects	317	318	318	318	
F.	Cosmic Rays					
F.1a	Cosmic Ray Neutron Counts (Deep River)	315	316	317	318	
F.1b	Cosmic Ray Neutron Counts (Climax)	315	316	317	318	
F.1c	Cosmic Ray Neutron Counts (Dallas)	315	316	317	318	
F.1d	Cosmic Ray Neutron Counts (Churchill)	315	316	317	318	
F.1e	Cosmic Ray Neutron Counts (Alert)	315	316	317	318	
H.	Miscellaneous					
H.60	IUWDS Alert Decisions	314	315	316	317	318
H.62	Abbreviated Calendar Record					

Table of Contents
for January 1971 Data

	Page
Alert Period	
IUWDS Alert Periods (Advance and Worldwide)	4-5
Daily Solar Indices	
12-Month Tables Sunspot Numbers, R_Z, and 2800 MHz Flux Adjusted to 1 A.U.	6
Combined Table Sunspot Numbers and Solar Fluxes	7
Graphs of Sunspot Cycle	8
Zürich Smoothed Observed and Predicted Sunspot Numbers	9
Solar Flares	
Flares of Numerical Importance 1 or Greater	10
Subflares	11-12
No-Flare-Patrol Chart	13
Solar Radio Waves	
408 MHz Solar Interferometric Chart - Nançay	14
169 MHz Solar Interferometric Chart - Nançay	15
10.7 cm East-West Solar Scans - ARO, Ottawa	16
21 cm East-West Solar Scans - Fleurs	17
43 cm East-West Solar Scans - Fleurs	18
Solar Wind	
Pioneer 6 and 7	19
Vela 3 and 5	20
Cosmic Ray Protons	
Pioneers 6 and 7	21
Pioneer 8 and 9	22
ATS-1	23-24
Solar Proton Event (Preliminary)	unnumbered

For explanations of the data contained herein see "Descriptive Text" published in February 1971.

ALERT PERIODS

INTERNATIONAL URSIGRAM
AND WORLD DAYS SERVICE

JANUARY 1971

JAN. 1971	TIME OF ISSUE UT	ADVANCE GEOPHYSICAL ALERT	WORLDWIDE GEOPHYSICAL ALERT	
			NO.	TYPE INCLUDING FLARE ACTIVITY EXPECTED
01	0400			N04E41, N13W27, S13W55 ERUPTIVE; THREE QUIET; SOLNIL
02	0400			FIVE QUIET; SOLNIL
03	0400			S13W82 ERUPTIVE; FIVE QUIET; SOLNIL
04	0400			SIX QUIET; SOLNIL
05	0400			SIX QUIET; SOLNIL
	----	WENDELSTEIN SOFLARE CLASS 1N S05E64 05/1239Z DURATION 12 MIN.		
06	0400			FOUR QUIET; SOLNIL
07	0400			FOUR QUIET; SOLNIL; STRATWARM STARTS WARM AIR EURASIA HAS INTENSIFIED FOR SEVERAL WEEKS WARMEST OVER SIBERIA
08	0400			FIVE QUIET; SOLNIL; STRATWARM EXISTS EURASIA AT 10 MB LEVEL WARMEST AIR OVER SIBERIA
09	0400			S06E17 ERUPTIVE; THREE QUIET; SOLNIL; STRATWARM EXISTS NORTHERN EURASIA NIMBUS FOUR DATA IMPLY STRONG UPPER STRATOSPHERE WARMING OVER ARCTIC
10	0400			S04E05 ERUPTIVE; FOUR QUIET; SOLNIL; STRATWARM EXISTS NORTHERN EURASIA
11	0400			S05W12 ERUPTIVE; FIVE QUIET; SOLNIL; STRATWARM EXISTS EURASIAN-ALASKAN ARCTIC
12	0400			S06W24 ERUPTIVE; THREE QUIET; SOLNIL; STRATWARM EXISTS EURASIAN-ALASKAN ARCTIC TEMPERATURES MODERATING AS WARM AIR MOVES OVER POLAR AREA
13	0400			S06W37, N20E32 ERUPTIVE; FIVE QUIET; SOLNIL; STRATWARM EXISTS POLAR AREA
14	0400			S06W50 ERUPTIVE; SIX QUIET; SOLNIL; STRATWARM EXISTS POLAR REGION MODERATING
	0930	PREDIGTSTUHL COSMIC EVENT BEGINS 13/1400Z DECREASE 3.6 PERCENT		
	1130	NERA TENFLARE 492 PERCENT FIRST MAXIMUM AT 14/1123Z FLARE 2B SW REGION 14/1130Z. ALSO AT OTHER FREQUENCIES STILL IN PROGRESS 14/1130Z.		
	1215	WENDELSTEIN SOFLARE CLASS 2B S08W55 14/1122Z DURATION 26 MINUTES MAXIMUM 1128Z		
15	0400		15192	SOLALERT; S07W63, S23W77, N10W16, N19E80 ERUPTIVE; FIVE QUIET; STRATWARM EXISTS POLAR REGION WEAKENING
16	0400			N18E72 ERUPTIVE; SIX QUIET; SOLNIL; STRATWARM ENDS TEMPERATURES COOLING CIRCULATION STILL DISTURBED
	0905	CARNARVON TENFLARE 300 PERCENT 16/0753Z IN PROGRESS		
	1530	CANARY ISLANDS TENFLARE 16/0830Z IN PROGRESS. PEAK AT 16/0930Z. VERY COMPLEX BURST.		
17	0400			N19E54 ERUPTIVE; THREE QUIET; SOLNIL
18	0400			N19E40 ERUPTIVE; TWO QUIET; SOLNIL
19	0400		19193	MAGSTORM BEGINS 18/0901Z MINOR; N19E33, N10E65 ERUPTIVE; SEVEN QUIET; SOLNIL
20	0400		20194	MAGSTORM ENDS 18/2210Z MINOR; N18E11, N10E45, S13E45 ERUPTIVE; FIVE QUIET; SOLNIL
21	0400		21195	SOLALERT; N19E01, S12E34 ERUPTIVE; FIVE QUIET
22	0400		22196	SOLALERT; N18W13, N18W00, N11E20, S13E21 ERUPTIVE; THREE QUIET
23	0400		23197	SOLALERT; N19W23, N19W13, S12E08 ERUPTIVE; FOUR QUIET
24	0400		24198	SOLALERT; N18W38 ACTIVE; N19W28, N11W06, S13E85 ERUPTIVE; FOUR QUIET
	2300	MANILA SOFLARE TWO BRIGHT N18W44 24/2310Z IN PROGRESS. TENFLARE 3000 UNIT 24/2300Z IN PROGRESS.		
	2350	DEEP RIVER COSMIC RAY INCREASE 24/2350Z 7.2 PERCENT. PROTON EVENT 24/2350Z 20-70 MEV ENERGY CHANNEL ATS-1 SATELLITE		

ALERT PERIODS

INTERNATIONAL URSIGRAM
AND WORLD DAYS SERVICE

JANUARY 1971

JAN. 1971	TIME OF ISSUE UT	ADVANCE GEOPHYSICAL ALERT	WORLDWIDE GEOPHYSICAL ALERT	
			NO.	TYPE TIMING ELABORATION
25	0025	TOYOKAWA TENFLARE 4000 UNITS 24/2303Z		
	0400		25199	SOLALERT; N19W41, N18W51 ACTIVE; S12W15 ERUPTIVE; THREE QUIET
			25200	COSMIC EVENT BEGINS 24/2350Z COSMIC RAY INCREASE OF 8.0%
26	0400		26201	SOLALERT; N18W64 ACTIVE; FIVE QUIET
			26202	MAGALERT 26/27
			26203	COSMIC EVENT ENDS 25/0400Z COSMIC RAY INCREASE ENDS
27	0400		27204	MAGALERT 27/28
			27205	SOLALERT; N18W78, S12W46, S12E44 ERUPTIVE; FIVE QUIET
28	0400		28206	MAGSTORM EXISTS
			28207	SOLALERT; N18W90, S12E32, N08E67 ERUPTIVE; SEVEN QUIET
29	0400		29208	MAGSTORM EXISTS MINOR
			29209	SOLALERT; S12E19, N08E55 ERUPTIVE; FIVE QUIET
30	0400		30210	MAGSTORM ENDS 29/0600Z
			30211	SOLALERT; S12E06, N08E40 ERUPTIVE; FIVE QUIET
31	0400			S11W08, N08E28 ERUPTIVE; FIVE QUIET; SOLNIL

RELATIVE SUNSPOT NUMBERS

ZURICH, R_Z

1970 PROVISIONAL — 1971

DAY	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.	JAN.
1	154	134	112	128	102	137	77	98	62	79	88	58
2	120	126	94	120	92	153	68	104	56	75	69	62
3	79	113	121	124	64	155	64	110	42	72	75	62
4	68	101	116	121	63	159	59	111	54	76	65	69
5	77	107	120	115	59	165	65	114	74	61	85	52
6	100	100	115	117	57	161	68	133	52	87	79	52
7	107	108	123	100	58	125	72	136	71	84	88	56
8	97	116	147	88	61	115	82	125	72	67	97	66
9	123	119	172	91	60	104	76	116	67	75	87	74
10	133	123	188	113	92	90	71	103	72	76	95	70
11	175	100	183	137	127	81	75	73	74	95	101	68
12	153	84	163	148	148	74	73	76	79	87	95	75
13	145	104	141	151	160	79	92	73	83	98	71	70
14	124	84	124	148	182	68	94	76	86	108	82	67
15	115	65	106	162	185	61	108	75	86	118	81	61
16	139	46	92	164	149	61	100	68	93	126	65	65
17	142	29	82	172	143	59	99	65	83	128	60	68
18	143	41	68	176	123	56	108	75	75	128	70	86
19	120	48	67	179	98	92	113	98	82	125	88	98
20	125	93	65	149	95	92	117	114	69	126	101	104
21	128 -	115	64	159	90	120	117	129	68	112	93	106
22	125	122	57	127	105	122	108	109	72	103	90	105
23	164	131	67	108	77	106	101	104	88	94	76	96
24	166	140	90	124	102	110	116	129	99	75	63	99
25	173	142	93	112	126	122	106	114	110	60	68	82
26	143	122	81	127	127	138	114	107	116	63	61	88
27	150	115	88	128	114	153	91	87	141	72	50	111
28	146	110	106	108	113	146	101	85	130	87	47	99
29		103	112	120	122	153	114	81	138	76	50	95
30		111	116	118	111	122	120	77	125	101	71	74
31		101		129		108	111		116		65	76
MEAN	129.8	101.7	109.1	131.1	106.8	112.5	92.9	98.8	85.0	91.1	76.6	77.9

1969 yearly mean = 105.5

DAILY SOLAR FLUX AT 2800 MHz
OTTAWA ARO

FLUX ADJUSTED TO 1 A.U., S_a

1970 — 1971

DAY	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.	JAN.
1	134.6	175.7*	160.8*	159.5	145.6	179.9	134.0*	154.1	128.7	163.3	146.4	130.5
2	133.1	173.0	167.1	160.7*	141.8	189.0*	128.5	156.7	125.4	159.1	148.4*	134.8
3	123.7	167.3	163.5	163.5	133.4	194.6*	127.9	163.2*	126.0	153.2*	148.1	134.7
4	119.4*	165.3	170.4	162.3	131.7	195.0	127.4	163.4*	137.3	148.3	154.0	140.2
5	121.0	169.8	179.4*	167.9	132.9*	191.0	128.4	162.3*	134.5	147.5	161.9*	146.1
6	131.9	167.8	192.9	163.3	130.0	186.4	128.0	161.5	128.0*	149.8	167.5	146.9
7	139.4	168.4*	193.4*	162.4	134.5*	166.3	128.2	164.4	133.3	150.6	166.5*	150.2
8	152.6	172.8*	203.1*	156.7	134.2	160.4	131.8	156.9	142.0	141.1	167.3	149.1
9	154.1	164.4	218.5	154.9*	138.2	148.4	138.3	157.2	144.9*	141.9	171.5	152.8*
10	170.3*	158.3	224.7*	162.8	145.9	143.8	137.3	143.9	147.6	147.8	170.9	152.1
11	184.3*	156.3*	206.4	176.2	169.5	137.7	127.2	134.4	142.8	155.6	172.6*	149.0
12	201.0	164.4	198.5*	180.3	171.7	135.4	136.9*	126.1	135.4	165.1*	178.4*	150.5
13	197.6	152.4*	185.3	193.1	200.3*	130.7	149.7	120.1	131.8*	179.1	164.3	148.1
14	196.2	147.3	173.8*	196.8	207.4*	126.3	167.0*	121.9	134.9*	186.4*	154.6	153.9
15	201.6	144.9	163.6	206.3	209.2	121.9	169.1	118.0	140.2*	200.0	154.1	153.7
16	193.3	139.0	152.2	206.0	198.6	121.4	162.5	118.4	134.0	193.5	146.7	156.4*
17	193.9	133.7	148.0	197.0	190.6	125.9	151.6*	116.9	131.5	184.1*	146.8	155.3
18	197.7	133.5	141.9	194.6	181.8	131.0	149.0	120.7	138.5	193.1*	151.6*	160.3
19	198.5	130.2	135.7	197.4	175.1*	135.8	145.4	134.7*	139.0	185.5*	152.4*	165.8
20	196.5	141.1	131.2	183.9	163.3	136.4	148.6	146.9	137.2	173.7	155.6	169.2*
21	191.1*	149.7	126.3	174.9	160.6	150.6*	142.8	149.4	136.5	163.3*	146.3*	178.7
22	183.0*	150.9*	128.6	170.3	150.1*	163.8	141.7	155.2	135.0	154.2	136.8*	180.6
23	183.9	164.9*	130.1	163.7	143.7	158.7*	146.2	161.6	149.0	142.4	132.1	182.9
24	185.9	169.8*	130.1	162.6*	142.3	164.0	140.2	156.0*	161.2*	133.9	124.4	177.0
25	179.6*	167.2	134.8	160.6	149.3	169.0	136.5	155.8	168.6*	127.9	124.0	168.6*
26	178.3*	166.4*	135.3	162.8	151.4	176.3	135.7	155.9	187.1	129.3	122.3	164.9
27	176.9	159.2	138.0	155.2	160.0	185.9	137.2*	145.0	191.8	135.1	119.8	166.7
28	174.1	153.8	148.6	153.8	160.5	182.1	141.6	144.5*	190.3	148.9	117.3	166.2
29		153.1	156.1	158.5	168.0*	161.0	148.7	138.7	189.0	148.4	123.4	160.7
30		149.4	153.3	163.7	174.8	156.1	149.0	134.7	175.2	152.5	129.0*	163.0
31		149.3		165.2		141.5	154.5		168.6		133.3	170.1
MEAN	171.2	156.8	163.1	172.2	159.9	157.0	141.6	144.6	147.3	158.5	148.0	157.4

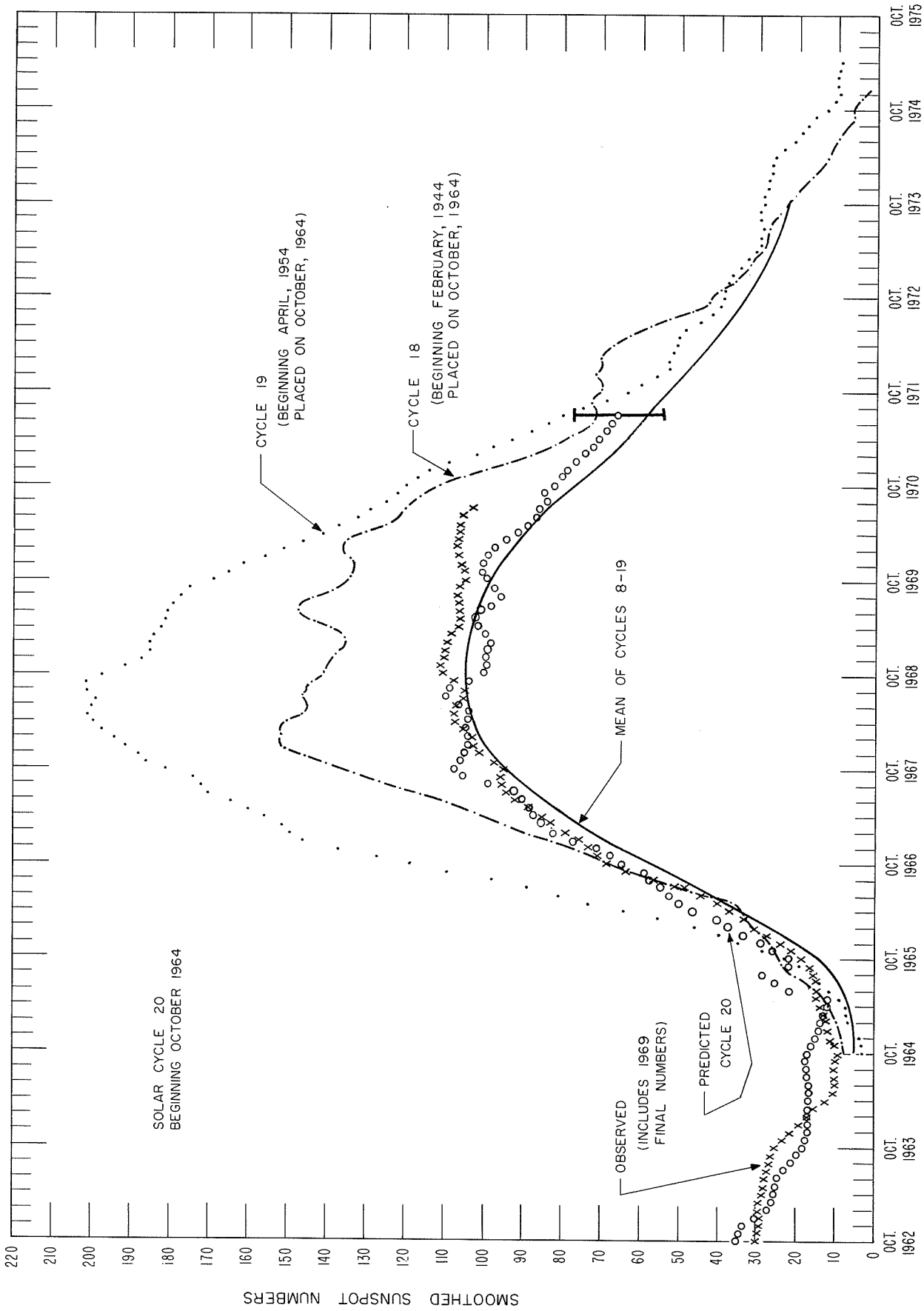
* adjustea for burst

DAILY SOLAR INDICES

JANUARY 1971

JAN. 1971	YEAR DAY	BARTELS 27-DAY CYCLE NUMBER	SUNSPOT NUMBERS		OBSERVED FLUX OTTAWA 2800	SOLAR FLUX ADJUSTED TO 1 A.U.							
			R_Z	$R_{A'}$		AFCRL 15400	AFCRL 8800	AFCRL 4995	OTTAWA 2800	AFCRL 2695	AFCRL 1415	AFCRL 606	AFCRL 245
01	1	26	58	68	135.0	536	242	200	130.5	120.9	94.4	61.7	10.8
02	2	27	62	68	139.4	539	244	202	134.8	124.0	95.7	60.7	10.3
03	3	1	62	63	139.3	543	249	211	134.7	127.2	97.4	61.8	10.8
04	4	2	69	63	145.0	535	256	212	140.2	130.5	101.2	63.5	12.0
05	5	3	52	68	151.1	552	255	226	146.1	135.2	104.7	65.0	10.2
06	6	4	52	69	151.9	535	259	227	146.9	137.5	105.8	66.1	15.9
07	7	5	56	67	155.3	537	260	228	150.2	142.1	107.2	84.3	47.6
08	8	6	66	80	154.2	533	259	225	149.1	140.0	105.6	69.1	17.8
09	9	7	74	94	158.1*	543	259	228	152.8*	145.5	110.0	73.1	25.1
10	10	8	70	69	157.3	543	267	224	152.1	143.1	110.2	68.3	47.0
11	11	9	68	66	154.1	539	260	221	149.0	141.3	105.8	73.9	93.0
12	12	10	75	86	155.6	547	261	224	150.5	142.9	110.5	68.4	82.7
13	13	11	70	78	153.2	547	256	219	148.1	138.2	104.8	67.4	24.4
14	14	12	67	77	159.2	537	265	225	153.9	145.0	111.0	71.0	21.2
15	15	13	61	68	158.9	559	270	233	153.7	144.0	108.5	65.6	33.4
16	16	14	65	57	161.6*	564	269	240	156.4*	152.6	113.9	71.7	15.3
17	17	15	68	67	160.4	545	271	243	155.3	145.0	103.9	65.8	15.4
18	18	16	86	102	165.6	539	271	258	160.3	148.5	101.9	64.2	16.9
19	19	17	98	107	171.3	538	276	260	165.8	155.0	107.7	65.3	25.4
20	20	18	104	126	174.8*	537	267	258	169.2*	163.6	107.7	66.1	62.5
21	21	19	106	137	184.6	542	278	271	178.7	169.3	115.8	65.5	38.6
22	22	20	105	124	186.4	540	273	259	180.6	169.8	117.4	65.9	14.8
23	23	21	96	120	188.8	563	273	252	182.9	159.9	120.9	65.4	19.5
24	24	22	99	129	182.7	551	272	259	177.0	167.6	118.3	68.3	12.7
25	25	23	82	112	174.0*	556	271	255	168.6*	158.9	120.9	67.7	13.0
26	26	24	88	106	170.2	548	263	247	164.9	155.5	113.6	63.2	11.9
27	27	25	111	121	171.9	555	267	243	166.7	157.2	111.6	63.8	11.7
28	28	26	99	112	171.3	555	267	245	166.2	157.2	112.6	68.6	13.5
29	29	27	95	114	165.7	544	258	236	160.7	150.9	109.8	65.8	15.4
30	30	1	74	94	168.0	544	266	246	163.0	154.0	110.2	70.7	49.3
31	31	2	76	102	175.2	539	264	247	170.1	164.4	116.9	67.8	25.7
MEAN			77.9	90.8	162.6	545	263	236	157.4	148.0	108.9	67.3	26.6

* Adjusted for Burst



PREDICTED AND OBSERVED SUNSPOT NUMBERS

SMOOTHED OBSERVED AND PREDICTED SUNSPOT NUMBERS
CYCLE 20

MONTH	JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.
1964										9.6	10.2	11.0
1965	11.7	12.0	12.5	13.6	14.6	15.0	15.5	16.4	17.4	19.7	22.3	24.5
1966	27.7	31.3	34.5	37.4	40.7	44.6	50.3	56.6	63.1	67.6	70.2	72.7
1967	75.0	78.8	82.2	84.6	87.4	91.3	94.1	95.3	95.3	95.0	97.1	100.6
1968	102.6	102.9	104.7	107.2	107.6	106.6	105.2	104.8	107.0	109.9	110.6	110.1
1969	110.0	109.6	108.0	106.4	106.2	106.1	106.0	106.9	105.8	104.5	105.1	105.6
1970	106.2	106.7	106.8	106.6	106.1	105.1	102.7	100.2	97.5	94.7	91.2	87.4
								(3)	(7)	(10)	(10)	(10)
1971	83.4	79.5	76.7	73.6	70.1	67.6	66.1	64.4	62.1	59.8	58.2	56.6
	(9)	(9)	(9)	(9)	(10)	(10)	(11)	(11)	(12)	(14)	(15)	(15)
1972	55.0	53.9	52.8	51.7	50.5	48.8	46.1	43.1	41.3	40.4	39.5	38.1
	(17)	(18)	(17)	(17)	(17)	(18)	(19)	(21)	(23)	(24)	(25)	(26)
1973	36.9	35.8	34.5	32.9	31.7	30.6	29.8	29.3	28.5	27.2	26.0	24.8
	(26)	(26)	(25)	(25)	(25)	(24)	(23)	(23)	(23)	(23)	(21)	(20)
1974	23.8	22.6	21.4	20.7	20.3	19.5	18.4	17.2	15.9	14.6	13.4	12.6
	(20)	(20)	(21)	(21)	(21)	(21)	(20)	(19)	(18)	(18)	(17)	(17)
1975	12.3	12.0										
	(16)	(15)										

For each month, the upper figure is the observed or predicted Zürich smoothed sunspot number. The lower figure in parenthesis is the corresponding absolute value of the 90% prediction interval, an indication of the uncertainty above and below the predicted number. Observed numbers are those with no prediction intervals. The observed smoothed sunspot numbers are based on final Zürich numbers through 1969.

Beginning in July 1968 the predicted sunspot numbers were derived from a regression analysis based on Cycles 1 through 19. At that time new statistical tests were performed to determine whether the population was homogeneous. From the results of these tests it was not possible to prove conclusively that the first 7 cycles were from a different population. Recently, more sophisticated statistical techniques have been applied to this problem. Although it has still not been proven conclusively that the first 7 cycles are from a different population, there is more evidence now that this may be the case. Until this question has been resolved, the predicted sunspot numbers will be derived from a regression analysis based on Cycles 8 through 19 instead of 1 through 19.

SOLAR FLARES

PARTIAL LISTING

Solar Flares for which at least one observatory has assigned a numerical importance of "1" or greater.

JANUARY 1971

OBSERVATORY	OBSERVED UT DATE 1971 JAN	START	END	MAX. PHASE	LOCATION APPROX. LAT.	MER. DIST.	CENTRAL DISTANCE	MCMATH PLAGE REGION	CMP DAY	DURATION MIN.	IMPORTANCE	OBS. COND.	TYPE	MEASUREMENTS TIME UT	MEAS. AREA Sq. Deg.	CORR. AREA Sq. Deg.	MAX. WIDTH Hα	MAX. INT. %	REMARKS
TEHR	05	0859	0926	0902	S04	E67	.919		10.4	27	SN		C		.28				F
HTRR	05	0910E	0920		S02	E64	.898	11111	10.2	10D	1N		C	0912	1.24				
WEND	05	0916E	0934D		S07	E67	.919	11111	10.4	18D	1N		V		3.09				
WEND	05	1239	1251D		S05	E64	.897	11111	10.3	12D	1N		P		3.09				
TEHR	05	1244	1303	1246	S03	E66	.913		10.5	19	SN		C		.28				DE
HTRR	09	1445	1601D	1507	N15	W28	.553	11108	7.5	76D	1N		C	1507	1.75	2.10			GW
RAMY	09	1452	1600	1503	N13	W29	.550		7.4	68	SF		C		1.34				DE
ONDR	14	1045E	1105	1048	S08	W56	.827	11111	10.2	20D	1B		V	1048			4.30		CFHV
WEND	14	1046E	1108		S07	W55	.817	11111	10.3	22D	1N		P		5.16				
WEND	14	1122	1148	1128	S08	W55	.817	11111	10.3	26	2B		P		8.25				
CATA	14	1124	1140	1124	S08	W55	.817		10.3	16	SB		C	1124	.87	1.52		246	Z
HURB	14	1125E	1136	1128	S07	W54	.807	11111	10.4	11D	1N						2.41		
ONDR	14	1126E	1137		S08	W56	.827	11111	10.3	11D	1B		V	1127			2.70		CFHJ
RAMY	14	1126E	1147	1126U	S11	W56	.827	11111	10.3	21D	1B		C		2.27				F
HTRR	16	0809	0856D		N20	E64	.924	11128	21.1	47D	1B		C	0830	1.86				FLW
RAMY	18	1848	1930D	1851	N19	E36	.678		21.5	42D	SB		C		1.34				F
RAMY	18			1857				11128			1N				2.68				
PALE	18	1849E	1904	1854	N19	E32	.636		21.2	15D	SB		C		.99				DE
HTRR	22	1106	1114	1106	N22	W14	.507	11128	21.4	8	1B		C	1106	2.06	2.30			V
WEND	23	0942E	1032D		N09	E39	.662	11133	26.3	50D	1F		P		3.09				
TEHR	23	0945	1011	0950	N12	E36	.639		26.1	26	SF		C		.37				DE
CATA	23	1000E	1005D	1000	N11	E36	.634		26.1	5D	SN		P	1000	.46	.61		151	
RAMY	24	1435	1509D	1443	N20	W45	.777	11128	21.2	34D	1B		C		2.37				UF
HTRR	24	1438	1505	1446	N22	W46	.795		21.2	27	SB		C	1446	1.13	1.60			L
RAMY	24	1705	1801	1710U	N18	W44	.758		21.4	56	SB		C		.93				UF
RAMY	24			1723							SB				1.65				DE
BOUL	24	1720	1805	1730	N20	W47	.795		21.2	45	1N	1	V						
PALE	24	1734E	1851	1734E	N18	W45	.768		21.4	77D	SN		C		1.54				UF
RAMY	24	1805	1845	1812	N15	W46	.765	11128	21.3	40	1N		C		3.51				F
PALE	24	1806	1848D	1816	N18	W45	.768	11128	21.4	42D	1B		C		1.89				DE
PALE	24			1834							1N				2.89				
BOUL	24	1811	1908	1825	N18	W45	.768		21.4	57	1B	1	V						
BOUL	24	2035	2100U	2039	N20	W52	.839		21.0	25U	1F	1	C	2039	1.28	2.38			
RAMY	24	2036	2049	2039	N21	W46	.791		21.4	13	SN		C		.83				DE
PALE	24	2041E	2140	2106U	N20	W48	.805	11128	21.3	59D	1N		C		2.53				U
RAMY	24	2045	2119D	2048	N18	W47	.787		21.3	34D	SB		C		.62				DE
PALE	24	2215	2231D	2227U	N20	W48	.805	11128	21.3	16D	1N		C		1.80				UF
MANI	24	2309	0024	2316	N19	W50	.818	11128	21.2	75	1B	2		2316	2.89	4.80			
PALE	24	2314E	2332D	2315U	N19	W49	.810	11128	21.3	18D	2B		C		4.95				U
PALE	24										4B				18.77				
TEHR	26	1037	1050	1039	S14	W43	.684		23.2	13	SN		C		.28				DE
CATA	26	1040	1055	1040	S13	W43	.682		23.2	15	SN		C	1040	.63	.89		191	
ONDR	26	1040E	1049		S13	W44	.695	11130	23.1	9D	1N		V	1042			2.70		CHJ
ARCE	26	1040E	1040D		S15	W46	.721		23.0		SF		P	1040	.36	.50			
TEHR	26	1217	1245	1219	S10	W42	.667		23.4	28	SF		V						DE
ONDR	26	1224	1241D		S12	W42	.669	11130	23.4	17D	2F		V	1230			1.90		CFHJL
CATA	26	1225	1238	1232	S11	W41	.655		23.4	13	SB		C	1232	.98	1.33		204	
RAMY	26	1233	1251	1240	S09	W45	.704		23.1	18	SF		C		.41				DE
CATA	26	1235	1245	1238	S09	W43	.679		23.3	10	SN		C	1238	.29	.40		195	
ONDR	26	1328	1343	1331	S13	W46	.719	11130	23.1	15	1N		V	1331			2.50		CJ
RAMY	26	1329	1341	1334U	S11	W45	.705		23.2	12	SN		C		.52				DE
CATA	26	1330	1340	1330	S12	W45	.706		23.2	10	SN		C	1330	.29	.41		162	
RAMY	28	1308	1340	1313	N12	W68	.939	11129	23.4	32	1B		C		2.78				F
HTRR	28	1309	1333	1315	N12	W65	.921		23.7	24	SB		C	1315	1.03	2.00			
RAMY	29	1852	1903D	1858	N18	E78	.986		4.6	11D	SF		C						DE
PALE	29	1902	1934	1917	N28	E78	.991	11141	4.6	32	1F		C		1.04				FS
PALE	29	2220	2316	2255	S09	E10	.181	11134	30.7	56	1N		C		2.89				F
PALE	31	0136E	0203	0136E	S12	W07	.160	11134	30.5	27D	1B		C		2.98				F
TEHR	31	0712	0716D	0714	S12	W10	.201		30.5	4D	SN		C		.91				F
BUCA	31	0720	0740		S12	W10	.201	11134	30.6	20	1N		P	0720	3.32	3.30			B
RAMY	31	1130E	1155D	1130E	S12	W13	.245		30.5	25D	SN		V		1.55				F
CATA	31	1130E	1140D	1130	S12	W12	.230	10134	30.6	10D	1B		P	1130	3.25	3.35		224	Z

SOLAR FLARES

Date, time (UT) and coordinates of Subflares not included in preceding table.

JANUARY 1971

01 0034E N14 W65	01 0206 N10 W55	01 1007 S11 E27	01 1541 S14 E24	01 1848 S16 W64	01 2012 N11 W67		
01 2013 N13 W34	01 2019E N13 W33	01 2019 N11 W67	02 0003 S29 E69	02 0158E N10 E32	02 0421F S14 W72		
02 0640 N13 W48	02 0649 N10 W55	02 0940 S14 W70	02 0941 S10 W70	02 0947E S14 W68	02 1101 S13 W71		
02 1119 S10 W70	02 1124E S13 W72	02 1402 S14 W72	02 1500 S14 W73	02 1500 S10 W72	02 1602 S12 W85		
02 1643 N08 W50	02 1754 N17 E90	02 1925 S14 E08	03 0240 N04 E11	03 0830 S12 W12	03 0830 S05 W12		
03 1115 N03 E06	03 1230 S12 W12	03 1910 S11 W17	04 0413 N03 E01	04 0949 S14 W13	05 0435 S05 E78		
05 0752 S04 E68	05 0753 S02 E65	05 0800 S05 E70	05 0945 N14 W11	05 1136 S05 E65	05 1233 S08 E66		
05 1425 S05 E64	06 0725 N12 E51	06 0726E N11 E51	06 0925 S04 E55	06 1254 S14 E39	06 2006 S06 E44		
06 2007E S06 E48	06 2011 S04 E50	06 2011 S04 E50	06 2011 N12 E50	06 2107U N10 E48	06 2116F N11 E49		
07 0323E S04 E43	07 0325 S05 E44	07 0353E S03 E45	07 0432 S05 E44	07 0434 S03 E42	07 0547 N12 E39		
07 0612 N14 E42	07 0825 N08 E42	07 0830 N10 E40	07 0833 N10 E42	07 0853E S07 E48	07 0858 S02 E40		
07 0955 S02 E40	07 0957 S00 E40	07 1049 N01 W46	07 1201 N02 W90	07 2125 S14 E46	07 2154 S05 E32		
08 0058 S08 E38	08 0355E S08 E30	08 0517 S03 E31	08 0725 S05 E24	08 0725 S05 E29	08 1058 S08 E24		
08 1135 N02 E25	08 1632 S11 E09	08 1753 S18 E82	08 1818 S04 E18	09 0144 S05 E13	09 0239 S04 E13		
09 0432 S04 E12	09 0843E S04 E12	09 1020 S08 E14	09 1042 S03 E08	09 1106 S03 E09	09 1107 S03 E08		
09 1141 N01 W77	09 1305 S02 E13	09 1308 S02 E11	09 1422 S03 E07	09 1448 N15 W20	09 1455 S11 E44		
09 1456 N15 W18	09 1456 N15 W18	09 1500 N20 W15	09 1511 S11 E45	09 1628 S19 E00	09 1650 S04 E07		
09 1840 S12 E42	09 2054 N15 E07	09 2056U N14 E07	09 2059 S12 W07	09 2340 S10 E90	10 0548 N05 W05		
10 1107 S03 W07	10 1140 S03 W02	10 1140 S03 W04	10 1555E S35 W09	10 1716 S06 W05	10 1716 S06 W05		
10 1728 S05 W03	10 1733 N17 E66	10 1753E N27 E70	10 1822 N23 E68	10 1824 N21 E67	11 0007E S05 W10		
11 0202 S05 W11	11 0210 S03 W11	11 0213E S04 W14	11 0444 N21 E63	11 0814E N19 E52	11 0814F S08 W10		
11 0820 S06 W19	11 0846 S06 W19	11 0915E S10 W15	11 0950 N21 E51	11 1000 N20 E51	11 1034 S04 W19		
11 1155E S03 W19	11 1223 S10 W17	11 1223 S11 W18	11 1225E S10 W17	11 1507 N22 E55	11 1508 N20 E55		
11 1518E N20 E55	11 1825E S03 W18	12 0223E N20 E45	12 0629 S07 W23	12 0904E N21 E49	12 0935F S16 E37		
12 0948E S16 W34	12 2042 S10 W34	12 2115 N22 E46	12 2130 S05 W35	12 2356E S05 W35	13 0417 S05 W39		
13 0447 S09 W40	13 0515 N22 E40	13 1222 N14 E68	13 1224 N13 E70	13 1236 S15 E23	13 1238 S15 E22		
13 1329 N19 E36	13 1330 N20 E33	13 1853 S10 W47	13 1855 S21 W43	13 1856E S10 W47	13 2104F S24 E62		
13 2109 N15 E65	14 0233 S22 W63	14 0502 N26 E26	14 0623 S08 W59	14 0830 N09 W09	14 0830 N09 W10		
14 1120 N09 W10	14 1120E S09 W58	14 1207 N15 E57	14 1609 N16 E90	14 1817 S24 W77	14 1817 S24 W77		
14 2032 S24 W77	14 2051E S15 E04	14 2108 S25 W78	15 1319 N19 E09	15 1452 N12 W32	15 1515 N21 E78		
15 1657 S23 W90	15 1712 N12 W32	15 2327 N19 E75	16 0230E S07 W75	16 0932 N20 E60	16 0955 S05 W85		
16 1128E N18 E59	16 1203 S07 W88	16 1205 S05 W80	16 1853 N08 W44	16 1942E N15 E64	17 0900 N14 E18		
17 1030 N17 E55	17 1031 N17 E55	17 1044 N22 E49	17 1100E N24 E48	17 1232 N22 E52	17 1235 N23 E50		
17 1249 N12 E80	17 1335E N18 E52	17 1424 N17 E43	18 0619 N20 E33	18 0637E N12 E73	18 0800E N13 E69		
18 1258 N08 W18	18 1349 N17 E39	18 1409 N16 E29	18 1552 N18 E42	18 1638 N12 E66	18 1657 N20 E28		
18 1659 N09 E65	18 1717 N21 E32	18 1805 N17 E37	18 1934 N08 E65	18 2030 N18 E39	18 2042F N19 E40		
18 2112 N12 E90	19 0058 N13 E88	19 0454 N18 E20	19 0456E N18 E25	19 0503 N14 E85	19 0637 N23 W45		
19 0640 N12 E59	19 0713 N18 E19	19 0715E N18 E25	19 0723 N26 W46	19 0845 N14 E81	19 0940 N18 E29		
19 1025 N18 E17	19 1115 N18 E17	19 1216 N13 W15	19 1216 N18 E15	19 1221 N12 W14	19 1258 N18 E15		
19 1300 N16 E18	19 1305 N09 E55	19 1309 N08 E53	19 1309 N08 E53	19 1416 N19 E20	19 1441 N18 E15		
19 1444E N18 E12	19 1458E N12 W15	19 1529 N12 E90	19 1533 N20 E22	19 1537U N22 E21	19 1604 N11 E56		
19 1616 N17 E13	19 1618E N18 E12	19 1641U N19 E18	19 1644 N18 E18	19 1720 N08 E58	19 1846 N18 E12		
19 1857 N11 E48	19 1857 N11 E53	19 2030U S14 E51	19 2136 N18 E11	19 2253E S16 E52	19 2328 N20 E29		
20 0019 N21 E16	20 0050E N22 E13	20 0128E S12 E49	20 0140 N20 E14	20 0428E S14 E52	20 0730 N14 W25		
20 0731 N12 W26	20 1014 S13 E44	20 1024 N22 E12	20 1214 S14 E41	20 1238 N21 E24	20 1456 S12 E42		
20 2241E N20 E16	20 2329 N23 E03	21 0004 S11 E39	21 0016 N20 E05	21 0044 N10 E34	21 0205F N27 W80		
21 0405E S12 E38	21 0421 N11 E71	21 0426 N20 E03	21 0440 N22 E02	21 0448E N20 E03	21 0450F N18 E13		
21 0529 N21 W03	21 0702 S14 E32	21 0707 N20 W07	21 0927 N17 E05	21 0939 N20 W08	21 1007 N19 E09		
21 1056 N18 E05	21 1116 N20 E09	21 1338E N17 W09	21 1338E N22 W05	21 1450 N18 E03	21 1540 N10 E30		
21 1540 N10 E30	21 1542 N14 E27	21 1740U N18 E 1	21 1804U N19 E 1	21 1826U N17 E 5	21 1650 N18 W02		
21 2025E N21 E02	21 2042U N19 E 3	21 2046U N11 E23	21 2152E N11 E26	21 2152 N11 E26	21 2203F N20 W04		
22 0245 N12 E20	22 0251 N15 E61	22 0323E N15 E60	22 0610E N13 E48	22 0649E N15 W09	22 1202 N22 W16		
22 1224 S12 E16	22 1358 S12 E16	22 1610 S11 E09	22 1611 S10 E07	22 1634U N12 W17	22 1640 N11 E12		
22 1642 S12 E14	22 1658U N27 W16	22 1901U N18 W20	22 1909U N10 E13	22 1909 N11 E73	22 1918F N10 E14		
22 1923U N19 W22	22 1925E N18 W20	22 2031U N05 E09	22 2100 N21 W14	22 2105E S13 E05	22 2136 N20 W15		
22 2242 S10 W20	22 2245U N20 W19	22 2331 N19 W24	22 2338 N19 W26	23 0010E N16 W23	23 0011 N18 W20		
23 0120 N21 W16	23 0126 N18 W27	23 0138 N21 W18	23 0211 N19 W19	23 0212E N20 W19	23 0234E S21 E17		
23 0245E N16 W16	23 0341 N19 W21	23 0346 N18 W20	23 0408 N19 W20	23 0408E N19 W21	23 0606 S14 E07		
23 0606 S14 E07	23 0606 S13 E07	23 0632 N17 W22	23 0707 N14 W18	23 0710E N15 W19	23 0711 N19 W12		
23 0725 N10 E07	23 0730E N10 E06	23 0736E N10 E06	23 0810 N10 W65	23 0830 S15 E08	23 0833 N20 W23		
23 0835 S15 E05	23 0839 S15 E06	23 0848 S13 E05	23 0948 N18 W24	23 1025 N18 W23	23 1235E N18 W24		
23 1236 N16 W25	23 1355 N20 W34	23 1535U N10 W 2	23 1818 N18 W27	23 2121 S17 W09	23 2121 S13 W09		
23 2203 N14 W41	23 2203 N17 W31	23 2313E N17 W31	24 0037 S12 W05	24 0046E S12 W03	24 0329E S12 E01		
24 0542 S15 W02	24 0550 N11 W07	24 0554E N11 W08	24 0611 S11 W02	24 0615 S15 W02	24 0709 S17 W15		
24 0719 N20 W43	24 0937 N11 W09	24 1020 N17 W36	24 1020 N17 W37	24 1021 N16 W37	24 1054 S15 W04		
24 1055 S15 W05	24 1056E S15 W05	24 1129 S11 E81	24 1139E S12 E85	24 1150 N18 W47	24 1152 N20 W47		
24 1152 N19 W47	24 1153 N15 W50	24 1154 N19 W44	24 1158 N11 W41	24 1201 N20 W40	24 1201 N20 W37		
24 1202 S11 W04	24 1202 N21 W37	24 1202 N20 W40	24 1203 S12 W06	24 1203 S12 W05	24 1210 N20 W45		
24 1210 N16 W42	24 1212 N20 W46	24 1212 N20 W46	24 1217 N19 W40	24 1236 N20 W48	24 1315 S12 W04		
24 1316 N10 W09	24 1316 N10 W10	24 1334 N20 W35	24 1337 S15 W07	24 1338 S15 W07	24 1345 S15 W07		

SOLAR FLARES

JANUARY 1971

24	1552	S15	W10	24	1621	N14	W43	24	1635	N20	W42	24	1822	S15	W10	24	1824	S11	E06
25	0844	S12	W22	25	0930	S13	E70	25	0950	S09	W28	25	1225	S15	E70	25	1242	S12	E68
25	1254	S10	W30	25	1255	S10	W31	25	1317	N18	W56	25	1421	S15	W65	25	1432	N08	W25
25	1456	S12	W32	25	1615	S08	E69	25	1615	S08	E69	25	1756	N22	W70	25	1756	N22	W70
25	1942	S08	E67	25	1947E	N16	W59	25	1955	S10	W34	25	2003E	S13	W36	25	2015	N16	W60
25	2123E	N18	W53	26	0003E	S11	W35	26	0019E	N15	W02	26	0056E	N20	W61	26	0105E	S13	W26
26	0114	N13	W62	26	0142E	S05	E49	26	0250E	S11	W38	26	0256E	S10	W37	26	0350E	S11	W38
26	0531	N17	W61	26	0615	S13	W40	26	0625	S12	E58	26	1008	S10	E56	26	1104	N14	W01
26	1129	N23	W80	26	1130	N20	W79	26	1140	S18	E56	26	1225E	N11	E90	26	1309	N20	W68
26	1402	N06	E86	26	1433	N06	E86	26	1529	N19	W69	26	1706	S12	W46	26	1707U	S13	W49
26	1843	S10	W46	26	2029E	S12	E52	26	2043E	N08	W47	27	0543	N10	W47	27	0824E	N09	E80
27	0940	S11	W50	27	1245	N15	W88	27	1353	N05	E68	27	1353	N05	E68	27	1712	N06	E66
27	1805	N17	W85	27	2038	N21	W90	27	2112	S13	E35	27	2219	N20	W90	27	2222	N21	W90
28	0518	S12	E32	28	0812	S12	E24	28	0948	N09	W63	28	0955E	S10	E27	28	1001	S08	E28
28	1704	N11	W70	28	1920	N15	E54	28	1944E	N 6	E56	29	0934	N07	E50	29	0935	N05	E49
29	1016	N06	E50	29	1127	N20	E78	29	1128	N19	E82	29	1210	S20	E88	29	1211	S21	E86
29	1604	N25	E80	29	1723E	N08	E45	29	2055	N21	E37	30	0245	N03	E39	30	0946E	S21	E76
30	1224	S12	W06	30	1612	S10	E03	30	1749	S12	W03	30	1759	S12	E02	30	1944	S11	W04
30	2028	S12	W05	30	2028	S12	W05	31	0159E	N06	E28	31	0226E	S12	W08	31	0227E	S12	W10
31	0620U	S12	W10	31	1335	S11	W13	31	1358	S13	W10	31	1434E	S09	W13	31	1500E	S10	W13
31	1902E	N04	E14	31	2243	S05	E70	31	2313E	N04	W37	31	2337E	S09	W16				

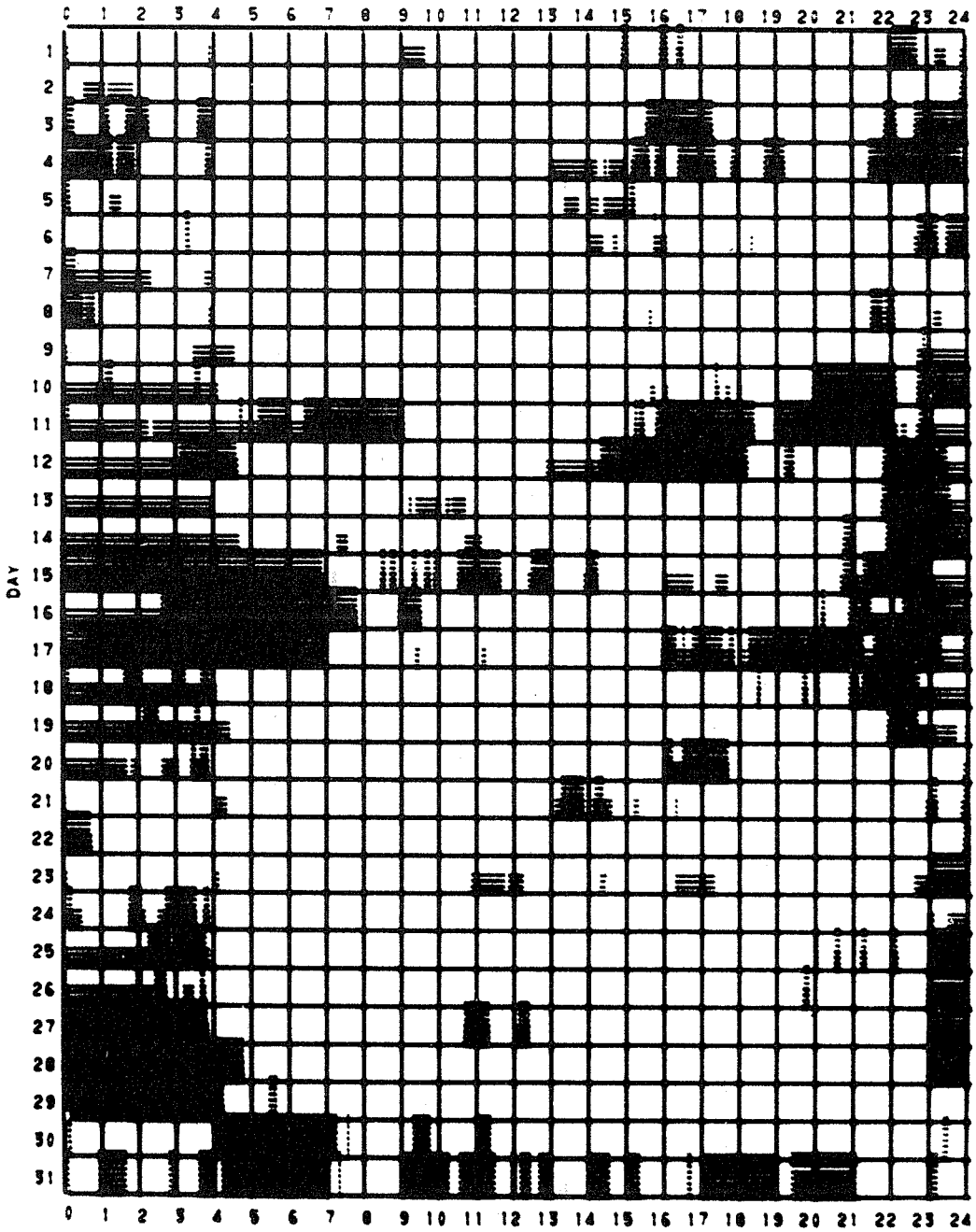
25	0140E	S09	W22	25	1242	S13	E68
25	1456	S12	W32	25	1847	S10	E68
25	2049	S08	E65	26	0107E	S11	W27
26	0426	N23	W73	26	1105	N15	W60
26	1310	N20	W65	26	1823	N17	W70
27	0626	N11	W50	27	1723	N21	W90
28	0508	S08	E29	28	1554	N08	E55
29	0936	S12	E15	29	1345E	N07	E40
30	1201	S21	E78	30	2028	S12	W05
31	0400	S12	W10	31	1522E	S10	W15

INTERVALS OF NO FLARE PATROL OBSERVATION

FOR PRECEDING SOLAR FLARE TABLE

JANUARY 1971

HOUR - UT



Observatories included in total patrol:

Arcetri	Catania	Manila	Palehua	Tehran
Boulder	Haute Provence	Meudon	Ramey	Wendelstein
Bucharest	Hurbanovo	Ondrejov		

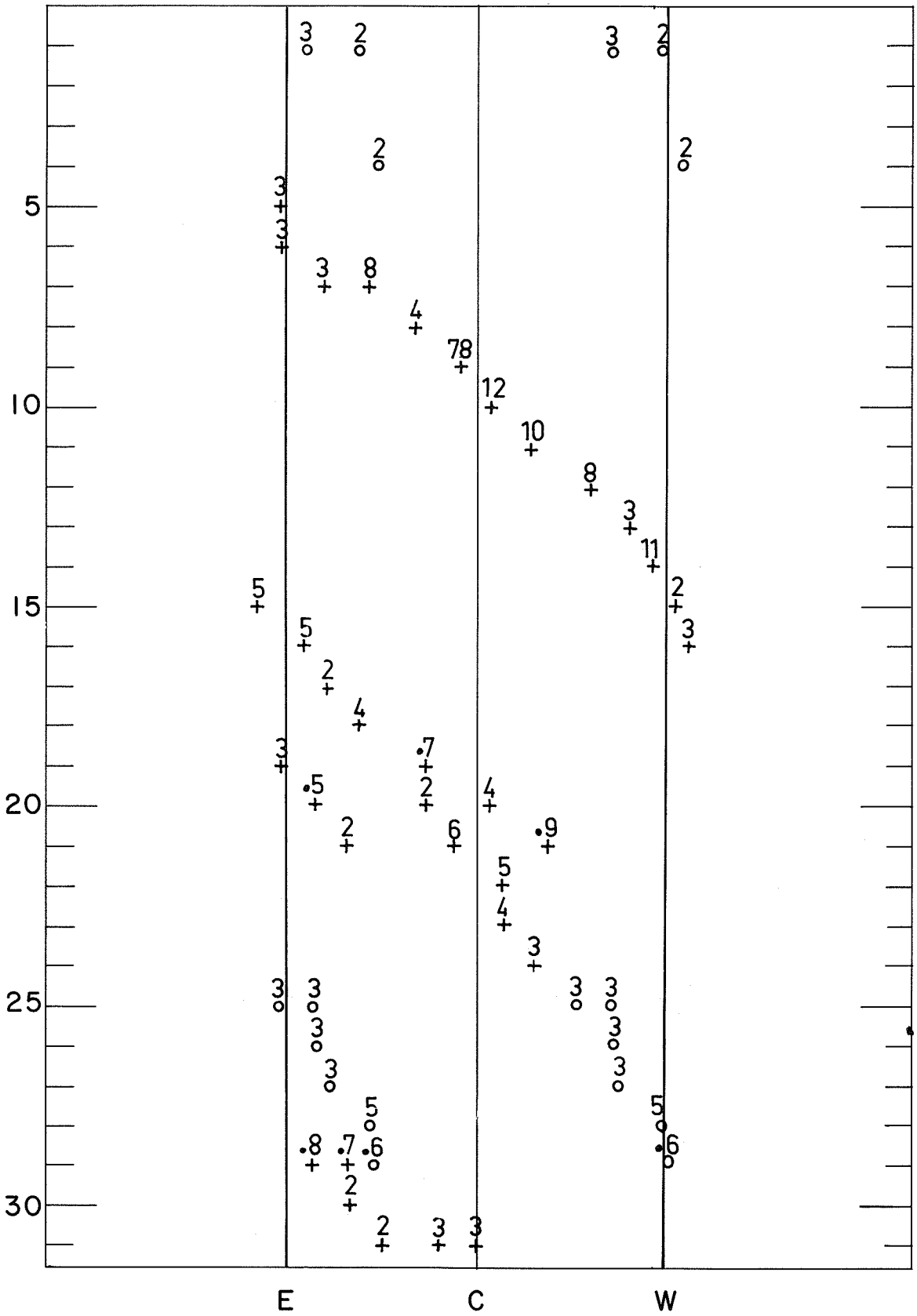
Times of no flare patrol are shown by the shaded area for each day divided into times of no cinematographic patrol (bottom half of day) and times of neither visual nor cinematographic patrol (top half of day).

14
Jan 71

SOLAR RADIO EMISSION
INTERFEROMETRIC OBSERVATION

JANUARY 1971

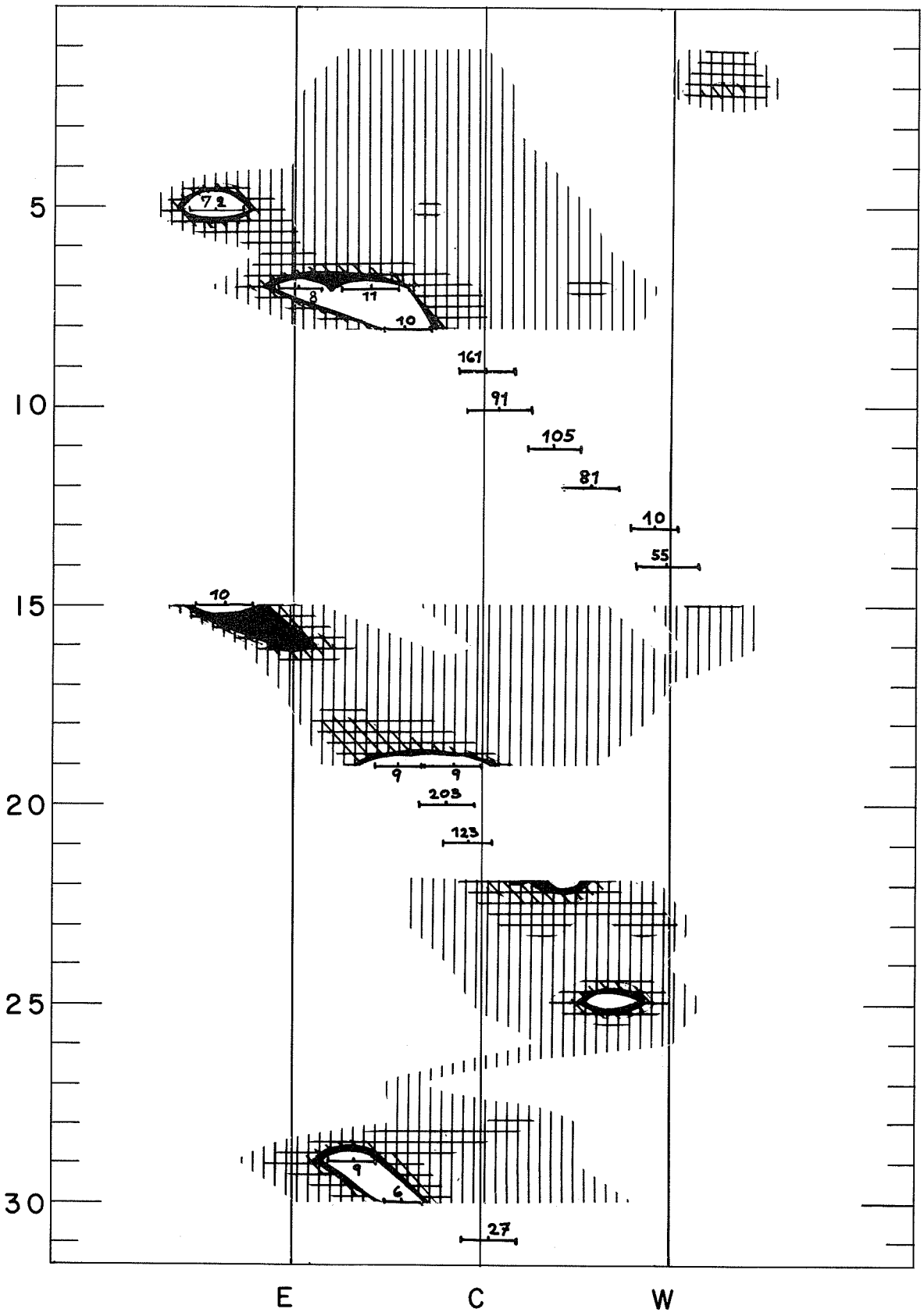
Nançay 408 MHz



SOLAR RADIO EMISSION
INTERFEROMETRIC OBSERVATION

JANUARY 1971

Nançay 169 MHz

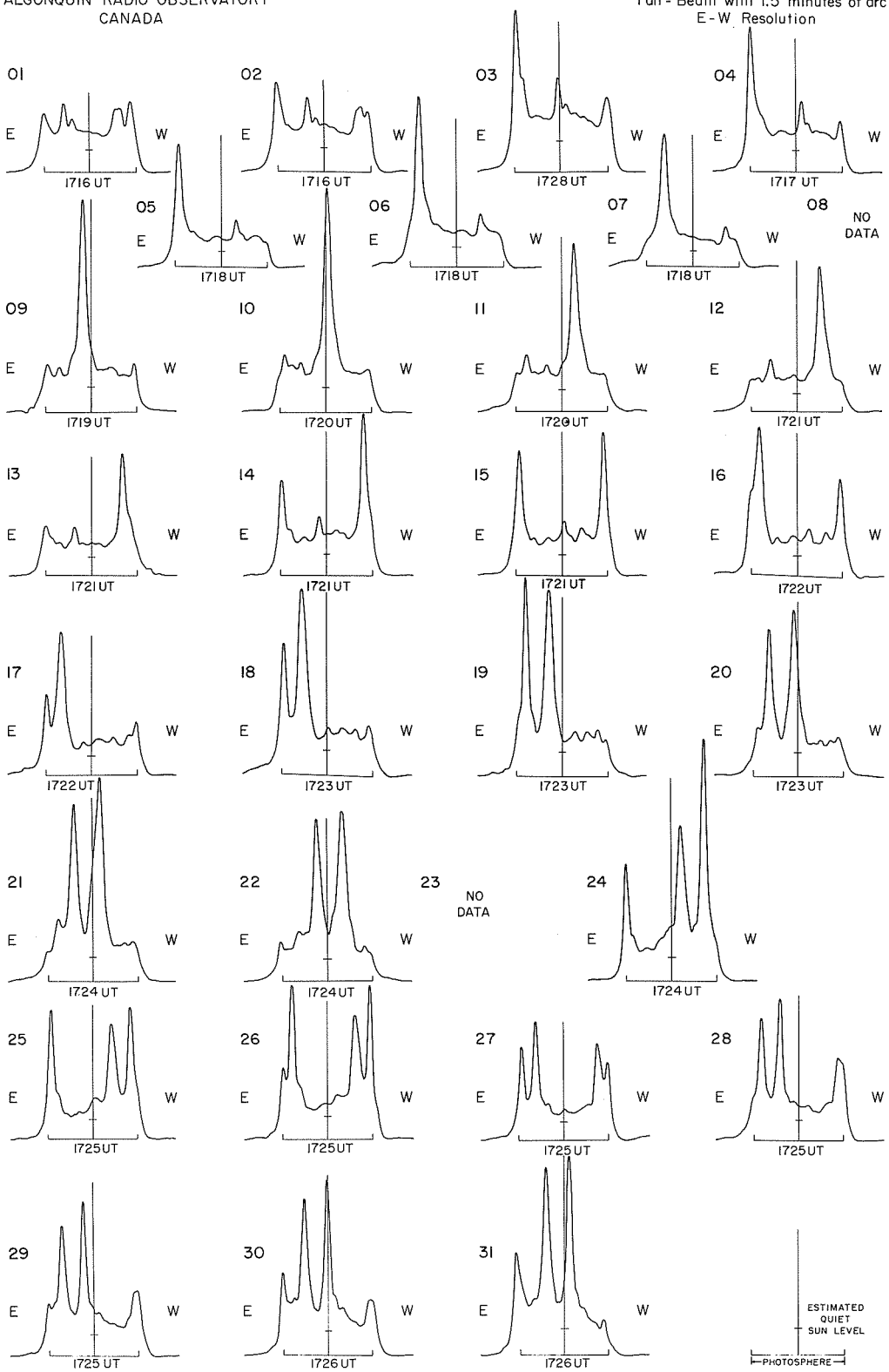


EAST - WEST SOLAR SCANS

January 1971

ALGONQUIN RADIO OBSERVATORY
CANADA

10.7 cm.
Fan - Beam with 1.5 minutes of arc
E - W Resolution

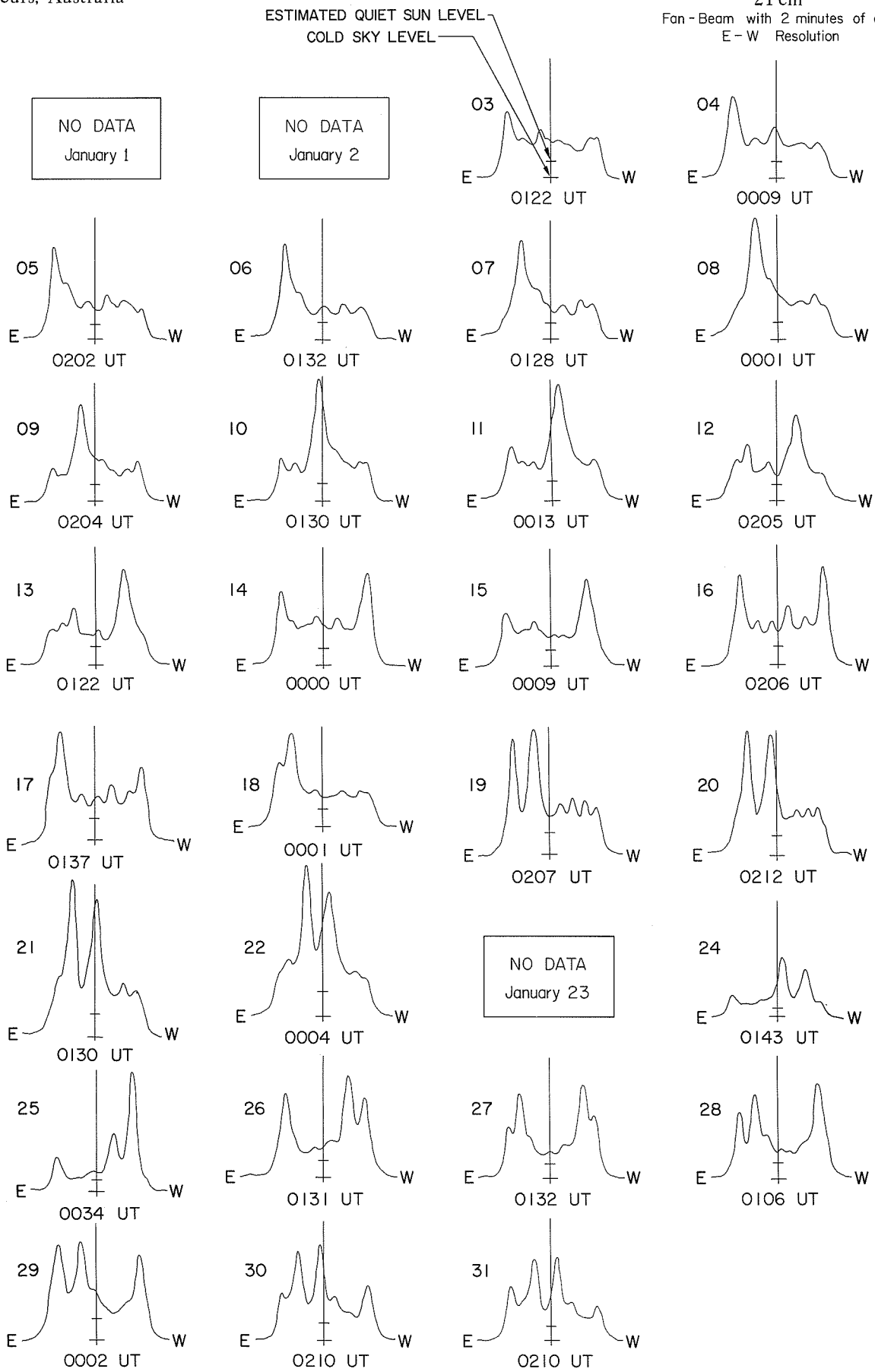


EAST-WEST SOLAR SCANS

JANUARY 1971

Fleurs, Australia

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

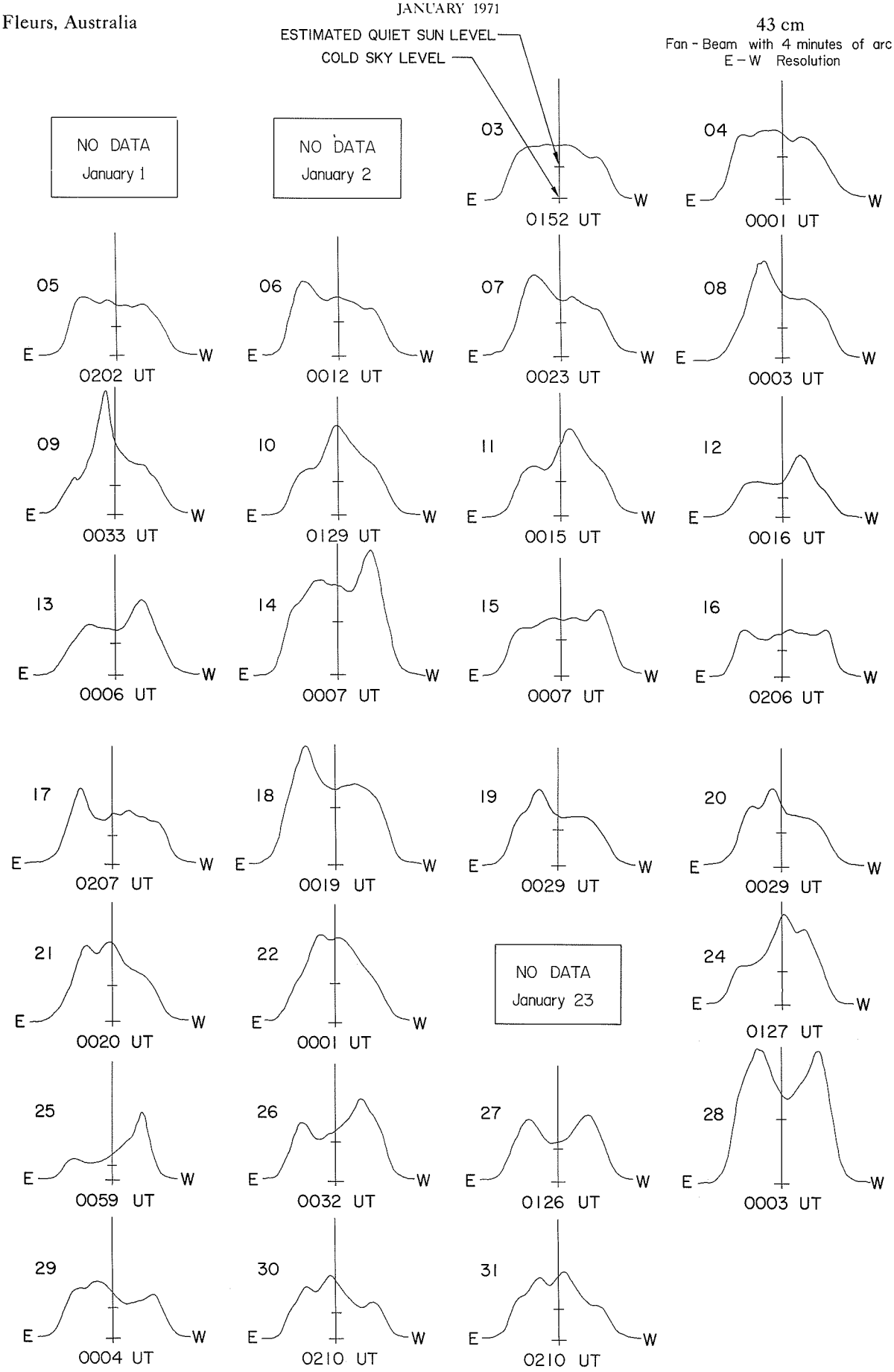


Fleurs, Australia

EAST-WEST SOLAR SCANS

JANUARY 1971

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



SOLAR WIND VELOCITY
and
CO-ROTATION DELAY TIMES

JANUARY 1971

NASA Ames Research Center

DATE	PIONEER VI				PIONEER VII			
January 1971	Time (Z)	Pass	U_H^+	TAU	Time (Z)	Pass	U_H^+	TAU
1	1137	1843	383	3.1	0045	1598	448	11.1
2	2003	1844	506	3.1				
3	2007	1845	448	3.1				
4	0800	1846	448	3.1				
5	0802	1847	339	3.1	0037	1602	341	11.1
6	0800	1848	383	3.1				
7	0801	1849	339	3.1				
8	0800	1850	383	3.1				
9	1051	1851	339	3.1				
10	0755	1852	302	3.1				
11	1745	1853	339	3.1	0102	1608	654	11.2
12	1746	1854	339	3.1				
13	0801	1855	339	3.1				
14	1751	1856	448	3.2	2141	1621	341	11.1
15	0853	1857	647	3.2				
16	1520	1858	756	3.2				
17	1341	1859	647	3.2				
18	1827	1860	756	3.2				
19	1745	1861	506	3.2				
20	0043	1861	506	3.2	2326	1618	571	11.2
21	0039	1862	506	3.2				
	0800	1863	383	3.2				
22	1750	1864	448	3.2				
23	1624	1865	448	3.2				
24	1600	1866	383	3.2				
25	1648	1867	448	3.2				
26	1600	1868	506	3.2				
27	1600	1869	566	3.2				
28	1800	1870	647	3.2				
29	0800	1871	566	3.2				
30	0725	1872	566	3.2	2348	1628	341	11.1
31	0753	1873	448	3.2				

SOLAR WIND
VELA 3 & 5
JANUARY 1971

Date	UT	Spacecraft	Velocity V_{H+} (km/sec)	Density N_{H+} (cm^{-3})	Date	UT	Spacecraft	Velocity V_{H+} (km/sec)	Density N_{H+} (cm^{-3})
01	0200	VELA-5B	384	2.6	15	1500	5B	315	--
	0000	5B	424	--		1700	5B	315	--
	0409	5B	384	2.4		1900	5B	315	--
	0700	5B	404	1.9		2000	5B	348	3.6
	1000	5B	404	2.3		2100	5B	348	4.3
	1100	5B	384	--		2200	5B	331	--
	1400	5B	384	--	17	1200	5B	315	--
	1600	5B	384	--		1300	5B	315	2.6
	1800	5B	424	--		1400	5B	315	--
	2000	5B	384	2.2		1600	5B	315	--
	2100	5B	384	--		1800	5B	300	2.4
02	0000	5B	384	--		1900	5B	315	--
	0100	5B	470	--		2000	5B	286	--
	0200	5B	470	--		2100	5B	315	--
	0300	5B	470	--		2200	5B	331	2.1
	0400	5B	470	--	18	0500	5A	331	--
	0500	5B	384	--		0800	5A	576	1.5
	0600	5B	424	--		0900	5A	348	--
	0700	5B	424	--		1000	5A	547	--
	0800	5B	520	--		1100	5A	384	--
	0900	5B	520	--		1200	5B	384	--
03	1600	5A	520	--		1300	5B	576	--
	1723	5A	576	3.0		1400	5B	637	--
	1752	5A	637	--		1500	5B	576	--
	2100	5B	576	--		1700	5B	520	--
	2300	5A	606	2.0		2200	5A	707	--
04	0000	5B	546	--	19	0600	5B	520	--
	0100	5B	576	--		1200	5B	576	--
	0300	5B	576	--		1600	5B	547	7.1
	0400	5A	606	2.5		1700	5B	576	--
	0500	5B	576	--		1900	5B	520	--
	0700	5B	547	3.5		2200	5B	576	--
	0900	5B	606	--	20	0000	5B	576	--
	1000	5A	576	2.8		0300	5B	637	--
	1200	5A	576	--		0600	5B	637	--
	1400	5A	606	2.0		0900	5B	707	--
	1600	5A	576	--		1200	5B	707	--
	1900	5A	547	1.8		1500	5B	707	--
	2000	5A	576	--		1800	5B	707	--
	2100	5A	576	--		1900	5B	745	1.2
	2200	5A	576	--		2000	5B	707	--
	2300	5A	637	--		2200	5B	707	--
05	0000	5A	606	2.0		2300	5B	707	--
	0100	5A	576	--	21	0000	5B	576	--
	0300	5A	576	--	22	1700	5A	446	--
	0417	5A	606	2.3		1900	5A	470	--
	0800	5B	519	--		2100	5A	470	--
	0900	5B	520	--		2218	5B	470	--
	1000	5A	494	1.8		2300	5B	424	--
	1200	5B	520	--		2311	5A	470	1.8
	1500	5B	520	--	23	0100	5B	424	--
	1600	5B	547	1.4		0300	5B	424	--
	1900	5B	470	--		0500	5B	424	2.1
	2200	5B	520	--		0600	5A	424	1.8
06	0100	5B	520	--		0700	5B	424	--
	0300	5B	470	--	24	0100	5A	424	--
	0600	5B	495	1.5		0200	5A	424	--
08	1953	5B	272	1.7		0348	5A	424	--
	2100	5B	272	--		0500	5A	424	--
	2200	5B	259	--		1547	5B	404	1.2
	2300	5B	259	--	25	0200	5B	470	--
09	0300	5A	315	--		0400	5B	470	--
	0351	5A	286	--		0600	5B	494	--
	2100	5A	286	3.7		0700	5B	470	1.3
10	0400	5B	315	--		0800	5B	424	--
	0500	5B	286	3.6	27	0500	5B	446	--
	0800	5A	286	--		0700	5A	576	--
	1000	5A	300	--		0800	5B	547	--
	1100	5B	286	--		0845	5A	520	--
	1700	5B	315	3.1		0900	5B	495	--
	1800	5B	315	--		1100	5A	495	--
	2000	5B	314	--		1137	5A	547	--
	2300	5B	348	--		1200	5B	520	--
11	0000	5B	348	--		1300	5B	520	--
	0300	5B	348	--		1400	5B	520	2.9
12	1900	5B	300	--		1500	5B	520	--
	2000	5B	365	--		1800	5B	470	--
	2100	5B	300	2.4		1900	5B	470	--
13	0102	5B	348	2.4	28	0100	5B	404	--
	0600	5B	331	2.7	29	0100	5A	384	--
	0800	5B	331	1.0		0150	5A	404	5.5
	0900	5B	315	--		0413	5B	384	7.8
	1000	5B	331	--		1000	5B	348	--
	1200	5B	348	--	30	0111	5B	424	--
	1400	5B	384	11.0		0700	5B	495	--
	1600	5B	384	--	31	1400	5B	520	--
	2000	5A	384	--		1600	5B	520	--
	2200	5A	384	--		1900	5B	547	--

COSMIC RAY PROTONS

JANUARY 1971

Counting Rates (particles/sec)

Univ. of Chicago

PIONEER VI

Date Jan.	Time (UT)	0.6-13 Mev*	13-175 Mev**	>175 Mev	Date Jan.	Time (UT)	0.6-13 Mev*	13-175 Mev**	>175 Mev
1	0200	274.	.647	1.04	16	0730	2.44	Q	Q
1	1000	323.	.509	.366	16	1800	5.87	Q	Q
1	1800	246.	.347	Q	17	0200	34.4	.113	Q
2	0200	223.	.273	Q	17	1000	>585.	.089	Q
2	1000	180.	.216	Q	17	1500	>585.	.140	Q
2	1800	189.	.204	Q	18	0200	4260.	.104	Q
3	0200	208.	.155	Q	18	1000	∿1200.	Q	Q
3	1000	127.	.111	Q	18	1800	365.	Q	Q
4	0200	89.8	Q	Q	19	0200	209.	Q	Q
4	1000	83.5	Q	Q	19	1000	188.	Q	Q
4	1800	83.5	Q	Q	19	1800	125.	Q	Q
5	0200	68.8	Q	Q	20	0200	94.1	Q	Q
5	1000	60.5	Q	Q	20	1800	97.2	Q	Q
5	1800	48.7	Q	Q	21	0200	56.8	Q	Q
6	0200	28.5	Q	Q	21	1000	26.6	Q	Q
6	1000	23.4	Q	Q	21	1800	9.92	Q	Q
6	1800	17.2	Q	Q	22	1800	5.58	Q	Q
7	0200	28.4	Q	Q	23	1600	5.58	Q	Q
7	1000	20.2	Q	Q	24	0200	4.05	Q	Q
7	1800	13.9	Q	Q	24	1000	3.23	Q	Q
8	1000	11.4	Q	Q	24	1800	2.87	Q	Q
8	1800	9.12	Q	Q	25	0100	>585.	>200.	10.6(?)
9	0200	8.00	Q	Q	25	0200	>585.	∿104.	4.86
9	1000	7.52	Q	Q	25	0600	?	∿320.	∿50.
9	1800	6.23	Q	Q	25	1000	?	?	?
10	0800	5.22	Q	Q	25	1800	>585	∿200.	9.5
10	1800	3.85	Q	Q	26	1000	>585	∿53.	2.61
11	0200	3.79	Q	Q	26	1800	∿900	28.6	1.30
11	1000	3.32	Q	Q	27	0200	>585	7.61	.718
11	1800	3.54	Q	Q	27	1000	>585	15.1	.690
12	0200	3.12	Q	Q	27	1800	293.	5.45	.485
12	1000	8.61	Q	Q	28	0200	275.	4.32	.487
12	1800	43.3	Q	Q	28	1800	202.	2.32	.406
13	0200	79.8	Q	Q	29	0200	76.2	1.26	Q
13	1000	48.8	Q	Q	29	1000	58.5	1.03	Q
13	1800	10.2	Q	Q	29	1800	36.6	.709	Q
14	0200	10.1	Q	Q	30	0800	24.9	.516	Q
14	1000	15.8	Q	Q	30	1800	21.6	.471	Q
14	1800	7.11	Q	Q	31	0200	19.5	.315	Q
15	0200	5.71	Q	Q	31	1000	18.2	.355	Q
15	1000	3.04	Q	Q	31	1800	18.2	.343	Q
15	1930	3.43	Q	Q					
15	0200	2.51	Q	Q					

PIONEER VII

Date Jan.	Time (UT)	0.6-13 Mev*	13-175 Mev**	>175 Mev	Date Jan.	Time (UT)	0.6-13 Mev*	13-175 Mev**	>175 Mev
11	0100	.962	Q	Q	20	2120	24.4	Q	Q
14	2130	2.79	Q	Q	30	2130	∿500.	1.05	.703

* Includes He 0.6-13 Mev/nucleons and electrons ∿0.5 Mev -see J. Retzler and J. A. Simpson, J. Geophys. Res., 74, 9, 2149-2160, 1969 for discussion of the electron response of Pioneer VII.

** Includes He >13 Mev/nucleon.

Q Used to indicate that a rate is at its quiescent level.

Notes:
(1) Data are subject to future determination of possible saturation during enhanced flux observations.
(2) Pioneer heliographic longitude is given in the solar wind tabulations in terms of "co-rotation" delay time (days).
(3) Unidirectional geometrical factors are 5.8×10^{-4}, 1.15×10^{-4}, $1.7 \times 10^{-4} m^2$ster for the three ascending energy intervals given above. The two higher energy intervals have a bidirectional response at energies greater than ∿100 Mev/nucleon. See Fan, Pick, Pyle, Simpson, and Smith, J. Geophys. Res., 73, 5, 1555-1582 for a description of the University of Chicago instruments.
(4) The symbol "Q" is used to indicate that a rate is at its quiescent level. Quiescent counting rates at present are approximately:
Pioneer 6 0.1, 0.055, 0.250 counts per second,
Pioneer 7 0.1, 0.055, ∿0.100 counts per second for the three ascending energy intervals.
(5) Times are only approximate (time accurate to approximately ± 15 minutes).

COSMIC RAY PROTONS

JANUARY 1971

Counting Rates (particles/sec)

University of New Hampshire

Pioneer VIII

Date Jan.	Time (UT)	>13.9 Mev	>64 Mev	Date Jan.	Time (UT)	>13.9 Mev	>64 Mev
1	0030	7.0	-	17	0030	5.55	.79
	0530	12.0	-		0430	5.19	.82
	0701	8.0	-	18	0430	4.39	.79
	1458	5.98	.80		1204	4.32	.77
2	0500	4.0	-		2230	3.83	.55
	0703	4.0	-	19	0400	3.66	.67
3	0600	6.0	-		1200	3.77	.68
	0700	13.0	-	20	0100	3.78	.60
	1529	4.90	.94		1200	3.88	.72
4	0504	11.0	-		2330	3.88	.69
	1100	4.0	-	21	1200	4.02	.75
5	0030	5.0	-	22	0030	14.2	.72
	0330	5.0	-		0330	4.15	.59
	1200	7.0	-		1200	4.11	.81
6	0200	4.0	-		2300	4.16	.77
	0604	4.15	.57	23	0530	4.15	.68
	1100	4.76	.76		1200	4.10	.77
7	0120	4.62	.51	24	0430	4.10	.62
	1100	4.70	.78		1201	4.19	.84
	2130	4.66	.80	25	0530	overflow	overflow
8	0100	4.72	.69		1528	65.9	1.83
	0530	4.76	.62		2300	51.0	-
	1204	4.72	.80	26	0000	44.0	-
9	0130	4.70	.68		0300	48.0	1.37
	0400	4.63	.71		0400	40.0	-
	0645	4.82	.83		1229	38.0	-
	1202	4.78	.77		1418	32.0	1.75
10	0500	4.69	.72		1601	28.6	1.17
	1059	4.80	.75		1800	28.7	1.17
11	0430	4.64	.85	27	0400	20.0	-
	1200	7.05	.53		1200	16.0	-
12	0518	4.60	.67		1356	4.49	.92
	1100	4.51	.75		1600	17.4	.94
13	0030	4.56	.72		1800	16.9	1.19
	1200	4.52	.79	28	2030	6.0	-
14	0400	4.53	.57	29	0324	7.0	-
	1200	4.56	.78		1256	8.49	.86
	2130	4.49	.75	30	0400	9.0	-
15	0130	4.50	.69		1343	6.91	1.09
	0457	4.44	.45	31	0430	∿10.	-
	1212	4.41	.75		1314	6.45	.92
16	0030	4.47	.66				
	0400	4.31	.68				
	1202	4.65	.81				
	2000	5.94	.67				

Pioneer IX

Date Jan.	Time (UT)	>13.9 Mev	>40 Mev	Date Jan.	Time (UT)	>13.9 Mev	>40 Mev
1	1845	5.10	.68	17	2330	3.51	.72
2	2000	4.72	.67	18	1800	3.48	.68
3	2000	4.38	.72	20	1900	3.54	.72
4	1830	4.34	.82	22	1800	3.59	.71
6	1900	4.15	.70	24	2030	3.74	.65
7	2200	4.06	.70	25	1700	4.77	.77
8	1800	3.83	.71	26	1600	-	-
9	1619	3.72	.70		1759	6.0	-
10	2100	3.70	.68		1952	7.14	.72
11	1800	3.68	.76	28	1800	52.0	-
12	1730	3.62	.86	30	2006	15.0	-
16	1514	4.24	.68				
	2000	4.27	.67				

SOLAR PROTON MONITORING ATS-1 (1966-110A)

JANUARY 1971

AEROSPACE CORP

ENERGY LEVEL 5-21 MEV - HOURLY AVERAGES (PARTICLES CM^{-2} SEC^{-1})

DATE \ HOUR	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
01	5.06	4.96	5.33	2.58	2.90	4.53	4.11	4.80	4.90	5.59	7.07	4.32	4.16	3.48	3.74	3.69	3.11	6.70	6.22	6.70	4.38	4.53	3.74	3.90
02	6.65	7.86	9.28	9.97	10.2	9.23	5.91	5.48	10.8	8.44	7.54	7.86	7.12	6.59	8.02	5.81	6.17	5.91	5.64	4.59	3.69	3.58	4.01	3.90
03	5.01	4.69	5.54	4.85	4.22	4.96	4.59	4.69	4.59	3.80	3.27	3.37	4.01	3.64	3.69	3.06	3.80	2.85	2.79	2.42	1.68	1.42	1.31	1.68
04	1.31	--	2.21	2.16	2.11	1.95	2.42	1.58	1.58	1.95	1.53	1.58	1.21	2.26	1.79	1.00	1.05	0.52	0.84	0.52	0.36	0.40	--	0.63
05	--	--	--	--	--	--	0.54	0.68	0.95	0.68	0.95	0.54	0.54	0.54	0.68	0.27	0.41	0.68	0.79	--	--	0.21	--	0.31
06	0.63	0.26	0.42	0.52	0.36	0.21	0.21	0.21	0.36	0.26	0.21	0.05	0.31	0.42	0.15	0.63	0.40	--	--	--	--	--	0.36	0.15
07	--	--	0.21	0.10	0.36	0.15	0.26	0.21	0.52	0.36	0.26	0.21	0.31	0.26	0.42	0.31	0.26	0.31	0.47	0.36	0.27	0.40	0.31	0.15
08	0.47	0.31	0.42	0.36	0.42	0.21	0.36	0.21	0.31	0.47	0.47	0.42	0.31	0.31	0.15	0.52	0.21	0.27	0.27	--	--	--	0.40	0.15
09	0.79	0.21	0.15	0.26	0.31	0.10	0.63	0.36	0.36	0.21	0.31	0.36	0.52	0.68	0.21	0.21	0.47	0.15	0.36	0.26	0.42	0.05	0.15	0.10
10	0.31	0.15	0.10	0.05	0.21	0.36	0.31	0.36	0.15	0.42	0.21	0.31	0.10	0.47	0.15	0.21	0.42	0.31	0.36	0.73	0.15	0.26	0.15	0.31
11	0.15	0.47	0.26	0.21	0.15	0.26	0.21	0.31	0.40	0.26	0.31	0.21	0.21	0.15	0.26	0.95	--	--	0.15	0.36	0.63	0.31	0.31	--
12	0.36	--	0.42	0.21	0.21	0.10	0.26	0.31	0.58	0.15	0.36	0.26	0.47	0.31	0.36	0.31	0.36	0.15	0.42	0.47	--	0.14	0.58	0.10
13	0.47	0.21	0.21	0.26	--	--	--	0.40	0.14	0.14	0.14	0.40	--	0.27	0.27	0.27	--	--	--	0.40	--	--	0.40	0.15
14	0.31	0.26	0.27	0.31	0.36	0.31	0.36	0.10	0.15	0.05	0.31	0.26	0.31	2.63	2.79	1.00	0.81	0.54	0.27	0.54	--	--	--	--
15	0.36	0.31	0.26	0.26	0.26	0.47	0.68	0.52	0.36	0.52	0.47	0.26	0.47	0.42	0.26	0.47	0.68	0.68	0.58	0.54	0.58	0.36	0.27	0.47
16	0.36	0.26	0.36	0.14	0.21	0.21	0.42	0.21	0.31	0.58	0.36	0.21	0.15	0.26	0.31	0.26	0.42	0.05	0.36	0.42	0.42	0.79	0.54	0.14
17	0.40	--	0.14	0.15	0.36	0.26	0.73	0.58	0.89	1.84	1.68	1.31	1.47	1.95	2.63	2.37	2.53	2.26	2.16	2.00	1.26	1.10	1.53	1.42
18	1.31	1.21	1.47	1.10	1.10	0.54	0.54	2.03	--	0.81	0.54	0.27	0.40	0.54	0.20	--	0.27	0.26	0.58	0.95	0.52	--	--	--
19	--	--	0.27	0.31	0.89	0.52	0.36	0.63	0.52	0.63	0.68	0.36	0.42	0.15	0.63	0.63	--	--	--	0.27	0.40	0.27	--	--
20	--	--	--	0.68	0.63	0.36	0.05	0.15	0.31	0.84	0.63	0.26	0.15	0.42	0.26	0.10	--	0.14	0.15	--	--	--	--	--
21	0.15	0.26	0.15	--	0.10	0.26	0.21	0.21	0.05	0.05	0.10	0.15	--	0.05	0.15	0.10	0.42	0.15	0.15	0.15	0.10	--	0.14	0.21
22	0.10	--	0.27	0.26	0.31	0.31	0.21	0.21	0.36	0.26	0.26	0.21	0.26	0.47	0.14	0.10	0.10	0.42	0.36	0.42	0.52	0.52	0.26	0.31
23	0.84	0.58	0.52	0.58	0.68	0.42	0.42	0.42	0.68	0.73	0.63	0.58	0.52	0.36	0.42	0.26	0.47	0.42	0.36	--	--	--	0.40	0.42
24	0.26	0.42	0.36	0.47	0.42	0.52	--	--	--	0.54	0.63	0.79	0.36	0.54	0.54	--	0.54	0.63	0.42	0.42	0.42	1.05	--	20.3
25	21.2	277.	841.	1588.	224.	3712.	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	8781.	7534.	6421.
26	5563.	--	--	4016.	3991.	3726.	--	--	--	4188.	3660.	3405.	2929.	2538.	2260.	--	--	--	--	--	--	--	682.	741.
27	762.	735.	681.	702.	1771.	1713.	--	--	--	--	--	1257.	1180.	1186.	1164.	--	--	--	--	--	--	819.	729.	610.
28	533.	542.	459.	378.	500.	--	--	--	378.	297.	297.	297.	224.	170.	--	--	--	--	--	--	--	--	--	--
29	68.7	81.4	62.2	--	82.2	62.0	--	--	--	--	79.1	90.5	81.1	68.6	52.6	--	--	--	--	--	--	--	--	--
30	--	32.8	36.2	39.8	--	--	--	--	--	--	--	--	--	--	--	16.6	14.1	12.1	12.9	11.7	14.6	14.5	14.5	14.9
31	13.2	7.75	7.75	7.12	7.96	7.38	--	--	--	6.22	5.48	5.59	6.96	8.81	5.11	4.90	5.33	3.43	5.11	4.75	--	--	--	

SOLAR PROTON MONITORING ATS-1 (1966-110A)

JANUARY 1971

AEROSPACE CORP

ENERGY LEVEL 21-70 MEV - HOURLY AVERAGES (PARTICLES CM^{-2} SEC^{-1})

DATE \ HOUR	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
01	0.82	0.87	0.87	0.72	0.70	0.77	0.71	0.72	0.67	0.68	0.72	0.77	0.63	0.72	0.79	0.70	0.52	0.72	0.75	0.71	0.73	0.62	0.60	0.64
02	0.54	0.63	0.60	0.62	0.63	0.61	0.56	0.62	0.63	0.58	0.57	0.55	0.54	0.54	0.51	0.60	0.60	0.50	0.44	0.54	0.41	0.48	0.52	0.43
03	0.56	0.45	0.44	0.55	0.41	0.47	0.63	0.55	0.42	0.44	0.38	0.53	0.31	0.51	0.43	0.49	0.49	0.41	0.37	0.47	0.45	0.42	0.38	0.46
04	--	--	0.47	0.40	0.47	0.46	0.38	0.43	0.42	0.44	0.41	0.37	0.32	0.36	0.37	0.41	0.33	0.38	0.41	0.42	0.51	0.43	--	0.34
05	--	--	--	--	--	--	0.38	0.33	0.33	0.43	0.31	0.34	0.43	0.34	0.40	0.34	0.40	0.46	0.36	--	--	0.32	--	0.43
06	0.35	0.37	0.38	0.47	0.31	0.38	0.36	0.43	0.41	0.34	0.45	0.37	0.38	0.40	0.38	0.33	--	--	--	--	--	--	0.43	0.35
07	--	--	0.36	0.36	0.36	0.30	0.37	0.36	0.34	0.41	0.40	0.35	0.37	0.41	0.43	0.36	0.44	0.35	0.43	0.40	0.38	0.37	0.40	0.40
08	0.33	0.41	0.40	0.38	0.40	0.35	0.37	0.37	0.44	0.38	0.32	0.38	0.48	0.36	0.45	0.36	0.38	0.41	0.38	--	0.36	0.30	0.34	0.44
09	0.44	0.37	0.43	0.38	0.44	0.36	0.46	0.34	0.36	0.34	0.37	0.38	0.28	0.40	0.32	0.47	0.41	0.37	0.39	0.31	0.32	0.45	0.37	0.36
10	--	0.40	0.47	0.46	0.43	0.49	0.39	0.41	0.30	0.41	0.37	0.44	0.47	0.36	0.36	0.36	0.32	0.39	0.41	0.39	0.34	0.48	0.42	0.32
11	0.45	0.36	0.38	0.41	0.32	0.44	0.48	0.43	0.51	0.38	0.38	0.40	0.38	0.38	0.45	0.41	--	--	0.50	0.44	0.41	0.40	0.43	--
12	0.40	--	0.44	0.47	0.41	0.45	0.48	0.40	0.45	0.39	0.44	0.34	0.37	0.39	0.48	0.42	0.47	0.42	0.40	0.36	--	0.33	0.39	--
13	0.35	0.37	0.51	0.40	--	--	--	0.37	0.47	0.38	0.40	0.34	--	--	0.33	0.37	0.47	0.43	0.34	0.34	0.41	0.40	0.33	0.40
14	--	0.42	0.45	0.38	0.42	0.39	0.50	0.44	0.38	0.31	0.45	0.32	0.40	0.52	0.47	0.41	0.38	0.38	--	--	--	--	--	--
15	0.41	0.36	0.50	0.49	0.37	0.47	0.46	0.47	0.41	0.36	0.38	0.41	0.38	0.49	0.30	0.40	0.31	0.23	0.41	0.34	0.39	0.40	0.51	0.40
16	0.45	0.38	0.39	0.34	0.35	0.44	0.38	0.33	0.42	0.45	0.45	0.44	0.41	0.37	0.34	0.46	0.38	0.35	0.43	0.37	0.45	0.38	0.41	0.50
17	0.41	--	0.43	0.43	0.40	0.40	0.36	0.38	0.37	0.38	0.44	0.45	0.36	0.38	0.46	0.45	0.40	0.31	0.41	0.33	0.33	0.43	0.35	0.30
18	0.34	0.40	0.36	0.40	0.41	0.27	0.33	--	--	0.26	0.50	0.50	0.33	0.36	0.47	--	0.37	0.42	0.43	0.40	0.43	--	--	--
19	--	--	0.34	0.36	0.38	0.36	0.33	0.40	0.45	0.41	0.43	0.40	0.33	0.36	0.41	0.33	--	--	--	0.21	0.37	0.23	--	--
20	--	--	--	0.28	0.30	0.35	0.38	0.37	0.30	0.34	0.40	0.38	0.36	0.42	0.30	0.43	--	0.27	0.30	--	--	--	--	0.28
21	0.30	0.35	0.28	0.39	0.41	0.33	0.36	0.35	0.37	0.32	0.37	0.31	0.33	0.37	0.41	0.44	0.35	0.42	0.30	0.37	0.33	--	0.54	0.46
22	0.39	--	0.47	0.38	0.37	0.42	0.36	0.37	0.31	0.43	0.44	0.41	0.39	0.33	0.28	0.30	0.40	0.35	0.40	0.32	0.40	0.34	0.39	0.33
23	0.24	0.31	0.29	0.35	0.32	0.39	0.28	0.45	0.32	0.26	0.33	0.30	0.31	0.22	0.35	0.32	0.44	0.30	0.32	--	--	--	0.31	0.34
24	0.36	0.32	0.37	0.47	0.38	0.28	--	--	--	0.30	0.33	0.31	0.40	--	--	--	0.31	0.32	0.41	0.33	0.39	0.37	--	48.3
25	107.	432.	524.	367.	529.	479.	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	582.	267.	694.
26	629.	767.	568.	222.	675.	845.	--	--	--	795.	563.	510.	450.	406.	365.	--	--	--	--	--	--	511.	596.	181.
27	177.	173.	164.	161.	168.	165.	--	--	--	--	--	93.3	96.2	88.1	85.3	--	--	--	--	--	--	72.7	62.1	52.9
28	48.1	43.7	42.6	38.3	39.8	--	--	--	31.2	27.0	27.0	27.0	21.3	15.3	--	--	--	--	--	--	--	--	--	--
29	8.80	8.93	8.03	--	8.72	7.23	--	--	--	--	7.95	7.67	7.82	6.96	5.96	--	--	--	--	--	--	--	--	--
30	--	5.80	5.81	6.18	--	--	--	--	--	--	--	--	--	--	--	2.70	2.72	2.49	2.65	2.53	2.48	2.48	2.45	2.32
31	1.99	1.68	3.25	1.72	1.72	1.65	--	--	--	1.50	1.47	3.13	1.75	1.48	1.45	1.36	1.43	1.22	1.08	1.17	--	--	--	

SOLAR PROTON EVENT
(PROVISIONAL)

JANUARY 1971

Date/Time	Detector	Activity
24/2340 UT	ATS-1	20-70 Mev channel became enhanced, increased rapidly
	Deep River	Neutron counts began to rise - showed a 12% increase at 25/0010
25/0020	ATS-1	5-20 Mev increase begins
0100	Vela proton counters	>25 Mev showed 2640 part/cm^2/sec (ATS-1 similar)
0355	Thule 30 MHz riometer	0.5 dB
0524	Pioneer 6, about 3.2 days corotation behind the earth	0.6-13 Mev approx 1100 part/cm^2/sec (Background approx 2 part/cm^2/sec)
		13-70 Mev approx 199 part/cm^2/sec (Background approx 2 part/cm^2/sec)
		70-190 Mev approx 605 part/cm^2/sec (Background approx 2 part/cm^2/sec)
		>190 Mev approx 387 part/cm^2/sec (Background approx 7.4 part/cm^2/sec)
0730	Thule 30 MHz riometer	0.8 dB
0800	Vela proton counters	>25 Mev peak value 5640 part/cm^2/sec (ATS-1 comparable)
1500	Ft. Churchill riometer	4.0 dB in twilight
1800	Thule 30 MHz riometer	1.9 dB (peak twilight value)
2000	Shepherd's Bay riometer	6.27 dB
26/0000	ATS-1	5-20 Mev 6420 part/cm^2/sec (peak value)
		20-70 Mev then read 694 part/cm^2/sec
0700	ATS-1	20-70 Mev reading 845 part/cm^2/sec
27/0100	ATS-1	about 1000 part/cm^2/sec at 5-20 Mev and about 200 part/cm^2/sec at 20-70 Mev
0431	ATS-1	Apparent sc on H, D, Z traces and ATS-1 magnetometer. Confirmed by Vela solar wind data. ATS-1 5-20 Mev counts rose simultaneously, implying arrival of energetic storm particles.

Table of Contents
for December 1970 Data

	Page
Daily Solar Activity Centers	
X-ray, 8.6 mm, 9.1 cm and 21 cm Spectroheliograms Magnetograms and Calcium Plages	28-58
Hα Spectroheliograms, Sunspots and Corona	59-69
Individual Regions of Solar Activity	70-77
Daily Calcium Plage Indices	77
Solar X-ray Radiation	
Naval Research Laboratory - Explorer 37	78-80
Sudden Ionospheric Disturbances	
Table of Events	81-82
Number of Events in each Plage Region	83
Solar Radio Waves	
Spectral Observations	84-95
408 MHz Interferometric Chart - Nançay	96
169 MHz Interferometric Chart - Nançay	97
Cosmic Rays	
Neutron Monitors Daily Values - Deep River, Churchill, Climax, Dallas	98
Chart of Variations - Deep River, Alert	99
Geomagnetic Indices	
Table of Indices Kp, Ci, Cp, Ap	100
12-Month Table of Daily Average Ap	101
Chart of Kp by Solar Rotations	102
Chart of C9 by Solar Rotations	103
Principal Magnetic Storms	104
Radio Propagation Indices	
North Atlantic Quality Figures and Forecasts	106
Charts of North Atlantic Short-term Forecasts and Quality and High Latitude Advance Forecasts	107
Transmission Frequency Ranges - North Atlantic Path	108-109
Quality Indices on Transmission from U.S.A., South America and Asia to Germany	110

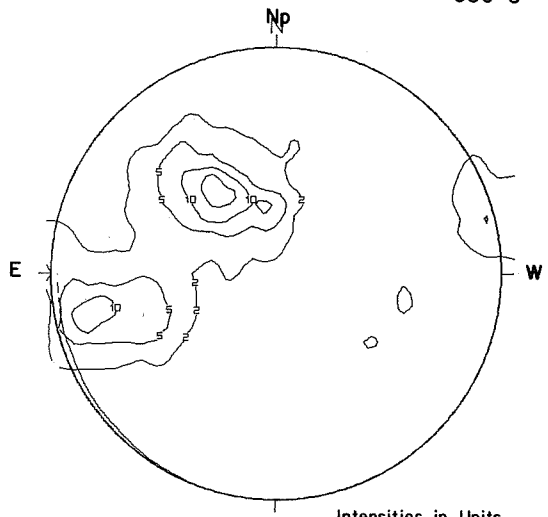
Errata and Notes: See pages 28, 70, 95 and 104

For explanations of the data contained herein see "Descriptive Text" published in February 1971.

DECEMBER 1, 1970 (P = 16.28, B_o = 0.88, L_o = 178.03)

UNIV. COLLEGE LONDON
LEICESTER UNIV.

X-RAY
OSO-5

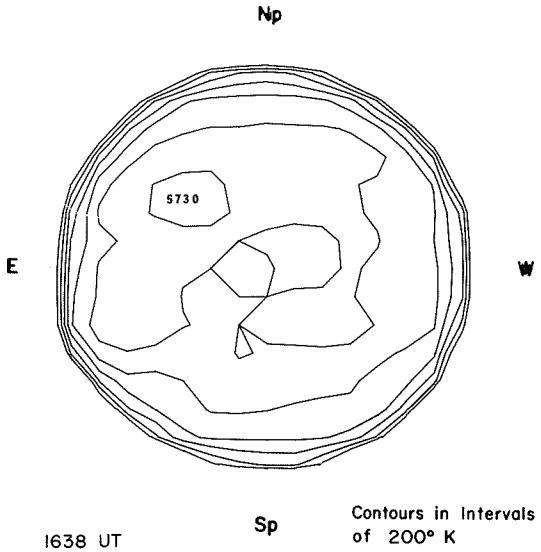


2219-2351 UT

Intensities in Units of 10^{-6} ergs cm^{-2} sec^{-1}

PROSPECT HILL
AFCRL

8.6 mm

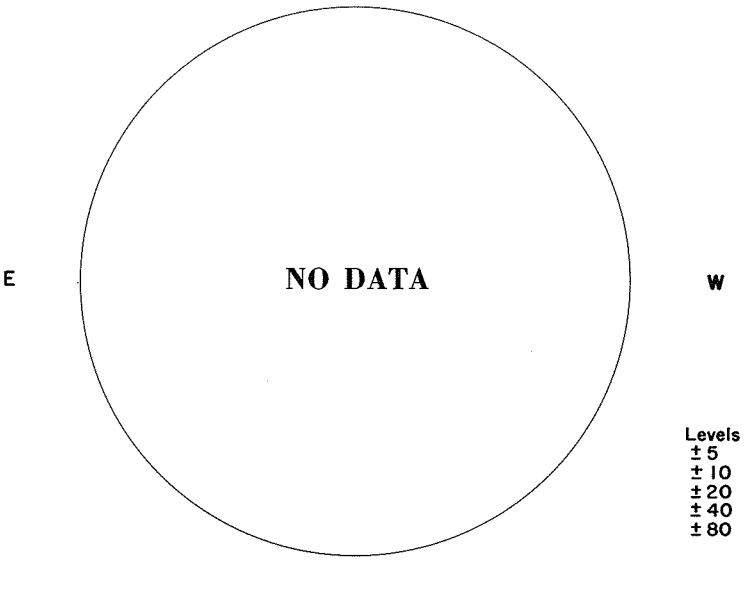


1638 UT

Contours in Intervals of 200° K

MT. WILSON

MAGNETOGRAM
Solid-Plus
Dotted-Minus

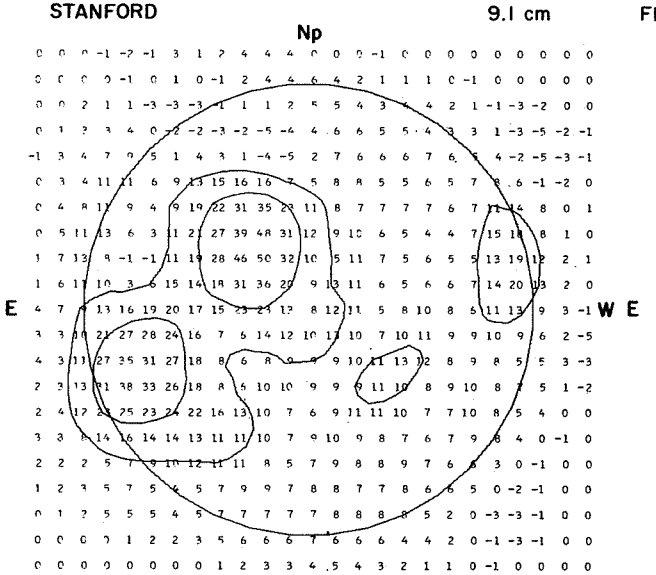


NO DATA

Levels
±5
±10
±20
±40
±80

STANFORD

9.1 cm

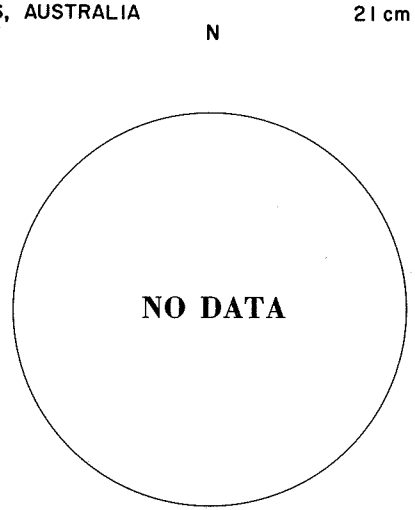


20-21 UT

Brightness Unit 5,000° K

FLEURS, AUSTRALIA

21 cm



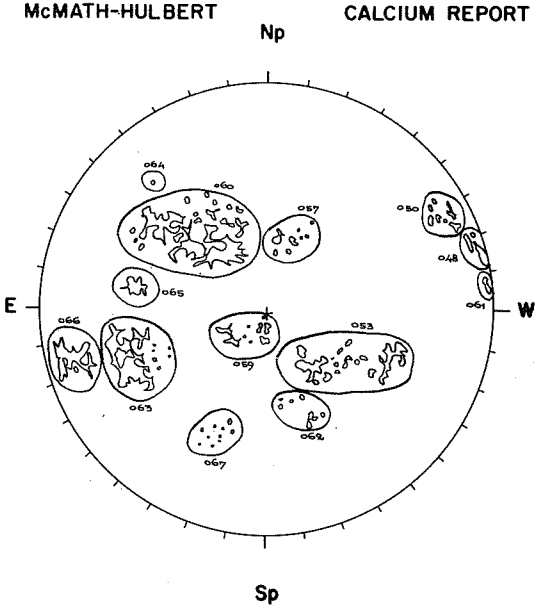
NO DATA

02-03 UT

Resolution 3 Minutes of Arc
Brightness Unit 1,700° K

McMATH-HULBERT

CALCIUM REPORT



FAIR	M
48	18 - 3.0
53	25 - 2.5
60	55 - 3.5
63	32 - 2.5
65	10 - 2.5
66	35 - 2.5

1600 UT

DECEMBER 2, 1970 (P = 15.89, B_o = 0.75, L_o = 164.86)

MT. WILSON

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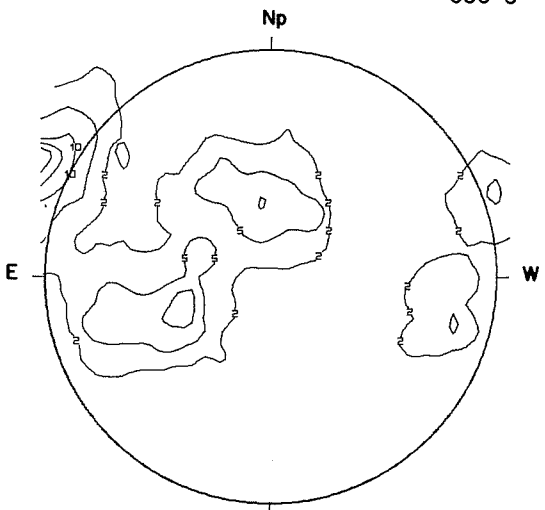
LEICESTER UNIV.

X-RAY
OSO-5

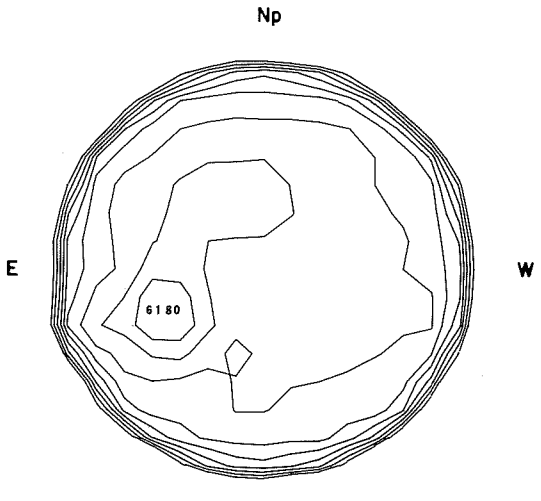


2117 - 2200 UT

Intensities in Units of 10^{-6} ergs cm^{-2} sec^{-1}

PROSPECT HILL
AFCRL

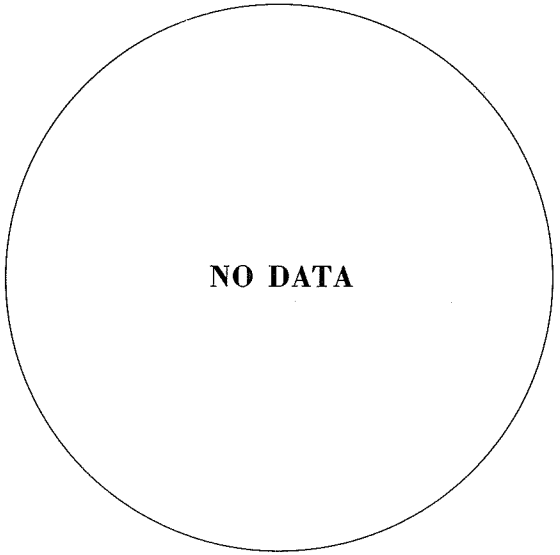
8.6 mm



1721 UT

Contours in Intervals of 200° K

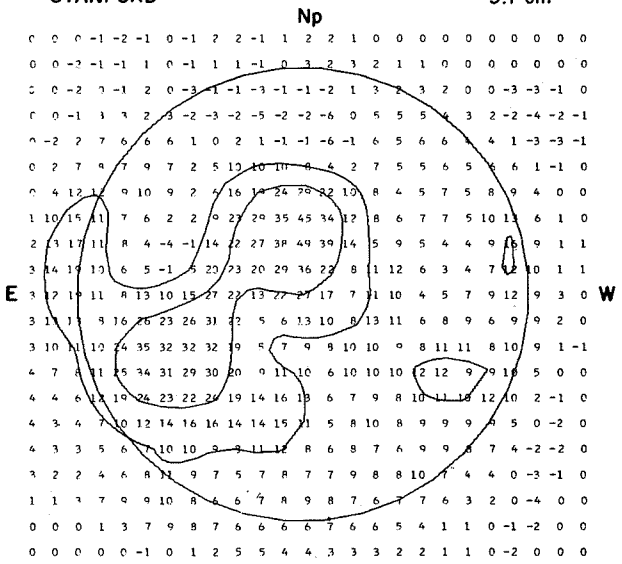
MAGNETOGRAM
Solid - Plus
Dotted - Minus



Levels
±5
±10
±20
±40
±80

STANFORD

9.1 cm

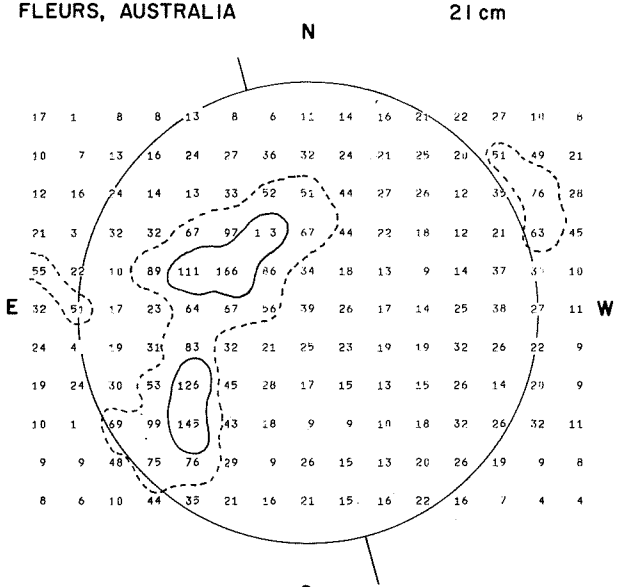


20-21 UT

Brightness Unit 5,000° K

FLEURS, AUSTRALIA

21 cm

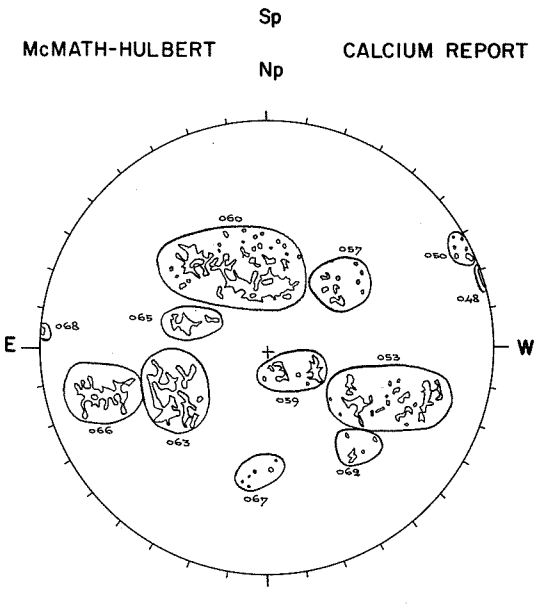


02-03 UT

Resolution 3 Minutes of Arc
Brightness Unit 1,700° K

McMATH-HULBERT

CALCIUM REPORT



FAIR	M
60-56-	3.0
63-31-	2.5
65-13-	3.0
66-30-	2.5

1420 UT

29
Dec 70

DECEMBER 3, 1970 (P = 15.50, B_o = 0.62, L_o = 151.68)

30 Dec 70

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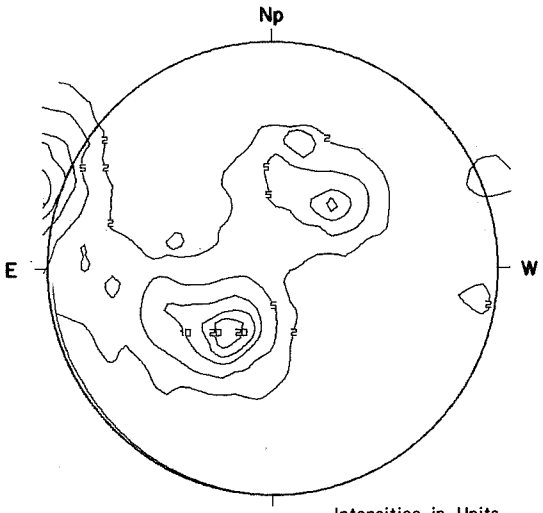
X-RAY
OSO-5

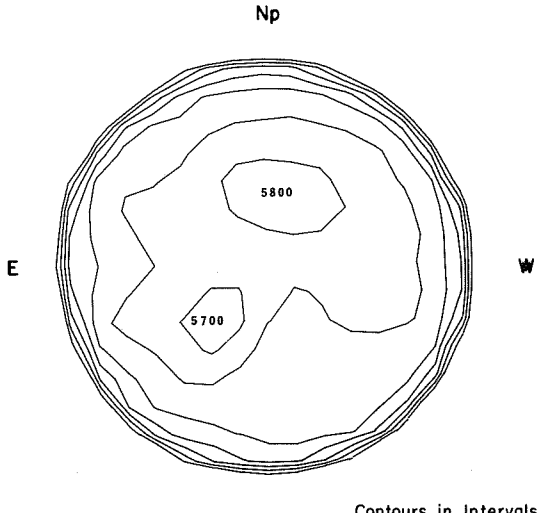


2339-0115 UT

Intensities in Units of 10^{-6} ergs cm^{-2} sec^{-1}

PROSPECT HILL
AFCRL

8.6 mm



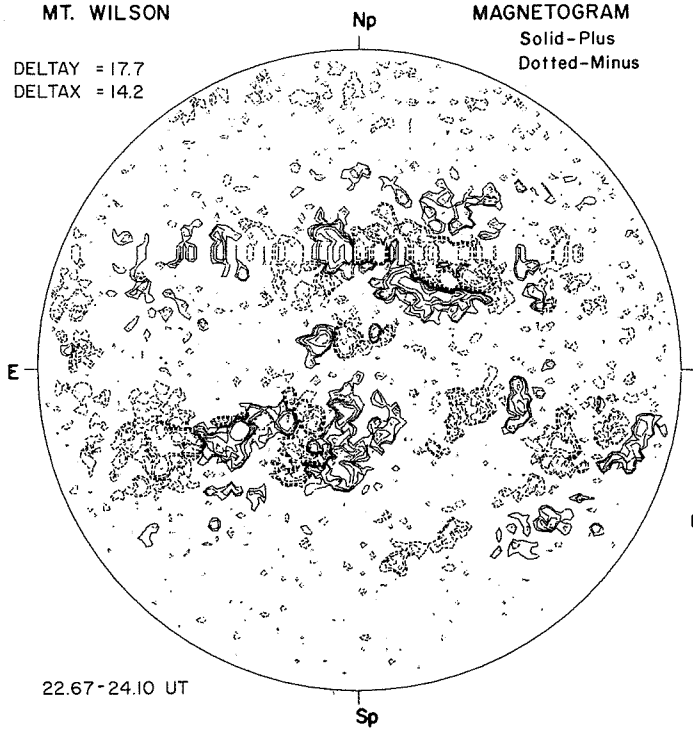
1528 UT

Contours in Intervals of 200° K

MT. WILSON

MAGNETOGRAM
Solid-Plus
Dotted-Minus

DELTAY = 17.7
DELTAX = 14.2

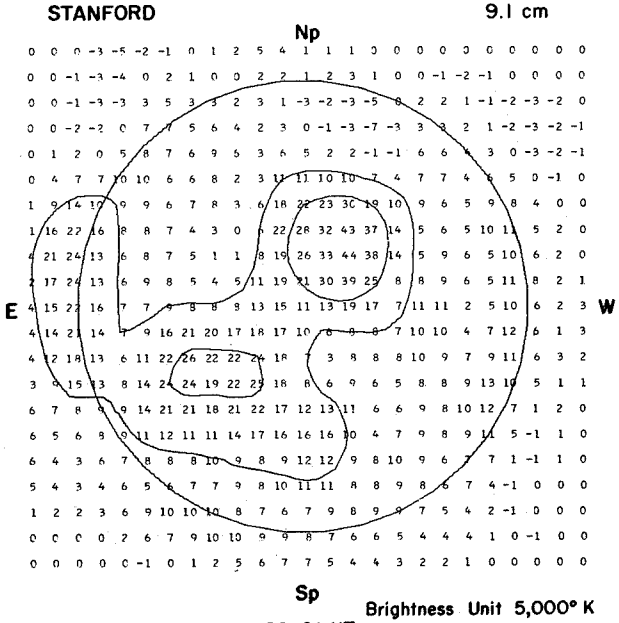


Levels
±5
±10
±20
±40
±80

22.67-24.10 UT

STANFORD

9.1 cm

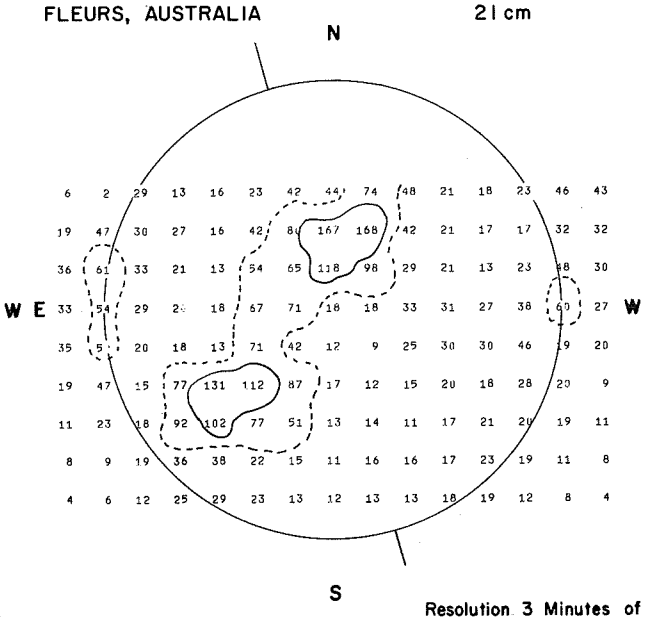


20-21 UT

Brightness Unit 5,000° K

FLEURS, AUSTRALIA

21 cm

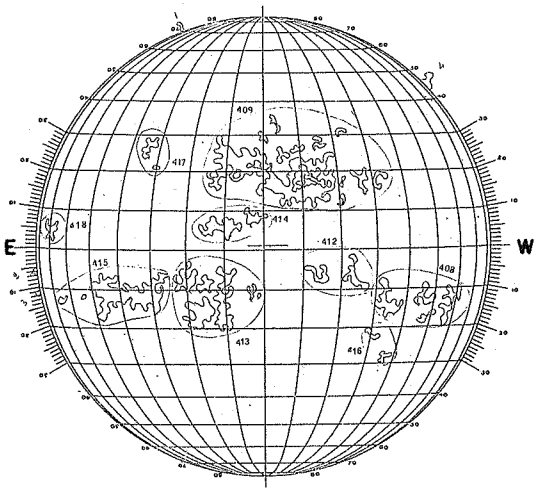


02-03 UT

Resolution 3 Minutes of Arc
Brightness Unit 1,700° K

CALCIUM REPORT

CATANIA



08-35-3.6
12-10-3.8
09-103-6.6
14-16-5.8
13-46-5.1
15-49-5.4

0955 UT

DECEMBER 4, 1970 (P=15.10, B_o=0.50, L_o=138.50)

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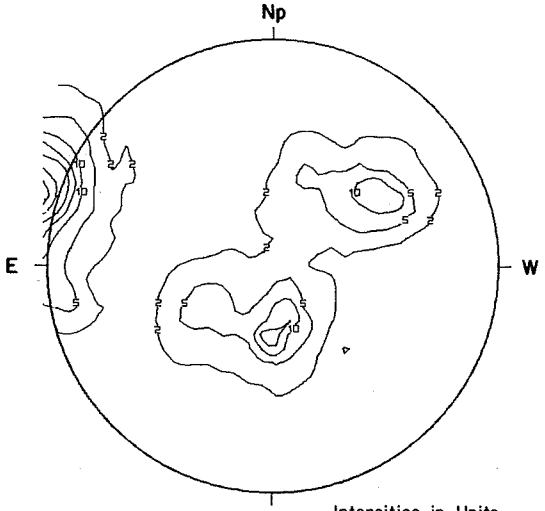
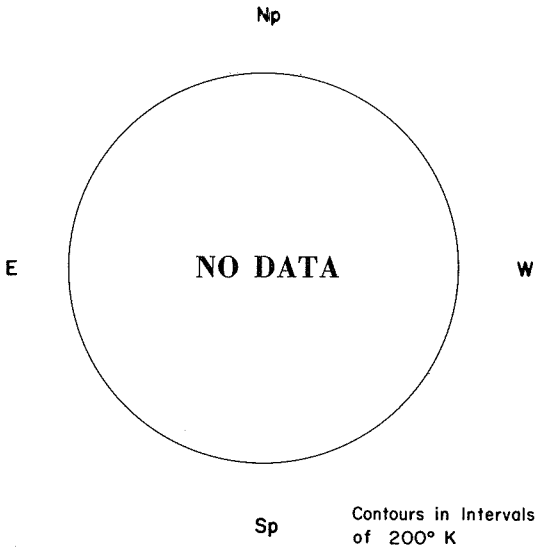


2053-2142 UT

Intensities in Units of 10^{-6} ergs cm^{-2} sec^{-1}

PROSPECT HILL
AFCRL

8.6 mm

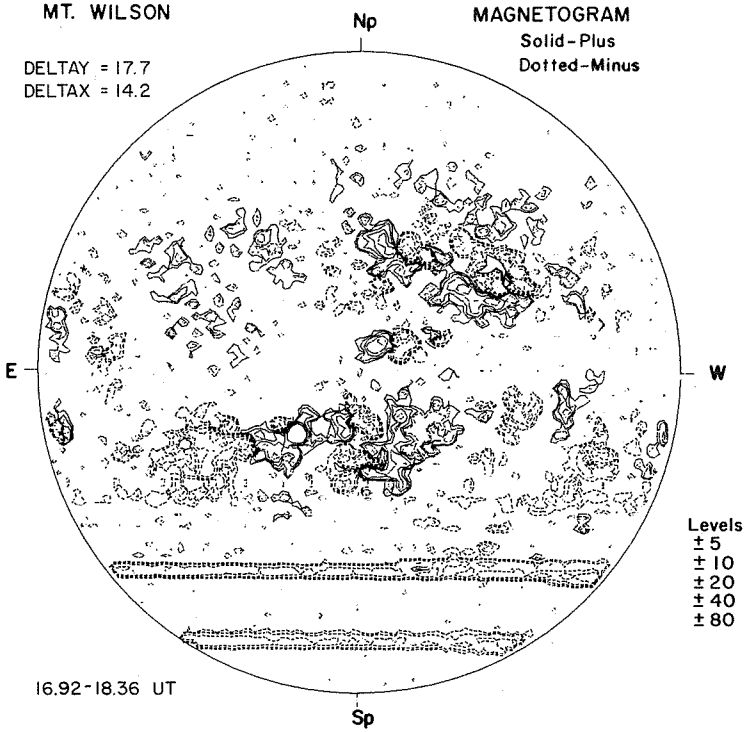


Contours in Intervals of 200° K

MT. WILSON

MAGNETOGRAM
Solid-Plus
Dotted-Minus

DELTAY = 17.7
DELTAX = 14.2

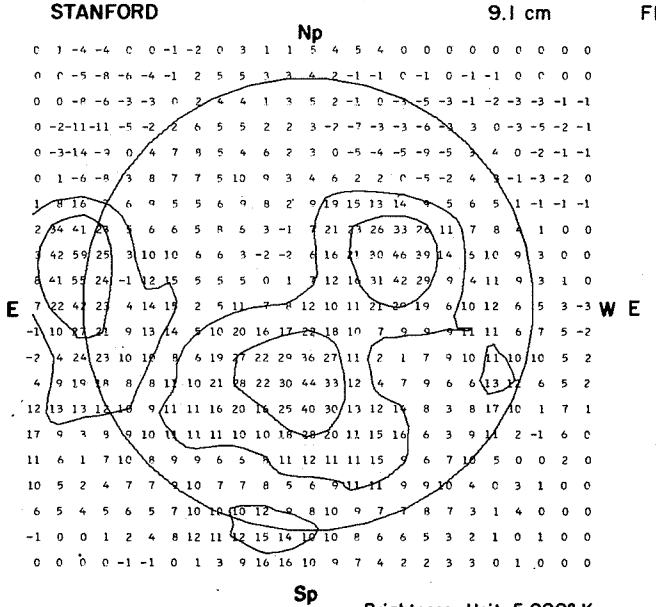


Levels
±5
±10
±20
±40
±80

16.92-18.36 UT

STANFORD

9.1 cm

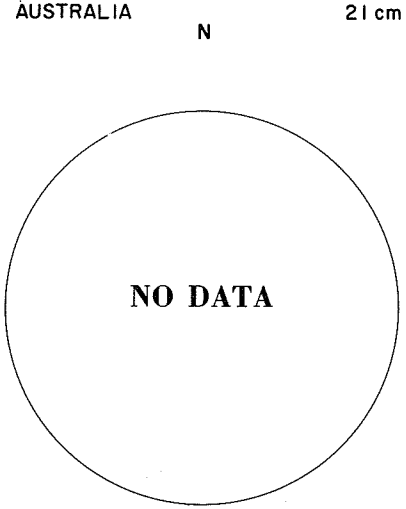


Brightness Unit 5,000° K

20-21 UT

FLEURS, AUSTRALIA

21 cm

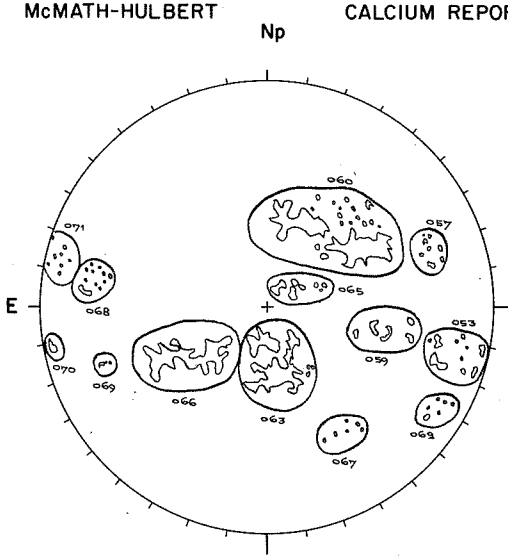


Resolution 3 Minutes of Arc
Brightness Unit 1,700° K

02-03 UT

McMATH-HULBERT

CALCIUM REPORT



BAD	M
60-55	-3.0
63-32	-3.5
65-10	-3.0
66-33	-3.0
70-06	-3.5

1555, UT

31
Dec 70

DECEMBER 5, 1970 (P=14.70, B_o=0.37, L_o=125.32)

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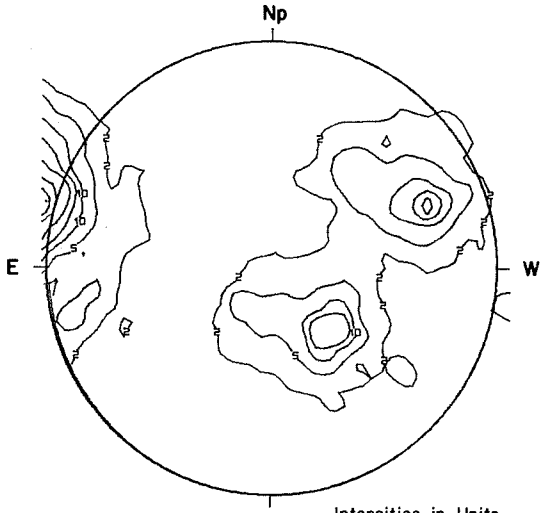
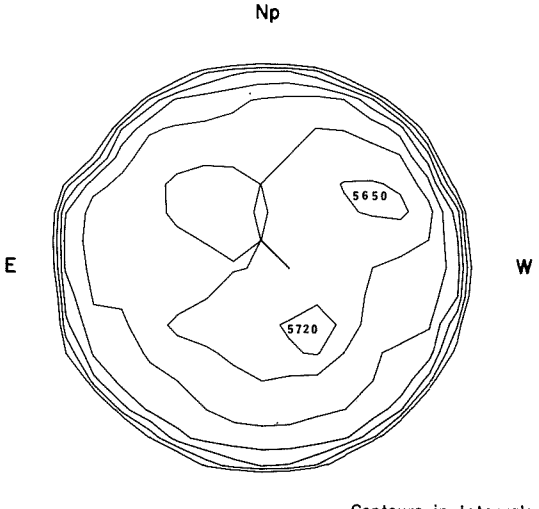


2219.-2312 UT

Intensities in Units of 10^{-6} ergs cm^{-2} sec^{-1}

PROSPECT HILL.
AFCRL

8.6 mm



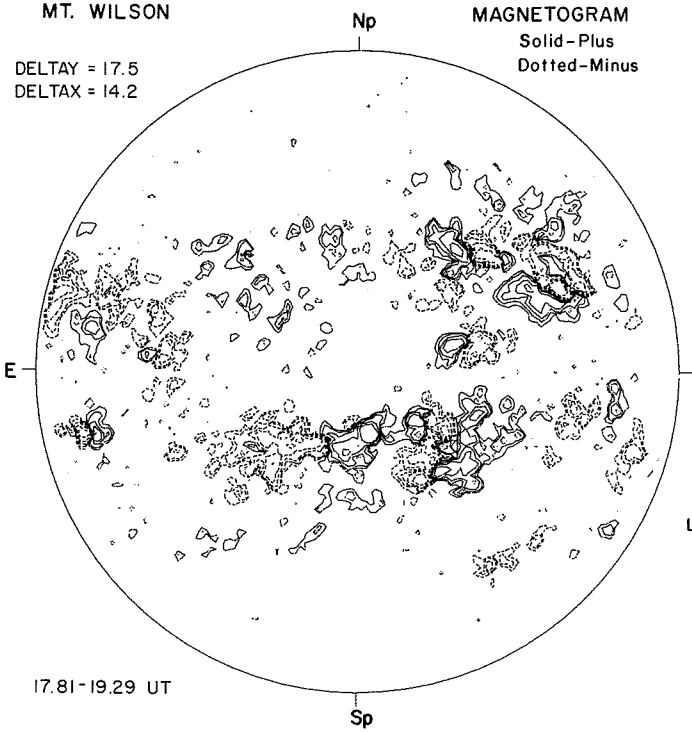
1452 UT

Contours in Intervals of 200° K

MT. WILSON

DELTAY = 17.5
DELTAX = 14.2

MAGNETOGRAM
Solid-Plus
Dotted-Minus

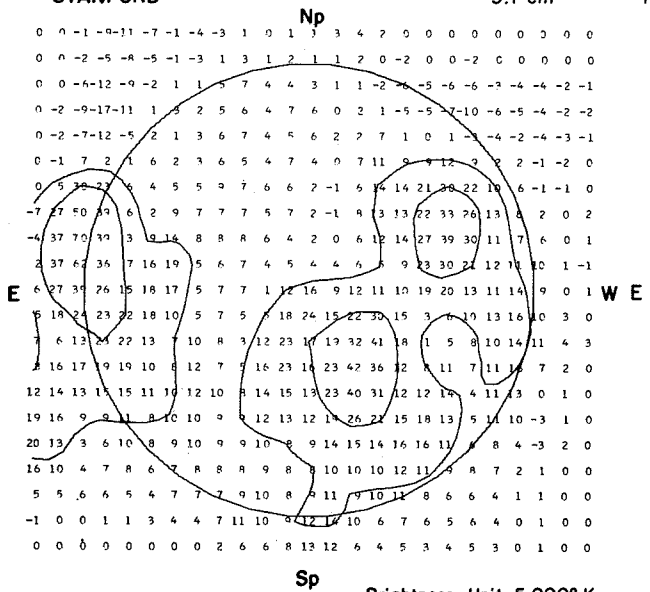


Levels
±5
±10
±20
±40
±80

17.81-19.29 UT

STANFORD

9.1 cm

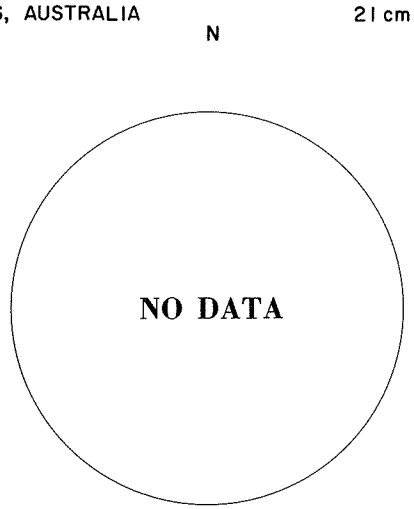


20-21 UT

Brightness Unit 5,000° K

FLEURS, AUSTRALIA

21 cm

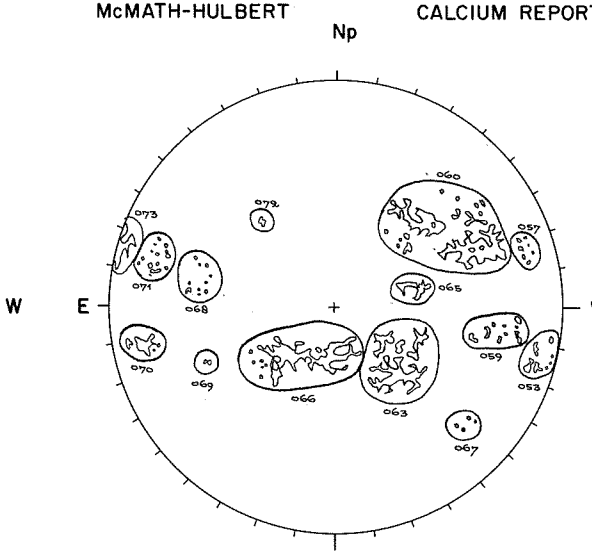


02-03 UT

Resolution 3 Minutes of Arc
Brightness Unit 1,700° K

McMATH-HULBERT

CALCIUM REPORT



FAIR	M
60-56	-3.0
63-32	-3.0
65-08	-2.5
66-33	-3.0
70-15	-3.0
73-30	-3.0

1755 UT

DECEMBER 6, 1970 (P=14.29, B_o=0.24, L_o=112.15)

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X-RAY
OSO-5

Np

E W

Sp

Intensities in Units of 10^{-6} ergs cm^{-2} sec^{-1}

PROSPECT HILL
AFCRL

8.6 mm

Np

E W

NO DATA

Sp

Contours in Intervals of 200° K

MT. WILSON

Np

MAGNETOGRAM
Solid-Plus
Dotted-Minus

E W

NO DATA

Levels
±5
±10
±20
±40
±80

Sp

STANFORD

9.1 cm

Np

E W

Sp

Brightness Unit 5,000° K

20-21 UT

FLEURS, AUSTRALIA

21 cm

N

E W

NO DATA

S

02-03 UT

Resolution 3 Minutes of Arc
Brightness Unit 1,700° K

McMATH-HULBERT

Sp

Np

CALCIUM REPORT

E W

FAIR	O
57-06-2.5	
60-54-3.0	
63-33-3.0	
65-09-2.5	
66-33-3.0	
70-16-3.0	
73-32-3.5	

Sp

1730 UT

DECEMBER 7, 1970 (P = 13.87, B_o = 0.11, L_o = 98.97)

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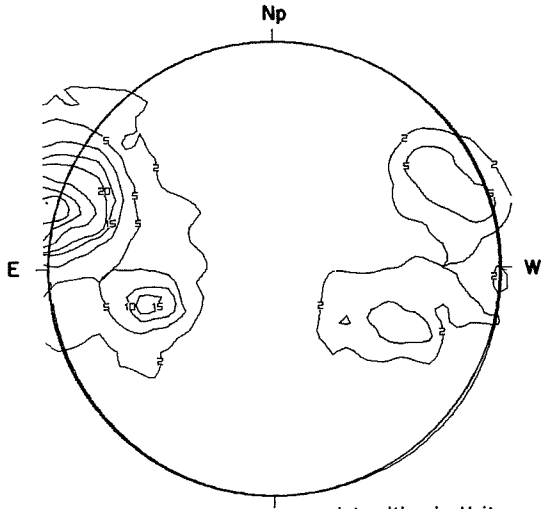
X-RAY
OSO-5

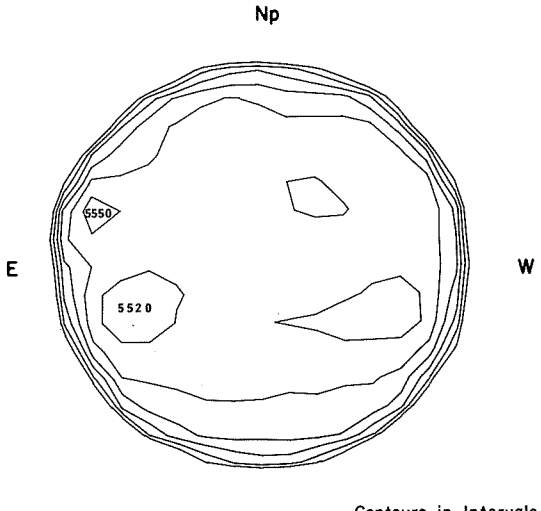


2130-2257 UT

Intensities in Units of 10^{-6} ergs cm^{-2} sec^{-1}

PROSPECT HILL
AFCRL

8.6 mm



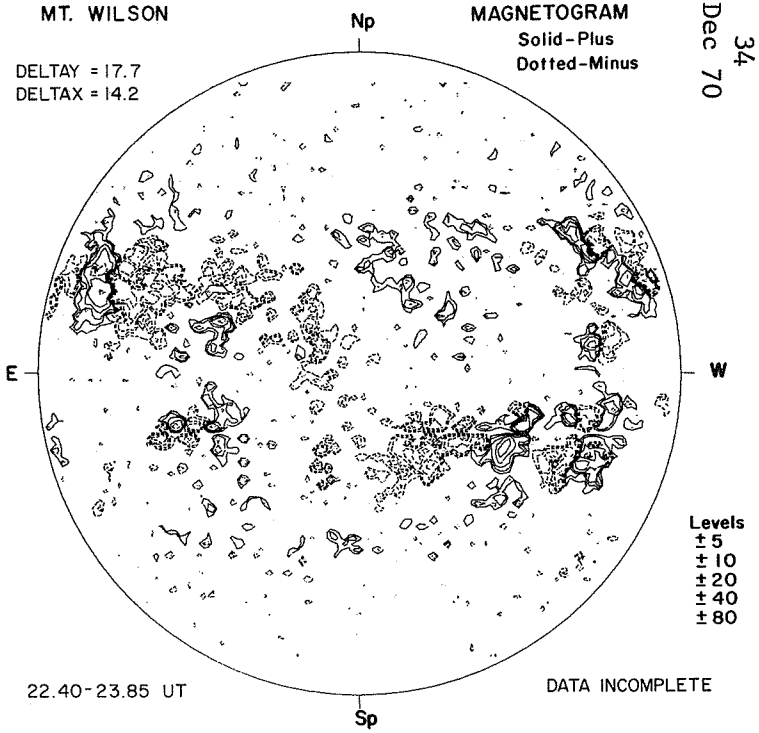
1707 UT

Contours in Intervals of 200° K

MT. WILSON

MAGNETOGRAM
Solid-Plus
Dotted-Minus

DELTAY = 17.7
DELTAX = 14.2

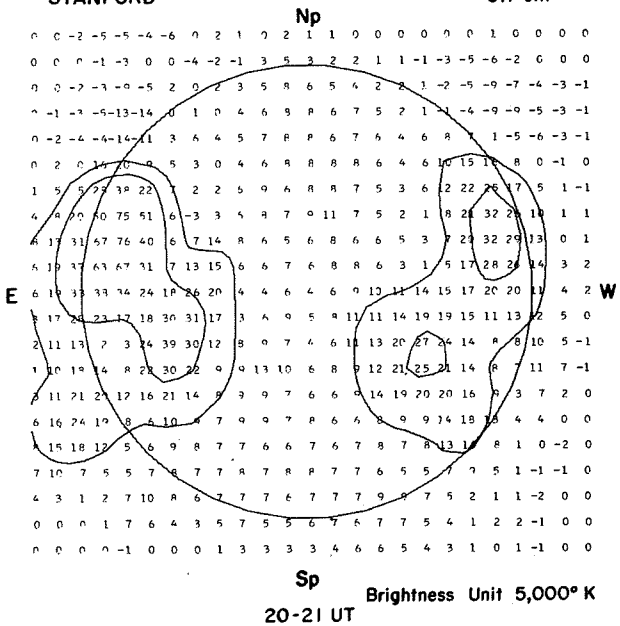


22.40-23.85 UT

DATA INCOMPLETE

STANFORD

9.1 cm

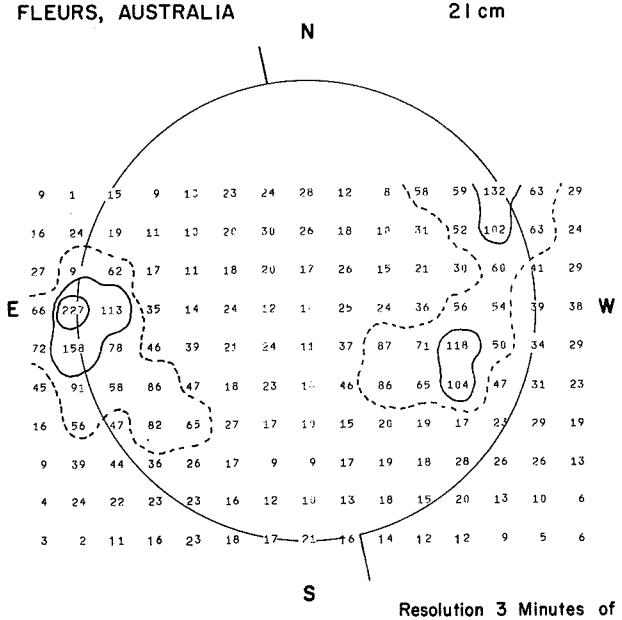


20-21 UT

Brightness Unit 5,000° K

FLEURS, AUSTRALIA

21 cm

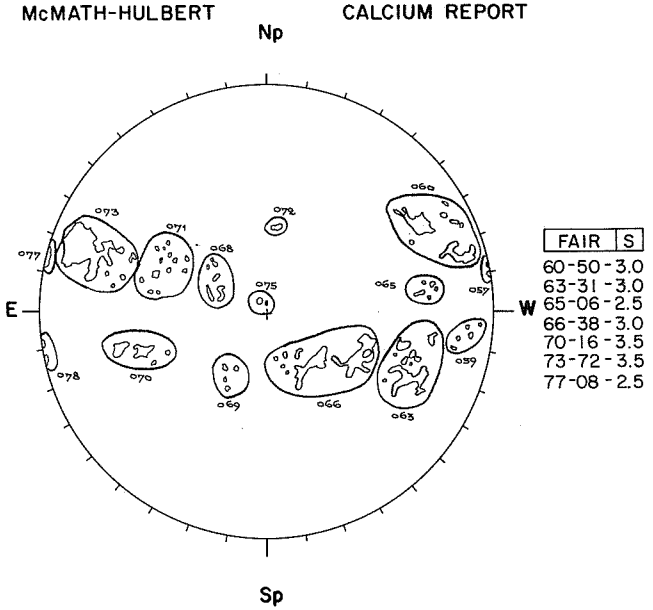


02-03 UT

Resolution 3 Minutes of Arc
Brightness Unit 1,700° K

McMATH-HULBERT

CALCIUM REPORT



1400 UT

DECEMBER 8, 1970 (P=13.45, B_o=-0.02, L_o=85.79)

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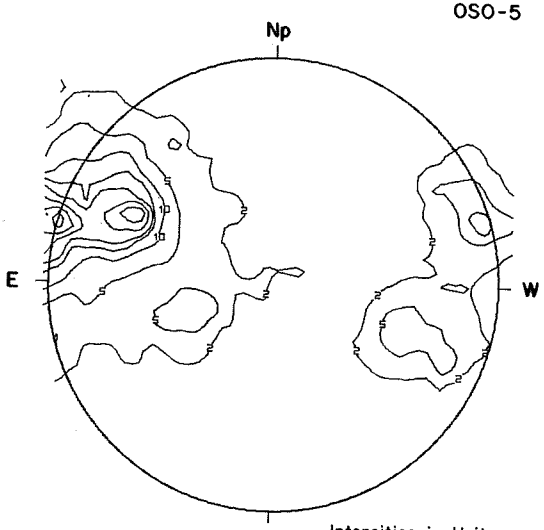
OSO-5

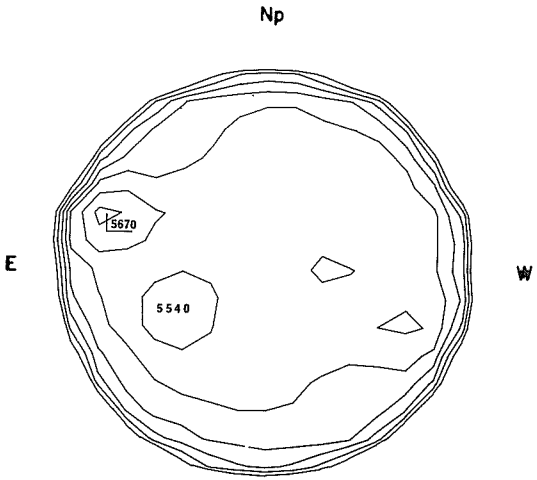


2108-2248 UT

Intensities in Units of 10^{-6} ergs cm^{-2} sec^{-1}

PROSPECT HILL
AFCRL

8.6 mm



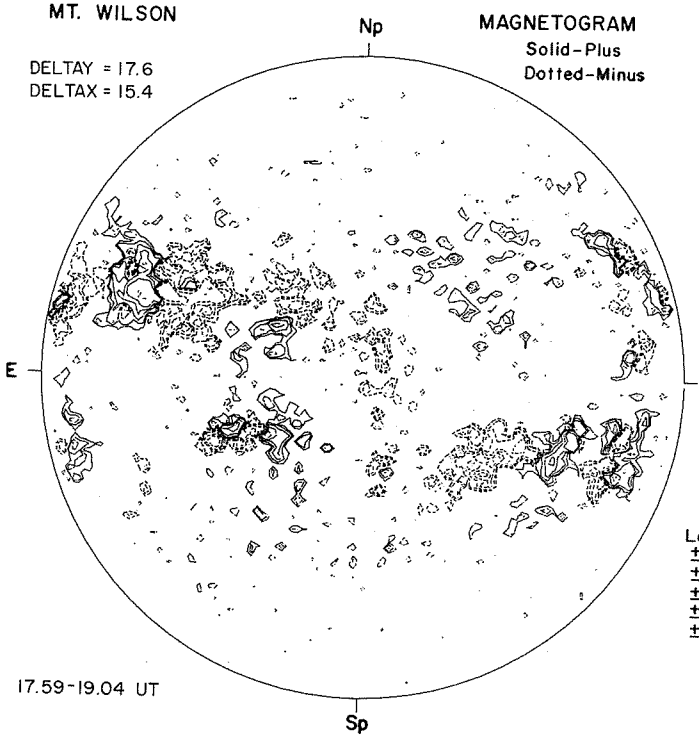
1513 UT

Contours in Intervals of 200° K

MT. WILSON

DELTAY = 17.6
DELTAX = 15.4

MAGNETOGRAM
Solid-Plus
Dotted-Minus

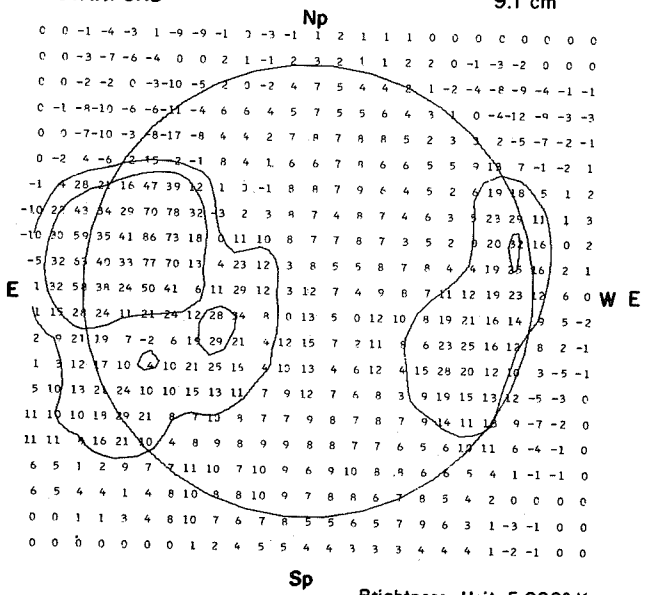


Levels
±5
±10
±20
±40
±80

17.59-19.04 UT

STANFORD

9.1 cm

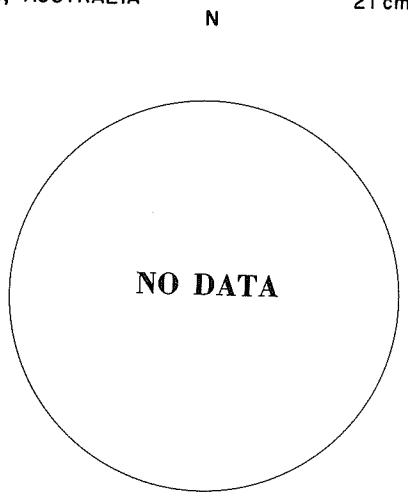


20-21 UT

Brightness Unit 5,000° K

FLEURS, AUSTRALIA

21 cm

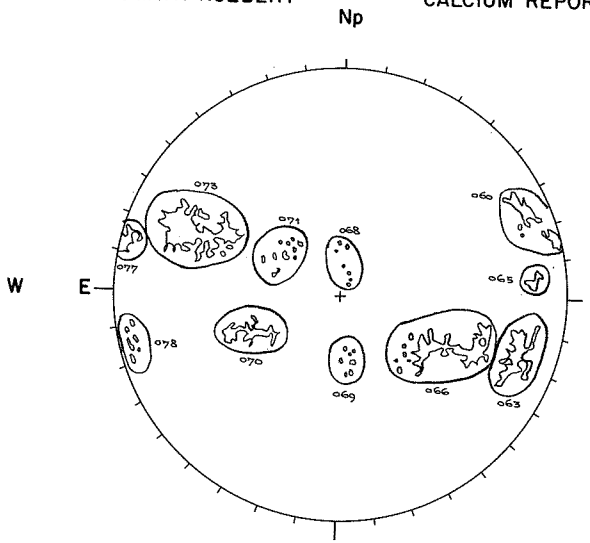


02-03 UT

Resolution 3 Minutes of Arc
Brightness Unit 1,700° K

McMATH-HULBERT

CALCIUM REPORT



FAIR	M
60-47	-2.5
63-33	-3.0
66-34	-3.0
70-15	-3.0
73-63	-3.5
77-35	-3.0

1430 UT

DECEMBER 9, 1970 (P = 13.03, B_o = -0.14, L_o = 72.61)

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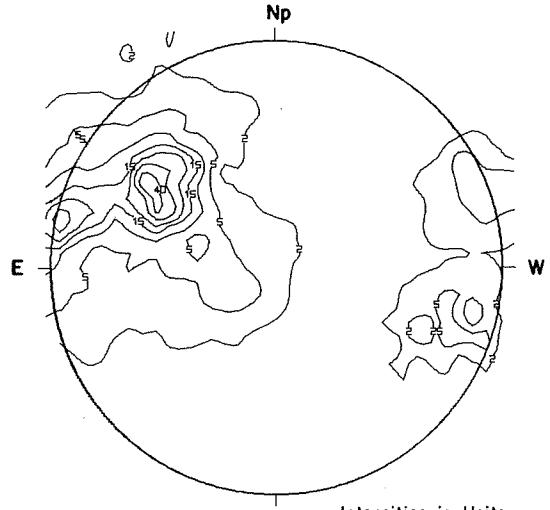
LEICESTER UNIV.

X-RAY
OSO-5

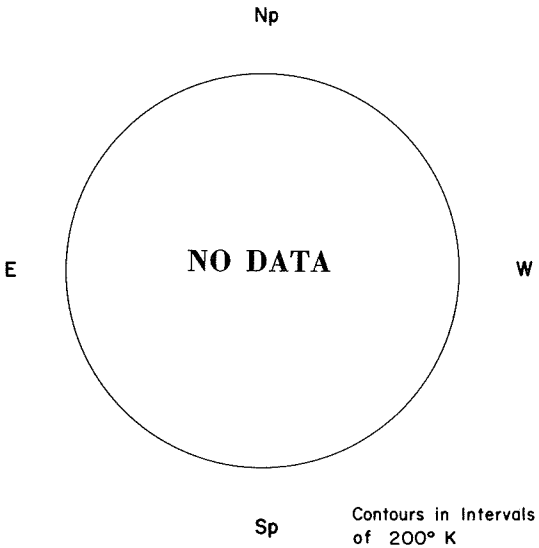


1912-2057 UT

Intensities in Units of 10^{-6} ergs cm^{-2} sec^{-1}

PROSPECT HILL
AFCRL

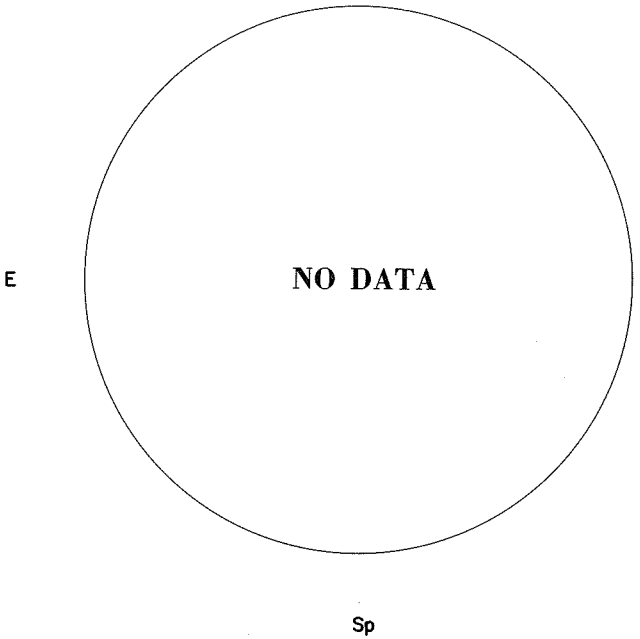
8.6 mm



Contours in Intervals of 200° K

MT. WILSON

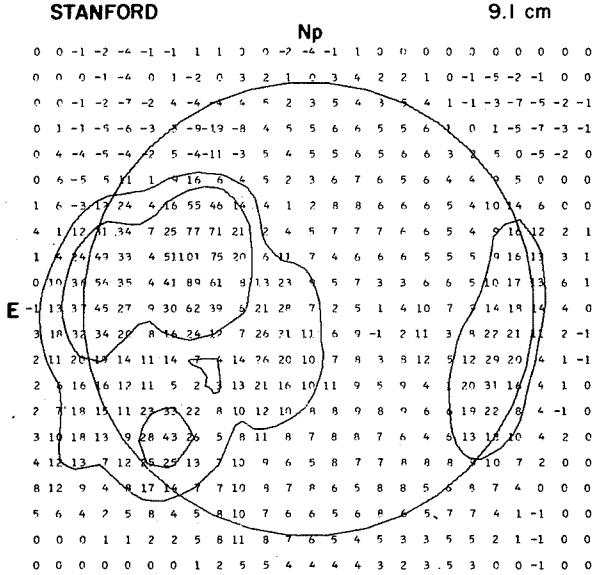
MAGNETOGRAM
Solid-Plus
Dotted-Minus



Levels
±5
±10
±20
±40
±80

STANFORD

9.1 cm

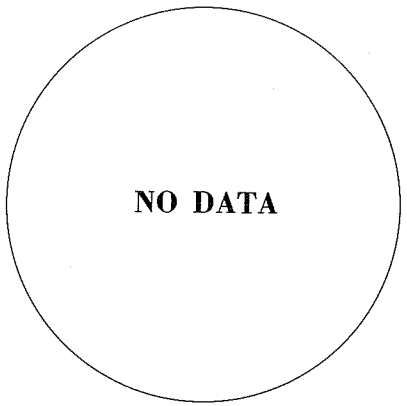


20-21 UT

Brightness Unit 5,000° K

FLEURS, AUSTRALIA

21 cm

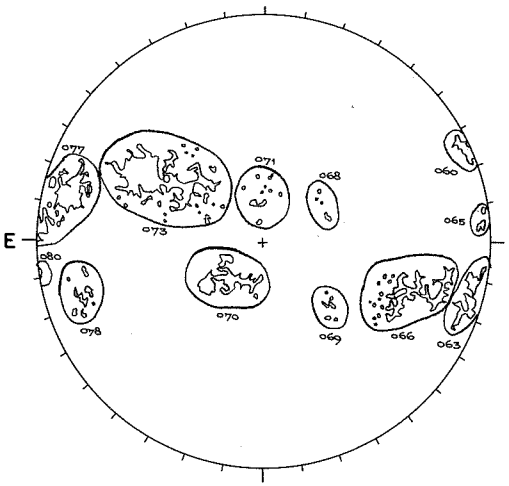


02-03 UT

Resolution 3 Minutes of Arc
Brightness Unit 1,700° K

McMATH-HULBERT

CALCIUM REPORT



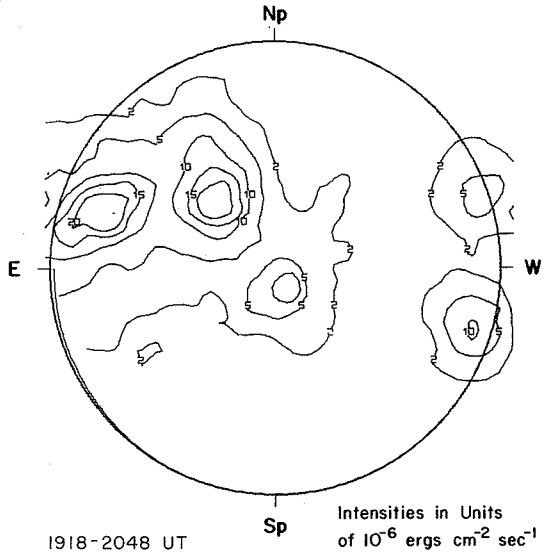
FAIR	M
60-20	-2.5
63-30	-2.5
66-32	-3.0
70-18	-3.5
73-70	-3.5
77-55	-3.0

1700 UT

DECEMBER 10, 1970 (P = 12.60, B_o = -0.27, L_o = 59.44)

UNIV. COLLEGE LONDON
LEICESTER UNIV.

X-RAY
OSO-5

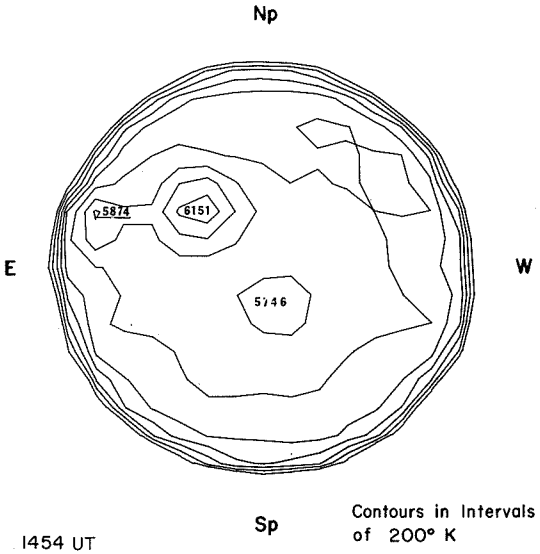


1918-2048 UT

Intensities in Units of 10^{-6} ergs cm^{-2} sec^{-1}

PROSPECT HILL
AFCRL

8.6 mm



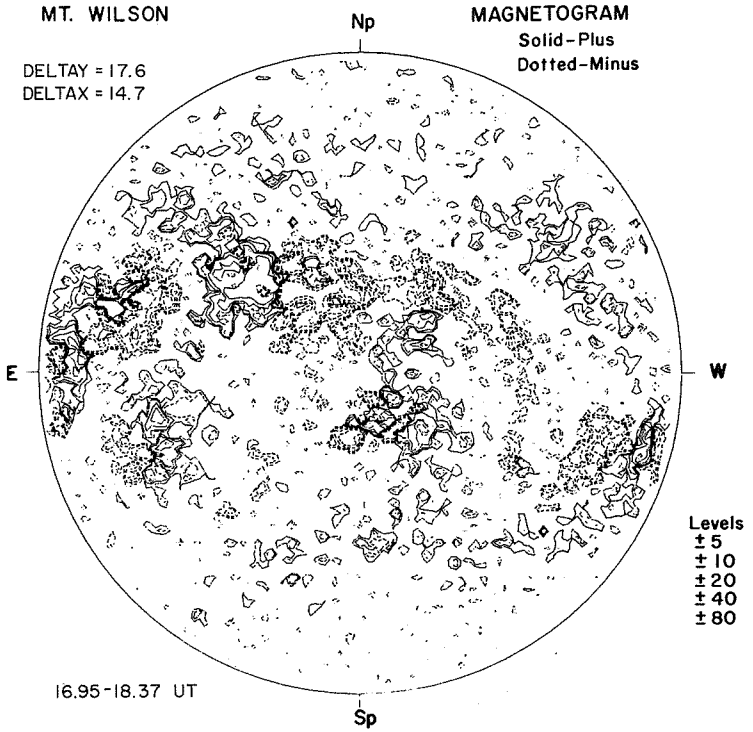
1454 UT

Contours in Intervals of 200° K

MT. WILSON

MAGNETOGRAM
Solid-Plus
Dotted-Minus

DELTAY = 17.6
DELTAX = 14.7

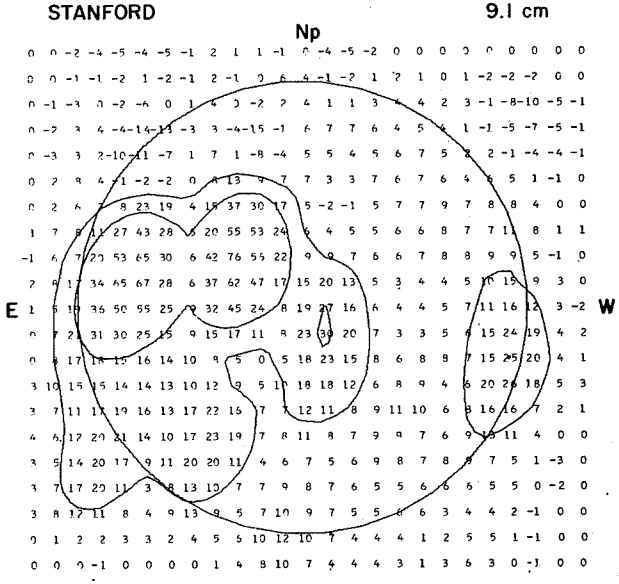


Levels
±5
±10
±20
±40
±80

16.95-18.37 UT

STANFORD

9.1 cm

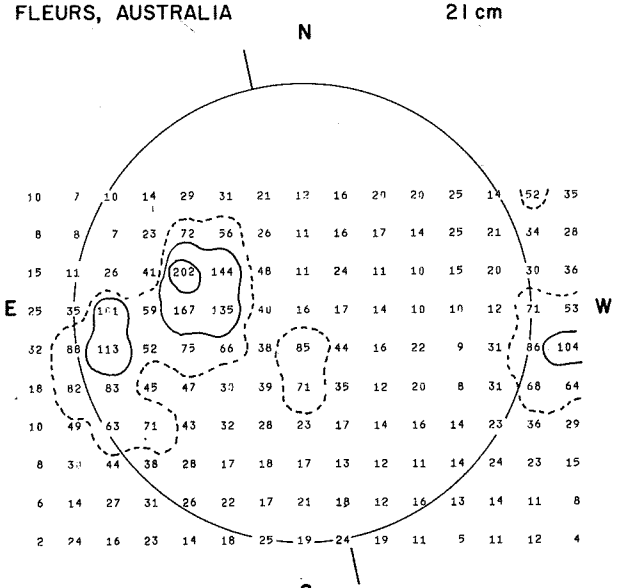


20-21 UT

Brightness Unit 5,000° K

FLEURS, AUSTRALIA

21 cm

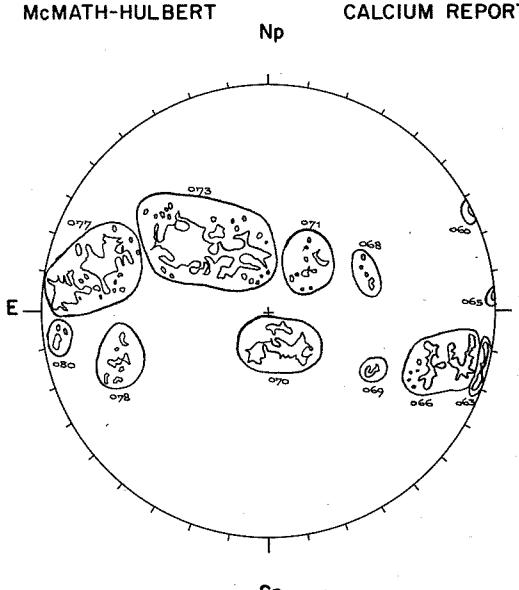


02-03 UT

Resolution 3 Minutes of Arc
Brightness Unit 1,700° K

McMATH-HULBERT

CALCIUM REPORT



FAIR	M
66-32-2.5	
70-23-3.0	
73-75-3.5	
77-72-3.5	
80-07-2.5	

1430 UT

DECEMBER 11, 1970 (P = 12.17, B_o = -0.40, L_o = 46.26)

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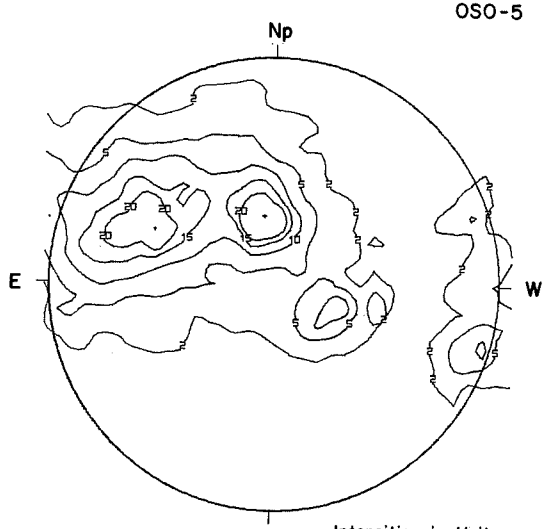
LEICESTER UNIV.

X-RAY
OSO-5

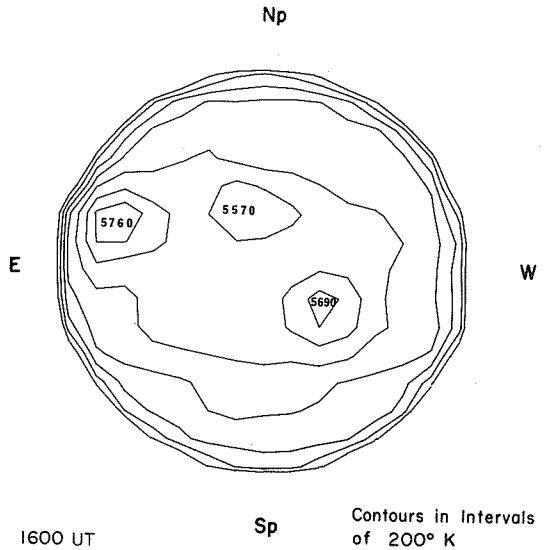


1856-2039 UT

Intensities in Units of 10^{-6} ergs cm^{-2} sec^{-1}

PROSPECT HILL
AFCRL

8.6 mm



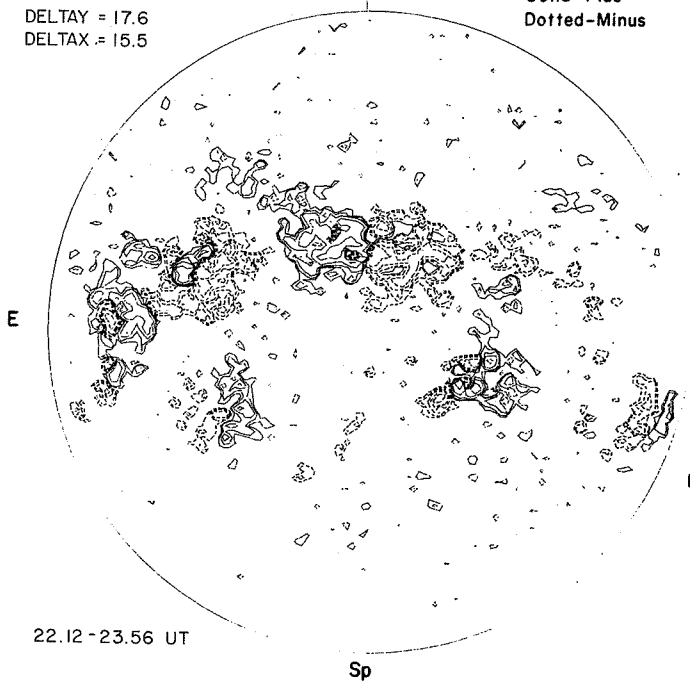
1600 UT

Contours in Intervals of 200° K

MT. WILSON

DELTAY = 17.6
DELTAX = 15.5

MAGNETOGRAM
Solid-Plus
Dotted-Minus

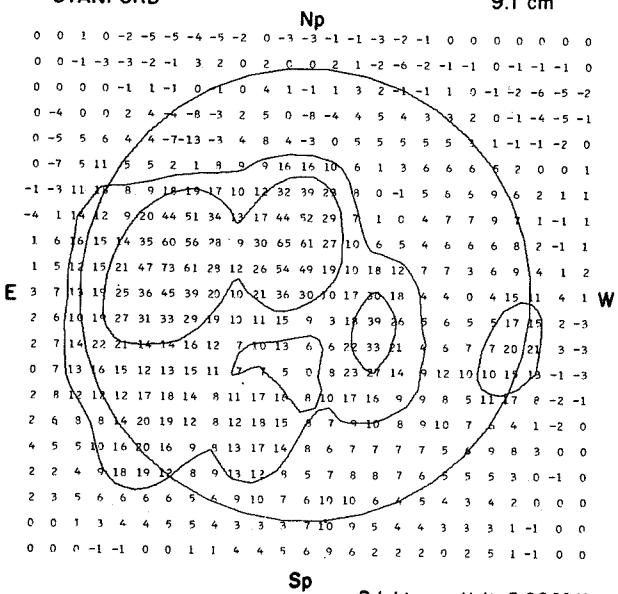


Levels
±5
±10
±20
±40
±80

22.12-23.56 UT

STANFORD

9.1 cm

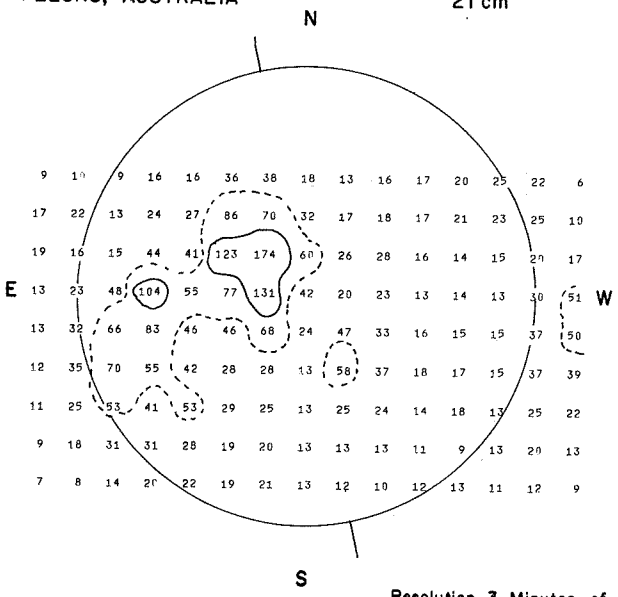


20-21 UT

Brightness Unit 5,000° K

FLEURS, AUSTRALIA

21 cm

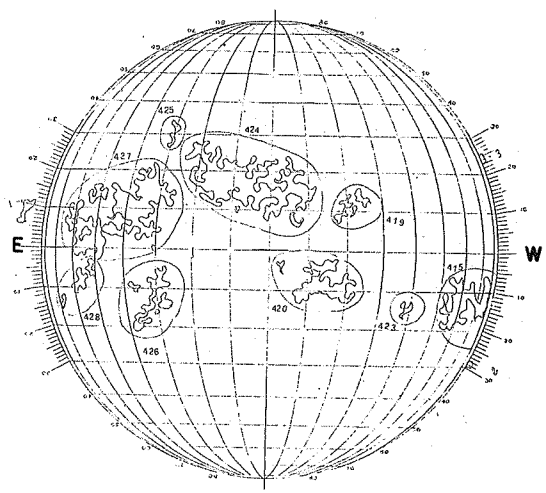


02-03 UT

Resolution 3 Minutes of Arc
Brightness Unit 1,700° K

CATANIA

CALCIUM REPORT



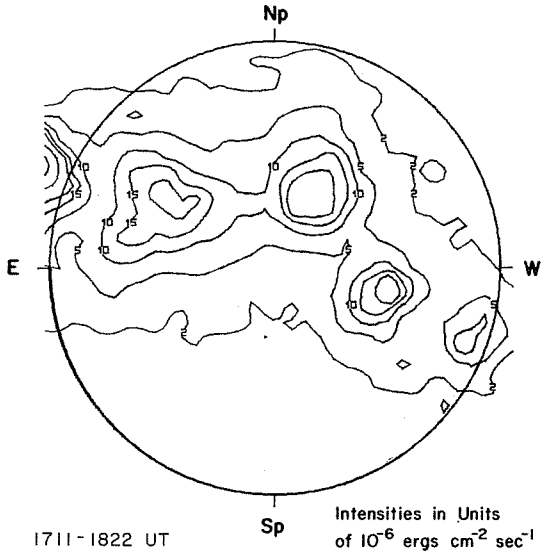
15-68 -3.1
20-33 -7.1
24-105 -5.8
26-23 -3.8
27-127 -7.2
28-17 -5.4

1015 UT

DECEMBER 12, 1970 (P = 11.73, B_o = -0.53, L_o = 33.08)

UNIV. COLLEGE LONDON
LEICESTER UNIV.

X-RAY
OSO-5

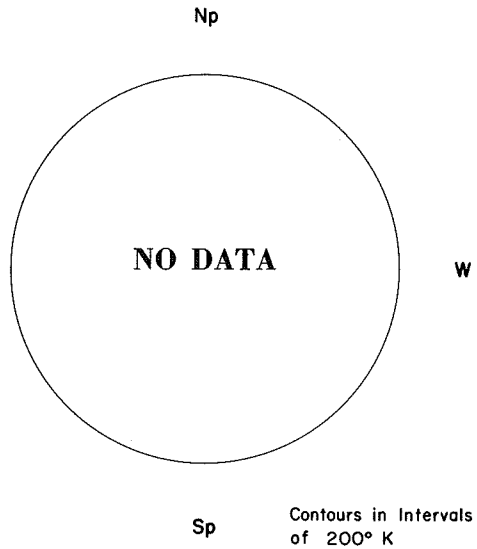


1711-1822 UT

Intensities in Units of 10^{-6} ergs cm^{-2} sec^{-1}

PROSPECT HILL
AFCRL

8.6 mm

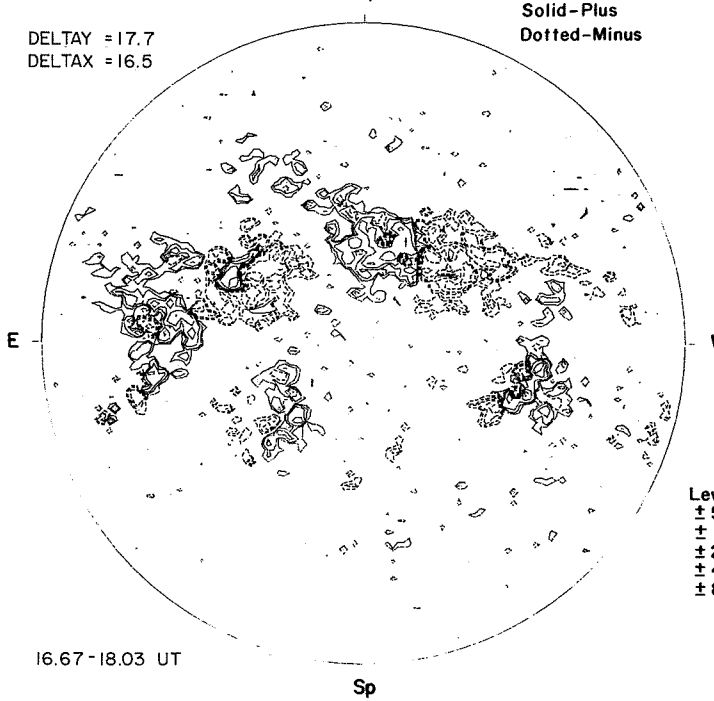


Contours in Intervals of 200° K

MT. WILSON

MAGNETOGRAM
Solid-Plus
Dotted-Minus

DELTAY = 17.7
DELTAX = 16.5

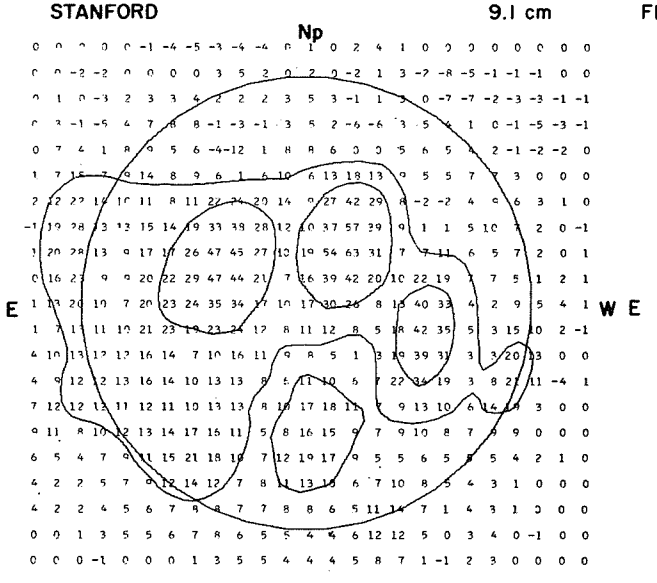


Levels
±5
±10
±20
±40
±80

16.67-18.03 UT

STANFORD

9.1 cm

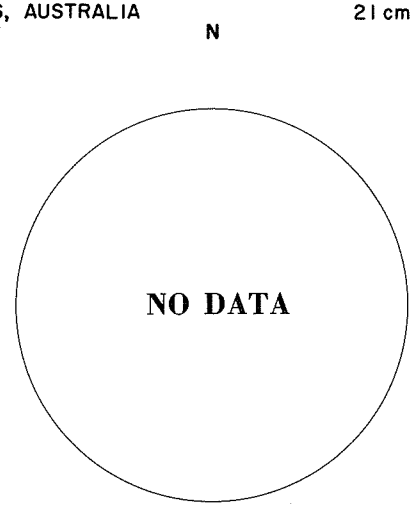


20-21 UT

Brightness Unit 5,000° K

FLEURS, AUSTRALIA

21 cm

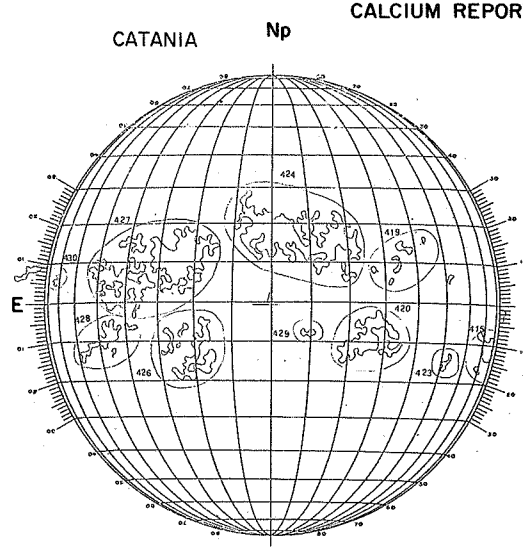


02-03 UT

Resolution 3 Minutes of Arc
Brightness Unit 1,700° K

CALCIUM REPORT

CATANIA



20-32-4.8
24-93-10.4
26-25-3.3
27-118-4.1
28-16-3.5

0805-UT

DECEMBER 13, 1970 (P = 11.29, B_o = -0.66, L_o = 19.91)

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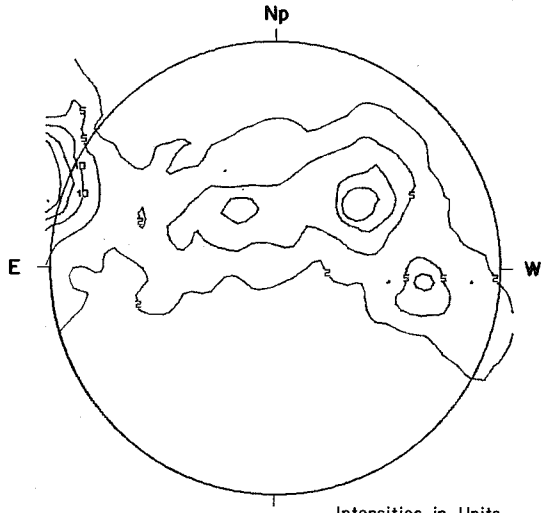
LEICESTER UNIV.

X-RAY
OSO-5

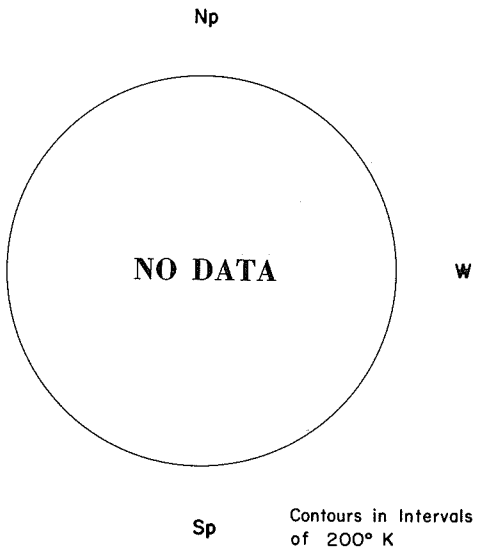


1837-1949 UT

Intensities in Units of 10^{-6} ergs cm^{-2} sec^{-1}

PROSPECT HILL
AFCRL

8.6 mm

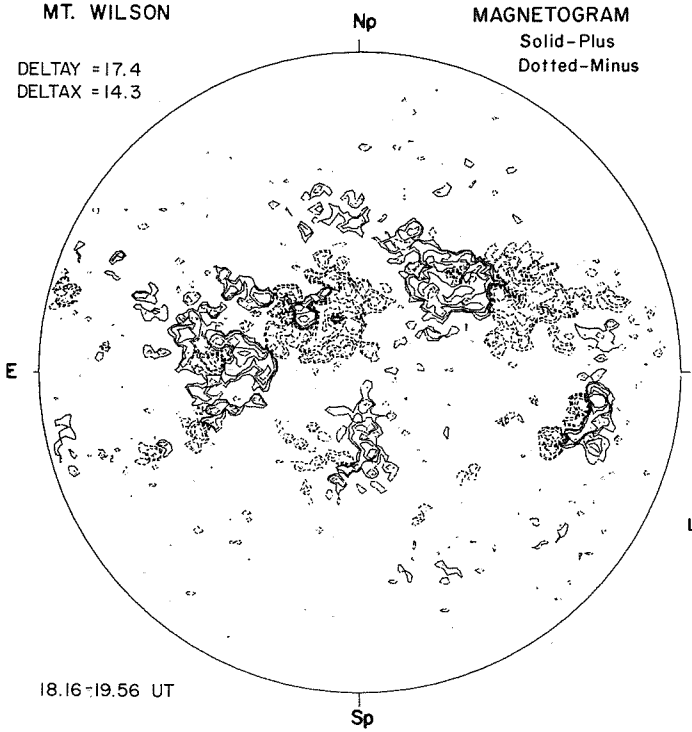


Contours in Intervals of 200° K

MT. WILSON

MAGNETOGRAM
Solid-Plus
Dotted-Minus

DELTAY = 17.4
DELTAX = 14.3

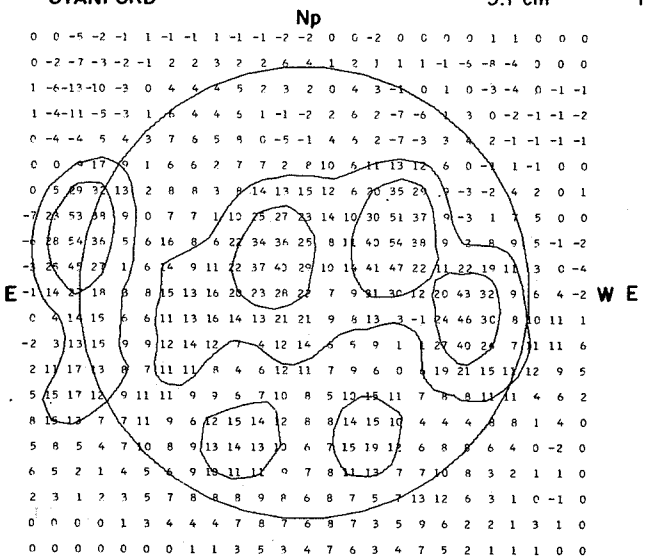


Levels
±5
±10
±20
±40
±80

18.16-19.56 UT

STANFORD

9.1 cm

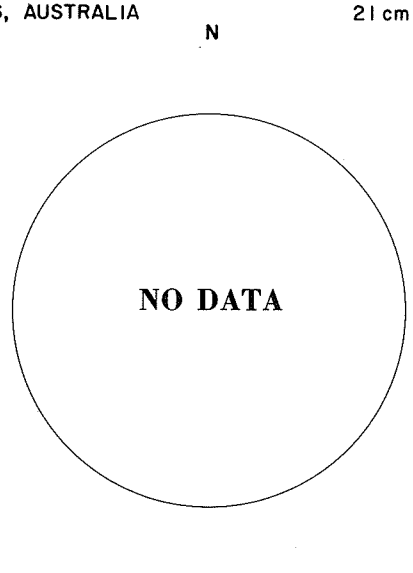


20-21 UT

Brightness Unit 5,000° K

FLEURS, AUSTRALIA

21 cm

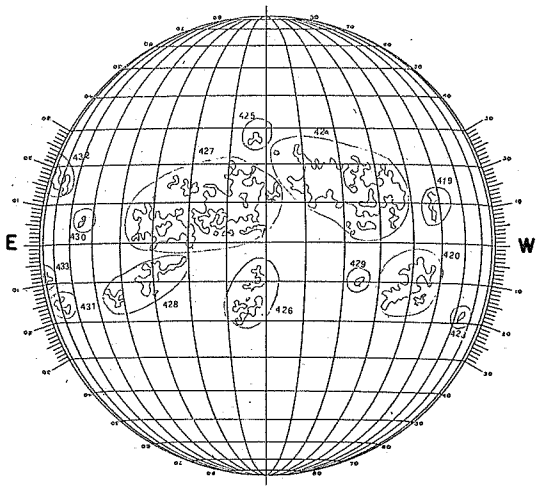


02-03 UT

Resolution 3 Minutes of Arc
Brightness Unit 1,700° K

CALCIUM REPORT

CATANIA



20-34-11.4
24-107-9.5
26-13-3.5
27-99-8.5
28-20-4.4
32-25-4.8

1135 UT

DECEMBER 14, 1970 (P = 10.84, B_o = -0.78, L_o = 6.73)

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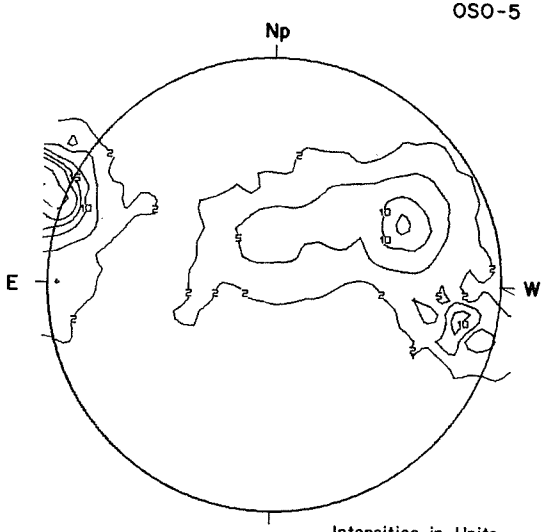
LEICESTER UNIV.

X-RAY
OSO-5

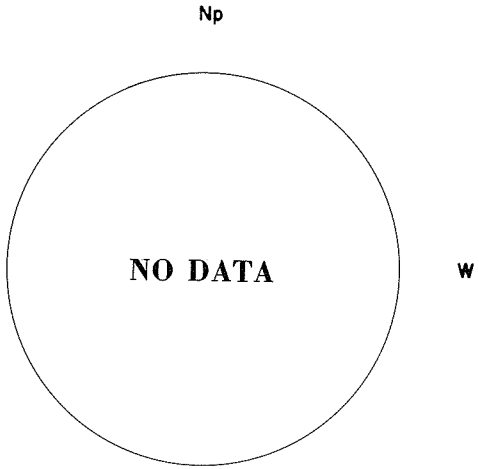


1650-1830 UT

Intensities in Units of 10^{-6} ergs cm^{-2} sec^{-1}

PROSPECT HILL
AFCRL

8.6 mm

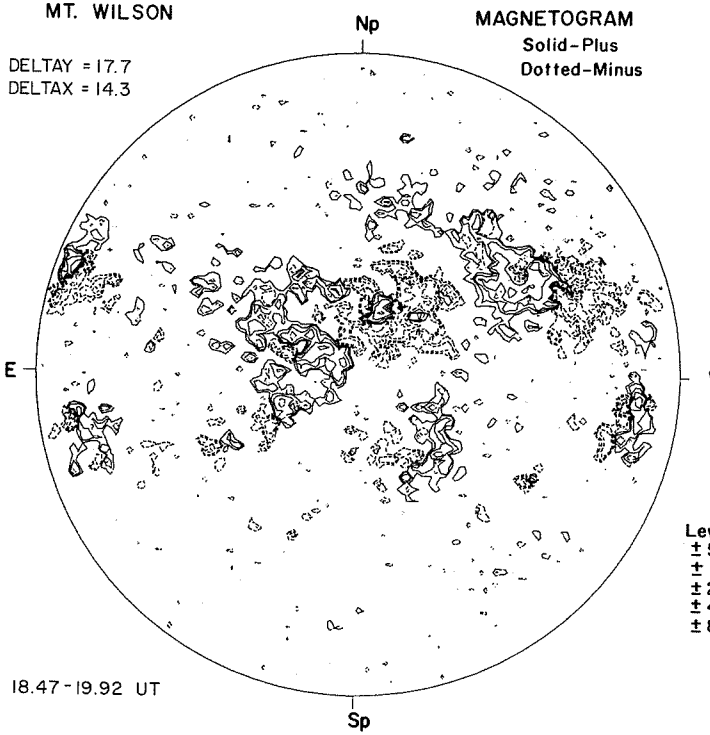


Contours in Intervals of 200° K

MT. WILSON

DELTAY = 17.7
DELTAX = 14.3

MAGNETOGRAM
Solid-Plus
Dotted-Minus

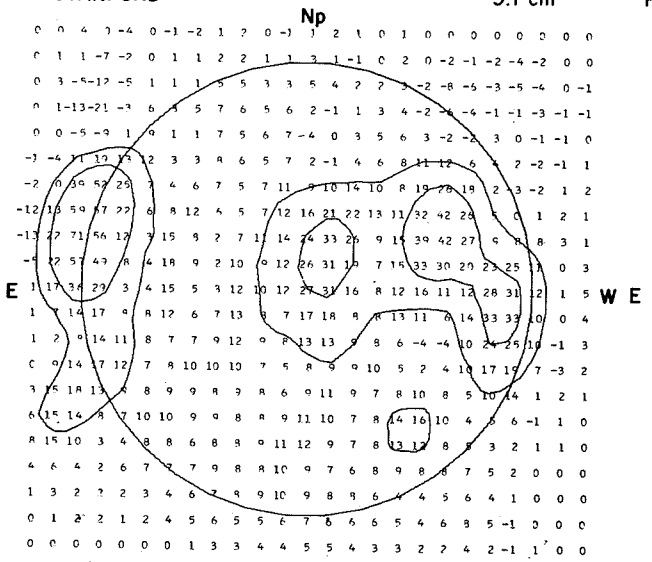


Levels
±5
±10
±20
±40
±80

18.47-19.92 UT

STANFORD

9.1 cm

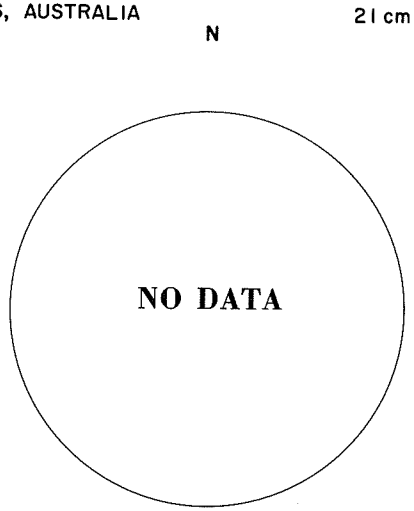


20-21 UT

Brightness Unit 5,000° K

FLEURS, AUSTRALIA

21 cm

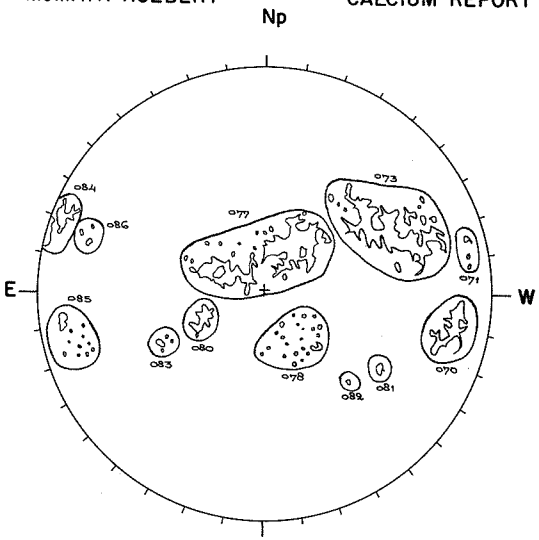


02-03 UT

Resolution 3 Minutes of Arc
Brightness Unit 1,700° K

McMATH-HULBERT

CALCIUM REPORT



POOR	M
70-26	-3.0
73-68	-3.5
77-70	-3.5
80-08	-2.5
83-03	-2.5
84-34	-3.5

1520 UT

DECEMBER 15, 1970 (P = 10.39, B_o = -0.91, L_o = 353.56)

MT. WILSON

MAGNETOGRAM
Solid-Plus
Dotted-Minus

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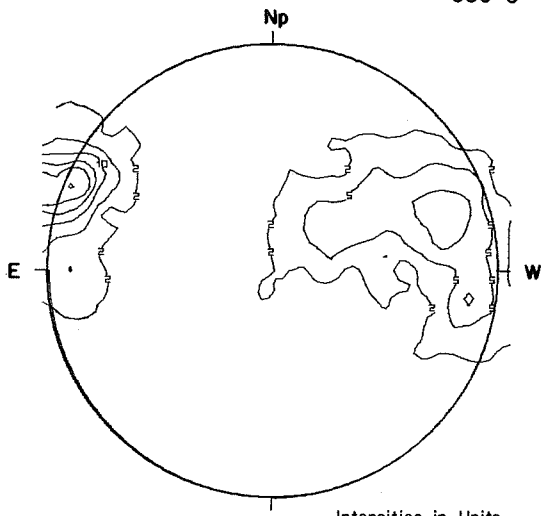
LEICESTER UNIV.

X-RAY
OSO-5

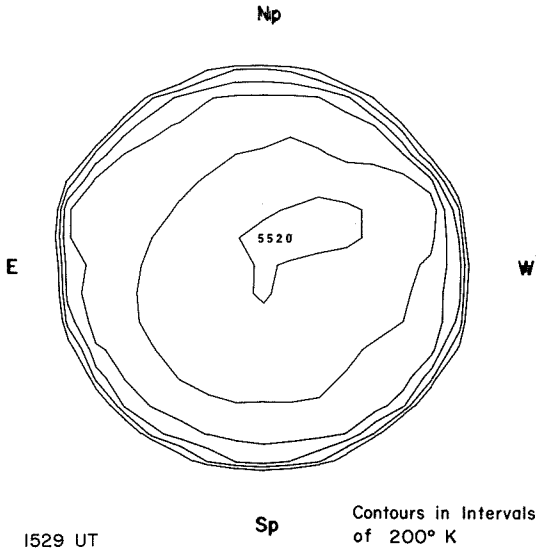


1723-1822 UT

Intensities in Units of 10^{-6} ergs cm^{-2} sec^{-1}

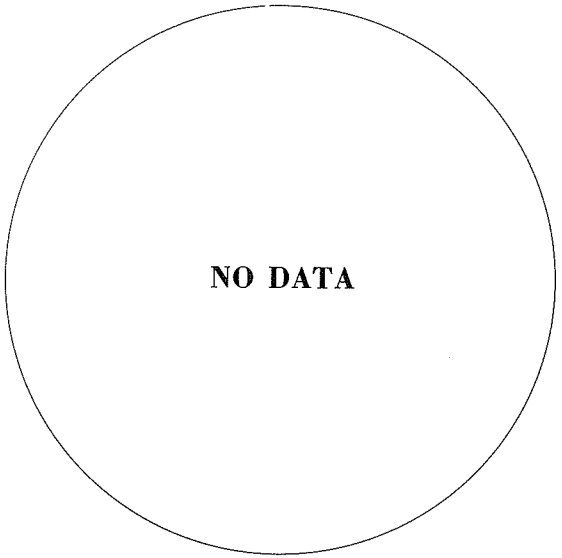
PROSPECT HILL
AFCRL

8.6 mm



1529 UT

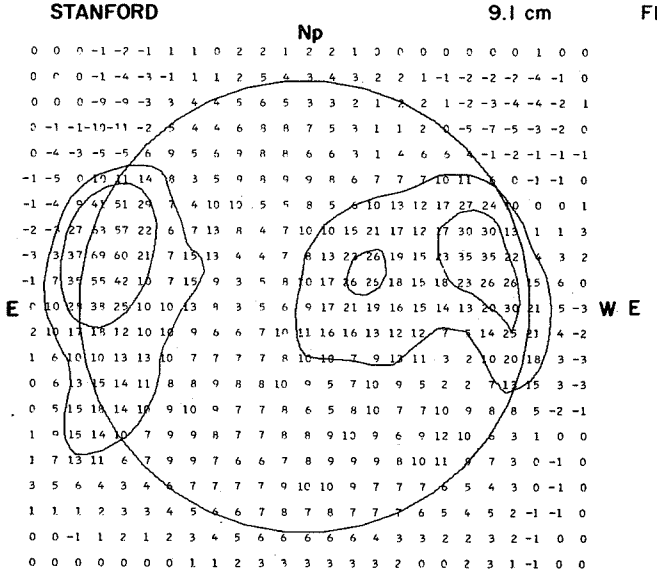
Contours in Intervals of 200° K



Levels
±5
±10
±20
±40
±80

STANFORD

9.1 cm

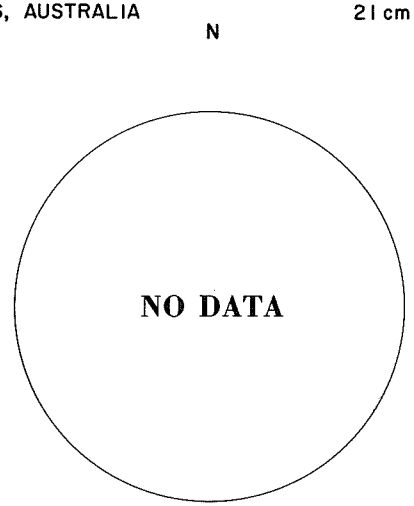


20-21 UT

Brightness Unit 5,000° K

FLEURS, AUSTRALIA

21 cm

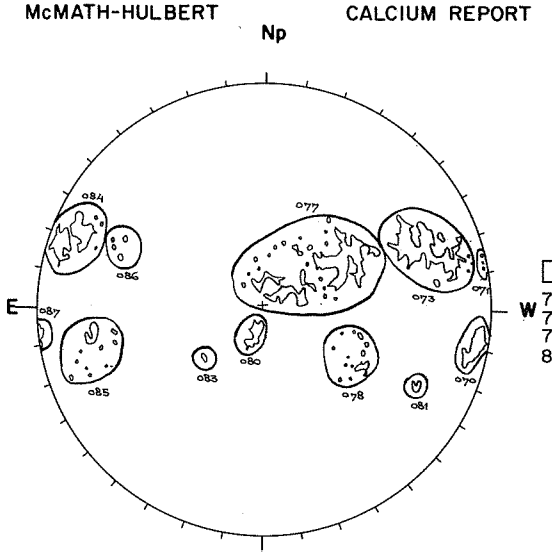


02-03 UT

Resolution 3 Minutes of Arc
Brightness Unit 1,700° K

McMATH-HULBERT

CALCIUM REPORT



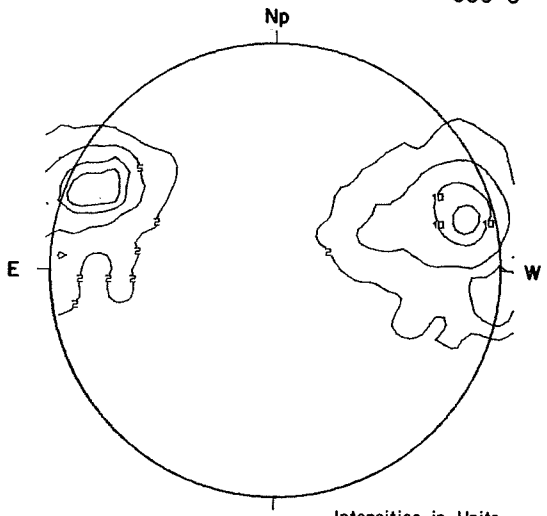
POOR	M
70-28	-3.5
73-65	-3.0
77-66	-3.5
84-55	-3.0

1440 UT

DECEMBER 16, 1970 (P = 9.94, B_o = -1.04, L_o = 340.38)

UNIV. COLLEGE LONDON
LEICESTER UNIV.

X-RAY
OSO-5

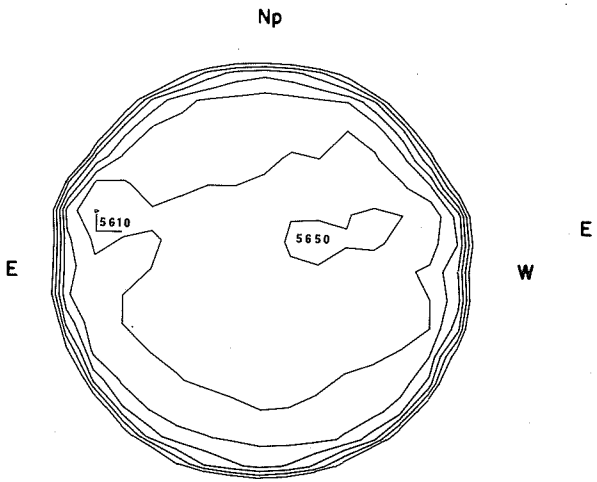


1447-1630 UT

Intensities in Units of 10^{-6} ergs cm^{-2} sec^{-1}

PROSPECT HILL
AFCRL

8.6 mm

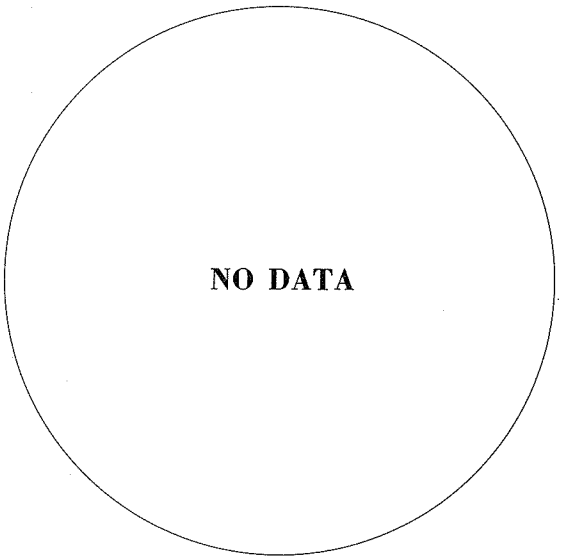


1527 UT

Contours in Intervals of 200° K

MT. WILSON

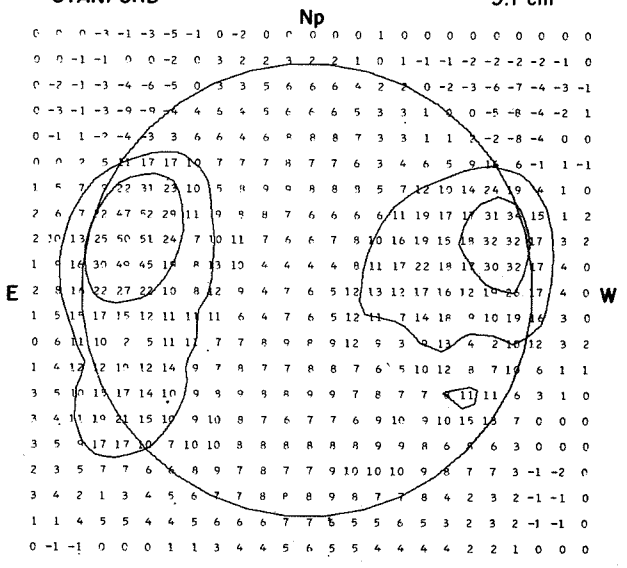
MAGNETOGRAM
Solid-Plus
Dotted-Minus



Levels
±5
±10
±20
±40
±80

STANFORD

9.1 cm

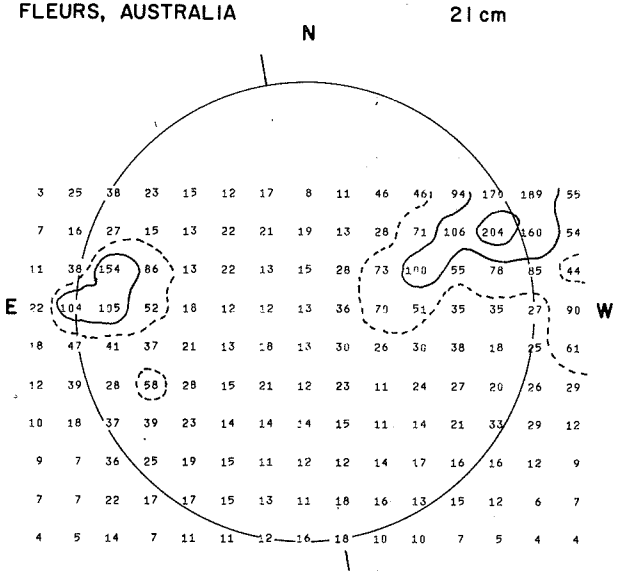


20-21 UT

Brightness Unit 5,000° K

FLEURS, AUSTRALIA

21 cm

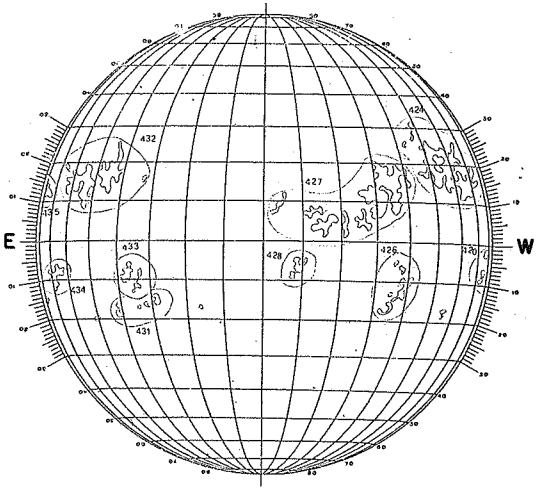


02-03 UT

Resolution 3 Minutes of Arc
Brightness Unit 1,700° K

CATANIA

CALCIUM REPORT



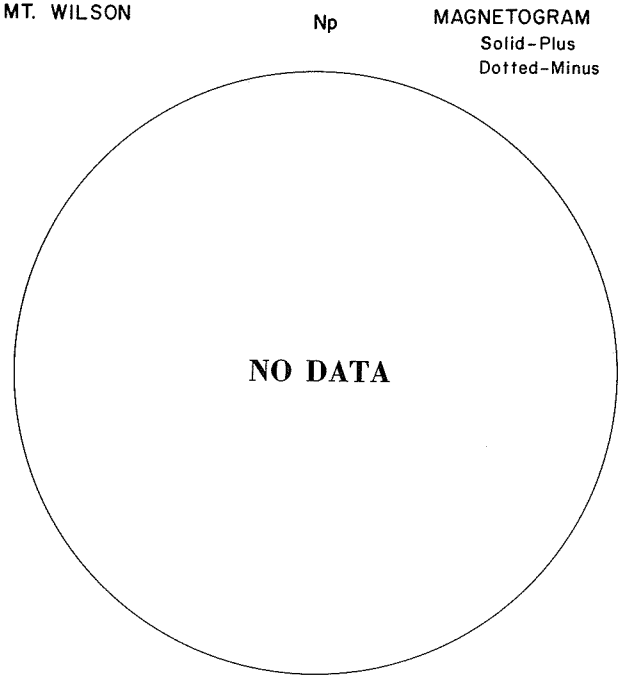
24-76 -9.8
26-09 -6.5
27-59 -4.8
28-04 -5.9
32-49 -6.2
34-15 -6.5

1215 UT

DECEMBER 17, 1970 (P = 9.48, B_o = -1.17, L_o = 327.21)

MT. WILSON

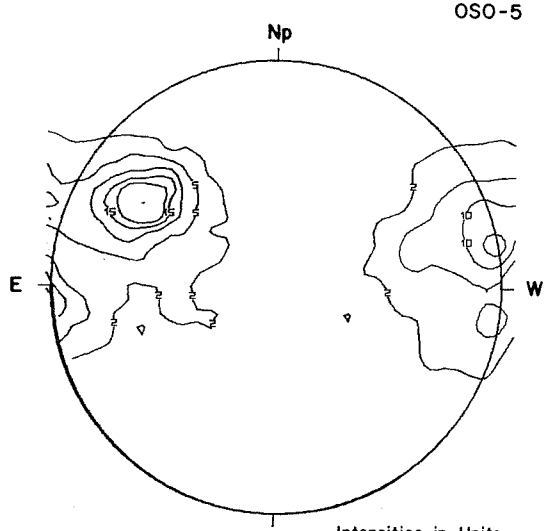
MAGNETOGRAM
Solid - Plus
Dotted - Minus



Levels
±5
±10
±20
±40
±80

UNIV. COLLEGE LONDON
LEICESTER UNIV.

X-RAY
OSO-5

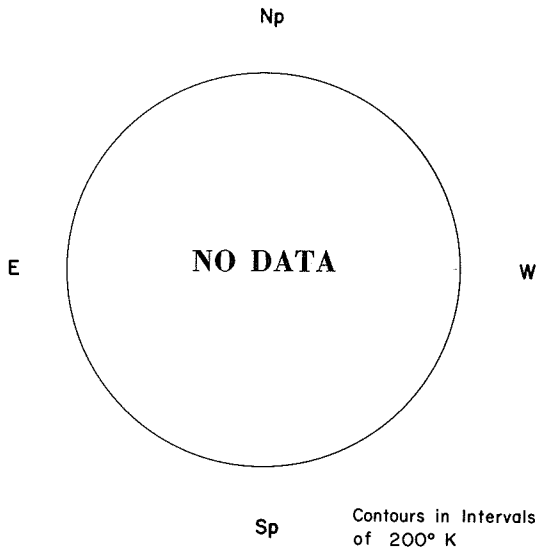


1618-1802 UT

Intensities in Units of 10^{-6} ergs cm^{-2} sec^{-1}

PROSPECT HILL
AFCRL

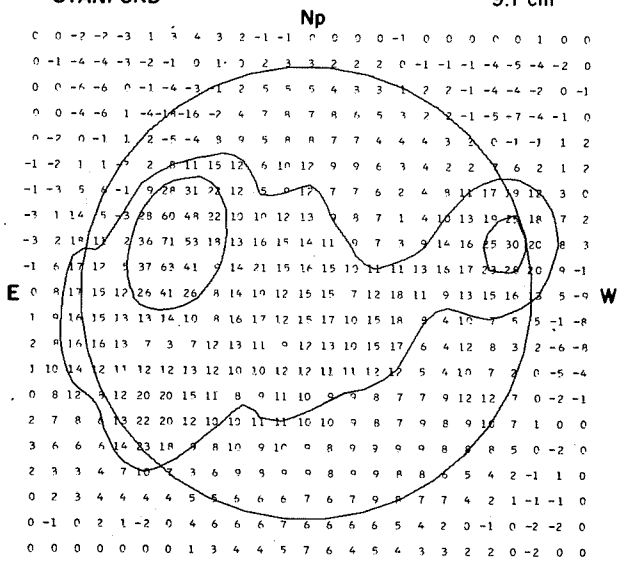
8.6 mm



Contours in Intervals of 200° K

STANFORD

9.1 cm

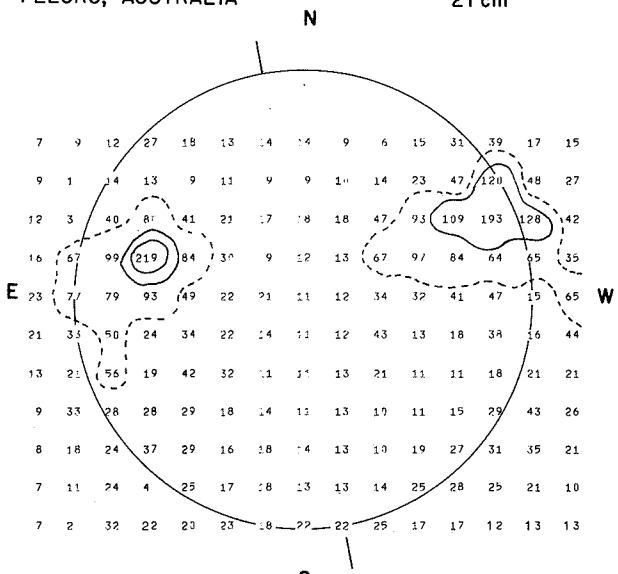


20-21 UT

Brightness Unit 5,000° K

FLEURS, AUSTRALIA

21 cm

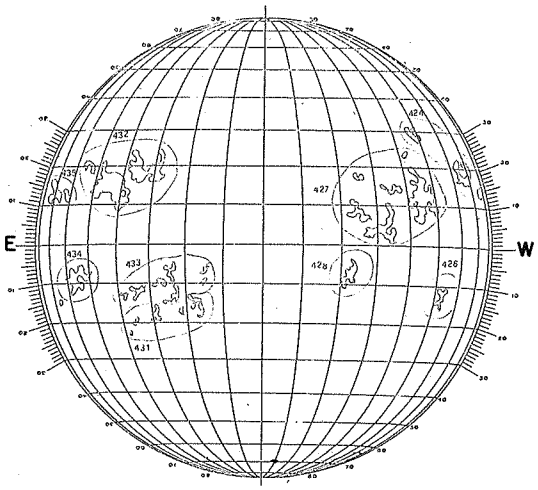


02-03 UT

Resolution 3 Minutes of Arc
Brightness Unit 1,700° K

McMATH-HULBERT
CATANIA

CALCIUM REPORT



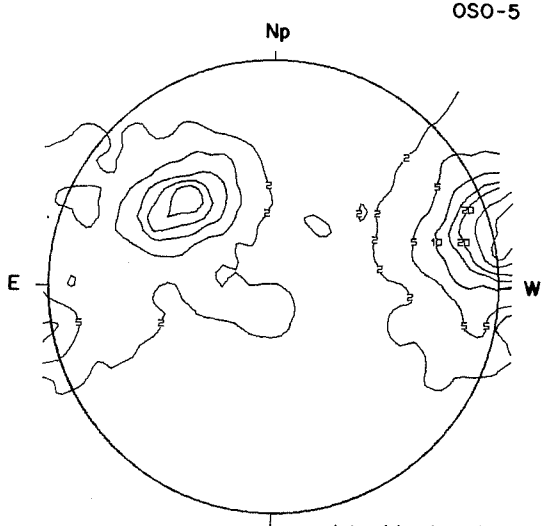
24-25 - - -
26-04 - - -
27-50 - - -
28-06 - - -
32-59 - - -
34-16 - - -

1055 UT

DECEMBER 18, 1970 (P = 9.02, B_o = -1.29, L_o = 314.03)

UNIV. COLLEGE LONDON
LEICESTER UNIV.

X-RAY
OSO-5

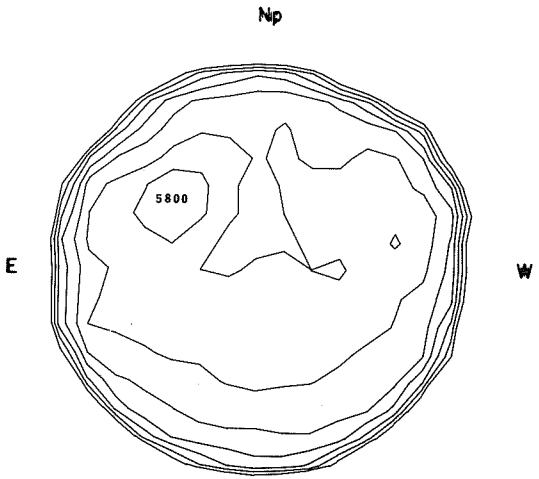


1726-1819 UT

Intensities in Units of 10^{-6} ergs cm^{-2} sec^{-1}

PROSPECT HILL
AFCRL

8.6 mm

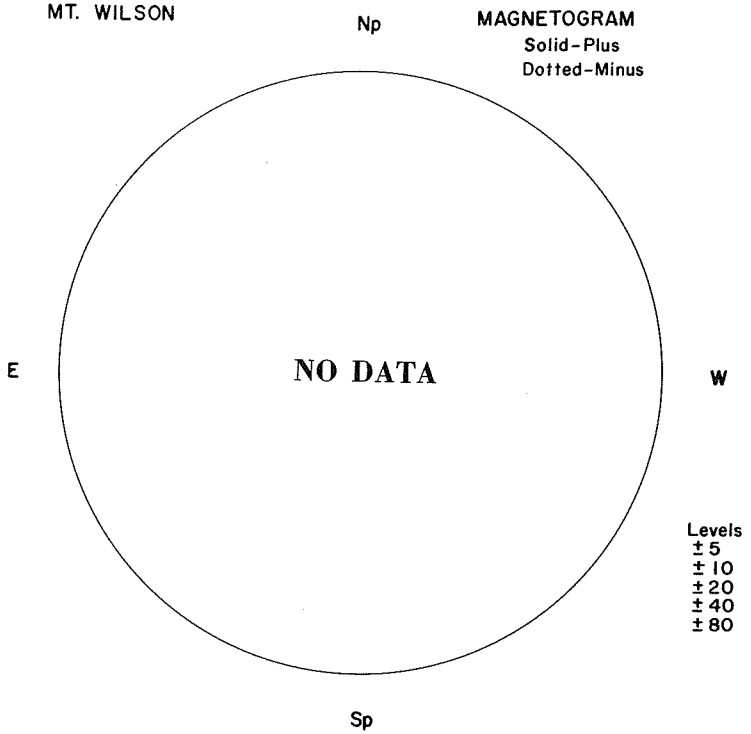


1554 UT

Contours in Intervals of 200° K

MT. WILSON

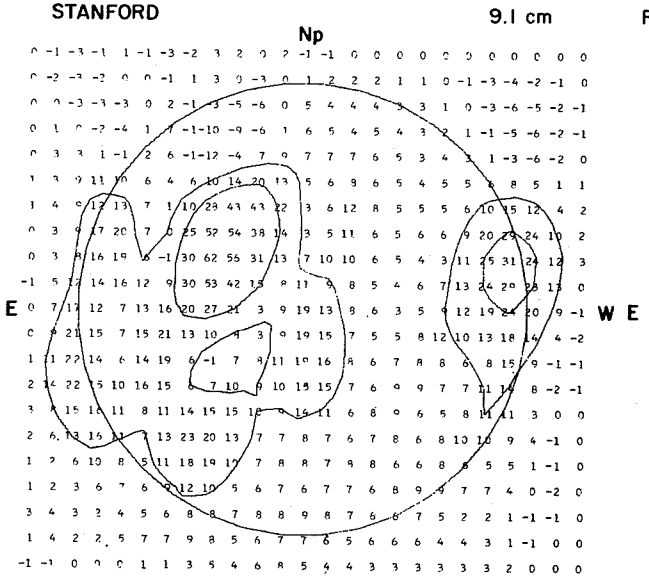
MAGNETOGRAM
Solid-Plus
Dotted-Minus



Levels
±5
±10
±20
±40
±80

STANFORD

9.1 cm

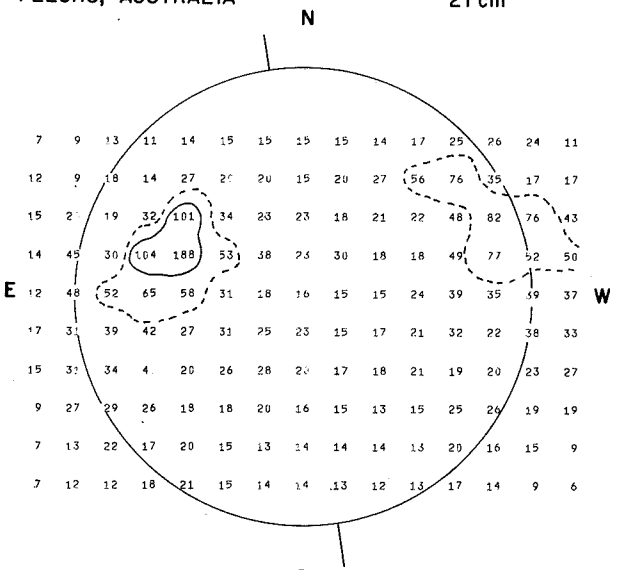


20-21 UT

Brightness Unit 5,000° K

FLEURS, AUSTRALIA

21 cm

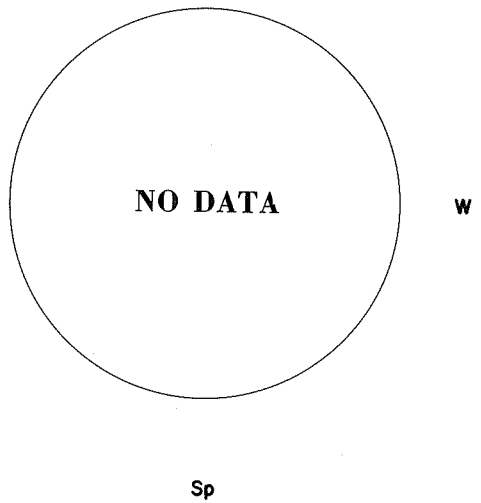


02-03 UT

Resolution 3 Minutes of Arc
Brightness Unit 1,700° K

McMATH-HULBERT

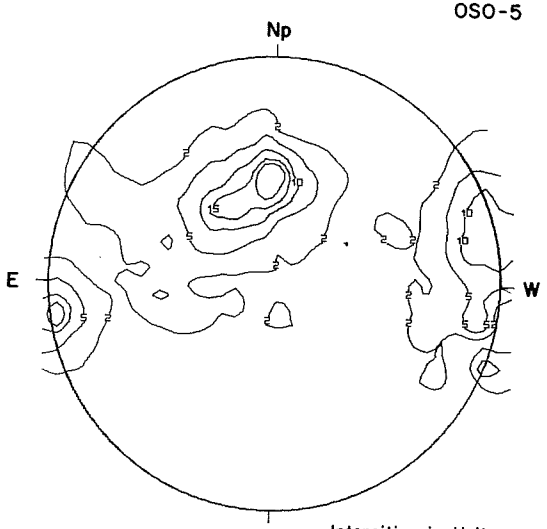
CALCIUM REPORT



DECEMBER 19, 1970 (P = 8.56, B_o = -1.42, L_o = 300.86)

UNIV. COLLEGE LONDON
LEICESTER UNIV.

X-RAY
OSO-5

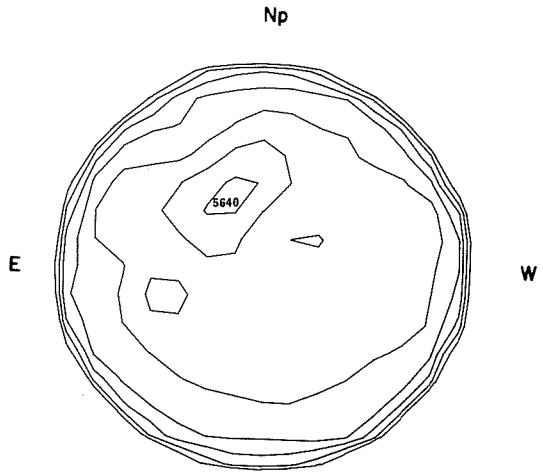


1600-1745 UT

Intensities in Units of 10^{-6} ergs cm^{-2} sec^{-1}

PROSPECT HILL
AFCRL

8.6 mm

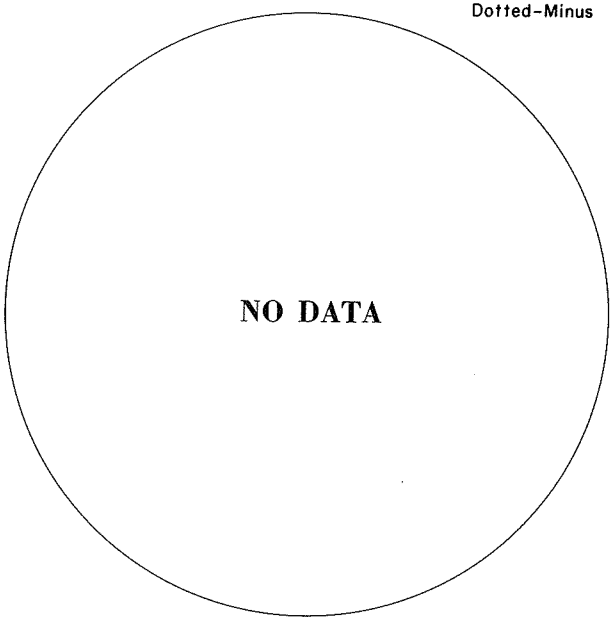


1557 UT

Contours in Intervals of 200° K

MT. WILSON

MAGNETOGRAM
Solid-Plus
Dotted-Minus

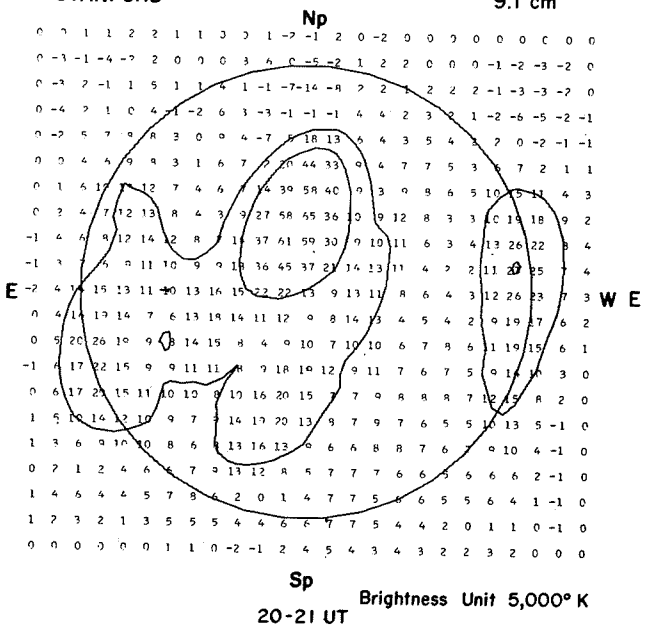


NO DATA

Levels
±5
±10
±20
±40
±80

STANFORD

9.1 cm

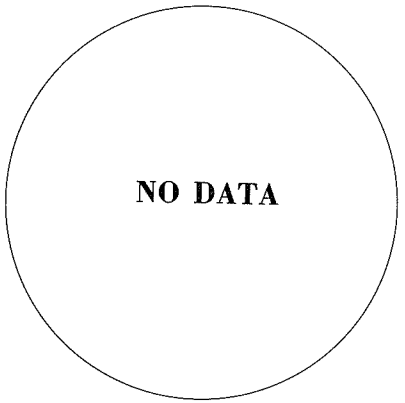


20-21 UT

Brightness Unit 5,000° K

FLEURS, AUSTRALIA

21 cm



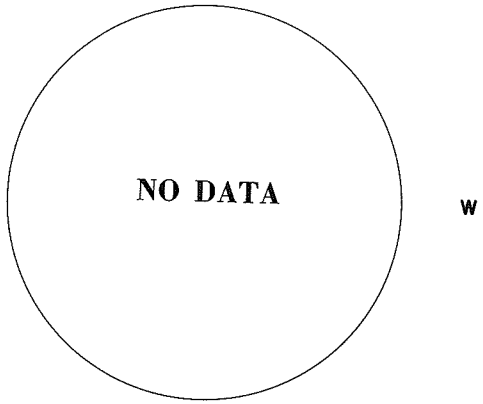
NO DATA

02-03 UT

Resolution 3 Minutes of Arc
Brightness Unit 1,700° K

McMATH-HULBERT

CALCIUM REPORT

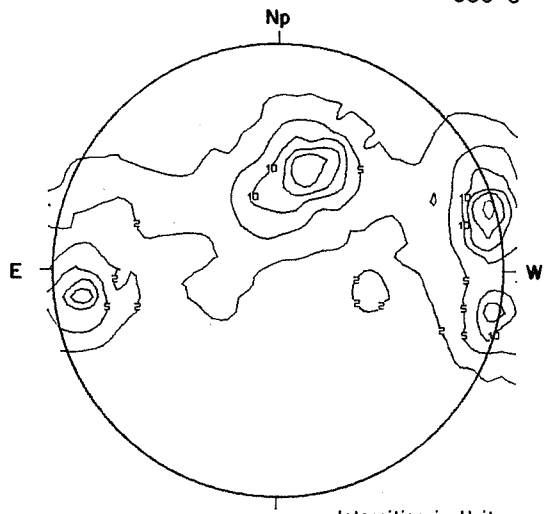


NO DATA

DECEMBER 20, 1970 (P = 8.09, B_o = -1.54, L_o = 287.69)

UNIV. COLLEGE LONDON
LEICESTER UNIV.

X-RAY
OSO-5

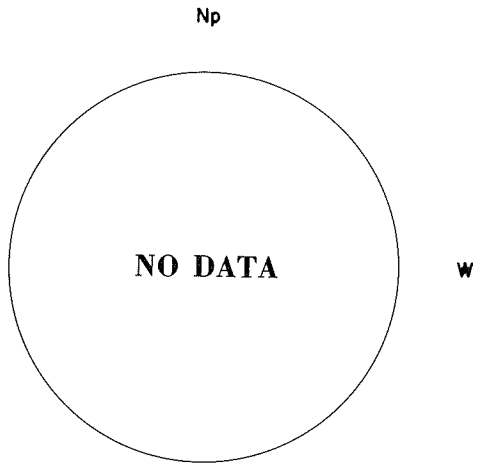


1231-1330 UT

Intensities in Units of 10^{-6} ergs cm^{-2} sec^{-1}

PROSPECT HILL
AFCRL

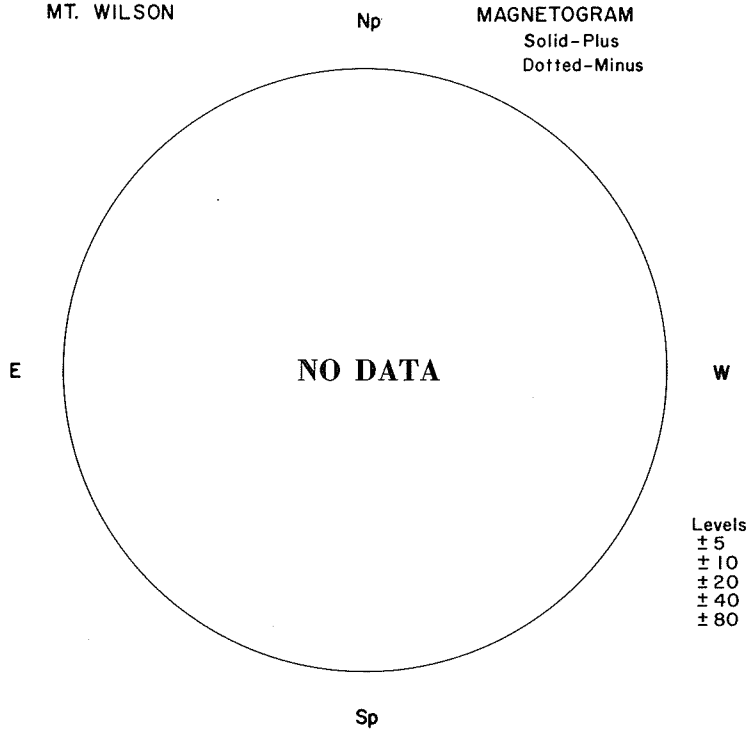
8.6 mm



Contours in Intervals of 200° K

MT. WILSON

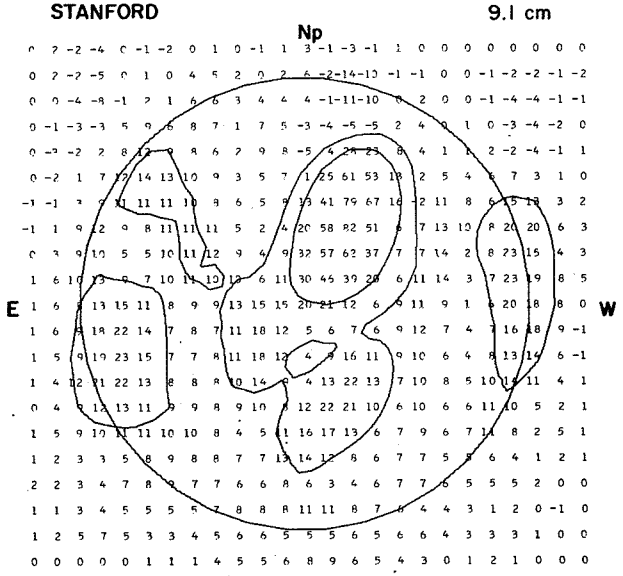
MAGNETOGRAM
Solid-Plus
Dotted-Minus



Levels
±5
±10
±20
±40
±80

STANFORD

9.1 cm

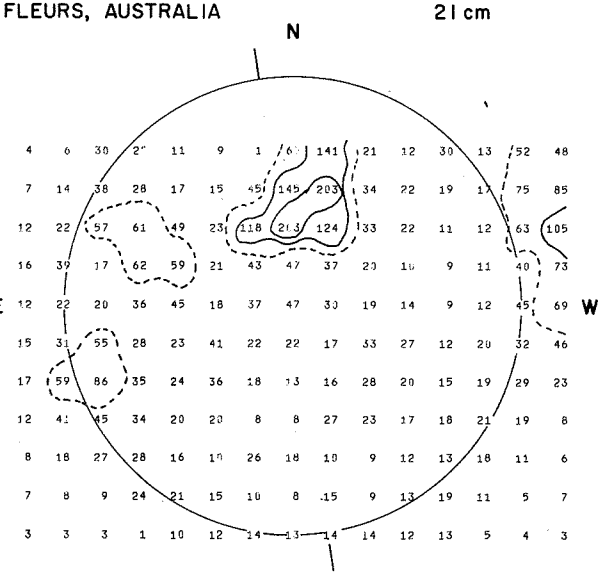


20-21 UT

Brightness Unit 5,000° K

FLEURS, AUSTRALIA

21 cm

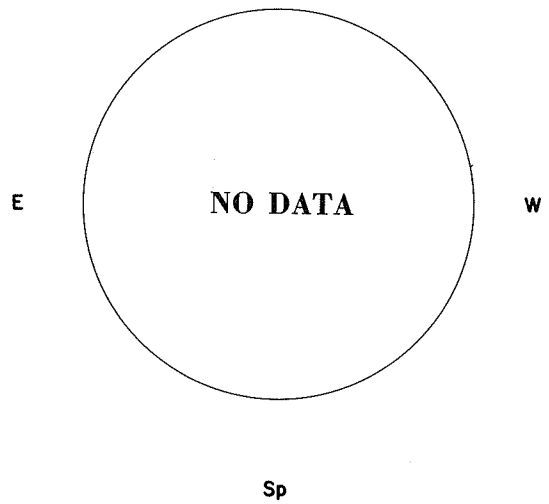


02-03 UT

Resolution 3 Minutes of Arc
Brightness Unit 1,700° K

McMATH-HULBERT

CALCIUM REPORT



DECEMBER 21, 1970 (P = 7.62, B_o = -1.67, L_o = 274.51)

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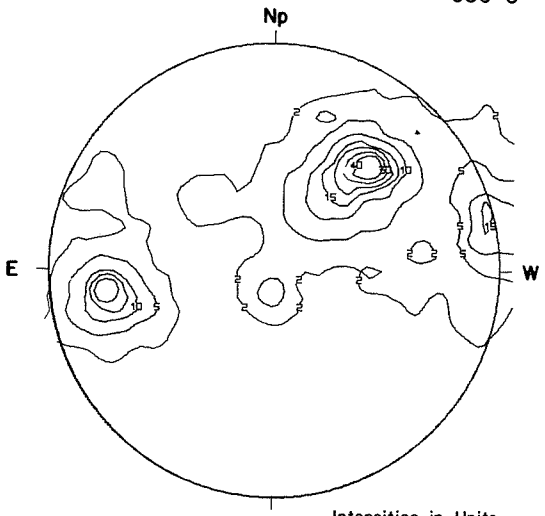
LEICESTER UNIV.

X-RAY
OSO-5

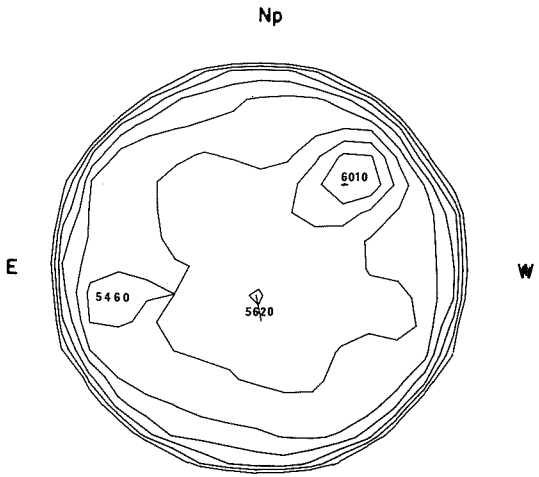


1402-1547 UT

Intensities in Units of 10^{-6} ergs cm^{-2} sec^{-1}

PROSPECT HILL
AFCRL

8.6 mm

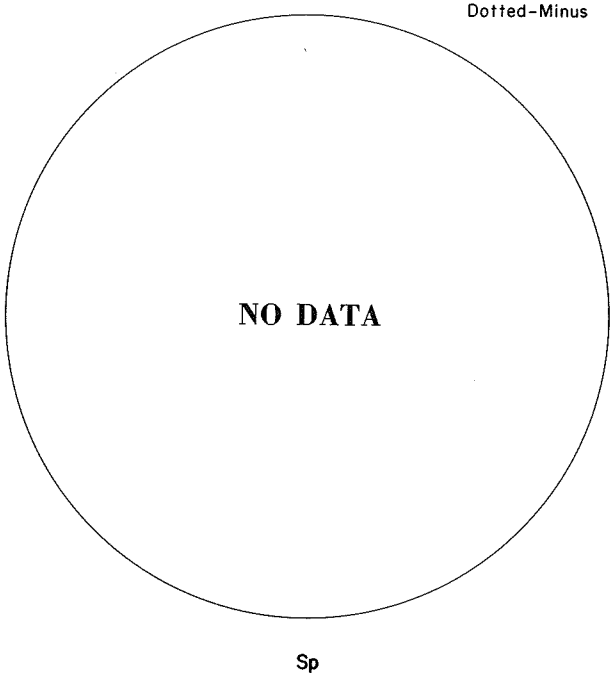


1556 UT

Contours in Intervals of 200° K

MT. WILSON

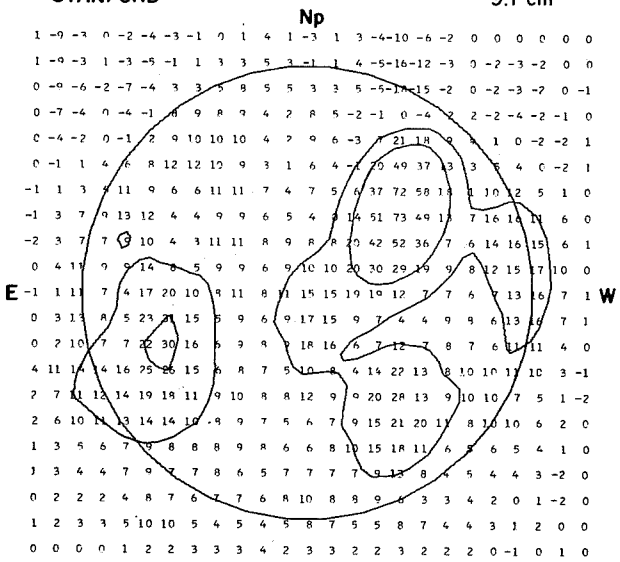
MAGNETOGRAM
Solid-Plus
Dotted-Minus



Levels
± 5
± 10
± 20
± 40
± 80

STANFORD

9.1 cm

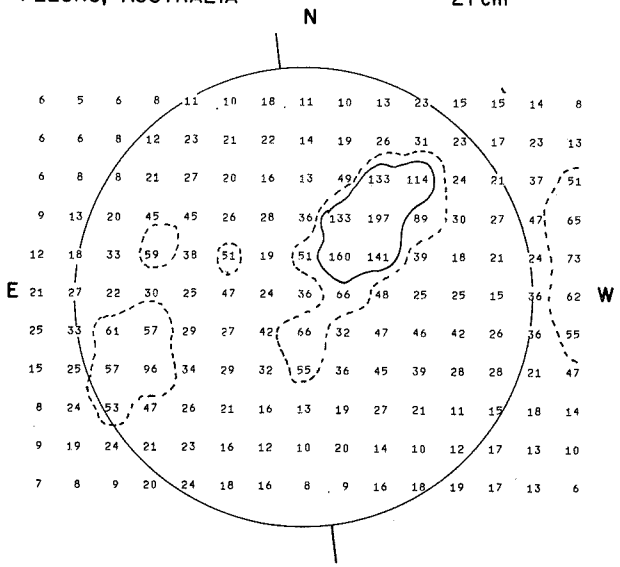


20-21 UT

Brightness Unit 5,000° K

FLEURS, AUSTRALIA

21 cm

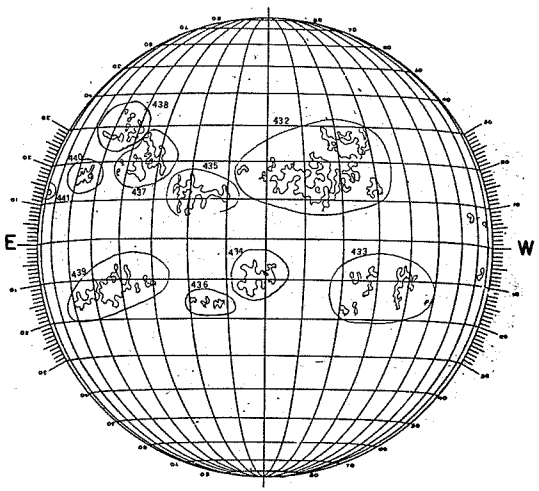


02-03 UT

Resolution 3 Minutes of Arc
Brightness Unit 1,700° K

CALCIUM REPORT

CATANIA



33-18- --
32-71- --
34-16- --
35-18- --
37-18- --
39-33- --
40-08- --

1013 UT

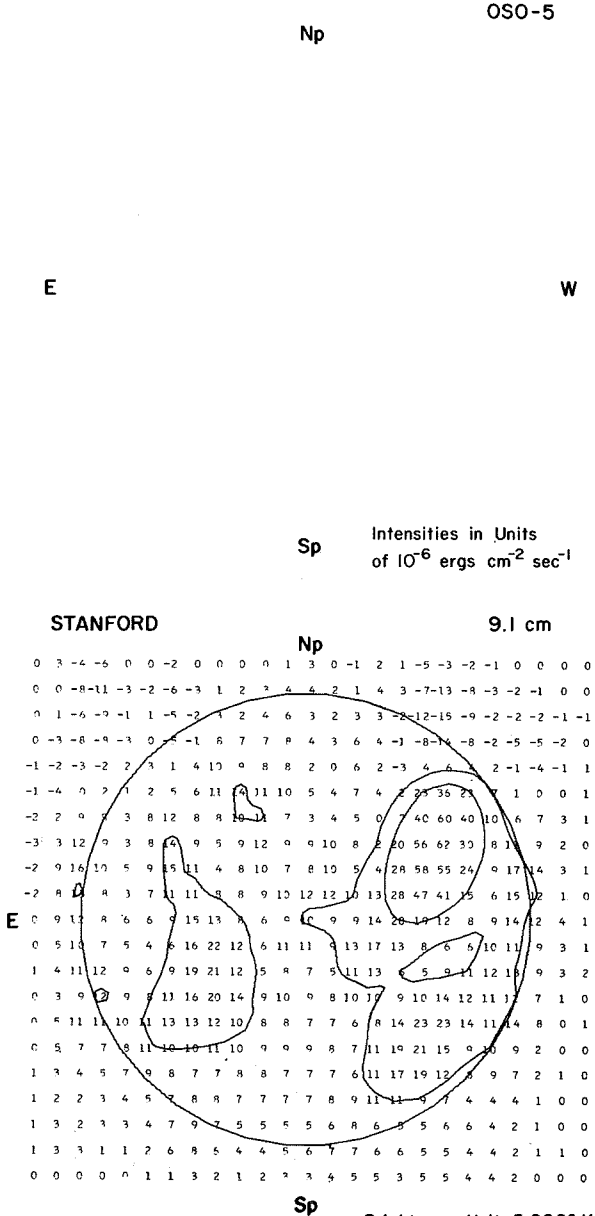
DECEMBER 22, 1970 (P = 7.15, B_o = -1.79, L_o = 261.34)

MT. WILSON

MAGNETOGRAM
Solid - Plus
Dotted - Minus

UNIV. COLLEGE LONDON
LEICESTER UNIV.

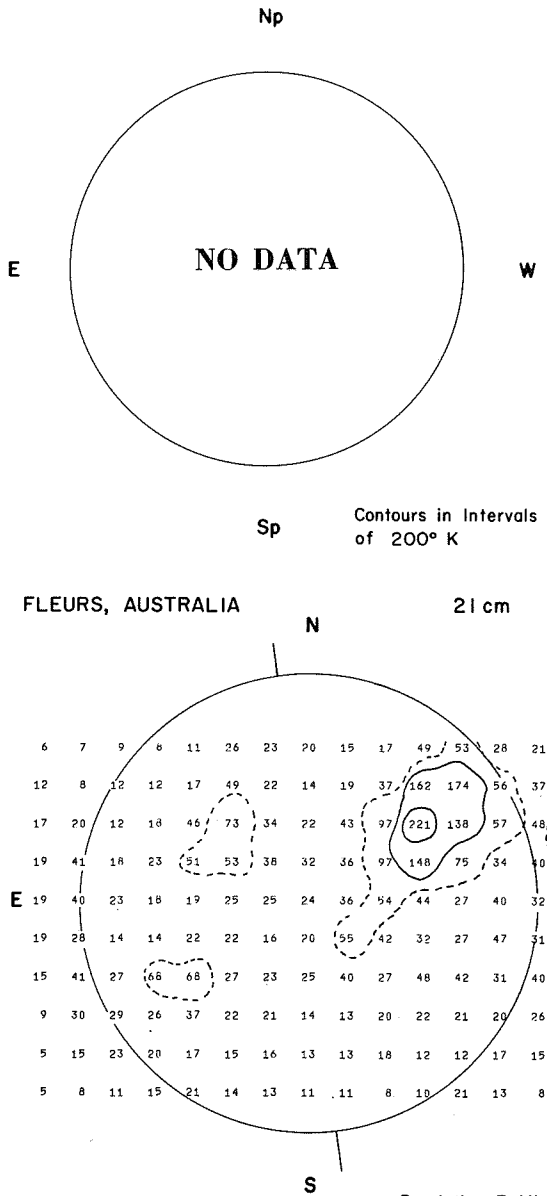
X-RAY
OSO-5



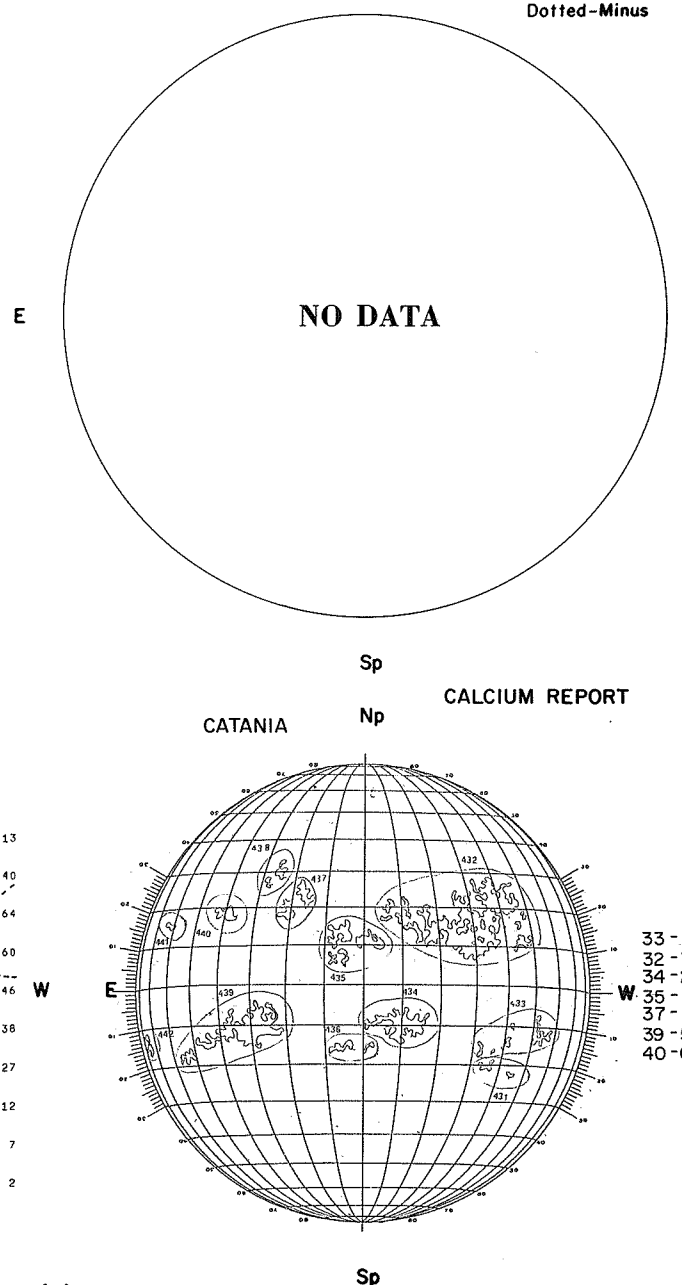
Intensities in Units of 10^{-6} ergs cm^{-2} sec^{-1}

PROSPECT HILL
AFCRL

8.6 mm



Contours in Intervals of 200° K



Levels
±5
±10
±20
±40
±80

STANFORD

9.1 cm

Brightness Unit 5,000° K

20-21 UT

FLEURS, AUSTRALIA

21 cm

Resolution 3 Minutes of Arc
Brightness Unit 1,700° K

02-03 UT

CALCIUM REPORT

CATANIA

33 - 11 - 3.7
32 - 77 - 4.8
34 - 24 - 4.0
35 - 19 - 4.3
37 - 10 - 3.1
39 - 50 - 4.9
40 - 07 - 5.8

1025 UT

DECEMBER 23, 1970 (P = 6.67, B_o = -1.92, L_o = 248.17)

UNIV. COLLEGE LONDON
LEICESTER UNIV.

X-RAY
OSO-5

Np
E W
Sp

Intensities in Units of 10^{-6} ergs cm^{-2} sec^{-1}

PROSPECT HILL
AFCRL

8.6 mm

Np
E W
Sp

NO DATA

Contours in Intervals of 200° K

MT. WILSON

MAGNETOGRAM
Solid-Plus
Dotted-Minus

Np
E W
Sp

NO DATA

Levels
±5
±10
±20
±40
±80

STANFORD

9.1 cm

Np
E W
Sp

Brightness Unit 5,000° K

20-21 UT

FLEURS, AUSTRALIA

21 cm

N
E W
S

NO DATA

Resolution 3 Minutes of Arc
Brightness Unit 1,700° K

02-03 UT

CATANIA

CALCIUM REPORT

Np
E W
Sp

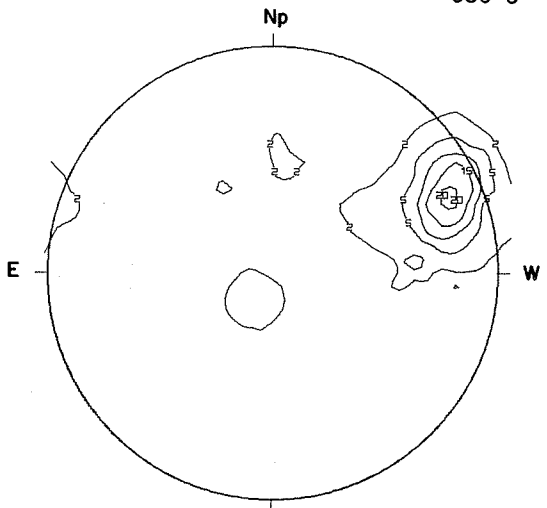
33-21-4.4
32-100-4.4
34-18-3.3
35-20-3.2
37-14-2.9
39-39-2.8
40-14-3.3

1135 UT

DECEMBER 24, 1970 (P = 6.20, B_o = -2.04, L_o = 234.99)

UNIV. COLLEGE LONDON
LEICESTER UNIV.

X-RAY
OSO-5

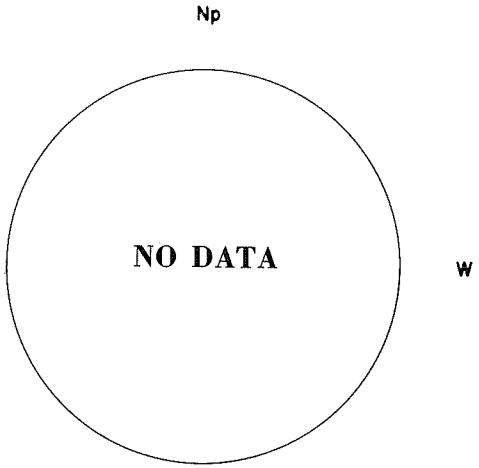


1153-1336 UT

Intensities in Units of 10^{-6} ergs cm^{-2} sec^{-1}

PROSPECT HILL
AFCRL

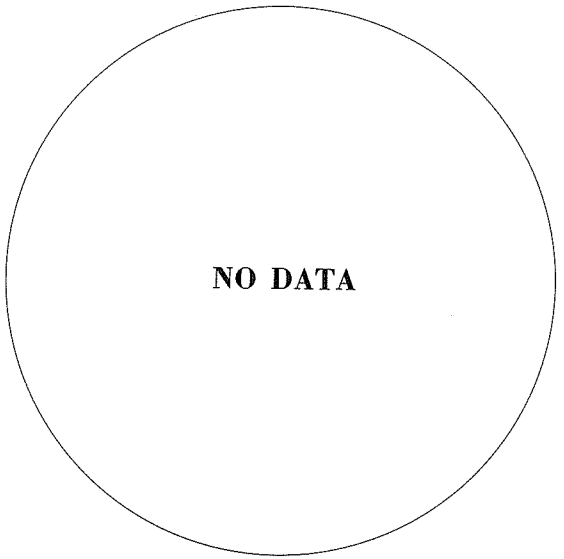
8.6 mm



Contours in Intervals of 200° K

MT. WILSON

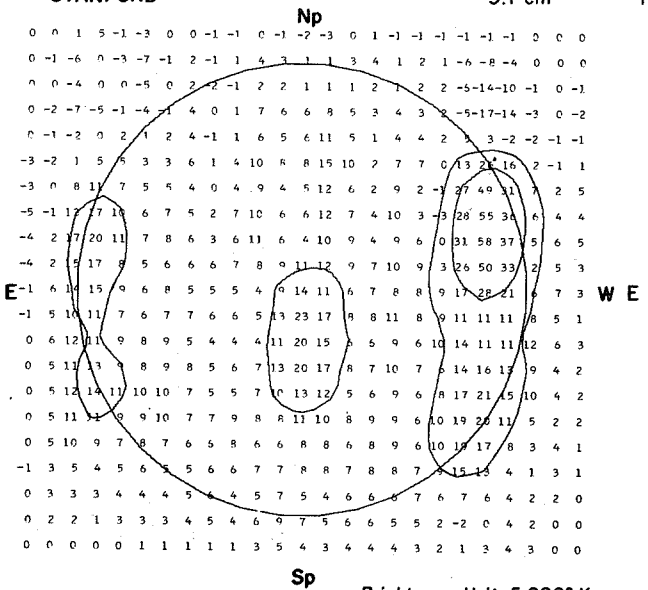
MAGNETOGRAM
Solid-Plus
Dotted-Minus



Levels
±5
±10
±20
±40
±80

STANFORD

9.1 cm

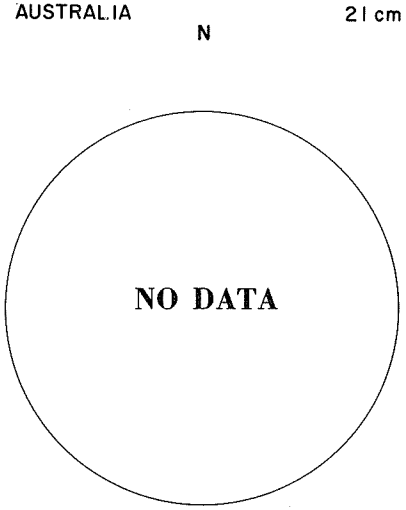


Brightness Unit 5,000° K

20-21 UT

FLEURS, AUSTRALIA

21 cm

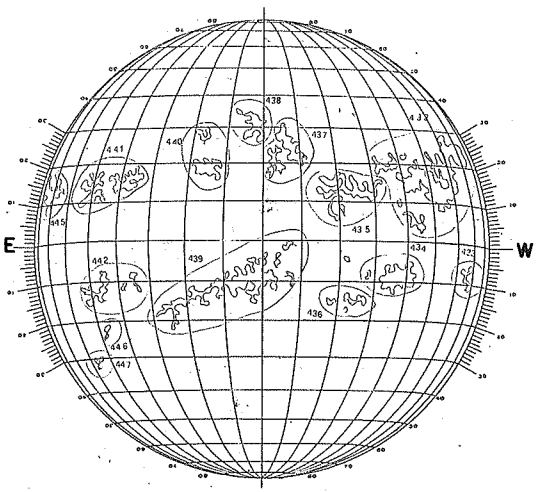


02-03 UT

Resolution 3 Minutes of Arc
Brightness Unit 1,700° K

CATANIA

CALCIUM REPORT



32-108 - 8.1
34-24 - 4.7
35-24 - 4.3
37-19 - 4.7
39-46 - 5.1
40-13 - 4.5
45-30 - --

0750 UT

DECEMBER 25, 1970 (P = 5.72, B_o = -2.17, L_o = 221.82)

UNIV. COLLEGE LONDON
LEICESTER UNIV.

X-RAY
OSO-5

Np

E W

Sp

Intensities in Units of 10^{-6} ergs cm^{-2} sec^{-1}

PROSPECT HILL
AFCRL

8.6 mm

Np

E W

NO DATA

Sp

Contours in Intervals of 200° K

MT. WILSON

MAGNETOGRAM
Solid-Plus
Dotted-Minus

Np

E W

NO DATA

Levels
± 5
± 10
± 20
± 40
± 80

Sp

STANFORD

9.1 cm

Np

E W

Sp

20-21 UT

Brightness Unit 5,000° K

FLEURS, AUSTRALIA

21 cm

N

E W

NO DATA

S

02-03 UT

Resolution 3 Minutes of Arc
Brightness Unit 1,700° K

CALCIUM REPORT

CATANIA

Np

E W

Sp

0955 UT

32-74-5.5
34-17-3.5
35-22-3.0
37-17-3.8
39-45-3.5
40-15-4.8
45-43-3.6

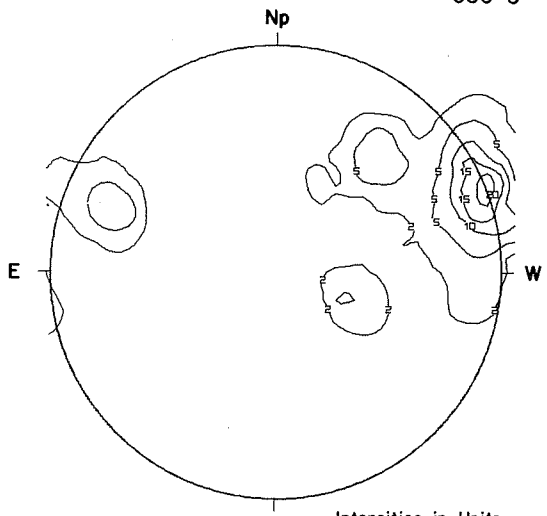
DECEMBER 26, 1970 (P = 5.24, B_o = -2.29, L_o = 208.65)

MT. WILSON

MAGNETOGRAM
Solid - Plus
Dotted - Minus

UNIV. COLLEGE LONDON
LEICESTER UNIV.

X-RAY
OSO-5

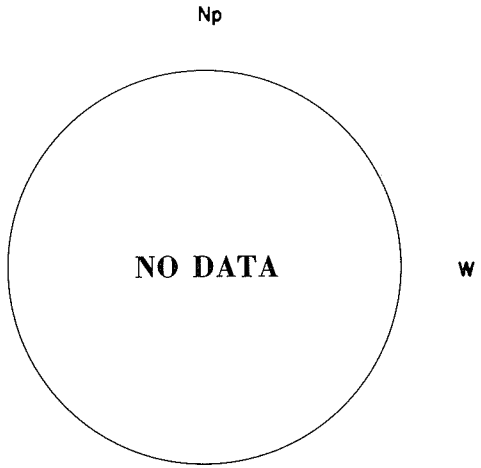


1002-1100 UT

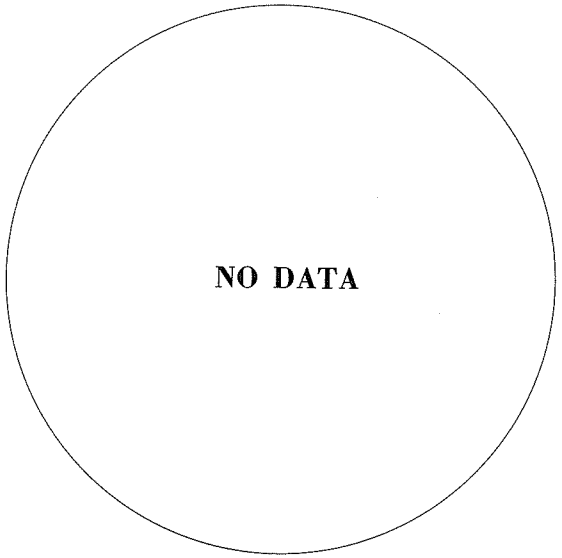
Intensities in Units of 10^{-6} ergs cm^{-2} sec^{-1}

PROSPECT HILL
AFCRL

8.6 mm



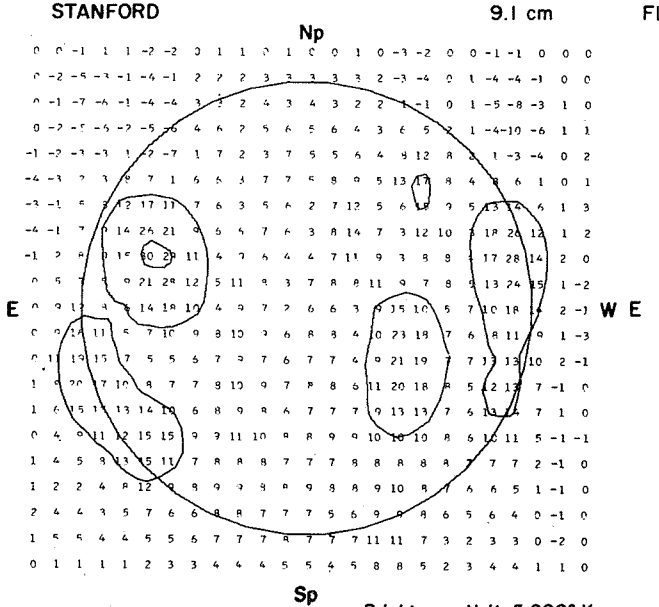
Contours in Intervals of 200° K



Levels
±5
±10
±20
±40
±80

STANFORD

9.1 cm

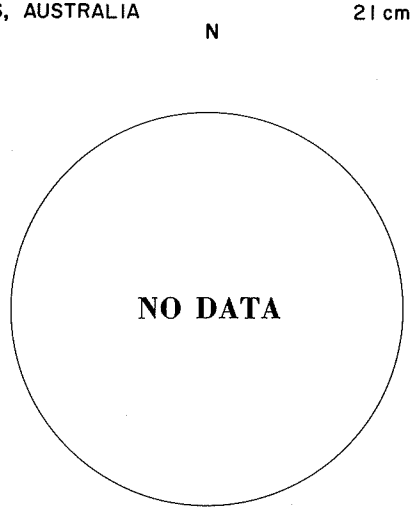


20-21 UT

Brightness Unit 5,000° K

FLEURS, AUSTRALIA

21 cm

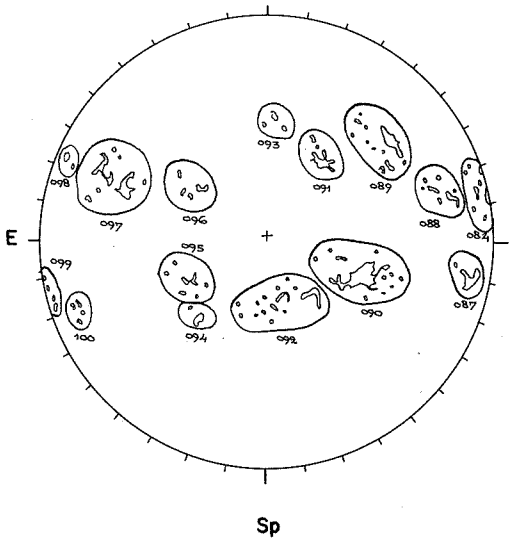


02-03 UT

Resolution 3 Minutes of Arc
Brightness Unit 1,700° K

McMATH-HULBERT

CALCIUM REPORT



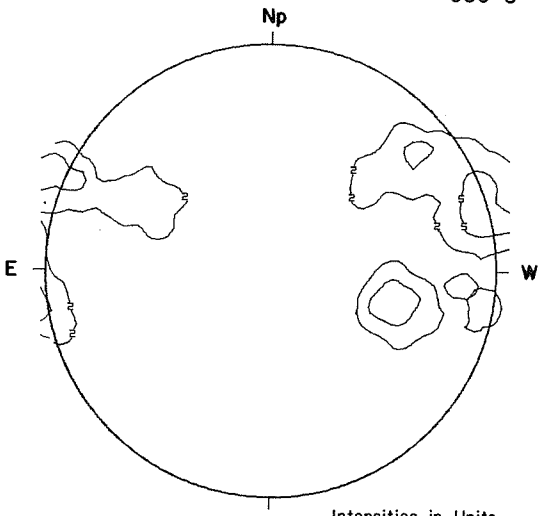
POOR	O
84-13-3.0	
89-20-3.0	
90-17-2.5	
91-11-2.5	
97-20-3.0	
98-04-3.0	

1525 UT

DECEMBER 27, 1970 (P = 4.76, B_o = -2.41, L_o = 195.48)

UNIV. COLLEGE LONDON
LEICESTER UNIV.

X-RAY
OSO-5

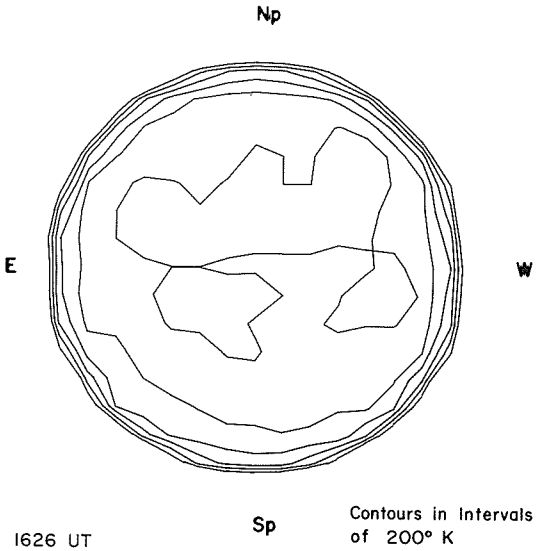


1126-1308 UT

Intensities in Units of 10^{-6} ergs cm^{-2} sec^{-1}

PROSPECT HILL
AFCRL

8.6 mm

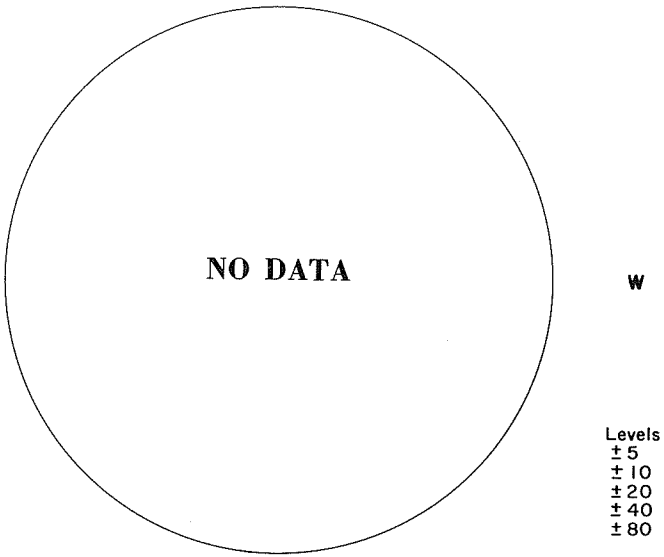


1626 UT

Contours in Intervals of 200° K

MT. WILSON

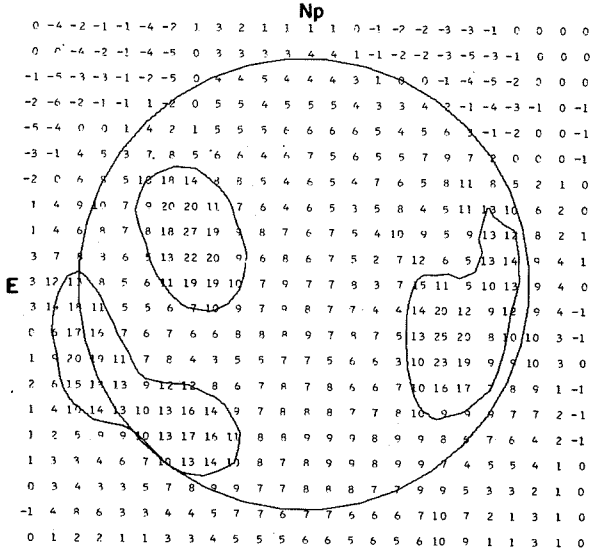
MAGNETOGRAM
Solid-Plus
Dotted-Minus



Levels
±5
±10
±20
±40
±80

STANFORD

9.1 cm

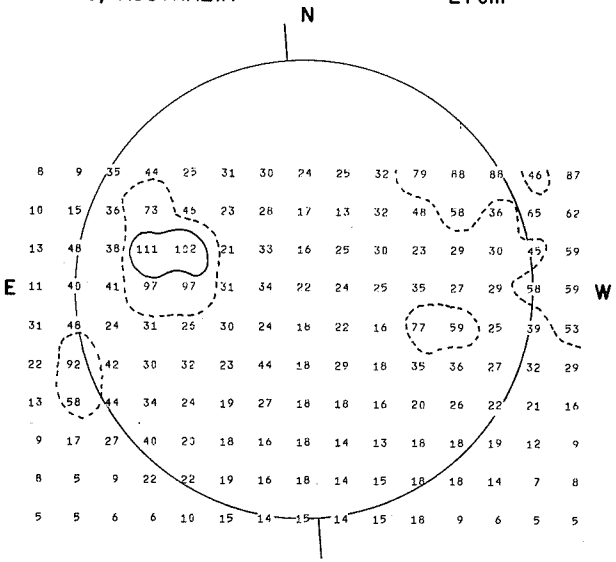


20-21 UT

Brightness Unit 5,000° K

FLEURS, AUSTRALIA

21 cm

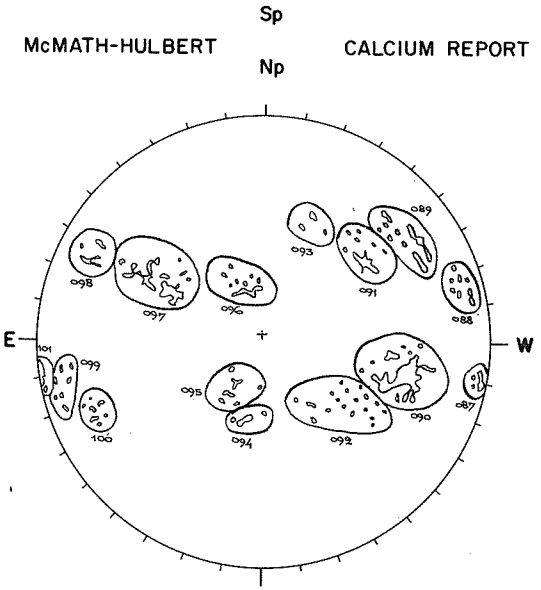


02-03 UT

Resolution 3 Minutes of Arc
Brightness Unit 1,700° K

McMATH-HULBERT

CALCIUM REPORT



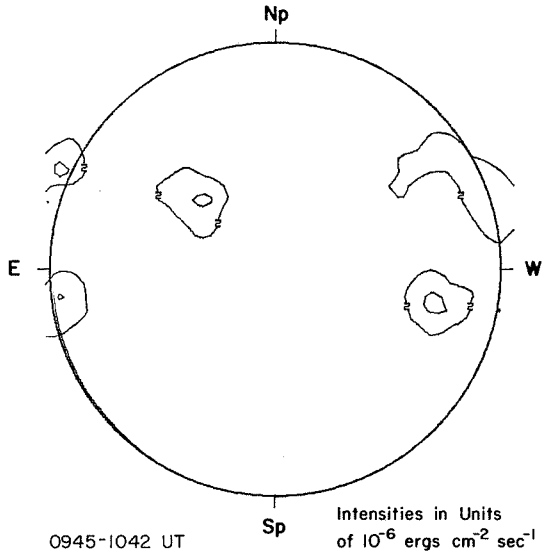
POOR	O
89-20	3.5
90-28	3.5
91-11	3.0
97-21	3.0
98-07	2.5
01-15	2.5

1550 UT

DECEMBER 28, 1970 (P = 4.27, B_o = -2.53, L_o = 182.31)

UNIV. COLLEGE LONDON
LEICESTER UNIV.

X-RAY
OSO-5

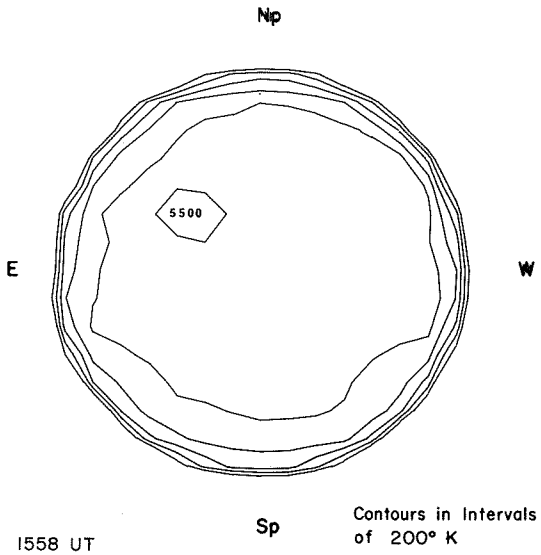


0945-1042 UT

Intensities in Units of 10^{-6} ergs cm^{-2} sec^{-1}

PROSPECT HILL
AFCRL

8.6 mm



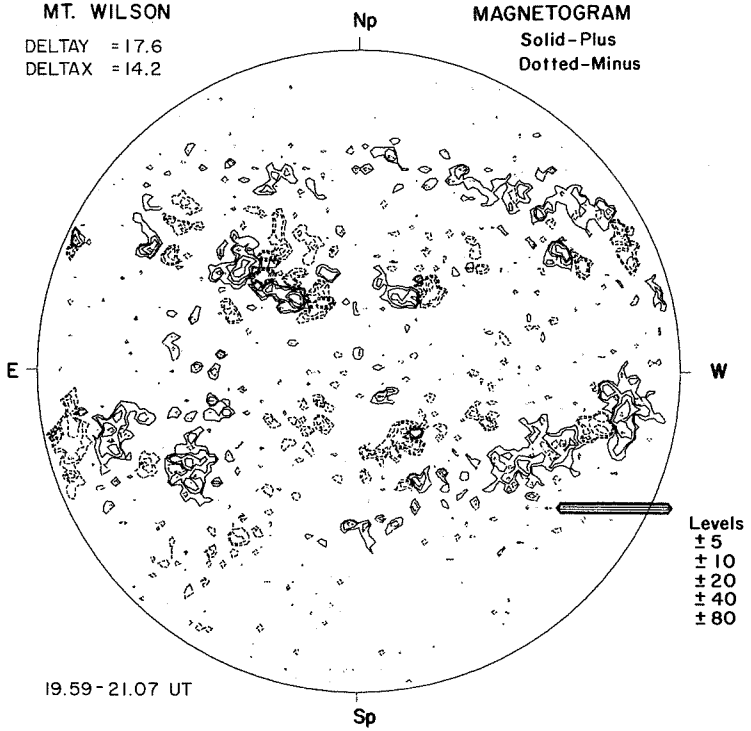
1558 UT

Contours in Intervals of 200° K

MT. WILSON

DELTAY = 17.6
DELTAX = 14.2

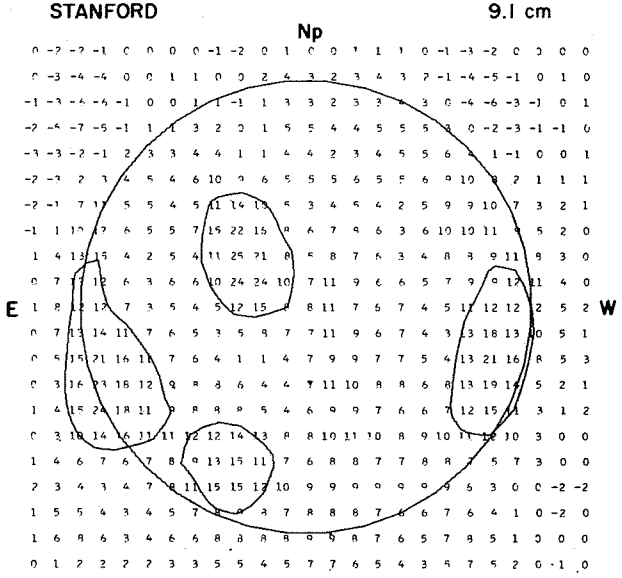
MAGNETOGRAM
Solid-Plus
Dotted-Minus



19.59-21.07 UT

STANFORD

9.1 cm

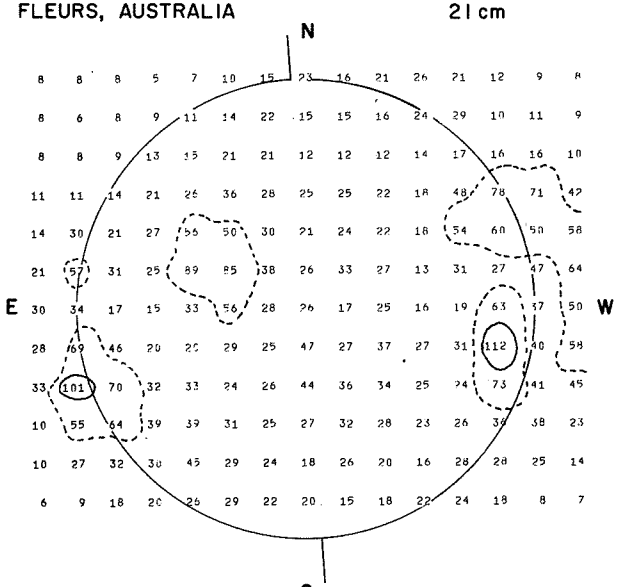


20-21 UT

Brightness Unit 5,000° K

FLEURS, AUSTRALIA

21 cm

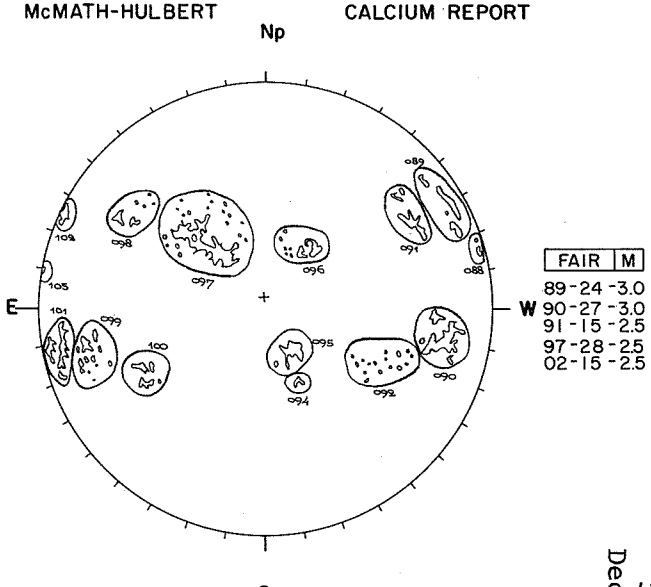


02-03 UT

Resolution 3 Minutes of Arc
Brightness Unit 1,700° K

McMATH-HULBERT

CALCIUM REPORT



1645 UT

55
Dec 70

DECEMBER 29, 1970 (P = 3.79, B_o = -2.65, L_o = 169.14)

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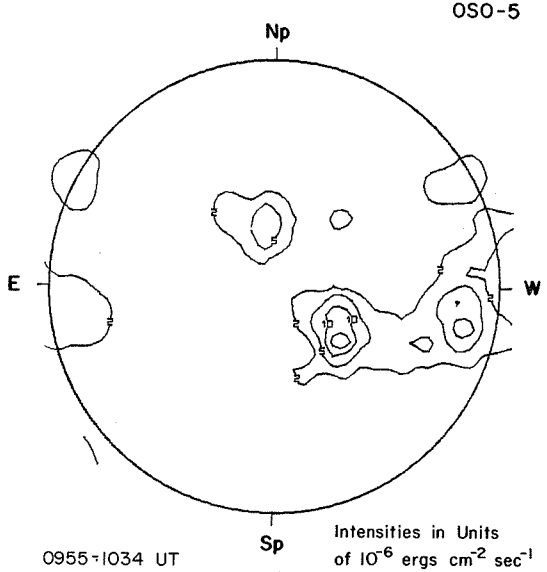
LEICESTER UNIV.

X-RAY
OSO-5

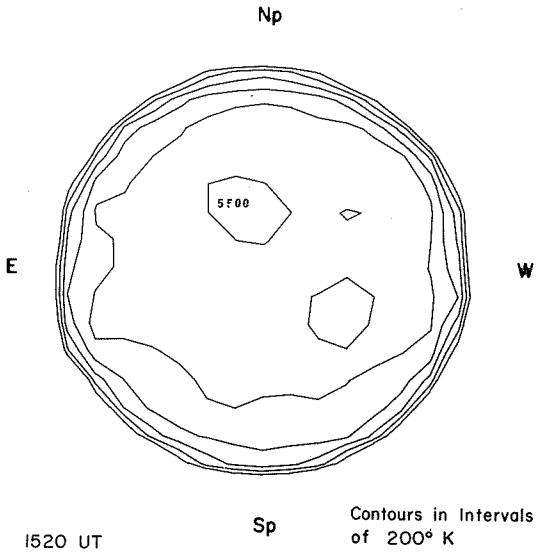


0955-1034 UT

Intensities in Units of 10^{-6} ergs cm^{-2} sec^{-1}

PROSPECT HILL
AFCRL

8.6 mm



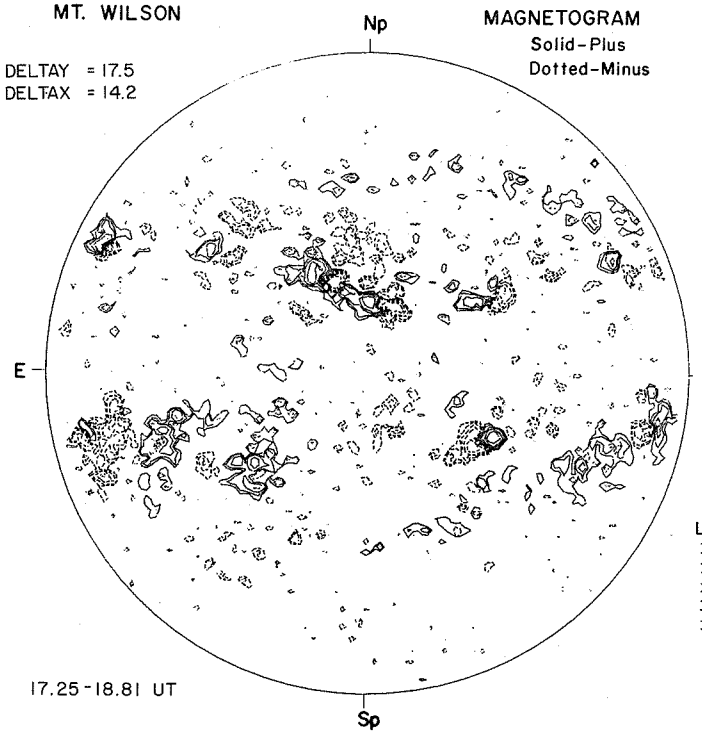
1520 UT

Contours in Intervals of 200° K

MT. WILSON

MAGNETOGRAM
Solid-Plus
Dotted-Minus

DELTAY = 17.5
DELTAX = 14.2

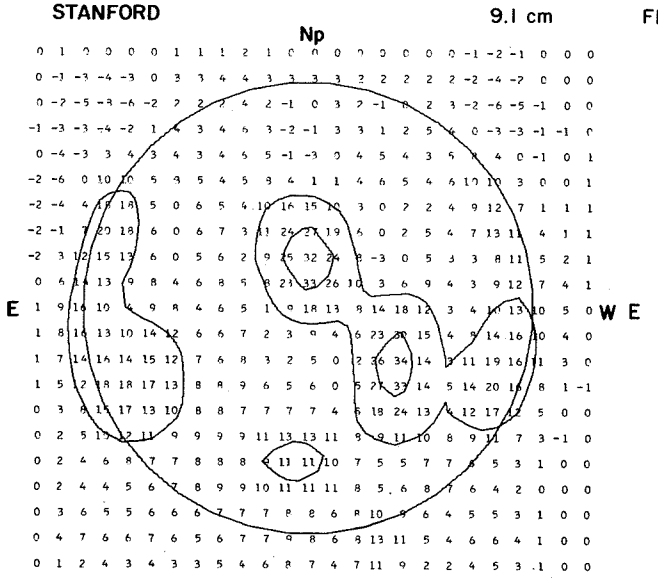


Levels
± 5
± 10
± 20
± 40
± 80

17.25-18.81 UT

STANFORD

9.1 cm

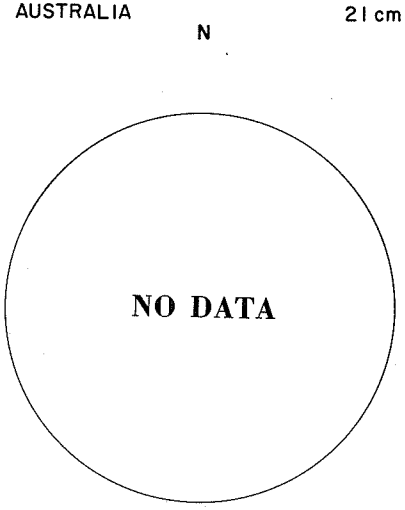


20-21 UT

Brightness Unit 5,000° K

FLEURS, AUSTRALIA

21 cm

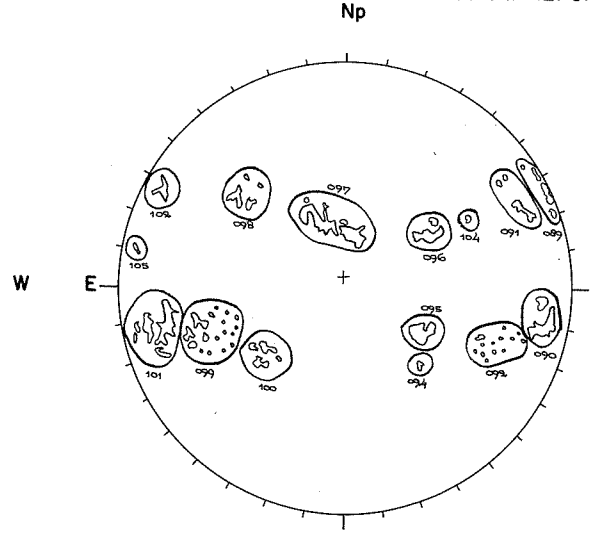


02-03 UT

Resolution 3 Minutes of Arc
Brightness Unit 1,700° K

McMATH-HULBERT

CALCIUM REPORT



POOR	M
90-27-2.5	
95-13-2.5	
97-26-3.0	
01-29-2.5	
02-11-3.0	

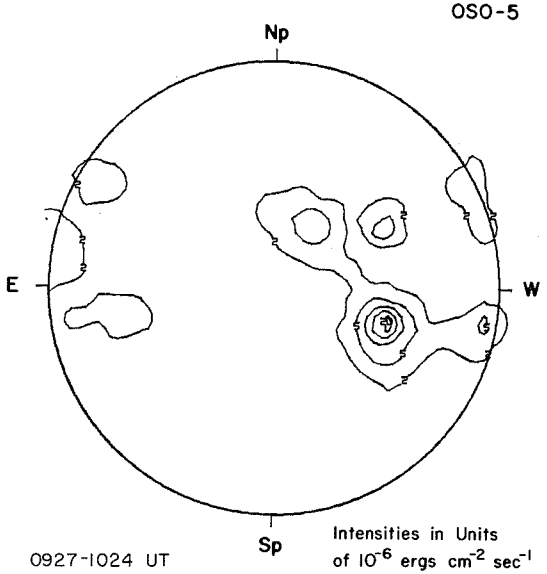
1515 UT

DECEMBER 30, 1970 (P = 3.30, B_o = -2.77, L_o = 155.96)

MT. WILSON

UNIV. COLLEGE LONDON
LEICESTER UNIV.

X-RAY
OSO-5

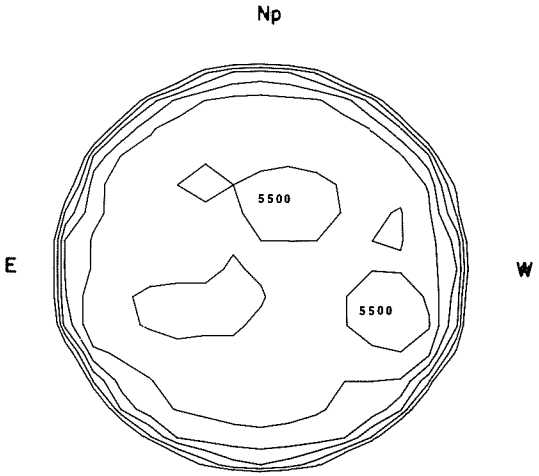


0927-1024 UT

Intensities in Units of 10^{-6} ergs cm^{-2} sec^{-1}

PROSPECT HILL
AFCRL

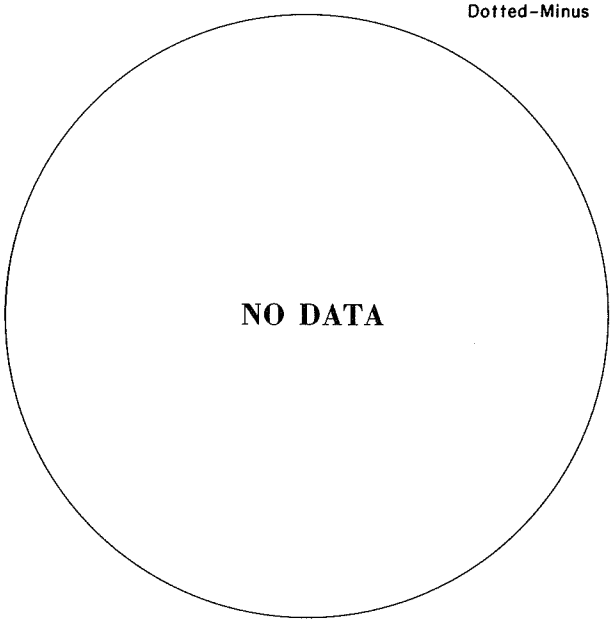
8.6 mm



1701 UT

Contours in Intervals of 200° K

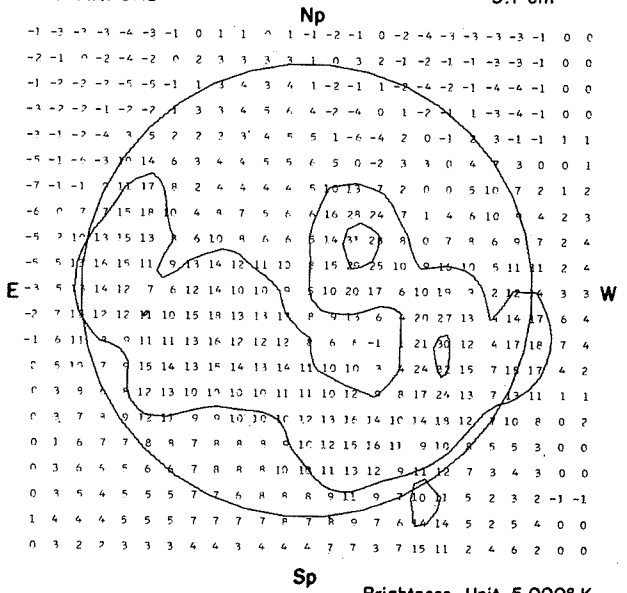
MAGNETOGRAM
Solid-Plus
Dotted-Minus



Levels
±5
±10
±20
±40
±80

STANFORD

9.1 cm

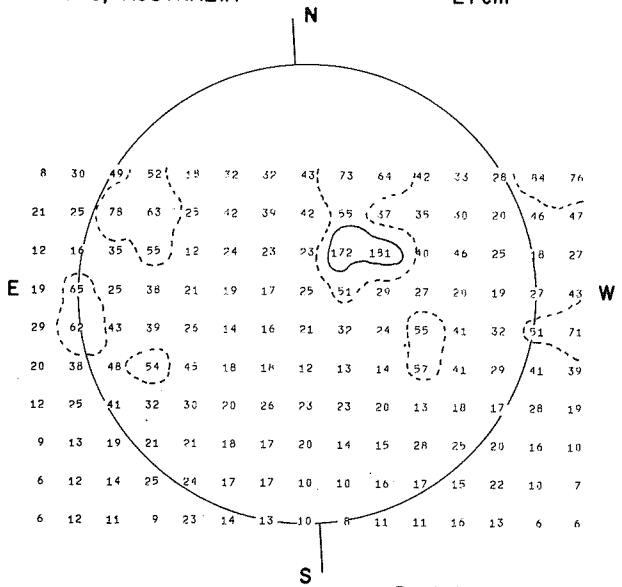


20-21 UT

Brightness Unit 5,000° K

FLEURS, AUSTRALIA

21 cm

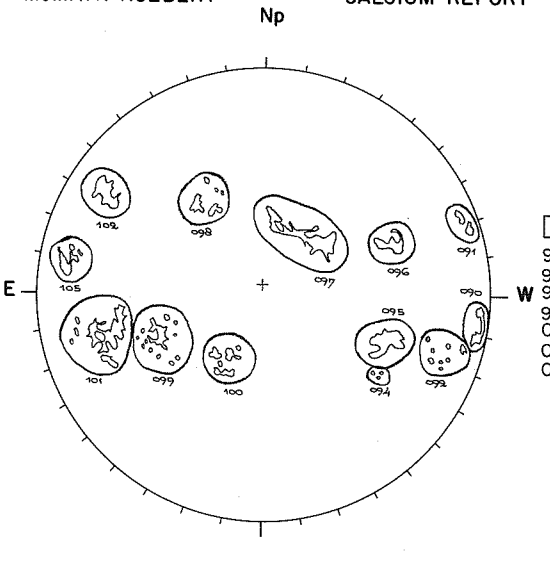


02-03 UT

Resolution 3 Minutes of Arc
Brightness Unit 1,700° K

McMATH-HULBERT

CALCIUM REPORT



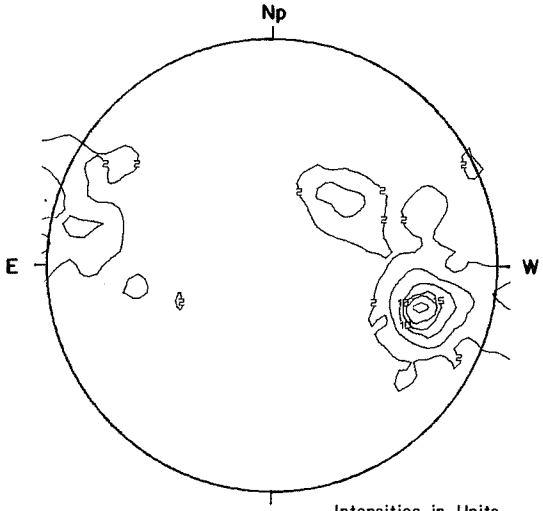
1445 UT

POOR	M
90-20	2.5
95-18	3.0
96-10	2.5
97-24	3.0
01-28	2.5
02-20	3.0
05-12	3.0

DECEMBER 31, 1970 (P = 2.82, B_o = -2.89, L_o = 142.79)

UNIV. COLLEGE LONDON
LEICESTER UNIV.

X-RAY
OSO-5

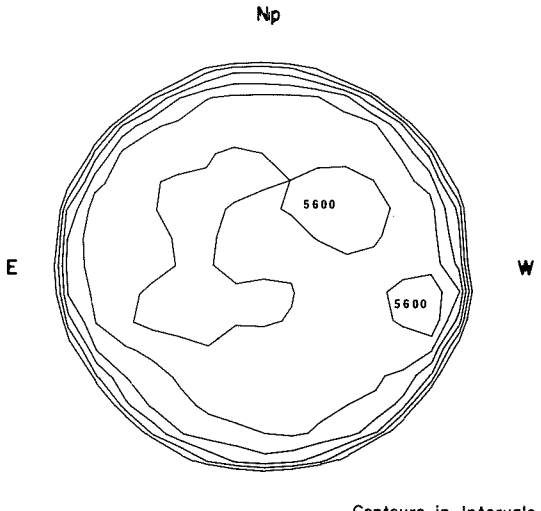


0918-1017 UT

Intensities in Units of 10^{-6} ergs cm^{-2} sec^{-1}

PROSPECT HILL
AFCRL

8.6 mm



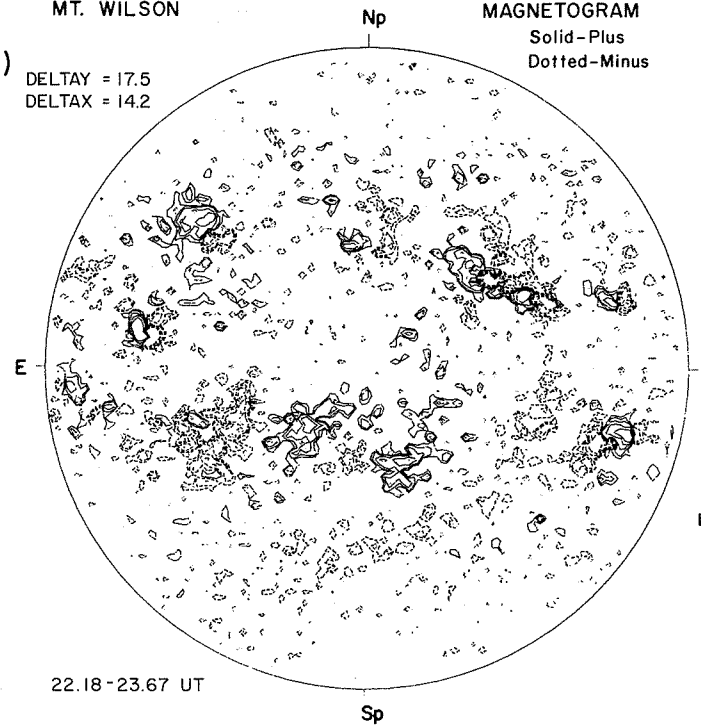
1522 UT

Contours in Intervals of 200° K

MT. WILSON

MAGNETOGRAM
Solid-Plus
Dotted-Minus

DELTAY = 17.5
DELTAX = 14.2

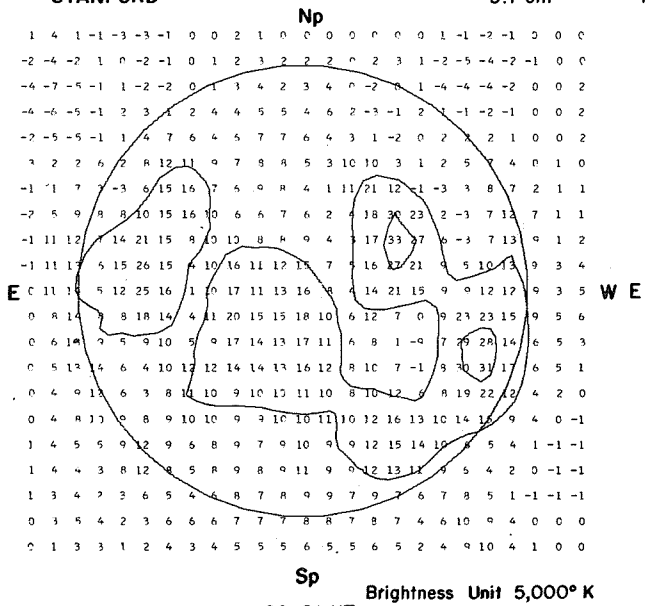


Levels
±5
±10
±20
±40
±80

22.18-23.67 UT

STANFORD

9.1 cm

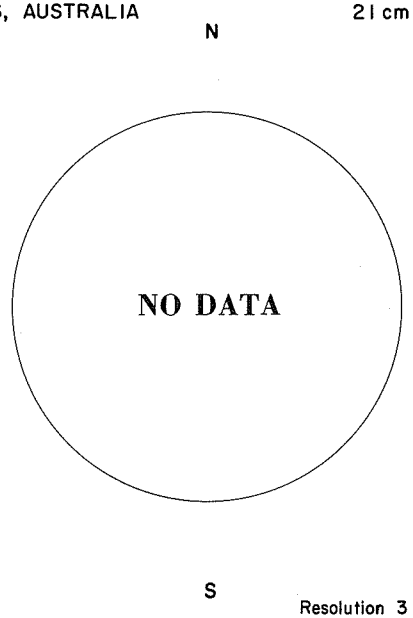


20-21 UT

Brightness Unit 5,000° K

FLEURS, AUSTRALIA

21 cm

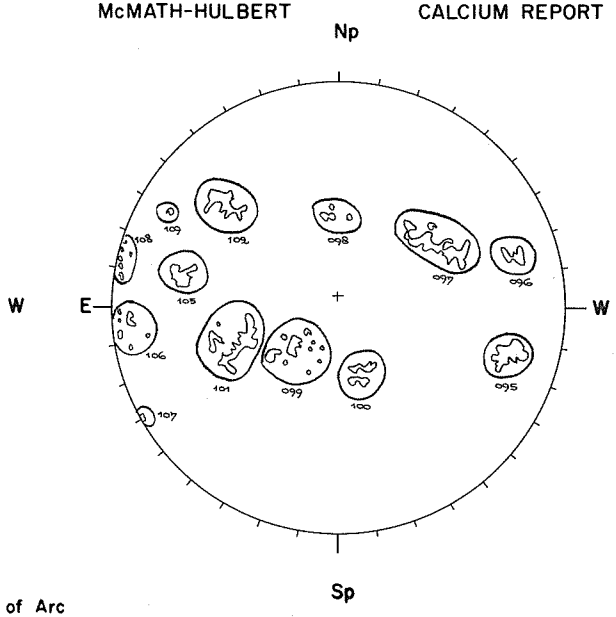


02-03 UT

Resolution 3 Minutes of Arc
Brightness Unit 1,700° K

McMATH-HULBERT

CALCIUM REPORT



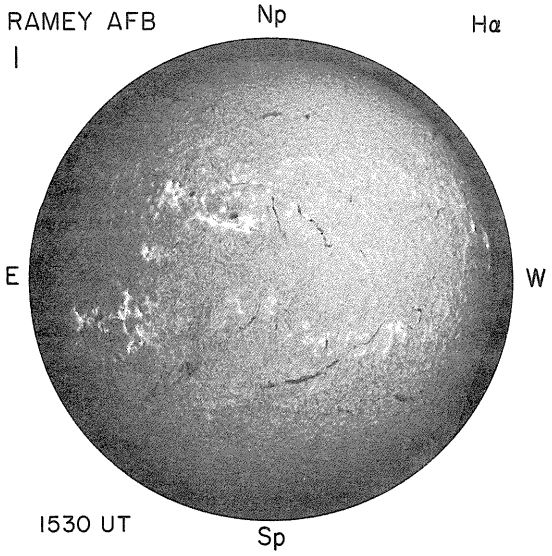
V POOR	M
95-22-3.0	
96-12-2.5	
97-23-3.0	
01-25-2.5	
05-12-3.0	

2030 UT

Hα SPECTROHELIOGRAMS — SUNSPOTS AND CORONA

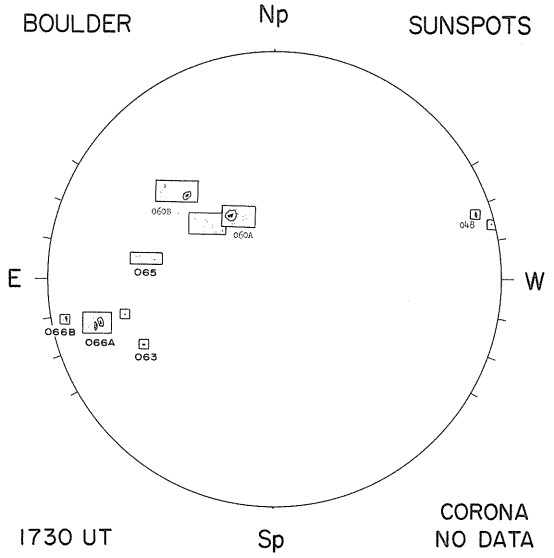
DECEMBER, 1970

RAMEY AFB
1



1530 UT

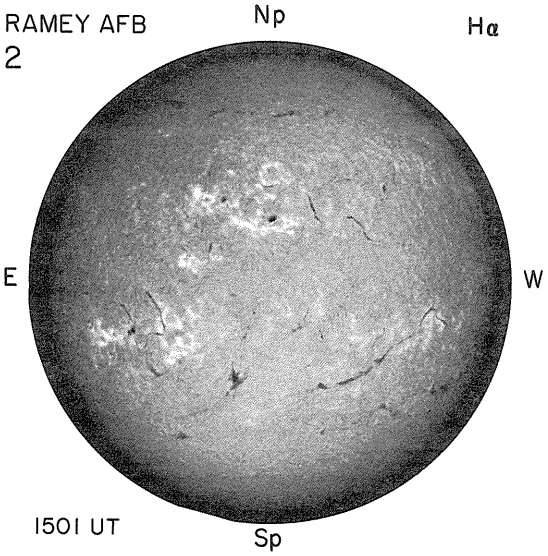
BOULDER



1730 UT

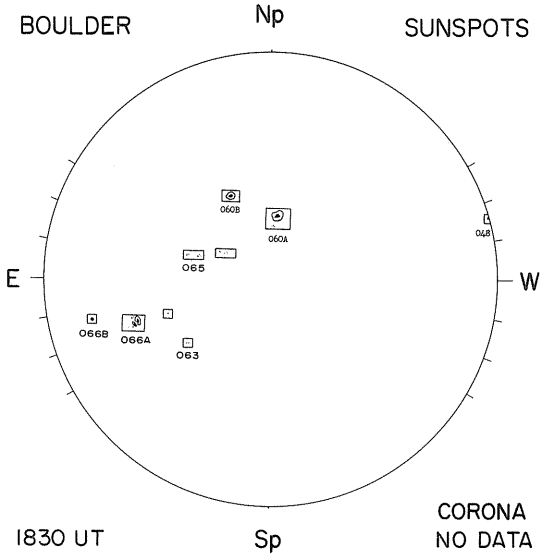
CORONA
NO DATA

RAMEY AFB
2



1501 UT

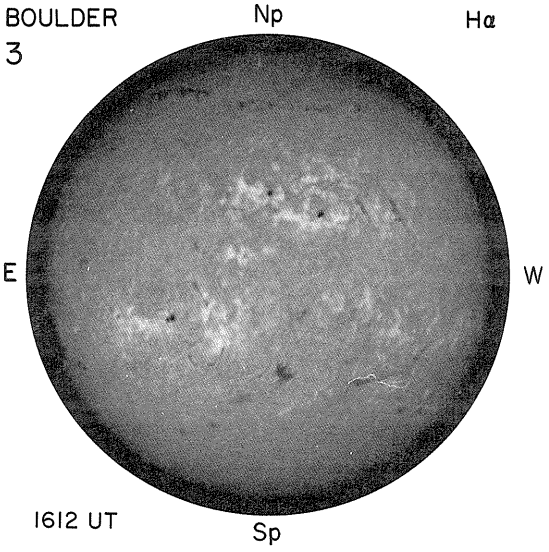
BOULDER



1830 UT

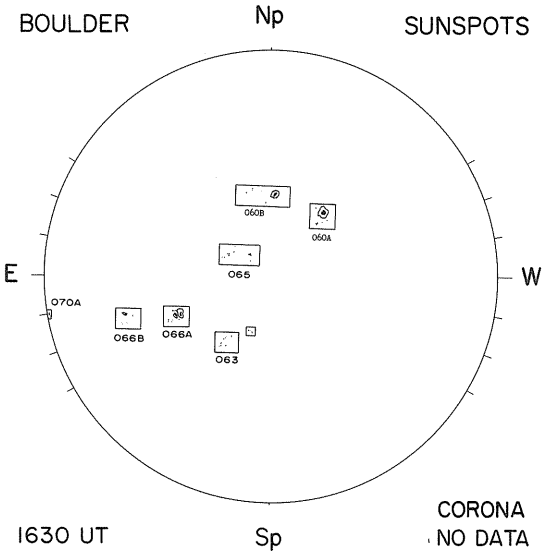
CORONA
NO DATA

BOULDER
3



1612 UT

BOULDER

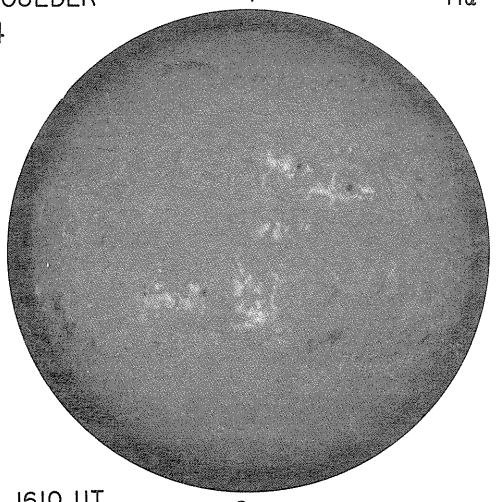


1630 UT

CORONA
NO DATA

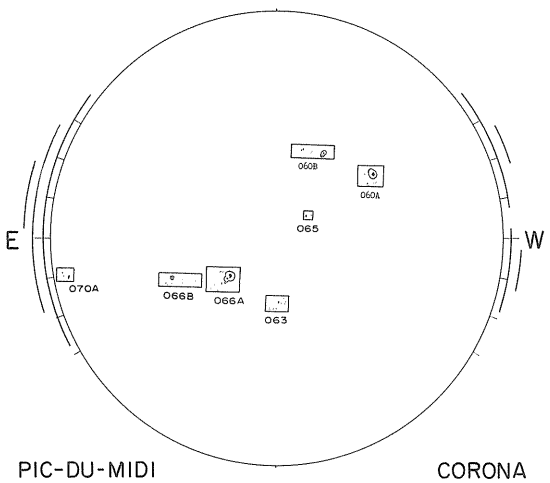
DECEMBER, 1970

BOULDER
4



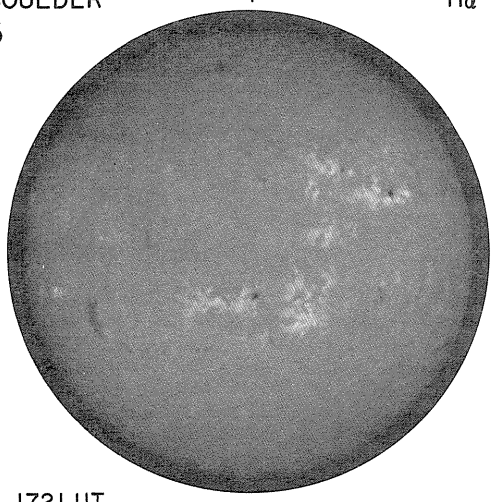
1610 UT

BOULDER
SUNSPOTS



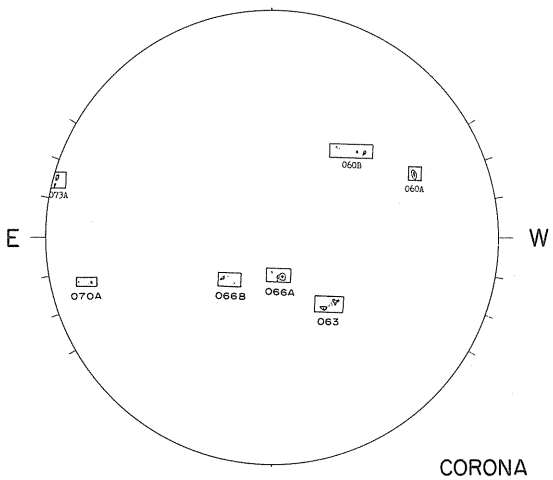
PIC-DU-MIDI
1520 UT
CORONA

BOULDER
5



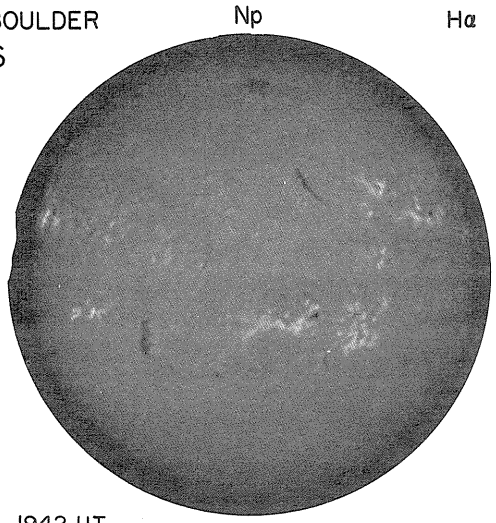
1721 UT

BOULDER
SUNSPOTS



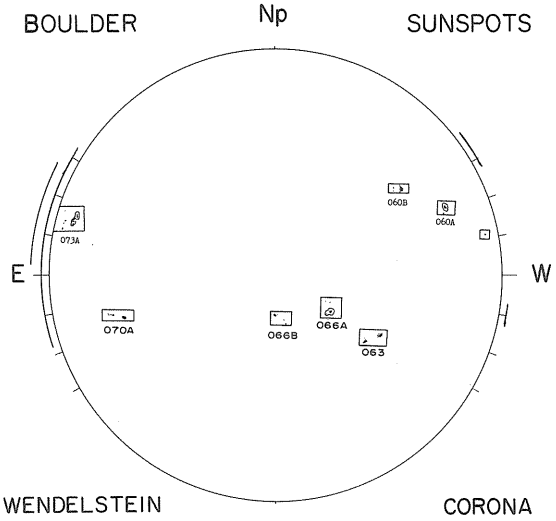
1820 UT
CORONA
NO DATA

BOULDER
6



1942 UT

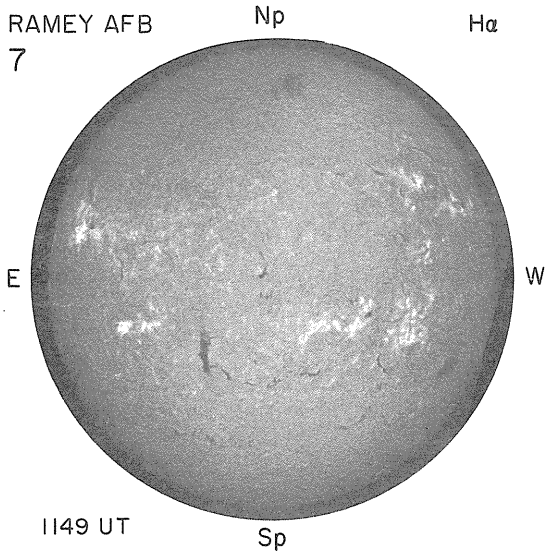
BOULDER
SUNSPOTS



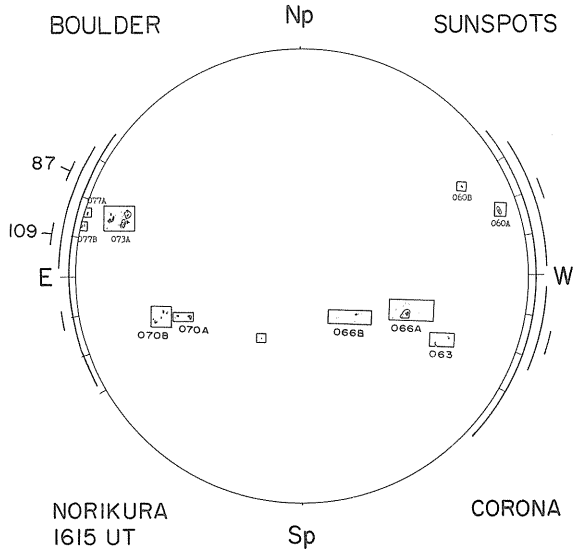
WENDELSTEIN
1530 UT
CORONA

DECEMBER, 1970

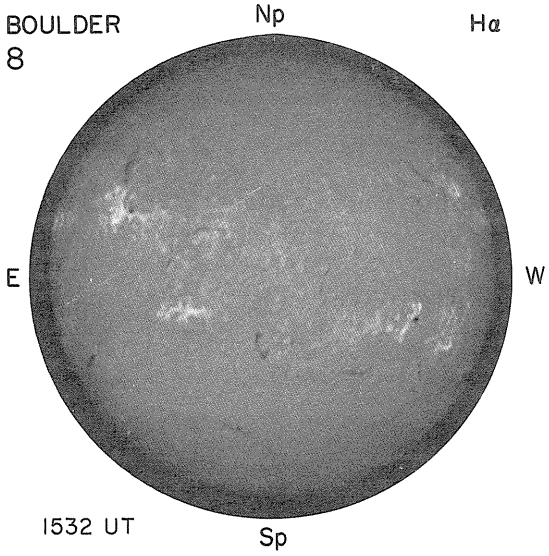
RAMEY AFB
7



BOULDER



BOULDER
8



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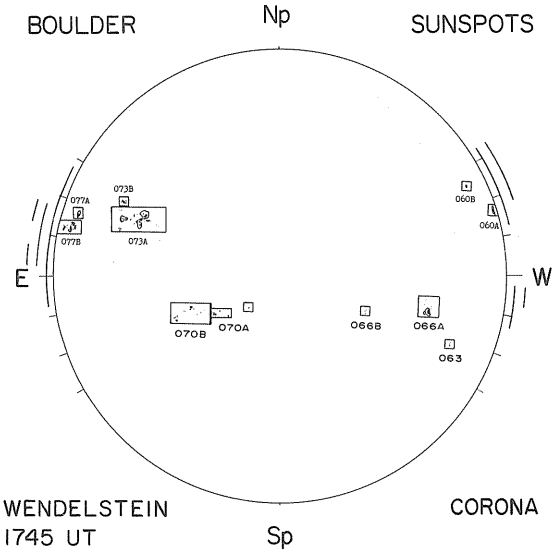
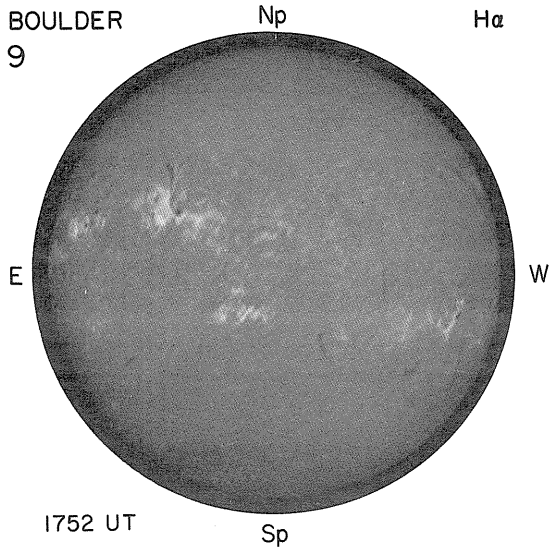
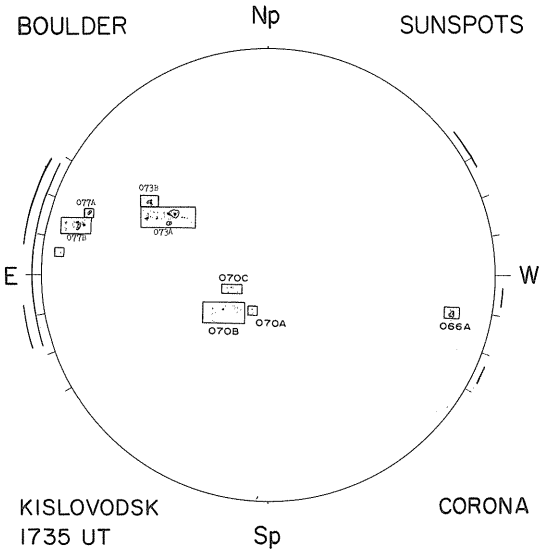


BOULDER
9



BOULDER



DECEMBER, 1970

BOULDER
10

Np

Hα

E

NO DATA

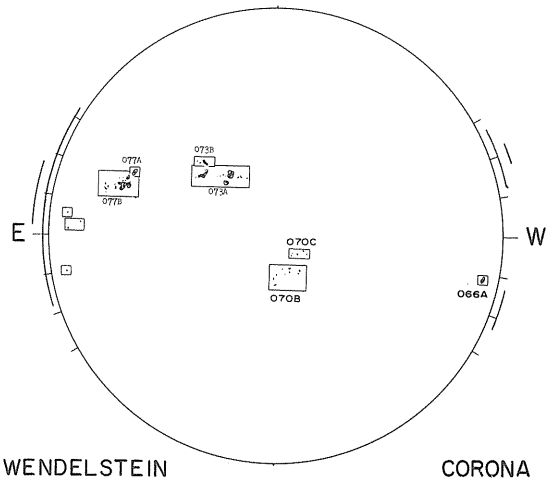
W

Sp

MT. WILSON

Np

SUNSPOTS



WENDELSTEIN
1925 UT

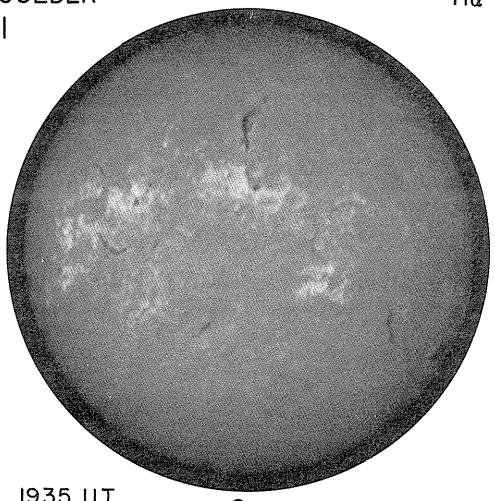
Sp

CORONA

BOULDER
11

Np

Hα



E

W

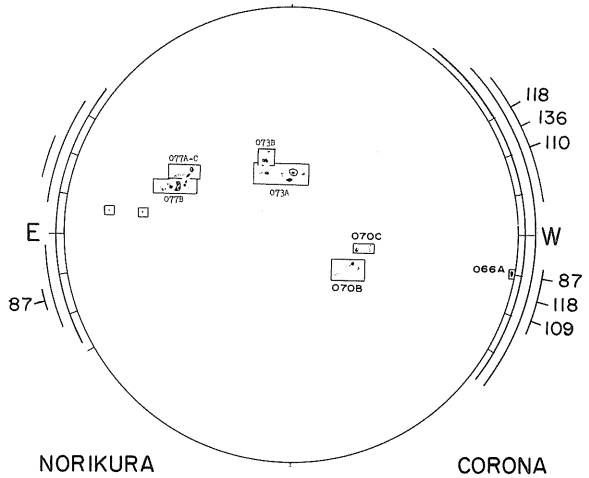
1935 UT

Sp

BOULDER

Np

SUNSPOTS



NORIKURA
1744 UT

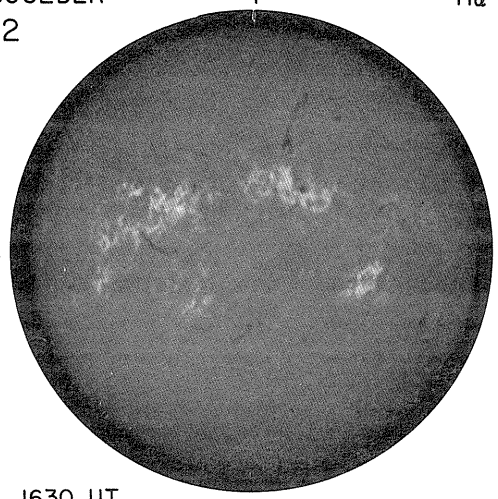
Sp

CORONA

BOULDER
12

Np

Hα



E

W

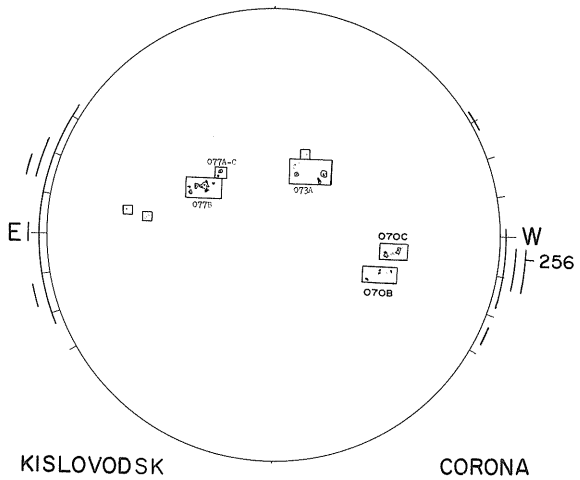
1630 UT

Sp

BOULDER

Np

SUNSPOTS



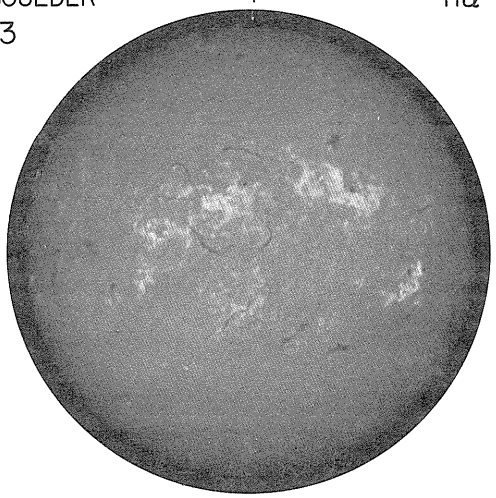
KISLOVODSK
1805 UT

Sp

CORONA

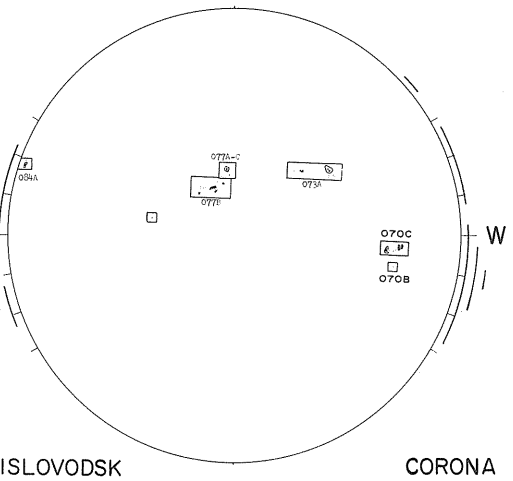
DECEMBER, 1970

BOULDER
13



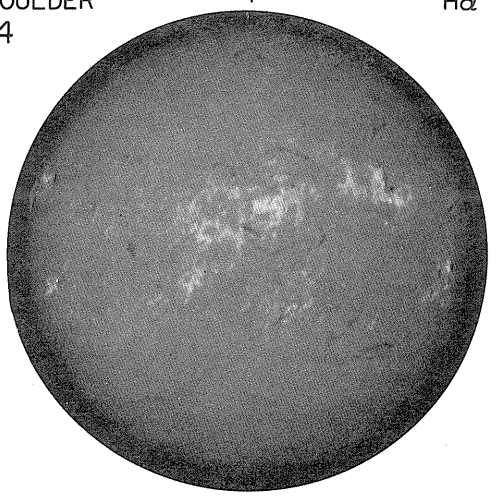
1937 UT

BOULDER
Np
SUNSPOTS



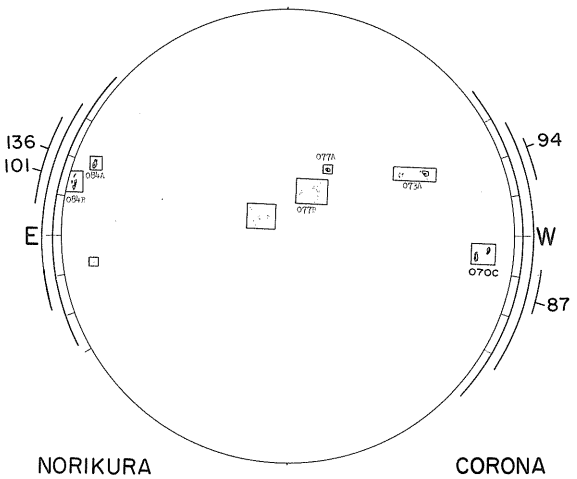
KISLOVODSK
1745 UT
Sp
CORONA

BOULDER
14



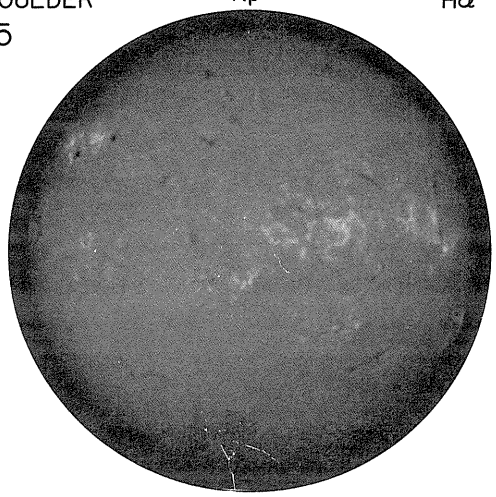
1903 UT

BOULDER
Np
SUNSPOTS



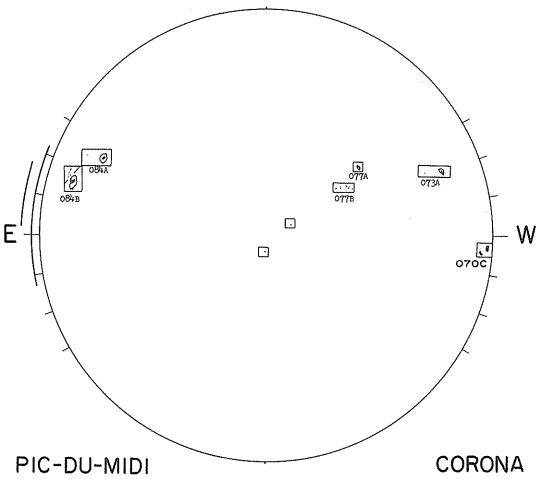
NORIKURA
1645 UT
Sp
CORONA

BOULDER
15



2224 UT

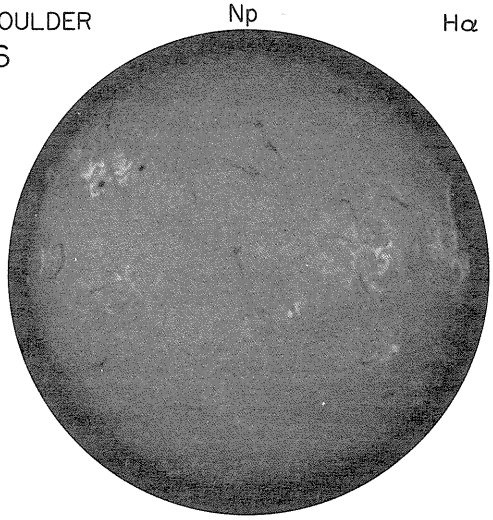
BOULDER
Np
SUNSPOTS



PIC-DU-MIDI
2030 UT
Sp
CORONA

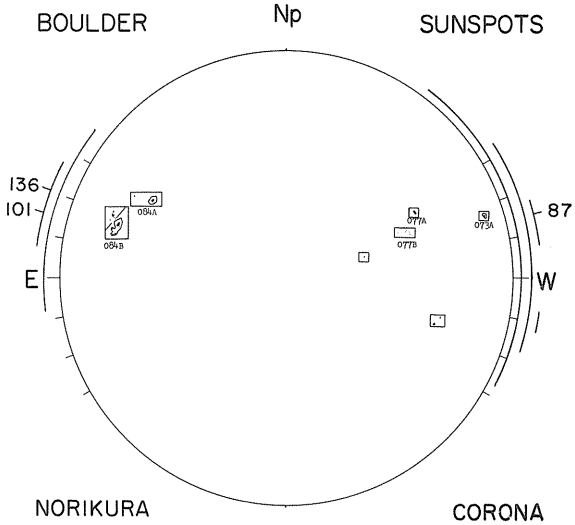
DECEMBER, 1970

BOULDER
16



2132 UT

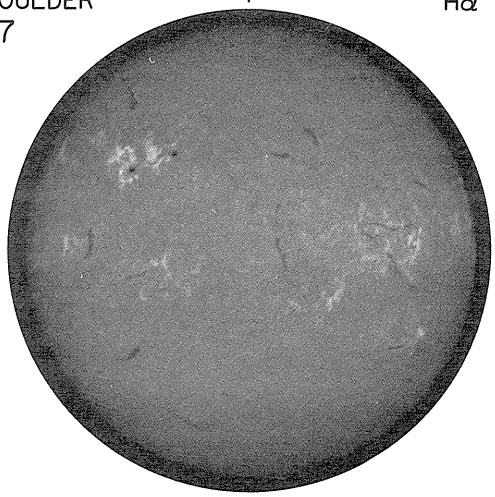
BOULDER



NORIKURA
1630 UT

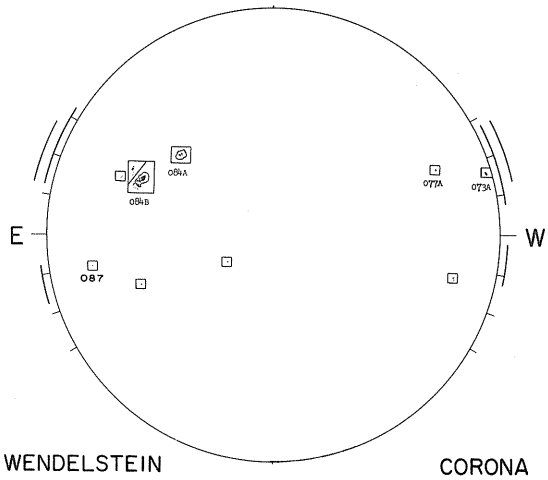
CORONA

BOULDER
17



1553 UT

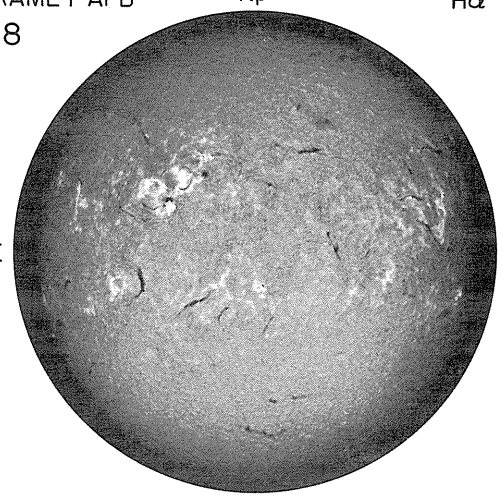
BOULDER



WENDELSTEIN
1600 UT

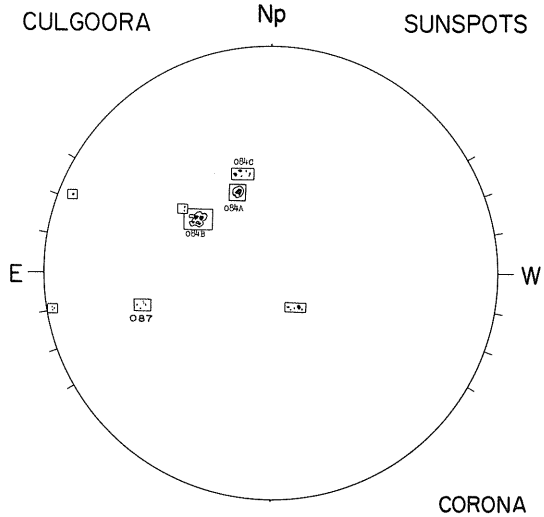
CORONA

RAMEY AFB
18



1316 UT

CULGOORA

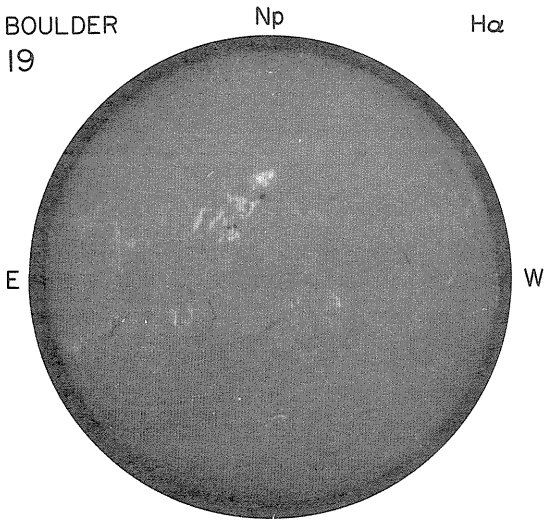


2345 UT

CORONA
NO DATA

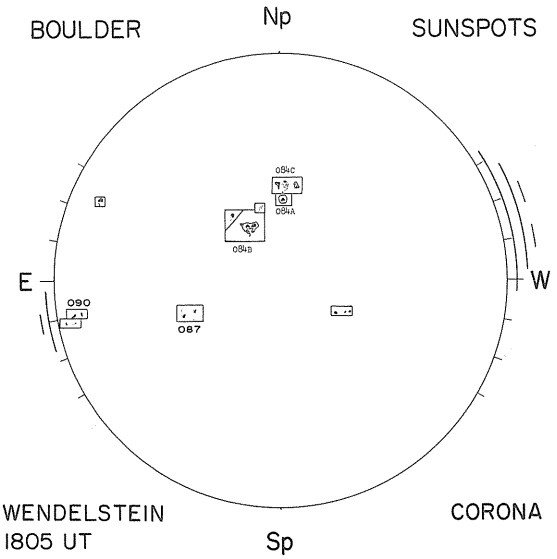
DECEMBER, 1970

BOULDER
19



1709 UT

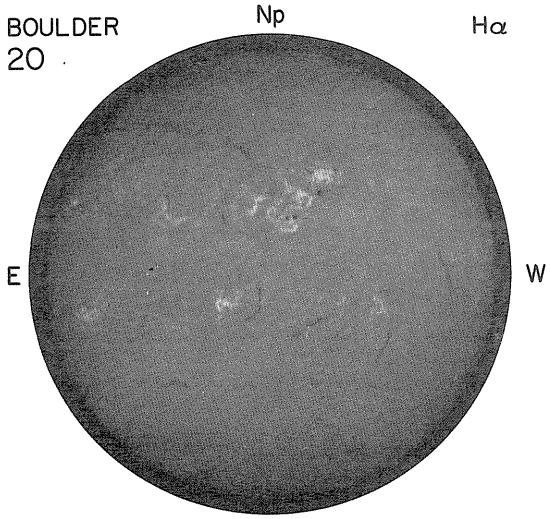
BOULDER



WENDELSTEIN
1805 UT

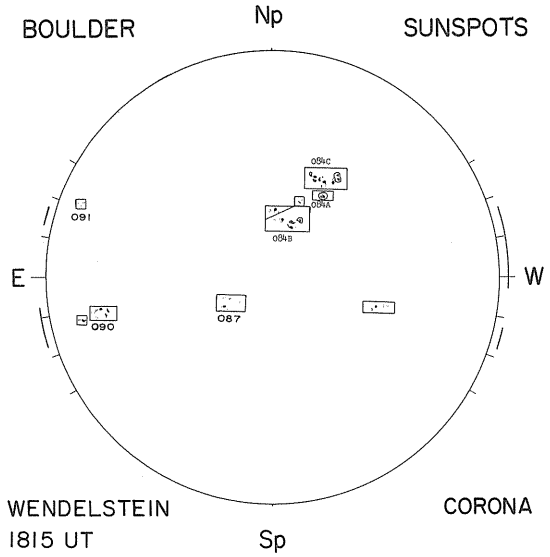
CORONA

BOULDER
20



1712 UT

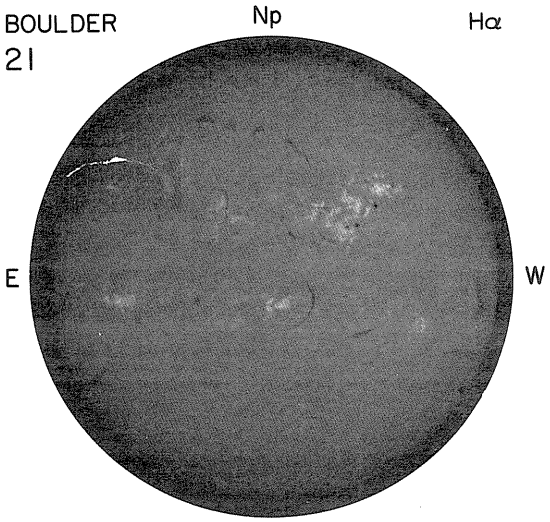
BOULDER



WENDELSTEIN
1815 UT

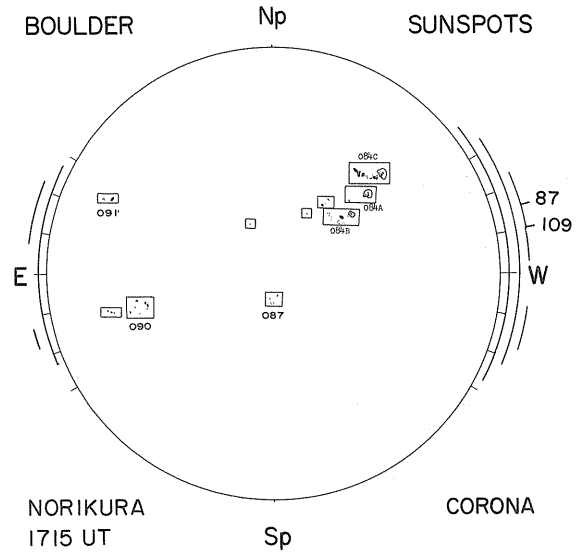
CORONA

BOULDER
21



1707 UT

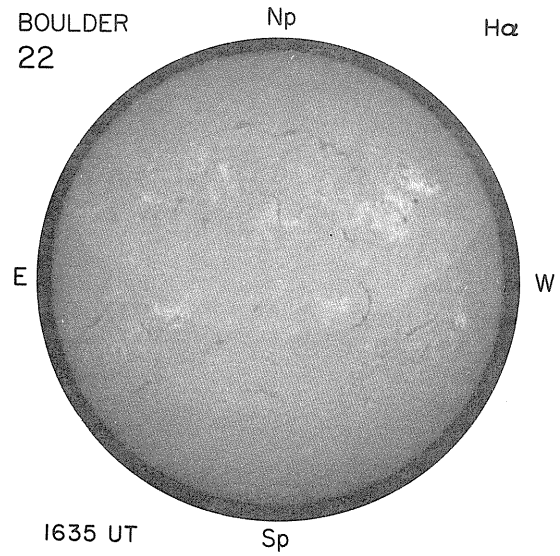
BOULDER

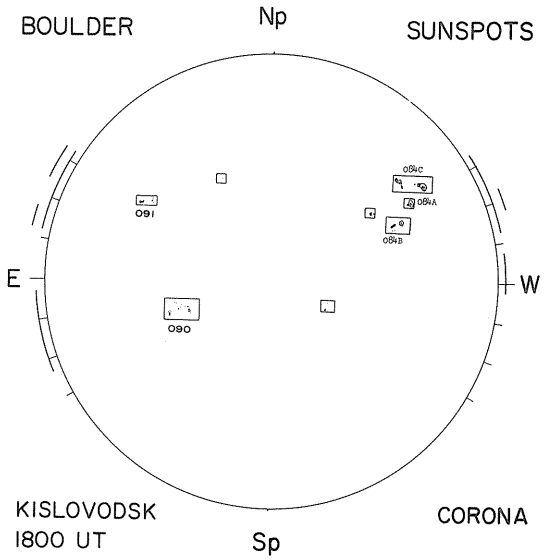


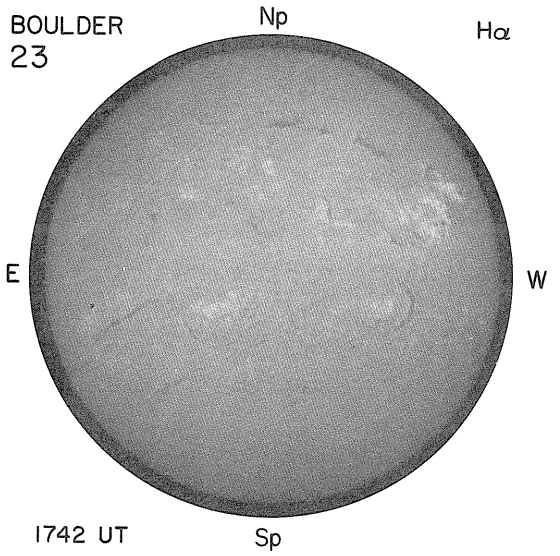
NORIKURA
1715 UT

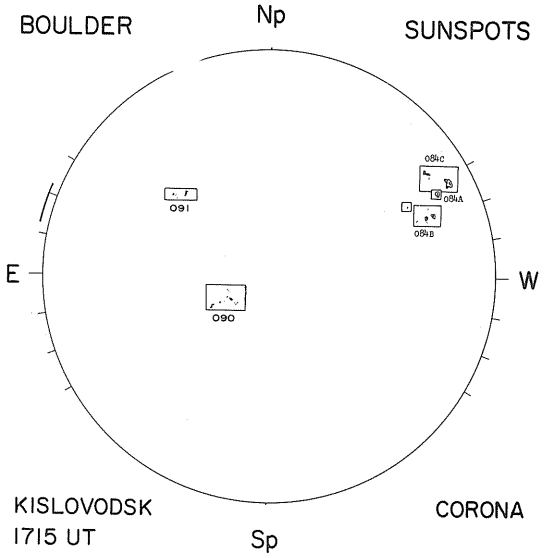
CORONA

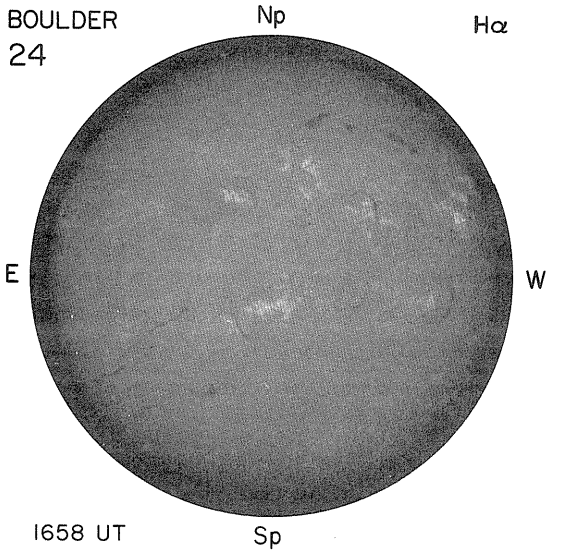
DECEMBER, 1970

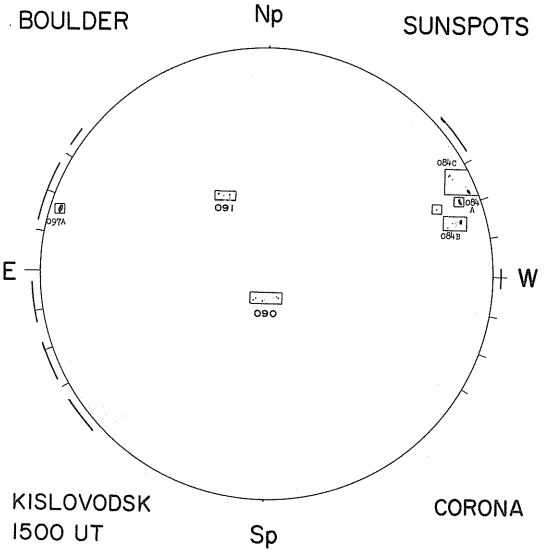






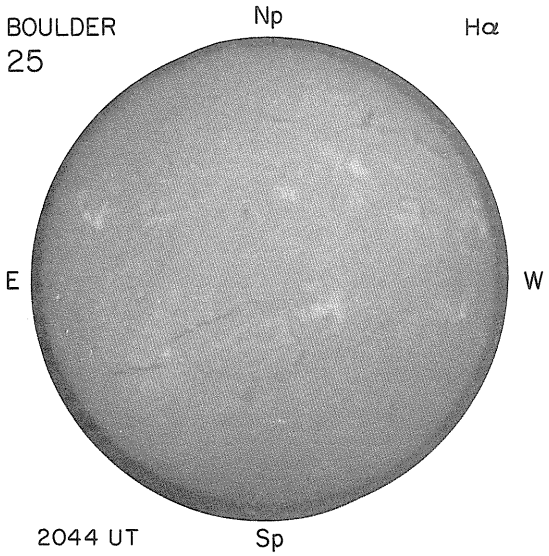






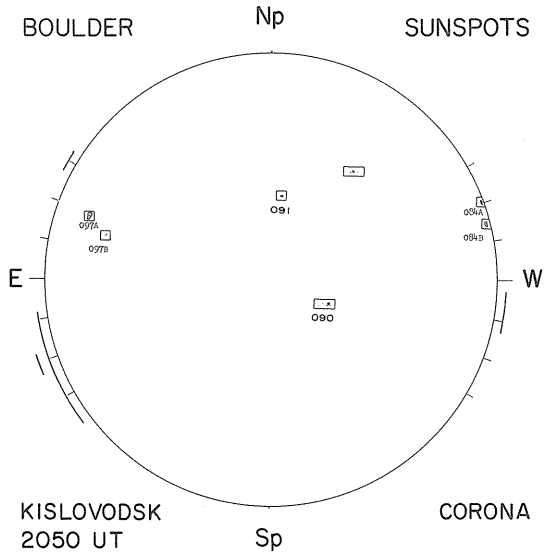
DECEMBER, 1970

BOULDER
25



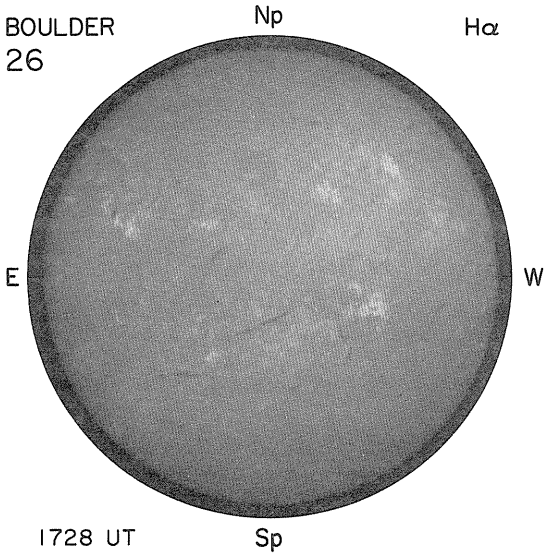
2044 UT

BOULDER



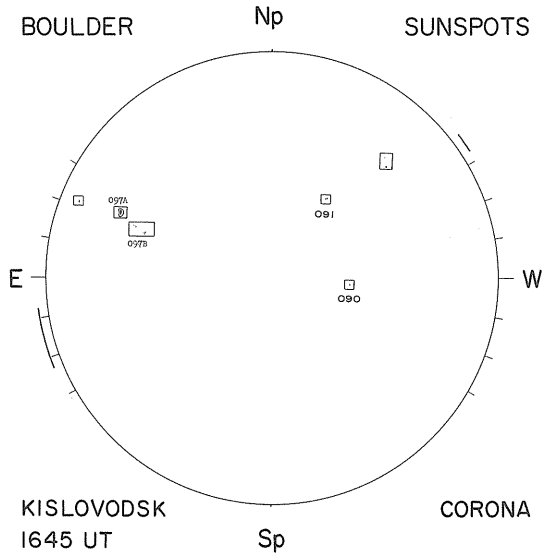
KISLOVODSK
2050 UT
CORONA

BOULDER
26



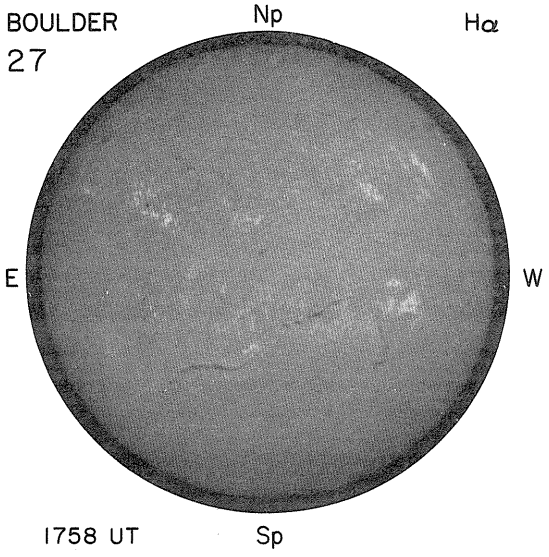
1728 UT

BOULDER



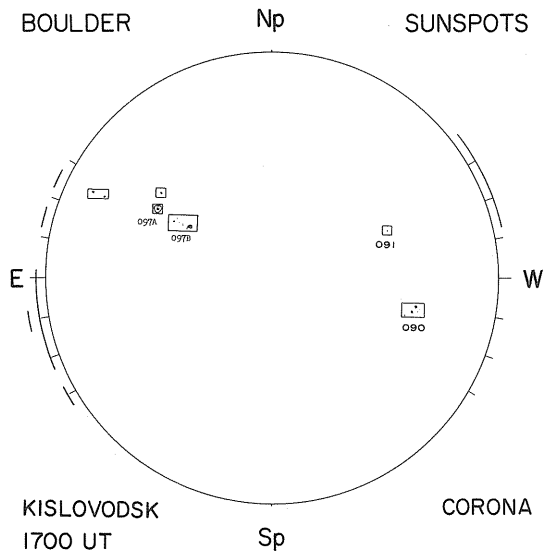
KISLOVODSK
1645 UT
CORONA

BOULDER
27



1758 UT

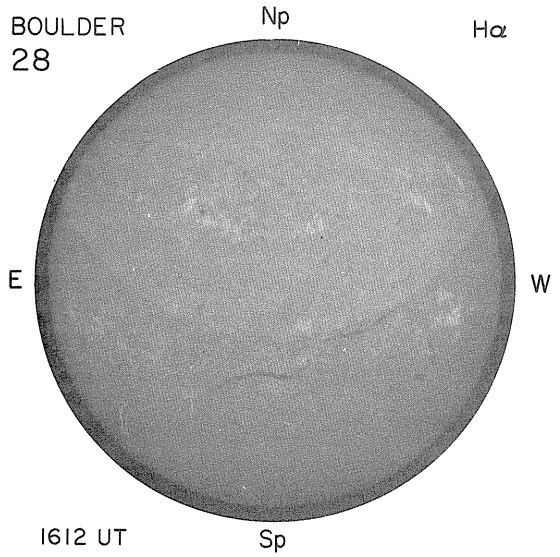
BOULDER



KISLOVODSK
1700 UT
CORONA

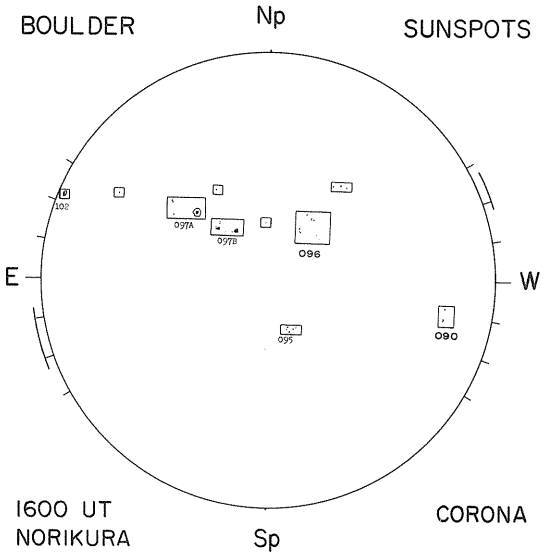
DECEMBER, 1970

BOULDER
28



1612 UT

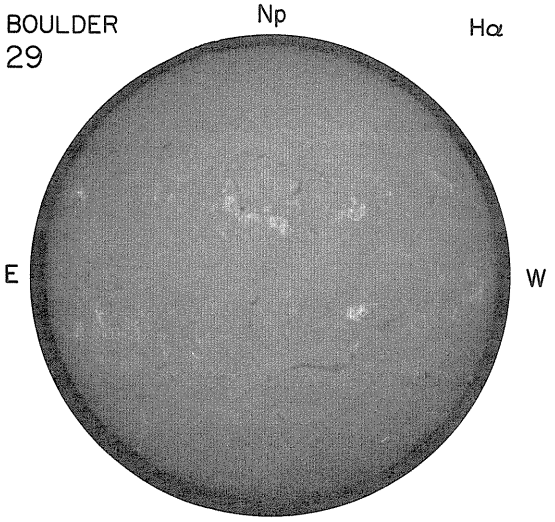
BOULDER



1600 UT
NORIKURA

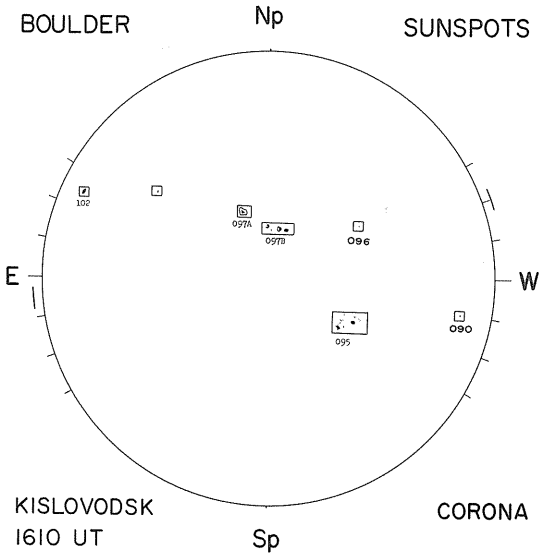
CORONA

BOULDER
29



1629 UT

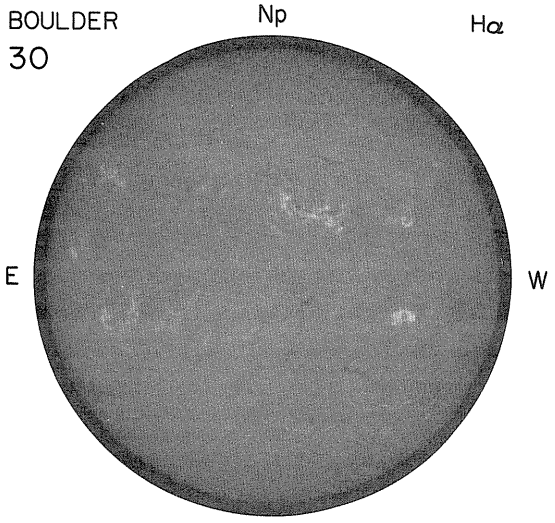
BOULDER



KISLOVODSK
1610 UT

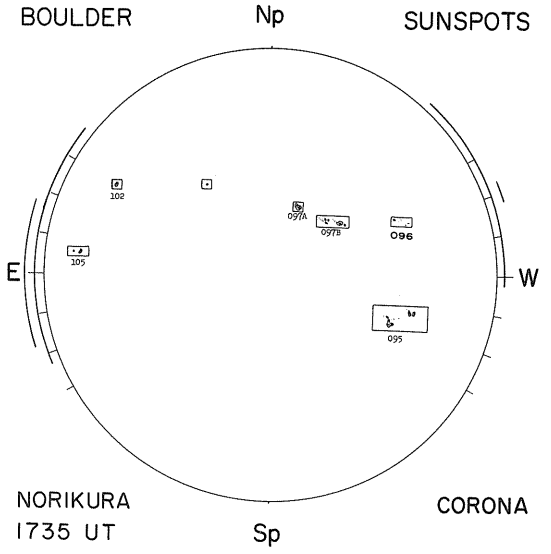
CORONA

BOULDER
30



1704 UT

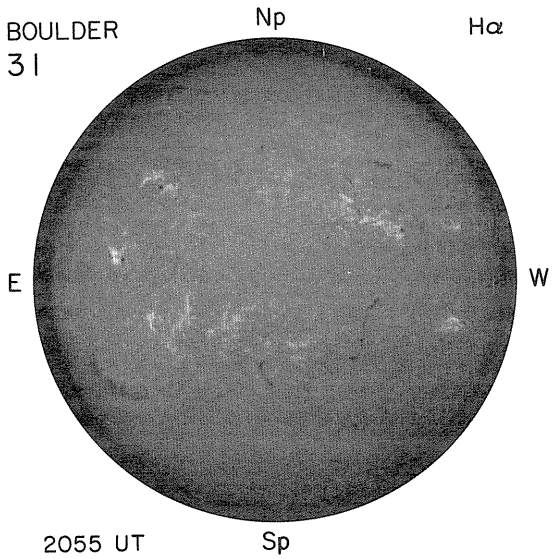
BOULDER

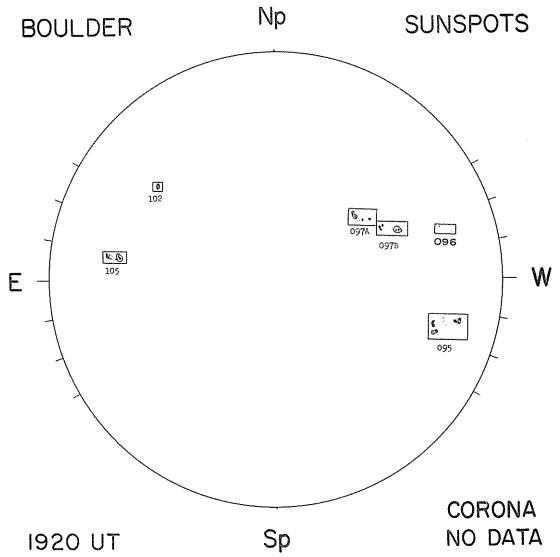


NORIKURA
1735 UT

CORONA

DECEMBER, 1970





REGIONS OF SOLAR ACTIVITY

DECEMBER 1970

MCMATH REGION 11062 — CMP DATE 1.0

CALCIUM PLAGE DATA

YR	MO	DA	MC NO.	LAT CMD	L	AREA	INT
70	11	30	11062	S27 E05	178	400	1.5
70	12	1	11062	S26 W09	178	400	1.5
70	12	2	11062	S26 W22	178	300	2.0
70	12	4	11062	S26 W54	183	300	2.0

RETURN OF REGION 11013* — ROTATION 2

SUNSPOT DATA — 9.1 CM

MW NO.	LAT CMD	L	MAG.	H	AREA	CNT	C	INT	FLUX

MCMATH REGION 11057 — CMP DATE 1.2

CALCIUM PLAGE DATA

YR	MO	DA	MC NO.	LAT CMD	L	AREA	INT
70	11	25	11057	N17 E75	173	400	1.0
70	11	26	11057	N19 E60		700	1.5
70	11	30	11057	N19 E07	176	600	2.0
70	12	1	11057	N19 W06	175	600	2.0
70	12	2	11057	N19 W19	175	600	2.0
70	12	4	11057	N17 W46	175	600	2.0
70	12	5	11057	N16 W60	175	500	1.5
70	12	6	11057	N15 W73	175	600	2.5
70	12	7	11057	N12 W85	175	200	1.5

RETURN OF REGION 11014 — ROTATION 2

SUNSPOT DATA — 9.1 CM

MW NO.	LAT CMD	L	MAG.	H	AREA	CNT	C	INT	FLUX
18236	N09 W76	175	(BF)	2	10	1	H		

MCMATH REGION 11059 — CMP DATE 2.1

CALCIUM PLAGE DATA

YR	MO	DA	MC NO.	LAT CMD	L	AREA	INT
70	11	30	11059	S06 E19	164	800	2.0
70	12	1	11059	S05 E06	163	700	2.0
70	12	2	11059	S05 W07	163	900	2.0
70	12	4	11059	S05 W33	162	800	2.0
70	12	5	11059	S06 W47	162	800	2.0
70	12	6	11059	S06 W60	162	800	2.0
70	12	7	11059	S06 W68	158	500	1.0

RETURN OF REGION 11021 — ROTATION 2

SUNSPOT DATA — 9.1 CM

MW NO.	LAT CMD	L	MAG.	H	AREA	CNT	C	INT	FLUX

MCMATH REGION 11067 — CMP DATE 2.8

CALCIUM PLAGE DATA

YR	MO	DA	MC NO.	LAT CMD	L	AREA	INT
70	12	1	11067	S33 E15		300	1.0
70	12	2	11067	S32 E03	153	300	1.0
70	12	4	11067	S33 W22	151	300	1.5
70	12	5	11067	S33 W41	156	300	1.5
70	12	6	11067	S33 W52	154	400	1.0

SUNSPOT DATA — 9.1 CM

MW NO.	LAT CMD	L	MAG.	H	AREA	CNT	C	INT	FLUX

MCMATH REGION 11060 — CMP DATE 3.4

CALCIUM PLAGE DATA

YR	MO	DA	MC NO.	LAT CMD	L	AREA	INT
70	11	25					
70	11	26	11060	N18 E80		1800	3.0
70	11	27					
70	11						
70	11						
70	12	1	11060	N19 E22	147	5500	3.5
70	12						
70	12						
70	12	2	11060	N20 E10	145	5600	3.0
70	12						
70	12	3					
70	12						
70	12						
70	12	4	11060	N20 W16	145	5500	3.0
70	12						
70	12	5	11060	N20 W33	148	5600	3.0
70	12						
70	12	6	11060	N20 W45	147	5400	3.0
70	12						
70	12	7	11060	N20 W57	147	5000	3.0
70	12						
70	12	8	11060	N20 W70	147	4700	2.5
70	12						
70	12	9	11060	N24 W80	142	2000	2.5
70	12	10	11060	N24 W90	141	500	1.0

RETURN OF REGION 11018, 11030 — ROTATION 2 & 1

SUNSPOT DATA — 9.1 CM

MW NO.	LAT CMD	L	MAG.	H	AREA	CNT	C	INT	FLUX
								17	9
					210	5	H		
					250	3	H	31	17
					100	1	H		
					10	1	A		
18225	N15 E12	157	BP	0	320	18	C	21	12
					20	14	B		
18226	N21 E28	141	BP	0	190	13	C		
					180	1	H	18	10
					300	4	C		
18225	N15 W14	155	(BP)	6	310	9	C		
18226	N21 E02	139	(BP)	5	180	4	C		
					10	3	B		
18225	N15 W28	155	(BP)	6	240	7	C	15	9
18226	N21 W11	138	(BP)	5	130	6	C		
18225	N15 W36	152	(BP)	6	200	1	H	13	8
18226	N22 W22	138	(BP)	5	60	5	D		
18225	N16 W57	156	(AP)	5	200	2	H	15	8
18226	N22 W42	141	(AP)	4	60	7	C		
18225	N16 W64	152	(BP)	5	200	1	H	11	7
18226	N22 W49	137	(BP)	3	20	1	H		
18225	N16 W81	157	AP	0	200	1	H	13	7
18226	N23 W62	138	BP	0	10	1	H		
18226	N20 W80	139	AP	0				4	2

* An asterisk beside the "Return of Region" number indicates that the new region is only part of the area of the old region.

Errata: On page 74 of SGD-313-Part I, the location of Region 10825 on July 6 should read S20 W10; on page 78 the CMP date for Region 10835 should read 20.2 instead of 19.8, and the CMP date of Region 10837 is 20.3 instead of 19.1.

REGIONS OF SOLAR ACTIVITY

DECEMBER 1970

MCMATH REGION 11065 CMP DATE 4.0

CALCIUM PLAGE DATA

YR	MO	DA	MC NO.	LAT CMD	L	AREA	INT
70	11	30	11065	N07 E49	134	800	3.0
70	12	1	11065	N07 E36	133	1000	2.5
70	12	2	11065	N07 E19	137	1300	3.0
70	12						
70	12	3					
70	12	4	11065	N07 W09	138	1000	3.0
70	12	5	11065	N06 W22	137	800	2.5
70	12	6	11065	N06 W35	137	900	2.5
70	12	7	11065	N06 W47	137	600	2.5
70	12	8	11065	N06 W60	137	800	2.0
70	12	9	11065	N06 W75	137	700	1.5
70	12	10	11065	N05 W85	136	300	1.0

SUNSPOT DATA 9.1 CM

MW NO.	LAT CMD	L	MAG.	H	AREA	CNT	C	INT	FLUX
					10	6	B		
18227	N05 E33	136	BP	0	10	8	B		
					10	5	B		
					10	5	A		
18227	N05 E07	134	(BP)	2	20	13	B		
18227	N06 W07	134	(BP)	2	0	2	A		

MCMATH REGION 11063 CMP DATE 4.5 RETURN OF REGION 11019 ROTATION 3

CALCIUM PLAGE DATA

YR	MO	DA	MC NO.	LAT CMD	L	AREA	INT
70	11	30	11063	S12 E53	130	3500	3.0
70	11						
70	12	1	11063	S13 E38	131	3200	2.5
70	12						
70	12	2	11063	S12 E25	131	3100	2.5
70	12						
70	12	3					
70	12						
70	12						
70	12	4	11063	S13 W02	131	3200	3.5
70	12	5	11063	S14 W17	132	3200	3.0
70	12						
70	12	6	11063	S14 W30	132	3300	3.0
70	12						
70	12	7	11063	S15 W42	132	3100	3.0
70	12						
70	12	8	11063	S15 W56	133	3300	3.0
70	12	9	11063	S15 W70	132	3000	2.5
70	12	10	11063	S15 W80	131	2600	2.0
70	12	11					

SUNSPOT DATA 9.1 CM

MW NO.	LAT CMD	L	MAG.	H	AREA	CNT	C	INT	FLUX
					20	3	H		
					10	3	H		
18228	S08 E34	135	AP	0					
18229	S18 E34	135	AP	0	20	3	C		
					10	3	A	11	6
					10	1	A		
18229	S18 E10	131	(BF)	2	190	16	C		
					20	17	B		
					0	3	A		
18229	S18 W03	130	(BP)	3	20	16	C	15	9
18229	S18 W14	130	(B)	3	110	11	D	15	9
18233	S08 W10	126	(A)	2					
18229	S17 W34	133	(BF)	3	80	16	D	13	7
18233	S08 W33	132		0					
18233	S09 W43	131		0				9	5
18229	S17 W42	130	(BF)	4	10	5	C		
18229	S17 W55	131	BF	0	0	2	A	10	6
18229	S18 W76	135	AP	0				10	6
								6	4
					50	1	H		

MCMATH REGION 11064 CMP DATE 4.5

CALCIUM PLAGE DATA

YR	MO	DA	MC NO.	LAT CMD	L	AREA	INT
70	11	30	11064	N36 E50	133	100	2.0
70	12	1	11064	N35 E38	131	100	1.0

SUNSPOT DATA 9.1 CM

MW NO.	LAT CMD	L	MAG.	H	AREA	CNT	C	INT	FLUX

MCMATH REGION 11066 CMP DATE 6.4

CALCIUM PLAGE DATA

YR	MO	DA	MC NO.	LAT CMD	L	AREA	INT
70	11	30	11066	S13 E75	108	3400	3.0
70	11						
70	12	1	11066	S13 E63	106	3500	2.5
70	12						
70	12	2	11066	S12 E50	105	3000	2.5
70	12	3					
70	12	4	11066	S13 E23	106	3300	3.0
70	12						
70	12	5	11066	S14 E08	107	3300	3.0
70	12						
70	12	6	11066	S14 W05	107	3300	3.0
70	12						
70	12	7	11066	S13 W16	106	3800	3.0
70	12						
70	12	8	11066	S14 W29	106	3400	3.0
70	12						
70	12	9	11066	S14 W45	107	3200	3.0
70	12	10	11066	S14 W57	108	3200	2.5
70	12	11					
70	12	12					
70	12	13					

SUNSPOT DATA 9.1 CM

MW NO.	LAT CMD	L	MAG.	H	AREA	CNT	C	INT	FLUX
					280	8	C	21	12
					60	1	H		
18230	S11 E59	110	BP	0	350	11	C	15	8
					50	4	H		
					10	1	H	13	7
18230	S11 E32	109	(BP)	5	30	6	C		
18230	S11 E17	110	(BP)	5	300	15	C	9	5
					30	6	C		
18230	S11 E06	110	(BP)	5	200	6	D	8	4
					50	4	D		
18230	S11 W12	111	(BP)	5	200	4	H	6	4
					20	4	C		
18230	S11 W20	108	(BP)	5	260	12	C		
					10	6	C		
18230	S10 W33	109	BP	0	180	9	H		
					10	4	A		
18230	S11 W60	119	AP	0					
18230	S11 W69	117	(AP)	4					
18230	S10 W80	116	(AP)	3				6	4
								6	4
								4	2

MCMATH REGION 11072 CMP DATE 7.3

CALCIUM PLAGE DATA

YR	MO	DA	MC NO.	LAT CMD	L	AREA	INT
70	12	5	11072	N22 E20	95	100	2.0
70	12	6	11072	N21 E08	94	400	1.5
70	12	7	11072	N22 W03	93	300	1.5

SUNSPOT DATA 9.1 CM

MW NO.	LAT CMD	L	MAG.	H	AREA	CNT	C	INT	FLUX

REGIONS OF SOLAR ACTIVITY

DECEMBER 1970

MCMATH REGION 11075 CMP DATE 7.8

CALCIUM PLAGE DATA

YR	MO	DA	MC NO.	LAT CMD	L	AREA	INT
70	12	7	11075	N03 E03	87	200	1.5

SUNSPOT DATA 9.1 CM

MW NO.	LAT CMD	L	MAG.	H	AREA	CNT	C	INT	FLUX

MCMATH REGION 11069 CMP DATE 8.4

CALCIUM PLAGE DATA

YR	MO	DA	MC NO.	LAT CMD	L	AREA	INT
70	12	4	11069	S15 E49	80	200	1.5
70	12	5	11069	S14 E36		100	1.0
70	12	6	11069	S15 E22		200	1.0
70	12	7	11069	S15 E10		300	1.0
70	12	8	11069	S16 W03		400	1.0
70	12	9	11069	S16 W17		300	1.0
70	12	10	11069	S16 W28		300	1.5

RETURN OF REGION 11024* ROTATION 4

SUNSPOT DATA 9.1 CM

MW NO.	LAT CMD	L	MAG.	H	AREA	CNT	C	INT	FLUX
18237	S18 E09	79	(B)	1	10	1	A		

MCMATH REGION 11068 CMP DATE 8.6

CALCIUM PLAGE DATA

YR	MO	DA	MC NO.	LAT CMD	L	AREA	INT
70	12	2	11068	N05 E85	71	200	1.0
70	12	3					
70	12	4	11068	N08 E55	74	800	1.5
70	12	5	11068	N08 E37	78	500	1.5
70	12	6	11068	N08 E24	78	500	1.5
70	12	7	11068	N08 E13	77	500	1.0
70	12	8	11068	N08 W01	78	500	1.0
70	12	9	11068	N08 W14	76	300	1.0
70	12	10	11068	N09 W25	75	300	1.0

RETURN OF REGION 11025 ROTATION 4

SUNSPOT DATA 9.1 CM

MW NO.	LAT CMD	L	MAG.	H	AREA	CNT	C	INT	FLUX
								6	3
18231	N03 E63	78	(AP)	2					

MCMATH REGION 11071 CMP DATE 9.8

CALCIUM PLAGE DATA

YR	MO	DA	MC NO.	LAT CMD	L	AREA	INT
70	12	4	11071	N16 E75	54	600	1.5
70	12	5	11071	N14 E55	60	700	1.5
70	12	6	11071	N14 E42	60	800	1.5
70	12	7	11071	N12 E28	62	900	1.5
70	12	8	11071	N12 E15	62	700	1.5
70	12	9	11071	N12 E01	61	600	1.5
70	12	10	11071	N12 W11	62	800	1.5
70	12	14	11071	N12 W65	62	500	1.0
70	12	15	11071	N12 W78	64	300	1.0

SUNSPOT DATA 9.1 CM

MW NO.	LAT CMD	L	MAG.	H	AREA	CNT	C	INT	FLUX
								21	12

MCMATH REGION 11070 CMP DATE 10.3

CALCIUM PLAGE DATA

YR	MO	DA	MC NO.	LAT CMD	L	AREA	INT
70	12	3					
70	12	4	11070	S10 E75	54	600	3.5
70	12	5	11070	S10 E61	54	1500	3.0
70	12						
70	12	6	11070	S10 E48	54	1600	3.0
70	12						
70	12	7	11070	S10 E36	54	1600	3.5
70	12						
70	12	8	11070	S10 E23	54	1500	3.0
70	12						
70	12						
70	12						
70	12	9	11070	S10 E08	54	1800	3.5
70	12						
70	12						
70	12	10	11070	S09 W02	53	2300	3.0
70	12						
70	12						
70	12	11					
70	12						
70	12	12					
70	12						
70	12	13					
70	12						
70	12	14	11070	S10 W55	52	2600	3.0
70	12	15	11070	S10 W70	56	2800	3.5
70	12	16					

RETURN OF REGION 11028 & 11043 ROTATION 2 & 3

SUNSPOT DATA 9.1 CM

MW NO.	LAT CMD	L	MAG.	H	AREA	CNT	C	INT	FLUX
18232	S11 E80	61	(AP)	2	10	1	A		
18232	S11 E69	58	(BP)	3	20	3	D		
18232	S11 E58	58	(BP)	3	20	4	D	7	4
18234	S10 E65	51	(AP)	1					
18232	S11 E42	57	(B)	3	50	8	D	10	6
18234	S11 E50	49	(AP)	2					
18232	S10 E32	56	(BP)	3	50	5	D	15	9
18234	S09 E39	49	(B)	3	80	14	D		
18232	S11 E20	56	BP	0	30	21	C	15	8
					10	10	B		
					0	1	A		
18234	S11 E27	49	B	0					
18232	S10 E04	55	BF	0	10	2	A	11	7
18241	S05 E06	53	BF	0	10	6	B		
18234	S11 E10	49	BP	0	30	22	C		
18232	S09 W08	56	BF)	2				8	5
18241	S04 W06	54	(BP)	2					
18234	S10 W03	51	(BP)	2					
18241	S05 W19	55	(B)	3	20	11	C	13	7
18234	S10 W16	52	(B)	4	20	14	C		
18241	S04 W34	55	(BP)	5	140	16	D	15	9
18234	S10 W30	51	(BP)	3	30	7	D		
18234	S09 W52	59	(AP)	1	0	1	A	21	12
18241	S04 W49	56	(B)	5	160	14	D		
18241	S04 W63	56	(B)	4	160	10	D		
18241	S04 W73	57	(B)	4				11	7
								4	3

REGIONS OF SOLAR ACTIVITY

DECEMBER 1970

MCMATH REGION 11073 CMP DATE 11.9 RETURN OF REGION 11026 ROTATION 2

CALCIUM PLAGE DATA								SUNSPOT DATA										9.1 CM
YR	MO	DA	MC NO.	LAT CMD	L	AREA	INT	MW NO.	LAT CMD	L	MAG.	H	AREA	CNT	C	INT	FLUX	
70	12	5	11073	N15 E80	35	3000	3.0	18235	N14 E79	37	(AP)	5	150	2	H	26	15	
70	12												60	1	H			
70	12	6	11073	N12 E65	37	3200	3.5	18235	N14 E66	33	(D)	4	430	7	D	37	21	
70	12												0	1	A			
70	12	7	11073	N15 E55	35	7200	3.5	18235	N14 E55	33	(BY)	5	460	37	E	31	18	
70	12	8	11073	N15 E42	35	6300	3.5	18235	N14 E45	31	BY	0	490	37	D	39	23	
70	12												20	7	H			
70	12	9	11073	N15 E28	34	7000	3.5	18235	N15 E27	32	BY	0	310	57	E	42	24	
70	12												40	10	H			
70	12	10	11073	N15 E16	35	7500	3.5	18235	N15 E15	33	(BP)	5				25	15	
70	12	11						18235	N14 E03	33	(D)	5	150	21	E	26	15	
70	12												20	4	H			
70	12												0	2	A			
70	12	12						18235	N14 W11	32	(BY)	5	240	15	D	25	15	
70	12												0	1	A			
70	12	13						18235	N14 W26	33	(BP)	5	170	9	D	24	14	
70	12	14	11073	N15 W36	33	6800	3.5	18235	N14 W39	32	(BP)	4	90	13	C			
70	12	15	11073	N15 W49	35	6500	3.0	18235	N15 W49	33	(BP)	4				13	9	
70	12	16											50	1	H	15	9	
70	12	17											50	1	H	9	5	
70	12	18														12	7	

MCMATH REGION 11081 CMP DATE 12.2

CALCIUM PLAGE DATA								SUNSPOT DATA										9.1 CM
YR	MO	DA	MC NO.	LAT CMD	L	AREA	INT	MW NO.	LAT CMD	L	MAG.	H	AREA	CNT	C	INT	FLUX	
70	12	14	11081	S20 W32	29	200	1.5	18248	S19 W36	29	(BF)	1						
70	12	15	11081	S20 W45	31	300	1.5											

MCMATH REGION 11082 CMP DATE 12.9

CALCIUM PLAGE DATA								SUNSPOT DATA										9.1 CM
YR	MO	DA	MC NO.	LAT CMD	L	AREA	INT	MW NO.	LAT CMD	L	MAG.	H	AREA	CNT	C	INT	FLUX	
70	12	14	11082	S23 W23	20	100	1.0											

MCMATH REGION 11078 CMP DATE 14.0 RETURN OF REGION 11032 ROTATION 2

CALCIUM PLAGE DATA								SUNSPOT DATA										9.1 CM
YR	MO	DA	MC NO.	LAT CMD	L	AREA	INT	MW NO.	LAT CMD	L	MAG.	H	AREA	CNT	C	INT	FLUX	
70	12	7	11078	S10 E85	5	400	1.0											
70	12	8	11078	S14 E70	7	700	1.5											
70	12	9	11078	S14 E56	6	700	1.5											
70	12	10	11078	S13 E44	7	900	1.5											
70	12	14	11078	S13 W08	5	1100	1.5											
70	12	15	11078	S13 W22	8	900	1.5											
70	12	16											10	2	B			
70	12	17											10	2	A			
70	12	20														7	4	

MCMATH REGION 11077 CMP DATE 14.8 RETURN OF REGION 11035 ROTATION 2&3

CALCIUM PLAGE DATA								SUNSPOT DATA										9.1 CM
YR	MO	DA	MC NO.	LAT CMD	L	AREA	INT	MW NO.	LAT CMD	L	MAG.	H	AREA	CNT	C	INT	FLUX	
70	12	7	11077	N13 E87	3	800	2.5	18238	N15 E80	8	(AP)	3	50	1	H			
70	12							18239	N12 E82	6	(BP)	2	100	2	D			
70	12	8	11077	N13 E76	1	3500	3.0	18238	N15 E70	6	AP	0	110	1	H	26	15	
70	12							18239	N13 E74	2	BY	0	260	22	E			
70	12							18240	N04 E82	355	AP	0						
70	12	9	11077	N10 E68		5500	3.0	18238	N16 E52	7	AP	0	50	1	H	21	12	
70	12							18239	N12 E58	1	BY	0	160	16	D			
70	12							18242	N08 E60	-0	AP	0						
70	12							18240	N05 E68	352	AP	0	20	10	B			
70	12												10	1	A			
70	12							18243	N02 E72	348	AP	0						
70	12	10	11077	N10 E52		7200	3.5	18238	N16 E40	8	(AP)	4				21	12	
70	12							18239	N12 E44	4	(D)	5						
70	12							18240	N06 E56	353	B	0						
70	12							18243	N02 E62	347	(B)	2						
70	12	11	11077					18243	N02 E49	348	(B)	1						
70	12		11077					18245	N05 E54	343	(AP)	2	0	1	A			
70	12	12	11077					18243	N02 E36	346	(B)	1	0	6	A	9	5	
70	12		11077					18245	N05 E40	342	(AP)	1	0	1	A			
70	12	13	11077													26	15	
70	12	14	11077					18245	N06 E06	348	(AP)	1	10	11	B			
70	12		11077					18243	N02 E10	344	B	0						
70	12	15	11077					18243	N02 W04	348	(BP)	1						
70	12		11077					18245	N06 W05	349	(AF)	1						

REGIONS OF SOLAR ACTIVITY

DECEMBER 1970

MCMATH REGION 11080 CMP DATE 15.8

			CALCIUM PLAGE DATA					SUNSPOT DATA								9.1 CM	
YR	MO	DA	MC NO.	LAT CMD	L	AREA	INT	MW NO.	LAT CMD	L	MAG.	H	AREA	CNT	C	INT	FLUX
70	12	9	11080	S08 E87	336	200	1.0										
70	12	10	11080	S08 E72	340	700	2.5	18244	S09 E67	342	BF)	2					
70	12	11						18244	S10 E56	341	(AF)	1				6	3
70	12	12						18244	S06 E38	344	(AP)	1				8	5
70	12	13														5	3
70	12	14	11080	S08 E18	340	800	2.5	18249	S08 E08	346	(AP)	1					
70	12	15	11080	S07 E03	343	800	2.0	18250	S06 E02	342	(AP)	2					
70	12	17														5	3

MCMATH REGION 11083 CMP DATE 16.8

			CALCIUM PLAGE DATA					SUNSPOT DATA								9.1 CM	
YR	MO	DA	MC NO.	LAT CMD	L	AREA	INT	MW NO.	LAT CMD	L	MAG.	H	AREA	CNT	C	INT	FLUX
70	12	14	11083	S13 E28	330	300	2.5										
70	12	15	11083	S13 E16	330	200	1.0										
70	12	22														5	3

MCMATH REGION 11086 CMP DATE 18.9 RETURN OF REGION 11039 ROTATION 4

			CALCIUM PLAGE DATA					SUNSPOT DATA								9.1 CM	
YR	MO	DA	MC NO.	LAT CMD	L	AREA	INT	MW NO.	LAT CMD	L	MAG.	H	AREA	CNT	C	INT	FLUX
70	12	14	11086	N15 E56		300	1.5										
70	12	15	11086	N15 E43	303	300	1.5										

MCMATH REGION 11085 CMP DATE 19.4 RETURN OF REGION 11041 ROTATION 5

			CALCIUM PLAGE DATA					SUNSPOT DATA								9.1 CM	
YR	MO	DA	MC NO.	LAT CMD	L	AREA	INT	MW NO.	LAT CMD	L	MAG.	H	AREA	CNT	C	INT	FLUX
70	12	14	11085	S13 E63	295	1500	2.0						0	1	A		
70	12	15	11085	S10 E50	296	1200	2.0										
70	12	17											0	1	A		
70	12												10	1	A		
70	12	18						18251	S10 W10	313	BP	0				6	4
70	12	19											30	5	D		
70	12	20											20	11	C		

MCMATH REGION 11084 CMP DATE 20.6

			CALCIUM PLAGE DATA					SUNSPOT DATA								9.1 CM	
YR	MO	DA	MC NO.	LAT CMD	L	AREA	INT	MW NO.	LAT CMD	L	MAG.	H	AREA	CNT	C	INT	FLUX
70	12	13						18247	N13 E89	279	AP	0					
70	12	13						18246	N18 E75	293	(AP)	3	120	2	H		
70	12	14						18246	N19 E60	294	(AP)	5	200	3	H		
70	12	14	11084	N18 E80	278	3400	3.5	18247	N13 E72	282	(BP)	4	290	5	D		
70	12	15	11084	N18 E68	278	5500	3.0	18247	N14 E62	282	(BP)	5				32	19
70	12	15	11084					18246	N20 E53	291	(BP)	6					
70	12	16											200	2	C	22	13
70	12												420	9	D		
70	12	17											320	13	D	27	16
70	12												10	2	A		
70	12												240	2	H		
70	12	18						18252	N23 E17	286	B	0				29	17
70	12							18247	N14 E23	280	Y	0					
70	12							18246	N20 E14	289	AP	0					
70	12	19											490	15	D		
70	12												0	13	A		
70	12												50	6	C		
70	12												190	1	H	26	15
70	12												180	35	D		
70	12	20											220	29	D		
70	12												0	5	A		
70	12												10	4	C		
70	12												190	1	H	41	24
70	12												290	23	D		
70	12	21											210	5	C		
70	12												160	29	D		
70	12												40	8	C		
70	12												0	1	A		
70	12												350	36	D	28	17
70	12	22											110	9	D	24	14
70	12												20	6	D		
70	12												0	1	A		
70	12												110	2	H		
70	12												210	9	D		

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REGIONS OF SOLAR ACTIVITY

DECEMBER 1970

(cont'd)

70	12	23																					
70	12																						
70	12																						
70	12																						
70	12																						
70	12																						
70	12																						
70	12	24																					
70	12																						
70	12																						
70	12																						
70	12																						
70	12	25																					
70	12																						
70	12	26	11084	N18 W80	279	1300	3.0																

18252	N24 W45	281		0																		24	14
18247	N12 W42	278	AP	0	80	6	C																
					10	1	H																
18255	N05 W38	274	BP	0																			
18256	N08 W32	268	AP	0																			
18246	N20 W51	287	AP	0	200	9	E																
					110	1	H																
					60	8	C															20	12
					0	1	A																
					130	1	H																
					70	1	H																
					70	6	C																
18247	N12 W70	281	AP	0																		13	8
18255	N05 W66	277	BP	0																			
																						10	6

MCMATH REGION 11087 CMP DATE 21.9

CALCIUM PLAGE DATA

YR	MO	DA	MC NO.	LAT CMD	L	AREA	INT
70	12	15	11087	S07 E85	261	800	1.5
70	12	17					
70	12	26	11087	S08 W53	262	1200	2.0
70	12	27	11087	S09 W76	262	1100	2.0

SUNSPOT DATA 9.1 CM

MW NO.	LAT CMD	L	MAG.	H	AREA	CNT	C	INT	FLUX
					0	1	A	4	2

MCMATH REGION 11088 CMP DATE 22.7

CALCIUM PLAGE DATA

YR	MO	DA	MC NO.	LAT CMD	L	AREA	INT
70	12	26	11088	N13 W52	251	900	2.0
70	12	27	11088	N13 W64	250	1200	2.0
70	12	28	11088	N15 W77		600	1.5

RETURN OF REGION 11061 ROTATION 2

SUNSPOT DATA 9.1 CM

MW NO.	LAT CMD	L	MAG.	H	AREA	CNT	C	INT	FLUX

MCMATH REGION 11089 CMP DATE 24.2

CALCIUM PLAGE DATA

YR	MO	DA	MC NO.	LAT CMD	L	AREA	INT
70	12	18					
70	12	26	11089	N26 W32	231	2000	3.0
70	12	27	11089	N26 W44	230	2000	3.5
70	12	28	11089	N26 W64		2400	3.0
70	12	29	11089	N25 W77	237	2500	2.0

SUNSPOT DATA 9.1 CM

MW NO.	LAT CMD	L	MAG.	H	AREA	CNT	C	INT	FLUX
18253	N13 E65	238	AP	0				8	5
					10	3	B		

MCMATH REGION 11090 CMP DATE 24.7

CALCIUM PLAGE DATA

YR	MO	DA	MC NO.	LAT CMD	L	AREA	INT
70	12	18					
70	12	19					
70	12						
70	12						
70	12	20					
70	12						
70	12						
70	12	21					
70	12						
70	12						
70	12						
70	12	22					
70	12						
70	12	23					
70	12	24					
70	12	25					
70	12	26	11090	S08 W25	224	1700	2.5
70	12	27	11090	S08 W38	224	2800	3.5
70	12	28	11090	S09 W52		2700	3.0
70	12	29	11090	S09 W64	224	2700	2.5
70	12	29					
70	12	30	11090	S09 W75	223	2000	2.5

SUNSPOT DATA 9.1 CM

MW NO.	LAT CMD	L	MAG.	H	AREA	CNT	C	INT	FLUX
18254	S10 E80	223	BP	0					
					40	10	D	5	3
					50	2	D		
					10	5	B		
					30	12	C	7	4
					60	16	D		
					20	5	C		
					10	13	B	4	2
					30	16	D		
					10	5	B		
					10	1	A		
					10	2	B	4	2
					30	15	D		
18254	S10 E14	222	B	0	50	18	D	6	4
					20	8	B	6	3
18254	S10 W12	223	B	0				7	4
					10	1	A	8	5
					20	6	C	6	4
18254	S09 W55	227	BP		10	4	B		
								4	2
18254	S10 W61	219	AF	0	10	1	A		
								3	2

Note: Region 11070 is mostly a return of region 11043.
Region 11088 also contains some weak remnants of old plage 11048 of the previous rotation.
Region 11089 has developed in the location of old plage 11050 of the previous rotation.
Because of unusually adverse weather conditions during the month of December, no calcium spectroheliograms were obtained at the McMath-Hulbert Observatory on December 3, 11-13, 16-25 and 30, 1970.
No Mt. Wilson Observatory observations were made on December 2, 16, 17, 19-22, 24, 26 and 27, 1970.

REGIONS OF SOLAR ACTIVITY

DECEMBER 1970

MCMATH REGION 11091 CMP DATE 25.7

CALCIUM PLAGE DATA

YR	MO	DA	MC NO.	LAT CMD	L	AREA	INT
70	12	23					
70	12	24					
70	12	25					
70	12	26	11091	N23 W13	212	1100	3.0
70	12	27	11091	N23 W26	212	1100	3.0
70	12	28	11091	N23 W45		1500	2.5
70	12	29	11091	N22 W56	216	1200	2.0
70	12	30	11091	N19 W69	217	1100	2.0

SUNSPOT DATA 9.1 CM

MW NO.	LAT CMD	L	MAG.	H	AREA	CNT	C	INT	FLUX
18257	N15 E20	216	B	0	30	9	C		
					20	7	B		
18257	N15 W07	218	AP	0					
					10	2	A		
					0	1	A		

MCMATH REGION 11092 CMP DATE 26.3 RETURN OF REGION 11053* ROTATION 4

CALCIUM PLAGE DATA

YR	MO	DA	MC NO.	LAT CMD	L	AREA	INT
70	12	26	11092	S16 W04	203	1000	1.5
70	12	27	11092	S16 W18	204	1300	1.5
70	12	28	11092	S15 W30		900	1.5
70	12	29	11092	S15 W44	204	700	1.0
70	12	30	11092	S15 W57	205	700	1.5

SUNSPOT DATA 9.1 CM

MW NO.	LAT CMD	L	MAG.	H	AREA	CNT	C	INT	FLUX

MCMATH REGION 11093 CMP DATE 26.4

CALCIUM PLAGE DATA

YR	MO	DA	MC NO.	LAT CMD	L	AREA	INT
70	12	26	11093	N29 W03		200	1.5
70	12	27	11093	N29 W16	202	400	1.5
70	12	28					

SUNSPOT DATA 9.1 CM

MW NO.	LAT CMD	L	MAG.	H	AREA	CNT	C	INT	FLUX
					0	3	B		

MCMATH REGION 11104 CMP DATE 27.0

CALCIUM PLAGE DATA

YR	MO	DA	MC NO.	LAT CMD	L	AREA	INT
70	12	29	11104	N16 W35	195	100	1.5

SUNSPOT DATA 9.1 CM

MW NO.	LAT CMD	L	MAG.	H	AREA	CNT	C	INT	FLUX

MCMATH REGION 11094 CMP DATE 27.9

CALCIUM PLAGE DATA

YR	MO	DA	MC NO.	LAT CMD	L	AREA	INT
70	12	26	11094	S19 E21	178	300	2.0
70	12	27	11094	S21 E04	182	400	2.0
70	12	28	11094	S21 W09		200	2.0
70	12	29	11094	S21 W21	181	200	1.5
70	12	30	11094	S21 W33	181	200	1.0

SUNSPOT DATA 9.1 CM

MW NO.	LAT CMD	L	MAG.	H	AREA	CNT	C	INT	FLUX
								10	6
								8	5

MCMATH REGION 11096 CMP DATE 28.1

CALCIUM PLAGE DATA

YR	MO	DA	MC NO.	LAT CMD	L	AREA	INT
70	12	26	11096	N11 E21	178	500	2.0
70	12	27	11096	N13 E06	180	600	2.0
70	12	28	11096	N13 W10		700	2.0
70	12						
70	12	29	11096	N13 W23	183	1000	2.0
70	12	30	11096	N13 W35	183	1000	2.5
70	12	31	11096	N12 W51	182	1200	2.5
71	1	1	11096	N11 W63	185	1300	3.0
71	1	2	11096	N11 W77	185	1300	3.0

SUNSPOT DATA 9.1 CM

MW NO.	LAT CMD	L	MAG.	H	AREA	CNT	C	INT	FLUX
					10	9	B		
					0	1	A		
					0	1	A		
18263	N11 W36	182	BF	0	20	6	C		
18263	N11 W52	180	B	0	0	2	B		

MCMATH REGION 11095 CMP DATE 28.2 RETURN OF REGION 11053* ROTATION 4

CALCIUM PLAGE DATA

YR	MO	DA	MC NO.	LAT CMD	L	AREA	INT
70	12	26	11095	S12 E21	178	400	1.5
70	12	27	11095	S13 E08	178	700	2.0
70	12	28	11095	S14 W07		900	2.0
70	12	29	11095	S14 W20	180	1300	2.5
70	12	30	11095	S14 W34	182	1800	3.0
70	12	31	11095	S14 W51	182	2200	3.0
71	1	1	11095	S15 W62	184	2500	3.0
71	1	2	11095	S15 W76	184	2500	3.5
71	1	3	11095				

SUNSPOT DATA 9.1 CM

MW NO.	LAT CMD	L	MAG.	H	AREA	CNT	C	INT	FLUX
18260	S15 W08	180	A	0	10	5	B		
18260	S13 W23	181	BP	0	50	19	D		
18260	S13 W36	182	BP	0	170	16	D		
18260	S13 W53	181	BP	0	190	13	E	8	5
18260	S14 W64	184	BP	0	220	13	E	8	5
18260	S14 W77	183	BP	0					
								3	2

REGIONS OF SOLAR ACTIVITY

DECEMBER 1970

MCMATH REGION 11097 CMP DATE 30.0 RETURN OF REGION 11060* ROTATION 3

			CALCIUM PLAGE DATA					SUNSPOT DATA								9.1 CM	
YR	MO	DA	MC NO.	LAT CMD	L	AREA	INT	MW NO.	LAT CMD	L	MAG.	H	AREA	CNT	C	INT	FLUX
70	12	23						18258	N14 E81	155	AP	0					
70	12	25						18259	N10 E45	166	AP	0					
70	12							18258	N14 E55	156	AP	0					
70	12	26	11097	N16 E45	154	2000	3.0						130	1	H	11	6
70	12												20	7	B		
70	12	27	11097	N16 E32	154	2100	3.0						130	1	H	7	4
70	12												50	12	D		
70	12												10	1	H		
70	12	28	11097	N16 E17		2800	2.5	18259	N10 E09	163	BP	0	40	10	D		
70	12							18258	N14 E18	154	AP	0	130	1	H		
70	12												0	1	A		
70	12												0	2	A		
70	12	29	11097	N15 E05	155	2600	3.0	18259	N10 W05	163	BP	0	80	7	D	9	6
70	12							18258	N14 E05	153	BP	0	110	1	H		
70	12	30	11097	N15 W09	157	2400	3.0	18259	N10 W16	162	BP	0	130	15	D	8	4
70	12							18258	N14 W07	153	AP	0	110	2	H		
70	12	31	11097	N15 W25	155	2300	3.0	18259	N11 W35	163	BP	0	140	7	D	9	5
70	12							18265	N13 W28	156	BP	0					
70	12							18258	N14 W25	153	AP	0	130	11	D		
71	1	1	11097	N14 W37	159	2700	3.5	18259	N11 W45	165	BP	0	100	3	D	12	17
71	1		11097					18265	N13 W38	158	BP	0					
71	1		11097					18258	N14 W35	155	AP	0	160	7	D		
71	1	2	11097	N15 W50	158	2700	3.5	18259	N11 W60	156	AP	0				7	4
71	1		11097					18265	N13 W51	157	BP	0					
71	1		11097					18258	N14 W48	154	AP	0					
71	1	3	11097					18259	N09 W79	169	AP	0				4	3
71	1		11097					18265	N11 W71	161	AP	0					
71	1		11097					18258	N11 W64	154	AP	0					
71	1	4	11097	N15 W78	157	1200	2.5	18259	N10 W90	170	AP	0				3	2
71	1		11097					18258	N14 W74	154	AP	0					

MCMATH REGION 11100 CMP DATE 31.4 RETURN OF REGION 11063* ROTATION 4

			CALCIUM PLAGE DATA					SUNSPOT DATA								9.1 CM	
YR	MO	DA	MC NO.	LAT CMD	L	AREA	INT	MW NO.	LAT CMD	L	MAG.	H	AREA	CNT	C	INT	FLUX
70	12	26	11100	S20 E63		400	1.0										
70	12	27	11100	S20 E50		400	2.0										
70	12	28	11100	S19 E35		600	2.0										
70	12	29	11100	S20 E23	137	800	2.0										
70	12	30	11100	S20 E10	138	800	2.0										
70	12	31	11100	S20 W05	136	800	2.0										
71	1	1	11100	S21 W15	137	800	1.5										
71	1	2	11100	S20 W27	135	800	2.0										
71	1	4	11100	S20 W55	134	500	1.0									3	2
71	1	5	11100	S20 W68	135	300	1.0										
71	1	6	11100	S18 W80	135	300	1.0										

MCMATH REGION 11098 CMP DATE 31.9 RETURN OF REGION 11060* ROTATION 2

			CALCIUM PLAGE DATA					SUNSPOT DATA								9.1 CM	
YR	MO	DA	MC NO.	LAT CMD	L	AREA	INT	MW NO.	LAT CMD	L	MAG.	H	AREA	CNT	C	INT	FLUX
70	12	26	11098	N19 E69	130	400	3.0						10	1	A	6	3
70	12	27	11098	N20 E56	130	700	2.5						20	2	D		
70	12	28	11098	N21 E42		600	2.0	18261	N20 E44	128	AP	0	10	1	A		
70	12	29	11098	N21 E30	130	800	2.0	18261	N20 E31	127	AP	0	10	1	A		
70	12	30	11098	N21 E16	132	800	2.0	18261	N20 E19	127	AP	0	10	1	H		
70	12	31	11098	N21 E01	130	500	1.5										
71	1	1	11098	N21 W12	134	400	1.0										
71	1	2	11098	N21 W24	132	400	1.0	18266	N20 W07	113	BP	0					
71	1	3	11098					18266	N19 W21	111	BP	0					
71	1	4	11098	N21 W55	134	300	1.0	18266	N20 W27	107	AP	0					
71	1	5	11098	N21 W57	134	300	1.0										
71	1	6	11098	N21 W79	134	200	1.0										

DAILY CALCIUM PLAGE INDEX

YR	MO	DAY	INDEX	YR	MO	DAY	INDEX	YR	MO	DAY	INDEX
70	12	1	18.2	70	12	11	*	70	12	21	*
70	12	2	18.8	70	12	12	*	70	12	22	*
70	12	3	*	70	12	13	*	70	12	23	*
70	12	4	20.2	70	12	14	50.1	70	12	24	*
70	12	5	19.7	70	12	15	38.8	70	12	25	*
70	12	6	21.1	70	12	16	*	70	12	26	15.0
70	12	7	31.0	70	12	17	*	70	12	27	19.7
70	12	8	33.9	70	12	18	*	70	12	28	17.8
70	12	9	33.0	70	12	19	*	70	12	29	16.1
70	12	10	33.6	70	12	20	*	70	12	30	23.3
								70	12	31	17.2

* NO OBSERVATIONS

SOLAR X-RAYS MEASURED BY SATELLITE
SOLRAD 9-EXPLORER 37

DECEMBER 1970

NAVAL RESEARCH LABORATORY 1=8A HOURLY AVERAGES (10^{-3} ergs/cm^2/sec.)

DAY	HOUR 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	0.67	0.67	0.55	0.58	0.61	1.10	0.69	0.94	0.63	0.58	0.93	0.47	0.44	0.38	0.34	0.43	0.38	0.47	0.42	0.48	0.49	0.62	0.53	0.56
2	0.49	0.54	0.42	0.46	0.45	0.87	0.51	0.43	0.47	0.40	0.40	0.45	0.37	0.39	1.09	0.51	12.0	1.31	0.56	0.59	0.98	0.98	1.25	1.91
3	2.18	1.83	2.79	1.96	1.78	1.48	1.23	1.14	1.01	0.79	0.80	0.87	0.65	0.84	0.84	0.65	0.65	0.63	0.68	0.71	0.66	1.86	1.53	1.54
4	1.07	0.85	0.98	0.92	0.76	0.70	0.71	0.90	0.91	1.23	7.46	1.56	1.82	1.11	1.00	1.38	0.81	0.88	1.34	1.65	0.98	1.10	0.95	1.35
5	0.99	1.30	1.51	1.24	1.02	2.67	2.74	1.01	1.09	1.00	0.92	0.97	1.44	1.19	1.01	0.79	0.91	0.87	0.76	1.20	0.92	1.57	1.33	7.95
6	5.49	2.37	1.46	1.15	0.99	0.95	1.70	1.73	1.48	1.31	0.92	1.93	1.91	2.32	1.14	0.96	1.22	1.60	3.22	1.20	1.05	2.03	1.62	1.47
7	1.61	2.21	6.21	1.21	0.92	1.31	1.83	1.62	0.99	1.17	0.84	0.91	2.20	1.10	2.37	1.84	1.35	1.04	1.40	1.02	0.98	1.59	1.67	1.57
8	1.70	1.02	1.05	6.73	39.5	2.54	3.56	1.16	1.64	1.11	1.48	1.62	8.99	3.78	1.49	1.00	1.28	1.10	1.35	1.19	1.51	0.95	6.13	4.63
9	1.54	1.63	1.14	1.90	1.58	0.90	1.30	1.45	22.3	1.85	2.03	6.42	2.07	1.04	0.94	1.22	1.46	5.04	3.06	1.41	2.76	1.92	2.29	1.21
10	2.29	1.21	0.80	0.97	2.17	0.86	0.86	0.89	1.58	1.49	1.06	0.82	1.21	1.43	1.34	2.50	1.94	1.60	0.90	2.07	1.45	0.98	1.08	1.15
11	1.96	1.67	1.70	1.00	3.25	0.99	1.38	1.65	1.44	1.23	2.38	1.68	1.33	2.83	5.59	3.78	1.98	1.90	1.45	1.69	1.62	1.69	35.1	67.8
12	38.9	13.3	9.63	5.98	4.17	3.52	3.08	2.70	3.29	2.10	1.96	2.01	2.89	1.87	7.16	18.4	4.87	2.77	3.98	1.56	1.48	2.14	1.09	3.77
13	5.05	3.71	1.49	0.97	1.19	1.41	1.01	2.81	2.03	1.09	1.28	0.99	1.99	1.00	0.89	0.73	0.66	0.76	4.39	1.83	1.73	1.05	1.41	0.96
14	0.90	0.97	0.61	0.60	0.62	0.68	0.55	0.87	0.61	1.13	0.98	0.78	0.59	0.71	1.10	0.56	0.63	1.00	0.79	2.84	1.92	1.06	2.34	5.26
15	2.54	1.62	1.58	1.34	1.06	1.21	1.00	1.03	0.89	0.85	0.61	1.10	0.64	0.63	0.59	0.65	0.72	0.63	0.62	0.57	0.76	0.77	0.58	0.54
16	0.49	0.63	0.49	0.49	0.54	0.59	0.54	0.58	0.42	0.92	0.64	0.59	1.99	0.49	0.55	0.54	0.50	0.53	0.56	0.86	1.40	0.94	0.85	0.63
17	0.58	0.45	0.49	0.59	0.80	0.85	1.36	0.81	0.71	0.86	0.79	0.85	0.78	0.94	0.57	0.89	1.01	0.86	0.85	1.41	1.44	0.65	0.58	0.63
18	0.71	1.05	0.62	0.62	0.55	0.66	1.30	0.83	1.20	1.24	0.77	1.54	0.98	1.49	2.86	3.53	1.82	1.50	1.43	0.91	1.42	0.86	1.85	0.86
19	0.62	0.79	1.20	0.65	0.74	0.85	1.83	0.92	1.89	2.11	1.16	1.00	1.03	0.86	1.22	1.17	0.85	0.80	0.96	0.74	0.77	0.93	1.39	1.35
20	0.79	1.27	0.83	0.76	0.87	0.81	1.15	1.38	0.90	0.93	1.25	1.11	1.00	0.91	0.86	0.85	0.99	0.91	0.95	1.18	1.58	1.84	1.61	0.86
21	1.09	0.94	0.81	0.73	0.80	0.77	0.84	0.83	0.79	0.87	1.08	1.48	1.23	1.41	1.27	1.73	1.01	0.98	0.95	0.87	1.17	0.91	1.03	1.99
22	0.94	0.79	0.63	0.50	0.45	0.79	0.47	0.45	0.36	0.33	0.45	0.57	8.57	6.96	0.91	18.0	1.38	0.52	0.48	1.51	0.81	0.52	0.43	0.38
23	0.38	0.61	0.59	0.44	0.40	0.46	0.45	0.37	2.41	0.45	0.41	0.44	0.60	0.92	1.10	0.95	0.39	0.37	0.46	0.60	0.73	1.14	0.50	1.50
24	0.56	0.38	0.51	0.30	0.34	0.44	0.61	1.00	0.50	0.39	0.38	0.48	0.38	0.79	0.52	0.35	0.31	0.27	0.32	0.43	0.34	0.62	0.45	0.51
25	0.36	0.36	0.45	0.45	0.47	0.45	0.41	1.23	0.44	0.44	0.35	0.59	0.83	0.53	1.34	0.42	0.37	0.30	0.32	0.51	0.50	1.21	0.53	0.98
26	0.44	0.40	0.45	0.67	0.47	0.53	0.38	0.44	3.39	0.65	0.60	0.42	0.58	0.37	0.30	0.61	0.35	0.28	0.50	0.40	0.41	0.34	0.58	0.34
27	0.32	0.28	0.25	1.00	0.28	0.29	0.23	0.22	0.31	0.88	0.75	0.32	0.32	0.19	0.21	0.20	0.19	0.20	0.22	0.32	0.24	0.23	0.21	0.18
28	0.18	0.23	0.24	0.18	0.21	0.17	0.22	0.23	0.20	0.16	0.14	0.16	0.15	0.17	0.17	0.17	0.28	0.19	0.20	0.17	0.23	0.23	0.15	0.18
29	0.17	0.20	0.26	0.20	0.24	0.22	0.38	0.50	0.30	0.19	0.36	1.14	0.42	0.26	0.27	0.26	0.23	0.25	0.32	0.31	0.43	0.30	0.31	0.48
30	0.40	0.39	0.62	0.28	0.43	0.56	0.31	0.34	0.32	0.30	0.26	0.23	0.25	0.26	0.34	0.41	0.44	0.96	1.18	0.74	0.50	1.00	0.36	0.37
31	0.34	0.41	0.45	0.38	0.37	0.30	0.33	0.37	0.35	0.48	0.38	0.39	0.40	0.35	0.58	0.51	0.39	0.43	0.50	0.66	0.66	0.66	0.36	0.34

SOLAR X-RAYS MEASURED BY SATELLITE
SOLRAD 9 - EXPLORER 37

DECEMBER 1970

NAVAL RESEARCH LABORATORY 8=20A HOURLY AVERAGES (10^{-2} ergs/cm^2/sec.)

DAY	HOUR 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	1.28	1.24	1.23	1.27	1.25	1.53	1.25	1.39	1.24	1.20	1.28	1.04	0.95	0.93	0.96	0.94	0.92	0.90	0.97	1.05	1.09	1.17	1.14	1.10
2	1.02	1.08	1.00	0.95	0.96	1.29	1.04	1.01	0.99	0.98	0.96	0.97	0.97	0.93	1.24	1.12	5.78	1.64	1.13	1.11	1.31	1.30	1.39	1.63
3	1.87	1.76	2.26	2.01	2.06	1.79	1.65	1.62	1.48	1.36	1.36	1.44	1.29	1.29	1.24	1.19	1.29	1.30	1.21	1.30	1.21	1.97	1.83	1.90
4	1.65	1.51	1.56	1.52	1.44	1.39	1.47	1.55	1.59	1.77	3.26	1.92	2.16	1.78	1.68	1.78	1.54	1.60	1.88	2.12	1.71	1.68	1.64	1.89
5	1.70	1.84	1.90	1.97	1.78	2.49	2.93	1.86	1.81	1.78	1.66	1.66	1.91	1.94	1.78	1.64	1.67	1.69	1.49	1.73	1.64	1.97	1.93	4.41
6	4.32	2.73	2.16	1.92	1.78	1.72	2.03	2.24	2.19	1.97	1.68	2.14	2.23	2.35	1.98	1.83	1.97	2.04	2.77	2.10	1.99	2.17	2.05	2.18
7	2.26	2.65	3.82	2.07	1.82	2.10	2.33	2.29	1.79	1.85	1.65	1.66	2.06	1.77	2.28	2.22	1.78	1.85	2.04	1.79	1.81	2.17	2.27	2.26
8	2.27	1.83	1.89	3.19	9.87	2.96	2.78	2.02	2.17	2.02	2.19	2.34	4.58	3.30	2.33	1.83	2.02	2.03	2.03	2.02	2.34	1.85	3.26	3.49
9	2.23	2.16	1.98	2.34	2.25	1.82	2.01	2.07	9.33	2.47	2.68	3.80	2.76	1.94	1.76	1.93	2.30	3.27	3.09	2.06	2.57	2.39	2.52	2.01
10	2.75	2.10	1.66	1.80	2.53	1.74	1.70	1.72	2.23	2.08	1.91	1.65	1.80	1.85	1.79	2.48	2.30	2.07	1.75	1.99	2.04	1.77	1.78	1.83
11	2.30	2.34	2.36	1.95	2.59	1.73	1.96	2.06	2.07	2.02	2.59	2.21	1.91	2.59	3.55	3.95	2.78	2.67	2.36	2.43	2.47	2.49	11.2	23.6
12	19.8	8.88	6.89	4.99	4.10	3.39	3.21	2.83	3.15	3.38	2.48	2.41	2.91	2.65	4.60	8.75	4.38	3.24	3.57	2.46	2.30	2.57	2.04	2.92
13	3.74	3.53	2.37	1.97	1.95	2.00	1.79	2.60	2.39	1.93	1.92	1.79	2.05	1.88	1.65	1.56	1.41	1.56	2.73	1.98	2.19	1.76	2.03	1.61
14	1.63	1.70	1.42	1.43	1.44	1.40	1.33	1.48	1.33	1.65	1.67	1.33	1.35	1.41	1.59	1.26	1.31	1.65	1.46	2.34	2.29	1.81	2.30	3.98
15	2.82	2.17	2.21	2.08	1.79	1.97	1.84	1.81	1.72	1.56	1.42	1.71	1.38	1.40	1.31	1.40	1.42	1.32	1.32	1.25	1.36	1.39	1.28	1.25
16	1.17	1.28	1.20	1.28	1.26	1.25	1.23	1.22	1.18	1.45	1.37	1.26	1.96	1.22	1.22	1.20	1.17	1.21	1.24	1.32	1.69	1.51	1.50	1.35
17	1.28	1.18	1.15	1.23	1.35	1.48	1.89	1.52	1.47	1.59	1.52	1.52	1.45	1.46	1.25	1.33	1.53	1.39	1.47	1.88	1.91	1.34	1.23	1.20
18	1.35	1.65	1.26	1.32	1.23	1.33	1.70	1.44	1.60	1.66	1.41	1.83	1.45	1.74	2.46	3.44	2.40	2.13	2.09	1.60	1.79	1.39	1.80	1.49
19	1.29	1.37	1.72	1.38	1.39	1.52	1.96	1.65	2.07	2.14	1.81	1.59	1.61	1.40	1.67	1.74	1.44	1.49	1.56	1.44	1.43	1.43	1.75	1.59
20	1.39	1.74	1.42	1.43	1.44	1.39	1.66	1.80	1.58	1.44	1.53	1.71	1.51	1.46	1.52	1.37	1.58	1.46	1.48	1.70	1.92	2.04	2.11	1.58
21	1.63	1.58	1.49	1.42	1.45	1.42	1.44	1.47	1.40	1.44	1.62	1.79	1.61	1.80	1.64	1.83	1.54	1.51	1.53	1.49	1.73	1.52	1.54	1.99
22	1.40	1.33	1.19	1.05	1.00	1.18	0.97	0.89	0.86	0.80	0.88	0.96	2.96	4.34	1.22	6.94	1.72	1.03	0.94	1.56	1.16	0.98	0.92	0.85
23	0.83	1.02	1.04	0.91	0.87	0.90	0.86	0.82	1.82	0.88	0.82	0.83	0.93	1.22	1.28	1.14	0.84	0.82	0.85	0.91	0.95	1.32	1.00	1.39
24	0.95	0.82	0.84	0.74	0.76	0.80	0.97	1.23	0.95	0.82	0.80	0.81	0.75	0.92	0.84	0.73	0.70	0.67	0.71	0.80	0.77	0.90	0.84	0.83
25	0.77	0.78	0.80	0.85	0.92	0.88	0.86	1.15	0.87	0.84	0.76	0.91	1.13	0.94	1.27	0.84	0.76	0.70	0.68	0.84	0.87	1.23	0.93	1.12
26	0.87	0.85	0.82	0.88	0.87	0.89	0.80	0.86	1.85	1.08	1.02	0.88	0.94	0.81	0.72	0.87	0.74	0.69	0.77	0.77	0.76	0.74	0.86	0.74
27	0.70	0.68	0.64	1.00	0.65	0.63	0.58	0.57	0.64	1.04	1.04	0.72	0.63	0.55	0.54	0.53	0.51	0.54	0.54	0.60	0.56	0.51	0.49	0.48
28	0.48	0.53	0.53	0.47	0.47	0.44	0.48	0.46	0.46	0.45	0.42	0.41	0.40	0.39	0.39	0.40	0.49	0.46	0.41	0.39	0.40	0.41	0.40	0.43
29	0.42	0.44	0.50	0.47	0.45	0.50	0.67	0.76	0.62	0.51	0.64	1.12	0.74	0.60	0.58	0.59	0.55	0.55	0.64	0.61	0.68	0.61	0.60	0.72
30	0.73	0.69	0.87	0.61	0.74	0.85	0.66	0.67	0.63	0.64	0.59	0.56	0.59	0.60	0.68	0.68	0.72	1.12	1.17	1.00	0.85	1.02	0.78	0.74
31	0.72	0.80	0.77	0.79	0.72	0.69	0.73	0.73	0.74	0.79	0.78	0.80	0.77	0.75	0.91	0.92	0.77	0.85	0.87	0.89	0.89	1.02	0.79	0.77

SOLAR X-RAYS BY SATELLITE

EXPLORER 37

DECEMBER 1970

NAVAL RESEARCH LABORATORY

OUTSTANDING EVENTS

DAY	START TIME	0.5-3A FLUX XE-5	PEAK TIME	1-8A FLUX XE-4	PEAK TIME	8-20A FLUX XE-3	PEAK TIME	END TIME	COMMENTS
2	1601	49.00	1608	210.00	1611	80.00	1618	1628D	
3	0208	5.60	0211	43.00	0216	29.00	0217	0218D	
4	1002E	130.00D	1005E	510.00	1004	110.00	1006	1017	
5	0253	13.00	0254	43.00	0255	28.00	0258	0258	
5	0552	4.50	0601	42.00	0557	40.00	0607	0611	
5	2342E	19.00	2345	130.00	2350	67.00	2355	0044D	
6	0127	5.60	0131	45.00	0130	40.00	0134	0135	
6	1810	16.00	1817	57.00	1817	40.00	1824	1835	
6	2137	20.00	2139	62.00	2141	40.00	2146	2148	
7	0155E	75.00	0204	210.00	0204	67.00	0208	0230	
7	1232	18.00	1233	72.00	1234	40.00	1237	1238	
7	1412	26.00	1413	83.00	1413	40.00	1415	1417	
7	1557	7.80	1558	52.00	1601	40.00	1559	1602	
8	0314	80.00	0321	260.00	0330	67.00	0330	0331D	
8	0427	120.00	0442	3000.00	0430	440.00	0431	0509D	
8	0626	34.00	0632	130.00	0633	53.00	0629	0644	
8	1218E	42.00D	1218E	170.00D	1219E	67.00D	1226E	1239	
8	1252	130.00D	1257E	260.00	1258	67.00	1258	1311	
8	2227	17.00	2228	62.00	2229	40.00	2234	2234	
8	2242	92.00	2252	210.00	2254	67.00	2302	2310D	
9	0346	12.00	0347	41.00	0346	29.00	0356	0356	
9	0801	120.00D	0815E	560.00	0819	170.00	0822	0859	
9	1137	26.00	1146	210.00	1140	67.00	1143	1203	
9	1753	38.00	1755	170.00	1759	80.00	1800	1814	
9	2015	11.00	2023	53.00D	2027D	40.00D	2027D	2027D	
9	2149	6.70	2200	44.00	2202	40.00	2203	2206D	
10	0020	4.50D	0021E	41.00D	0020E	40.00D	0026E	0026	
10	0421	8.90D	0421E	38.00	0423	40.00	0427	0439D	
10	1357	19.00	1358	58.00	1358	40.00	1359	1402	
10	1542	13.00	1551	56.00	1554	40.00	1604	1606	
11	0438	91.00	0441	210.00	0442	67.00	0444	0450	
11	1258	14.00	1300	54.00	1301	40.00	1305	1308	
11	1432	52.00	1453	210.00	1453	80.00	1453	0651	
12	0809	21.00	0810	86.00	0822	53.00	0810	0829	
12	1210	3.30	1213	37.00	1220	40.00	1220	1221D	
12	1439	120.00	1501	340.00	1503	120.00	1503	1537D	
12	1611E	79.00	1618	170.00	1619	80.00	1620	1635	
12	1749E	4.50	1751	38.00	1750	40.00	1804	1804	
12	1841	76.00	1844	170.00	1845	67.00	1846	1854D	
12	2109E	10.00	2110	65.00D	2109E	40.00	2113	2117	
12	2306	37.00	2308	90.00	2310	53.00	2317	2322	
13	0047	46.00	0054	170.00	0056	80.00	0056	0113	
13	0701	17.00	0705	56.00	0713	40.00	0714	0720	
13	1238	12.00	1240	42.00	1243	29.00	1243	1249	
13	1833	120.00	1834	390.00	1835	110.00	1836	1839	
14	1928	10.00	1944	49.00	1943	40.00	2002	2003D	
14	2242	7.80	2313	62.00	2311	53.00	2354E	0010	
16	1209	14.00	1211	56.00	1214	40.00	1219	1222	
18	1435E	3.30	1440	36.00	1436	29.00	1440	1443	
18	1452	4.50	1514	44.00	1519	53.00	1524	1549	
18	2006	11.00	2010	43.00	2010	26.00	2012	2012	
19	0928	5.60	0931	35.00	0933	26.00	0935	0935	
21	1453	14.00	1501	54.00	1502	29.00	1504	1505	
21	2324	16.00	2324	61.00	2324	40.00	2324E	2335	
22	1248	120.00	1259	560.00	1258	170.00	1259	1323	
22	1514	120.00	1527	900.00	1521	200.00	1523	1601	
23	0807	16.00	0808	64.00	0809	40.00	0817	0823	
25	0749	19.00	0750	61.00	0751	28.00	0751	0754	
25	1440	6.70	1449	40.00	1449	23.00	1451	1451	

SUDDEN IONOSPHERIC DISTURBANCES

DECEMBER 1970

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	0454	0524	0502	1-	3	1			2		1		0454	X-RAY
02	1601	1725	1614	1	5	2		2	3	4	6		1558	11063
03	0416	0439	0426	1-	3				2				0420	11071
04	0957	1025	1004	2-	5	5		2	3	1	3		0953	11073
04	1427	1525	1433	1-	3			1	2		2		1423	11073
05	0511	0544	0525	1-	1				1				0513E	11066
05	1400	1410	1401	1+	1					1	1		1355	11063
05	2148	2152	2149	1-	1							1	2145	11063
05	2300	0040	2340	1-	1					1	1		2300	11063
05	2320	0106	2343	1+	3				1	1	1		2315	11063
05	2326	2328	2327	1-	3				1			1	2327	11060
05	2339	2358	2347	1-	1	1							2338	11063
06	1806	1900	1821	1-	5	1		1	3		4		1807	11073
06	2205	2215	2206	1	3				1	1	1		2201	X-RAY
07	0158	0237	0205	1	3	1			2	2	2		0159	11077
07	0302	0355	0333	1	1				1				0305	11066
07	1411	1422	1418	1-	3	2		1					1412	11077
07	1531	1542	1538	1-	1	1							1528	11073
07	1555	1657	1605	1-	1					1	1		1555	11077
08	0310	0426D	0333	1	3	2			2				0318	11077
08	0426	0532	0432	3	5	5	1	2	4		2		0425	11077
08	0625	0710	0636	1-	3				2				0625	11077
08	1253	1350	1300	1-	5	2		2	3		1		1251	X-RAY
08	2245	2310	2252	1	5				4	3	3		2244	X-RAY
09	0143	0210	0156	1-	3				2				0143	11073
09	0343	0410	0353	1-	3				2				0343	11073
09	0802	0920	0821	2-	5	1		2	3		1		0800	11077
09	1135	1220	1145	1+	5	2		1	3		1		1137	11073
09	1232U	1258	1249	1-	1	1							1242	11070
09	1501	1507	1503	1-	1	1							1507E	11080
09	1545	1628	1553	1-	3	2			3		2		1547E	11077
09	1707	1713	1713	1-	1					1	1		1708	11077
09	1751	1839	1802	1	3	2	2	3	3	1	4		1750	11079
09	2015	2105	2025	1-	3	1			2				2011	11073
09	2354	0043	0007	1-	3	1			4				2355	11073
10	0100	0200		1-	1				1				0059	11077
10	0410	0442	0425	1-	3				2				0408	11077
10	0800	0815	0804	1	3				2		1		0805	11070
10	1314	1333	1326	1-	1	1							1313	11073
10	1428	1515	1435	1-	3				1	3	4		1424	11073
10	1541	1631	1554	1-	3				2	1	1		1544	11073
10	1741	1820	1749	1-	3				3		1		1740	11070
10	1920	2005	1928	1-	5	1		4	4		1	1	1914	11073
10	2357	0022	0002	1-	1				1				2355	11077
11	0212	0237	0218	1-	3	2			2				0210	11070
11	0437	0557	0442	1-	3	1		1	2		1		0436	11073
11	1027	1100	1031	3	5	6	1	3	3	1	4	1	1026	11070
11	1433	1458	1441	1-	3			1	1	2	4		1430	11077
11	2225	2308	2242	1-	3	1			3				2236	11077
12	0903	1020	0909	3	5	7	2	4	5		3		0903E	11077
12	1439	1447	1445	1	5	2			1	2	4		1437	11073
12	1457	1509	1504	1-	3	2		3		1	3		1454E	11073
12	1610	1655	1619	1-	3	2		3	1	3	5		1603	11077
12	1840	1935	1849	1	5	1	1	2	5	3	6	1	1840	11073
12	1922	1936	1927	1-	1	1							1921	11077
12	2050		2100	1-	1				1				2051	11077
12	2304	2329	2310	1	3	1			4	2	2		2303	X-RAY
12	2347	0043	2359	1+	5	2			5	4	4		2347	11077
13	0033	0100	0040	1	1	1							0036	11070
13	0049	0111	0057	1-	3				2				0047	11070
13	0139	0222	0146	1	3	1			2	5	5		0134	11077
13	0700	0728	0707	1	1				1				0659	11077
13	1722	1749	1731	1	1		1						1718U	11077
13	1831	1852	1834	1	5	3	1	3	4	3	6	1	1827	11077
13	2344	2348	2346	1	1							1	2345	X-RAY
14	0717	0910	0805	1	1				1				0721	11077
14	1410	1428	1418	1-	1	1							1407	11085
16	1910	2212		1-	1					1	1		1857E	11077
18	0114	0158	0120	1-	3				2	2	2		0115	X-RAY
18	0157	0209	0200	1-	1				1				0156	11084

SUDDEN IONOSPHERIC DISTURBANCES

DECEMBER 1970

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
18	1738	1836	1747	1-	3	1		2	2		2		1729	11090
18	1815	1855	1850	1	1					1	1		1811E	11084
18	2005	2055	2010	1-	1				1				2001E	11090
18	2135	2149	2144	1+	3					2	2		2138	11090
21	1455	1505	1501	1-	1	1							1450	11084
21	2322	2347	2327	1-	3				4	2	2		2320	11090
22	1246	1320	1258	2-	5	5		2	3		3		1243	11084
22	1515	1707	1523	2	5	3	1	4	1	2	7		1517	11084
22	2050	2125	2052	1-	1				1				2046	11086
23	1500	1550		1-	1				1				1458	11086
23	2340	0005	2358	1-	1	1							2339E	11086
25	1435	1517	1440	1	3				1	1	1		1434	11084
25	1529	1540	1534	1+	3					2	2		1529	11084
25	1549	1600	1558	2	3					2	2		1542	11097
25	2309	2322	2312	1-	1				1				2258	11084
26	0316	0414	0318	1-	3				2		1		0315	X-RAY
26	0840	0855	0842	1	5	1		3	4		3		0834E	11097
26	1137	1152	1139	1	3				1		1		1136	11084
26	1500	1507	1502	1-	3	1			1				1500	11084
30	1827	1831D	1831	1-	1				1				1825	11095
30	2100	2130	2102	1-	3				2				2058U	11095
31	0243	0304	0245	1-	1				1				0245	11095

STATIONS REPORTING FOR DECEMBER 1970

AAVSO (A1, A6, A8, A17, A19, A27, A29) (SEA) (A2, A4, A19, A21) (SES)
ANCHORAGE (AN) (SWF, SCNA, SPA)
ATHENS (AT) (SWF)
ATTU (LORAN-C) (TT) (LF-SPA, SES)
BEARLEY (BY) (SWF)
BOULDER (BO) (SCNA, SEA)
CAPE RACE (LORAN-C) (CP) (LF-SPA, SES)
DARMSTADT (DA) (SWF)
ENKOPING (SW) (SWF, SPA)
FORESTPORT (FP) (SPA)
GESASHI (LORAN-C) (GE) (LF-SPA, SES)
HAWAII (HA) (SPA, SFD)
HIRAISO (HI) (SWF)
HOBART (TA) (SEA)
HUANCAYO (HU) (SWF)
INUBO (IN) (SPA)
JUPITER (LORAN-C) (JP) (LP-SPA, SES)
KUHLUNGSBORN (KU) (SPA, SEA)
KURE (LORAN-C) (KR) (LF-SPA, SES)
MANILA (MA) (SWF, SPA)
MARCUS (LORAN-C) (MR) (LF-SPA, SES)
MCMATH (MC) (SWF, SCNA)
NANTUCKET (LORAN-C) (NT) (LF-SPA, SES)
NEUSTRELITZ (NU) (SWF, SCNA)
NEW DELHI (ND) (SWF,SCNA, SEA, SES, SFD)
OKINAWA (OK) (SWF)
PANSKA VES (PU) (SWF, SEA, SES)
POITIERS (PO) (SEA)
PORT CLARENCE (LORAN-C) (PC) (LF-SPA, SES)
PRESTON (LO) (SEA)
PYRAMID ROCK (PR) (SPA)
SAN DIEGO (SD) (SPA)
SANDUR (LORAN-C) (SA) (LF-SPA, SES)
SAO PAULO (UM) (SPA, SES)
SITKINAK (LORAN-C) (SK) (LF-SPA, SES)
SOMERTON (SO) (SWF)
SYLT (LORAN-C) (ST) (LF-SPA, SES)
TABLE MOUNTAIN (TM) (SWF, SPA, LF-SPA)
TRINIDAD (TR) (SWF)
UPOLO POINT (LORAN-C) (UP) (LF-SPA, SES)
WHITE SANDS (WS) (SWF)
YAP (LORAN-C) (YP) (LF-SPA, SES)

PERIODS OF NO OBSERVATIONS:

DATE	TIME (UT) and STATION
01-08	0000-0115 A4
01	0715-0735 UM
02	1210-1250 MA, 1930-2045 UM
03	0000-1656 TM, 0655-0800 UM, 1700-2245 UM, 1704-1710 TM, 1934-2153 TM
04	1703-1707 TM, 1807-1817 TM, 1942-2102 TM
05	1711-1713 TM
06	0454-2400 TM, 0500-2400 A27
07	0000-0435 UM, 0000-1423 TM, 0000-1430 A27, 0700-0720 UM
08	0000-0006 TM, 0056-0122 TM, 1717-2031 TM, 2142-2400 TM
09	0000-0240 TM, 1515-2400 A21
10	0000-0130 A21, 0000-0240 TM, 0700-0725 UM, 1700-2225 TM
11	0820-1020 MA, 1730-1707 TM, 2310-2318 TM
12	0710-0800 UM, 1820-1823 TM, 2048-2101 TM
14	2100-2338 TM
15	1936-2400 TM
16	1653-2303 TM
17	1700-0035 UM
18	1700-0035 UM
21	0000-0930 UM, 0444-0608 TM
25	0720-0820 UM
26-31	0300-2400 A8
27	2045-2145 UM
28	0000-0230 UM, 2123-2128 TM
29	0620-1450 MA, 1635-1648 TM
30	0039-0346 TM, 0400-2400 A21
31	0000-2400 A21, 0000-2400 AT

SID's BY McMATH REGION

DECEMBER 1970

DAY	60	63	66	70	71	73	77	79	80	84	85	86	90	95	97	X-RAY	UNKNOWN	FP NO
01																1		
02		1																
03					1													
04						2												
05	1	5	1															
06						1										1		
07			1			1	3											
08							3									2		
09				1		5	3	1	1									
10				2	4	4	3											
11				2		1	2											
12						3	5									1		
13				2			4									1		
14							1				1							
15																		
16							1											
17																		
18										2			3			1		
19																		
20																		
21										1			1					
22										2		1						
23												2						
24																		
25										3					1			
26										2					1	1		
27																		
28																		
29																		
30														2				
31														1				

SOLAR RADIO EMISSION
SPECTRAL OBSERVATIONS

DECEMBER 1970

DEC 1970	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.	
01	0000	0729	CULG				0334.5	0336.5	2				IIIG,U
	0702	1509	WEIS				1024.6	1025.2	1				IIIG
	1133	2106	SGMR										
	1649	2234	BOUL										
	1400	2334	HARV				1812	2330	1				I
	2022	2400	CULG				2022	2400	1				I
02	0000	0729	CULG				0000	0020	1				I
			CULG				0705	0706	1				IIIG,W
			CULG				0711.5		1				IIIB
			CULG				0724	0725	1				IIIG
	0735	0930	WEIS										
	1325	1505	WEIS										
	1401	2335	HARV				1602	1614	1				I
	1553	2400	BOUL				1604.9	1616.2	2	1604.9	1616.2	2	IIIGG
			HARV	1608	1613	1							IIIGG
	1125	2105	SGMR							1837.8	1839		IIIB
			BOUL				1838.2	1838.9	2	1838.2	1838.9	2	III
			BOUL				1941.9	1942	1				III
			BOUL				2021.5	2021.7	1	2021.5	2021.7	1	III
	2021	2400	CULG				2021.5	2022	1				IIIG,W
			BOUL				2029.4	2029.7	1	2029.4	2029.7	1	III
			CULG				2029.5		1				IIIB
			HARV				2147	2332	1				IN
			CULG				2253		1				IIIB,W
			CULG				2255.5		1				IIIB
			CULG				2323.5		1				IIIB
03	0000	0730	CULG				0104		1				IIIB,W,U
			CULG	0111.5	0112	1							IIIG,W
			CULG				0137	0138	1				IIIG,V
			CULG				0140.5	0141	1				IIIG,W
			CULG				0143.5	0145	1				IIIG,W
			CULG				0146.5	0147	1				IIIG
			CULG				0201	0202	1				UNCLF
			CULG				0203	0212.5	1				IIIGG
			CULG				0203.5	0204	2				IIIG,V
			CULG				0205	0205.5	2				UNCLF
			CULG				0214.5	0217.5	1				IIIG,W
			CULG				0221.5	0225	1				IIIG
			CULG				0227	0229	1				UNCLF
			CULG	0331	0332.5	1							IIIG
			CULG				0339.5		1				IIIB
			CULG	0416	0416.5	2	0413.5	0424	2	0415.5	0416.5	1	IIIG,V,U
			CULG				0420.5	0453	1				II
			CULG				0438	0439	1				UNCLF
	1120	2102	SGMR										
	0733	1505	WEIS				1154.4	1155.7	2				IIIG
	1400	2335	HARV	1405	1408	1	1405	1408	3				IIIGG
			HARV	2102	2134	1	2036	2134	1				IN
	2022	2400	CULG				2105.5	2108.5	1				IIIG,U
	1634	2300	BOUL				2107.7	2108.5	2	2107.7	2108.5	2	III
			HARV	2134	2300	1	2134	2300	1				I
			HARV				2300	2332	1				IN
	2022	2400	CULG				2306.5		1				IIIB,W
			CULG				2321		1				IIIB,W
			CULG				2324		1				IIIB,W
			CULG				2334		1				IIIB,W
			CULG				2342	2342.5	1				IIIG,W
			CULG				2350	2400	1				IIIN,W
			CULG				2350	2400	1				I
04	0000	0719	CULG				0000	0100	1				IIIN,W
			CULG				0000	0100	1				I
			CULG				0033.5	0039	1				IIIG
			CULG				0158	0159	1				IIIG,U
			CULG				0202		1				IIIB
			CULG				0214	0216	1				IIIG,W
			CULG				0227		1				IIIB
			CULG				0231.5		1				IIIB
			CULG				0613.5		1				UNCLF
	0734	1506	WEIS				0956.8	0957.4	2				V
			WEIS				0959.5	1001.5	2				UNCLF
			WEIS				1005.1	1005.4	1				IIIG
	1401	2335	HARV				1424	1433	2				IIIGG
			WEIS				1424.6	1426.7	1				IIIGG
			WEIS				1428.5	1431.3	1				IIIGG
			HARV				1534	1536	2	1535		2	IIIGG
	1133	2105	SGMR							1534.8	1535.7		IIIB
			HARV				1546	1548	2				I
	2022	2400	CULG				2029.5		1				IIIB,W
			CULG				2126.5	2130	1				IIIG,U
			HARV				2127	2130	1				IIIG
			CULG				2144.5	2145	1				IIIG,W
			CULG				2205.5	2206	1				IIIG,W
	1644	2300	BOUL				2206.1	2206.2	1				III
			CULG				2213.5	2214	1				IIIG,W
			CULG				2217.5	2219.5	1				IIIG
			BOUL				2218.8	2219.3	2	2218.8	2219.3	2	III
			CULG				2219	2219.5	2				IIIG,V

SOLAR RADIO EMISSION
SPECTRAL OBSERVATIONS

DECEMBER 1970

DEC 1970	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.	
04			CULG				2232		1				IIIB+W
			CULG				2245.5		1				IIIB+W
05	0000	0729	CULG				0016		1				IIIB+W
			CULG				0142		1				IIIB+W
			CULG				0143.5	0144.5	2				IIIG+U
			CULG				0146	0148	2				IIIG+U
			CULG				0229.5		1				IIIB
			CULG				0337.5	0338	1				IIIG+W
			CULG				0354		1				IIIB
	0736	1415	WEIS				0835.4	0835.7	1				IIIG
			WEIS				0840.3	0841.5	1				IIIG
	1139	2105	SGMR										
	1400	2335	HARV	2050	2051	1	2050	2051	2				IIIGG
	1643	2159	BOUL				2110.9	2111.3	1	2110.9	2111.3	1	III
	2023	2400	CULG				2111		1				IIIB
			CULG				2154.5		1				IIIB
			CULG				2316	2320	2				IIIG+U
			CULG				2319		1				IIIB+W
			CULG				2333.5	2336	2				II
06	0000	0729	CULG				0101	0102	1				I
			CULG				0221.5		1				UNCLF
			CULG				0340	0340.5	1				IIIG+W
			CULG				0442.5		1				IIIB
			CULG				0535.5		1				IIIB+W
			CULG				0547.5		1				IIIB
			CULG				0609.5	0611	1				IIIG
			CULG				0612.5	0613.5	1				IIIG+U
			CULG				0658.5	0700.5	1				IIIG
			CULG				0659.5	0700	2				IIIG+U
	1055	1503	WEIS										
	1142	2102	SGMR										
	1400	2335	HARV				1430	1433	2				IIIGG
			HARV				1537	1616	1				IN
	1625	2230	BOUL				1657.1	1658.2	1	1657.1	1658.2	1	IIIG
			HARV	1703	1706	1	1703	1706	1				IIIG
			BOUL				1804.8	1805.3	1				III
			BOUL				1811.5	1812.5	1				III
			HARV	2022	2023	1	2022	2023	1				IIIG
	2022	2400	CULG				2045.5	2046.5	1				IIIG+W
			CULG				2049.5		1				IIIB+W
			CULG				2058		1				IIIB
			BOUL				2058	2058.2	1				III
			HARV				2122	2154	1				IN
			CULG				2132	2134	2				IIIG+V
			BOUL				2132.1	2133.4	2	2132.1	2133.4	2	IIIG
			CULG				2136.5	2140	1				IIIG+W
			CULG				2235	2235.5	1				IIIG+W+U
			HARV	2243	2245	2	2244	2245	2				IIIG
			CULG				2244.5	2245	2				IIIG+U
			CULG				2252.5		1				IIIB
			CULG				2325.5		1				IIIB+W
			CULG				2352	2354	1				IIIG+W
			CULG				2357	2357.5	1				IIIG+W
07	0000	0726	CULG				0014	0014.5	1				IIIG+W
			CULG				0029.5	0030	2				IIIG+U
			CULG				0121	0121.5	1				IIIG+U
			CULG				0140	0142	2				IIIG+V
			CULG				0216	0217	1				IIIG
			CULG				0220.5	0223	1				IIIG
			CULG				0229	0229.5	1				IIIG
			CULG				0531		1				IIIB+W
			CULG				0719	0719.5	1				IIIG
	0735	1506	WEIS										
	1134	2102	SGMR										
	1401	2024	HARV				1709	1816	1				IIIN
	1656	2320	BOUL				1709.6	1709.8	2	1709.6	1709.8	2	III
			BOUL				1724.2	1724.7	2	1724.2	1724.7	2	IIIG
			BOUL				1734.8	1734.9	1				III
			BOUL				1738	1738.5	1	1738	1738.5	1	III
			BOUL				1743.6	1743.8	2	1743.6	1743.8	2	III
			BOUL				1815.7	1816	2	1815.7	1816	2	III
			HARV	1826	1827	1							IIIG
	2021	2400	CULG										
			HARV										
			BOUL				2026.5	2029.2	2	2026.5	2029.2	2	IIIG
08	0000	0730	CULG				0027.5	0029.5	2				IIIG+U
			CULG				0043.5		2				IIIB+U
			CULG				0048		1				IIIB
			CULG				0153	0154	1				IIIG
			CULG				0249		1				IIIB+U
			CULG				0309	0311	1				IIIG+W
			CULG				0319	0322	1				IIIG+W
			CULG				0336.5		1				IIIB+W
			CULG				0354	0355	1				IIIG
			CULG				0415.5		1				IIIB

SOLAR RADIO EMISSION
SPECTRAL OBSERVATIONS

DECEMBER 1970

DEC 1970	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.	
08			CULG				0421	0421.5	1				IIIG
			CULG				0423	0423.5	1				IIIG
			CULG				0427		1				IIIB,V
			CULG				0434	0434.5	1				IIIG
			CULG				0440.5	0441.5	1				IIIG
			CULG				0445	0446	1				IIIG,W
			CULG				0524		1				IIIB,W
			CULG				0528.5	0531.5	1				IIIG
			CULG				0604.5	0605	1				IIIG,W
			CULG				0625.5	0627	2				IIIG,V,U
			CULG				0628.5		1				IIIB,W
			CULG				0639	0639.5	1				IIIG,W
			CULG				0709	0711	2				IIIG,V
			CULG				0712.5	0715	1				IIIG
			CULG				0716	0718	1				IIIG
			CULG				0724.5		1				IIIB,W
	0737	1200	WEIS				0755.4	0755.6	1				IIIB
			WEIS				0800.4	0800.6	1				IIIB
			WEIS				0810	0810.2	2				IIIG
			WEIS				0812.1	0812.6	2				IIIG
			WEIS				0839.9	0840	1				IIIG
	1224	1457	WEIS	1225.5	1226	1							IIIG
			WEIS				1225.8	1226.5	1				II
			WEIS				1242.2	1242.4	1				IIIG
			WEIS				1327.2	1329	3				IIIG
	1132	2105	SGMR							1327.6	1329		IIIB
			WEIS				1333.7	1333.9	1				IIIG
	1401	2335	HARV				1558	1559	2				IIIG
			HARV	1612	1613	1	1612	1613	2				IIIGG
			HARV	1650	1742	1							IN
	1716	2230	BOUL				1713.9	1714	1	1713.9	1714.2	1	III
			HARV				1812	1813	3	1813		3	IIIG
			BOUL				1812.7	1813.5	2	1812.7	1813.7	2	III
			SGMR							1812.8	1813.3		IIIB
	2025	2400	CULG				2035	2036	1				IIIG,V,U
			CULG				2136.5		1				IIIB
			CULG				2156		1				IIIB,W
			CULG				2246		1				IIIB,W
09	0000	0730	CULG				0008.5		1				IIIB,W
			CULG				0103	0103.5	1				IIIG,W
			CULG				0201	0201.5	1				IIIG,W
			CULG				0354.5		1				IIIB
			CULG				0402	0403	1				IIIG
			CULG				0413		1				IIIB
			CULG				0433.5		1				IIIB
	0740	1456	WEIS				0810	1430	1				IN
			WEIS				0815	0825	1				II
	1148	2105	SGMR										
	1401	2335	HARV	1510	1523	2	1613	2057	1				IN
	1649	2233	BOUL				1708.3	1709.8	2	1708.3	1710	2	IIIG
			BOUL				1751.9	1755.3	2	1751.9	1756.9	2	IIIGG
			BOUL				1758.5	1821.1	1	1758.5	1821.1	1	IV
			BOUL				1955.2	1955.3	1				III
	2022	2400	CULG				2037	2038	2				IIIG
			BOUL				2037.4	2038	1	2038.4	2039.3	1	IIIG
			CULG				2148.5	2150	3				IIIG,V,U
			BOUL				2148.7	2150	2	2148.7	2151.3	2	IIIG
			HARV	2149	2150	1	2148	2150	2				IIIG
			CULG				2216	2216.5	2				IIIG,U
			BOUL				2216.1	2216.4	2	2216.1	2217.1	2	IIIG
			CULG				2221	2221.5	1				IIIG,U
			BOUL				2221.1	2221.1	2	2221.1	2221.9	2	IIIG
			CULG				2255.5		1				IIIB,U
			CULG				2259.5		1				IIIB,W
			CULG				2303	2305	1				IIIG
			CULG				2308.5		3				IIIB,U
			CULG				2318.5		1				IIIB
			CULG				2321		1				IIIB
			CULG				2347	2348	1				IIIG,W
			CULG				2350	2350.5	1				IIIG,U
10	0000	0728	CULG				0001		1				IIIB,W
			CULG				0250.5	0251	2				IIIG,U
			CULG				0303		1				IIIB,W
			CULG				0304.5	0305	3				IIIG,U
			CULG				0321		1				IIIB
			CULG				0324.5		1				IIIB,W
			CULG				0346	0347	2				IIIG,V,U
			CULG				0419						IIIB
			CULG				0429.5	0430	1				IIIG,U
			CULG				0430.5		2				IIIB,U
			CULG				0456	0457	2				IIIG,V,U
			CULG				0501	0501.5	1				IIIG
			CULG				0603	0603.5	1				IIIG,W
			CULG				0643.5		2				IIIB,U
			CULG				0712.5	0713.5	1				IIIG,W
	0743	1454	WEIS				0826.6	0826.8	1				IIIB
			WEIS				0827	0827.3	1				IIIG

SOLAR RADIO EMISSION
SPECTRAL OBSERVATIONS

DECEMBER 1970

DEC 1970	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.	
10			WEIS				0943	0943.3	1				IIIG,DP
			WEIS				1134.1	1134.3	1				IIIB
			WEIS				1139.3	1142.8	3				IIIGG,DP
			WEIS				1212.9	1213.6	2				IIIG
			WEIS				1307	1317	1				IIIGG
			WEIS				1323.5	1323.8	1				IIIG
			WEIS				1353.6	1359	3				IIIGG,DP
	1123	2101	SGMR							1356.8	1357.6		IIIB
			WEIS				1433	1433.6	1				IIIG
	1401	2336	HARV	1542	1543	1	1540	1542	2				IIIGG
			HARV	1713	1714	2	1713	1714	2				IIIGG
			HARV	1733		3	1733	1734	3				IIIG
			HARV	1741	1742	2							IIIG
	1643	2400	BOUL				1913	1913.4	1	1913	1913.4	1	IIIG
			HARV	1914	1919	2	1914	1920	1				I
			HARV	2013	2015	1	2011	2015	1	2013	2015	1	IIIGG
			BOUL				2013	2015	2	2013	2015	2	IIIG
	2022	2400	CULG				2117.5	2118	1				IIIG,W,U
			CULG				2129.5		1				IIIB,W
			HARV	2240	2242	1							I
11	0000	0729	CULG				0137	0137.5	1				IIIG
			CULG				0334		1				IIIB
			CULG				0358	0406.5	2				II
			CULG				0441.5	0447.5	1				I
			CULG				0514.5	0517	1				IIIG
	0744	1052	WEIS				0750	0753	2				IIIGG,DP
			WEIS				1027.4	1038	3				IIIGG,DPRS
			WEIS				1028	1033	3				IV
			WEIS				1030	1043	3				II
	1132	2104	SGMR										
	1132	1455	WEIS				1226.9	1228.7	2				IIIGG,DP
			WEIS				1322.5	1322.6	3				UNCLF
	1400	2336	HARV	1444	1447	2	1444	1447	2				IIIGG
			WEIS				1444	1444.7	2				IIIG
			HARV	1451	1455	2	1450	1455	2				IIIGG
			WEIS				1451.2	1452.2	1				IIIG
			WEIS				1451.7	1451.9	1				IIIB
			HARV	1522		1	1522	1523	2				IIIGG
			HARV	1554	1555	2	1554	1555	3	1555		2	IIIGG
			HARV	1620	1621	1	1620	1621	2	1620	1621	2	IIIG
			HARV	1629	1630	1	1629	1630	2	1629	1630	1	IIIG
			HARV	1647	1648	2	1647	1648	2				IIIG
	1743	2250	BOUL										
			HARV	2202	2203	2							IIIG
			HARV	2209	2300	2							IVN
	2022	2400	CULG				2210.5	2340	1				IW
			HARV				2211	2309	2				IC
			CULG				2222	2225	2				UNCLF
			CULG				2225	2247	1				IIIGG,W,U
			CULG				2238	2243	1				II
			CULG				2247	2257	1				IV
			CULG				2308	2318	1				UNCLF
			HARV	2308	2336	3	2309	2336	3				IV
			CULG				2319	2335	1				I
			CULG				2340	2400	1				IS
12	0000	0730	CULG				0000	0730	1				IS
			CULG				0100.5	0101.5	1				IIIG
			CULG				0107.5	0109	1				IIIG
			CULG				0410		1				IIIB
			CULG				0421		1				IIIB
			CULG				0444		1				IIIB
			CULG				0516		1				IIIB
			CULG				0615.5	0617	1				IIIG
			CULG				0640.5	0642.5	1				IIIG
			CULG				0641	0641.5	2				IIIG
			CULG				0729.5	0730	1				IIIG
	0746	1040	WEIS				0751	1020	1				IS
			WEIS				0755	0755.4	1				IIIG
			WEIS				0807.7	0811.8	3				IIIGG,DP
			WEIS				0817	0818.1	3				IIIGG,DP
			WEIS				0819.6	0821	3				IIIGG,DP
			WEIS				0841	0841.5	2				UNCLF
			WEIS				0901.8	0909	2				IIIGG
			WEIS				0902	0909	3				IV
			WEIS				0915.7	0916.4	2				IIIGG,DPRS
	1202	2105	SGMR							1309.2	1310		IIIB
	1401	2336	HARV	1437	1441	2							IIIGG
			SGMR							1437.7	1440.2		IIIG
			HARV				1442	2250	1				IN
			SGMR							1452.9	1453.3		IIIB
			HARV	1453		1	1453		3				IIIG
			HARV	1602	1607	3	1602	1607	3				IIIGG
			HARV	1612	1613	2	1611	1613	3	1612	1613	3	IIIGG,U
	1612	2400	BOUL				1612.3	1613.5	2	1612.3	1613.5	2	IIIG
			HARV	1615	1619	2	1615	1619	3	1616	1619	3	IIIGG
			BOUL				1615.4	1620	3	1615.4	1620	3	IIIG
			HARV	1840	1845	2	1840	1845	3				IIIGG

SOLAR RADIO EMISSION
SPECTRAL OBSERVATIONS

DECEMBER 1970

DEC 1970	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			BOUL				1841.2	1841.5	1	1841.2	1841.5	1	III
			SGMR							1847.9	1852		IIIG
			HARV	1848	1854	2	1848	1854	3	1848	1852	3	IIIGG
			BOUL				1848.3	1854	2	1848.3	1852.3	2	IIIGG
			HARV				1856	1925	2				IIIN
			BOUL				1903.1	1903.2	1				III
			BOUL				1911.5	1911.6	1	1911.5	1911.6	1	III
	2022	2400	CULG				2058	2126	1				I
			HARV	2105	2109	2	2105	2109	2	2109		1	IIIG
			CULG				2105.5	2106	1				IIIG
			CULG				2108.5	2109.5	1				IIIG
			BOUL				2109	2109.6	1	2109	2109.8	1	IIIG
			CULG				2113		1				IIIB
			HARV	2213	2214	1	2213	2214	2	2213	2214	1	IIIGG
			CULG				2213.5	2214.5	2				IIIG,U
			BOUL				2213.9	2214.5	2	2213.9	2214.8	2	IIIG
			CULG				2325	2325.5	1				IIIG
			CULG				2348	2349.5	2				IIIG,V
			CULG				2350	2351.5	1				IIIG
			CULG				2352	2354.5	1				I
			CULG				2354	2355	1				IIIG
			CULG				2357.5		1				IIIB,W
13	0000	0730	CULG				0000.5	0001.5	1				IIIG
			CULG				0014.5		1				IIIB
			CULG				0016	0016.5	1				IIIG
			CULG				0019	0020.5	1				IIIG
			CULG				0124.5	0125	1				IIIG
			CULG				0136	0145	2	0136	0145		IIIGG,V
			CULG				0147.5	0148	1				IIIG,W
			CULG				0228.5	0229	1				IIIG
			CULG				0421.5	0422.5	1				IIIG,W
			CULG				0424	0425	1	0424	0425		IIIG
			CULG				0429		1				IIIB,W
			CULG				0435.5	0437	1				IIIG,W
			CULG				0447.5	0448	1				IIIG,U
			CULG				0458	0459	2				IIIG,V
			CULG				0511.5	0513	2				IIIG,V,U
			CULG				0514.5	0515.5	2				IIIG,V
			CULG				0550.5	0551	1				IIIG,W
			CULG				0628	0628.5	2				IIIG,U
			CULG				0658.5	0700.5	2				IIIG,V
			CULG				0700.5	0704	1				IIIG
			CULG				0713	0714	2				IIIG,V,U
			CULG				0718	0719	1				IIIG,W
			CULG				0729		1				IIIB
	0857	1454	WEIS				0920	0920.2	1				IIIB
			WEIS				0944.1	0951.5	1				IIIG
			WEIS				0952.3	0953.8	2				IIIG,DP,RS
			WEIS				0953	1004	2				IIIGG,DPRS
			WEIS	1107.6	1108	2							IIIG,RS
			WEIS				1131.5	1132.9	2				IIIG,DP
	1400	2336	HARV				1717	1724	1				I
	1610	2200	BOUL				1717.4	1721.2	3	1717.4	1721	3	IIIG
			HARV	1719	1720	2	1719	1720	2	1719	1720	2	IIIGG
	1136	2105	SGMR							1719.5	1720.6		IIIB
			HARV	1722	1724	1							IIIGG
			HARV	1831	1840	3	1831	1839	3	1831	1837	3	IIIGG,V
			SGMR							1831.8	1838.1		IV
			BOUL				1831.9	1839	3	1831.9	1839	3	III
			HARV				1834	1840	3				II
			BOUL				1840.4	1847.6	2	1840.4	1847.6	2	V
			HARV				1854	1920	1				IN
			BOUL				1916.2	1918.9	1	1916.2	1924.4	1	IIIGG
			BOUL				1926.1	1927.8	2	1926.1	1927.8	2	IIIG
	2022	2400	CULG				2153	2158.5	1				IIIGG,N
			HARV	2323	2327	1	2323	2327	2				IIIGG
			CULG				2323.5	2327.5	2				IIIG,V
14	0000	0730	CULG				0114	0115	1				IIIG,W
			CULG				0150	0151	1				IIIG
			CULG				0224	0225	2				IIIG,V,U
			CULG				0345		1				IIIB
			CULG				0600.5	0602	1				IIIG
			CULG				0633	0639	1				IIIGG
			CULG				0634	0636	2				IIIG
			CULG				0721	0728.5	2				IIIGG,V
	0748	1455	WEIS				0852.8	0853	1				IIIB
			WEIS				1031	1032	1				IIIG
			WEIS				1037.2	1043	1				IIIGG
	1152	2105	SGMR							1320	1320.9		IIIB
			SGMR							1340	1345		V B
			WEIS				1340.2	1344	1				IIIG
	1400	2336	HARV	1815	1816	1	1815	1816	2	1815	1816	2	IIIG
	1612	2230	BOUL				1815.8	1816.1	1	1815.8	1816.9	1	III
			BOUL				1900.6	1904.3	2	1900.6	1904.7	2	IIIGG
			HARV	1902	1903	1	1901	1904	2	1902	1904	2	IIIGG
			SGMR							1902	1903.1		IIIB
			HARV	2113		1	2113		2				IIIG

SOLAR RADIO EMISSION
SPECTRAL OBSERVATIONS

DECEMBER 1970

DEC 1970	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.	
14	2022	2400	CULG				2113	2114	1				IIIG
			HARV	2235	2236	1							IIIG
			HARV	2312	2314	1							IIIG
			CULG				2319		1				IIIB,W
			CULG				2355.5	2356.5	2				IIIG,V,U
15	0000	0728	CULG				0000.5	0001	1				IIIG,W
	0729	1454	WEIS										
	1144	2106	SGMR										
	1416	2337	HARV	2106	2107	1	2106	2107	2				IIIG
	2022	2231	CULG	2106	2107	1	2106	2107	1				IIIG,U
	1631	2234	BOUL				2106.6	2106.9	1	2106.6	2106.9	1	III
			CULG				2118.5		1				IIIB,W
			CULG				2213.5		1				IIIB,W
	2344	2400	CULG										
16	0000	0730	CULG				0103	0106	2				IIIGG,V,U
			CULG	0114.5	0115	1	0114.5	0115	1				IIIG,U
	0740	1455	WEIS										
	1146	2106	SGMR										
	1416	2337	HARV				1434	1436	1				IIIGG
	1606	2230	BOUL				1824.3	1824.4	1	1824.3	1824.4	1	III
			HARV				1846	1849	1				IIIG
			BOUL				1848.2	1849.1	1	1848.2	1850.6	1	III
			BOUL				1857.8	1858.4	1	1857.8	1858.5	1	III
	2023	2400	CULG				2104	2400	1				IIIN
			CULG				2104	2400	1				N,RS,DP
			CULG	2131	2131.5	1	2131	2131.5	1				IIIG,U
			HARV	2131	2132	2	2131	2132	2				IIIG
			BOUL				2138.1	2138.8	1	2138.1	2138.7	1	III
			CULG				2249	2249.5	1				IIIG
			CULG				2348.5	2349.5	1				IIIG,U
17	0000	0336	CULG				0000	0336	1				IIINW,RSDP
	0339	0730	CULG				0339	0708.5	1				IIINW,RSDP
			CULG				0353.5	0408	1				IIIG
			CULG				0358.5	0403	2				IIIG
			CULG				0406.5	0408	1				IIIG
			CULG				0430.5	0431.5	1				IIIG
			CULG	0503.5	0504	2	0503.5	0504	3	0504		2	IIIG,V
			CULG				0516	0519.5	1				IIIGG
			CULG				0525.5		1				IIIB,U
			CULG				0550	0615	1				UNCLF
			CULG				0617.5	0618.5	1				II
			CULG	0621.5	0622.5	2	0621.5	0625.5	3	0621.5	0622.5	1	IIIG,V
			CULG				0721	0722.5	2				IIIG
	0749	1455	WEIS				0950	0953	2				IIIGG
			WEIS				1031.5	1033.4	1				IIIG
			WEIS				1039.7	1040	1				IIIB
			WEIS				1144.1	1144.3	1				IIIB
			WEIS				1246.8	1248.4	1				IIIG
			WEIS				1305.4	1310	1				IIIG
	1156	2106	SGMR							1326.9	1327.3		IIIB
			SGMR							1538	1539.1		IIIB
	1416	2337	HARV				1551	1553	2	1551	1553	2	IIIG
			SGMR							1551.8	1553		IIIB
	1620	2315	BOUL				1617.8	1618.1	2	1617.8	1618.2	2	III
			BOUL				1622.4	1622.5	1	1622.4	1622.7	1	III
			BOUL				1743.3	1747.7	2	1743.3	1749.4	2	IIIGG
			BOUL				1900	2322	2	1900	2322	2	CONT
			BOUL				1922.2	1923.4	2				IIIGG
			HARV	1923	1924	2	1922	1924	2	1922	1924	2	IIIGG
			SGMR							1923.4	1924.1		IIIB
			BOUL				1923.4	1924.2	3	1923.4	1924.2	3	III
			SGMR							1923.4	2030		CONT
			HARV				1932	1939	1	1936		1	IIIGG
			BOUL				1935	1939.4	2	1935	1941.8	2	IIIGG
			SGMR							1935.5	1936.3		IIIB
			SGMR							1944.8	1945.5		IIIB
			BOUL				1944.8	1955.5	3	1944.8	1958.5	3	IIIGG
			HARV	1945		1	1945		2	1945		2	IIIGG
			HARV				1949	1953	1				IIIGG
			HARV				2000	2055	1				IIIN
	2022	2400	CULG				2023	2400	1				IIIG,N
			HARV	2049	2051	2	2049	2050	1				IIIGG
			CULG				2049	2051.5	2				IIIG,V,U
			BOUL				2049.1	2050.7	3	2049.1	2051.5	3	IIIG
			CULG				2054.5		2				IIIB,U
			HARV	2106	2107	3	2106	2107	2	2106	2107	1	IIIGG
			CULG	2106.5	2107	2	2106.5	2107	2				IIIG
			CULG				2201	2204	2				IIIG,V
			BOUL				2201.8	2204.3	3	2201.8	2204.3	3	III
			HARV	2202	2204	2	2202	2204	2	2202	2204	2	IIIGG
			CULG	2206.5	2208	2	2206.5	2208	2				IIIG
			HARV	2207	2212	1	2207	2212	2				IIIGG
			CULG				2209.5	2212.5	2				IIIG,U
			CULG				2244.5		1				IIIB
			HARV				2251	2330	1				IN
			CULG				2307.5	2309.5	2				IIIG,DP

SOLAR RADIO EMISSION
SPECTRAL OBSERVATIONS

DECEMBER 1970

DEC. 1970	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.	
17			CULG				2352.5	2358	3				IIIGG
18	0000	0730	CULG				0000	0730	1				IIIN,DP
			CULG	0035	0036	1	0035	0037	3	0035.5	0036	2	IIIG,V
			CULG				0108.5	0110	2				IIIG
			CULG				0114.5	0117.5	2				IIIG,U
			CULG				0121.5	0123.5	1				IIIG
			CULG				0127.5	0133.5	2				IIIG
			CULG				0203	0204	3				IIIG
			CULG				0210	0212	2				IIIG
			CULG				0227	0227.5	2				IIIG
			CULG				0228.5	0230	3	0228.5	0229.5	1	IIIG,V
			CULG				0307.5	0309.5	2				IIIG,V
			CULG				0349.5	0350.5	2				IIIG,U
			CULG				0353	0355	2	0353	0353.5	1	IIIG,V
			CULG				0442.5	0444	2				IIIG
			CULG				0448.5	0449.5	1				IIIG
			CULG				0453.5	0454	1				IIIG
			CULG				0457	0457.5	1				IIIG
			CULG				0510.5	0514.5	2				IIIG
			CULG				0548		2				IIIB
			CULG				0552.5		2				IIIB
			CULG				0555.5	0730	2				I
			CULG				0610	0611.5	2				IIIG
	0749	1455	WEIS				0815	1249	1				IN
	1155	2107	SGMR							1301	2107		IV
			WEIS				1350.7	1351.2	1				IIIG
	1415	2337	HARV				1415	1820	1				IN
			HARV				1426	1428	1				IIIG
			SGMR							1426.4	1427		IIIB
			WEIS				1426.7	1427.1	1				IIIG
	1610	2335	BOUL				1609.8E	2335 D	3	1609.8E	2335 D	3	CONT
			HARV	1735	1739	1	1732	1739	1	1734	1739	2	IIIGG
			SGMR							1738.6	1739		IIIB
			BOUL				1810.3	1812.6	3	1810.3	1812.6	3	III
			HARV				1820	1840	1	1811	1812	1	I
			HARV				1840	2333	1				IN
			HARV				2011	2013	1	2011	2013	1	IIIG
	2022	2400	CULG				2022	2400	1				IIIN,DP
			HARV				2024	2207	1				IIIN
			CULG				2025	2025.5	2				IIIG
			CULG				2042	2042.5	2				IIIG
			CULG				2101.5		2				IIIB
			CULG				2112.5	2113.5	2				IIIG,U
			CULG				2118	2120	2				IIIG
			HARV	2144	2145	2	2144	2145	1				IIIGG
			CULG				2206.5		2				IIIB,U
			CULG				2219.5		1				IIIB
			CULG				2220	2225	2				UNCLF
			HARV	2221	2224	2	2220	2225	1				IIIGG
			CULG				2222	2400	1				IS
			CULG				2232	2233	2				IIIG
			CULG				2237	2240	1				IIIG
			HARV				2328	2329	2				IIIG
			CULG				2355	2357	2				IIIG,V
19	0000	0730	CULG				0000	0730	1				IS
			CULG				0000	0730	1				IIIN,RS,DP
			CULG				0020	0135	2				I
			CULG	0513	0513.5	1							IIIG,W
			CULG				0532.5	0533	2				IIIG
			CULG				0640.5	0645	2				IIIG
			CULG				0655	0656	2				IIIG
	0910	1455	WEIS				0805	1455	1				IS
	0753	0905	WEIS				0813	0820	3				IIIGG
			WEIS				0933	0933.5	1				UNCLF
			WEIS				0958	1003	1				IIIG
			WEIS				1130.4	1130.8	1				IIIG
	1156	2114	SGMR							1219.9	2114		IV
			WEIS				1259	1259.7	1				IIIG
			WEIS				1345.7	1347.2	2				IIIG
	1415	2338	HARV				1416	2335	2				IC
			HARV	1434	2335	1							IN
			WEIS				1434.1	1435.6	2				IIIG
			WEIS				1442.6	1443.1	2				IIIG
			HARV	1538	1542	2	1539	1545	2	1545		2	IIIGG
			HARV	1545	1548	2							IIIGG
			HARV				1552		2				IIIG
			HARV	1604	1605	1							IIIG
			HARV	1626	1627	2	1626	1627	2				IIIG
			HARV	1654	1659	1	1654	1659	2				IIIGG
			HARV	2021	2022	2	2021	2022	1				IIIG
	2022	2400	CULG				2022	2400	2				IS,CONT
			CULG				2022	2400	2				IIIS
			HARV	2040	2041	1	2040	2041	3	2040	2041	2	IIIGG
			HARV	2053		2	2053		2	2053		2	IIIG
			CULG				2053	2053.5	3				IIIG
			HARV	2057	2058	2							IIIG
			HARV	2106	2108	2	2106	2108	2				IIIGG

SOLAR RADIO EMISSION
SPECTRAL OBSERVATIONS

DECEMBER 1970

DEC 1970	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.	
19			HARV	2155	2156	2	2155	2156	2				IIIGG
			HARV				2244	2251	1				UNCLF
			HARV	2255	2257	2	2255	2257	2				IIIGG
			CULG	2255.5	2256	1							IIIG
			HARV	2308	2311	1	2308	2311	2				IIIGG
			CULG				2308	2312	3				IIIGG
			CULG	2323	2324.5	1	2323	2324.5	2				IIIG
			HARV	2323	2326	2	2323	2325	2				IIIGG
			HARV	2329	2331	2	2329	2331	2				IIIGG
			CULG	2329.5	2330.5	1	2328.5	2331.5	2				IIIG
			HARV	2334	2335	3	2334	2335	2				IIIGG
			CULG	2334.5	2335	1	2333.5	2339	2	2334	2335	2	IIIGG
			CULG	2341		1							IIIB
			CULG				2343.5	2347.5	1	2343.5	2347.5	1	IIIGG
20	0000	0727	CULG				0000	0727	2				IS,CONT
			CULG				0002.5	0004.5	2	0002.5	0003.5	1	IIIG
			CULG				0021	0021.5	2				IIIG
			CULG				0125.5	0126	2				IIIG
			CULG				0232	0232.5	2				IIIG
			CULG				0251	0253	2				IIIG
			CULG				0310	0430	1				
			CULG				0431.5	0432	2				IIIG
			CULG				0500	0725	1				
			CULG				0512	0512.5	2				IIIG
			CULG				0515	0515.5	2				IIIG
	0755	1455	WEIS				0758	1455	1				IS,CONT
			WEIS				1058.6	1100	2				IIIG,RS
	1155	2107	SGMR							1224	2107		IV
			WEIS				1350.2	1351.2	2				IIIG
	1416	2339	HARV				1416	2339	1				IC
	2022	2400	CULG				2022	2400	2				IS,CONT
			CULG				2026	2027	2				IIIG
			CULG				2028.5	2400	1				IIIN
			CULG				2044	2044.5	2				IIIG,U
			HARV	2127		2							IIIG
			HARV	2234	2235	2	2234	2235	2				IIIGG
			CULG	2234	2235.5	1	2234	2235	1				IIIG,U
			CULG				2245	2255	1				
			CULG				2330	2337	1				
21	0000	0729	CULG				0000	0713.5	1				IIIN
			CULG				0000	0728	2				IS
			CULG				0024	0405	1				
			CULG				0205	0210	2				IIIG
			CULG				0302	0304.5	2				IIIG
			CULG				0306	0307.5	2				IIIG
			CULG				0314		2				IIIB
			CULG				0338.5	0339	2				IIIG
			CULG				0344.5	0345	2				IIIG
			CULG				0349	0350	2				IIIG,U
			CULG				0429.5	0431.5	2				IIIG
			CULG				0435	0436	2				IIIG
			CULG				0540.5	0541	2				IIIG
			CULG	0558.5	0559	1	0556	0559.5	2	0558.5	0559	1	IIIGG
			CULG				0601	0601.5	2				IIIG
			CULG				0602.5	0606	2				IIIG
			CULG				0654.4	0655	2				IIIG
	0754	1155	WEIS				0757	1436	1				IS
			WEIS				0902.3	0904.8	3				IIIG,DP
			WEIS				1021.3	1021.9	1				IIIG,RS
	1150	2108	SGMR										
	1214	1455	WEIS				1248.5	1250.7	1				IIIG,RS
	1416	2339	HARV				1416	2339	2				I
	1635	2245	BOUL				1635	1935	2				
			BOUL				1731	1731.4	1				III
			BOUL				1736.6	1736.9	1				III
			BOUL				1919.9	1920.3	1				IIIG
	2022	2400	CULG				2022	2400	1				IIIN
			CULG				2022	2400	2				I
			BOUL				2036.6	2038.3	1	2036.6	2038.3	1	IIIG
			BOUL				2138.8	2140	1	2138.8	2140.2	1	III
			CULG				2147	2147.5	2				IIIG,U
			BOUL				2147	2149	2	2148.2	2150.5	2	IIIG
			CULG				2154	2154.5	2				IIIB,U
			BOUL				2154.3	2156.7	2	2154.4	2157.4	2	IIIG
			CULG				2155	2156.5	2				IIIG,U
			BOUL				2203.8	2204.2	1				III
			CULG				2214.5	2216.5	1				IIIG,U
			BOUL				2214.8	2218	3	2214.5	2219.4	3	IIIGG
			HARV	2216	2217	2	2215	2218	3	2217	2218	3	IIIGG,V,U
			CULG				2217		3				IIIB,V
			BOUL				2237.1	2237.7	1	2237.1	2237.8	1	IIIG
			CULG				2324	2325	2				IIIG,U

SOLAR RADIO EMISSION
SPECTRAL OBSERVATIONS

DECEMBER 1970

DEC 1970	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.	
22	0000	0730	CULG				0000	0711	1				IIIN
			CULG				0000	0719	1				I
			CULG				0214	0215	2				IIIG
			CULG				0318	0319.5	2				IIIG
			CULG				0407.5	0408	1				IIIG
			CULG				0409.5	0411	2				IIIG
			CULG				0441	0443.5	2				IIIG
			CULG				0508.5	0511	2				IIIG
			CULG				0517	0524	1				IIIG
	0755	1456	WEIS				1309.2	1310.2	1				IIIG
	1416	2339	HARV				1416	1840	1				IN
			HARV	1517	1519	2							IIIGG
			HARV				1730	1851	1	1730	1738	1	IIIN
	1648	2215	BOUL				1730.2	1730.7	2	1730.2	1730.9	2	IIIG
			BOUL				1738	1738.4	1	1738	1738.4	1	IIIG
			HARV				1805	1809	2	1805	1809	2	IIIGG
			BOUL				1805.3	1809.5	3	1805.3	1809.5	3	IIIGG
			HARV	1832		1	1832	1833	2	1832	1833	3	IIIGG
	1147	2108	SGMR							1832.2	1832.7		IIIB
			BOUL				1837.2	1837.8	2	1837.2	1838	2	III
			HARV				1840	2338	1				I
			BOUL				1842.3	1843.3	1	1842.3	1842.5	1	IIIG
			BOUL				1853.1	1853.3	1				III
			BOUL				1910	2100	2	1910	2100	2	CONT
			HARV				1918	1920	2	1918	1920	1	IIIGG
			BOUL				1918.5	1931.2	3	1918.5	1931.2	3	IIIGG
			HARV				1922	1928	2				UNCLF
			HARV	1924	1928	2	1922	1929	2				IIIGG
	2022	2400	CULG				2022	2400	1				I
			CULG				2031	2400	1				IIIN
			BOUL				2128.2	2131	1	2128.2	2131	1	IIIG
			CULG				2159	2200	2				IIIG
			BOUL				2159.1	2200.5	2	2159.1	2200.5	2	IIIG
			BOUL				2209.5	2209.8	1	2209.5	2209.8	1	III
			CULG				2345	2347	2				IIIG
			CULG	2353.5	2354	1	2353	2354.5	1	2353.5	2354	1	IIIG
23	0000	0729	CULG				0000	0721.5	1				IIIN
			CULG				0000	0729	1				I
			CULG				0002.5	0005.5	1				IIIGG,V,U
			CULG				0020.5	0021.5	1				IIIG
			CULG				0154.5	0157	2				IIIG
			CULG				0204.5	0208	2	0205	0205.5	1	IIIG,V
			CULG				0210	0211	2				IIIG
			CULG				0221	0222	2				IIIG,U
			CULG				0224		2				IIIB
			CULG				0244.5		1				IIIB,U
			CULG				0305	0306	2	0305	0306	1	IIIG,V
			CULG				0307.5	0308	3	0307.5	0308	1	IIIG
			CULG				0313	0315	3	0313	0315	2	IIIG,V
			CULG				0316	0318	2				IIIG
			CULG				0333	0336	1				IIIG
			CULG				0347	0348	1				IIIG,U
			CULG				0417.5	0418.5	1				IIIG
			CULG				0431.5	0432	1				IIIG
			CULG				0446	0448.5	1				IIIG,V
			CULG				0500.5	0501	2				IIIG
			CULG				0504	0505	1				IIIG,V,U
			CULG				0518.5	0521	2				IIIG,V,U
			CULG				0603	0610	2				IIIG
			CULG				0616	0616.5	1				IIIG,U
			CULG				0618	0620	2				IIIG,V
			CULG				0624.5	0625	3				IIIG,V
			CULG				0630.5		1				IIIB
			CULG				0633.5		2				IIIB,V
			CULG				0641.5	0643.5	1				IIIG
			CULG				0709	0710	2				IIIG
			CULG				0719	0720.5	1				IIIG
			CULG				0723.5	0726	3				IIIG,V
	0757	1335	WEIS				0800	1440	1				IN
			WEIS				0801	0808	2				IIIGG,DP
			WEIS				0954	0956	3				IIIG
			WEIS				1211.9	1214	2				UNCLF
	1139	2109	SGMR							1301	1302		IIIB
			SGMR							1306	1307		IIIB
			SGMR							1344	1344.7		IIIB
	1416	2340	HARV				1416	2340	1				I
			HARV				1432	1437	1				IIIGG
	1346	1457	WEIS				1433.1	1434.2	1				IIIG
			SGMR							1433.9	1434.8		IIIB
			HARV				1448	1451	1				IIIG
	1346	1457	WEIS				1449.6	1450.5	1				IIIG
			SGMR							1449.8	1450.9		IIIB
			SGMR							1455.5	1457		IIIG
			WEIS				1456	1456.6	1				IIIG
			HARV				1606	1608	2	1607		1	IIIGG
	1721	2325	BOUL				1710 E	1850	2	1710 E	1850	2	CONT
			BOUL				1710 E	1850	2				
			HARV				1732	1734	2	1732	1734	2	IIIGG

SOLAR RADIO EMISSION
SPECTRAL OBSERVATIONS

DECEMBER 1970

DEC 1970	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.	
23			BOUL				1732.5	1734.8	3	1732.0	1735.6	3	IIIG
			SGMR							1732.8	1734.2		IIIG
			HARV				1740	1741	2	1741		1	IIIG,U
			BOUL				1740.1	1741.2	2	1740.0	1742.1	2	IIIG
			BOUL				1816.5	1816.7	2	1816.6	1817	2	III
			HARV				1822	1823	2	1822	1823	2	IIIG
			BOUL				1822.3	1823.3	2	1822.5	1823.6	2	III
			SGMR							1822.4	1823		IIIB
			SGMR							1844.8	1846		IIIB
			HARV				1845	1846	1	1845	1846	1	IIIG
			BOUL				1845	1846.1	2	1845	1846.2	2	III
			BOUL				1853.5	1854.2	2	1853.6	1854.5	2	III
			SGMR							1853.7	1854.2		IIIB
			BOUL				1916.3	1916.4	1	1916.3	1916.6	1	IIIG
			BOUL				1945	2210	2	1945	2210	2	CONT
	2022	2400	CULG				2022	2400	1				I
			CULG				2037	2359	1				IIIN
			BOUL				2049.9	2053.1	3	2049.9	2053.8	3	IIIGG
			CULG				2050	2052	2				IIIG,U
			HARV				2050	2053	2	2050	2053	2	IIIGG
			HARV				2132	2133	1				IIIG
			CULG				2132	2145	1				IIIGG
			HARV				2221	2222	3				IIIGG,U
			CULG				2221	2223	2				IIIG,V,U
			BOUL				2221.3	2223	3	2221.3	2222.8	3	III
			CULG				2236.5	2237	1				IIIG
			BOUL				2236.6	2240.4	1	2236.6	2240.4	1	IIIG
			CULG				2240.5		1				IIIB
			BOUL				2302.5	2304.8	1	2302.5	2304.9	1	IIIG
			CULG				2303.5	2305	1				IIIG,U
			CULG				2315.5	2325.5	2				IIIGG
			BOUL				2315.6	2321.2	2	2315.6	2321.6	2	IIIG
			HARV	2316	2317	1	2315	2321	2				IIIGG
			HARV	2335	2336	2	2335	2337	2				IIIG
			CULG	2335.5	2336	2	2335.5	2336	2				IIIG,L
			CULG				2335.5	2342	1				IIIGG
24	0000	0730	CULG				0020.5	0022	1				IIIG
			CULG				0024.5	0025	2				IIIG
			CULG				0039	0040.5	2				IIIG
			CULG				0045	0100	1				IIIN
			CULG				0045	0100	1				IW
			CULG				0118.5	0121	1				IIIG,U
			CULG				0145	0146	1				IIIG,V
			CULG				0203	0204	1				IIIG,U
			CULG				0213	0215.5	2				IIIG,V,U
			CULG				0221	0223	1				IIIG,U
			CULG				0601.5		2				IIIB,U
			CULG				0604	0605.5	2				IIIG,U
			CULG				0651	0653	1				IIIG
	0756	1456	WEIS				0825	1151	1				IN
			WEIS				1241	1242	2				IIIGG,DPRS
			WEIS	1327	1328.5	1							IIIG
			WEIS				1348.5	1354	3				IIIG
	1152	2109	SGMR							1351.9	1352.4		IIIB
	1416	2341	HARV				1416	2206	1				IN
			HARV				1526	1527	1				IIIG
			HARV				1816	1818	1				IIIG
			HARV				1930	1932	1				IIIGG
			HARV				1935	1936	1				IIIG
	2022	2400	CULG				2022	2242.5	1				I
			CULG				2026	2231	1				IIIN,W
			CULG				2045	2046	1				IIIG
			CULG				2100.5	2103	1				IIIG
			CULG				2116.5	2120	1				IIIG
			CULG				2310.5	2311.5	1				IIIG
25	0000	0716	CULG	0017.5	0018	1							IIIG
			CULG				0042.5	0044	1				IIIG,W
			CULG				0153	0155	2				IIIG,V,U
			CULG				0209		1				IIIB,W
			CULG				0220.5		1				IIIB
			CULG	0223	0228	1	0222.5	0225	2	0222	0225	1	IIIG,V
			CULG				0225	0228	2				IIIG
			CULG				0259.5	0302.5	1				IIIG
			CULG				0313	0316	2				IIIG
			CULG				0327	0355.5	1				IIIGG
			CULG				0333	0446.5	1				I
			CULG				0333.5	0355	2				IIIGG
			CULG				0400	0502	1				
			CULG				0400	0700	1				I
			CULG				0416.5	0420	1				IIIG
			CULG				0517.5		2				IIIB
			CULG				0600	0601	2				IIIG,U
			CULG				0628	0629	1				IIIG
	0755	1456	WEIS										
	1157	2110	SGMR										
	1416	2342	HARV										
	2022	2400	CULG				2054	2358	1				IIIN,W

SOLAR RADIO EMISSION
SPECTRAL OBSERVATIONS

DECEMBER 1970

DEC 1970	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.	
25			CULG				2145.5		2				IIIB
			CULG				2212	2215	2				IIIG
			CULG				2251.5		2				IIIB
			CULG				2339	2339.5	1				IIIG
26	0000	0729	CULG				0008.5	0656	1				IIIN,W
			CULG				0025	0025.5	1	0025	0025.5	1	IIIG
			CULG				0054		1				IIIB
			CULG				0056.5	0057	2				IIIG
			CULG				0114		2				IIIB
			CULG				0150	0156	2				IIIG
			CULG				0202		1				IIIB
			CULG				0208		1				IIIB
			CULG				0212	0213	2				IIIG
			CULG				0253	0254	2				IIIG
			CULG				0315	0320	2				IIIGG
			CULG				0316.5	0319.5	2				IIIGG
			CULG				0524.5		1				IIIB
			CULG	0545	0546	1	0545	0546	2				IIIG
			CULG				0547.5	0549	1				IIIG
			CULG				0558		1				IIIB
			CULG				0605		1				IIIB
			CULG				0613		1				IIIB
	0755	0940	WEIS				0840	0843.6	1				IIIG
	0944	1500	WEIS				1031.4	1032.4	1				IIIG
			WEIS				1135	1135.6	2				IIIG,RS
	1205	2111	SGMR							1307.5	1311.5		IIIG
	1416	2342	HARV	1458	1500	1	1458	1502	1				IIIG
			SGMR							1458.3	1502		IIIG
			HARV	2041	2048	1	2046	2048	1				I
	2023	2400	CULG				2234.5	2241.5	1				IIIGG
			HARV	2239		2	2239		1				IIIG
			CULG				2254.5	2255.5	1				IIIG
			CULG				2305	2306.5	1				IIIG,W
27	0000	0729	CULG				0320.5	0321.5	1				IIIG,U
			CULG				0324.5		1				IIIB
			CULG				0348.5	0350.5	1				IIIG,W
			CULG				0426	0429	2				IIIG,V,U
			CULG				0429.5		1				IIIB,W
			CULG				0552.5	0554.5	1				IIIG,U
			CULG				0556	0559	1				IIIG,W,U
			CULG				0655	0657.5	1				IIIG,W
	0755	1459	WEIS										
	1202	2112	SGMR							1734.9	1735.2		IIIB
	1416	2343	HARV	1735	1736	1	1735	1736	2	1735	1736	2	IIIG,U
	2022	2400	CULG				2112	2114	1				I
			CULG				2125	2127.5	1				IIIG
			CULG				2137.5	2138.5	1				IIIG
28	0000	0729	CULG										
	0757	1458	WEIS										
	1201	2114	SGMR										
	1416	2344	HARV										
	1641	2230	BOUL										
	2022	2400	CULG										
29	0000	0730	CULG				0226	0226.5	1				IIIG,W
	0940	1501	WEIS										
	1140	2113	SGMR										
	0757	0933	WEIS				1331.5	1333.5	1				UNCLF
	1416	2345	HARV										
	1649	2309	BOUL										
	2022	2400	CULG				2335	2335.5	1				IIIG
30	0000	0729	CULG				0140.5		1				IIIB,U
			CULG				0152.5	0153	1				IIIG
			CULG				0159.5	0201	1				IIIG,U
			CULG				0205.5	0206.5	1				IIIG,W
			CULG				0208.5	0212	1				I
			CULG				0307.5		1				IIIB,W
	0756	1501	WEIS	1351	1351.4	1							IIIG
			WEIS	1411.1	1411.5	1							IIIG
	1416	2346	HARV	1451	1453	2	1451	1452	1				IIIGG
			HARV	1508	1509	1							IIIG
			HARV	1512	1514	2							IIIGG
			HARV	1522	1525	2	1523	1525	2				IIIGG
			HARV	1541	1544	2							IIIG
			HARV	1548	1552	1	1548	1552	2				IIIG
			HARV	1647	1653	2							IIIGG,V
			HARV				1647	2336	1				IN
			HARV	1722	1726	3	1723	1724	2	1723	1724	2	IIIGG
	1720	2305	BOUL				1723.2	1724.3	1	1723.3	1724.7	1	IIIG
			HARV	1727	1731	2							UNCLF
			HARV	1730	1731	3							IIIG
			HARV	1752	1756	2	1752	1758	2	1754	1756	2	IIIGG
	1149	2114	SGMR							1754.2	1755.1		IIIB
			BOUL				1754.3	1755.8	2	1754.4	1756.3	2	IIIG
			HARV	1825	1832	3							IIIGG

SOLAR RADIO EMISSION
SPECTRAL OBSERVATIONS

DECEMBER 1970

DEC 1970	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.	
30			HARV	1835	1836	2	1836	1837	2				IIIG
			HARV	1839	1841	3							IIIGG
			BOUL				1845.5	1847.5	2	1845.6	1847.6	2	IIIG
			HARV	1846	1851	2	1845	1848	2	1845	1846	1	IIIGG
			SGMR							1846.3	1846.7		IIIB
			HARV	1908	1910	2	1908	1910	3	1910		3	IIIGG
			SGMR							1910	1910.5		IIIB
			BOUL				1910.1	1910.5	2	1910	1910.5	2	III
			HARV	1917	1921	2	1917	1921	2				IIIGG
			BOUL				1918.5	1921.2	1	1918.3	1921.5	1	IIIG
			HARV	1929	1930	2	1929	1930	2				IIIGG
			BOUL				1930.1	1930.6	2	1930.2	1930.8	2	III
			HARV	2010	2014	3	2010	2014	2				IIIGG
			HARV	2044	2045	2	2044	2045	1				IIIG
	2023	2400	CULG	2044.5		1							IIIB
			CULG				2048	2048.5	2				IIIG
			BOUL				2048.2	2048.8	2	2048.3	2048.9	2	III
			CULG				2055.5	2317	1				I
			CULG	2059		1							IIIB
			HARV	2059	2102	2	2100	2102	3				IIIGG
			CULG	2100	2102	1	2100	2102	2				IIIGG,U
			BOUL				2100.8	2102.1	2	2100.7	2102.2	2	IIIG
			CULG				2143	2212	1				IIIN,W
			BOUL				2303.8	2304.1	1				III
			CULG				2304		1				IIIB,U
			HARV	2313	2315	1							IIIG
			CULG				2317	2400	1				IW
			CULG	2318	2318.5	1	2318	2318.5	1				IIIG,V,U
			HARV	2318	2319	3	2318	2319	1				IIIGG
			CULG				2338.5	2339	1				IIIG
			HARV	2339	2341	2	2339	2340	2				IIIG
31	0000	0729	CULG	0001.5	0002.5	1	0001.5	0002.5	1				IIIG
			CULG	0006.5	0007	1							IIIG
			CULG				0020		1				IIIB,W
			CULG	0045	0046.5	1							IIIG
			CULG	0048.5	0049.5	1							IIIG
			CULG	0204	0204.5	1							IIIG
			CULG	0244	0245.5	1							IIIG
			CULG				0318.5	0320					IW
			CULG				0337						IIIB,W
			CULG	0654.5	0655.5	1							IIIG
	0755	1458	WEIS										
	1219	2114	SGMR										
	1415	2346	HARV				1415	1515	1				IN
	1654	2230	BOUL										
	2022	2400	CULG										

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

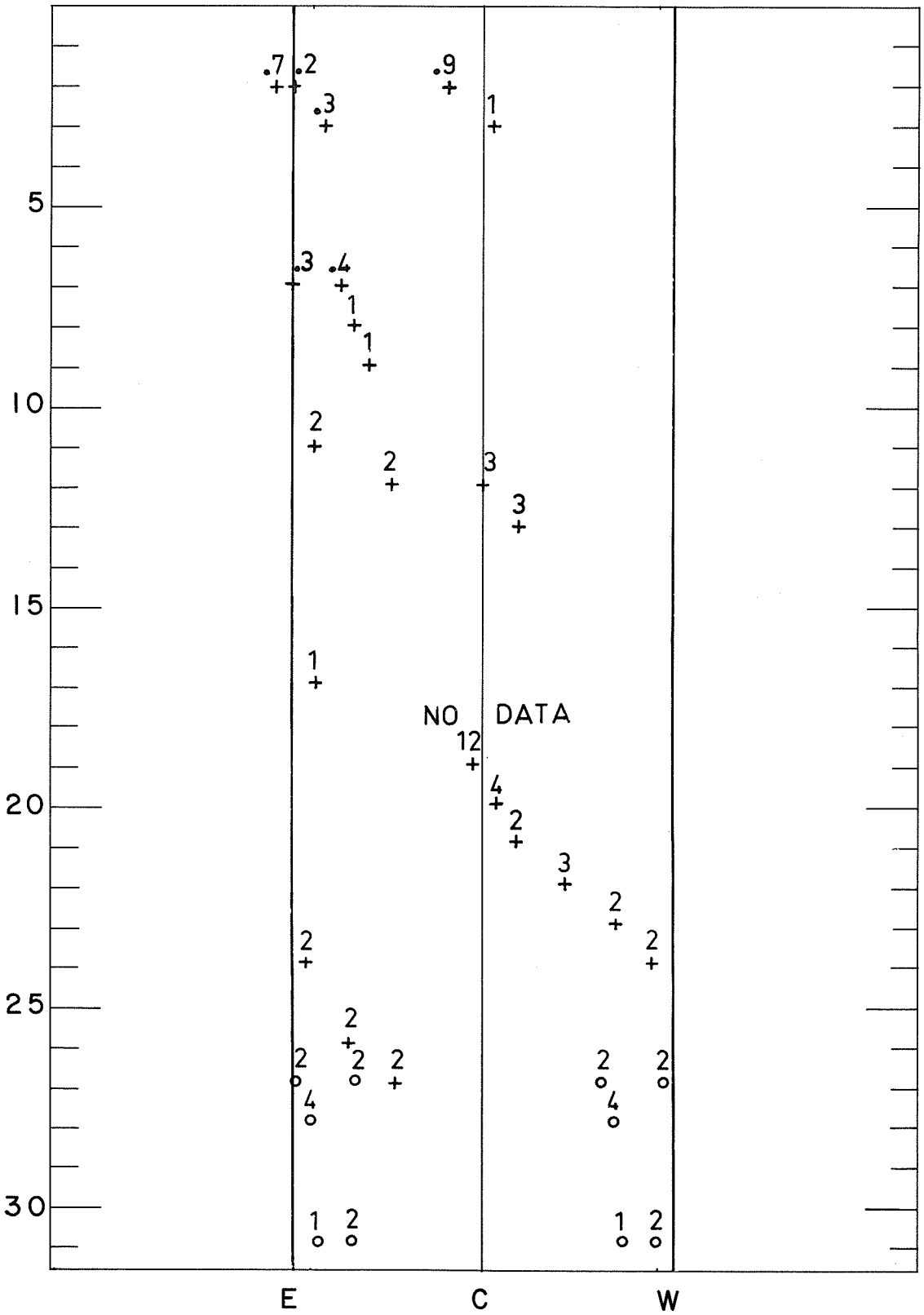
U = U-shaped burst of Type III
RS = Reverse slope burst
DP = Drifting pairs
DC = Drifting Chains
H = Herringbone
W = Weak
CONT = Continuum
UNCLF = Unclassified activity

Notes: No report for December 1970 has been received from Clark Lake Radio Observatory. The data for November 1970 from Weissenau are published in the Miscellanea section of this issue.

SOLAR RADIO EMISSION
INTERFEROMETRIC OBSERVATION

DECEMBER 1970

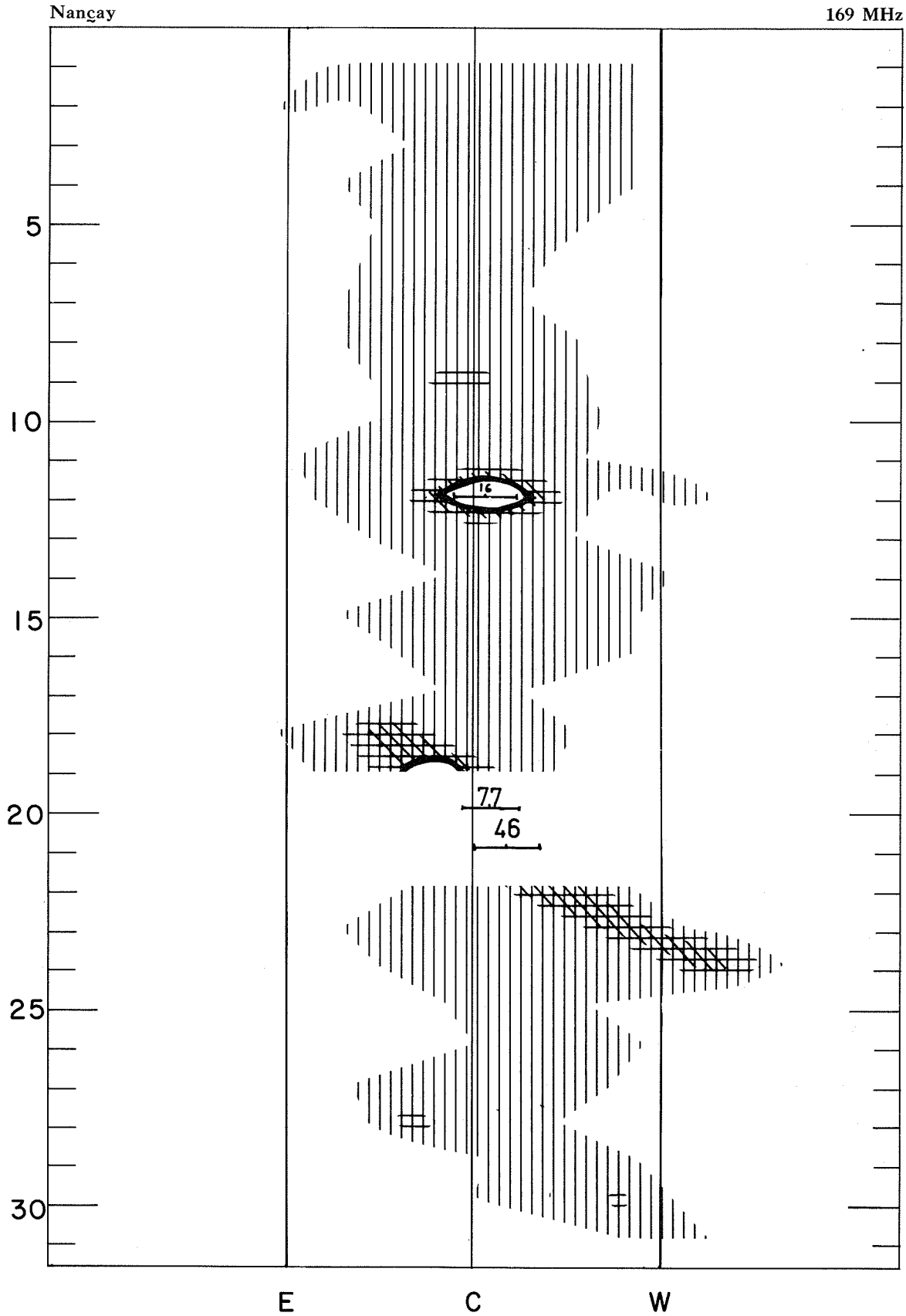
Nançay 408 MHz



Because of the distance between the main lobes there is sometimes an ambiguity about the position East or West of the Center of Activity. The two possible positions are indicated by circles on the chart.

SOLAR RADIO EMISSION
INTERFEROMETRIC OBSERVATION

DECEMBER 1970



COSMIC RAY INDICES
(Neutron Monitors)

DECEMBER 1970

Dec. 1970	CHURCHILL DAILY AVERAGE COUNTS PER HOUR	DEEP RIVER DAILY AVERAGE COUNTS PER HOUR	CLIMAX DAILY AVERAGE COUNTS PER HOUR	DALLAS DAILY AVERAGE COUNTS PER HOUR
1	5974.1	6524.7	3889.4	5970.9
2	6015.9	6554.6	3919.9	6001.9
3	6052.9	6593.0	3914.0	6011.1
4	6061.7	6603.5	3918.3	6030.8
5	6015.6	6554.1	3880.5	5984.5
6	5996.6	6547.1	3868.2	5989.3
7	5964.8	6534.7	3861.9	5981.5
8	5871.2	6434.9	3810.5	5906.7
9	5913.2	6434.7	3825.5	5896.9
10	5899.8	6436.8	3824.1	5896.3
11	5928.1	6459.8	3813.6	5911.0
12	5950.3	6500.0	3842.8	5950.2
13	6029.0	6591.5	3921.8	6038.2
14	5900.3	6440.2	3850.6*	5939.5
15	5841.8	6379.3	3802.1*	5899.1
16	5926.3	6483.2	3861.6	5980.1
17	5997.7	6536.1	3940.3	6027.3
18	5999.5	6528.6	3919.2	6002.0
19	6006.5	6506.1	3897.7	5998.1
20	6024.5	6536.9	3907.1	5997.3
21	6042.6	6543.0	3918.5	5986.9
22	6089.6	6592.1	3946.8	5994.0
23	6088.5	6601.8	3940.7	6031.1
24	6088.5	6591.0	3950.1	6039.3
25	6089.3	6606.3	3949.5	6042.9
26	6046.9	6570.6	3909.6	6019.8
27	6042.8	6597.7	3930.0	6029.8
28	6054.4	6588.5	3940.6	6022.7
29	6073.4	6625.8	3971.0	6072.2
30	6038.5	6592.1	3943.8	6029.4
31	6009.5	6564.5	3902.6	6018.2

( ) Number of hours for which data are available if less than 24.
* Sum of both sections less than 40 hours.

Churchill Super Neutron Monitor, Scaling Factor 120.

Deep River Neutron Monitor, Scaling Factor 300.

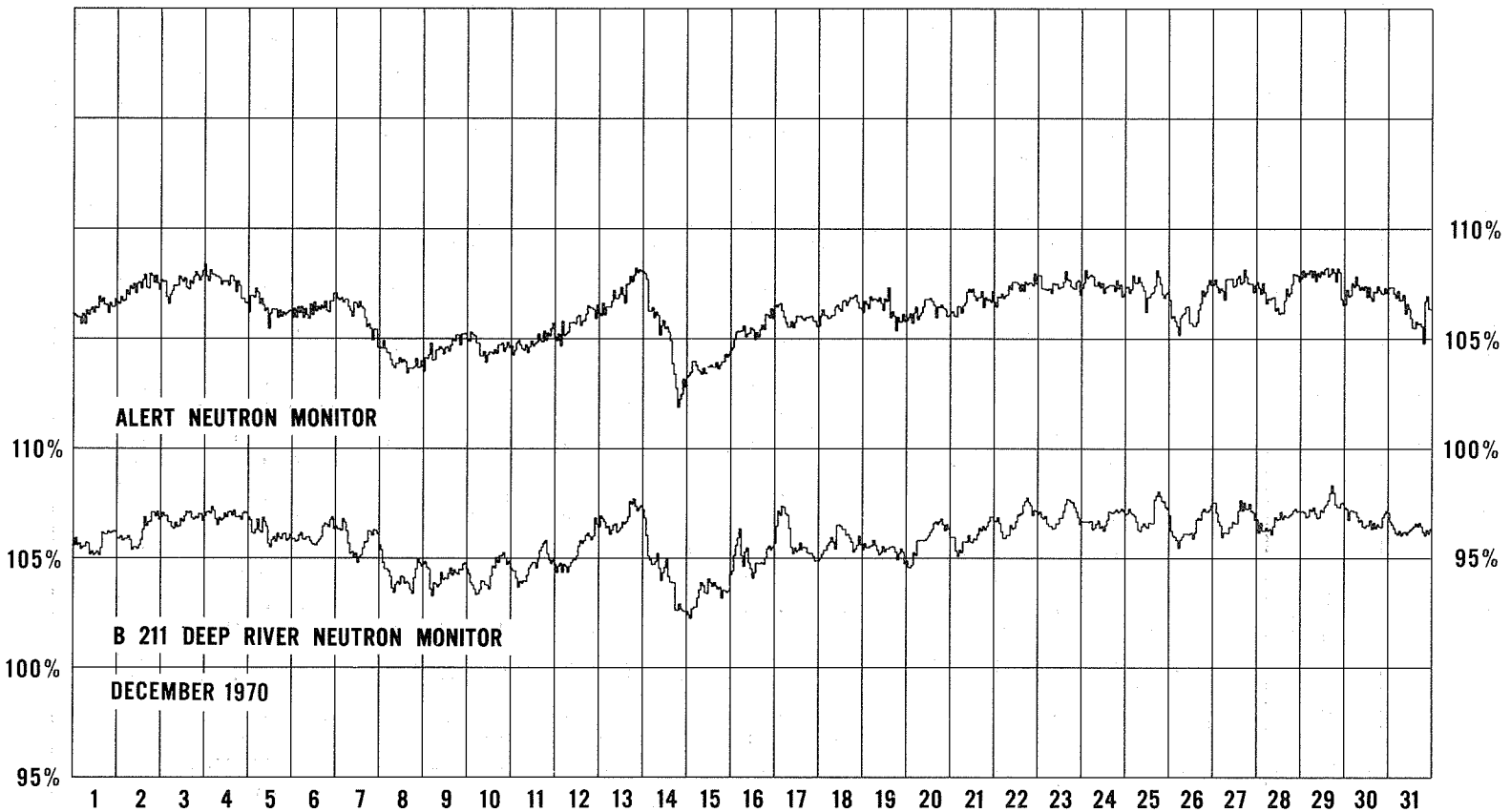
Climax IGC Station B305, Scaling Factor 100. One section normalized by multiplicative factor.

Dallas Super Neutron Monitor, Scaling Factor 120.

COSMIC RAY INDICES

(Pressure Corrected Hourly Totals)

DECEMBER 1970



GEOMAGNETIC ACTIVITY INDICES

DECEMBER 1970

DAY		K_p THREE-HOUR RANGE INDICES 1	2	3	4	5	6	7	8	SUM	C_i	C_p	A_p
1	QQ	0+	0	0	0	0	0+	0+	0+	1+	0.0	0.0	1
2		1−	0	0	0	2	2	3−	1	8+	0.2	0.1	4
3		2+	1−	2−	1	0+	1−	0	1	8−	0.1	0.1	4
4		0+	0	1−	1+	1−	1	3−	2+	9	0.3	0.2	5
5		2	3−	2	3−	1+	3−	1	0+	15−	0.6	0.4	8
6		1+	1+	3+	2	2+	2+	1	1	15−	0.5	0.4	8
7		1	1+	2	1+	2	2−	2+	3+	15	0.6	0.4	8
8	D	4−	5−	3+	4−	4	1+	3−	2−	25	1.1	1.0	19
9		2	2	2−	3−	2−	1	1−	0+	12	0.2	0.3	6
10	QQ	1−	0+	0+	1	1	1−	1	0+	5+	0.1	0.1	3
11	QQ	0	0+	1−	1−	0+	0	0+	0+	3−	0.0	0.0	2
12	Q	1	0+	0+	1+	1+	1−	1−	1	7−	0.1	0.1	4
13		2	1+	0+	1−	0+	1+	1+	2	9+	0.2	0.2	4
14	D	4−	6	8+	5	4+	3	4+	5+	40	1.7	1.7	65
15	D	4+	3+	3+	3−	3	2+	1+	1+	22−	0.7	0.8	14
16	Q	2−	1−	1−	1−	0+	1−	1−	1+	7−	0.0	0.1	4
17	QQ	2−	1	0+	0+	1	0	1−	1	6	0.0	0.1	3
18	Q	0	0+	1−	0	0+	0+	0+	3−	5−	0.2	0.1	3
19		1+	2−	3	3−	1−	1+	2+	4−	17−	0.7	0.5	10
20		2+	2+	3	2+	2	0+	1+	1	15−	0.4	0.4	8
21	Q	1+	1+	1+	1+	1−	0	1−	1	8−	0.0	0.1	4
22		2+	2	2	1	1−	1	1	2−	12−	0.1	0.2	6
23		3−	3−	2−	2	2	2	0+	1+	15−	0.3	0.4	7
24	D	5−	4+	2+	2−	2	2−	2−	1	19+	0.6	0.8	14
25		2−	0	0	0+	1	2−	2	2	9−	0.2	0.1	4
26	Q	1+	2−	2−	1	0	0+	1	1+	8+	0.1	0.1	4
27		0	2+	0+	2	2−	3−	2	4−	15−	0.5	0.4	8
28	D	3−	4−	1+	1+	3−	4−	4+	4+	24	1.0	1.0	18
29		4−	2−	2	1	1	3−	3−	4+	19	1.0	0.7	12
30		4+	4	2−	2−	1+	3+	1+	1	19−	0.8	0.7	13
31	QQ	0	0+	0	1+	1−	1−	1−	1−	4+	0.1	0.0	2
										MEAN	0.40	0.37	9

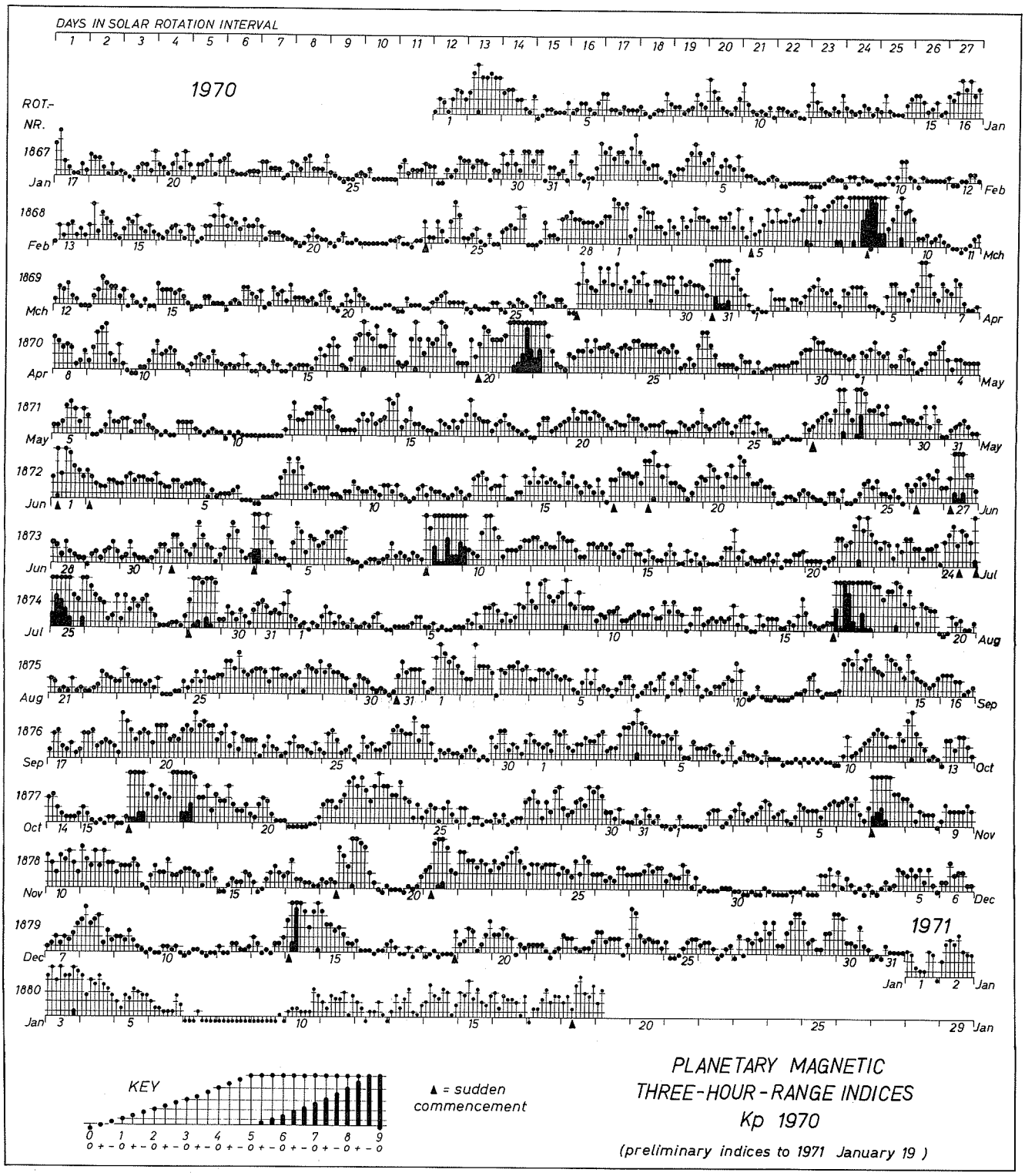
GEOMAGNETIC ACTIVITY INDICES

See Kp graph for 1970 on page 102.

DAILY AVERAGE INDICES Ap

1970

DAY	JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.
1	8	9	22	6	11	28	10	4	23	10	2	1
2	30	20	16	6	9	9	11	6	18	9	4	4
3	9	7	15	11	10	11	24	4	15	14	8	4
4	3	12	16	10	6	8	26	4	11	25	7	5
5	6	10	12	9	12	6	16	3	8	9	9	8
6	5	4	25	23	6	3	15	8	5	6	12	8
7	5	2	42	10	6	9	5	12	6	4	58	8
8	6	2	149	12	4	13	10	26	8	2	8	19
9	10	3	47	18	4	5	87	19	5	2	8	6
10	6	5	7	3	2	6	34	7	6	7	17	3
11	4	3	3	8	3	4	10	9	1	15	20	2
12	8	3	6	6	15	5	14	9	5	16	10	4
13	4	5	8	4	6	10	10	6	24	9	9	4
14	6	11	3	3	13	8	9	4	19	8	7	65
15	7	8	7	5	10	13	5	7	11	4	4	14
16	17	5	3	14	6	9	6	21	8	37	5	4
17	11	10	5	29	10	13	8	115	8	34	6	3
18	6	9	6	18	5	27	5	36	10	39	18	3
19	5	4	5	21	6	8	5	14	18	11	18	10
20	7	3	4	21	13	18	6	4	15	7	3	8
21	6	2	3	90	8	17	30	5	23	1	30	4
22	5	2	2	41	6	4	12	6	12	18	18	6
23	5	4	5	14	7	4	9	7	6	29	21	7
24	7	11	2	16	6	6	26	4	6	14	12	14
25	2	4	3	17	7	6	92	8	8	6	13	4
26	2	10	5	13	2	13	21	17	6	4	8	4
27	6	8	16	10	15	35	14	12	19	5	10	8
28	5	14	21	5	45	7	4	12	7	15	8	18
29	6		17	7	13	6	45	10	5	13	2	12
30	12		16	18	11	5	7	5	9	9	1	13
31	8		51		6		14	12		4		2
MEAN	7	7	17	16	9	10	19	13	11	12	12	9


DAYS IN SOLAR ROTATION INTERVAL
1970
ROT.-NR.
1867
1868
1869
1870
1871
1872
1873
1874
1875
1876
1877
1878
1879
1880
1971
KEY
▲ = sudden commencement
PLANETARY MAGNETIC
THREE-HOUR-RANGE INDICES
Kp 1970
(preliminary indices to 1971 January 19)

R9	Rot.-Nr.	1st day	C9	
876 468 877	19	J 6	,67 3,4 .67 22. ,,4 2,, ,,. .3, ...	.3 426
667 645 668		F 2	..3 426 7 2. 3... ,,7 4,, ,,2 4,4 3,,	,.2 ,32
887 645 678	67	M 1	,,2 ,32 ,,3 2.. ,,,. ,,5 633 ,,.. .5 2,3 .53	
875 654 345	1829	M28	2,3 .53 ,43 32, ,,. ,,.. .33 252 255	62. ...
555 532 335	30	A24	62. ... .467 32 ,4, ,,3 342 ,,3 2,,	,,2 38
788 875 323	31	M21	,,2 38 577 77. 2,3 675 44, ,,, 42,	2,, ...
566 556 654	32	J17	2,, ...565 244 ,,, 423 ... 52,	22, ,2,
554 688 777	33	J14	22, ,2, ,,. 423 ,.334 ... 22, 23,	362 ,2,
656 777 777	34	A10	362 ,2, 254 23, ,,2 422 ,23 365 ,,.	,223 ..
765 345 455	35	S 6	,223 .. .64 43, 3577 2. ,,, ,676 3,	2,, ,,3
666 435 678	36	0 3	2,, ,,3 563 524 2,2 ,,. .,2 ... 366	4,. 352
775 347 777	37	030	4,. 352 3,. 53. 454 332 ... .,3 253	224 436
776 678 887	38	N26	224 436 52, 355 63, ,,, .32 356 644	4.. ,2,
787 788 875	1839	D23	4.. ,2, ,2766 2 223 2,, .34 232 343	442 232
456 888 665	19	J19	442 232 ,32 443 225 442 ..4 567 45,	645 636
656 877 556	68	F15	645 636 63, ,,, 265 224 44, ,,. 422	,566 33
544 788 766		M13	,566 33 35, ,25 544 346 463 326 63.	..,2 356
657 444 578	1843	A 9	.,2 356 443 2... 23 2,6 544 234 3,.	.7, 524
876 788 888	44	M 6	.7, 524 643 234 435 643 5,. ,,2 324	442 ,,3
777 677 777	45	J 2	442 ,,3 326 867 623 534 ,.3 ... 43,	433 243
533 687 767	46	J29	433 243 2,2 ,,6 3,5 5,2 ,32 ,253.2	432 ,2,
776 677 888	47	J26	432 ,2, ..3 ,34 344 2,, 365 765 3,.	,35 ,.,
754 576 886	48	A22	,35 ,,, ... 423 543 557 4,. 576 63,	.3, 335
678 857 766	49	S18	.3, 335 ... ,22 ,476 .. ,422, .764	2,2 23,
678 876 567	1850	015	2,2 23, ... 2,, ,,64 887 766 ,,4 253	3.,..4
665 656 677	51	N11	3.,..455, 4,, ,,2 232 ..2 ,55 62,	3,4 ,2,
765 677 875	52	D 8	3,4 ,2, ,.2 .23 .33 425 .3, 223 2..	... 22,
788 765 665	19	J 4	... 22, ,,, .24 355 33, ,,3 653 ,.,	,.77 32
667 646 788		J31	,.77 32 422 .37 232 53. .22 2.,23	642 2..
877 767 888	69	F27	642 2.,244 32, 562 254 634 543 775	2,,444
888 766 887	1856	M26	2,,444 644 333 523 ,23 544 454 ,2,	3,2 2,3
655 555 787	57	A22	3,22,3 736 264 232 ,,3 3,2 678 745	224 333
888 636 888	58	M19	224 333 2.. 2,3 3,, ,,, .24 432 546	255 ,,3
765 347 877	59	J15	255 .,3 ,.32, ,.. ,4, ... ,,, ,,,	343 ,3.
655 445 888	1860	J12	343 ,3. ... ,2, ..57 .. 3,. ,43 2,2	23, .5,
754 335 786	61	A8	23, .5, ,,. ,23 ,,, 3,. 45, ,.. ...	.55 352
555 675 677	62	S4	.55 352 22, .35 235 22, .2, 2.. 777	565 2,4
677 543 578	63	01	565 2,4 ,.2 522 ,.. ,,, 3,2 2.4 ,.2	,.. ,.3
756 665 577	64	028	,.. ,.34,, .34 763 ,,. ... .2, .3,	,,3 524
776 643 566	65	N24	,,3 524 5,. .,5 5,, 323 ,.. ,3, ...	.23 222
788 754 488	1866	021	.23 222 2.,.. 262. ,,, ,2, .2, ,4	3,, 2,,
876 887 678	19	J17	3,, 2,, ,2. .,, ,32 252 33.	,32 ,32
787 888 777	70	F13	,32 ,32 ,... .3 .22 454 443 678 7,.	,2. ,.,
645 787 777		M12	,2. ,.,,,, .,. ... 454 47, ,33 252	35. 2,.
887 556 677	1870	A8	35. 2,. .,4 655 577 444 33, 253 23,	3,, ...
768 888 777	71	M5	3,, ...4,33, 3,, 32, 2,, .47 33,	623 2,.
644 788 667	72	J1	623 2,. 23, ,,, 223 236 254 .., ,36	2,, 335
788 765 477	73	J28	2,, 335 644 ,37 634 32, ,2, ,,6 326	854 .72
886 555 677	74	J25	854 .72 4., ... 236 522 2,, 258 64.	,,2 .24
777 777 755	75	A21	,,2 .24 332 ,35 543 2,, 2,, .,6 532	235 453
577 654 555	76	S17	235 453 ,,2 ,5, ,23 246 2,. ... 442	2.6663
655 677 555	77	014	2.6663 ,.564, .,432 ...2 ,23 722	452 2,.
677 765 655	78	N10	452 2,. ,,54.6553 322 2.. ... ,22	25, ...
665 565 44	79	D7	25, ... ,74 ... 22. ,24 ..2 533 . 25	753 ,..
	1880	J3	753 ,.. .22 .23 422 4 preliminary	

Symbol	.	,	2	3	4	5	6	7	8	▮
$\bar{R}$ =	0	1-15	16-30	31-45	46-60	61-80	81-100	101-130	131-170	171...
R9, C9 =	0	1	2	3	4	5	6	7	8	9
Cp =	0.0-0.1	0.2-0.3	0.4-0.5	0.6-0.7	0.8-0.9	1.0-1.1	1.2-1.4	1.5-1.8	1.9	2.0-2.5

DAILY GEOMAGNETIC CHARACTER FIGURES C9 AND 3-DAY MEAN SUNSPOT NUMBERS R9

For explanation and previous years see J. Bartels, Abhandlungen der Akademie der Wissenschaften zu Göttingen, Beiträge zum I.G.J., Heft 3 (1958) (may be requested from Institut für Geophysik, Postfach 876, 34 Göttingen, Germany).

PRINCIPAL MAGNETIC STORMS

DECEMBER 1970

DATE 1970 MO DA.	STORM TIME UT START	STORM TIME UT END MO. DA. HR	OBS.	GEO-MAG. LAT.	SUDDEN COMMENCEMENT TYPE	AMPLITUDES D(')	AMPLITUDES H(γ)	AMPLITUDES Z(γ)	C FIGURE DEGREE OF ACTIVITY	MAXIMAL ACTIVITY ON K-SCALE 0 TO 9 MO. DA.	3-HOUR PERIOD	K INDEX	RANGES D (')	RANGES H (γ)	RANGES Z (γ)	STORM NUMBERS
12 04	1054	12 -- --	HYDE	7.6N	SC	0	+ 5	- 1	-	-- --	-	-	--	--	--	50
12 07	08--	12 08 21	COLL	64.6N	••	••	••	••	MS	12 08	3,4,5	6	162	960	430	51
12 14	0154	12 15 18	COLL	64.6N	SC *	+55	+85	+58	S	12 14	3	9	300	3160	1500	52
	0154	12 15 17	SITK	60.0N	SC *	+ *	+ *	+	S	12 14	3	9	280	1340	1600	52
	0155	12 15 18	NEWP	55.1N	SC *	3	45	6	S	12 14	3	9	123	722	755	52
	0154	12 14 24	WITT	54.1N	SC	- 4	+32	- 1	MS	12 14	3	7	30	310	70	52
	0154	12 15 09	FRED	49.6N	SC	2	20	- 6	S	12 14	3	8	62	325	232	52
	0156	12 15 21	BOUL	49.0N	SC	+ 2	+28	--	S	12 14	3	8	57	290	180	52
	0154	12 15 03	IRKU	40.8N	SC	- 1.8	25	4	MS	12 14	3	7	22	264	71	52
	0155	12 15 15	TUCS	40.4N	SC	+ 1	+30	+ 2	MS	12 14	3	7	28	200	30	52
	0154	12 24 00	SJUA	29.9N	SC	+ 0.5	+16	+ 6	MS	12 14	3	6	14	144	40	52
	0155	12 15 04	MBOR	21.3N	SC	- 1	+30	- 5	MS	12 14	3	6	4	110	30	52
	0154	12 15 03	HONO	21.1N	SC	+ 1	+28	+14	MS	12 14	3	6	8	200	40	52
	0153	12 15 00	ALIB	9.5N	SC	- 1.1	+31	-12	MS	12 14	3	7	5	264	26	52
	0155	12 15 03	HYDE	7.6N	SC	- 0.9	+31	- 3	S	12 14	3	8	5	284	34	52
	0153	12 15 04	GUAM	4.0N	SC	--	41	14	MS	12 14	3	7	0	180	10	52
	0153	12 15 00	ANNA	1.5N	SC	- 2.0	+44	+19	MS	-- --	-	-	7	395	160	52
	0153	12 15 00	TVAN	1.1S	SC	- 0.3	+39	+47	MS	-- --	-	-	3	469	308	52
	0154	12 15 15	APIA	16.1S	SC	+ 1	+31	-13	MS	12 14	4	7	7	262	54	52
	0154	12 15 04	PMOR	18.6S	SC	- 0.5	+40	+36	MS	12 14	3	7	9	310	150	52
	0154	12 15 06	HRMN	33.3S	SC	+ 2	+37	+25	MS	12 14	3	7	33	192	98	52
	0153	12 15 15	GNAN	43.2S	SC	- 5	+14	-16	MS	12 14	3,4	6	26	180	260	52
	0154	12 15 17	TOOL	46.7S	SC	- 4.2	+22	+ 6	MS	12 14	3	7	27	270	180	52
	0156	12 15 06	AMBE	47.7S	SC *	+ 1.1	+56.6	- 3.3	MS	12 14	3	7	32	268	126	52
	0155	12 15 15	KGLN	57.3S	SC	--	--	--	MS	12 14	2,3	6	--	--	--	52
12 18	2142	12 20 07	HYDE	7.6N	SC	- 0.2	+17	- 1	M	12 19	8	4	4	68	38	53
12 27	08--	12 30 05	COLL	64.6N	••	••	••	••	M	12 28	6,7	5	105	670	320	54
12 28	16--	12 29 01	WITT	54.1N	••	••	••	••	M	12 28	6,7,8	5	20	120	40	54
12 29	1529	12 30 18	HYDE	7.6N	SC	- 0.2	+16	- 1	M	12 29	7,8	4	3	45	23	55
	1532	12 30 09	KGLN	57.3S	SC *	--	--	--	M	12 29	8	4	--	--	--	55

Note: The December 1970 Sudden Commencements and Solar Flare Effects will be found, together with the October and November data, in the Miscellanea Section of this issue.

RADIO PROPAGATION QUALITY FIGURES AND FORECASTS

DECEMBER 1970

North Atlantic

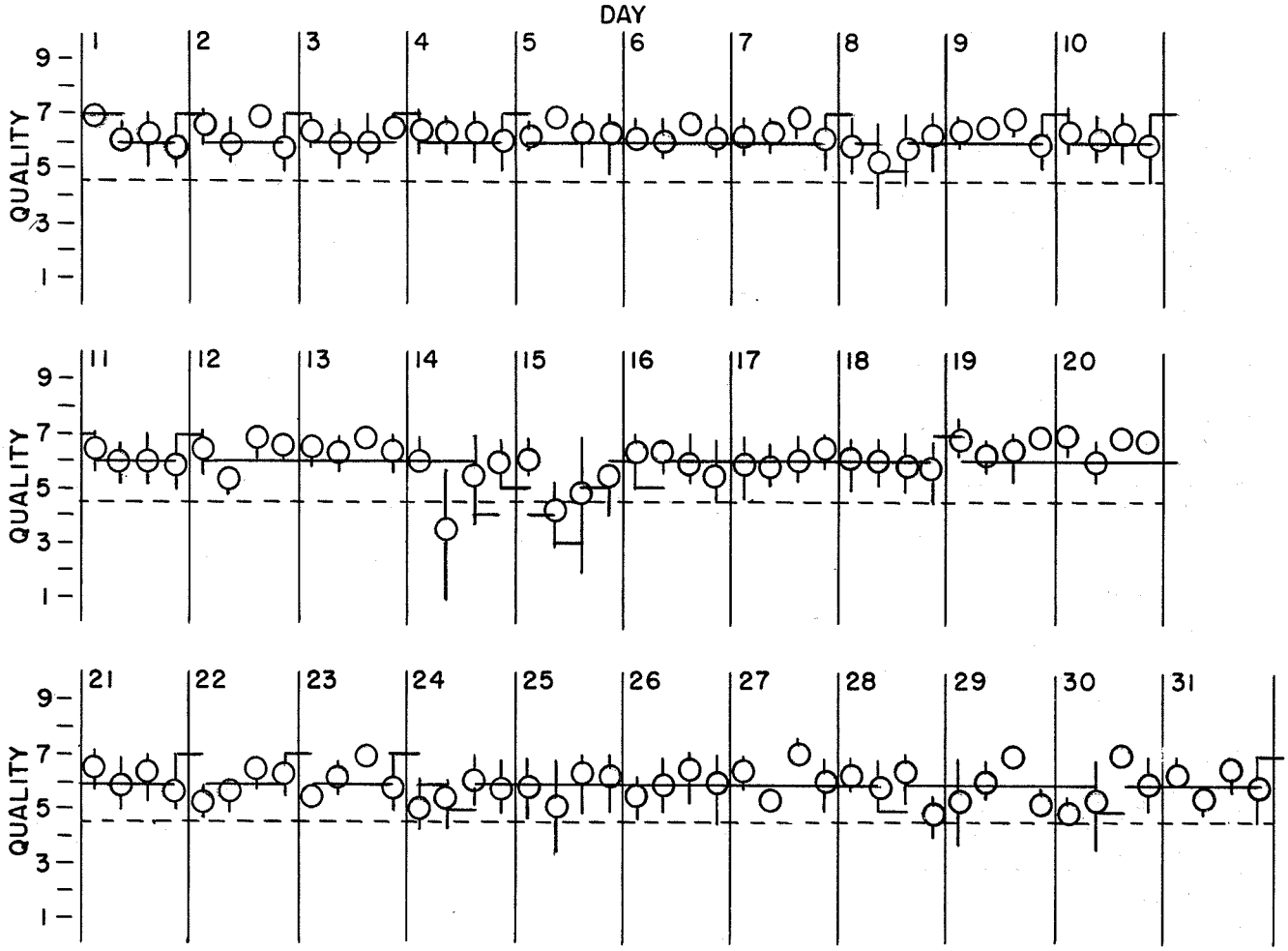
DEC. 1970	WHOLE DAY INDICES NORTH ATLANTIC	ADVANCE FORECASTS (JC-REPORTS) FOR WHOLE DAY	NORTH ATLANTIC 6-HOURLY QUALITY FIGURES 00 TO 06	06 TO 12	12 TO 18	18 TO 24	SHORT-TERM FORECASTS ISSUED ABOUT ONE HOUR IN ADVANCE OF 02	08	14	20	GEOMAGNETIC INDICES K_{FR} HALF DAY (1)	(2)	A_{FR} OBSERVED
01	6+	6	7o	6o	6+	6o	7	6	6	7	0	0	0
02	6+	6	7−	6o	7o	6o	6	6	6	7	0	2	3
03	6+	6	6+	6o	6o	7−	6	6	6	7	2	1	4
04	6+	6	7−	6+	6+	6+	6	6	6	7	1	2	3
05	6+	6	6+	7−	6+	6+	6	6	6	6	2	1	6
06	6+	6	6+	6+	7−	6+	6	6	6	6	2	1	6
07	6+	6	6+	6+	7−	6+	6	6	6	7	2	2	7
08	6−	6	6o	5+	6−	6+	6	5	6	6	(4)	2	14
09	6+	7	6+	7−	7−	6o	6	6	6	7	2	1	4
10	6+	7	6+	6+	6+	6o	6	6	6	7	1	0	1
11	6o	7	7−	6o	6o	6o	6	6	6	7	1	0	1
12	6+	7	7−	6−	7−	7−	6	6	6	6	1	1	3
13	7−	7	7−	6+	7o	6+	6	6	6	6	1	1	3
14	5+	7	6o	4−	6−	6o	6	6	4	5	(5)	(4)	56
15	5+	7	6+	4+	5−	6−	4	3	5	6	3	2	13
16	6o	7	6+	6+	6o	6−	5	6	6	6	1	0	1
17	6o	6	6o	6−	6o	7−	6	6	6	6	1	0	2
18	6o	6	6o	6o	6−	6−	6	6	6	7	1	1	3
19	7−	6	7−	6+	6+	7o	6	6	6	6	2	2	7
20	7−	6	7−	6o	7o	7o	6	6	6	6	2	0	5
21	6+	6	7−	6o	6+	6−	6	6	6	7	1	0	2
22	6o	6	5+	6−	7−	6+	6	6	6	7	2	1	6
23	6o	6	6−	6+	7o	6−	6	6	6	7	2	1	6
24	6−	6	5o	5+	6o	6−	6	5	6	6	3	1	9
25	6−	6	6−	5o	6+	6+	6	6	6	6	0	1	2
26	6o	6	6−	6o	7−	6o	6	6	6	6	2	1	2
27	6+	7	7−	5+	7o	6+	6	6	6	6	1	2	6
28	6o	7	6+	6o	7−	5o	6	5	6	6	2	3	11
29	6o	7	5+	6+	7o	5+	6	6	6	6	1	2	18
30	6−	7	5o	5+	7o	6o	6	5	6	6	3	2	10
31	6o	6	6+	6−	7−	6o	5	6	6	7	1	1	2

DECEMBER 1970

North Atlantic

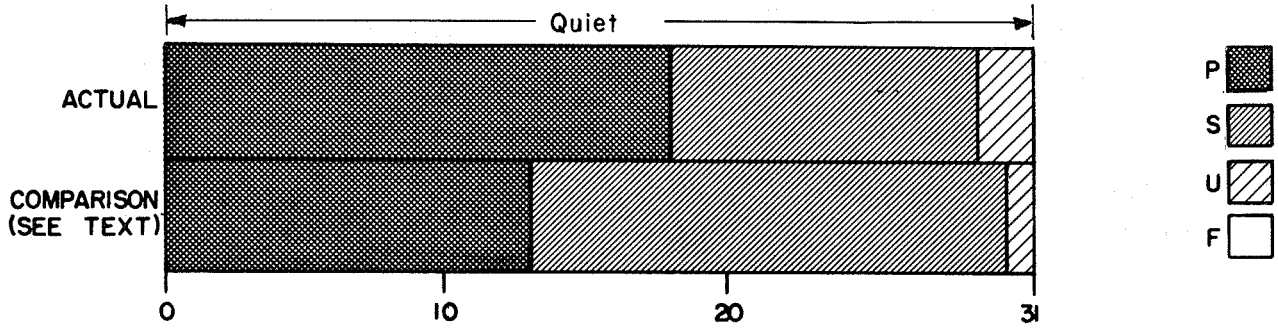
— Short term forecast
o Quality figure

I range of reports



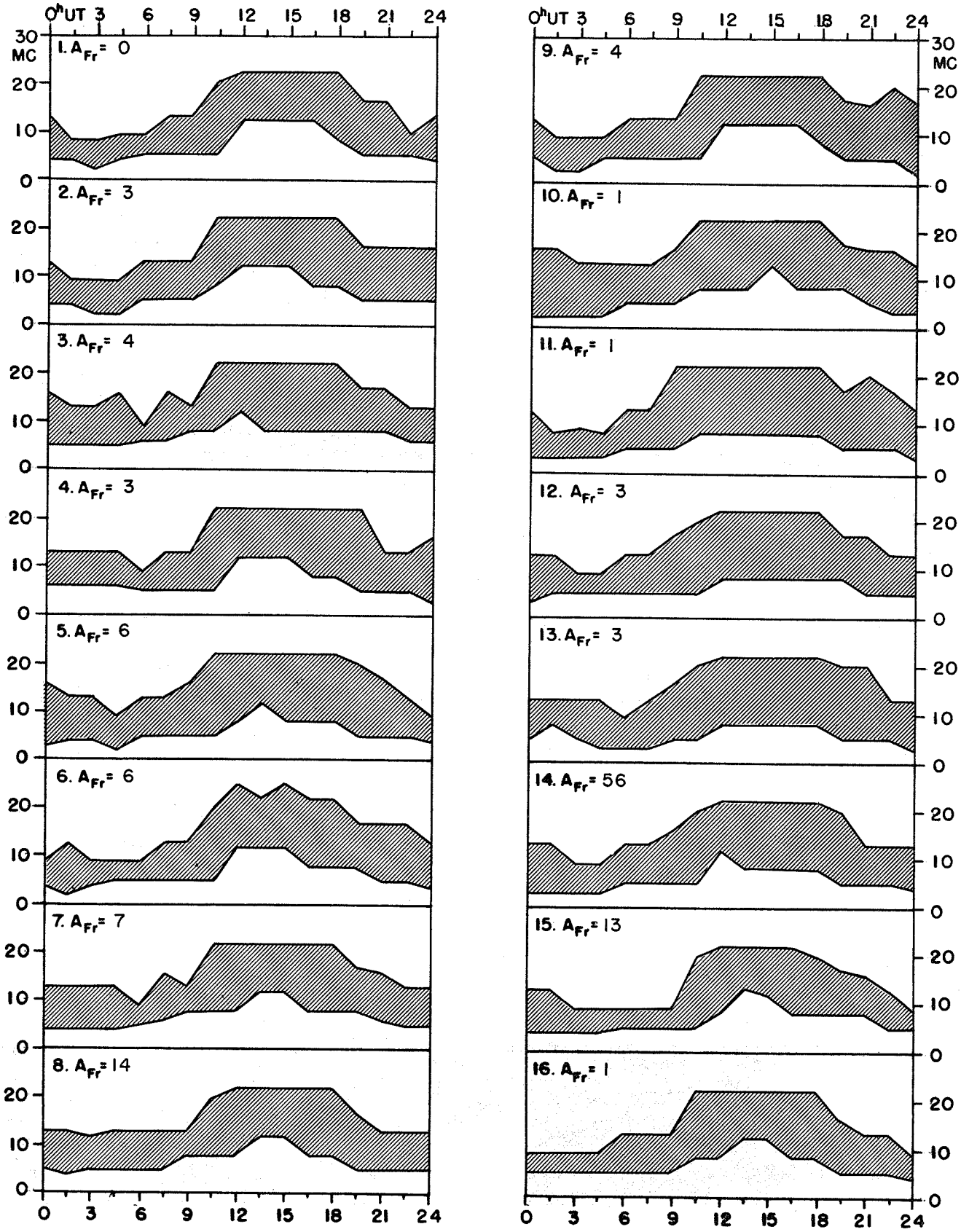
Outcome of advance forecasts of High Latitude radio propagation conditions
(scored against observed North Atlantic radio propagation conditions)

HIGH LATITUDE



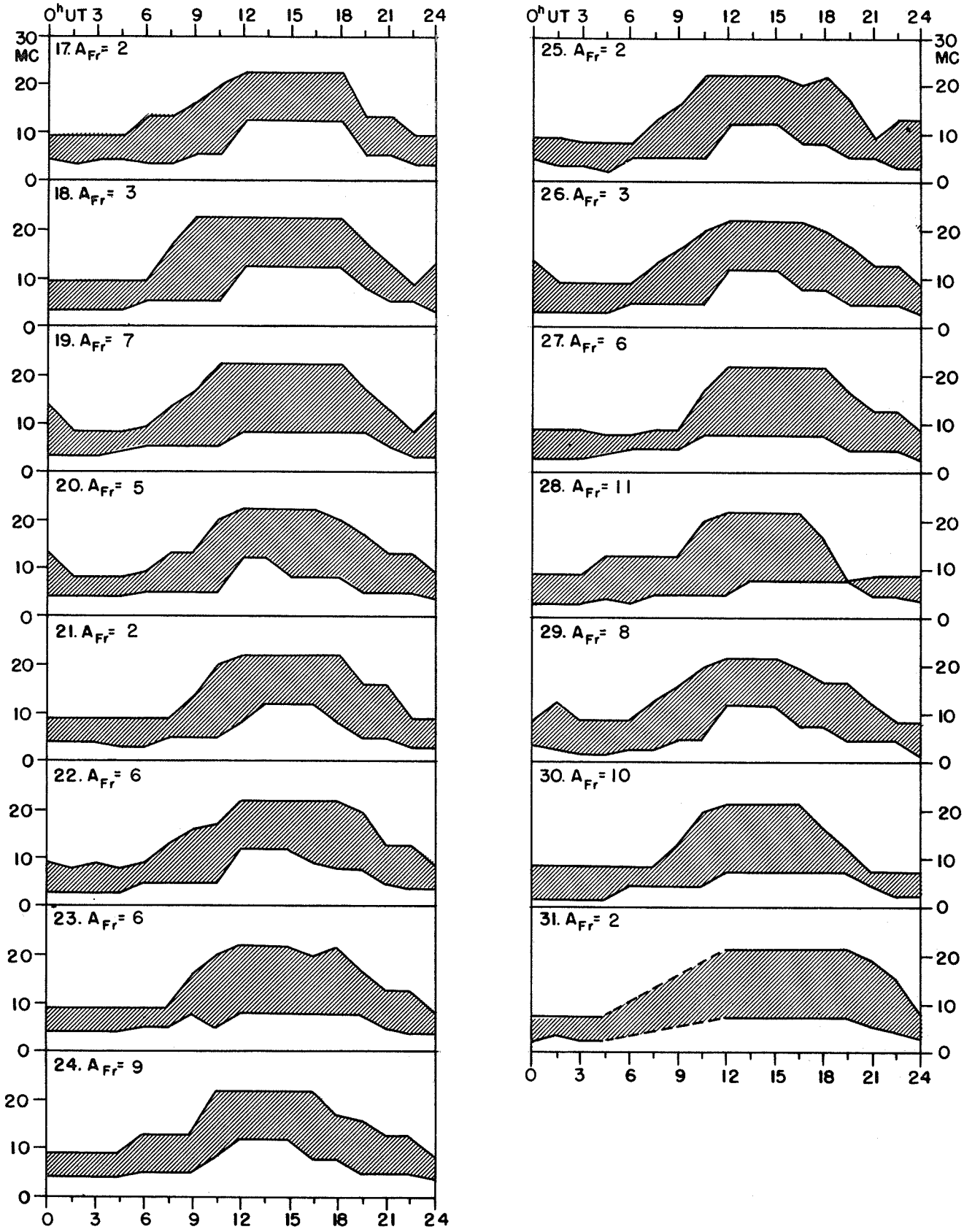
TRANSMISSION FREQUENCY RANGES--NORTH ATLANTIC PATH

DECEMBER 1970



TRANSMISSION FREQUENCY RANGES--NORTH ATLANTIC PATH

DECEMBER 1970



Adapted from Observations by Deutsche Bundespost

RADIO PROPAGATION QUALITY INDICES

Derived from observations of the transmission frequency range

December 1970

Date	USA - Germany		South America - Germany		East Asia - Germany	
	Day	Night	Day	Night	Day	Night
1	6.0	5.6	5.6	6.4	5.4	5.6
2	6.0	6.4	6.6	6.0	6.2	7.2
3	6.0	6.2	5.0	5.2	5.6	5.6
4	7.0	6.8	5.8	6.0	5.8	5.6
5	7.4	6.4	6.6	6.2	5.6	6.4
6	6.4	6.8	6.6	7.0	6.6	7.0
7	6.4	5.6	6.2	6.4	7.4	9.2
8	5.8	5.0	6.4	5.6	7.2	6.0
9	6.0	6.0	6.0	5.4	6.8	5.8
10	6.0	5.8	6.8	6.2	5.0	4.8
11	7.0	6.6	6.4	5.6	5.4	6.6
12	6.6	6.4	5.8	5.6	7.0	6.0
13	7.2	5.8	6.2	4.8	6.0	5.6
14	5.8	5.4	6.2	6.0	4.8	7.6
15	5.6	4.8	5.4	5.2	6.2	5.2
16	6.0	6.0	5.4	5.6	6.2	6.0
17	5.0	4.0	6.2	5.2	4.6	5.4
18	5.4	5.4	6.8	5.6	6.4	6.2
19	5.8	5.6	5.8	5.8	6.2	5.6
20	5.6	5.8	6.2	6.4	6.2	5.8
21	5.2	5.2	6.2	5.4	5.4	5.6
22	5.4	5.6	6.6	5.4	6.8	5.8
23	6.0	6.2	4.6	5.4	5.4	5.6
24	5.4	5.2	6.0	5.6	6.2	4.8
25	5.2	5.8	6.0	6.2	5.6	5.2
26	5.2	5.0	7.2	5.6	6.8	5.4
27	6.2	6.2	6.0	6.2	4.2	4.0
28	5.6	4.4	5.6	4.0	7.2	5.6
29	6.0	5.2	5.6	5.2	5.0	5.6
30	5.2	---	6.2	5.0	6.2	4.2
31	7.0	6.4	4.6	4.2	---	5.8

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