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Solar - Geophysical Data

Part I (Prompt Reports)

NO. 513 MAY 1987

DATA FOR
APRIL 1987
MARCH 1987

Michael A. Chinnery, Director
NATIONAL GEOPHYSICAL DATA CENTER
BOULDER, COLORADO

International Standard Serial Number: 0038-0911
Library of Congress Catalog Number: 79-640375 //r81

For sale through the National Geophysical Data Center, NOAA/NESDIS, E/GC2, 325 Broadway, Boulder, Colorado 80303. 1987 Subscription Price for the U.S.: $70.00 annually for both Part I (Prompt Reports) and Part II (Comprehensive Reports) or $35.00 annually for either part. Annual supplement containing explanation is included. Foreign subscriptions: For 1987 issues -- $106.00 for both parts or $53.00 for either part. We require prepayment for all orders. Please include with your request a check or money order payable in U.S. currency to the Department of Commerce, NOAA/NGDC. Any bank charges should be paid by the subscriber. Payment may be made through an American Express, Mastercard or VISA credit cards. Please include the correct name of credit card holder, card number and expiration date. Prices are subject to change. NGDC phone number: (303)497-6135 (FTS 320-6135).

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S O L A R - G E O P H Y S I C A L D A T A

NUMBER 513

(Issued in Two Parts)

Co-Editors: Helen E. Coffey
John A. McKinnon

Chief: Joe H. Allen
Solar-Terrestrial Physics Division

Staff: Daniel C. Wilkinson
Viola W. Miller
Carol Weathers
Charles T. Shanks

C O N T E N T S

PART I (PROMPT REPORTS)

PART II (COMPREHENSIVE REPORTS)

Published with partial support from ONR (N00014-86-F-0049).

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Prompt Reports DATA FOR APRIL 1987 Number 513 Part I

ALERT PERIODS

INTERNATIONAL URSIGRAM AND WORLD DAYS SERVICE

Summary of the Geoalert Messages APRIL 1987

Julian Day	Date of Issue	Date of Observation	Wolf No.	10-cm Solar Flux	A-index	Location °Lat °Long	Flares Total	M	X	Date of Forecast	Location °Lat °Long	Region Forecast[1]	Geoalerts
091	01	31	030	072	007	N04 W02	0	0	0	01	N04 W02	Q	Solquiet, Magquiet.
						S22 W13	0	0	0		S22 W13	Q	
092	02	01	013	073	010	N04 W17	0	0	0	02	N04 W17	Q	Solquiet, Magquiet.
093	03	02	011	072	008	N05 W31	1	0	0	03	N05 W31	Q	Solquiet, Magquiet.
094	04	03	011	072	002	N05 W44	0	0	0	04	N05 W44	Q	Solquiet, Magquiet.
095	05	04	026	074	013	N05 W56	0	0	0	05	N05 W56	Q	Solquiet, Magquiet.
						S22 E59	1	0	0		S22 E59	Q	
096	06	05	043	078	011	N07 W70	0	0	0	06	N07 W70	Q	Solquiet, Magquiet.
						S22 E47	4	0	0		S22 E47	Q	
						S32 E86	1	1	0		S32 E86	E	
		Presto:[2] Boulder Magstorm begins 04/0315 UT.											
097	07	06	055	089	008	N05 W84	0	0	0	07	N05 W84	Q	Solquiet, Magquiet.
						S22 E32	6	0	0		S22 E32	Q	
						S32 E72	6	0	0		S32 E72	A	
098	08	07	084	094	013	N04 W99	0	0	0	08	N04 W99	Q	Solquiet, Magquiet.
						S23 E19	2	0	0		S23 E19	E	
						S33 E60	7	0	0		S33 E60	E	
						S24 W07	0	0	0		S24 W07	Q	
						S06 E73	1	0	0		S06 E73	Q	
099	09	08	085	095	009	S23 E07	3	0	0	09	S23 E07	E	Solquiet, Magquiet.
						S34 E47	1	0	0		S34 E47	E	
						S24 W21	0	0	0		S24 W21	Q	
						S05 E62	1	0	0		S05 E62	E	
						S30 E51	2	0	0		S30 E51	E	
100	10	09	082	100	008	S23 W06	1	0	0	10	S23 W06	Q	Solalert 10/XX,
						S34 E38	6	0	0		S34 E38	E	Magquiet.
						S06 E51	5	0	0		S06 E51	E	
						S30 E40	2	0	0		S30 E40	E	
101	11	10	083	100	010	S23 W20	3	0	0	11	S23 W20	E	Solalert Minor 11/XX,
						S34 E23	7	0	0		S34 E23	E	Magquiet.
						S06 E38	2	0	0		S06 E38	E	
						S30 E27	0	0	0		S30 E27	E	
102	12	11	103	101	007	S23 W33	2	0	0	12	S23 W33	E	Solalert 12/13,
						S33 E11	4	0	0		S33 E11	E	Magquiet.
						S04 E22	3	0	0		S04 E22	E	
						S30 E16	0	0	0		S30 E16	E	
						N25 E73	1	0	0		N25 E73	Q	
103	13	12	093	098	006	S23 W48	0	0	0	13	S23 W48	E	Solalert 13/XX,
						S33 W02	2	0	0		S33 W02	E	Magquiet.
						S06 E06	1	0	0		S06 E06	Q	
						S31 E04	0	0	0		S31 E04	E	
						N25 E61	0	0	0		N25 E61	Q	

ALERT PERIODS

INTERNATIONAL URSIGRAM AND WORLD DAYS SERVICE

Summary of the Geoalert Messages **APRIL 1987**

Julian Day	Date of Issue	Date of Observation	Wolf No.	10-cm Solar Flux	A-index	Location °Lat °Long	Flares Total	M	X	Date of Forecast	Location °Lat °Long	Region Forecast[1]	Geoalerts
104	14	13	086	099	015	S23 W64	1	0	0	14	S23 W64	E	Solalert 14/XX
						S33 W14	1	0	0		S33 W14	E	Magquiet.
						S06 W06	0	0	0		S06 W06	Q	
						S32 W04	0	0	0		S32 W04	E	
						N22 E47	0	0	0		N22 E47	Q	
105	15	14	080	098	008	S22 W77	0	0	0	15	S22 W77	Q	Solnil, Magquiet.
						S33 W28	2	0	0		S33 W28	E	
						S07 W20	0	0	0		S07 W20	Q	
						S31 W26	0	0	0		S31 W26	E	
						N24 E36	0	0	0		N24 E36	Q	
106	16	15	098	097	007	S22 W91	0	0	0	16	S22 W91	Q	Solquiet, Magquiet.
						S33 W39	6	0	0		S33 W39	E	
						S07 W34	0	0	0		S07 W34	Q	
						S32 W36	6	0	0		S32 W36	E	
						N24 E22	1	0	0		N24 E22	Q	
						S17 W16	0	0	0		S17 W16	Q	
107	17	16	071	105	007	S33 W50	4	0	0	17	S33 W50	Q	Solquiet, Magquiet.
						S06 W48	0	0	0		S06 W48	Q	
						S31 W48	6	1	0		S31 W48	E	
						N24 E08	1	0	0		N24 E08	Q	
						S16 W30	0	0	0		S16 W30	Q	
108	18	17	071	097	005	S32 W65	8	0	0	18	S32 W65	E	Solquiet, Magquiet.
						S07 W61	0	0	0		S07 W61	Q	
						S32 W62	2	0	0		S32 W62	E	
						S18 W46	0	0	0		S18 W46	Q	
						N28 W40	0	0	0		N28 W40	Q	
109	19	18	051	093	003	S07 W76	1	0	0	19	S07 W76	Q	Solquiet, Magquiet.
						S31 W78	9	0	0		S31 W78	E	
						N28 W53	0	0	0		N28 W53	Q	
						N31 E67	0	0	0		N31 E67	Q	
110	20	19	037	091	008	S03 W89	0	0	0	20	S03 W89	Q	Solquiet, Magalert
						S31 W91	1	0	0		S31 W91	E	Minor 20/21.
						N32 E55	0	0	0		N32 E55	Q	
111	21	20	011	085	018	N31 E43	0	0	0	21	N31 E43	Q	Solquiet, Magnil.
112	22	21	047	078	004	S25 E12	0	0	0	22	S25 E12	Q	Solquiet, Magquiet.
						S40 E41	0	0	0		S40 E41	Q	
						N05 E76	0	0	0		N05 E76	Q	
113	23	22	060	076	004	S26 W01	0	0	0	23	S26 W01	Q	Solquiet, Magquiet.
						S38 E26	0	0	0		S38 E26	Q	
						N04 E64	3	0	0		N04 E64	Q	
						N27 W30	0	0	0		N27 W30	Q	
						N10 W01	0	0	0		N10 W01	Q	
114	24	23	039	076	005	S26 W15	0	0	0	24	S26 W15	Q	Solquiet, Magquiet.
						N04 E50	1	0	0		N04 E50	Q	
						N27 W44	0	0	0		N27 W44	Q	

ALERT PERIODS

INTERNATIONAL URSIGRAM AND WORLD DAYS SERVICE

Summary of the Geoalert Messages APRIL 1987

Julian Day	Date of Issue	Date of Observation	Wolf No.	10-cm Solar Flux	A-index	Location °Lat °Long	Flares Total	M	X	Date of Forecast	Location °Lat °Long	Region Forecast[1]	Geoalerts
115	25	24	051	078	010	S26 W26	0	0	0	25	S26 W26	Q	Solquiet, Magquiet.
						N04 E37	0	0	0		N04 E37	Q	
						N27 W57	3	0	0		N27 W57	E	
						N12 E33	0	0	0		N12 E33	Q	
116	26	25	025	075	005	N04 E23	0	0	0	26	N04 E23	Q	Solquiet, Magquiet.
						N27 W71	0	0	0		N27 W71	Q	
117	27	26	024	073	005	N04 E10	0	0	0	27	N04 E10	Q	Solquiet, Magquiet.
						N27 W84	0	0	0		N27 W84	Q	
118	28	27	013	074	010	N03 W03	0	0	0	28	N03 W03	Q	Solquiet, Magquiet.
119	29	28	049	073	002	N04 W16	0	0	0	29	N04 W16	Q	Solquiet, Magquiet.
						N26 E31	0	0	0		N26 E31	Q	
						S36 W25	0	0	0		S36 W25	Q	
						S28 E01	0	0	0		S28 E01	Q	
120	30	29	039	073	004	N03 W31	0	0	0	30	N03 W31	Q	Solquiet, Magquiet.
						S36 W37	0	0	0		S36 W37	Q	
						S28 W12	0	0	0		S28 W12	Q	
121	01	30	043	076	004	N03 W45	1	0	0	01	N03 W45	Q	Solquiet, Magquiet.
						S28 W25	0	0	0		S28 W25	Q	
						S23 E73	0	0	0		S23 E73	Q	

[1]Q = quiet, E = eruptive, A = active, P = proton.
[2]Presto message is a rapid report of a major event.

INTERNATIONAL RELATIVE SUNSPOT NUMBERS

Day	Final May 86	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Prov Jan 87	Feb	Mar	Apr
01	15	7	0	12	9	12	44	0	19	0	14	14
02	26	0	0	11	9	14	35	0	15	0	23	12
03	15	0	11	11	8	23	37	0	12	0	15	10
04	12	0	14	11	8	24	37	0	11	0	18	13
05	10	0	18	11	0	24	35	0	10	0	24	28
06	0	0	29	10	11	22	31	0	9	0	23	47
07	0	0	29	8	13	27	24	0	10	0	24	56
08	0	9	29	9	12	20	15	0	0	0	22	64
09	0	0	17	8	10	32	10	12	0	0	14	69
10	0	8	36	0	8	29	9	20	0	7	11	72
11	0	0	39	0	8	23	9	23	0	7	8	80
12	0	0	36	0	0	26	0	22	0	7	0	77
13	0	0	25	0	0	22	14	24	0	0	0	79
14	0	0	16	0	0	0	12	13	8	8	11	74
15	10	0	28	0	0	0	12	0	9	7	11	78
16	12	0	26	9	0	11	12	11	0	0	11	60
17	13	0	28	8	0	16	12	9	13	0	22	41
18	22	0	14	0	0	22	12	0	17	0	21	36
19	27	0	13	0	0	31	12	0	9	0	12	29
20	27	0	18	11	0	39	12	0	9	7	11	16
21	30	0	21	12	0	47	11	11	14	7	15	19
22	27	0	22	12	0	57	10	16	20	7	17	26
23	24	0	14	14	0	71	18	16	23	0	16	25
24	24	0	0	9	0	76	12	13	12	0	23	35
25	22	8	0	9	0	68	0	9	13	14	16	23
26	28	0	0	9	0	60	0	0	14	14	12	21
27	19	0	12	9	0	65	13	0	12	19	11	11
28	18	0	13	9	0	61	0	0	20	8	12	14
29	19	0	17	9	8	63	8	0	15		11	20
30	13	0	19	9	9	62	0	0	0		15	30
31	12		17	9		50		11	10		15	
Mean	13.7	1.1	18.1	7.4	3.8	35.4	15.2	6.8	9.8	4.0	14.8	39.3

The yearly mean sunspot number equaled 13.4 in 1986.

Algonquin Radio Observatory — OTTAWA 2800 MHz (10.7 cm) SOLAR FLUX — Adjusted to 1 AU

Day	May 86	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan 87	Feb	Mar	Apr
01	72.5	71.1	68.9	72.8	69.8	71.2	87.6*	70.7	71.6	69.2	72.8	72.5
02	74.3	69.8	68.7	72.3	69.2	71.6	84.1	70.6	70.5	69.8	73.3	71.9
03	73.8	69.9	68.9	72.9	69.3	72.1	80.8	70.2	69.1	70.0	71.6	72.4
04	71.6	69.3	69.3	71.6	69.4	70.7	82.3	69.2	69.0	68.3	73.3	74.0
05	70.8	69.3	71.1	71.7	69.6	71.1	81.5	70.0	70.3	67.5	73.7	77.6
06	69.8	69.8	73.9	72.1	69.5	72.4	80.6	69.1	69.3	67.7	75.6	89.4
07	69.9	70.0	72.1	71.9	69.9	74.3	76.9	68.2	69.7	69.1	75.5	94.4
08	69.5	70.2	71.6	71.3	69.4	74.8	73.5	69.1	68.2	68.9	76.9	94.8
09	69.8	71.1	72.5	71.3	69.4	74.6	71.9	70.8	68.0	69.2	73.6	100.5
10	70.9	70.3	75.0	70.5	69.3	73.3	70.4	72.3	67.4	69.3	71.4	100.0
11	71.4	70.1	74.7	68.6	68.8	73.2	69.9	73.0a	68.0	68.5	70.5	101.3
12	70.9	70.5	73.5	68.4	68.8	75.3	71.4	71.1	68.9	67.8	69.5	98.6
13	71.7	70.4	74.2	67.9	69.0	75.1	76.0*	71.5	69.7	68.0	69.6	99.3
14	71.6	72.1	74.6	68.2	70.0	75.0	74.1	71.4	71.1	68.3	71.1	97.7
15	72.7	71.3	74.0	69.5	71.5	71.8	75.1	70.9	71.5	69.3	70.5	97.8
16	74.3	70.7	74.4	69.4	70.5	79.1	75.0	70.8	70.7	68.4	71.0	95.3*
17	75.3	69.8	74.9	68.9	69.2	82.6	73.8	71.7	70.8	68.1	71.2	97.3
18	78.7	69.9	74.6	69.1	68.8	86.3	73.0	71.4	70.6	69.8	72.5	94.0
19	78.7	69.6	73.3	69.3	68.7	88.6	72.5	71.0	70.0	69.5	71.5	91.7
20	79.6	69.6	73.2	70.7	68.6	92.2	72.5	70.4	68.9	69.6	73.8	85.6
21	79.2	69.2	72.5	70.5	68.8	91.5	74.1	70.6	71.2*	70.7	74.2	78.3
22	79.2	69.7	73.2	70.1	68.3	94.4	74.5	71.4	73.6*	70.4	73.8	76.5
23	78.8	69.6	71.6	69.6	68.7	97.9	75.8	70.8	72.1	70.5	75.5	76.5
24	79.5	68.4	71.2	69.1	68.8	97.3	77.0	70.0	71.6	72.1	75.9	78.6
25	81.1	68.5	70.9	69.3	69.4	94.4	75.5	70.0	71.5	73.5	75.7	75.8
26	77.1	68.2	71.1	69.9	68.5	94.2	74.3	69.7	72.6	73.9	75.6	74.3
27	74.7	68.6	71.6	69.1	68.9	94.3	73.6	69.4	69.9	74.0	75.4	74.8
28	74.3	68.3	72.5	68.8	70.3	93.6	73.1	69.2	70.8	72.7*	75.0	74.3
29	74.3	68.3	74.0	68.8	71.5	91.4	72.4	69.2	70.6		75.3	73.6d
30	72.5	68.3	73.6	69.3	71.6	89.8	70.9	69.6	69.8		74.6	76.8
31	73.2		72.6	69.6		89.2		68.1	68.7		71.9b	
Mean	74.2	69.7	72.5	70.1	69.4	82.4	75.5	70.4	70.2	69.8	73.3	85.5

* = adjusted for burst in progress at time of measurement; a = uncorrected for interference during calibration; b = ice on antenna; d = snow on antenna. The yearly mean 2800 MHz flux equaled 74.0 in 1986.

D A I L Y S O L A R I N D I C E S

April 1987

Day	Julian Day	Bartels Cycle Day	Sunspot Numbers Int	Sunspot Numbers Amer	Obs Flux Ottawa (2800)	Solar Flux Adjusted to 1 Astronomical Unit: SGMR (15400)	SGMR (8800)	SGMR (4995)	Ottawa (2800)	SGMR (2695)	SGMR (1415)	SGMR (610)	SGMR (410)	SGMR (245)
01	091	20	14	13	72.6	472	222	105	72.5	76	54	25	16	8
02	092	21	12	11	72.0	492	245	120	71.9	76	56	34	17	7
03	093	22	10	11	72.4	487	217	110	72.4	70	55	34	19	8
04	094	23	13	14	73.9	486	241	114	74.0	72	55	32	19	9
05	095	24	28	27	77.5	453	225	114	77.6	79	58	35	18	10
06	096	25	47	40	89.2	456	---	133	89.4	90	61	32	19	14
07	097	26	56	68	94.2	451	---	---	94.4	95	67	34	25	21
08	098	27	64	67	94.5	450	---	132	94.8	93	59	33	22	19
09	099	1	69	69	100.2	489	---	146	100.5	98	74	35	17	11
10	100	2	72	75	99.6	491	238	134	100.0	99	71	34	20	11
11	101	3	80	86	100.8	498	256	134	101.3	106	64	36	22	9
12	102	4	77	78	98.1	493	259	133	98.6	98	72	36	22	8
13	103	5	79	73	98.7	---	---	---	99.3	---	--	--	--	--
14	104	6	74	76	97.1	496	273	140	97.7	102	74	41	22	9
15	105	7	78	74	97.1	508	267	144	97.8	97	76	45	46	--
16	106	8	60	64	94.6*	404	243	153	95.3*	98	--	33	33	--
17	107	9	41	45	96.5	391	227	130	97.3	93	72	37	20	13
18	108	10	36	35	93.2	450	253	141	94.0	96	68	36	20	9
19	109	11	29	24	90.9	479	---	132	91.7	90	64	31	18	8
20	110	12	16	11	84.8	486	258	125	85.6	87	63	32	19	7
21	111	13	19	19	77.5	482	256	123	78.3	81	59	32	18	7
22	112	14	26	25	75.7	488	263	120	76.5	78	58	33	18	7
23	113	15	25	27	75.7	490	256	123	76.5	80	60	37	20	7
24	114	16	35	28	77.7	486	235	123	78.6	80	63	39	19	9
25	115	17	23	23	74.9	503	247	121	75.8	76	60	36	18	8
26	116	18	21	21	73.3	496	235	118	74.3	73	--	30	18	6
27	117	19	11	11	73.8	499	239	120	74.8	78	--	30	19	7
28	118	20	14	12	73.3	478	255	118	74.3	74	--	25	17	7
29	119	21	20	24	72.5d	494	252	119	73.6d	74	--	37	20	9
30	120	22	30	32	75.7	498	242	123	76.8	79	--	37	19	9
Mean			39.3	39.4	84.9	477	246	126	85.5	85	63	34	20	10

The international sunspot numbers are preliminary values.

The observed and the adjusted Ottawa fluxes tabulated here are the "Series C" daily values reported by the Algonquin Radio Observatory, Ottawa, Ontario, Canada. Numbers in parentheses in the column headings denote frequencies in MHz. Qualifiers after an entry have the following meaning:

a = interpolated
b = ice on antenna
d = snow on atenna
# = uncorrected for interference during calibration.
* = adjusted for burst in progress at time of measurement.

Equipment problems produced any gaps shown above in the Air Weather Service's Sagamore Hill (SGMR) observations.

OBSERVED AND PREDICTED SOLAR ACTIVITY INDICES

APRIL 1987

	RELATIVE SUNSPOT NUMBERS						2800 MHz RADIO FLUX Adjusted to 1 AU (Sa)	
	International (Ri)		American (Ra)		Derived (Rs)			
Date	Monthly Mean	Smoothed	Monthly Mean	Smoothed	Monthly Mean	Smoothed	Monthly Mean	Smoothed
Jul 83	82.2	66	82.2	63	77.4	66	129.1	118
Aug	71.8	66	69.2	63	75.7	66	127.5	118
Sep	50.3	68	47.4	66	57.0	67	110.2	119
Oct	55.8	68	52.3	66	58.6	67	111.7	120
Nov	33.3	59	30.2	65	35.6	67	90.4	120
Dec	33.4	64	32.3	62	35.7	65	90.5	118
Jan 84	57.0	60	54.4	58	59.4	61	112.4	115
Feb	85.4	56	81.5	54	86.2	58	137.2	101
Mar	83.5	53	83.0	51	68.5	55	120.8	108
Apr	69.7	50	66.5	48	78.1	52	129.7	105
May	76.4	48	72.1	45	79.6	49	131.1	103
Jun	46.1	46	45.2	44	49.8	48	103.5	102
Jul	37.4	44	36.2	42	37.6	39	92.2	99
Aug	25.5	40	24.5	38	30.7	41	85.8	95
Sep	15.7	34	13.6	32	23.2	35	78.9	90
Oct	12.0	29	9.8	27	16.9	31	73.1	86
Nov	22.8	25	19.4	23	18.6	26	74.6	72
Dec	18.7	22	17.0	20	17.4	23	73.5	79
Jan 85	16.5	20	14.5	19	15.9	21	72.1	77
Feb	15.9	20	16.3	18	15.7	20	71.9	76
Mar	17.2	19	11.8	16	16.3	19	72.5	75
Apr	16.2	18	17.1	17	19.8	19	75.7	75
May	27.5	18	24.0	17	26.6	19	82.0	75
Jun	24.2	18	22.2	16	22.8	19	78.5	75
Jul	30.7	17	30.8	16	25.8	19	81.3	75
Aug	11.1	17	10.7	15	17.2	19	73.3	75
Sep	3.9	17	3.4	16	13.8	20	70.2	76
Oct	18.6	17	16.5	16	18.1	20	74.2	76
Nov	16.2	17	16.4	15	16.4	19	72.6	75
Dec	17.3	15	10.1	14	16.2	19	72.4	75
Jan 86	2.5	14	2.3	12	14.6	18	70.9	74
Feb	23.2	13	23.8	11	26.0	17	81.5	74
Mar	15.1	13	12.5	11	20.3	17	76.2	73
Apr	18.5	14	13.8	12	19.6	18	75.6	74
May	13.7	14	11.6	12	18.1	18	74.2	74
Jun	1.1	14	0.8	11	13.3	18	69.7	74
Jul	18.1	14*	17.7	11	16.3	18	72.5	74
Aug	7.4	13*	7.6	11	13.7	17	70.1	73
Sep	3.8	12*	3.5	10	13.0	17	69.4	73
Oct	35.4	13*	19.8	11	27.0	17	82.4	73
Nov	15.2	14(1)*	14.7	12	19.5	18	75.5	--
Dec	6.8	14(2)*	5.1	12	14.0	17	70.4	--
Jan 87	9.8†	14(3)*	9.4	12	13.8	17	70.2	--
Feb	4.0†	15(4)*	3.0	13	13.4	18	69.8	--
Mar	14.8†	16(5)*	13.3	14	17.2	19	73.3	--
Apr	39.3†	17(6)*	37.9	15	30.3	19	85.5	--
May	----	18(8)*	----	16	----	21	----	--
Jun	----	20(9)*	----	18	----	22	----	--
Jul	----	21(10)*	----	19	----	23	----	--
Aug	----	22(12)*	----	21	----	25	----	--
Sep	----	25(14)*	----	23	----	27	----	--
Oct	----	28(18)*	----	27	----	30	----	--

*An asterisk marks either a value of the observed 12-month running mean or of a predicted 12-month average that is based in part on preliminary observations.

Underlined entries indicate predicted values and parentheses enclose the absolute value of the 90% confidence limits. The two columns headed "Derived" represent a sunspot number computed from a linear regression equation between the 2800 MHz solar flux (adjusted to 1 astronomical unit) and the Zurich sunspot number.

SMOOTHED (OBSERVED AND PREDICTED) SUNSPOT NUMBERS: CYCLES 21 AND 22

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1980	164	163	161	159	156	155	153	150	150	150	148	143
1981	140	142	143	143	143	142	140	141	143	142	139	138
1982	137	133	129	124	120	117	115	109	101	96	95	95
1983	93	90	86	82	77	71	66	66	68	68	67	64
1984	60	56	53	50	48	47	44	40	34	29	25	22
1985	21	20	19	18	18	18	17	17	17	17	17	15
1986	14	13	13	14	14	14	14	13	12*	13	14	14
											(1)	(2)
1987	14	15	16	17	18	20	21	22	25	28	32	36
	(3)	(4)	(5)	(6)	(8)	(9)	(10)	(12)	(14)	(18)	(20)	(23)
1988	39	42	45	47	51	56	61	65	69	73	75	78
	(26)	(28)	(31)	(33)	(36)	(39)	(43)	(46)	(49)	(52)	(54)	(54)
1989	81	85	90	96	101	104	107	110	113	114	115	115
	(54)	(57)	(60)	(63)	(65)	(66)	(68)	(72)	(74)	(75)	(76)	(76)

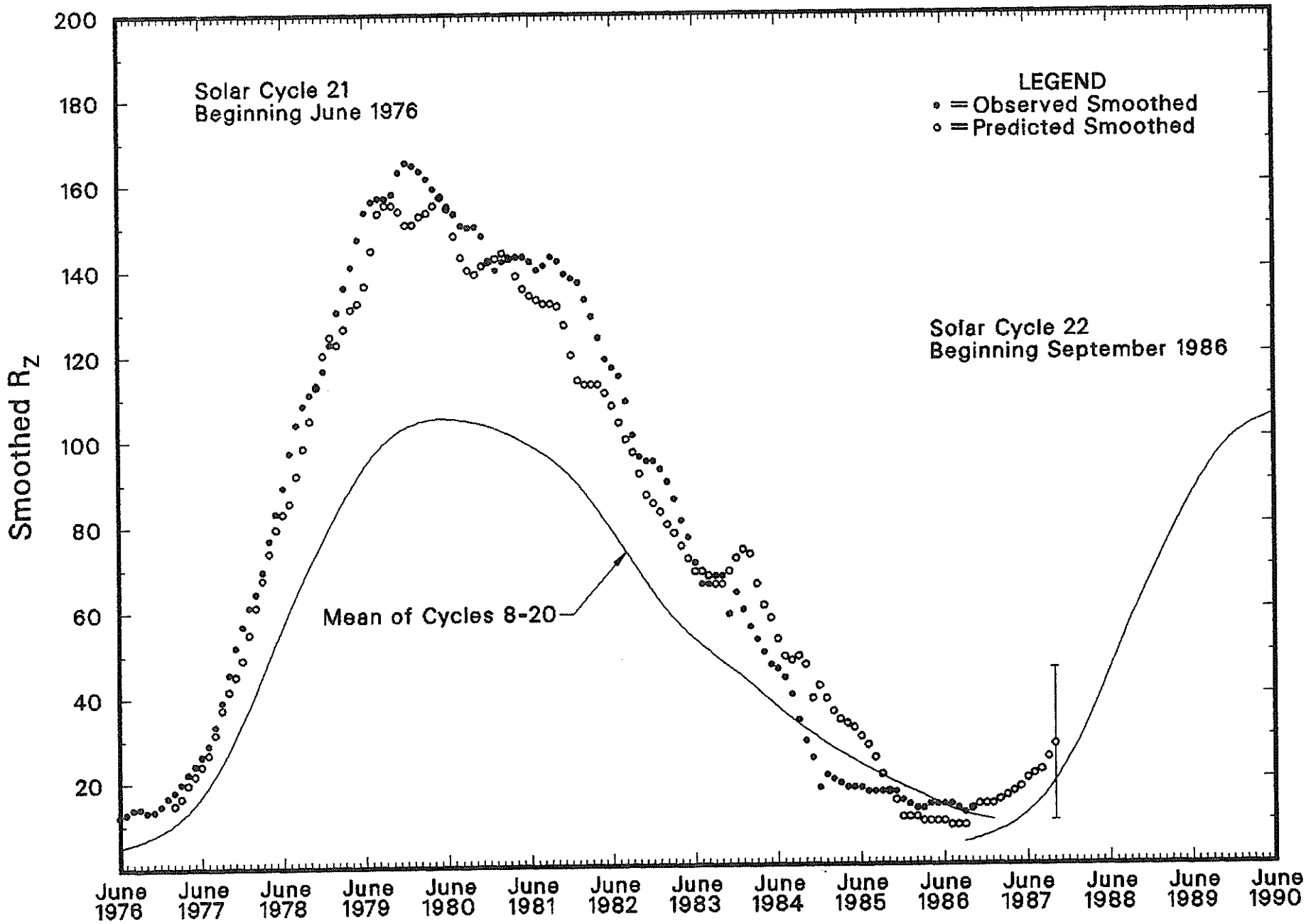
*September 1986 may be the onset of Sunspot Cycle 22.

For the end of Solar Cycle 21, and perhaps the beginning of Cycle 22, the table gives observed smoothed sunspot numbers up to the one calculated from the most recently measured monthly mean. These smoothed observed values are based on final, unsmoothed monthly means through December 1986 and on provisional ones thereafter.

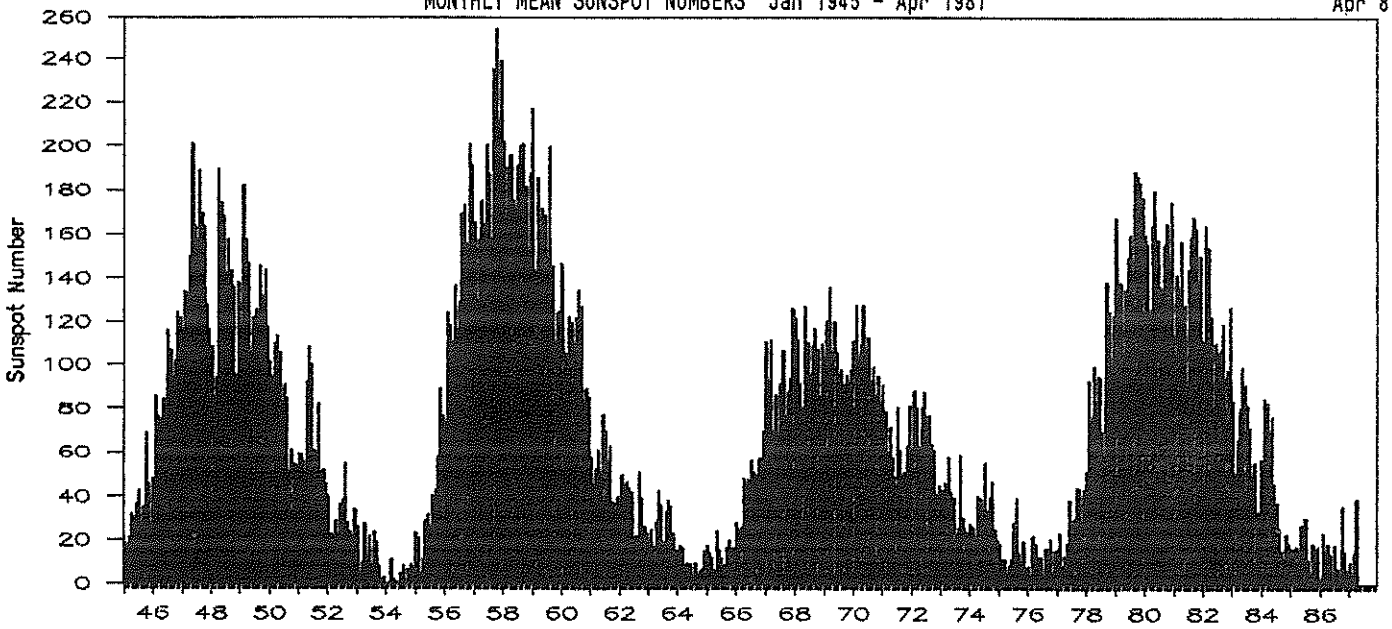
Table entries, with numbers in parentheses below them, denote predictions by the McNish-Lincoln method. (See page 9 in the March 1986 supplement to Solar-Geophysical Data.) Adding the number in parentheses to the predicted value generates the upper limit of the 90% confidence interval; subtracting the number from the predicted value generates the lower limit. Consider, for example, the October 1987 prediction. There exists a 90% chance that in October 1987 the actual smoothed sunspot number will fall somewhere between 10 and 46.

THE MCNISH-LINCOLN PREDICTION METHOD GENERATES USEFUL ESTIMATES OF SMOOTHED, MONTHLY MEAN SUNSPOT NUMBERS FOR NO MORE THAN 12 MONTHS AHEAD. Beyond a year the predictions regress rapidly toward the mean of all 14 cycles used in the computation. Moreover, the method is very sensitive to the date defined as the beginning of the current sunspot cycle, that is, to the date of the most recent sunspot minimum. The new-cycle predictions tabulated above are based on the assumption that the September 1986 value of 12.4 is the minimum. If a smoothed number lower than 12.4 occurs, the predictions will change.

OBSERVED AND ONE-YEAR-AHEAD PREDICTED SUNSPOT NUMBERS



MONTHLY MEAN SUNSPOT NUMBERS Jan 1945 - Apr 1987



Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Mean
1945	18.5	12.7	21.5	32.0	30.6	36.2	42.6	25.9	34.9	68.8	46.0	27.4	33.2
1946	47.6	86.2	76.6	75.7	84.9	73.5	116.2	107.2	94.4	102.3	123.8	121.7	92.6
1947	115.7	133.4	129.8	149.8	201.3	163.9	157.9	188.8	169.4	163.6	128.0	116.5	151.6 M
1948	108.5	86.1	94.8	189.7	174.0	167.8	142.2	157.9	143.3	136.3	95.8	138.0	136.3
1949	119.1	182.3	157.5	147.0	106.2	121.7	125.8	123.8	145.3	131.6	143.5	117.6	134.7
1950	101.6	94.8	109.7	113.4	106.2	83.6	91.0	85.2	51.3	61.4	54.8	54.1	83.9
1951	59.9	59.9	55.9	92.9	108.5	100.6	61.5	61.0	83.1	51.6	52.4	45.8	69.4
1952	40.7	22.7	22.0	29.1	23.4	36.4	39.3	54.9	28.2	23.8	22.1	34.3	31.5
1953	26.5	3.9	10.0	27.8	12.5	21.8	8.6	23.5	19.3	8.2	1.6	2.5	13.9
1954	0.2	0.5	10.9	1.8	0.8	0.2	4.8	8.4	1.5	7.0	9.2	7.6	4.4 m
1955	23.1	20.8	4.9	11.3	28.9	31.7	26.7	40.7	42.7	58.5	89.2	76.9	38
1956	73.6	124.0	118.4	110.7	136.6	116.6	129.1	169.6	173.2	155.3	201.3	192.1	141.7
1957	165.0	130.2	157.4	175.2	164.6	200.7	187.2	158.0	235.8	253.8	210.9	239.4	190.2 M
1958	202.5	164.9	190.7	196.0	175.3	171.5	191.4	200.2	201.2	181.5	152.3	187.6	184.8
1959	217.4	143.1	185.7	163.3	172.0	168.7	149.6	199.6	145.2	111.4	124.0	125.0	159
1960	146.3	106.0	102.2	122.0	119.6	110.2	121.7	134.1	127.2	82.8	89.6	85.6	112.3
1961	57.9	46.1	53.0	61.4	51.0	77.4	70.2	55.8	63.6	37.7	32.6	39.9	53.9
1962	38.7	50.3	45.6	46.4	43.7	42.0	21.8	21.8	51.3	39.5	26.9	23.2	37.6
1963	19.8	24.4	17.1	29.3	43.0	35.9	19.6	33.2	38.8	35.3	23.4	14.9	27.9
1964	15.3	17.7	16.5	8.6	9.5	9.1	3.1	9.3	4.7	6.1	7.4	15.1	10.2 m
1965	17.5	14.2	11.7	6.8	24.1	15.9	11.9	8.9	16.8	20.1	15.8	17.0	15.1
1966	28.2	24.4	25.3	48.7	45.3	47.7	56.7	51.2	50.2	57.2	57.2	70.4	47
1967	110.9	93.6	111.8	69.5	86.5	67.3	91.5	107.2	76.8	88.2	94.3	126.4	93.8
1968	121.8	111.9	92.2	81.2	127.2	110.3	96.1	109.3	117.2	107.7	86.0	109.8	105.9 M
1969	104.4	120.5	135.8	106.8	120.0	106.0	96.8	98.0	91.3	95.7	93.5	97.9	105.5
1970	111.5	127.8	102.9	109.5	127.5	106.8	112.5	93.0	99.5	86.6	95.2	83.5	104.5
1971	91.3	79.0	60.7	71.8	57.5	49.8	81.0	61.4	50.2	51.7	63.2	82.2	66.6
1972	61.5	88.4	80.1	63.2	80.5	88.0	76.5	76.8	64.0	61.3	41.6	45.3	68.9
1973	43.4	42.9	46.0	57.7	42.4	39.5	23.1	25.6	59.3	30.7	23.9	23.3	38
1974	27.6	26.0	21.3	40.3	39.5	36.0	55.8	33.6	40.2	47.1	25.0	20.5	34.5
1975	18.9	11.5	11.5	5.1	9.0	11.4	28.2	39.7	13.9	9.1	19.4	7.8	15.5
1976	8.1	4.3	21.9	18.8	12.4	12.2	1.9	16.4	13.5	20.6	5.2	15.3	12.6 m
1977	16.4	23.1	8.7	12.9	18.6	38.5	21.4	30.1	44.0	43.8	29.1	43.2	27.5
1978	51.9	93.6	76.5	99.7	82.7	95.1	70.4	58.1	138.2	125.1	97.9	122.7	92.5
1979	166.6	137.5	138.0	101.5	134.4	149.5	159.4	142.2	188.4	186.2	183.3	176.3	155.4 M
1980	159.6	155.0	126.2	164.1	179.9	157.3	136.3	135.4	155.0	164.7	147.9	174.4	154.6
1981	114.0	141.3	135.5	156.4	127.5	90.9	143.8	158.7	167.3	162.4	137.5	150.1	140.4
1982	111.2	163.6	153.8	122.0	82.2	110.4	106.1	107.6	118.8	94.7	98.1	127.0	115.9
1983	84.3	51.0	66.5	80.7	99.2	91.1	82.2	71.8	50.3	55.8	33.3	33.4	66.6
1984	57.0	85.4	83.5	69.7	76.4	46.1	37.4	25.5	15.7	12.0	22.8	18.7	45.9
1985	16.5	15.9	17.2	16.2	27.5	24.2	30.7	11.1	3.9	18.6	16.2	17.3	17.9
1986	2.5	23.2	15.1	18.5	13.7	1.1	18.1	7.4	3.8	35.4	15.2	6.8	13.4
1987	9.8*	4.0*	14.8*	39.3*									17.0*

*Preliminary

For the yearly means, each "M" marks a sunspot cycle maximum and each "m" a minimum.

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Grp #	Sta	Day	Start (UT)	Max (UT)	End (UT)	Lat	CMD	NOAA/ USAF Region	CMP Mo	CMP Day	Dur (Min)	Imp	Opt	Xray	See	Obs Type	Time (UT)	Area Measurement Apparent (10^{-6} Disk)	Area Measurement Corr (Sq Deg)	Remarks
0001	YUNN	01	0257	0302	0315	N02	W05	4783	03	31.7	18	SN				P		96	1.0	D
0002	YUNN	01	0327	0329	0340D	N02	W05	4783	03	31.8	13D	SN				P		32	.3	D
0003	LEAR	02	0115	0115U	0124	N02	W17	4783	03	31.8	9	SF			3	C		21		
0004		03	1437	14431	1456	S22	E77	4786	04	9.5	19	SF						37		
	HOLL	03	1437	1443	1455	S23	E78	4786	04	9.6	18	SF			3	C		36		
	RAMY	03	1437	1444	1457	S22	E76	4786	04	9.4	20	SF			3	C		38		
0005		03	15161	16091	1622	S22	E77	4786	04	9.5	66	SF						31		
	RAMY	03	1516	1610	1619D	S22	E76	4786	04	9.5	63D	SF			3	C		29		
	HOLL	03	1517	1609	1622	S23	E78	4786	04	9.6	65	SF			3	C		33		
0006	YUNN	04	0141	0143	0149	N10	W43	4783	03	31.8	8	SN				P		16	.2	
0007	RAMY	04	1922	1924	1929	S22	E60	4786	04	9.4	7	SF			2	C		20		
0008		05	0006	0008*	0025	S22	E59	4786	04	9.5	19	SF	C	1.0				38		
	LEAR	05	0006	0008	0026	S22	E59	4786	04	9.5	20	SF	C	1.0	3	C		54		
	HOLL	05	0006	0013	0025	S22	E59	4786	04	9.5	19	SF	C	1.0	3	C		43		
	PALE	05	0016E	0019	0024	S22	E60	4786	04	9.6	8D	SF	C	1.0	3	C		16		
0009		05	0522*	0525*	0547	S22	E56	4786	04	9.5	25	SF						17		F
	LEAR	05	0522	0525	0528	S22	E56	4786	04	9.5	6	SF			3	C		15		F
	LEAR	05	0536	0536	0543	S22	E56	4786	04	9.5	7	SF			4	C		15		F
	LEAR	05	0547	0558	0609	S22	E56	4786	04	9.5	22	SF			4	C		22		F
0010	LEAR	05	0636	0638	0653	S22	E55	4786	04	9.5	17	SF			4	C		25		F
0011	SVTO	05	1227	1227	1234	S22	E54	4786	04	9.7	7	SN			3	C		18		
0012	HOLL	05	1934	1938	1948	S29	E90	4787	04	12.9	14	SN	M	1.1	3	C		39		F
0013	HOLL	05	2015	2016	2021	S23	E48	4786	04	9.5	6	SF			3	C		28		
0014	HOLL	05	2051	2051	2125	S23	E50	4786	04	9.7	34	SF			3	C		21		
0015	LEAR	06	0429	0431	0436	S28	E86	4787	04	12.9	7	SN	C	9.2	3	C		31		F
0016	LEAR	06	0712	0714	0724	S23	E42	4786	04	9.5	12	SF			3	C		24		FH
0017	LEAR	06	0729	0737	0755	S23	E42	4786	04	9.5	26	SF			3	C		33		FH
0018	LEAR	06	0923	0923	0931	S23	E41	4786	04	9.5	8	SF			2	C		27		H
0019	SVTO	06	0947	0948	0958	S23	E42	4786	04	9.6	11	SF			3	C		81		F
0020	RAMY	06	1121E	1122	1139	S30	E76	4787	04	12.4	18D	SF	C	1.2	3	C		19		F
0021	RAMY	06	1121E	1132U	1151D	S23	E39	4786	04	9.5	30D	SF			3	C		78		F
0022	RAMY	06	1204	1204	1217	S28	E83	4787	04	13.0	13	SF			3	C		10		
0023	SVTO	06	1317	1318	1323	S33	E77	4787	04	12.7	6	SF			3	C		27		
0024		06	13491	13531	1358	S32	E80	4787	04	12.9	9	SF						30		F
	HOLL	06	1349	1354	1359	S31	E82	4787	04	13.0	10	SF			3	C		33		F
	SVTO	06	1350	1353	1357	S33	E79	4787	04	12.8	7	SF			3	C		28		
0025		06	14411	14434	1456	S30	E80	4787	04	12.9	15	SF						36		
	HOLL	06	1441	1443	1502D	S31	E82	4787	04	13.1	21D	SF			3	C		38		
	SVTO	06	1442	1447	1456	S29	E79	4787	04	12.8	14	SF			3	C		33		
0026		06	16312	16333	1648	S23	E37	4786	04	9.5	17	SF						18		
	RAMY	06	1631	1633	1649D	S23	E37	4786	04	9.5	18D	SF			3	C		19		
	HOLL	06	1633	1636	1648	S23	E37	4786	04	9.5	15	SF			3	C		16		
0027	HOLL	06	1732	1733	1741	S23	E36	4786	04	9.5	9	SF			3	C		16		

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Grp #	Sta	Day	Start (UT)	Max (UT)	End (UT)	Lat	CMD	NOAA/ USAF Region	CMP Mo	CMP Day	Dur (Min)	Imp Opt	Imp Xray	See	Obs Type	Time (UT)	Area Measurement Apparent (10^{-6} Disk)	Area Measurement Corr (Sq Deg)	Remarks
0028	RAMY	06	1954	2010	2024	S22	E38	4786	04	9.7	30	SF		3	C		88		
0029	HOLL	06	2247	2301	2353	S31	E82	4790	04	13.4	66	1N	C 1.1	4	C		96		F
0030	PALE	06	2301E	2301	2305D	S31	E72	4787	04	12.6	4D	SF	C 1.1	2	C		30		
0031	YUNN	07	0247	0255	0304	S31	E72	4787	04	12.8	17	1N			C		80		
0032	SVTO	07	0802	0811	0830	S35	E70	4787	04	12.9	28	SF		3	C		19		E
0033	LEAR	07	0843	0845	0850	S33	E69	4787	04	12.8	7	SF		2	C		22		
0034	RAMY	07	1341	1341	1348	S31	E72	4787	04	13.2	7	SF		3	C		14		F
0035	HOLL	07	1645	1656	1657	S31	E68	4787	04	13.1	12	SF		3	C		39		
0036		07	1717	1718	1733	S23	E23	4786	04	9.5	16	SN					28		
	HOLL	07	1717	1718	1733	S23	E23	4786	04	9.5	16	SN		3	C		30		
	RAMY	07	1724E	1724U	1728D	S23	E23	4786	04	9.5	4D	SF		3	C		27		
0037		07	17401	1742	1747	S33	E67	4787	04	13.0	7	SF					42		
	HOLL	07	1740	1742	1749	S33	E66	4787	04	13.0	9	SF		3	C		74		
	PALE	07	1741	1742	1745	S33	E68	4787	04	13.1	4	SF		3	C		10		
0038	HOLL	07	1740	1749	1823	S24	E22	4786	04	9.4	43	SF		3	C		40		
0039		07	18238	1844	1932	S34	E66	4787	04	13.0	69	1N	C 1.3				112		
	HOLL	07	1823	1844	1932	S35	E66	4787	04	13.0	69	1N	C 1.3	3	C		184		
	PALE	07	1831	1843U	1844D	S34	E65	4787	04	12.9	13D	SF	C 1.3	3	C		41		
0040	HOLL	07	2039	2043	2055	S29	E65	4787	04	12.9	16	1B	C 2.0	3	C		113		F
0041	HOLL	07	2254	2300	2311	S07	E79	4789	04	13.9	17	SF		3	C		54		
0042	SVTO	08	0730	0741	0750	S31	E60	4787	04	13.0	20	SF		3	C		59		
0043		08	11441	11471	1154	S25	E12	4786	04	9.4	10	SN					114		EF
	RAMY	08	1144	1147	1156	S27	E11	4786	04	9.3	12	SN		3	C		128		FE
	SVTO	08	1145	1148	1152	S23	E13	4786	04	9.5	7	SN		3	C		99		E
0044	RAMY	08	1214	1225	1244	S23	E16	4786	04	9.7	30	SN		3	C		82		
0045	HOLL	08	1716	1734	1748	S08	E73	4789	04	14.2	32	SF		4	C		19		FH
0046	HOLL	08	1832	1854	1904	S33	E58	4787	04	13.4	32	SF		3	C		21		
0047	HOLL	08	2113	2123	2146	S23	E10	4786	04	9.6	33	SB	C 1.2	3	C		59		
0048	HOLL	08	2215	2216	2226	S33	E53	4787	04	13.1	11	SF		3	C		27		
0049		08	2341*	2354	2402	S32	E52	4787	04	13.1	21	SN					43		
	HOLL	08	2341	2354	2405	S31	E52	4787	04	13.1	24	SN		3	C		55		
	LEAR	08	2354	2354	2359	S32	E51	4787	04	13.0	5	SF		3	C		31		
0050		09	01432	01461	0153	S05	E68	4789	04	14.1	10	SN					59		F
	LEAR	09	0143	0146	0154	S06	E63	4789	04	13.8	11	SF		3	C		70		F
	YUNN	09	0145	0147	0152	S04	E72	4789	04	14.4	7	SN			C		48		
0051	LEAR	09	0232	0239	0253	S08	E66	4789	04	14.0	21	SF	C 1.0	3	C		37		F
0052	LEAR	09	0423	0423	0437	S32	E47	4787	04	12.9	14	SF		3	C		20		F
0053	LEAR	09	0452	0457	0502	S28	E47	4790	04	12.9	10	SF		3	C		28		
0054	LEAR	09	0614	0615	0635	S08	E64	4789	04	14.0	21	SF		3	C		26		
0055	LEAR	09	0637	0638	0707	S06	E62	4789	04	13.9	30	1N	C 2.6	3	C		154		F
0056	LEAR	09	0837	0838	0857	S06	E59	4789	04	13.8	20	SF	C 2.6	3	C		67		F

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Grp #	Sta	Day	Start (UT)	Max (UT)	End (UT)	Lat	CMD	NOAA/ USAF Region	CMP Mo	CMP Day	Dur (Min)	Imp Opt	Imp Xray	See	Obs Type	Time (UT)	Area Measurement Apparent (10^{-6} Disk)	Area Measurement Corr (Sq Deg)	Remarks
0057	SVTO	09	1229	1229	1251	S34	E44	4787	04	13.0	22	SF		3	C		17		
0058		09	1500*	1521*	1606	S30	E43	4787	04	13.0	66	SF					41		
	RAMY	09	1500	1555	1603	S31	E43	4787	04	13.0	63	SF		3	C		51		
	HOLL	09	1517	1521	1610	S30	E43	4787	04	13.0	53	SF		3	C		45		
	RAMY	09	1609E	1613	1616D	S29	E43	4787	04	13.0	7D	SF		3	C		26		
0059		09	1622	1658	1709	S32	E42	4787	04	13.0	47	SN					58		F
	HOLL	09	1622	1658	1709	S33	E40	4787	04	12.8	47	SN		3	C		40		
	RAMY	09	1623E	1658	1705D	S32	E44	4787	04	13.2	42D	SN		3	C		75		F
0060		09	17322	17373	1738	S32	E42	4787	04	13.0	6	SB					82		
	HOLL	09	1732	1737	1738	S33	E43	4787	04	13.1	6	SB		3	C		73		
	RAMY	09	1734	1740	1819D	S31	E42	4787	04	13.0	45D	SN		3	C		90		
0061	RAMY	09	1820	1827	1837	S26	E02	4786	04	9.9	17	SF		3	C		47		
0062		09	1855	18551	1905	S34	E42	4787	04	13.1	10	SF					26		F
	RAMY	09	1855	1855	1905	S31	E42	4787	04	13.1	10	SF		3	C		22		F
	HOLL	09	1855	1856	1905	S38	E42	4787	04	13.2	10	SF		3	C		31		
0063		09	20031	2006	2026	S06	E56	4789	04	14.0	23	SF					20		
	RAMY	09	2003	2006	2037	S07	E56	4789	04	14.0	34	SF		3	C		15		
	HOLL	09	2004	2006	2015	S06	E57	4789	04	14.1	11	SF		3	C		25		
0064	LEAR	10	0450	0451	0454	S05	E49	4789	04	13.9	4	SF		3	C		23		
0065		10	09162	09182	0931	S32	E32	4787	04	12.9	15	SN					46		F
	LEAR	10	0916	0918	0932	S32	E32	4787	04	12.9	16	SN		3	C		49		F
	SVTO	10	0918	0920	0930	S33	E31	4787	04	12.8	12	SN		3	C		44		
0066		10	1031	1032*	1134	S32	E34	4787	04	13.1	63	SN	C 1.3				77		
	SVTO	10	1031	1032	1133	S32	E31	4787	04	12.9	62	SN	C 1.3	3	C		130		
	RAMY	10	1124E	1129	1136	S33	E37	4787	04	13.4	12D	SF		3	C		24		
0067		10	11242	11243	1226	S24	W09	4786	04	9.8	62	SB	C 1.2				110		F
	RAMY	10	1124	1124	1226	S23	W08	4786	04	9.8	62	SB	C 1.2	3	C		115		F
	SVTO	10	1126	1127	1227	S24	W10	4786	04	9.7	61	SB	C 1.2	3	C		105		F
0068		10	1306*	13226	1341	S33	E30	4787	04	12.9	35	SN					43		
	RAMY	10	1306	1322	1346	S33	E32	4787	04	13.1	40	SN		3	C		48		
	SVTO	10	1328	1328	1336	S33	E28	4787	04	12.8	8	SF		3	C		38		
0069		10	14524	14552	1518	S32	E30	4787	04	13.0	26	SF					42		
	RAMY	10	1452	1455	1518	S32	E32	4787	04	13.1	26	SF		3	C		37		
	SVTO	10	1456	1457	1519	S33	E28	4787	04	12.8	23	SF		3	C		48		
0070	RAMY	10	1625	1641	1708	S32	E31	4787	04	13.1	43	SB		3	C		78		F
0071	RAMY	10	1647	1647	1654	S06	E48	4789	04	14.3	7	SF		3	C		18		
0072	RAMY	10	1647	1649	1723	S24	W13	4786	04	9.7	36	SF		3	C		18		
0073	RAMY	10	1715	1720	1732	S32	E31	4787	04	13.2	17	SN		3	C		45		
0074	RAMY	10	1733	1736	1747	S32	E31	4787	04	13.2	14	SF		3	C		27		
0075		10	18192	18221	1840	S22	W20	4786	04	9.2	21	SN	C 5.5				186		EFH
	HOLL	10	1819	1822	1850	S23	W17	4786	04	9.4	31	SB	C 5.5	3	C		192		
	RAMY	10	1820E	1824U	1855D	S23	W13	4786	04	9.8	35D	1B	C 5.5	3	C		295		FE
	PALE	10	1821	1823	1830	S20	W29	4786	04	8.5	9	SF	C 5.5	3	C		71		FH
0076	HOLL	10	2152	2215	2225	S24	W16	4786	04	9.7	33	SN	C 1.1	3	C		29		H
0077	HOLL	10	2211	2212	2215	S31	E29	4787	04	13.2	4	SF		3	C		31		
0078	LEAR	11	0245	0246	0257	S06	E36	4789	04	13.8	12	SF		3	C		23		F
0079		11	04151	04164	0424	S24	W20	4786	04	9.6	9	SN					24		
	PALE	11	0415	0416	0425	S23	W20	4786	04	9.6	10	SN		2	C		20		
	LEAR	11	0416	0420	0424	S25	W20	4786	04	9.6	8	SN		3	C		28		

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Grp #	Sta	Day	Start (UT)	Max (UT)	End (UT)	Lat	CMD	NOAA/ USAF Region	CMP Mo	CMP Day	Dur (Min)	Imp Opt	Imp Xray	Imp See	Obs Type	Time (UT)	Area Measurement Apparent (10^{-6} Disk)	Area Measurement Corr (Sq Deg)	Remarks
0080	YUNN	11	0445	0459	0512	S34	E28	4790	04	13.4	27	SN			P		48	.6	D
0081		11	05093	05122	0520	S24	W21	4786	04	9.6	11	SB	C 2.1				120	2.0	DU
	YUNN	11	0509	0514	0520	S24	W20	4786	04	09.7	11	SB			C		177	2.0	D
	LEAR	11	0512	0512	0520	S25	W20	4786	04	9.7	8	SB	C 2.1	3	C		72		U
	SVTO	11	0512	0513	0521	S23	W23	4786	04	9.4	9	SN	C 2.1	3	C		110		
0082	RAMY	11	1239	1244	1255	S32	E25	4787	04	13.5	16	SN		3	C		26		F
0083		11	1422*	1437*	1455	S07	E32	4789	04	14.0	33	SF					34		
	HOLL	11	1422	1437	1441	S07	E32	4789	04	14.0	19	SF		3	C		11		
	RAMY	11	1428	1445	1512	S07	E33	4789	04	14.1	44	SF		3	C		57		
	SVTO	11	1438	1448	1453	S06	E30	4789	04	13.8	15	SF		3	C		33		
0084	HOLL	11	1545	1545	1553	S37	E19	4787	04	13.2	8	SF		3	C		11		
0085	HOLL	11	1607	1609	1617	S37	E19	4787	04	13.2	10	SF		3	C		21		
0086	HOLL	11	1628	1638	1642	N22	E62	4791	04	16.4	14	SF		3	C		12		
0087	RAMY	11	1644	1645	1700	S37	E18	4787	04	13.1	16	SF		3	C		19		
0088	LEAR	11	2320	2328	2341	S06	E25	4789	04	13.8	21	SF		2	C		67		F
0089	YUNN	12	0134E	0136	0149	S05	E25	4789	04	13.9	15D	SN			P		80	.9	
0090	SVTO	12	1017	1017	1036	S33	E11	4787	04	13.3	19	SN		3	C		28		
0091	SVTO	12	1251	1251	1303	S07	E14	4789	04	13.6	12	SF		3	C		25		F
0092	LEAR	12	2354	2354	2357	S34	W04	4787	04	12.7	3	SF		3	C		38		
0093	LEAR	13	0208	0208	0217	S34	W05	4787	04	12.7	9	SF		3	C		30		
0094	LEAR	13	0226	0226	0248	S24	W48	4786	04	9.4	22	SF		3	C		21		F
0095		14	0642*	0645*	0655	S34	W12	4787	04	13.3	13	SF					21		F
	LEAR	14	0642	0645	0647	S34	W12	4787	04	13.3	5	SF		3	C		22		F
	LEAR	14	0654	0655	0703	S33	W12	4787	04	13.3	9	SF		3	C		20		F
0096		15	00146	00191	0035	S33	W21	4790	04	13.3	21	SN					26		
	HOLL	15	0014	0019	0044	S33	W21	4790	04	13.3	30	SN		3	C		30		
	LEAR	15	0020	0020	0026	S33	W21	4790	04	13.3	6	SF		3	C		21		
0097		15	02311	0232	0241	S32	W25	4790	04	13.1	10	SN	C 1.8				120	3.1	EFZ
	YUNN	15	0231	0232	0238D	S32	W26	4790	04	13.0	7D	1B			P		241	3.1	E
	MITK	15	0231	0232	0241	S33	W24	4790	04	13.2	10	SN			C	0232			E
	PALE	15	0232	0232	0237	S32	W26	4790	04	13.0	5	SN	C 1.8	3	C		54		F
	LEAR	15	0236E	0236U	0244	S33	W25	4790	04	13.1	8D	SN	C 1.8	3	C		64		ZF
0098	LEAR	15	0542	0542	0551	S33	W26	4790	04	13.2	9	SF		3	C		28		F
0099	LEAR	15	0736E	0736	0750	S31	W29	4787	04	13.0	14D	1B	C 6.6	3	C		203		UZ
0100		15	1136	1154	1312	S32	W36	4787	04	12.6	96	SN	C 3.5				163		F
	RAMY	15	1136	1154	1246	S31	W33	4787	04	12.9	70	SB	C 3.5	3	C		122		F
	SVTO	15	1136	1154	1318	S32	W35	4787	04	12.7	102	1N	C 3.5	3	C		227		F
	HOLL	15	1255E	1300U	1332	S34	W39	4787	04	12.4	37D	SN		3	C		139		
0101		15	15221	1525	1530	S31	W38	4787	04	12.6	8	SF					30		
	RAMY	15	1522	1525	1531	S31	W39	4787	04	12.6	9	SF		3	C		34		
	SVTO	15	1523	1525	1530	S31	W38	4787	04	12.6	7	SF		3	C		26		
0102		15	1751*	1756*	1817	S33	W32	4790	04	13.2	26	SF					28		
	RAMY	15	1751	1810	1826	S33	W34	4790	04	13.0	35	SN		3	C		51		
	HOLL	15	1756	1756	1805	S34	W30	4790	04	13.3	9	SF		3	C		17		
	HOLL	15	1807	1810	1820	S33	W33	4790	04	13.1	13	SF		3	C		17		
0103	RAMY	15	1834	1835	1849	S31	W39	4787	04	12.7	15	SF		3	C		29		
0104	HOLL	15	1957	2004	2025	S32	W40	4787	04	12.7	28	SN	C 1.1	3	C		98		

H - ALPHA S O L A R F L A R E S

APRIL 1987

Grp #	Sta	Day	Start (UT)	Max (UT)	End (UT)	Lat	CMD	NOAA/ USAF Region	CMP Mo	Day	Dur (Min)	Imp Opt	Xray	See	Obs Type	Time (UT)	Area Measurement Apparent (10^{-6} Disk)	Corr (Sq Deg)	Remarks
0105	HOLL	15	2032	2041	2129	S32	W41	4787	04	12.6	57	1B	C 1.7	3	C		232		EF
0106	HOLL	15	2314	2315	2322	S32	W35	4790	04	13.2	8	SF		3	C		23		
0107	HOLL	15	2314	2316	2320	N25	E21	4791	04	17.6	6	SF		3	C		10		
0108	SVTO	16	1000	1008	1020	S31	W50	4787	04	12.5	20	SN		3	C		37		F
0109	SVTO	16	1006	1007	1014	S32	W43	4790	04	13.0	8	SF		3	C		29		F
0110	SVTO	16	1035	1040	1058	S32	W43	4790	04	13.0	23	SN		3	C		59		F
0111	RAMY	16	1156	1212	1225	S33	W43	4790	04	13.1	29	SF		3	C		86		
0112		16	1315	13152	1327	S32	W43	4790	04	13.1	12	SN	C 1.0				64		F
	RAMY	16	1315E	1315	1326	S32	W43	4790	04	13.1	11D	SN	C 1.0	3	C		72		
	SVTO	16	1315	1317	1328	S31	W43	4790	04	13.1	13	SN	C 1.0	3	C		57		F
0113		16	1430*	14513	1527	N27	E12	4791	04	17.5	57	SF					60		F
	RAMY	16	1430	1454	1528	N27	E11	4791	04	17.5	58	SF		3	C		75		
	SVTO	16	1431	1451	1540	N26	E12	4791	04	17.5	69	SN		3	C		66		F
	HOLL	16	1448	1454	1513	N27	E12	4791	04	17.5	25	SF		3	C		39		
0114		16	1445	1448	1522	S32	W48	4787	04	12.8	37	SN					47		F
	SVTO	16	1445	1448	1521	S31	W48	4787	04	12.8	36	SN		3	C		71		F
	RAMY	16	1445	1448	1522	S32	W47	4787	04	12.9	37	SF		3	C		23		
0115		16	15111	1515	1529	S32	W44	4790	04	13.1	18	SN	C 3.0				77		F
	RAMY	16	1511	1515	1529	S32	W44	4790	04	13.1	18	SN	C 3.0	3	C		93		F
	SVTO	16	1511	1515	1534	S32	W44	4790	04	13.1	23	SN	C 3.0	3	C		74		F
	HOLL	16	1512	1515	1525	S32	W44	4790	04	13.1	13	SF	C 3.0	3	C		63		
0116		16	1545*	16133	1645	S31	W51	4787	04	12.6	60	1B	M 1.0				165		FU
	HOLL	16	1545	1613	1645	S32	W52	4787	04	12.5	60	1N	M 1.0	3	C		165		F
	RAMY	16	1558	1613	1649D	S31	W49	4787	04	12.8	51D	1B	M 1.0	3	C		154		UF
	SVTO	16	1558	1616	1652D	S30	W51	4787	04	12.6	54D	1B	M 1.0	3	C		175		UF
0117		16	1544*	16124	1804	S32	W44	4790	04	13.2	140	1B	M 1.0				254		FU
	HOLL	16	1544	1616	1804	S32	W43	4790	04	13.2	140	1B	M 1.0	3	C		343		UF
	SVTO	16	1600	1612	1652D	S32	W46	4790	04	13.0	52D	1B	M 1.0	3	C		226		UF
	RAMY	16	1600	1613U	1651D	S33	W44	4790	04	13.2	51D	1B	M 1.0	3	C		192		UF
0118	PALE	16	1729E	1729U	1749D	S34	W45	4790	04	13.1	20D	SN		2	C		43		
0119	HOLL	16	1946	1950	1957	S32	W53	4787	04	12.6	11	SF		3	C		12		
0120	HOLL	16	2041	2043	2045	S32	W54	4787	04	12.6	4	SF		3	C		10		
0121	HOLL	16	2231	2231	2234	S32	W63	4787	04	11.9	3	SF		3	C		15		F
0122		17	0041	00482	0056	S32	W56	4787	04	12.6	15	SN					32		
	LEAR	17	0035E	0048	0102	S31	W56	4787	04	12.6	27D	SF		3	C		42		
	HOLL	17	0041	0050	0051	S32	W56	4787	04	12.6	10	SN		3	C		22		
0123		17	0048	0048	0058	S32	W49	4790	04	13.1	10	SN					20		
	HOLL	17	0048	0048	0056	S32	W49	4790	04	13.1	8	SN		3	C		24		
	LEAR	17	0048	0048	0059	S33	W49	4790	04	13.1	11	SF		3	C		17		
0124	LEAR	17	0133	0134	0142	S33	W50	4790	04	13.1	9	SF		3	C		34		
0125	YUNN	17	0150	0152	0200	S32	W55	4790	04	12.7	10	SN			P		48	.9	D
0126		17	0158*	0202*	0231	S30	W54	4790	04	12.8	33	SN					48	1.0	D
	YUNN	17	0158	0202	0218	S29	W53	4790	04	12.9	20	SN			P		16	.3	D
	YUNN	17	0212	0218	0244	S30	W56	4790	04	12.7	32	SN			P		80	1.6	
0127		17	06051	06071	0616	S05	W46	4789	04	13.8	11	SN					40	.6	
	YUNN	17	0605	0607	0618	S04	W49	4789	04	13.6	13	SN			P		48	.8	
	YUNN	17	0606	0608	0613	S06	W44	4789	04	14.0	7	SN			P		32	.5	

H - ALPHA S O L A R F L A R E S

APRIL 1987

Grp #	Sta	Day	Start (UT)	Max (UT)	End (UT)	Lat	CMD	NOAA/ USAF Region	CMP Mo	CMP Day	Dur (Min)	Imp Opt	Imp Xray	Imp See	Obs Type	Area Measurement Time (UT)	Area Measurement Apparent (10^{-6} Disk)	Area Measurement Corr (Sq Deg)	Remarks
0128		17	1215	1215	1226	S33	W56	4787	04	13.1	11	SF					27		F
	RAMY	17	1209E	1215	1233D	S33	W55	4787	04	13.1	24D	SF		3	C		37		F
	SVTO	17	1215	1215	1226	S33	W56	4787	04	13.1	11	SF		3	C		17		F
0129	RAMY	17	1458	1507	1537D	S33	W56	4787	04	13.2	39D	SN		3	C		42		
0130		17	1656*	1712*	1727	S30	W61	4787	04	12.9	31	SN	C 1.6				42		F
	RAMY	17	1656	1724	1724	S30	W61	4787	04	12.9	28	SN	C 1.6	2	C		53		F
	HOLL	17	1702	1712	1720	S30	W61	4787	04	12.9	18	SN		3	C		21		F
	HOLL	17	1721	1724	1737	S30	W61	4787	04	12.9	16	SN	C 1.6	3	C		52		F
0131	HOLL	17	1837	1838	1841	S30	W62	4787	04	12.9	4	SN		3	C		52		
0132	HOLL	17	1901	1905	1919	S30	W62	4787	04	12.9	18	SF		3	C		32		
0133	HOLL	17	1923	1928	1950	S31	W66	4787	04	12.6	27	SF	C 1.1	3	C		38		FU
0134		17	23367	23454	2420	S33	W59	4790	04	13.3	44	1N	C 5.2				130	3.2	EFU
	HOLL	17	2336	2349	2439	S32	W55	4790	04	13.6	63	1N	C 5.2	4	C		174		UF
	MITK	17	2337	2345	2401	S34	W60	4790	04	13.2	24	1N			C	2345	140	3.2	E
	PALE	17	2343	2350U	2355D	S33	W61	4790	04	13.1	12D	SF	C 5.2	3	C		77		F
0135	YUNN	18	0121E	0121U	0145D	S32	W61	4790	04	13.2	24D	SN			P	0121	80	1.8	D
0136	SVTO	18	0552	0553	0559	S30	W69	4790	04	12.8	7	SF		3	C		17		
0137	SVTO	18	0620	0623	0628	S33	W64	4790	04	13.2	8	SF		3	C		33		F
0138	RAMY	18	1143	1149	1216	S10	W62	4789	04	13.8	33	SF	C 1.9	3	C		33		F
0139		18	13525	13595	1430	S32	W68	4790	04	13.2	38	SB	C 3.5				107		EF
	SVTO	18	1352	1404	1433	S32	W67	4790	04	13.3	41	1N		3	C		108		F
	RAMY	18	1353	1359	1434	S32	W67	4790	04	13.3	41	SB	C 3.5	3	C		109		FE
	HOLL	18	1357	1359	1422	S32	W70	4790	04	13.0	25	SB	C 3.5	4	C		104		F
0140	RAMY	18	1451	1453	1459	S30	W75	4790	04	12.7	8	SN		3	C		15		F
0141		18	15237	15239	1554	S32	W68	4790	04	13.2	31	SF					44		F
	RAMY	18	1523	1523	1550	S32	W68	4790	04	13.2	27	SF		3	C		13		F
	SVTO	18	1523	1532	1606	S33	W72	4790	04	12.9	43	SN		3	C		72		
	HOLL	18	1530	1532	1545	S31	W64	4790	04	13.6	15	SF		4	C		46		
0142		18	17154	1719	1722	S32	W76	4790	04	12.7	7	SF	C 1.0				18		
	HOLL	18	1715	1719	1722	S32	W77	4790	04	12.6	7	SF	C 1.0	3	C		18		
	RAMY	18	1719	1719	1723	S33	W76	4790	04	12.7	4	SF	C 1.0	3	C		17		
0143	HOLL	18	1759	1800	1805	S32	W77	4790	04	12.6	6	SF		3	C		17		
0144	HOLL	18	1838	1843	1845	S32	W77	4790	04	12.7	7	SF		3	C		28		
0145		18	18552	18573	1908	S32	W77	4790	04	12.7	13	SN					34		
	HOLL	18	1855	1857	1905	S32	W77	4790	04	12.7	10	SN		3	C		29		
	RAMY	18	1857	1900	1910	S32	W77	4790	04	12.7	13	SF		3	C		38		
0146	YUNN	19	0201E	0204	0222	S32	W76	4790	04	13.1	21D	SN			P		96		D
0147		19	12054	12081	1220	S32	W80	4790	04	13.2	15	SN	C 1.3				22		
	RAMY	19	1205	1208	1227	S32	W81	4790	04	13.1	22	SN	C 1.3	3	C		30		
	SVTO	19	1209	1209	1213	S33	W80	4790	04	13.1	4	SF	C 1.3	3	C		14		
0148		19	1934*	4335	3147	S30	W90	4790	04	12.7	733	1B					130		
	RAMY	19	1934	1936U	1948	S30	W90	4790	04	12.7	14	SB		3	C		120		
	HOLL	20	1932	1935	1946	S31	W90	4790	04	13.7	14	1B		3	C		140		
0149		22	14191	14211	1434	N02	E68	4797	04	27.7	15	SF					40		
	SVTO	22	1419	1422	1434	N03	E69	4797	04	27.7	15	SF		3	C		42		
	RAMY	22	1420	1421	1434	N02	E67	4797	04	27.6	14	SF		3	C		38		
0150	RAMY	22	1444	1448	1505	N02	E68	4797	04	27.7	21	SF		3	C		23		
0151	HOLL	22	1707	1708	1714	N03	E67	4797	04	27.7	7	SF		3	C		32		

H - ALPHA SOLAR FLARES

APRIL 1987

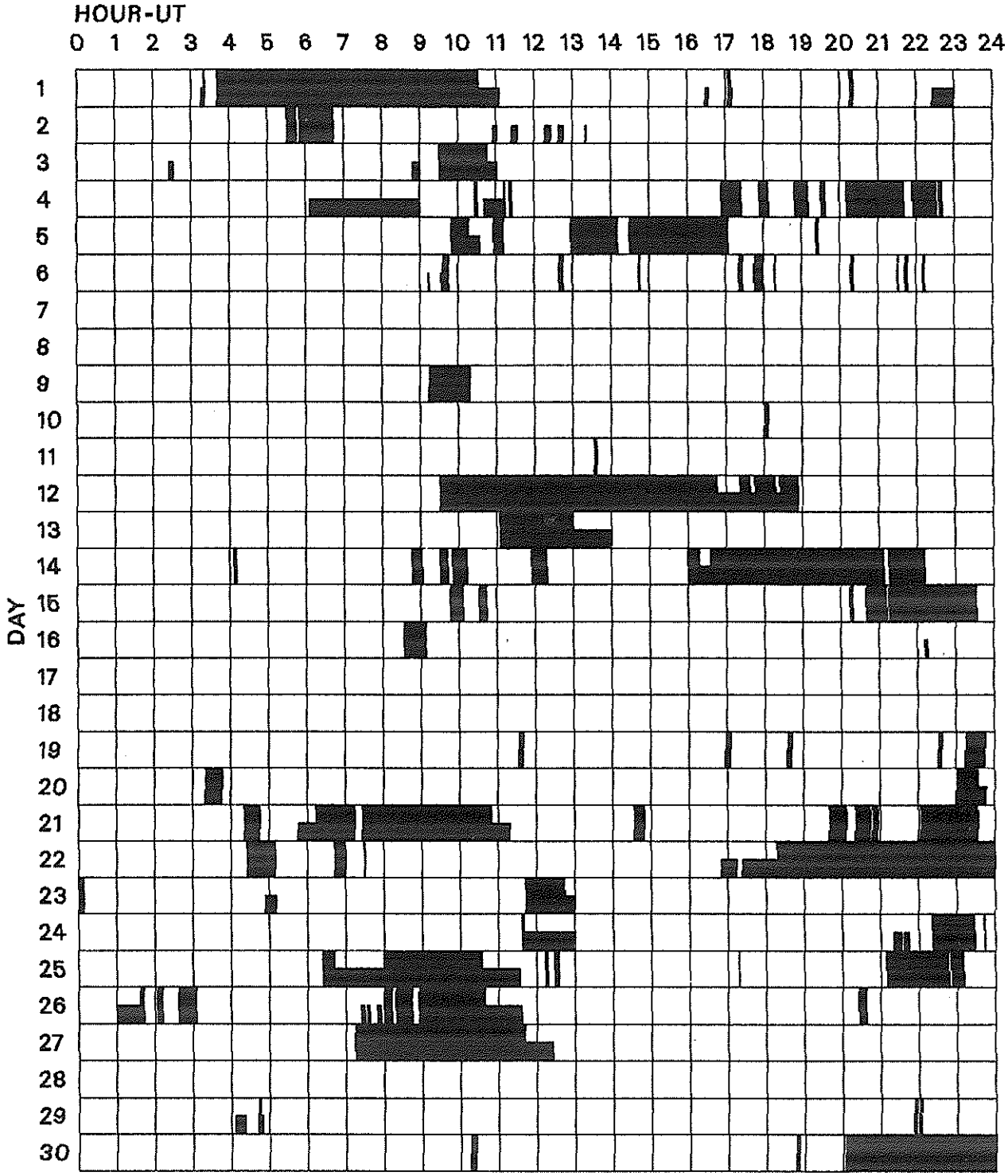
Grp #	Sta	Day	Start (UT)	Max (UT)	End (UT)	Lat	CMD	NOAA/ USAF Region	CMP Mo	CMP Day	Dur (Min)	Imp Opt	Imp Xray	Imp See	Obs Type	Area Measurement Time (UT)	Area Measurement Apparent (10^{-6} Disk)	Area Measurement Corr (Sq Deg)	Remarks
0152	HOLL	22	2235	2242	2244	N02	E63	4797	04	27.6	9	SF		3	C		22		
0153		23	1741*	1746*	1758	N01	E52	4797	04	27.6	17	SF					22		
	RAMY	23	1741	1746	1750D	N00	E52	4797	04	27.6	9D	SF		3	C		38		
	HOLL	23	1746	1750	1753	N02	E52	4797	04	27.6	7	SF		3	C		12		
	HOLL	23	1754	1800	1803	N02	E52	4797	04	27.6	9	SF		3	C		17		
0154	SVTO	24	0734	0736	0744	N26	W51	4798	04	20.3	10	SN	C 3.7	3	C		72		H
0155		24	17112	17116	1726	N28	W56	4798	04	20.3	15	SN					23		
	HOLL	24	1711	1711	1719	N28	W56	4798	04	20.3	8	SN		3	C		15		
	PALE	24	1713	1717	1733	N28	W56	4798	04	20.3	20	SF		2	C		31		
0156	RAMY	24	1949	1951	2011	N25	W55	4798	04	20.6	22	SF		3	C		19		
0157	YUNN	25	0030E	0042U	0108	N27	W64	4798	04	20.0	38D	SN			P	0042	32		E
0158	YUNN	25	0048E	0048U	0108	N01	E40		04	28.0	20D	SN			P	0048	32	.4	D
0159	YUNN	25	0133	0134	0224	N29	W64	4798	04	20.0	51	SN			C		32		E
0160	SVTO	30	0722	0724	0741	N01	W35	4797	04	27.7	19	SF		3	C		18		

"Remarks"

A = Eruptive prominence whose base is less than 90 degrees from central meridian.
B = Probably the end of a more important flare.
C = Invisible 10 minutes before.
D = Brilliant point.
E = Two or more brilliant points.
F = Several eruptive centers.
G = No visible spots in the neighborhood.
H = Flare accompanied by high-speed dark filament.
I = Active region very extended.
J = Distinct variations of plage intensity before or after the flare.
K = Several intensity maxima.
L = Existing filaments show signs of sudden activity.
M = White-light flare.
N = Continuous spectrum shows effects of polarization.
O = Observations have been made in the H and K lines of Ca II.
P = Flare shows Helium D3 in emission.
Q = Flare shows Balmer continuum in emission.
R = Marked asymmetry in H-alpha line suggests ejection of high-velocity material.
S = Brightness follows disappearance of filament in same position.
T = Region active all day.
U = Two bright branches, parallel or converging.
V = Occurrence of an explosive phase; important, expansion within roughly 1 minute that often includes a significant intensity increase.
W = Great increase in area after time of maximum intensity.
X = Unusually wide H-alpha line.
Y = System of loop-type prominences.
Z = Major sunspot umbra covered by flare.

INTERVALS OF NO FLARE PATROL OBSERVATION
FOR PRECEDING SOLAR FLARE TABLE

APRIL 1987



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

Bucharest	Istanbul	Mitaka	Purple Mt.	San Vito
Holloman	Learmonth	Palehua	Ramey	Wendelstein
				Yunnan

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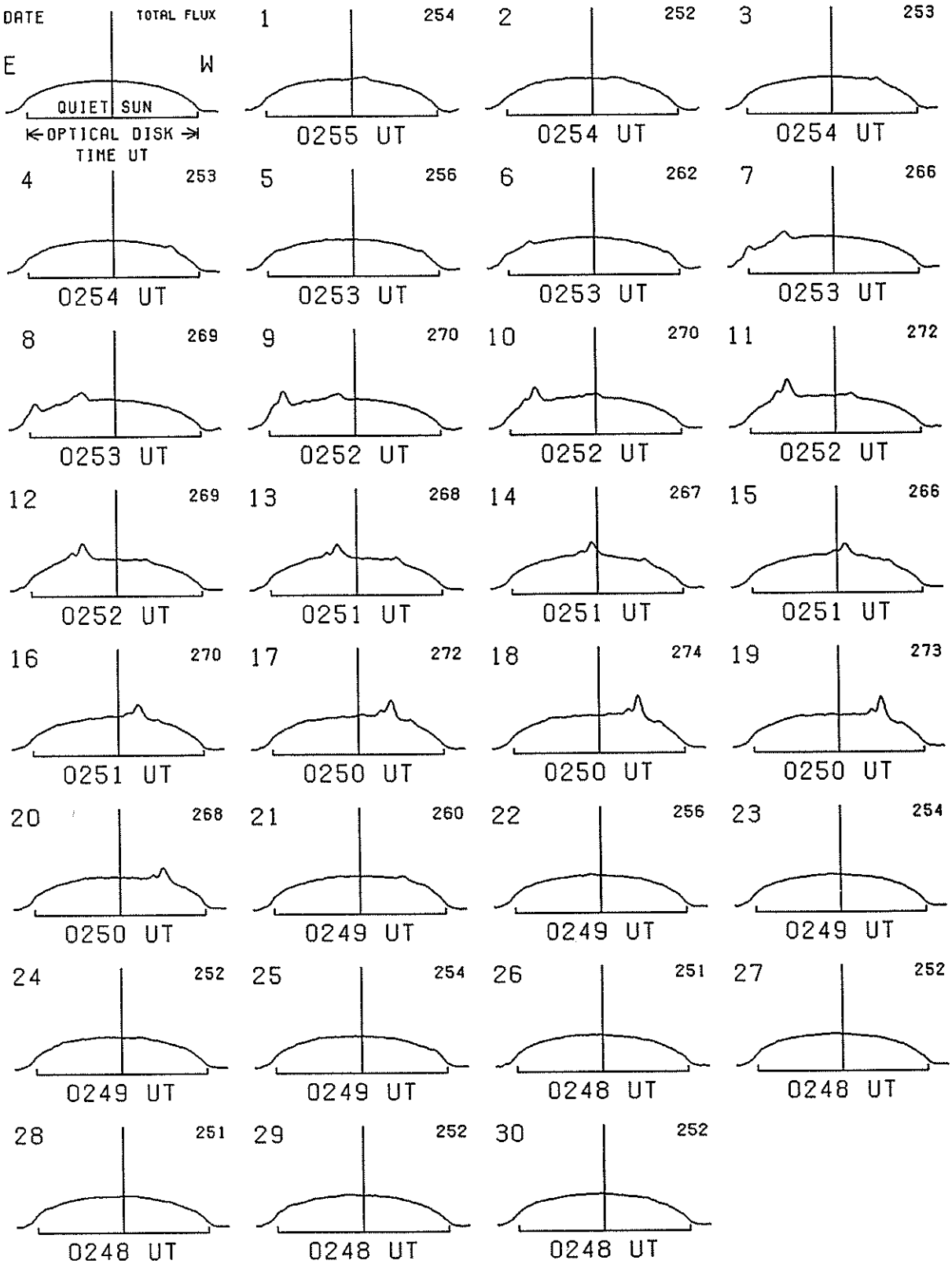
Apr 87

EAST-WEST SOLAR SCANS

APRIL 1987

TOYOKAWA, JAPAN

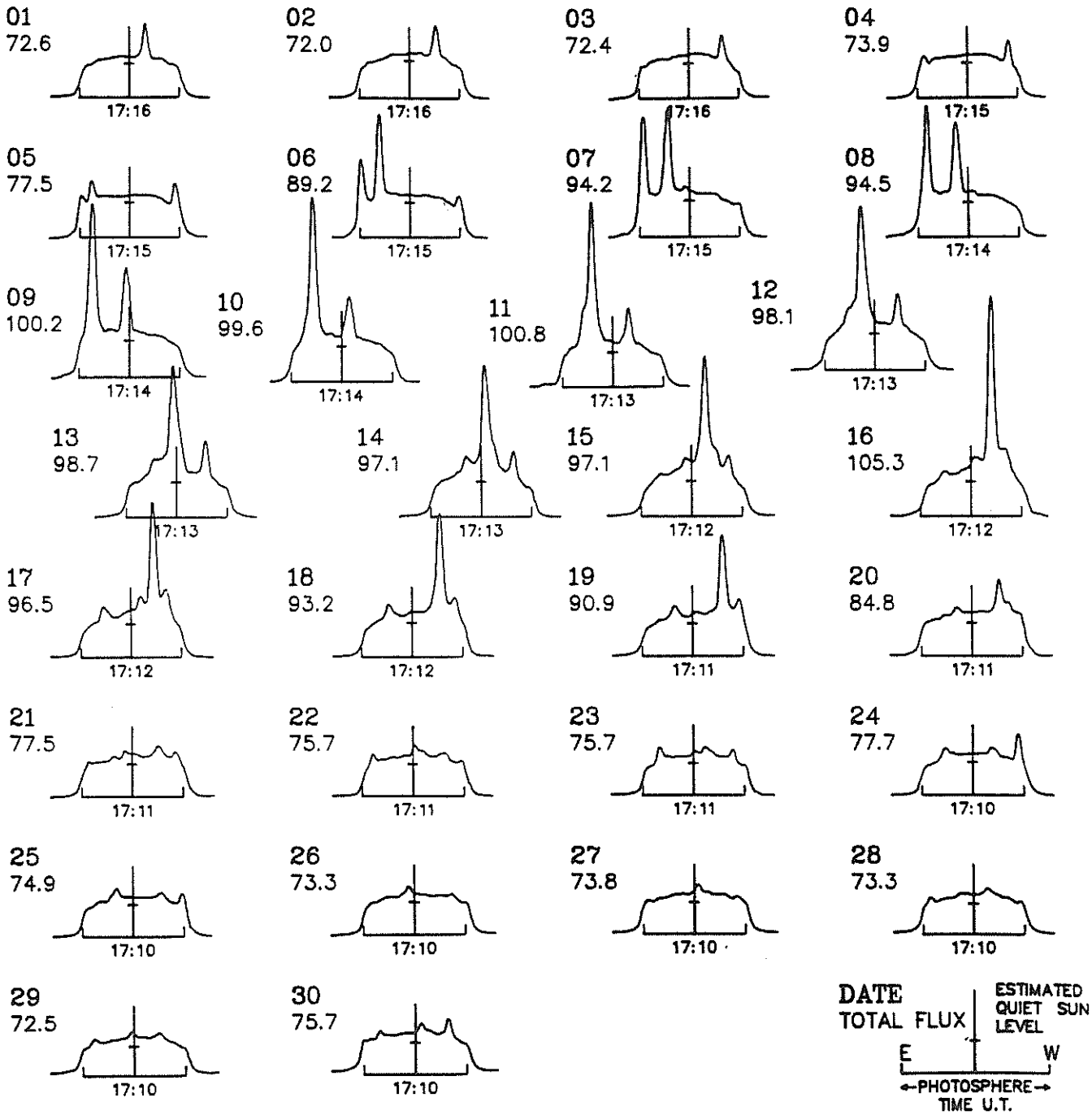
3 CM
FAN BEAM WITH 1.1 MINUTES OF ARC



EAST – WEST SOLAR SCANS
APRIL 1987

ALGONQUIN RADIO OBSERVATORY
CANADA

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



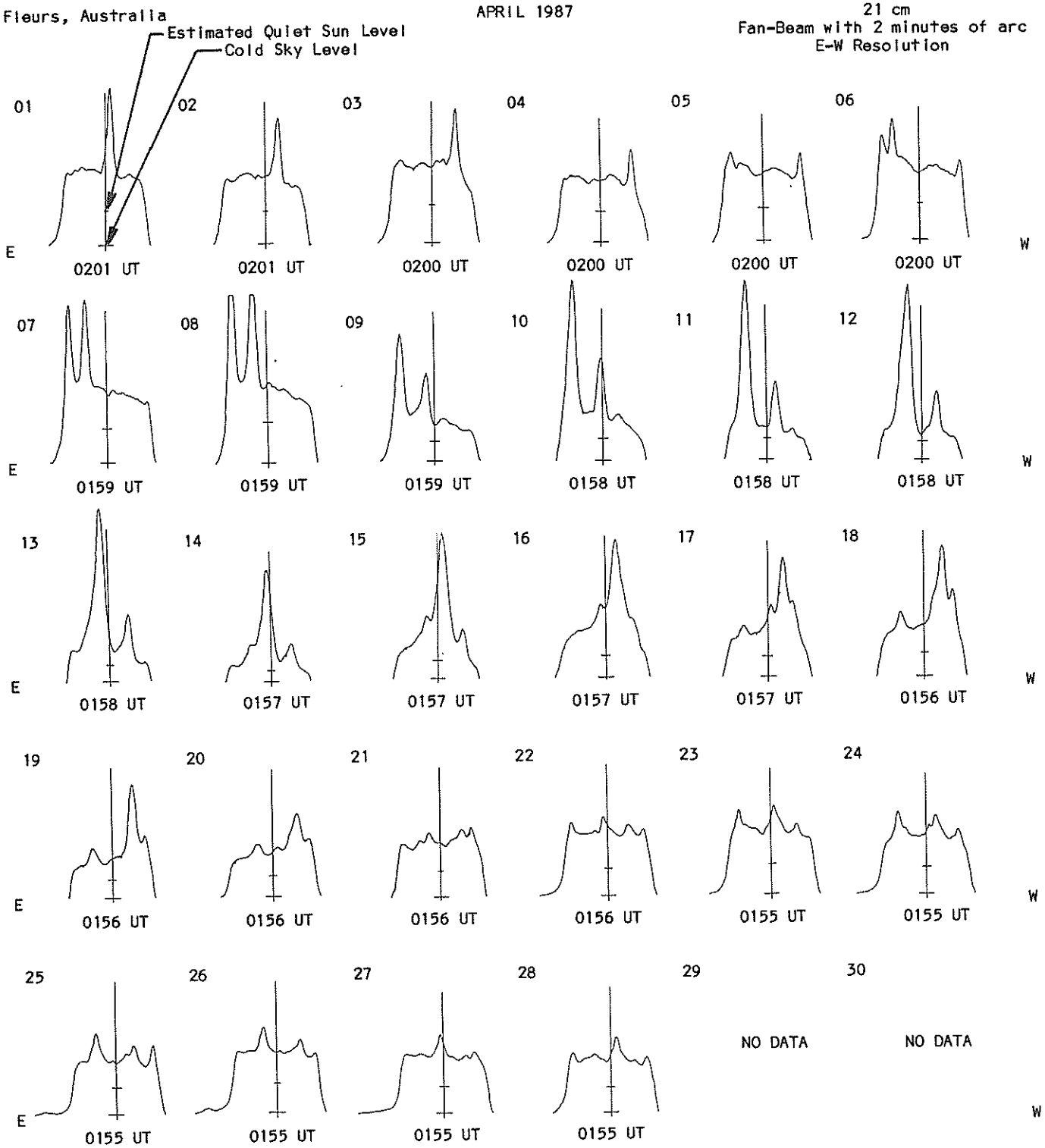
24
Apr 87

EAST-WEST SOLAR SCANS

Fleurs, Australia

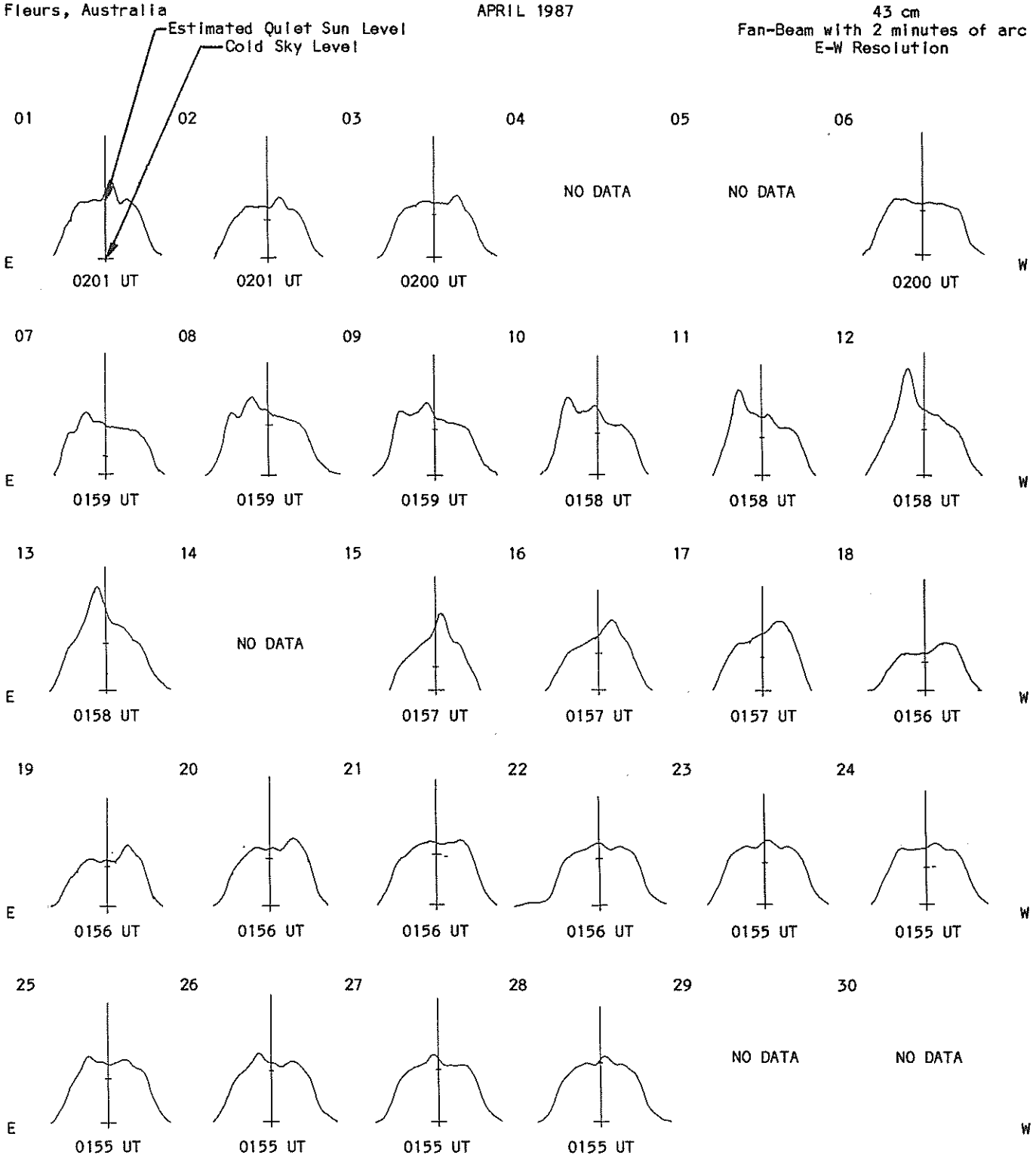
APRIL 1987

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



E A S T - W E S T S O L A R S C A N S

Fleurs, Australia — APRIL 1987 — 43 cm
Fan-Beam with 2 minutes of arc
E-W Resolution



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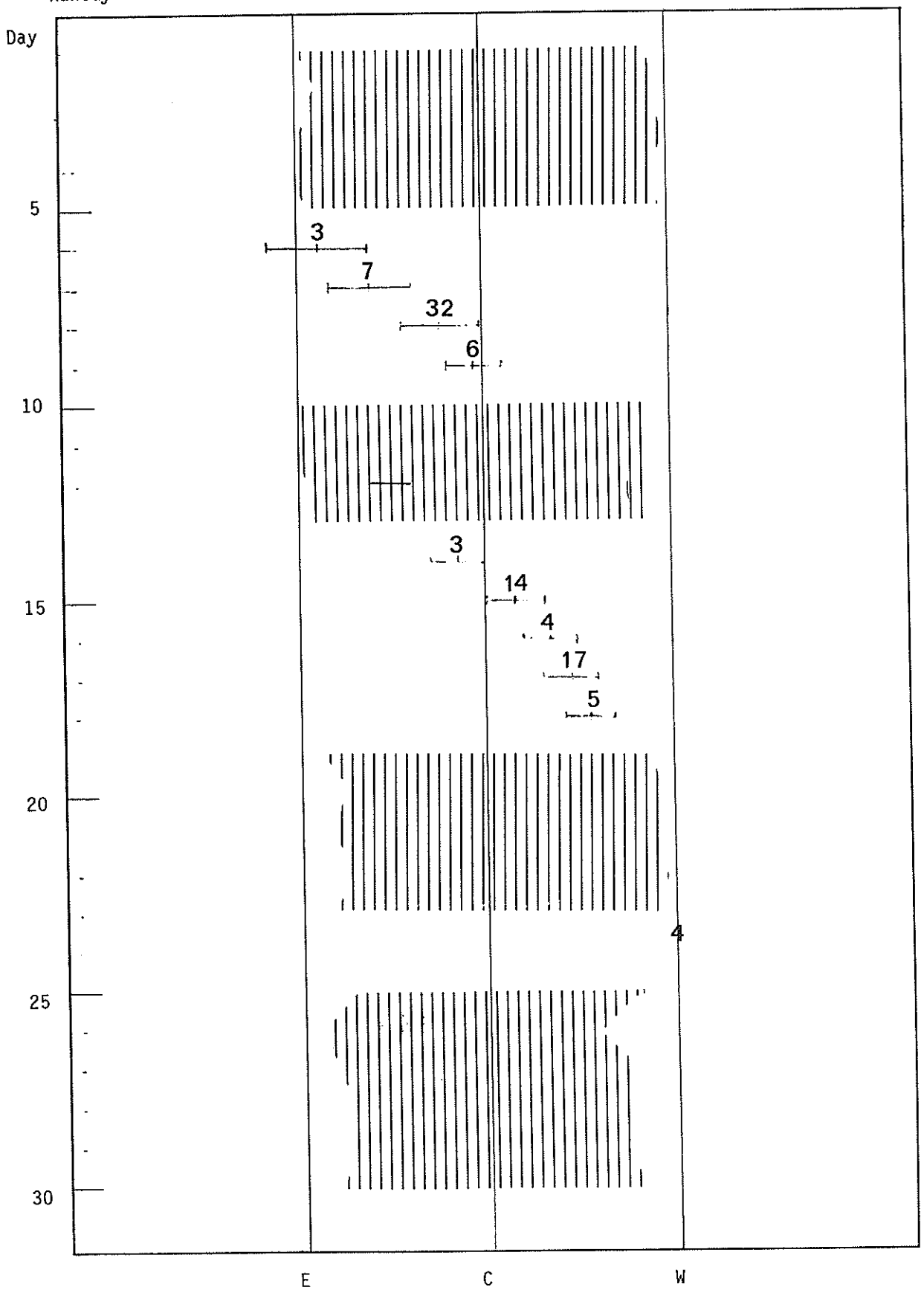
Apr 87

SOLAR INTERFEROMETRIC OBSERVATIONS

Nancay APRIL 1987 164 MHz

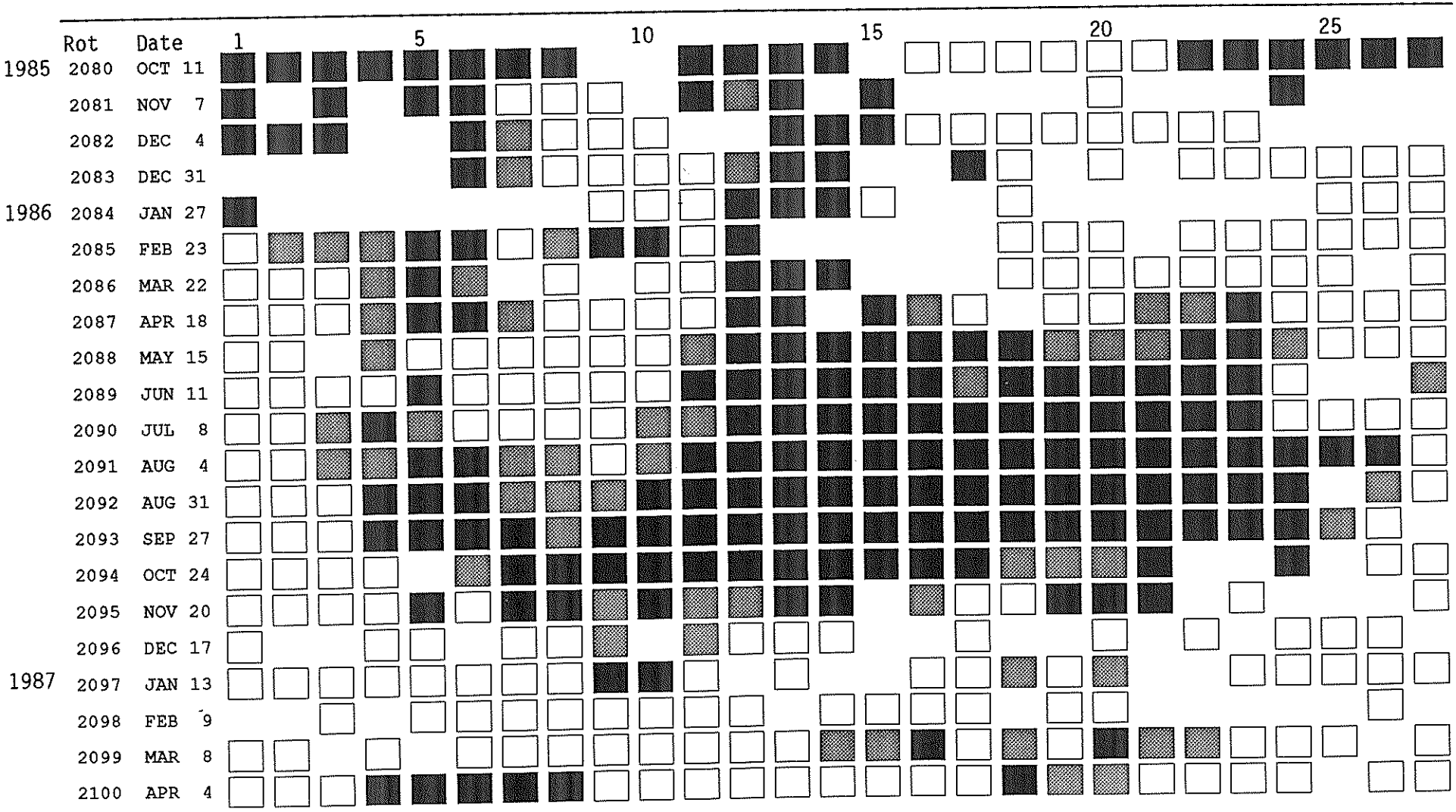


SOLAR RADIO EMISSION
SELECTED FIXED FREQUENCY EVENTS

APRIL 1987

Day	Freq	Sta	Type		Start (UT)	Time of Maximum (UT)	Duration (Min)	Flux Density Peak (10 -22 W/m 2 Hz)	Flux Density Mean (10 -22 W/m 2 Hz)	Int	Remarks
05	2800	OTTA	45	C	1933.8	1936.9	4.2	8.1	1.6		
06	2695	PALE	45	C	2257.0E	2258.0	6.0D	43.0			QL=5 ST=2 TYP=5
07	2695	SGMR	4	S/F	2037.0E	2040.0	4.0D	77.0			QL=1 ST=2 TYP=5
	2695	PALE	4	S/F	2038.0E	2039.0	3.0D	84.0			QL=5 ST=3 TYP=5
	2800	OTTA	4	S/F	2038.7	2040.2	4.3	87.7	35.1		
08	2800	OTTA	20	GRF	2056.5	2120.7	65.0	3.9	2.3		
09	2695	LEAR	8	S	0636.0E	0637.0	1.0D	22.0			QL=5 ST=2 TYP=3
	2800	OTTA	240	FR	1336.2	1440.0	63.8U	4.3	1.7		
	2800	OTTA	20	GRF	1733.2	1745.0	55.0	1.8	1.1		
10	8800	PALE	8	S	0354.0E	0354.0	1.0D	17.0			QL=5 ST=2 TYP=3
	2800	OTTA	45	C	1814.5	1823.4	17.0	11.3	5.0		
	2800	OTTA	8	S	2139.2	2139.9	.9	2.7	1.3		
	2800	OTTA	20	GRF	2208.6	2211.1	16.4	3.0	1.8		
11	2695	SYDN	4	S/F	0414.0	0417.0	5.0D	48.0			QL= ST= TYP=3
	8800	LEAR	8	S	0416.0E	0416.0	1.0D	57.0			QL=5 ST=3 TYP=5
	8800	PALE	45	C	0416.0E	0416.0	1206.0D	31.0			QL=5 ST=2 TYP=3
	2695	LEAR	8	S	0416.0E	0416.0	1.0D	30.0			QL=5 ST=3 TYP=3
	2695	PALE	45	C	0416.0E	0416.0	1184.0D	20.0			QL=5 ST=1 TYP=3
	2695	LEAR	8	S	0511.0E	0512.0	1.0D	19.0			QL=5 ST=3 TYP=3
	8800	LEAR	8	S	0513.0E	0514.0	1.0D	30.0			QL=5 ST=3 TYP=3
12	2800	OTTA	1	S	1247.4	1251.1	6.6	2.6	1.3		
15	8800	LEAR	46	C	0231.0E	0231.0	1.0D	70.0			QL=5 ST=2 TYP=5
	8800	LEAR	4	S/F	0732.0E	0733.0	7.0D	110.0			QL=5 ST=2 TYP=5
	8800	SVTO	8	S	0733.0E	0733.0	1.0D	50.0			QL=5 ST=2 TYP=5
	2800	OTTA	20	GRF	1738.5	1751.0	21.5	3.5	2.2		
16	8800	LEAR	8	S	0218.0E	0219.0	1.0D	35.0			QL=5 ST=2 TYP=3
	2800	OTTA	1	S	1444.8	1446.6	9.2	7.6	3.0		
	8800	SVTO	45	C	1514.0E	1514.0	987.0D	40.0			QL=5 ST=2 TYP=3
	2800	OTTA	42	SER	1554.5	1608.6	215.0	61.2	12.2		
	8800	SVTO	4	S/F	1606.0E	1608.0	9.0D	130.0			QL=5 ST=2 TYP=5
	2695	SVTO	4	S/F	1606.0E	1608.0	10.0D	65.0			QL=5 ST=2 TYP=5
	2695	SGMR	4	S/F	1606.0E	1608.0	10.0D	40.0			QL=5 ST=2 TYP=3
	8800	SGMR	4	S/F	1608.0E	1608.0	8.0D	72.0			QL=5 ST=2 TYP=5
	2695	SGMR	45	C	1648.0E	1648.0	474.0D	14.0			QL=5 ST=2 TYP=3
	2800	OTTA	1	S	2015.7	2017.9	3.5	5.8	3.5		
17	2800	OTTA	1	S	1238.1	1238.6	5.0	3.2	.8		
	2800	OTTA	20	GRF	1855.5	1924.2	100.0	3.2	1.6		
18	8800	LEAR	45	C	0504.0E	0504.0	1302.0D	17.0			QL=5 ST=2 TYP=3
	8800	LEAR	4	S/F	0646.0E	0646.0	2.0D	74.0			QL=5 ST=2 TYP=5
	8800	SVTO	4	S/F	0646.0E	0646.0	1.0D	61.0			QL=5 ST=3 TYP=5
	2800	OTTA	1	S	1127.6	1128.6	1.7	4.8	2.4		
	2800	OTTA	3	S	1353.5	1356.0	5.0	13.3	6.6		
	2800	OTTA	1	S	1453.0	1454.4	7.0	3.0	1.5		
	2800	OTTA	1	S	1621.5	1622.8	8.5	6.8	2.7		
19	2800	OTTA	1	S	1123.5	1125.0	4.5	2.3	1.1		
	2800	OTTA	20	GRF	1204.8	1207.5	10.2	4.4	1.3		
	2800	OTTA	1	S	1439.2	1440.5	9.0	2.0	1.0		
20	2800	OTTA	1	S	1939.0	1940.1	1.4	3.8	1.9		
21	2800	OTTA	20	GRF	1823.0	2025.0	170.0	6.4	3.2		
24	2695	LEAR	46	C	0736.0E	0736.0	1129.0D	77.0			QL=5 ST=3 TYP=5
	2695	SVTO	4	S/F	0736.0E	0736.0	10.0D	50.0			QL=5 ST=2 TYP=3
	8800	SVTO	45	C	0736.0E	0736.0	1034.0D	30.0			QL=5 ST=2 TYP=3
27	2695	SGMR	46	C	1302.0E	1308.0	33.0D	110.0			QL=1 ST=3 TYP=5

STANFORD MEAN SOLAR MAGNETIC FIELD



Mean Solar Magnetic Field Polarity: □ = field > 2 microT; ▒ = -2 microT ≤ field ≤ 2 microT

■ = field <-2 microT; No box = no data available

Observations are taken at 2000 UT. Rotation numbers given are the Bartels series, but the dates are not; these dates mark times of occurrence of phenomena on the Sun that affect the Earth during the given Bartels Rotation.

STANFORD MEAN SOLAR MAGNETIC FIELD (MICROTESLA)

Day	1986 May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	1987 Jan	Feb	Mar	Apr
1	•	-6	-6	3	4	-7	-11	-1	•	1	•	10
2	-7	-2	-5	7	5	-7	-11	-10	11	•	•	•
3	0	1	-7	4	-6	-6	-12	-11	•	•	•	8
4	2	-1	2	10	-6	1	-5	•	•	9	•	13
5	•	-4	•	10	-3	-7	-10	0	6	10	•	10
6	2	-4	•	0	0	-6	-7	20	•	14	9	2
7	2	0	-1	-2	-2	-12	-7	4	9	16	•	-5
8	0	6	10	-5	-1	-15	-5	-9	•	15	14	-14
9	1	4	4	-4	-9	-11	-4	-4	12	•	15	-13
10	-5	11	1	-2	-14	-15	-2	-5	13	•	•	-12
11	2	5	-5	1	-16	-18	-2	•	16	10	10	-5
12	8	11	0	3	-17	-10	-2	4	•	•	•	5
13	13	4	3	-1	-18	-8	-5	•	20	14	10	18
14	13	3	5	-12	-19	-9	•	•	25	8	23	30
15	8	-3	5	-17	-15	-10	•	•	23	7	18	30
16	10	6	2	-21	-10	-10	-21	14	17	15	22	25
17	•	6	-2	-23	-11	-15	•	23	13	13	22	19
18	-2	6	-2	-21	-11	-21	6	•	11	11	17	13
19	3	6	-7	-18	-13	-10	13	•	15	12	13	6
20	9	6	-23	-13	-14	-7	19	22	11	11	7	2
21	7	-4	-21	-14	-15	1	34	6	-6	•	-1	-3
22	6	-19	-26	-13	-13	7	29	•	-4	2	1	-2
23	9	-23	-16	-15	-9	•	15	9	9	2	-3	1
24	10	-16	-12	-8	•	33	-3	8	•	5	2	2
25	0	-11	-8	-16	1	14	3	0	7	4	0	6
26	-22	-8	-7	-9	4	11	-9	•	•	•	3	8
27	-31	-2	-4	-9	6	6	-8	1	•	4	-3	10
28	-25	-4	-5	-8	9	•	0	9	3	6	-2	•
29	-14	-3	-3	-3	3	-1	-12	3	5		-1	12
30	-8	-3	-22	5	-3	-6	-2	5	-2		7	12
31	-4		2	12		-9		•	5		12	

Dot symbol indicates no data available for the day.

C O N T E N T S

Prompt Reports DATA FOR MARCH 1987 Number 513 Part I

The H-alpha Synoptic Chart for Carrington Rotation 1786 is unavailable at this time. Please check the next SGD Prompt Report issue for Late Data.

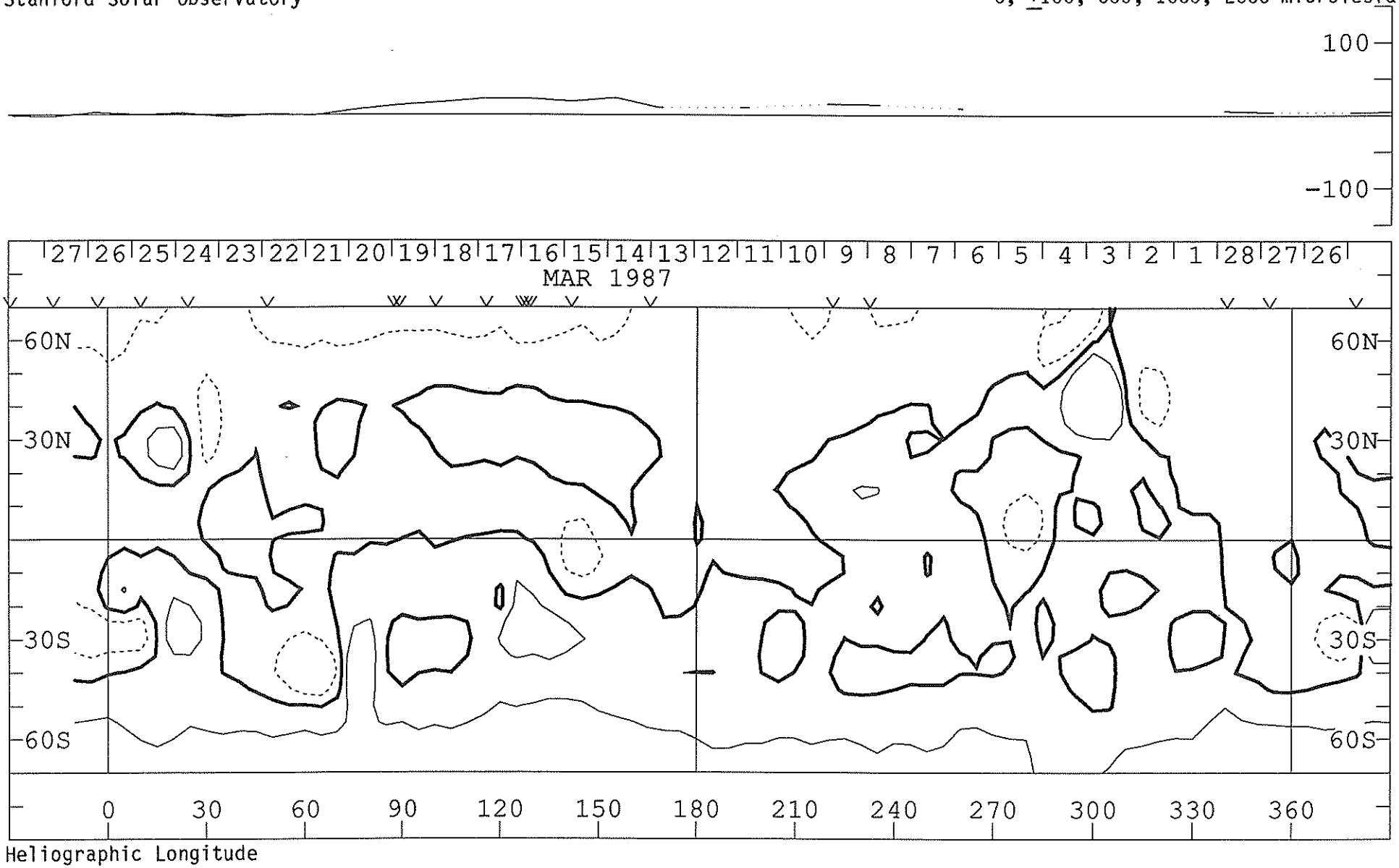
S O L A R M A G N E T I C F I E L D S Y N O P T I C C H A R T

CARRINGTON ROTATION NUMBER 1786

(27 February to 26 March 1987)

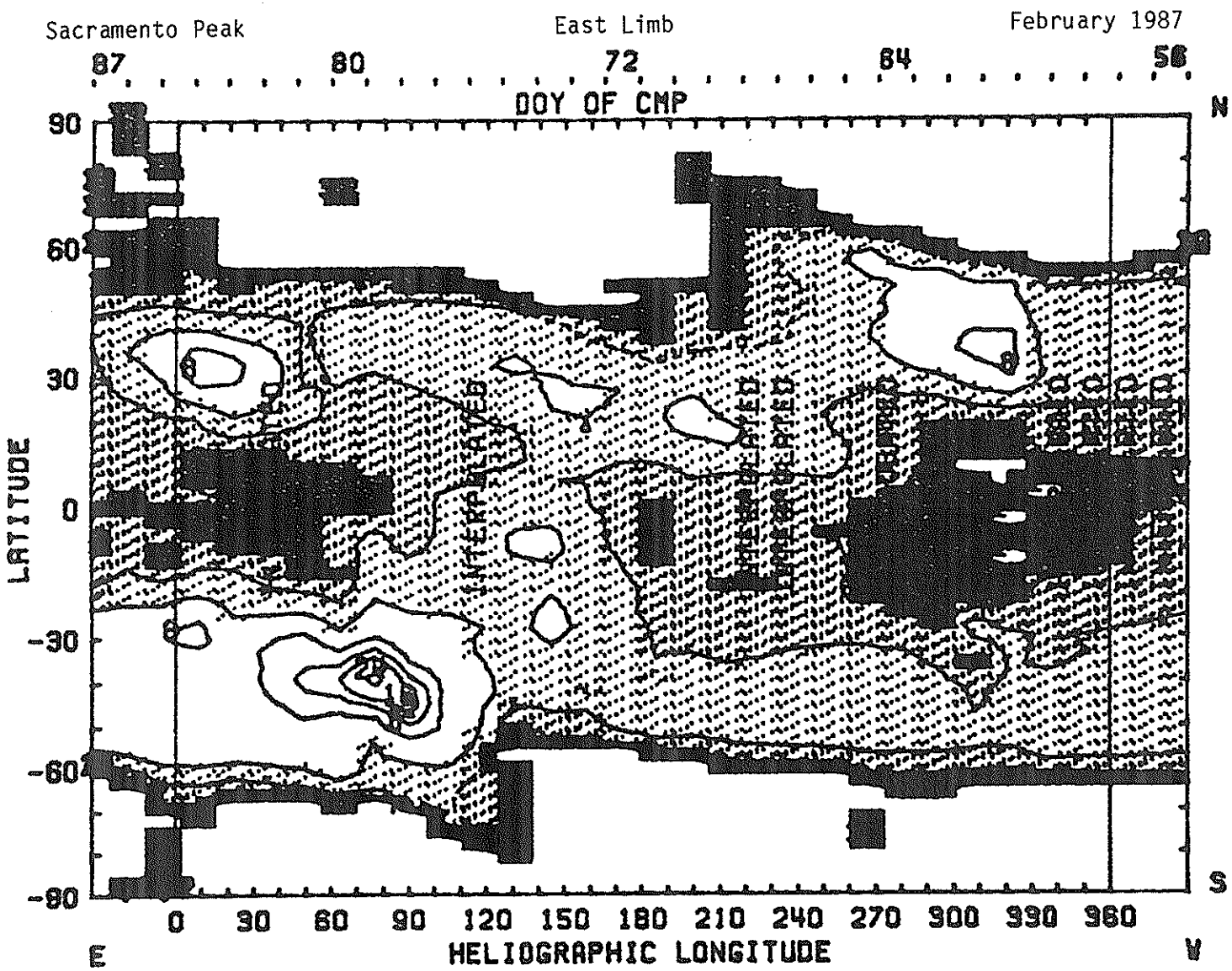
Stanford Solar Observatory

0, ±100, 500, 1000, 2000 microTesla



CORONAL GREEN LINE SYNOPTIC MAP

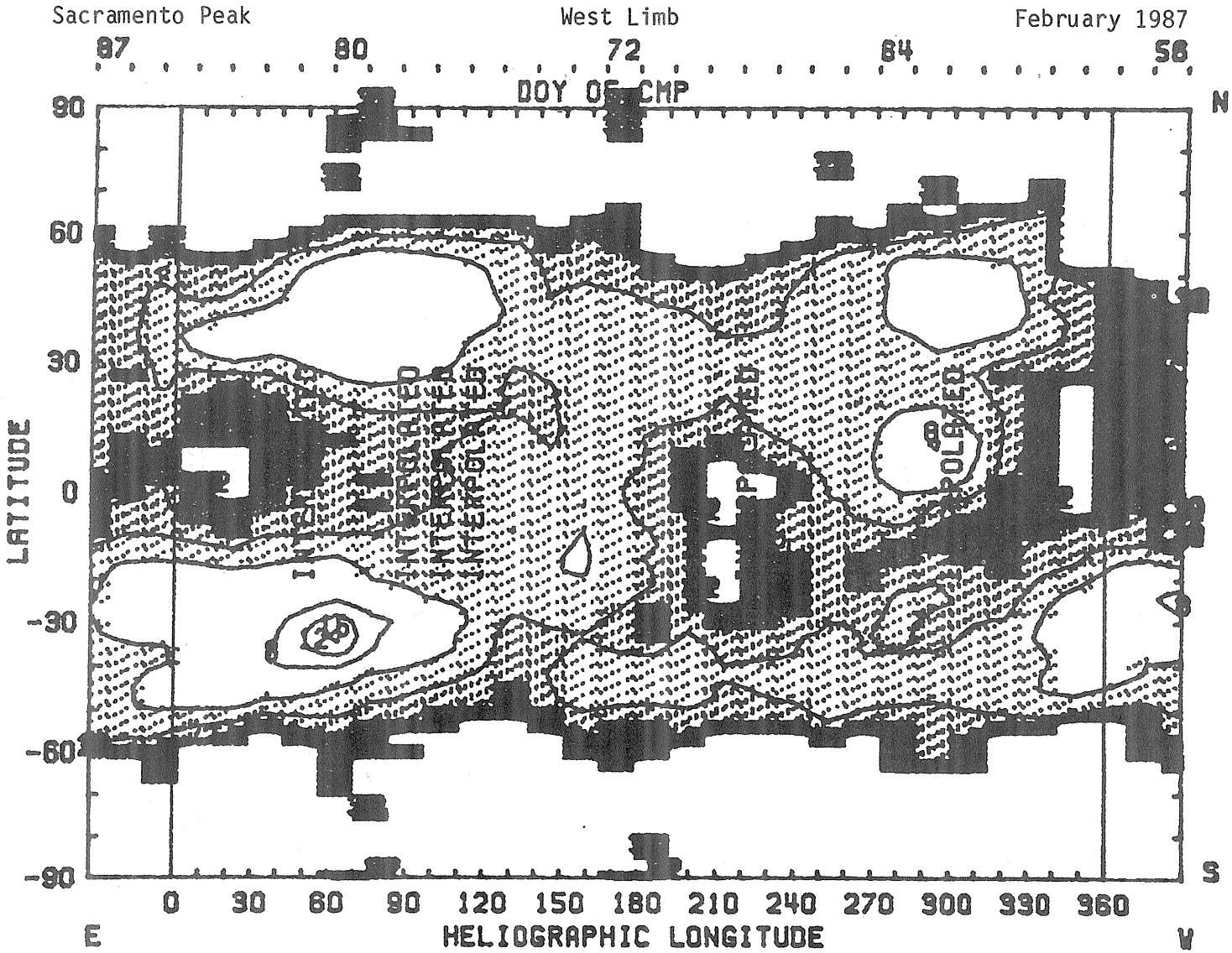
CARRINGTON ROTATION NUMBER 1786
(27 February to 26 March 1987)



1987 E LIMB CONTOURS: .5,1,2,4,8,12,16,24,32 MILLIONTHS OF Ie
CORONAL HOLES ARE SHOWN AS WHITE SURROUNDED BY BLACK

CORONAL GREEN LINE SYNOPTIC MAP

CARRINGTON ROTATION NUMBER 1786
(27 February to 26 March 1987)



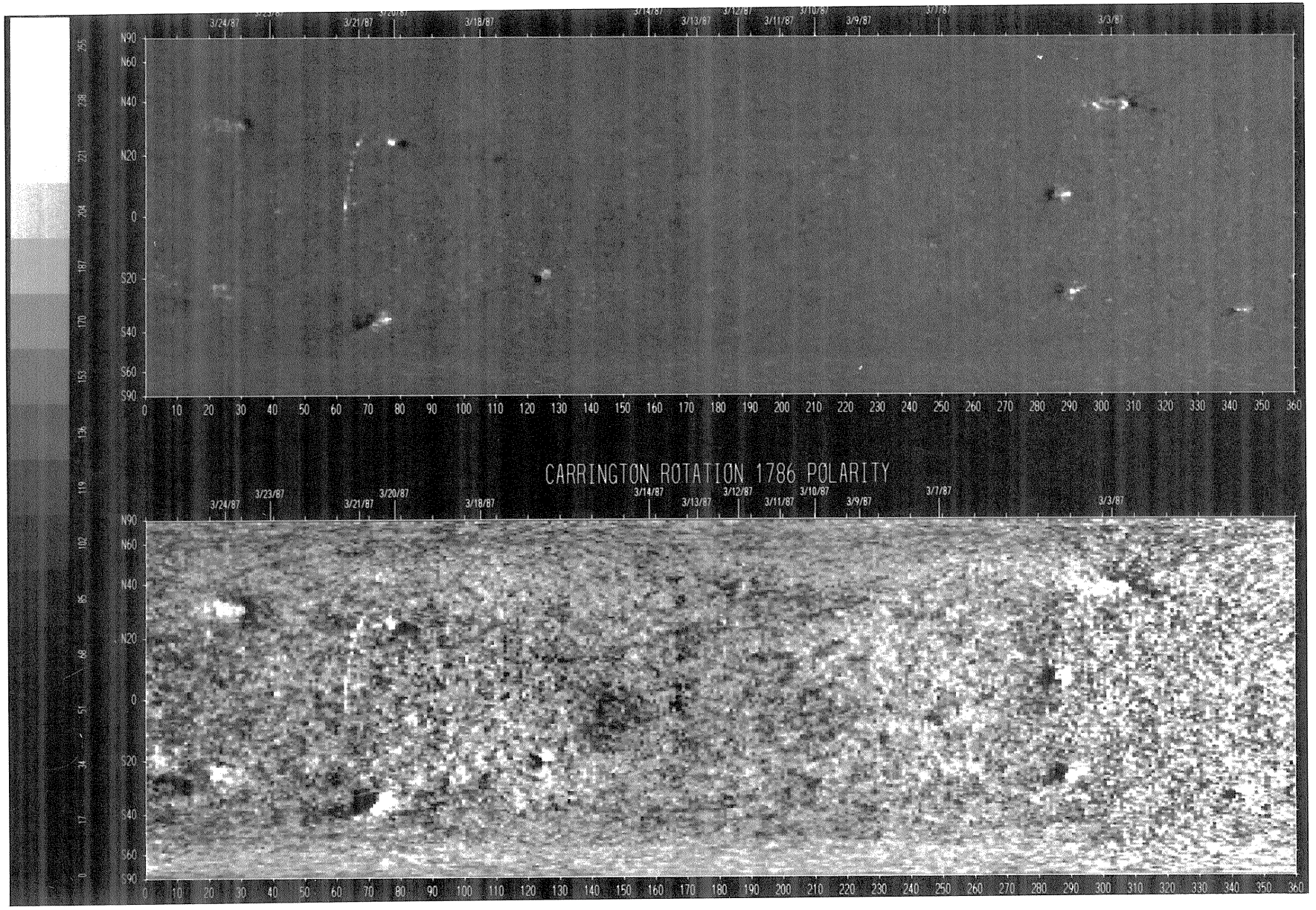
1987 W LIMB CONTOURS: .5,1,2,4,8,12,16,24,92 MILLIONTHS OF Io
CORONAL HOLES ARE SHOWN AS WHITE SURROUNDED BY BLACK

SOLAR MAGNETIC FIELD SYNOPTIC CHART

CARRINGTON ROTATION NUMBER 1786
(27 February to 26 March 1987)

Kitt Peak National Observatory

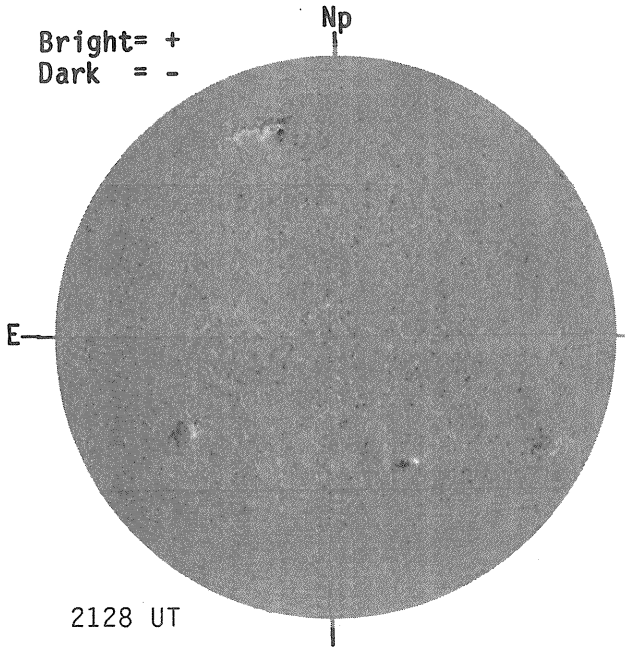
Dates of Observations



M A R C H 01, 1 9 8 7 (P=-21.40, B_0=-7.11, L_0= 339.11)

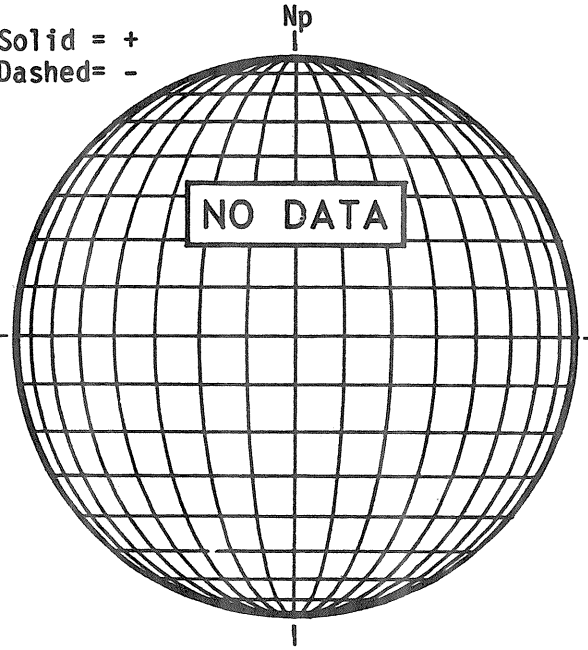
KITT PEAK MAGNETOGRAM

Bright= +
Dark = -



STANFORD MAGNETOGRAM

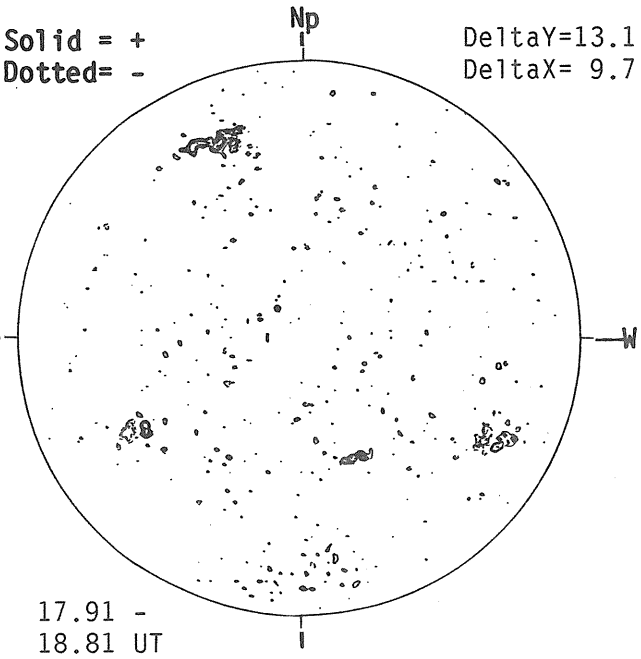
Solid = +
Dashed= -



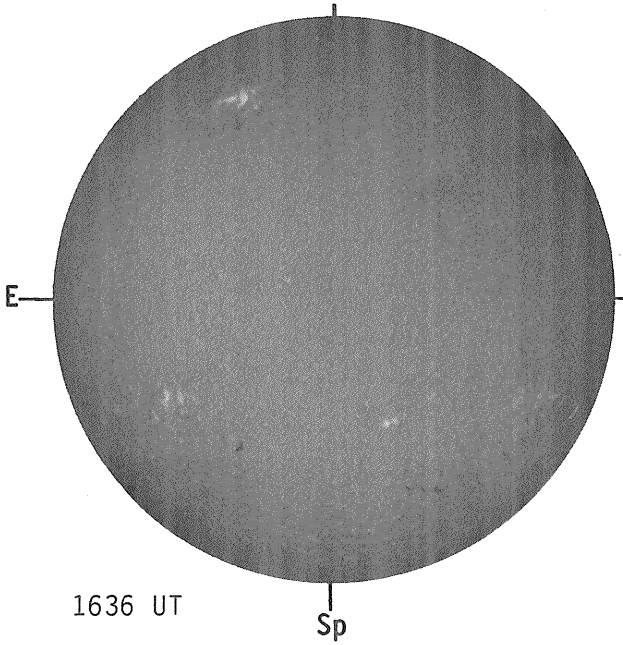
MT. WILSON MAGNETOGRAM

Solid = +
Dotted= -

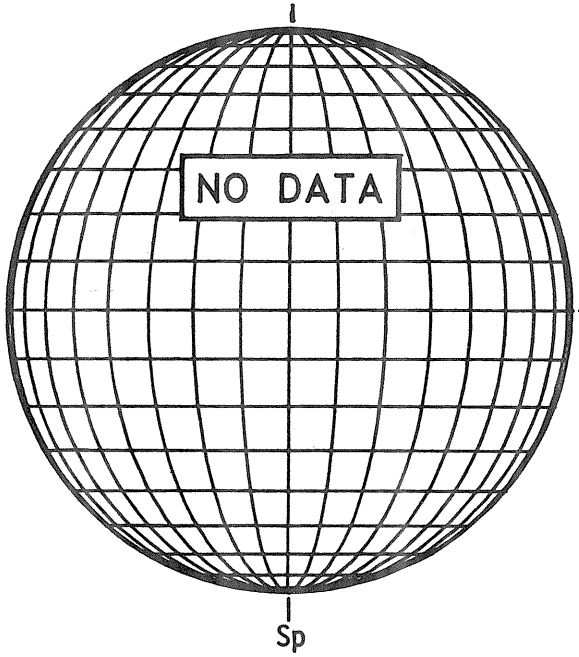
DeltaY=13.1
DeltaX= 9.7



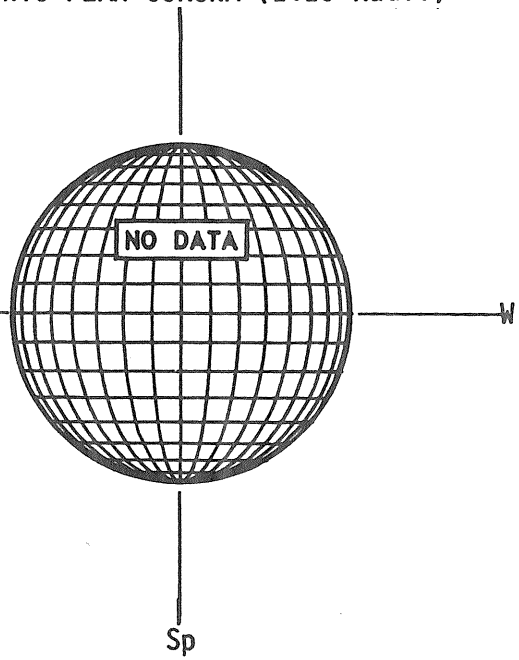
SACRAMENTO PEAK H-ALPHA



BOULDER SUNSPOTS



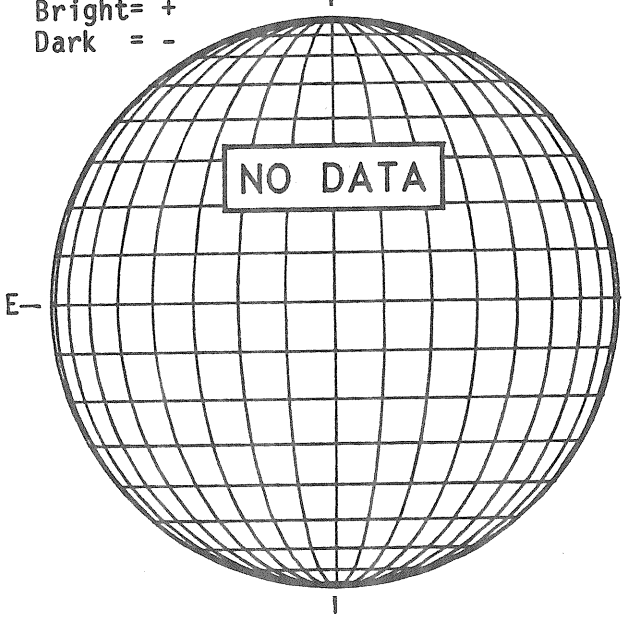
SACRAMENTO PEAK CORONA (1.15 Radii)



M A R C H 02, 1 9 8 7 (P=-21.65, B_0=-7.12, L_0= 325.94)

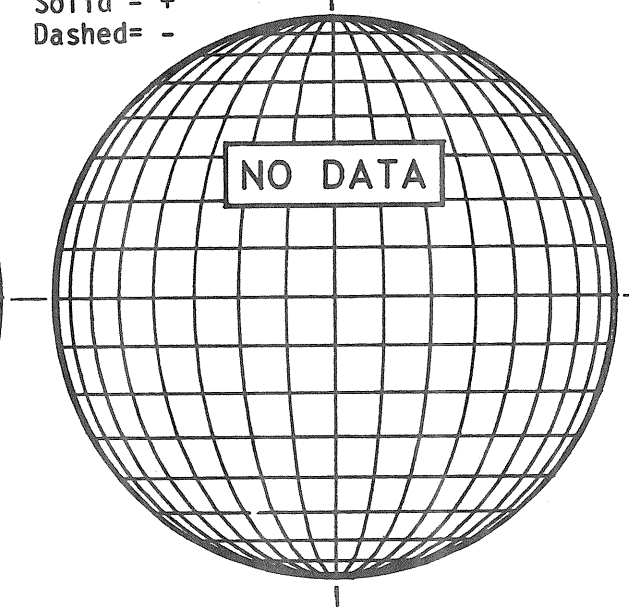
KITT PEAK MAGNETOGRAM

Bright= +
Dark = -



STANFORD MAGNETOGRAM

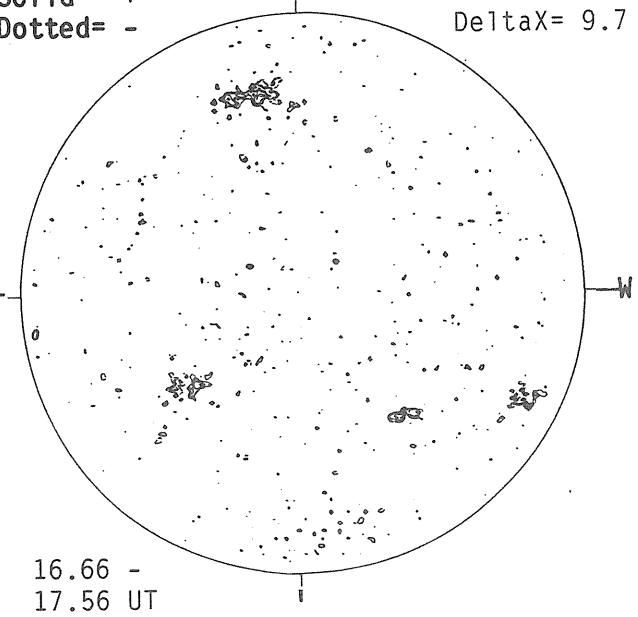
Solid = +
Dashed= -



MT. WILSON MAGNETOGRAM

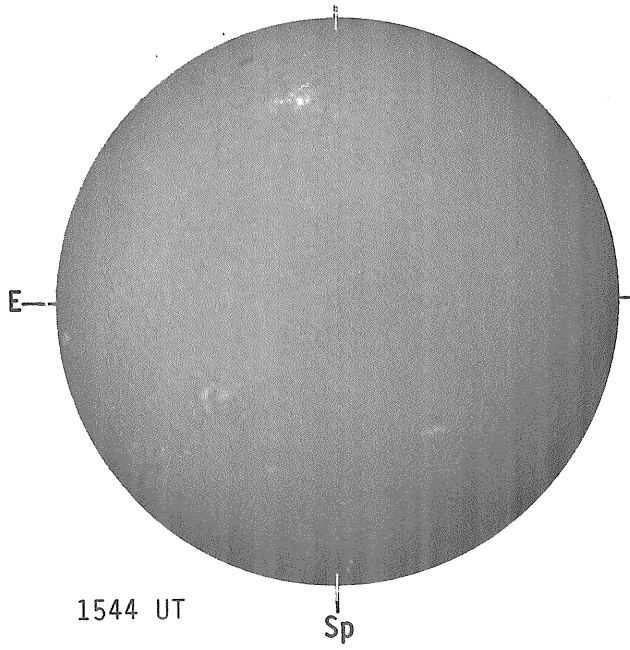
Solid = +
Dotted= -

DeltaY=13.1
DeltaX= 9.7



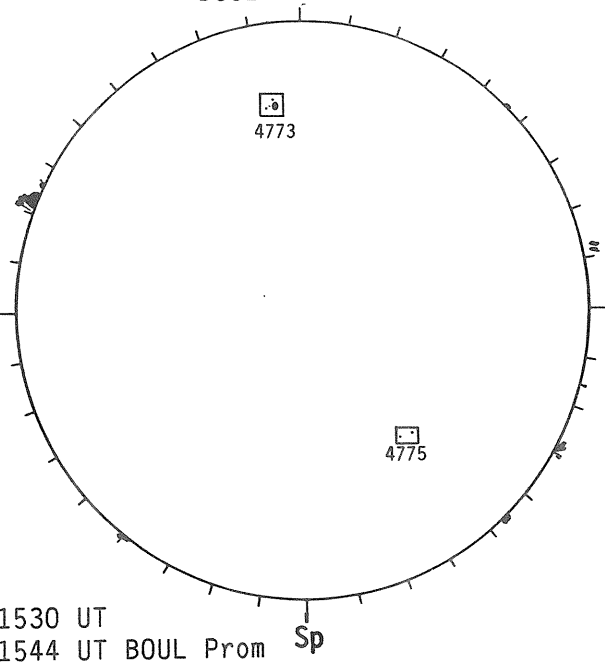
16.66 -
17.56 UT

BOULDER H-ALPHA



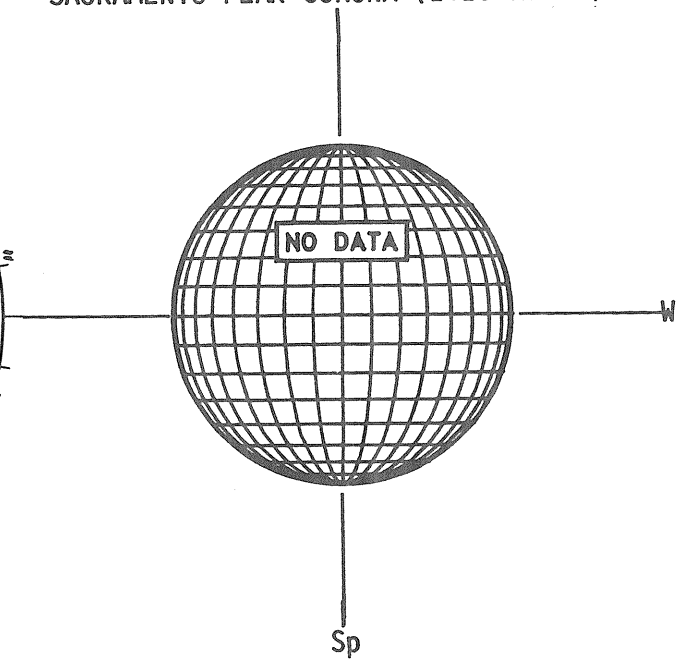
1544 UT

BOULDER SUNSPOTS



1530 UT
1544 UT BOUL Prom

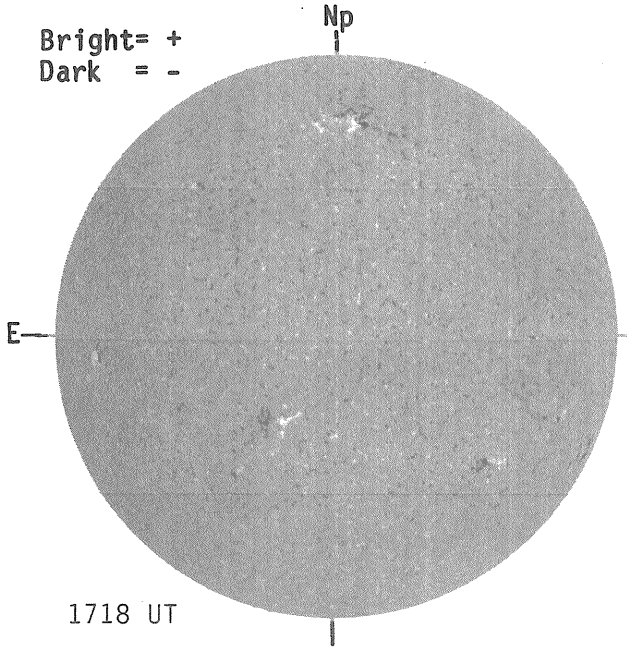
SACRAMENTO PEAK CORONA (1.15 Radii)



M A R C H 03, 1 9 8 7 (P=-21.89, B_o=-7.13, L_o= 312.77)

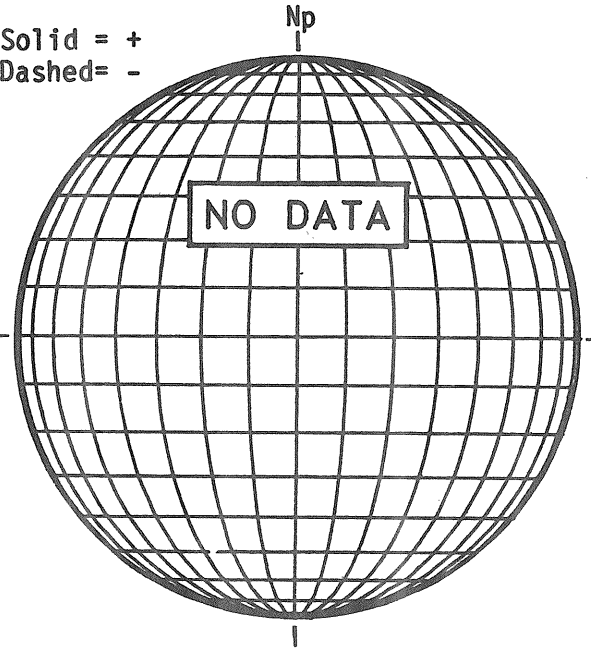
KITT PEAK MAGNETOGRAM

Bright= +
Dark = -



STANFORD MAGNETOGRAM

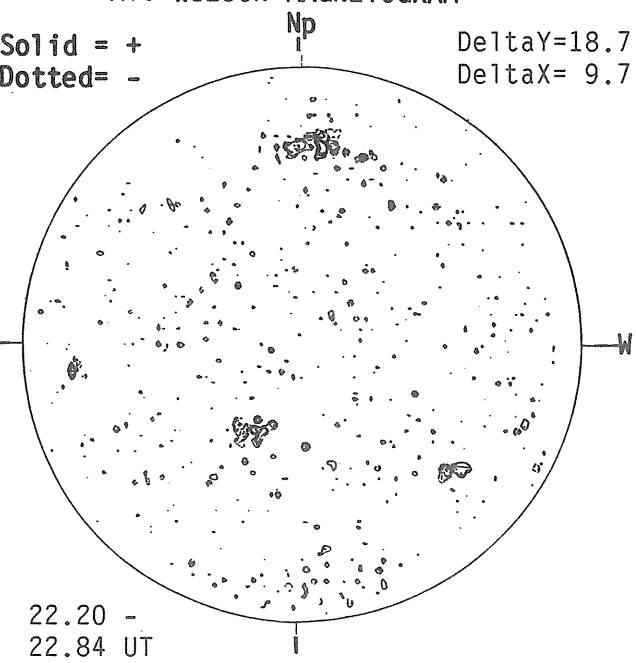
Solid = +
Dashed= -



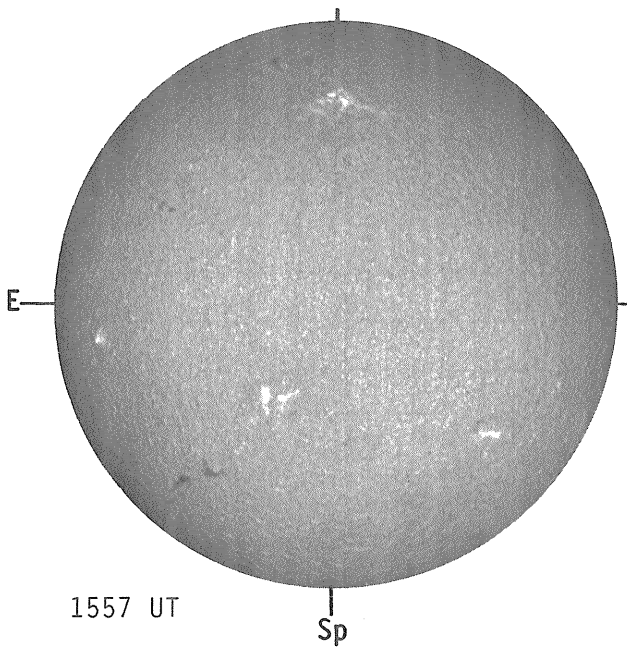
MT. WILSON MAGNETOGRAM

Solid = +
Dotted= -

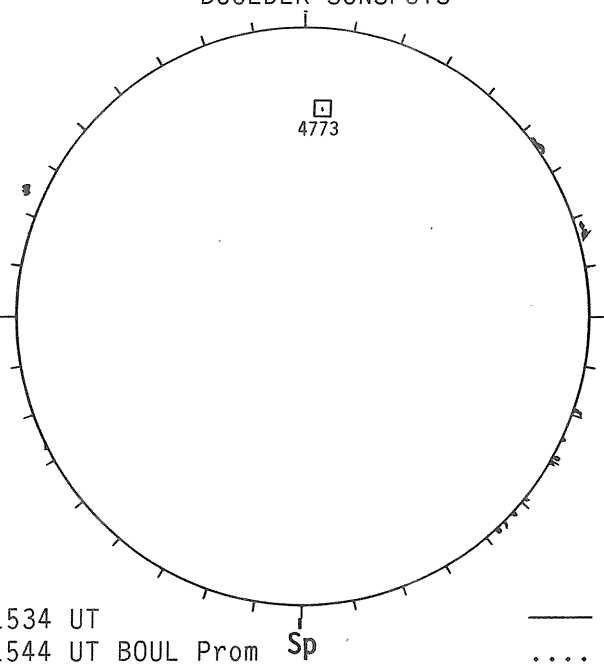
DeltaY=18.7
DeltaX= 9.7



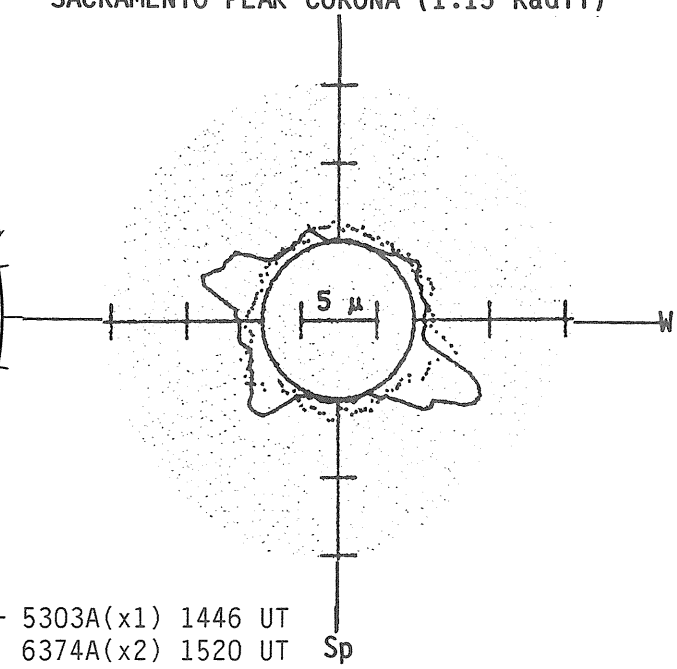
SACRAMENTO PEAK H-ALPHA



BOULDER SUNSPOTS



SACRAMENTO PEAK CORONA (1.15 Radii)

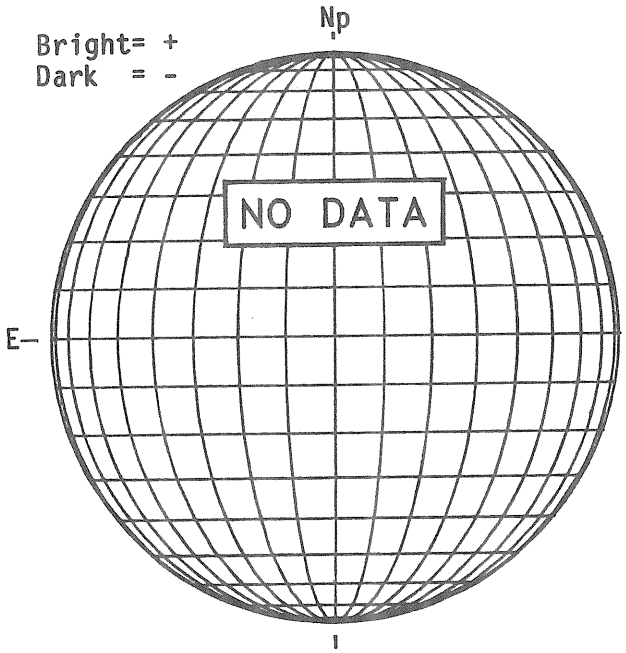


—— 5303A(x1) 1446 UT
.... 6374A(x2) 1520 UT
xxxx 5694A(x6) 1505 UT
NO 5694A ACTIVITY TODAY

M A R C H 04, 1 9 8 7 (P=-22.13, B_0=-7.14, L_0= 299.59)

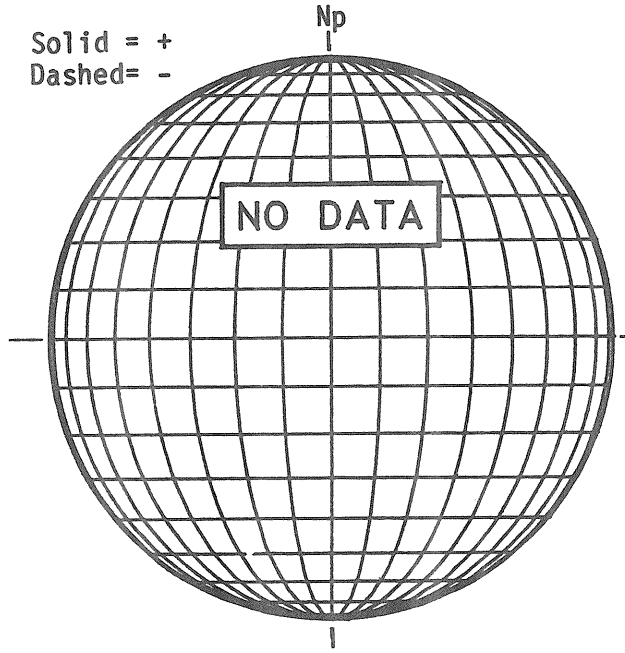
KITT PEAK MAGNETOGRAM

Bright= +
Dark = -



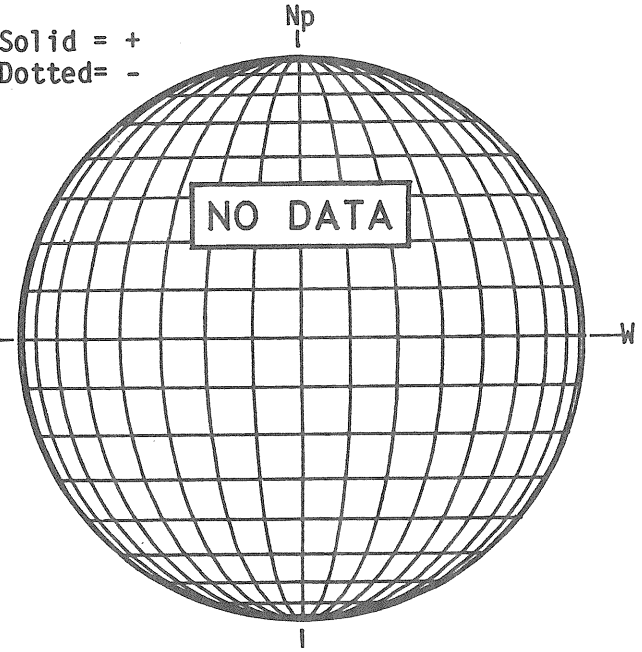
STANFORD MAGNETOGRAM

Solid = +
Dashed= -

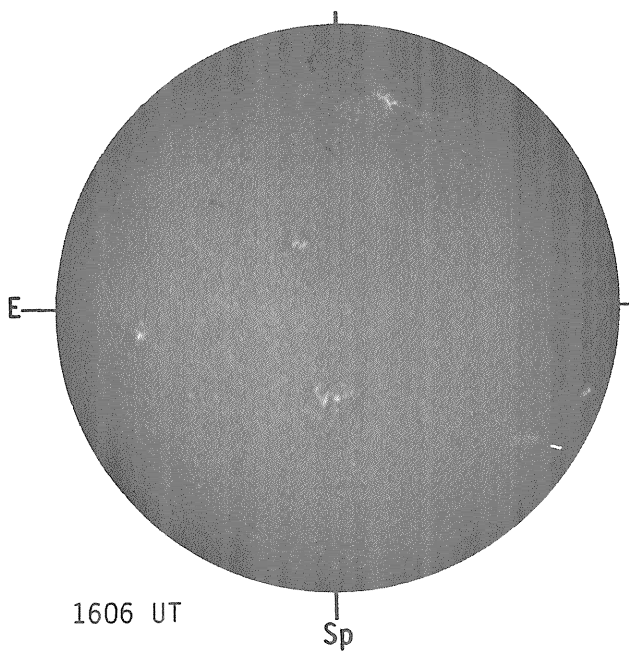


MT. WILSON MAGNETOGRAM

Solid = +
Dotted= -

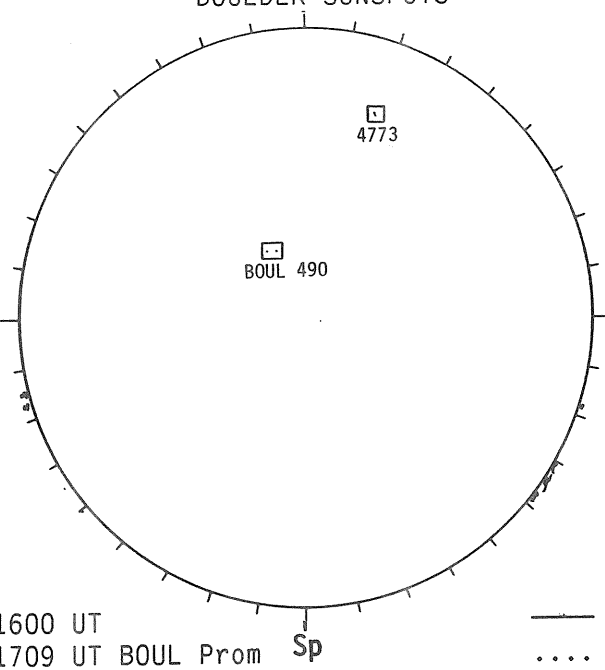


SACRAMENTO PEAK H-ALPHA



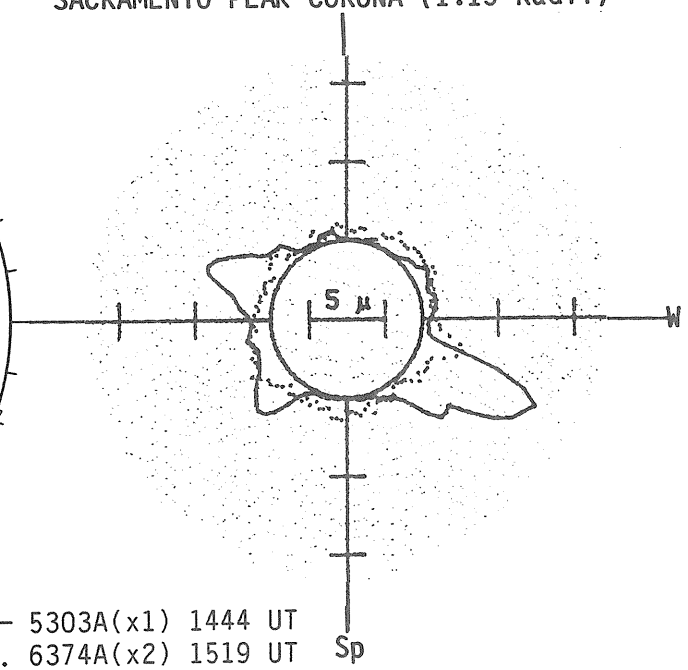
1606 UT

BOULDER SUNSPOTS



1600 UT
1709 UT BOUL Prom

SACRAMENTO PEAK CORONA (1.15 Radii)

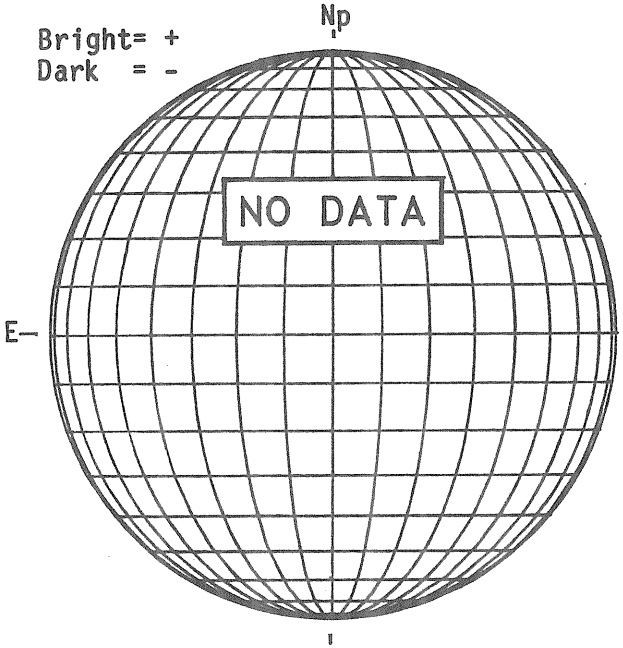


—— 5303A(x1) 1444 UT
.... 6374A(x2) 1519 UT
xxxx 5694A(x6) 1505 UT
NO 5694A ACTIVITY TODAY

M A R C H 05, 1 9 8 7 (P=-22.36, B_o=-7.14, L_o= 286.42)

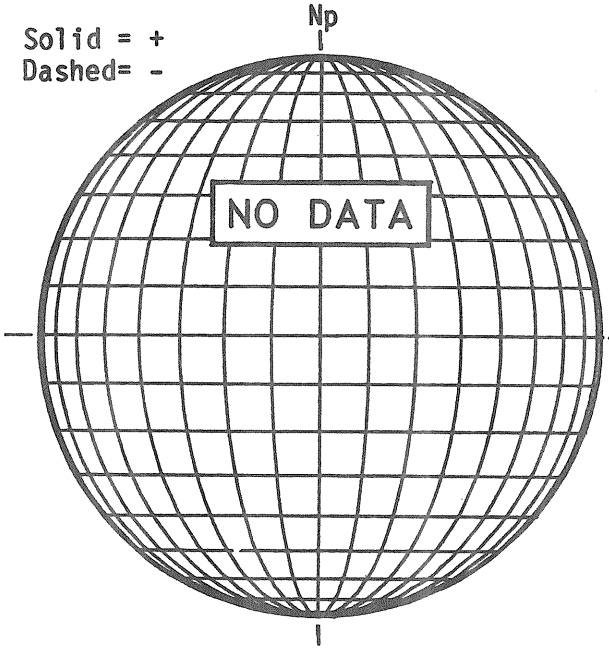
KITT PEAK MAGNETOGRAM

Bright= +
Dark = -



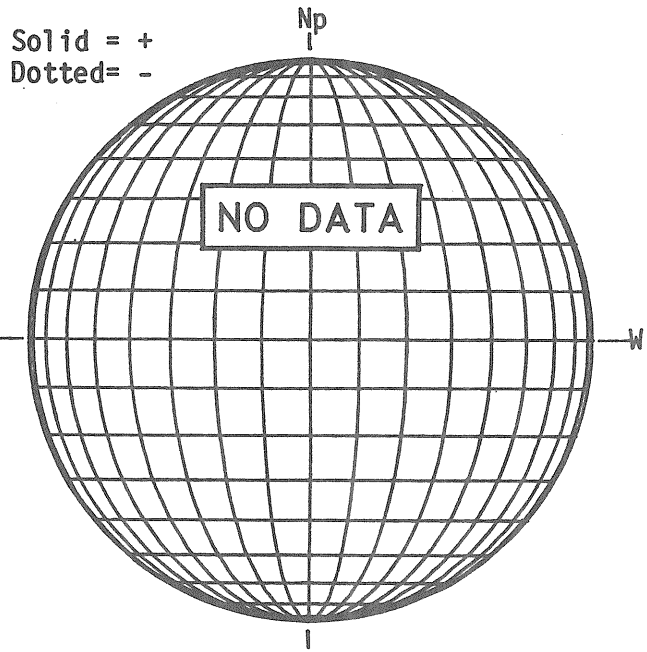
STANFORD MAGNETOGRAM

Solid = +
Dashed= -

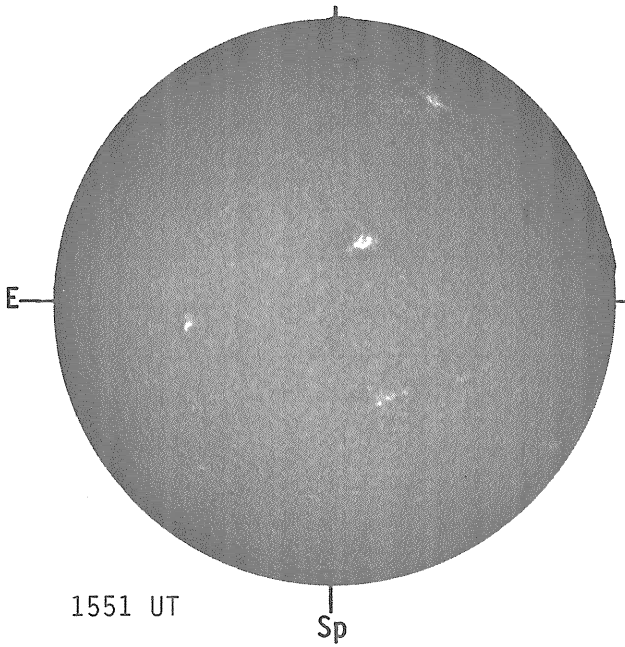


MT. WILSON MAGNETOGRAM

Solid = +
Dotted= -

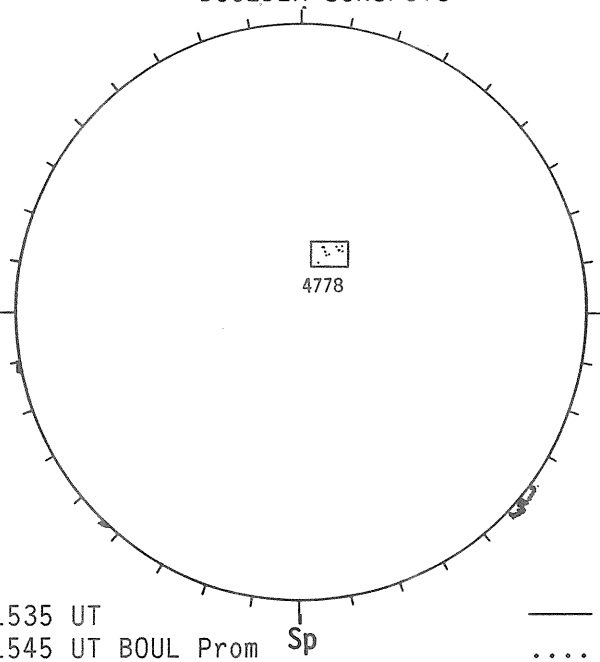


SACRAMENTO PEAK H-ALPHA



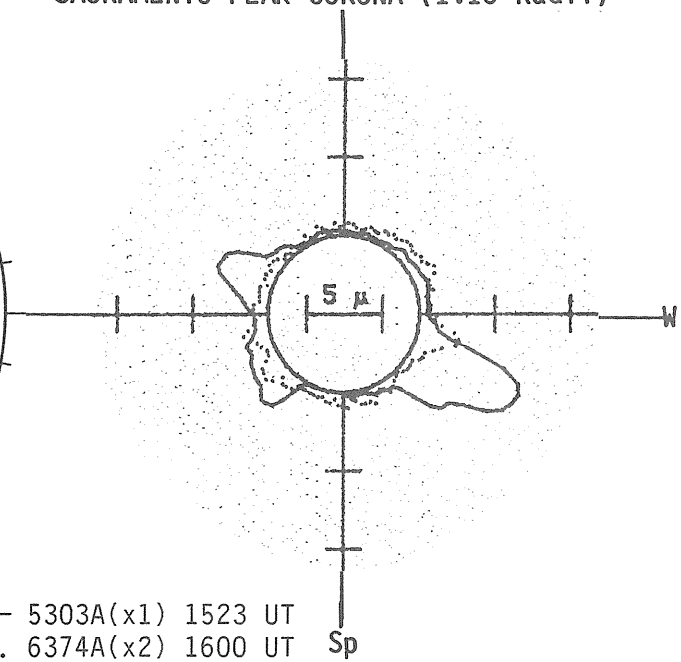
1551 UT

BOULDER SUNSPOTS



1535 UT
1545 UT BOUL Prom

SACRAMENTO PEAK CORONA (1.15 Radii)

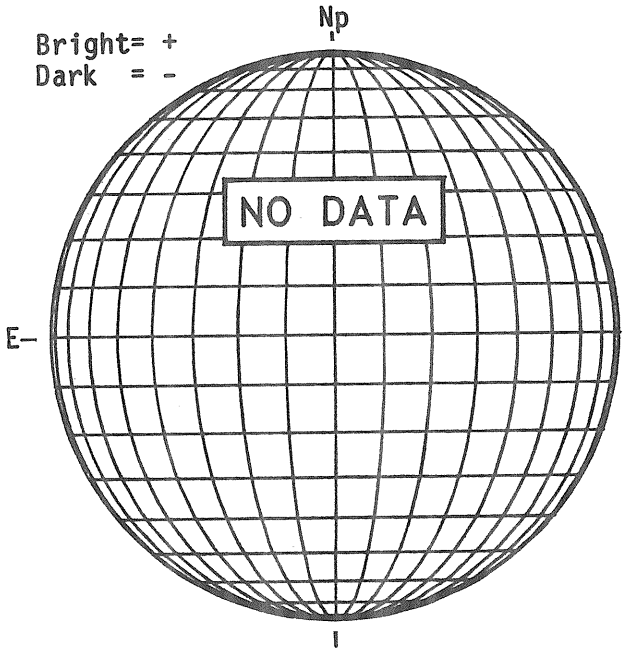


—— 5303A(x1) 1523 UT
.... 6374A(x2) 1600 UT
xxxx 5694A(x6) 1544 UT
NO 5694A ACTIVITY TODAY

M A R C H 06, 1 9 8 7 (P=-22.59, B_0=-7.14, L_0= 273.25)

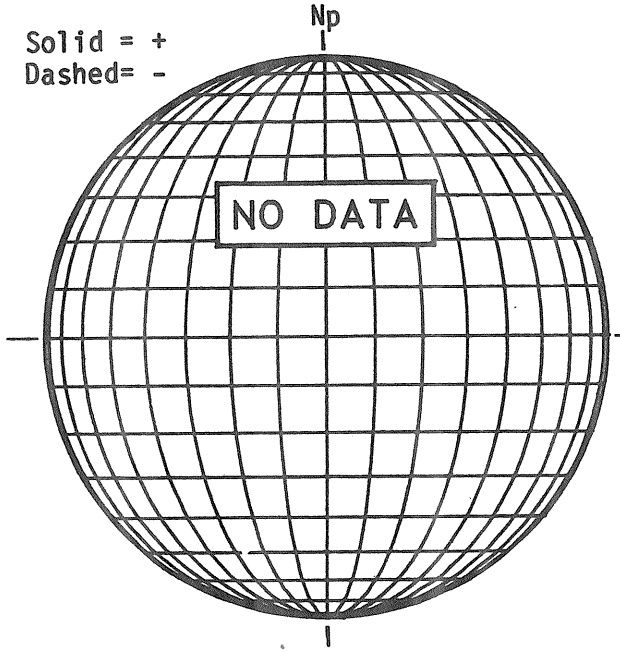
KITT PEAK MAGNETOGRAM

Bright= +
Dark = -



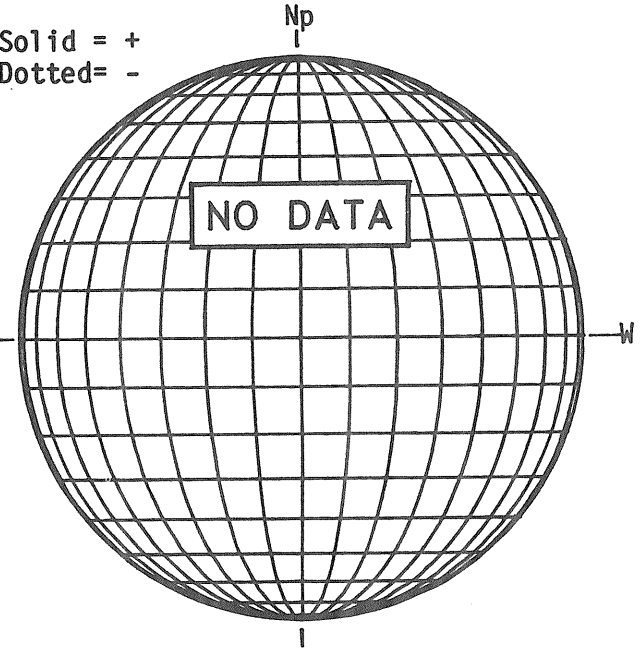
STANFORD MAGNETOGRAM

Solid = +
Dashed= -

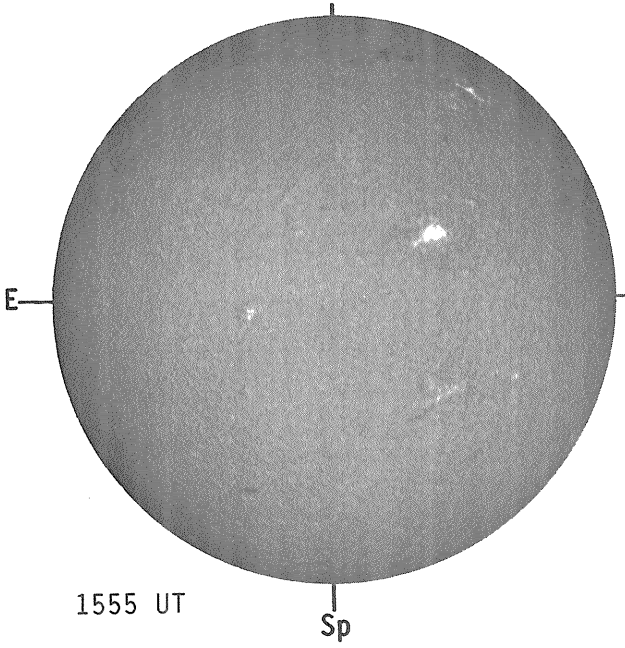


MT. WILSON MAGNETOGRAM

Solid = +
Dotted= -

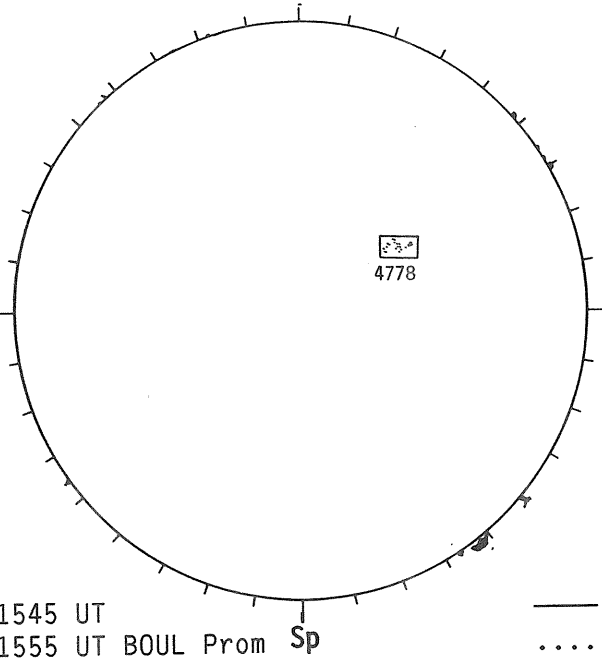


SACRAMENTO PEAK H-ALPHA



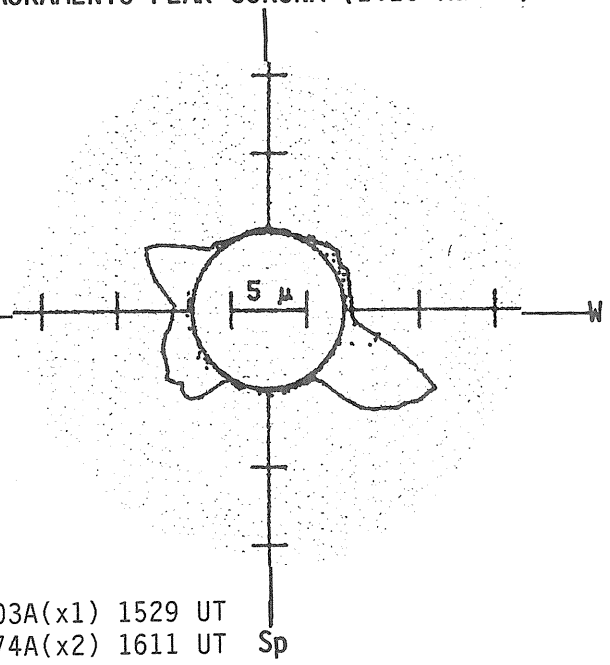
1555 UT

BOULDER SUNSPOTS



1545 UT
1555 UT BOUL Prom

SACRAMENTO PEAK CORONA (1.15 Radii)

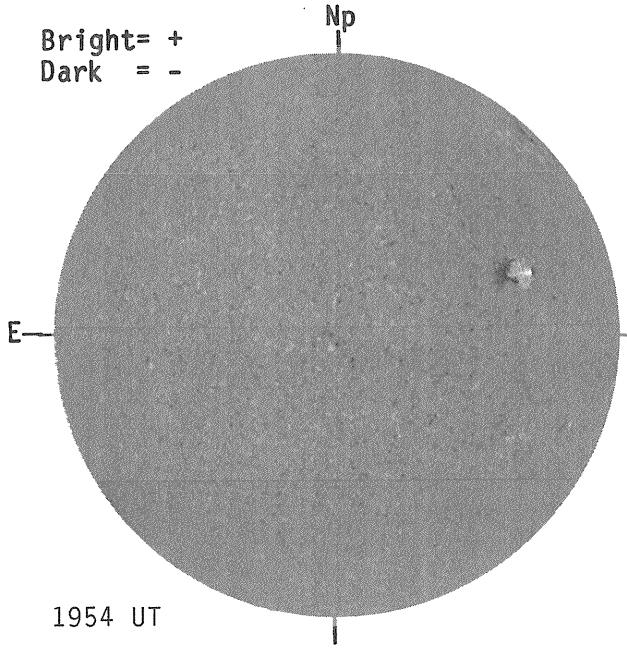


—— 5303A(x1) 1529 UT
.... 6374A(x2) 1611 UT
xxxx 5694A(x6) 1553 UT
NO 5694A ACTIVITY TODAY

M A R C H 07, 1 9 8 7 (P=-22.80, B_0=-7.15, L_0= 260.07)

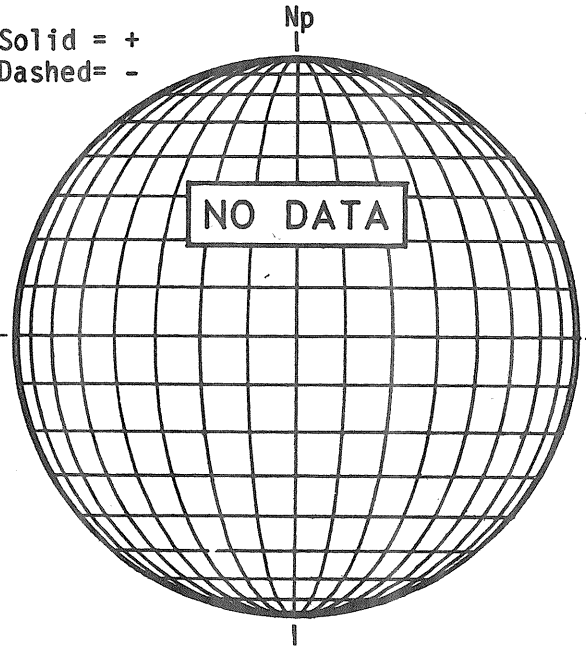
KITT PEAK MAGNETOGRAM

Bright= +
Dark = -



STANFORD MAGNETOGRAM

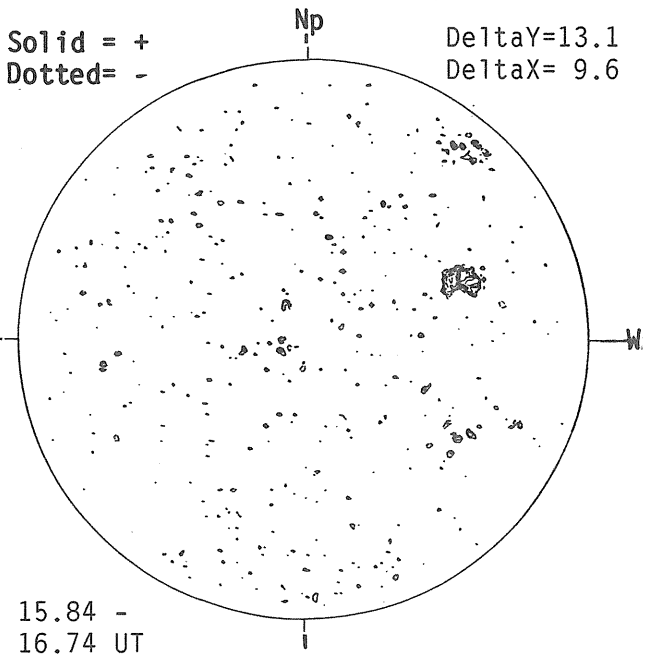
Solid = +
Dashed= -



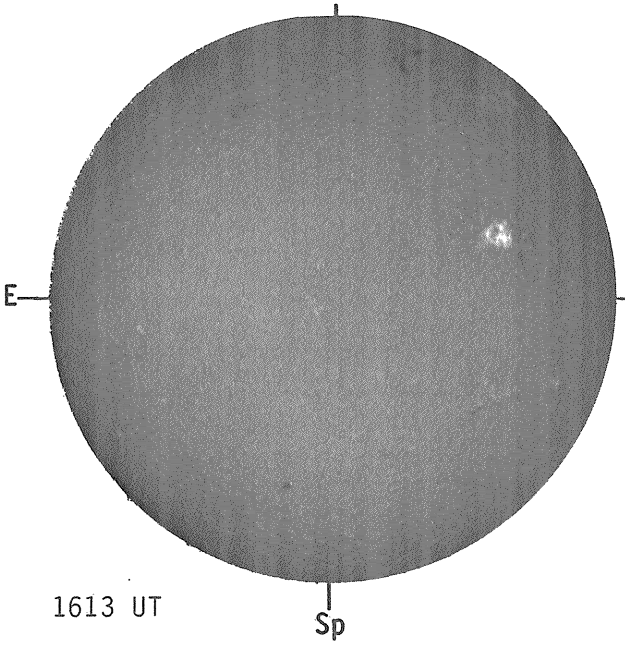
MT. WILSON MAGNETOGRAM

Solid = +
Dotted= -

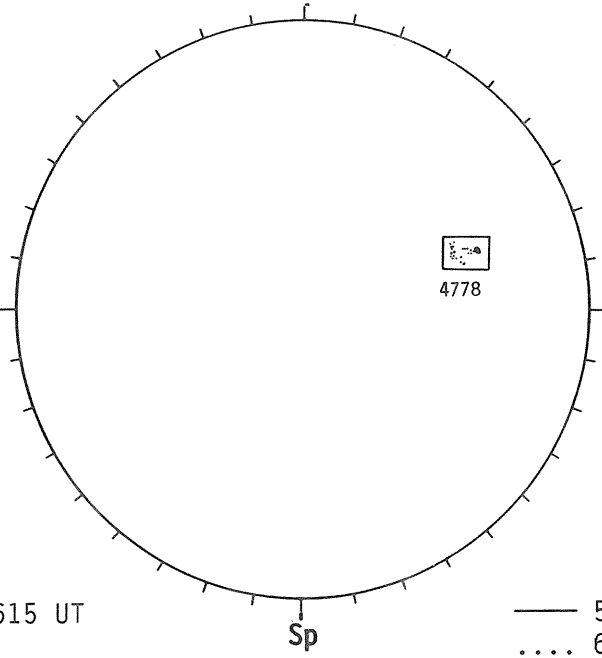
DeltaY=13.1
DeltaX= 9.6



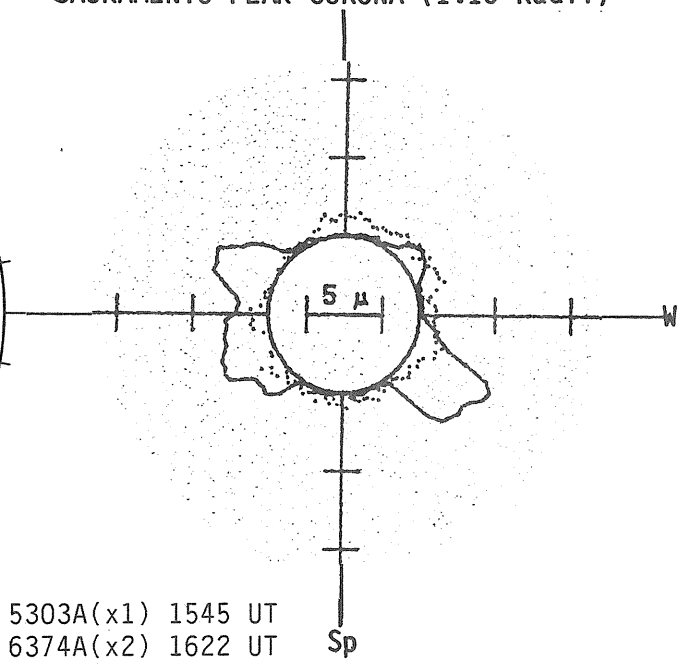
SACRAMENTO PEAK H-ALPHA



BOULDER SUNSPOTS



SACRAMENTO PEAK CORONA (1.15 Radii)

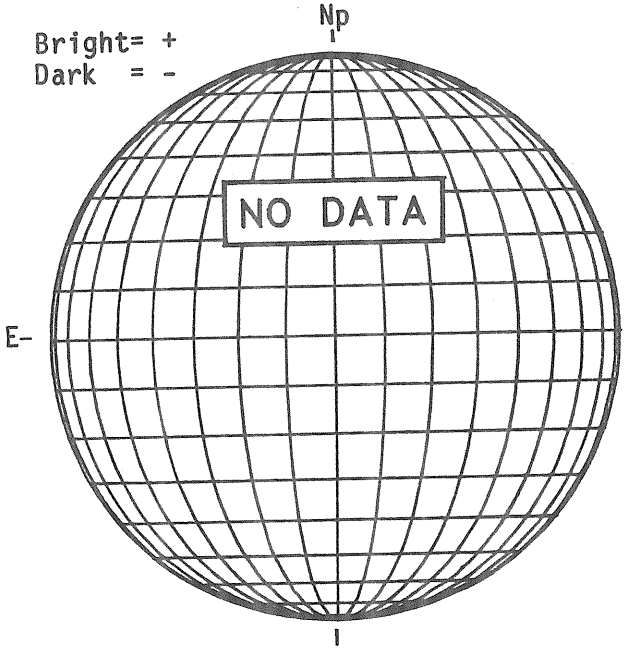


—— 5303A(x1) 1545 UT
.... 6374A(x2) 1622 UT
xxxx 5694A(x6) 1611 UT
NO 5694A ACTIVITY TODAY

M A R C H 08, 1 9 8 7 (P=-23.02, B_0=-7.15, L_0= 246:89)

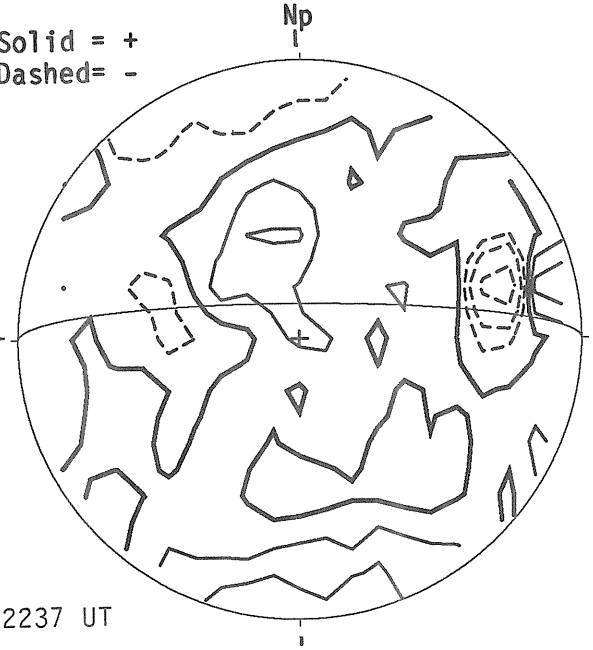
KITT PEAK MAGNETOGRAM

Bright= +
Dark = -



STANFORD MAGNETOGRAM

Solid = +
Dashed= -

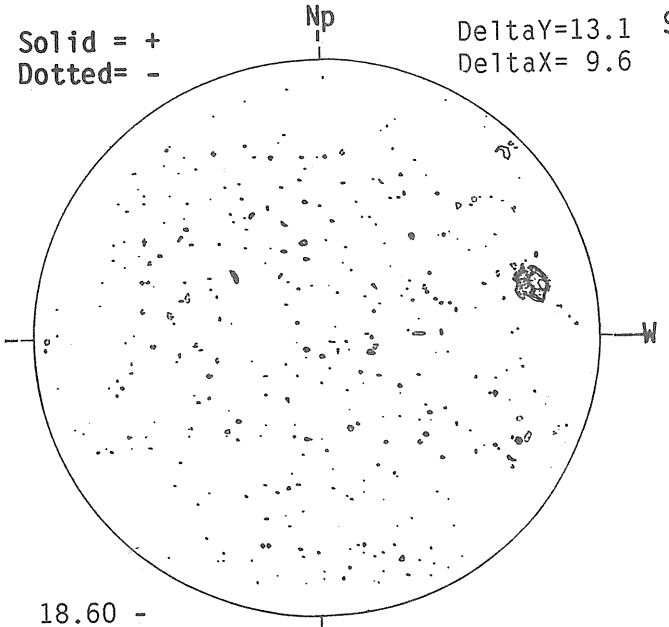


2237 UT

MT. WILSON MAGNETOGRAM

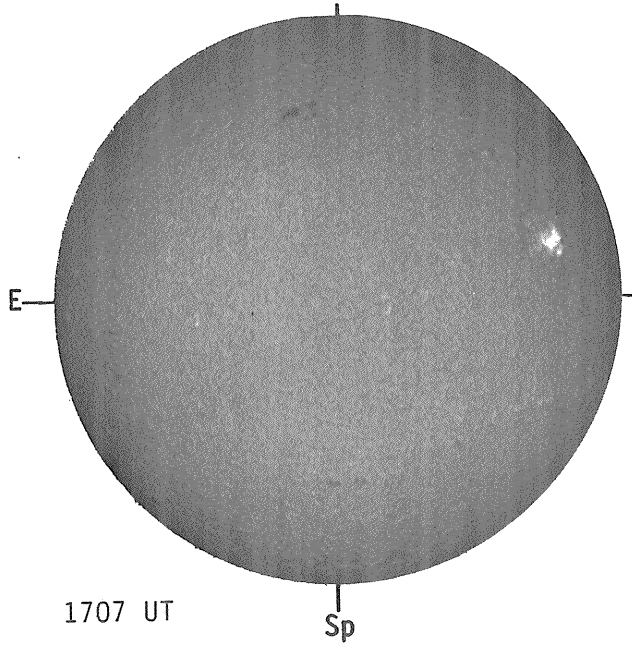
Solid = +
Dotted= -

DeltaY=13.1
DeltaX= 9.6



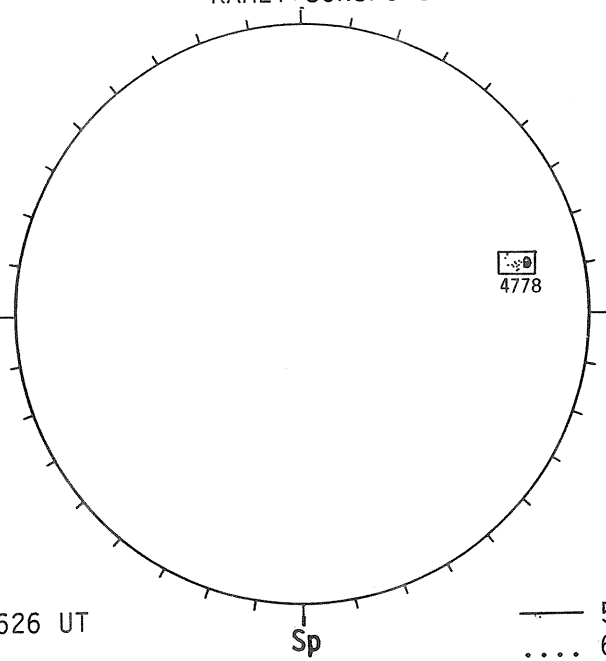
18.60 -
19.60 UT DATA INCOMPLETE

SACRAMENTO PEAK H-ALPHA



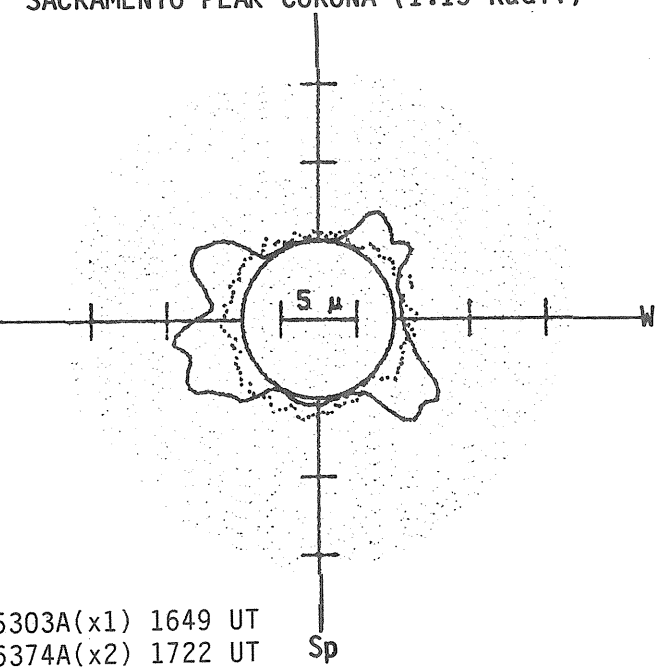
1707 UT

RAMEY SUNSPOTS



1626 UT

SACRAMENTO PEAK CORONA (1.15 Radii)

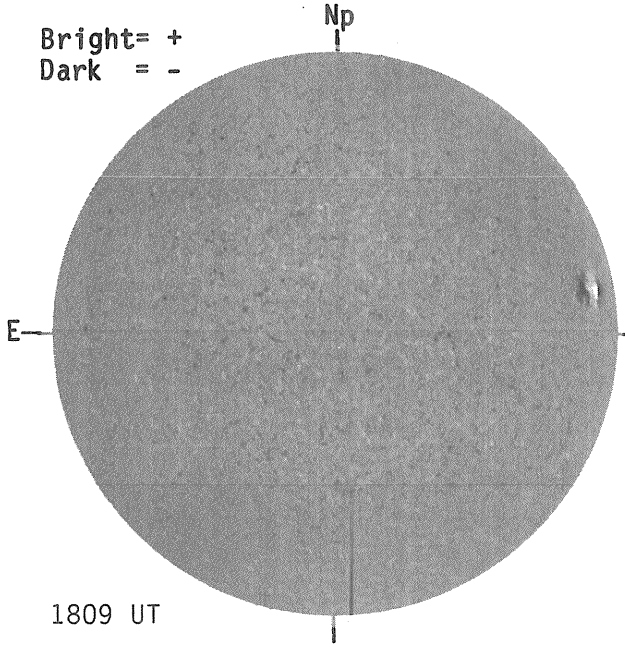


—— 5303A(x1) 1649 UT
.... 6374A(x2) 1722 UT
xxxx 5694A(x6) 1714 UT
NO 5694A ACTIVITY TODAY

M A R C H 09, 1 9 8 7 (P=-23.22, B_0=-7.14, L_0= 233.72)

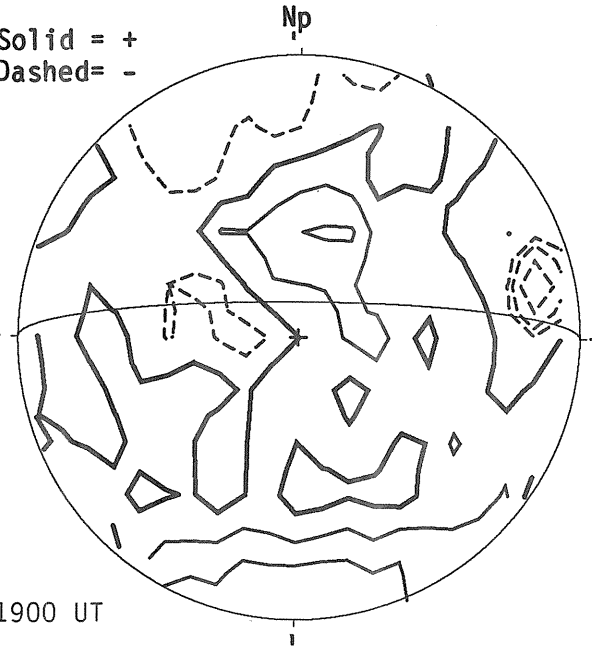
KITT PEAK MAGNETOGRAM

Bright= +
Dark = -



STANFORD MAGNETOGRAM

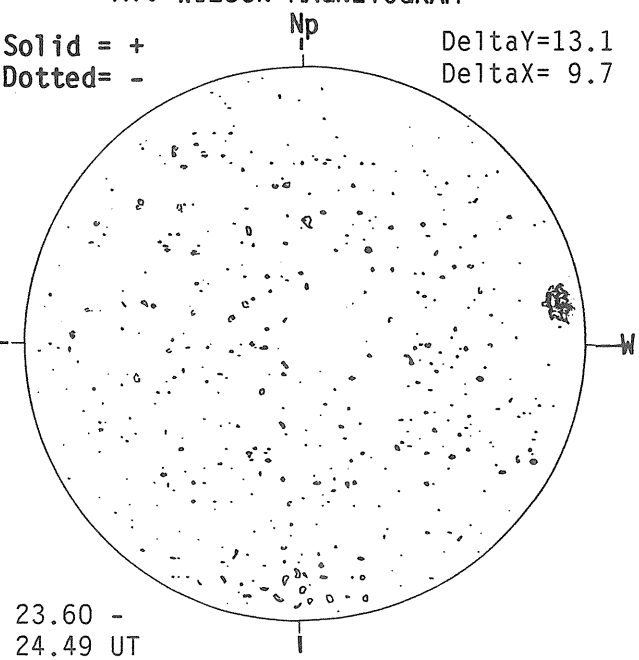
Solid = +
Dashed= -



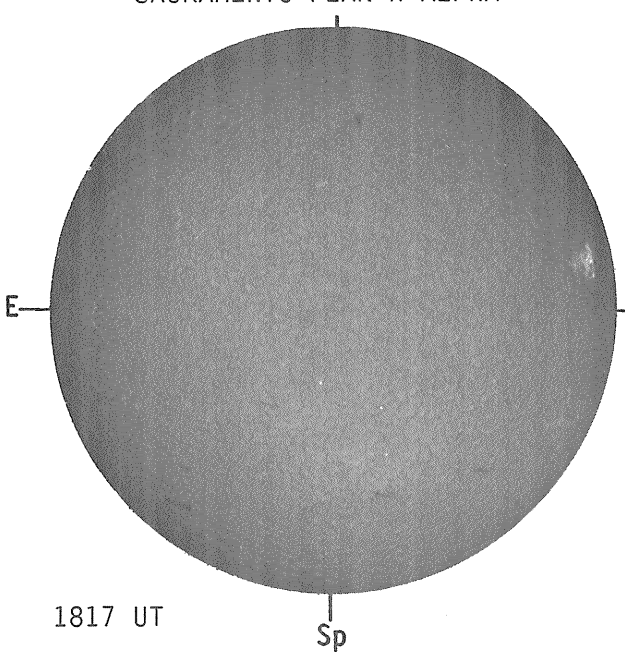
MT. WILSON MAGNETOGRAM

Solid = +
Dotted= -

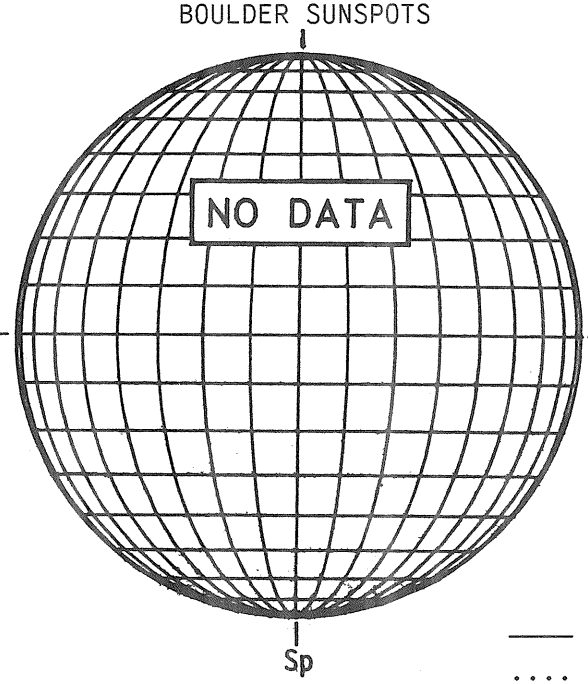
DeltaY=13.1
DeltaX= 9.7



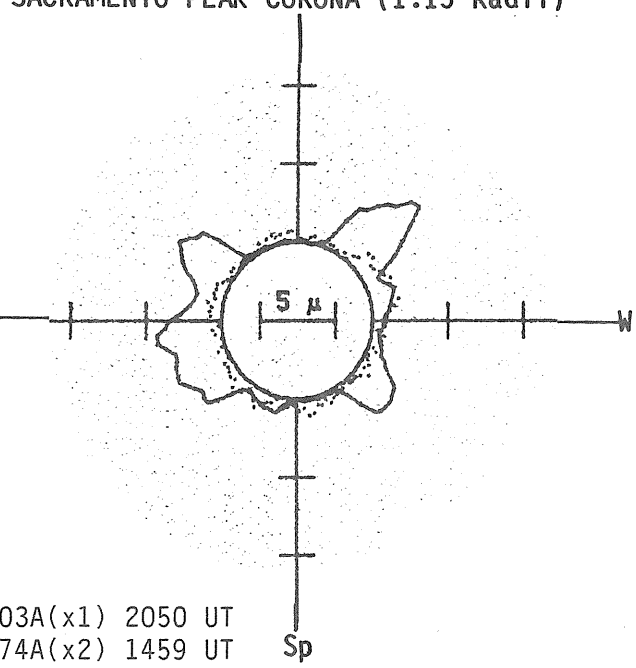
SACRAMENTO PEAK H-ALPHA



BOULDER SUNSPOTS

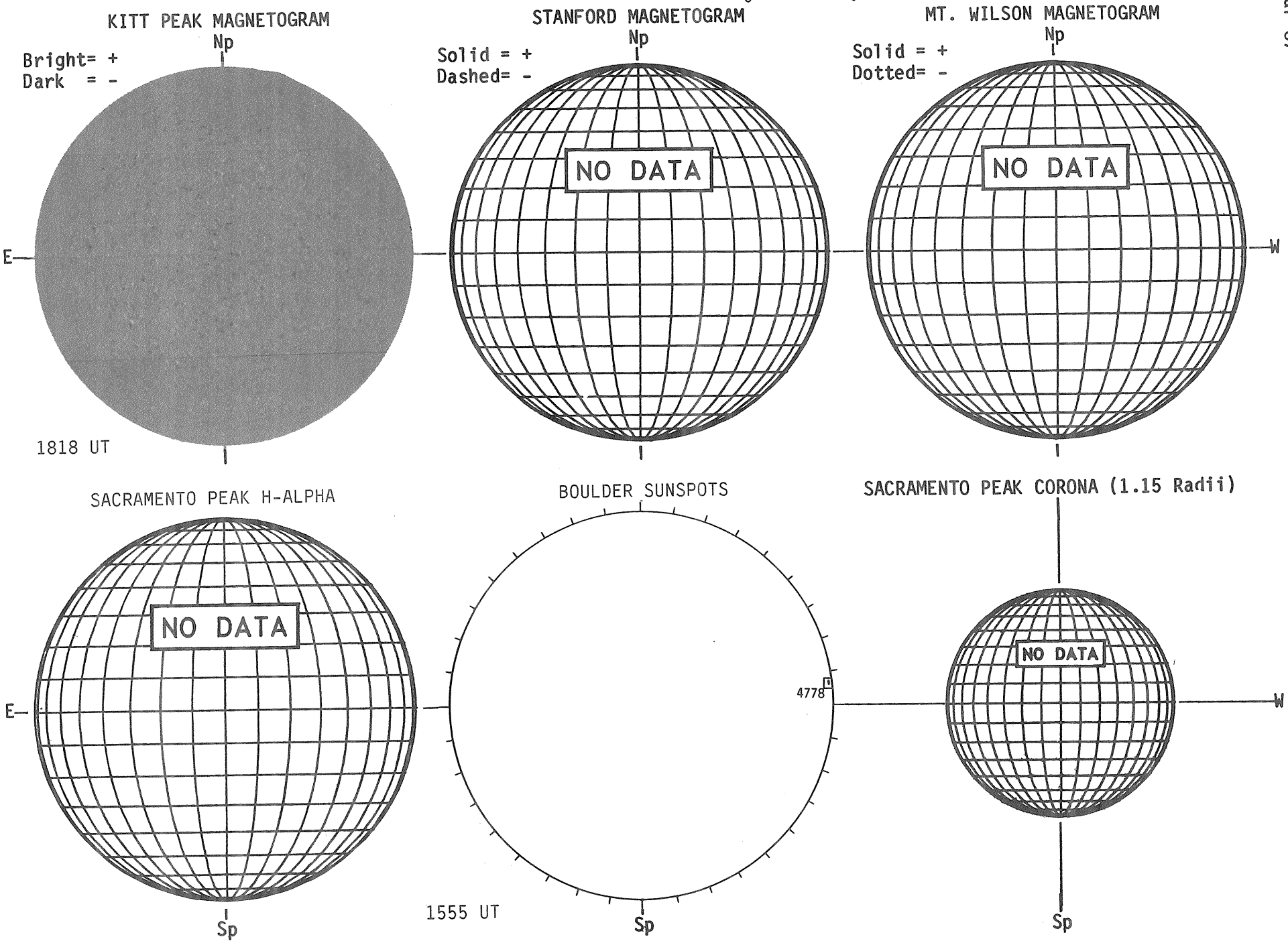


SACRAMENTO PEAK CORONA (1.15 Radii)

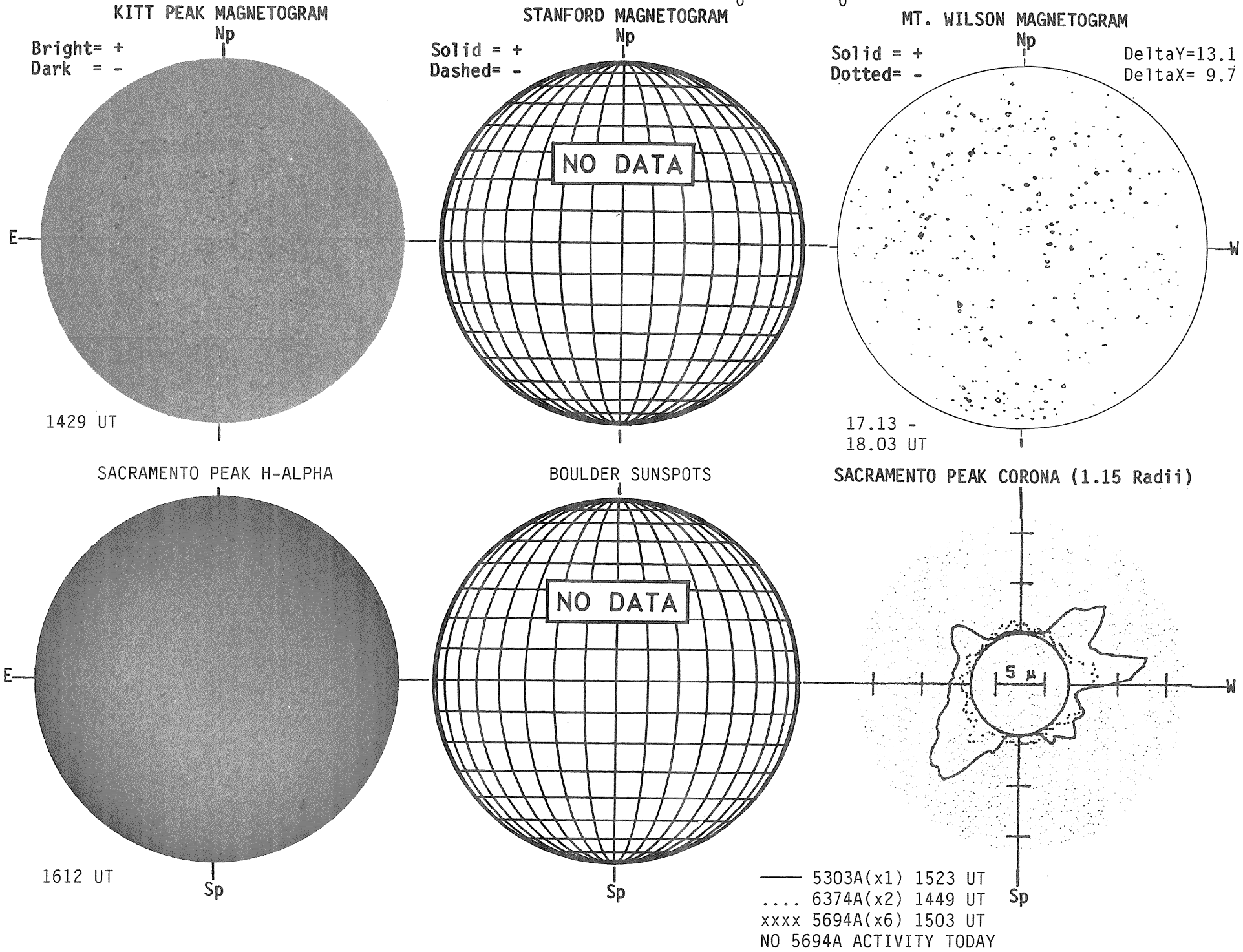


—— 5303A(x1) 2050 UT
.... 6374A(x2) 1459 UT
xxxx 5694A(x6) 1509 UT
NO 5694A ACTIVITY TODAY

M A R C H 10, 1 9 8 7 (P=-23.42, B_0=-7.14, L_0= 220.54)



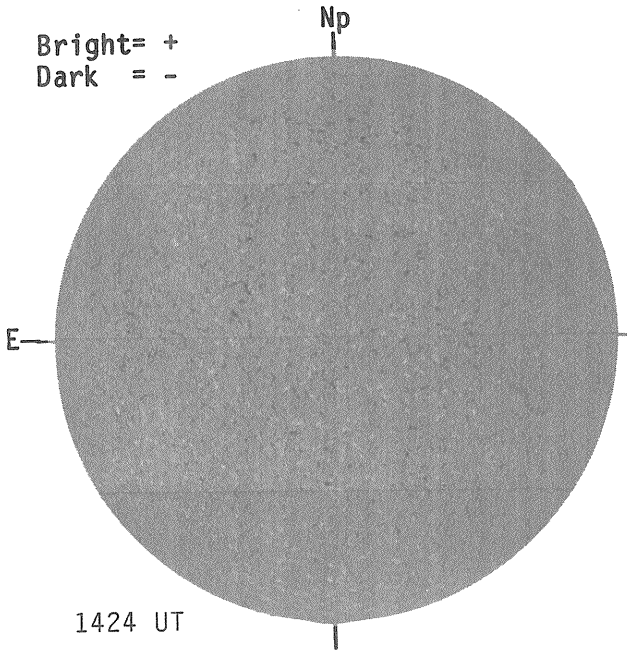
M A R C H 11, 1 9 8 7 (P=-23.61, B_0=-7.13, L_0= 207.36)



M A R C H 12, 1 9 8 7 (P=-23.80, B_0=-7.12, L_0= 194.19)

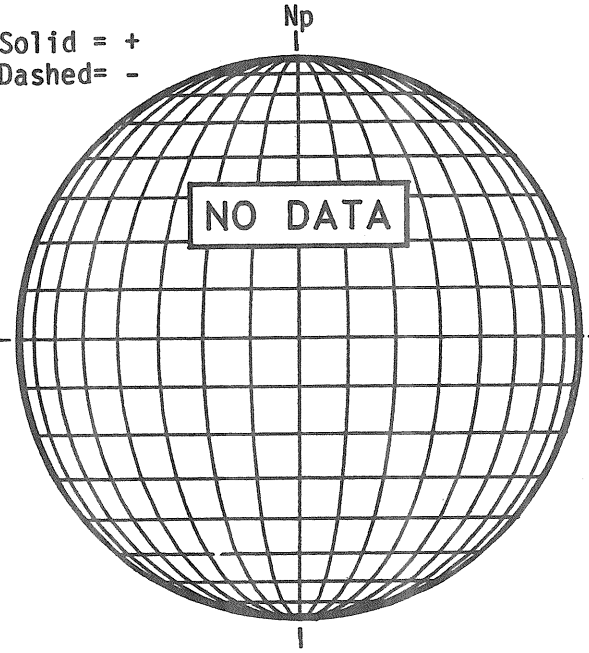
KITT PEAK MAGNETOGRAM

Bright= +
Dark = -



STANFORD MAGNETOGRAM

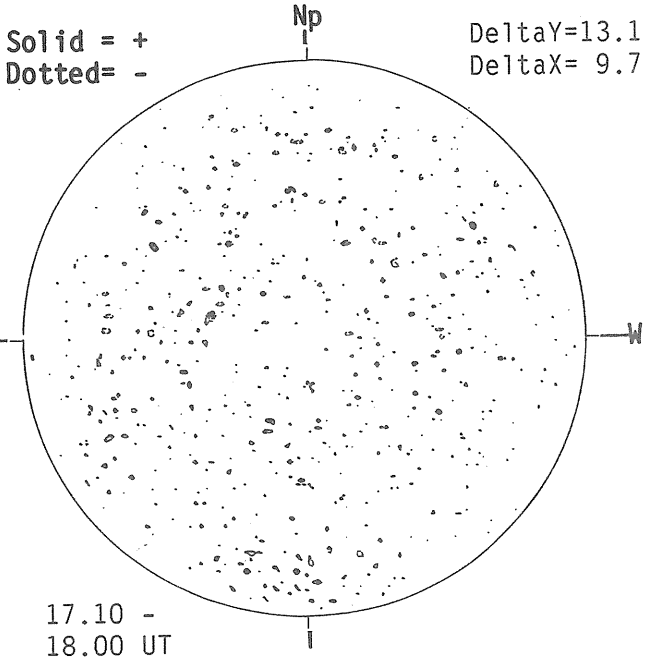
Solid = +
Dashed= -



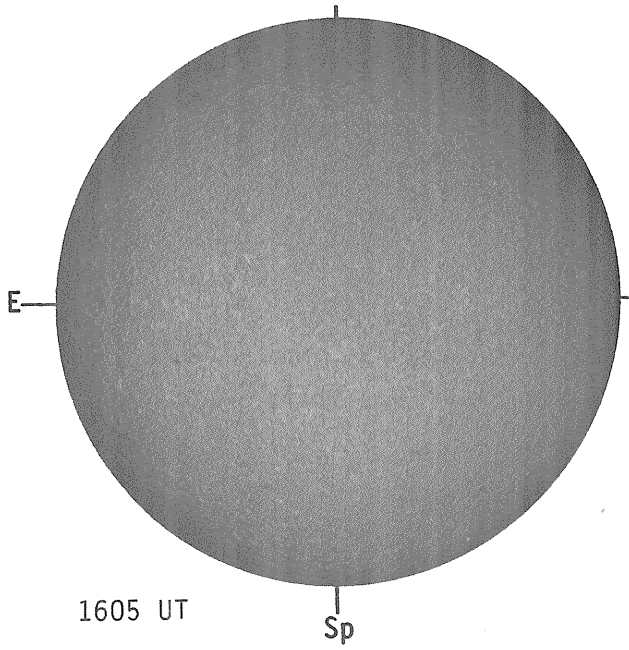
MT. WILSON MAGNETOGRAM

Solid = +
Dotted= -

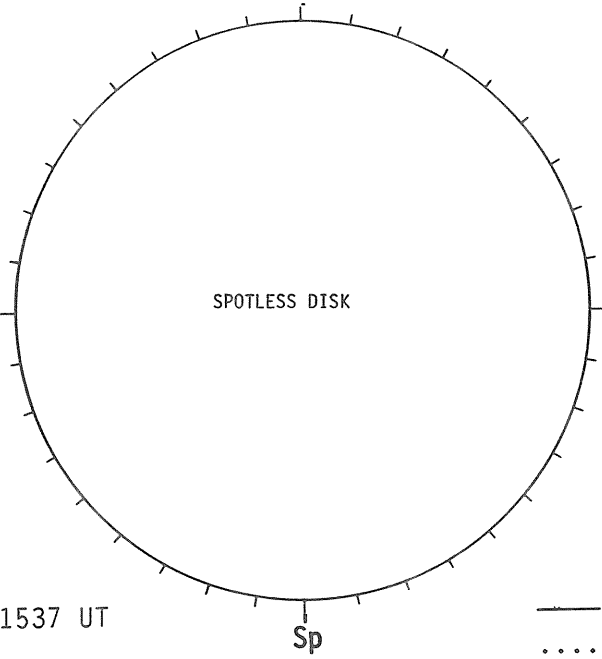
DeltaY=13.1
DeltaX= 9.7



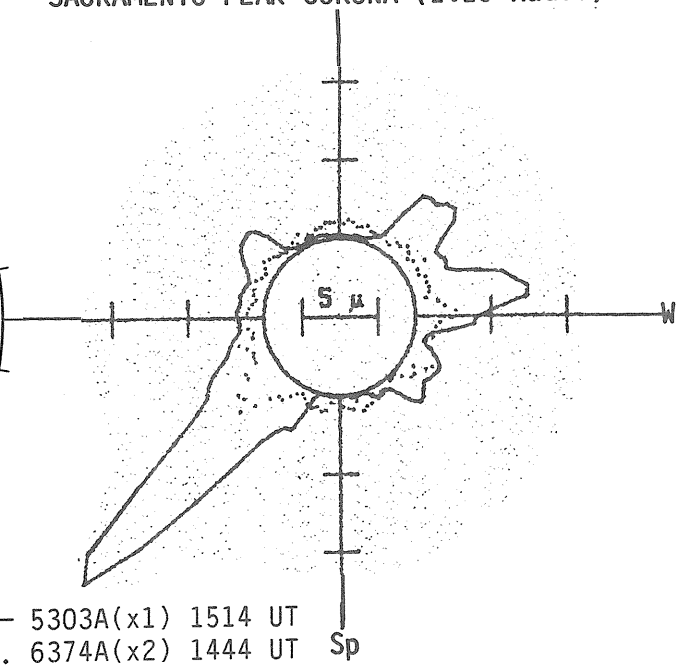
SACRAMENTO PEAK H-ALPHA



BOULDER SUNSPOTS



SACRAMENTO PEAK CORONA (1.15 Radii)

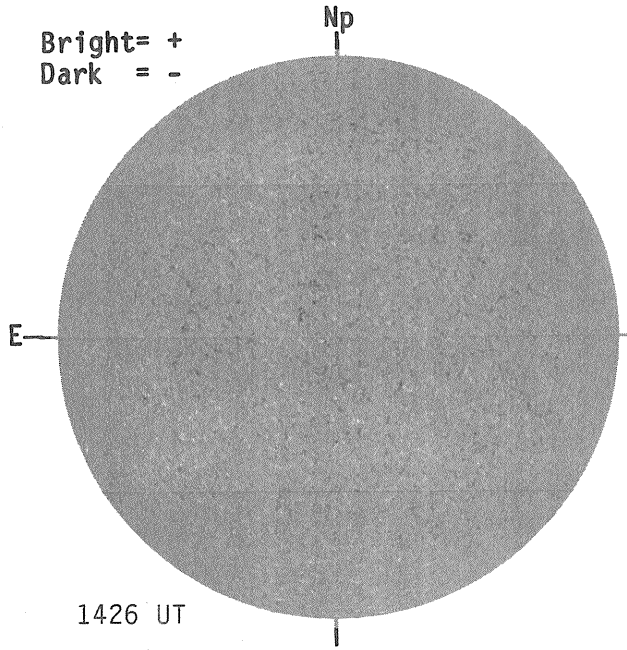


—— 5303A(x1) 1514 UT
.... 6374A(x2) 1444 UT
xxxx 5694A(x6) 1458 UT
NO 5694A ACTIVITY TODAY

M A R C H 13, 1 9 8 7 (P=-23.98, B_0=-7.11, L_0= 181.01)

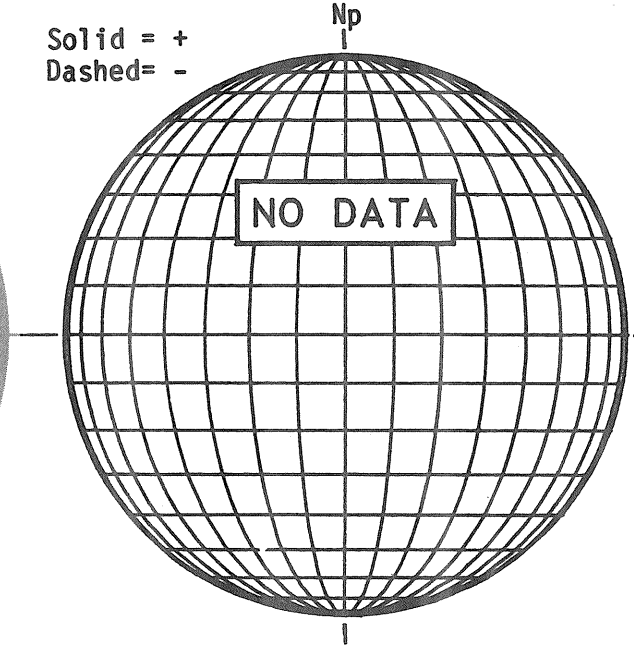
KITT PEAK MAGNETOGRAM

Bright= +
Dark = -



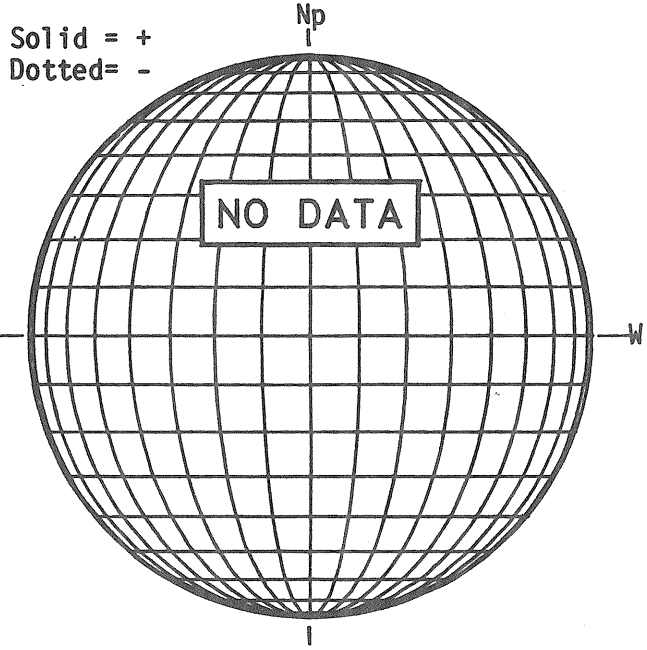
STANFORD MAGNETOGRAM

Solid = +
Dashed= -

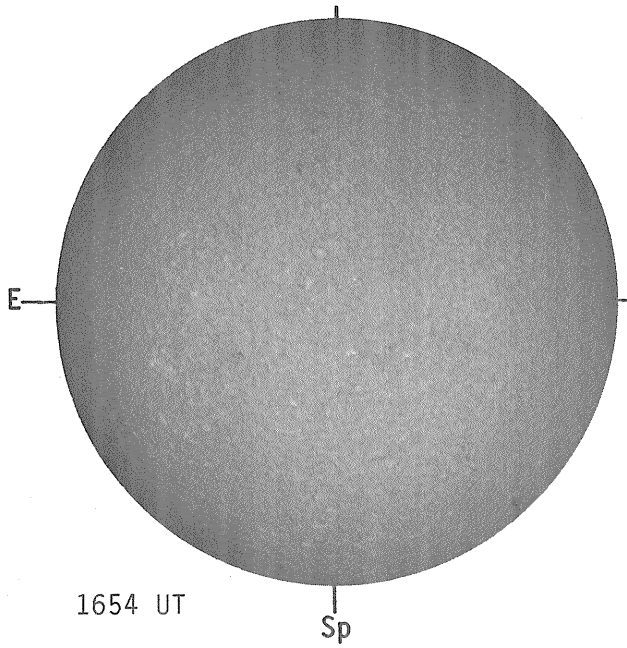


MT. WILSON MAGNETOGRAM

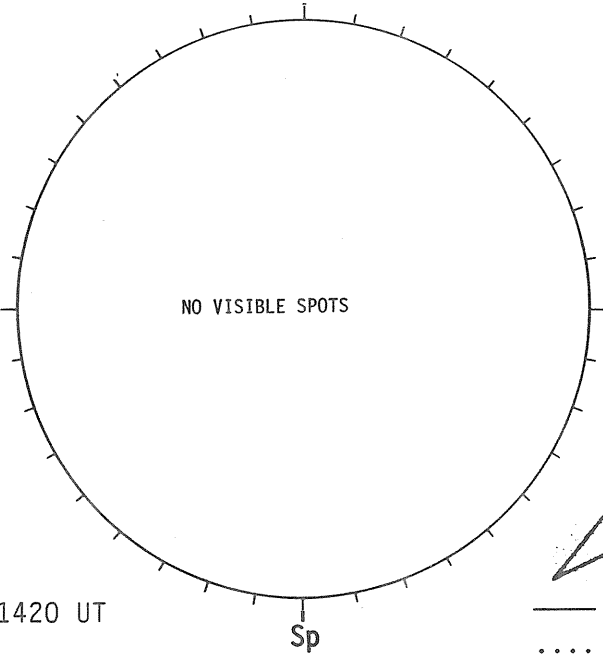
Solid = +
Dotted= -



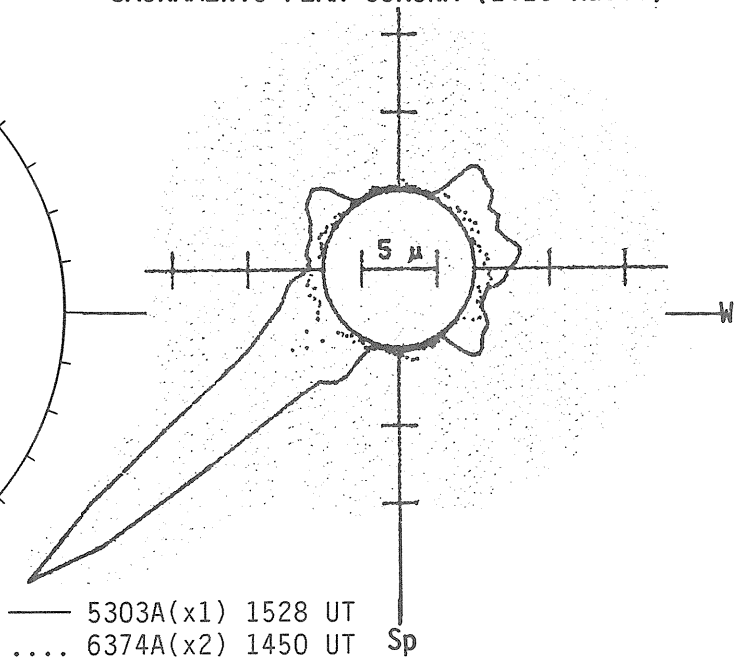
SACRAMENTO PEAK H-ALPHA



RAMEY SUNSPOTS



SACRAMENTO PEAK CORONA (1.15 Radii)

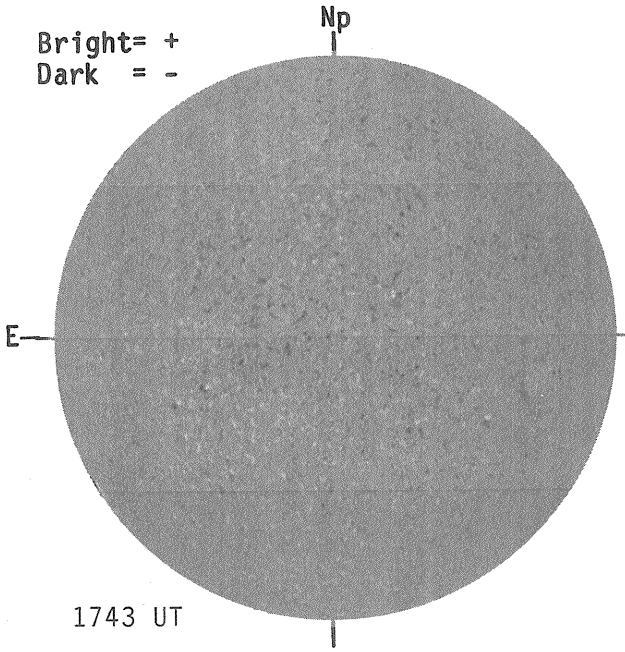


—— 5303A(x1) 1528 UT
.... 6374A(x2) 1450 UT
xxxx 5694A(x6) 1510 UT
NO 5694A ACTIVITY TODAY

M A R C H 14, 1 9 8 7 (P=-24.15, B_0=-7.09, L_0= 167.83)

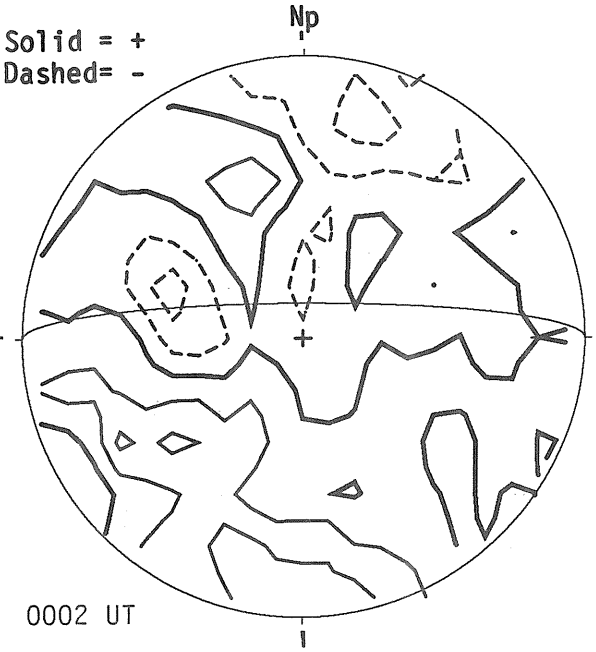
KITT PEAK MAGNETOGRAM

Bright= +
Dark = -



STANFORD MAGNETOGRAM

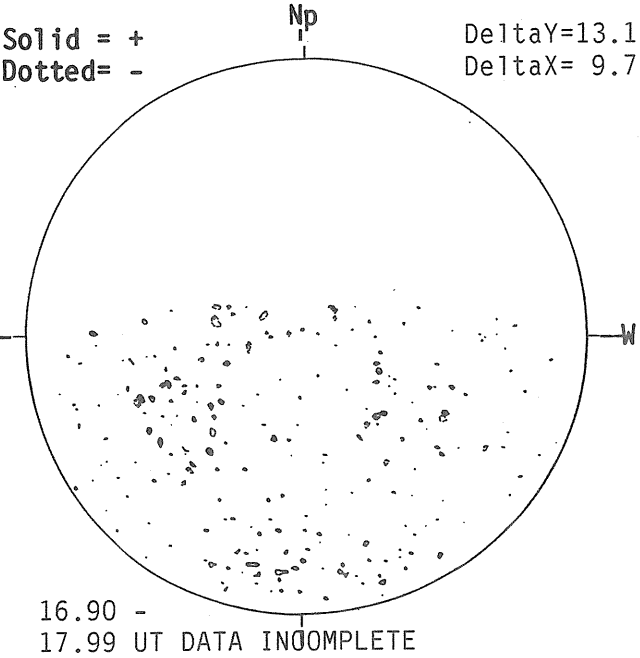
Solid = +
Dashed= -



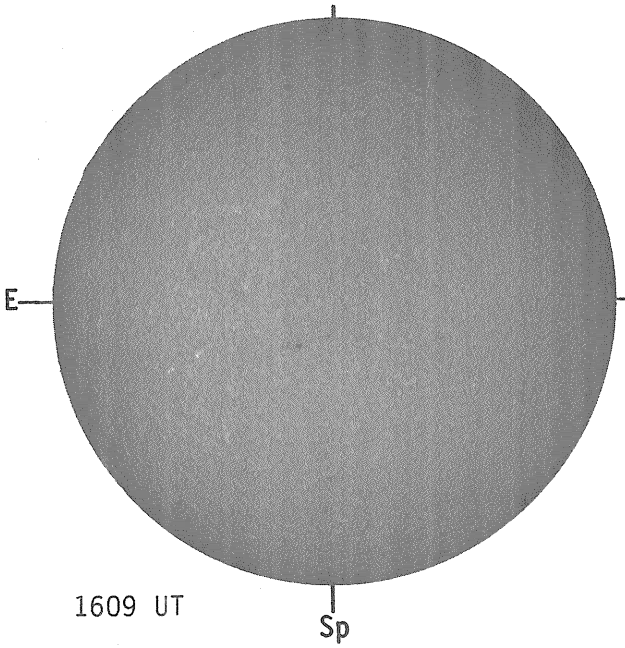
MT. WILSON MAGNETOGRAM

Solid = +
Dotted= -

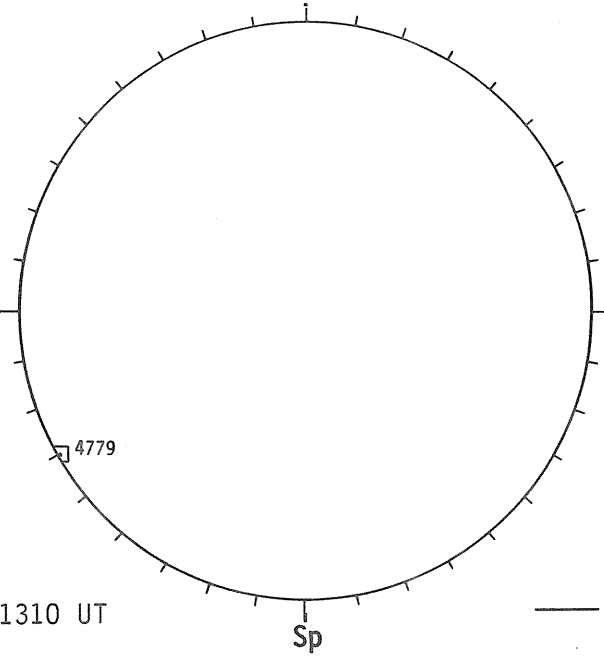
DeltaY=13.1
DeltaX= 9.7



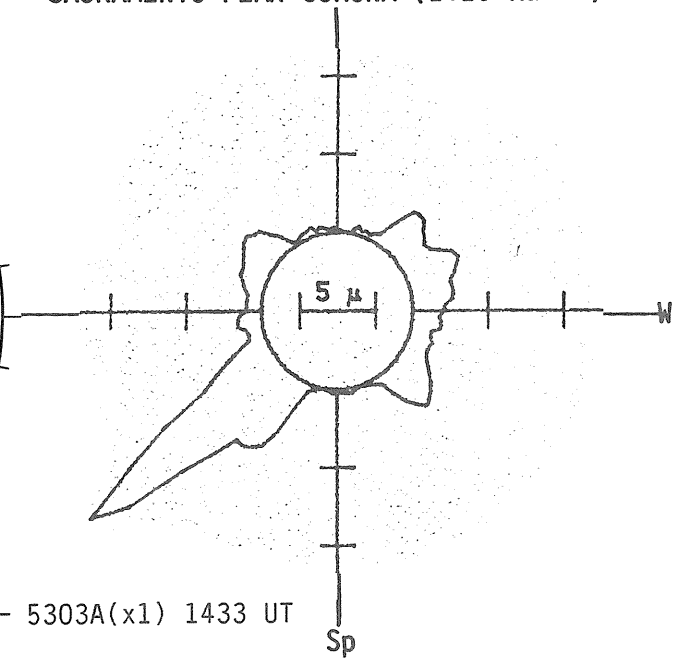
SACRAMENTO PEAK H-ALPHA



RAMEY SUNSPOTS



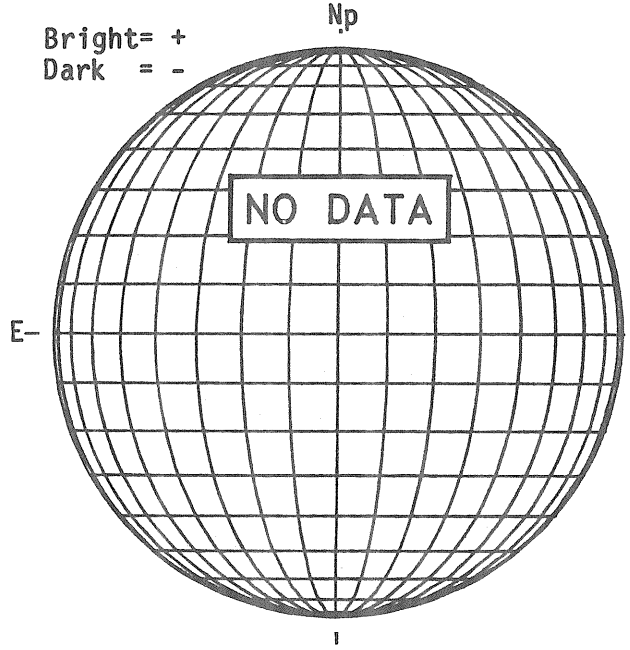
SACRAMENTO PEAK CORONA (1.15 Radii)



M A R C H 15, 1 9 8 7 (P=-24.32, B_0=-7.08, L_0= 154.65)

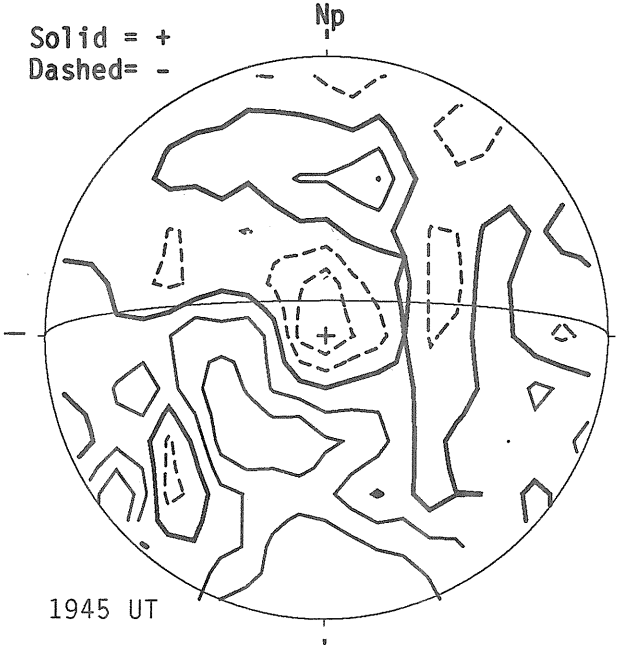
KITT PEAK MAGNETOGRAM

Bright= +
Dark = -



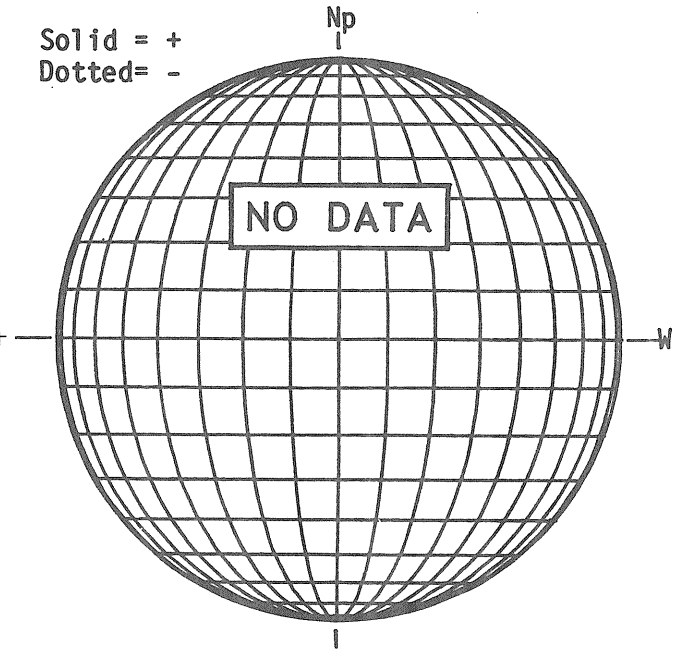
STANFORD MAGNETOGRAM

Solid = +
Dashed= -

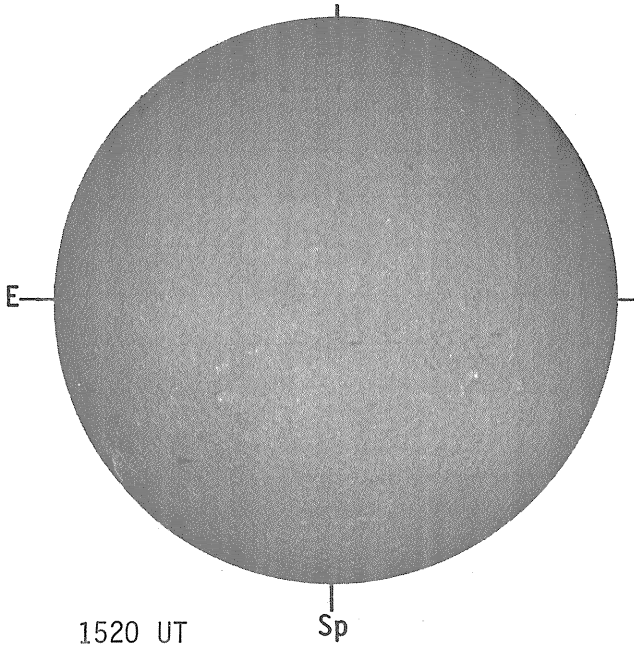


MT. WILSON MAGNETOGRAM

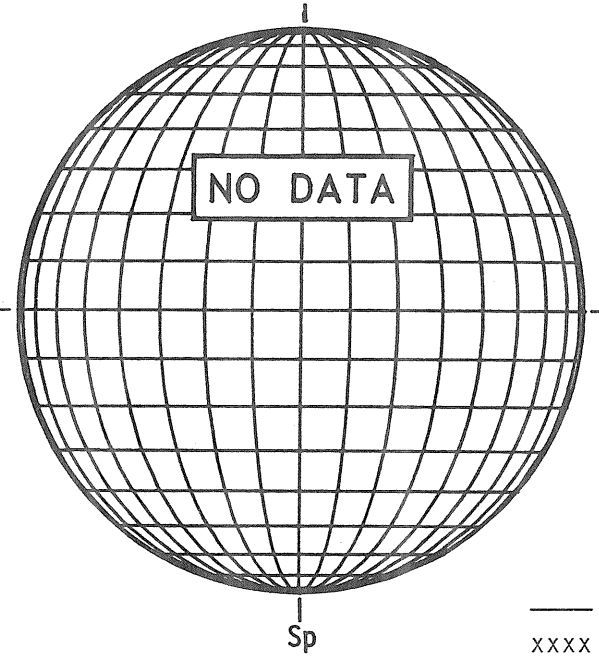
Solid = +
Dotted= -



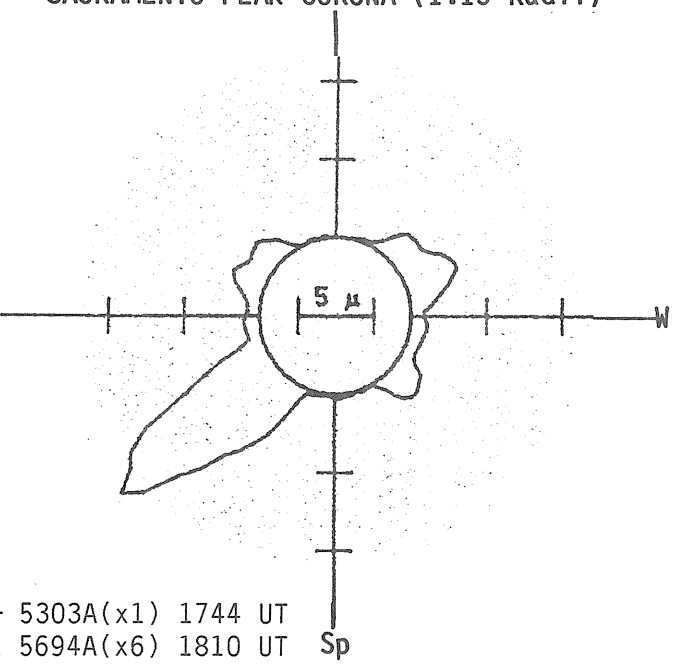
SACRAMENTO PEAK H-ALPHA



BOULDER SUNSPOTS



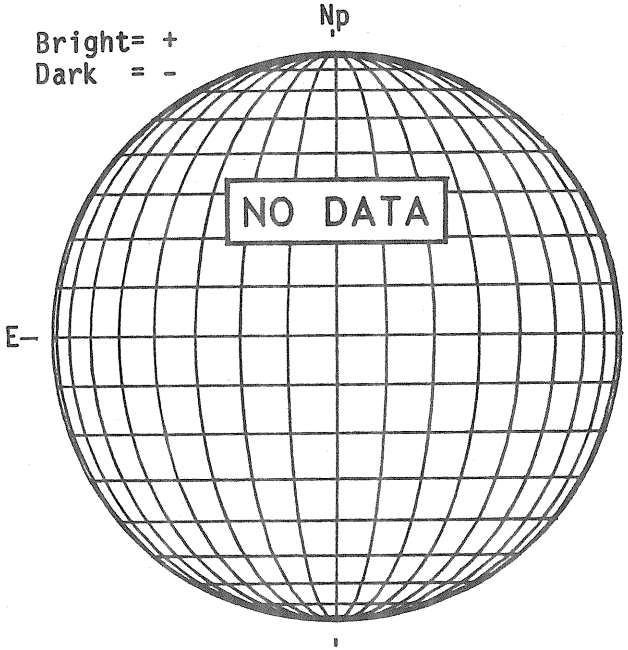
SACRAMENTO PEAK CORONA (1.15 Radii)



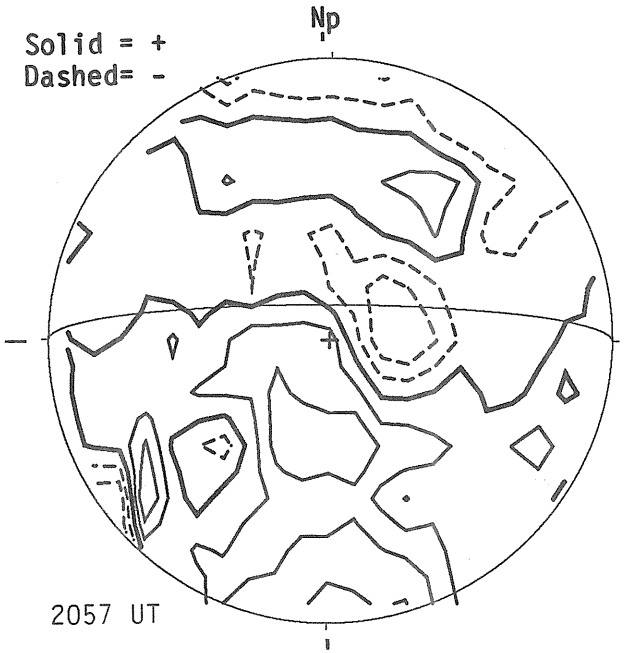
—— 5303A(x1) 1744 UT
xxxx 5694A(x6) 1810 UT
NO 5694A ACTIVITY TODAY

M A R C H 16, 1 9 8 7 (P=-24.48, B_0=-7.06, L_0= 141.47)

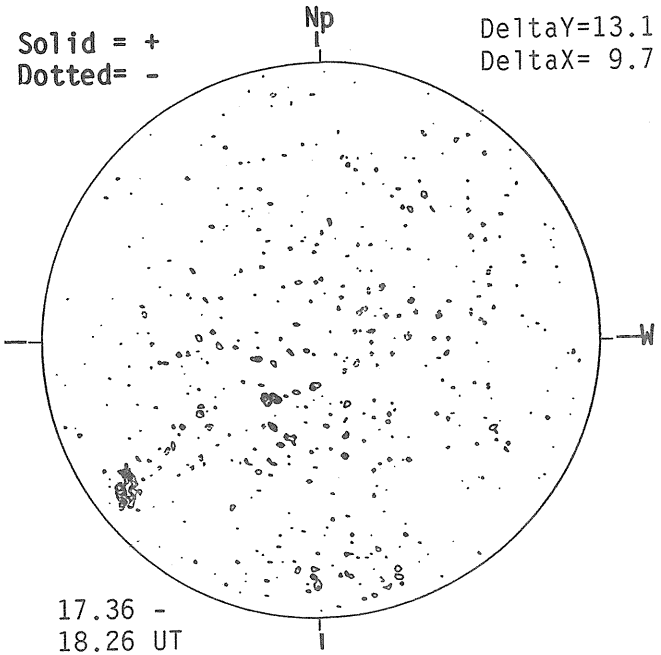
KITT PEAK MAGNETOGRAM



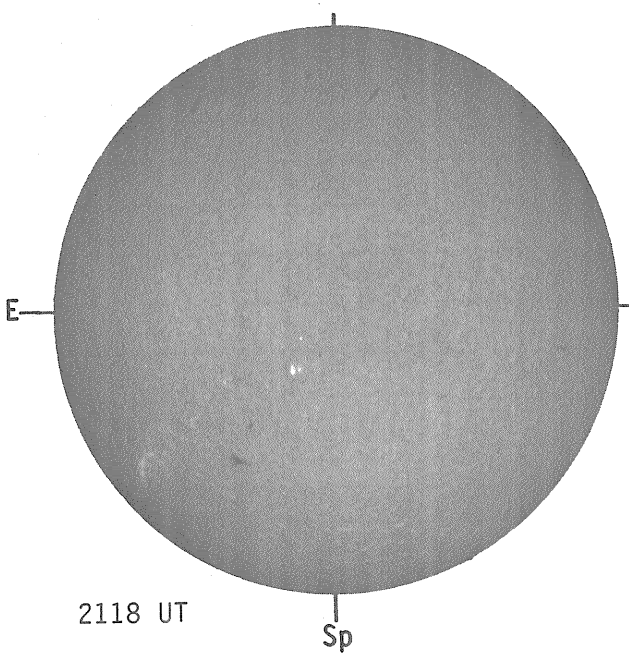
STANFORD MAGNETOGRAM



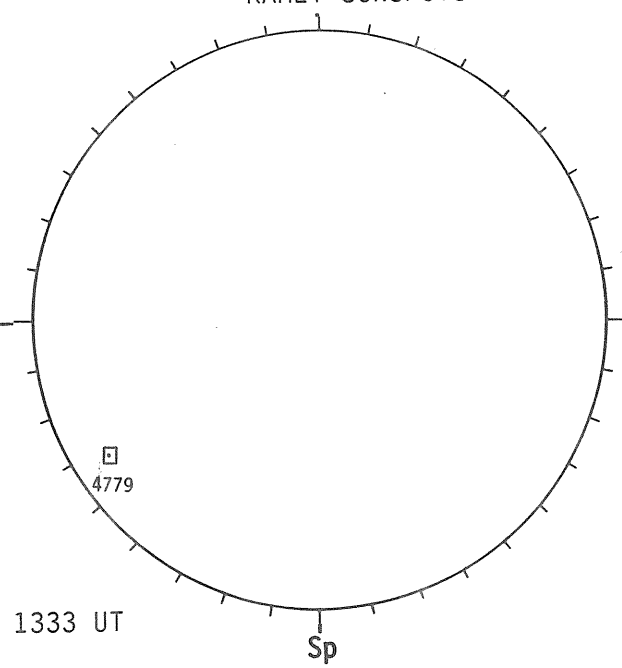
MT. WILSON MAGNETOGRAM



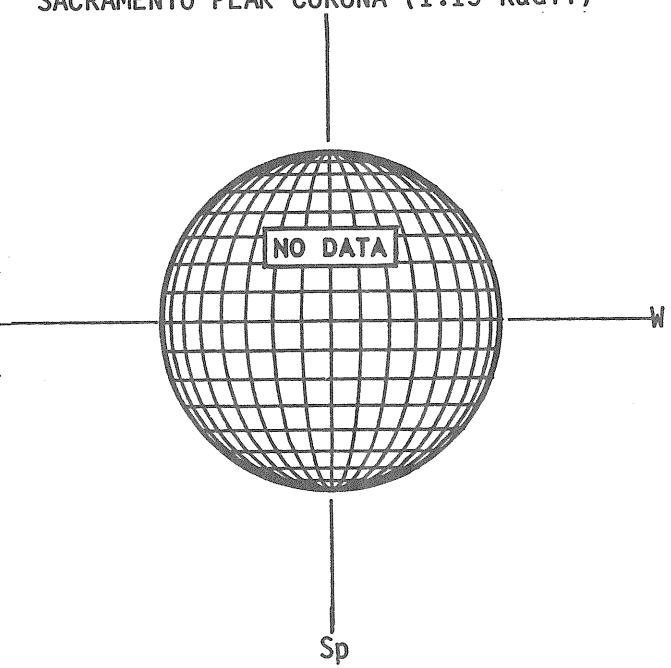
SACRAMENTO PEAK H-ALPHA



RAMEY SUNSPOTS



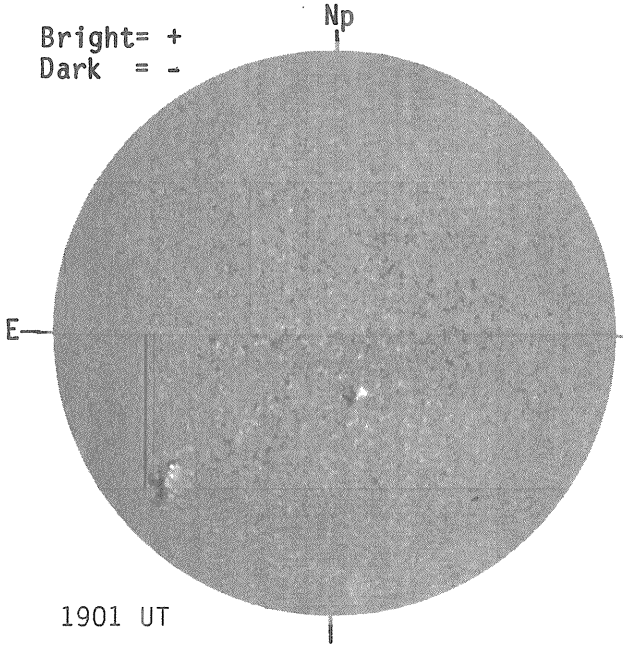
SACRAMENTO PEAK CORONA (1.15 Radii)



M A R C H 17, 1 9 8 7 (P=-24.63, B_0=-7.04, L_0= 128.28)

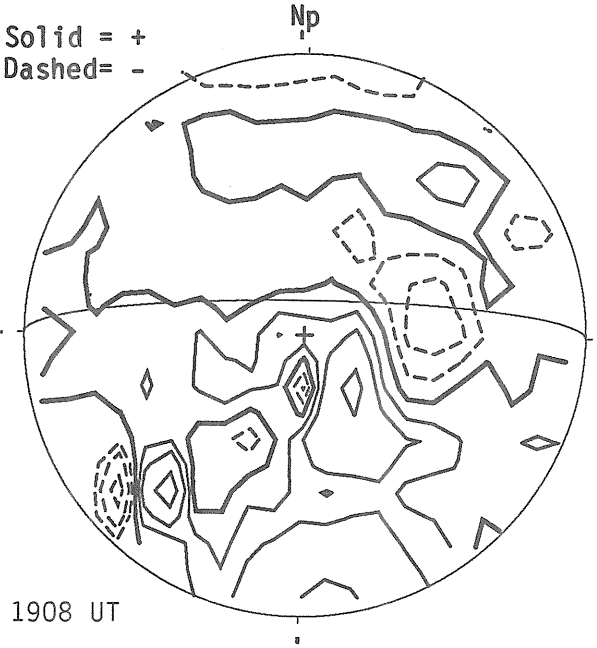
KITT PEAK MAGNETOGRAM

Bright= +
Dark = -



STANFORD MAGNETOGRAM

Solid = +
Dashed= -

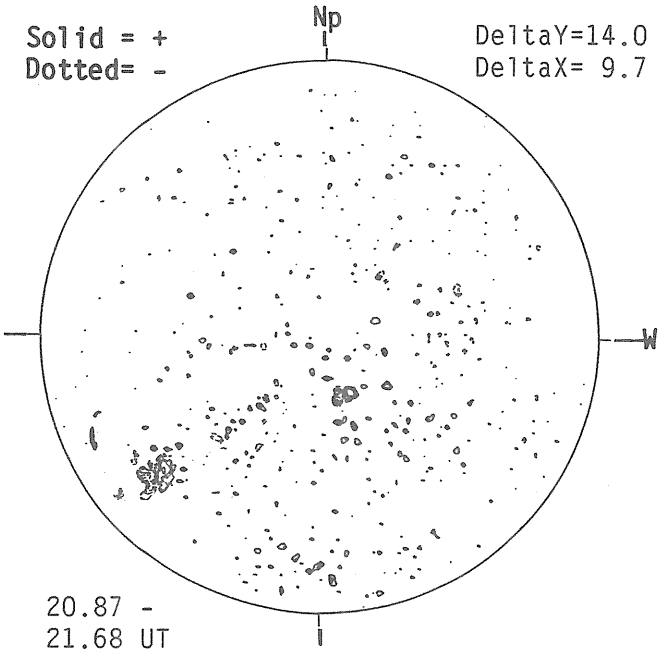


1908 UT

MT. WILSON MAGNETOGRAM

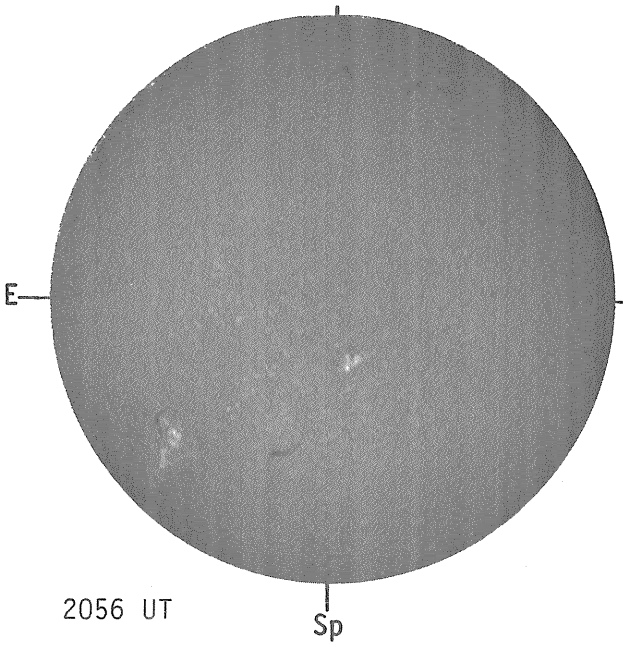
Solid = +
Dotted= -

DeltaY=14.0
DeltaX= 9.7



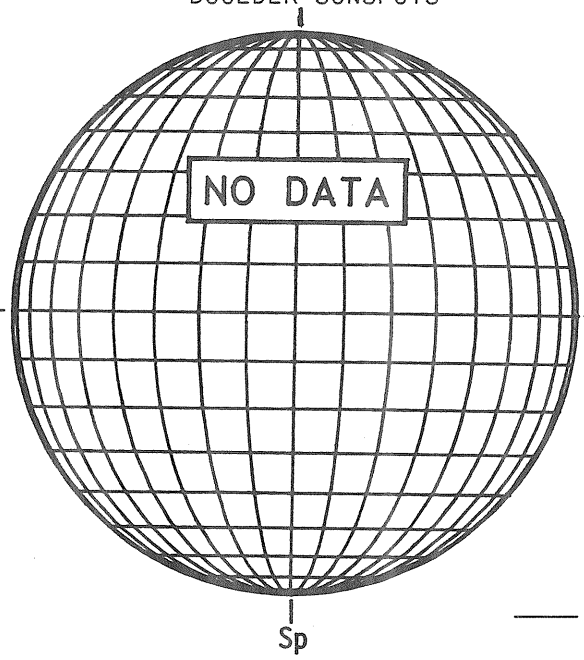
20.87 -
21.68 UT

SACRAMENTO PEAK H-ALPHA

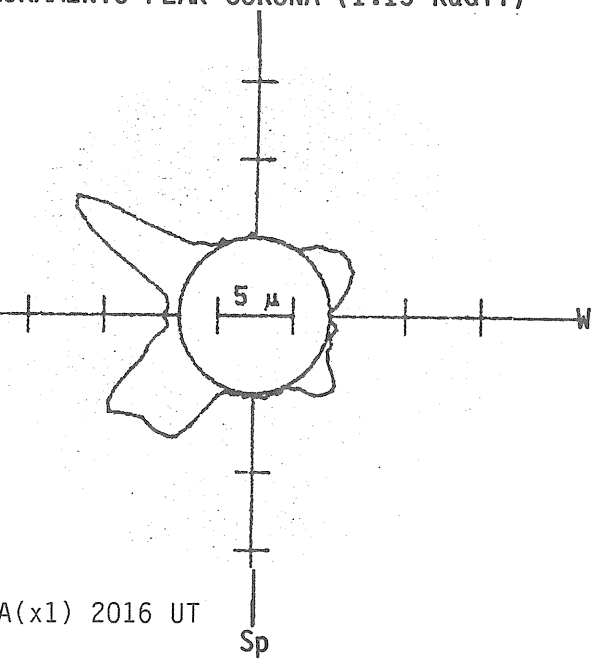


2056 UT

BOULDER SUNSPOTS



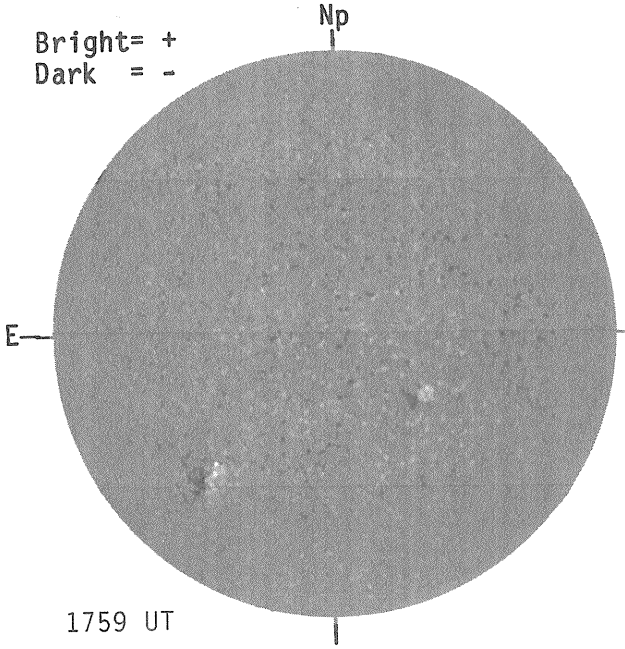
SACRAMENTO PEAK CORONA (1.15 Radii)



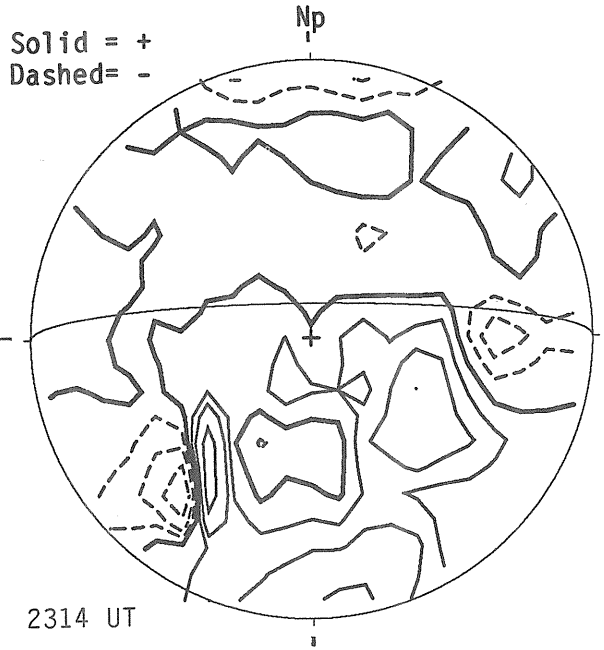
—— 5303A(x1) 2016 UT

M A R C H 18, 1 9 8 7 (P=-24.78, B_o=-7.02, L_o= 115.10)

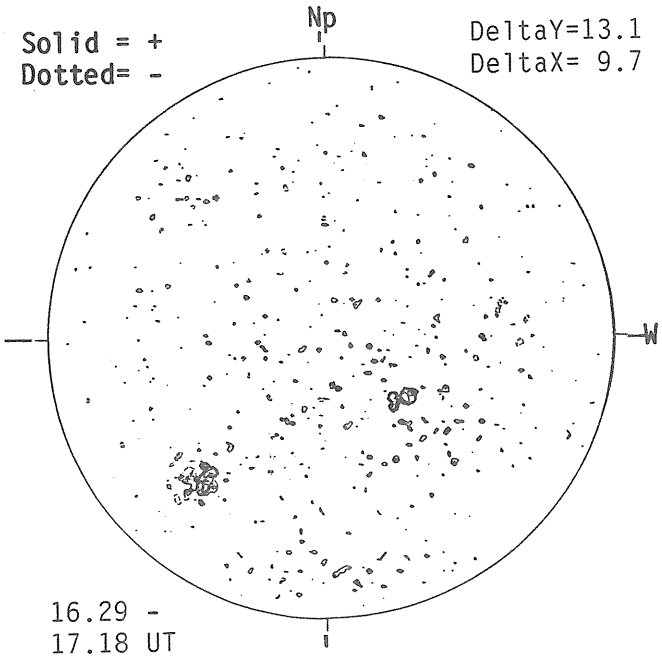
KITT PEAK MAGNETOGRAM



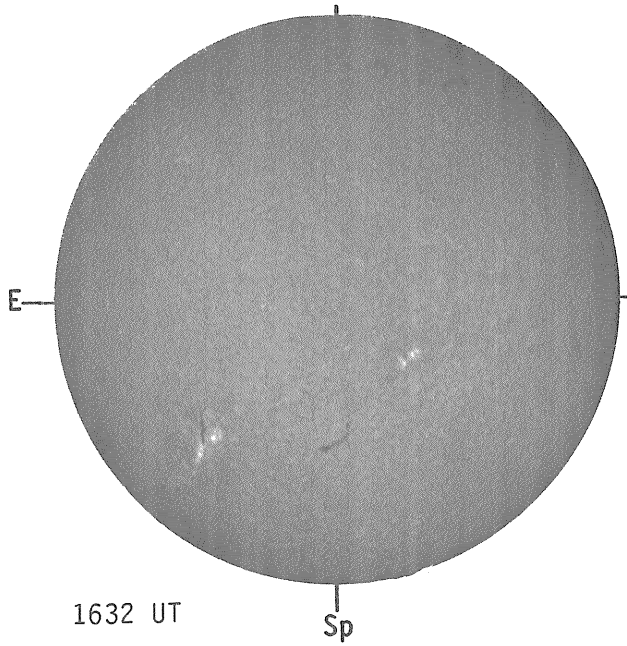
STANFORD MAGNETOGRAM



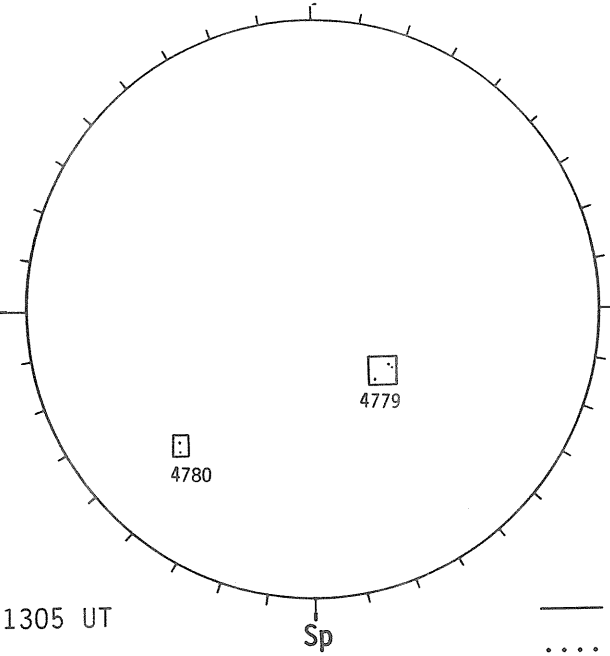
MT. WILSON MAGNETOGRAM



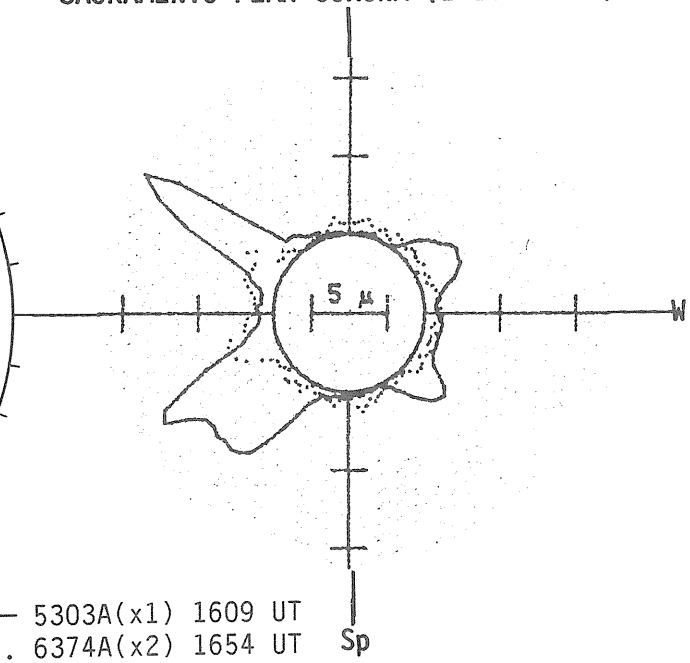
SACRAMENTO PEAK H-ALPHA



RAMEY SUNSPOTS

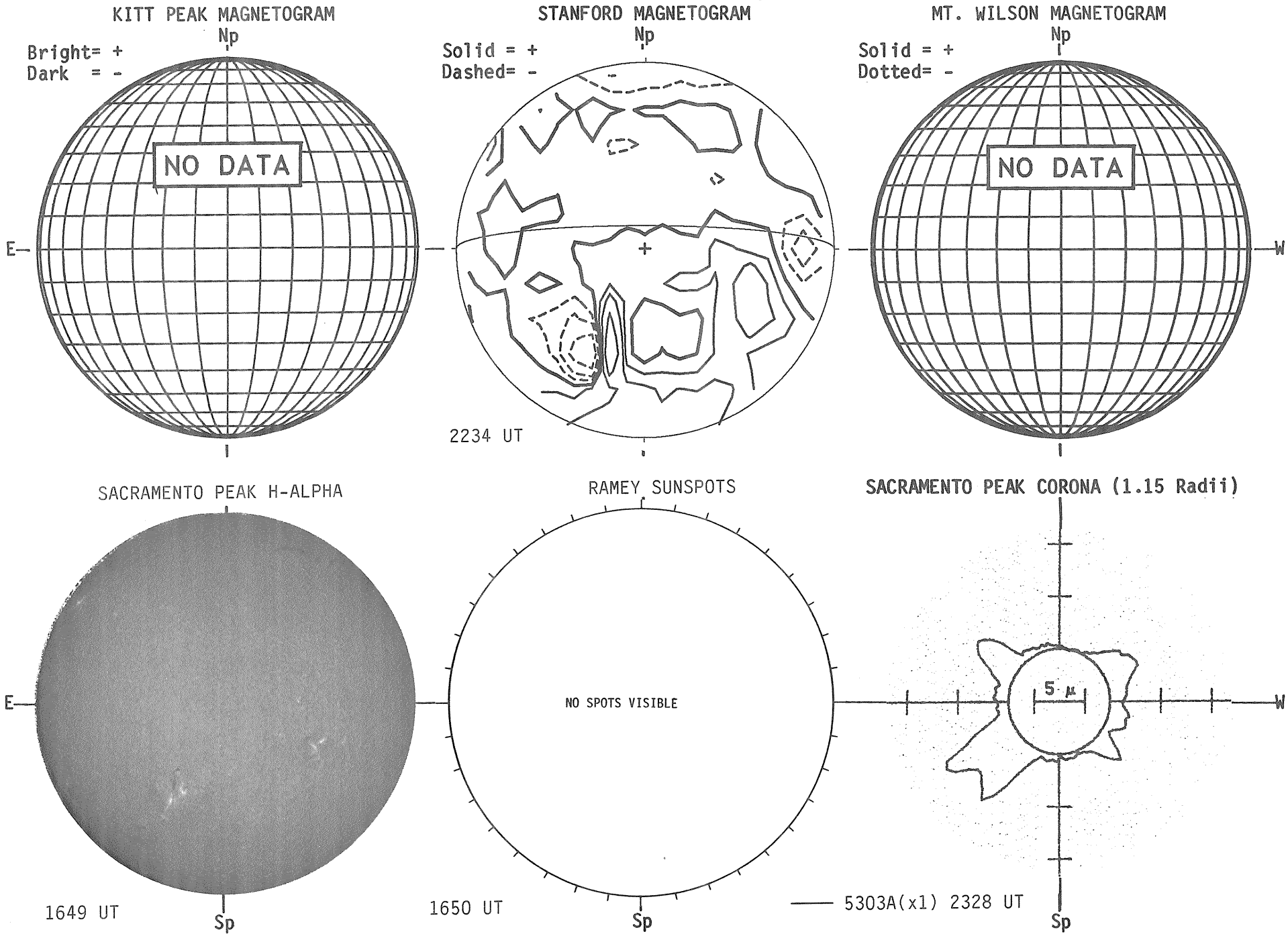


SACRAMENTO PEAK CORONA (1.15 Radii)



—— 5303A(x1) 1609 UT
.... 6374A(x2) 1654 UT
xxxx 5694A(x6) 1638 UT
NO 5694A ACTIVITY TODAY

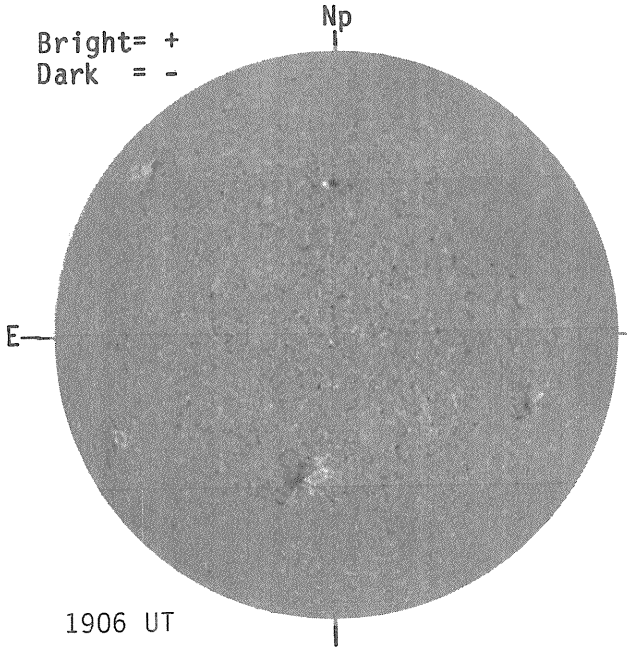
M A R C H 19, 1 9 8 7 (P=-24.91, B_o=-6.99, L_o= 101.92)



M A R C H 20, 1 9 8 7 (P=-25.05, B_0=-6.96, L_0= 88.74)

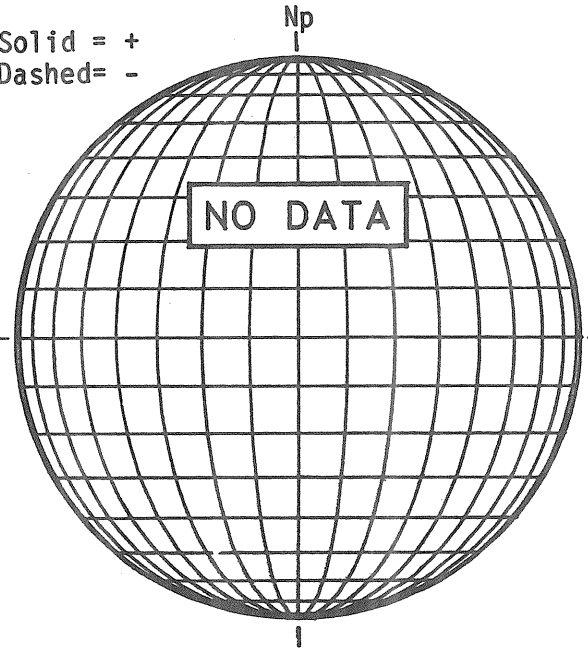
KITT PEAK MAGNETOGRAM

Bright= +
Dark = -



STANFORD MAGNETOGRAM

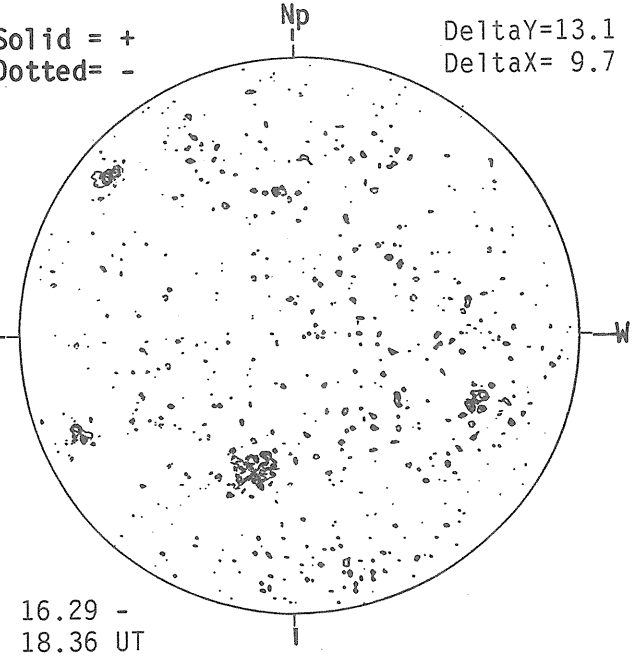
Solid = +
Dashed= -



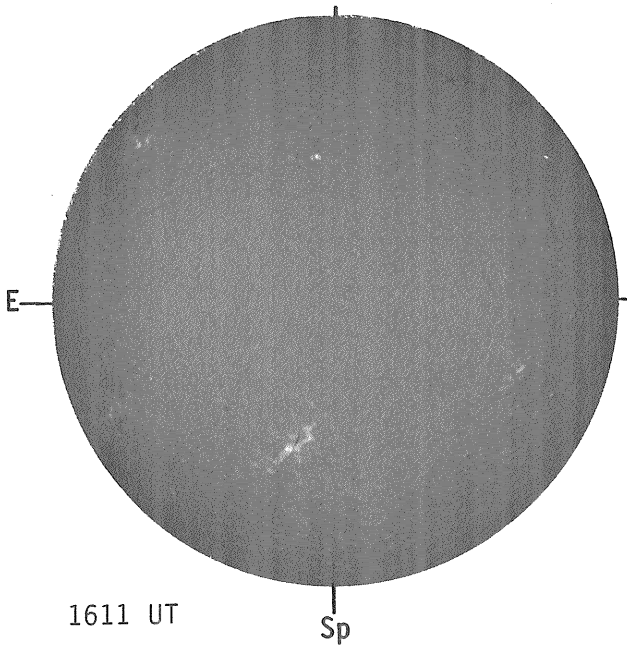
MT. WILSON MAGNETOGRAM

Solid = +
Dotted= -

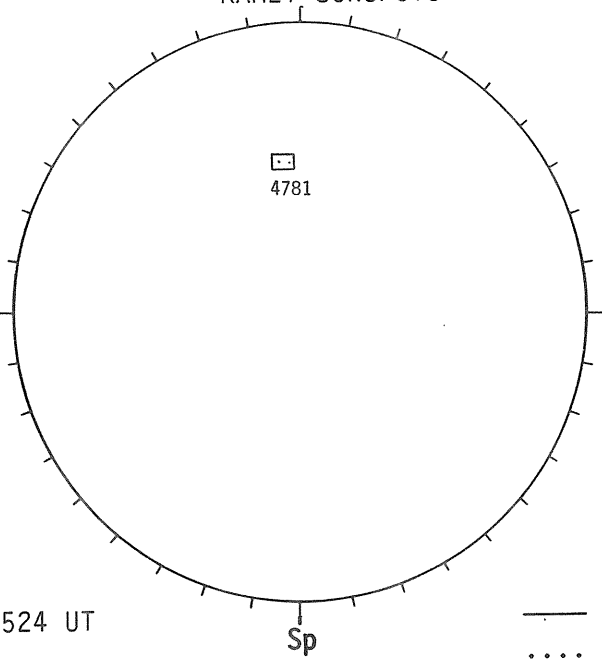
DeltaY=13.1
DeltaX= 9.7



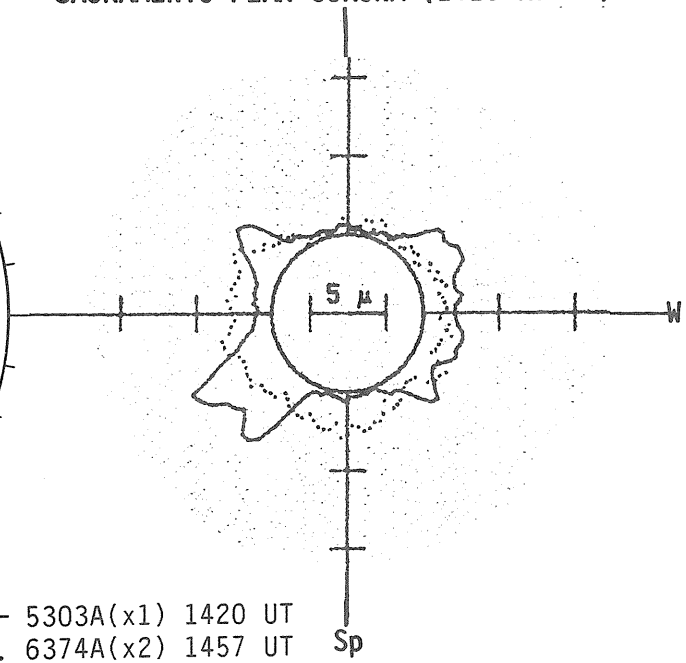
SACRAMENTO PEAK H-ALPHA



RAMEY SUNSPOTS



SACRAMENTO PEAK CORONA (1.15 Radii)

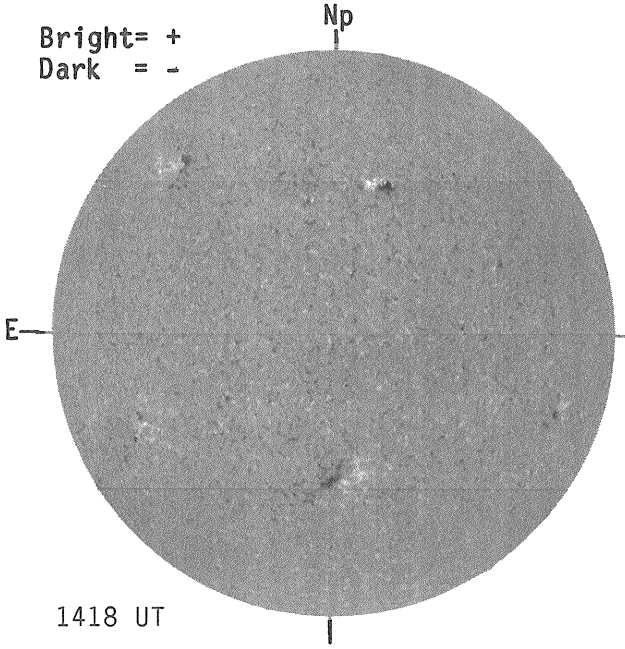


—— 5303A(x1) 1420 UT
.... 6374A(x2) 1457 UT
xxxx 5694A(x6) 1445 UT
NO 5694A ACTIVITY TODAY

M A R C H 21, 1 9 8 7 (P=-25.17, B_0=-6.93, L_0= 75.55)

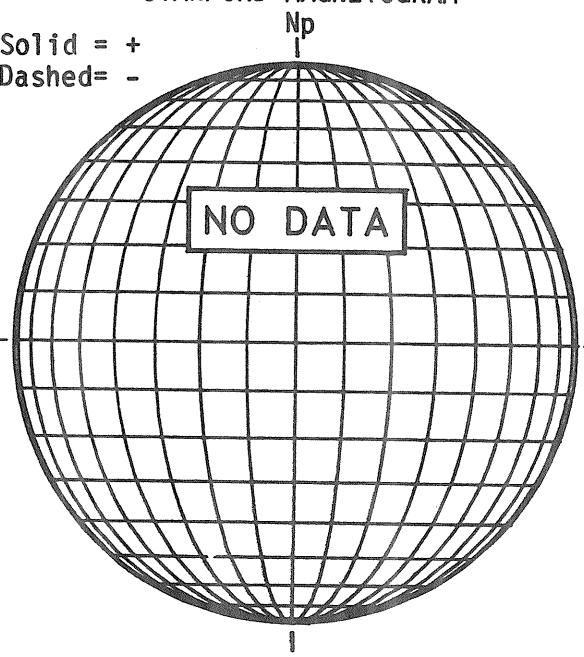
KITT PEAK MAGNETOGRAM

Bright= +
Dark = -



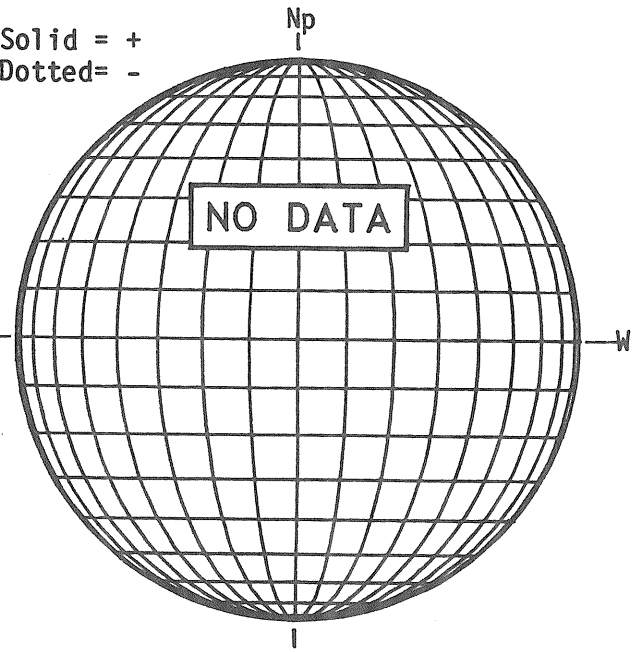
STANFORD MAGNETOGRAM

Solid = +
Dashed= -

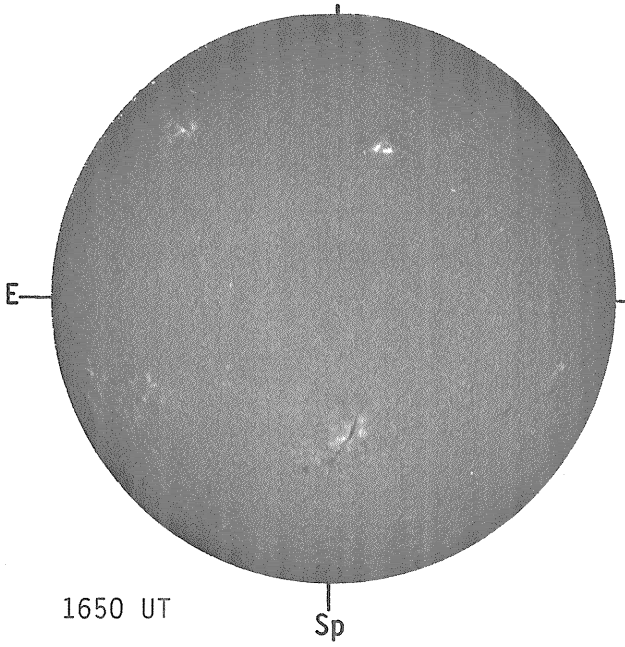


MT. WILSON MAGNETOGRAM

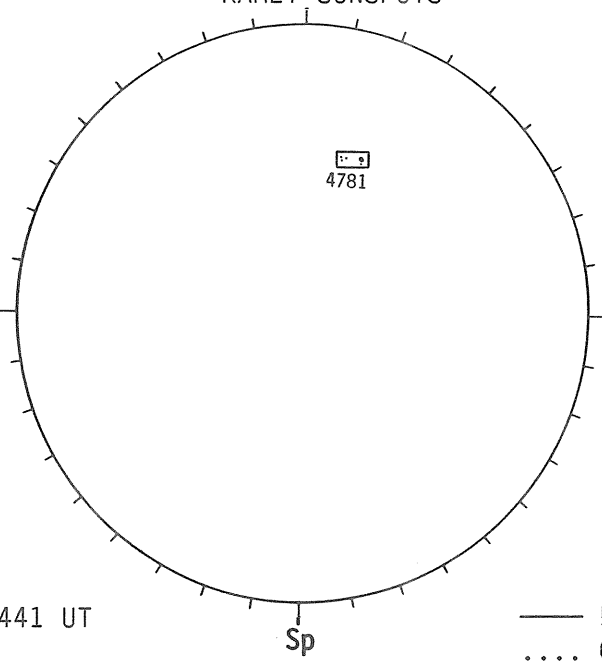
Solid = +
Dotted= -



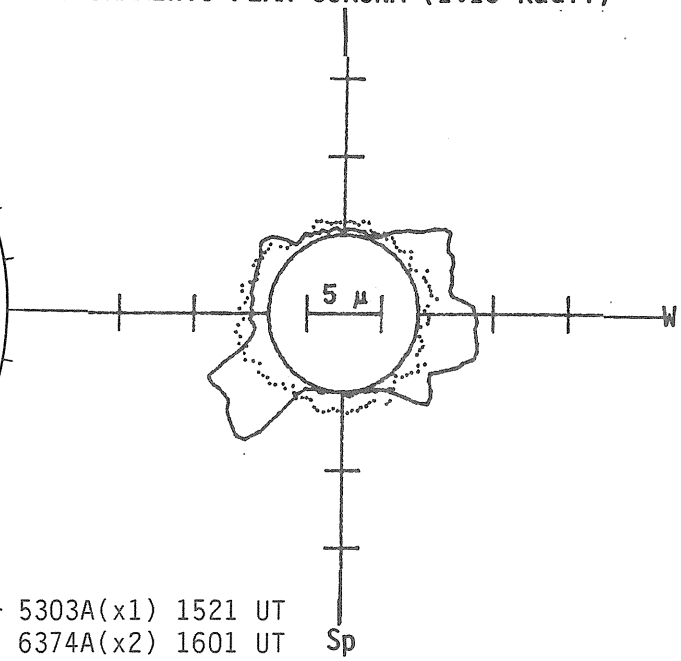
SACRAMENTO PEAK H-ALPHA



RAMEY SUNSPOTS



SACRAMENTO PEAK CORONA (1.15 Radii)

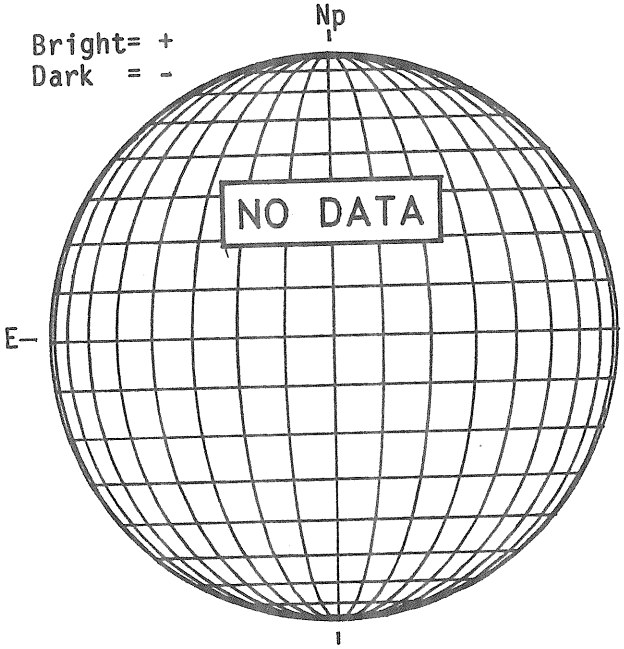


—— 5303A(x1) 1521 UT
.... 6374A(x2) 1601 UT
xxxx 5694A(x6) 1548 UT
NO 5694A ACTIVITY TODAY

M A R C H 22, 1 9 8 7 (P=-25.29, B_0=-6.90, L_0= 62.37)

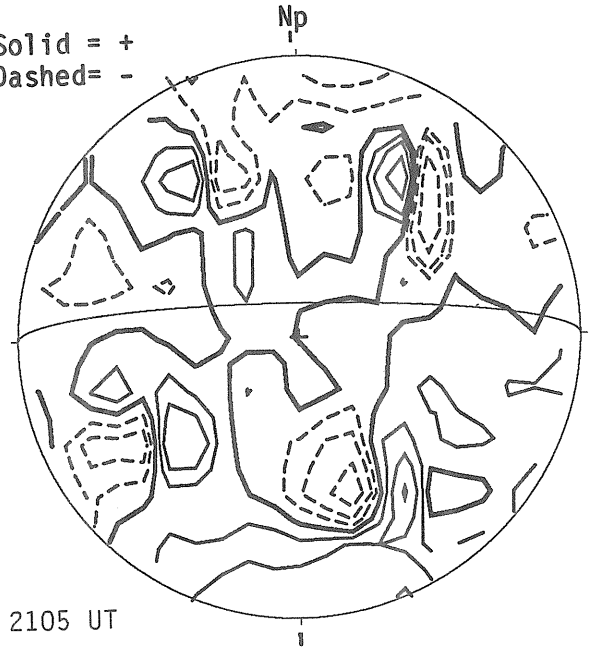
KITT PEAK MAGNETOGRAM

Bright= +
Dark = -



STANFORD MAGNETOGRAM

Solid = +
Dashed= -

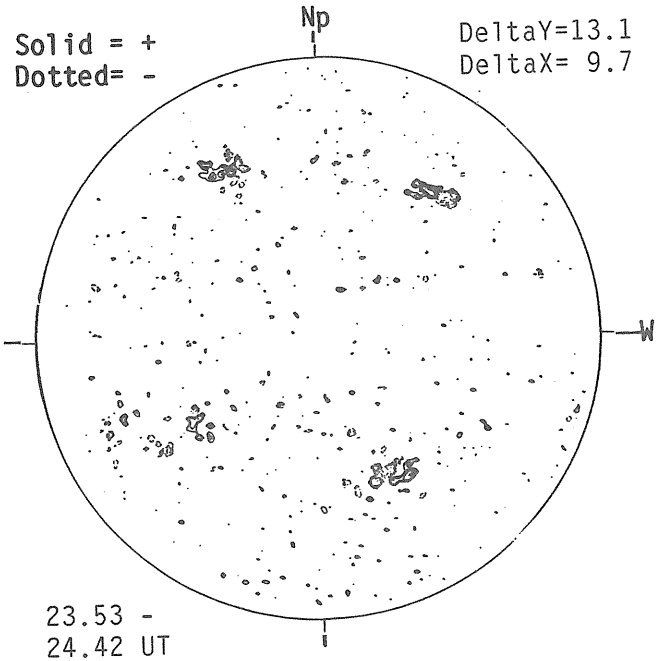


2105 UT

MT. WILSON MAGNETOGRAM

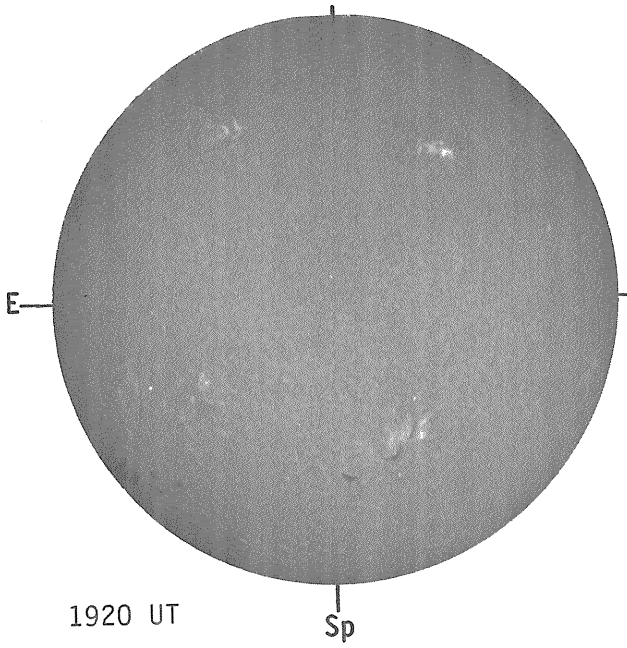
Solid = +
Dotted= -

DeltaY=13.1
DeltaX= 9.7



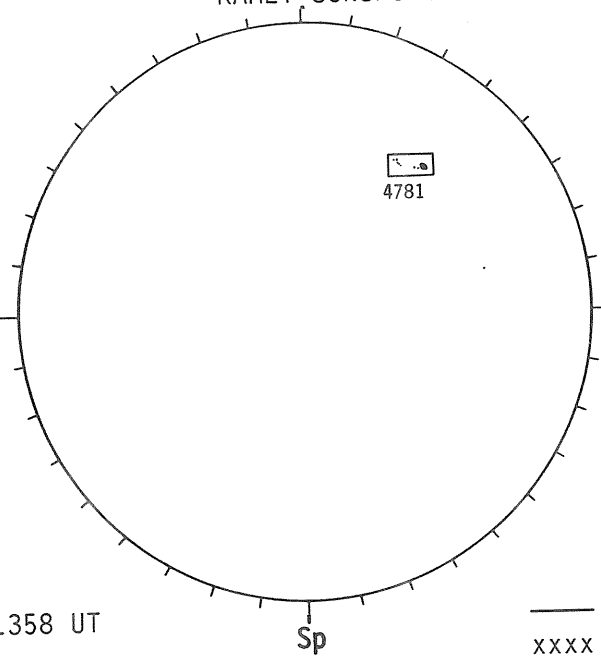
23.53 -
24.42 UT

SACRAMENTO PEAK H-ALPHA



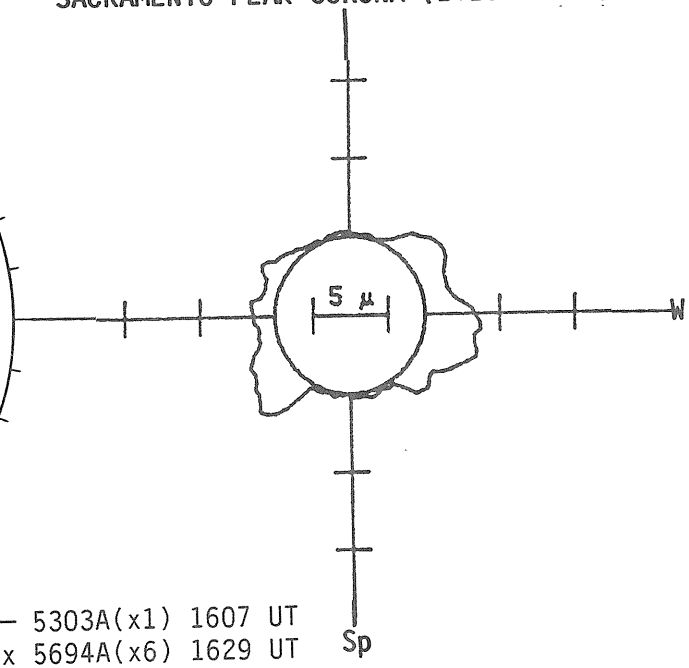
1920 UT

RAMEY SUNSPOTS



1358 UT

SACRAMENTO PEAK CORONA (1.15 Radii)

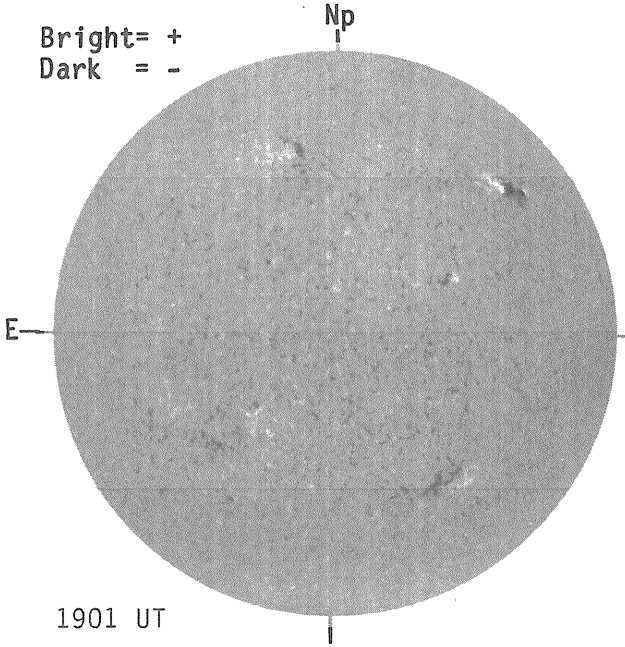


—— 5303A(x1) 1607 UT
xxxx 5694A(x6) 1629 UT
NO 5694A ACTIVITY TODAY

M A R C H 23, 1 9 8 7 (P=-25.40, B_0=-6.87, L_0= 49.18)

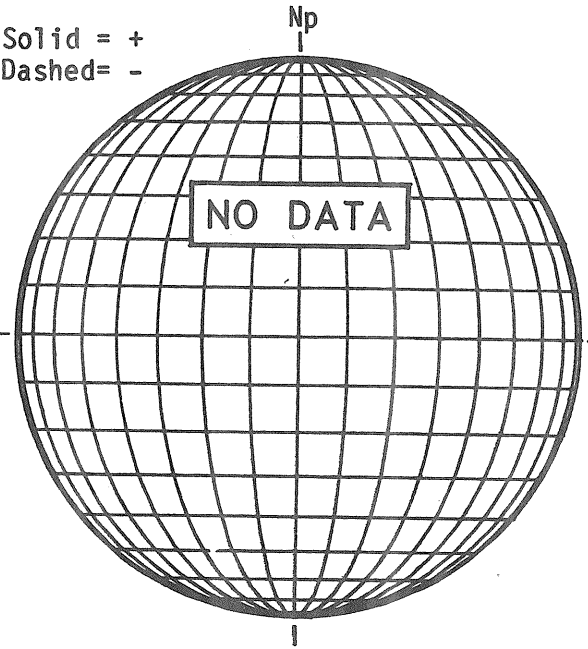
KITT PEAK MAGNETOGRAM

Bright= +
Dark = -



STANFORD MAGNETOGRAM

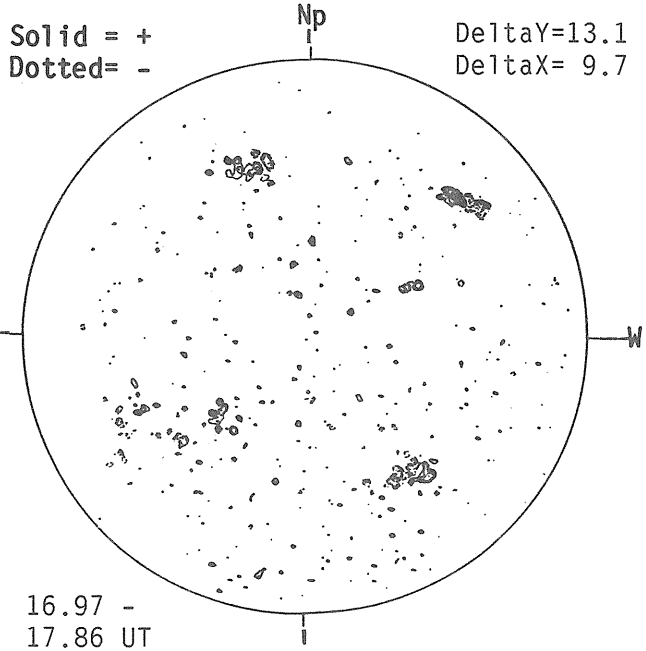
Solid = +
Dashed= -



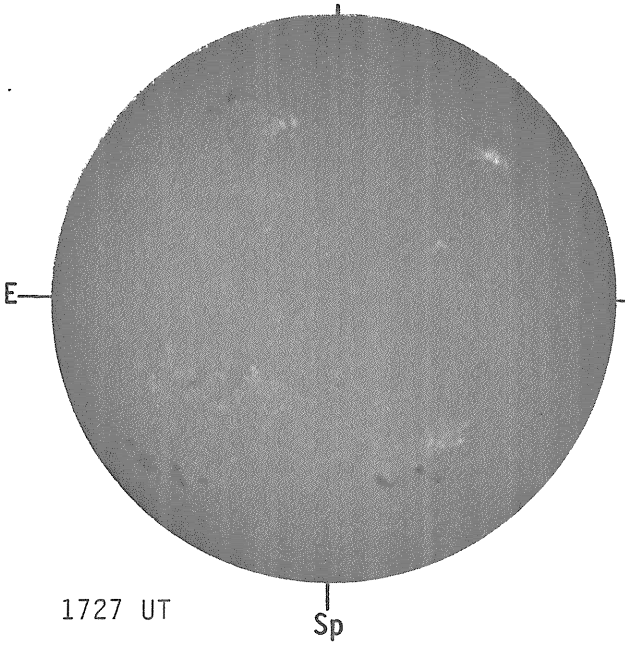
MT. WILSON MAGNETOGRAM

Solid = +
Dotted= -

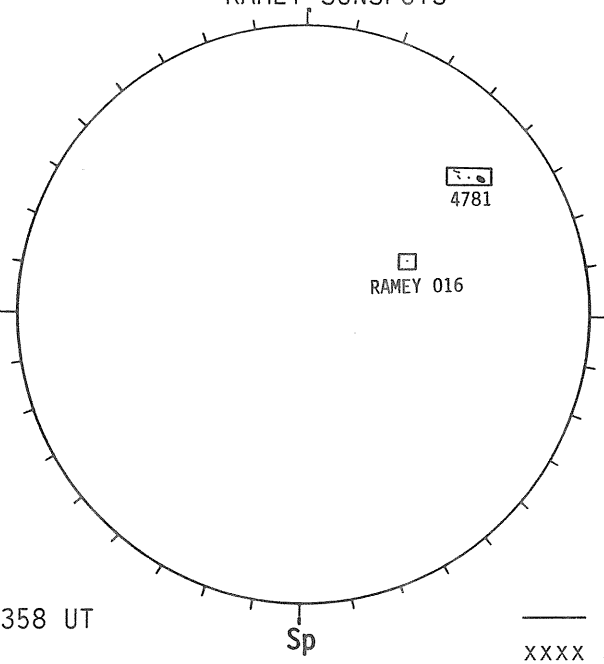
DeltaY=13.1
DeltaX= 9.7



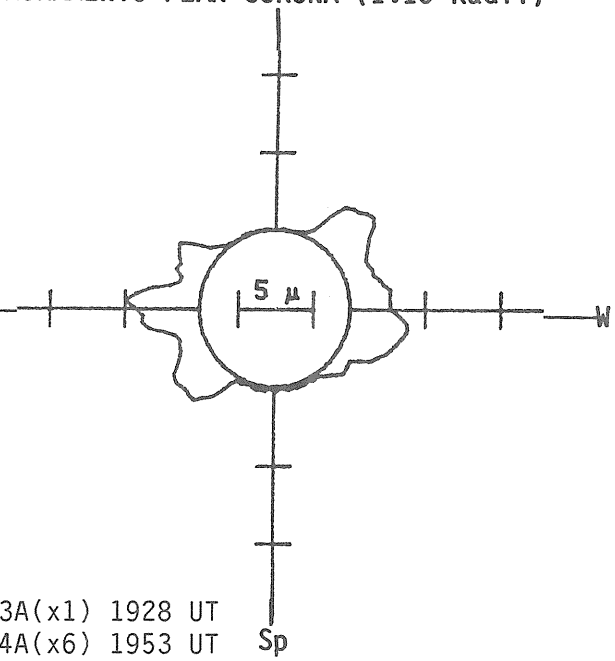
SACRAMENTO PEAK H-ALPHA



RAMEY SUNSPOTS



SACRAMENTO PEAK CORONA (1.15 Radii)

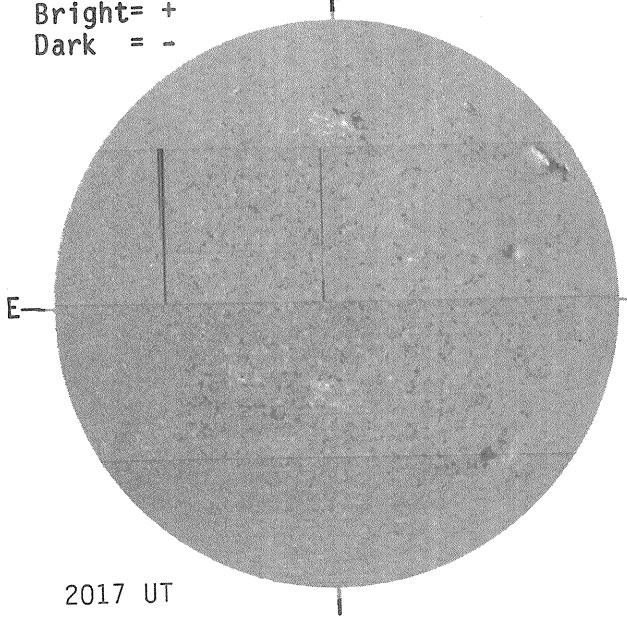


—— 5303A(x1) 1928 UT
xxxx 5694A(x6) 1953 UT
NO 5694A ACTIVITY TODAY

M A R C H 24, 1 9 8 7 (P=-25.51, B_0=-6.84, L_0= 36.00)

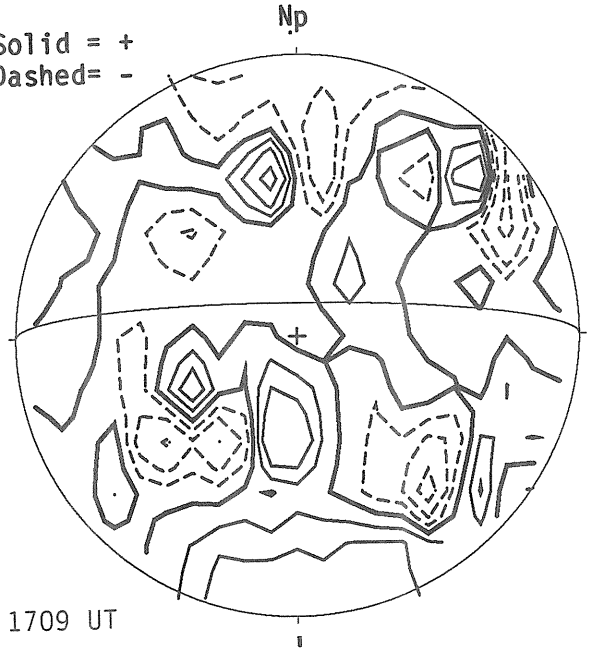
KITT PEAK MAGNETOGRAM

Bright= +
Dark = -



STANFORD MAGNETOGRAM

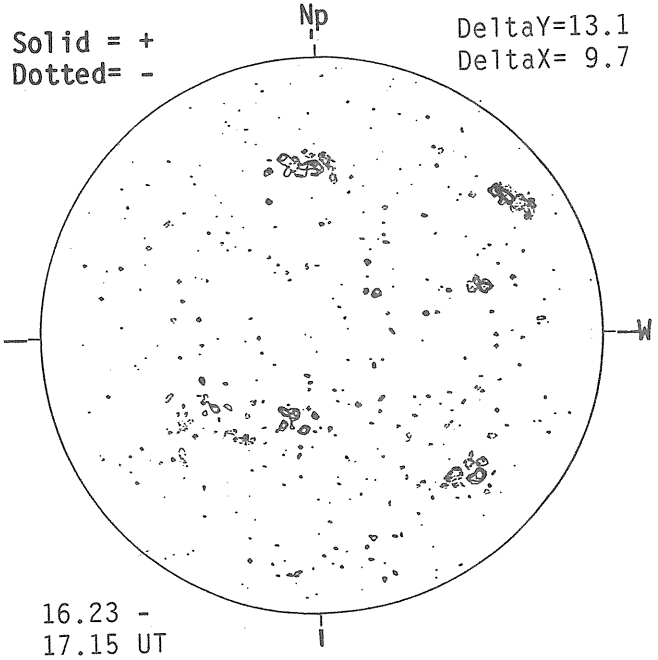
Solid = +
Dashed= -



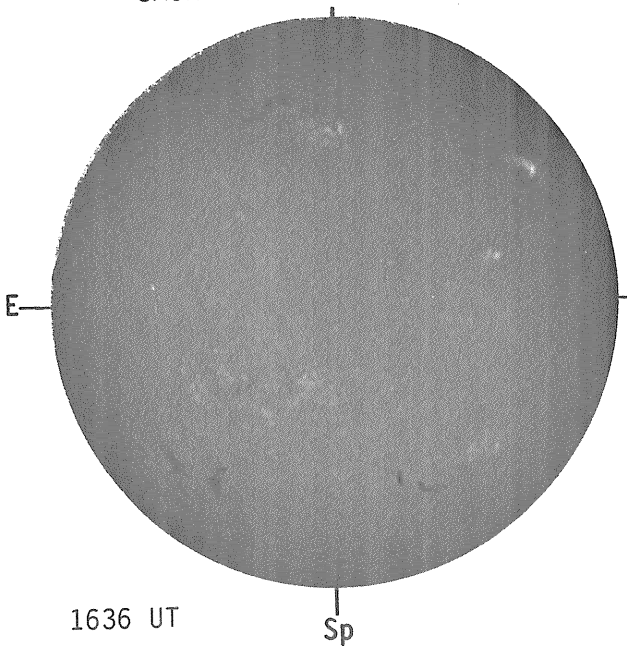
MT. WILSON MAGNETOGRAM

Solid = +
Dotted= -

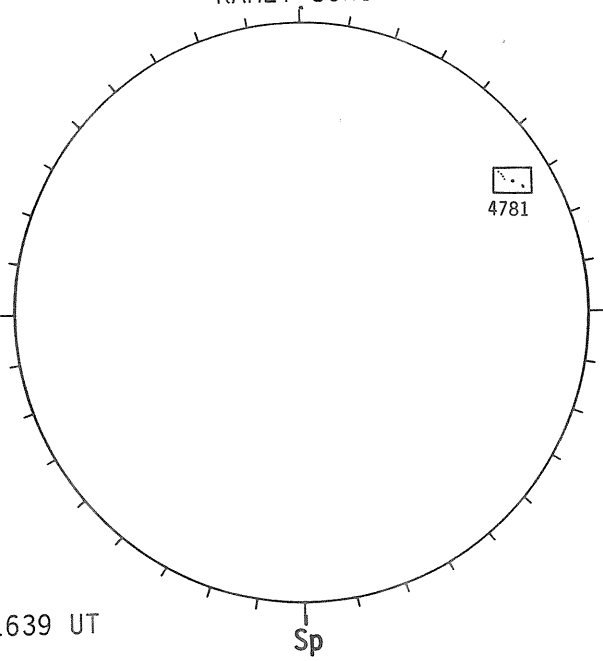
DeltaY=13.1
DeltaX= 9.7



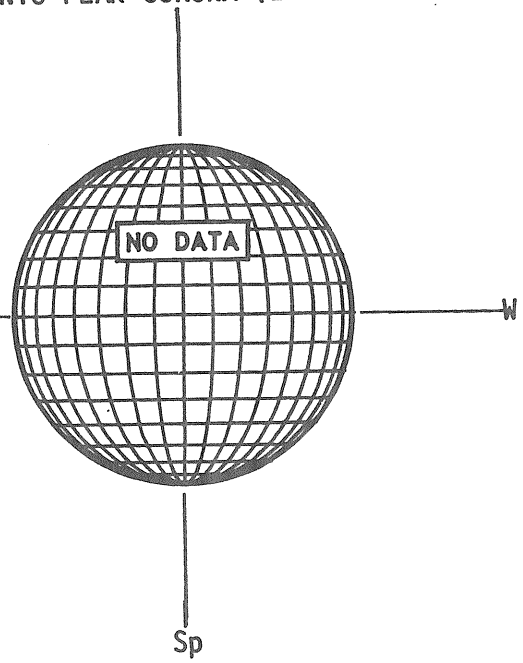
SACRAMENTO PEAK H-ALPHA



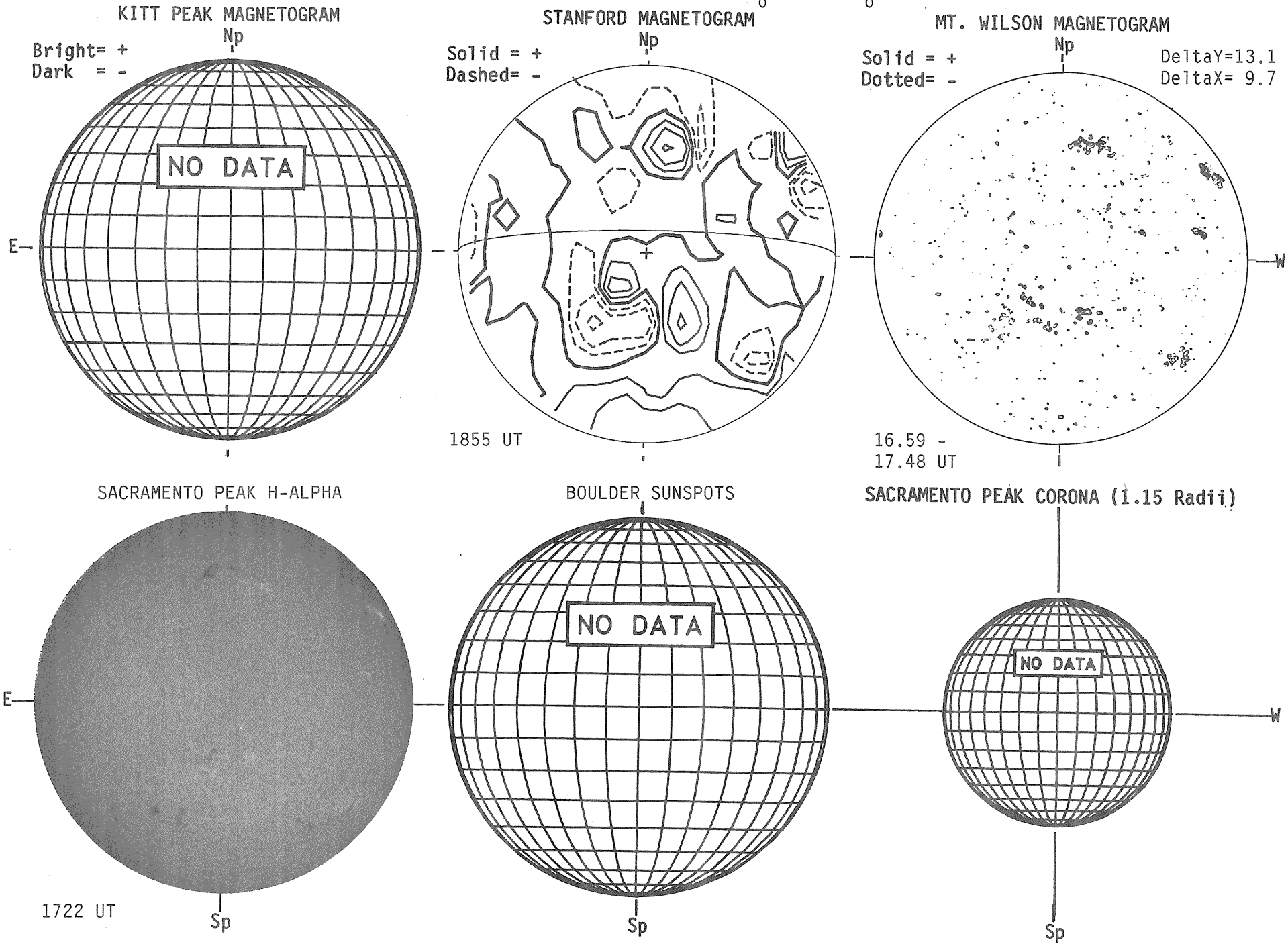
RAMEY SUNSPOTS



SACRAMENTO PEAK CORONA (1.15 Radii)

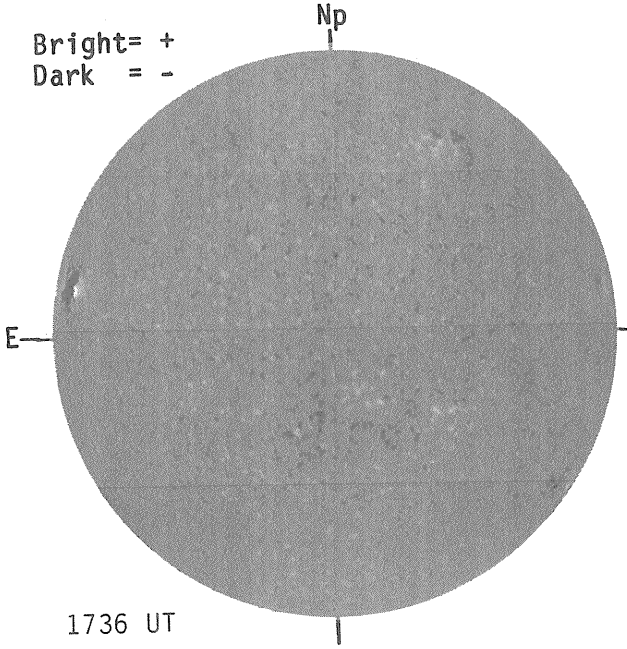


M A R C H 25, 1 9 8 7 (P=-25.60, B_0=-6.80, L_0= 22.81)

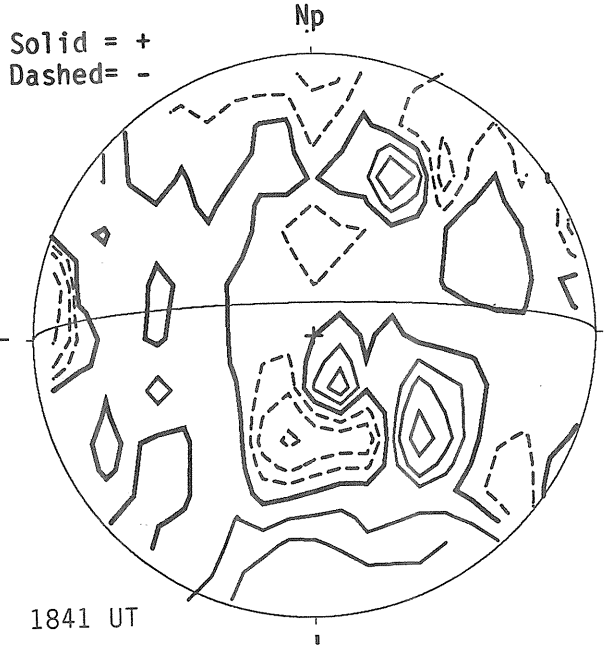


M A R C H 26, 1 9 8 7 (P=-25.69, B_0=-6.76, L_0= 9.62)

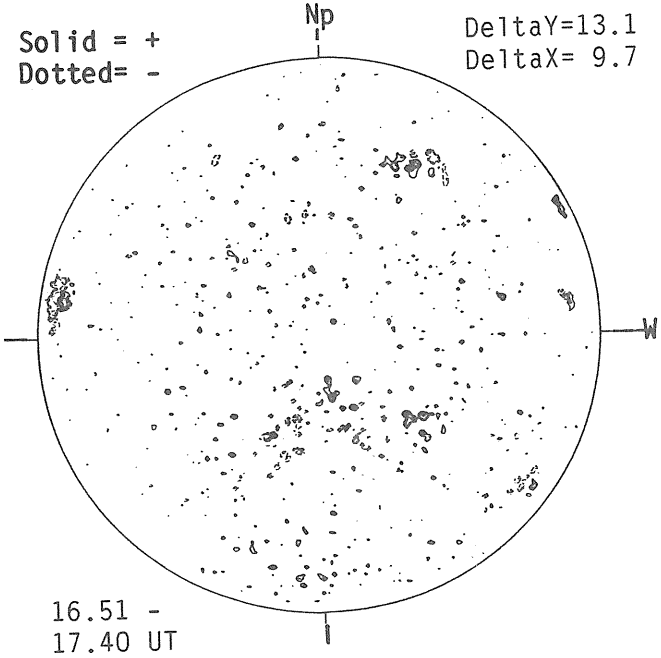
KITT PEAK MAGNETOGRAM



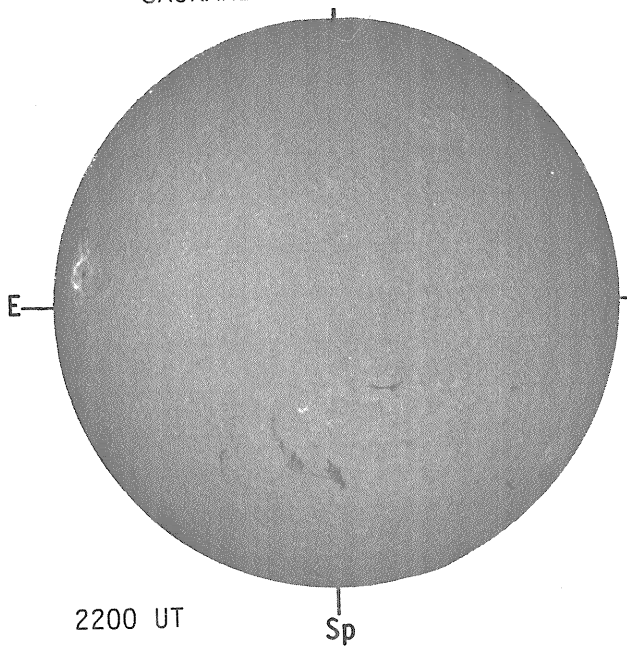
STANFORD MAGNETOGRAM



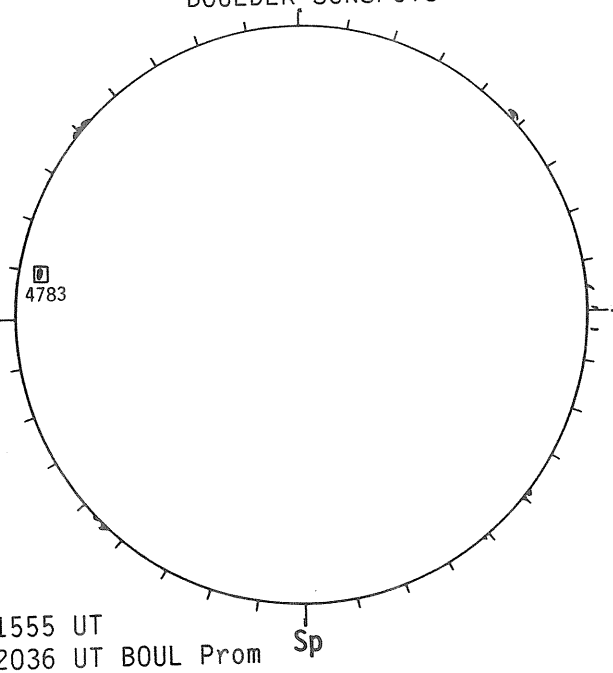
MT. WILSON MAGNETOGRAM



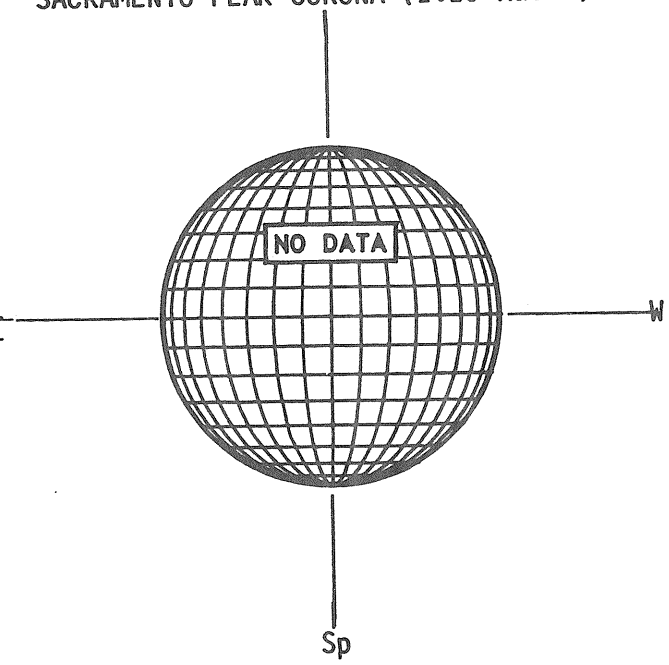
SACRAMENTO PEAK H-ALPHA



BOULDER SUNSPOTS



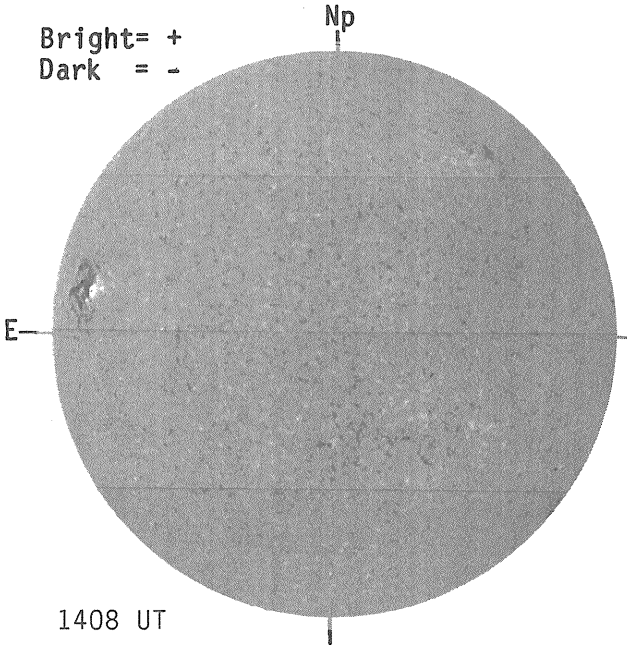
SACRAMENTO PEAK CORONA (1.15 Radii)



M A R C H 27, 1 9 8 7 (P=-25.78, B_0=-6.72, L_0= 356.44)

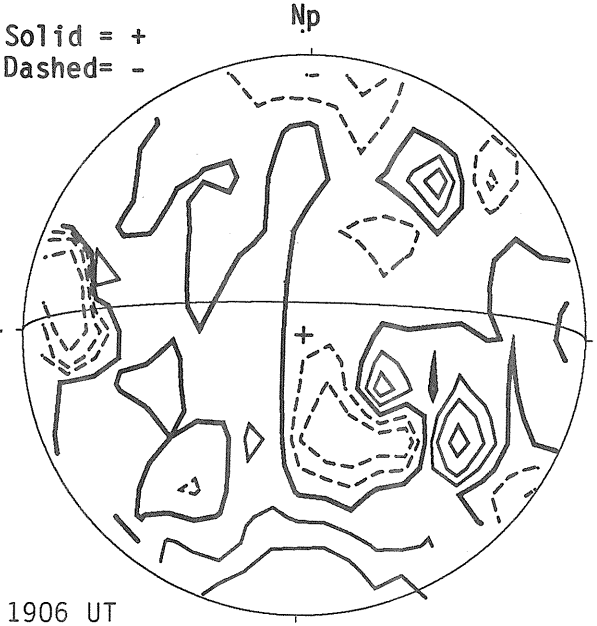
KITT PEAK MAGNETOGRAM

Bright= +
Dark = -



STANFORD MAGNETOGRAM

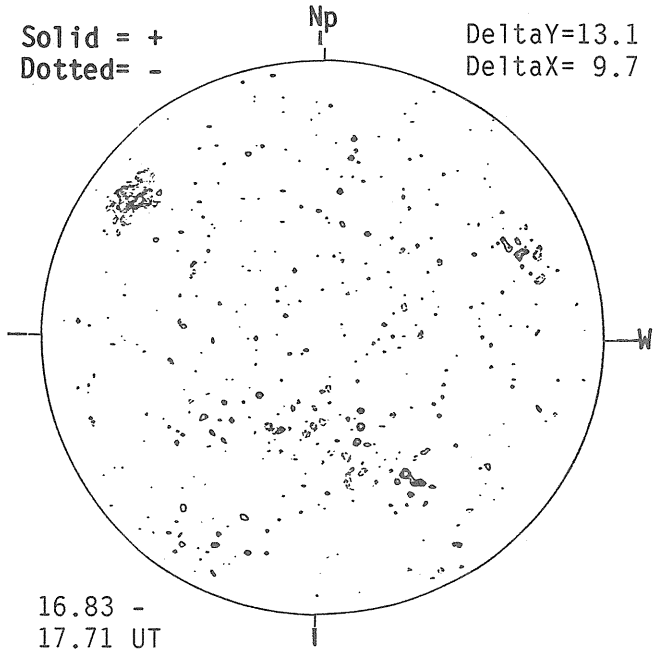
Solid = +
Dashed= -



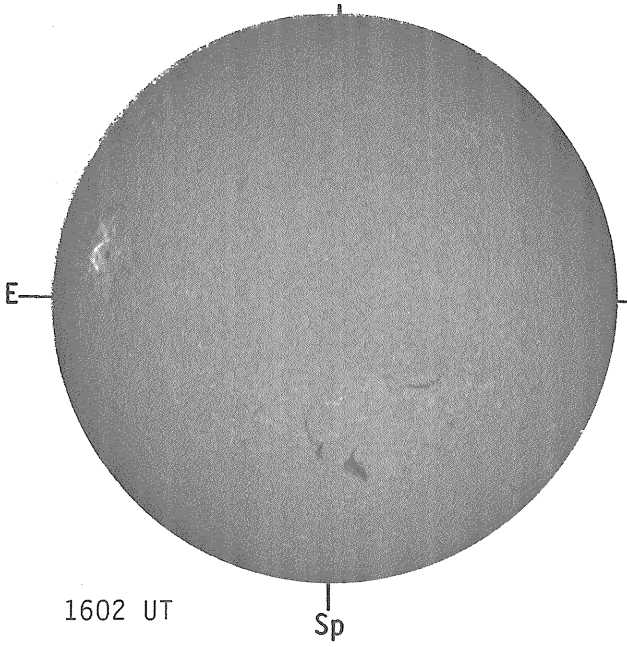
MT. WILSON MAGNETOGRAM

Solid = +
Dotted= -

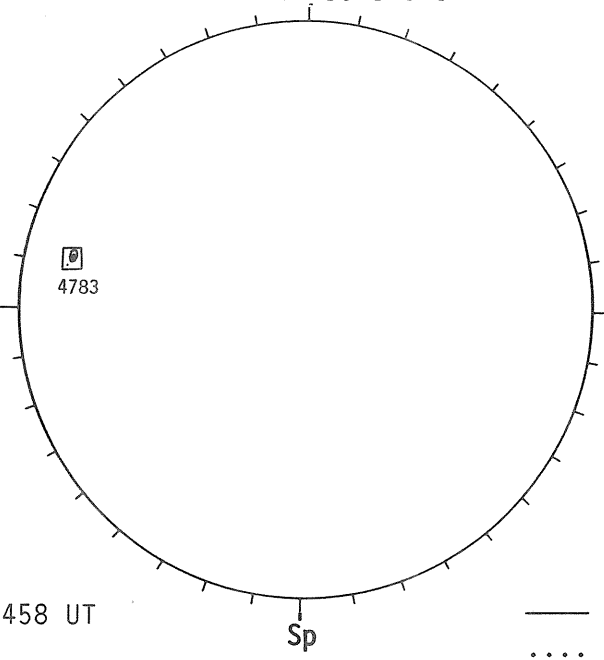
DeltaY=13.1
DeltaX= 9.7



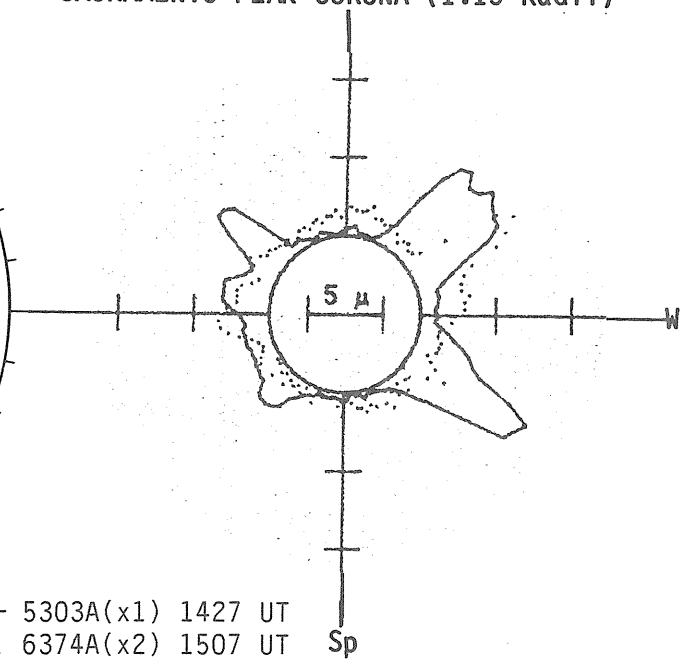
SACRAMENTO PEAK H-ALPHA



RAMEY SUNSPOTS



SACRAMENTO PEAK CORONA (1.15 Radii)



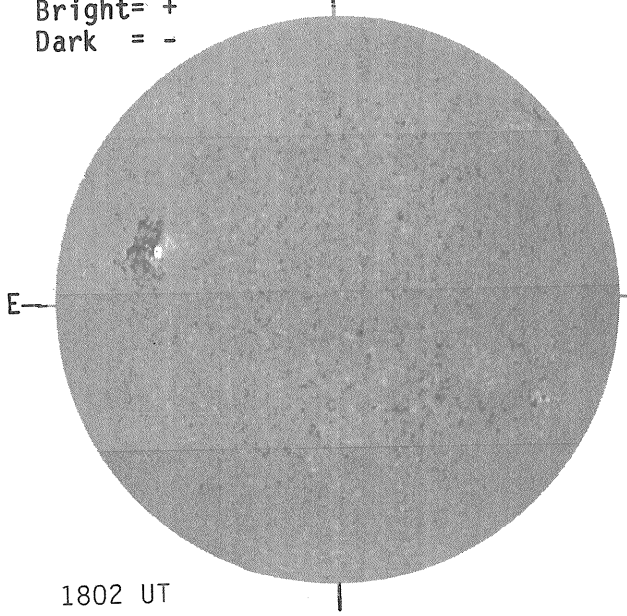
—— 5303A(x1) 1427 UT
.... 6374A(x2) 1507 UT
xxxx 5694A(x6) 1447 UT
NO 5694A ACTIVITY TODAY

63
Mar 87

M A R C H 28, 1 9 8 7 (P=-25.85, B_0=-6.68, L_0= 343.25)

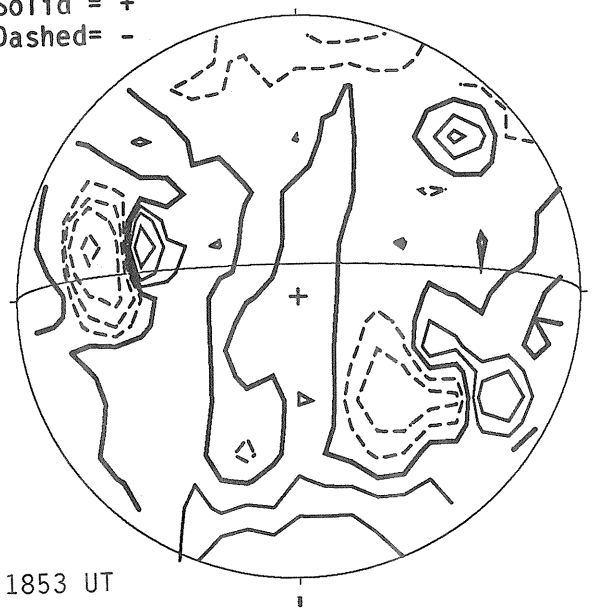
KITT PEAK MAGNETOGRAM

Bright= +
Dark = -



STANFORD MAGNETOGRAM

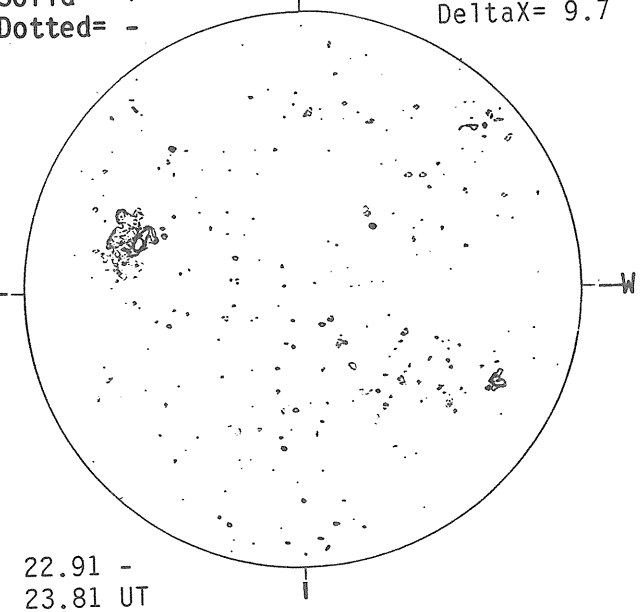
Solid = +
Dashed= -



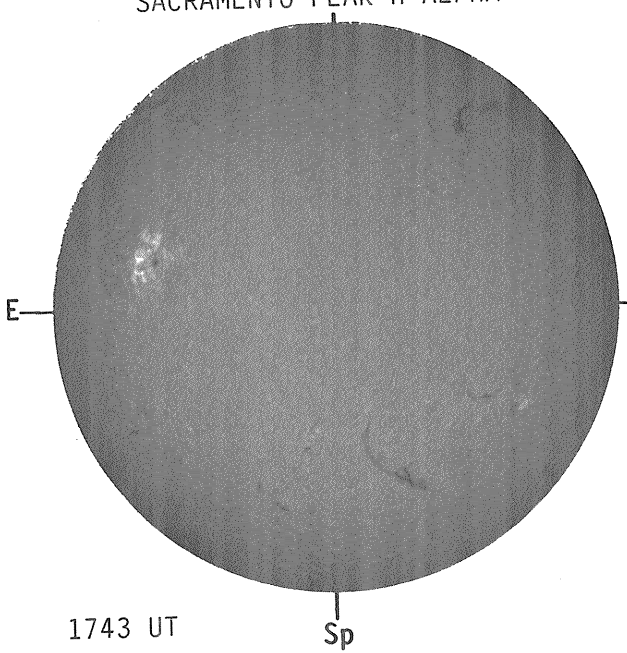
MT. WILSON MAGNETOGRAM

Solid = +
Dotted= -

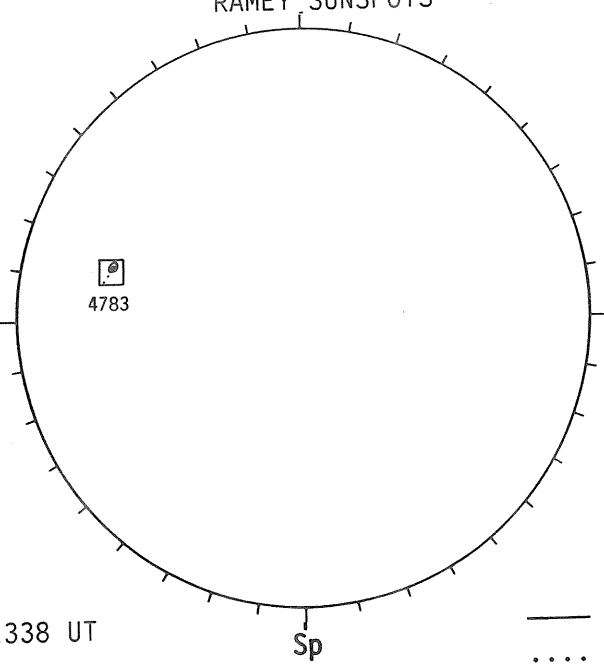
DeltaY=13.0
DeltaX= 9.7



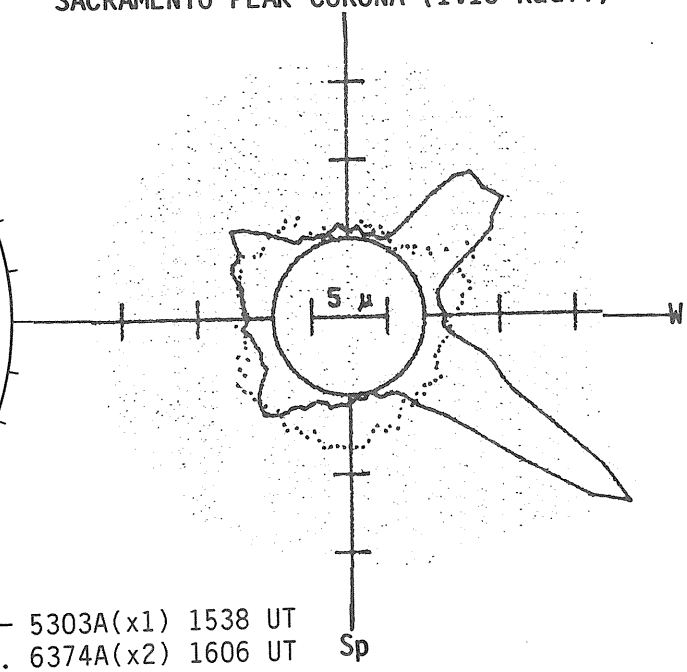
SACRAMENTO PEAK H-ALPHA



RAMEY SUNSPOTS

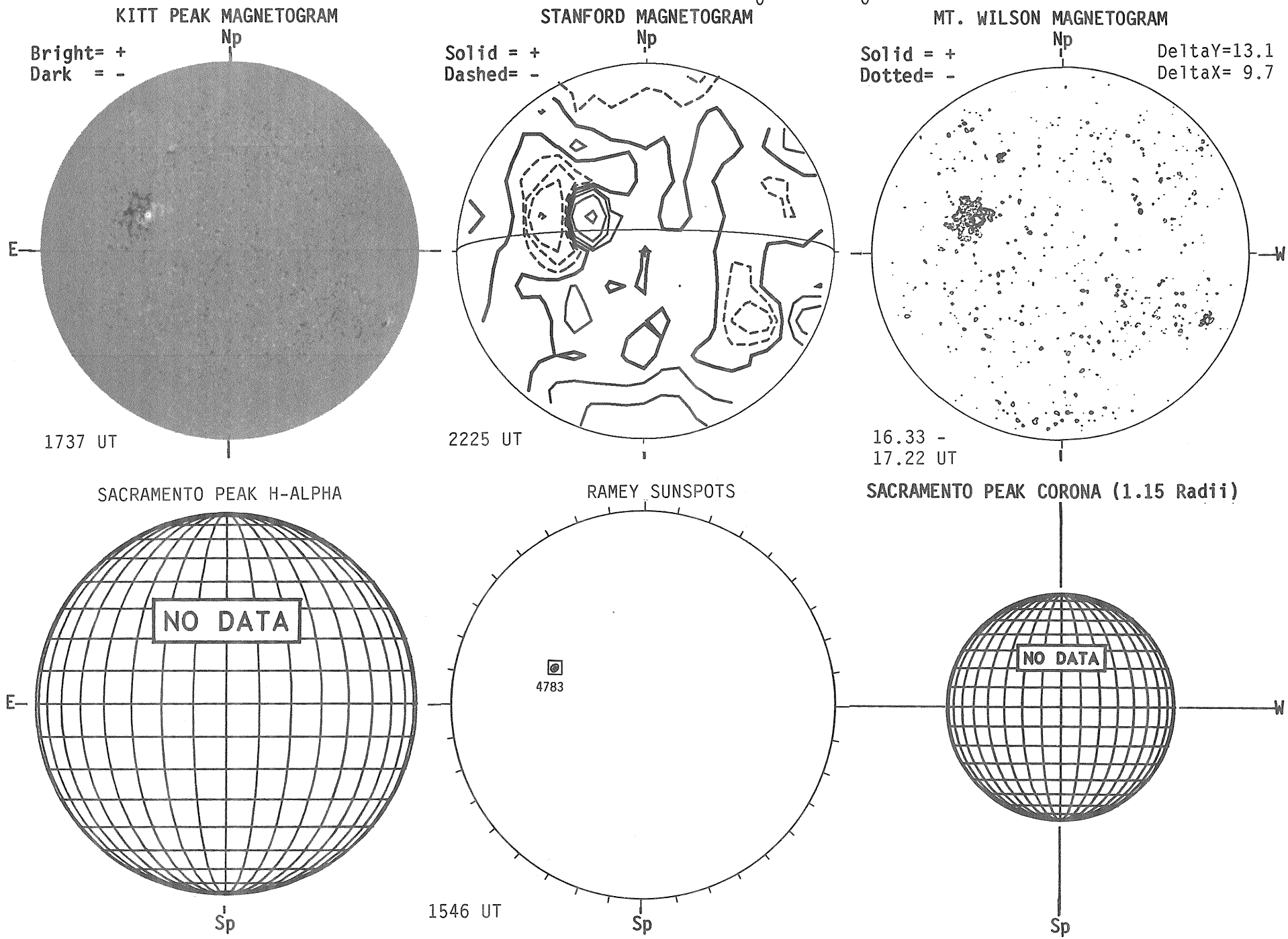


SACRAMENTO PEAK CORONA (1.15 Radii)



—— 5303A(x1) 1538 UT
.... 6374A(x2) 1606 UT
xxxx 5694A(x6) 1553 UT
NO 5694A ACTIVITY TODAY

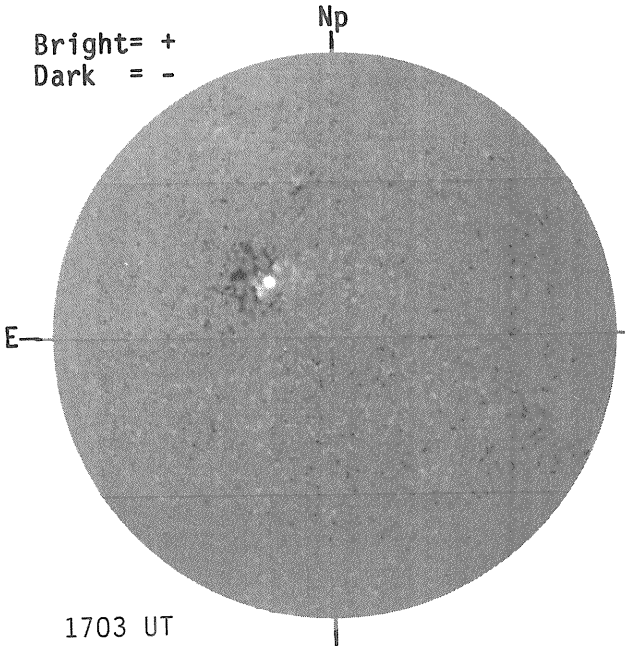
M A R C H 29, 1 9 8 7 (P=-25.92, B_0=-6.63, L_0= 330.06)



M A R C H 30, 1 9 8 7 (P=-25.99, B_0=-6.58, L_0= 316.87)

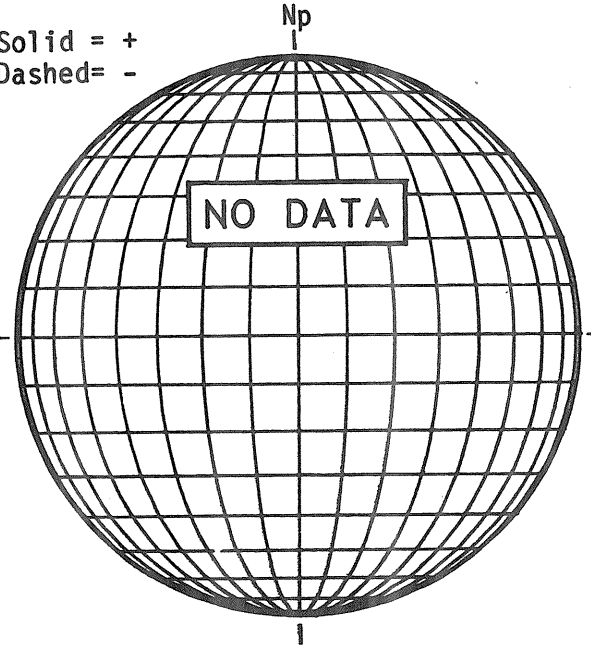
KITT PEAK MAGNETOGRAM

Bright= +
Dark = -



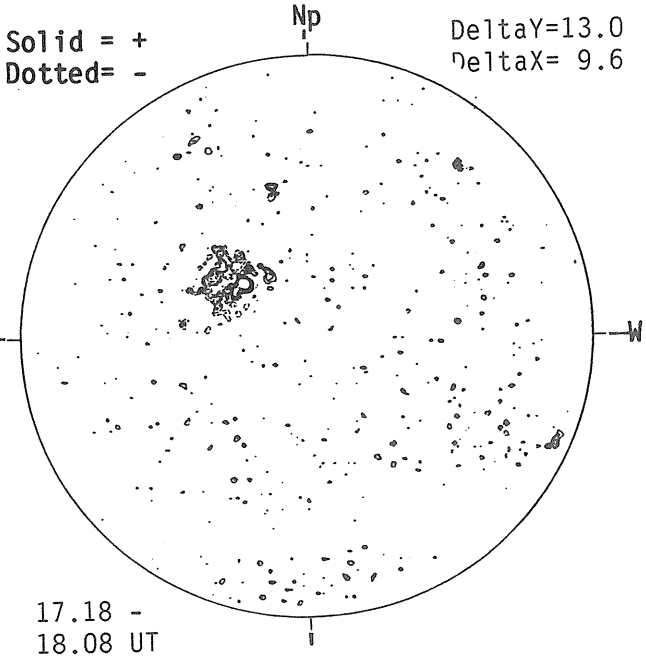
STANFORD MAGNETOGRAM

Solid = +
Dashed= -

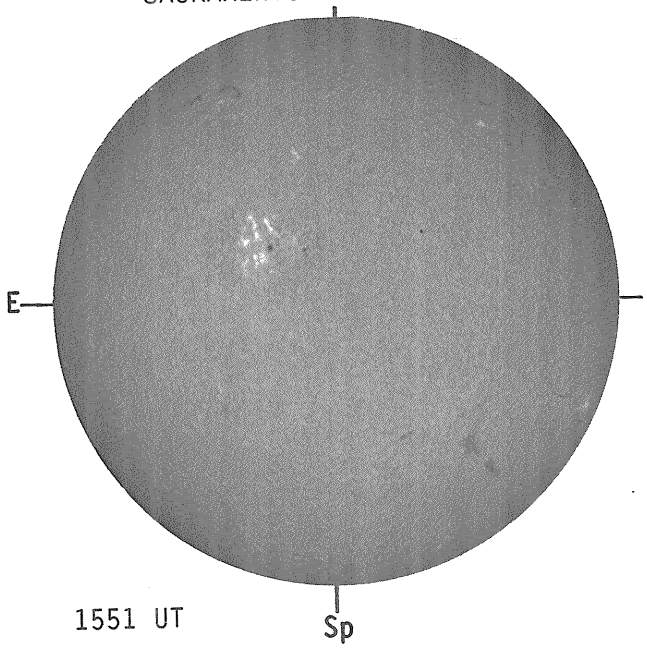


MT. WILSON MAGNETOGRAM

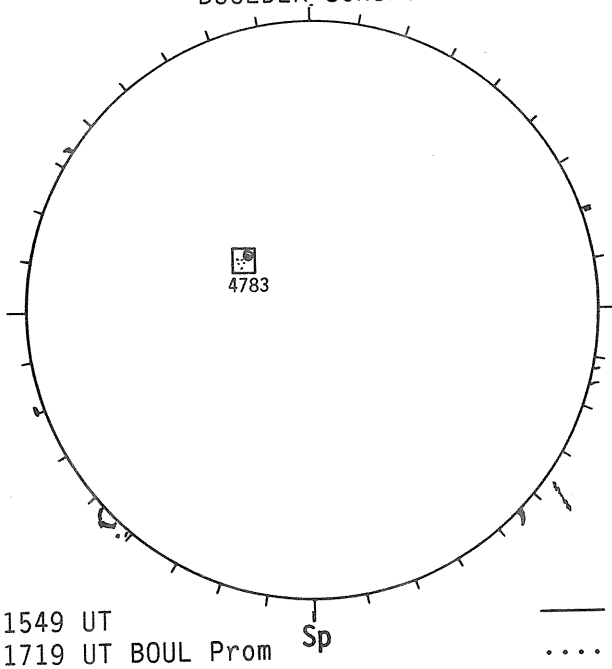
Solid = +
Dotted= -



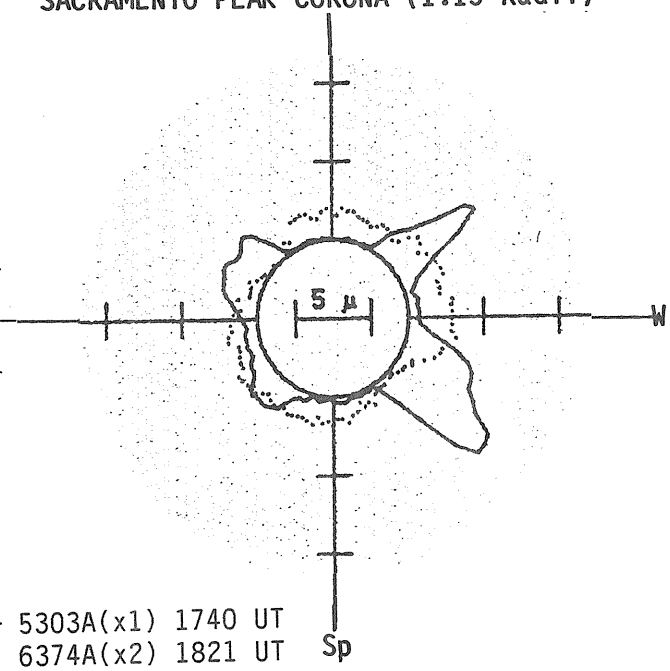
SACRAMENTO PEAK H-ALPHA



BOULDER SUNSPOTS



SACRAMENTO PEAK CORONA (1.15 Radii)

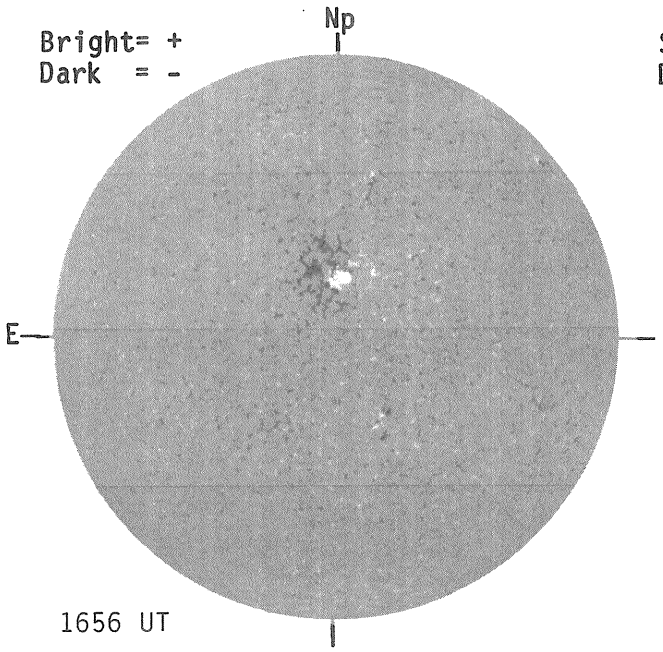


—— 5303A(x1) 1740 UT
.... 6374A(x2) 1821 UT
xxxx 5694A(x6) 1806 UT
NO 5694A ACTIVITY TODAY

M A R C H 31, 1 9 8 7 (P=-26.04, B_0=-6.53, L_0= 303.68)

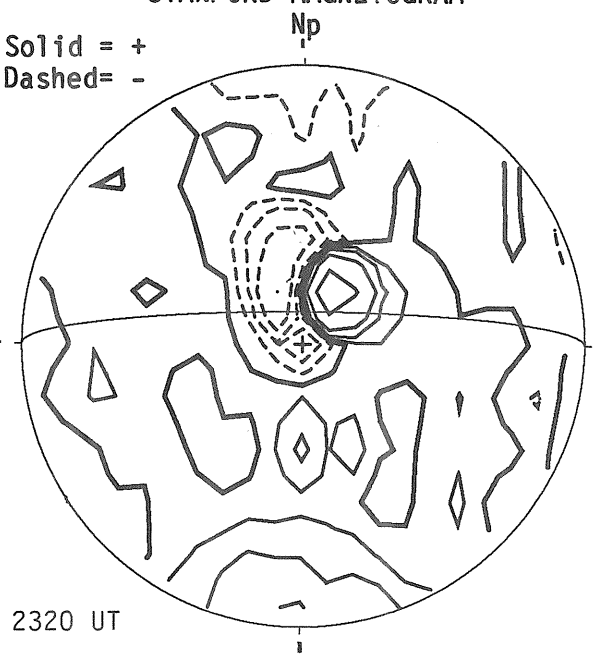
KITT PEAK MAGNETOGRAM

Bright= +
Dark = -



STANFORD MAGNETOGRAM

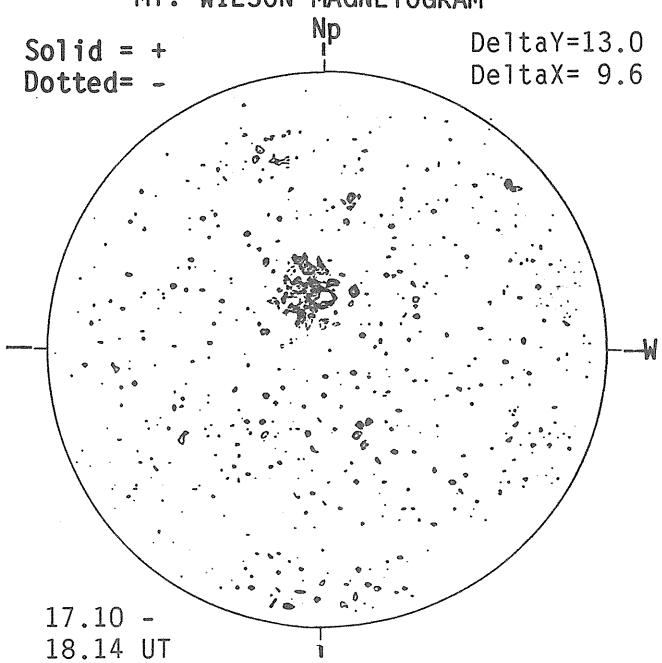
Solid = +
Dashed= -



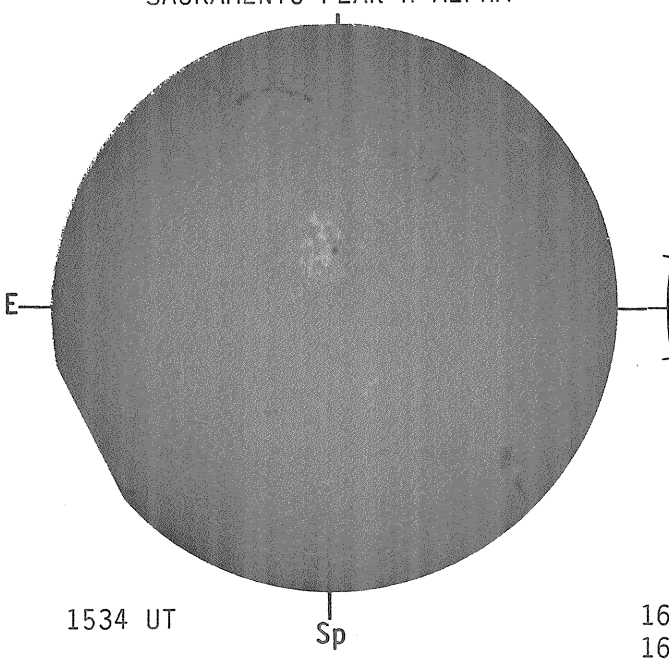
MT. WILSON MAGNETOGRAM

Solid = +
Dotted= -

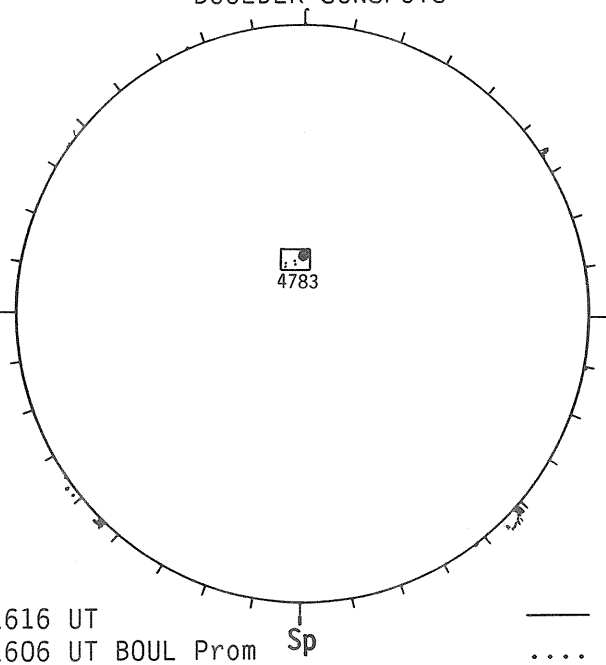
DeltaY=13.0
DeltaX= 9.6



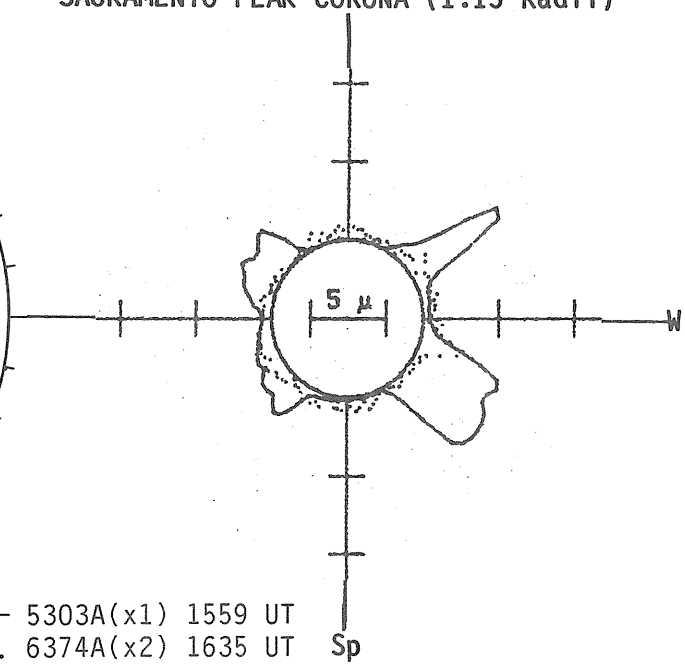
SACRAMENTO PEAK H-ALPHA



BOULDER SUNSPOTS



SACRAMENTO PEAK CORONA (1.15 Radii)



—— 5303A(x1) 1559 UT
.... 6374A(x2) 1635 UT
xxxx 5694A(x6) 1622 UT
NO 5694A ACTIVITY TODAY

S U N S P O T G R O U P S
(ORDERED BY CENTRAL MERIDIAN PASSAGE DATE)

MARCH 1987

NOAA/ USAF Group	Mt Wilson Group	Sta	Observation Mo	Day	Time (UT)	Lat	CMD	CMP Mo	Day	Max H	Mag Class	Spot Class	Corrected Area (10-6 Hemi)	Spot Count	Long. Extent (Deg)	Qual
4773		HOLL	02	24	2016	N37	E77	03	3.0		A	HS	40	2	2	2
4773		LEAR	02	25	0044	N38	E80	03	3.5		A	HS	10	1	1	2
4773		HOLL	02	25	1921	N38	E67	03	3.2		A	HS	60	1	2	2
4773		PALE	02	25	2035	N38	E66	03	3.2		A	HS	50	1	2	3
4773		LEAR	02	26	0035	N38	E67	03	3.4		A	HS	20	1	1	3
4773		HOLL	02	26	1710	N40	E56	03	3.3		A	HS	50	1	2	3
4773		PALE	02	26	1800	N38	E55	03	3.2		A	HS	50	1	2	3
4773		CULG	02	27	0500	N39	E50	03	3.3		A	HS	50	1	2	2
4773		LEAR	02	27	0912	N39	E46	03	3.1		A	HS	40	1	1	4
4773	24361	MWIL	02	27	1530	N38	E43	03	3.1	5	(AP)					
4773		BOUL	02	27	1540	N37	E42	03	3.0		A	HS	20	1	2	3
4773		HOLL	02	27	1555	N39	E44	03	3.2		A	HS	40	1	2	2
4773		PALE	02	27	1932	N38	E42	03	3.2		A	HS	30	1	3	2
4773		LEAR	02	28	0024	N38	E38	03	3.1		A	HS	40	1	2	4
4773		CULG	02	28	0430	N39	E37	03	3.2		A	HS	40	1	2	3
4773		HOLL	02	28	1455	N38	E32	03	3.2		A	HS	30	1	2	3
4773		BOUL	02	28	1510	N36	E31	03	3.1		A	HS	20	1	2	2
4773	24361	MWIL	02	28	1530	N38	E31	03	3.2	5	(AP)					
4773		PALE	02	28	1819	N38	E30	03	3.2		A	HS	30	1	2	3
4773		LEAR	03	01	0022	N39	E25	03	3.0		A	HS	40	1	2	3
4773		CULG	03	01	0300	N40	E20	03	2.7		A	HS	40	1	2	3
4773		SVTO	03	01	1017	N38	E23	03	3.3		A	HA	60	1	2	2
4773	24361	MWIL	03	01	1600	N38	E18	03	3.1	4	(AP)					
4773		HOLL	03	01	1725	N38	E18	03	3.2		A	HS	60	1	2	3
4773		PALE	03	01	1825	N38	E18	03	3.2		A	HS	30	1	2	3
4773		LEAR	03	02	0009	N39	E13	03	3.1		A	HS	40	2	2	3
4773		SVTO	03	02	0744	N38	E12	03	3.3		B	CSO	60	2	4	3
4773	24361	MWIL	03	02	1515	N38	E08	03	3.3	5	(BP)					
4773		BOUL	03	02	1530	N38	E08	03	3.3		B	CSO	60	3	3	2
4773		HOLL	03	02	1722	N38	E06	03	3.2		B	CSO	60	2	3	2
4773		PALE	03	02	1932	N38	E06	03	3.3		B	CSO	60	2	4	2
4773		LEAR	03	03	0046	N39	W01	03	2.9		B	CRO	20	2	2	3
4773		CULG	03	03	0430	N38	W03	03	2.9		A	HS	10	1	1	3
4773	24361	MWIL	03	03	1500	N38	W05	03	3.2	5	(AP)					
4773		BOUL	03	03	1534	N38	W04	03	3.3		B	BXO	10	2	1	1
4773		HOLL	03	03	1623	N38	W06	03	3.2		A	HS	10	2	1	4
4773		PALE	03	03	1859	N38	W08	03	3.1		A	HS	10	1	1	2
4773		LEAR	03	04	0043	N39	W11	03	3.1		B	BXO	10	3	1	3
4773		CULG	03	04	0500	N37	W13	03	3.2		A	HS	10	1	1	2
4773	24361	MWIL	03	04	1500	N38	W17	03	3.3	4	(BP)					
4773		HOLL	03	04	1625	N39	W18	03	3.2		A	HS	30	3	3	3
4773		BOUL	03	04	1653	N38	W18	03	3.2		B	BXO	10	2	1	2
4773		PALE	03	04	1917	N38	W19	03	3.3		A	HS	20	3	2	4
4773		LEAR	03	05	0015	N38	W23	03	3.1		A	HR	20	2	2	3
4773		CULG	03	05	0325	N38	W27	03	2.9		A	HS	10	1	1	3
4773		HOLL	03	05	1635	N38	W31	03	3.2		A	AX		2		3
4773		PALE	03	05	1755	N38	W31	03	3.2		A	AX		2		3
4773		HOLL	03	06	1741	N37	W45	03	3.1		A	AX		1		4
4773		PALE	03	06	1939	N38	W43	03	3.3		A	AX		1		3
4778	24364	MWIL	03	04	1500	N06	E07	03	5.1	4	(B)					
4778		HOLL	03	04	1625	N07	E06	03	5.1		B	BXO		2	3	3
4778		BOUL	03	04	1653	N07	E07	03	5.2		B	BXO	10	2	2	2
4778		PALE	03	04	1917	N06	E05	03	5.2		B	BXO		2	3	4
4778		LEAR	03	05	0355	N06	W01	03	5.1		B	BXO	10	2	3	3
4778		BOUL	03	05	1535	N06	W06	03	5.2		B	BXO	50	9	6	3
4778		HOLL	03	05	1635	N07	W07	03	5.2		B	BXI	30	13	5	3
4778		PALE	03	05	1755	N07	W08	03	5.1		B	BXI	30	12	5	3
4778		CULG	03	06	0425	N04	W14	03	5.1			CSI	30	11	5	3
4778		LEAR	03	06	0805	N06	W16	03	5.1		B	DAI	50	22	6	4
4778	24364	MWIL	03	06	1500	N06	W20	03	5.1	5	(B)					
4778		BOUL	03	06	1545	N06	W20	03	5.1		B	DAO	70	16	6	3
4778		HOLL	03	06	1741	N07	W23	03	5.0		B	DAO	110	9	7	4
4778		PALE	03	06	1939	N07	W24	03	5.0		B	CRO	90	18	7	3
4778		LEAR	03	07	0015	N07	W26	03	5.1		B	DAI	70	30	7	4
4778		CULG	03	07	0305	N03	W29	03	5.0			DSO	50	10	6	3
4778		BOUL	03	07	1615	N06	W36	03	5.0		B	CAI	60	34	7	3
4778		HOLL	03	07	1631	N07	W35	03	5.1		B	DSO	130	11	8	3

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NOAA/ USAF Group	Mt Wilson Group	Sta	Observation Mo	Day	Time (UT)	Lat	CMD	CMP Mo	Day	Max H	Mag Class	Spot Class	Corrected Area (10-6 Hemi)	Spot Count	Long. Extent (Deg)	Qual
4778	24364	MWIL	03	07	1700	N06	W36	03	5.0	5	(B)					
4778		PALE	03	07	1924	N07	W37	03	5.0		B	DAO	140	16	7	3
4778		LEAR	03	08	0033	N06	W40	03	5.0		B	DAI	80	20	8	3
4778		CULG	03	08	0400	N02	W42	03	5.0		B	CAO	50	9	8	4
4778		RAMY	03	08	1626	N06	W48	03	5.1		B	CAI	80	21	7	3
4778		HOLL	03	08	1635	N06	W49	03	5.0		BG	CKI	200	23	6	3
4778		PALE	03	08	2005	N06	W51	03	5.0		B	DSO	200	15	8	2
4778		LEAR	03	09	0024	N06	W54	03	5.0		B	CSO	90	12	8	3
4778		CULG	03	09	0440	N07	W58	03	4.8		B	CSO	70	4	6	3
4778		SVTO	03	09	0710	N07	W56	03	5.1		B	CSO	80	5	5	2
4778		HOLL	03	09	1630	N06	W64	03	4.9		B	CKO	210	5	6	3
4778		PALE	03	09	1934	N06	W64	03	5.0		B	CSO	90	2	6	2
4778	24364	MWIL	03	09	2200	N06	W68	03	4.8	4	(BP)					
4778		CULG	03	10	0445	N05	W70	03	5.0		A	HS	110	1	2	3
4778	24364	MWIL	03	10	1445	N06	W78	03	4.8	4	(AP)					
4778		BOUL	03	10	1555	N05	W80	03	4.7		A	HS	60	1	1	2
4778		PALE	03	10	1820	N08	W82	03	4.6		A	HH	60	1	3	3
4778		HOLL	03	10	2105	N07	W80	03	4.9		A	HAO	120	1	1	3
4778		LEAR	03	11	0325	N05	W82	03	5.0		A	HS	30	1	3	3
4780	24365	MWIL	03	14	1445	S18	E43	03	17.9	3	(AP)					
4780		HOLL	03	14	1758	S18	E36	03	17.5		A	AX		1		3
4780		PALE	03	14	1920	S19	E35	03	17.5		A	AX		1		3
4780		PALE	03	16	1820	S19	E10	03	17.5		A	AX		2	1	3
4780		HOLL	03	16	2256	S19	E08	03	17.6		A	AX		1		2
4780		LEAR	03	17	0015	S19	E06	03	17.5		B	BXO	20	2	2	4
4780		CULG	03	17	0500	S20	E03	03	17.4		B	CSO	10	2	1	3
4780		SVTO	03	17	0835	S18	E03	03	17.6		B	CRO	30	4	3	2
4780		HOLL	03	17	1737	S19	W04	03	17.4		B	BXO	20	6	5	3
4780		PALE	03	17	1839	S18	W07	03	17.2		B	BXO	10	5	6	3
4780	24365	MWIL	03	17	1900	S18	W03	03	17.6	3	(B)					
4780		LEAR	03	18	0022	S19	W07	03	17.5		B	BXO	20	8	5	4
4780		CULG	03	18	0435	S22	W08	03	17.6		B	CSO	10	2	4	2
4780		SVTO	03	18	0807	S20	W12	03	17.4		B	BXO	10	4	6	3
4780		RAMY	03	18	1305	S19	W15	03	17.4		B	BXO	10	3	4	3
4780	24365	MWIL	03	18	1445	S18	W15	03	17.5	3	(B)					
4780		HOLL	03	18	1845	S18	W18	03	17.4				10	4	5	4
4780		PALE	03	18	1911	S19	W17	03	17.5		B	BXO	10	2	4	3
4780		LEAR	03	19	0026	S18	W22	03	17.3		A	AX	10	2	1	3
4781		SVTO	03	20	1302	N24	E07	03	21.1		B	BXO	20	2	2	2
4781	24368	MWIL	03	20	1445	N24	E04	03	20.9	4	(B)					
4781		RAMY	03	20	1524	N24	E04	03	20.9		B	BXO	10	2	3	4
4781		HOLL	03	20	1533	N24	E03	03	20.9		B	BXO	10	2	3	3
4781		LEAR	03	21	0300	N24	W04	03	20.8		B	BXO	20	7	4	3
4781		CULG	03	21	0400	N24	W06	03	20.7		B	BXO	20	4	4	3
4781		SVTO	03	21	0709	N26	W05	03	20.9		B	BXO	30	7	4	3
4781		RAMY	03	21	1441	N25	W11	03	20.7		B	BXO	20	5	5	4
4781		HOLL	03	21	1540	N24	W10	03	20.9		B	BXO	40	11	5	4
4781		PALE	03	21	1811	N25	W11	03	20.9		B	BXO	50	10	6	2
4781		LEAR	03	22	0009	N24	W15	03	20.8		B	CSO	40	12	7	4
4781		CULG	03	22	0430	N22	W21	03	20.6		B	CSO	30	6	7	4
4781		RAMY	03	22	1358	N24	W24	03	20.7		B	CSO	50	9	7	3
4781		HOLL	03	22	1619	N24	W24	03	20.8		B	CSO	70	9	10	3
4781		PALE	03	22	1944	N26	W26	03	20.8		B	CSO	70	9	8	2
4781	24368	MWIL	03	22	2230	N23	W30	03	20.6	4	(B)					
4781		CULG	03	23	0445	N24	W35	03	20.5		B	CSO	40	3	7	2
4781		SVTO	03	23	0921	N24	W35	03	20.7		B	DSO	110	9	8	3
4781		RAMY	03	23	1358	N23	W38	03	20.6		B	CSO	70	7	8	3
4781	24368	MWIL	03	23	1445	N23	W37	03	20.8	4	(B)					
4781		HOLL	03	23	1710	N24	W37	03	20.8		B	CSO	70	7	8	3
4781		LEAR	03	24	0115	N23	W43	03	20.7		B	CSO	90	10	10	4
4781		CULG	03	24	0400	N24	W45	03	20.7		B	DSO	70	3	8	2
4781		SVTO	03	24	0716	N24	W46	03	20.7		B	DSI	120	11	8	3
4781	24368	MWIL	03	24	1445	N23	W50	03	20.8	4	(B)					
4781		RAMY	03	24	1639	N24	W52	03	20.7		B	CAI	30	9	6	3
4781		PALE	03	24	1820	N26	W52	03	20.7		B	CSI	60	8	9	3
4781		LEAR	03	25	0010	N23	W56	03	20.7		B	DRI	50	6	10	4

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4781		CULG	03	25	0420	N20	W62	03	20.4		B	DRO	30	4	7	1
4781		SVTO	03	25	0714	N24	W60	03	20.7		B	CSI	80	6	9	3
4781	24368	MWIL	03	25	1430	N23	W65	03	20.6	3	(AP)					
4781		HOLL	03	25	1600	N24	W67	03	20.5		B	CSO	30	3	5	3
4781		PALE	03	25	1838	N26	W69	03	20.4		B	CSO	10	3	4	4
4781		LEAR	03	26	0005	N23	W70	03	20.6		B	BXO	10	2	5	4
4781		RAMY	03	26	1205	N23	W71	03	21.0		A	AX	10	1	1	4
4781	24368	MWIL	03	26	1445	N25	W75	03	20.8	3	(AP)					
4781		HOLL	03	26	1910	N25	W80	03	20.6		A	AX		2	1	4
4779		LEAR	03	14	0902	S33	E83	03	21.0		A	HS	20	1	1	1
4779		RAMY	03	14	1310	S31	E81	03	20.9		A	HR	20	1	1	3
4779	24366	MWIL	03	14	1445	S32	E80	03	20.9	3	(AP)					
4779		HOLL	03	14	1611	S32	E81	03	21.1		A	HS	30	1	1	3
4779		PALE	03	14	1920	S33	E80	03	21.2		A	HS	60	1	1	3
4779		LEAR	03	15	0120	S32	E76	03	21.1		A	HA	30	1	2	3
4779		CULG	03	15	0430	S32	E78	03	21.4		A	HS	30	1	1	3
4779	24366	MWIL	03	15	1500	S33	E70	03	21.2	4	(AP)					
4779		HOLL	03	15	1540	S32	E68	03	21.0		A	HS	50	1	2	3
4779		PALE	03	15	1820	S33	E67	03	21.1		A	HS	20	1	1	3
4779		LEAR	03	16	0422	S31	E63	03	21.1		A	HS	20	1	1	2
4779		CULG	03	16	0500	S32	E63	03	21.2		A	HS	20	1	1	3
4779		RAMY	03	16	1333	S32	E58	03	21.1		A	HR	10	1	1	3
4779		SVTO	03	16	1400	S32	E57	03	21.1		A	HS	30	1	1	1
4779	24366	MWIL	03	16	1445	S33	E56	03	21.1	4	(AP)					
4779		PALE	03	16	1820	S33	E56	03	21.2		A	HS	20	1	1	3
4779		HOLL	03	16	2256	S34	E54	03	21.2		A	HS	20	1	1	2
4779		CULG	03	17	0500	S30	E51	03	21.2		A	HS	20	1		3
4779		LEAR	03	17	0750	S32	E49	03	21.2		A	HR	10	1	1	3
4779		SVTO	03	17	0835	S33	E47	03	21.1		A	AX	10	1	1	2
4779		HOLL	03	17	1737	S33	E43	03	21.1		A	HR	10	2	1	3
4779		PALE	03	17	1839	S33	E42	03	21.1		A	HS	10	2	1	3
4779	24366	MWIL	03	17	1900	S32	E38	03	20.8	5	(B)					
4779		LEAR	03	18	0022	S33	E41	03	21.3		B	CRO	20	3	7	4
4779		CULG	03	18	0435	S31	E42	03	21.5		A	HS	10	1		2
4779		SVTO	03	18	0807	S33	E34	03	21.0		A	HR	10	1	1	3
4779		RAMY	03	18	1305	S34	E33	03	21.2		A	HA	10	2	1	3
4779	24366	MWIL	03	18	1445	S33	E28	03	20.8	5	(AP)					
4779		HOLL	03	18	1845	S34	E31	03	21.2		A	HR	10	2	4	4
4779		PALE	03	18	1911	S34	E30	03	21.2		A	HR	10	2	2	3
4779		LEAR	03	19	0026	S33	E29	03	21.3		B	CRO	10	3	3	3
4779		SVTO	03	19	0804	S33	E23	03	21.2		A	AX	20	1	2	3
4779		HOLL	03	19	1505	S33	E19	03	21.1		A	AX	10	1	1	3
4779		LEAR	03	20	0048	S33	E14	03	21.1		A	AX	10	1	1	3
4782		SVTO	03	23	0921	N05	W18	03	22.0		A	AX		1		3
4782		RAMY	03	23	1358	N05	W21	03	22.0		A	AX	10	1	1	3
4782	24367	MWIL	03	23	1445	N05	W21	03	22.0	3	(AP)					
4782		HOLL	03	23	1710	N05	W23	03	22.0		A	AX		1	1	3
4782		CULG	03	24	0400	N02	W29	03	22.0		B	BXO	10	2	4	2
4782		SVTO	03	24	0716	N05	W32	03	21.9		A	AX		1		3
4782		LEAR	03	24	0808	N03	W32	03	21.9		A	AX	10	1	1	3
4782A		SVTO	03	23	0921	S21	E22	03	25.1		A	AX		2	2	3
4782A		PALE	03	28	2252	S22	W51	03	25.0		A	AX		1		3
4782A		HOLL	03	30	1515	S25	W71	03	25.1		B	BXO	10	2	1	4
4782A		RAMY	03	30	1630	S26	W69	03	25.3		A	AX	10	1	1	4
4784		HOLL	03	30	1705	N31	W39	03	27.6		A	AX		2		4
4784		LEAR	03	31	0130	N32	W44	03	27.6		A	AX	10	2	2	3
4784A		RAMY	03	31	1328	S22	W08	03	30.9		B	BXO	10	2	2	4
4784A	24371	MWIL	03	31	1500	S22	W07	03	31.1	4	(B)					
4784A		HOLL	03	31	1520	S22	W08	03	31.0		B	BXO		2	2	4
	24370	MWIL	03	29	1430	N25	E23	03	31.4	2	(AF)					
4783	24369	MWIL	03	25	1430	N05	E80	03	31.6	5	(AP)					

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4783		HOLL	03	25	1600	N05	E80	03	31.6		A	HS	120	1	2	3
4783		PALE	03	25	1838	N04	E80	03	31.8		A	HA	200	1	2	4
4783		LEAR	03	26	0005	N05	E77	03	31.8		A	HH	220	1	2	4
4783		RAMY	03	26	1205	N06	E67	03	31.5		A	HS	190	1	2	4
4783	24369	MWIL	03	26	1445	N04	E67	03	31.6	5	(AP)					
4783		BOUL	03	26	1518	N06	E67	03	31.6		A	HS	140	1	2	3
4783		HOLL	03	26	1910	N05	E67	03	31.8		A	HH	190	1	3	4
4783		LEAR	03	27	0010	N05	E62	03	31.6		A	HH	220	1	4	3
4783		CULG	03	27	0505	N07	E59	03	31.6		A	HS	160	1	2	3
4783		SVTO	03	27	0925	N04	E58	03	31.7		A	HS	150	2	3	2
4783	24369	MWIL	03	27	1430	N04	E55	03	31.7	5	(AP)					
4783		RAMY	03	27	1458	N05	E55	03	31.7		B	CSO	170	2	3	3
4783		HOLL	03	27	1559	N05	E54	03	31.7		B	CKO	170	2	4	4
4783		PALE	03	27	1855	N02	E53	03	31.7		B	CHO	160	2	3	2
4783		CULG	03	28	0515	N05	E47	03	31.7		B	CSO	150	2	3	3
4783		SVTO	03	28	0840	N03	E44	03	31.6		A	HH	250	3	3	4
4783		RAMY	03	28	1338	N05	E42	03	31.7		B	CSI	120	3	4	4
4783	24369	MWIL	03	28	1430	N04	E41	03	31.7	5	(AP)					
4783		HOLL	03	28	1558	N05	E41	03	31.7		A	HK	190	4	4	3
4783		PALE	03	28	2252	N02	E37	03	31.7		A	HA	190	2	4	3
4783		CULG	03	29	0405	N07	E33	03	31.6		A	HS	100	1	2	4
4783	24369	MWIL	03	29	1430	N04	E27	03	31.6	5	(AP)					
4783		RAMY	03	29	1546	N05	E27	03	31.7		A	HS	150	1	2	2
4783		HOLL	03	29	2305	N04	E24	03	31.7		A	HS	120	2	4	2
4783		LEAR	03	30	0010	N06	E23	03	31.7		A	HH	100	3	4	3
4783		CULG	03	30	0440	N04	E21	03	31.8		B	CSO	110	4	3	3
4783		SVTO	03	30	0747	N04	E19	03	31.7		B	CHO	250	2	5	3
4783	24369	MWIL	03	30	1445	N04	E15	03	31.7	5	(BP)					
4783		HOLL	03	30	1515	N04	E15	03	31.7		B	CSO	170	7	4	4
4783		BOUL	03	30	1549	N04	E15	03	31.8		B	CSO	90	7	4	2
4783		RAMY	03	30	1630	N04	E15	03	31.8		B	CSO	170	6	4	4
4783		PALE	03	30	1957	N04	E14	03	31.9		B	CSO	190	11	5	1
4783		LEAR	03	31	0130	N04	E10	03	31.8		B	CSO	170	8	6	3
4783		RAMY	03	31	1328	N04	E03	03	31.8		BG	CSI	140	8	5	4
4783	24369	MWIL	03	31	1500	N04	E02	03	31.8	6	(BP)					
4783		HOLL	03	31	1520	N04	E02	03	31.8		B	CSO	170	9	4	4
4783		BOUL	03	31	1616	N04	E02	03	31.8		B	CSO	110	6	4	2
4783		PALE	03	31	2143	N05	W02	03	31.7		B	CSO	170	4	4	2
4783		LEAR	04	01	0337	N04	W05	03	31.8		B	CSO	160	4	6	1
4783		CULG	04	01	0500	N03	W07	03	31.7		B	HSO	100	4	3	3
4783		SVTO	04	01	0835	N04	W07	03	31.8		A	HS	110	2	3	1
4783	24369	MWIL	04	01	1430	N04	W12	03	31.7	6	(BP)					
4783		HOLL	04	01	1504	N04	W12	03	31.7		B	CHO	160	2	4	3
4783		BOUL	04	01	1532	N05	W12	03	31.7		B	CSO	100	4	3	4
4783		RAMY	04	01	1547	N04	W13	03	31.7		B	CSO	110	2	3	4
4783		PALE	04	01	1843	N04	W15	03	31.6		A	HS	170	3	3	2
4783		LEAR	04	02	0014	N05	W16	03	31.8		B	CSO	100	2	4	3
4783		CULG	04	02	0330	N05	W20	03	31.6		A	HS	90	1	2	4
4783		RAMY	04	02	1359	N05	W26	03	31.6		A	HS	110	1	2	4
4783	24369	MWIL	04	02	1520	N04	W25	03	31.8	6	(AP)					
4783		BOUL	04	02	1612	N04	W26	03	31.7		A	HS	110	1	2	3
4783		HOLL	04	02	1617	N05	W27	03	31.6		A	HS	150	1	2	3
4783		PALE	04	02	1830	N07	W27	03	31.7		B	CSO	170	3	3	3
4783		LEAR	04	03	0104	N06	W31	03	31.7		B	CSO	80	3	3	3
4783		CULG	04	03	0330	N04	W32	03	31.7		A	HS	90	1	2	3
4783		SVTO	04	03	0706	N05	W35	03	31.7		A	HS	160	1	2	3
4783		RAMY	04	03	1400	N04	W39	03	31.7		A	HS	130	1	2	3
4783		BOUL	04	03	1540	N06	W38	03	31.8		A	HS	100	1	2	4
4783		HOLL	04	03	1547	N06	W40	03	31.7		A	HS	130	1	2	3
4783		PALE	04	03	1835	N06	W42	03	31.6		A	HS	130	1	2	3
4783		LEAR	04	04	0355	N05	W48	03	31.6		A	HS	120	1	2	2
4783		CULG	04	04	0500	N05	W48	03	31.6		A	HS	90	1	2	3
4783		RAMY	04	04	1400	N05	W51	03	31.8		B	CSO	120	3	3	4
4783	24369	MWIL	04	04	1445	N04	W52	03	31.7	6	(BP)					
4783		BOUL	04	04	1510	N05	W52	03	31.7		A	HS	100	1	2	2
4783		HOLL	04	04	1619	N06	W53	03	31.7		B	CSO	130	3	5	3
4783		PALE	04	04	1823	N07	W55	03	31.6		B	CAO	120	2	4	3
4783		LEAR	04	05	0016	N04	W56	03	31.8		B	CSO	70	2	6	3

S U N S P O T G R O U P S
(ORDERED BY CENTRAL MERIDIAN PASSAGE DATE)

MARCH 1987

NOAA/ USAF Group	Mt Wilson Group	Sta	Observation Mo	Day	Time (UT)	Lat CMD	CMP Mo Day	Max H	Mag Class	Spot Class	Corrected Area (10-6 Hemi)	Spot Count	Long. Extent (Deg)	Qual
4783		SVTO	04	05	1014	N04 W62	03 31.8		A	HS	120	1	2	1
4783		BOUL	04	05	1423	N05 W65	03 31.7		A	HS	180	1	2	2
4783	24369	MWIL	04	05	1445	N04 W66	03 31.7	5	(BP)					
4783		PALE	04	05	1759	N07 W68	03 31.6		A	HA	100	1	3	3
4783		HOLL	04	05	1858	N06 W68	03 31.7		A	HS	160	1	2	3
4783		LEAR	04	06	0016	N04 W71	03 31.7		A	HS	90	1	2	3
4783		CULG	04	06	0400	N05 W72	03 31.8		A	HS	120	1	2	3
4783		SVTO	04	06	0953	N05 W78	03 31.6		A	HS	140	1	2	3
4783		BOUL	04	06	1427	N04 W78	03 31.8		A	HS	60	1	1	2
4783	24369	MWIL	04	06	1445	N04 W78	03 31.8	4	(AP)					
4783		HOLL	04	06	1610	N05 W80	03 31.7		A	HS	60	1	1	3
4783		RAMY	04	06	1900	N05 W81	03 31.7		A	HS	40	1	3	2
4783		PALE	04	06	1930	N05 W85	03 31.4		A	HS	120	1	2	2
4783		LEAR	04	07	0018	N04 W87	03 31.5		A	HS	200	1	2	3

Stations reporting:

BOUL = Boulder
CULG = Culgoora
HOLL = Holloman
LEAR = Learmonth
MWIL = Mt. Wilson
PALE = Palehua
RAMY = Ramey
SVTO = San Vito

SUDDEN IONOSPHERIC DISTURBANCES

MARCH 1987

Day	Start (UT)	Max (UT)	End (UT)	Imp	Wide-spread Index	Number of Station Reports by Type SWF	SEA	SPA	LF-SPA	SES	Known Flare	X-ray Class	NOAA/SESC Region
02	1158	1227	1249	2-	1		1				No flare		
02	1332	1338	1405	1	1		1				No flare		
03	1005	1008	1020	1	1		1				No flare		
03	1128	1136	1150	1-	1					1	No flare		
03	1420	1425	1447	1-	1		1				No flare		
06	1416	1429U	1450	1	1		1				No flare		
08	1921	1943	2015	2	3					4	1909 UT		4778
09	0001	0010	0026	1-	1			1			No flare		
09	1200	1211	1216	2	1		1				No flare		
11	0411	0418	0438	1-	1			1			No flare		
11	1146	1147	1216U	1	1		1				No flare		
13	2135	2149	2253	1-	1			1			2126 UT	C5.5	4779
17	0931	0946	1034	2	1		1				No flare		
24	0304	0311	0357	1+	3	1		1		1	No flare		
27	1401	1412	1421	1-	1		1				No flare		
28	0259	0311	0336	1-	1			1			0303 UT	C1.2	

* No flare patrol

Observatories Reporting for March 1987**

Ayrshire, Scotland	SES	Maui, Hawaii, USA	SWF
Darmstadt, German Fed. Rep.	SWF	Panska Ves, Czechoslovakia	SWF, SES, SEA
Edenvale, Rep. of S. Africa	SES	Paterson, New Jersey, USA (A03)	SES
Farsta, Sweden	SES	Paterson, New Jersey USA (A43)	SES
Hiraiso, Japan	SWF	Rimavska Sobota, Czechoslovakia	SEA
Houston, Texas, USA	SES	Somesworth, New Hampshire, USA	SES
Inubo, Japan	SPA	Tavares, Florida, USA	SES
Juliusruh, German Dem. Rep.	SWF	Tucson, Arizona, USA	SES
Kandilli, Turkey	SEA	Upice, Czechoslovakia	SEA
Kuhlungsborn, German Dem. Rep.	SPA, SEA	Valley Cottage, New York, USA	SES
Latrobe, Pennsylvania, USA	SES	Zilina, Czechoslovakia	SEA
Louisville, Kentucky, USA	SES		

**Observations are not necessarily continuous.

S I D s by N O A A/S E S C R E G I O N S

MARCH 1987

Day:	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
Events in Region #																															
4778								1																							
4779													1																		
Events with X-ray													1															1			
Events with no flare reported		2	3			1			2		2						1							1			1				
Events with no flare patrol																															
Events with flare but no region number																															
Daily Event Totals		2	3			1		1	2		2		1				1							1			1	1			

SOLAR RADIO EMISSION SPECTRAL OBSERVATIONS

MARCH 1987

Day	Observation Start (UT)	Observation End (UT)	Sta	Decimetric Band Start (UT)	Decimetric Band End (UT)	Decimetric Band Int (1-3)	Metric Band Start (UT)	Metric Band End (UT)	Metric Band Int (1-3)	Dekametric Band Start (UT)	Dekametric Band End (UT)	Dekametric Band Int (1-3)	Spectral Type
01	1112	1512	WEIS				1140.3	1140.5	2				III B
02			LEAR				0306.0	0308.0	1				III
	0659	1648	WEIS										
03	0648	1648	WEIS										
04	1043	1648	WEIS										
05	0636	0649	WEIS										
	0657	1115	WEIS										
06	0632	1422	WEIS										
	1425	1437	WEIS										
	1638	1653	WEIS										
07	0630	1653	WEIS										
08	0630	1019	WEIS										
			SVTO				1118.0	1118.0	1				III
	1041	1656	WEIS				1501.3	1502.4	1				III G
09	0626	1247	WEIS										
	1417	1657	WEIS										
10	0624	0720	WEIS										
	0910	1421	WEIS										
	1428	1658	WEIS										
11	0624	1700	WEIS										
			CULG				2251.0	2300.0	2				II
			PALE				2251.0	2258.0	1				II
12	0626	0803	WEIS										
	1035	1623	WEIS										
	1628	1702	WEIS										
13	0618	1221	WEIS										
	1307	1635	WEIS										
			PALE				1808.0	1856.0	1				S
			PALE				1902.0	2000.0	1				S
			CULG				2144.0	2211.0	2				II
			PALE				2152.0	2207.0	1				II
			CULG				2156.0	2204.0	1				IV
			CULG				2215.0	2225.0	1				I
14	0618	1000	WEIS										
	1423	1606	WEIS										
15	0614	0753	WEIS										
			LEAR				0633.0	0644.0	2				II
	0829	1706	WEIS										
16	0612	1317	WEIS										
	1456	1707	WEIS										
17	0610	0646	WEIS										
	0653	1703	WEIS										
18	0608	1711	WEIS										
19	0606	1712	WEIS										
			LEAR				0827.0	0827.0	1				III
			SVTO				0827.0	0827.0	1				III
			LEAR				0856.0	0857.0	1				III
20	0754	1128	WEIS				1038.9	1041.2	1				III G
	1130	1713	WEIS										
21	0602	1715	WEIS										
22	0600	0910	WEIS										

SOLAR RADIO EMISSION
SPECTRAL OBSERVATIONS

MARCH 1987

Day	Observation Start (UT)	Observation End (UT)	Sta	Decimetric Band Start (UT)	Decimetric Band End (UT)	Decimetric Band Int (1-3)	Metric Band Start (UT)	Metric Band End (UT)	Metric Band Int (1-3)	Dekametric Band Start (UT)	Dekametric Band End (UT)	Dekametric Band Int (1-3)	Spectral Type
22	1054	1715	WEIS										
			CULG				2242.0	2243.0	1				III
			CULG				2255.0	2255.0	1				III
23			CULG				0044.0	0045.0	1				III
			CULG				0228.0	0228.0	1				III
			CULG				0343.0	0343.0	1				III
	0559	1718	WEIS										
			LEAR				0753.0	0754.0	2				III
			CULG				0754.0	0754.0	1				III
			LEAR				0815.0	0816.0	2				III
24			LEAR				0302.0	0306.0	3				V
			CULG				0303.0	0303.0	2				III
			CULG				0305.0	0305.0	2				III
			LEAR				0323.0	0324.0	1				III
			PALE				0323.0	0324.0	1				III
			LEAR				0408.0	0409.0	2				V
			CULG				0409.0	0409.0	2				III
			PALE				0409.0	0409.0	1				III
	0555	0823	WEIS										
			LEAR				0720.0	0720.0	1				III
			SGMR				1433.0	1434.0	1				V
	0833	1719	WEIS				1434.2	1434.5	2				IIIB
			CULG				2054.0	2054.0	1				III
			CULG				2113.0	2115.0	1				III
			CULG				2118.0	2118.0	1				III
			CULG				2126.0	2127.0	1				III
			CULG				2135.0	2135.0	1				III
25	0554	0949	WEIS										
	1012	1720	WEIS										
			SGMR				1641.0	1659.0	1				S
			SGMR				1820.0	1823.0	1				V
			PALE				1822.0	1822.0	1				III
26			CULG				0029.0	0030.0	3				III
			LEAR				0029.0	0031.0	3				V
			PALE				0029.0	0031.0	2				III
			CULG				0030.0	0033.0	1				III
			LEAR				0506.0	0507.0	2				III
			CULG				0507.0	0507.0	1				III
			SVTO				0537.0	0539.0	1				III
			CULG				0608.0	0612.0	3				III
			LEAR				0608.0	0610.0	3				III
			SVTO				0608.0	0610.0	1				III
			SGMR				1421.0	1422.0	1				V
	0646	1722	WEIS				1422.1	1423.3	2				IIIG
27	0549	1528	WEIS										
	1531	1724	WEIS										
28	0547	1725	WEIS										
29			SGMR				1637.0	1638.0	1				V
30	0543	0846	WEIS										
	1246	1728	WEIS										
31	0541	1634	WEIS										
	1711	1729	WEIS										

The symbols used under the column heading SPECTRAL TYPE have the following definitions:

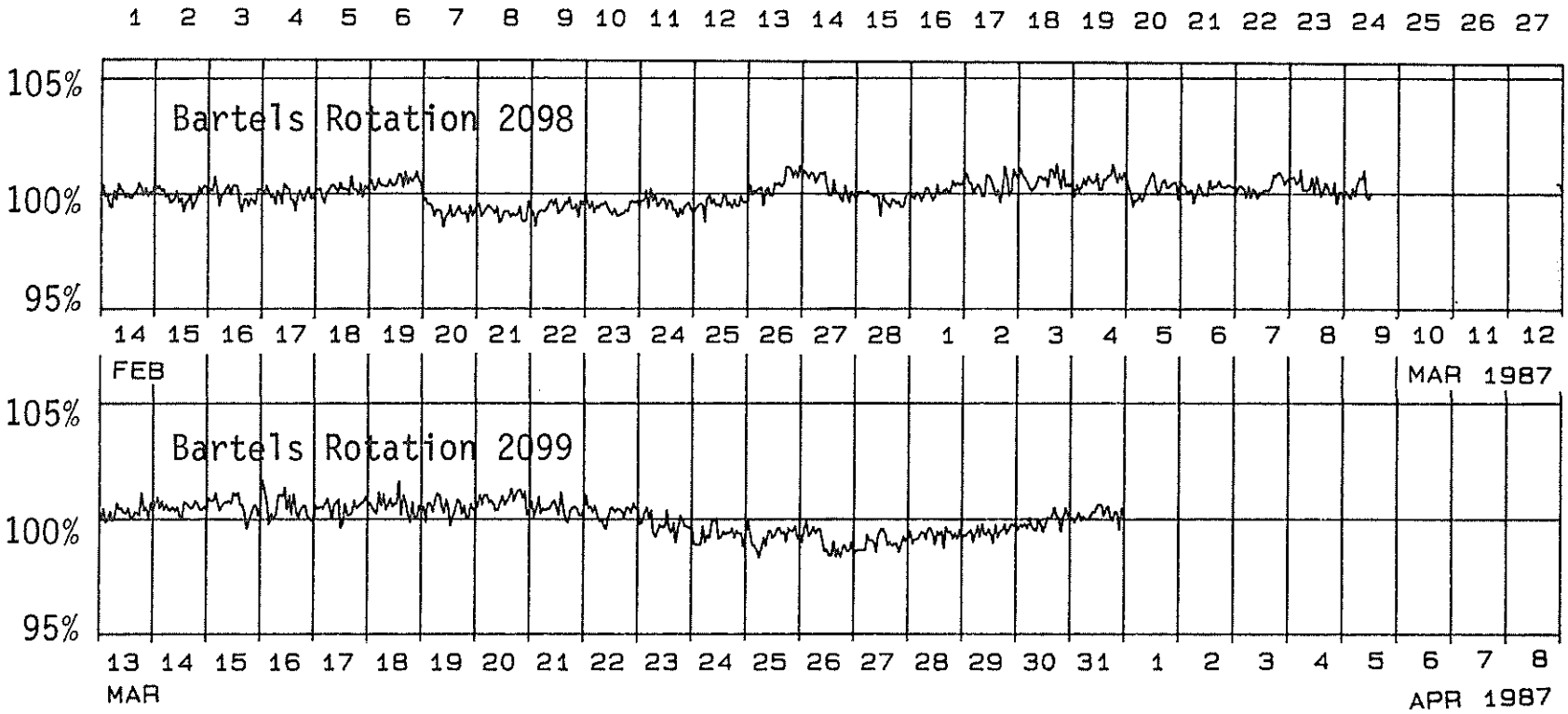
B = Single burst
G = Small group (< 10) of bursts
GG = Large group (> 10) of burst
C = Underlying continuum (particularly with Type I)
S = Storm in the sense of intermittent but apparently connected activity
N = Intermittent activity in this period
U = U-shaped burst of Type III

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

Stations Reporting:

BLEN = Bleien LEAR = Learmonth PALE = Palehua SGMR = Sagamore Hill WEIS = Weissenau

THULE NEUTRON MONITOR



77
Mar 87

COSMIC RAY INDICES
(Neutron Monitor)

MARCH 1987

Day	THULE Average (cts/h)/100	ALERT Average (cts/h)/100	DEEP RIVER Average (cts/h)/300	KIEL Average (cts/h)/100	CLIMAX Average (cts/h)/100	PREDIGTSTUHL Average (cts/h)/100	TOKYO Average (cts/h)/256	HUANCAYO Average (cts/h)/100
1	4650			6466.2			3731.0	
2	4661			6502.6			3733.9	
3	4673			6515.4			3731.8	
4	4671			6534.2			3727.3	
5	4654			6490.0			3725.3	
6	4654			6470.6			3719.0	
7	4659			6473.4			3699.9	
8	4657			6462.9			3718.0	
9	4654			6476.3			3730.5	
10	---			6486.0			3728.2	
11	---			6483.5			3718.1	
12	4664			6494.5			3722.9	
13	4648			6494.5			3711.9	
14	4657			6508.1			3711.7	
15	4662			6534.6			3714.9	
16	4659			6526.7			3718.0	
17	4657			6519.0			3714.0	
18	4660			6527.1			3716.7	
19	4656			6527.4			3712.6	
20	4672			6545.7			3719.9	
21	4654			6509.5			3723.4	
22	4649			6486.1			3712.1	
23	4624			6450.1			3693.0	
24	4603			6405.9			3692.8	
25	4599			6434.8			3704.7	
26	4587			6441.2			3707.5	
27	4587			6420.3			3698.8	
28	4602			6456.9			3693.2	
29	4609			6451.4			3686.7	
30	4629			6451.5			3685.4	
31	4643			6464.2			3706.7	
Mean	4643			6484.2			3713.1	

For less than 24-hour coverage, parentheses enclose the number of hours for which data are available.
For Climax and Huancayo, parentheses enclose the number of section hours whenever the sum of both sections falls below 40 hours.

GEOMAGNETIC ACTIVITY INDICES

March 1987

Day		Kp Three-Hourly Indices 1	2	3	4	5	6	7	8	Sum	Ap	Cp	Km Three-Hourly Indices 1	2	3	4	5	6	7	8	Am	aa Provisional N	S	M	
1		2	2+	1+	1+	2-	3-	3	3-	17	9	0.5	2	2	1+	1+	1+	3-	3	2	17	19	17	14	23	K
2	Q2	0	0+	1+	1-	1-	2-	1-	1+	7-	3	0.1	0	0+	1	1-	1+	1+	1-	1+	6	8	6	4	10	CK
3	Q8	0+	2+	2-	2	1	1+	2+	2	13	6	0.3	1-	2	2-	2-	1	2-	2+	2+	12	17	10	12	16	
4		4-	2	1+	3-	2+	2	1+	3-	18	10	0.6	3	1+	1+	3-	2+	2	2	3-	18	17	17	17	18	
5	D2	2-	3+	2	4	4	4+	3+	4+	27	21	1.1	1+	3	2-	4-	4	4-	3-	4	35	40	32	24	48	
6		3	2+	2+	2	1+	1-	3-	3+	18-	10	0.5	2+	1+	2	2	1+	1	3-	3	15	23	9	15	18	
7	D3	4+	4	5-	3+	4+	1+	2+	2-	26	21	1.1	4-	3	4-	4-	4-	1+	2	1+	32	30	31	39	23	
8		3	2+	3+	3	3-	3+	1+	2	21	12	0.7	3-	2-	3	3-	3-	3	1+	2-	20	26	19	23	23	
9		3+	4-	2+	1+	1	1+	1	1-	15-	9	0.5	3-	3-	2-	1	1+	1+	1+	1	12	16	9	16	9	C
10		1+	2+	3+	3-	4	3	1-	0	17+	11	0.6	1	2	3-	2	4-	3	1	0	17	18	19	17	21	
11		1+	2-	2+	2	2+	3	3-	1+	17-	8	0.5	1+	1+	2-	2+	3-	3	3	1+	17	17	17	13	22	
12		3	3+	2	3	2-	1+	3	4+	22-	14	0.8	2+	2+	2+	3	2-	1	2+	4-	21	28	16	22	23	
13	Q10A	3	2	2+	2+	2-	1	1	2+	16-	8	0.4	3-	1+	2	2-	2	1+	1	2+	13	17	13	17	13	
14		2	3-	2	2+	2	2-	2+	2-	17-	8	0.4	2-	2+	1+	2	2-	2-	2+	2-	14	18	9	13	14	
15		2	3+	3-	3	2	1+	2	2+	19-	10	0.6	2-	3-	2-	2+	2+	1+	1+	2+	16	21	14	19	17	
16		3	1	3-	3-	3+	1+	3-	3	20-	12	0.7	2+	1	3-	3-	3+	1+	2+	2	19	25	18	17	26	
17		3+	4	2	2-	2-	2-	1	1+	17-	10	0.6	3-	3	2+	2-	2	2-	1	1-	15	19	11	18	12	
18		2+	1	2	1	2+	4-	3	4	19+	12	0.7	2	1	2-	1+	2+	3	3-	4-	21	33	16	13	36	
19		4	3	2+	3-	2	1	2	2+	19+	11	0.6	3	3-	2	3-	2+	1+	2	2+	19	27	14	25	16	
20	Q1	1	0+	1-	1-	1	1+	1	1+	7+	4	0.1	1-	0	1-	1-	1+	1+	1-	1+	6	6	7	4	8	CC
21	D4*	1+	1+	2	3	4-	4+	4	4+	24	18	1.0	1+	1+	2-	3-	3+	4	3+	4	29	29	25	12	43	
22	D5*	4+	2+	2	2+	1+	2	4	4-	22	15	0.8	4	2	2	2+	2-	2+	4-	4-	27	28	14	25	19	
23	Q7	2-	2-	2	2	2	2-	1-	0+	12	6	0.2	1+	1	2	2+	2	1	1-	0	10	9	11	13	8	CK
24	Q5	1-	0+	3-	1	0+	1	2-	1+	9	5	0.2	1	0+	3-	1	0+	0+	1+	1+	7	7	6	8	6	CC
25	Q9K	0+	0	1-	1-	1+	4-	1+	3-	11-	6	0.3	1-	0	0+	1-	1	3	2-	2+	10	17	5	4	19	KK
26		3-	3-	3	3+	3-	3+	3-	1	21+	13	0.7	2+	2	3	3	2+	3-	2+	1	21	23	16	21	19	
27	D1	3	4-	3+	5-	4+	5-	3+	4-	31-	26	1.2	3-	3-	3-	4	4	4-	3-	3-	35	45	32	33	44	
28		4+	3+	3	2+	2-	1	1+	1-	18-	12	0.7	4-	3-	3	2+	2+	1+	1+	1-	19	19	16	27	8	
29	Q6	1-	1+	3-	2	0+	1-	1+	1	10	5	0.2	1-	1	3-	2-	0+	1-	1+	1	8	10	7	11	7	CC
30	Q4	1-	1	1-	1	2-	1+	2-	0+	8+	4	0.1	1-	1-	0+	1	1+	1+	1+	0+	6	8	8	6	11	CC
31	Q3	1-	2-	1	1	1+	1-	1	1-	8	4	0.1	1-	1+	1	1	2-	1-	1	1-	7	8	6	6	8	CC
Mean											10	0.55									16.9	20.3	14.6		17.6	

Day	Kn Three-Hourly Indices 1	2	3	4	5	6	7	8	An	Ks Three-Hourly Indices 1	2	3	4	5	6	7	8	As	S_a	Prov R_I	R_a	R_s	IMF	
1	2	2-	1+	1+	2	3-	3+	2+	17	2-	2+	1+	1+	1	3-	3	2	16	72.8	14	14	17	A	-
2	0	0+	1	1-	1+	2-	1	2-	7	0	0	1	1	1	1	1-	1+	5	73.3	23	18	17	AT	-
3	1-	2	2	2	1+	2-	2+	2+	13	1-	2-	2-	1+	1	2-	2+	2	11	71.6	15	12	15	AT	-
4	3	2-	1+	3	3-	2+	2	3-	20	3	1	1+	3-	2+	2-	2-	2+	15	73.3	18	12	17	TA	-
5	2-	3	2	4-	4+	4	3	4	39	1+	3	2-	3+	4-	4-	3-	4-	32	73.7	24	23	18	A	-
6	2+	2-	2+	2	2-	1	3-	3	17	3-	1	1+	2	1	1-	2+	3-	13	75.6	23	25	20	A	-
7	4-	3	4-	4-	4	2-	2+	2-	34	4	3-	4	4-	4-	1-	2	1+	30	75.5	24	23	20	A	-
8	3-	2+	3	3-	3	3	2-	2	23	2+	1+	3	3-	2+	3-	1+	2-	17	76.9	22	20	21	A	-
9	3-	3	2	1+	1	2-	1+	1	14	3-	3-	2-	0+	1+	1+	1+	1	11	73.6	14	13	17	A	-
10	1+	2	3-	2+	4	3+	1	0+	21	1-	2-	2+	1+	3+	3-	1	0	13	71.4	11	10	15	A	-
11	1+	1+	2	2+	3	3	3+	2-	20	1+	1	2-	2	3-	3-	2+	1	14	70.5	8	2	14	A	-
12	3-	3-	3-	3+	2	1+	3	4	26	2+	2+	2-	3-	1+	1-	2-	4-	18	69.5	0	0	13	A	-
13	3-	1+	2	2	2+	2-	1+	2+	14	3-	1+	2	2-	1+	1	1	2	12	69.6	0	0	13	AT	-
14	2	2+	2-	3-	2	2	2+	2	16	2-	2+	1+	2-	1+	1+	2	1+	11	71.1	11	9	15	A	-
15	2-	3	2	3-	2+	2-	2-	2+	17	2-	3-	2-	2	2	1+	1+	2+	14	70.5	11	10	14	A	-
16	2+	1+	3	3	3+	2-	3-	3-	22	3-	1-	2+	2+	3+	1+	2	1+	17	71.0	11	12	15	TA	-
17	3-	3+	2+	2	2+	2	1+	1+	19	2+	3-	2	1+	2-	1+	0+	0+	12	71.2	22	21	15	AT	-
18	2	1+	2	1+	3-	3+	3	4-	24	2+	1	2-	1	2	3-	3-	3+	18	72.5	21	20	16	T	-
19	3+	3-	2	3-	2+	1+	2+	3-	21	3-	2+	2	3-	2	1	1+	2	16	71.5	12	10	15	T	-
20	1-	0+	1	1-	1+	2-	1+	2-	7	1	0	0+	0+	1	1	0+	1+	4	73.8	11	9	18	A	-
21	1+	1+	2	3-	4-	4	3+	4	32	1	1	1+	3-	3	4-	3+	4-	27	74.2	15	14	18	A	-
22	4	2	2+	3-	2-	2+	4-	3+	27	4	2	1+	2-	1+	2	4-	4	27	73.8	17	14	18	T	-
23	1+	1+	2	3-	2+	1+	1+	0+	12	2-	1	2-	2+	2-	1-	0	0	9	75.5	16	17	20	A	-
24	1	0+	3-	1+	1-	1-	2-	1+	9	1	0	2+	1-	0	0	1	1-	5	75.9	23	17	20	T	-
25	1-	0	1-	1-	1+	3+	2-	3-	12	1-	0	0+	0+	1-	3-	1+	2	8	75.7	16	14	20	T	-
26	2+	2	3	3	3-	3	2+	1+	22	3-	2	3	3	2	2+	2-	1	18	75.6	12	11	20	TA	-
27	2+	3	3	4+	4	4-	3	3	38	3	2+	3-	4	4	4-	2+	2+	32	75.4	11	10	19	-	-
28	4-	3-	3	3-	2+	2-	1+	1	21	4-	3	3-	2	2	1	1+	0+	18	75.0	12	11	19	-	-
29	1-	1	3-	2	1	1	1+	1+	10	1-	1	2+	1+	0	1-	1	1-	7	75.3	11	12	19	-	-
30	1-	1-	1-	1	2-	1+	1+	0+	7	1-	1	0	1	1+	1	1	0	5	74.6	15	14	19	-	-
31	1-	1+	1+	1+	2	1+	1+	1	9	1	1+	1	1-	1	0	0+	0+	5	71.9b	15	15	16	-	-
Mean									19.0									14.8	73.3	14.8	13.3	17.2		

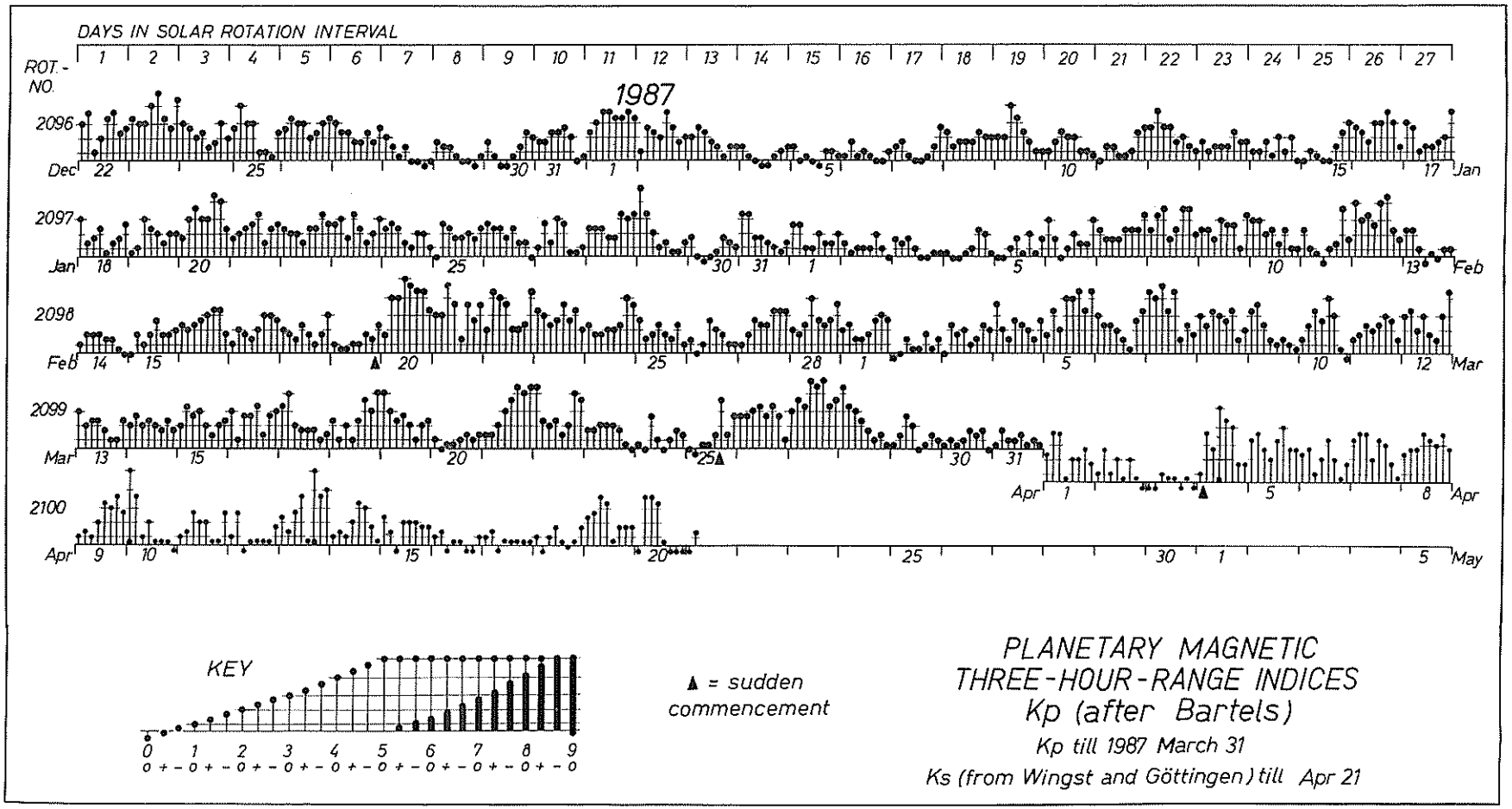
D A I L Y A V E R A G E I N D I C E S Ap

DAY	1986 APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	1987 JAN	FEB	MAR
1	8	5	15	7	6	9	7	13	13	18	7	9
2	5	43	8	13	5	16	23	6	8	10	4	3
3	14	40	10	8	19	7	9	16	6	6	4	6
4	4	17	7	7	20	7	7	67	7	3	4	10
5	9	17	5	7	9	9	19	20	4	3	4	21
6	4	67	6	5	6	8	12	12	4	3	7	10
7	5	12	12	4	4	5	5	6	6	5	9	21
8	5	7	7	6	7	5	6	4	4	7	14	12
9	13	5	7	6	10	6	6	3	6	10	11	9
10	19	6	13	6	6	6	3	5	12	6	8	11
11	6	6	6	4	7	16	4	14	8	5	7	8
12	10	7	6	6	10	89	2	9	4	10	18	14
13	5	4	6	7	10	22	28	5	12	6	4	8
14	4	3	6	4	5	12	31	5	20	5	5	8
15	7	4	5	4	6	18	14	12	4	5	6	10
16	8	7	5	5	4	7	6	11	12	12	12	12
17	6	8	8	8	5	14	6	8	5	10	9	10
18	7	5	9	6	3	20	13	6	6	8	7	12
19	11	8	5	4	4	21	21	4	6	7	5	11
20	5	5	6	3	15	18	14	5	7	18	29	4
21	7	6	6	6	29	11	11	3	11	10	19	18
22	11	3	8	7	29	4	6	2	14	10	18	15
23	10	8	5	5	25	43	5	12	22	11	14	6
24	12	7	7	15	22	22	2	46	10	7	12	5
25	7	10	3	17	17	26	4	49	11	7	7	6
26	7	8	5	20	12	27	3	17	14	7	6	13
27	4	7	28	16	13	20	16	9	9	7	12	26
28	11	3	18	9	12	13	9	5	3	11	13	12
29	9	4	11	17	22	13	15	10	3	10		5
30	5	10	9	11	27	5	14	14	4	4		4
31		17		12	16		6		7	8		4
MEAN	8	12	8	8	12	17	11	13	8	8	10	10

PLANETARY 3-HOUR-RANGE INDICES (Kp) BY 27-DAY SOLAR ROTATION INTERVAL

University of Gottingen

Kp through March 31, 1987



P R I N C I P A L M A G N E T I C S T O R M S

MARCH 1987

Sta	Geomag Lat	Commencement Day	Commencement Time (UT)	Type	SC Amplitudes D (Min)	SC Amplitudes H (Gamma)	SC Amplitudes Z (Gamma)	Maximum 3-Hour K Index Day(3-Hour Periods)	K	Ranges D (Min)	Ranges H (Gamma)	Ranges Z (Gamma)	End Day	End Hour (UT)
		FEB												
KRC	16.4N	27	0358	..	..	..	..	27(6,7)	5	4	79	28	01	23
		MAR												
KRC	16.4N	03	03--	..	..	..	..	05(6) 07(3)	5	5	80	27	09	18
HYB	07.6N	04	1000	..	..	..	..	05(5)	5	3	89	14	05	23
KGL	56.5S	05	1230	..	..	..	..	05(5,6)	5	26	128	64	06	03
HYB	07.6N	06	1800	..	..	..	..	07(3,5)	4	2	81	30	07	21
HYB	07.6N	08	0622	SC	- 0.2	13	0	08(3)	4	2	74	12	08	23
KRC	16.4N	10	01--	..	..	..	..	10(5,6)	5	2	77	30	10	20
KRC	16.4N	11	02--	..	..	..	..	16(4,5)	5	2	78	25	17	16
HYB	07.6N	16	0600	..	..	..	..	16(5)	5	3	109	16	17	19
KRC	16.4N	18	04--	..	..	..	..	18(3,6,7)	4	2	53	15	19	23
KRC	16.4N	20	21--	..	..	..	..	21(5,6)	5	8	110	42	23	17
HYB	07.6N	21	0500	..	..	..	..	21(6)	6	3	155	19	22	02
ETT	00.6S	21	0000	..	..	..	..		-	5	181	57	23	14
KGL	56.5S	21	1430	..	..	..	..	21(6) 22(1)	5	20	208	200	22	02
KRC	16.4N	25	04--	..	..	..	..	27(4,6)	5	4	72	35	28	21
ETT	00.6S	26	0130	..	..	..	..		-	4	142	48	28	20
FRD	49.6N	27	----	..	..	..	..	27(4,5) 28(1)	5	21	100	35	28	--
HYB	07.6N	27	0200	..	..	..	..	27(4,5,6)	5	4	111	19	28	10

Stations Reporting:

BJI = BEIJING
COL = COLLEGE
ETT = ETAIYAPURAM
FRD = FREDERICKSBURG
GNA = GNANGARA
GUA = GUAM
HER = HERMANUS
HYB = HYDERABAD
KRC = KARACHI
KGL = KERGUELEN
PMG = PORT MORESBY
SIT = SITKA
WIT = WITTEVEEN

RADIO PROPAGATION QUALITY INDICES

MARCH 1987

Day	Bracknell	Teheran	For Circuits Norddeich to: New York	Tokyo	Johannesburg	Canberra
1	5.5	6.1	7.8	7.8	7.2	7.1
2	6.2	7.9	7.4	6.6	6.0	5.9
3	6.6	8.5	7.7	7.4	6.8	8.0
4	6.2	7.4	7.6	8.0	7.8	7.2
5	6.2	9.0	6.6	8.7	7.4	6.2
6	3.7	6.6	3.4	8.5	6.4	4.3
7	3.9	7.7	2.0	5.2	5.9	4.8
8	4.8	8.6	2.6	6.4	6.5	5.0
9	3.9	6.3	2.8	7.6	4.7	4.4
10	3.9	7.6	3.8	6.6	5.5	3.7
11	4.6	6.6	5.3	8.3	5.4	5.1
12	4.7	8.5	4.9	6.8	7.0	3.9
13	5.0	6.9	4.1	6.2	5.0	5.0
14	4.5	7.6	3.8	6.9	6.1	5.3
15	5.2	8.3	4.1	8.1	5.2	6.0
16	5.1	8.5	4.9	5.7	6.6	5.5
17	4.8	7.4	4.9	6.1	5.8	5.9
18	5.5	6.9	6.7	7.0	6.7	6.2
19	4.2	6.7	5.0	5.4	3.9	4.9
20	4.8	8.2	6.8	5.8	5.1	6.4
21	4.9	7.7	5.5	8.4	6.6	5.6
22	3.3	5.6	3.9	3.1	5.0	3.7
23	4.4	6.6	4.7	6.8	6.7	5.1
24	5.4	8.4	6.2	7.5	5.1	5.8
25	5.5	8.1	6.7	8.5	6.9	6.2
26	4.6	6.4	6.4	7.9	6.5	6.2
27	5.1	7.1	5.5	9.0	5.8	6.5
28	5.7	4.0	6.9	7.2	6.1	5.3
29	5.7	5.9	7.1	9.3	6.0	6.2
30	5.9	5.0	7.7	8.8	6.9	6.4
31	5.0	3.8	6.8	5.7	6.6	6.0
Mean	5.0	7.1	5.5	7.1	6.1	5.6

CALCULATION OF QUALITY INDICES (Q)

From all 24 hourly field strength values and from all frequencies of the same circuit a median field strength value is calculated (FD). This daily value is compared with the average value (FA) of the preceeding 27 days (1 sun rotation).

$$Q = 6.0 + 20 \log(FD/FA)/3.0$$

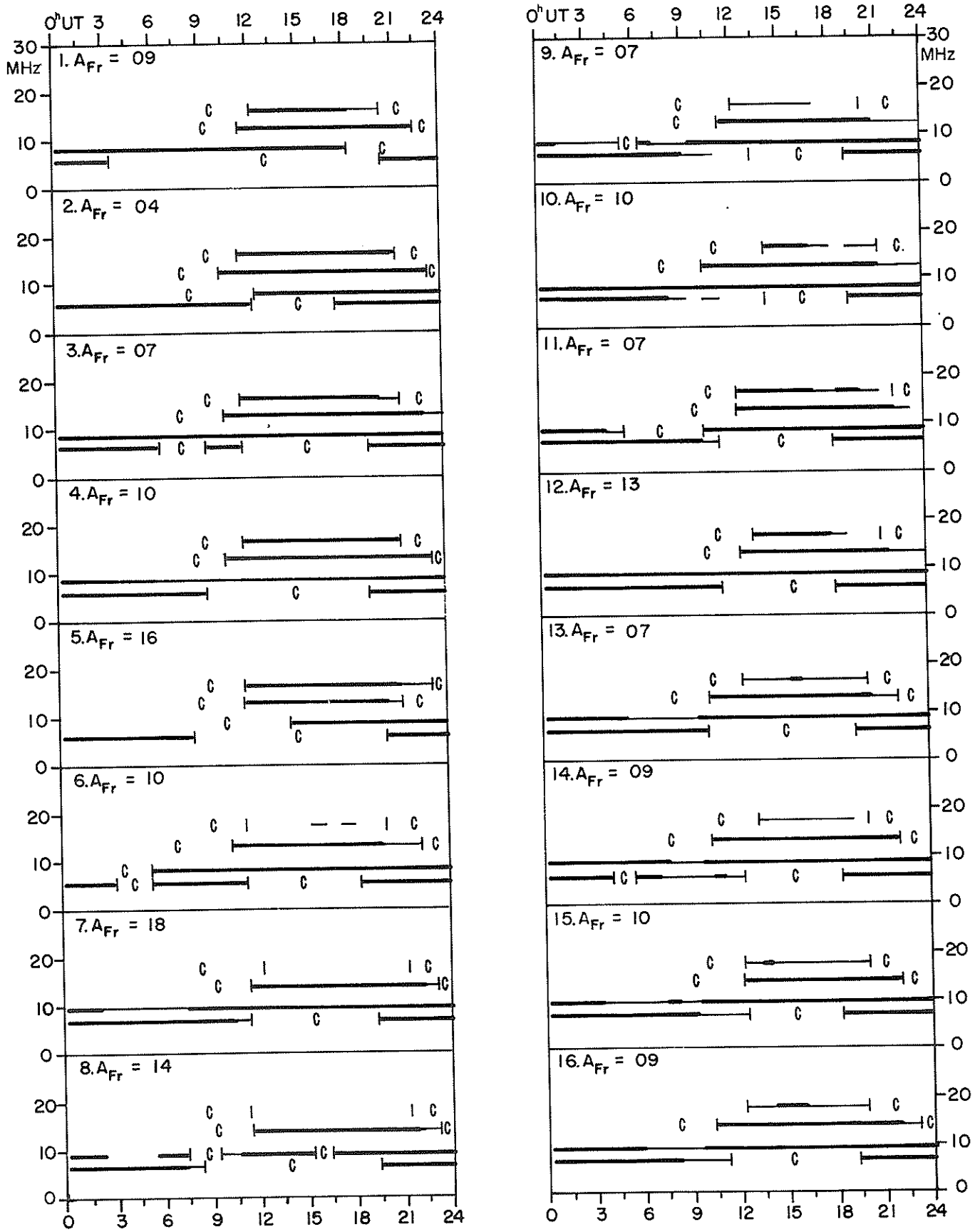
The quality indices vary from 0.0 to 9.9 where 6.0 is normal. Conditions are "normal" (index = 6.0), if they correspond to the average of the preceeding 27 days.

SCALE FOR QUALITY INDICES

0.0 - 1.0 = very poor
1.1 - 3.0 = poor
3.1 - 5.0 = fair
5.1 - 7.0 - normal
7.1 - 9.0 = good
9.1 - 9.9 = very good

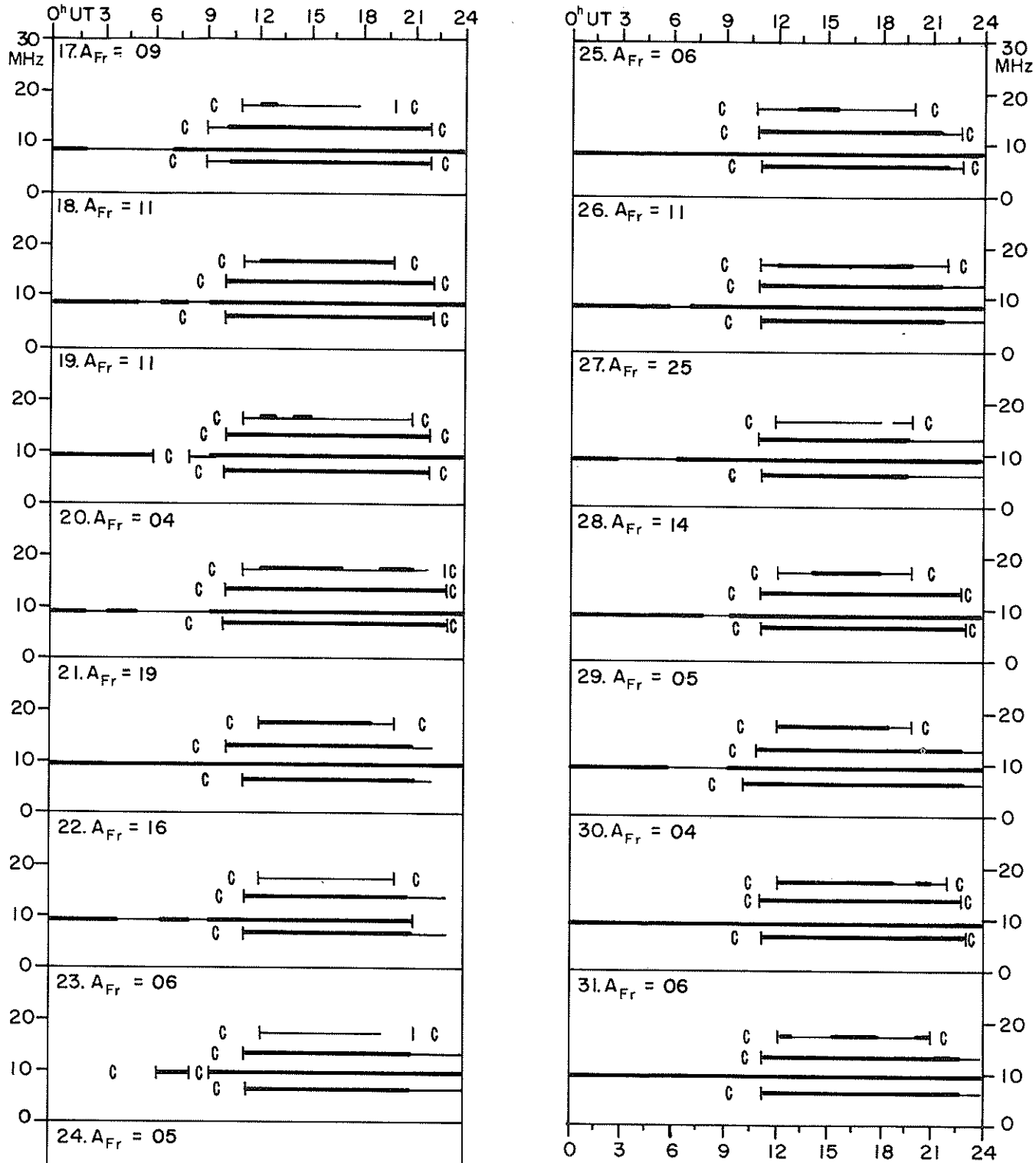
TRANSMISSION FREQUENCY RANGES -- NORTH ATLANTIC PATH

March 1987



TRANSMISSION FREQUENCY RANGES -- NORTH ATLANTIC PATH

March 1987



Field strengths from four frequencies, 6.4, 8.6, 13.0, and 17.0 MHz, observed on a Norddeich-New York circuit are represented above. Heavy solid lines represent field strengths ≥ -12 dB above 1 μV/m (transmitter power reduced to 1 kW). Observed field strengths between -12 dB and -40 dB above 1 μV/m are represented by the fine line.

C O N T E N T S

Prompt Reports LATE DATA Number 513 Part I

COSMIC RAY INDICES
(Neutron Monitor)

JANUARY 1987

Day	THULE Average (cts/h)/100	ALERT Average (cts/h)/100	DEEP RIVER Average (cts/h)/300	KIEL Average (cts/h)/100	CLIMAX Average (cts/h)/100	PREDIGTSTUHL Average (cts/h)/100	TOKYO Average (cts/h)/256	HUANCAYO Average (cts/h)/100
1	4629	7526.7	7151.0	6380.2	4258.5		3689.2	
2	4623	7518.9	7172.5	6401.5	4251.4		3678.2	
3	4606	7535.1	7184.5	6394.6	4241.0		3679.8	
4	4613	7548.5	7173.5	6391.8	4241.0		---	
5	4623	7547.7	7183.8	6428.6	4260.8		3676.8	
6	4618	7546.0	7184.0	6435.0	4267.9		3689.1	
7	4619	7560.0	7210.5	6419.7	4262.8		3689.7	
8	4615	7557.7	7199.5	6413.2	4265.8		3696.5	
9	4605	7523.1	7196.9	6411.4	4273.0		3698.0	
10	4616	7553.0	7204.9	6421.7	4268.7		3706.1	
11	4623	7572.2	7238.2	6444.4	4256.4		3703.5	
12	4627	7547.5(7)	7236.0	6442.6	4257.4		3687.0	
13	4630	7541.4(19)	7221.4	6437.5	4265.8		3701.1	
14	4637	7545.9	7227.2	6444.9	4292.6		3702.4	
15	4633	7539.2	7216.4	6417.9	4292.3		3699.8	
16	4642	7510.0	7218.1	6422.1	4308.0(28)		3697.5	
17	4654	7526.4	7248.4	6424.8	4308.6		3703.7	
18	4647	7531.1	7233.0	6427.9	4306.8		3709.5	
19	4635	7504.9	7236.2	6415.0	4303.9		3711.1	
20	4610	7490.4	7219.1	6392.9	4296.8		3713.8	
21	4609	7471.7	7216.7	6389.4	4287.5		3706.9	
22	4609	7473.8	7219.2	6395.0	4279.0		3703.8	
23	4600	7482.8	7258.7	6411.5	4285.9		3692.3	
24	4606	7481.4	7259.3	6409.2	4293.2		3703.1	
25	4602	7479.4	7246.9	6423.9	4286.0		3707.4	
26	4593	7481.7	7239.7	6464.7	4268.0		3708.0	
27	4608	7500.4	7251.6	6473.6	4280.5		3704.7	
28	4621	7514.1	7265.0	6502.7	4297.0		3702.0	
29	4632	7532.6	7242.3	6492.3	---		3700.5	
30	4655	7558.5	7286.1	6490.0	4302.0(8)		3704.7	
31	4658	7562.2	7282.8	6466.6	4312.1		3714.1	
Mean	4623	7524.7	7223.4	6428.6	4277.9		3699.4	

For less than 24-hour coverage, parentheses enclose the number of hours for which data are available.
For Climax and Huancayo, parentheses enclose the number of section hours whenever the sum of both sections falls below 40 hours.

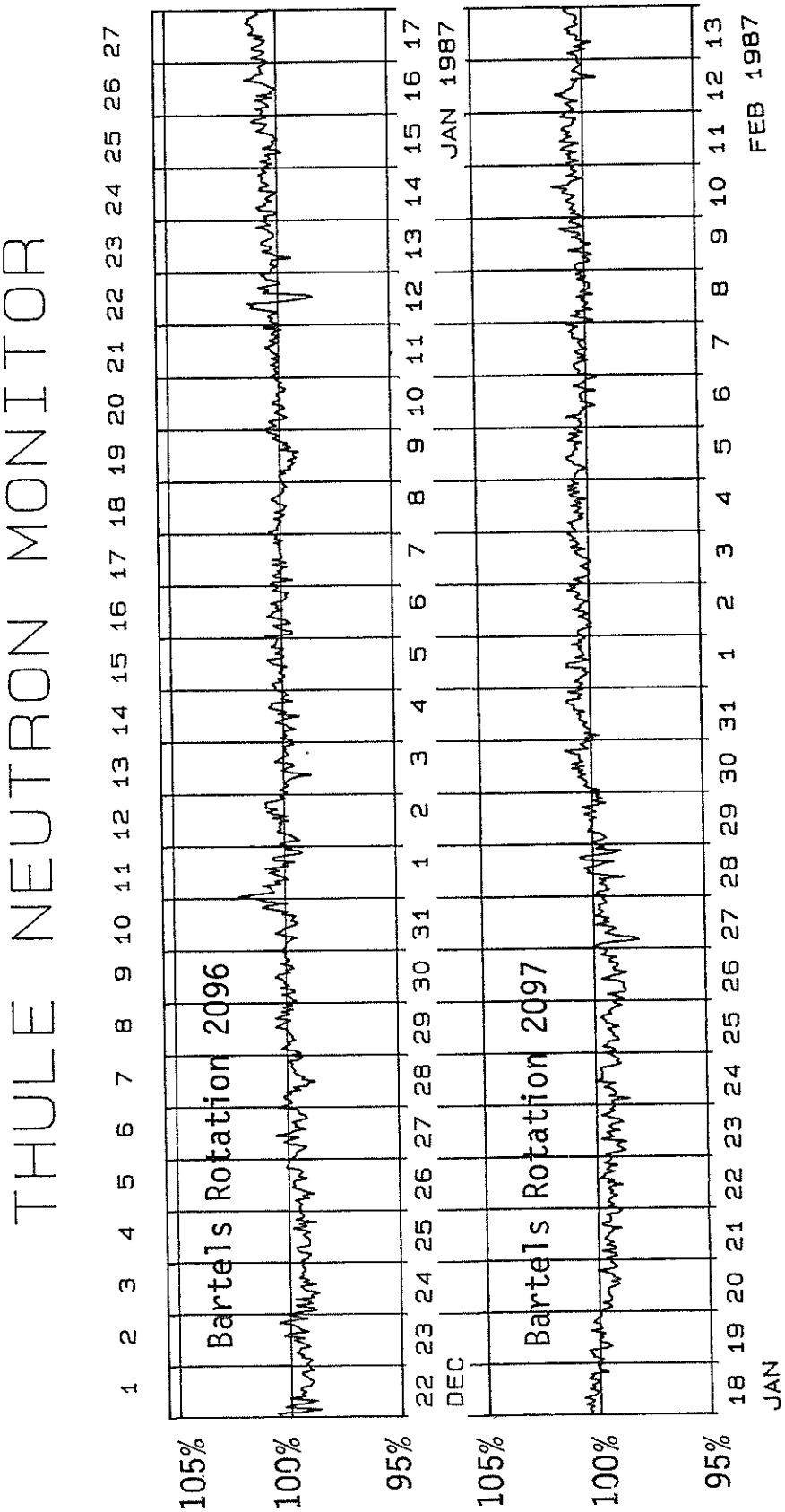
COSMIC RAY INDICES
(Neutron Monitor)

FEBRUARY 1987

Day	THULE Average (cts/h)/100	ALERT Average (cts/h)/100	DEEP RIVER Average (cts/h)/300	KIEL Average (cts/h)/100	CLIMAX Average (cts/h)/100	PREDIGTSTUHL Average (cts/h)/100	TOKYO Average (cts/h)/256	HUANCAYO Average (cts/h)/100
1	4656	7563.5	7279.1	6481.9	4310.9		3715.7	
2	4653	7569.6	7274.5	6486.6	4300.4		3701.9	
3	4653	7552.1	7284.2	6475.9	4310.7		3728.4	
4	4661	7569.1	7299.1	6475.0	4323.7		3732.3	
5	4660	7569.0(12)	7297.2	6476.8	4309.3		3718.5	
6	4642	7544.7(22)	7266.4	6456.6	4289.9		3715.8	
7	4653	7549.3	7279.3	6484.0	4287.6		3719.2	
8	4638	7509.0	7271.5	6458.1	4292.7		3716.8	
9	4647	7501.1(7)	7282.5	6468.4	4305.0		3717.4	
10	4662	7520.8(22)	7285.1	6504.0	4310.8		3714.0	
11	4665	7527.7	7309.0	6522.7	4319.3		3710.2	
12	4654	7520.6	7320.1	6537.9	4340.3		3719.5	
13	4650	7518.5	7311.6	6512.4	4331.1		3724.7	
14	4645	7502.8	7298.8	6495.2	4330.5		3714.0	
15	4639	7510.6	7307.4	6495.6	4327.1		3717.1	
16	4643	7525.4(23)	7289.6	6508.9	4344.6		---	
17	4641	7492.5	7275.2	6493.1	4323.6		3711.9	
18	4653	7480.4	7286.1	6502.6	4333.6		3706.1	
19	4667	7488.3	7311.7	6505.3	4345.8		3721.2	
20	4608	7432.2	7242.4	6470.8	4321.0		3719.0	
21	4606	7478.2	7253.6	6480.4	4333.0		3715.0	
22	4617	7483.2	7257.0	6470.4	4324.8		3707.9	
23	4615	7457.5	7276.7	6483.4	4340.8		3724.3	
24	4623	7496.1	7272.0	6480.6	4342.5		3723.5	
25	4624	7519.4	7260.7	6476.3	4334.1		3729.9	
26	4665	7579.3	7295.3	6485.8	4346.3		3728.8	
27	4659	7590.5	7287.8	6508.5	4555.7		3731.4	
28	4634	7547.2	7263.0	6481.1	4334.4		3733.9	
Mean	4644	7521.4	7283.5	6488.4	4324.0		3719.2	

For less than 24-hour coverage, parentheses enclose the number of hours for which data are available.
For Climax and Huancayo, parentheses enclose the number of section hours whenever the sum of both sections falls below 40 hours.

90
Late
Jan-Feb 87



GEOMAGNETIC ACTIVITY INDICES

February 1987

Day		Kp Three-Hourly Indices 1	2	3	4	5	6	7	8	Sum	Ap	Cp	Km Three-Hourly Indices 1	2	3	4	5	6	7	8	Am	aa Provisional N	S	M	
1		3-	3-	1	1	2	1+	1+	2	14	7	0.4	2	2	1	1+	2+	2	1+	2-	13	14	13	11	16	CC
2	Q2	1+	1-	1	1	1	2	1	0+	8+	4	0.1	1+	1-	1	1+	2-	2	1	1	9	8	6	5	9	CC
3	Q1	2-	1+	2-	1	0+	0+	1-	1-	8-	4	0.1	2-	1	2-	1+	1-	1-	1	1	8	6	8	9	5	CC
4	Q4	1-	0+	0+	1-	1	2+	2	1-	8	4	0.1	1	1	1-	1	2-	2+	2	0+	9	9	7	5	12	CC
5	Q3	0+	0+	1	2-	1-	2	1-	2-	8+	4	0.1	1	1-	1	2-	1	2	1-	2-	9	8	11	9	10	CC
6		3	2-	0+	1	2	1+	1+	3	14-	7	0.4	3-	1+	1-	2-	2+	2-	1+	3-	14	15	14	14	16	K
7		2+	2-	2-	2-	2+	2+	2+	3+	18-	9	0.5	2	1+	1+	1+	2+	2+	2	3	16	17	16	11	23	
8	D5*	2+	3+	4-	2-	2+	4-	4-	2	23-	14	0.8	2	3-	3	2-	2+	4	3	2	25	24	28	21	32	
9		2+	2+	2-	3	3-	3-	1	3+	19	11	0.6	2	2-	1+	3	3-	3-	1	3-	18	26	18	20	26	
10		3	3	2	2+	1+	2+	1	1	16	8	0.5	3-	2	1+	2+	2-	2+	1+	1	14	16	11	18	9	
11	Q10A	2+	1	1-	0	1	1+	4-	2-	12-	7	0.3	2	1	1	0+	1+	1+	3+	2	12	13	11	9	16	K
12	D3*	4	3	3+	3-	4	4+	2+	2-	25+	18	1.0	3	3-	3-	3-	4	4	2	2-	31	34	25	25	35	
13	Q7	2+	2+	1	0	1-	0+	1	1	9-	4	0.2	2	2-	1+	0	1+	0+	1+	1+	8	8	7	10	6	C
14	Q5	1	2-	2-	2-	1+	1+	1-	0+	10-	5	0.2	2-	2-	2-	2	1	2-	1-	0+	9	7	8	9	7	CC
15	Q9	0+	2-	1	2-	3-	2-	2-	2	13-	6	0.3	0+	1	1-	1+	3-	1+	2-	2	11	11	9	6	15	CC
16		2+	2	2+	3-	3	3+	3+	2-	21-	12	0.7	2	1+	3-	3	3+	3	3	2-	23	22	18	15	26	
17		1	2	2-	1+	2	3	3	3-	17-	9	0.5	1	2-	1+	1+	2+	3-	3-	3-	16	19	11	8	22	
18		2	2-	1+	2+	2-	1	2-	3	15-	7	0.4	2-	1+	1	2+	2-	1	1+	2+	12	14	9	11	12	CK
19	Q6	1	1-	1-	1	1	2-	1+	2+	10-	5	0.2	1+	1-	0+	1-	1	2-	1+	2+	9	9	6	4	12	C
20	D1	2-	4	4	5	5-	4+	4+	3+	31+	29	1.3	2	4-	3+	4+	4+	4+	3+	3-	45	42	40	36	46	
21	D2*	3	3	5-	4-	1+	4-	3-	4-	26-	19	1.0	3-	2+	4-	3	1+	4-	3-	3	27	31	24	27	29	
22	D4*	2	4+	4	4-	2	2	2+	4+	25-	18	1.0	2	4-	3+	4-	2+	2-	2	4-	28	26	23	30	20	
23		3+	3	2+	3-	4-	3-	3+	2	23	14	0.8	2+	2+	2	3-	3+	3-	3	2-	22	22	16	17	22	
24		2+	2-	2-	2	2	2+	4	4-	20-	12	0.7	2-	1+	1+	2+	2+	2+	4-	3	21	23	14	12	26	
25		3-	1+	2-	2+	2-	1+	2+	1	14+	7	0.4	2	1	1+	2+	1+	2-	2+	1	12	13	10	13	10	C
26	Q8	1+	0+	1	3-	2	2-	1	1	11	6	0.2	1+	0+	1	3-	2	1+	1-	1	9	9	10	10	9	CK
27		1	2-	3-	2+	2+	3+	3+	3+	20	12	0.7	1	1+	3	2+	2+	3	3+	3	22	30	22	16	36	
28		2	2-	2+	4	3-	2+	3-	4-	21+	13	0.7	2-	2	2+	4-	3-	2-	2+	3	22	24	21	20	26	
Mean											10	0.51									16.9	18.0	15.0		16.6	

Day	Kn Three-Hourly Indices 1	2	3	4	5	6	7	8	An	Ks Three-Hourly Indices 1	2	3	4	5	6	7	8	As	S_a	Prov R_I	R_a	R_s	IMF	
1	2	2+	1+	1+	2+	2+	1+	2-	14	2	2-	1	1+	2	2-	1+	2-	12	69.2	0	0	13	-	-
2	1+	1	1+	1+	1+	2+	1+	1	9	2-	0+	1-	1+	2-	2-	1-	1-	8	69.8	0	0	13	-	-
3	1+	1	2-	1+	1-	1-	1	0+	7	2	1+	2	1+	0+	1-	1	1+	8	70.0	0	0	14	-	-
4	1-	1-	0+	1-	2-	3-	2	0+	9	1	1	1-	1+	2-	2	2	1-	9	68.3	0	0	12	-	-
5	1-	0+	1+	2-	1	2	0+	2-	8	1+	1-	1	2	1	2	1	2-	9	67.5	0	0	11	-	-
6	2+	1+	1-	1+	2+	2-	1+	3-	13	3-	2-	1	2	2	2-	2-	3-	15	67.7	0	0	11	-	-
7	2-	1+	1+	2-	2+	3-	2	3	16	2	1+	1+	1+	2+	2	2	3	15	69.1	0	0	13	-	-
8	2	3	3	2-	3-	4	3+	2	27	2	3-	3-	1+	2+	4-	3	2	23	68.9	0	0	12	-	-
9	2-	2-	1+	3+	3	3-	1	3	20	2	2-	1	2+	2+	2+	1+	3-	16	69.2	0	12	13	-	-
10	3-	2	1+	3-	2	3-	2-	1+	16	2+	2-	1+	2+	1+	2	1	1-	12	69.3	7	9	13	-	-
11	2-	1	1-	0+	1+	2-	4-	2	12	2+	1+	1+	0+	1	1+	3	2	12	68.5	7	7	12	-	-
12	3	3-	3	3	4	4+	2+	2	35	3	3-	2+	2+	4	4-	2	2-	28	67.8	7	0	11	-	-
13	2	2-	1	0	1+	1-	1+	1+	9	2-	1+	1+	0	1	0+	1+	1	7	68.0	0	0	11	-	-
14	1+	1+	2-	2	1+	2	1+	0+	10	2	2	2	2	1-	1+	0+	0+	9	68.3	8	0	12	-	-
15	1-	1	1	2-	3-	2-	2-	2	12	0+	1+	0+	1+	3-	1+	1+	2	10	69.3	7	0	13	-	-
16	2	2-	3-	3	3	3	3+	2-	25	2	1+	2	3+	3+	3	3-	2-	22	68.4	0	0	12	-	-
17	1	2	1+	1+	3-	3	3	2+	17	1+	2-	1+	1+	2	2+	2+	3-	14	68.1	0	11	12	-	-
18	2-	2-	1+	3-	2	1+	1+	3-	13	2-	1+	1	2	1+	1-	1	2+	10	69.8	0	0	13	-	-
19	1+	1-	1-	1-	1+	2	2-	3-	10	1+	0+	0+	1-	1	1+	1+	2+	7	69.5	0	0	13	-	-
20	2	4-	3+	4+	5-	4+	4-	3	46	2+	4-	3+	5-	4	4	3	3-	44	69.6	7	0	13	-	-
21	3-	3-	4+	3	2-	4-	3-	3	32	2+	2	3	3-	1+	3	2+	3	23	70.7	7	0	14	-	-
22	2-	4	3+	4-	3-	2	2+	4-	30	2	3	3	4-	2+	2-	2-	4-	26	70.4	7	0	14	-	-
23	2+	2	2	3-	4-	3-	3	2-	23	2	2+	2-	2+	3+	2+	3	2-	20	70.5	0	0	14	-	-
24	2-	1+	2-	3-	3-	3-	4-	3+	23	2-	1+	1	2+	2+	2	3+	3-	18	72.1	0	0	16	-	-
25	2	1	2-	3-	2-	2-	3-	1+	13	2	1	1+	2+	1	1+	2-	1	10	73.5	14	12	17	-	-
26	1+	0+	1	3-	2+	2-	1	1	10	1+	0+	1	2+	2-	1+	1-	1-	8	73.9	14	11	18	-	-
27	1-	1+	3-	2	2+	3+	4-	3+	23	1+	2-	3	3-	2+	3-	3+	2+	22	74.0	19	10	18	-	-
28	2	2	3-	4-	3-	2	3-	3+	23	2-	2-	2+	4-	3-	2-	2	3	21	72.7*	8	12	17	-	-
Mean									18.0									15.6	69.8	4.0	3.0	13.4		

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UAG-86 [Superseded by UAG-92]

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