U.S. DEPARTMENT OF COMMERCE
C. William Verity, Jr., Secretary-Designate
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
J. Curtis Mack II, Assistant Secretary, NOAA
NATIONAL ENVIRONMENTAL SATELLITE, DATA, AND INFORMATION SERVICE
Thomas N. Pyke, Jr., Assistant Administrator

Solar - Geophysical Data Part I (Prompt Reports)

NO. 521 JANUARY 1988

DATA FOR
DECEMBER 1987
NOVEMBER 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. 1988 Subscription Prices for the U.S.: $70.00 annually for both Part I (Prompt Reports) and Part II (Comprehensive Reports) or $40.00 annually for either Part. Annual supplement containing explanation is included. Foreign subscriptions: For 1988 issues -- $106.00 annually for both parts or $58.00 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)497-6223 (FTS 320-6223).

For obtaining bulletins on a data exchange basis, send request to: World Data Center A for Solar-Terrestrial Physics, NOAA/NESDIS/NGDC, E/GC2, 325 Broadway, Boulder, Colorado 80303 U.S.A.

BACK ISSUES OF "SOLAR-GEOPHYSICAL DATA"

Reel#	Coverage	Medium	Reel#	Coverage	Medium	Reel#	Coverage	Medium
1	Jan 56 - Dec 56	Microfilm	9	Jan 64 - Dec 64	Microfilm	17	Jul 69 - Dec 69	Microfilm
2	Jan 57 - Dec 57	Microfilm	10	Jan 65 - Dec 65	Microfilm	18	Jan 70 - Jun 70	Microfilm
3	Jan 58 - Dec 58	Microfilm	11	Jan 66 - Sep 66	Microfilm	19	Jul 70 - Dec 70	Microfilm
4	Jan 59 - Dec 59	Microfilm	12	Oct 66 - Dec 66	Microfilm	20	Jan 71 - Jun 71	Microfilm
5	Jan 60 - Dec 60	Microfilm	13	Jan 67 - Dec 67	Microfilm	21	Jul 71 - Dec 71	Microfilm
6	Jan 61 - Dec 61	Microfilm	14	Jan 68 - Jun 68	Microfilm	22	Jan 72 - Jun 72	Microfilm
7	Jan 62 - Dec 62	Microfilm	15	Jul 68 - Dec 68	Microfilm	23	Jul 72 - Dec 72	Microfilm
8	Jan 63 - Dec 63	Microfilm	16	Jan 69 - Jun 69	Microfilm		1973 - 1987	Microfiche

Microfilm are available at $30.00 per reel; microfiche at $96.00 per year; $2,130.00 for the above set. Back issues in booklet form are available, as long as the stocks exist, at $4.00 for either Part. Any entire year of back issues in booklet form is available at the current annual subscription rate, as long as the stocks exist. Please add a ten dollar ($10.00) handling fee for non-U.S.A. orders. Prices are subject to change.

To standardize referencing these reports in the open literature, the following format is recommended: Solar-Geophysical Data, 515 Part I (or Part II), pages, July 1987, U.S. Department of Commerce (Boulder, Colorado, USA 80303).

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

NUMBER 521

(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).

DETAILED INDEX OF OBSERVATIONS PUBLISHED IN "SOLAR-GEOPHYSICAL DATA"

CODE	KIND OF OBSERVATION	MAY 87	JUN	JUL	AUG	SEP	OCT	NOV	DEC
A.	SOLAR AND INTERPLANETARY EVENTS								
A.1	Sunspot Drawings	515A 35	516A 38	517A 36	518A 36	519A 34	520A 36	521A 32	
A.2aa	Internat. Provisional Sunspot Numbers	514A 9	515A 7	516A 9	517A 9	518A 9	519A 9	520A 9	521A 9
A.2c	American Sunspot Numbers	514A 9	515A 7	516A 9	517A 9	518A 9	519A 9	520A 9	521A 9
A.3a	Mt. Wilson Magnetograms	515A 35	516A 38	517A 36	518A 36	519A 34	520A 36	521A 32	
A.3b	Mt. Wilson Sunspot Magnetic Class	515A 66	516A 68	517A 67	518A 67	519A 64	520A 67	521A 62	
A.3c	Kitt Peak Magnetograms	515A 35	516A 38	517A 36	519A121	519A 34	520A 36	521A 32	
A.3d	Mean Solar Magnetic Field (Stanford)	514A 27	515A 20	516A 29	517A 26	518A 26	519A 25	520A 26	521A 24
A.3e	Stanford Magnetograms	515A 35	516A 38	517A 36	517A 36	519A 34	520A 36	521A 32	
A.4	H-alpha Filtergrams	515A 35	516A 38	517A 36	517A 36	519A 34	520A 36	521A 32	
A.5	Calcium Plage Photographs/Drawings	519A114							
A.5a	Calcium Plage Regions	Apr 87 in 519A105							
A.5b	Daily Calcium Plage Indices	Apr 87 in 519A108							
A.6	H-alpha Synoptic Charts	515A 24	516A 32	517A 30	518A 30	519A 28	520A 30	521A 26	
A.6b	Active Region Carte Synoptique (Paris)	519B 4	520B 5	521B 4					
A.6c	Stanford Solar Mag Field Synoptic Maps	515A 26	516A 33	517A 31	518A 31	519A 29	520A 31	521A 27	
A.6d	Kitt Peak " Mag Field Synoptic Maps	515A 32	516A 36	517A 34	518A 34	519A 32	520A 34	521A 30	
A.6e	Mass Ejections from the Sun	519B 55	520B 23	521B 30					
A.6f	Active Prominences and Filaments	519B 56	520B 24	521B 31					
A.6g	Sac Peak Coronal Line Synoptic Maps	515A 28	516A 34	517A 32	518A 32	519A 30	520A 32	521A 28	
A.7h	Coronal Line Emission (Sac Peak)	515A 35	516A 38	517A 46	518A 36	519A 34	520A 36	521A 32	
A.8aa	2800 MHz - Solar Flux (Ottawa)	514A 9	515A 7	516A 9	517A 9	518A 9	519A 9	520A 9	521A 9
A.8ac	2800 MHz - Adj. Solar Flux (Ottawa)	514A 9	515A 7	516A 9	517A 9	518A 9	519A 9	520A 9	521A 9
A.8g	Adjusted Daily Solar Fluxes (Sagamore)	514A 9	515A 7	516A 9	517A 9	518A 9	519A 9	520A 9	521A 9
A.10a	Interferometric Chart (164 MHz) Nancay	515A102	515A 18	517A 92	517A 24	518A 24	519A 23	---	521A 21
A.10c	East-West Scans - 21 cm - Fleurs	514A 23	515A 16	516A 26	517A 23	518A 23	519A 22	520A 24	521A 20
A.10d	East-West Scans - 43 cm - Fleurs	514A 24	515A 17	516A 27	---	---	---	---	---
A.10e	East-West Scans - 10 cm - Ottawa	514A 22	515A 15	516A 25	517A 22	518A 22	519A 21	520A 23	521A 19
A.10f	East-West Scans - 3 cm - Toyokawa	514A 21	515A 14	516A 24	517A 21	518A 21	519A 20	520A 22	521A 18
A.11g	Solar X-ray GOES (graphs/event table)	519B 46	520B 16	521B 28					
A.12e	Solar Particles (IMP H & J)	Jan 84-Apr 85 in 505B 34; May-Aug 85 in 510B 26							
A.13e	Solar Plasma (IMP H & J)	Feb-Mar 86 in 509B 34; Mar-Oct 86 in 511B 26; Nov 86-Apr 87 in 517B 31							
A.16a	SMM Solar Irradiance	1980-1985 in 515B 26							
A.16b	NIMBUS Solar Irradiance	Nov 78-Oct 84 in 499B 26							
A.17	Interplanetary Mag Field (Pioneer 12)	517A 97 518A 96							
A.17c	Inferred Interplanetary Mag Field	Mar 86 in 500A 21; Mar 87 in 512A 21							
B.	IONOSPHERIC RADIO PROPAGATION								
B.52	Field Strength Graphs-North Atlantic	515A 96	516A 84	517A 88	518A 92	519A 86	520A 92	521A 92	
B.53	Quality Indices on Paths to Germany	515A 95	516A 83	517A 90	518A 91	519A 88	520A 94	521A 91	
C.	SOLAR FLARE-ASSOCIATED EVENTS								
C.1a	H-alpha Flares	514A 14	515A 12	516A 18	517A 14	518A 14	519A 14	520A 14	521A 14
C.1ba	H-alpha Flare Groups	519B 6	520B 8	521B 6					
C.1d	Flare Patrol Observations	514A 20	515A 13	516A 23	517A 20	518A 20	519A 19	520A 21	521A 17
C.1d	Flare Patrol Observations	519B 16	520B 11	521B 13					
C.3	Radio Bursts Fixed Freq.	519B 18	520B 13	521B 15					
C.3	Radio Bursts Fixed Freq. Selected	514A 25	515A 19	516A 28	517A 25	518A 25	519A 24	520A 25	521A 22
C.4d	Radio Bursts Spectral (Culgoora)	515A 75	514A 77	521A100	521A101	521A103	521A105	521A 73	
C.4e	Radio Bursts Spectral (Weissenau)	515A 75	516A 74	517A 78	518A 78	519A 75	520A 80	521A 73	
C.4f	Radio Bursts Spectral (Sagamore Hill)	515A 75	516A 74	517A 78	518A 78	519A 75	520A 80	521A 73	
C.4i	Radio Bursts Spectral (Bleien)	---	---	---	---	---	---	---	
C.4k	Radio Bursts Spectral (Learmonth)	515A 75	516A 74	517A 78	518A 78	519A 75	520A 80	521A 73	
C.4l	Radio Bursts Spectral (Palehua)	515A 75	516A 74	517A 78	518A 78	519A 75	520A 80	521A 73	
C.6	Sudden Ionospheric Disturbances	515A 73	516A 72	517A 76	518A 75	519A 73	520A 78	521A 71	
D.	GEOMAGNETIC & MAGNETOSPHERIC EVENTS								
D.1a	Geomagnetic Indices	515A 90	519A100	517A 83	518A 86	519A 81	520A 87	521A 86	
D.1ba	27-day Chart of Kp Indices	515A 92	516A 80	517A 85	518A 88	519A 83	520A 89	521A 88	
D.1c	27-day Chart of C9								
D.1cb	Monthly Mean aa Indices	515A 93	516A 81	517A 86	518A 89	519A 84	520A 90	521A 89	
D.1d	Principal Magnetic Storms	515A 94	516A 82	517A 87	518A 90	519A 85	520A 91	521A 90	
D.1f	Sudden Commencements/Flare Effects	516A 91	517A101	518A104	520A 98	520A 98			
D.1g	Equatorial Indices Dst	516A 90	517A106	519A 99					
F.	COSMIC RAYS								
F.1a	Cosmic Ray Neutron Cts (Deep River)	515A 86							
F.1b	Cosmic Ray Neutron Cts (Climax)	515A 86	516A 78	518A103	518A 84	519A 79	520A 86	521A 82	
a.1e	Cosmic Ray Neutron Cts (Alert)	515A 86							
F.1h	Cosmic Ray Neutron Cts (Thule)	515A 86	517A 99	517A 81	518A 84	519A 79	521A 96	521A 82	
F.1i	Cosmic Ray Neutron Cts (Kiel)	515A 86	516A 78	517A 81	518A 84	519A 79	520A 86	521A 82	
F.1j	Cosmic Ray Neutron Cts (Tokyo)	515A 86	519A 96	519A 97	519A 98	519A 79	521A 96	521A 82	
F.1l	Cosmic Ray Neutron Cts (Huancayo)	515A 86	516A 78	520A 96					
H.	MISCELLANEOUS								
H.60	IUWDS Alert Periods	514A 5	515A 4	516A 5	517A 5	518A 5	519A 5	520A 5	521A 5

The entry "515A 35" under May 1987, for example, means that the sunspot drawings for May 1987 appear in SOLAR-GEOPHYSICAL DATA No. 515, Part I, and that they begin on page 35. "A" denotes Part I and "B", Part II. Blanks indicate data not yet received and dashes mark unavailable data.

C O N T E N T S

Prompt Reports DATA FOR DECEMBER 1987 Number 521 Part I

ALERT PERIODS

INTERNATIONAL URSIGRAM AND WORLD DAYS SERVICE

Summary of the Geoalert Messages DECEMBER 1987

Julian Day	Date of Issue	Date of Obser-vation	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
335	01	30	026	092	002	S22 W12	0	0	0	01	S22 W12	Q	Solquiet, Magquiet.
						N24 W10	0	0	0		N24 W10	Q	
336	02	01	036	090	004	S22 W25	0	0	0	02	S22 W25	Q	Solquiet, Magquiet.
						N31 E31	0	0	0		N31 E31	Q	
						N25 W22	0	0	0		N25 W22	Q	
337	03	02	025	089	004	S21 W38	1	0	0	03	S21 W38	Q	Solquiet, Magquiet.
						N24 W34	0	0	0		N24 W34	Q	
338	04	03	035	088	013	S21 W55	0	0	0	04	S21 W55	Q	Solquiet, Magquiet.
						N27 E07	1	0	0		N27 E07	Q	
						S22 E34	0	0	0		S22 E34	Q	
339	05	04	014	088	011	S23 E19	0	0	0	05	S23 E19	Q	Solquiet, Magquiet.
340	06	05	017	089	012	S22 E05	2	0	0	06	S22 E05	Q	Solquiet, Magquiet.
341	07	06	033	088	006	S22 W90	0	0	0	07	S22 W90	Q	Solquiet, Magquiet.
						S22 W10	3	0	0		S22 W10	Q	
342	08	07	037	088	002	S22 W23	0	0	0	08	S22 W23	Q	Solquiet, Magquiet.
						N26 W28	0	0	0		N26 W28	Q	
343	09	08	052	091	000	S21 W37	2	0	0	09	S21 W37	Q	Solquiet, Magquiet.
						N27 W41	0	0	0		N27 W41	Q	
						S34 W62	0	0	0		S34 W62	Q	
344	10	09	048	094	003	S21 W51	3	0	0	10	S21 W51	E	Solquiet, Magquiet.
						S34 W76	0	0	0		S34 W76	Q	
						S19 W36	0	0	0		S19 W36	Q	
345	11	10	043	093	015	S19 W66	1	0	0	11	S19 W66	E	Solquiet, Magalert 11.
						S32 W89	0	0	0		S32 W89	Q	
						S19 W50	0	0	0		S19 W50	Q	
346	12	11	029	094	011	S19 W77	0	0	0	12	S19 W77	E	Solquiet, Magnil.
						S21 W60	0	0	0		S21 W60	Q	
347	13	12	038	098	009	S21 W87	0	0	0	13	S21 W87	Q	Solquiet, Magquiet.
						N26 W57	0	0	0		N26 W57	Q	
						S34 E80	1	0	0		S34 E80	E	
348	14	13	037	094	003	N28 W74	0	0	0	14	N28 W74	Q	Solquiet, Magquiet.
						S32 E70	0	0	0		S32 E70	E	
						S25 E32	0	0	0		S25 E32	Q	
349	15	14	041	094	001	S33 E58	0	0	0	15	S33 E58	E	Solquiet, Magquiet.
						S26 E14	0	0	0		S26 E14	Q	
						S27 E60	1	0	0		S27 E60	Q	
350	16	15	044	097	011	S33 E47	2	0	0	16	S33 E47	E	Solquiet, Magquiet.
						S25 E08	0	0	0		S25 E08	Q	
						S25 E47	0	0	0		S25 E47	E	

ALERT PERIODS
INTERNATIONAL URSIGRAM AND WORLD DAYS SERVICE

Summary of the Geoalert Messages DECEMBER 1987

Julian Day	Date of Issue	Date of Obser-vation	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
351	17	16	040	099	025	S33 E37	6	0	0	17	S33 E37	E	Solquiet, Magalert
						S26 W06	0	0	0		S26 W06	Q	Minor 17/17.
352	18	17	047	095	014	S32 E23	2	0	0	18	S32 E23	E	Solquiet, Magnil.
						S26 W20	0	0	0		S26 W20	Q	
						N21 E69	0	0	0		N21 E69	Q	
353	19	18	042	093	007	S33 E10	0	0	0	19	S33 E10	Q	Solquiet, Magquiet.
						S26 W38	0	0	0		S26 W38	Q	
						N22 E56	0	0	0		N22 E56	Q	
354	20	19	039	091	008	S32 W10	1	0	0	20	S32 W10	Q	Solquiet, Magquiet.
						N21 E41	0	0	0		N21 E41	Q	
						S17 W57	0	0	0		S17 W57	Q	
355	21	20	033	090	004	S33 W22	0	0	0	21	S33 W22	Q	Solquiet, Magquiet.
						S22 W77	0	0	0		S22 W77	Q	
						N22 E30	0	0	0		N22 E30	Q	
356	22	21	022	094	010	S32 W35	0	0	0	22	S32 W35	Q	Solquiet, Magquiet.
						S17 W90	4	0	0		S17 W90	Q	
357	23	22	025	091	020	S33 W46	0	0	0	23	S33 W46	Q	Solquiet, Magquiet.
						S39 W31	0	0	0		S39 W31	Q	
358	24	23	025	091	009	S33 W59	0	0	0	24	S33 W59	Q	Solquiet, Magquiet.
						S37 W43	0	0	0		S37 W43	Q	
359	25	24	022	093	006	S34 W72	0	0	0	25	S34 W72	Q	Solquiet, Magquiet.
						S39 W53	0	0	0		S39 W53	Q	
						S34 E87	1	0	0		S34 E87	E	
360	26	25	036	102	006	S33 W85	0	0	0	26	S33 W85	Q	Solquiet, Magquiet.
						S33 E71	4	0	0		S33 E71	A	
						S21 W12	0	0	0		S21 W12	Q	
361	27	26	032	106	003	S33 E62	10	2	0	27	S33 E62	A	Solquiet, Magquiet.
						N15 E02	0	0	0		N15 E02	Q	
		Presto:[2] Boulder Tenflare 170 flux units 26/1949 UT duration 15 minutes.											
362	28	27	028	105	000	S34 E50	8	0	0	28	S34 E50	A	Solquiet, Magquiet.
363	29	28	037	106	000	S34 E38	12	0	0	29	S34 E38	A	Solquiet, Magquiet.
364	30	29	047	105	003	S34 E26	7	0	0	30	S34 E26	E	Solquiet, Magquiet.
						S34 W40	0	0	0		S34 W40	Q	
365	31	30	047	103	001	S35 E13	3	0	0	31	S35 E13	E	Solquiet, Magquiet.
						S35 W48	1	0	0		S35 W48	Q	
001	01	31	040	103	003	S33 E00	3	0	0	01	S33 E00	Q	Solquiet, Magquiet.
						S33 W59	0	0	0		S33 W59	Q	

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

STRATWARM ALERTS

10 December Stratwarm exists. Major warming in progress. Large warm region over the eastern hemisphere, sloping from northeastern Asia at the lower stratosphere to northern Europe at the upper stratosphere. Temperature gradient reversed between 60° N and the pole throughout the stratosphere and mean zonal flow from the east poleward of 60° N from 30 HPA upwards.

11 December Stratwarm exists. Major warming continues. Large warm region over northern Asia and Europe influences most parts of the hemisphere. Temperature gradient reversed between 60° N and the pole throughout the stratosphere and mean zonal flow from the east poleward of 60° N from 30 HPA upwards.

12 December Stratwarm exists. Major warming continues. Warming over northern Europe, Russia, Siberia, and the whole Arctic slowly weakening, but temperature gradient continuously reversed between 60° N and the pole throughout the stratosphere and mean zonal flow from the east polewards of 60° N above 30 HPA.

13 December Stratwarm exists. Major warming continues. Large warm region further exists over northern Europe, Siberia, and the Arctic, but slowly weakening. The coldest temperature exists over central Canada. Temperature gradient continuously reversed between 60° N and the pole throughout the whole stratosphere and mean zonal flow from the east polewards of 60° N from 30 HPA up to the upper stratosphere.

14 December Stratwarm exists. Major warming continues. Extensive warming over Siberia, northern Europe, and the Arctic continuously weakening. Coldest temperature gradient further reversed between 60° N and the pole throughout the whole stratosphere and mean zonal flow from the east polewards of 60° N from 30 HPA up to the upper stratosphere.

15 December Stratwarm exists. Major warming continues. At 10-HPA level large warm region over northwestern Siberia, northern Europe, and the Arctic continues, but warming slowly weakening. The coldest temperature exists over northwestern Canada. Temperature gradient further reversed between 60° N and the pole throughout the whole stratosphere and mean zonal flow from the east polewards of 60° N from 30 HPA up to the upper stratosphere.

16 December Stratwarm exists. Major warming continues. Warming over northern Europe, Siberia, and the adjacent Arctic continuously weakening, but temperature gradient still reversed between 60° N and the pole throughout the whole stratosphere. The coldest temperature exists over Alaska, extending northwestwards. Mean zonal flow still from the east polewards of 60° N above 30 HPA up to the upper stratosphere.

17 December Stratwarm exists. Major warming continues. Warming over northern Europe, Siberia, and the adjacent Arctic further weakening, but temperature gradient continuously reversed in the lower and middle stratosphere up to around 10 HPA. Mean zonal flow from the east polewards of 60° N only still around 10-HPA level.

18 December Stratwarm exists. Anticyclonic circulation over high latitudes in the middle and low stratosphere with reversed temperature gradient between 60° N and the pole in the upper stratosphere. Weak cooling over polar latitudes continues.

19 December Stratwarm exists. Weakening of major warming continues. Circulation reversal confined to middle stratosphere north of 70° N.

20 December Stratwarm exists. Weakening of major warming continues. Slow return to normal conditions.

21 December Stratwarm ends. Major warming finished.

INTERNATIONAL RELATIVE SUNSPOT NUMBERS

Day	Final Jan 87	Feb	Mar	Apr	May	Jun	Prov Jul	Aug	Sep	Oct	Nov	Dec
01	19	0	13	14	39	15	0	45	33	34	56	17
02	15	0	23	12	40	11	0	47	38	26	57	16
03	13	0	15	10	27	0	0	39	37	37	57	18
04	12	0	16	13	23	0	0	33	38	58	46	12
05	11	0	24	28	24	10	13	31	39	48	47	15
06	10	0	23	47	27	0	0	32	44	48	27	19
07	11	0	24	56	34	0	9	38	56	39	31	34
08	0	0	22	64	25	0	12	45	67	55	43	39
09	0	0	14	69	23	0	13	39	64	50	42	37
10	0	7	11	77	25	0	11	47	59	51	30	34
11	0	0	9	80	26	11	0	56	58	63	28	17
12	0	0	0	80	23	21	0	48	44	53	22	13
13	0	0	0	79	22	14	0	47	25	74	15	20
14	8	8	10	77	13	10	0	49	18	92	23	26
15	9	7	11	78	39	11	11	49	21	101	19	42
16	0	0	11	60	50	12	17	55	14	101	33	40
17	13	0	22	41	68	14	12	46	25	91	46	39
18	13	0	21	36	54	24	17	43	32	86	48	43
19	9	0	12	29	65	13	23	45	35	82	51	28
20	9	0	12	12	46	22	33	51	38	79	49	26
21	14	7	15	19	41	29	67	48	32	61	51	14
22	20	7	17	26	38	38	87	34	23	50	70	24
23	23	0	19	25	40	37	102	39	26	33	89	17
24	14	0	19	35	38	38	92	35	25	22	71	10
25	13	7	16	25	37	38	88	35	11	29	42	28
26	14	9	12	21	37	41	85	34	10	40	50	22
27	13	8	11	11	35	33	77	24	19	70	27	29
28	20	8	12	14	21	41	60	23	22	79	20	28
29	15		13	20	17	25	60	11	26	78	20	30
30	14		15	30	15	14	62	10	26	85	20	42
31	11		15		12		73	20		78		43
Mean	10.4	2.4	14.7	39.6	33.0	17.4	33.0	38.6	33.5	61.1	40.9	26.5

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	Jan 87	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
01	71.6	69.2	72.8	72.5	79.3	77.8	76.0	91.0	85.3*	84.2	99.1	87.6
02	70.5	69.8	73.3	71.9	80.2	77.9	74.4	89.7	85.5	84.8	105.0	86.5
03	69.1	70.0	71.6	72.4	82.8	76.4	73.7	87.1	87.5	85.6*	98.0	85.8
04	69.0	68.3	73.3	74.0	84.4	77.3	73.2	84.0	89.6	89.2	101.1*	85.1
05	70.3	67.5	73.7	77.6	86.1	76.1	73.4	81.6	93.5*	90.1	99.2	86.8
06	69.3	67.7	75.6	89.4	87.9	75.8	73.3	85.2	95.6*	89.5	94.9	85.7
07	69.7	69.1	75.5	94.4	88.1	76.0	74.1	89.5*	99.5*	90.9	94.4	85.3
08	68.2	68.9	76.9	94.8	89.1	77.0	76.1	93.8	101.9	95.0	92.7	88.7
09	68.0	69.2	73.6	100.5	87.3	76.8	76.3	94.8	100.9	92.7	90.3	91.2
10	67.4	69.3	71.4	100.0	89.5	78.1	76.3	94.0	97.8	101.1	89.2	90.1
11	68.0	68.5	70.5	101.3	86.4	80.7	75.7	99.8*	95.4	100.8*	92.6	91.1
12	68.9	67.8	69.5	98.6	85.4	82.1	75.5	100.0	91.1	102.2	92.6	91.5*
13	69.7	68.0	69.6	99.3	87.4	82.3	75.1	101.8*	89.7	105.5	92.9	91.1
14	71.1	68.3	71.1	97.7	91.2	80.6	76.6	102.4	86.8	113.3*	92.3	91.5
15	71.5	69.3	70.5	97.8	93.6	80.4	78.8	101.3	85.0	117.8I	93.7	92.0*
16	70.7	68.4	71.0	95.3*	98.2	81.3	80.9	102.7	83.5	111.1	95.0	93.4*
17	70.8	68.1	71.2	97.3	96.7	81.8	81.5	101.2	84.0	106.0	96.8	92.2
18	70.6	69.8	72.5	94.0	98.5	82.9	82.5	100.4	82.4	106.5	100.0	90.2
19	70.0	69.5	71.5	91.7	100.1	82.4	85.1	99.0	82.7	100.4	106.6	88.4
20	68.9	69.6	73.8	85.6	99.8	81.1	93.8	101.2	84.9	95.6	112.2	86.9
21	71.2*	70.7	74.2	78.3	99.9	82.6	95.6	96.6	83.0	89.3	115.3	90.7
22	73.6*	70.4	73.8	76.5	101.0	87.1	102.6*	94.4*	81.3	88.2	117.8	88.1
23	72.1	70.5	75.5	76.5	94.9	87.5	115.6	91.8	80.4	87.0	115.1	88.2
24	71.6	72.1	75.9	78.6	98.5	89.1	115.0	89.6	80.3	87.1	109.4	89.9
25	71.5	73.5	75.7	75.8	96.8	86.3	114.9	89.9	77.9	92.3	104.9	96.2*
26	72.6	73.9	75.6	74.3	92.3	84.3	109.8*	87.3	76.4	96.9	101.3	96.8*
27	69.9	74.0	75.4	74.8	87.5	78.9	105.4	85.1	80.2	105.9	94.9	101.4
28	70.8	72.7*	75.0	74.3	85.1	79.2	102.5	81.3	82.3	106.2	92.3	102.5
29	70.6		75.3	73.6E	79.3	76.6	97.3	79.9	83.5	102.7	90.7	101.4
30	69.8		74.6	76.8	77.9	75.9H	94.0	78.5	81.9	104.2	89.1	99.2
31	68.7		71.9G		77.3		91.9	83.2		97.8		99.7
Mean	70.2	69.8	73.3	85.5	89.8	80.4	87.0	92.2	87.0	97.4	99.0	91.5

* = corrected for burst in progress; E = corrected for snow on antenna; G = corrected for ice on antenna; H = measured at Penticton; I = 1700 UT calibration taken at 1915 UT. The yearly mean 2800 MHz flux equaled 85.3 in 1987.

DAILY SOLAR INDICES

December 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	335	21	17	17	90.1	519	252	120	87.6	78	68	44	24	11
02	336	22	16	14	89.0	473	254	121	86.5	83	67	44	23	11
03	337	23	18	21	88.3	518	267	121	85.8	84	67	44	24	10
04	338	24	12	14	87.6	496	261	120	85.1	87	65	45	44	10
05	339	25	15	21	89.4	449	266	122	86.8	87	66	44	25	10
06	340	26	19	26	88.3	521	273	122	85.7	82	66	45	28	14
07	341	27	34	31	87.9	521	269	121	85.3	90	65	45	39	10
08	342	1	39	35	91.4	511	254	126	88.7	84	68	44	32	10
09	343	2	37	37	94.0	510	263	127	91.2	82	71	45	25	10
10	344	3	34	32	92.9	520	251	129	90.1	85	68	44	30	11
11	345	4	17	21	94.0	411	238	118	91.1	88	69	47	28	11
12	346	5	13	11	94.4*	514	271	125	91.5*	87	70	46	30	12
13	347	6	20	19	94.0	517	266	126	91.1	83	67	46	24	11
14	348	7	26	26	94.4	520	269	125	91.5	87	67	40	28	12
15	349	8	42	34	95.0*	512	264	129	92.0*	87	71	49	28	16
16	350	9	40	35	96.4*	518	257	126	93.4*	87	79	44	28	13
17	351	10	39	33	95.2	523	262	125	92.2	90	73	48	27	13
18	352	11	43	38	93.2	499	271	122	90.2	92	71	--	--	--
19	353	12	28	33	91.3	516	285	124	88.4	83	--	49	36	14
20	354	13	26	27	89.8	290	177	102	86.9	79	66	49	23	13
21	355	14	14	15	93.7	508	257	125	90.7	86	72	50	31	14
22	356	15	24	16	91.0	509	255	122	88.1	84	70	46	30	13
23	357	16	17	20	91.2	509	255	129	88.2	87	71	47	41	13
24	358	17	10	15	92.9	511	293	127	89.9	81	71	50	41	16
25	359	18	28	31	99.5*	461	258	138	96.2*	88	77	49	40	23
26	360	19	22	33	100.1*	418	165	97	96.8*	95	75	49	49	58
27	361	20	29	26	104.8	517	274	137	101.4	93	--	48	35	22
28	362	21	28	32	106.0	508	267	129	102.5	99	72	49	49	31
29	363	22	30	36	104.9	472	279	131	101.4	94	81	49	51	17
30	364	23	42	39	102.6	509	275	130	99.2	102	80	51	54	21
31	365	24	43	40	103.1	517	264	131	99.7	91	79	51	44	24
Mean			26.5	26.7	94.4	493	258	124	91.5	87	70	46	33	15

The International numbers shown above are preliminary values; the American numbers are final.

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:

* = corrected for burst in progress

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

OBSERVED AND PREDICTED SOLAR ACTIVITY INDICES

DECEMBER 1987

	RELATIVE SUNSPOT NUMBERS						2800 MHz RADIO FLUX	
	International (R_i)		American (R_a)		Derived (R_s)		Adjusted to 1 AU (S_a)	
Date	Monthly Mean	Smoothed	Monthly Mean	Smoothed	Monthly Mean	Smoothed	Monthly Mean	Smoothed
Feb 84	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	15	14.7	13	19.5	18	75.5	74
Dec	6.8	16	5.1	14	14.0	19	70.4	75
Jan 87	10.4	18*	9.4	16	13.8	20	70.2	76
Feb	2.4	20*	3.0	18	13.4	22	69.8	78
Mar	14.7	22*	13.3	20	17.2	24	73.3	80
Apr	39.6	24*	39.4	23	30.3	25	85.5	81
May	33.0	26*	30.7	26	35.0	27	89.8	83
Jun	17.4	28*	18.0	28	24.8	29	80.4	84
Jul	33.0*	31(2)*	34.3	31	32.0	32	87.0	--
Aug	38.6*	34(4)*	39.0	34	37.6	35	92.2	--
Sep	33.5*	38(6)*	34.0	37	32.0	38	87.0	--
Oct	61.1*	42(9)*	55.8	42	43.2	43	97.4	--
Nov	40.9*	49(12)*	42.5	48	44.9	50	99.0	--
Dec	26.5*	55(15)*	26.0*	55	36.8	56	91.5	--
Jan 88	----	61(18)*	----	60	----	62	----	--
Feb	----	65(22)*	----	64	----	66	----	--
Mar	----	69(27)*	----	68	----	70	----	--
Apr	----	72(31)*	----	72	----	74	----	--
May	----	76(35)*	----	75	----	77	----	--
Jun	----	81(38)*	----	80	----	82	----	--

*An asterisk marks either a preliminary value or one 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

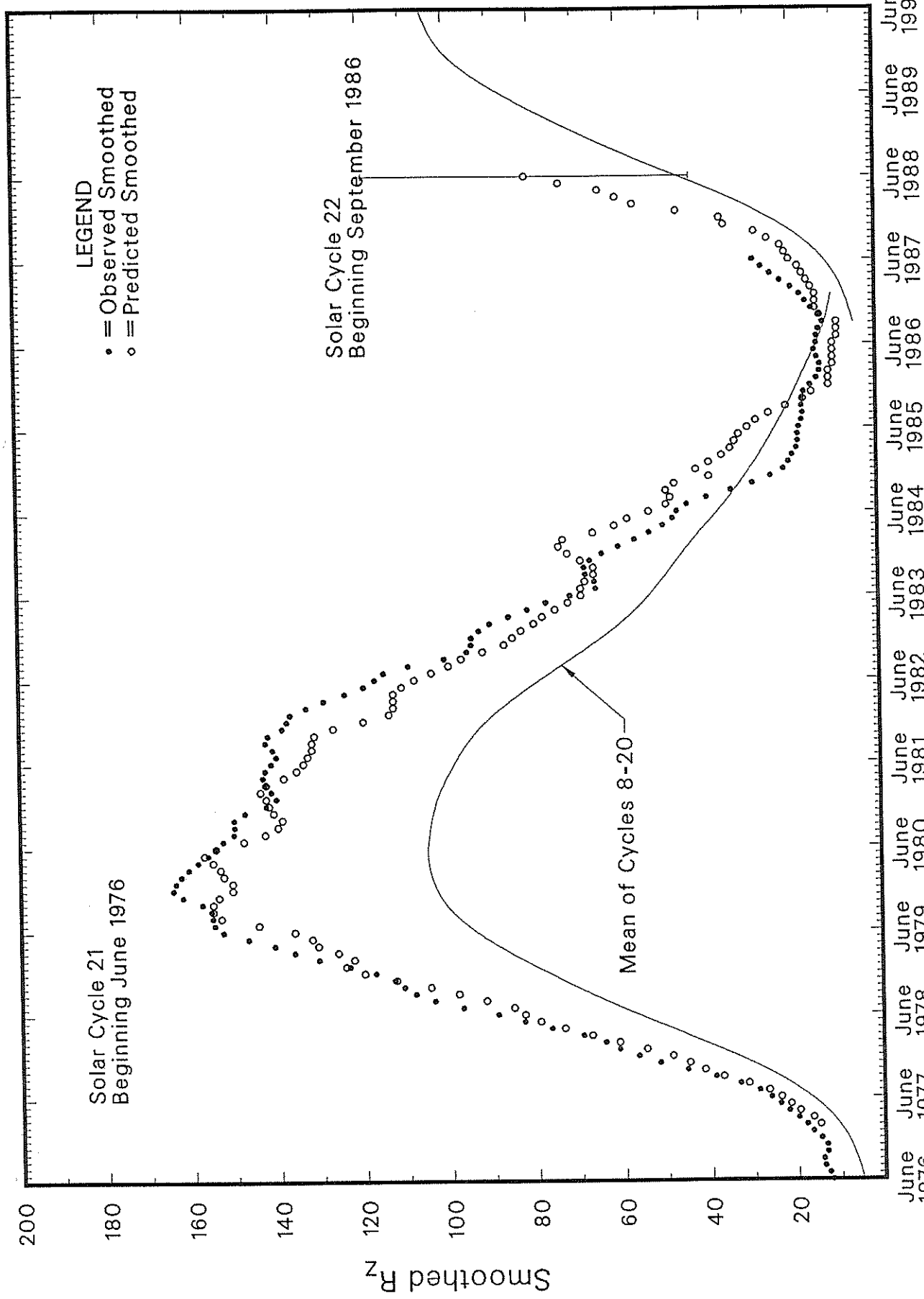
Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1980	164	163	161	159	156	155	153	150	150	150	148	143
1981	140	142	143	143	143	142	140	141	143	142	139	138
1982	137	133	129	124	120	117	115	109	101	96	95	95
1983	93	90	86	82	77	71	66	66	68	68	67	64
1984	60	56	53	50	48	47	44	40	34	29	25	22
1985	21	20	19	18	18	18	17	17	17	17	17	15
1986	14	13	13	14	14	14	14	13	12*	13	15	16
1987	18	20	22	24	27	28	31	34	38	42	49	55
							(2)	(4)	(6)	(9)	(12)	(15)
1988	61	65	69	72	76	81	87	94	100	105	108	110
	(18)	(22)	(27)	(31)	(35)	(38)	(42)	(47)	(51)	(55)	(59)	(62)
1989	113	118	127	136	144	150	156	159	165	170	173	174
	(63)	(62)	(64)	(66)	(68)	(70)	(71)	(72)	(77)	(80)	(81)	(82)
1990	172	171	167	159	151	145	141	138	132	124	116	112
	(84)	(85)	(85)	(82)	(76)	(70)	(68)	(67)	(62)	(56)	(49)	(43)

*September 1986 marks the onset of Sunspot Cycle 22.

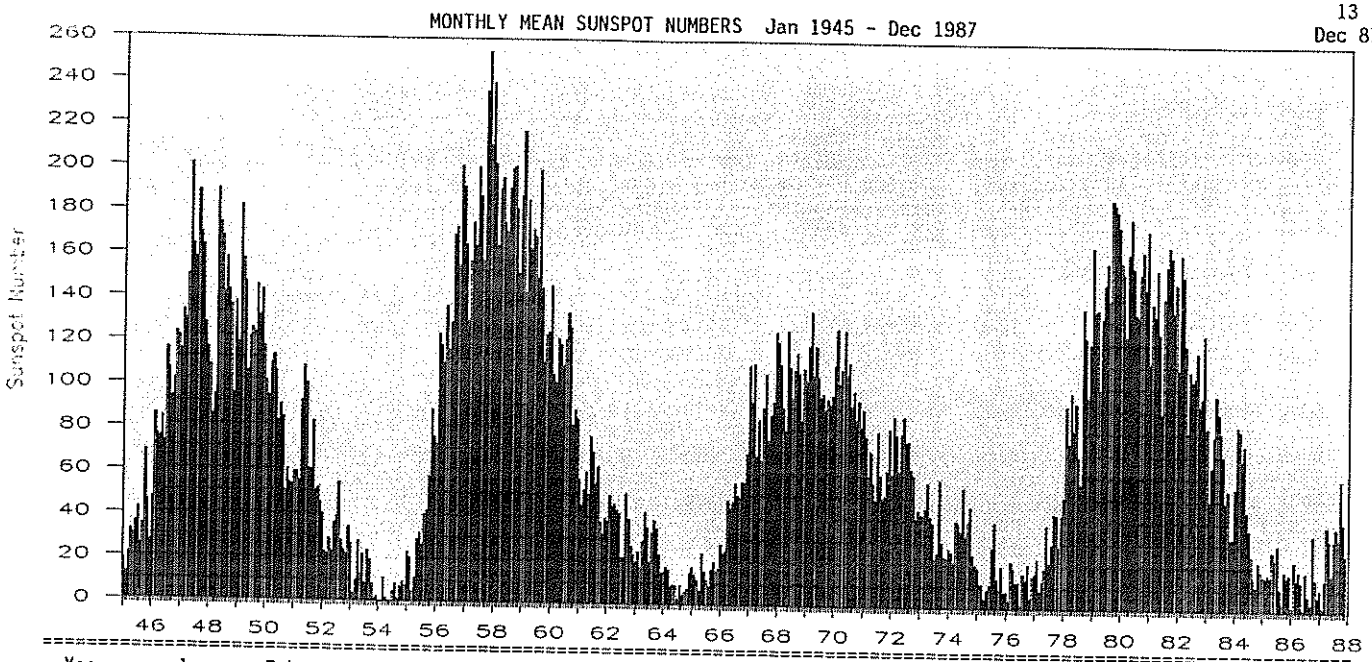
For the end of Solar Cycle 21, and the beginning of Cycle 22, the table gives observed smoothed sunspot numbers up to the one calculated from the most recently measured monthly mean. These smoothed observed values are based on final, unsmoothed monthly means through June 1987 and on provisional numbers thereafter.

Table entries, with numbers in parentheses below them, denote predictions by the McNish-Lincoln method. (See page 9 in the July 1987 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 June 1988 prediction. There exists a 90% chance that in June 1988 the actual smoothed sunspot number will fall somewhere between 43 and 119.

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 minimum value of 12.3 that occurred in September 1986.


OBSERVED AND ONE-YEAR-AHEAD PREDICTED SUNSPOT NUMBERS
LEGEND
• = Observed Smoothed
○ = Predicted Smoothed
Solar Cycle 21
Beginning June 1976
Solar Cycle 22
Beginning September 1986
Mean of Cycles 8-20
Smoothed R_z
200
180
160
140
120
100
80
60
40
20
June 1976
June 1977
June 1978
June 1979
June 1980
June 1981
June 1982
June 1983
June 1984
June 1985
June 1986
June 1987
June 1988
June 1989
June 1990

MONTHLY MEAN SUNSPOT NUMBERS Jan 1945 - Dec 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	38.0
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	159.0
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	47.0
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	38.0
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	10.4	2.4	14.7	39.6	33.0	17.4	33.0*	38.6*	33.5*	61.1*	40.9*	26.5*	29.3*

*Preliminary

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

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

DECEMBER 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	Obs See	Obs Type	Area Measurement Time (UT)	Area Measurement Apparent (10^{-6} Disk)	Area Measurement Corr (Sq Deg)	Remarks
0001	LEAR	02	0517	0517	0523	S23	W27	4898	11	30.1	6	SF		3	C		15		F
0002	LEAR	03	0853	0853	0900	N35	E17	4899	12	4.7	7	SF		3	C		37		FS
0003	RAMY	05	1447	1448	1453	S23	E10	4901	12	6.4	6	SF		3	C		14		F
0004	PALE	05	1740	1748	1749	S21	E08	4901	12	6.3	9	SF		2	C		23		F
0005	PALE	05	1742	1752	1753	S23	W77	4898	11	29.9	11	SF		2	C		13		
0006	LEAR	06	0239	0240	0244	S22	E02	4901	12	6.3	5	SF		3	C		22		F
0007		06	05505	05524	0604	S22	E00	4901	12	6.2	14	1N	C 3.7				169	3.3	E
	LEAR	06	0550	0552	0609	S22	E01	4901	12	6.3	19	SF	C 3.7	3	C		44		
	PEKG	06	0555	0556	0600	S22	W00	4901	12	6.2	5	1N	C 3.7		C	0556	294	3.3	E
0008	HOLL	06	2312	2317	2324	S20	W14	4901	12	5.9	12	SF		4	C		17		
0009	HOLL	08	1916	1918	1930	S22	W34	4901	12	6.2	14	SF		3	C		13		
0010		08	20274	20283	2038	S22	W34	4901	12	6.2	11	SF					14		F
	HOLL	08	2027	2028	2038	S21	W33	4901	12	6.3	11	SF		3	C		14		F
	PALE	08	2031	2031	2037	S22	W34	4901	12	6.2	6	SF		2	C		14		F
0011	LEAR	09	0106	0118	0123	S21	W36	4901	12	6.3	17	SF	C 1.1	3	C		20		
0012	HOLL	09	1508	1509	1513	S22	W44	4901	12	6.2	5	SF		3	C		12		
0013	HOLL	09	1728	1729	1740	S21	W48	4901	12	6.0	12	SF		3	C		15		
0014		14	2114	21152	2136	S24	E63	4908	12	19.7	22	SF	C 1.8				50		F
	RAMY	14	2114	2115	2137D	S24	E62	4908	12	19.7	23D	SF	C 1.8	3	C		54		F
	HOLL	14	2114	2117	2136	S23	E64	4908	12	19.8	22	SF	C 1.8	3	C		47		F
0015	LEAR	15	0245	0247	0251	S33	E59	4906	12	19.8	6	SF		3	C		28		
0016	LEAR	15	0914	0915	0922	S35	E57	4906	12	19.9	8	SF	C 1.1	3	C		11		F
0017	LEAR	16	0317	0318	0323	S35	E47	4906	12	19.9	6	SF		3	C		18		
0018	LEAR	16	0336	0339	0400	S35	E47	4906	12	19.9	24	SF		3	C		42		E
0019	LEAR	16	0437	0439	0442	S35	E47	4906	12	19.9	5	SF		3	C		56		
0020	LEAR	16	0553	0554	0559	S34	E38	4906	12	19.3	6	SF		3	C		26		
0021	RAMY	16	1527	1531	1546	S34	E43	4906	12	20.1	19	SF		5	C		12		
0022	RAMY	16	1616	1620	1637	S35	E42	4906	12	20.0	21	SF		3	C		25		
0023	LEAR	17	0022	0022	0030	S33	E37	4906	12	19.9	8	SF		3	C		16		F
0024	LEAR	17	0226	0227	0237	S34	E32	4906	12	19.6	11	SN		3	C		42		FH
0025		17	0250	02503	0255	S33	E43	4906	12	20.5	5	SN					58	1.8	EF
	LEAR	17	0250	0250	0255	S34	E42	4906	12	20.5	5	SF		3	C		11		F
	PEKG	17	0253E	0253	0255	S32	E44	4906	12	20.6	2D	SN			P	0253	105	1.8	E
0026	RAMY	17	1437	1438	1451	N21	E72		12	23.1	14	SF		3	C		11		
0027	LEAR	19	0207	0208	0210	S35	E06	4906	12	19.6	3	SF		3	C		16		
0028	HOLL	21	1914	1915	1921	S21	W91	4910	12	14.8	7	SF		4	C		26		
0029	HOLL	21	1943	1945	1957	S19	W89	4910	12	15.0	14	SF		4	C		78		
0030	HOLL	21	2009	2012	2013	S21	W91	4910	12	14.9	4	SF		4	C		11		

DECEMBER 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
0031		24	1854	1855	1903	S34	E87		12	31.7	9	SF	C 1.2				42		
	PALE	24	1854	1855	1902	S34	E90		01	1.0	8	SF	C 1.2	3	C				
	HOLL	24	1854	1855	1904	S35	E84		12	31.5	10	SF	C 1.2	3	C		42		
0032	RAMY	25	1734	1735	1743	S32	E69	4912	12	31.2	9	SF		3	C		23		F
0033		25	1903	1903*	1944	S32	E71	4912	12	31.4	41	SF	C 2.5				25		
	RAMY	25	1903	1903	1937	S32	E69	4912	12	31.2	34	SF	C 2.5	3	C		14		
	PALE	25	1921E	1931	1950	S33	E73	4912	12	31.6	29D	SF		3	C		36		
0034	RAMY	25	2041	2050	2106	S34	E76	4912	12	31.9	25	SF	C 2.2	3	C		10		
0035	PALE	25	2216E	2218	2222	S34	E76	4912	01	1.0	6D	SF		3	C		14		
0036	LEAR	26	0024	0024	0033	S34	E76	4912	01	1.1	9	SF		3	C		18		
0037	LEAR	26	0121	0124	0130	S34	E76	4912	01	1.1	9	SF		3	C		28		
0038	LEAR	26	0152	0216	0236	S34	E76	4912	01	1.1	44	1N	C 4.6	3	C		53		
0039	LEAR	26	0237	0244	0257	S34	E76	4912	01	1.2	20	SF		3	C		24		
0040	LEAR	26	0654	0655	0700	S34	E76	4912	01	1.3	6	SF		3	C		24		
0041		26	0903	0904	0912	S34	E70	4912	12	31.9	9	SF					26		
	SVTO	26	0903	0904	0908	S33	E71	4912	01	1.0	5	SF		3	C		22		
	LEAR	26	0903	0904	0915	S34	E70	4912	12	31.9	12	SF		3	C		31		
0042		26	0928	09282	0932	S32	E74	4912	01	1.2	4	SF					14		
	LEAR	26	0928	0928	0933	S32	E76	4912	01	1.4	5	SF		3	C		16		
	SVTO	26	0928	0930	0932	S31	E71	4912	01	1.0	4	SF		3	C		13		
0043	RAMY	26	1804E	1805U	1827	S33	E66	4912	01	1.0	23D	SF	M 1.8	2	C		40		
0044		26	1940	2016*	2137	S34	E64	4912	12	31.9	117	1N	M 1.1				207		FZ
	RAMY	26	1935E	2020U	2124	S34	E66	4912	01	1.1	109D	1N	M 1.1	2	C		178		F
	HOLL	26	1940	2016	2122	S34	E62	4912	12	31.8	102	1N	M 1.1	3	C		225		ZF
	PALE	26	2019E	2026	2204	S34	E63	4912	12	31.9	105D	1N		3	C		218		F
0045	LEAR	27	0107	0107	0113	S33	E62	4912	01	1.0	6	SF		3	C		20		
0046	LEAR	27	0447	0448	0452	S33	E60	4912	01	1.0	5	SF		3	C		30		
0047	LEAR	27	0714	0719	0732	S34	E62	4912	01	1.2	18	SF	C 5.5	3	C		61		F
0048	RAMY	27	1226	1247	1253	S34	E62	4912	01	1.4	27	SF	C 1.3	3	C		38		
0049	RAMY	27	1324	1325	1330	S35	E62	4912	01	1.5	6	SF	C 1.3	3	C		18		
0050	SVTO	27	1420E	1420	1442D	S33	E48	4912	12	31.4	22D	SF		2	C		30		
0051		27	17562	17563	1818	S33	E60	4912	01	1.5	22	SN	C 3.1				36		EF
	RAMY	27	1756	1756	1810	S34	E58	4912	01	1.4	14	SF	C 3.1	2	C		14		F
	HOLL	27	1756	1757	1827	S33	E61	4912	01	1.6	31	SN	C 3.1	3	C		48		FE
	PALE	27	1758	1759	1818	S33	E60	4912	01	1.5	20	SN	C 3.1	3	C		46		F
0052		27	2129	21331	2220	S34	E56	4912	01	1.3	51	SF	C 4.4				53		F
	PALE	27	2126E	2133	2225	S34	E56	4912	01	1.3	59D	SF	C 4.4	3	C		56		F
	HOLL	27	2129	2134	2216	S33	E55	4912	01	1.3	47	SF	C 4.4	3	C		50		F
0053	HOLL	27	2302	2303	2309	S34	E58	4912	01	1.6	7	SF	C 1.1	3	C		15		
0054	LEAR	28	0027	0028	0031	S35	E48	4912	12	31.8	4	SF		3	C		27		
0055	PALE	28	0148	0149	0153	S35	E57	4912	01	1.6	5	SF	C 1.3	3	C		15		
0056	LEAR	28	0416	0418	0433	S33	E50	4912	01	1.1	17	SF	C 1.8	3	C		37		F

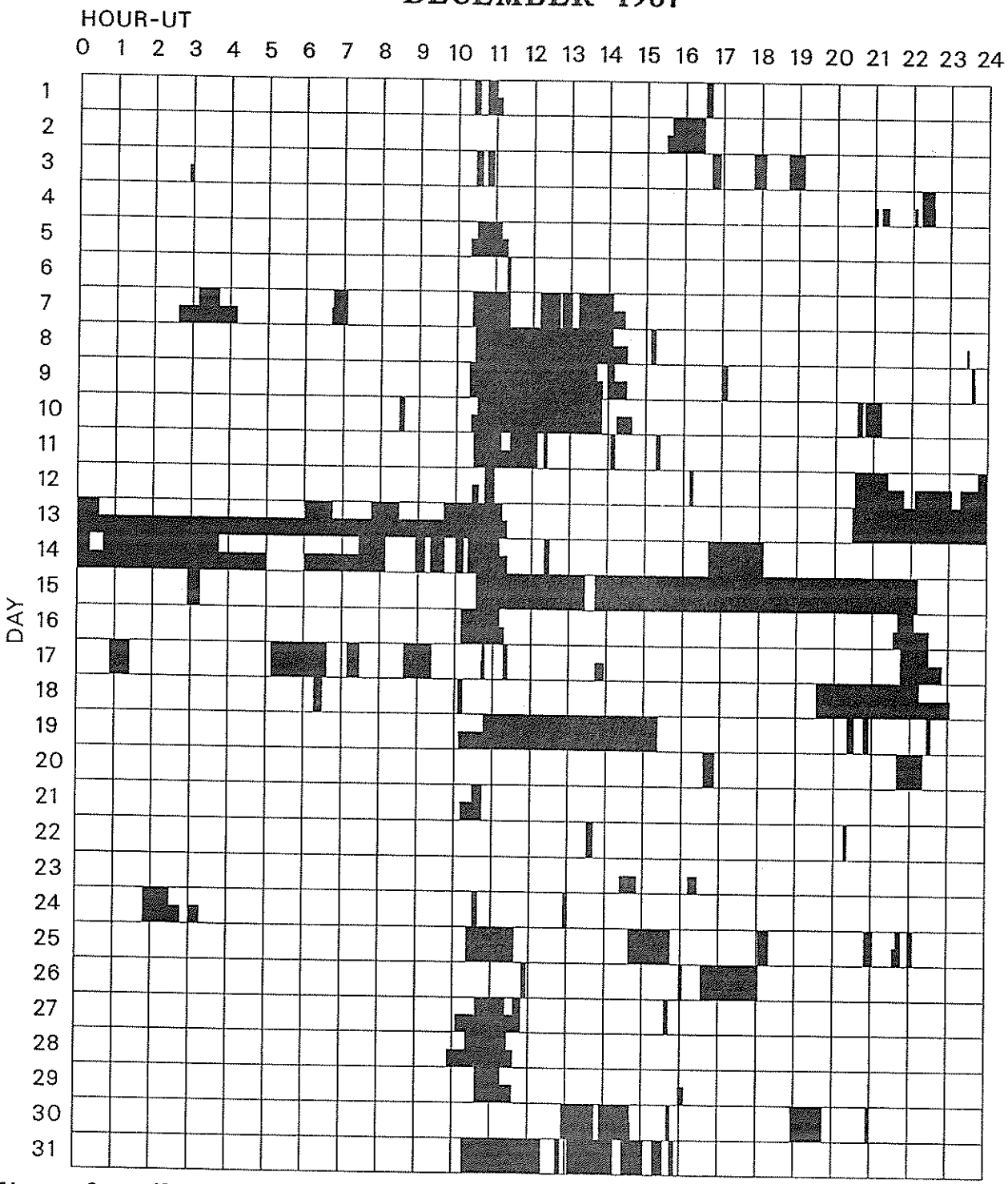
H - ALPHA S O L A R F L A R E S

DECEMBER 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
0057		28	0605	0610	0633	S34	E50	4912	01	1.2	28	SN	C 7.3				61		F
	LEAR	28	0605	0610	0633	S34	E51	4912	01	1.3	28	SN	C 7.3	3	C		92		F
	SVTO	28	1420E	1423U	1442D	S33	E48	4912	01	01.4	22D	SF	C 1.4	2	C		30		
0058	RAMY	28	1421	1425	1443	S35	E46	4912	01	1.3	22	SN	C 1.4	3	C		26		F
0059		28	15372	15391	1554	S36	E50	4912	01	1.7	17	SF	C 1.1				54		FH
	HOLL	28	1537	1540	1600	S35	E50	4912	01	1.6	23	SF	C 1.1	3	C		76		H
	RAMY	28	1539	1539	1548	S36	E49	4912	01	1.6	9	SF	C 1.1	3	C		31		F
0060		28	1659	1659	1716	S34	E44	4912	01	1.2	17	SF					12		
	RAMY	28	1659	1659	1710	S34	E41	4912	01	1.0	11	SF		3	C		11		
	HOLL	28	1659	1659	1721	S33	E46	4912	01	1.4	22	SF		3	C		13		
0061		28	1722*	1742*	1757	S34	E48	4912	01	1.5	35	SF					19		FH
	HOLL	28	1722	1742	1746	S34	E49	4912	01	1.6	24	SF		4	C		16		F
	PALE	28	1753	1754	1759	S33	E45	4912	01	1.3	6	SF		2	C		15		FH
	HOLL	28	1753	1801	1806	S34	E49	4912	01	1.6	13	SF		3	C		27		
0062	PALE	28	1818	1819	1825	S34	E45	4912	01	1.3	7	SF		3	C		11		
0063		28	18312	18361	1851	S34	E46	4912	01	1.4	20	SN	C 1.1				36		F
	PALE	28	1831	1836	1854	S34	E45	4912	01	1.3	23	SN	C 1.1	3	C		33		F
	HOLL	28	1833	1837	1848	S34	E46	4912	01	1.4	15	SF	C 1.1	3	C		38		
0064	HOLL	28	2308	2326	2335	S34	E43	4912	01	1.4	27	SF		3	C		22		
0065	LEAR	29	0708	0709	0732	S33	E37	4912	01	1.2	24	SF		3	C		21		E
0066	RAMY	29	1630	1640	1658	S34	E31	4912	01	1.1	28	SF		4	C		25		FH
0067	PALE	29	1950	1951	2002	S36	E35	4912	01	1.6	12	SF		3	C		23		
0068	PALE	29	2211	2212	2216	S34	E28	4912	01	1.1	5	SF		3	C		25		
0069		29	2246*	2248*	2258	S33	E29	4912	01	1.2	12	SF					16		F
	PALE	29	2246	2248	2250	S33	E29	4912	01	1.2	4	SF		3	C		21		F
	PALE	29	2258	2301	2305	S33	E29	4912	01	1.3	7	SF		3	C		11		
0070		29	23211	2322*	2352	S34	E32	4912	01	1.5	31	SF	C 1.7				60		F
	PALE	29	2321	2332	2351	S33	E29	4912	01	1.3	30	SF	C 1.7	3	C		82		F
	LEAR	29	2322	2322	2353	S36	E34	4912	01	1.7	31	SF	C 1.7	3	C		37		F
0071	LEAR	30	0142	0149	0220	S36	E32	4912	01	1.6	38	1F	C 4.1	3	C		156		FU
0072	PALE	30	0213E	0231	0237D	S33	E27	4912	01	1.2	24D	SF		3	C		33		F
0073	RAMY	30	1500	1500	1517	S36	E27	4912	01	1.8	17	SF		3	C		14		
0074	RAMY	30	1508	1510	1528	S35	W43	4915	12	27.2	20	SN	C 1.0	3	C		44		
0075	HOLL	30	1623	1633	1636	S33	E23	4912	01	1.5	13	SF		3	C		17		
0076	LEAR	31	0231	0232	0237	S33	E14	4912	01	1.2	6	SF		3	C		88		EU
0077		31	2154	2156	2205	S36	E10	4912	01	1.7	11	SF					14		FH
	PALE	31	2153E	2155U	2208D	S36	E10	4912	01	1.7	15D	SF		2	C		14		FH
	HOLL	31	2154	2156	2205	S36	E10	4912	01	1.7	11	SF		3	C		14		FH
0078	HOLL	31	2313E	2320U	2328D	S36	E08	4912	01	1.6	15D	SF		3	C		96		F

INTERVALS OF NO FLARE PATROL OBSERVATION
FOR PRECEDING SOLAR FLARE TABLE

DECEMBER 1987



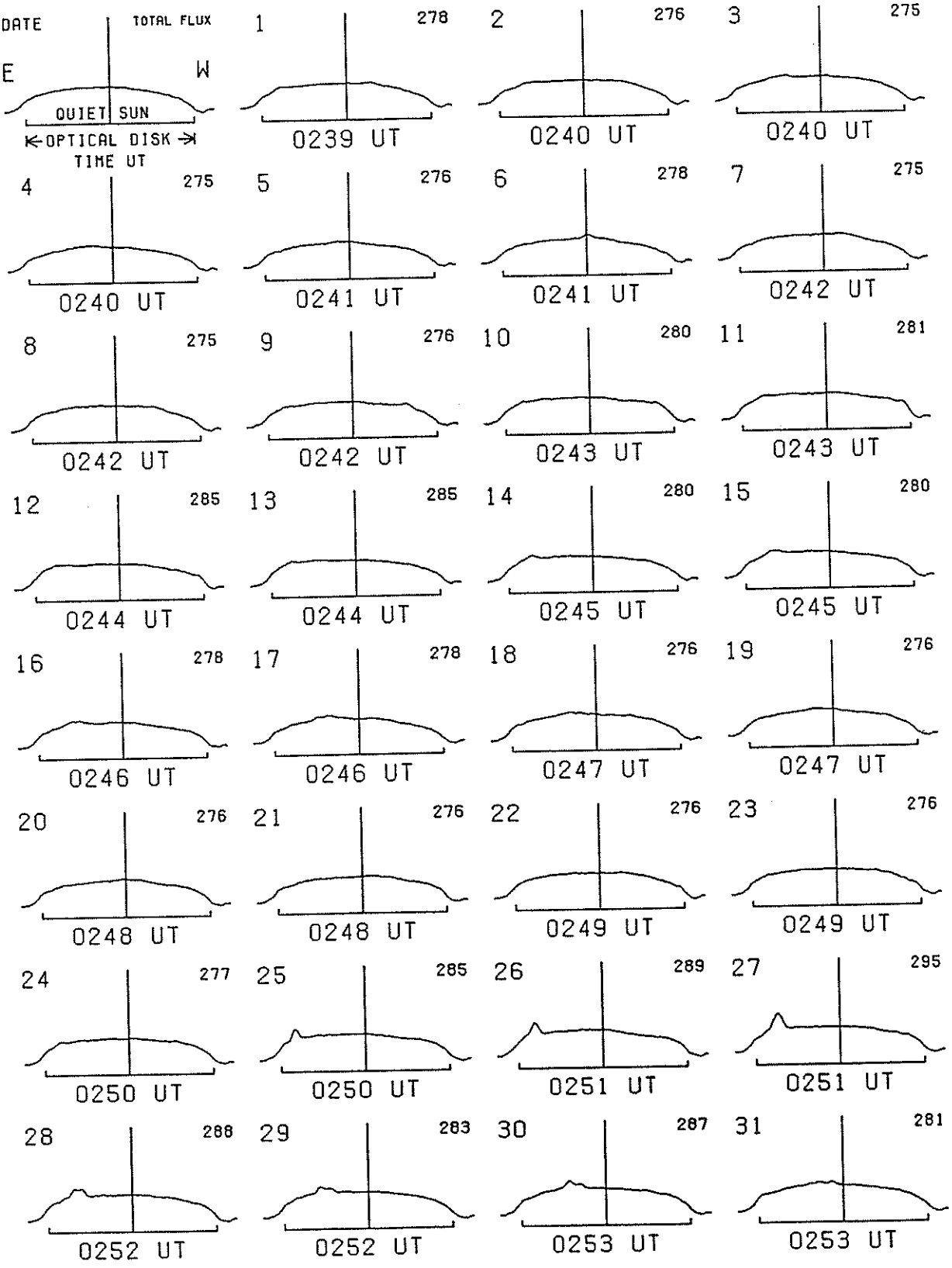
Times of no flare patrol, shown here as shaded areas, combine reports from the observatories listed below. Portions of a panel completely shaded mark dates and times of no patrol of any kind, that is, of neither visual nor cinematographic; portions of a panel with only the bottom half shaded mark times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

Holloman
Istanbul
Learmonth
Palehua
Peking
Ramey
San Vito
Urumqi

EAST-WEST SOLAR SCANS
DECEMBER 1987

TOYOKAWA, JAPAN

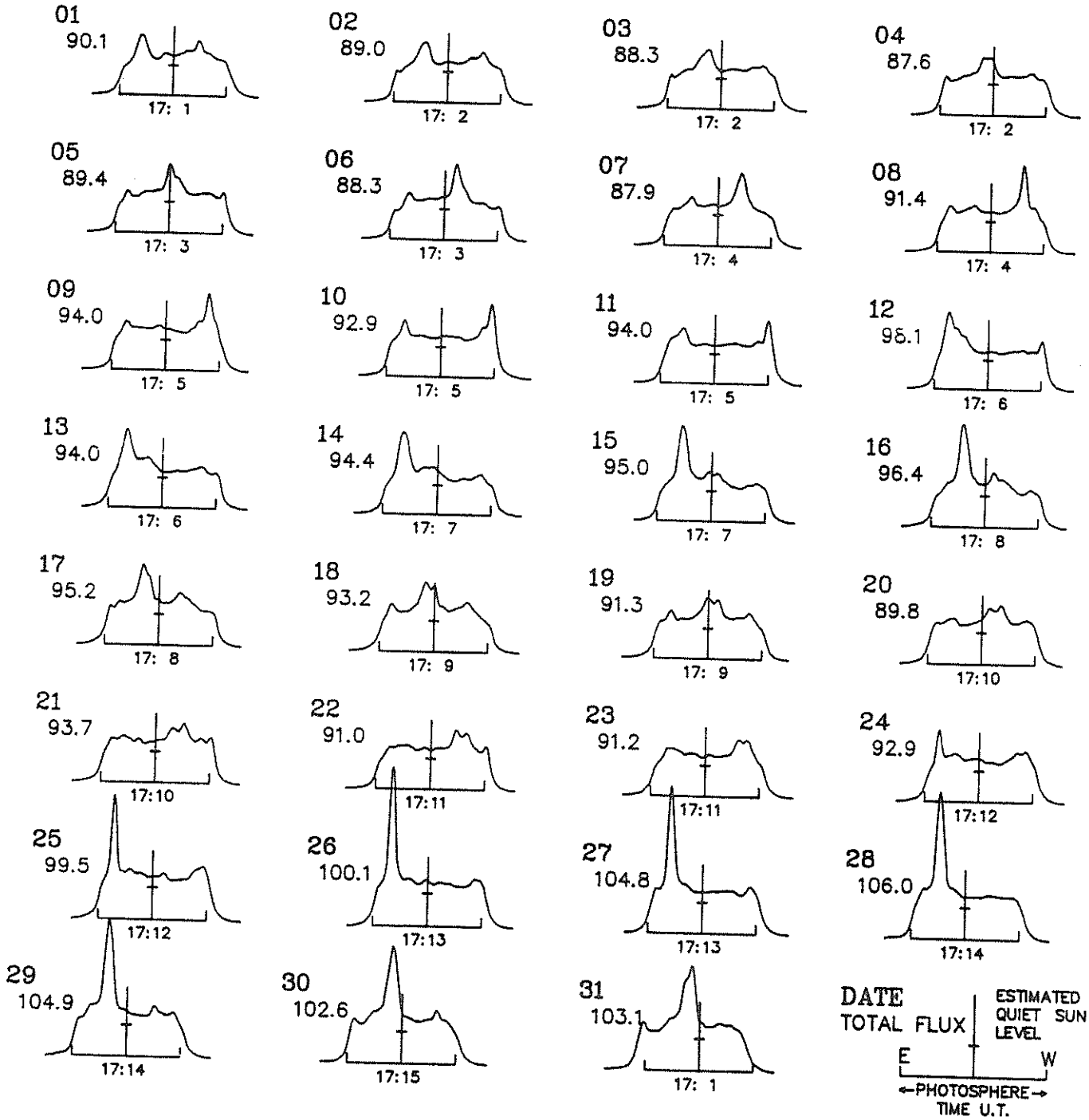
3 CM
FAN BEAM WITH 1.1 MINUTES OF ARC



EAST – WEST SOLAR SCANS
DECEMBER 1987

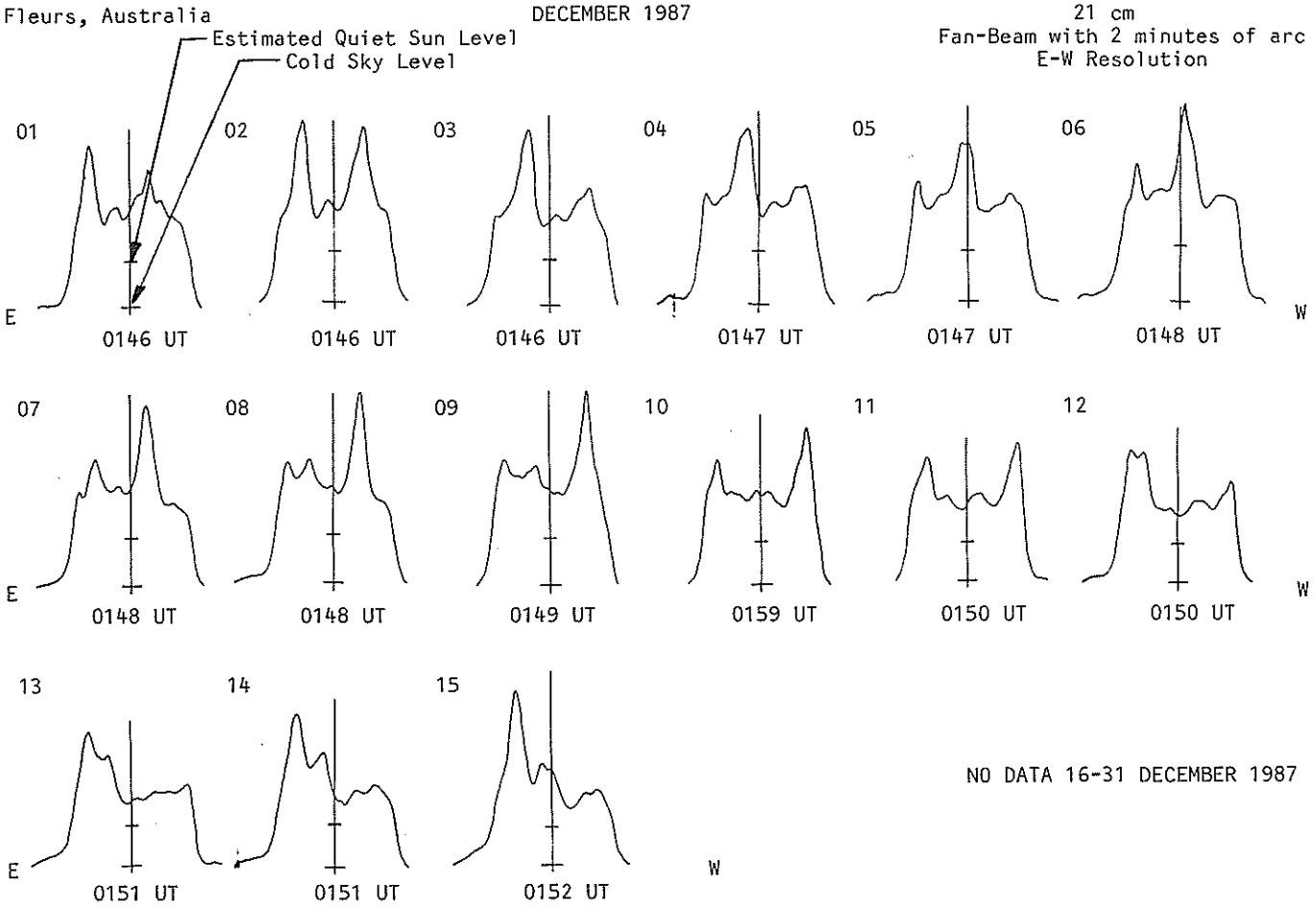
ALGONQUIN RADIO OBSERVATORY
CANADA

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



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

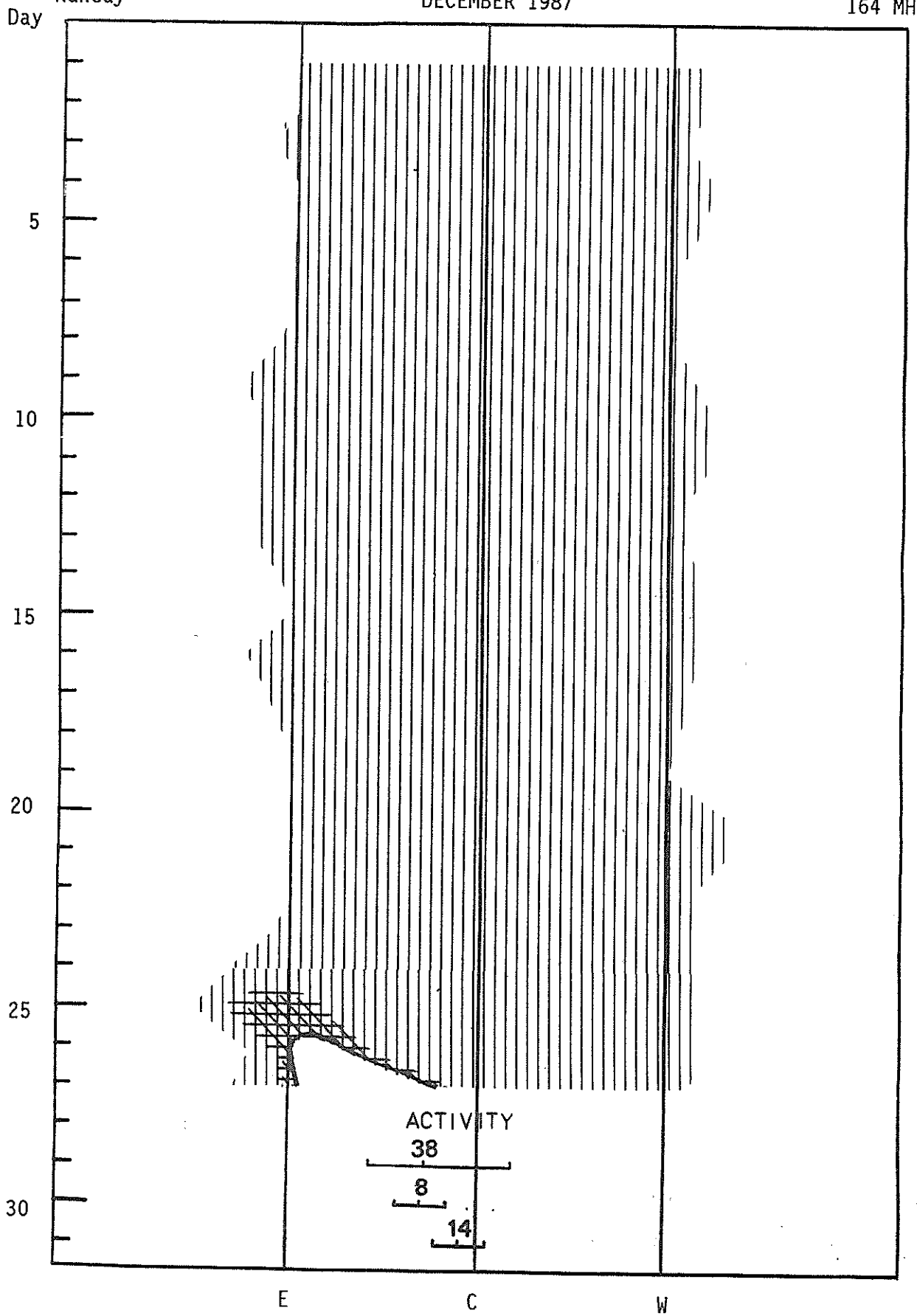
Fleurs, Australia — DECEMBER 1987 — 21 cm Fan-Beam with 2 minutes of arc E-W Resolution



NO DATA 16-31 DECEMBER 1987

SOLAR INTERFEROMETRIC OBSERVATIONS

DECEMBER 1987



SOLAR RADIO EMISSION
SELECTED FIXED FREQUENCY EVENTS

DECEMBER 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
08	2695	SGMR	48	C	1309.0	1314.0		120.0			QL=1 ST=1 TYP=8
12	2800	OTTA	24	R	1635.0	1750.0	400.0D	6.5			
	2800	OTTA	3	S	1635.5	1636.5	6.0	4.7	2.5		
15	8800	SVTO	8	S	0853.0		1.0	10.0			QL=5 ST=2 TYP=3
	2695	SVTO	8	S	0853.0	0853.0	1.0	33.0			QL=5 ST=2 TYP=3
	8800	SVTO	8	S	0853.0	0853.0	1.0	10.0			QL=5 ST=2 TYP=3
	2800	OTTA	22	GRF	1530.0	1640.0	260.0	3.1			
16	2800	OTTA	22	GRF	1600.0	1615.0	140.0D	4.3			
17	8800	LEAR	8	S	0226.0	0226.0	2.0	1.0			QL=5 ST=3 TYP=3
	2695	LEAR	8	S	0226.0	0227.0	2.0	13.0			QL=5 ST=2 TYP=3
25	2800	OTTA	28	PRE	1605.0	1736.0	91.0	5.0	2.3		
	2800	OTTA	4	S/F	1736.0	1745.0	9.0	19.5	13.0		
	2695	PALE	20	GRF	1744.0	1745.0	1.0	13.0			QL=5 ST=2 TYP=2
	2800	OTTA	30	PBI	1752.0	1752.0		12.0			
26	2800	OTTA	22	GRF	1430.0	1757.0	310.0	13.0			
	2800	OTTA	46	C	1941.0	2026.0	108.0	86.0	60.0		
	2695	PALE	48	C	1948.0	2004.0	40.0	170.0			QL=5 ST=2 TYP=8
	8800	PALE	48	C	1952.0	2004.0	35.0	51.0			QL=1 ST=2 TYP=8
	2695	SGMR	48	C	1954.0	2004.0	17.0	140.0			QL=5 ST=2 TYP=8
	8800	SGMR	4	S/F	2000.0	2000.0	3.0	17.0			QL=5 ST=2 TYP=3
	2695	PALE	4	S/F	2037.0	2039.0	3.0	75.0			QL=5 ST=2 TYP=5
27	8800	PALE	8	S	1756.0	1756.0	1.0	41.0			QL=1 ST=2 TYP=3
28	2695	LEAR	8	S	0609.0	0609.0	2.0	38.0			QL=5 ST=2 TYP=3
	8800	LEAR	8	S	0609.0	0609.0	1.0	45.0			QL=5 ST=2 TYP=3
29	2695	LEAR	8	S	0706.0	0707.0	1.0	20.0			QL=5 ST=2 TYP=3
	2800	OTTA	22	GRF	1700.0	1934.0		6.9			
30	2800	OTTA	28	PRE	1423.5	1424.0	2.0	2.8	1.4		
	2800	OTTA	46	C	1424.0	1428.6	6.0	19.4	13.0		
	2695	SGMR	8	S	1426.0	1426.0	2.0	19.0			QL=5 ST=3 TYP=3
	2695	SVTO	4	S/F	1426.0	1426.0	3.0	15.0			QL=5 ST=2 TYP=3
	2800	OTTA	30	PBI	1430.0	1430.0	150.0	3.5			
	2800	OTTA	22	GRF	1447.0	1500.0	50.0	9.3			

Reports are received routinely from the following observatories:
LEAR = Learmonth OTTA = Ottawa PALE = Palehua SGMR = Sagamore Hill SVTO = San Vito

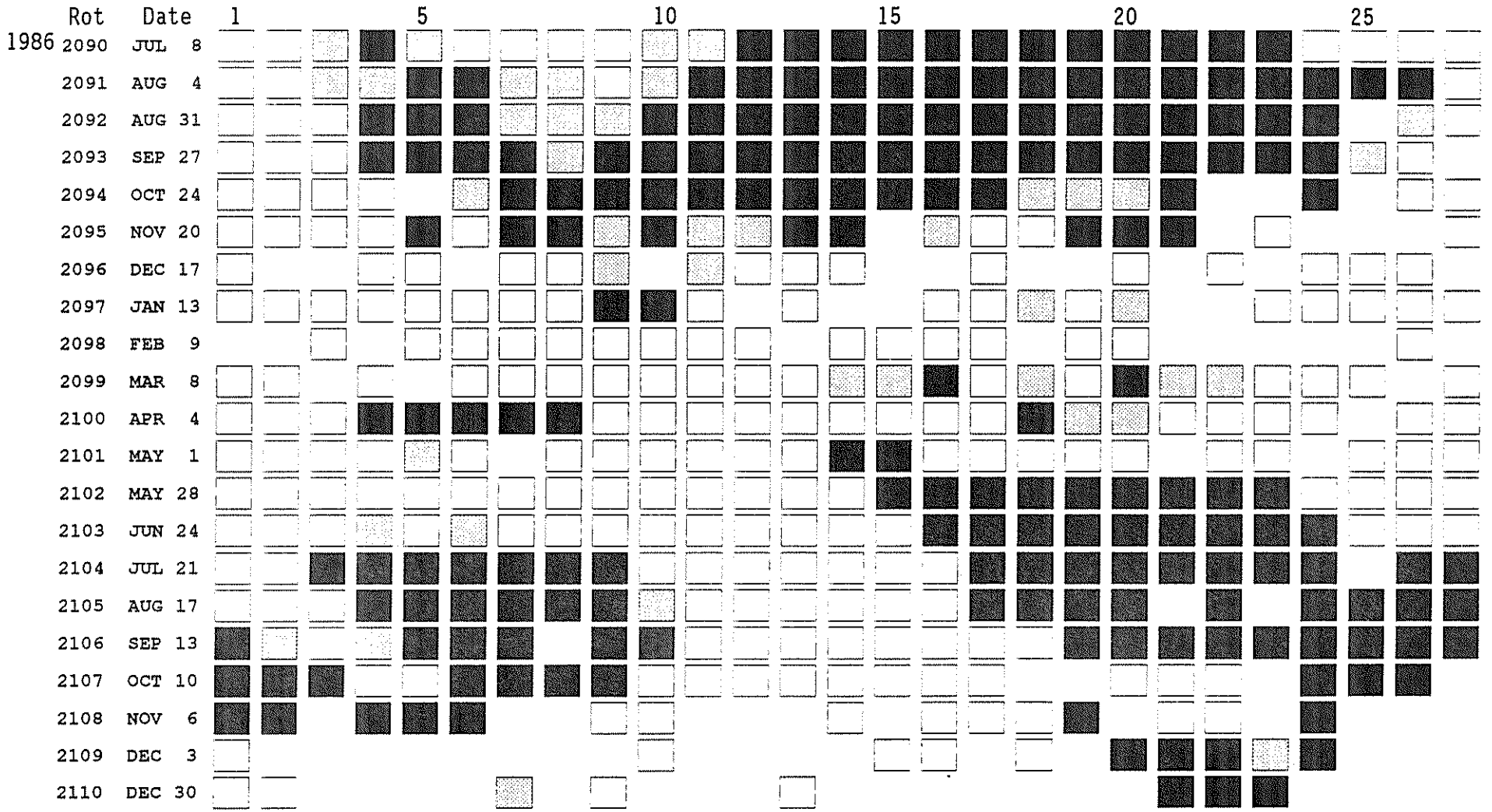
Explanation of Type Code:

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

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

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

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	1987 Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1	.	1	.	10	14	2	11	39	12	-3	.	.
2	11	.	.	.	17	3	20	43	-3	-4	-20	.
3	.	.	.	8	11	12	26	27	-16	-3	-19	2
4	.	9	.	13	5	23	33	14	-19	-17	-24	.
5	6	10	.	10	0	27	33	4	-31	-28	.	.
6	.	14	9	2	3	24	32	-10	.	-35	-10	.
7	9	16	.	-5	.	29	17	-16	-49	-28	-12	.
8	.	15	14	-14	6	38	2	-29	.	-24	.	.
9	12	.	15	-13	6	31	-10	-37	-50	-20	-28	.
10	13	.	.	-12	5	8	-13	-38	-39	-16	-28	.
11	16	10	10	-5	20	-8	-19	-36	-24	-6	-20	.
12	.	.	.	5	17	-17	-29	-43	-18	-3	.	19
13	20	14	10	18	5	-19	-24	-32	-10	6	.	.
14	25	8	23	30	-6	-21	-22	.	-1	7	4	.
15	23	7	18	30	-4	-21	-18	-19	4	-11	5	.
16	17	15	22	25	2	-16	-15	-7	-1	-9	.	.
17	13	13	22	19	4	-12	-9	2	-5	-10	.	22
18	11	11	17	13	3	-16	4	6	-5	-6	.	30
19	15	12	13	6	4	-6	9	3	-8	5	18	.
20	11	11	7	2	7	9	11	-13	.	6	.	20
21	-6	.	-1	-3	.	13	7	-15	-10	9	21	.
22	-4	2	1	-2	19	12	11	-18	-5	12	30	-10
23	9	2	-3	1	21	7	-5	-22	7	23	3	-17
24	.	5	2	2	.	7	-12	-25	14	25	-10	-18
25	7	4	0	6	3	11	-11	-18	19	21	.	-1
26	.	.	3	8	8	6	-10	-2	21	23	4	-3
27	.	4	-3	10	8	-1	-10	12	22	.	4	.
28	3	6	-2	.	12	4	-5	26	20	.	.	.
29	5		-1	12	17	-1	-10	33	15	15	-5	.
30	-2		7	12	16	5	6	22	5	2	.	24
31	5		12		4		27	16		4		24

Dot symbol indicates no data available for the day.

C O N T E N T S

Prompt Reports DATA FOR **NOVEMBER** 1987 Number 521 Part I

H-ALPHA SYNOPTIC CHART for Rotation 1795 not received in time for publication.

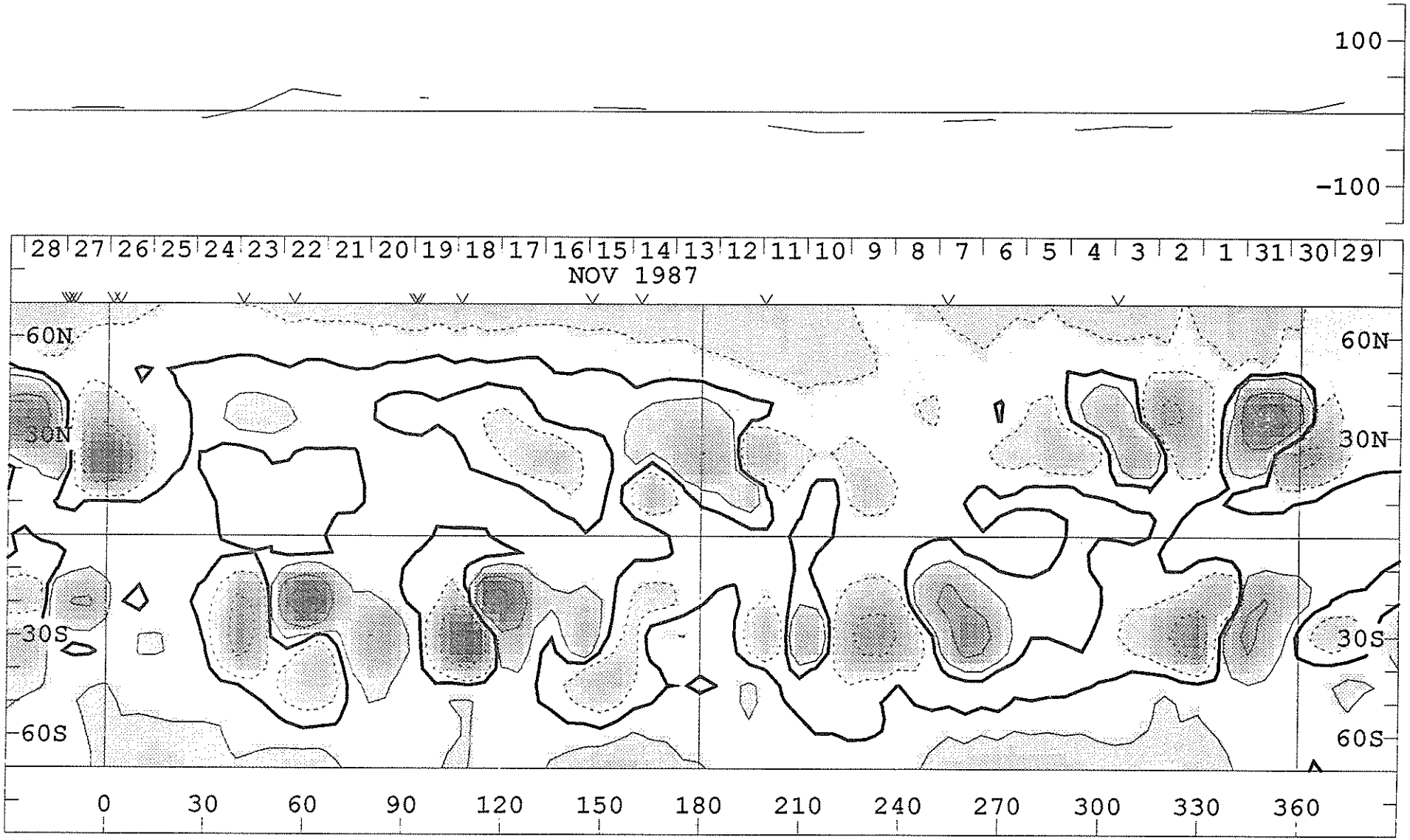
SOLAR MAGNETIC FIELD SYNOPTIC CHART

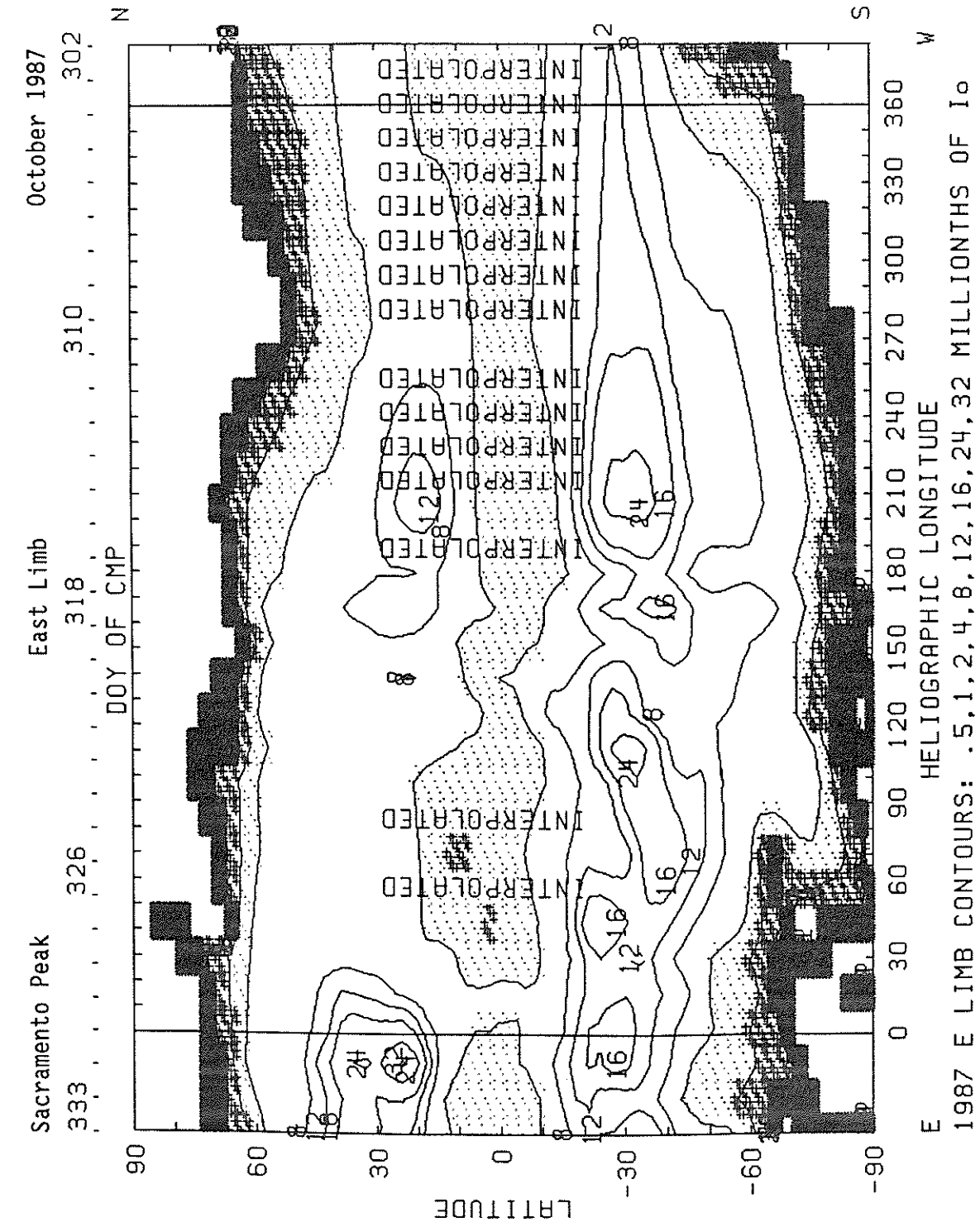
CARRINGTON ROTATION NUMBER 1795

(30 October to 26 November 1987)

Stanford Solar Observatory

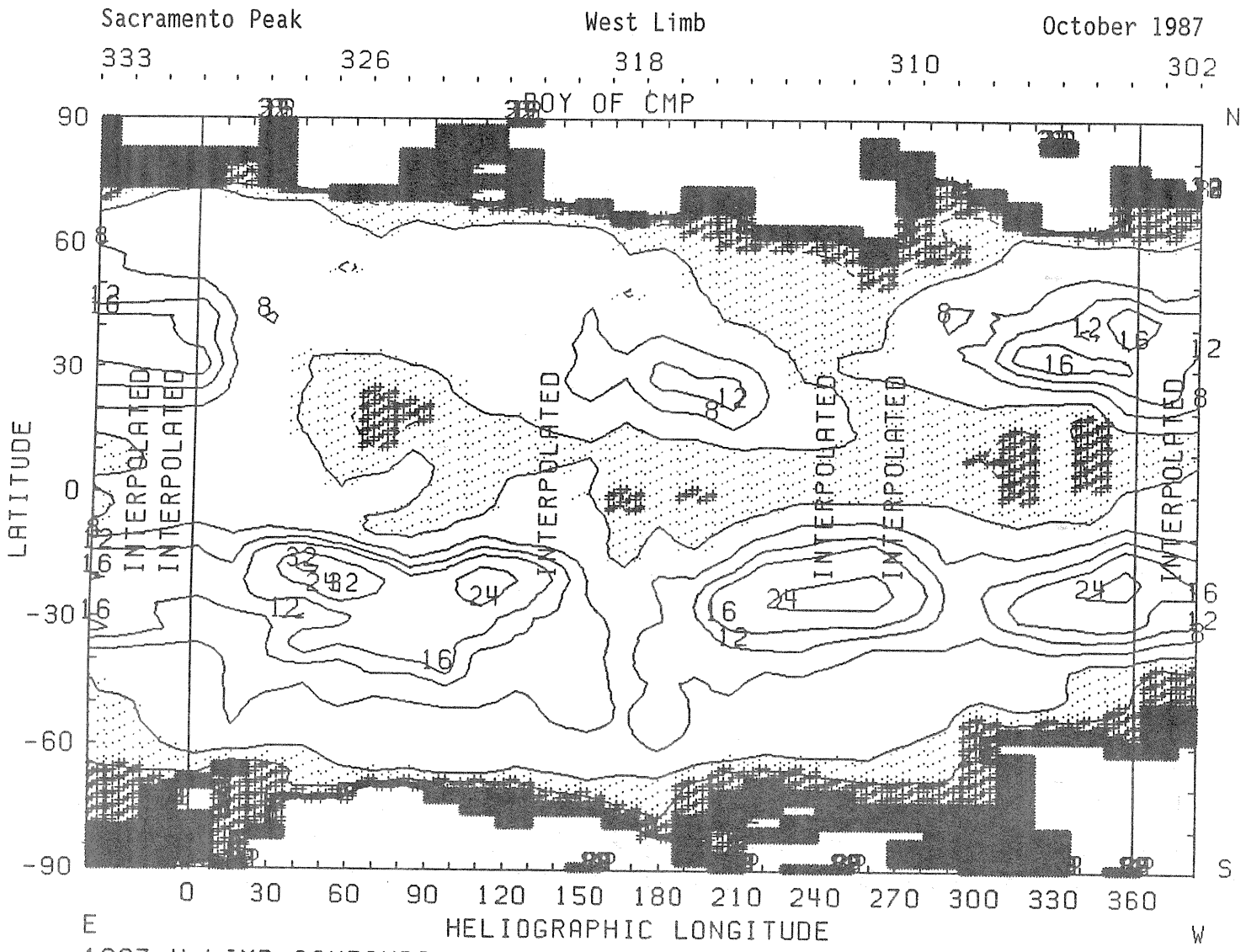
0, ±100, 500, 1000, 2000 microTesla




CORONAL GREEN LINE SYNOPTIC MAP
CARRINGTON ROTATION NUMBER 1795
(30 October to 26 November 1987)
Sacramento Peak
East Limb
October 1987
DOY OF CMP
333
326
318
310
302
N
S
E
W
LATITUDE
HELIOGRAPHIC LONGITUDE
INTERPOLATED
1987 E LIMB CONTOURS: .5,1,2,4,8,12,16,24,32 MILLIONTHS OF Io
CORONAL HOLES ARE SHOWN AS WHITE SURROUNDED BY BLACK

CORONAL GREEN LINE SYNOPTIC MAP

CARRINGTON ROTATION NUMBER 1795
(30 October to 26 November 1987)



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

29 Nov 87

SOLAR MAGNETIC FIELD SYNOPTIC CHART

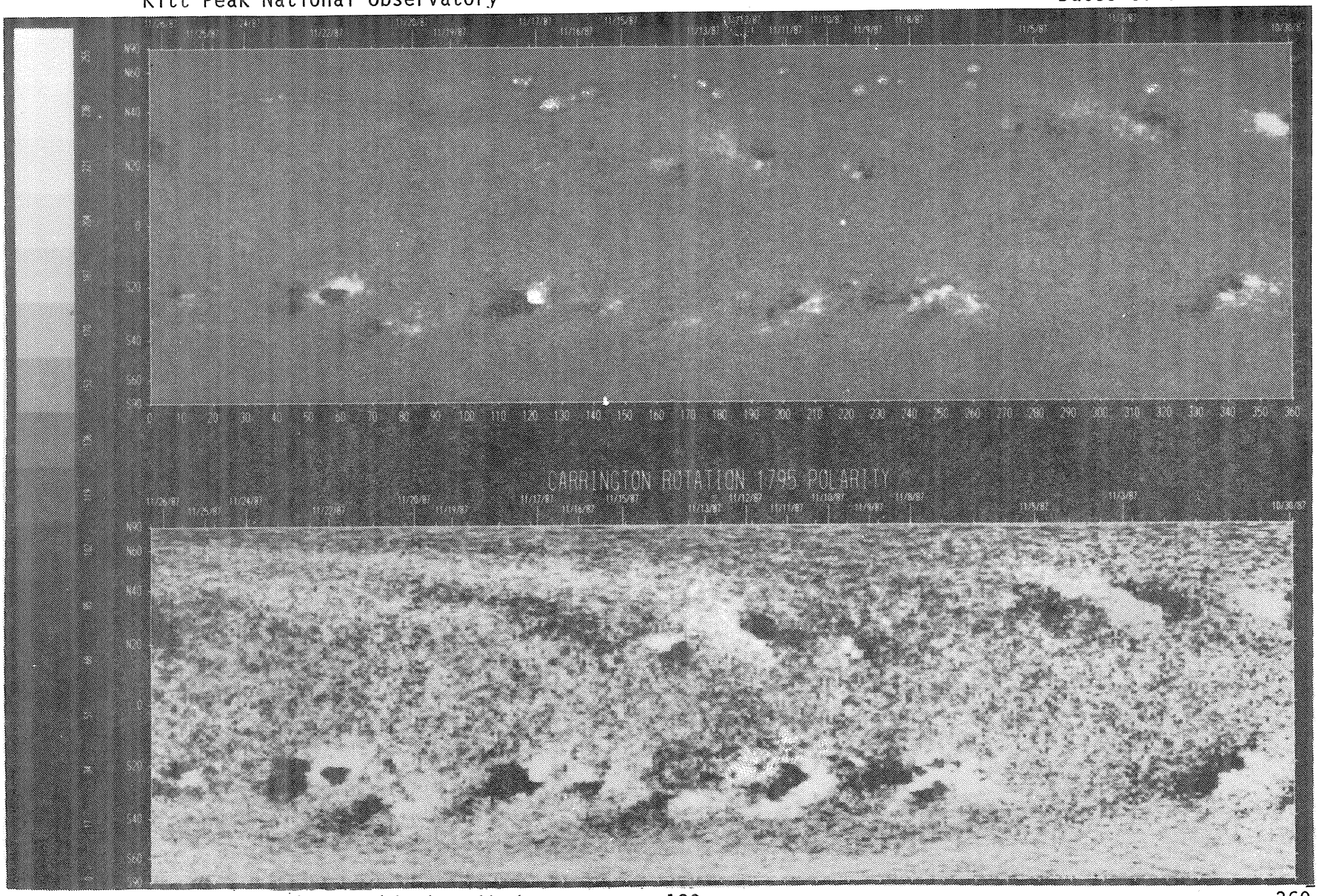
CARRINGTON ROTATION NUMBER 1795

(30 October to 26 November 1987)

Kitt Peak National Observatory

Dates of Observation

30
Nov 87

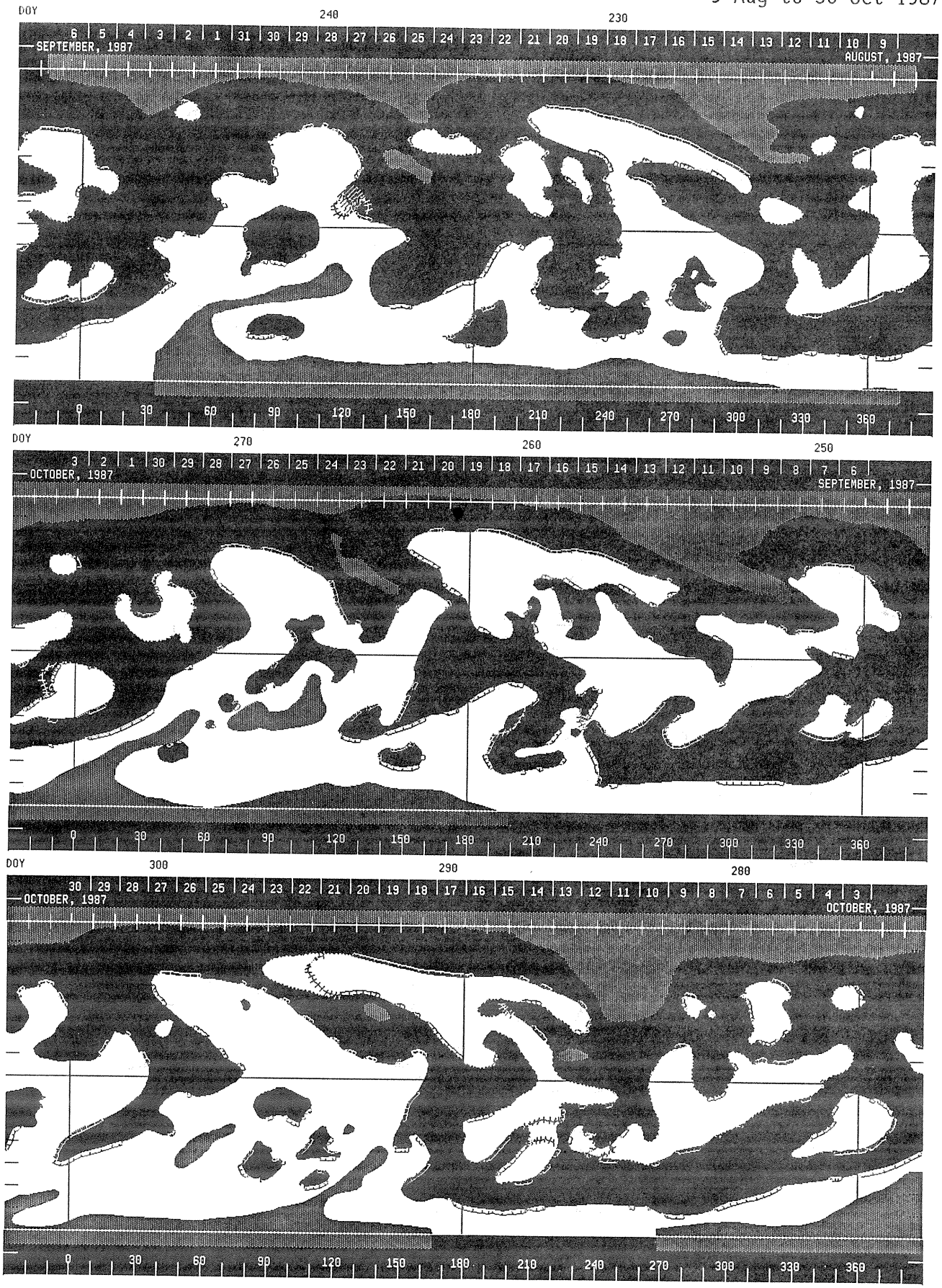


0 Heliographic Longitude 180 360

SHADED H-ALPHA SOLAR SYNOPTIC CHARTS

Carrington Rot. 1792-1794

9 Aug to 30 Oct 1987

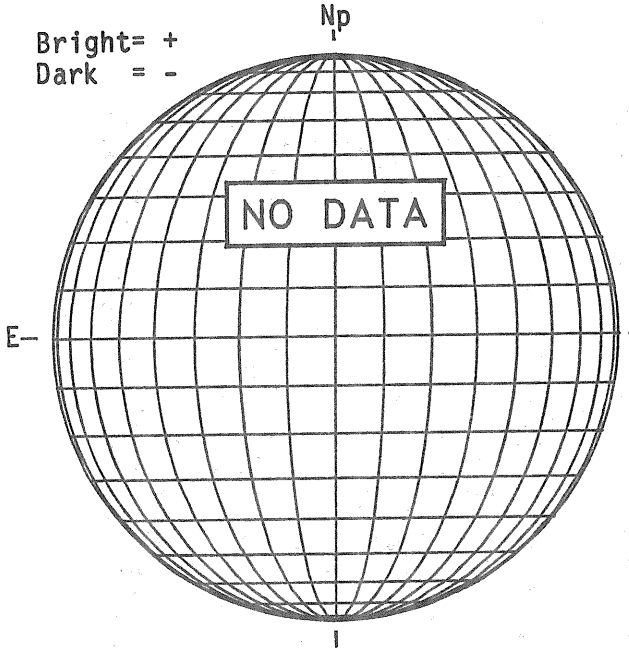


□ = Positive Polarity ■ = Negative Polarity ▒ = 10830 Coronal Hole Estimate ▨ = X-Ray Flares > M1

Heliographic Longitude

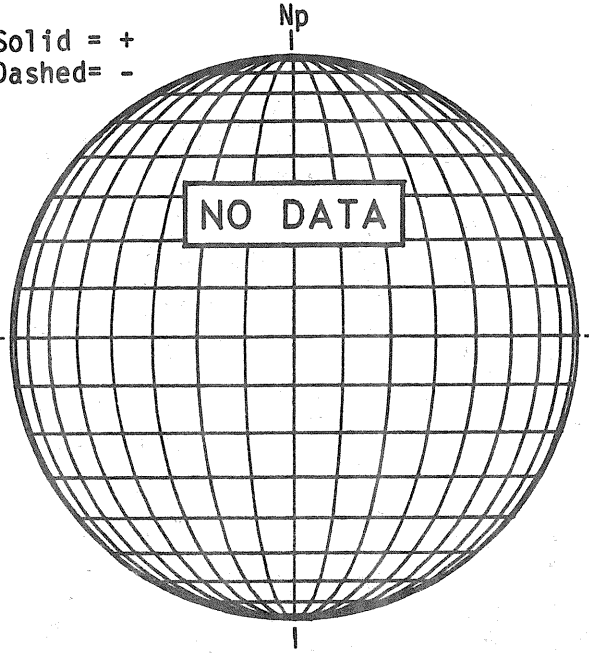
KITT PEAK MAGNETOGRAM

Bright= +
Dark = -



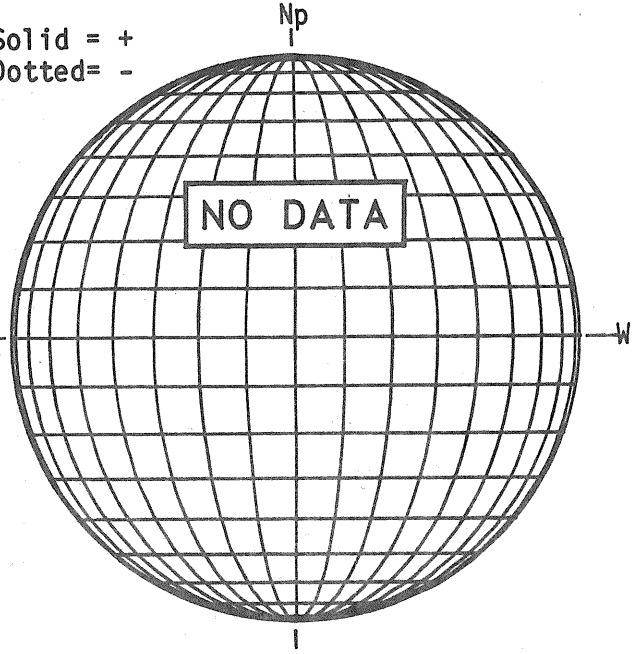
STANFORD MAGNETOGRAM

Solid = +
Dashed= -

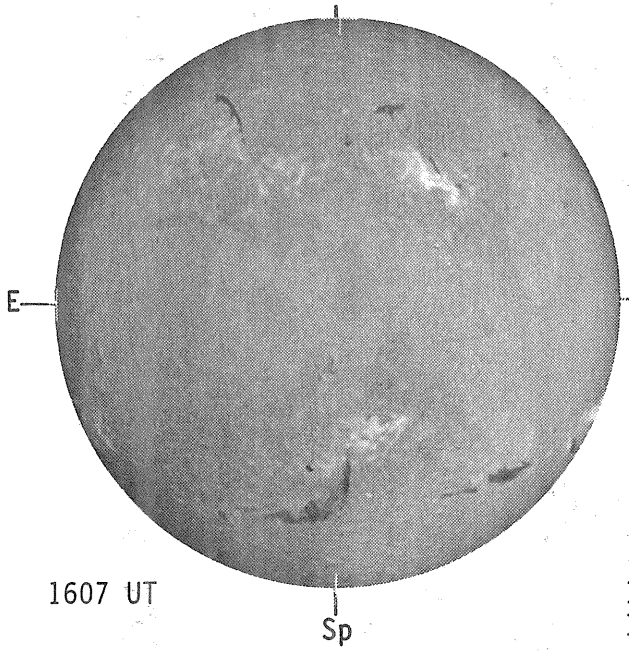


MT. WILSON MAGNETOGRAM

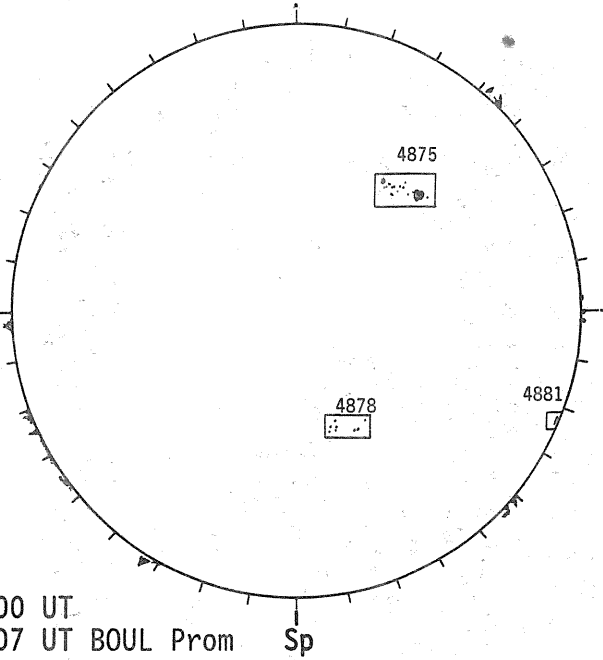
Solid = +
Dotted= -



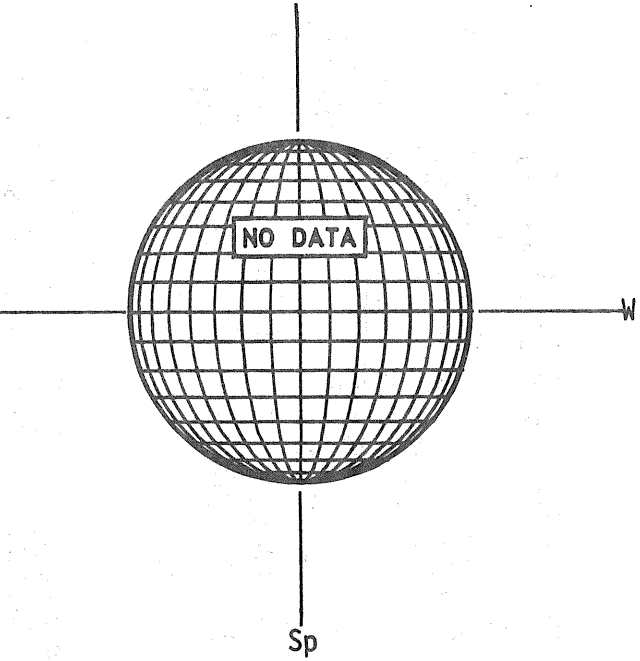
BOULDER H-ALPHA



BOULDER SUNSPOTS



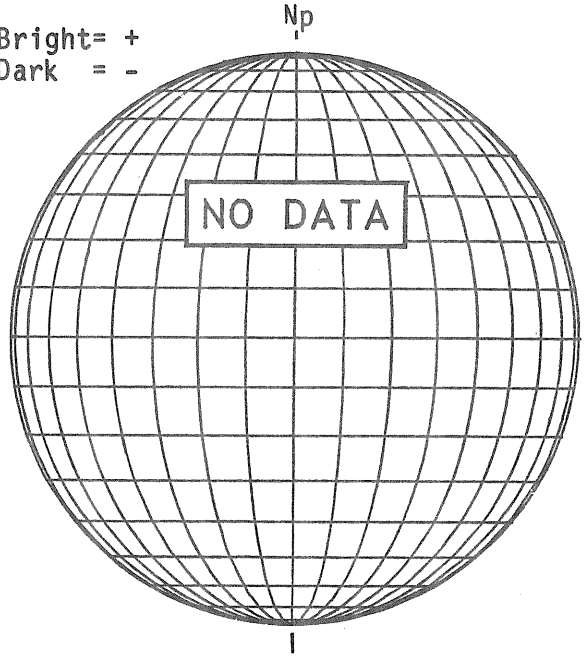
SACRAMENTO PEAK CORONA (1.15 Radii)



NOVEMBER 01, 1987 (P= 24.51, B_o= 4.38, L_o= 342.35)

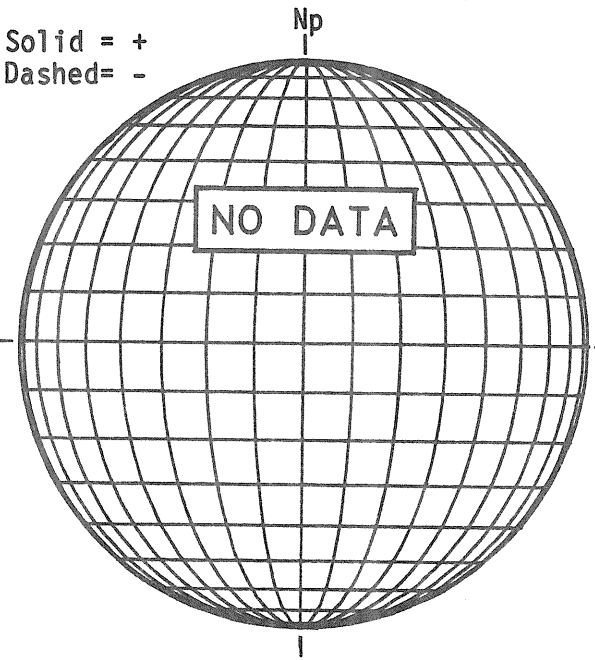
KITT PEAK MAGNETOGRAM

Bright= +
Dark = -



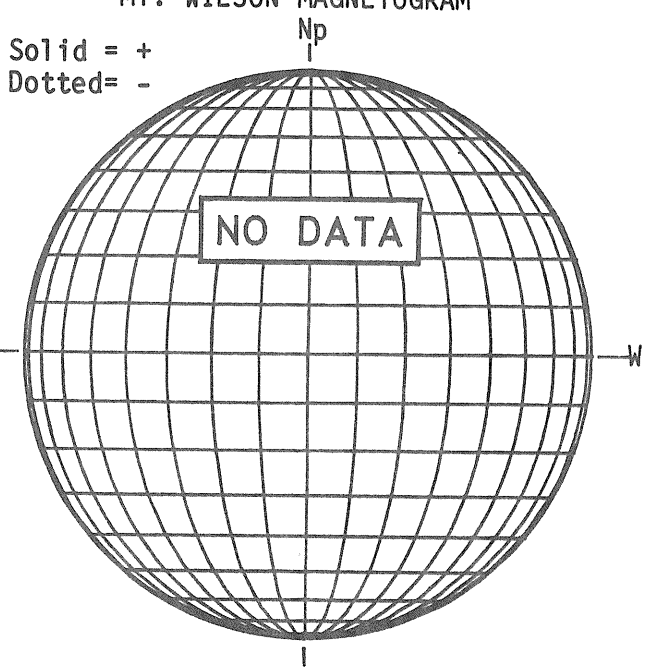
STANFORD MAGNETOGRAM

Solid = +
Dashed= -

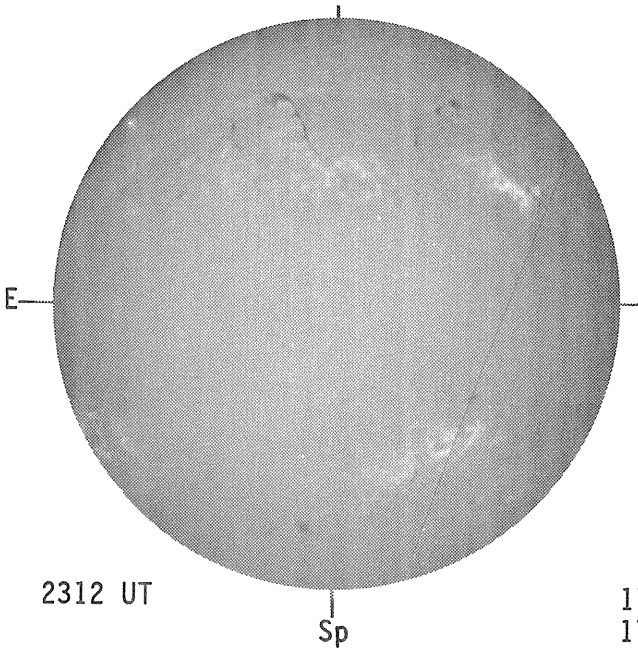


MT. WILSON MAGNETOGRAM

Solid = +
Dotted= -

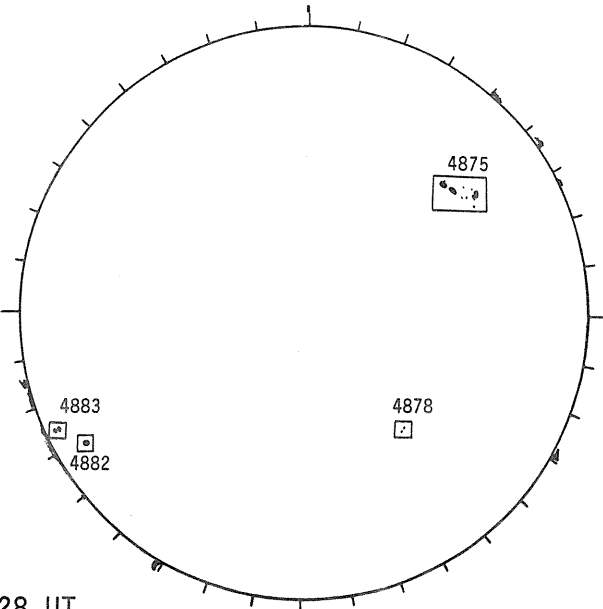


SACRAMENTO PEAK H-ALPHA



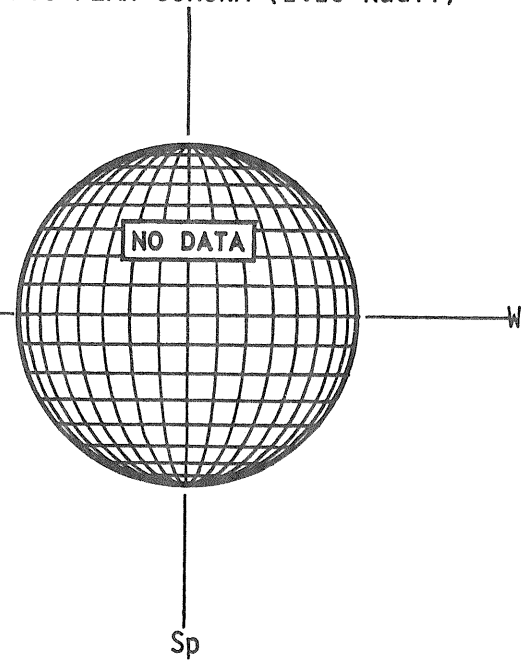
2312 UT

BOULDER SUNSPOTS



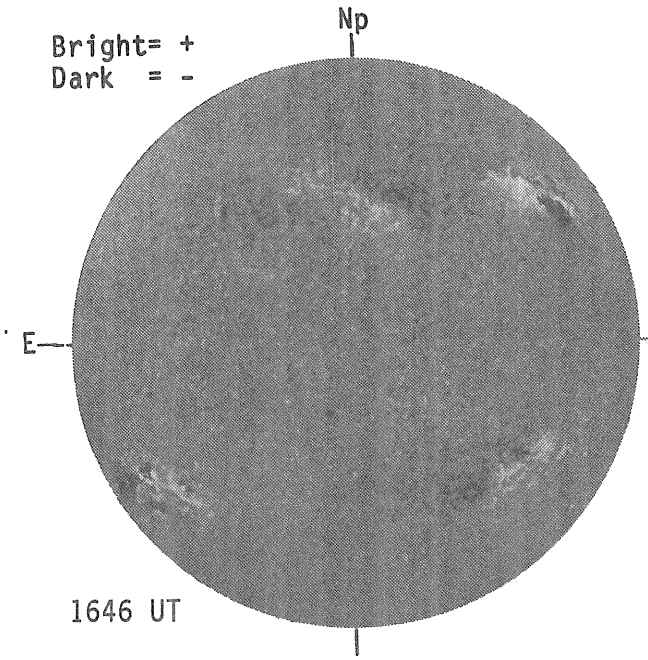
1728 UT
1731 UT BOUL Prom

SACRAMENTO PEAK CORONA (1.15 Radii)

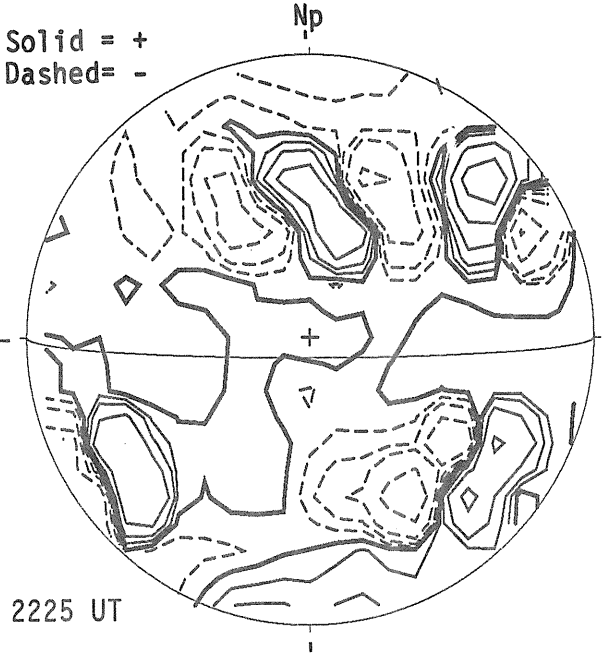


NOVEMBER 02, 1987 (P= 24.34, B_o= 4.28, L_o= 329.17)

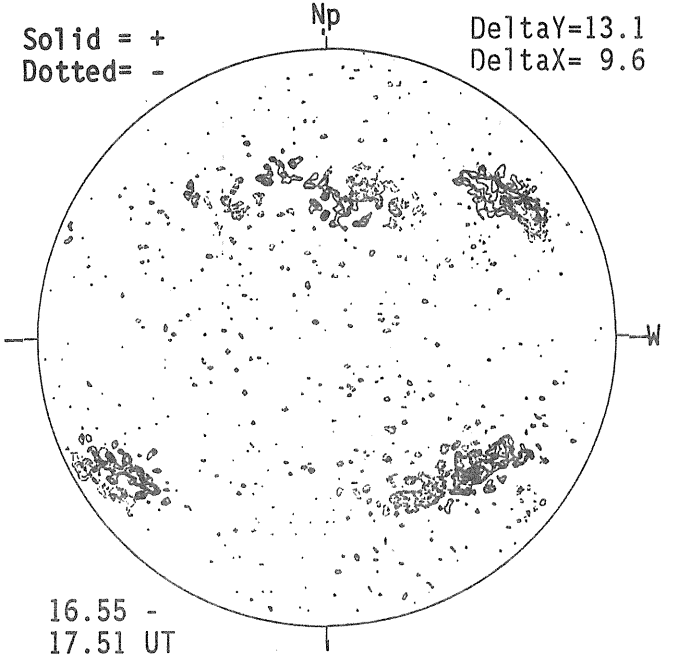
KITT PEAK MAGNETOGRAM



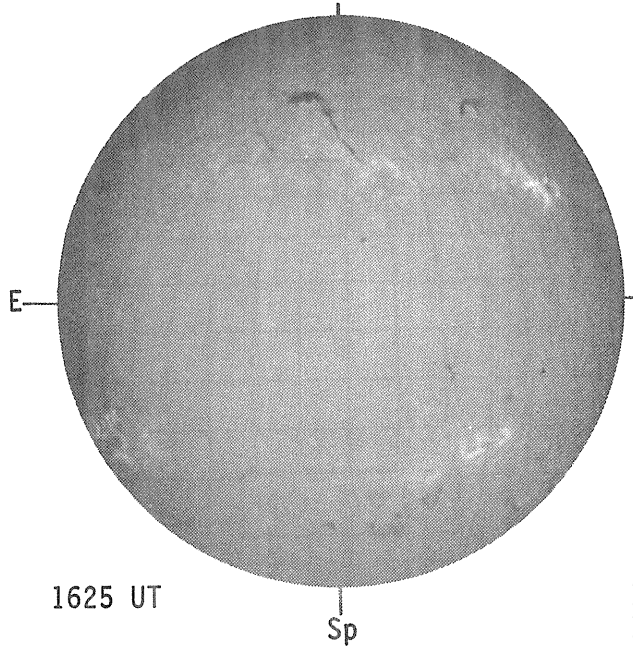
STANFORD MAGNETOGRAM



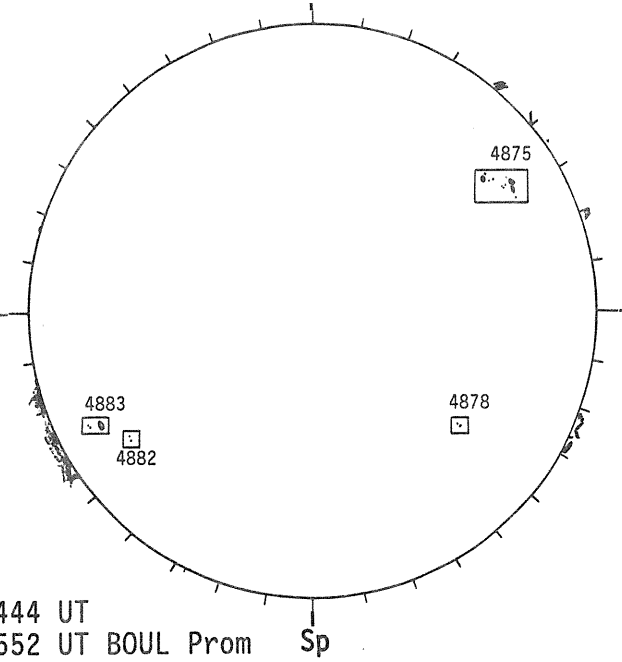
MT. WILSON MAGNETOGRAM



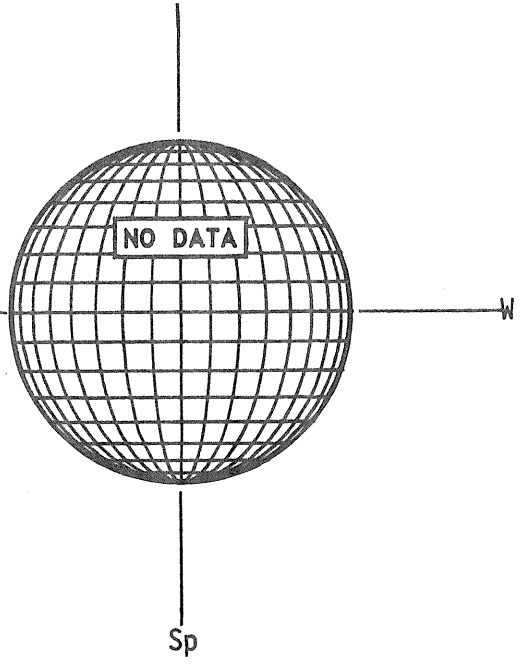
SACRAMENTO PEAK H-ALPHA



BOULDER SUNSPOTS



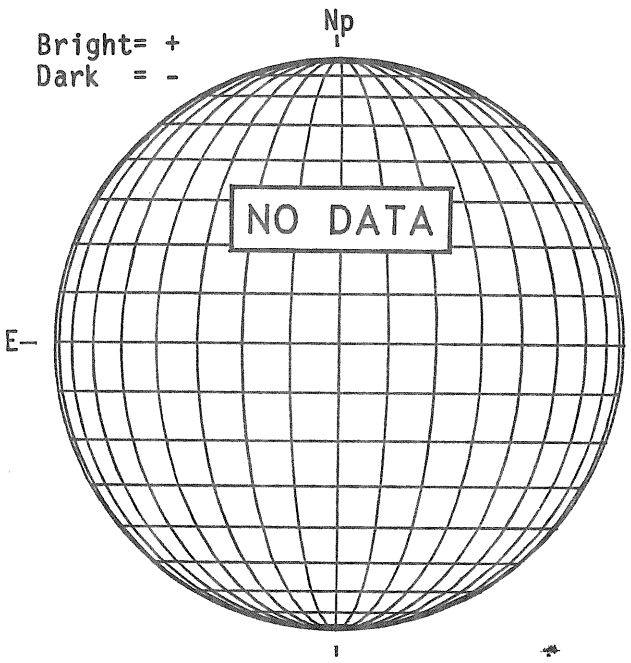
SACRAMENTO PEAK CORONA (1.15 Radii)



NOVEMBER 03, 1987 (P= 24.17, B_o= 4.18, L_o= 315.98)

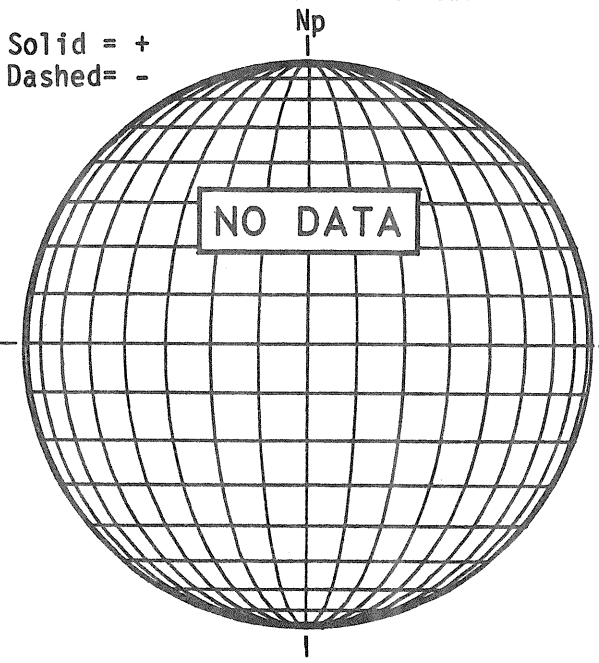
KITT PEAK MAGNETOGRAM

Bright= +
Dark = -



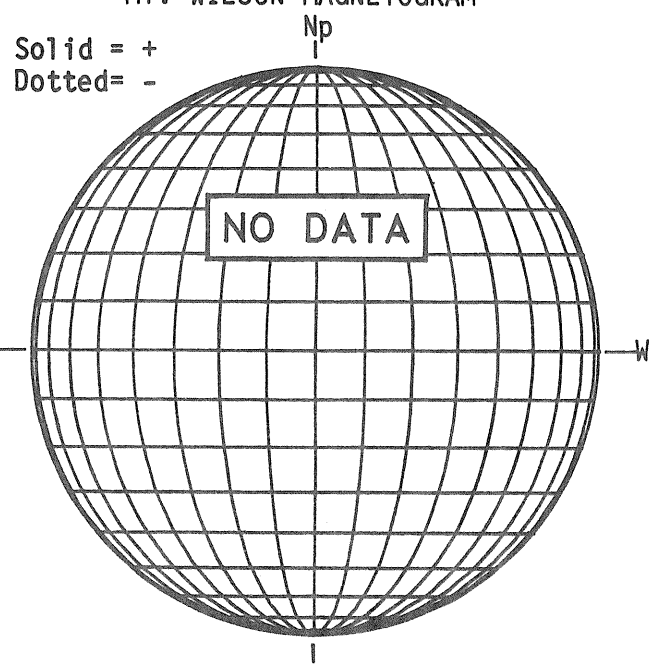
STANFORD MAGNETOGRAM

Solid = +
Dashed= -

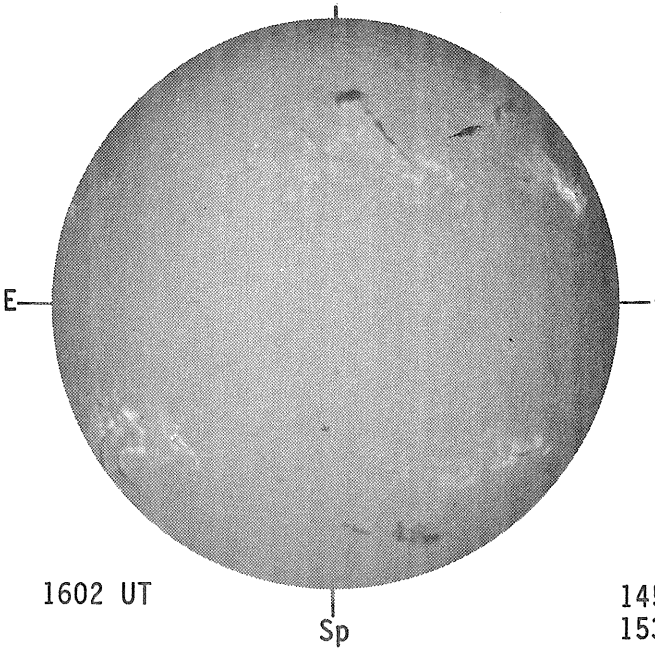


MT. WILSON MAGNETOGRAM

Solid = +
Dotted= -

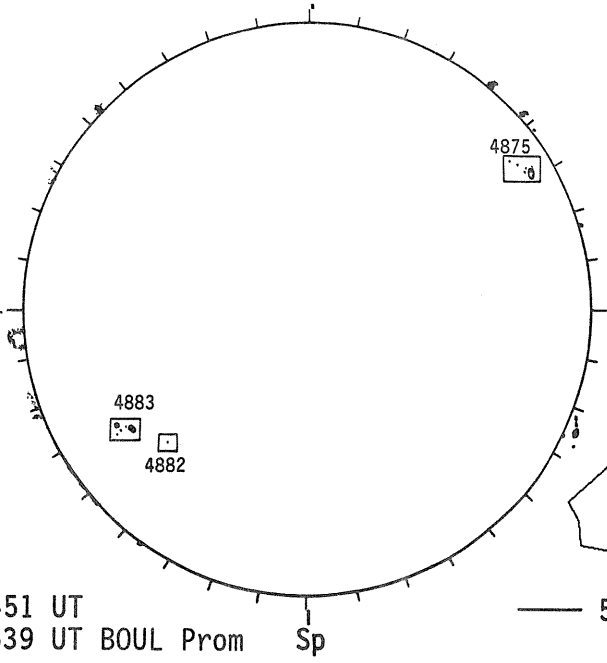


SACRAMENTO PEAK H-ALPHA



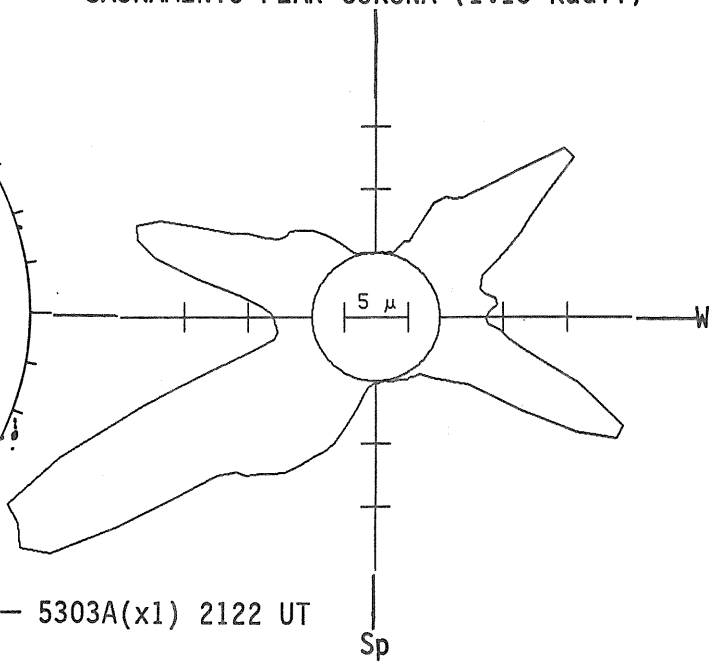
1602 UT

BOULDER SUNSPOTS



1451 UT
1539 UT BOUL Prom

SACRAMENTO PEAK CORONA (1.15 Radii)



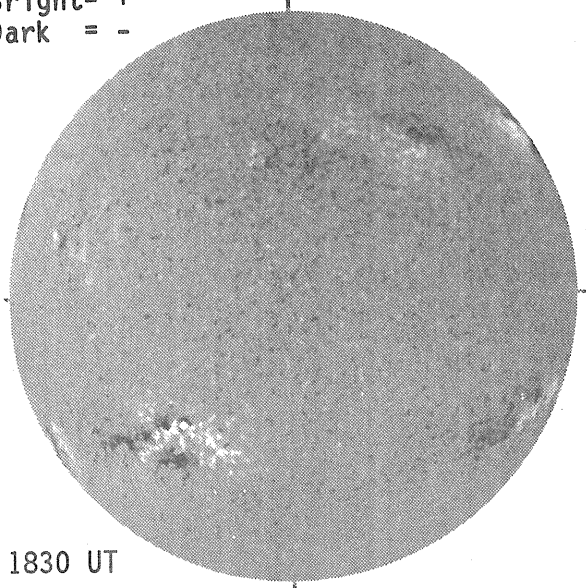
—— 5303A(x1) 2122 UT

NOVEMBER 04, 1987 (P= 23.98, B_o= 4.08, L_o=302.79)

KITT PEAK MAGNETOGRAM

Np

Bright= +
Dark = -



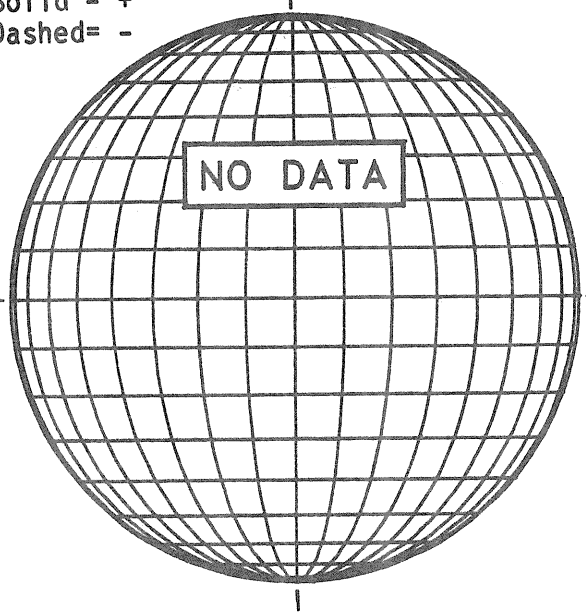
E

1830 UT

STANFORD MAGNETOGRAM

Np

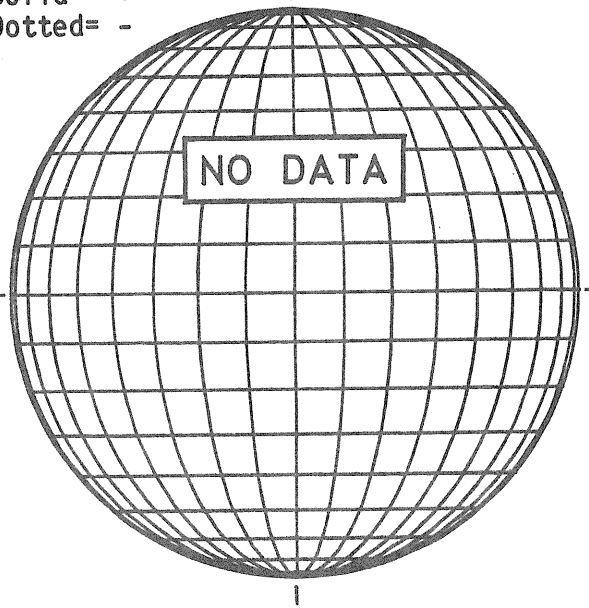
Solid = +
Dashed= -



MT. WILSON MAGNETOGRAM

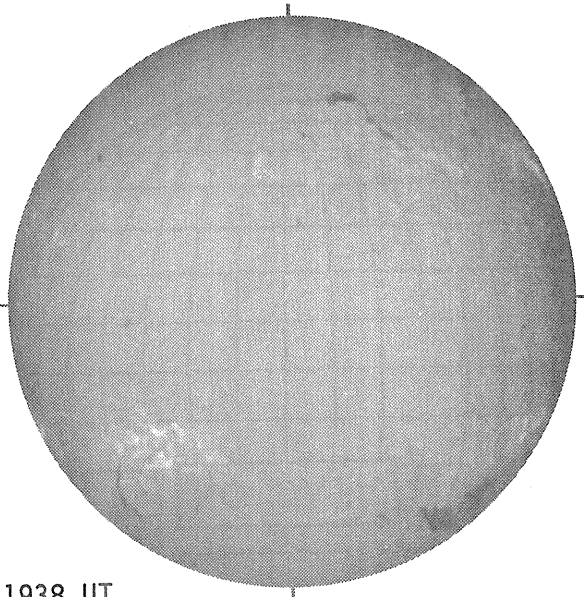
Np

Solid = +
Dotted= -



W

SACRAMENTO PEAK H-ALPHA

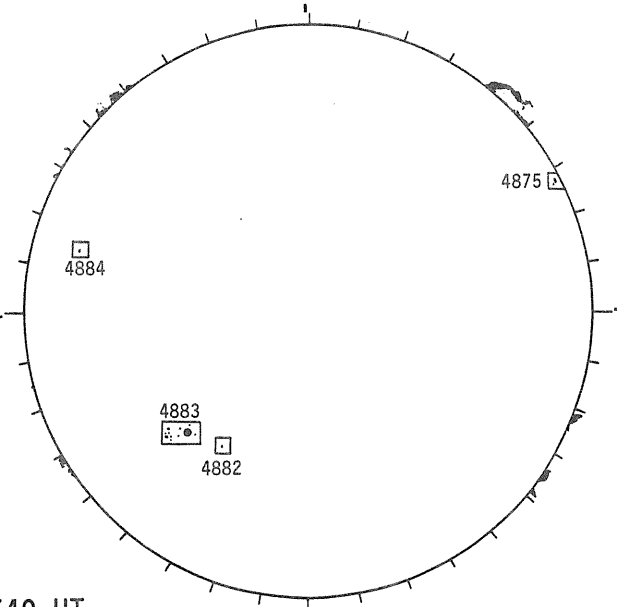


E

1938 UT

Sp

BOULDER SUNSPOTS



1540 UT
1900 UT BOUL Prom

Sp

SACRAMENTO PEAK CORONA (1.15 Radii)

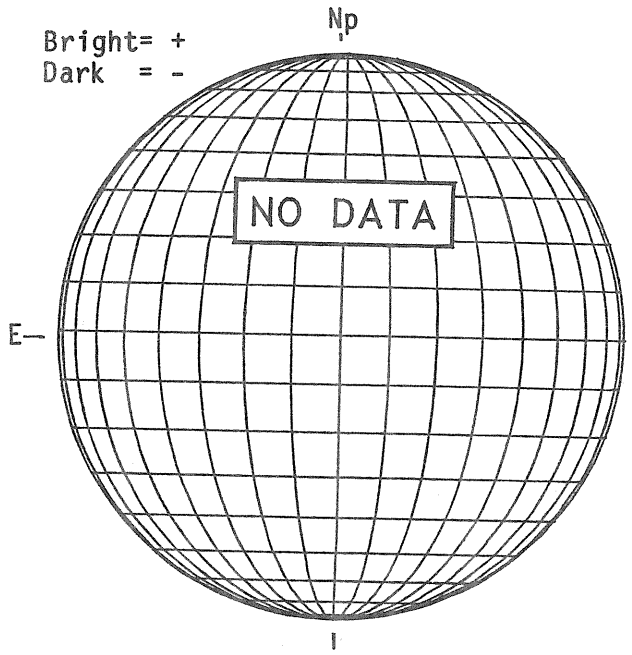
W

Sp

NOVEMBER 05, 1987 (P= 23.79, B_o= 3.98, L_o=289.61)

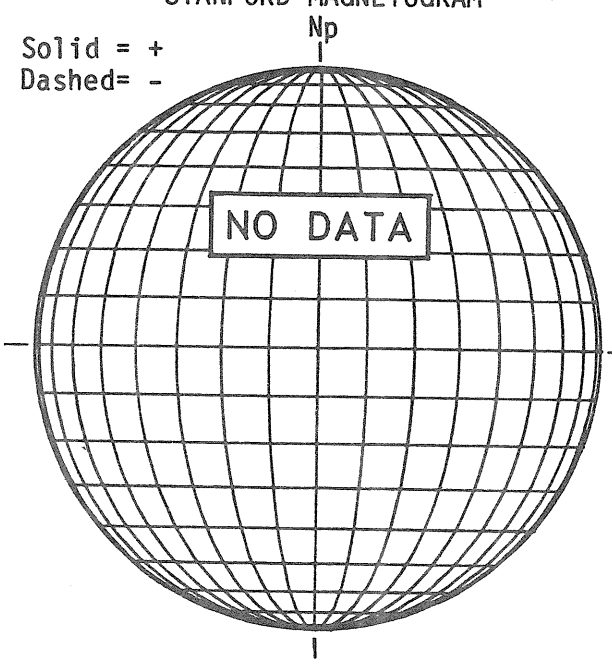
KITT PEAK MAGNETOGRAM

Bright= +
Dark = -



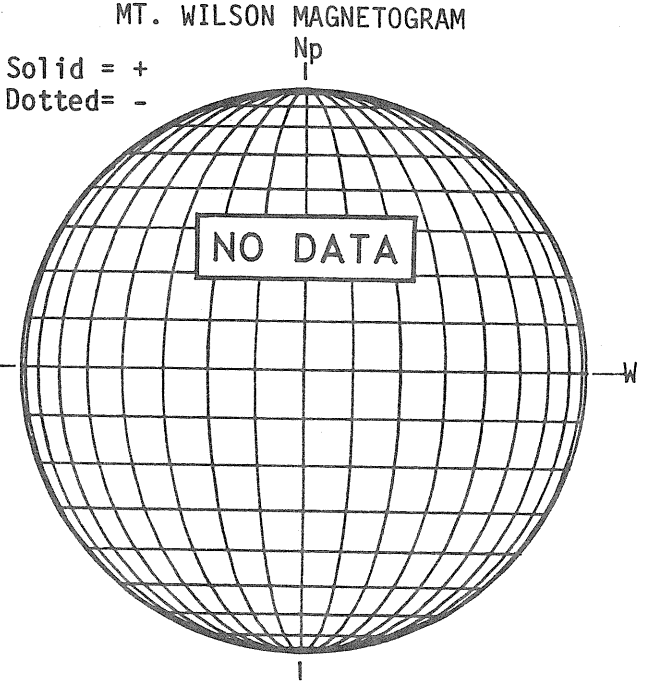
STANFORD MAGNETOGRAM

Solid = +
Dashed= -

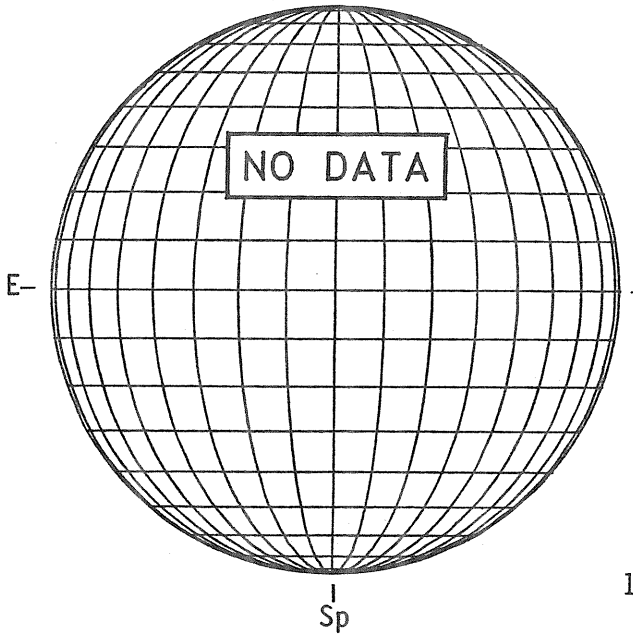


MT. WILSON MAGNETOGRAM

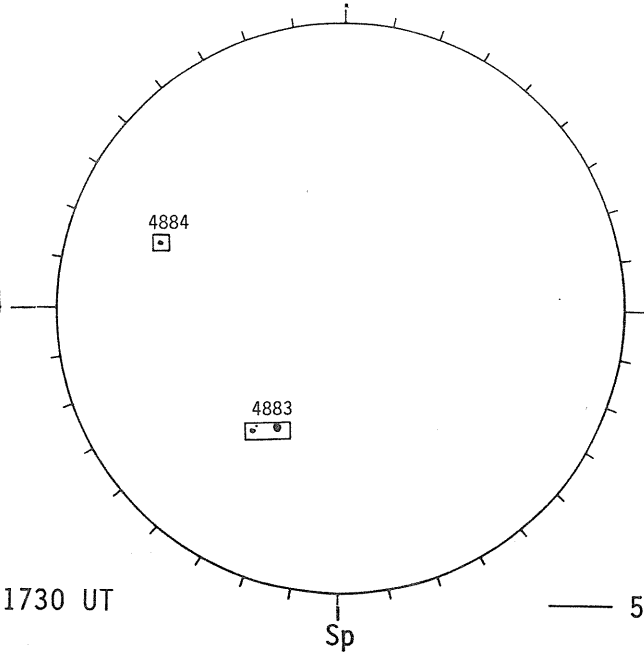
Solid = +
Dotted= -



SACRAMENTO PEAK H-ALPHA

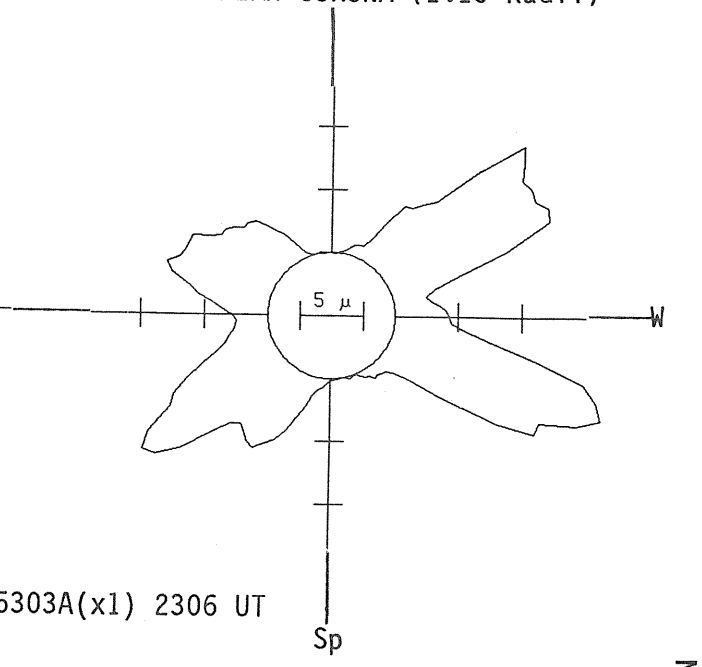


BOULDER SUNSPOTS



1730 UT

SACRAMENTO PEAK CORONA (1.15 Radii)



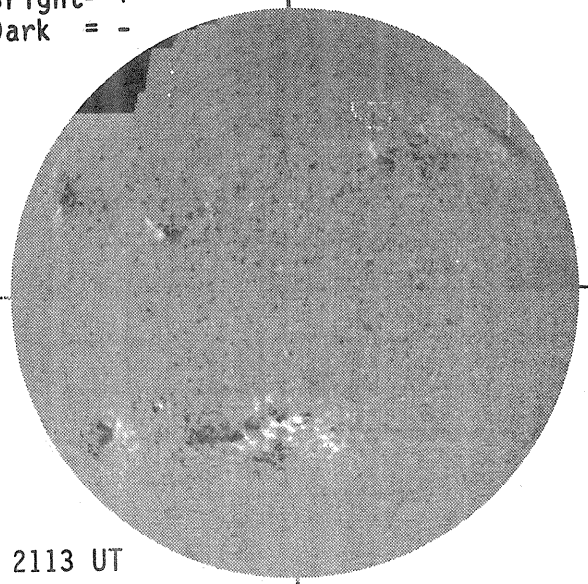
5303A(x1) 2306 UT

NOVEMBER 06, 1987 (P= 23.60, B_o= 3.87, L_o= 276.42)

KITT PEAK MAGNETOGRAM

Np

Bright= +
Dark = -



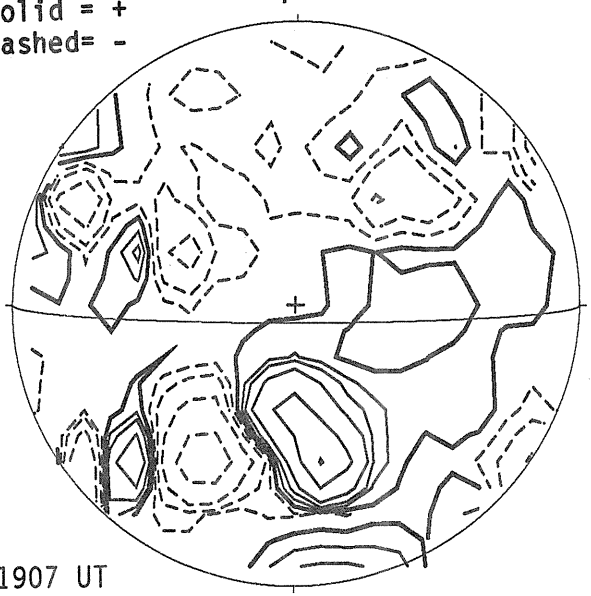
E

2113 UT

STANFORD MAGNETOGRAM

Np

Solid = +
Dashed= -



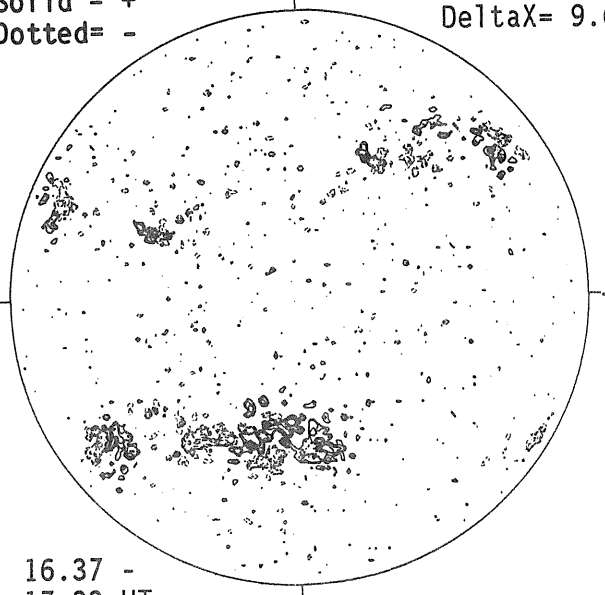
1907 UT

MT. WILSON MAGNETOGRAM

Np

Solid = +
Dotted= -

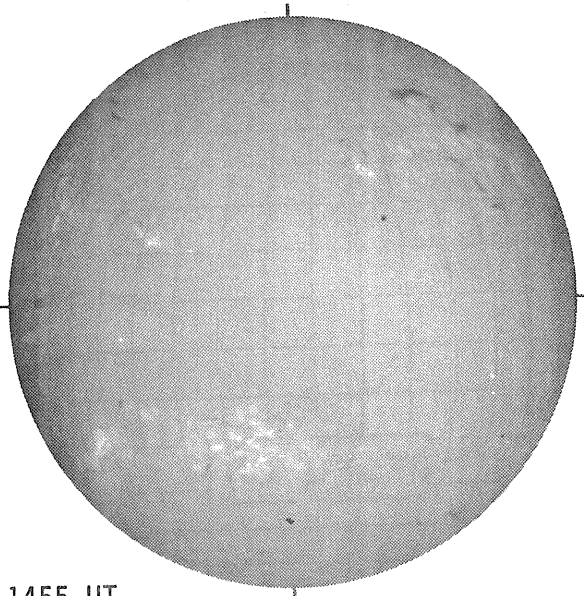
DeltaY=13.1
DeltaX= 9.6



W

16.37 -
17.33 UT

SACRAMENTO PEAK H-ALPHA

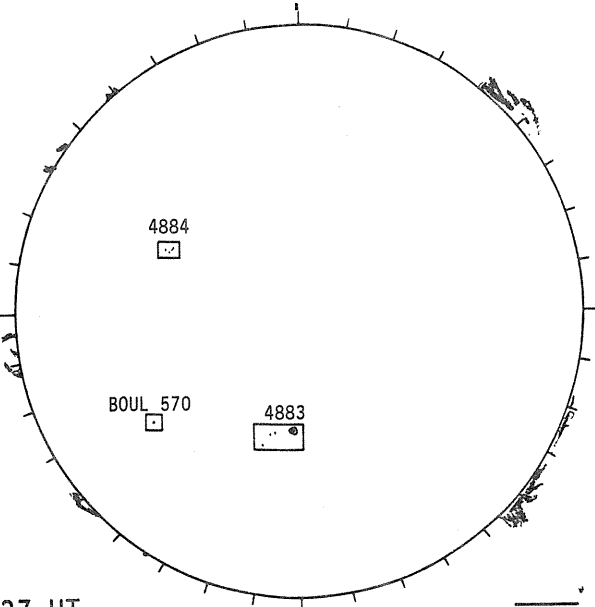


E

1455 UT

Sp

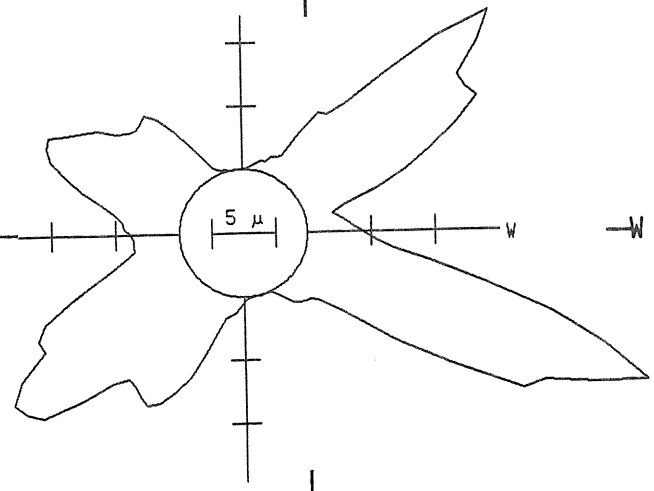
BOULDER SUNSPOTS



1537 UT
1630 UT BOUL Prom

Sp

SACRAMENTO PEAK CORONA (1.15 Radii)



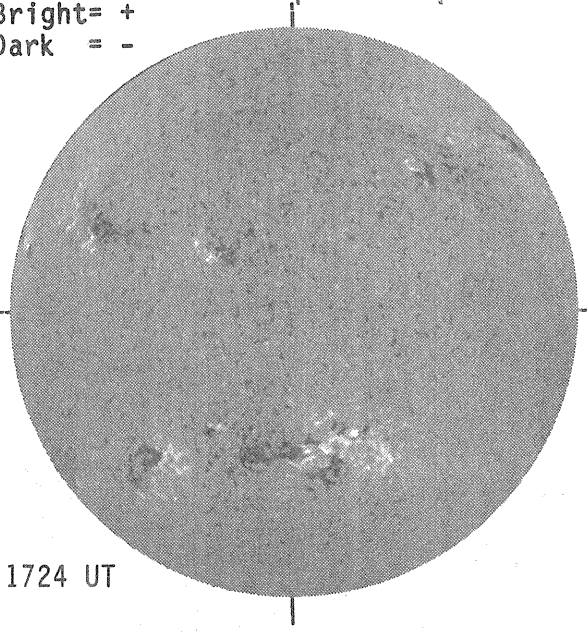
—— 5303A(x1) 1714 UT
xxxx 5694A(x6) 1726 UT
NO 5694A ACTIVITY TODAY

Sp

NOVEMBER 07, 1987 (P= 23.39, B_0= 3.77, L_0= 263.24)

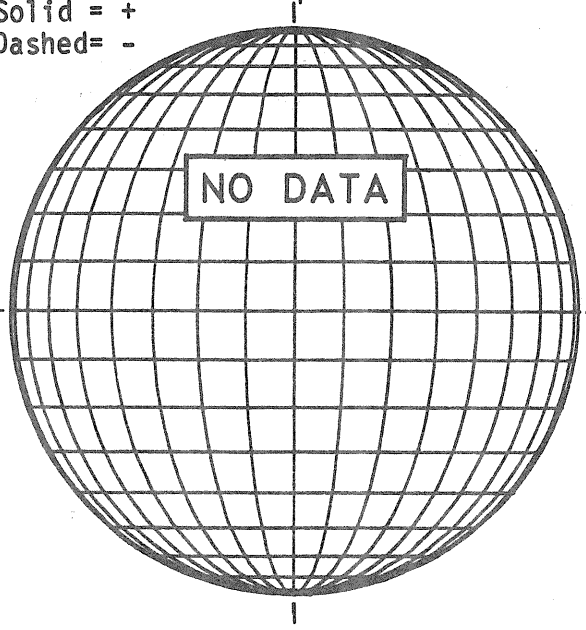
KITT PEAK MAGNETOGRAM

Bright= +
Dark = -



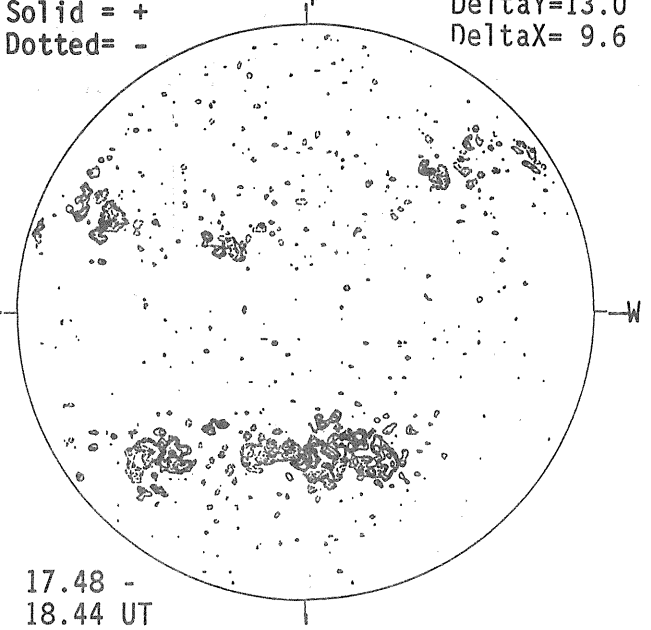
STANFORD MAGNETOGRAM

Solid = +
Dashed= -

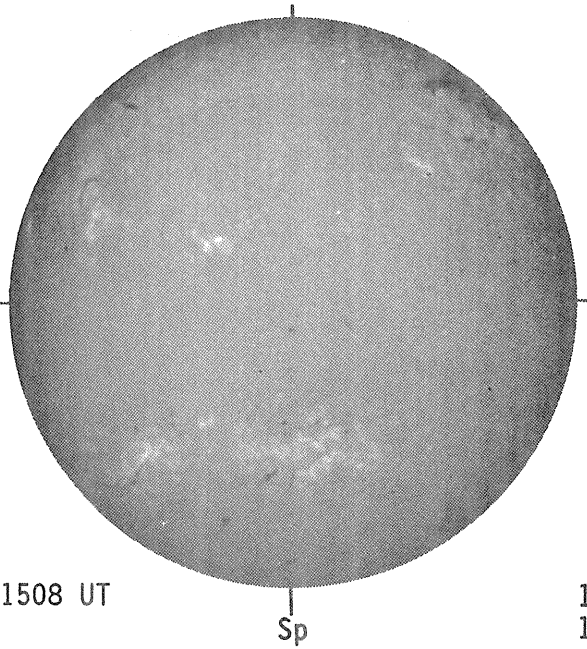


MT. WILSON MAGNETOGRAM

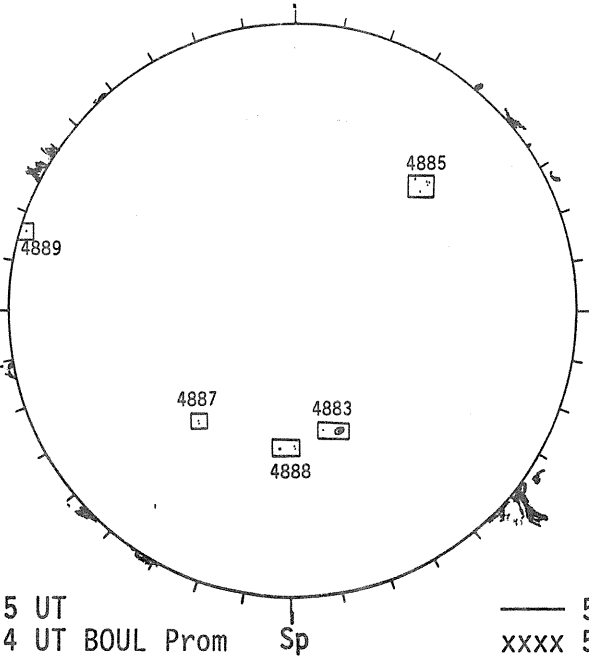
Solid = +
Dotted= -
DeltaY=13.0
DeltaX= 9.6



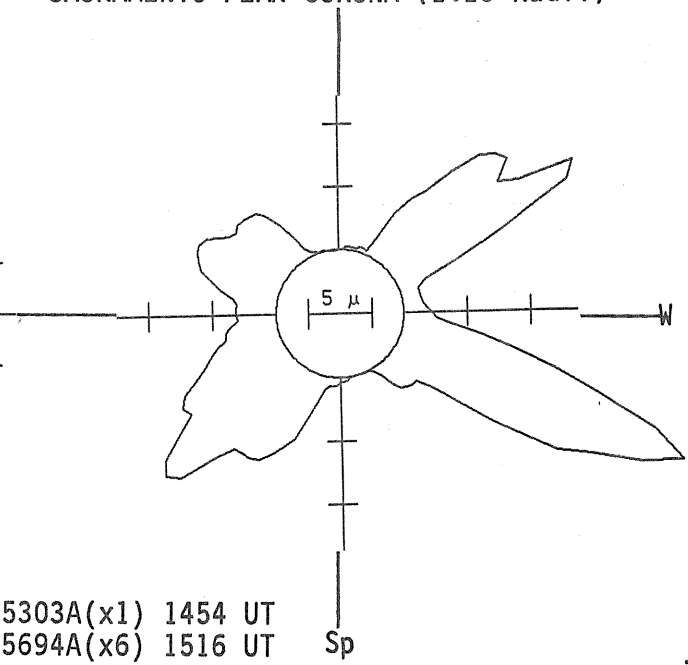
SACRAMENTO PEAK H-ALPHA



BOULDER SUNSPOTS



SACRAMENTO PEAK CORONA (1.15 Radii)

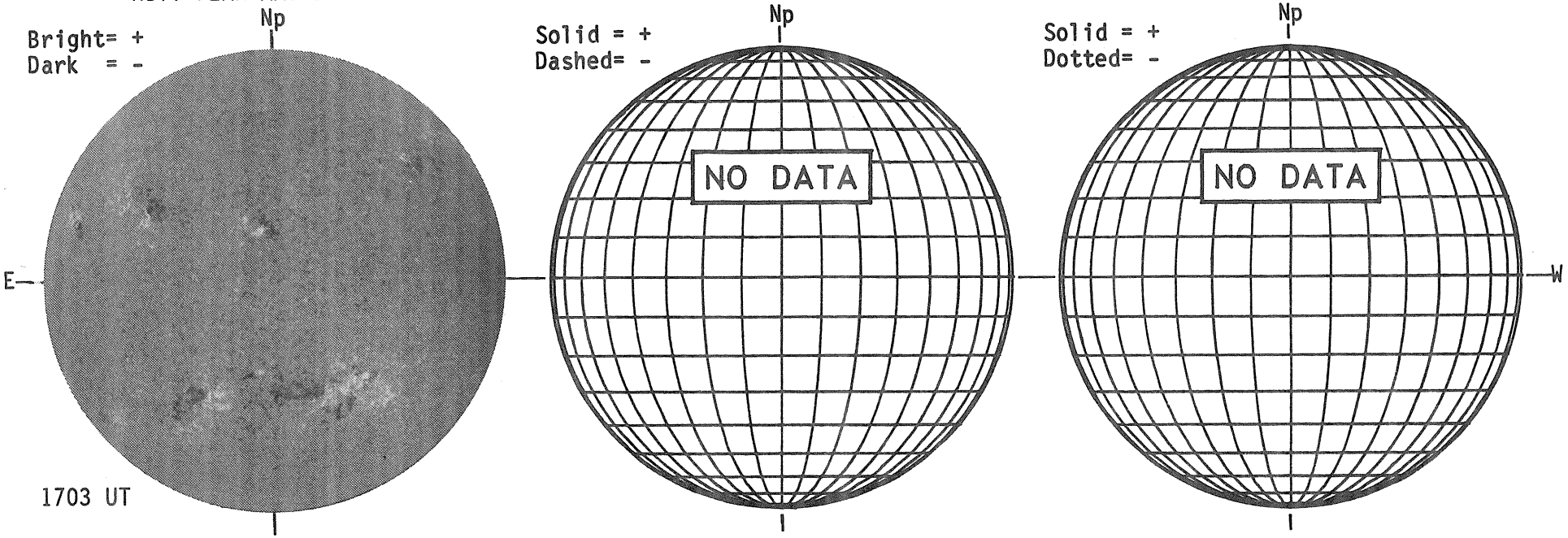


—— 5303A(x1) 1454 UT
xxxx 5694A(x6) 1516 UT
NO 5694A ACTIVITY TODAY

NOVEMBER 08, 1987 (P= 23.18, B_0= 3.66, L_0= 250.05)

KITT PEAK MAGNETOGRAM

Bright= +
Dark = -



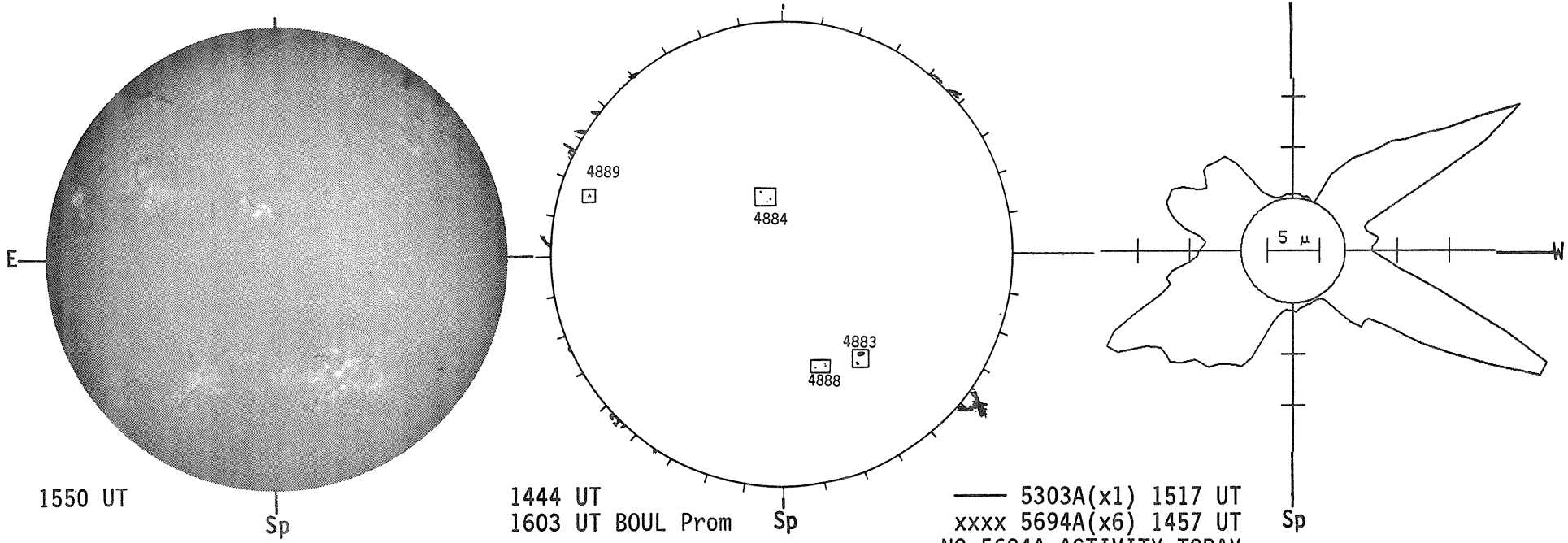
STANFORD MAGNETOGRAM

Solid = +
Dashed= -

MT. WILSON MAGNETOGRAM

Solid = +
Dotted= -

SACRAMENTO PEAK H-ALPHA



BOULDER SUNSPOTS

1444 UT
1603 UT BOUL Prom

SACRAMENTO PEAK CORONA (1.15 Radii)

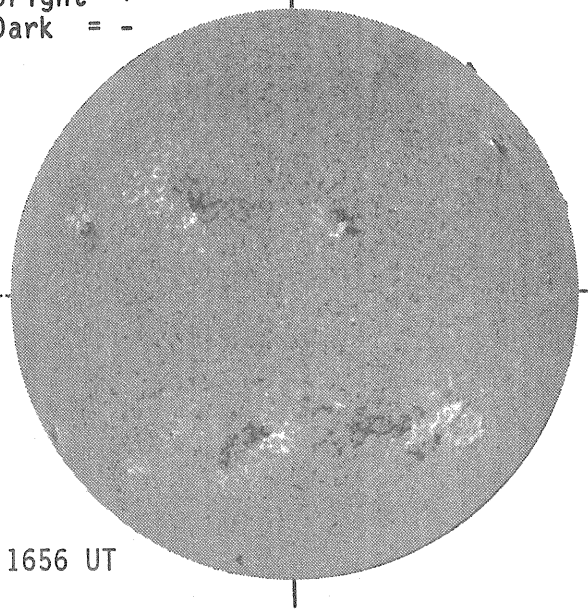
—— 5303A(x1) 1517 UT
xxxx 5694A(x6) 1457 UT
NO 5694A ACTIVITY TODAY

NOVEMBER 09, 1987 (P= 22.95, B_o= 3.55, L_o= 236.87)

KITT PEAK MAGNETOGRAM

Np

Bright= +
Dark = -



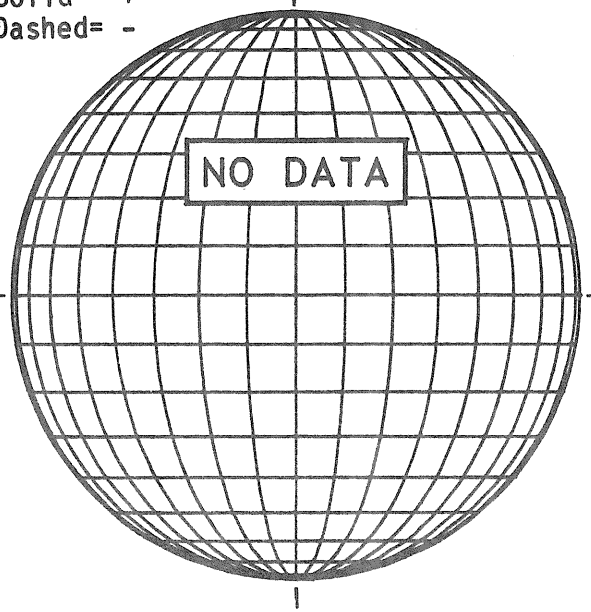
E

1656 UT

STANFORD MAGNETOGRAM

Np

Solid = +
Dashed= -

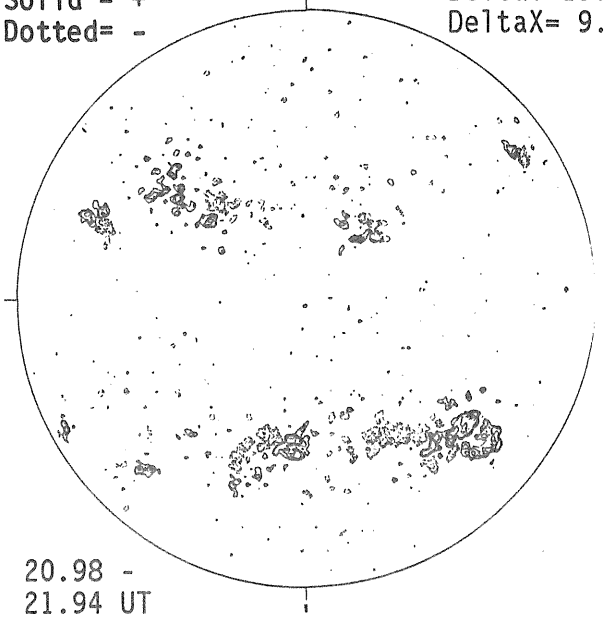


MT. WILSON MAGNETOGRAM

Np

Solid = +
Dotted= -

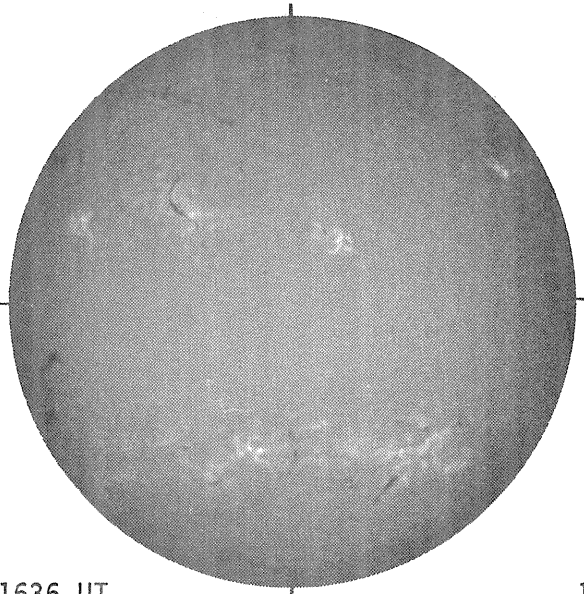
DeltaY=13.0
DeltaX= 9.6



W

20.98 -
21.94 UT

SACRAMENTO PEAK H-ALPHA

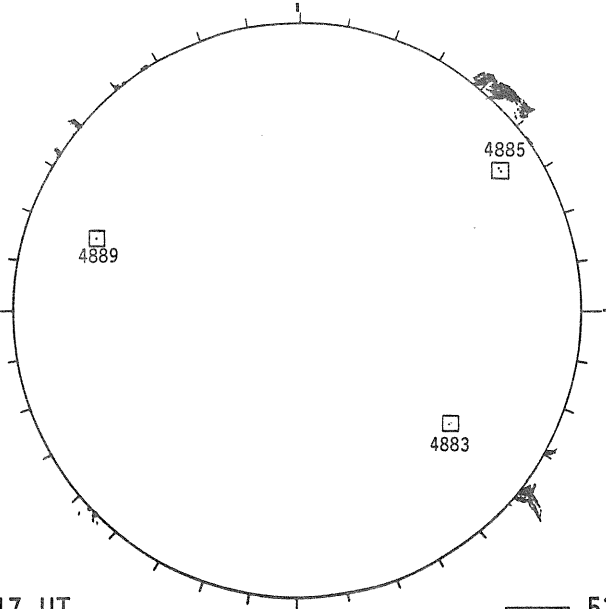


E

1636 UT

Sp

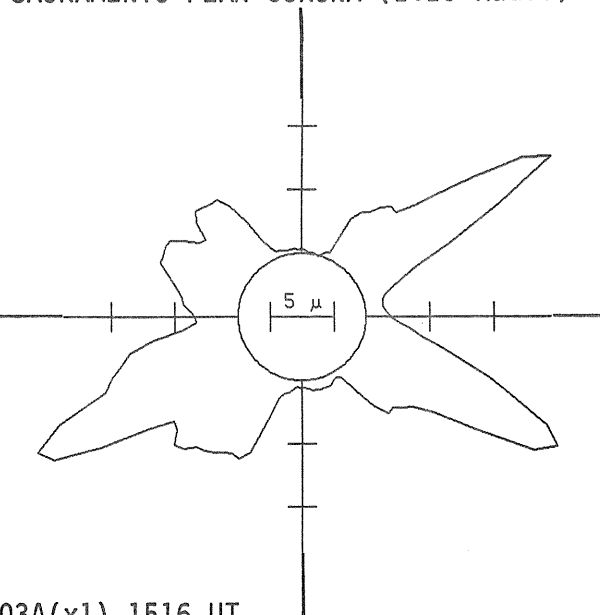
BOULDER SUNSPOTS



1447 UT
1543 UT BOUL Prom

Sp

SACRAMENTO PEAK CORONA (1.15 Radii)



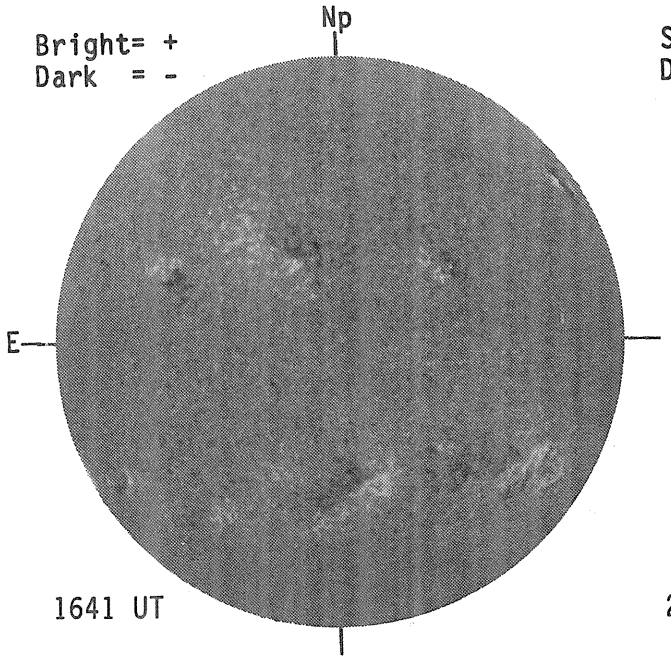
W

Sp

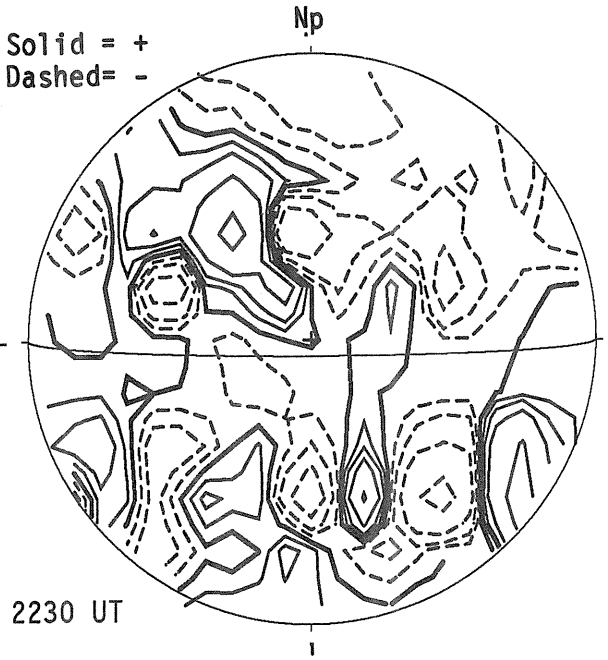
—— 5303A(x1) 1516 UT
xxxx 5694A(x6) 1454 UT
NO 5694A ACTIVITY TODAY

NOVEMBER 10, 1987 (P= 22.72, B_o= 3.44, L_o= 223.68)

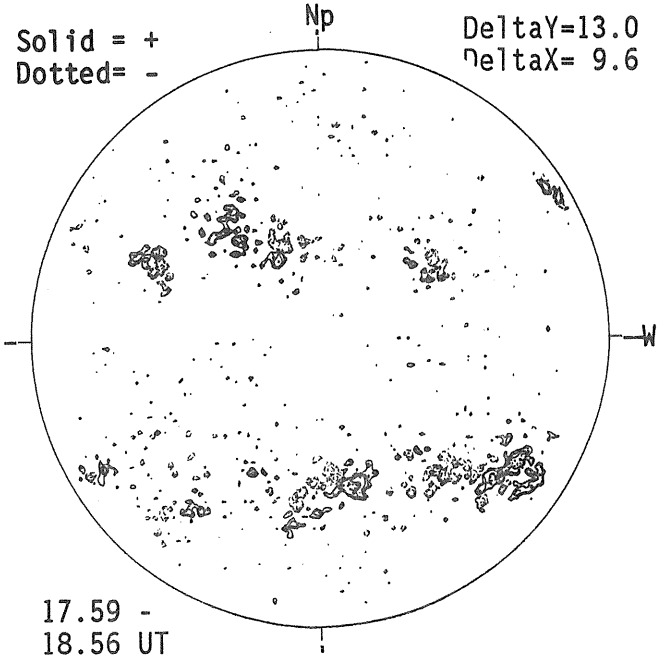
KITT PEAK MAGNETOGRAM



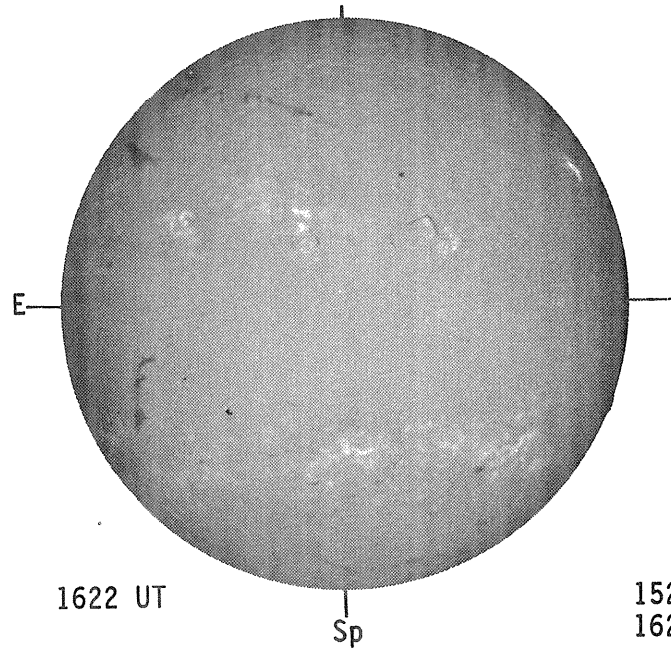
STANFORD MAGNETOGRAM



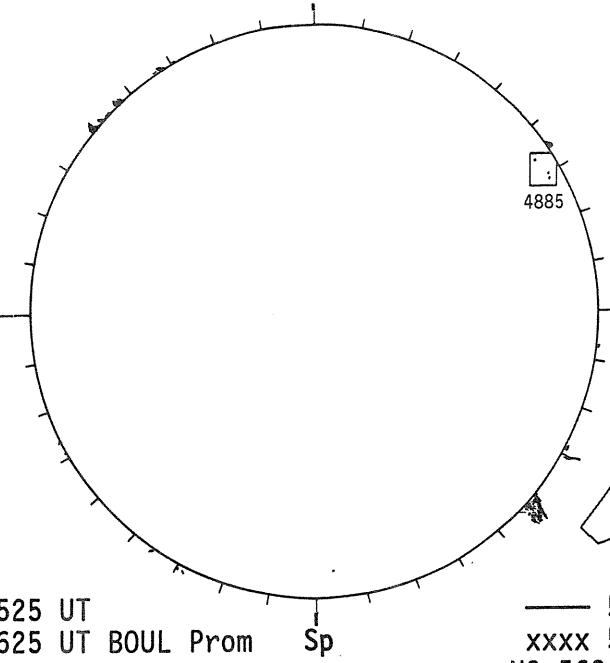
MT. WILSON MAGNETOGRAM



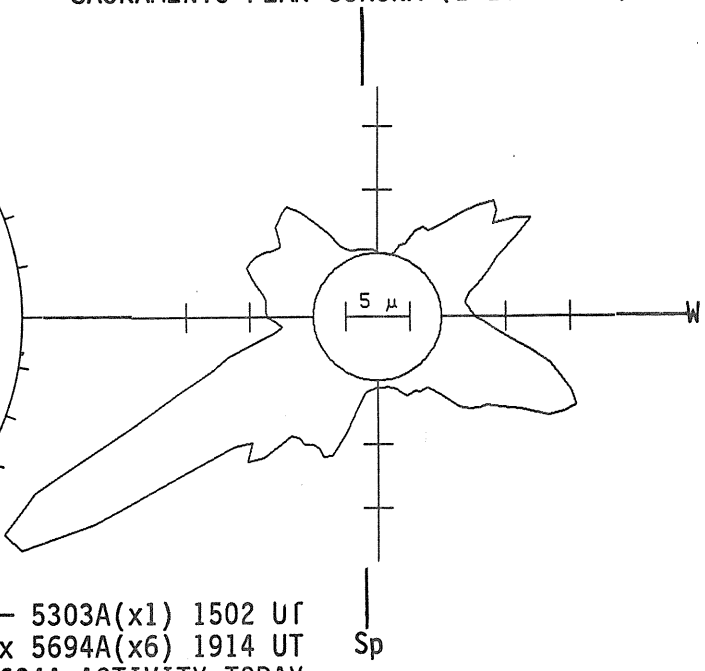
SACRAMENTO PEAK H-ALPHA



BOULDER SUNSPOTS



SACRAMENTO PEAK CORONA (1.15 Radii)

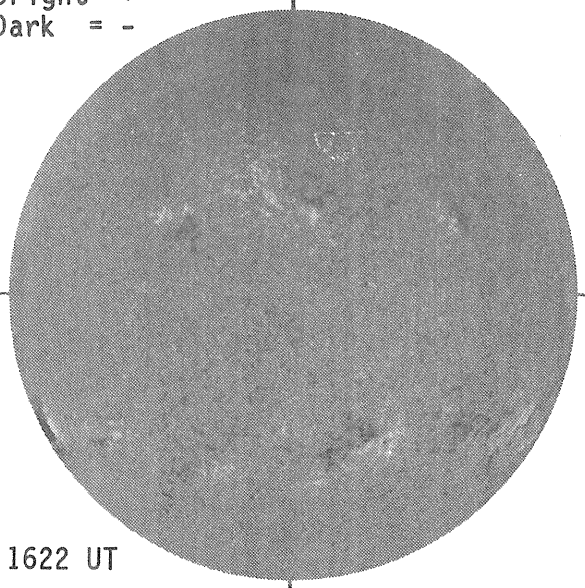


NOVEMBER 11, 1987 (P= 22.49, B_o= 3.33, L_o= 210.50)

KITT PEAK MAGNETOGRAM

Np

Bright= +
Dark = -



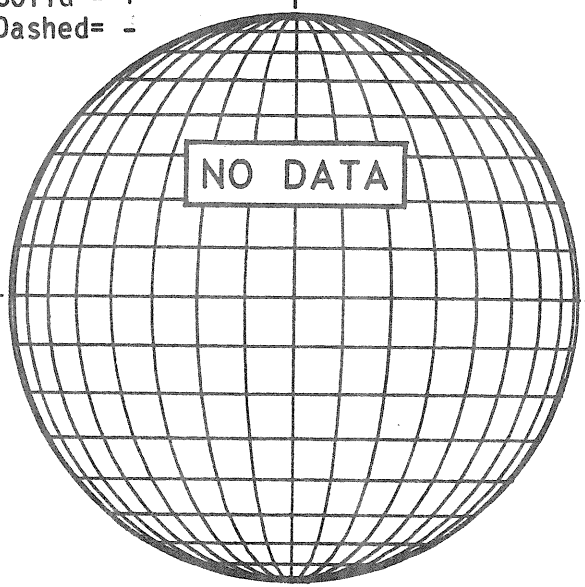
E

1622 UT

STANFORD MAGNETOGRAM

Np

Solid = +
Dashed= -

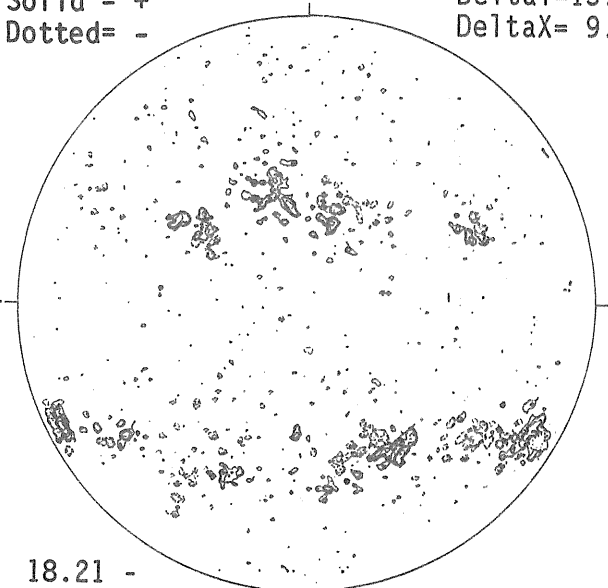


MT. WILSON MAGNETOGRAM

Np

Solid = +
Dotted= -

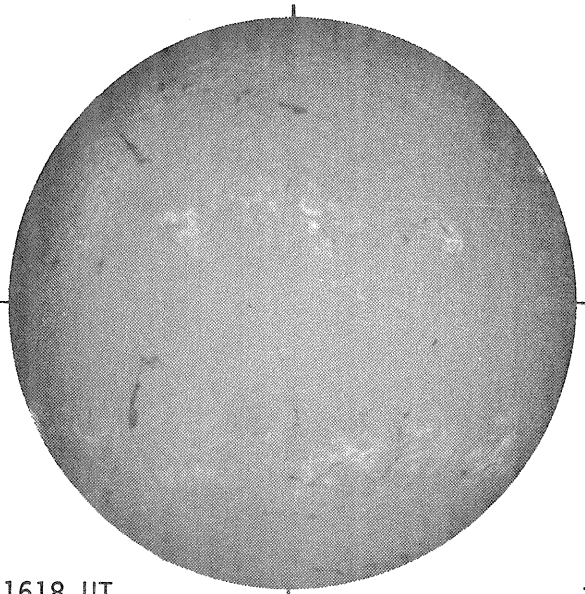
DeltaY=13.0
DeltaX= 9.6



W

18.21 -
19.18 UT

SACRAMENTO PEAK H-ALPHA

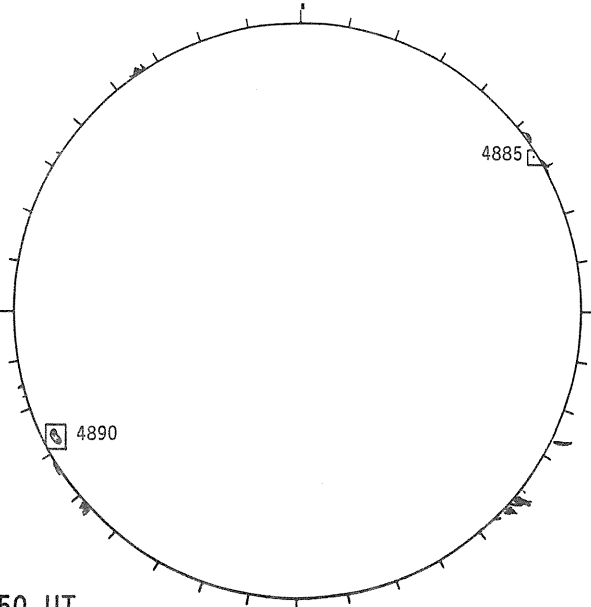


E

1618 UT

Sp

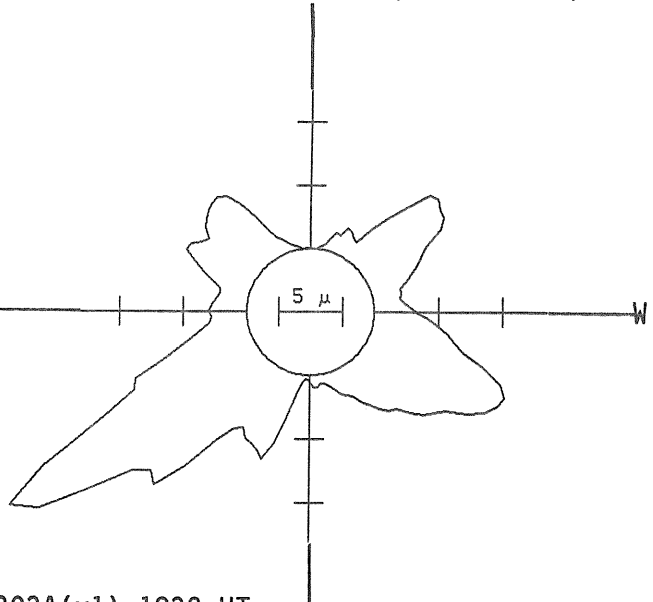
BOULDER SUNSPOTS



1550 UT
1645 UT BOUL Prom

Sp

SACRAMENTO PEAK CORONA (1.15 Radii)



W

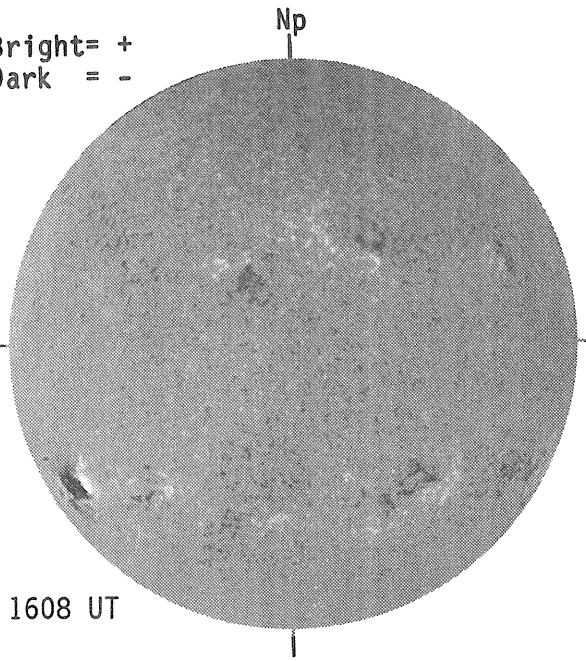
—— 5303A(x1) 1839 UT
xxxx 5694A(x6) 1904 UT
NO 5694A ACTIVITY TODAY

Sp

NOVEMBER 12, 1987 (P= 22.24, B_o= 3.22, L_o= 197.32)

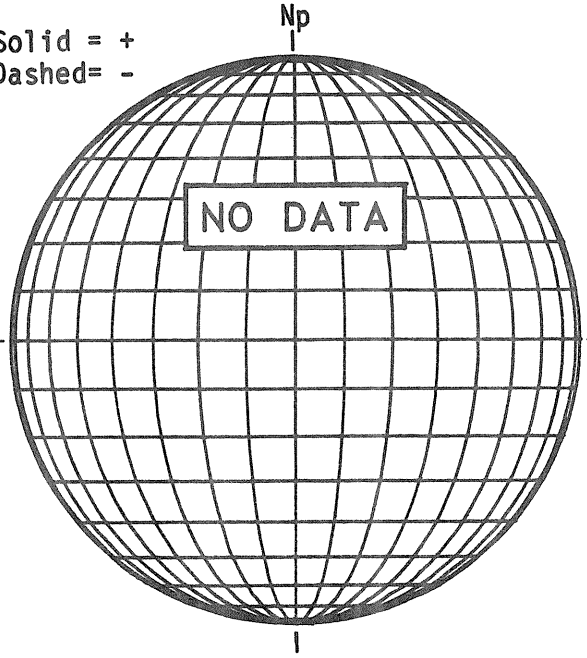
KITT PEAK MAGNETOGRAM

Bright= +
Dark = -



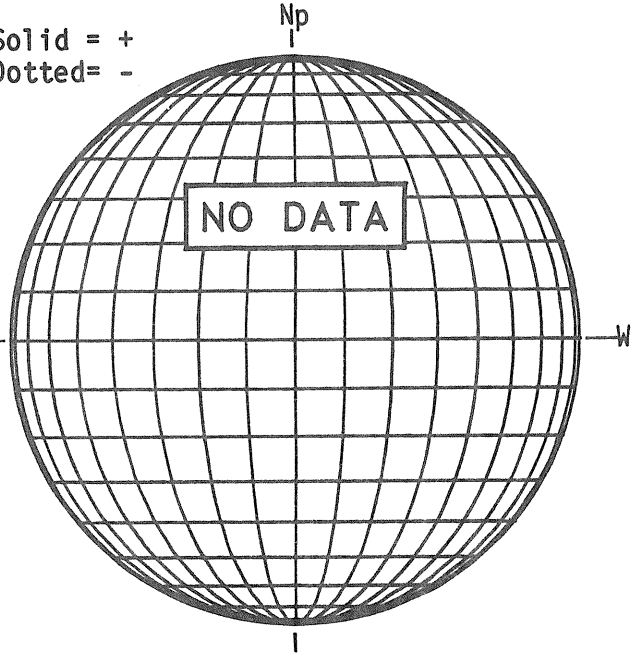
STANFORD MAGNETOGRAM

Solid = +
Dashed= -

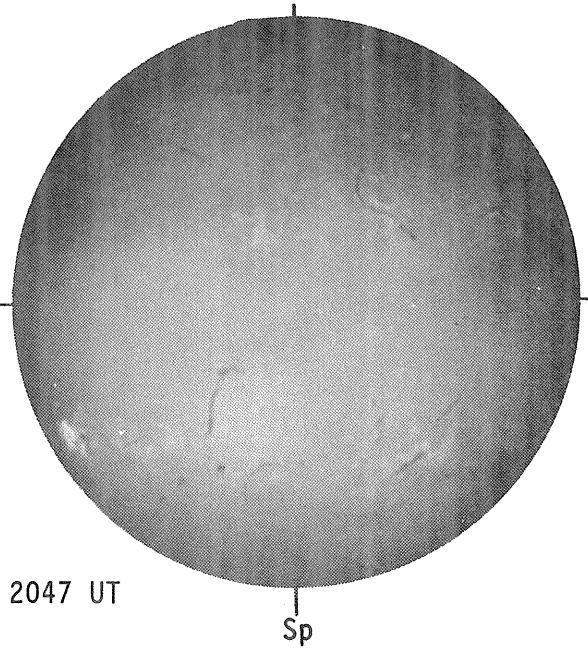


MT. WILSON MAGNETOGRAM

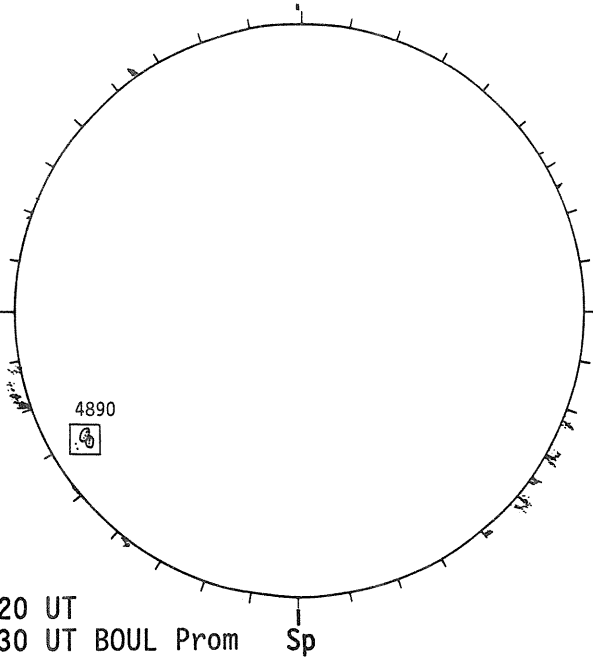
Solid = +
Dotted= -



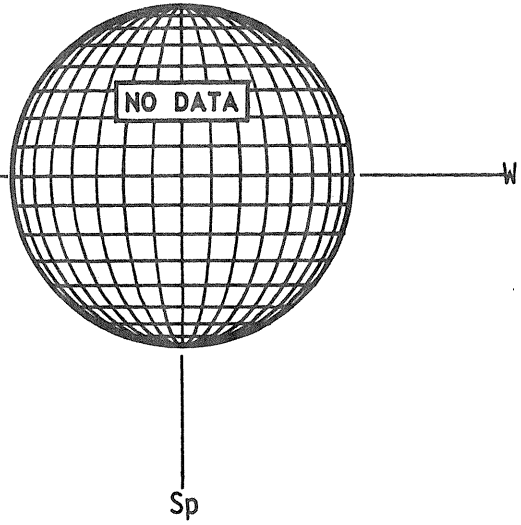
SACRAMENTO PEAK H-ALPHA



BOULDER SUNSPOTS



SACRAMENTO PEAK CORONA (1.15 Radii)

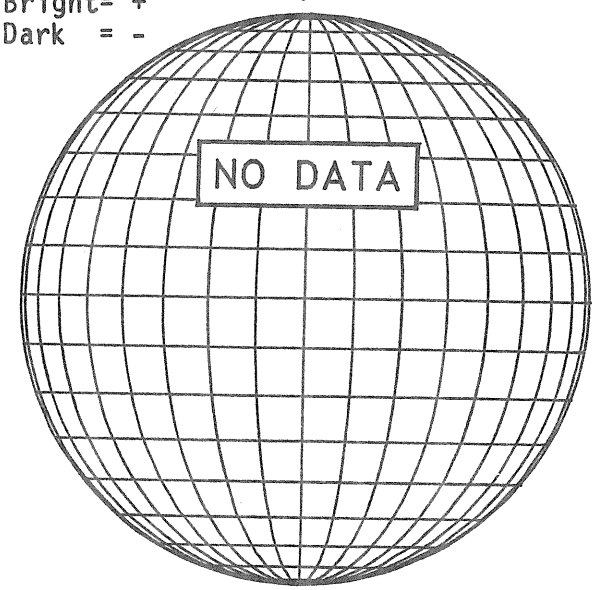


NOVEMBER 13, 1987 (P= 21.99, B_o= 3.11, L_o= 184.13)

KITT PEAK MAGNETOGRAM

Bright= +
Dark = -

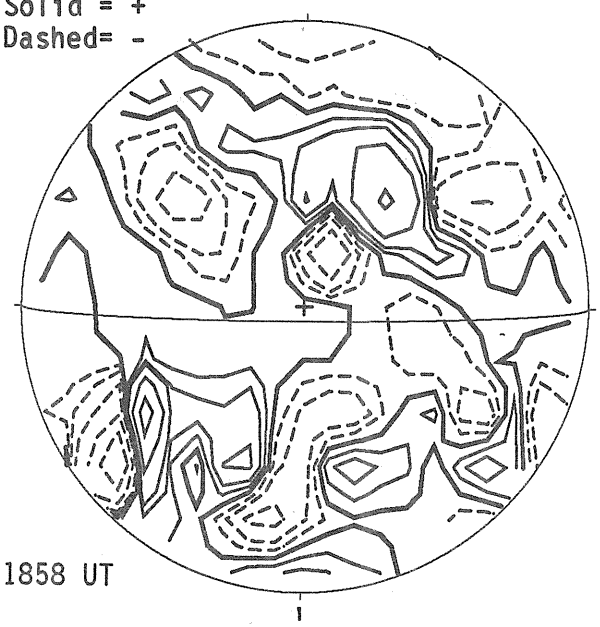
Np



STANFORD MAGNETOGRAM

Solid = +
Dashed= -

Np

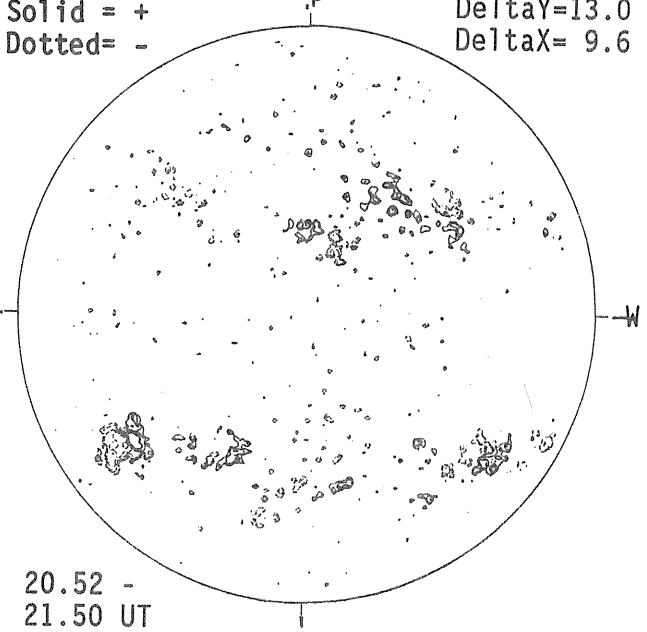


MT. WILSON MAGNETOGRAM

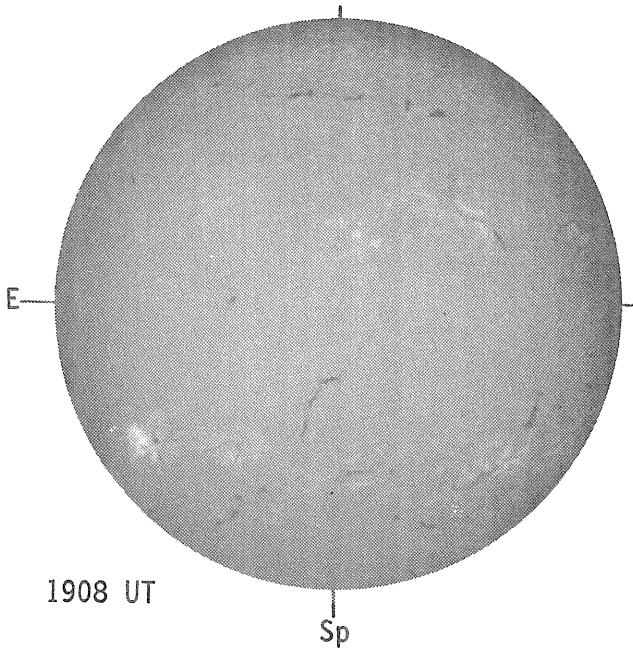
Solid = +
Dotted= -

DeltaY=13.0
DeltaX= 9.6

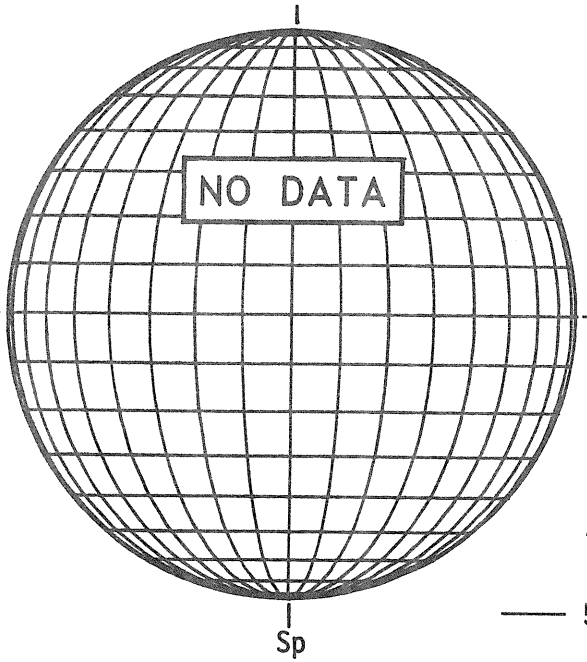
Np



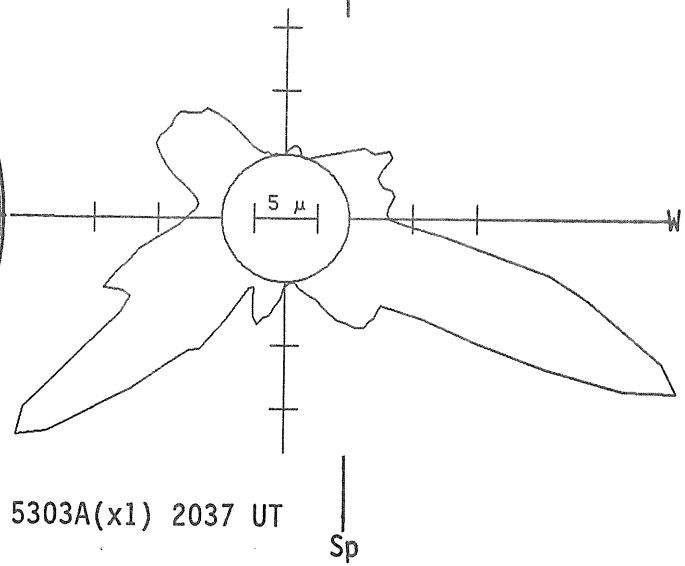
BOULDER H-ALPHA



BOULDER SUNSPOTS



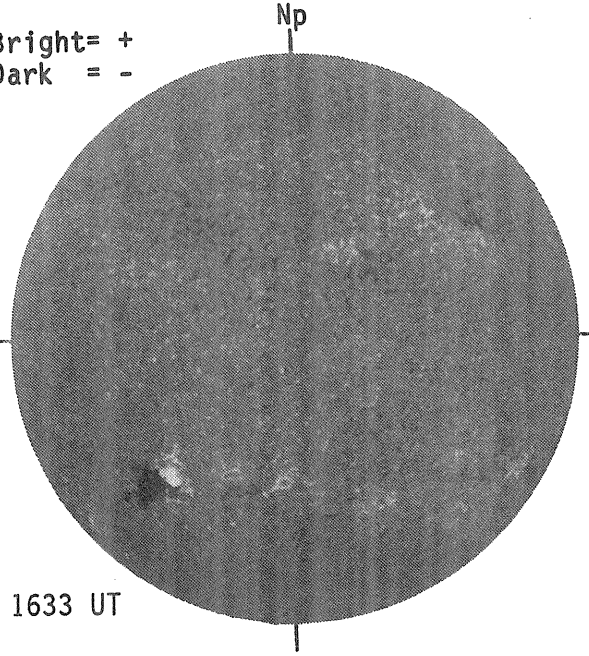
SACRAMENTO PEAK CORONA (1.15 Radii)



NOVEMBER 14, 1987 (P= 21.73, B_o= 3.00, L_o= 170.95)

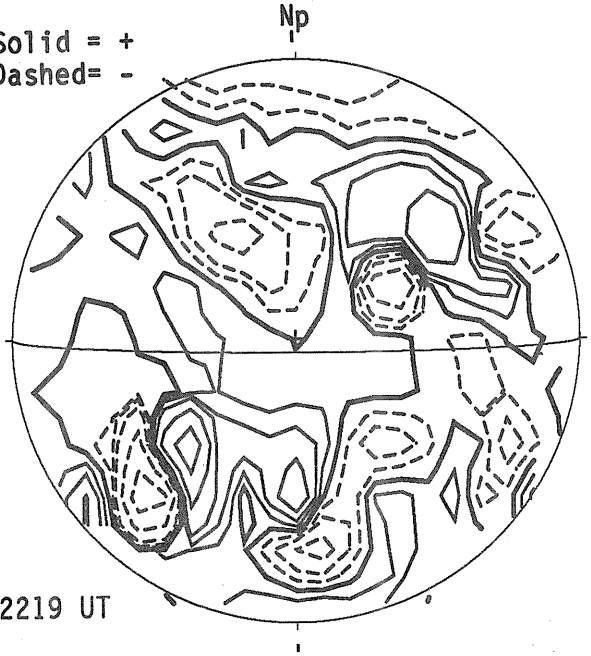
KITT PEAK MAGNETOGRAM

Bright= +
Dark = -



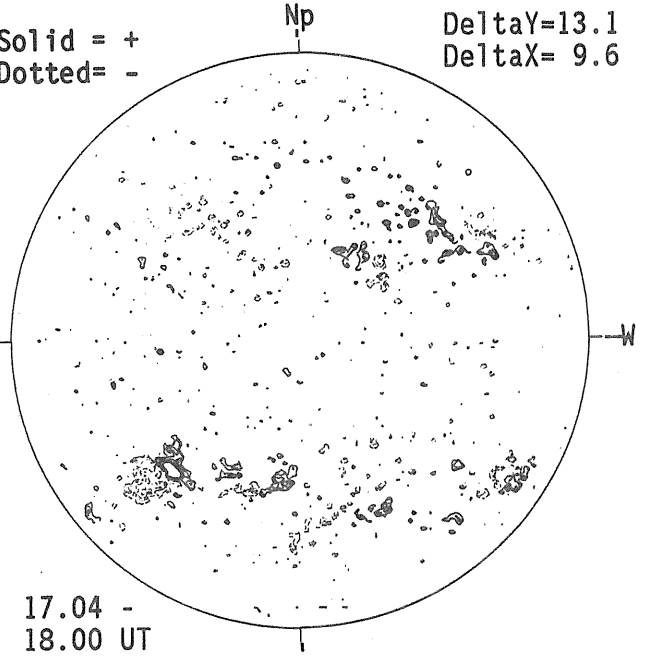
STANFORD MAGNETOGRAM

Solid = +
Dashed= -

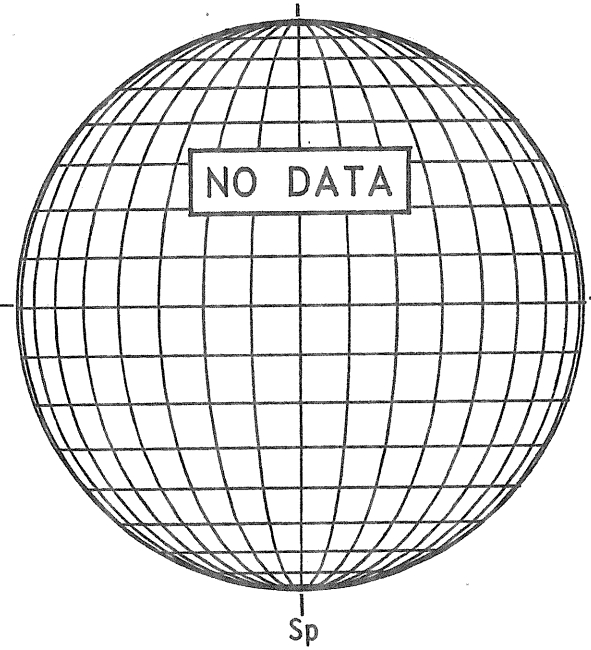


MT. WILSON MAGNETOGRAM

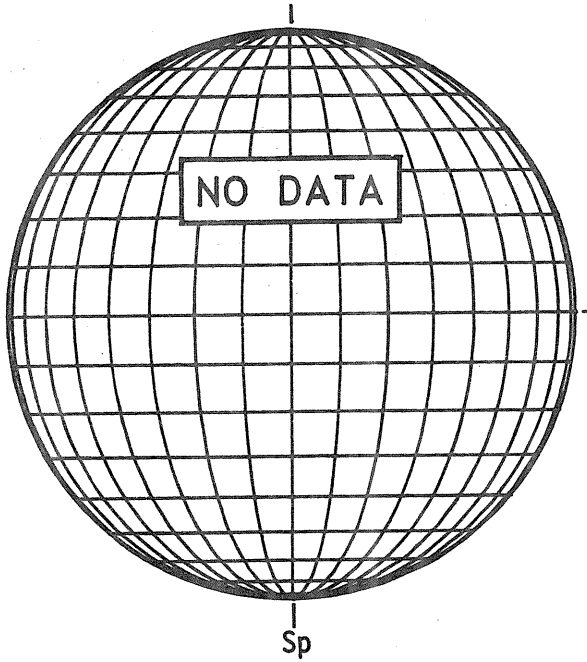
Solid = +
Dotted= -
DeltaY=13.1
DeltaX= 9.6



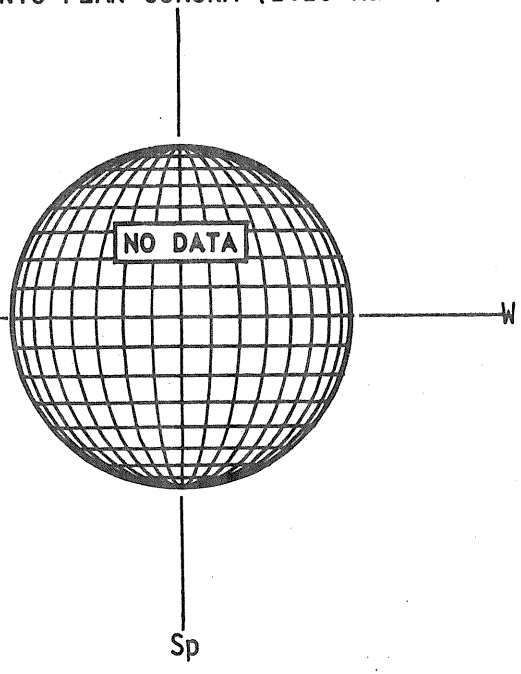
SACRAMENTO PEAK H-ALPHA



BOULDER SUNSPOTS



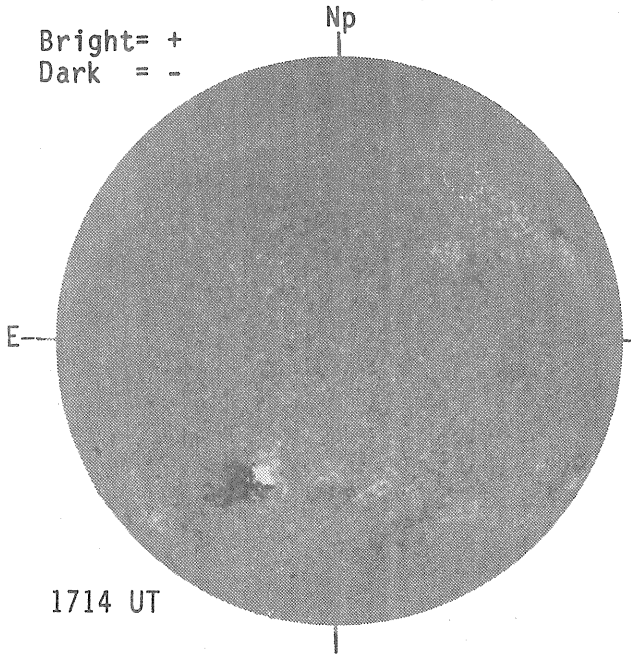
SACRAMENTO PEAK CORONA (1.15 Radii)



NOVEMBER 15, 1987 (P= 21.46, B_o= 2.88, L_o= 157.77)

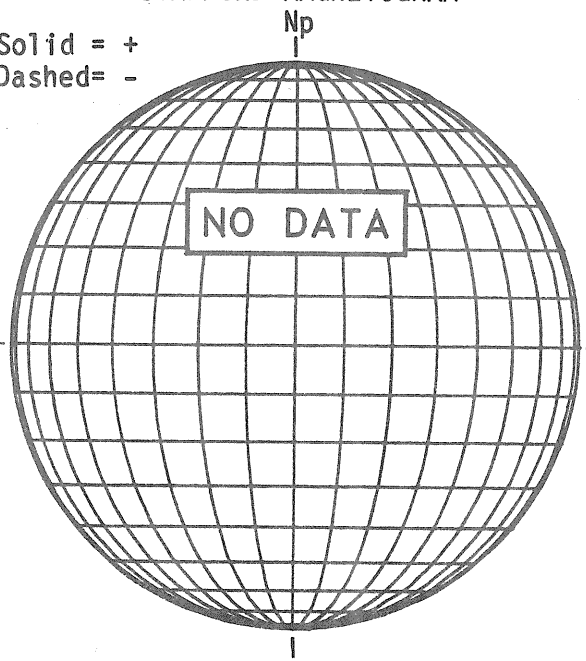
KITT PEAK MAGNETOGRAM

Bright= +
Dark = -



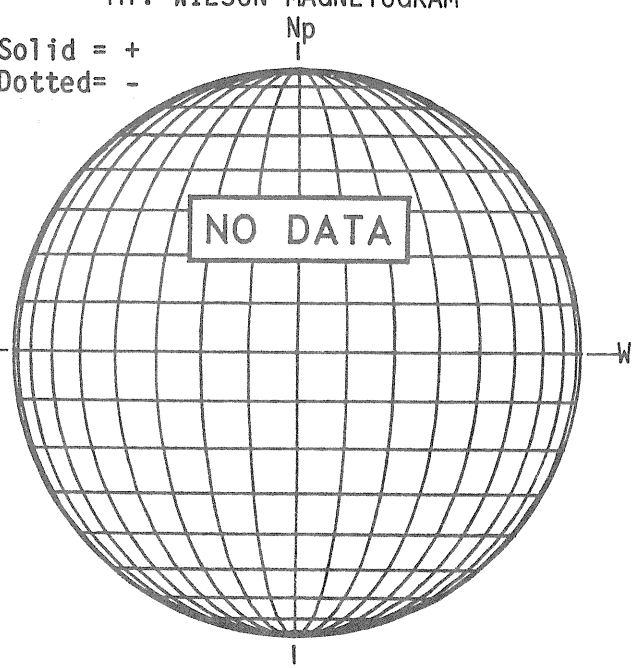
STANFORD MAGNETOGRAM

Solid = +
Dashed= -

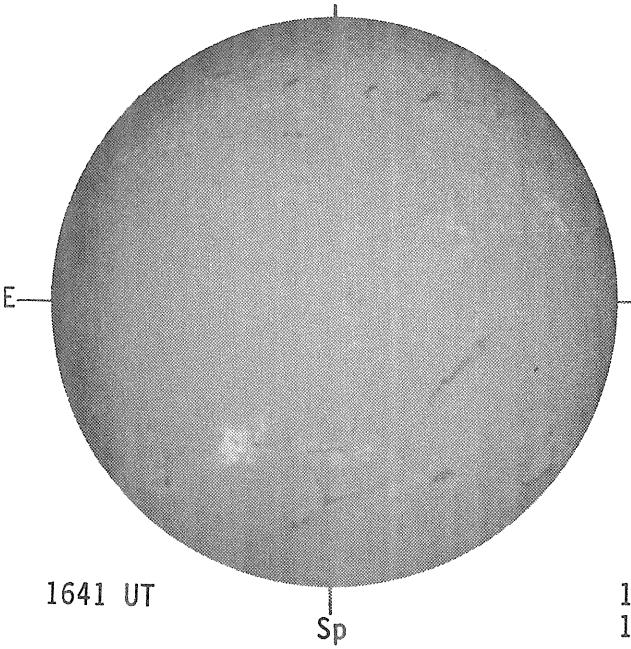


MT. WILSON MAGNETOGRAM

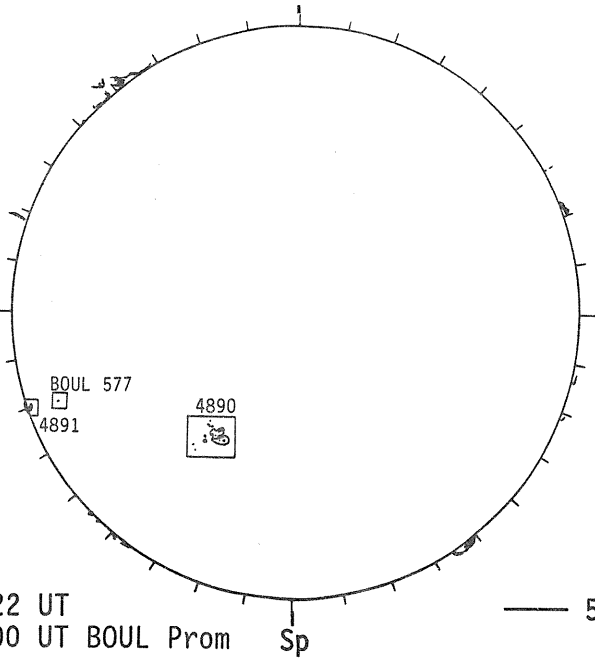
Solid = +
Dotted= -



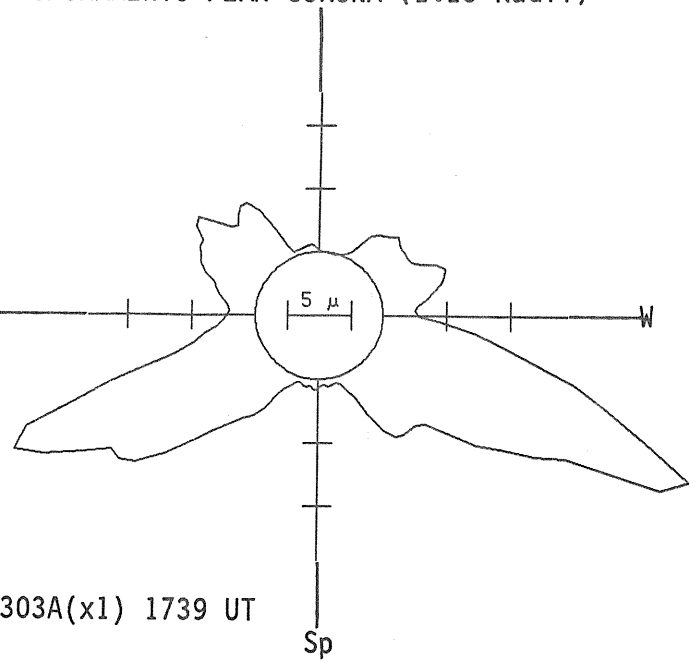
BOULDER H-ALPHA



BOULDER SUNSPOTS



SACRAMENTO PEAK CORONA (1.15 Radii)

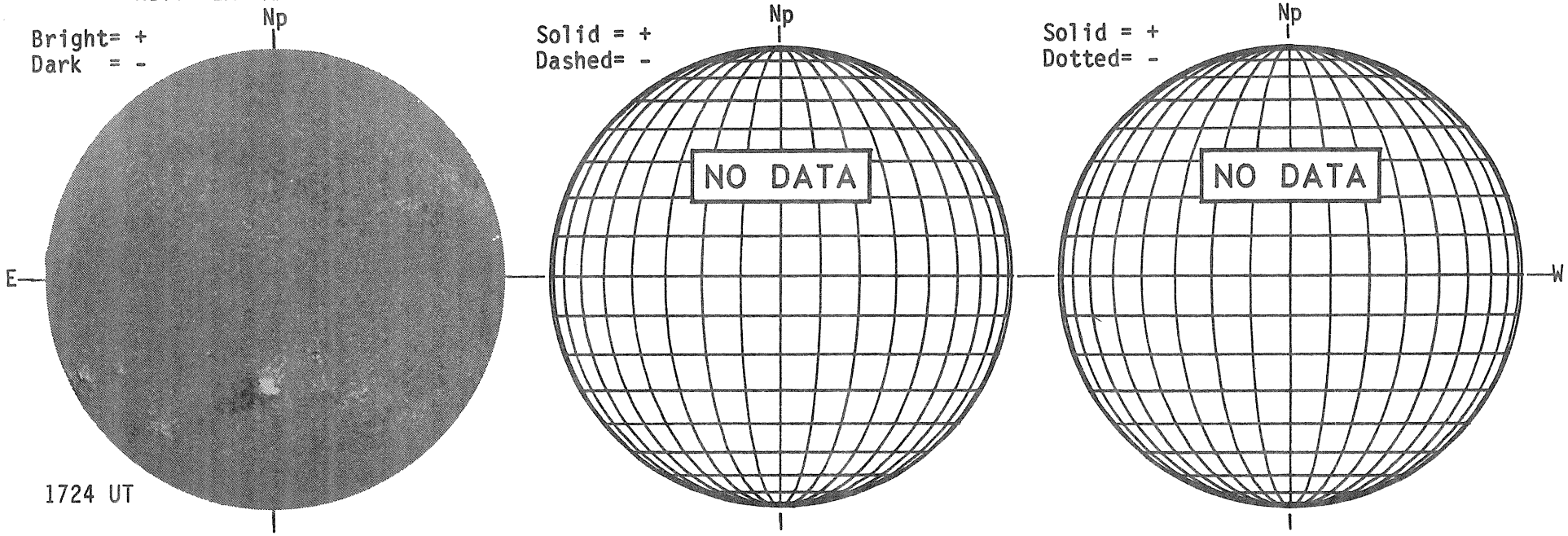


—— 5303A(x1) 1739 UT

NOVEMBER 16, 1987 (P= 21.19, B_o= 2.77, L_o= 144.58)

KITT PEAK MAGNETOGRAM

Bright= +
Dark = -



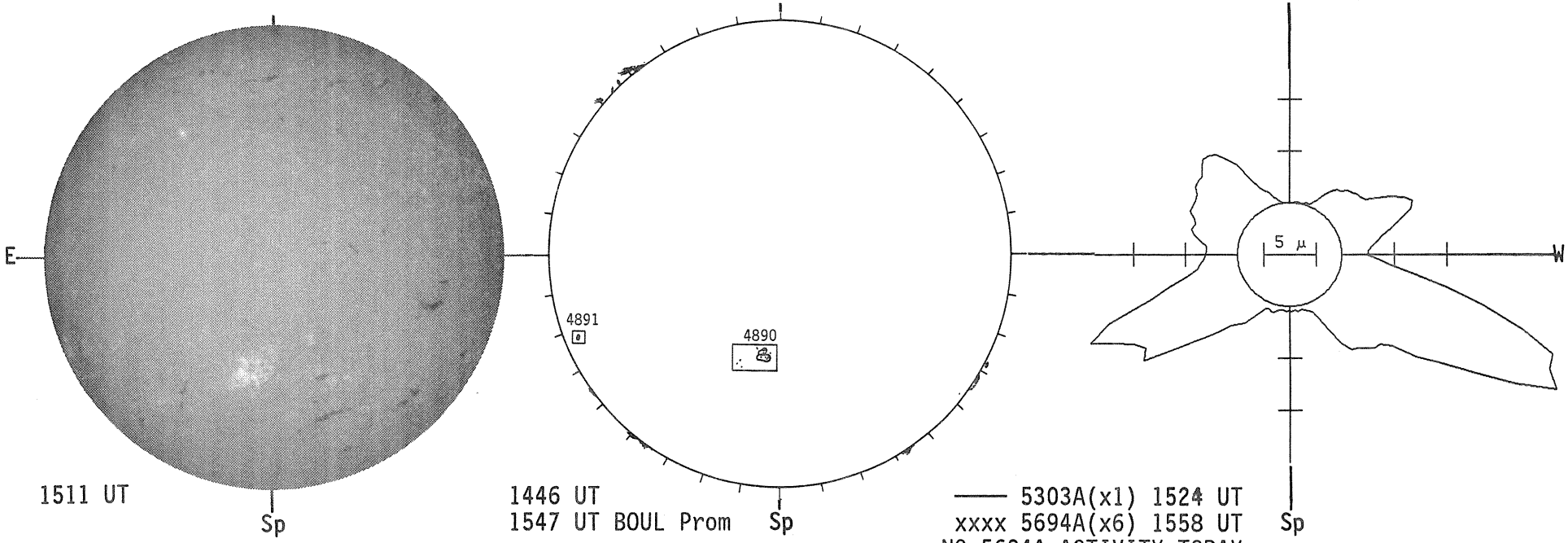
STANFORD MAGNETOGRAM

Solid = +
Dashed= -

MT. WILSON MAGNETOGRAM

Solid = +
Dotted= -

SACRAMENTO PEAK H-ALPHA



BOULDER SUNSPOTS

SACRAMENTO PEAK CORONA (1.15 Radii)

—— 5303A(x1) 1524 UT
xxxx 5694A(x6) 1558 UT
NO 5694A ACTIVITY TODAY

NOVEMBER 17, 1987 (P= 20.91, B_o= 2.65, L_o= 131.40)

KITT PEAK MAGNETOGRAM

Np

Bright= +
Dark = -

NO DATA

E

SACRAMENTO PEAK H-ALPHA

STANFORD MAGNETOGRAM

Np

Solid = +
Dashed= -

2148 UT

BOULDER SUNSPOTS

MT. WILSON MAGNETOGRAM

Np

Solid = +
Dotted= -

DeltaY=13.1
DeltaX= 9.6

W

17.66
18.63 UT

SACRAMENTO PEAK CORONA (1.15 Radii)

5 μ

E

1543 UT

Sp

4891

4890

1550 UT
1800 UT BOUL Prom

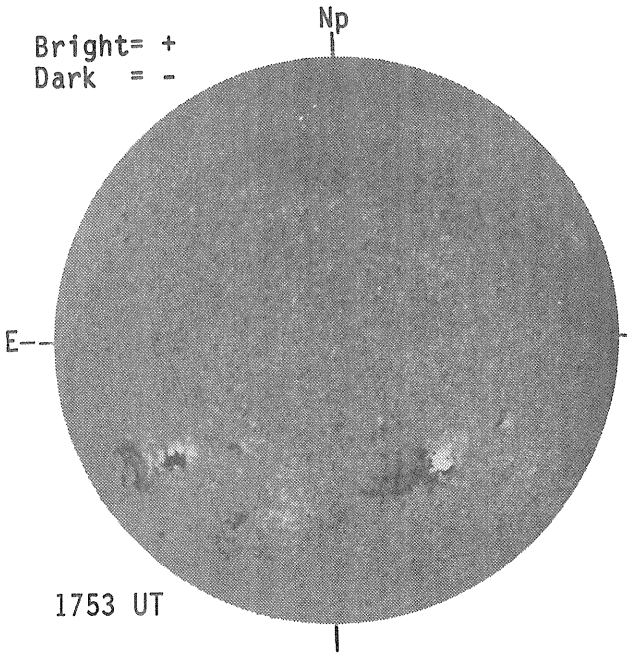
Sp

—— 5303A(x1) 1557 UT
xxxx 5694A(x6) 1618 UT
NO 5694A ACTIVITY TODAY

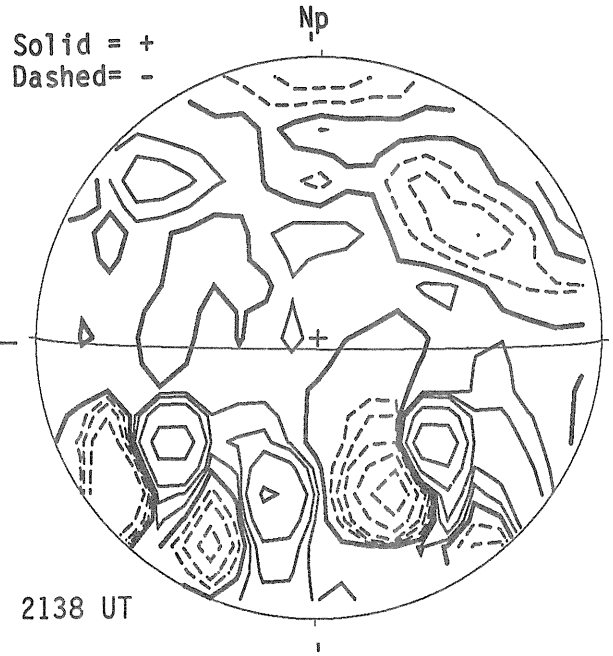
Sp

NOVEMBER 18, 1987 (P= 20.62, B_o= 2.54, L_o= 118.22)

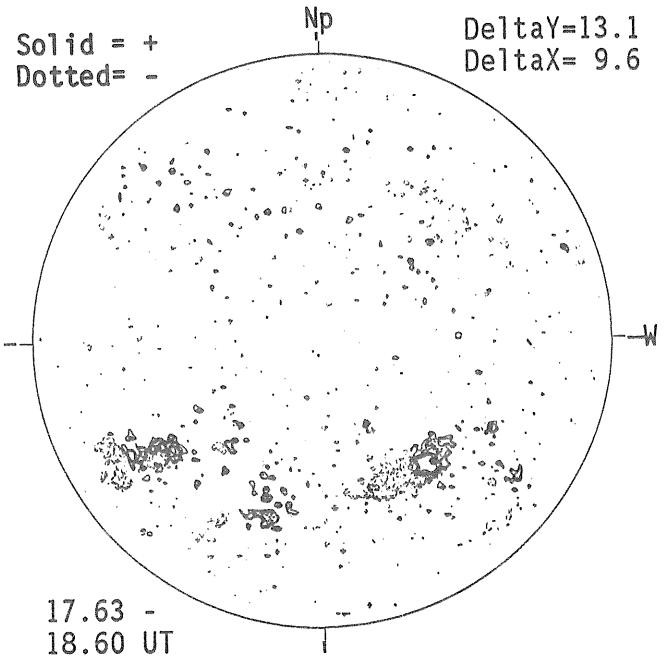
KITT PEAK MAGNETOGRAM



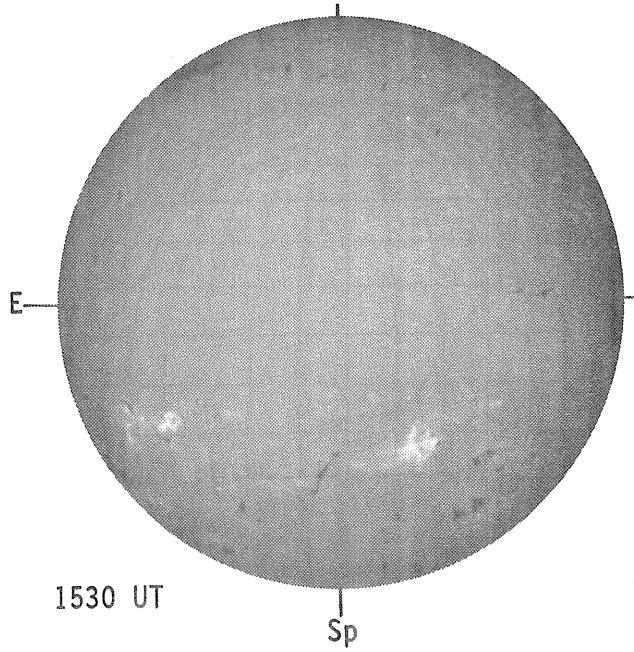
STANFORD MAGNETOGRAM



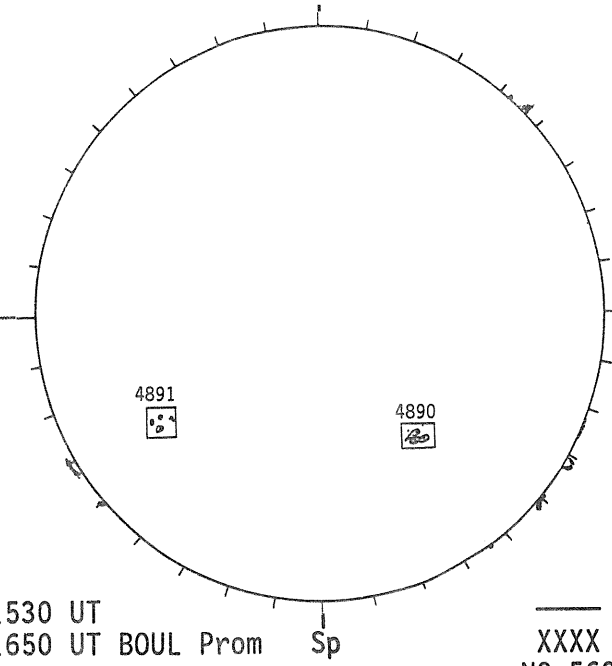
MT. WILSON MAGNETOGRAM



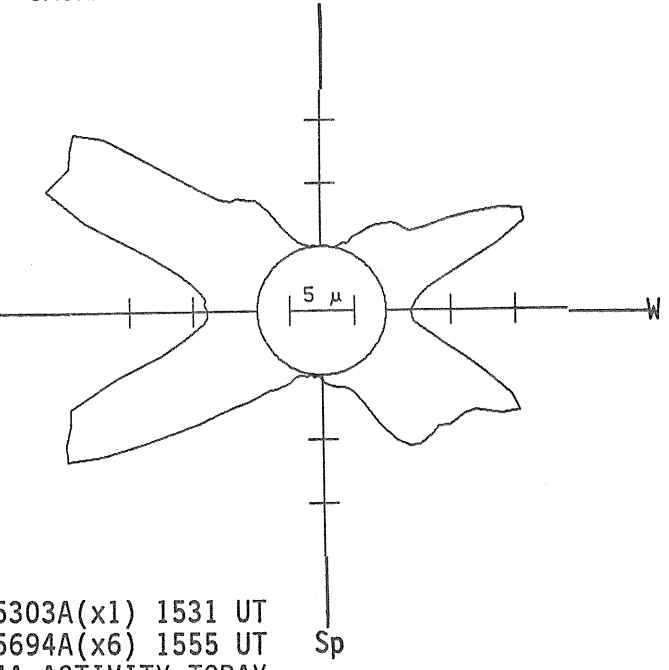
SACRAMENTO PEAK-ALPHA



BOULDER SUNSPOTS



SACRAMENTO PEAK CORONA (1.15 Radii)

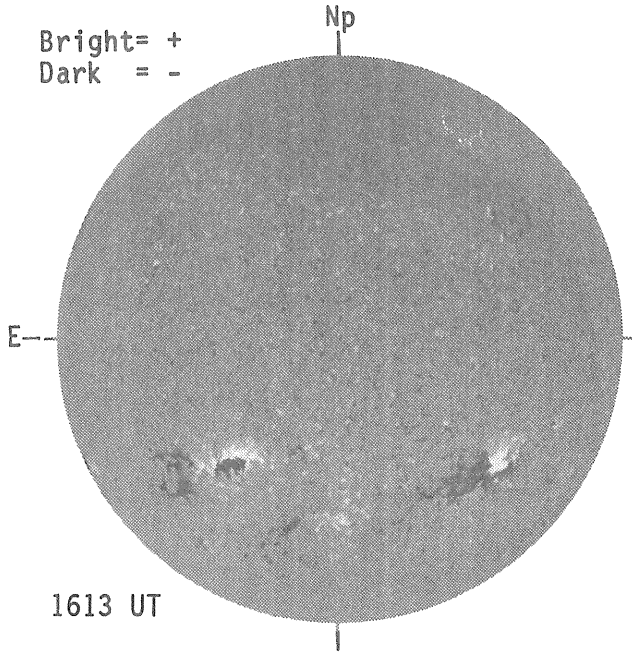


—— 5303A(x1) 1531 UT
XXXX 5694A(x6) 1555 UT
NO 5694A ACTIVITY TODAY

NOVEMBER 19, 1987 (P= 20.32, B_o= 2.42, L_o= 105.04)

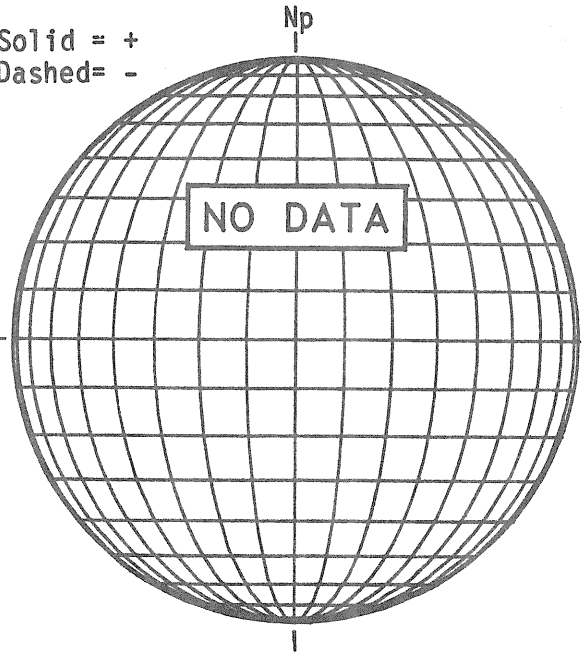
KITT PEAK MAGNETOGRAM

Bright= +
Dark = -



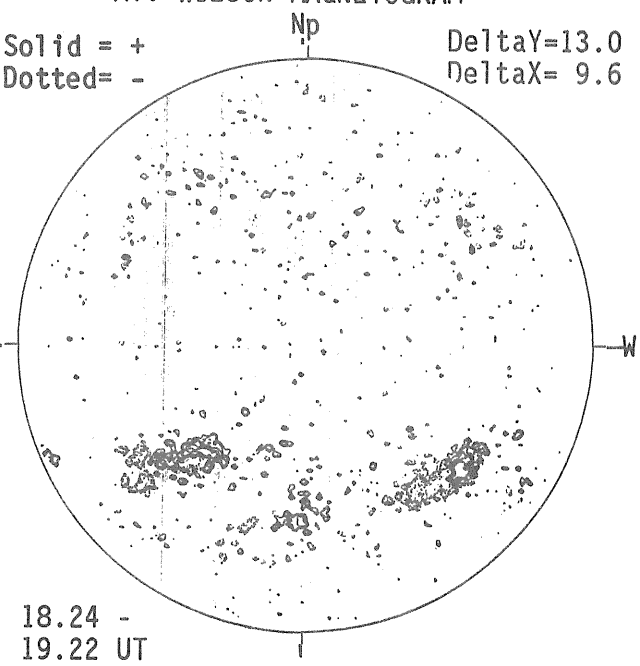
STANFORD MAGNETOGRAM

Solid = +
Dashed= -

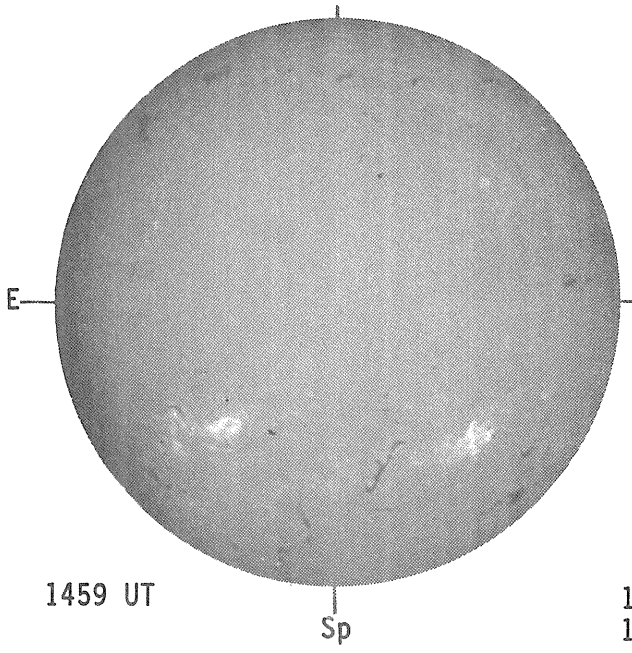


MT. WILSON MAGNETOGRAM

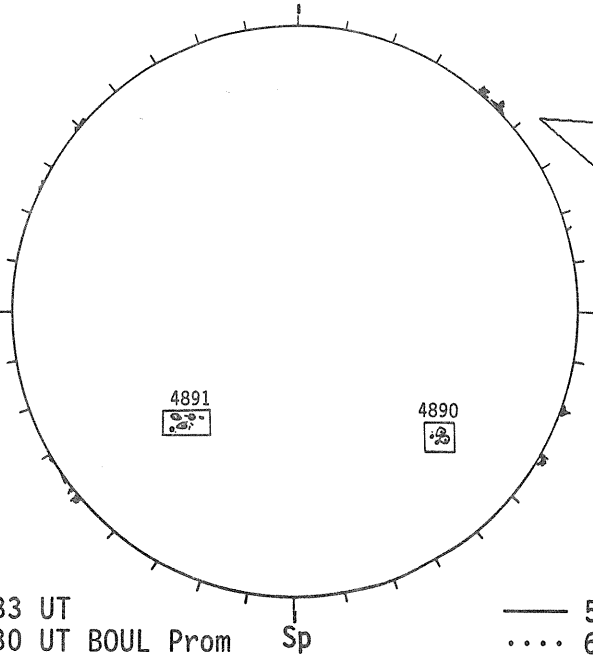
Solid = +
Dotted= -
DeltaY=13.0
DeltaX= 9.6



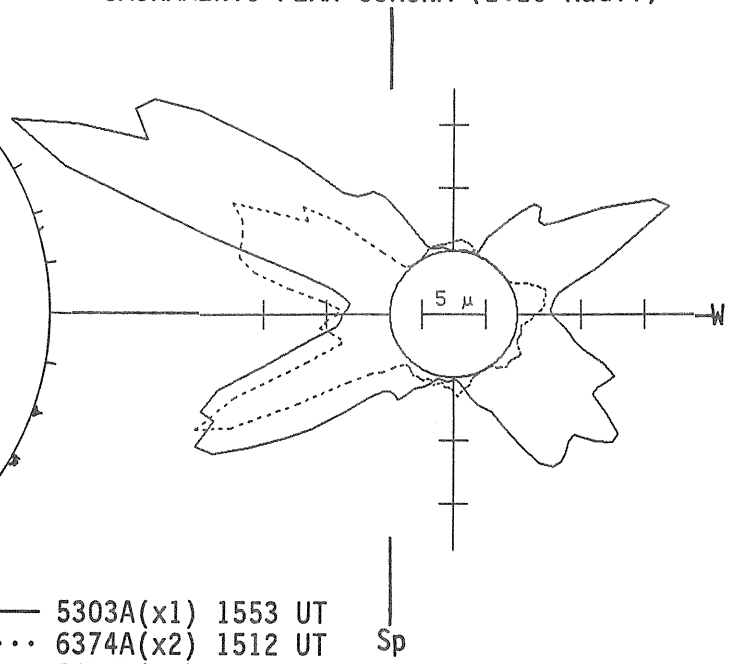
SACRAMENTO PEAK H-ALPHA



BOULDER SUNSPOTS



SACRAMENTO PEAK CORONA (1.15 Radii)

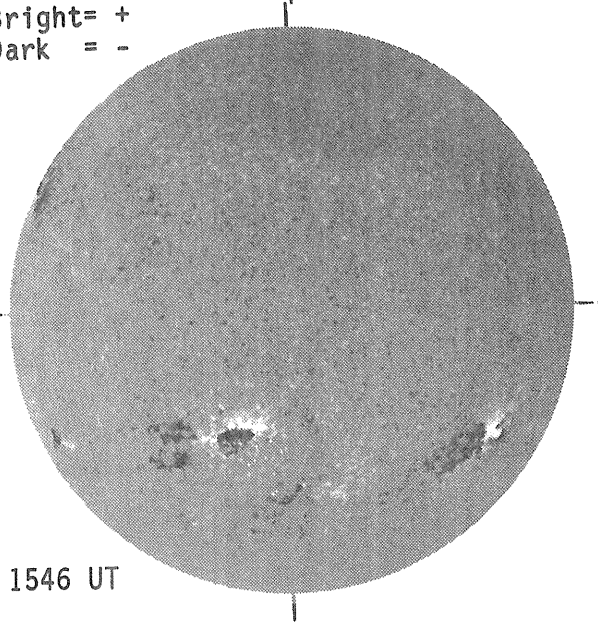


—— 5303A(x1) 1553 UT
···· 6374A(x2) 1512 UT
xxxx 5694A(x6) 1531 UT
NO 5694A ACTIVITY TODAY

NOVEMBER 20, 1987 (P= 20.01 B_o= 2.30, L_o= 91.86)

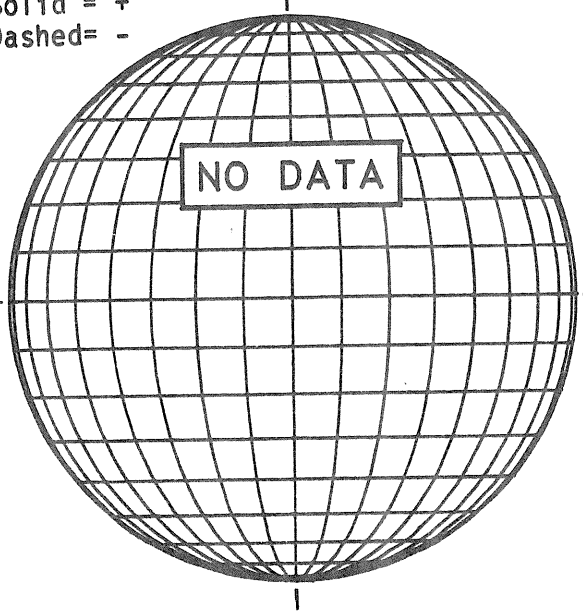
KITT PEAK MAGNETOGRAM

Bright= +
Dark = -



STANFORD MAGNETOGRAM

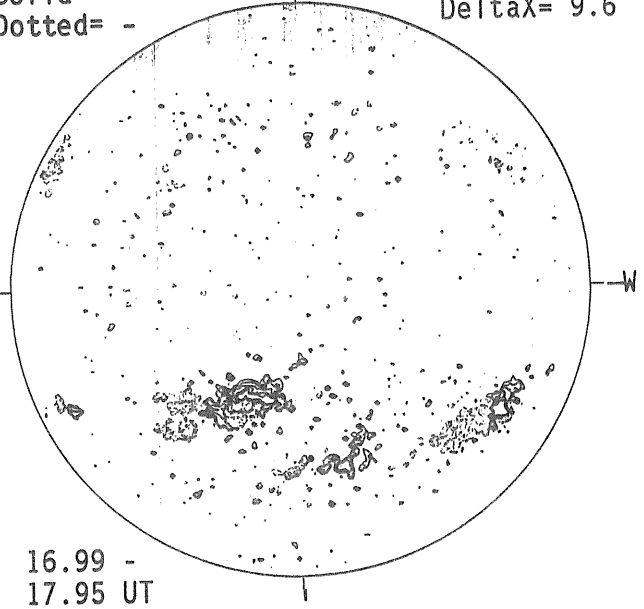
Solid = +
Dashed= -



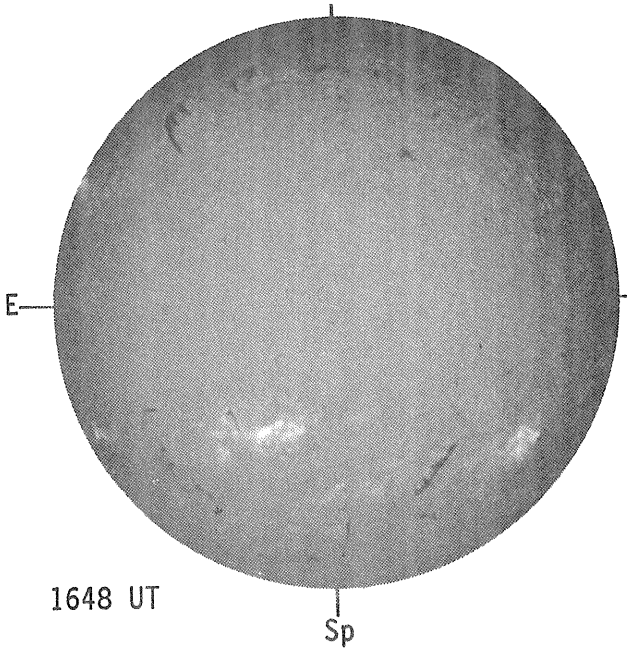
MT. WILSON MAGNETOGRAM

Solid = +
Dotted= -

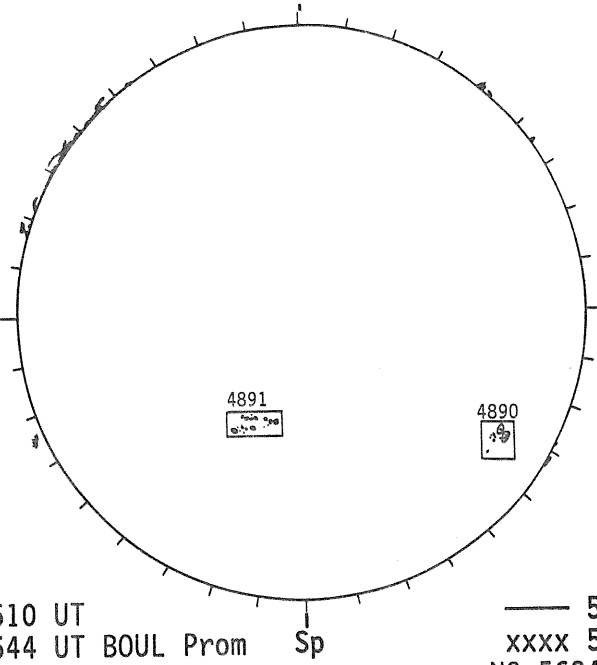
DeltaY=13.1
DeltaX= 9.6



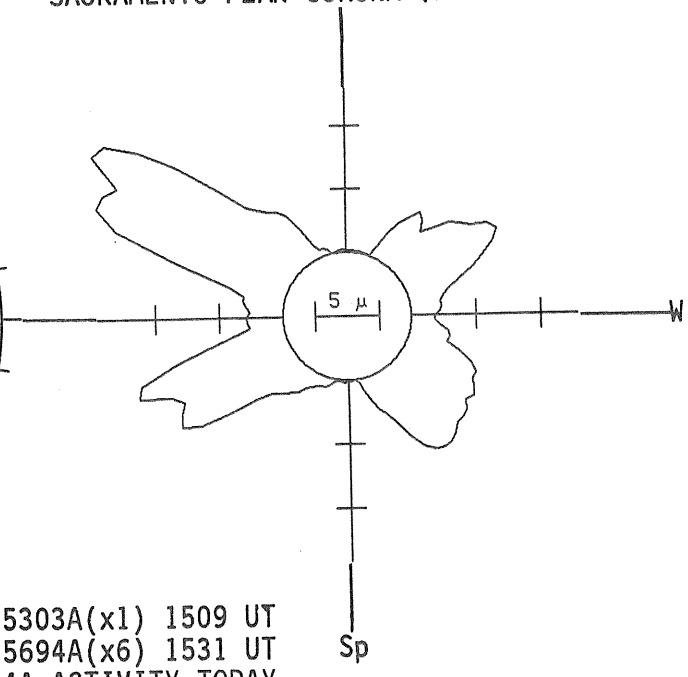
SACRAMENTO PEAK H-ALPHA



BOULDER SUNSPOTS



SACRAMENTO PEAK CORONA (1.15 Radii)

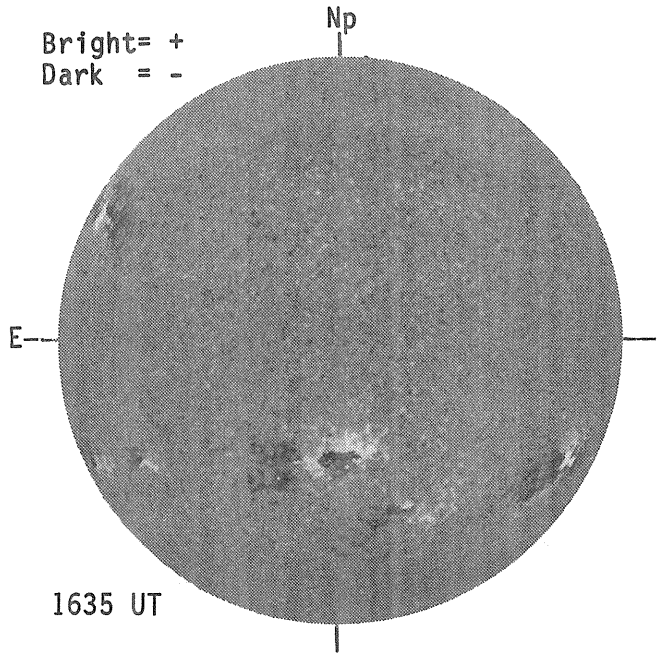


—— 5303A(x1) 1509 UT
xxxx 5694A(x6) 1531 UT
NO 5694A ACTIVITY TODAY

NOVEMBER 21, 1987 (P= 19.70, B_0= 2.18, L_0= 78.68)

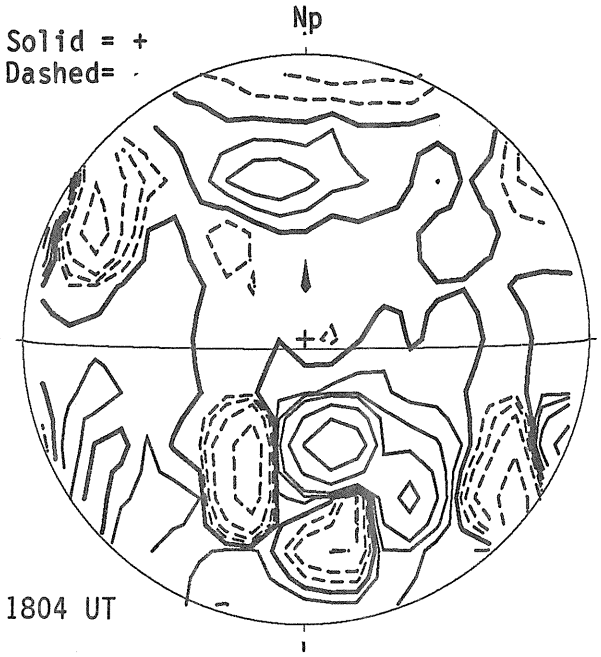
KITT PEAK MAGNETOGRAM

Bright= +
Dark = -



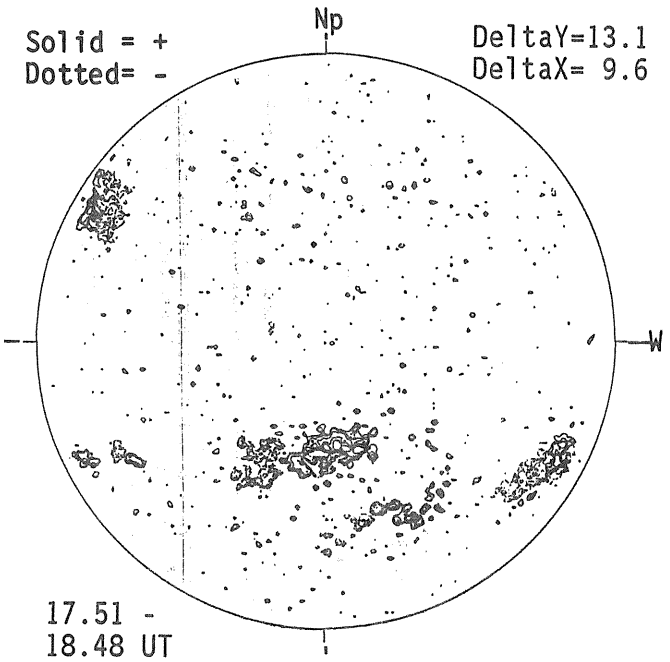
STANFORD MAGNETOGRAM

Solid = +
Dashed= -

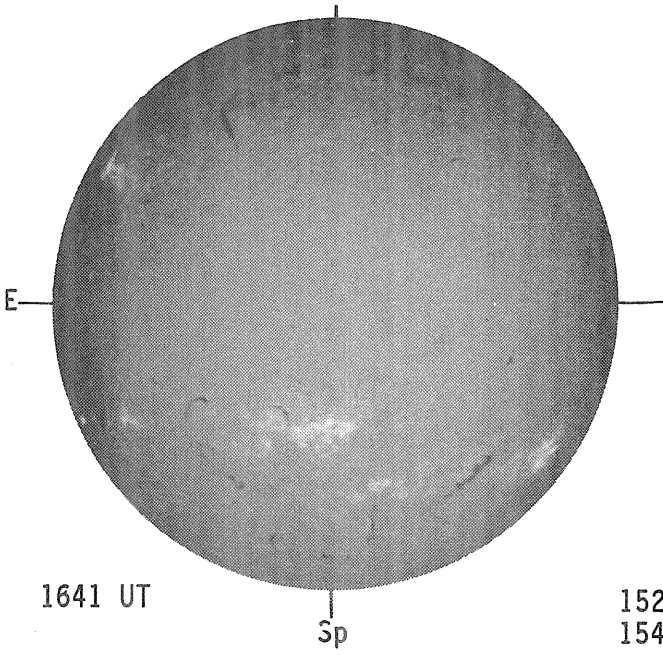


MT. WILSON MAGNETOGRAM

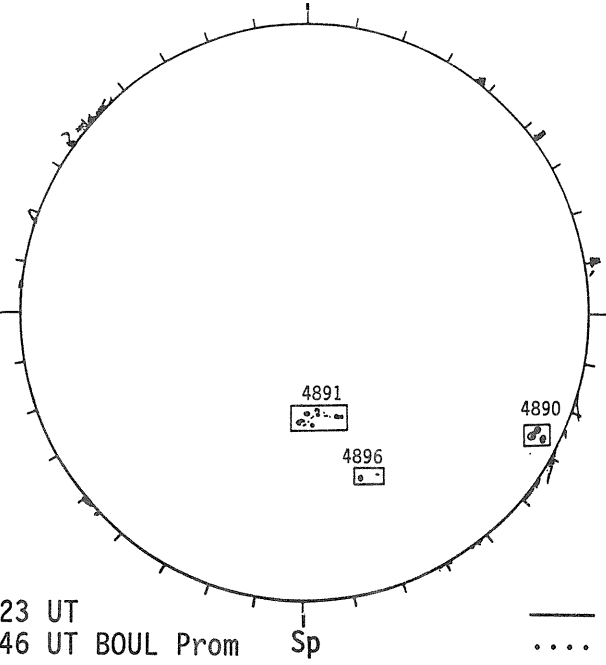
Solid = +
Dotted= -
DeltaY=13.1
DeltaX= 9.6



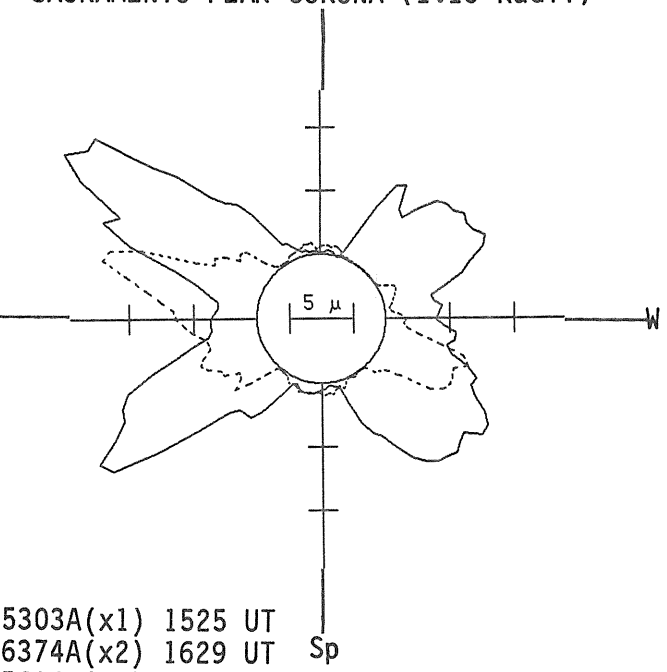
SACRAMENTO PEAK H-ALPHA



BOULDER SUNSPOTS



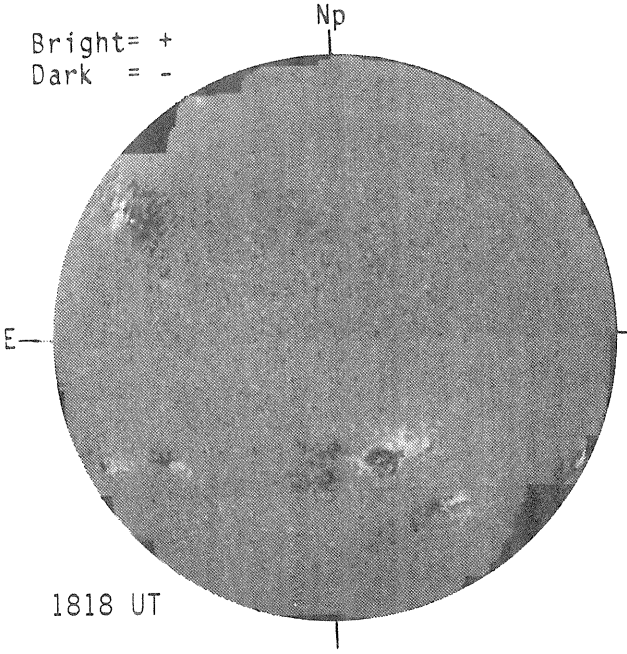
SACRAMENTO PEAK CORONA (1.15 Radii)



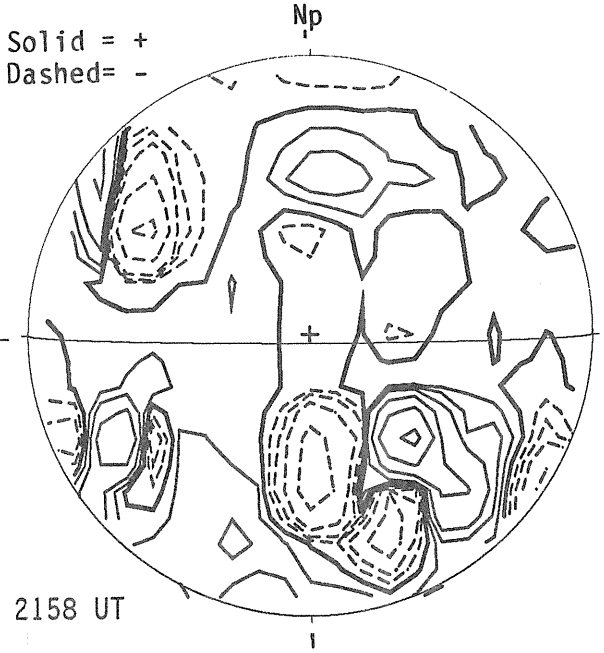
—— 5303A(x1) 1525 UT
···· 6374A(x2) 1629 UT
xxxx 5694A(x6) 1607 UT
NO 5694A ACTIVITY TODAY

NOVEMBER 22, 1987 (P= 19.38, B_o= 2.06, L_o= 65.50)

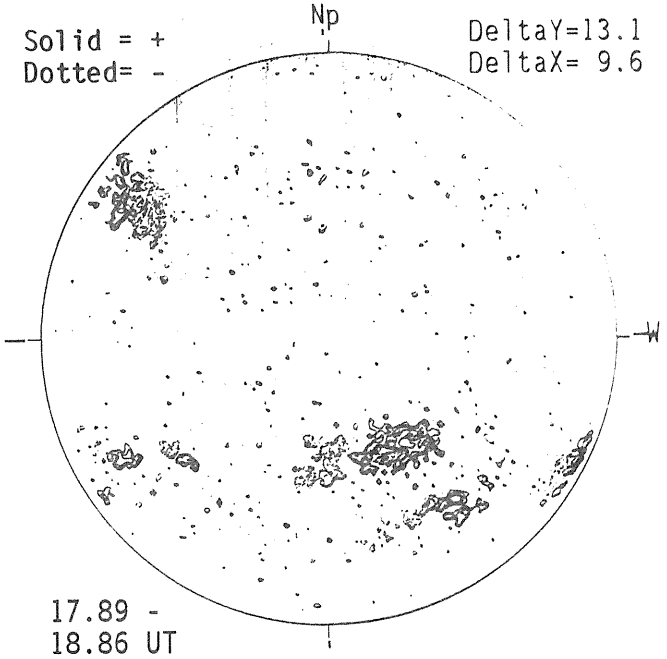
KITT PEAK MAGNETOGRAM



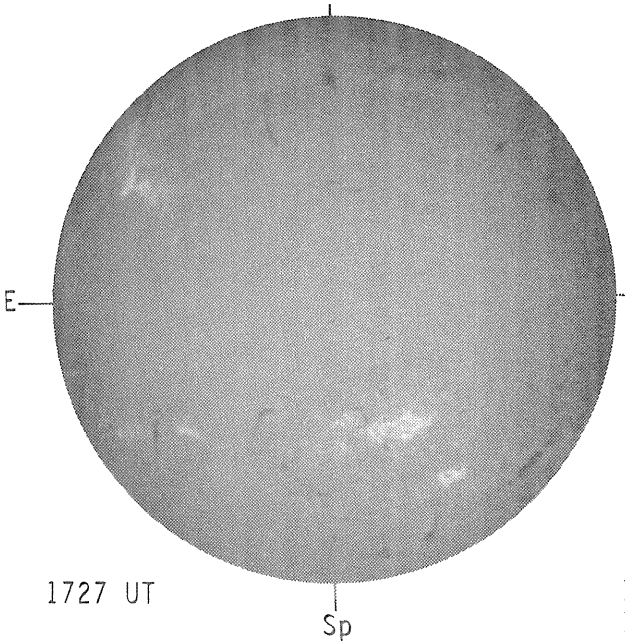
STANFORD MAGNETOGRAM



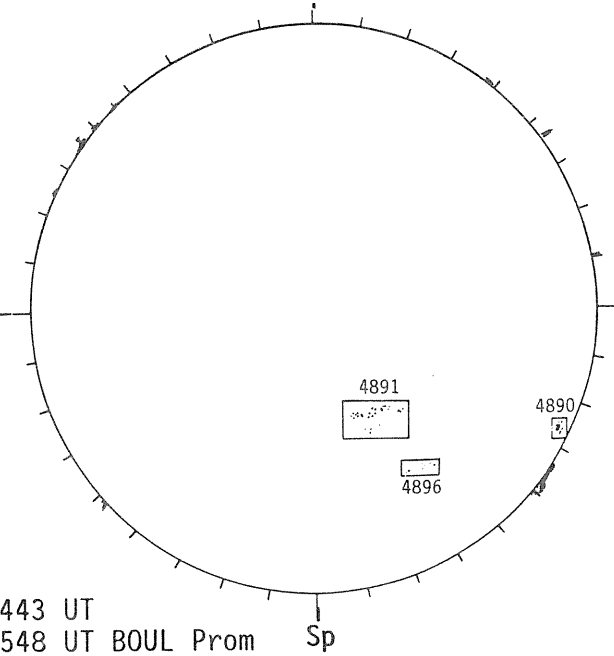
MT. WILSON MAGNETOGRAM



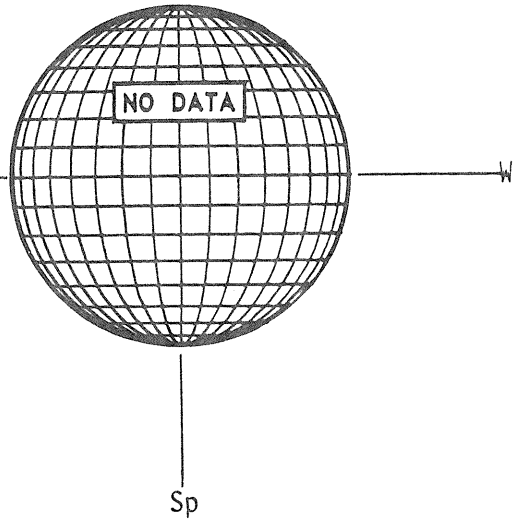
SACRAMENTO PEAK H-ALPHA



BOULDER SUNSPOTS



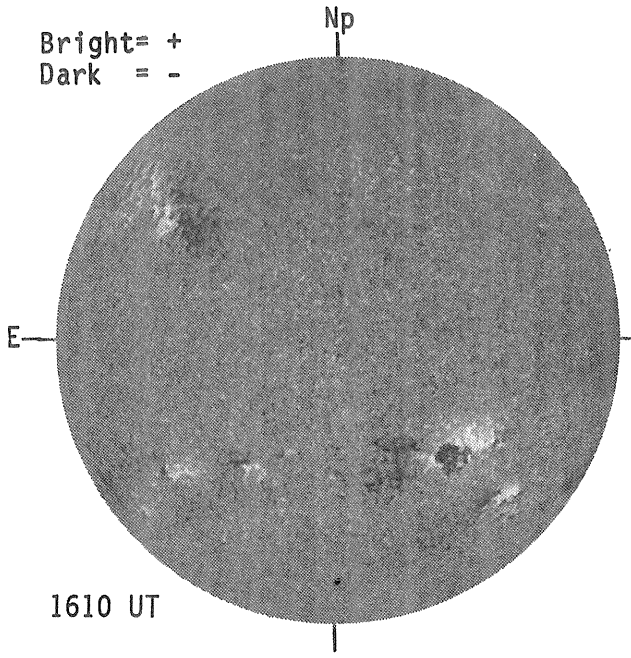
SACRAMENTO PEAK CORONA (1.15 Radii)



NOVEMBER 23, 1987 (P= 19.06, B_o= 1.94, L_o= 52.32)

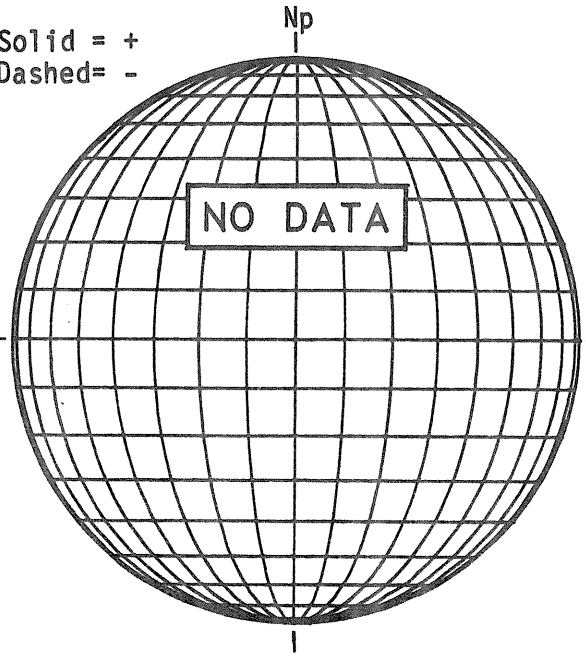
KITT PEAK MAGNETOGRAM

Bright= +
Dark = -



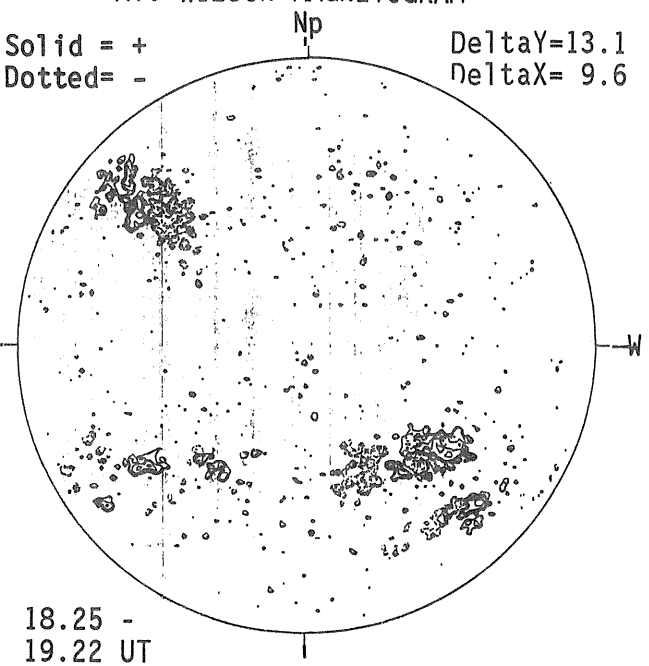
STANFORD MAGNETOGRAM

Solid = +
Dashed= -

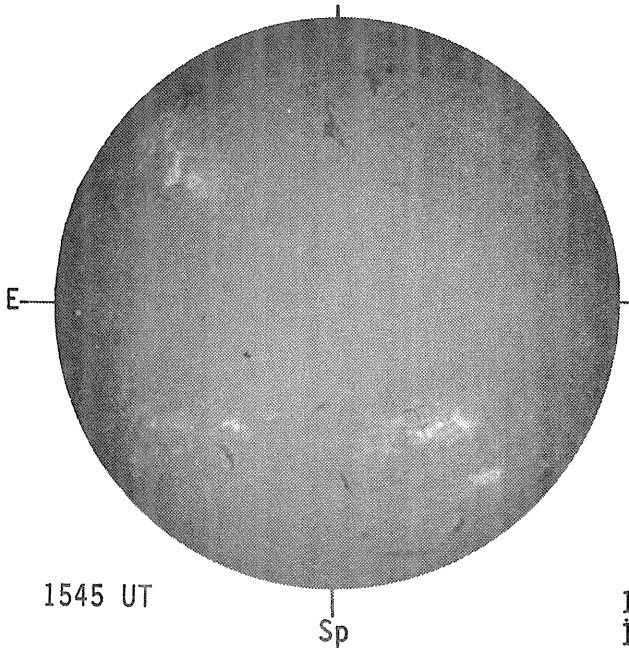


MT. WILSON MAGNETOGRAM

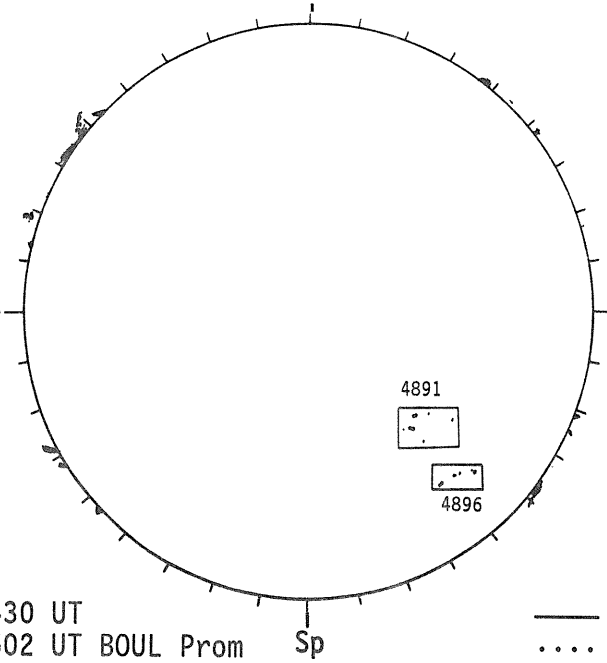
Solid = +
Dotted= -
DeltaY=13.1
DeltaX= 9.6



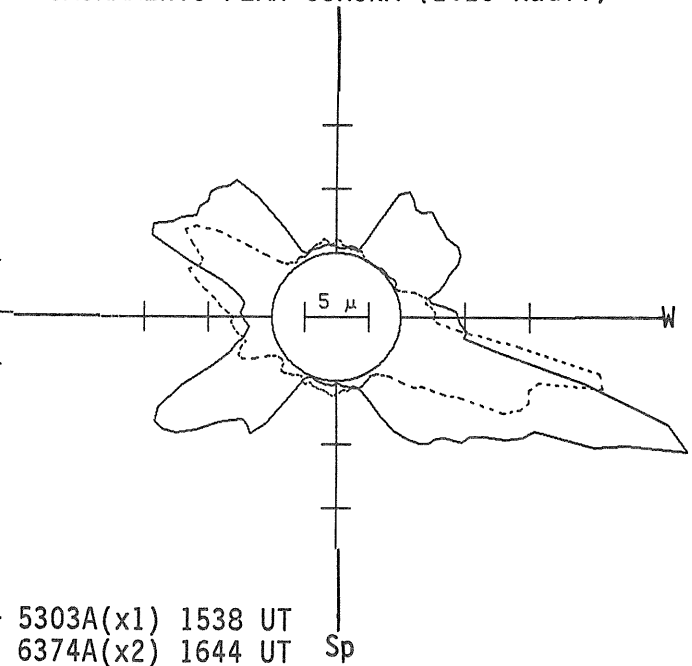
SACRAMENTO PEAK H-ALPHA



BOULDER SUNSPOTS



SACRAMENTO PEAK CORONA (1.15 Radii)



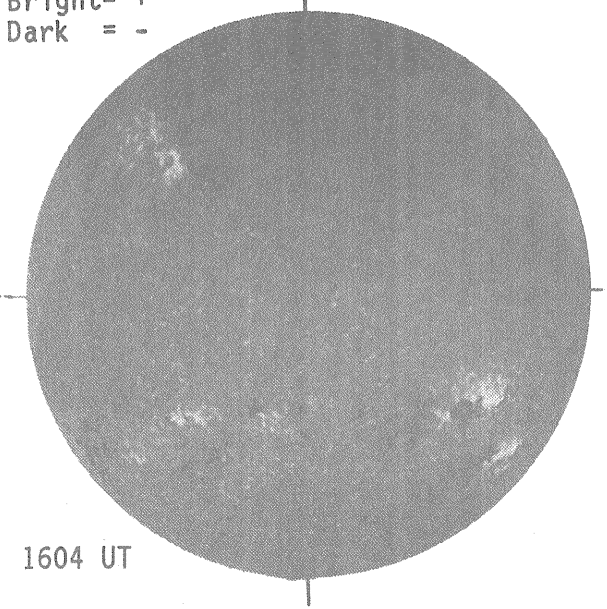
—— 5303A(x1) 1538 UT
···· 6374A(x2) 1644 UT
xxxx 5694A(x6) 1606 UT
NO 5694A ACTIVITY TODAY

NOVEMBER 24, 1987 (P= 18.73, B_o= 1.82, L_o= 39.14)

55
Nov 87

KITT PEAK MAGNETOGRAM

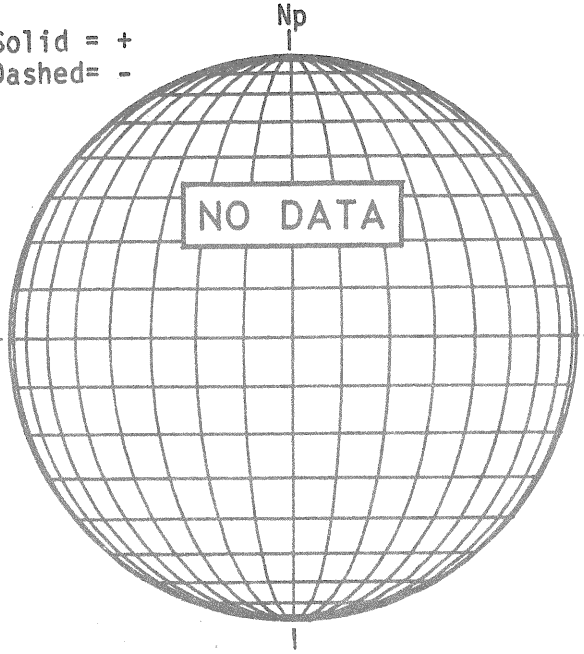
Bright= +
Dark = -



1604 UT

STANFORD MAGNETOGRAM

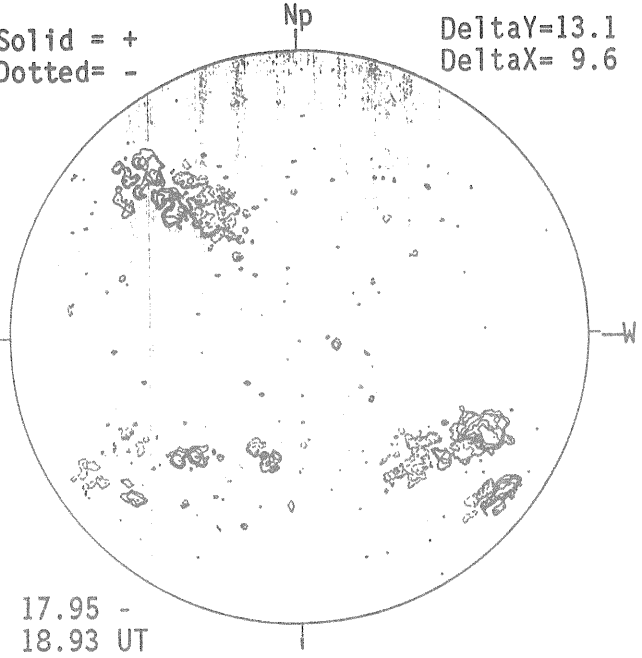
Solid = +
Dashed= -



MT. WILSON MAGNETOGRAM

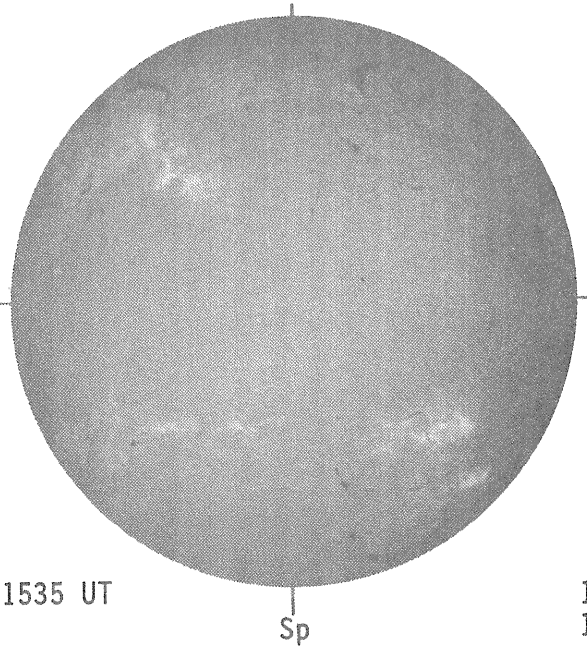
Solid = +
Dotted= -

DeltaY=13.1
DeltaX= 9.6



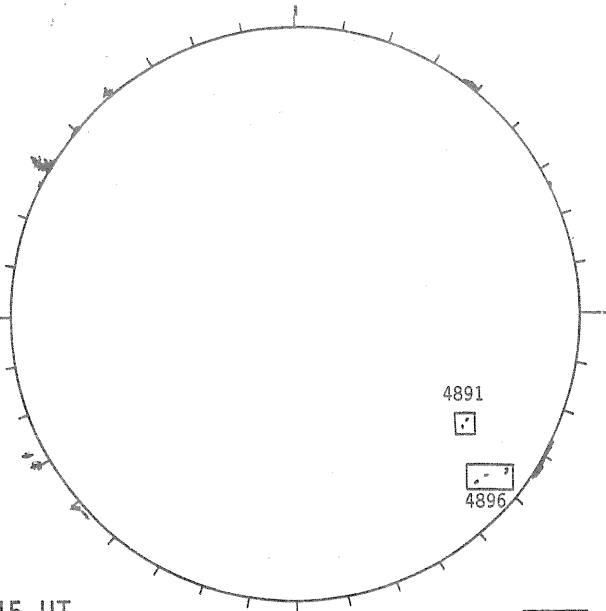
17.95 -
18.93 UT

SACRAMENTO PEAK H-ALPHA



1535 UT

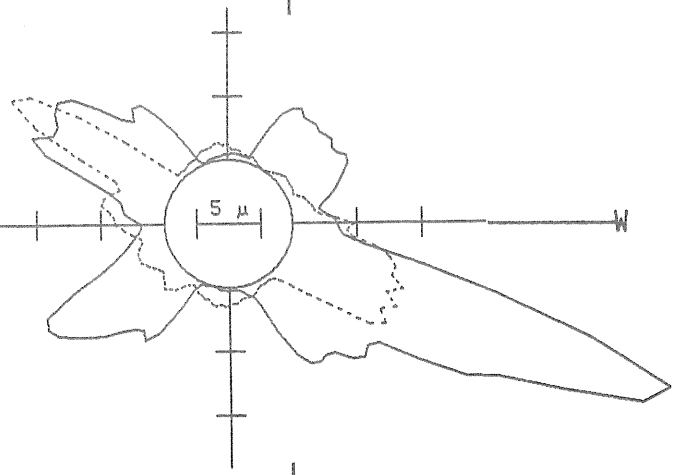
BOULDER SUNSPOTS



1545 UT
1735 UT BOUL Prom

Sp

SACRAMENTO PEAK CORONA (1.15 Radii)

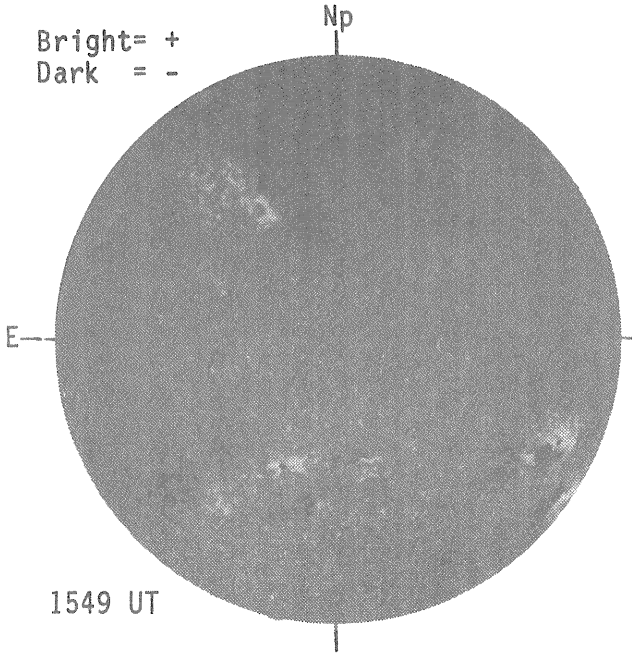


—— 5303A(x1) 1649 UT
···· 6374A(x2) 1611 UT
xxxx 5694A(x6) 1631 UT
NO 5694A ACTIVITY TODAY

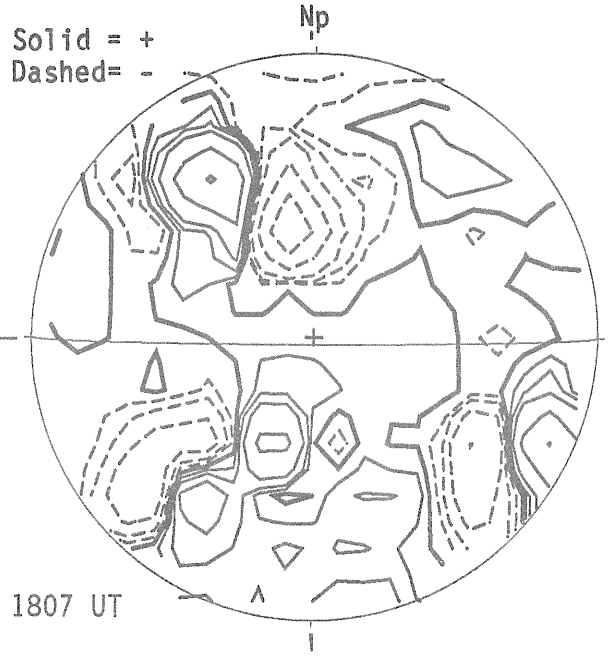
Sp

NOVEMBER 25, 1987 (P= 18.39, B_o= 1.70, L_o= 25.96)

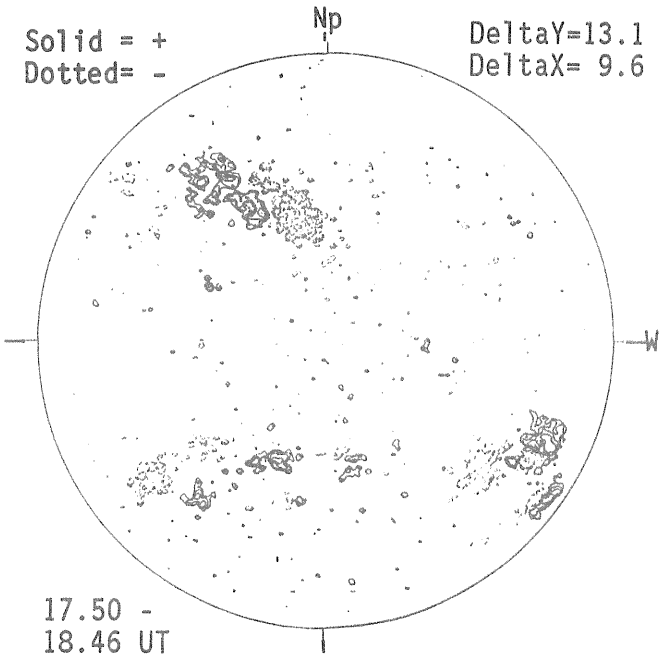
KITT PEAK MAGNETOGRAM



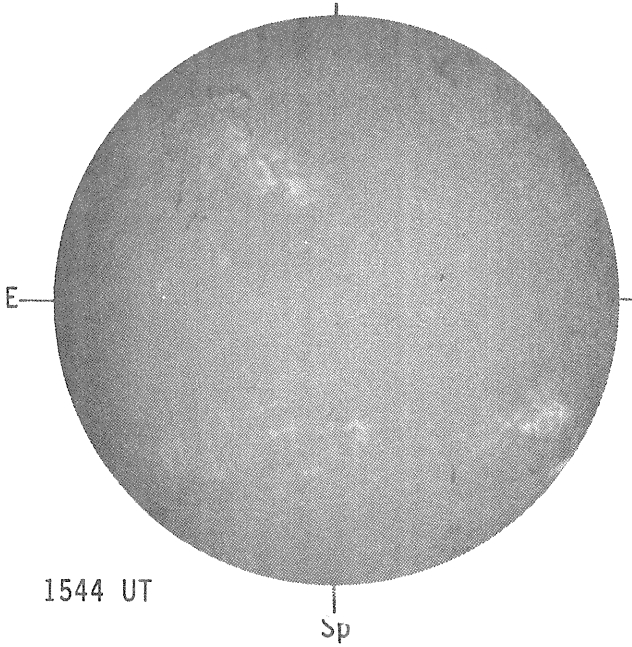
STANFORD MAGNETOGRAM



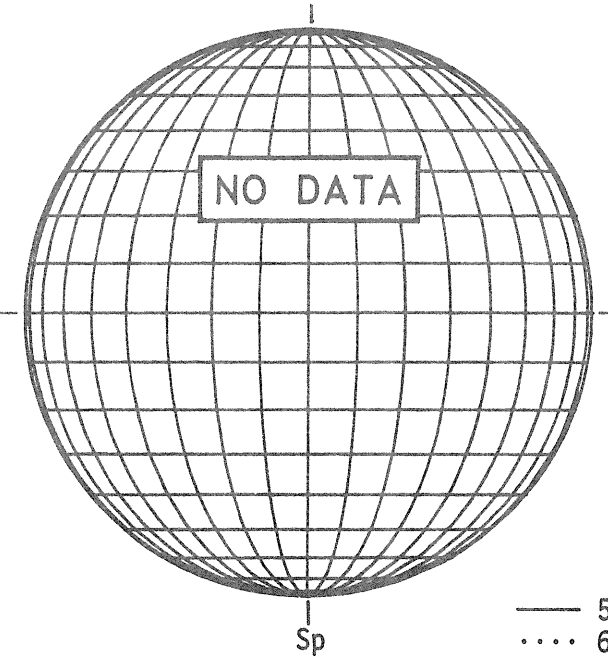
MT. WILSON MAGNETOGRAM



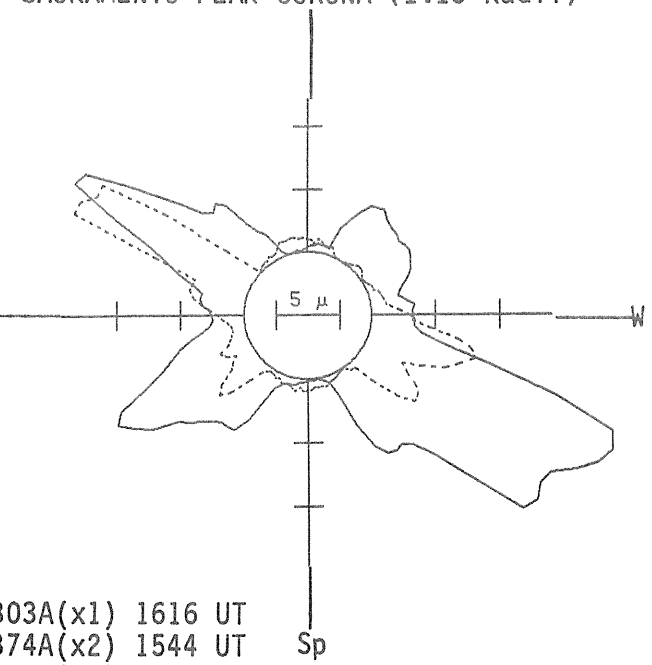
SACRAMENTO PEAK H-ALPHA



BOULDER SUNSPOTS



SACRAMENTO PEAK CORONA (1.15 Radii)

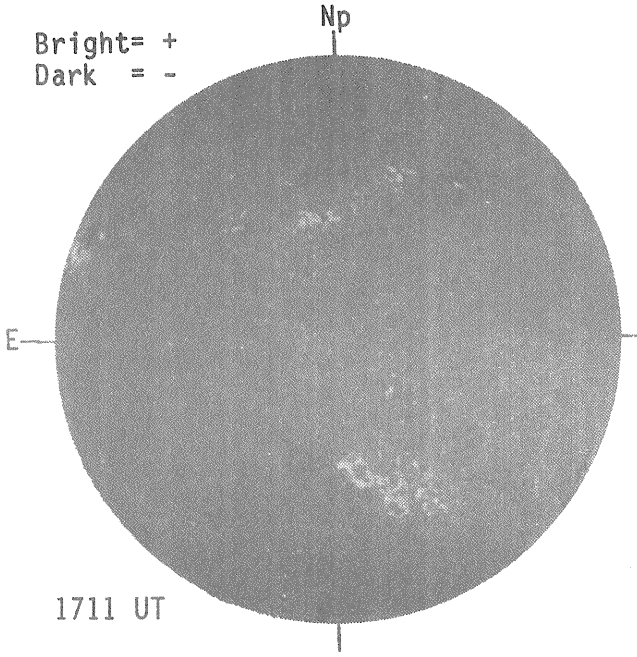


—— 5303A(x1) 1616 UT
···· 6374A(x2) 1544 UT
xxxx 5694A(x6) 1555 UT
NO 5694A ACTIVITY TODAY

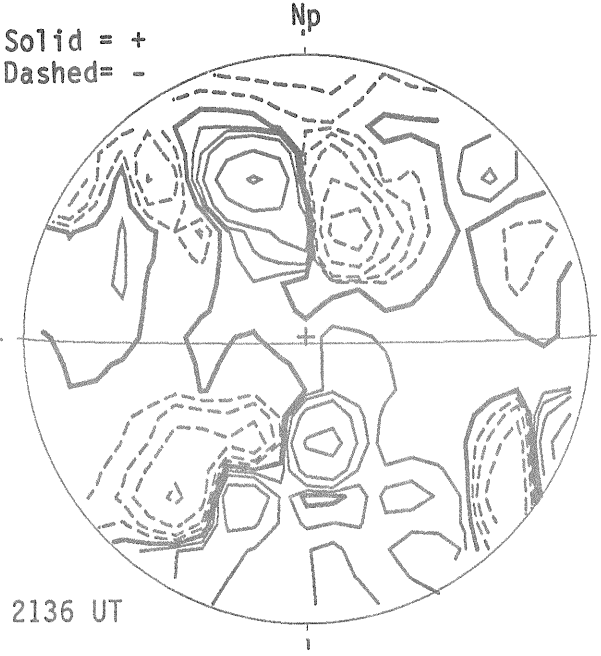
NOVEMBER 26, 1987 (P= 18.04, B_o= 1.57, L_o= 12.78)

57
Nov 87

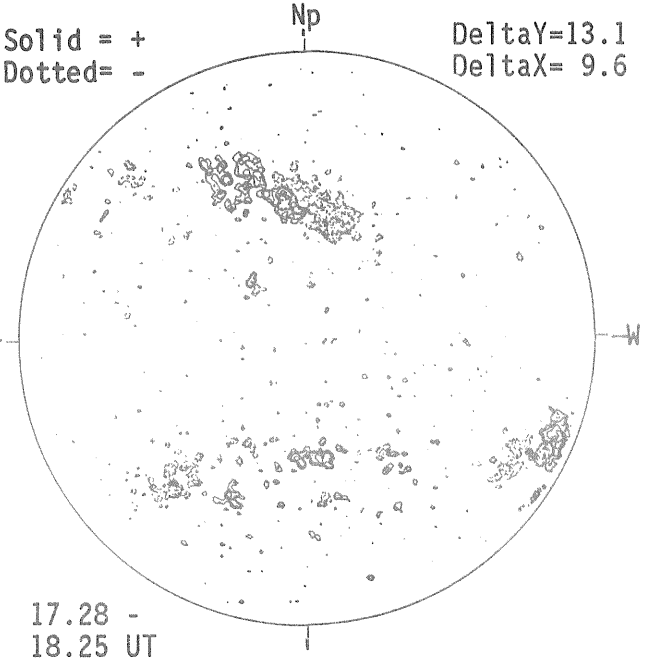
KITT PEAK MAGNETOGRAM



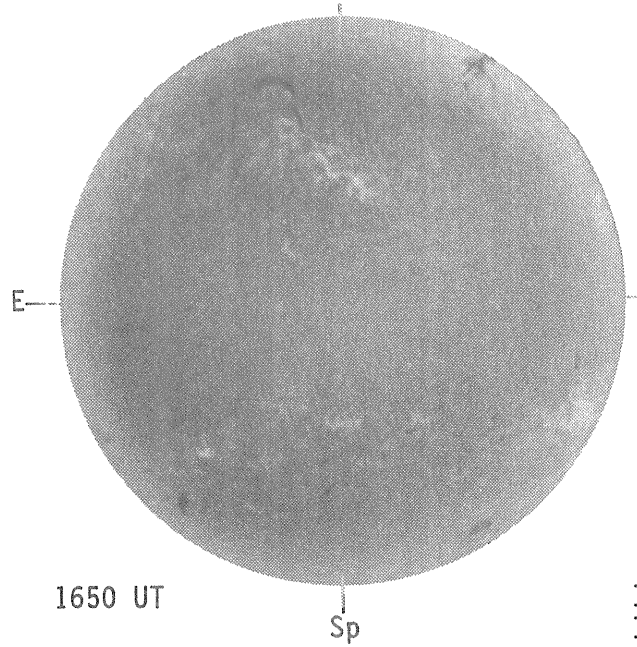
STANFORD MAGNETOGRAM



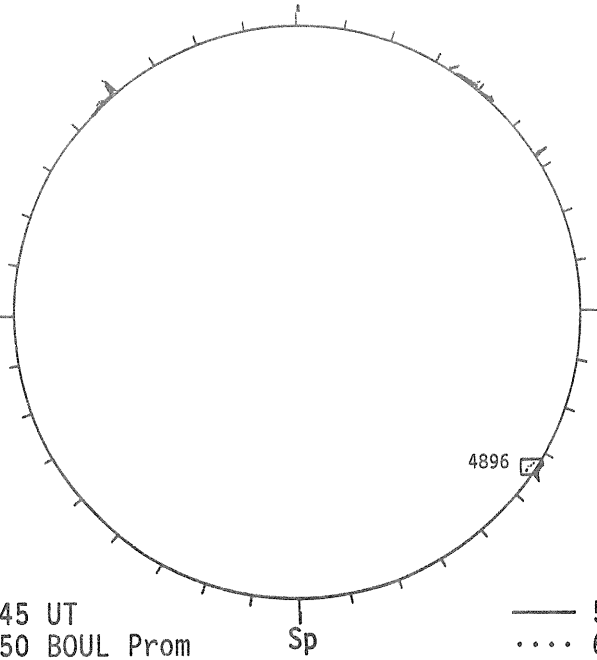
MT. WILSON MAGNETOGRAM



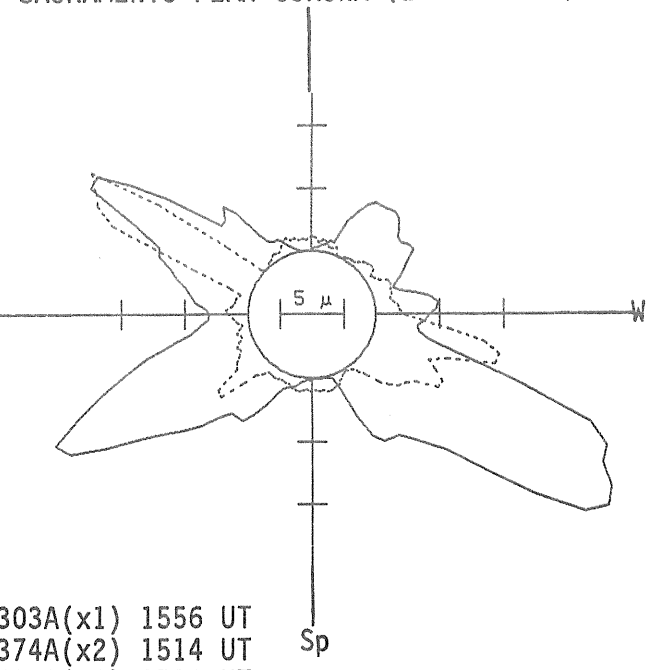
BOULDER H-ALPHA



BOULDER SUNSPOTS



SACRAMENTO PEAK CORONA (1.15 Radii)

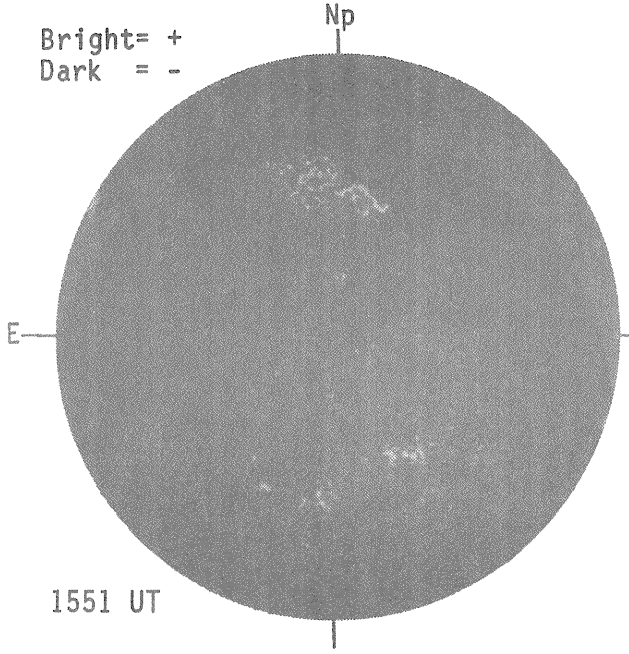


—— 5303A(x1) 1556 UT
···· 6374A(x2) 1514 UT
xxxx 5694A(x6) 1529 UT
NO 5694A ACTIVITY TODAY

NOVEMBER 27, 1987 (P= 17.69, B_o= 1.45, L_o= 359.60)

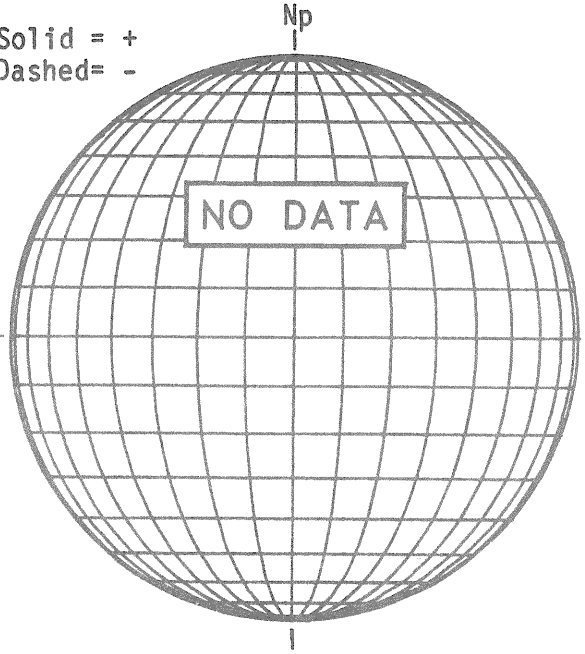
KITT PEAK MAGNETOGRAM

Bright= +
Dark = -



STANFORD MAGNETOGRAM

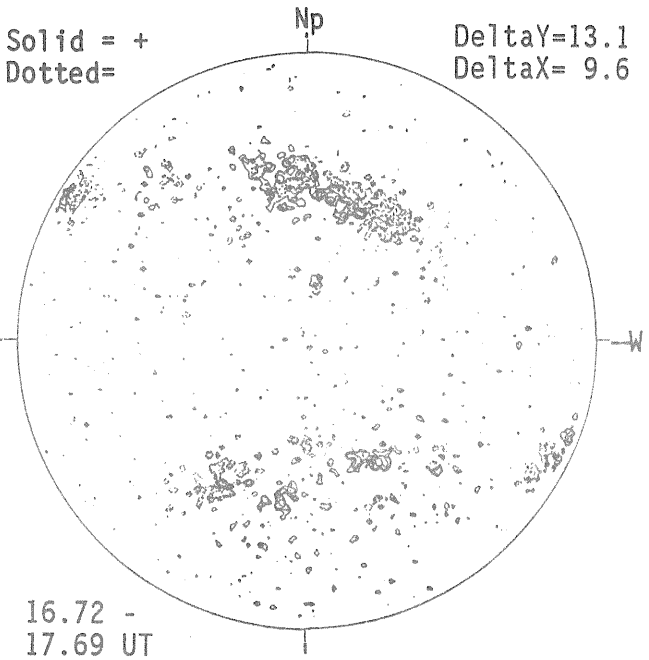
Solid = +
Dashed= -



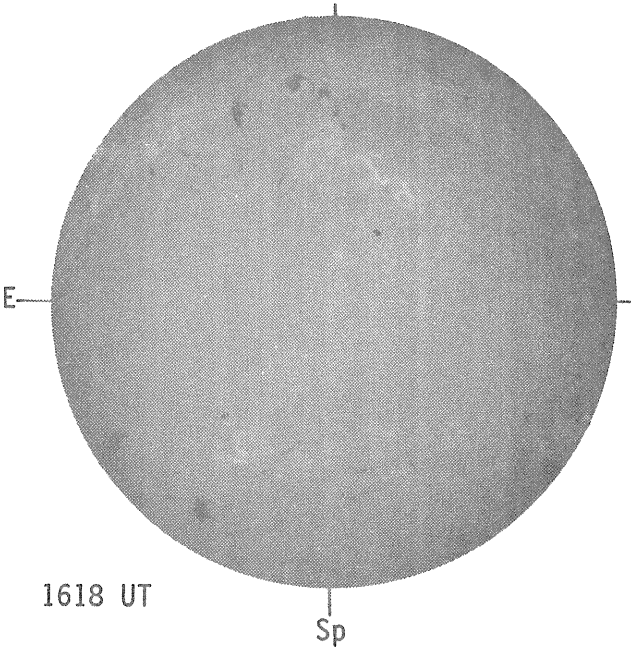
MT. WILSON MAGNETOGRAM

Solid = +
Dotted=

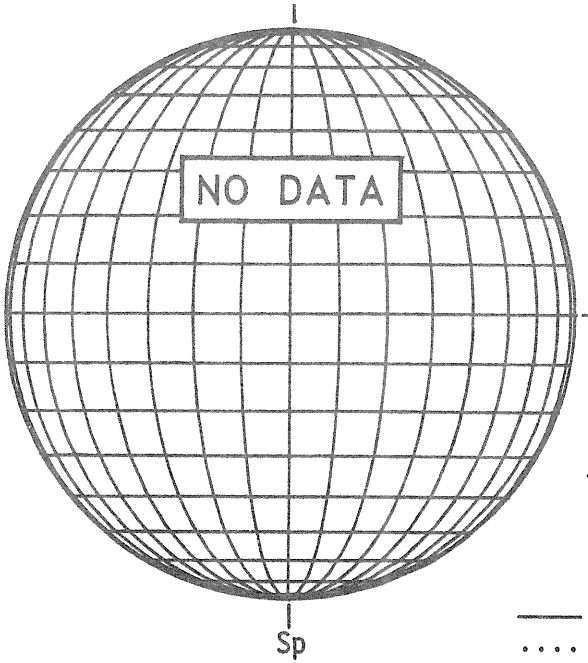
DeltaY=13.1
DeltaX= 9.6



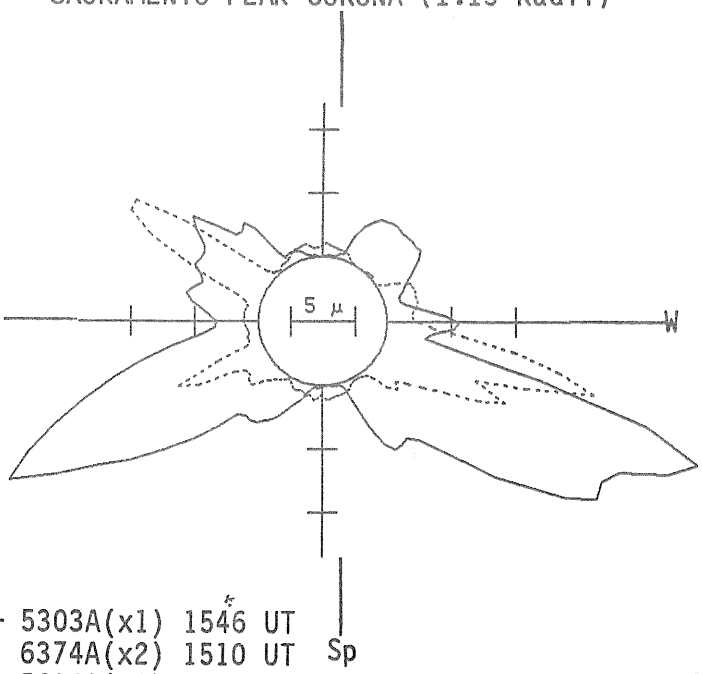
SACRAMENTO PEAK H-ALPHA



BOULDER SUNSPOTS



SACRAMENTO PEAK CORONA (1.15 Radii)



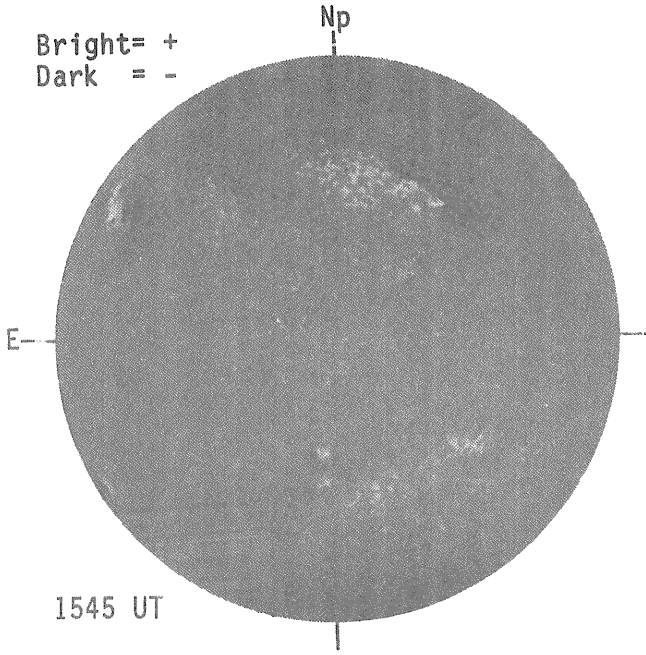
—— 5303A(x1) 1546 UT
···· 6374A(x2) 1510 UT
xxxx 5694A(x6) 1523 UT
NO 5694A ACTIVITY TODAY

NOVEMBER 28, 1987 (P= 17.33, B_o= 1.33, L_o= 346.42)

Nov 87

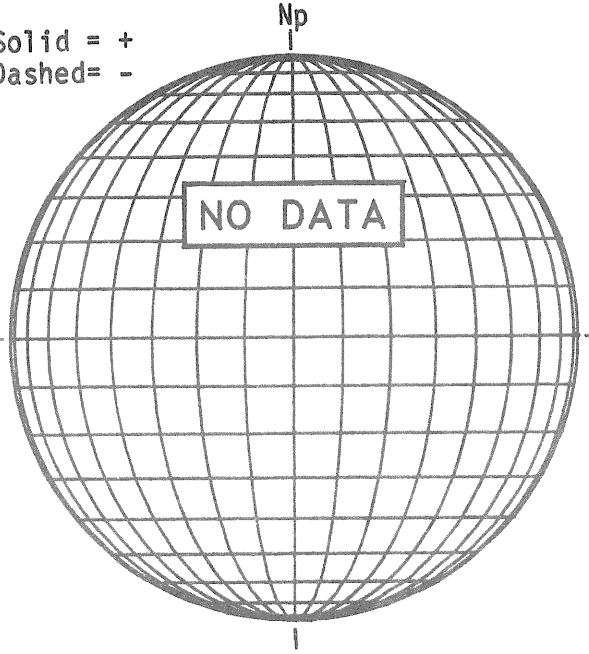
KITT PEAK MAGNETOGRAM

Bright= +
Dark = -



STANFORD MAGNETOGRAM

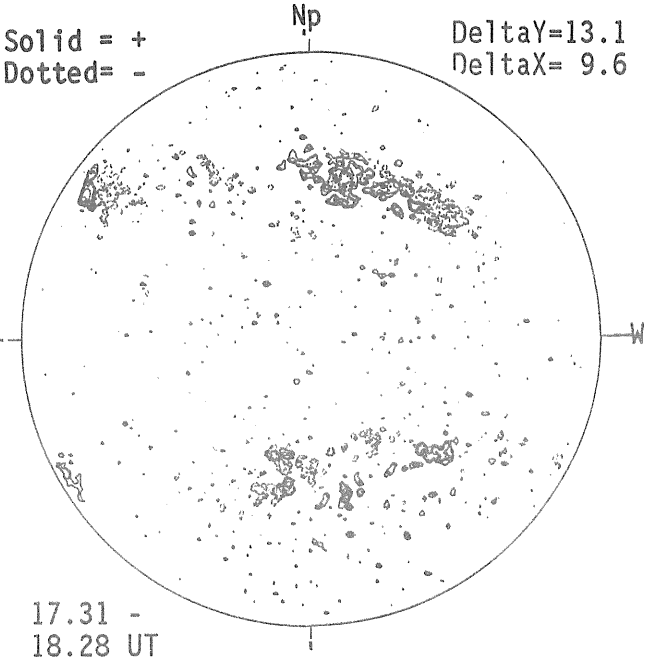
Solid = +
Dashed= -



MT. WILSON MAGNETOGRAM

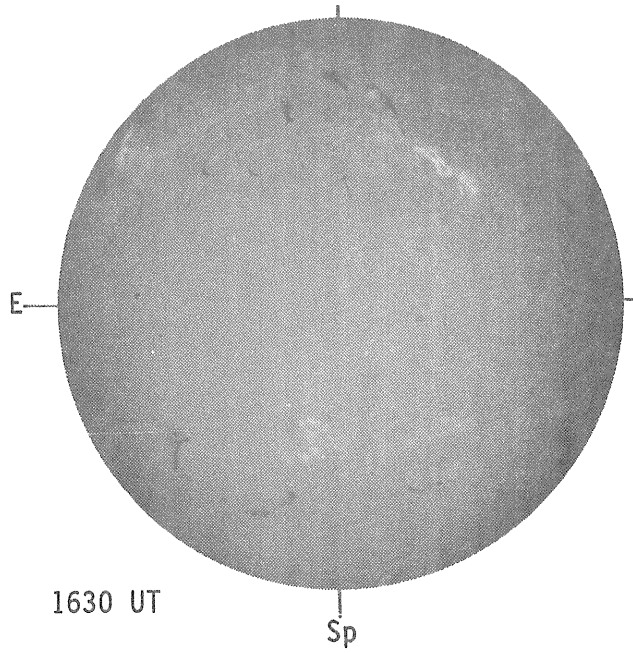
Solid = +
Dotted= -

DeltaY=13.1
DeltaX= 9.6

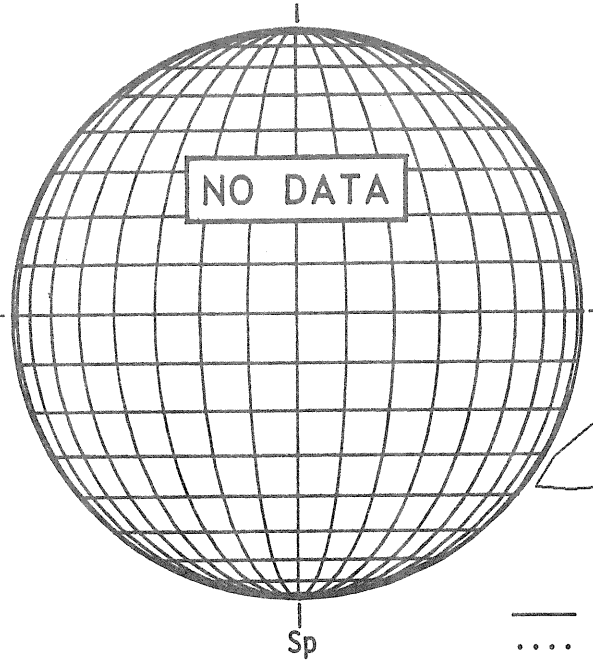


Nov 87 60

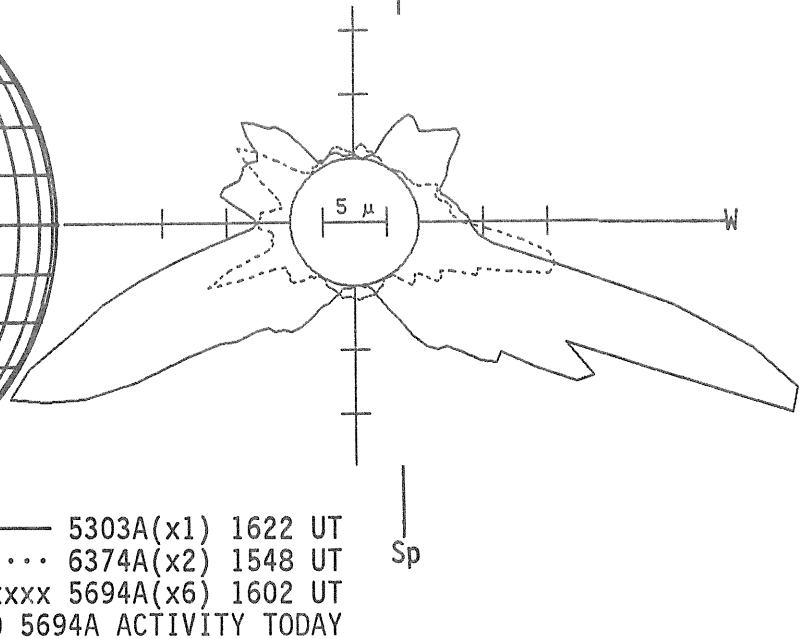
SACRAMENTO PEAK H-ALPHA



BOULDER SUNSPOTS



SACRAMENTO PEAK CORONA (1.15 Radii)

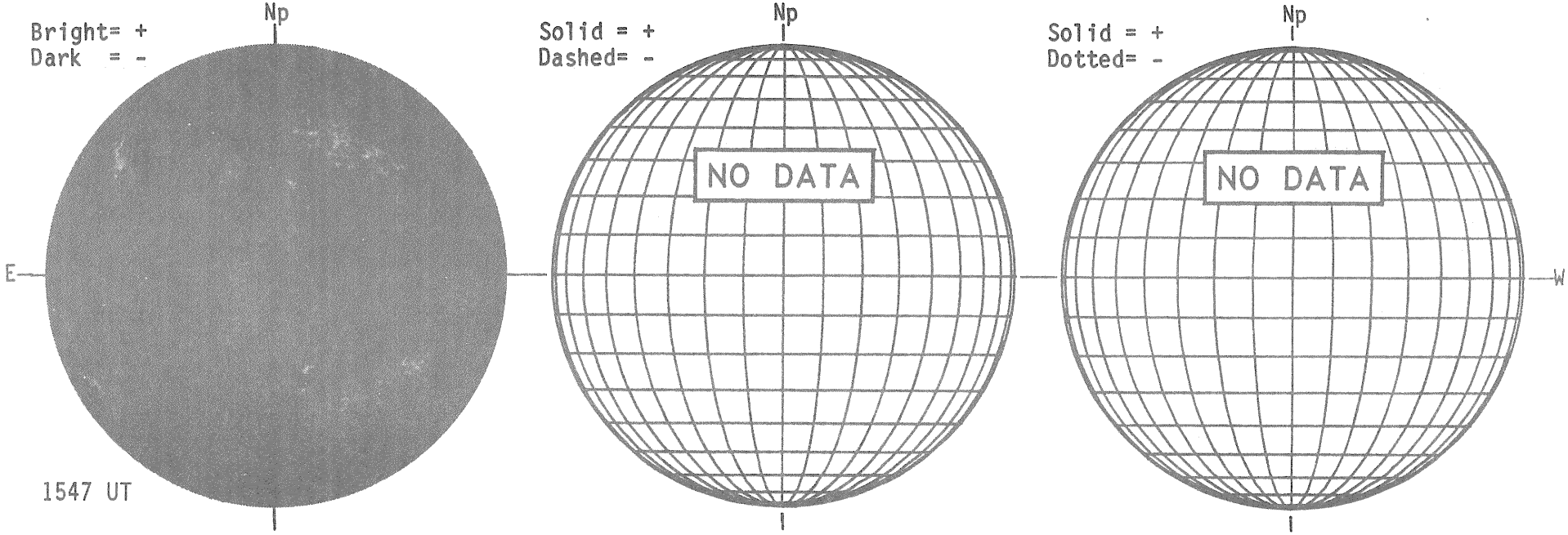


—— 5303A(x1) 1622 UT
···· 6374A(x2) 1548 UT
xxxx 5694A(x6) 1602 UT
NO 5694A ACTIVITY TODAY

NOVEMBER 29, 1987 (P= 16.96, B_0= 1.20, L_0= 333.24)

KITT PEAK MAGNETOGRAM

Bright= +
Dark = -



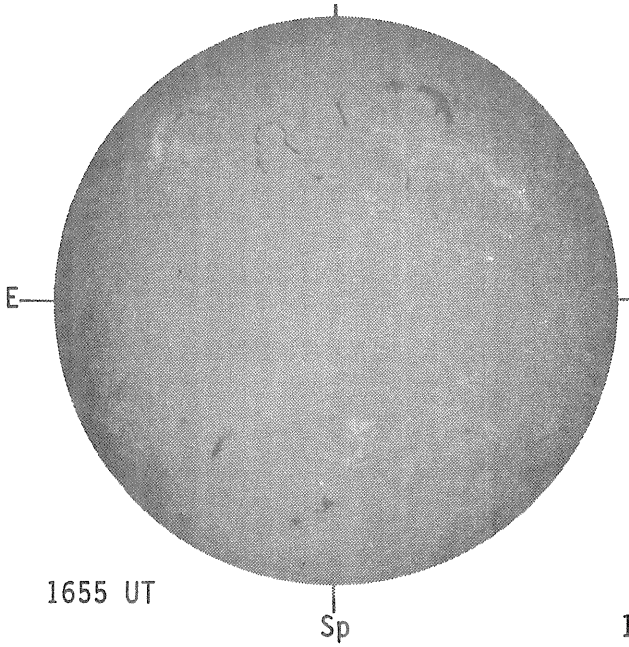
STANFORD MAGNETOGRAM

Solid = +
Dashed= -

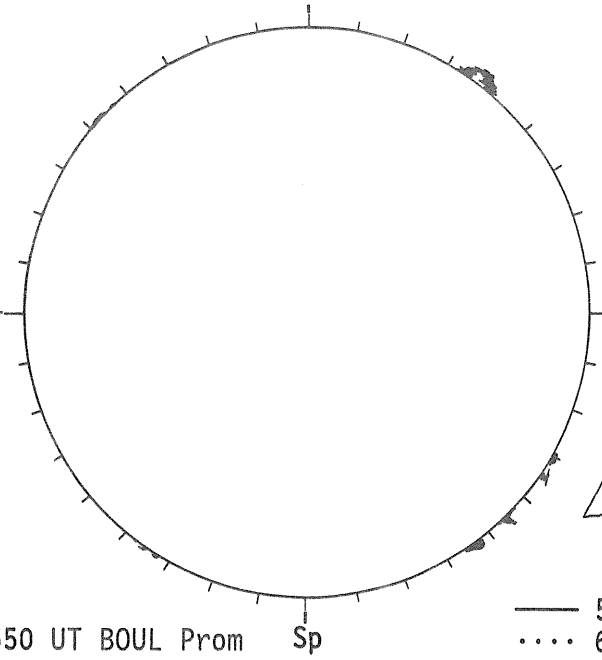
MT. WILSON MAGNETOGRAM

Solid = +
Dotted= -

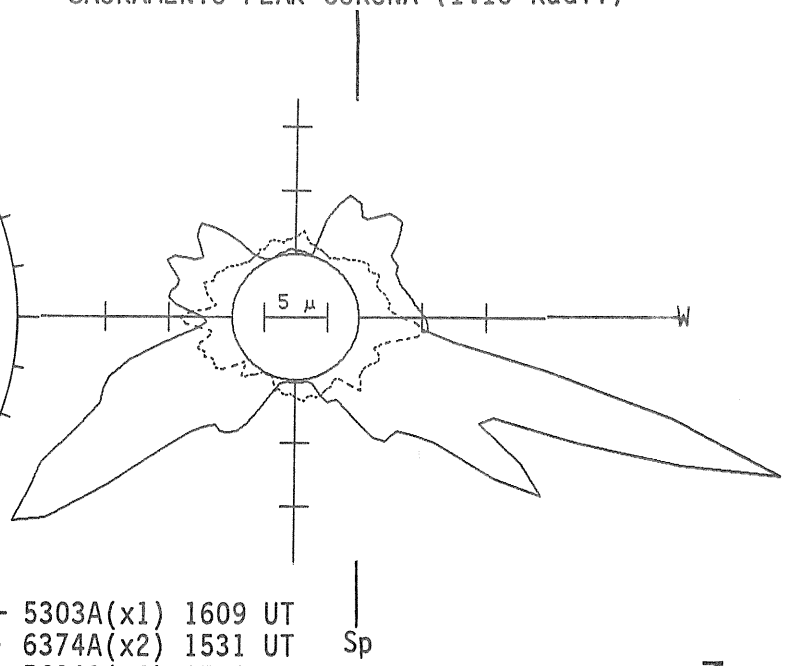
SACRAMENTO PEAK H-ALPHA



BOULDER SUNSPOTS



SACRAMENTO PEAK CORONA (1.15 Radii)



—— 5303A(x1) 1609 UT
···· 6374A(x2) 1531 UT
xxxx 5694A(x6) 1546 UT
NO 5694A ACTIVITY TODAY

NOVEMBER 30, 1987 (P= 16.59, B_o= 1.08, L_o= 320.06)

SUNSPOT GROUPS
(ORDERED BY CENTRAL MERIDIAN PASSAGE DATE)

NOVEMBER 1987

NOAA/ USAF Group	Mt Wilson Group	Sta	Observation Time Mo	Day	(UT)	Lat	CMD	CMP Mo	Day	Max H	Mag Class	Spot Class	Corrected Area (10^{-6} Hemi)	Spot Count	Long. Extent (Deg)	Qual
4878		RAMY	10	26	1400	S19	E69	10	31.8		A	AX	20	1	1	4
4878	24465	MWIL	10	26	1500	S20	E68	10	31.8	3	(AP)					
4878		HOLL	10	26	1522	S19	E68	10	31.8		A	AX	10	1	1	3
4878		PALE	10	26	1815	S21	E67	10	31.9		A	AX		1		3
4878		LEAR	10	27	0050	S21	E64	10	31.9		B	BXO	10	3	5	4
4878		CULG	10	27	0515	S22	E59	10	31.7		B	BXO	20	2	2	3
4878		SVTO	10	27	0925	S21	E59	10	31.9		B	BXO	30	7	5	4
4878		BOUL	10	27	1453	S21	E52	10	31.6		B	BXO	40	4	5	2
4878		HOLL	10	27	1535	S20	E55	10	31.8		B	BXO	40	4	6	4
4878		PALE	10	27	1845	S21	E53	10	31.8		B	BXO	30	5	8	3
4878		LEAR	10	28	0015	S21	E51	10	31.9		B	CRO	30	5	4	3
4878		CULG	10	28	0450	S23	E45	10	31.7		B	BXO	50	5	3	4
4878		SVTO	10	28	0845	S21	E45	10	31.8		B	DSO	60	8	8	3
4878		RAMY	10	28	1425	S19	E43	10	31.9		B	BXO	30	8	8	1
4878		BOUL	10	28	1540	S20	E42	10	31.9		B	CSO	90	5	7	1
4878		HOLL	10	28	1800	S19	E41	10	31.9		B	CRO	30	8	8	3
4878		LEAR	10	29	0034	S21	E37	10	31.9		B	BXO	10	4	8	3
4878		CULG	10	29	0430	S22	E38	11	1.1		A	AX	20	2	2	2
4878		SVTO	10	29	0917	S22	E36	11	1.1		B	CAO	40	9	10	2
4878		RAMY	10	29	1520	S18	E28	10	31.8		B	CRO	40	7	9	1
4878		BOUL	10	29	1540	S19	E27	10	31.7		B	BXI	180	15	9	3
4878		PALE	10	29	1738	S21	E27	10	31.8		B	BXO	60	13	9	4
4878		LEAR	10	30	0020	S20	E23	10	31.8		B	CRO	20	9	10	3
4878		CULG	10	30	0430	S22	E18	10	31.6		B	DSO	80	12	10	3
4878		SVTO	10	30	1150	S22	E15	10	31.6		B	CAO	30	8	7	1
4878		RAMY	10	30	1340	S20	E17	10	31.9		B	BXI	30	14	9	3
4878		HOLL	10	30	1515	S20	E15	10	31.8		B	CSO	20	9	8	3
4878	24465	MWIL	10	30	1530	S21	E15	10	31.8	3	(B)					
4878		PALE	10	30	1807	S20	E15	10	31.9		B	BXO	10	9	10	3
4878		LEAR	10	31	0015	S21	E11	10	31.8		B	BXO	10	10	8	3
4878		CULG	10	31	0430	S22	E06	10	31.6		B	CRO	30	5	7	3
4878		SVTO	10	31	0851	S23	E07	10	31.9		B	CKO	10	8	8	3
4878		RAMY	10	31	1225	S20	E05	10	31.9		B	BXO	20	8	9	3
4878		PALE	10	31	2015	S21	E02	11	1.0		B	BXO	10	9	9	2
4878		LEAR	11	01	0110	S20	W02	10	31.9		B	BXO	10	7	7	3
4878		CULG	11	01	0515	S21	W05	10	31.8		B	BXO	30	3	5	3
4878		SVTO	11	01	1035	S21	W07	10	31.9		B	BXO	10	9	5	2
4878		RAMY	11	01	1245	S21	W08	10	31.9		B	BXO	20	8	6	3
4878		BOUL	11	01	1600	S20	W11	10	31.8		B	BXO	20	11	8	3
4878		PALE	11	01	1905	S20	W13	10	31.8		B	BXO	10	7	6	3
4878		HOLL	11	01	2110	S19	W14	10	31.8		B	BXO	10	4	6	3
4878		LEAR	11	02	0015	S20	W15	10	31.9		B	BXO	10	5	6	3
4878		CULG	11	02	0455	S20	W22	10	31.5		A	AX	10	1	1	3
4878		SVTO	11	02	0740	S21	W19	10	31.9		B	CSO	20	4	6	3
4878		RAMY	11	02	1504	S21	W20	11	1.1		B	BXO	10	3	2	3
4878		HOLL	11	02	1607	S21	W23	10	31.9		B	BXO	10	7	8	3
4878		BOUL	11	02	1728	S19	W22	11	1.0		A	AX	20	2	2	1
4878		PALE	11	02	1950	S21	W23	11	1.1		B	BXO	10	2	2	2
4878		LEAR	11	03	0020	S20	W26	11	1.0		A	AX	10	1	1	3
4878		BOUL	11	03	1444	S20	W33	11	1.1		A	AX	10	2	2	1
4878	24465	MWIL	11	03	1530	S21	W36	10	31.9	3	(AP)					
4878		HOLL	11	03	1613	S21	W37	10	31.8		B	BXO	10	5	7	2
4878		PALE	11	03	1820	S22	W38	10	31.8		B	BXO	10	4	8	3
4878A		RAMY	11	06	1529	N07	W31	11	4.3		B	BXO	10	2	1	2
4885	24469	MWIL	11	06	1515	N31	W06	11	6.2	2	(AP)					
4885		RAMY	11	06	1529	N31	W07	11	6.1		B	BXO	10	2	1	2
4885		HOLL	11	06	1550	N32	W07	11	6.1		B	BXO	10	3	3	4
4885		PALE	11	06	1910	N33	W07	11	6.2		B	BXO		3	4	3
4885		LEAR	11	07	0007	N32	W10	11	6.2		B	BXO	10	5	3	3
4885		SVTO	11	08	0920	N32	W29	11	6.1		B	BXO	10	4	4	3
4885		RAMY	11	08	1402	N31	W32	11	6.0		B	BXO	20	8	3	3
4885		BOUL	11	08	1515	N30	W32	11	6.1		B	BXO	30	5	5	2
4885	24469	MWIL	11	08	1530	N33	W30	11	6.3	4	(B)					
4885		HOLL	11	08	1611	N31	W32	11	6.1		B	BXO	10	5	4	3
4885		CULG	11	10	0430	N33	W51	11	6.1		A	AX	10	2	2	1
4885		RAMY	11	10	1345	N29	W58	11	6.0		A	AX	10	3	2	4
4885	24469	MWIL	11	10	1430	N30	W58	11	6.0	5	(AP)					

SUNSPOT GROUPS
(ORDERED BY CENTRAL MERIDIAN PASSAGE DATE)

NOVEMBER 1987

NOAA/ USAF Group	Mt Wilson Group	Sta	Observation Mo	Day	Time (UT)	Lat	CMD	CMP Mo	CMP Day	Max H	Mag Class	Spot Class	Corrected Area (10^{-6} Hemi)	Spot Count	Long. Extent (Deg)	Qual
4885		BOUL	11	10	1447	N32	W56	11	6.2		A	AX	10	2	1	1
4885		HOLL	11	10	1545	N31	W58	11	6.1		A	AX	10	2	2	4
4885		PALE	11	10	1812	N28	W57	11	6.3		A	AX	10	2	1	3
4885		LEAR	11	11	0039	N30	W65	11	5.9		A	AX	10	1	1	3
4885		RAMY	11	11	1345	N31	W69	11	6.1		B	BXO	40	4	4	4
4885	24469	MWIL	11	11	1500	N32	W68	11	6.2	4	(BP)					
4885		BOUL	11	11	1525	N32	W70	11	6.1		B	BXO	90	3	3	3
4885		HOLL	11	11	1620	N34	W70	11	6.1		B	BXO	30	4	11	3
4885		PALE	11	11	1810	N33	W73	11	5.9		B	BXO	10	3	7	3
4885		LEAR	11	12	0007	N32	W77	11	5.9		B	BXO	100	3	16	3
4885		CULG	11	12	0300	N30	W78	11	6.0		B	CRO	30	2	4	1
4885		SVTO	11	12	0825	N32	W78	11	6.2		A	AX	20	1	1	2
4885		RAMY	11	12	1408	N31	W80	11	6.3		B	BXO	30	2	4	4
4885	24469	MWIL	11	12	1545	N33	W80	11	6.3	5	(AP)					
4885		BOUL	11	12	1550	N33	W81	11	6.2		A	AX	30	1	1	2
4885		HOLL	11	12	1615	N35	W81	11	6.2		A	AX	20	1	1	3
4885		PALE	11	12	1815	N33	W87	11	5.8		B	BXO	10	2	4	3
4882		RAMY	11	01	1245	S23	E72	11	7.1		A	AX		1		3
4882		HOLL	11	01	2110	S23	E72	11	7.4		B	CSO	60	2	12	3
4882		LEAR	11	02	0015	S24	E71	11	7.5		B	FAO	60	3	18	3
4882		SVTO	11	02	0740	S23	E68	11	7.5		B	ESO	90	3	15	3
4882		RAMY	11	02	1504	S23	E60	11	7.2		A	HA	40	3	1	3
4882		HOLL	11	02	1607	S25	E59	11	7.2		A	HA	40	1	1	3
4882		BOUL	11	02	1728	S25	E56	11	7.1		A	HS	40	1	1	1
4882		PALE	11	02	1950	S24	E56	11	7.1		B	CSO	40	2	1	2
4882		LEAR	11	03	0020	S24	E54	11	7.2		A	HA	30	2	2	3
4882		CULG	11	03	0430	S26	E51	11	7.1		A	HA	30	2	1	3
4882		BOUL	11	03	1444	S24	E44	11	7.0		A	HS	20	3	2	1
4882	24467	MWIL	11	03	1530	S25	E45	11	7.1	4	(BP)					
4882		HOLL	11	03	1613	S25	E46	11	7.2		B	CAO	20	3	2	2
4882		PALE	11	03	1820	S26	E45	11	7.2		B	CSO	30	4	3	3
4882		LEAR	11	04	0006	S26	E42	11	7.3		B	CAO	30	3	2	3
4882		CULG	11	04	0410	S26	E38	11	7.1		A	AX	10	1	1	3
4882		SVTO	11	04	0659	S24	E38	11	7.2		A	HR	10	2	1	3
4882		RAMY	11	04	1415	S24	E35	11	7.3		A	HA	20	1	2	3
4882		BOUL	11	04	1451	S24	E33	11	7.2		A	AX	10	1	1	1
4882		HOLL	11	04	1515	S25	E32	11	7.1		A	HR	10	1	1	4
4882		PALE	11	04	1813	S25	E32	11	7.2		A	AX	10	1		3
4882		LEAR	11	05	0130	S25	E28	11	7.2		A	HS	10	1	1	3
4882		CULG	11	05	0450	S26	E24	11	7.1		A	AX	10	1		2
4882		SVTO	11	05	0730	S25	E25	11	7.2		A	AX	20	1	1	2
4882		RAMY	11	05	1323	S26	E24	11	7.4		B	BXO	10	5	5	4
4882		BOUL	11	05	1540	S24	E18	11	7.0		A	AX	10	1	1	2
4882		PALE	11	05	1902	S24	E18	11	7.2		A	AX		2	1	3
4882		LEAR	11	06	0104	S23	E16	11	7.3		A	AX	10	1	1	3
4882		LEAR	11	07	0007	S26	E05	11	7.4		B	CSO	50	6	6	3
4882	24467	MWIL	11	07	1500	S25	W04	11	7.3	3	(AP)					
4882A		CULG	11	06	0415	S30	E23	11	8.0		A	AX	10	1		2
4883		PALE	11	01	1905	S23	E87	11	8.5		A	HS	30	1	2	3
4883		CULG	11	02	0455	S26	E76	11	8.1		B	CSO	60	3	15	3
4883		RAMY	11	02	1504	S21	E71	11	8.1		B	DAO	90	4	5	3
4883		HOLL	11	02	1607	S22	E71	11	8.1		B	DAO	90	2	3	3
4883		BOUL	11	02	1728	S22	E69	11	8.0		B	CSO	110	2	4	1
4883		PALE	11	02	1950	S22	E68	11	8.0		B	DSO	130	2	6	2
4883		LEAR	11	03	0020	S22	E65	11	8.0		B	DSO	60	2	5	3
4883		CULG	11	03	0430	S24	E62	11	8.0		B	CSO	40	2	6	3
4883		BOUL	11	03	1444	S21	E56	11	7.9		B	CSO	120	4	4	1
4883	24468	MWIL	11	03	1530	S22	E54	11	7.8	5	(AP)					
4883		HOLL	11	03	1613	S22	E58	11	8.1		B	DSO	100	2	5	2
4883		PALE	11	03	1820	S23	E56	11	8.1		B	DSO	70	3	7	3
4883		LEAR	11	04	0006	S22	E52	11	8.0		B	DAO	180	7	7	3
4883		CULG	11	04	0410	S23	E48	11	7.9		B	DSO	60	3	6	3
4883		SVTO	11	04	0659	S23	E51	11	8.2		B	ESI	170	7	14	3
4883		RAMY	11	04	1415	S22	E45	11	8.0		B	DSI	170	9	7	3
4883		BOUL	11	04	1451	S22	E43	11	7.9		B	DSO	110	6	5	1
4883		HOLL	11	04	1515	S22	E44	11	8.0		B	ESI	150	10	13	4

SUNSPOT GROUPS
(ORDERED BY CENTRAL MERIDIAN PASSAGE DATE)

NOVEMBER 1987

NOAA/ USAF Group	Mt Wilson Group	Sta	Observation Time Mo	Day	(UT)	Lat	CMD	CMP Mo	Day	Max H	Mag Class	Spot Class	Corrected Area (10^{-6} Hemi)	Spot Count	Long. Extent (Deg)	Qual
4883		PALE	11	04	1813	S22	E43	11	8.1		B	DSI	90	11	8	3
4883		LEAR	11	05	0130	S23	E39	11	8.1		B	DSO	150	9	6	3
4883		CULG	11	05	0450	S23	E33	11	7.7		B	DSO	140	5	7	2
4883		SVTO	11	05	0730	S22	E35	11	8.0		B	DSO	100	9	7	2
4883		RAMY	11	05	1323	S22	E33	11	8.1		B	DSI	110	14	8	4
4883		BOUL	11	05	1540	S22	E28	11	7.8		B	CSO	190	11	8	2
4883		PALE	11	05	1902	S22	E27	11	7.9		B	DSO	100	7	6	3
4883		LEAR	11	06	0104	S21	E26	11	8.0		B	CAO	40	6	6	3
4883		CULG	11	06	0415	S23	E22	11	7.9		B	DSO	70	3	6	2
4883		SVTO	11	06	0650	S25	E22	11	8.0		B	DSO	90	10	8	3
4883	24468	MWIL	11	06	1515	S22	E18	11	8.0	5	(BP)					
4883		RAMY	11	06	1529	S22	E18	11	8.0		B	CSO	100	7	7	2
4883		HOLL	11	06	1550	S22	E17	11	8.0		B	DSO	70	8	9	4
4883		BOUL	11	06	1730	S21	E15	11	7.9		B	DSO	110	4	8	1
4883		PALE	11	06	1910	S22	E15	11	7.9		B	DSO	50	7	8	3
4883		LEAR	11	07	0007	S21	E13	11	8.0		A	AX	10	2	1	3
4883		CULG	11	07	0436	S22	E07	11	7.7		B	CSO	70	4	7	1
4883		SVTO	11	07	0915	S22	E10	11	8.1		B	CSO	90	9	8	3
4883		RAMY	11	07	1425	S22	E07	11	8.1		B	CSO	80	5	7	3
4883	24468	MWIL	11	07	1500	S22	E04	11	7.9	5	(BP)					
4883		HOLL	11	07	1532	S22	E05	11	8.0		B	CSO	70	4	6	3
4883		BOUL	11	07	1537	S22	E04	11	7.9		B	CSO	100	4	8	1
4883		PALE	11	07	1810	S22	E04	11	8.1		B	CSO	60	6	9	2
4883		LEAR	11	08	0023	S23	E03	11	8.2		B	CSO	50	4	13	2
4883		CULG	11	08	0500	S25	W03	11	8.0		B	CSO	80	4	13	3
4883		SVTO	11	08	0920	S23	W01	11	8.3		B	ESO	90	8	15	3
4883		RAMY	11	08	1402	S22	W03	11	8.4		B	CAO	80	6	14	3
4883		BOUL	11	08	1515	S21	W09	11	7.9		B	CSO	90	2	5	2
4883	24468	MWIL	11	08	1530	S22	W10	11	7.9	5	(BP)					
4883		HOLL	11	08	1611	S22	W08	11	8.0		B	CSO	50	2	4	3
4883		PALE	11	08	2003	S24	W09	11	8.1		B	CSO	80	4	14	1
4883		LEAR	11	09	0047	S23	W09	11	8.3		B	CSO	30	5	15	2
4883		RAMY	11	09	1227	S22	W20	11	8.0		B	CAO	70	4	4	3
4883	24468	MWIL	11	09	1430	S24	W23	11	7.8	5	(AP)					
4883		BOUL	11	09	1444	S22	W22	11	7.9		B	CSO	70	4	4	1
4883		HOLL	11	09	1549	S22	W22	11	8.0		B	CSO	50	3	3	3
4883		PALE	11	09	1740	S23	W25	11	7.8		B	CSO	50	3	4	3
4883		CULG	11	10	0430	S22	W28	11	8.0		B	CSO	50	2	9	1
4883		SVTO	11	10	0911	S23	W33	11	7.8		A	HR		1	1	2
4883		RAMY	11	10	1345	S23	W35	11	7.9		A	HR	20	3	2	4
4883	24468	MWIL	11	10	1430	S22	W36	11	7.8	5	(AP)					
4883		BOUL	11	10	1447	S21	W35	11	7.9		A	AX	10	2	1	1
4883		HOLL	11	10	1545	S22	W36	11	7.9		A	HS	30	4	2	4
4883		PALE	11	10	1812	S23	W41	11	7.6		A	HS	30	2	1	3
4883		LEAR	11	11	0039	S23	W41	11	7.9		A	AX	10	1	1	3
4883		RAMY	11	11	1345	S24	W48	11	7.9		A	AX		1	1	4
4883	24468	MWIL	11	11	1500	S22	W49	11	7.9	3	(AP)					
4883		HOLL	11	11	1620	S21	W51	11	7.8		A	AX	10	1	1	3
4883		PALE	11	11	1810	S22	W52	11	7.8		A	AX		1		3
4883		LEAR	11	12	0007	S22	W54	11	7.8		A	AX	10	1	1	3
4888		BOUL	11	08	1515	S25	E01	11	8.7		B	BXO	20	3	4	2
4888	24473	MWIL	11	08	1530	S26	E01	11	8.7	3	(B)					
4888		HOLL	11	08	1611	S26	E01	11	8.7		B	BXO	10	3	4	3
4888		RAMY	11	09	1227	S25	W10	11	8.7		B	BXO	10	3	4	3
4888	24473	MWIL	11	09	1430	S26	W13	11	8.6	2	(B)					
4888		BOUL	11	09	1444	S25	W11	11	8.8		B	BXO	10	3	4	1
4888		HOLL	11	09	1549	S27	W12	11	8.7		B	BXO	10	3	4	3
4888		PALE	11	09	1740	S27	W13	11	8.7		B	BXO	10	3	4	3
4888		RAMY	11	10	1345	S27	W26	11	8.5		A	AX		1	1	4
4884		RAMY	11	04	1415	N18	E77	11	10.4		A	AX	10	1	1	3
4884		HOLL	11	04	1515	N17	E75	11	10.3		A	AX	10	1	1	4
4884		PALE	11	04	1813	N18	E75	11	10.5		A	AX	10	1		3
4884		LEAR	11	05	0130	N15	E68	11	10.2		B	BXO	20	2	6	3
4884		RAMY	11	05	1323	N16	E58	11	9.9		A	AX		1	1	4
4884		BOUL	11	05	1540	N15	E56	11	9.9		A	AX	20	1	1	2
4884		SVTO	11	06	0650	N15	E48	11	9.9		A	AX		2		3
4884	24470	MWIL	11	06	1515	N16	E43	11	9.9	3	(B)					

SUNSPOT GROUPS
(ORDERED BY CENTRAL MERIDIAN PASSAGE DATE)

NOVEMBER 1987

NOAA/ USAF Group	Mt Wilson Group	Sta	Observation Time Mo	Day	(UT)	Lat	CMD	CMP Mo	Day	Max H	Mag Class	Spot Class	Corrected Area (10^{-6} Hemi)	Spot Count	Long. Extent (Deg)	Qual
4884		HOLL	11	06	1550	N17	E45	11	10.1		B	BXO	10	3	3	4
4884		BOUL	11	06	1730	N16	E41	11	9.8		A	HS	20	1	1	1
4884		PALE	11	06	1910	N15	E43	11	10.0		B	CRO	10	4	4	3
4884		LEAR	11	07	0007	N15	E39	11	9.9		A	AX	10	2	1	3
4884		CULG	11	07	0436	N11	E36	11	9.9		A	AX	10	2	1	1
4884		SVTO	11	07	0915	N16	E34	11	10.0		B	BXO	10	5	3	3
4884		RAMY	11	07	1425	N17	E31	11	9.9		B	BXO	30	6	3	3
4884	24470	MWIL	11	07	1500	N16	E30	11	9.9	3	(BP)					
4884		HOLL	11	07	1532	N16	E30	11	9.9		B	BXO	10	8	4	3
4884		BOUL	11	07	1537	N17	E28	11	9.8		A	AX	10	4	2	1
4884		PALE	11	07	1810	N17	E27	11	9.8		B	BXO	20	5	3	2
4884		LEAR	11	08	0023	N17	E24	11	9.8		A	AX	10	2	2	2
4884		SVTO	11	08	0920	N17	E19	11	9.8		A	AX		2	2	3
4884		RAMY	11	08	1402	N18	E15	11	9.7		A	AX		1	1	3
4884	24470	MWIL	11	08	1530	N16	E14	11	9.7	2	(AP)					
4884		RAMY	11	09	1227	N18	E06	11	10.0		B	BXO	10	7	2	3
4884	24470	MWIL	11	09	1430	N17	E03	11	9.8	4	(B)					
4884		BOUL	11	09	1444	N17	E03	11	9.8		A	AX	20	3	2	1
4884		HOLL	11	09	1549	N16	E03	11	9.9		A	AX	10	4	3	3
4884		PALE	11	09	1740	N17	E03	11	10.0		B	BXO	10	3	3	3
4884		SVTO	11	10	0911	N18	W07	11	9.8		A	AX		1	1	2
4884		RAMY	11	10	1345	N15	W12	11	9.7		A	AX		1	1	4
4884	24470	MWIL	11	10	1430	N15	W13	11	9.6	3	(AP)					
4884		HOLL	11	10	1545	N15	W13	11	9.7		A	AX		1	1	4
4884		PALE	11	10	1812	N19	W13	11	9.8		A	AX	10	1		3
4887		RAMY	11	07	1425	S19	E35	11	10.3		A	AX	10	1	1	3
4887	24472	MWIL	11	07	1500	S20	E34	11	10.2	3	(AF)					
4887		HOLL	11	07	1532	S19	E34	11	10.2		A	AX		1	1	3
4887		BOUL	11	07	1537	S19	E32	11	10.1		A	AX	10	1	1	1
4887		PALE	11	07	1810	S20	E30	11	10.0		B	BXO	10	2	2	2
4887		LEAR	11	08	0023	S19	E28	11	10.1		A	AX	10	2	2	2
4887		CULG	11	08	0500	S23	E23	11	10.0		B	BXO	10	2	1	3
4887		SVTO	11	08	0920	S20	E25	11	10.3		B	BXO	10	3	2	3
4887		RAMY	11	08	1402	S19	E22	11	10.3		B	BXO	10	5	2	3
4887		BOUL	11	08	1515	S19	E19	11	10.1		A	AX	10	2	1	2
4887	24472	MWIL	11	08	1530	S21	E21	11	10.3	3	(AF)					
4889		SVTO	11	08	0920	N17	E80	11	14.5		A	AR	30	1	2	3
4889		RAMY	11	08	1402	N19	E78	11	14.5		A	HA	30	1	1	3
4889		BOUL	11	08	1515	N16	E77	11	14.5		A	AX	30	1	1	2
4889	24474	MWIL	11	08	1530	N16	E77	11	14.5	4	(AP)					
4889		HOLL	11	08	1611	N17	E77	11	14.5		A	AX	20	1	1	3
4889		PALE	11	08	2003	N17	E75	11	14.5		A	HS	30	1	1	1
4889		LEAR	11	09	0047	N17	E70	11	14.3		A	HS	30	1	2	2
4889		RAMY	11	09	1227	N18	E65	11	14.5		A	AX	10	3	1	3
4889	24474	MWIL	11	09	1430	N16	E60	11	14.2	4	(AP)					
4889		BOUL	11	09	1444	N17	E60	11	14.2		A	AX	20	3	1	1
4889		HOLL	11	09	1549	N16	E62	11	14.4		A	AX	20	1	1	3
4889		PALE	11	09	1740	N17	E62	11	14.4		A	AX	10	2	1	3
4889		CULG	11	10	0430	N14	E56	11	14.4		A	AX	10	1	1	1
4889		SVTO	11	10	0911	N18	E53	11	14.4		A	AX	10	2	1	2
4889		RAMY	11	10	1345	N18	E49	11	14.3		A	AX	10	3	2	4
4889	24474	MWIL	11	10	1430	N17	E49	11	14.3	4	(AP)					
4889		BOUL	11	10	1447	N17	E48	11	14.3		A	AX	10	1	1	1
4889		HOLL	11	10	1545	N17	E49	11	14.4		B	BXO	10	3	4	4
4889		PALE	11	10	1812	N12	E48	11	14.4		B	BXO	20	3	2	3
4889		LEAR	11	11	0039	N17	E45	11	14.4		A	AX	10	1	1	3
4889		RAMY	11	11	1345	N17	E36	11	14.3		A	AX		1	1	4
4889	24474	MWIL	11	11	1500	N16	E36	11	14.4	3	(AP)					
4889		HOLL	11	11	1620	N16	E36	11	14.4		A	AX		1	1	3
4889A		LEAR	11	19	0003	S16	W38	11	16.1		B	BXO	10	2	3	3
4889A		LEAR	11	20	0025	S14	W52	11	16.1		A	AX	10	2	1	3
4889A		LEAR	11	21	0055	S16	W65	11	16.1		A	AX	10	1	1	3
4893		RAMY	11	17	1423	S17	W08	11	17.0		B	BXO	10	2	2	3
4893		HOLL	11	17	1455	S16	W09	11	16.9		A	AX	10	2	2	3
4893		PALE	11	17	1820	S17	W11	11	16.9		B	BXO	20	2	2	3

SUNSPOT GROUPS
(ORDERED BY CENTRAL MERIDIAN PASSAGE DATE)

NOVEMBER 1987

NOAA/ USAF Group	Mt Wilson Group	Sta	Observation Time Mo	Day	(UT)	Lat	CMD	CMP Mo	Day	Max H	Mag Class	Spot Class	Corrected Area (10^{-6} Hemi)	Spot Count	Long. Extent (Deg)	Qual
4893		LEAR	11	18	0004	S17	W13	11	17.0		B	CAO	10	3	2	4
4893		CULG	11	18	0400	S17	W17	11	16.9		A	AX	10	1	1	3
4893	24477	MWIL	11	18	1530	S17	W22	11	17.0	4	(AP)					
4893		HOLL	11	18	1555	S17	W23	11	16.9		A	AX		1		3
4893		PALE	11	18	1917	S16	W24	11	17.0		B	BXO		2	3	2
4893		LEAR	11	19	0003	S16	W27	11	16.9		B	BXO	10	2	3	3
4893		CULG	11	19	0222	S16	W31	11	16.7		B	BXO	20	2	2	3
4893		SVTO	11	19	0930	S16	W33	11	16.9		A	AX	20		2	3
4893	24477	MWIL	11	19	1515	S16	W35	11	17.0	3	(AF)					
4893		HOLL	11	19	1528	S17	W35	11	17.0		A	AX	50	1	1	3
4893		RAMY	11	19	1632	S19	W35	11	17.0		A	AX		1	1	2
4893		PALE	11	19	1825	S17	W37	11	16.9		A	AX		1		3
4890		RAMY	11	11	1345	S24	E83	11	18.0		B	CAO	100	3	3	4
4890	24475	MWIL	11	11	1500	S23	E80	11	17.8	3	(AP)					
4890		HOLL	11	11	1620	S26	E80	11	17.9		B	EHO	120	5	15	3
4890		PALE	11	11	1810	S27	E85	11	18.4		A	HK	240	4	3	3
4890		LEAR	11	12	0007	S24	E79	11	18.1		A	HK	300	6	10	3
4890		CULG	11	12	0300	S26	E77	11	18.1		B	DKO	320	3	7	1
4890		SVTO	11	12	0825	S24	E72	11	17.9		A	HK	390	6	5	2
4890		RAMY	11	12	1408	S25	E69	11	17.9		B	DKO	420	8	10	4
4890	24475	MWIL	11	12	1545	S25	E69	11	18.0	5	(BP)					
4890		BOUL	11	12	1550	S24	E67	11	17.8		B	CKO	420	8	5	2
4890		HOLL	11	12	1615	S26	E64	11	17.6		B	DKO	350	9	12	3
4890		PALE	11	12	1815	S27	E62	11	17.6		B	CKO	360	8	9	3
4890		LEAR	11	13	0029	S25	E62	11	17.8		A	HK	480	5	3	3
4890		CULG	11	13	0415	S26	E65	11	18.2		B	CKO	410	6	9	2
4890		SVTO	11	13	0746	S25	E61	11	18.0		B	CKO	530	0	7	2
4890		RAMY	11	13	1515	S24	E58	11	18.1		B	DKO	460	10	10	3
4890		BOUL	11	13	1520	S25	E57	11	18.0		B	CKO	560	14	7	2
4890		HOLL	11	13	1523	S26	E59	11	18.2		B	CKO	440	6	9	4
4890		PALE	11	13	1845	S26	E58	11	18.3		B	CKO	590	10	9	3
4890	24475	MWIL	11	13	2230	S25	E54	11	18.1	5	(BP)					
4890		LEAR	11	14	0016	S26	E54	11	18.2		B	CKO	400	11	9	3
4890		CULG	11	14	0500	S25	E51	11	18.1		B	CKO	240	9	8	1
4890		RAMY	11	14	1255	S24	E45	11	18.0		B	CKO	350	14	8	4
4890		SVTO	11	14	1405	S26	E46	11	18.2		B	CKO	510	12	8	2
4890	24475	MWIL	11	14	1645	S25	E43	11	18.0	5	(BP)					
4890		HOLL	11	14	1802	S25	E45	11	18.2		B	DKO	520	4	9	2
4890		PALE	11	14	1835	S27	E44	11	18.2		B	DKO	430	7	10	2
4890		LEAR	11	15	0041	S24	E40	11	18.1		B	CKO	480	13	9	3
4890		CULG	11	15	0410	S25	E37	11	18.0		B	CKO	410	12	8	3
4890		RAMY	11	15	1224	S25	E34	11	18.1		B	CKO	460	14	8	4
4890	24475	MWIL	11	15	1530	S25	E30	11	18.0	5	(AP)					
4890		HOLL	11	15	1641	S26	E33	11	18.2		B	DKO	470	12	10	2
4890		PALE	11	15	1932	S26	E31	11	18.2		B	CKO	470	10	10	2
4890		LEAR	11	16	0232	S24	E26	11	18.1		B	CKO	400	14	8	2
4890		CULG	11	16	0420	S25	E24	11	18.0		B	CKO	360	12	8	1
4890		SVTO	11	16	0825	S25	E23	11	18.1		B	DKI	560	26	9	2
4890		RAMY	11	16	1245	S25	E22	11	18.2		B	CKO	580	31	11	3
4890		BOUL	11	16	1522	S24	E19	11	18.1		B	CKO	570	25	9	2
4890	24475	MWIL	11	16	1530	S25	E17	11	18.0	5	(BP)					
4890		HOLL	11	16	1535	S26	E19	11	18.1		B	DKO	530	25	8	4
4890		PALE	11	16	1815	S26	E18	11	18.1		B	CKO	550	28	10	3
4890		LEAR	11	17	0119	S25	E14	11	18.1		B	DKO	440	24	7	2
4890		SVTO	11	17	0750	S25	E09	11	18.0		B	DKO	520	27	8	3
4890		RAMY	11	17	1423	S25	E07	11	18.1		B	DKI	490	40	11	3
4890		BOUL	11	17	1446	S24	E06	11	18.1		B	CKO	370	13	10	1
4890		HOLL	11	17	1455	S25	E08	11	18.2		B	EKO	480	26	11	3
4890		PALE	11	17	1820	S26	E06	11	18.2		B	CKO	400	33	11	3
4890		LEAR	11	18	0004	S26	E02	11	18.1		B	CKI	310	36	10	4
4890		CULG	11	18	0400	S25	W05	11	17.8		B	DKC	310	17	6	3
4890		SVTO	11	18	0733	S24	W04	11	18.0		B	DSI	280	15	7	2
4890	24475	MWIL	11	18	1530	S25	W08	11	18.0	5	(BG)					
4890		BOUL	11	18	1550	S24	W09	11	18.0		B	DAO	340	7	5	1
4890		HOLL	11	18	1555	S25	W09	11	18.0		B	DKO	310	11	6	3
4890		PALE	11	18	1917	S24	W11	11	17.9		B	CSO	250	13	8	2
4890		LEAR	11	19	0003	S25	W12	11	18.1		B	CKI	320	24	8	3

SUNSPOT GROUPS
(ORDERED BY CENTRAL MERIDIAN PASSAGE DATE)

NOVEMBER 1987

NOAA/ USAF Group	Mt Wilson Group	Sta	Observation Time Mo	Day	(UT)	Lat	CMD	CMP Mo	Day	Max H	Mag Class	Spot Class	Corrected Area (10^{-6} Hemi)	Spot Count	Long. Extent (Deg)	Qual
4890		CULG	11	19	0222	S24	W16	11	17.9		B	DAC	460	11	7	3
4890		SVTO	11	19	0930	S26	W17	11	18.1		B	DHI	290	20	7	3
4890	24475	MWIL	11	19	1515	S25	W22	11	17.9	5	(BP)					
4890		HOLL	11	19	1528	S25	W22	11	17.9		B	DKI	240	14	5	3
4890		BOUL	11	19	1530	S23	W22	11	17.9		B	DKO	380	10	5	1
4890		RAMY	11	19	1632	S27	W20	11	18.1		B	DKI	280	21	6	2
4890		PALE	11	19	1825	S25	W24	11	17.9		A	HA	220	18	5	3
4890		LEAR	11	20	0025	S25	W26	11	18.0		B	DAO	290	19	6	3
4890		CULG	11	20	0505	S24	W31	11	17.8		B	DAI	230	7	5	1
4890	24475	MWIL	11	20	1530	S24	W35	11	17.9	5	(BP)					
4890		BOUL	11	20	1533	S25	W35	11	17.9		B	DKI	330	10	6	2
4890		HOLL	11	20	1535	S23	W34	11	18.0		B	CKO	320	11	9	3
4890		PALE	11	20	1845	S25	W36	11	18.0		B	CSO	430	11	7	4
4890		LEAR	11	21	0055	S24	W37	11	18.2		B	DAO	330	19	8	3
4890		CULG	11	21	0405	S23	W43	11	17.8		B	DKO	350	9	6	3
4890		SVTO	11	21	0741	S24	W43	11	18.0		B	DKI	430	9	7	2
4890		RAMY	11	21	1310	S25	W45	11	18.1		B	DKO	450	13	6	4
4890		BOUL	11	21	1510	S25	W48	11	17.9		B	DKI	370	10	8	1
4890	24475	MWIL	11	21	1530	S24	W48	11	17.9	4	(B)					
4890		HOLL	11	21	1530	S25	W47	11	18.0		B	DAO	410	13	6	3
4890		LEAR	11	22	0027	S25	W51	11	18.1		B	DSO	420	18	8	3
4890		CULG	11	22	0450	S24	W55	11	17.9		B	DKO	420	6	7	3
4890		RAMY	11	22	1258	S26	W59	11	17.9		B	DKO	420	8	6	3
4890		BOUL	11	22	1523	S25	W65	11	17.6		B	DAO	350	3	10	1
4890	24475	MWIL	11	22	1530	S25	W60	11	18.0	5	(B)					
4890		PALE	11	22	1835	S26	W63	11	17.9		B	DAO	330	8	6	3
4890		HOLL	11	22	1920	S24	W62	11	18.0		B	DKO	440	10	9	3
4890		LEAR	11	23	0035	S25	W65	11	18.0		B	CAO	390	12	6	3
4890		CULG	11	23	0550	S24	W70	11	17.8		B	DKO	400	5	7	1
4890		SVTO	11	23	1025	S25	W75	11	17.6		B	EKI	500	10	12	2
4890		RAMY	11	23	1355	S24	W73	11	17.9		B	DKO		12	9	3
4890		BOUL	11	23	1443	S25	W75	11	17.8		B	BXO	120	7	10	1
4890	24475	MWIL	11	23	1545	S24	W75	11	17.9	5	(AP)					
4890		PALE	11	23	1800	S25	W75	11	17.9		B	CKO	300	6	6	4
4890		HOLL	11	23	1914	S25	W77	11	17.8		B	DAO	200	4	8	2
4890		LEAR	11	24	0228	S25	W80	11	17.9		B	CKO	150	4	8	4
4894		LEAR	11	18	0004	S15	E14	11	19.1		A	AX	10	1	1	4
4894		SVTO	11	18	0733	S16	E09	11	19.0		A	AX		1	1	2
4894	24478	MWIL	11	18	1530	S16	E07	11	19.2	3	(AF)					
4894		HOLL	11	18	1555	S16	E05	11	19.0		A	AX		2	2	3
4894		LEAR	11	19	0003	S15	W01	11	18.9		A	AX	10	1	1	3
4892		BOUL	11	16	1522	S17	E57	11	21.0		A	AX	10	1	1	2
4892		HOLL	11	16	1535	S22	E56	11	21.0		B	CSO	60	2	17	4
4892		SVTO	11	17	0750	S19	E52	11	21.3		B	BXO	10	3	4	3
4892		RAMY	11	17	1423	S19	E50	11	21.4		A	AX		1	1	3
4892		HOLL	11	17	1455	S19	E49	11	21.4		A	AX	10	1	1	3
4896		LEAR	11	22	0027	S34	W06	11	21.5		B	BXO	10	4	4	3
4896		CULG	11	22	0450	S36	W10	11	21.4		B	BXO	10	3	3	3
4896		RAMY	11	22	1258	S34	W13	11	21.5		B	BXO	30	6	6	3
4896		BOUL	11	22	1523	S34	W14	11	21.5		B	CSO	20	3	5	1
4896	24480	MWIL	11	22	1530	S34	W14	11	21.5	4	(B)					
4896		PALE	11	22	1835	S33	W16	11	21.5		B	DSO	40	4	5	3
4896		HOLL	11	22	1920	S33	W18	11	21.4		B	CRO	20	4	6	3
4896		LEAR	11	23	0035	S34	W19	11	21.5		B	CRO	40	4	6	3
4896		CULG	11	23	0550	S34	W24	11	21.3		B	BXO	10	4	6	1
4896		SVTO	11	23	1025	S34	W25	11	21.4		B	DSO	50	10	7	2
4896		RAMY	11	23	1355	S33	W26	11	21.5		B	DRI	60	16	8	3
4896		BOUL	11	23	1443	S33	W27	11	21.5		B	BXO	80	8	7	1
4896	24480	MWIL	11	23	1545	S34	W28	11	21.4	5	(B)					
4896		PALE	11	23	1800	S33	W28	11	21.5		B	DAO	110	12	8	4
4896		HOLL	11	23	1914	S33	W30	11	21.4		B	DSO	100	10	9	2
4896		LEAR	11	24	0228	S34	W34	11	21.4		B	DSO	100	20	11	4
4896		BOUL	11	24	1430	S33	W40	11	21.4		B	BXO	140	7	11	1
4896	24480	MWIL	11	24	1530	S33	W40	11	21.5	5	(B)					
4896		HOLL	11	24	1607	S34	W39	11	21.6		B	EAO	190	6	13	3
4896		PALE	11	24	1908	S33	W42	11	21.5		B	EAO	190	10		3

SUNSPOT GROUPS
(ORDERED BY CENTRAL MERIDIAN PASSAGE DATE)

NOVEMBER 1987

NOAA/ USAF Group	Mt Wilson Group	Sta	Observation Time Mo	Day	(UT)	Lat	CMD	CMP Mo	Day	Max H	Mag Class	Spot Class	Corrected Area (10^{-6} Hemi)	Spot Count	Long. Extent (Deg)	Qual
4896		CULG	11	25	0420	S36	W46	11	21.5		B	EAI	210	5	11	2
4896		SVTO	11	25	1323	S32	W52	11	21.4		B	EAO	380	10	14	1
4896		RAMY	11	25	1410	S34	W54	11	21.3		B	EAO	110	5	12	1
4896	24480	MWIL	11	25	1530	S33	W51	11	21.6	4	(B)					
4896		BOUL	11	25	1545	S33	W56	11	21.2		B	CAO	200	4	11	1
4896		HOLL	11	25	1606	S31	W53	11	21.5		B	EAO	220	9	15	3
4896		PALE	11	25	1806	S33	W55	11	21.4		B	EAO	170	8	12	3
4896		LEAR	11	26	0011	S33	W57	11	21.5		B	ESO	490	15	14	3
4896		CULG	11	26	0415	S36	W58	11	21.5		B	DAO	200	5	10	3
4896	24480	MWIL	11	26	1445	S33	W62	11	21.7	3	(BF)					
4896		HOLL	11	26	1556	S31	W66	11	21.5		B	DSO	330	6	4	3
4896		PALE	11	26	2020	S33	W70	11	21.3		B	ESO	240	6	11	2
4896		LEAR	11	27	0105	S32	W70	11	21.5		B	ESO	420	13	14	3
4896		CULG	11	27	0440	S34	W76	11	21.1		B	EAO	200	5	12	2
4896		SVTO	11	27	0705	S33	W75	11	21.3		B	ESO	110	6	17	2
4896		BOUL	11	27	1545	S33	W77	11	21.5		B	CAO	150	5	4	3
4896		HOLL	11	27	1648	S31	W75	11	21.8		B	ESO	80	5	12	3
4896		RAMY	11	27	1719	S33	W75	11	21.8		B	DAO	100	3	3	2
4896		PALE	11	27	1916	S33	W80	11	21.4		B	DSO	120	2	7	2
4896		LEAR	11	28	0022	S34	W80	11	21.6		B	ESO	90	2	13	3
4896		CULG	11	28	0430	S32	W85	11	21.4		A	HS	60	1	3	3
4896		SVTO	11	28	0850	S34	W85	11	21.6		B	BXO	20	2	1	3
4891		SVTO	11	16	0825	S21	E85	11	22.9		A	HR	30	1	2	2
4891		RAMY	11	16	1245	S21	E80	11	22.7		A	HS	60	1	1	3
4891		BOUL	11	16	1522	S19	E79	11	22.7		A	HS	60	1	1	2
4891	24476	MWIL	11	16	1530	S21	E78	11	22.6	3	AP					
4891		PALE	11	16	1815	S21	E78	11	22.7		A	HS	80	1	2	3
4891		LEAR	11	17	0119	S21	E74	11	22.7		A	HS	90	1	2	2
4891		SVTO	11	17	0750	S21	E69	11	22.6		A	HH	120	1	3	3
4891		RAMY	11	17	1423	S21	E67	11	22.7		A	HA	110	1	2	3
4891		BOUL	11	17	1446	S20	E66	11	22.7		A	HS	100	1	2	1
4891		HOLL	11	17	1455	S20	E66	11	22.7		A	HA	90	1	2	3
4891		PALE	11	17	1820	S21	E65	11	22.7		A	HS	100	1	2	3
4891		LEAR	11	18	0004	S20	E61	11	22.7		A	HS	110	2	2	4
4891		CULG	11	18	0400	S23	E58	11	22.6		B	CSO	100	3	3	3
4891		SVTO	11	18	0733	S21	E57	11	22.7		B	CSO	80	4	4	2
4891	24476	MWIL	11	18	1530	S22	E53	11	22.7	5	(B)					
4891		BOUL	11	18	1550	S21	E50	11	22.5		B	CSO	170	6	4	1
4891		HOLL	11	18	1555	S22	E52	11	22.6		B	CAO	100	8	4	3
4891		PALE	11	18	1917	S22	E51	11	22.7		B	DAO	100	8	5	2
4891		LEAR	11	19	0003	S22	E46	11	22.5		B	CSO	150	9	7	3
4891		CULG	11	19	0222	S25	E46	11	22.7		B	DAI	260	10	6	3
4891		SVTO	11	19	0930	S23	E43	11	22.7		B	DSI	120	19	7	3
4891	24476	MWIL	11	19	1515	S22	E37	11	22.5	4	(B)					
4891		HOLL	11	19	1528	S22	E39	11	22.6		B	DAO	150	14	8	3
4891		BOUL	11	19	1530	S21	E36	11	22.4		B	DAC	230	11	6	1
4891		RAMY	11	19	1632	S18	E40	11	22.7		B	DAI	140	21	8	2
4891		PALE	11	19	1825	S22	E36	11	22.5		B	DAI	150	13	7	3
4891		LEAR	11	20	0025	S21	E32	11	22.5		B	DSO	90	18	8	3
4891		CULG	11	20	0505	S24	E29	11	22.4		B	DAI	200	9	8	1
4891	24476	MWIL	11	20	1530	S22	E25	11	22.6	5	(B)					
4891		BOUL	11	20	1533	S21	E23	11	22.4		B	DAI	240	35	9	2
4891		HOLL	11	20	1535	S22	E24	11	22.5		B	DAI	310	26	9	3
4891		PALE	11	20	1845	S22	E25	11	22.7		B	ESI	270	33	12	4
4891		LEAR	11	21	0055	S20	E16	11	22.3		B	DAO	250	27	9	3
4891		CULG	11	21	0405	S23	E17	11	22.5		B	DAI	140	20	9	3
4891		SVTO	11	21	0741	S21	E16	11	22.5		B	DKI	300	20	10	2
4891		RAMY	11	21	1310	S21	E14	11	22.6		B	EAI	290	42	11	4
4891		BOUL	11	21	1510	S21	E10	11	22.4		B	EAI	220	20	11	1
4891	24476	MWIL	11	21	1530	S22	E11	11	22.5	4	(BP)					
4891		HOLL	11	21	1530	S22	E13	11	22.6		B	EAI	220	32	12	3
4891		LEAR	11	22	0027	S22	E08	11	22.6		B	EAI	310	44	13	3
4891		CULG	11	22	0450	S21	E03	11	22.4		B	EAC	350	26	14	3
4891		RAMY	11	22	1258	S21	E00	11	22.5		B	EAI	300	54	11	3
4891		BOUL	11	22	1523	S20	W03	11	22.4		B	EAI	220	16	11	1
4891	24476	MWIL	11	22	1530	S21	W01	11	22.6	5	(BP)					
4891		PALE	11	22	1835	S22	W03	11	22.5		B	EAI	310	51	12	3
4891		HOLL	11	22	1920	S21	W04	11	22.5		B	EAI	330	47	12	3

SUNSPOT GROUPS
(ORDERED BY CENTRAL MERIDIAN PASSAGE DATE)

NOVEMBER 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
4891		LEAR	11	23	0035	S22	W06	11	22.6		B	EAI	350	50	13	3
4891		CULG	11	23	0550	S23	W10	11	22.5		B	EAC	480	22	10	1
4891		SVTO	11	23	1025	S21	W12	11	22.5		B	ESI	200	47	13	2
4891		RAMY	11	23	1355	S22	W13	11	22.6		B	EAI	280	50	14	3
4891		BOUL	11	23	1443	S20	W14	11	22.5		B	BXI	210	31	12	1
4891	24476	MWIL	11	23	1545	S22	W14	11	22.6	5	(BP)					
4891		PALE	11	23	1800	S21	W14	11	22.7		B	EAI	280	50	13	4
4891		HOLL	11	23	1914	S22	W17	11	22.5		B	EAO	210	26	13	2
4891		LEAR	11	24	0228	S21	W21	11	22.5		BG	EAI	140	42	13	4
4891		BOUL	11	24	1430	S21	W27	11	22.5		B	BXI	140	8	9	1
4891	24476	MWIL	11	24	1530	S22	W26	11	22.6	5	(B)					
4891		HOLL	11	24	1607	S22	W29	11	22.4		B	EAO	100	13	12	3
4891		PALE	11	24	1908	S22	W30	11	22.5		B	EAI	220	20	14	3
4891		CULG	11	25	0420	S22	W35	11	22.5		B	DAO	110	7	10	2
4891		SVTO	11	25	1323	S20	W40	11	22.5		B	CSO	90	10	9	1
4891		RAMY	11	25	1410	S22	W43	11	22.3		B	CAO	60	7	10	1
4891	24476	MWIL	11	25	1530	S22	W38	11	22.7	3	(B)					
4891		BOUL	11	25	1545	S21	W39	11	22.7		B	BXO	60	2	2	1
4891		HOLL	11	25	1606	S19	W43	11	22.4		B	CAO	80	10	11	3
4891		PALE	11	25	1806	S22	W43	11	22.4		B	CSO	60	9	10	3
4891		LEAR	11	26	0011	S21	W41	11	22.9		B	CSO	60	6	4	3
4891		CULG	11	26	0415	S22	W49	11	22.4		B	CSO	70	3	8	3
4891		HOLL	11	26	1556	S20	W55	11	22.4		B	BXO	20	4	2	3
4891		LEAR	11	27	0105	S20	W57	11	22.7		B	BX	10	5	9	3
4891		LEAR	11	28	0022	S20	W73	11	22.4		B	BXO	30	2	5	3
4891		SVTO	11	28	0850	S22	W72	11	22.8		B	BXO	10	3	8	3
	24479	MWIL	11	20	1530	S22	E79	11	26.7	2	X					
4895		LEAR	11	22	0027	N27	E74	11	27.8		B	BXO	20	2	6	3
4895		RAMY	11	22	1258	N28	E65	11	27.6		B	BXO	30	3	7	3
4895	24481	MWIL	11	22	1530	N27	E65	11	27.7	3	(B					
4895		PALE	11	22	1835	N28	E64	11	27.8		A	AX		1		3
4895		HOLL	11	22	1920	N26	E64	11	27.8		B	BXO	10	3	3	3
4895		LEAR	11	23	0035	N27	E57	11	27.5		A	AX	20	2	2	3
4895		SVTO	11	23	1025	N27	E55	11	27.7		B	BXO	10	3	4	2
4895		RAMY	11	23	1355	N30	E53	11	27.7		B	BXO	10	3	9	3
4895		PALE	11	23	1800	N32	E50	11	27.7		A	AX		1		4
4895	24481	MWIL	11	24	1530	N27	E37	11	27.5	4	(AP)					
4895		LEAR	11	26	0011	N32	E17	11	27.3		A	AX	10	1	1	3
4895		LEAR	11	27	0105	N28	E06	11	27.5		B	BX	10	3	3	3
4897	24482	MWIL	11	22	1530	S24	E68	11	27.9	3	(AP)					
4897		HOLL	11	22	1920	S26	E68	11	28.1		A	AX	10	1	1	3
4897		LEAR	11	23	0035	S24	E64	11	28.0		A	AX	10	1	1	3
4897		SVTO	11	23	1025	S23	E56	11	27.7		A	AX	10	1	1	2
4897		RAMY	11	23	1355	S22	E54	11	27.7		A	AX	10	1	1	3
4897	24482	MWIL	11	23	1545	S23	E53	11	27.7	3	(AP)					
4897		PALE	11	23	1800	S22	E52	11	27.7		A	AX		1		4
4897		LEAR	11	24	0228	S23	E45	11	27.6		A	AX	10	1	1	4
4897		RAMY	11	25	1410	S22	E25	11	27.5		A	AX	10	1	1	1
4897		HOLL	11	25	1606	S23	E22	11	27.4		A	AX	10	2	1	3
4897		PALE	11	25	1806	S22	E24	11	27.6		B	BXO	10	2	1	3
4897		LEAR	11	26	0011	S22	E21	11	27.6		B	BXO	10	3	3	3
4897		CULG	11	26	0415	S21	E18	11	27.5		B	CRO	30	3	4	3
4897		HOLL	11	26	1556	S25	E12	11	27.6		B	CRO	40	4	5	3
4897		PALE	11	26	2020	S22	E10	11	27.6		B	CSO	20	5	6	2
4897		LEAR	11	27	0105	S22	E08	11	27.6		B	BX	10	5	4	3
4897		CULG	11	27	0440	S22	E07	11	27.7		B	BXO	30	3	5	2
4897		SVTO	11	27	0705	S22	E05	11	27.7		B	CRO	20	4	7	2
4897		HOLL	11	27	1648	S23	W06	11	27.2		B	BXO	10	2	3	3
4897		PALE	11	27	1916	S23	W04	11	27.5		A	AX		1		2
4897		LEAR	11	28	0022	S24	W08	11	27.4		A	AX	10	1	1	3
4897A		PALE	11	26	2020	N12	E22	11	28.5		B	BXO	10	2	3	2
4898		HOLL	11	28	1848	S23	E16	11	30.0		B	BXO	10	4	3	3
4898		LEAR	11	29	0029	S24	E14	11	30.1		B	BXO	10	4	3	3
4898		SVTO	11	29	0935	S24	E10	11	30.2		B	BXO	10	6	4	3

SUNSPOT GROUPS
(ORDERED BY CENTRAL MERIDIAN PASSAGE DATE)

NOVEMBER 1987

NOAA/ USAF Group	Mt Wilson Group	Sta	Observation Time Mo	Day	(UT)	Lat	CMD	CMP Mo	Day	Max H	Mag Class	Spot Class	Corrected Area (10^{-6} Hemi)	Spot Count	Long. Extent (Deg)	Qual
4898		HOLL	11	29	1600	S23	E05	11	30.0		A	AX	10	3	3	2
4898		SVTO	11	30	0840	S22	W03	11	30.1		B	BXO	10	3	2	3
4898		LEAR	11	30	0902	S22	W03	11	30.1		A	BX	10	2	2	3
4898	24483	MWIL	11	30	1445	S23	W07	11	30.1	4	(AP)					
4898		HOLL	11	30	1730	S22	W10	11	30.0		A	AX	10	2	1	2
4898		PALE	11	30	2010	S22	W10	11	30.1		A	AX	10	3	1	3
4898		LEAR	12	01	0006	S22	W12	11	30.1		B	BXO	10	2	3	3
4898		CULG	12	01	0450	S22	W13	11	30.2		B	CRO	20	3	3	1
4898		SVTO	12	01	0737	S22	W15	11	30.2		B	BXO	30	5	5	3
4898		RAMY	12	01	1347	S22	W19	11	30.1		B	CRO	30	4	6	4
4898		BOUL	12	01	1530	S22	W19	11	30.2		B	BXO	30	3	5	1
4898	24483	MWIL	12	01	1530	S22	W21	11	30.0	5	(B)					
4898		HOLL	12	01	1610	S21	W22	11	30.0		B	BXO	30	7	6	3
4898		PALE	12	01	1855	S23	W23	11	30.0		B	BXO	40	3	8	3
4898		LEAR	12	02	0001	S21	W25	11	30.1		B	DSO	30	6	6	3
4898		CULG	12	02	0440	S22	W28	11	30.0		B	CRO	40	6	7	1
4898		SVTO	12	02	1055	S22	W28	11	30.3		B	BXO	10	3	7	3
4898	24483	MWIL	12	02	1530	S22	W34	11	30.0	4	(B)					
4898		HOLL	12	02	1607	S20	W35	11	30.0		B	BXO	20	4	9	3
4898		PALE	12	02	1901	S22	W38	11	30.0		B	BXO	10	2	3	3
4898		LEAR	12	03	0000	S21	W40	11	30.0		B	CSO	40	4	3	3
4898		CULG	12	03	0500	S21	W45	11	29.8		A	AR	10	1	1	2
4898		SVTO	12	03	1215	S22	W49	11	29.8		A	AX	10	1	1	3
4898		HOLL	12	03	1509	S19	W50	11	29.9		A	AX	10	3	3	3
4898	24483	MWIL	12	03	1515	S21	W50	11	29.8	3	(AP)					
4898		PALE	12	03	1918	S21	W52	11	29.9		A	AX		1		2
4898		LEAR	12	04	0012	S23	W56	11	29.8		A	AX	10	1	1	3
4898		LEAR	12	06	0002	S22	W76	11	30.2		A	HR	50	2	3	3
4898		CULG	12	06	0445	S21	W81	11	30.0		A	AX	10	1	1	3
4898A		HOLL	11	27	1648	S32	E31	11	30.1		B	BXO	10	3	3	3
4898A		RAMY	11	27	1719	S30	E32	11	30.2		B	BXO	10	2	2	2
4898A		PALE	11	27	1916	S30	E30	11	30.2		B	BXO		2	3	2
4898A		LEAR	11	28	0022	S30	E24	11	29.9		A	AX	10	5	2	3
4898A		CULG	11	28	0430	S31	E23	11	30.0		A	AX	10	1		3
4898A		RAMY	11	29	1340	S33	E08	11	30.2		B	BXO	10	4	4	3
4898A		RAMY	11	30	1405	S33	W06	11	30.1		A	AX	10	1	1	4
4898A		LEAR	12	03	0000	S31	W35	11	30.2		A	AX	10	1	1	3
4898A	24486	MWIL	12	03	1515	S32	W43	11	30.2	3	(AF)					
4900		SVTO	11	30	0840	N24	W02	11	30.2		B	BXO	10	5	3	3
4900		LEAR	11	30	0902	N24	W02	11	30.2		B	BX	10	2	2	3
4900		RAMY	11	30	1405	N24	W05	11	30.2		B	BXO	10	3	3	4
4900	24484	MWIL	11	30	1445	N24	W06	11	30.2	3	(BP)					
4900		HOLL	11	30	1730	N24	W06	11	30.3		B	BXO	10	5	4	2
4900		LEAR	12	01	0006	N25	W09	11	30.3		A	AX	10	1	1	3
4900		LEAR	12	02	0001	N24	W21	11	30.4		A	AX	10	1	1	3

Stations reporting:

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

SUDDEN IONOSPHERIC DISTURBANCES

NOVEMBER 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
01	1355	1359	1435	2	1					1	No flare reported		
01	1718	1721	1745	1	3					4	1726EUT	C1.2	4881
01	1935	1938	200	1	1					1	1938 UT	C1.7	4882
02	1015	1021	1035	1-	3	1	1	1	1		1011 UT	C2.7	
02	1356	1403	1430	2	5	2	1		1	4	1355 UT	C7.0	4882
02	1805	1807	183	1-	1					1	1813 UT	C7.8	4882
03	0310	0314	0340	1-	1			1			No flare patrol		
03	0401	0407	0446	1-	1			1			0359 UT	C1.3	
03	0912	0924	1021	1-	3	1	1	1	1	1	0906 UT	C4.1	4875
04	1715	1723	1739	1+	3	1				7	1713 UT	M1.3	4875
04	2323	2333	0148	2+	3	2		1			2323 UT	M1.5	4875
05	0456	0507	0736	3	3	1		1		1	0456 UT	M3.1	4875
05	1004	1015	1052	1	3	1	1	1	1	2	0956 UT	C6.5	4883
05	2335	2343	0142	2+	3	1		1			2334 UT	M2.1	4875
06	2000	2016	2043	2	1					1	2005 UT		4884
06	2338	2340	2350	1+	1	1					No flare patrol		
07	1504	1520	1540	2	1	1					1500 UT		4886
10	0747	0756	0819	1-	1			1			No flare patrol		
11	0504	0510	0532	1-	1			1			0459 UT	C1.2	
12	1637	1640	1700	1	3					4	1641 UT	C1.2	4890
12	1748	1751	1800	1-	3					2	1750 UT	C1.4	4890
12	1856	1905	1915	1	1					1	1855 UT	C1.9	4890
13	0034	0038	0052	1-	1			1			0032 UT	C2.1	4890
13	0158	0205	0232	1-	1			1			0156 UT	C2.4	4890
13	1902	1913	1945	2	1					1	1903 UT	C1.7	4890
15	0515	0521	0535	1-	1			1		1	No flare patrol		
16	0031	0035	0108	1-	1			1			0026 UT	C1.1	4890
18	0318	0323	0456	2+	3	2		1			0318 UT	M1.0	4890
19	0112	0116	0148	1-	1			1			0110 UT	C2.4	4890
19	0415	0422	0457	1	3	1		1			0414 UT	C2.7	4891
19	0743	0752	1052	3	3			1	1	1	0741 UT	M1.1	4891
19	1618	1621	1633	1-	1					2	1618 UT		4890
20	0051	0057	0115	1-	1			1			0052 UT	C1.1	4890
20	0155	0201	0214	1-	1			1			0158 UT		4890
20	0313	0318	0333	1-	1			1			0313 UT		4891
20	0414	0432	0630	3	3	1		1			0412 UT	M1.3	4891
20	0428	0442	0530	2+	1					1	0425 UT		No data
20	2209	2217	2257	1-	1			1			2209 UT	C2.4	
20	2332	2345	0137	2+	1	2		1			2331 UT	M1.3	4891
21	1400	1407	1444	1	1		1				1357 UT		No data
21	1757	1802	1930	2	3	1				7	1756 UT	M3.5	4891
22	0240	0251	0340	1-	3	1		1			0242EUT	C2.2	4891
22	0526	0542	0610	1-	1			1			0521 UT	C2.0	4891
22	0716	0737	0752	1-	1			1			0715 UT	C1.2	4891

SUDDEN IONOSPHERIC DISTURBANCES

NOVEMBER 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
23	0720	0727	0742	1-	1			1			No flare reported		
26	0315	0324	0402	1	3			1		1	0311 UT	C3.3	4891
29	1612	1615	1700	2	1					1	1611 UT	C1.5	4895

OBSERVATORIES REPORTING FOR NOVEMBER

Amherst, New Hampshire, USA	SES	Kuhlungsborn, German Democratic Rep.	SPA, SEA
Darmstadt, German Federal Republic	SWF	Latrobe, Pennsylvania, USA	SES
Edenvale, Republic of South Africa	SES	Louisville, Kentucky, USA	SES
Farsta, Sweden	SES	Maui, Hawaii, USA	SWF
Hiraiso, Japan	SWF	Panska Ves, Czechoslovakia	SEA, SWF, SES
Houston, Texas, USA	SES	Sao Paulo, Brasil	SPA, SES
Huancayo, Peru	SWF	Somersworth, New Hampshire	SES
Inubo, Japan	SPA	Tavares, Florida, USA	SES
Juliusruh, German Democratic Rep.	SWF	Tucson, Arizona, USA	SES
Kandilli, Turkey	SEA	Valley Cottage, New York, USA	SES

*Observations are not necessarily continuous.

SIDs by NOAA/SESC REGIONS

NOVEMBER 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
Region No.	Number of events in active regions																													
4875			1	2	2																									
4881	1																													
4882	1	2																												
4883					1																									
4884						1																								
4886							1																							
4890												3	3			1		1		2	2									
4891																				2	3	1	3			1				
4895																													1	
	Number of events with X-ray flares																													
	2	3	2	2	3						1	3	3			1		1	3	4	1	3				1			1	
	Number of events with no flare reported																													
	1		1			1				1					1								1							
	Number of events with flare but no active region reported																													
																				1	1									
Totals	3	3	3	2	3	2	1			1	1	3	3		1	1		1	4	7	2	3	1			1			1	

NOVEMBER 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	0000	0027	CULG				0000.0	0022.0	1	0000.0	0022.0	1	IIIS
	0542	0716	CULG				0542.0	0716.0	1	0542.0	0716.0	1	IIIS
	0647	1540	WEIS										
			PALE				1937.0	1940.0	1				V
	2016	2400	CULG				2020.5	2117.0	1				IIIN, B
			LEAR				2250.0	2252.0	2				V
			PALE				2250.0	2252.0	1				V
			CULG				2250.5	2251.0	2	2250.5	2251.0	2	IIIB
			CULG				2251.0	2253.0	2	2251.0	2253.0	2	V
			LEAR				2339.0	2341.0	2				III
			PALE				2339.0	2340.0	1				III
			CULG				2340.0	2341.0	2	2340.0	2341.0		IIIG
			LEAR				2357.0	2358.0	1				III
02	0000	0715	CULG				0000.0	0715.5	1				IIIN, B
			LEAR				0003.0	0004.0	1				III
			LEAR				0031.0	0032.0	1				III
			LEAR				0107.0	0110.0	3				III
			PALE				0107.0	0109.0	1				V
			CULG				0108.5	0110.5	2	0108.5	0110.5	2	IIIV
			CULG				0109.0	0111.0	2				III
			LEAR				0111.0	0315.0	1				CONT
			LEAR				0229.0	0230.0	3				III
			PALE				0229.0	0229.0	2				III
			CULG				0229.5	0230.0	3			II	B
			CULG				0230.0	0230.0	3				III
			LEAR				0244.0	0251.0	2				S
			CULG				0244.5	0246.0	3	0246.5	0247.5	3	IIIB
			CULG				0251.0	0251.5	1	0251.0	0251.5	1	IIIG
			LEAR				0341.0	0341.0	1				III
			LEAR				0509.0	0510.0	2				III
			LEAR				0547.0	0547.0	1				III
			LEAR				0708.0	0708.0	1				III
			LEAR				0753.0	0753.0	2				III
			LEAR				0827.0	0829.0	2				III
			LEAR				0918.0	0920.0	2				III
	0649	1537	WEIS				0918.8	0919.9	2				IIIG
			WEIS				1125.6	1126.3	2				IIIG
			WEIS				1325.4	1325.6	2				IIIB
			SGMR				1355.5	1401.3	3				IIIGG/V
			SVTO				1356.0	1357.0	2				V
			WEIS				1356.0	1357.0	2				V
			PALE				1444.2	1444.3	2				IIIG
			PALE				1810.0	1813.0	3				V
			SGMR				1811.0	1814.0	3				V
	2015	2400	CULG				1811.0	1813.0	3				V
			SGMR				2015.5	2400.0	1				IIIN,B
			PALE				2022.0	2022.0	1				V
			CULG				2023.0	2024.0	1				V
			LEAR				2024.0	2026.0	2	2024.0	2026.0	2	IIIG
			PALE				2310.0	2317.0	2				S
			CULG				2310.0	2317.0	1				III
			CULG				2311.0	2312.0	1				III
			PALE				2313.0	2315.0	1				III
							2339.0	2340.0	1				III
03	0000	0715	CULG				0000.0	0715.5	1				IIIN,B
			LEAR				0029.0	0035.0	3				III
			PALE				0029.0	0034.0	2				V
			CULG				0030.0	0031.5	2	0030.0	0031.5	2	IIIV
			CULG				0034.0	0036.5	2	0034.0	0036.5	2	IIIG
			PALE				0056.0	0056.0	1				III
			CULG				0156.0	0156.0	1	0156.0	0156.0	1	IIIB
			LEAR				0156.0	0159.0	2				III
			PALE				0216.0	0218.0	1				III
			CULG				0217.0	0219.0	3	0217.0	0219.0	3	IIIG
			CULG				0513.0	0514.5	1				I
			LEAR				0535.0	0536.0	1				III
			CULG				0535.5	0537.0	1				IIIG
			LEAR				0604.0	0604.0	2				III

SOLAR RADIO EMISSION--SPECTRAL OBSERVATIONS

NOVEMBER 1987

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
03		LEAR				0646.0	0646.0	1				III
		CULG				0651.5	0653.0	1				IIIG
		LEAR				0758.0	0758.0	1				III
		LEAR				0818.0	0819.0	2				III
		SVTO				0825.0	0825.0	2				III
		LEAR				0826.0	0826.0	2				III
		SVTO				0829.0	0829.0	2				III
		LEAR				0835.0	0835.0	1				III
		SGMR				1310.0	1310.0	1				V
	1337	1527 WEIS				1356.2	1356.4	1				IIIG
		SGMR				1407.0	2112.0	1				CONT
		WEIS				1407.1	1408.1	1				IIIG
		WEIS				1411.2	1411.8	2				IIIG
		WEIS				1420.3	1420.7	2				IIIB
		WEIS				1520.8	1523.1	3				IIIG
		WEIS				1526.3	1526.5	1				IIIG
	2015	2400 CULG				2032.5	2204.0	1	2034.5	2204.0	1	IIIN,B
		CULG							2033.0	2034.0	2	V
		PALE				2056.0	2057.0	2				III
		CULG				2058.0	2058.0	2	2058.0	2058.0	2	IIIB
		LEAR				2203.0	2208.0	2				V
		PALE				2203.0	2212.0	2				CONT
		CULG				2204.0	2207.0	3				V
		CULG				2204.0	2207.0	3	2204.0	2207.0	3	IIIG,V
		CULG				2208.5	2212.0	1	2208.5	2212.0	1	IIIG
		CULG				2216.0	2216.5	1	2216.0	2216.5	1	III
		LEAR							2335.0	2354.0	1	S
		CULG				2335.5	2344.5	1	2335.5	2345.5	1	IIIG
		CULG				2342.5	2343.0	2	2342.5	2343.0	2	IIIV
		LEAR				2351.0	2356.0	3				III
		PALE				2351.0	2352.0	2				V
04		LEAR				0040.0	0041.0	1				III
		PALE				0213.0	0217.0	1				V
		LEAR				0214.0	0219.0	3				V
	0000	0715 CULG				0214.5	0217.5	3	0214.5	0217.5	3	IIIG
		CULG							0217.0	0219.5	3	V
		LEAR				0236.0	0236.0	2				III
		CULG				0237.0	0237.0	2	0237.0	0237.5	2	IIIB
		CULG				0350.5	0353.0	1				IIIG
		CULG				0356.5	0715.5	1				IIIN,B
		CULG				0534.5	0538.0	3				IIIG
		LEAR				0535.0	0537.0	2				III
		CULG				0539.5	0554.0	1	0540.0	0554.0	1	IIIGG
		LEAR				0541.0	0543.0	1				III
		LEAR				0548.0	0552.0	2				III
		SVTO				0628.0	0628.0	2				III
		LEAR				0742.0	0742.0	2				III
	0652	1536 WEIS				0742.1	0742.4	1				IIIG
		WEIS				0759.9	0801.3	1				IIIG
		LEAR				0800.0	0801.0	2				III
		LEAR				0835.0	0835.0	1				III
		WEIS				0939.7	0945.6	3				IIIGG
		LEAR				0941.0	0943.0	2				III
		WEIS				1010.4	1011.1	2				IIIG
		WEIS				1143.5	1151.4	3				IIIGG/b
		WEIS				1204.7	1205.1	1				IIIG
		WEIS				1303.2	1304.9	3				IIIG
		WEIS				1315.1	1315.4	1				IIIG
		WEIS				1342.8	1342.9	1				IIIB
		WEIS				1350.2	1350.4	1				IIIG
		WEIS				1353.6	1353.7	2				IIIB
		WEIS				1355.4	1357.3	3				IIIGG/b
		WEIS				1359.2	1359.4	1				IIIG
		WEIS				1410.5	1410.9	1				IIIG
		WEIS				1444.8	1445.7	2				IIIG
		WEIS				1449.4	1457.0	2				IIIGG
		WEIS				1500.8	1501.1	2				IIIG
		WEIS				1514.9	1516.4	1				IIIG
		PALE				1703.0	1703.0	1				III

SOLAR RADIO EMISSION--SPECTRAL OBSERVATIONS

NOVEMBER 1987

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
04		PALE				1712.0	1714.0	2				II
		PALE				1837.0	1837.0	1				III
		PALE				1946.0	1947.0	2				V
		PALE				1950.0	1950.0	1				III
		PALE				2000.0	2000.0	1				III
		PALE				2019.0	2027.0	1				III
	2015	2400 CULG				2021.0	2021.5	1				IIIG
		CULG				2027.0	2027.5	1	2027.0	2027.5	1	IIIG
		PALE				2052.0	2052.0	1				III
		PALE				2136.0	2136.0	1				III
		CULG				2137.0	2320.0	1				I S
		LEAR				2233.0	2234.0	2				III
		PALE				2233.0	2233.0	2				III
		CULG				2234.0	2238.0	2	2234.0	2238.0	2	IIIG
		CULG				2242.0	2242.5	1	2242.0	2242.5	1	IIIG
		LEAR				2257.0	2257.0	2				III
		PALE				2257.0	2257.0	2				III
		CULG				2258.0	2258.5	1	2258.0	2258.5	1	IIIG
		LEAR				2321.0	2326.0	3				III
		PALE				2321.0	2326.0	3				III
		CULG				2322.0	2327.0	3	2323.0	2327.0	3	IIIGG
		CULG				2324.0	2328.0	3	2325.0	2329.0	3	V B
		LEAR				2331.0	2341.0	2				II
		CULG				2332.0	2340.0	3				II
	2015	2400 CULG				2332.0	2340.0	3	2335.0	2340.0	3	II H
		PALE				2332.0	2337.0	2				II
		LEAR				2345.0	2346.0	2				III
		CULG				2346.0	2347.5	1	2346.0	2347.5	1	IIIGG
05		LEAR				0046.0	0047.0	1				III
	0000	0715 CULG				0047.0	0439.0	1	0047.0	0434.0	1	IIIG,N
		LEAR				0346.0	0347.0	2				III
		LEAR				0357.0	0400.0	2				V
		LEAR				0418.0	0425.0	2				III
		LEAR				0432.0	0433.0	1				III
		CULG				0440.0	0555.0	1				I S
		LEAR				0455.0	0503.0	3				V
		CULG				0457.0	0501.0	3	0457.0	0501.0	3	V B
		CULG				0500.0	0529.0	3	0508.0	0529.0	3	II B
		LEAR				0502.0	0517.0	3				II
		LEAR				0502.0	0528.0	3				II
		LEAR				0748.0	0750.0	1				III
	0654	1533 WEIS				0748.3	0748.9	1				IIIG
		WEIS				0752.4	0752.5	1				IIIB
		WEIS				0820.1	0820.2	1				IIIB
		LEAR				0849.0	0849.0	2				III
		SVTO				0849.0	0849.0	2				III
		WEIS				0849.3	0849.7	3				IIIG
		LEAR				0858.0	0858.0	2				III
		WEIS				0858.3	0858.4	1				IIIG
		WEIS				1117.2	1120.8	3				IIIGG
		WEIS				1336.9	1340.4	3				IIIGG
		SVTO				1337.0	1340.0	2				V
		WEIS				1448.4	1449.6	3				IIIG
		PALE				1630.0	1631.0	2				III
		PALE				1813.0	1813.0	1				III
		PALE				1918.0	1918.0	1				III
	2015	2400 CULG				2137.0	2137.5	1				IIIB
		CULG				2157.0	2203.0	1	2157.0	2203.0	1	IIIG
		CULG				2258.0	2259.0	1	2258.0	2259.0	1	IIIG
		CULG				2324.0	2337.0	3	2324.0	2337.0	3	IIIGG
		LEAR				2324.0	2327.0	3				III
		PALE				2324.0	2330.0	2				V
		LEAR				2330.0	2330.0	2				III
		LEAR				2332.0	2338.0	3				V
		PALE				2332.0	2338.0	3				V
		CULG				2337.0	2358.0	3	2347.0	2358.0	3	II B
		LEAR				2339.0	2358.0	2				II
		CULG				2340.0	2358.0	3				II
		PALE				2341.0	0001.0	2				II

SOLAR RADIO EMISSION--SPECTRAL OBSERVATIONS

NOVEMBER 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
06	0000	0715	CULG				0107.5	0108.0	1				IIIB
			LEAR				0309.0	0312.0	1				III
			CULG				0309.5	0314.0	1	0309.5	0314.0	1	IIIG
			CULG				0423.0	0630.0	1	0423.0	0630.0	1	IIIN
			LEAR				0423.0	0423.0	2				III
			LEAR				0545.0	0546.0	1				III
			LEAR				0603.0	0603.0	1				III
			LEAR				0620.0	0620.0	1				III
			LEAR				0629.0	0629.0	2				III
	0657	0728	WEIS										
			LEAR				0744.0	0744.0	2				III
	0756	1522	WEIS										
			PALE				1946.0	1946.0	1				V
			PALE				2008.0	2024.0	1				II
	2015	2400	CULG				2015.0	2026.0	3	2016.0	2036.0	3	II B
			CULG				2036.0	2042.0	1	2036.0	2042.0	1	IIIG
			CULG				2104.0	2104.5	1	2116.0	2116.5	1	IIIB
			PALE				2341.0		2				II
			PALE				2341.0	0001.0	2				II
07	0000	0715	CULG										
	0657	1237	WEIS										
	1347	1531	WEIS										
			PALE				2002.0	2021.0	2				IV
			PALE				2023.0	2046.0	1				S
			PALE				2105.0	2105.0	1				III
	2016	2400	CULG				2116.0	2021.0	2	2116.0	2021.0	2	II B
			CULG				2117.0	2118.0	1	2117.0	2118.0	1	IIIB
			CULG				2323.0	2323.0	1	2323.0	2323.0	1	IIIB
08	0000	0716	CULG										
	0659	1528	WEIS										
			PALE				1838.0	1839.0	1				III
	2016	2400	CULG										
09	0000	0716	CULG										
	0703	1528	WEIS				1112.7	1112.9	1				IIIB
	2016	2400	CULG										
10			LEAR				0109.0	0110.0	2				III
	0000	0716	CULG				0145.0	0145.0	2	0145.0	0145.0	2	IIIB
			LEAR				0215.0	0215.0	2				III
			PALE				0215.0	0215.0	1				III
	0702	1029	WEIS										
	1036	1526	WEIS										
	2016	2400	CULG										
11	0000	0716	CULG				0245.0	0245.0	1	0245.0	0245.0	1	IIIB
			LEAR				0246.0	0246.0	1				III
	0704	1525	WEIS										
	0704	1525	WEIS				1040.7	1041.0	1				IIIG
			PALE				1939.0	1940.0	1				III
	2016	2400	CULG				2111.5	2112.0	1	2111.5	2112.0	1	IIIB
			CULG				2152.0	2157.0	2	2152.0	2157.0	2	IIIGG
			LEAR				2152.0	2153.0	1				III
			PALE				2152.0	2154.0	1				III
			LEAR				2325.0	2325.0	1				III
			CULG				2326.0	2326.5	1				IIIB
12	0000	0716	CULG				0041.0	0044.0	1	0041.0	0044.0	1	IIIB
			LEAR				0045.0	0046.0	2				III
			CULG				0104.0	0105.0	1	0104.0	0105.0	1	IIIB
			LEAR				0222.0	0224.0	2				III
			CULG				0223.0	0225.0	1	0223.0	0225.0	1	IIIG
			LEAR				0310.0	0312.0	2				III
			CULG				0311.0	0327.0	1	0311.0	0327.0	1	IIIB,N
			LEAR				0316.0	0317.0	1				III
			LEAR				0327.0	0327.0	2				III
			CULG				0427.0	0429.0	2	0427.0	0429.0	2	IIIG
			LEAR				0427.0	0429.0	3				V

NOVEMBER 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
12			CULG				0428.0	0430.0	2	0428.0	0430.0	2	V
			SVTO				0640.0		2				V
	0708	1357	WEIS										
	1405	1524	WEIS										
			PALE				1938.0	1943.0	1				III
			PALE				2001.0	2001.0	1				III
	2016	2400	CULG				2034.0	2034.0	1	2034.0	2034.5	1	IIIB
			CULG				2223.5	2224.0	1	2223.5	2224.0	1	IIIG
	2016	2400	CULG				2256.0	2257.0	1	2256.0	2257.0	1	IIIG
			LEAR				2256.0	2257.0	2				III
			PALE				2256.0	2256.0	1				III
			CULG				2312.0	2312.5	1	2312.0	2312.5	1	IIIB
			CULG				2342.5	2342.5	1	2342.5	2343.0	1	IIIB
13			LEAR				0122.0	0125.0	1				III
			LEAR				0207.0	0207.0	1				III
			LEAR				0300.0	0301.0	1				III
			CULG				0604.0	0605.0	2				III
			LEAR				0604.0	0605.0	2				III
	0000	0716	CULG				0604.5	0605.5	2	0604.5	0605.5	2	IIIB
			CULG				0652.0	0652.5	1				IIIB
	0707	1522	WEIS				1443.7	1444.1	1				IIIB
			PALE				1820.0	1827.0	2				III
			PALE				1843.0	1844.0	2				III
			PALE				1855.0	1855.0	1				III
	2016	2400	CULG				2016.0	2400.0	1	2016.0	2400.0	1	IIIB,N
14	0000	0716	CULG				0000.0	0716.0	1	0000.0	0716.0	1	IIIS
			LEAR				0058.0	0059.0	1				III
			LEAR				0142.0	0143.0	1				III
			LEAR				0249.0	0250.0	1				III
			LEAR				0315.0	0315.0	1				III
			CULG				0610.0	0611.0	1				III
			LEAR				0610.0	0610.0	2				III
			CULG				0610.5	0611.0	1	0610.5	0611.0	1	IIIB
			LEAR				0653.0	0659.0	1				III
			LEAR				0906.0	0906.0	1				III
			LEAR				0935.0	0935.0	1				III
	0709	1520	WEIS				0935.0	0935.4	1				IIIB
			PALE				1839.0	1842.0	2				V
			PALE				2006.0	2008.0	2				V
	2016	2400	CULG				2016.0	2400.0	1	2016.0	2400.0	1	IIIS
			CULG				2150.0	2153.0	1	2150.0	2153.0	1	IIIG
			PALE				2150.0	2152.0	1				III
15	0000	0716	CULG				0000.0	0716.0	1	0000.0	0716.0	1	IIIS
			LEAR				0632.0	0632.0	1				III
	0713	1520	WEIS				1106.7	1107.7	3				IIIG
			PALE				2014.0	2015.0	1				III
	2016	2400	CULG				2016.0	2400.0	1	2016.0	2400.0	1	IIIS
16	0000	0717	CULG				0000.0	0717.0	1	0000.0	0717.0	1	IIIGG
			LEAR				0051.0	0051.0	1				III
			LEAR				0124.0	0125.0	2				III
			PALE				0124.0	0125.0	1				III
			LEAR				0316.0	0317.0	2				III
			LEAR				0401.0	0402.0	1				III
			LEAR				0554.0	0554.0	2				III
	0712	1519	WEIS				1218.7	1218.8	1				IIIB
			PALE				1833.0	1834.0	2				III
			PALE				1841.0	1848.0	1				III
			PALE				1903.0	1904.0	2				III
			PALE				1924.0	1927.0	1				III
			PALE				1949.0	1949.0	1				III
	2017	2400	CULG				2017.0	2400.0	2	2017.0	2400.0	2	IIIS
			PALE				2026.0	2026.0	1				III
			LEAR				2245.0	0915.0	1				CONT
			LEAR				2329.0	2331.0	3				III
			PALE				2329.0	2331.0	2				III

SOLAR RADIO EMISSION--SPECTRAL OBSERVATIONS

NOVEMBER 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
17	0000	0717	CULG				0000.0	0717.0	2	0000.0	0717.0	2	IIIS
			PALE				0036.0	0037.0	2				III
			LEAR				0037.0	0038.0	3				III
			LEAR				0109.0	0110.0	3				III
			PALE				0109.0	0110.0	2				III
			PALE				0304.0	0304.0	2				III
			LEAR				0607.0	0610.0	3				III
			SVTO				0607.0	0608.0	2				V
			WEIS				0711.7	0711.9	2				IIIG
			LEAR				0806.0	0811.0	3				III
			SVTO				0806.0	0806.0	2				V
	0714	0940	WEIS				0806.0	0806.4	3				IIIG
			WEIS				0821.1	0822.0	2				IIIG
	1017	1517	WEIS				1030.2	1030.3	2				IIIB
			WEIS				1107.2	1107.3	2				IIIB
			WEIS				1109.9	1110.3	2				IIIG
			WEIS				1120.1	1120.2	2				IIIB
			WEIS				1344.9	1345.1	2				IIIB
			WEIS				1432.2	1432.6	1				IIIG
			WEIS				1451.7	1451.9	2				IIIG
			PALE				1728.0	1728.0	1				III
			PALE				1826.0	1827.0	1				III
			PALE				1852.0	1852.0	1				III
			PALE				1902.0	1902.0	1				III
			PALE				2003.0	2003.0	1				III
			PALE				2014.0	2014.0	1				III
	2017	2400	CULG				2017.0	2400.0	2	2017.0	2400.0	2	IIIGG
			LEAR				2243.0	2243.0	1				III
			LEAR				2255.0	2256.0	2				III
			PALE				2329.0	2331.0	2				III
			LEAR				2337.0	2337.0	2				III
			PALE				2337.0	2337.0	1				III
			LEAR				2345.0	2345.0	1				III
			LEAR				2350.0	2351.0	2				III
			PALE				2350.0	2351.0	1				III
18			LEAR				0016.0	0017.0	2				III
			LEAR				0030.0	0400.0	1				CONT
			LEAR				0037.0	0043.0	3				III
			LEAR				0127.0	0129.0	3				III
			LEAR				0156.0	0158.0	3				III
			PALE				0158.0	0251.0	1				S
			LEAR				0218.0	0220.0	3				III
			LEAR				0235.0	0236.0	3				III
			LEAR				0251.0	0251.0	3				III
			LEAR				0315.0	0321.0	3				III
			PALE				0316.0	0319.0	2				V
			CULG				0324.0	0330.0	1				II
	0000	0707	CULG						1	0324.0	0330.0	1	II B
			LEAR				0324.0	0328.0	2				II
			LEAR				0348.0	0356.0	2				III
			LEAR				0426.0	0437.0	2				III
			LEAR				0522.0	0536.0	2				III
			LEAR				0615.0	0615.0	2				III
			LEAR				0637.0	0637.0	3				III
			LEAR				0702.0	0707.0	2				III
			LEAR				0717.0	0726.0	2				III
			LEAR				0728.0	0739.0	3				III
	0718	1716	WEIS				0728.1	0728.6	1				IIIG
			SVTO				0738.0	0738.0	3				III
			WEIS				0738.6	0738.8	2				IIIG
			LEAR				0802.0	0802.0	2				III
			LEAR				0822.0	0822.0	2				III
			WEIS				0824.8	0825.0	2				IIIB
			LEAR				0834.0	0835.0	2				III
			SVTO				0834.0	0835.0	3				III
			LEAR				0855.0	0856.0	2				III
			WEIS				0855.6	0856.0	2				IIIG
			WEIS				0953.2	0953.6	1				IIIG
			WEIS				0959.3	0959.6	3				IIIG/RS

NOVEMBER 1987

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
18		WEIS				1008.3	1008.5	2				IIIG
		WEIS				1049.0	1049.3	3				IIIG
		WEIS				1054.5	1054.7	2				IIIG
		WEIS				1137.7	1139.2	3				IIIG
		SVTO				1207.0	1209.0	3				V
		WEIS				1207.1	1211.2	3				IIIGG
		WEIS				1215.7	1216.0	3				IIIB
		WEIS				1218.7	1219.7	3				IIIG
		WEIS				1248.7	1250.3	3				IIIG
		WEIS				1325.2	1331.8	3				IIIGG/b
		SVTO				1326.0	1331.0	3				III
		WEIS				1352.4	1352.6	1				IIIB
		WEIS				1419.9	1420.3	2				IIIG
		WEIS				1429.3	1430.7	3				IIIG
		WEIS				1441.4	1442.1	3				IIIG
		PALE				1710.0	1711.0	1				III
		PALE				1727.0	1730.0	2				V
		PALE				1749.0	1749.0	1				III
		PALE				1806.0	1809.0	1				III
		PALE				1826.0	1826.0	1				III
		PALE				1936.0	1941.0	3				V
		PALE				2012.0	2018.0	1				V
	2017	CULG				2017.0	2400.0	2	2017.0	2400.0	2	IIIGG
		PALE				2116.0	2128.0	1				III
		PALE				2200.0	2213.0	1				S
		LEAR				2204.0	2213.0	2				III
		LEAR				2224.0	2229.0	3				III
		PALE				2224.0	2240.0	3				S
		LEAR				2237.0	2240.0	2				III
		LEAR				2306.0	2308.0	1				III
		LEAR				2330.0	2333.0	3				III
		PALE				2332.0	2332.0	3				V
19	0000 0717	CULG				0000.0	0717.0	3	0000.0	0717.0	3	IIIGG
		LEAR				0027.0	0031.0	2				III
		PALE				0046.0	0050.0	1				S
		LEAR				0047.0	0052.0	3				III
		LEAR				0100.0	0135.0	3				S
		PALE				0106.0	0121.0	3				CONT
		PALE				0133.0	0134.0	3				V
		PALE				0215.0	0216.0	2				V
		LEAR				0217.0	0221.0	3				III
		LEAR				0300.0	0301.0	2				III
		LEAR							0329.0	0330.0	1	III
		LEAR				0352.0	0352.0	2				III
		LEAR				0412.0	0423.0	2				III
		LEAR				0438.0	0438.0	2				III
		LEAR				0458.0	0501.0	1				III
		LEAR				0514.0	0515.0	2				III
		LEAR				0526.0	0526.0	1				III
		LEAR				0558.0	0559.0	1				III
		LEAR				0642.0	0644.0	2				III
		SVTO				0642.0	0643.0	3				III
		LEAR				0650.0	0651.0	2				III
		SVTO				0651.0	0651.0	3				III
		LEAR				0735.0	0735.0	1				III
		SVTO				0735.0	0735.0	3				III
		LEAR				0743.0	0843.0	2				S
		LEAR				0934.0	0934.0	2				III
	0717	WEIS				1115.4	1116.1	3				IIIG
	1439 1515	WEIS				1453.8	1453.9	1				IIIB
		PALE				1727.0	1728.0	1				III
		PALE				1750.0	1751.0	1				III
		PALE				2155.0	2156.0	1				III
	2018 2400	CULG				2324.0	2335.0	2	2324.0	2335.0	2	IIIG
		LEAR				2333.0	2335.0	2				III
20	0000 0718	CULG				0415.0	0423.0	1				II B
		CULG				0417.0	0445.0	1				IV B
		CULG				0418.0	0422.0	2	0418.0	0422.0	2	IIIG

SOLAR RADIO EMISSION--SPECTRAL OBSERVATIONS

NOVEMBER 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
20			LEAR				0418.0	0421.0	3				III
			LEAR				0421.0	0708.0	2				IV
	0719	1512	WEIS				1331.5	1332.4	1				RS
			WEIS				1342.1	1342.3	1				IIIB
			WEIS				1355.2	1355.3	1				IIIB
	2018	2400	CULG				2234.0	2237.0	1				II
			CULG				2329.0	2337.0	1				IIIGG
			LEAR				2331.0	2335.0	1				III
			CULG				2341.0	2347.0	3	2341.0	2346.0	3	IIIGG
			CULG				2341.0	2347.0	3	2341.0	2347.0	3	II
			LEAR				2341.0	2346.0	3				III
			LEAR				2341.0	2349.0	3				II
			PALE				2341.0	2346.0	3				II
			LEAR				2346.0	0341.0	1				IV
			CULG				2347.0	2351.0	1				I
			CULG				2358.0	2400.0	1				IV
21	0000	0718	CULG				0000.0	0004.0	1				IV
			CULG				0005.0	0006.0	2	0005.0	0006.0	2	IIIG
			CULG				0005.0	0008.0	2	0005.0	0008.0	2	V
			LEAR				0006.0	0014.0	2				II
			CULG				0008.0	0015.5	1				II
	0723	1513	WEIS										IV
			PALE				1806.0	1819.0	3				II
			PALE				1807.0	1816.0	3				CONT
			PALE				1834.0	2151.0	1				IIIS
			CULG				2018.0	2240.0	1	2018.0	2240.0	1	IV
	2018	2400	CULG				2018.0	2045.0		2018.0	2045.0	1	IIIG
			CULG				2308.0	2308.5	1	2308.0	2308.5	1	III
			LEAR				2331.0	2335.0	1				III
			LEAR				2341.0		3				
22	0000	0718	CULG										
	0722	1512	WEIS										
	2018	2400	CULG				2337.0	2400.0	1	2337.0	2400.0	1	IIIGG
			LEAR				2338.0	1031.0	1				CONT
23	0000	0718	CULG				0000.0	0718.0	1	0000.0	0718.0	1	IIIGG
	0724	1509	WEIS										
	2018	2400	CULG				2025.0	2025.0	1	2025.0	2025.0	1	IIIB
24	0000	0719	CULG										
	0728	1143	WEIS										
	1209	1510	WEIS										
	2019	2400	CULG										
25	0000	0719	CULG				0352.5	0353.0	2	0352.5	0353.0	2	IIIB
			LEAR				0353.0	0353.0	2				III
			CULG				0412.0	0412.5	1	0412.0	0412.5	1	IIIB
			LEAR				0412.0	0412.0	1				III
	0727	1510	WEIS										
	2019	2400	CULG										
26			LEAR				0059.0	0059.0	3				III
			PALE				0059.0	0059.0	1				V
			LEAR				0153.0	0154.0	1				III
			LEAR				0240.0	0240.0	1				III
			LEAR				0300.0	0301.0	2				III
			LEAR				0415.0	0418.0	2				III
	0000	0719	CULG				0415.5	0415.5	1	0415.5	0416.0	1	IIIB
			CULG				0419.0	0419.0	1	0419.0	0419.5	1	IIIB
			LEAR				0503.0	0503.0	1				III
			CULG				0514.0	0514.0	1	0514.0	0514.5	1	IIIB
			LEAR				0559.0	0600.0	2				III
			LEAR				0718.0	0720.0	2				III
			CULG				0719.0	0719.0	1				
	0728	1510	WEIS										
			LEAR				0846.0	0847.0	1				III
	2019	2400	CULG										

SOLAR RADIO EMISSION--SPECTRAL OBSERVATIONS

NOVEMBER 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
27	0000	0719	CULG										
			LEAR				0155.0	0156.0	1				III
			LEAR				0250.0	0251.0	1				III
			LEAR				0444.0	0445.0	1				III
	0732	0913	WEIS										
	0919	1507	WEIS										
	2020	2400	CULG										
28	0000	0719	CULG										
	0731	1507	WEIS										
	2019	2400	CULG										
29	0000	0719	CULG										
	0733	1506	WEIS										
	2019	2400	CULG										
30	0000	0719	CULG										
	0736	1506	WEIS										
	2019	2400	CULG										

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 bursts
C = Underlying continuum (particularly with Type I)
S = Storm in the sense of intermittent but apparently connected activity
N = Intermittent activity in this period
U = U-shaped burst of Type III

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

Stations Reporting:

CULG = Culgoora
LEAR = Learmonth
PALE = Palehua
SGMR = Sagamore Hill
SVTO = San Vito
WEIS = Weissenau

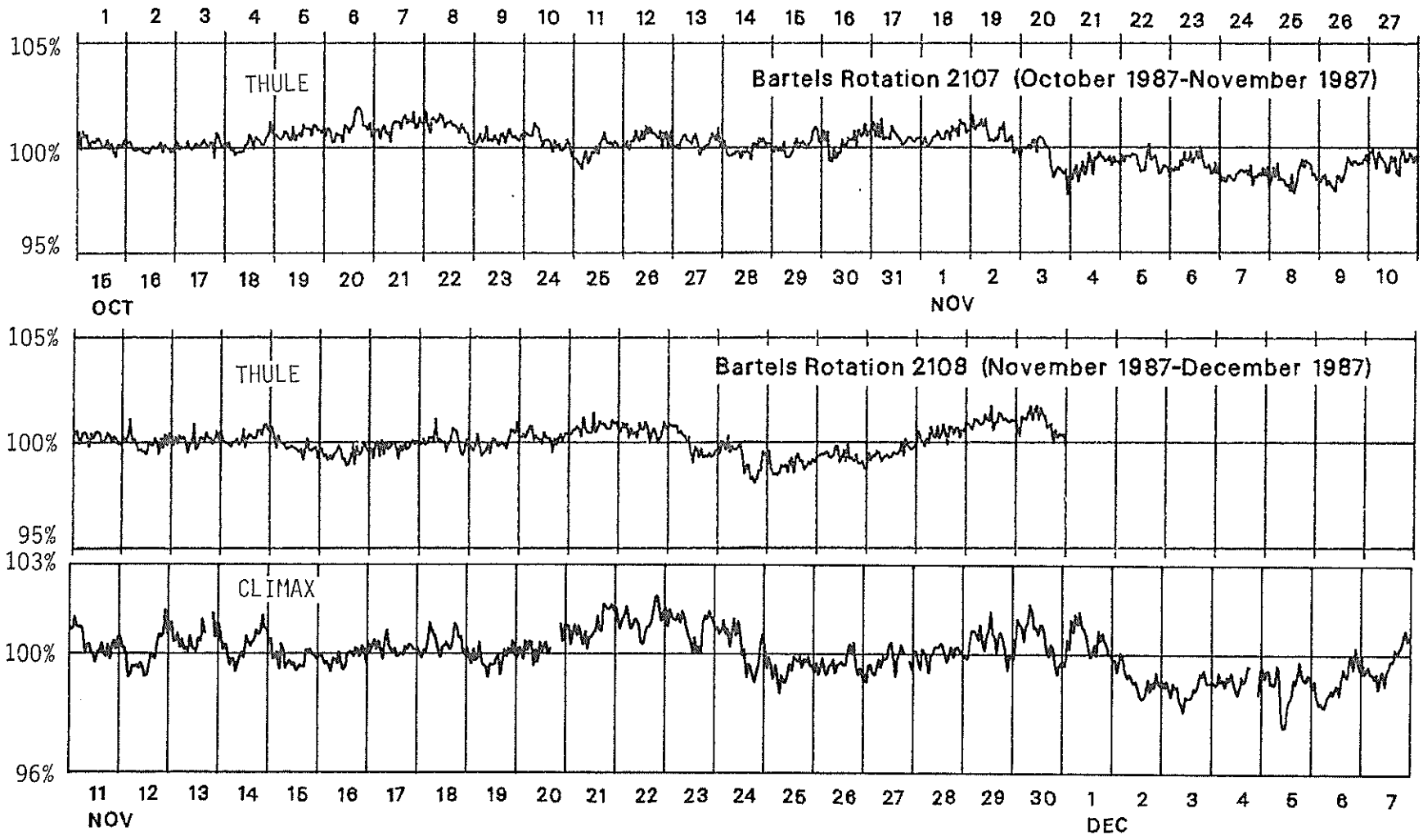
COSMIC RAY INDICES
(Neutron Monitor)

NOVEMBER 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
01	4440			6203.2	4095.4		3642.1	
02	4438			6207.3	4120.3		3630.9	
03	4392			6129.7	4047.0		3610.2	
04	4377			6090.2	4012.7		3607.7	
05	4381			6099.7	4023.1		3625.1	
06	4379			6111.6	4044.6		3633.7	
07	4353			6110.8	4017.4		3609.6	
08	4354			6110.1	4021.8		3609.3	
09	4360			6118.5	4001.8		3599.2	
10	4385			6157.8	4037.1		3615.7	
11	4375			6156.0	4030.3		3619.4	
12	4366			6148.4	4014.5		3612.0	
13	4372			6161.1	4037.7		3617.6	
14	4377			6133.0	4028.6		3617.4	
15	4357			6097.0	4010.2		3618.2	
16	4342			6094.2	4010.1		---	
17	4357			6098.8	4023.6		---	
18	4369			6105.4	4029.7		3631.0	
19	4366			6112.5	4010.1		3636.7	
20	4377			6163.8	4024.8		3638.0	
21	4397			6165.9	4052.8		3633.3	
22	4390			6182.7	4061.6		3641.5	
23	4362			6162.9	4053.5		3636.9	
24	4334			6124.9	4028.2		3630.2	
25	4320			6078.9	3997.8		3610.1	
26	4337			6106.1	4001.7		3615.7	
27	4346			6093.7	4005.0		3611.5	
28	4385			6101.8	4016.7		3619.3	
29	4411			6132.9	4032.1		3627.5	
30	4405			6154.0	4037.7		3630.0	
Mean	4373			6130.4	4030.5		3622.5	

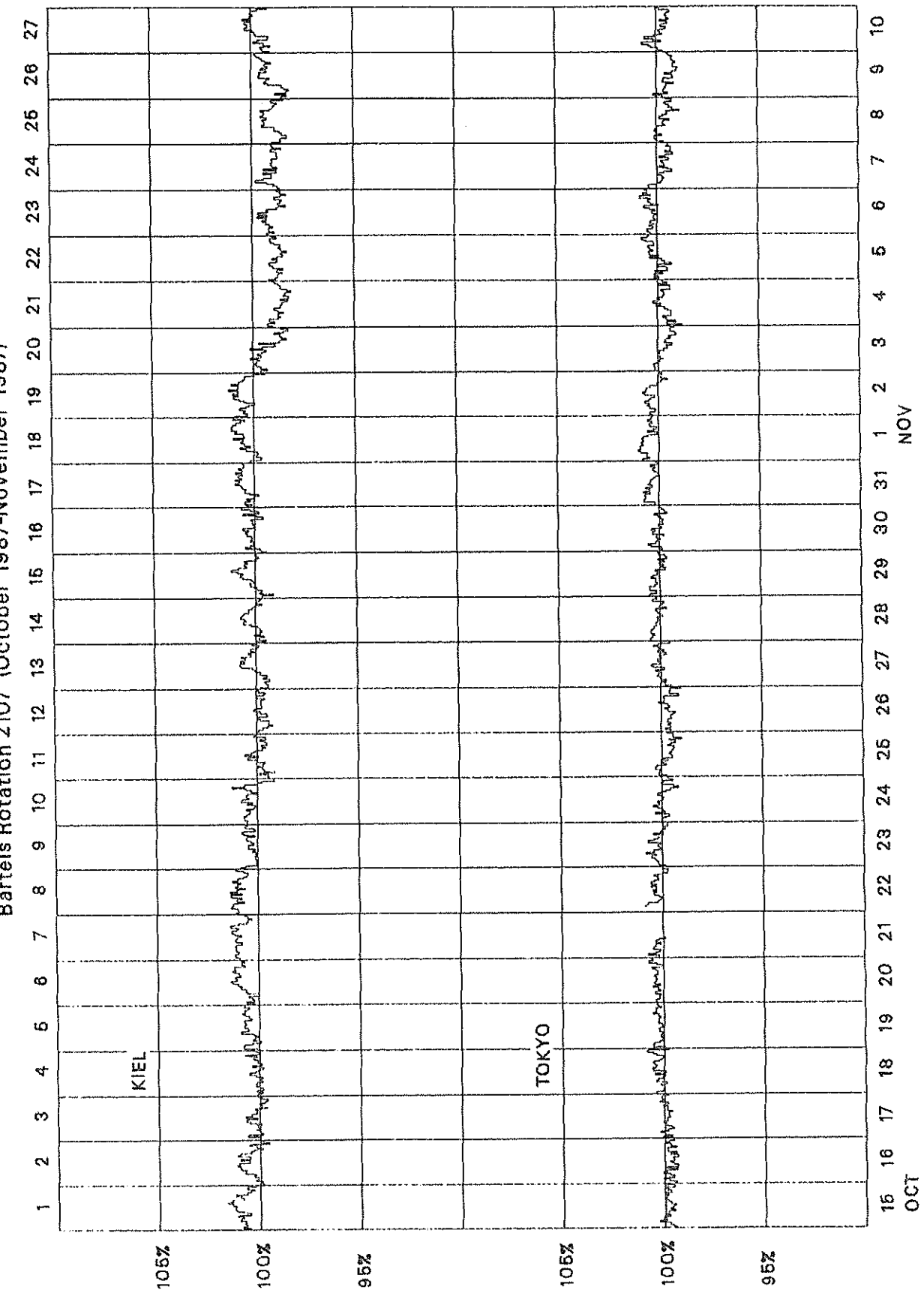
For less than 24-hour coverage, parentheses enclose the number of hours for which data are available.
For Climax and Huancayo, parentheses enclose the number of section hours whenever the sum of both sections falls below 40 hours

COSMIC RAY INDICES
(Neutron Monitor)



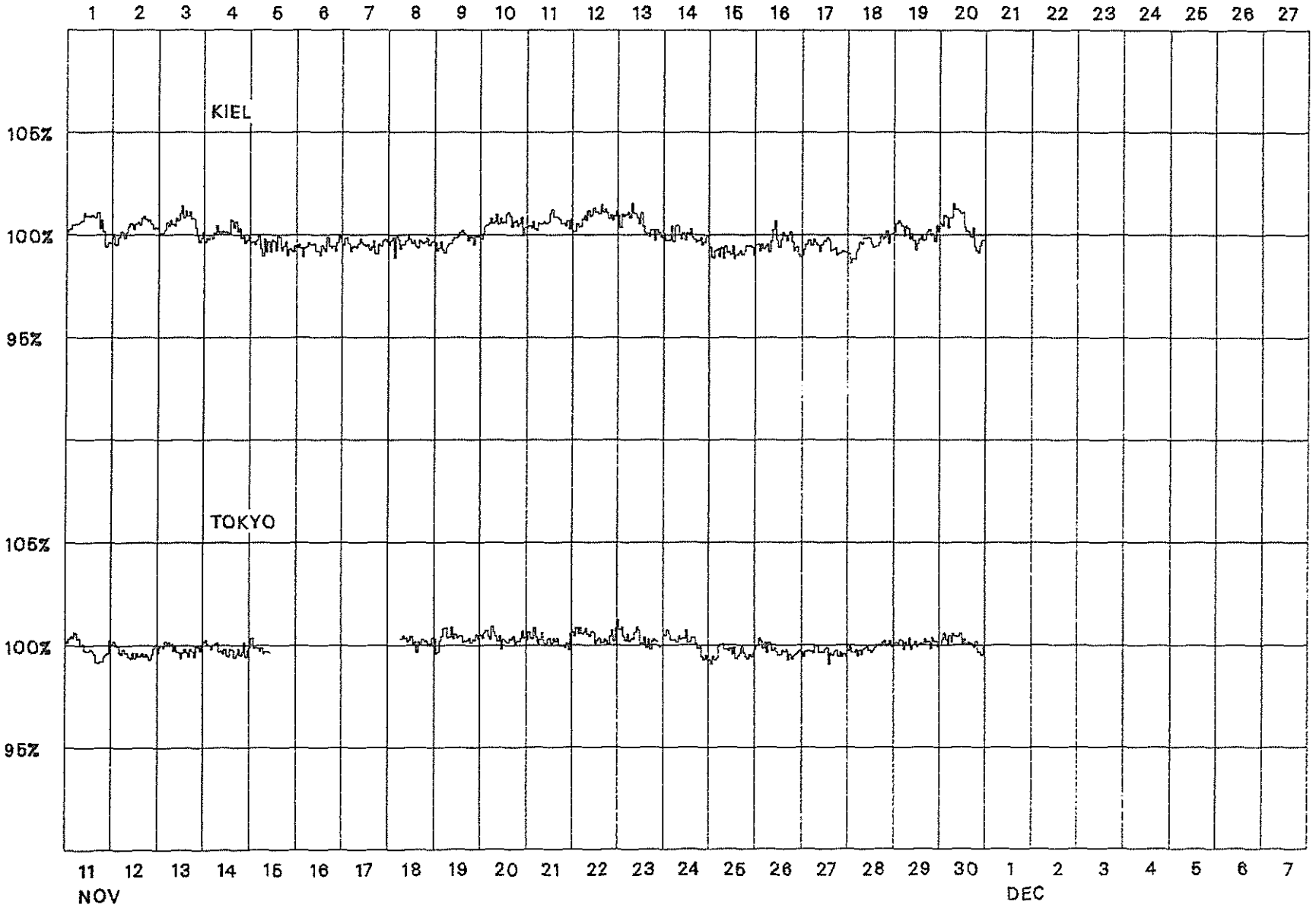
COSMIC RAY INDICES
(Neutron Monitor)

Bartels Rotation 2107 (October 1987-November 1987)



COSMIC RAY INDICES
(Neutron Monitor)

Bartels Rotation 2108 (November 1987-December 1987)



85
Nov 87

GEOMAGNETIC ACTIVITY INDICES

November 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	aa Provisional Am	N	S	M	
1	Q9A	3-	3	2-	2	2-	2	1	0+	14+	7	0.4	2	2-	2	2	2	2	1	0+	12	21	8	16	13	
2	D5	2	2+	3	2	3-	4+	5+	5	27-	23	1.1	2-	2-	3-	2+	3	4	5	4+	39	42	34	15	61	
3	D2	4+	3	2	3-	4-	5-	5+	4+	30	27	1.2	3+	3	2+	3-	3+	4+	5	4-	44	54	37	28	63	
4		3+	3-	2	1+	3-	1-	2	2+	17	9	0.5	3	2	2+	1	2	1	2-	2+	16	17	17	21	12	
5		1+	1	2	3-	2-	3-	3-	4-	18-	10	0.6	1-	1-	2-	3-	2-	3-	3-	3+	18	26	15	16	25	
6		2+	3+	2-	2+	3-	2-	2+	2-	18	9	0.5	1+	3-	2-	3-	3-	2-	2+	2-	16	21	13	19	15	
7	Q6K	1+	3	2-	1	1-	1	0+	1-	10-	5	0.2	2-	3	1+	1+	1	1+	0+	1+	11	11	12	17	7	KK
8	Q4	1	1+	2-	1	2	1-	1-	0+	9-	4	0.1	1+	1+	2-	1+	1+	1-	1+	1-	8	8	9	10	8	CC
9		0+	0+	2-	2	2+	2	2+	5-	16-	10	0.6	0+	1-	2-	2	3-	2	2+	4	18	25	15	10	31	
10		4-	3	2+	3	2+	1	1	2	18+	11	0.6	3	3-	3-	3	2+	1	1+	2+	20	24	23	31	16	
11		2+	3+	3+	3	2	2	3-	4-	22+	14	0.8	2+	3-	3	3-	2+	2+	3-	3+	23	27	24	28	23	
12		5	3-	3+	3	2	2	4	4	26	20	1.0	4	2	3+	3	2	2	4-	4	32	41	28	35	34	
13	D3	4+	4-	4-	4-	5-	5-	3	4-	31+	27	1.2	3+	3	3	3+	4	4+	3-	3+	39	50	41	39	52	
14		4	4+	3	4-	3+	4	3	3+	29-	22	1.1	3	4-	2+	3+	3+	4-	3	3-	33	40	24	29	35	
15		3+	3-	3	3	2+	3-	3	3-	23-	14	0.8	3	2-	2+	3	3-	3-	3-	2+	22	24	19	22	21	
16	Q10A	3	3	2-	1+	1	2+	1	1	14+	8	0.4	2	2+	1+	1+	1	2	1	1+	11	15	10	13	12	CK
17	Q1	2-	1-	0+	0+	0+	0+	0+	0+	4+	3	0.0	1	1	0+	0+	0	0+	0+	0+	3	6	4	5	4	CC
18	Q5	1	2	1+	0+	1+	1	1+	2+	11-	5	0.2	1-	1+	1	0+	1+	1+	2-	2+	9	13	8	7	14	CK
19		2	3+	3+	3	3-	3	2	1+	21-	12	0.7	2-	3-	3-	3	3-	3-	2	1+	19	25	17	23	19	
20		2+	3	4-	2	2-	2+	2+	2	19+	10	0.6	2	3-	3	2-	2	3-	3-	2	18	22	19	21	20	
21	Q7	2	3-	2+	2	1+	0+	1+	0+	12+	6	0.3	2-	2	2	2	2-	1-	1+	0+	10	9	7	11	5	CC
22	Q8A	2	3-	2	2	1+	1+	2-	2-	15-	7	0.3	2-	2	2+	2	1+	1+	2-	2-	12	16	12	15	13	
23	D1	2+	3	5+	5	5	3+	5+	4+	34-	35	1.4	2-	2	5-	5	5	4-	5	4-	59	57	61	46	72	
24	D4	4	4-	4-	5-	4+	3+	3-	3+	30-	24	1.1	3	3	3+	4+	4	3+	2+	3	38	35	37	37	35	
25		2+	3	3+	2	4-	3	2	2	21+	12	0.7	2	3-	2+	2-	3+	3	2	2	20	20	21	14	27	
26		3	4-	3-	3-	3+	4	2+	3+	25	17	0.9	2+	3-	2	3-	3	3+	2	3+	25	32	19	19	33	
27		3+	3+	5-	4-	4-	4	2+	2+	27+	20	1.0	2+	2+	4-	3+	4-	3+	3-	2+	31	33	27	27	33	
28		2	2+	2	3+	2	2+	2	2-	18-	9	0.5	2-	2-	2	3	2	2+	2	2-	17	20	15	17	18	
29	Q2	2-	1	0	1	0+	1-	0+	0	5	3	0.0	2-	1+	0+	1+	1-	1-	1	0	6	6	8	9	4	CC
30	Q3	0	0	0	1	1-	1+	2	1+	6+	3	0.1	0	0	0	2-	1	1	2	2-	7	9	9	6	12	CC
Mean											13	0.63									21.2	25.0	19.9		22.4	

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	Sa	Prov Ri	Ra	Rs	IMF
1	2+	2	2+	2	2+	2+	1	0+	14	2	1	2-	2	2-	1+	1-	0+	10	99.1	56	62	45	
2	2-	2-	3-	2	3	4+	5	5-	39	2-	2	2+	2+	3-	4	5	4+	39	105.0	57	54	51	
3	4-	3-	2+	3-	4-	5-	5	4-	46	3+	3	2	3-	3	4	5	4	42	98.0	57	53	44	
4	3	2	2-	1	2	1+	2-	2	15	3	2+	3-	1	2	1-	2-	3-	16	101.1#	46	50	47	
5	1	1	2	3-	2-	3-	2+	3+	18	1-	1-	2-	3	2-	3-	3-	3+	18	99.2	47	41	45	
6	2-	3-	2-	3-	2+	2	2	2	16	1	3-	2	3-	3-	2-	2+	2-	16	94.9	27	32	40	
7	2-	3	1+	1+	1	1+	0	1+	11	1+	3	1+	2-	1	1	0+	1	10	94.4	31	31	40	
8	1-	1	2-	1	2-	1	1-	0	6	2-	1+	2	1+	1+	0+	2-	1	9	92.7	43	43	38	
9	0	0+	1+	2-	3-	2+	2	4	17	0+	1	2	2	3	2-	3-	4-	18	90.3	42	43	36	
10	3	3-	3-	3-	2+	1+	1+	2+	20	3	2+	3	4-	3-	1-	1+	2	21	89.2	30	31	34	
11	2	2+	3-	3-	2	2+	2+	4-	22	2+	3	4-	3-	2+	2	3-	3-	24	92.6	28	28	38	
12	4	2	4-	3	2	2	4-	4-	33	4-	2	3+	3	2-	2	4-	4	32	92.6	22	23	38	
13	4-	3	3	4-	4+	5-	3-	3+	43	3	3-	3	3+	4-	4	3-	3+	36	92.9	15	20	38	
14	3	4-	3-	4-	4-	4	3	3-	38	3-	4-	2	3	3	3+	3-	2+	28	92.3	23	21	38	
15	3	2	2+	3-	3-	3-	3-	2+	22	3	2-	2+	3	3-	2+	3-	3-	22	93.7	19	22	39	
16	2+	2+	1+	1+	1+	2	1+	1	12	2-	2	1	1+	1	2	1	1+	10	95.0	33	35	41	
17	1	0+	0+	0+	0	0+	0+	0+	3	1	1+	0+	0	0	0	1-	1-	3	96.8	46	47	43	
18	1-	1+	1	1-	1+	1	1+	2+	9	1-	2-	1	0+	1	2-	2	3-	10	100.0	48	52	46	
19	2-	3-	3-	3-	3-	3	2-	1	19	1+	3-	3-	3	3-	2+	2+	1+	19	106.6	51	51	53	
20	1+	2	3	2	2-	3-	2+	2-	17	2+	3	3-	2-	2	2+	3-	2	19	112.2	49	50	59	
21	2	2+	2-	2+	1+	1-	2-	0	12	1+	2-	2	2-	2-	1-	1+	0+	9	115.3	51	57	63	
22	2-	2+	2-	2	2-	1+	2-	2-	13	2-	2	3-	2-	1+	1	1+	2-	12	117.8	70	77	65	
23	2-	2+	5-	4+	5+	4-	5+	4-	61	1+	2	4+	5+	5	4-	5-	4	57	115.1	89	89	62	
24	3+	3	3+	4+	4+	3+	2+	3-	41	3	3-	3+	4	4-	3+	2+	3	35	109.4	71	76	56	
25	2-	3-	3-	2-	3+	3	2	2	21	2	2+	2	2	3+	3-	2-	2	20	104.9	42	48	51	
26	3-	3	2	3-	3	4-	2	3	26	2+	2	2	3-	3	3+	2	3+	24	101.3	50	47	47	
27	3-	3-	4	3+	4-	4-	2+	2+	34	2+	2	3	4-	4-	3+	3-	3-	29	94.9	27	27	40	
28	1+	2-	2	4-	2	3-	2+	2-	19	2	2-	2	3-	2	2-	2	2-	15	92.3	20	26	38	
29	2-	1	0+	1	1-	1	1-	0	5	2	2-	1-	2-	1	0+	1	0+	7	90.7	20	21	36	
30	0	0	0	1+	0+	1+	2	2-	6	0	0	0	2	1+	1	2	2	8	89.1	20	17	34	
Mean									21.9									20.6	99.0	40.9	42.5	44.9	

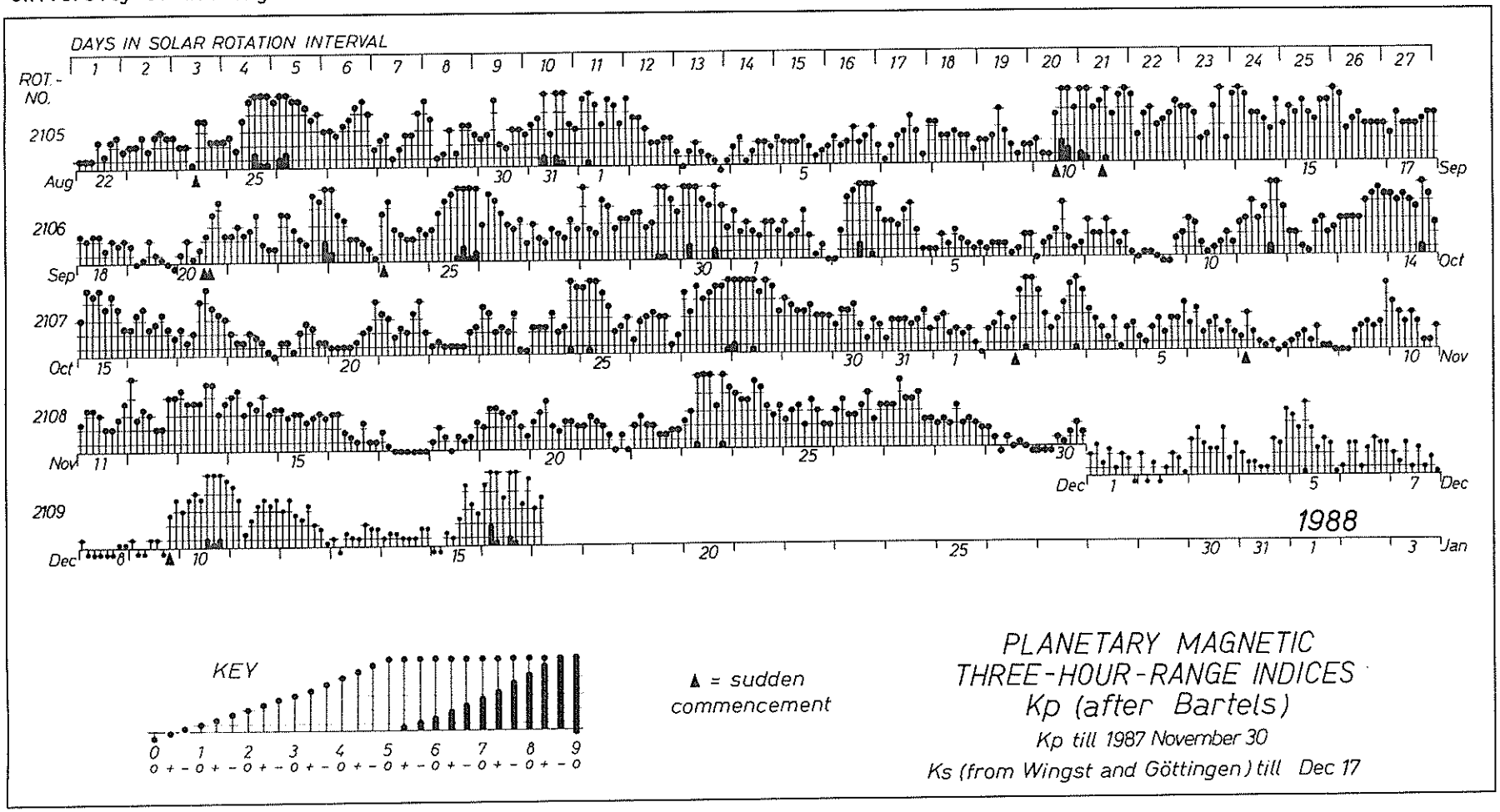
DAILY AVERAGE INDICES Ap

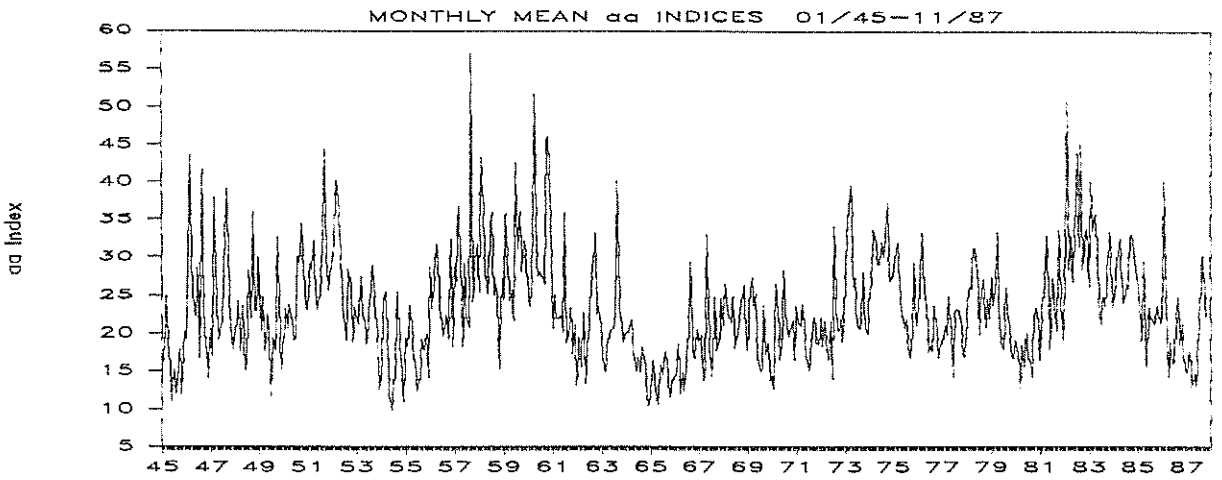
Day	Dec 86	Jan 87	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov
1	13	18	7	9	10	7	8	2	10	34	13	7
2	8	10	4	3	4	6	8	3	5	12	9	23
3	6	6	4	6	2	6	4	9	12	4	36	27
4	7	3	4	10	16	5	6	8	7	6	14	9
5	4	3	4	21	12	4	7	6	13	6	6	10
6	4	3	7	10	7	5	25	5	8	9	5	9
7	6	5	9	21	13	8	9	4	4	11	8	5
8	4	7	14	12	11	4	4	10	10	10	8	4
9	6	10	11	9	8	4	3	9	8	10	3	10
10	12	6	8	11	10	10	4	11	4	38	7	11
11	8	5	7	8	7	6	7	7	7	40	28	14
12	4	10	18	14	5	2	13	7	16	22	8	20
13	12	6	4	8	12	6	6	4	23	23	24	27
14	20	5	5	8	6	9	6	5	16	26	31	22
15	4	5	6	10	6	4	4	24	19	29	26	14
16	12	12	12	12	4	4	8	20	12	19	13	8
17	5	10	9	10	5	4	6	14	11	17	18	3
18	6	8	7	12	4	2	6	10	6	7	5	5
19	6	7	5	11	8	2	17	8	9	3	6	12
20	7	18	29	4	12	4	8	9	8	11	8	10
21	11	10	19	18	3	3	6	6	5	10	13	6
22	14	10	18	15	4	7	4	8	7	29	5	7
23	22	11	14	6	4	8	3	6	10	17	11	35
24	10	7	12	5	9	20	7	12	11	14	19	24
25	11	7	7	6	4	25	7	17	39	46	28	12
26	14	7	6	13	4	9	9	4	40	20	11	17
27	9	7	12	26	9	14	5	5	21	11	35	20
28	3	11	13	12	2	10	4	26	15	22	44	9
29	3	10		5	4	21	5	52	12	30	19	3
30	4	4		4	4	9	3	9	14	43	13	3
31	7	8		4		11		14	34		11	
Mean	8	8	10	10	7	8	7	11	14	19	16	13

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

University of Göttingen

Kp through November 30, 1987





Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Mean
1945	16.1	16.4	25.0	19.1	15.4	11.1	15.3	12.1	15.6	17.9	12.0	20.2	16.3
1946	19.2	30.2	43.5	25.0	24.1	22.3	28.6	16.7	41.7	19.6	19.3	14.3	25.4
1947	20.6	17.1	37.9	23.3	19.1	21.1	21.4	32.9	39.1	31.3	20.7	17.9	25.2
1948	20.8	21.0	24.2	17.7	23.7	15.0	16.2	28.3	22.0	36.1	23.1	23.0	22.6
1949	29.8	20.4	24.7	17.6	22.4	17.9	11.8	19.2	17.8	32.7	24.6	15.1	21.2
1950	19.5	23.2	20.6	23.8	21.7	19.0	19.5	30.2	29.3	34.5	28.0	24.0	24.4
1951	23.1	29.2	28.5	32.1	25.5	23.2	25.2	29.7	44.4	30.3	25.7	28.2	28.8
1952	28.5	34.3	40.1	38.0	33.1	23.8	20.7	19.0	28.5	26.4	18.9	23.4	27.9
1953	22.3	21.2	27.4	22.7	21.4	18.4	22.5	26.1	29.0	22.4	20.2	12.6	22.2
1954	13.9	24.5	25.5	20.6	12.0	9.7	13.1	16.5	25.4	21.1	14.5	10.9	17.3
1955	19.3	18.2	23.6	21.1	16.7	15.1	12.3	14.3	19.1	17.8	19.9	14.1	17.6
1956	28.7	23.3	27.6	31.7	29.3	23.5	19.8	20.7	22.4	19.3	32.3	18.2	24.7
1957	28.7	26.8	36.7	28.8	18.1	29.1	21.7	20.7	57.0	24.0	29.5	31.7	29.4
1958	25.5	43.2	36.1	27.6	25.2	29.7	36.0	25.1	26.5	24.7	15.0	27.2	28.5
1959	24.3	35.9	29.9	24.2	25.7	21.6	42.5	31.2	36.1	28.2	32.1	30.8	30.2
1960	25.2	23.5	27.6	51.5	31.6	27.6	28.1	27.2	26.4	45.6	45.9	34.5	32.9
1961	20.6	25.1	22.0	21.8	22.3	20.1	36.0	18.5	20.7	23.3	17.3	21.1	22.4
1962	13.2	19.2	15.5	22.6	13.4	18.1	21.0	26.2	29.8	33.3	22.5	23.5	21.5
1963	19.3	15.3	14.9	18.2	20.4	20.5	20.8	22.5	40.2	23.5	20.7	18.9	21.3
1964	20.1	20.1	21.0	21.7	17.5	15.1	16.9	14.8	18.2	16.9	13.8	10.3	17.2
1965	11.8	16.3	14.3	12.6	10.5	15.7	14.7	16.8	17.5	13.1	11.7	13.8	14.1
1966	14.2	14.8	16.6	12.0	14.8	12.5	17.1	20.0	29.4	17.5	16.8	20.5	17.3
1967	18.9	19.8	13.8	15.5	33.1	18.6	14.4	17.5	24.7	17.8	18.9	24.5	19.8
1968	21.1	26.5	23.3	22.2	21.4	24.9	18.0	20.1	22.0	24.8	26.2	20.3	22.6
1969	17.8	25.8	27.3	23.6	25.2	16.7	15.0	15.3	23.8	17.2	18.7	13.8	20.0
1970	14.4	12.7	26.4	23.1	16.6	18.3	28.4	21.0	19.7	20.6	21.6	16.5	19.9
1971	23.5	21.2	21.1	23.9	21.1	17.0	15.2	17.1	21.4	22.2	18.8	18.6	20.1
1972	21.9	18.3	21.5	18.1	16.6	21.5	14.0	34.2	20.4	20.4	21.8	18.9	20.6
1973	26.1	32.7	36.9	39.6	26.1	27.3	20.9	20.6	22.8	28.2	20.7	19.9	26.8
1974	25.8	26.4	33.7	32.9	29.2	29.2	32.0	30.2	33.7	37.3	26.8	27.5	30.4
1975	27.6	31.1	32.0	24.3	22.7	20.7	21.7	18.1	16.9	20.2	29.3	21.1	23.8
1976	23.3	28.5	33.4	25.4	23.7	17.5	18.4	17.7	23.7	20.4	16.9	18.6	22.3
1977	18.7	21.0	19.9	24.9	20.1	14.2	22.9	23.2	23.0	20.9	17.3	17.0	20.3
1978	24.6	26.2	25.9	31.3	31.2	28.3	19.9	25.6	27.0	20.8	24.6	22.0	25.6
1979	27.3	23.7	26.9	33.5	21.0	18.3	17.9	26.0	22.0	19.3	17.1	16.8	22.5
1980	19.0	17.3	12.7	18.4	15.6	20.0	17.0	15.9	14.2	21.9	23.3	21.7	18.1
1981	16.5	23.1	26.6	32.8	26.9	18.0	27.2	24.0	20.4	33.7	24.1	19.3	24.4
1982	24.2	50.6	28.5	32.9	26.7	32.1	43.9	31.4	45.1	28.5	33.0	33.8	34.2
1983	26.2	40.0	33.6	35.7	31.6	24.9	21.3	24.9	23.7	28.3	33.5	26.0	29.1
1984	23.5	26.7	30.7	32.5	27.2	23.7	26.4	25.8	32.6	33.1	31.0	29.0	28.5
1985	25.7	24.1	19.0	29.5	15.6	19.9	23.4	22.0	21.2	22.2	23.7	21.4	22.3
1986	22.4	40.0	21.1	14.3	18.8	15.9	16.3	22.3	24.7	18.6	21.2	15.3	20.9
1987	14.8	16.6	17.6	12.9	14.7	13.2	19.3	24.3	30.3	25.8	22.4		19.3

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

NOVEMBER 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)
WIT	54.2N	02	1553	SC	- 1	2.4	0	02(7,8) 03(7)	6	35	149	63	03	24
FRD	49.6N	02	1552	SC*	2.5	13	- 3	03(1)	5	21	98	39	04	--
JAI	17.3N	02	1548	SC	- 0.8	25	- 5		-	4	67	12	03	02
KRC	16.4N	02	1554	SC	- 1.5	33	16	03(7)	7	6	134	68	07	17
SHL	14.7N	02	1548	SC	- 0.5	26	5		-	3	67	9	03	02
UJJ	13.5N	02	1548	SC	- 0.4	27	- 6		-	3	71	14	03	02
ABG	09.5N	02	1548	SC	- 0.6	23	- 6	02(6,7)	5	3	68	14	03	02
HYB	07.6N	02	1552	SC	- 0.4	25	2	02(6,7)	5	4	118	16	03	06
GUA	04.0N	02	1553	SC	- 0.2	23	- 5	02(6)	5	--	80	20	03	06
ETT	00.6S	02	1515	SC	- 0.6	23	20		-	-5	188	82	04	15
TRD	01.1S	02	1548	SC	0.1	25	30		-	2	70	82	03	02
HER	33.7S	02	1552	SC	2	17	13	02(7)	5	10	71	65	02	24
BJI	28.5N	03	1000	SC	0.6	20	..	03(6)	6	8	117	29	04	24
JAI	17.3N	03	0957	SC	- 0.3	16	- 3		-	3	124	20	04	03
SHL	14.7N	03	0957	SC	- 0.1	18	3		-	3	113	14	04	03
UJJ	13.5N	03	0957	SC	- 0.1	20	- 4		-	2	128	21	04	03
ABG	09.5N	03	0957	SC	- 0.3	21	- 4	03(6,7)	6	3	135	19	04	03
HYB	07.6N	03	0959	SC	- 0.1	19	1	03(6,7)	6	2	150	19	04	22
GUA	04.0N	03	1000	SC	..	15	- 4	03(7)	5	--	50	10	03	22
ETT	00.6S	03	1000	SC	- 0.3	10	7		-	--	--	--	04	15
TRD	01.1S	03	0957	SC	0.1	23	26		-	1	140	121	04	03
HER	33.7S	03	1000	SC	..	18	16	03(6,7)	5	32	107	150	03	23
WIT	54.2N	12	19--	..	..	..	..	13(6)	6	27	135	38	14	02
ETT	00.6S	12	0100	..	..	..	..		-	-4	104	37	14	23
HYB	07.6N	22	2000	..	..	..	..	23(5)	6	6	167	15	24	22
COL	64.6N	23	06--	..	..	..	..	23(3,5) 24(4)	7	284	1930	1620	24	18
SIT	60.0N	23	06--	..	..	..	..	23(5)	7	--	--	560	24	16
WIT	54.2N	23	05--	..	..	..	..	23(7)	7	38	250	46	24	02
FRD	49.6N	23	06--	..	..	..	..	23(3,4,5)	5	21	135	60	24	16
BJI	28.5N	23	05--	..	..	..	..	23(3)	6	15	120	23	24	17
JAI	17.3N	23	0600	..	..	..	..		-	6	139	34	24	22
KRC	16.4N	23	05--	..	..	..	..	23(3,5,7)	5	7	140	68	29	22
SHL	14.7N	23	0600	..	..	..	..		-	7	138	21	24	22
UJJ	13.5N	23	0600	..	..	..	..		-	5	137	33	24	22
ABG	09.5N	23	0600	..	..	..	..	23(3,5,7)	5	6	155	37	24	22
GUA	04.0N	23	0618	..	..	..	..	23(3)	5	--	110	10	23	16
ETT	00.6S	23	0100	..	..	..	..		-	-6	206	77	24	23
TRD	01.1S	23	0600	..	..	..	..		-	5	189	112	24	22
HER	33.7S	23	06--	..	..	..	..	23(7)	5	28	103	68	24	02
GNA	43.2S	23	06--	..	..	..	..	23(4,5,7) 24(4)	5	19	80	140	24	17
CNB	43.9S	23	05--	..	..	..	..	23(3,4,5)	5	16	129	49	24	17
GUA	04.0N	24	0910	..	..	..	..	24(5)	5	--	50	10	24	16
HYB	07.6N	26	0300	..	..	..	..	26(6) 27(4,6)	4	4	108	16	27	21

Stations Reporting:

ABG = ALIBAG
BJI = BEIJING
CNB = CANBERRA
COL = COLLEGE
ETT = ETAIYAPURAM
FRD = FREDERICKSBURG
GNA = GNANGARA
GUA = GUAM
HER = HERMANUS
HYB = HYDERABAD
JAI = JAIPUR
KRC = KARACHI
SHL = SHILLONG
SIT = SITKA
TRD = TRIVANDRUM
UJJ = UJJAIN
WIT = WITTEVEEN

RADIO PROPAGATION QUALITY INDICES
NOVEMBER 1987

Day	For Circuits from Norddeich to: Bracknell	Rome	Teheran	New York	Tokyo	Canberra
1	5.5	5.8	5.5	5.1	6.6	5.7
2	5.6	5.0	4.6	4.5	7.4	5.5
3	5.4	4.8	4.0	5.3	7.6	5.1
4	5.9	4.5	4.4	5.8	6.6	5.1
5	5.8	4.8	5.9	6.2	6.8	6.4
6	5.6	4.9	4.8	6.3	7.6	5.4
7	6.3	4.8	5.9	7.1	7.6	7.1
8	6.7	5.3	5.0	7.1	6.5	6.8
9	7.0	4.9	6.1	7.9	7.7	7.7
10	7.1	5.2	6.2	7.1	7.5	6.1
11	7.1	5.2	6.2	6.7	8.2	6.6
12	6.5	4.6	6.9	6.3	8.3	5.2
13	5.8	4.6	4.9	5.8	6.3	5.1
14	5.7	4.1	5.6	5.3	5.6	5.5
15	5.6	4.0	4.6	4.6	6.2	4.7
16	5.1	5.4	6.3	6.2	6.7	6.2
17	5.6	5.4	5.5	5.7	6.2	5.8
18	5.8	5.7	7.0	6.1	6.9	6.8
19	6.0	6.5	6.1	6.6	6.1	7.1
20	6.2	6.5	7.8	7.1	7.4	7.7
21	6.0	6.3	5.0	6.9	7.0	7.5
22	6.0	5.7	5.5	6.5	5.8	6.7
23	6.0	5.4	5.0	5.7	6.1	5.7
24	5.4	5.2	5.2	4.8	4.9	5.0
25	5.2	5.1	4.7	4.1	5.5	5.0
26	4.8	4.6	5.3	3.8	6.1	4.6
27	4.6	5.9	5.4	3.6	5.4	4.9
28	3.9	5.2	4.6	4.1	5.4	4.8
29	3.9	5.0	4.2	5.1	5.3	5.6
30	4.7	5.3	5.7	5.7	5.5	5.9
MEAN:	5.7	5.2	5.5	5.8	6.6	5.9

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).

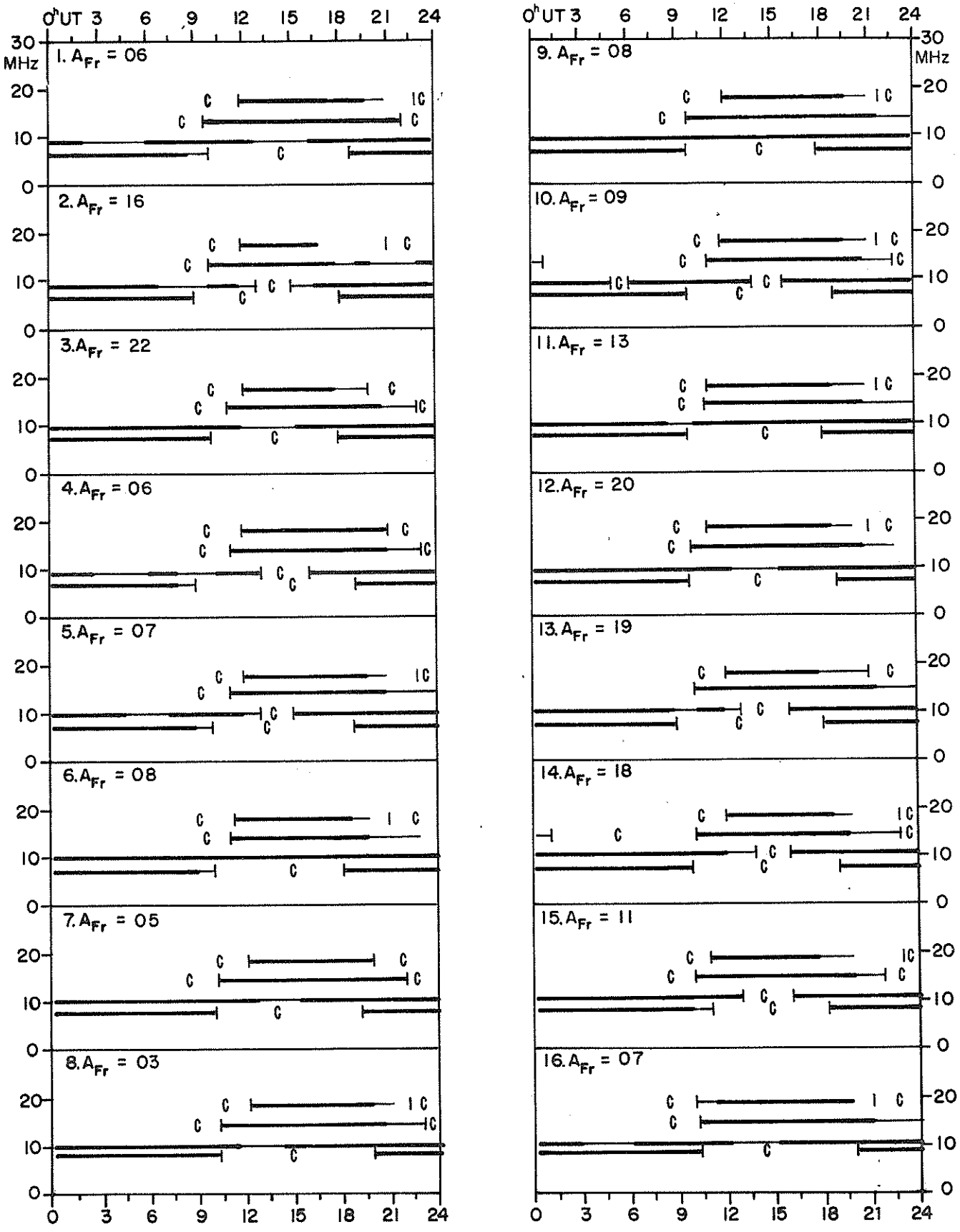
$Q = 6.0 + 20 \log (FD/FA)/3.0$

The quality indices vary from 0.1 to 9.9 where 6.0 is normal. Conditions are "normal" (index = 6.0), if they respond to the average of the preceeding 27 days.

SCALE FOR QUALITY INDICES:
0.1 - 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

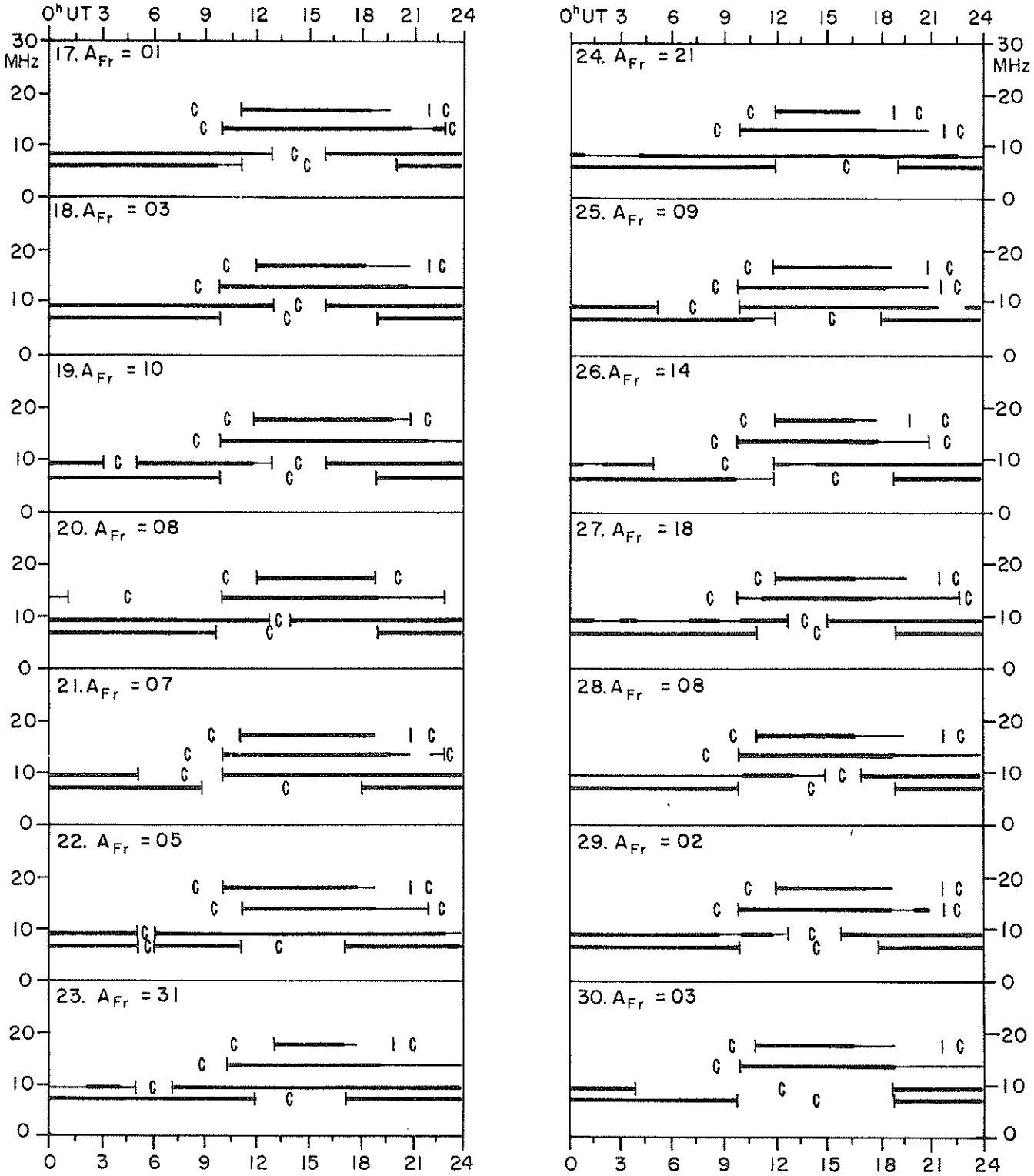
TRANSMISSION FREQUENCY RANGES--NORTH ATLANTIC PATH

NOVEMBER 1987



TRANSMISSION FREQUENCY RANGES--NORTH ATLANTIC PATH

NOVEMBER 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 $\geq$ -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.

CONTENTS

Prompt Reports **LATE DATA** Number 521 Part I

Page

COSMIC RAY INDICES
(Neutron Monitor)

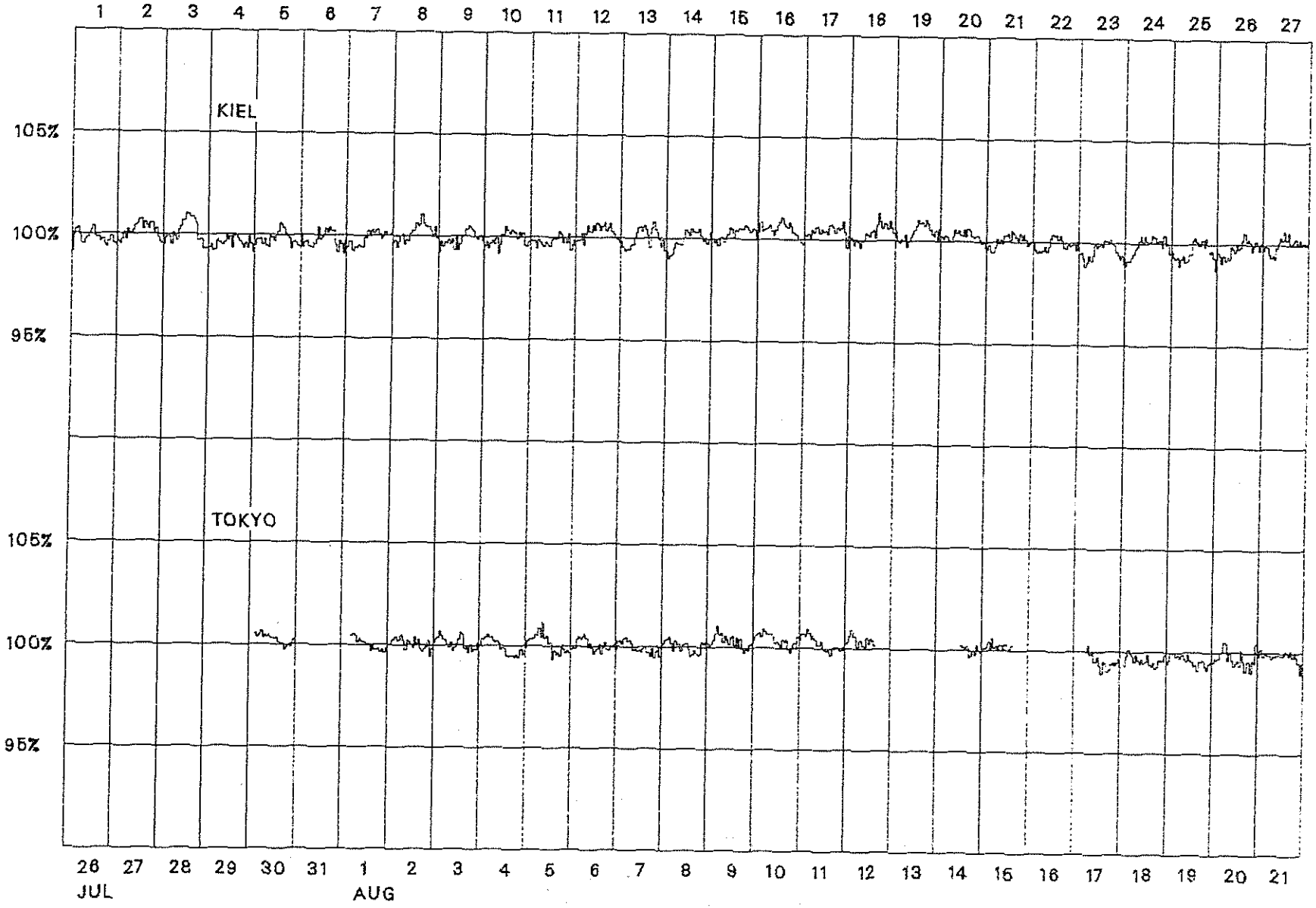
OCTOBER 1987

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	4422			6151.3	4065.4		3614.2	
2	4436			6175.4	4077.7		3618.0	
3	4402			6185.0	4085.2		3633.0	
4	4419			6188.7	4077.6		3627.0	
5	4441			6209.4	4086.1		3627.7	
6	4445			6236.4	4093.5		3632.1	
7	4439			6240.6	4098.4		3632.1	
8	4439			6246.5	4091.4		3631.1	
9	4434			6204.9	4081.3		3636.2	
10	4432			6217.8	4093.0		3637.5	
11	4407			6196.1	4057.8		3612.5	
12	4373			6164.7	4048.5		3602.9	
13	4394			6189.2	4071.3		3608.3	
14	4415			6224.6	4109.8		3610.1	
15	4420			6227.5	4110.7		3614.0	
16	4410			6200.5	4096.6		3609.2	
17	4416			6179.4	4077.3		3617.6	
18	4421			6179.3	4088.4		3630.5	
19	4442			6204.2	4103.4		3629.4	
20	4452			6222.6	4107.9		3634.2	
21	4458			6232.5	4111.6		3633.0	
22	4456			6233.6	4108.5		3632.2	
23	4432			6193.3	4090.9		3628.4	
24	4424			6195.8	4090.6		3618.3	
25	4406			6161.9	4083.3		3609.8	
26	4432			6156.3	4074.8		3606.7	
27	4423			6177.2	4093.8		3622.0	
28	4408			6178.1	4093.8		3628.0	
29	4417			6186.1	4086.5		3625.5	
30	4424			6181.3	4097.2		3622.7	
31	4435			6204.0	4103.2		3634.8	
Mean	4425			6198.2	4088.9		3623.2	

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

COSMIC RAY INDICES
(Neutron Monitor)

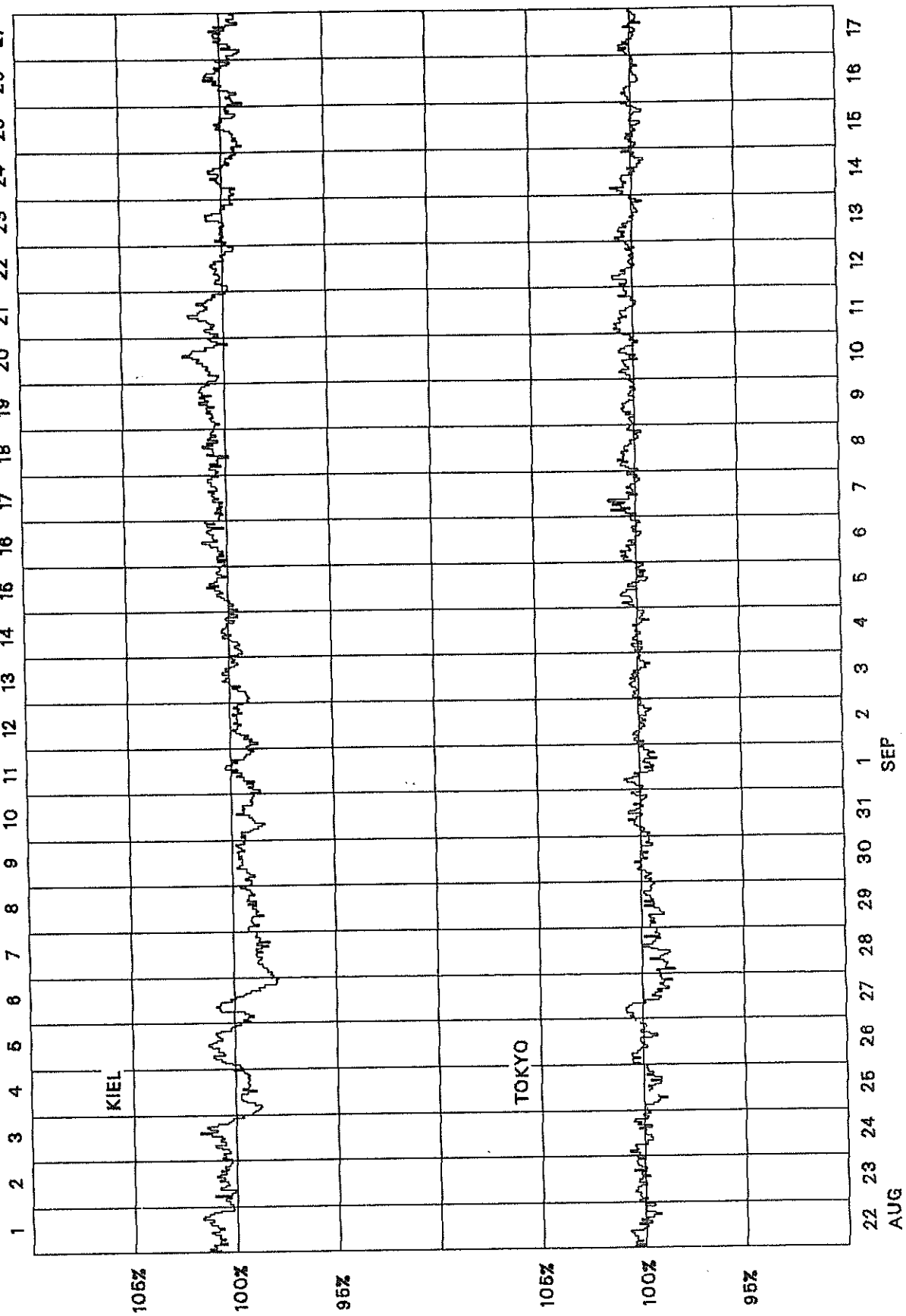
Bartels Rotation 2104 (July 1987-August 1987)



97
Late
Aug 87

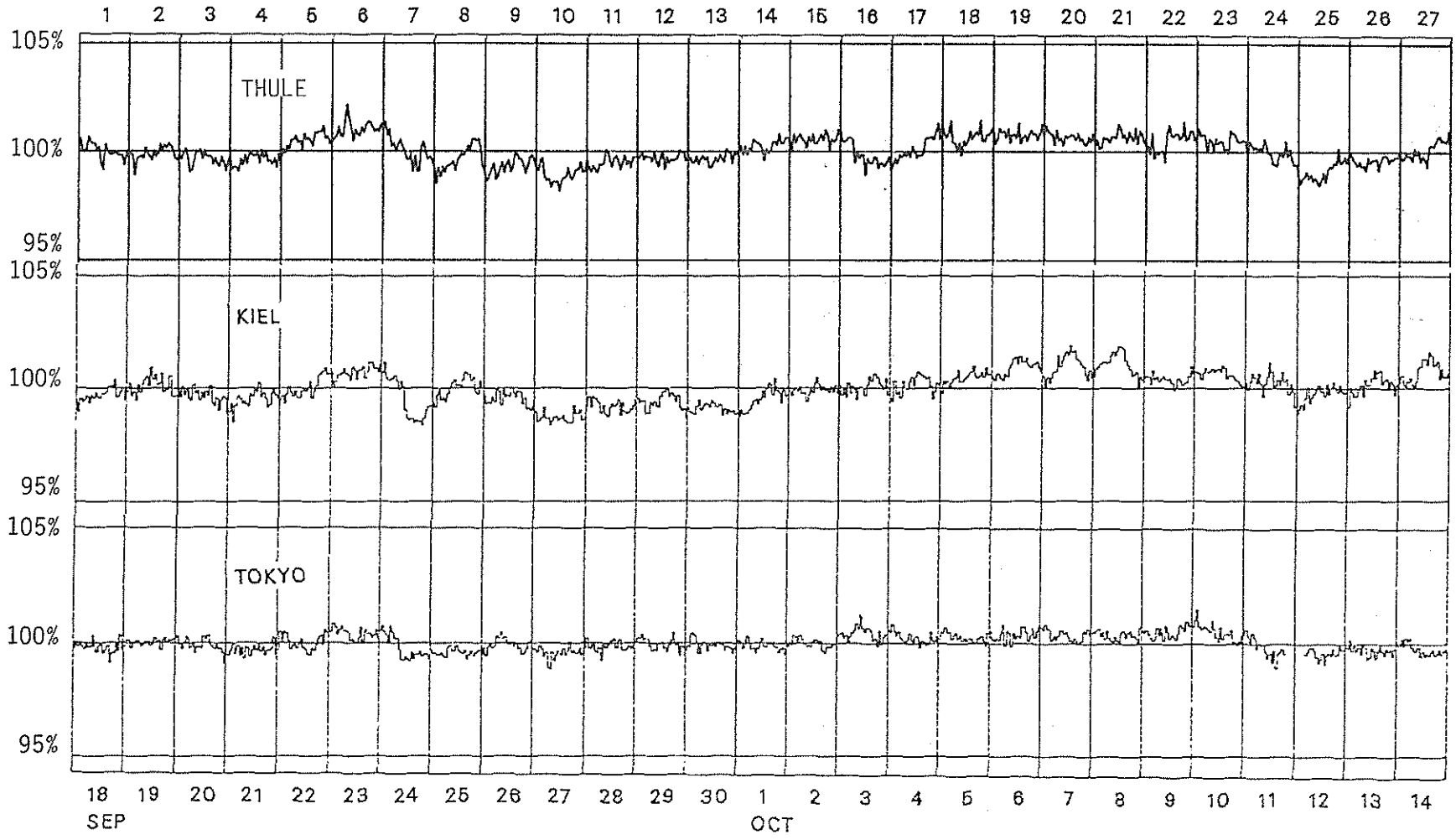
COSMIC RAY INDICES
(Neutron Monitor)

Bartels Rotation 2105 (August 1987-September 1987)



COSMIC RAY INDICES
(Neutron Monitor)

Bartels Rotation 2106 (September 1987-October 1987)



99
Late
Oct 87

SOLAR RADIO EMISSION--SPECTRAL OBSERVATIONS

JULY 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	0000	0735	CULG										
	2035	2400	CULG										
02	0000	0735	CULG										
	2035	2400	CULG										
03	0000	0736	CULG										
	2036	2400	CULG										
04	0000	0736	CULG										
	2035	2400	CULG										
23	2039	2400	CULG										
24	0000	0739	CULG										
	2034	2400	CULG										
25	0000	0739	CULG										
	2034	2400	CULG				2244.5	2244.5	1				IIIB
26	0000	0738	CULG				0622.0	0623.5	1				IIIG
	2139	2400	CULG										
27	0000	1738	CULG				0420.5	0420.5	1	0420.5	0420.5	1	IIIB
	2038	2400	CULG										
28	0000	0738	CULG				0104.5	0104.5	1	0104.5	0104.5	1	IIIB
	2038	2400	CULG										
29	0000	0738	CULG										
	2038	2400	CULG										
30	0000	0730	CULG				0137.0	0138.0	1	0137.0	0138.0	1	IIIG
			CULG				0141.0	0142.0	1				IIIG
	2038	2400	CULG				2255.0	2256.0	1				IIIB
31	0000	0730	CULG				0057.0	0058.0	1				IIIG
			CULG				0458.0	0459.0	1				IIIB
	2103	2400	CULG										

SOLAR RADIO EMISSION--SPECTRAL OBSERVATIONS

AUGUST 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	0000	0738	CULG										
	2038	2400	CULG										
02	0000	0400	CULG				0012.0	0016.5	1				II
	0430	0738	CULG										
	2038	2400	CULG										
03	0000	0738	CULG										
	2038	2400	CULG										
09	2037	2400	CULG				2252.0	2254.0	1	2252.0	2254.0	1	IIIB
			CULG				2254.0	2256.0	1				II
10	0000	0700	CULG				0131.0	0137.0	1	0131.0	0137.0	1	IIIG
	2037	2400	CULG				2104.0	2105.0	1	2104.0	2105.0	1	IIIB
			CULG				2237.0	2238.0	1				IIIB
11	0000	0200	CULG				0341.0	0342.0	1				IIIB
	2037	2400	CULG										
13	0000	0737	CULG				0709.0	0727.0	1				IIIGG
	2037	2400	CULG				2110.0	2400.0	1	2110.0	2400.0	1	IIIN,B,G
			CULG				2311.0	2312.0	1	2311.0	2312.0	1	IIIB
14	0000	0737	CULG				0000.0	0529.0	1	0000.0	0529.0	1	IIIN,B,G
	2037	2400	CULG				2037.0	2400.0	1	2037.0	2400.0	1	IIIN,B,G
15	0000	0737	CULG				0000.0	0536.0	1	0000.0	0536.0	1	IIIN,B,G
			CULG				0240.0	0246.0	2	0240.0	0246.0	2	IIIG
			CULG				0312.0	0328.0	1	0312.0	0328.0	1	IIIGG
			CULG				0330.0	0347.0	1				I
			CULG				0334.0	0343.0	1				II
			CULG				0343.0	0353.0	1				IV
			CULG				0536.0	0714.0	1	0536.0	0714.0	1	IIIB
	2036	2400	CULG				2036.0	2400.0	1				IIIB,N
16	0000	0736	CULG				0650.0	0705.0	1				IIIB,N
	2036	2400	CULG				2045.0	2400.0	1	2045.0	2400.0	1	IIIS
			CULG				2111.0	2114.0	2	2111.0	2114.0	2	IIIG
			CULG				2121.0	2400.0	1	2121.0	2400.0	1	IIIN,B,G
17	0000	0736	CULG				0001.0	0003.0	2	0001.0	0003.0	2	IIIG
			CULG				0215.5	0216.0	2	0215.5	0216.0	2	IIIB
18	0000	0736	CULG				0101.0	0122.0	2	0101.0	0122.0	2	IIIGG
	2117	2400	CULG				2117.0	2400.0	1				IIIS
19	0000	0730	CULG				0000.0	0453.0	1				IIIB,N
			CULG				0245.0	0246.0	1	0245.0	0246.0	1	IIIG
			CULG				0453.0	0730.0	1				IIIS
			CULG				0511.0	0730.0	1				I S
	2038	2400	CULG				2038.0	2400.0	1	2038.0	2400.0	1	IIIB,N
20	0000	0730	CULG				0000.0	0730.0	1	0000.0	0730.0	1	IIIB,N
21	0000	0735	CULG				0223.0	0223.0	1	0223.0	0223.0	1	IIIB
			CULG				0534.0	0617.0	2	0534.0	0617.0	2	IIIGG
			CULG				0625.0	0735.0	1				I S
			CULG				0625.0	0735.0	1	0625.0	1111.0	1	IIIS
22	2035	2400	CULG										
23	0000	0735	CULG										
	2035	2400	CULG				2236.0	2236.0	2	2236.0	2236.0	2	IIIB
			CULG				2310.0	2312.5	2	2310.0	2312.5	2	IIIB
24	0000	0735	CULG				0222.0	0514.0	1	0222.0	0514.0	1	IIIB,N
			CULG				0452.0	0457.0	2	0452.0	0457.0	2	IIIG
			CULG				0609.5	0610.5	2	0609.5	0610.5	2	IIIG
	2035	2400	CULG				2121.0	2400.0	1	2121.0	2400.0		IIIN
			CULG				2236.0	2239.0	1				II

SOLAR RADIO EMISSION--SPECTRAL OBSERVATIONS

AUGUST 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
25	0000	0734	CULG				0000.0	0734.0	2	0000.0	0737.0	2	IIIN
	2034	2400	CULG				2034.0	2400.0	2	2034.0	2400.0	2	IIIN
26	0000	0734	CULG				0000.0	0734.0	2	0000.0	0734.0	2	IIIN
	2035	2400	CULG										
27	0000	0734	CULG				0055.0	0055.0	2				IIIB
	2034	2400	CULG				2305.0	2305.0	1				IIIB
29	0000	0733	CULG				0240.0	0240.0	1	0240.0	0240.0	1	UNCLF
			CULG				0258.0	0301.0	1	0301.0	0302.0	1	II
	2034	2400	CULG				0465.0	0733.0	1				IIIN,G
30	2032	2400	CULG				2051.0	2051.5	1	2051.0	2051.5	1	IIIB
			CULG				2124.0	2126.0	1	2124.0	2126.0	1	IIIG
			CULG				2326.0	2326.5	1				IIIB

SOLAR RADIO EMISSION--SPECTRAL OBSERVATIONS

SEPTEMBER 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	0000	0732	CULG										
	2032	2400	CULG										
02	0000	0732	CULG				0433.0	0447.0	1				IIIGG
	2031	2400	CULG										
03	0000	0731	CULG										
	2031	2400	CULG										
04	0000	0730	CULG				0429.0	0429.0	1	0429.0	0429.0	1	IIIB
			CULG				0712.0	0730.0	1	0712.0	0730.0	1	IIIS
	2031	2400	CULG										
05	0000	0730	CULG				0339.0	0339.0	1	0339.0	0339.0	1	IIIB
			CULG				0454.0	0459.0	1	0454.0	0459.0	1	IIIG
			CULG				0551.0	0551.0	1	0551.0	0551.0	1	IIIB
	2030	2400	CULG										
06	0000	0730	CULG										
	2030	2400	CULG										
07	0000	0730	CULG				0600.0	0613.0	1	0600.0	0613.0	1	IIIGG
	2029	2400	CULG				2046.0	2047.0	1	2046.0	2047.0	1	IIIB
08	0000	0355	CULG										
	2038	2400	CULG										
09	0000	0729	CULG				0114.0	0114.5	1	0114.0	0114.5	1	IIIB
	2029	2400	CULG										
10	0000	0729	CULG										
	2030	2400	CULG				2109.0	2113.0	1	2109.0	2113.0	1	IIIG
11	0000	0728	CULG				0603.0	0603.5	2				IIIG
			CULG				0608.0	0610.0	2				IIIG
			CULG				0614.0	0614.5	2				IIIG
			CULG				0621.0	0622.0	2				IIIG
	2028	2400	CULG				2223.0	2223.5	1	2223.0	2223.5	1	IIIB
			CULG				2313.0	2313.5	2	2313.0	2313.5	2	IIIG
			CULG				2314.0	2315.5	2	2314.0	2315.5	2	V
			CULG				2333.0	2335.0	2	2333.0	2335.0	2	IIIG
12	0000	0728	CULG				0002.0	0004.0	2	0002.0	0004.0	2	IIIG
			CULG				0327.0	0645.0	1	0327.0	0645.0	1	IIIB,N
	2028	2400	CULG										
13	0000	0727	CULG				0416.0	0417.0	1				IIIG
			CULG				0453.0	0453.5	1				IIIB
			CULG				0607.0	0607.5	1				IIIB
			CULG				0624.0	0624.5	1	0624.0	0624.5	1	IIIB
	2027	2400	CULG				2117.0	2123.0	2	2117.0	2123.0	2	IIIG
			CULG				2234.0	2245.0	2	2234.0	2245.0	2	IIIGG
14	0000	0727	CULG				0011.0	0011.5	1				IIIB
			CULG				0023.0	0029.0	2	0023.0	0029.0	2	IIIGG
			CULG				0029.0	0034.0	2			II	B
			CULG				0409.0	0409.5	2	0409.0	0409.5	2	IIIB
			CULG				0414.0	0414.5	1				IIIB
			CULG				0417.0	0425.0	2	0417.0	0425.0	2	IIIGG
			CULG				0500.0	0503.0	1				IIIG
			CULG				0633.0	0637.0	2	0633.0	0637.0	2	IIIGG
			CULG				0705.0	0705.5	1				IIIB
	2027	2400	CULG				2116.0	2121.0	1	2116.0	2121.0	1	IIIG
15	0000	0727	CULG				0054.0	0056.0	1	0054.0	0056.0	1	IIIG
			CULG				0112.0	0113.0	1	0112.0	0113.0	1	IIIB
			CULG				0509.0	0522.0	1	0509.0	0522.0	1	IIIGG
	2027	2400	CULG				2131.0	2131.0	1	2131.0	2131.0	1	IIIB
16	0000	0130	CULG										

SOLAR RADIO EMISSION--SPECTRAL OBSERVATIONS

SEPTEMBER 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
16	0430	0727	CULG				0504.5	0711.0	1	0504.5	0711.0	1	IIIN,B
	2027	2400	CULG										
17	0000	0727	CULG				0018.0	0020.0	1	0018.0	0020.0	1	IIIV,B
			CULG				0228.0	0230.0	1	0228.0	0230.0	1	IIIV,B
			CULG				0524.0	0524.0	1	0524.0	0524.0	1	IIIB
			CULG				0648.0	0708.0	1				III
	2027	2400	CULG										
18	0000	0727	CULG				0243.0	0244.0	1	0243.0	0244.0	1	IIIG
	2027	2400	CULG										
19	0000	0725	CULG				0114.0	0115.0	1	0114.0	0115.0	1	IIIG
	2025	2400	CULG										
20	0000	0725	CULG										
	2025	2400	CULG				2151.0	2155.0	2				IIIG
21	0000	0725	CULG				0058.5	0215.5	1				IIIN
			CULG				0157.5	0200.5	3	0157.5	0200.5	3	IIIG
			CULG				0200.5	0211.0	1				II
			CULG				0205.0	0205.0	1	0205.0	0205.0	1	IIIB
			CULG				0533.0	0534.0	1	0533.0	0534.0	1	IIIG
			CULG				0623.0	0623.0	1				IIIB
22	0000	0725	CULG										
	2025	2400	CULG				2105.5	2106.0	1	2105.5	2106.0	1	IIIG
23	0000	0725	CULG				0444.0	0444.5	1				IIIB
	2025	2400	CULG				2138.0	2158.0	1	2138.0	2158.0	1	II
24	0000	0725	CULG										
	2024	2400	CULG										
25	0000	0724	CULG										
	2023	2400	CULG				2138.0	2158.0	1	2138.0	2158.0	1	II
26	0000	0723	CULG										
	2023	2400	CULG										
27	0000	0722	CULG										
	2023	2400	CULG				2324.0	2324.0	1				IIIB
28	0000	0723	CULG				0555.0	0601.0	1	0555.0	0602.1	1	IIIG
	2023	2400	CULG										
29	0000	0723	CULG										
	2022	2400	CULG										
30	0000	0722	CULG										
	2022	2400	CULG										

SOLAR RADIO EMISSION--SPECTRAL OBSERVATIONS

OCTOBER 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	0100	0720	CULG										
	2023	2400	CULG										
02	0000	0722	CULG										
	2021	2400	CULG				2027.0	2027.0	1	2027.0	2027.0	1	IIIB
			CULG				2028.0	2028.0	1	2028.0	2028.0	1	IIIB
03	0000	0630	CULG				0237.0	0330.0	1	0237.0	0330.0	1	IIIG
	2021	2400	CULG										
04	0000	0600	CULG				0000.0	0600.0	1	0000.0	0600.0	1	IIIGG
	2020	2400	CULG				2020.0	2400.0	2	2020.0	2400.0	2	IIIS
05	0000	0700	CULG				0000.0	0720.0	1	0000.0	0720.0	1	IIIS
			CULG				0245.0	0650.0	2	0245.0	0650.0	2	IIIGG
	2020	2400	CULG				2020.0	2400.0	1				IIIN,G,B
			CULG				2042.0	2051.0	1				U
			CULG				2123.5	2124.5	2	2123.5	2124.5	2	IIIG
06	0000	0720	CULG				0000.0	0648.0	1	0000.0	0648.0	1	IIIN,B,G,G
			CULG				2050.0	2124.0	3	2050.0	2124.0	3	IIIGG
			CULG				2131.0	2140.5	3	2131.0	2140.5	3	IIIGG
			CULG				2204.0	2211.0	2	2204.0	2211.0	2	IIIG
			CULG				2232.0	2400.0	1	2232.0	2400.0	1	IIIN,B,G
07	0000	0720	CULG				0040.5	0021.0	3	0040.5	0021.0	3	IIIGG
			CULG				0143.0	0143.0	1				IIIB
			CULG				0145.5	0145.5	1	0145.5		1	IIIB
			CULG				0206.5	0210.0	1	0206.5	0210.0	1	IIIG
			CULG				0238.0	0255.0	2	0238.0	0255.0	2	IIIGG
			CULG				0623.0	0626.0	2	0623.0	0626.0	2	IIIGG
			CULG				0632.0	0635.0	3	0632.0	0635.0	3	V
			CULG				0632.0	0642.5	3	0632.0	0642.5	3	IIIGG
	2020	2400	CULG										
08	0000	0720	CULG				0359.0	0359.0	1				IIIB
	2019	2400	CULG				2056.0	2056.5	1	2056.0	2056.5	1	IIIB
			CULG				2100.5	2101.5	1	2100.5	2101.5	1	IIIB
			CULG				2116.0	2116.0	1	2116.0	2116.0	1	IIIB
			CULG				2210.0	2218.0	1	2210.0	2218.0	1	IIIG
			CULG				2308.0	2308.0	1	2308.0	2308.0	1	IIIB
			CULG				2324.0	2333.0	2	2324.0	2333.0	2	IIIGG
09	0000	0719	CULG				0014.0	0017.0	1	0014.0	0017.0	1	IIIG
			CULG				0208.0	0209.0	1	0208.0	0209.0	1	IIIG
			CULG				0223.0	0230.0	2	0223.0	0230.0	2	IIIGG
			CULG				0233.0	0235.0	1	0233.0	0235.0	1	IIIN,B
			CULG				0536.0	0637.0	1	0536.0	0637.0	1	IIIN,B
	2019	2400	CULG				2031.0	2033.0	1	2031.0	2033.0	1	IIIB
			CULG				2225.0	2225.0	1	2225.0	2225.0	1	IIIB
10	0000	0719	CULG				0249.0	0249.0	1	0249.0	0249.0	1	IIIB
			CULG				0504.0	0504.0	1	0504.0	0504.0	1	IIIB
			CULG				0513.0	0513.0	1	0513.0	0513.0	1	IIIG
			CULG				0646.0	0648.0	1	0646.0	0648.0	1	IIIG
	2018	2400	CULG										
11	0000	0718	CULG										
	2018	2400	CULG										
12	0000	0718	CULG										
	2017	2400	CULG				2326.0	2400.0	1	2326.0	2400.0	1	IIIG
13	0000	0718	CULG				0051.0	0630.0	1	0051.0	0630.0	1	IIIGG
	2017	2400	CULG				2242.0	2243.0	1				IIIB
14	0000	0700	CULG				0610.0	0610.0	1				IIIB
			CULG				2018.0	2400.0	1	2018.0	2400.0	1	IIIS
	2018	2400	CULG				2018.0	2400.0	1				I S

SOLAR RADIO EMISSION--SPECTRAL OBSERVATIONS

OCTOBER 1987

Day	Observation Start (UT)	Observation End (UT)	Sta	Deoimetric Band Start (UT)	Deoimetric Band End (UT)	Deoimetric 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
15			CULG				0000.0	0330.0	1	0000.0	0330.0	1	IIIS
	0000	0718	CULG				0000.0	0330.0	1				I S
			CULG				0530.0	0718.0	1	0530.0	0718.0	1	IIIS
			CULG				2018.0	2400.0	1	2018.0	2400.0	1	IIIS
	2018	2400	CULG				2018.0	2400.0	1				I S
16	0000	0717	CULG				0000.0	0717.0	2	0000.0	0717.0	2	IIIG,N
	2017	2400	CULG										
17	0000	0717	CULG				0426.0	0717.0	1				IIIB,N
			CULG				0436.0	0717.0	1				I S
	2017	2400	CULG				2017.0	2202.0	1	2017.0	2022.0	1	IIIB,N
			CULG				2037.0	2050.0	1	2037.0	2050.0	1	IIIGG
18	0000	0717	CULG				0049.0	0051.0	1	0049.0	0051.0	1	IIIG
			CULG				0119.0	0120.0	1	0119.0	0120.0	1	IIIG
	2017	2400	CULG										
19	0000	0717	CULG										
	2017	2400	CULG										
20	0000	0717	CULG										
	2017	2400	CULG										
21	0000	0717	CULG										
	2017	2400	CULG										
22	0000	0716	CULG										
	2016	2400	CULG										
23	0000	0716	CULG										
	2016	2400	CULG										
24	0000	0716	CULG										
	2016	2400	CULG										
25	0000	0716	CULG										
	2016	2400	CULG										
26	0000	0716	CULG				0346.0	0346.0	1				IIIB
	2016	2400	CULG										
27	0000	0716	CULG										
	2016	2400	CULG										
28	0000	0716	CULG										
	2016	2400	CULG										
29	0000	0716	CULG										
	2016	2400	CULG										
30	0000	0716	CULG				0149.0	0149.0	1				IIIB
			CULG				0604.0	0604.0	1			1	IIIB
	2016	2400	CULG							2016.0	2400.0	1	IIIG
			CULG				2118.0	2300.0	1	2118.0	2300.0	1	IIIS
			CULG				2130.0	2400.0	1				CONT
31	0000	0716	CULG										
	2016	2400	CULG				2016.0	2400.0	1	2016.0	2400.0	1	IIIS

WORLD DATA CENTER A
FOR
SOLAR-TERRESTRIAL PHYSICS

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

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