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THE AMERICAN ASSOCIATION OF VARIABLE STAR OBSERVERS



Solar Bulletin

HARRY L. BONDY, EDITOR

61-30 157 ST., FLUSHING 67, N. Y.

SOLAR DIVISION COMMITTEE: RICHARD W. HAMILTON, AAVSO PRESIDENT; H. L. BONDY, CHAIRMAN
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MAY - JUNE 1957

Numbers: 129 - 130

SOLAR DIVISION - AAVSO PARTICIPATING IN U.S.-I.G.Y. PROGRAM OF RECORDING SUDDEN ENHANCEMENTS OF ATMOSPHERICS (SEA's).

The Solar Division-AAVSO obtained through the courtesy of Dr. Walter Orr Roberts and the National Bureau of Standards four Brown potentiometer recorders for the purpose of recording Sudden Enhancements of Atmospherics (SEA's) due to solar flares for the U.S.-I.G.Y. Solar Activity Program.

Thanks to the pioneering work of David Warshaw, the Solar Division-AAVSO is the first organization of amateurs who employ radio-astronomy techniques in a coordinated, systematic research program.

The following members are participating in this Solar Division SEA program:

- DAVID WARSHAW, Brooklyn, N.Y. (recording SEA's since Oct. 1956)
- WALTER A. FEIBELMAN, Pittsburgh, Pa. (recording since May '57)
- PHILIP J. DEL VECCHIO, Paterson, N.J. (recording since July '57)
- RALPH N. BUCKSTAFF, Oshkosh, Wisconsin
- WALTER SCOTT HOUSTON, Manhattan, Kansas
- FRANKLIN C. LOEHDE, Edmonton, Alberta, Canada
- ROBERT S. EVANS, Victoria, British Columbia, Canada

Mr. David Warshaw is acting as our chief electronic and technical adviser. Harry L. Bondy is coordinating this program and analysing the records obtained. The tabulated results are then forwarded to Dr. Walter Orr Roberts, High Altitude Observatory, for the U.S.-I.G.Y. Solar Panel.

The July-August SOLAR BULLETIN will carry a detailed report on this SEA-program.

Harry L. Bondy
Chairman, Solar Division-AAVSO

SOLAR PHOTOGRAPHY

Pictures of the sun can be made fairly easily by simply photographing the solar image as it appears projected on a white screen by a telescope using a low-powered eye-piece. This method is comparatively easy and can be applied with practically any camera. The necessary exposure can be obtained with a light-meter taking a reading of the projected image.

Photographs of the sun taken in this manner, unfortunately, are generally poor in quality lacking in sharpness of detail. This is so because the fine detail in the solar disc is not only reflected by the screen but also diffused by this process. (Smoother screens or even deep concave mirrors, f1 or f2, may be used to pick up the solar image and reflect it into the camera with less scattering of light and thus the definition of the photograph may be improved to some extent.

The best way, however, is to photograph the sun directly by placing photographic film or plates where the projection would normally be. The film (or plate) is held in a camera from which the camera lens has been removed. The solar image is projected through a low-power eye-piece onto the ground glass screen of the camera for focusing. A solar image of 3 or 4 inches in diameter is desirable and can be accommodated if the camera size is 4 x 5 or 5 x 7. Graphic, Graphlex or view cameras can be used or a "box camera" can be built to accommodate 4 x 5 or 5 x 7 film holders to do this job.

Exposures can be made either with focal plane shutters, which some of these cameras have, or with a shutter having steel blades in position on the camera lens board but minus the camera lenses. The diaphragm opening should be set at its widest and the shutter positioned directly behind the eye-piece at a distance of about one half to one inch.

In order to cut down the excessive light of the sun's image, filters as well as stops (i.e. diaphragms) on the telescope objective are used together with very slow, contrasty films so that the available shutter speed can be used. This is more or less the general procedure used in solar photography.

A description of my own equipment and method of photographing the sun may be helpful.

Most of my solar photographs have been taken with a 3" refractor of 40" focal length. The mounting is of the altazimuth type. I use a 1-inch f.l. eye-piece which projects the solar image into a 4 x 5 Graphlex camera from which the lens has been removed. The eye-piece fits loosely into a small tube where the camera lens would normally be. Stray light is kept out by a dark cloth placed around the eye-piece and telescope tube.

The camera is mounted on a tripod which has an elevating pan-head. This feature is desirable in lining up the eye-piece and camera, and in centering the solar image on the ground glass screen. The bright solar image is reduced by using a neutral-density filter over the eye-piece.

This filter has a density of one half of what would normally be used in observing the sun. Probably a denser filter than this one would be better as I still find it necessary to stop the objective lens down to 1-inch. This small stop sometimes brings out dust particles or bubbles in the eye-piece which show up as small out-of-focus smudges on the prints.

I have used Contrast Process Ortho film and Ansco Process film with good results. When the objective was stopped down to 1-inch, I have found that exposures of 1/200 to 1/400 second were about right. I develop these films in D72 for 3, 4 or 5 minutes by inspection, so that slight errors in exposure can be compensated for by shortening or lengthening development time.

Good photographs of the sun show a mottling, granulation-like appearance and details in the penumbrae and bright divisions (bridges) in umbrae if present. The limb darkening effect should be clearly noticeable.

First attempts at solar photography are often unsuccessful and even frustrating. However, some experimentation with filters and exposures will usually bring about the desired results and a satisfactory set up and procedure can be worked out.

CHARLES CUEVAS

4816 38th Street
Lond Island City 1, N.Y.



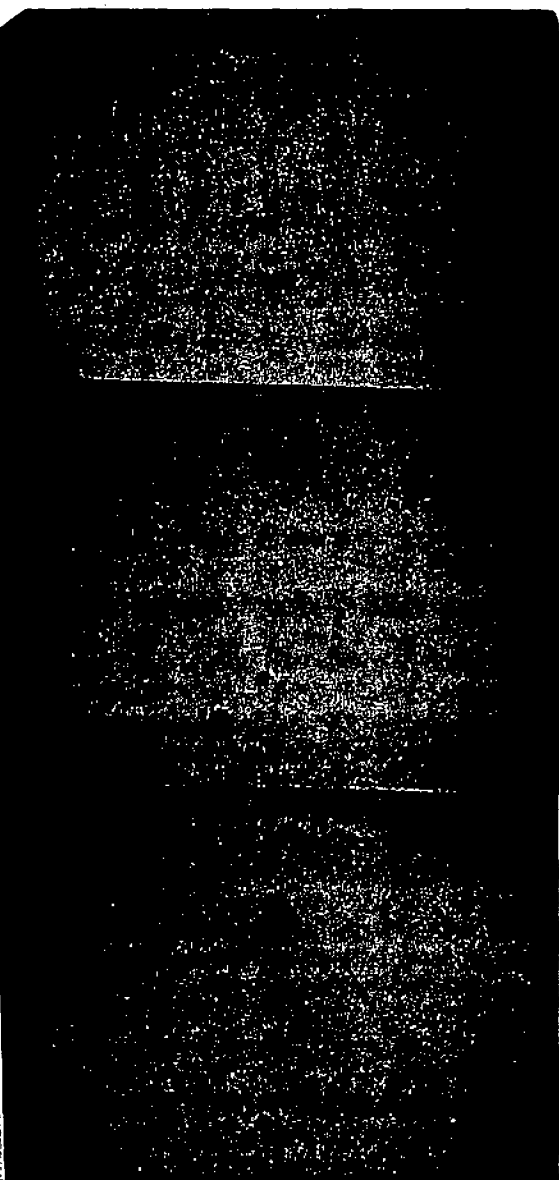
Charles Cuevas

Solar photographsby CHARLES CUEVAS20 June 1957
1530 U.T.

Note the daily rotation as well as the evolutionary changes. The high latitude F-group was the largest group recorded in such latitudes since 1874. Its f-spot (easternmost) was in latitude 841° . This group was the center of greatest activity, with numerous flares.

21 June 1957
1530 U.T.

The F-group in latitude 822° in the eastern part is among the largest of the current cycle. Its p-spot reached an area of some 1300 millionths of the solar hemisphere

22 June 1957
1545 U.T.

PIC DU MIDI

17 05 57

MEUDON

Seeing (S best)

Bill = moyenne
11h T.U.

Roi. 1387

Sunspot Number → R = 212 Qual. = 2

7h 20 T.U.

Universal Time LMC = 298

Latitude of Central Meridian

CARVES, JOURNALIERES

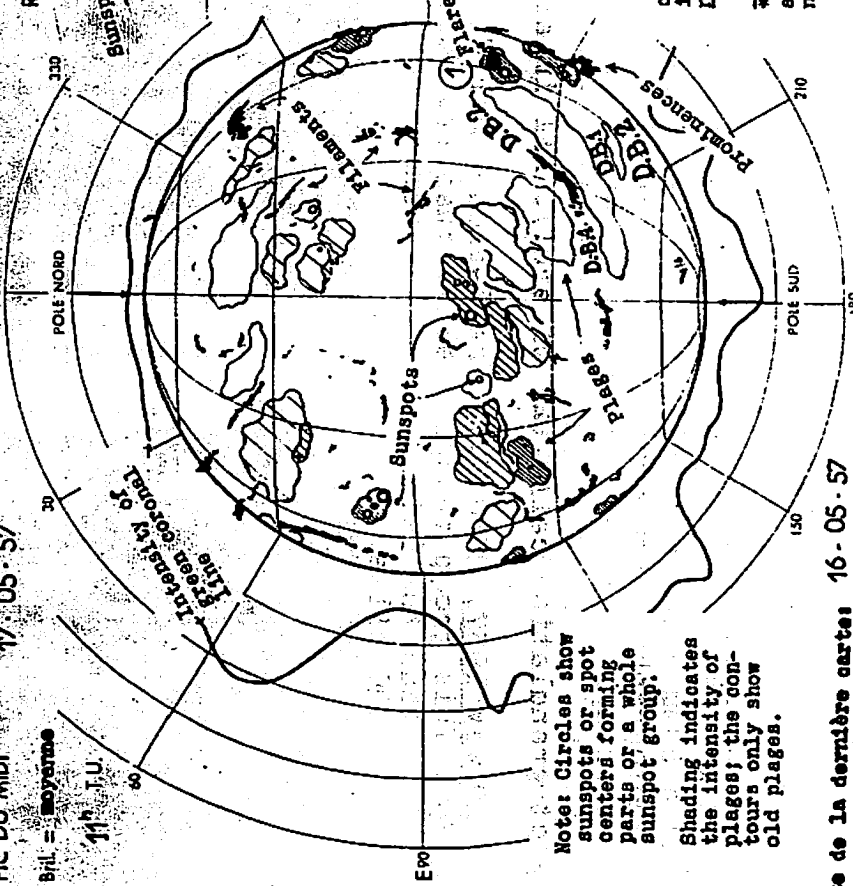
DE L'ACTIVITE SOLAIRE

These "daily maps of solar activity" are prepared by the MEUDON OBSERVATORY in France and its station at Pic du Midi.

These maps are prepared for the ICY and show sunspots, large areas (atmospheric rages), filaments (prominences) over the visible disc and limb prominences. Flares* and disaritions brusque* (=D.B.) with their importance are also indicated. The intensity of the green coronal line is shown graphically.

* D.B. are sudden disappearances of filaments or prominences.

Flare beginning and importance



Note: Circles show sunspots or spot centers forming parts or a whole sunspot group.

Shading indicates the intensity of plages; the contours only show old plages.

Date de la dernière carte: 16-05-57

A SUPERB PHOTOGRAPH TAKEN BY HANS ARBER

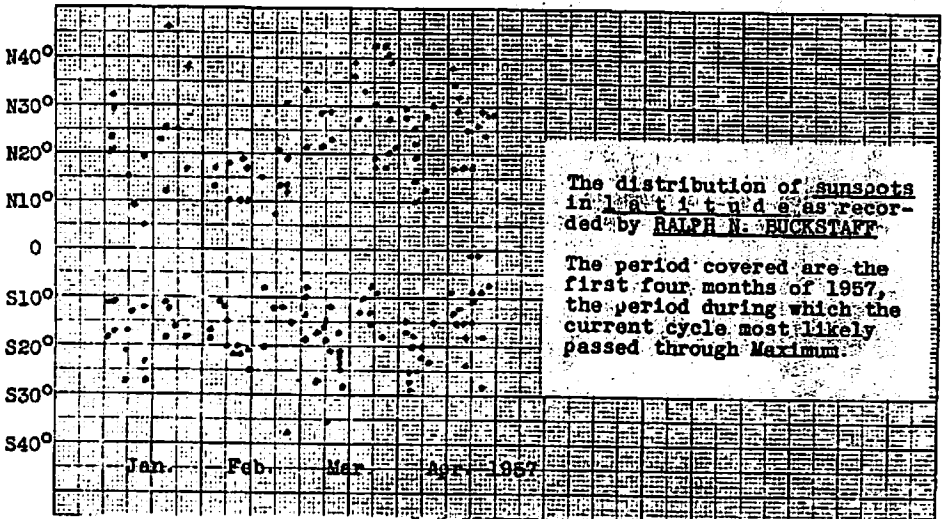
These two sunspot groups are enlargements from a photograph taken by Mr. HANS ARBER, Manila, Philippines, with his new 6-inch refractor and a 50mm eye-piece. (Ed. note: an article describing the fine solar photographic work done by Mr. Arber will be published here.) This photograph shows excellent detail - such as the penumbral structure, the radial and vortically curved filaments, numerous pores and distinct granulation cells (2" of arc!). All in all a superb photo.

Date: 10 May 1957, 2300 U.T. The F-group near Central Meridian and South 260. This group though smaller than its northern companion was more active than the latter one. It extended some 200 in longitude or some 150,000 miles.

PHOTOGRAPH BY HANS ARBER
MAY 10 1957
SOLAR BULLETIN

Data: 10 May 1957, 2300 U.T. The large F-group near Central Meridian and in latitude North 11°. Its large p-spot had alone an area of 500 millionths of the solar hemisphere. This group extended also to almost 20° in longitude. There are rather striking similarities between these two large groups.

GLASS ARREAR



12 April 1957

U.T. 07^h23^m

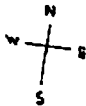


Group No. 195
L = 43°, B = -21°

Instrument used: MERZ 82mm x 103

27 April 1957

Group No. 226
L = 142°, B = -9°



Group No. 227
L = 140°, B = -17°

U.T. 06^h44^m

U.T. 06^h07^m

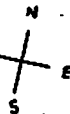
SUNSPOT DRAWINGS

by DEMETRIUS P. ELIAS
Athens, Greece.



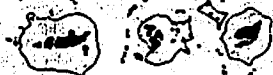
Group No. 155 24 March 1957

L = 24°, B = -13.5° U.T. 05^h59^m



U.T. 05^h45^m

25 March 1957



Group No. 155
L = 24°, B = -13.5°

Demetrius P. Elias
147 April 2

LETTERS AND NOTES

"It now appears that the Smoothed American Sunspot Numbers passed their maximum in February 1957 (1957.1) at a value of about 150 which is 46 below my predicted maximum of 196 forecast to occur at 1957.25. Since the Zurich Sunspot Numbers have been running from ten to fifteen per cent higher than the American ones recently, Dr. Waldmeier's prediction of around 170 for the maximum of the Smoothed Zurich Numbers, R_z will probably turn out to be quite accurate as will his predicted time of Maximum also. Paradoxically February 1957 had the lowest monthly mean Sunspot Number for the eight months since June 1956."

Month	Monthly Mean Amer Rel. Sunspot Number R_A'	Smoothed values R_A	Predicted
April 1956	102.4	107	104
May 1956	117.3	114	112
June 1956	106.0	122	120
July 1956	117.9	129	128
August 1956	155.7	131	136
September 1956	159.5	(133)*	144

* Estimated value

LEITH HOLLOWAY

The DAILY COLONIST, Victoria, B.C., Canada, carried in its Sunday May 12, 1957, issue a fine article about our good friend and active solar observer Mr. ROBERT S. EVANS. It tells about Mr. Evans telescopes and observatory domes. Besides a 3" refractor, Evans uses the Questar for solar observations and photography. The newest addition is his 14 feet in diameter and 15 feet high steel dome observatory, fully mechanized. This dome, however is only the frame for a new 16-inch Cassegrain type telescope which is manufactured by Cox, Hargreaves and Thomson in London and which is due to arrive in September.

Good luck and good seeing, Bob.

Dr. Huberta von Bronsart, Stuttgart, Germany, wrote us in one of her letters: "Will you come to the Canaries too in 1959, for the total eclipse? I am already preparing this trip!" Wonderful and sincerest wishes for good skies. Dr. von Bronsart organized a very successful eclipse expedition to Sweden in 1954.

SUNSPOT AREAS.Data based on the United States Naval Observatory Circulars

Monthly summary:

month 1956	mean area	mean number of groups	date of maximum spottedness	maximum areas
January	1763	5,0	18 January	4259
February	3438	8.8	21 February	6282
March	2307	9.1	15 March	3194
April	1795	8,6	10 April	3871
May	2812	8,9	29 May	4395
June	2047	6,1	22 June	3830
July	2280	8,4	10 July	3026
August	3623	12,2	23 August	5498
September	2994	13,1	14 September	6007
October	2934	11,2	10 October	4667
November	4696	10,5	7 November	8992
December	4102	11,1	6 December	5367
Mean:	2899	9,6		

Sunspot groups with largest area during 1956:

- 1) Mt. Wilson No.: 11797 11,6 Sept. at CM S26° 2714
- 2) " " " 11953 7,5 Nov. E52 S24 2504
- 3) " " " 11863 18,6 Nov. W31 S15 2403
- 4) " " " 11440 20.8 Jan. at CM N21 2254
- 5) " " " 11462 14,5 Feb. E34 N21 2109

Group No. 12054 first seen on 27 Dec. 1956 reached maximum area on 5,8 Jan. 1957 at W40 N17; area= 2876. This group would be 22nd in order of magnitude in the Greenwich tabulation of large sunspots, while the first group listed (11797) would be 25th in order.

Recurrent groups:

Mt. Wilson No.:	first seen	last seen	lat.	max. area	date
11467=11509=11556=11612	12 Feb.1.	17 May 1.	S21	1712	18 Feb.
11453=11480=11525	1 Feb.d.	21 Mar.d.	N25	813	25 Feb.
11558=11606=11648	8 Apr.1.	12 Jun.1.	N21	436	9 May
11717=11754=11830	20 Jul.1.	27 Sep.1.	S22	1604	27 Jul.
11887=11948=12002	6 Oct.1.	13 Dec.1.	N22	723	14 Nov.

l. = came or disappeared over limb; d. = torn or died on disc
An additional 45 groups returned a second time.



PHILIP J. DEL VECCHIO, Paterson, N.J.

28 April 1967, 1530 U.T.

2.4" Unitron stopped down to $1\frac{3}{4}$ "
Fine grain positive - exp. $1/125$ s.

PHILIP J. DEL VECCHIO
Paterson, N.J.
28 April 1967, 1530 U.T.

AMERICAN RELATIVE SUNSPOT NUMBERS R_A for APRIL and MAY 1957.

day	April	May	day	April	May
1	113	124	16	190	197
2	127	125	17	187	159
3	132	119	18	193	182
4	132	85	19	180	172
5	150	106	20	198	187
6	136	106	21	188	173
7	137	117	22	195	172
8	164	134	23	226	174
9	160	156	24	229	185
10	143	151	25	209	126
11	117	156	26	183	116
12	117	190	27	198	137
13	97	161	28	188	146
14	93	205	29	180	163
15	124	179	30	151	159
			31	-	134

Monthly mean R_A for APRIL: 161.2MAY: 151.5

* * * * *

ZURICH PROVISIONAL SUNSPOT NUMBERS R_Z for APRIL and MAY 1957
dependent on observations made at Zürich Observatory and its
stations in Locarno and Arosa.

day	April	May	day	April	May
1	140	118	16	181	185
2	156	121	17	202	179
3	135	123	18	205	186
4	156	106	19	207	178
5	138	92	20	208	179
6	108	142	21	218	195
7	138	136	22	212	155
8	160	150	23	226	164
9	163	162	24	248	195
10	150	195	25	251	150
11	121	211	26	223	140
12	114	207	27	213	140
13	143	202	28	223	147
14	122	214	29	177	154
15	162	210	30	155	172
			31	-	180

Monthly mean R_Z for APRIL: 175.2MAY: 164.8