

Solar Bulletin

THE AMERICAN ASSOCIATION OF VARIABLE STAR OBSERVERS— SOLAR DIVISION

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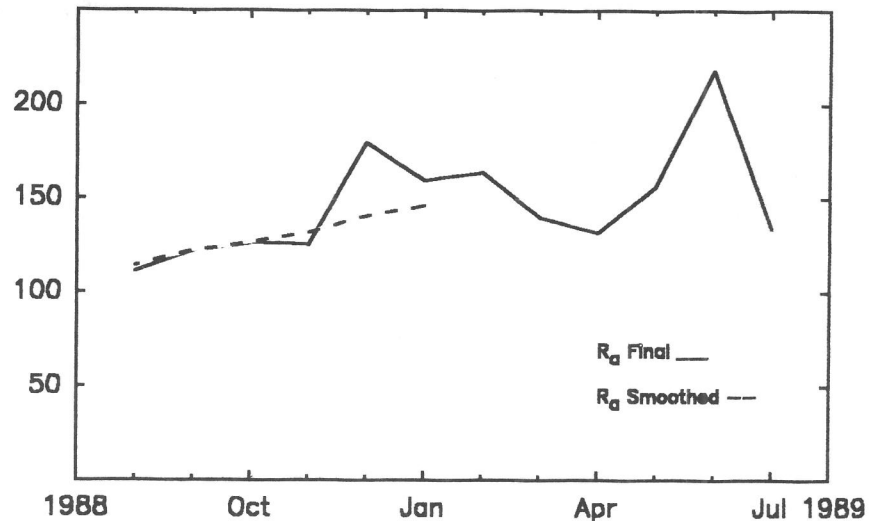


Volume 45 Number 7

July 1989

American Relative Sunspot Numbers for July

| | | | |
|--------------|----------------------|---------|--|
| | R _a Final | | |
| 1) 139 | 11) 145 | 21) 181 | |
| 2) 153 | 12) 123 | 22) 217 | |
| 3) 134 | 13) 114 | 23) 215 | |
| 4) 122 | 14) 111 | 24) 169 | |
| 5) 110 | 15) 96 | 25) 135 | |
| | | | |
| 6) 131 | 16) 105 | 26) 108 | |
| 7) 153 | 17) 111 | 27) 98 | |
| 8) 144 | 18) 126 | 28) 88 | |
| 9) 112 | 19) 146 | 29) 112 | |
| 10) 115 | 20) 160 | 30) 130 | |
| | | 31) 144 | |
| Mean = 133.8 | | | |



The smoothed-mean American Relative Sunspot Number for January 1989 is 146.1. One-hundred-nine members of the international network of **American Sunspot Program** contributors submitted reports for July. Solar activity decreased during the month. One X-level and eight M-class flares were recorded during July. The month's only X-level event, an X2.6/2N flare, was spawned by Region 5603 (N28, L358, DSO on 25 July) as it neared the western limb on the 25th. Protons from this event were observed on Earth some twenty minutes after its beginning. This (proton) event was the most energetic of cycle 22 when measured by high energy (> 100 MeV) particles, although its peak flux was low. The Ottawa 10.7 centimeter radio flux dropped to below 170 and background x-radiation fell to the upper B-level during July.

The *estimated* American Sunspot Number for 1-15 August is 219. Solar activity increased when compared with July. Three X-level, and thirty-four M-level events have occurred during this interval. All three X-class events were produced by Region 5629 (S16, L075, FKC on 12 August). The first, on 12 August, was rated X2.6/2B. The second, an X3.5/3B flare, occurred on the 14th accompanied by discrete bursts in the thousands of flux units across the radio spectrum. The third event was an X1.0/SF on the 15th. By the 15th, this activity had helped to raise the solar 10.7 centimeter flux and background-level to 278 and C4.3 respectively, and the geomagnetic field was at minor to severe storm conditions.

NOTE: Early on the 16th, a fourth major flare (possibly upper X-level) was reported from Region 5629.

References: SESC PRE, Numbers 722-28, (1989); SESC SDF, Numbers 223-27, (1989).

Our collaborator in West Germany, Jochen Friedrichs (Wesendorfer Str. 12, 1000 Berlin 26) is seeking the following reference in connection with his research: D.J.K. O'Connell, 1958, The Green Flash and Other Low Sun Phenomena, Vatican Observatory, North Holland Publishing Company. Please contact Mr. Friedrichs directly in this regard.

Predicted Smoothed Relative Sunspot Numbers

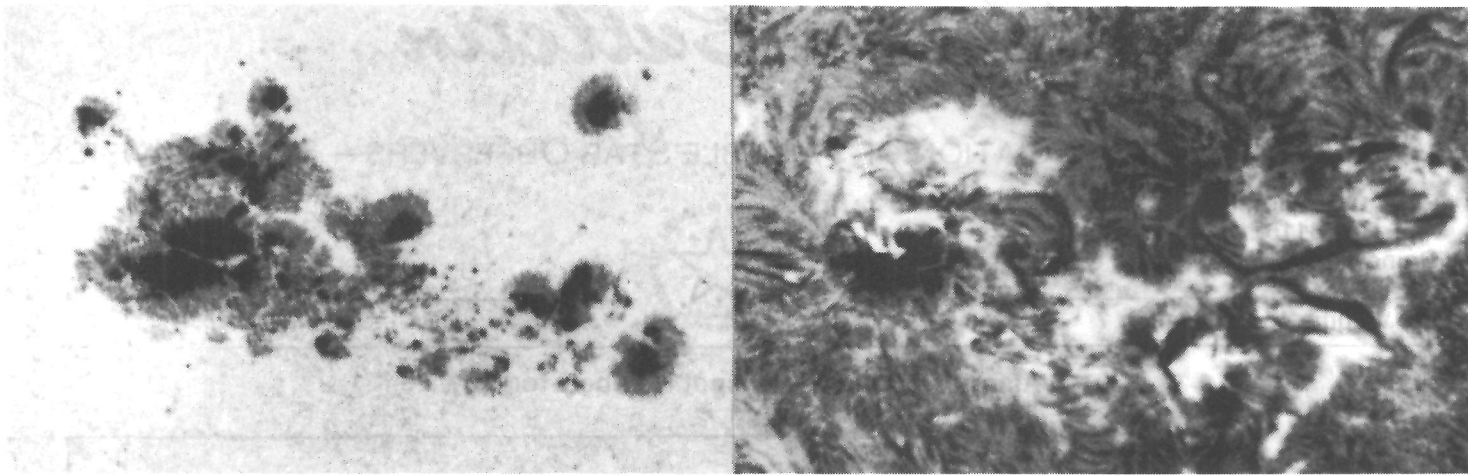
McNish - Lincoln Method

February 142 (7); March 149 (10); April 155 (13); May 161 (15); June 167 (19); July 169 (25).

Solar-Geophysical Data, Number 538, Part I, 14.

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(Note: Network collaborators should utilize these reporting facilities whenever possible.)



These photographs show SESC Region 5528 (N20, L093, FKC on 15 June) as it appeared on 15 June. The left frame was taken in white-light at 08:42 Universal Time, and the photo to the right in hydrogen-alpha at 09:22. During its disk passage between 7 and 20 June, Region 5528 produced one X-class and eleven M-level solar flares, and grew to encompass an area of 2340 millionths solar hemisphere on the 14th. The X-level (X1.6/3B) event on the 20th was accompanied by an eruptive prominence extending to .55 solar radii and 10.7 centimeter burst of 560 s.f.u. (PRF, 1989). The photographs were taken by Professor Jean Dragesco from the south of France.
 SESC PRF, Number 721, June 1989.

Sudden Ionospheric Disturbances Recorded During June
 Records were received from A1,9,19,26,46,50,52,59,61,62,63,64.

| Day | Max | Imp | Day | Max | Imp | Day | Max | Imp | Day | Max | Imp | Day | Max | Imp |
|----------------|-------|-----|-----|-------|-----|-----|-------|-----|-----------------|-------|-----|-----------------|-------|-----|
| 1 | 21:34 | 1+ | 6 | 20:13 | 2 | 11 | 19:36 | 1 | 15 | 22:22 | 1+ | 21 ¹ | 12:15 | 2 |
| 2 | 05:35 | 3+ | 7 | 10:56 | 1 | 11 | 20:36 | 1 | 16 | 04:51 | 1 | 21 ¹ | 13:21 | 1+ |
| 2 | 13:35 | 1+ | 7 | 12:54 | 1+ | 11 | 21:15 | 2 | 16 | 05:19 | 2+ | 21 ¹ | 14:13 | 2 |
| 2 | 16:02 | 2+ | 7 | 13:30 | 1 | 12 | 12:46 | 1- | 16 | 07:41 | 2+ | 21 | 17:20 | 2 |
| 2 | 17:04 | 2 | 7 | 19:10 | 1+ | 12 | 13:02 | 1 | 16 | 09:20 | 2+ | 21 | 18:54 | 1 |
| 2 | 17:58 | 1 | 7 | 20:12 | 1- | 12 | 15:57 | 1 | 16 | 12:05 | 1- | 21 | 19:50 | 2 |
| 2 | 18:16 | 2 | 7 | 20:42 | 2 | 12 | 17:00 | 2+ | 16 | 12:25 | 2 | 22 | 07:58 | 1 |
| 3 | 03:16 | 1- | 8 | 07:03 | 1+ | 12 | 19:08 | 1+ | 16 | 14:45 | 1- | 22 | 12:45 | 1- |
| 3 | 12:17 | 2 | 8 | 08:14 | 2 | 12 | 19:42 | 1- | 16 | 15:15 | 1+ | 22 | 13:47 | 2 |
| 3 | 13:18 | 2+ | 8 | 09:19 | 2+ | 12 | 21:13 | 1 | 16 | 17:01 | 2+ | 22 | 14:43 | 2+ |
| 3 | 16:25 | 2 | 8 | 13:07 | 1 | 12 | 21:54 | 1 | 16 | 19:02 | 2+ | 22 | 21:25 | 1+ |
| 3 | 17:00 | 2 | 8 | 14:00 | 2 | 13 | 11:09 | 2 | 16 | 21:50 | 2 | 23 | 12:42 | 1+ |
| 3 | 18:28 | 2+ | 8 | 17:40 | 2 | 13 | 14:36 | 1+ | 17 | 04:28 | 2+ | 23 | 17:53 | 1 |
| 3 | 20:50 | 1+ | 8 | 22:32 | 1+ | 13 | 19:42 | 2 | 17 | 09:44 | 1+ | 24 | 12:28 | 1 |
| 3 | 23:12 | 2 | 9 | 05:51 | 1 | 14 | 07:32 | 1+ | 17 | 16:01 | 3 | 24 | 13:55 | 2+ |
| 4 | 08:00 | 2 | 9 | 08:00 | 2+ | 14 | 13:56 | 2 | 18 ¹ | 05:53 | 2 | 24 | 16:04 | 2+ |
| 4 | 08:33 | 1 | 9 | 16:00 | 2 | 14 | 15:51 | 1 | 18 | 14:47 | 1- | 24 | 18:51 | 2+ |
| 4 | 09:00 | 2+ | 9 | 16:32 | 2 | 14 | 16:36 | 2+ | 18 | 16:19 | 1+ | 25 | 18:08 | 1 |
| 4 ¹ | 12:28 | 2 | 9 | 17:52 | 1+ | 14 | 18:17 | 1+ | 18 | 19:01 | 2 | 26 | 15:57 | 2+ |
| 4 | 13:18 | 1- | 9 | 19:18 | 2 | 14 | 20:06 | 2 | 18 | 20:01 | 2 | 26 | 21:10 | 1 |
| 4 | 13:45 | 1+ | 9 | 20:28 | 2 | 14 | 21:36 | 1+ | 18 | 20:45 | 1- | 27 | 12:20 | 1+ |
| 4 | 14:08 | 2 | 9 | 21:41 | 1 | 14 | 23:17 | 2+ | 18 | 23:47 | 1+ | 27 | 13:40 | 1+ |
| 4 | 16:18 | 1- | 9 | 22:50 | 2 | 15 | 05:46 | 1 | 19 | 05:47 | 1+ | 27 | 18:31 | 2 |
| 4 | 16:34 | 2+ | 10 | 05:57 | 1 | 15 | 07:40 | 2 | 19 | 07:32 | 2+ | 28 | 08:40 | 2+ |
| 4 | 21:16 | 2+ | 10 | 06:18 | 1 | 15 | 10:10 | 1+ | 19 | 16:54 | 1+ | 28 | 13:04 | 2 |
| 5 | 07:26 | 2 | 10 | 09:44 | 1+ | 15 | 11:35 | 1+ | 19 | 18:00 | 2 | 28 | 17:47 | 1 |
| 5 | 08:18 | 1 | 10 | 12:03 | 1 | 15 | 13:31 | 1+ | 19 | 19:32 | 1- | 28 | 18:16 | 3 |
| 5 | 11:15 | 2 | 10 | 12:30 | 1 | 15 | 13:57 | 1- | 19 | 21:57 | 2 | 29 | 21:16 | 2+ |
| 5 | 14:23 | 2 | 10 | 12:50 | 2 | 15 | 14:19 | 2 | 20 | 08:17 | 1+ | 30 | 06:11 | 2+ |
| 5 | 15:45 | 2 | 10 | 14:07 | 1+ | 15 | 15:02 | 1+ | 20 | 13:45 | 2+ | 30 | 13:34 | 1+ |
| 5 | 19:23 | 1+ | 10 | 16:18 | 1+ | 15 | 15:47 | 1 | 20 | 15:00 | 3 | 30 | 14:18 | 1+ |
| 5 | 20:09 | 2 | 10 | 16:55 | 2 | 15 | 16:33 | 1 | 20 | 17:25 | 2+ | 30 | 15:00 | 2 |
| 5 | 21:34 | 2 | 10 | 19:02 | 1+ | 15 | 17:15 | 1+ | 20 | 20:20 | 2 | 30 | 16:43 | 1 |
| 6 | 11:01 | 2+ | 10 | 20:56 | 1- | 15 | 17:58 | 1- | 20 | 21:01 | 2+ | 30 | 17:09 | 1- |
| 6 | 12:32 | 2+ | 11 | 09:15 | 2+ | 15 | 18:14 | 1- | 20 | 21:59 | 2+ | 30 | 17:23 | 1- |
| 6 | 14:46 | 1- | 11 | 13:48 | 2+ | 15 | 19:02 | 1- | 21 | 04:49 | 2 | 30 | 17:38 | 2 |
| 6 | 16:36 | 1 | 11 | 15:37 | 1 | 15 | 19:15 | 2 | 21 | 11:42 | 1 | 30 | 18:42 | 2 |
| 6 | 18:21 | 1 | 11 | 18:56 | 2 | | | | | | | | | |

¹Def = 4. Def = 5 for all other events.

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