Solar Bulletin

THE AMERICAN ASSOCIATION OF VARIABLE STAR OBSERVERS— SOLAR DIVISION

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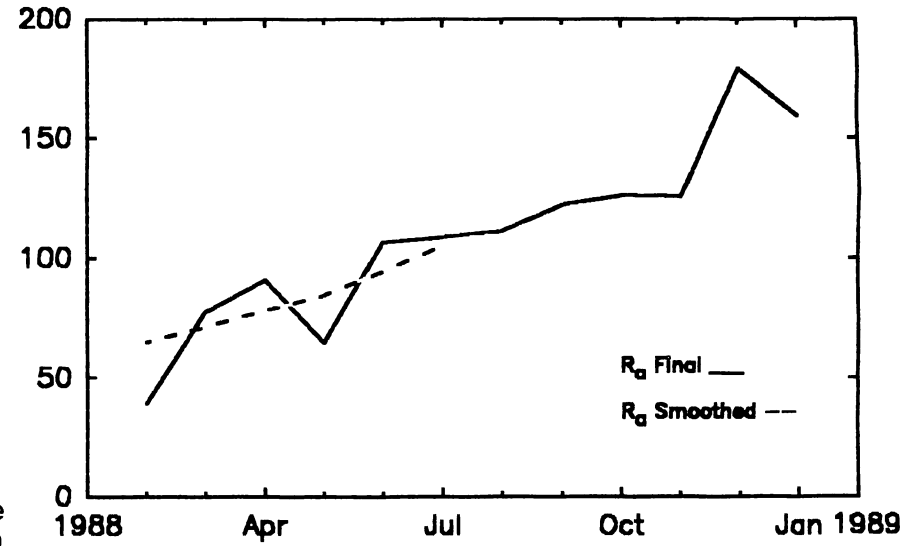
Volume 45 Number 1 January 1989

American Relative Sunspot Numbers for January

	R_a Final				
1)	150	11)	200	21)	114
2)	149	12)	197	22)	151
3)	135	13)	206	23)	154
4)	116	14)	189	24)	130
5)	142	15)	187	25)	157
6)	146	16)	170	26)	156
7)	176	17)	154	27)	166
8)	189	18)	151	28)	172
9)	170	19)	132	29)	168
10)	195	20)	113	30)	149
				31)	148

Mean = 159.1



The smoothed mean American Relative Sunspot Number for July 1988 is 104.9.

One hundred and four members of the international network of **American Sunspot Program** contributors submitted reports for January. Flare activity for January was the highest thus far, during cycle 22. Seven X-level, and ninety-four M-level x-ray flares were recorded during the month. The estimated mean American Sunspot Number for 1-14 February is 170. During this period, SESC Region 5354 (N30, L286, class FKI on 9 February) produced an X1 flare on 4 February, an M9 event on the 8th, and combined with Region 5355 (N22, L268, class CAO on 10 February) to produce an X3 flare on 9 February. Region 5355 produced a third X-flare on the 10th.

Sudden Ionospheric Disturbances Recorded During December

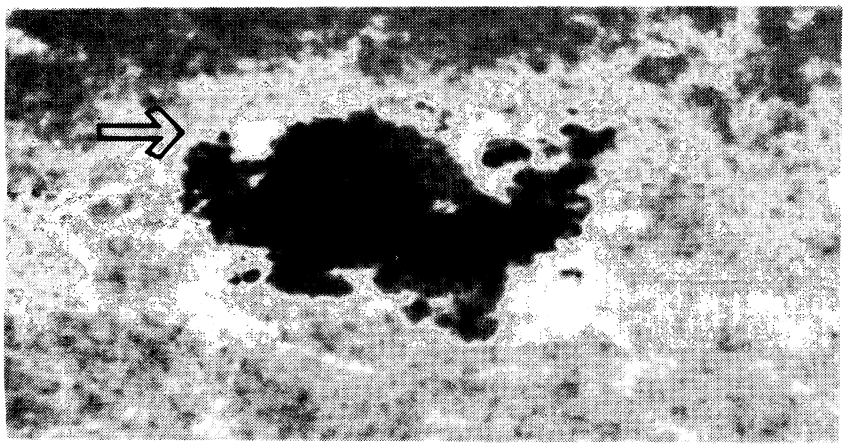
Records were received from A1,3,9,19,26,40,46,49,50,52,59,60.

Day	Max(UT)	Imp	Def	Day	Max(UT)	Imp	Def	Day	Max(UT)	Imp	Def
1	19:07	1-	5	15	18:23	1	5	23	19:35	1+	5
2	13:44	1	5	15	21:32	2+	5	24	06:58	1+	5
7	16:33	1-	5	16	08:33	2	5	24	15:20	1+	5
7	17:52	1	5	16	17:55	1+	5	24	16:58	2	5
7	18:29	1-	5	17	05:02	1	5	25	19:09	1	5
8	20:22	1	5	17	16:33	1+	5	26	07:04	2	5
9	18:23	1	5	17	17:38	2+	5	26	20:48	1-	5
9	21:16	2	5	18	09:17	1-	5	26	21:15	1+	5
10	14:29	2+	5	18	16:42	1+	5	27	05:30	2+	5
10	16:53	1	5	18	17:14	2	5	27	07:08	2+	5
12	19:29	1+	5	19	16:17	1+	5	28	07:36	2+	5
14	13:00	1-	5	19	18:49	2	5	28	08:51	1	5
14	13:43	1-	5	20	08:47	1	5	28	14:37	2+	5
14	17:38	2+	5	21	15:01	2	5	28	18:49	2	5
14	19:49	2	5	22	06:23	2	5	29	16:44	1+	5
14	20:40	1	5	22	11:09	1	5	29	18:30	1	5
15	05:06	2	5	22	16:06	2+	5	29	20:47	1+	5
15	15:30	2	5	23	08:52	2+	5	30	17:11	1	5
15	16:10	2	5	23	14:40	1+	5	30	18:10	2	5
15	17:56	1	5	23	15:17	2	5	31	13:57	1	5

SID Analyst: Bruce R. Wingate

White-Light Flare Update

The following additional statistical material on solar white-light flares (WLFs) is provided to us by **American Sunspot Program** collaborator, Thomas Compton. The information has been summarized from the extensive review of WLFs by Neidig and Cliver (1983) and supplements that previously supplied by Neidig (1988).

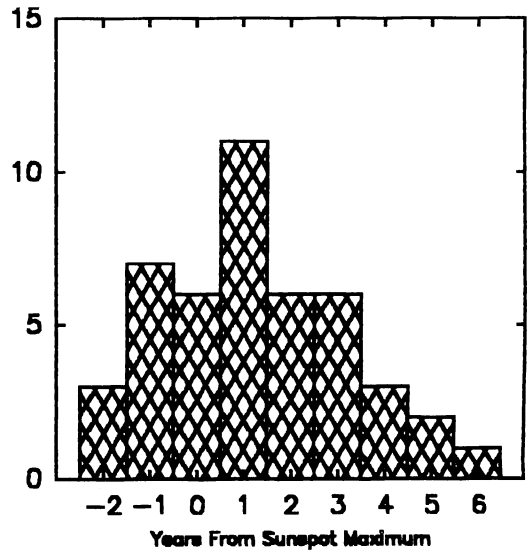


Because of their relatively low contrast when viewed against the solar background, WLFs are detected only rarely. Less than sixty have been observed since the first was seen by Carrington and Hodgson in 1859. The flares can usually be expected to last between one and ten minutes, and often appear as one or more small, rapidly brightening *patches* or *ribbons*, near, or within, a large and complex sunspot group. One of the brightest WLFs is pictured in the accompanying photograph, taken just inside the visual portion of the spectrum, at 4275Å. (Photograph courtesy of **Sacramento Peak Observatory**.)

Even though WLFs occupy only a small percent of the area encompassed by Hα flares, they are tremendously energetic events. They may radiate as much energy, in only a few moments, as the *total* emitted by their Hα counterparts (i.e., ~10^{30} erg) with peak power near 10^{28} erg/sec.

By far, the most likely area for a WLF is adjacent to, or within, the "K" type penumbra of the principal sunspot of a "delta" class sunspot group. **SESC** K-class penumbrae are greater than two and one-half heliographic degrees in diameter. Importantly, they are *asymmetric or oval*, and enclose two or more umbrae. When they exceed five degrees in longitudinal spread they almost always include both magnetic polarities within the single penumbra. They are designated, "delta," when opposite polarities exist within two degrees of one another, inside this penumbra. These are the sources of the truly great flares. There is a high probability that the associated sunspot group will be classified "D," "E" or "F," and that it will encompass an area of more than five-hundred millionths solar hemisphere. Groups with many small spots located between the principal leading and trailing spots are especially likely sources.

Seventy-percent of the WLFs that have been detected so far, have occurred in the Northern Solar Hemisphere. They appear at average latitudes of 18° ±1° in the Northern Hemisphere, and 13° ±2° in the Southern Hemisphere. WLF activity begins earlier in the Northern Hemisphere than it does in the South, around one to two years before sunspot cycle maximum. However, when the hemispheres are combined, activity appears to peak around one year *after* maximum. The relationship of WLFs and sunspot cycle maxima is shown in the figure to the right.



Observers are again encouraged to report their observation of a WLF to the Editor. Please include date, time (UT), associated sunspot active area and estimate of the flare's brightness relative to the surrounding photosphere. Additional information is available in the cited references.

References

Neidig, D.F. 1988, Solar Bulletin, 44, Number 6.

Neidig, D.F. and Cliver, E.W. 1983, **AFGL-TR-83-0257**, National Technical Information Service.

R_i Provisional

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8)	135	18)	160	28)	172
9)	165	19)	140	29)	169
10)	190	20)	126	30)	157
				31)	154

Mean = 161.6

Sunspot Bulletin, 1989, 1.

Predicted Smoothed American Sunspot Numbers

McNish - Lincoln Method:

August 109; September 116; October 123;
November 129; December 133; January 137.

Solar Geophysical Data, 532, I, 14.

The American Relative Sunspot Numbers and related information are available through the CompuServe Information Service, MCImail, INFOPLEX, and through domestic and international Telex and Fax.