

Solar Bulletin

THE AMERICAN ASSOCIATION OF VARIABLE STAR OBSERVERS— SOLAR DIVISION

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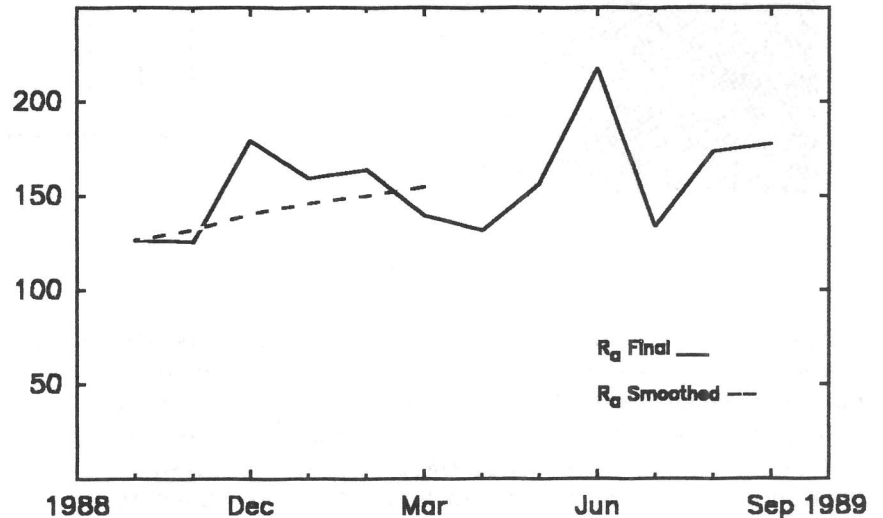
Volume 45 Number 9

September 1989

American Relative Sunspot Numbers for September

R _a Final		
1) 149	11) 254	21) 102
2) 168	12) 272	22) 106
3) 198	13) 252	23) 110
4) 220	14) 213	24) 85
5) 223	15) 205	25) 83
6) 243	16) 192	26) 86
7) 275	17) 155	27) 104
8) 260	18) 144	28) 113
9) 284	19) 147	29) 131
10) 284	20) 120	30) 149

Mean = 177.6



The smoothed-mean American Relative Sunspot Number for March 1989 is 154.7. One-hundred-five members of the international network of **American Sunspot Program** contributors submitted reports for September. Solar activity remained at the relatively high levels experienced during August. Sixty-six M-level, and six X-level x-ray events were detected during September. SESC Region 5669 (S17, L085, FKC on 3 September) produced four of the X-class events, and a majority of the M-level flares which occurred during the first half of the month. Region 5680 (N16, L354, FKI on 9 September) yielded a fifth X-flare on the 9th. September's final X-level event, a powerful X9.8 flare on the 29th from Region 5698 (S25, L220, EKC on 21 September), resulted in the highest-intensity ground level proton event in thirty years. However, the strong geomagnetic disturbance expected from the eruption did not materialize. The solar 10.7 centimeter radio flux and background x-radiation levels were at 201 and C1.3, respectively, on the 30th.

The *estimated* American Sunspot Number for 1-15 October is 181. Although sunspot numbers continued to be fairly high, flare activity declined during the first half of October when compared with September. Thus far, seven flares have met or exceeded the M-class threshold, and all were low or moderate-intensity M-level events. Two regions, 5744 (S23, L228, DSO on 15 October) and 5747 (S27, L211, DKO on 15 October) rotated over the east limb on 11-13 October near the location of old Region 5698 which produced the X9.8 flare referred to above, and were responsible for some increase in activity at the end of the period.

References: SESC PRF, Numbers 731-36, (1989); SESC SDF, Numbers 282-88, (1989).

Predicted Smoothed Relative Sunspot Numbers

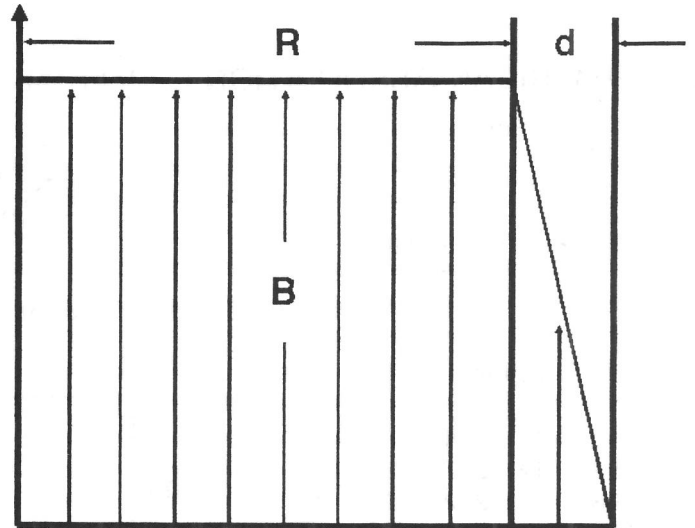
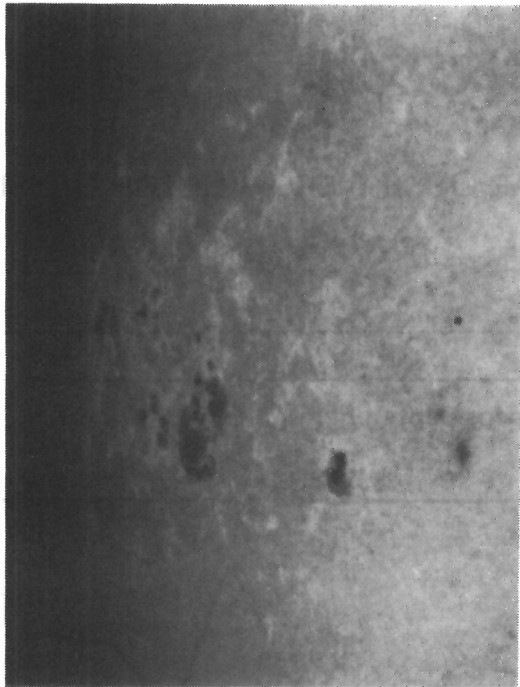
McNish - Lincoln Method:

April 158 (14); May 164 (16); June 170 (18); July 173 (23); August 175 (28); September 182 (31).

Solar-Geophysical Data, 540, I, 14.

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



Facular Heating

Thomas G. Compton, American Sunspot Program

The photospheric faculae, like sunspots, are thought to be associated with magnetic flux tubes. Over the past 10 years or so, high resolution observations have disclosed a considerable amount of new information concerning the fine-scale structure of these features. When observed at disk center, the facular "filigree" appears to be 50-100 percent more intense than the surrounding photosphere. In 1986, E.V. Kononovich and others at *Shternberg Astronomical Institute* in Moscow, proposed a model which could explain this large difference. According to the Kononovich model, facular flux tubes, 100-220 kilometers in radius, are bordered by "ring" electric currents confined to a thin, 6 meter skin which surrounds the magnetic plasma field. The flux tubes have a field strength of 1500-2000 gauss with a type of configuration which could heat the faculae to the required level. The key to the Kononovich model is the excellent resolution of current observations (better than 0".3), which is capable of defining facular "points" measuring only 150-300 kilometers in diameter.

The figure to the left shows the bright-appearing faculae associated with **SESC Region 5409** (N18, L141, EKI on 26 March) as it neared the Sun's western limb on 26 March 1989. The photograph was taken by **American Sunspot Program** collaborator, Franky Dubois, Langemark, Belgium, using a 102 millimeter F/15 refractor (1/60th second, Afga Ortho 25). Mr. Compton supplied the schematic diagram on the right, prepared from a similar drawing in Kononovich, et al. (1986). In the latter figure, "d" represents the transition-skin thickness, "R" the flux tube radius, and "B" the magnetic plasma field.

Reference: Kononovich, E.V., Mironova, I.V. and B.E. Serebryakov, 1986, *Soviet Astronomy Letters*, 12, 3, 164.

Sudden Ionospheric Disturbances Recorded During August

Records were received from A1,3,9,19,46,50,52,61,62,63,64,65.

Day	Max	Imp	Day	Max	Imp	Day	Max	Imp	Day	Max	Imp	Day	Max	Imp
1	06:56	1	5	19:55	2	10	05:31	2	15	13:50	3	29	12:58	1
1	09:31	1-	6	07:50	2+	11	16:24	1	15	15:05	1+	29	13:15	2+
1	09:48	1	6	10:11	2	11	20:20	1+	15	17:00	1-	29	15:19	1+
2	07:48	2+	6	12:07	2+	12	03:05	2	15	17:55	2	29	16:46	1-
2	23:13	1	7	09:30	2+	12	07:38	1	15	18:58	2+	29	17:03	1-
3	07:00	1-	7	20:55	2+	12	08:00	2+	15	20:40	2+	29	17:25	2+
3	07:48	2+	8	05:17	2+	12	09:28	2+	17	18:50	3	29	18:15	1+
3	16:37	2	8	06:47	1+	12	14:06	3+	23	20:04	1+	30	16:35	2
3	20:47	1+	8	15:29	1-	13	06:27	1-	24	16:15	2+	30	16:40	2
5	05:58	2+	8	19:18	2	13	07:20	2+	29	04:30	2+	31	16:15	1-
5	10:29	1+	9	06:49	1	13	13:58	2+	29	08:29	2	31	16:30	1
5	16:23	2+	9	14:28	2	14	19:18	2						

Def = 5 for all events. **SID Analyst:** Bruce R. Wingate