

# Solar Bulletin

THE AMERICAN ASSOCIATION OF VARIABLE STAR OBSERVERS - SOLAR DIVISION

Elizabeth Stephenson, Editor  
14205 Washington Boulevard  
University Heights, OH 44118



email: AU206265@aol.com  
phone: 216-291-0275  
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## American Relative Sunspot Numbers, $R_a$ , for July 1998

Date	$R_a$ Final		Date	$R_a$ Final		Date	$R_a$ Final
1	112		11	66		21	87
2	117		12	66		22	94
3	126		13	50		23	91
4	122		14	48		24	91
5	109		15	71		25	75
6	75		16	75		26	70
7	56		17	64		27	82
8	44		18	50		28	91
9	42		19	51		29	78
10	60		20	81		30	71
						31	77

Monthly Mean = 77.1

(Based on 1075 observations contributed by 63 observers)

Flares observed by sunspot observers during late June and July 1998.

Solar Flares - June-July 1998						
Date	Times U.T.			Importance	Location	Observer
	Start	Maximum	End			
June 27	in progress	00:40:	00:50	1+	-	Cragg
July 4	?	22:20	?	-	-	Leventhal
July 4	?	22:20	?	-	-	Leventhal
July 10	04:03	04:09	04:14	1-	SE limb	Cragg
July 11	in progress	04:48	05:14	1	SW group	Cragg
July 11	?	22:30:	?	-	-	Leventhal
July 12	01:24	01:29	01:34	1	NW group	Cragg

Betty Stephenson, Chair  
AAVSO Solar Division

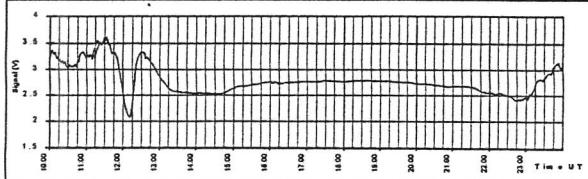
### On Counting Groups

Michel Lerman and his group have put together a rather comprehensive review of the art of counting groups. For a copy of this review, write to Mr. Lerman at 1 Church Street, Penetanguishene, ONTARIO, CANADA L9M 1A7. Or by e-mail to "lermanma@csolve.net." Or to me (addresses on page 1).

We seem to be in rather good agreement in our counts of groups. Changes may not be in order at all. Count what you think is correct, based on your own individual observations. If you are in doubt, just add a question mark and I will compare your count for that day with the collection of drawings I usually have on hand. Monty Leventhal in Australia sends in drawings and I have a set of my own. Drawings made by other observers are most heartily invited and welcome.

# Sudden Ionospheric Disturbance Report

Casper Hossfield, SID Coordinator  
PO Box 23  
New Milford, NY 10959 USA  
casper@carroll.com  
FAX 201.327.5246



Joseph Lawrence, SID Analyst  
1808 N. Anthony Blvd.  
Fort Wayne, IN 46805 USA  
lawrence@ipfw.edu

## Sudden Ionospheric Disturbances Recorded During July 1998

Date	Max	Importance	Date	Max	Importance	Date	Max	Importance
980701	1813	2	980704	1847	2	980715	1559	2+
980701	1841	1	980705	1143	2	980715	1954	2+
980703	2007	1	980705	1825	1+	980716	1623	2
980704	0550	2	980711	1251	1+	980716	2029	2
980704	1015	2	980714	1255	2+	980718	1656	2
980704	1212	2+	980714	1904	2	980719	1844	1-
980704	1454	2	980715	1054	1+			
980704	1643	2+	980715	1517	1+			

The following observers submitted reports and/or charts for July:

A-09 Scharlach, Arizona \* A-50 Winkler, Texas \* A-52 Overbeek & Toldo, Republic of South Africa  
A-62 Stokes, Ohio \* A-63 Ellerbe, Spain \* A-72 Witkowski, Florida \* A-80 King, England  
A-84 Moos, Switzerland. \* A-87 Hill, Massachusetts

The events listed above meet at least one of the following criteria:

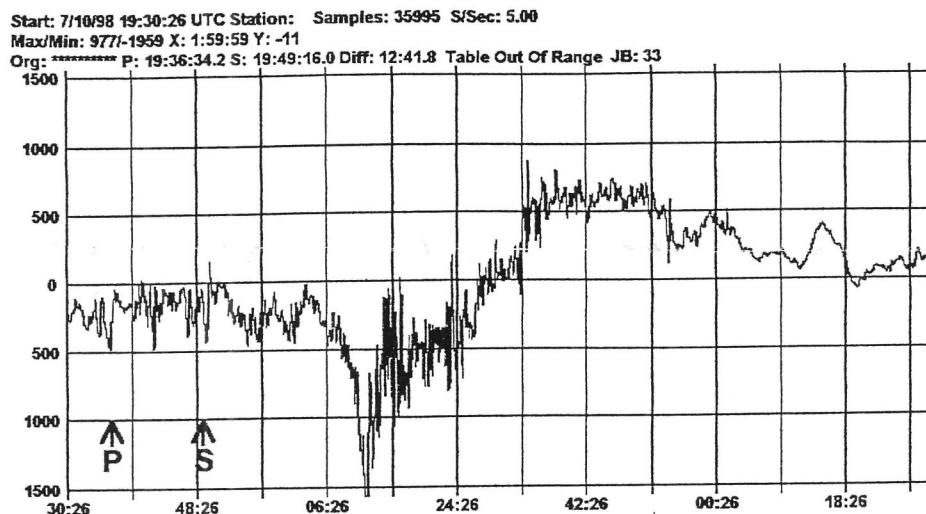
- 1) reported in at least two observers' reports.
- 2) visually analyzed with definiteness rating = 5 on submitted charts
- 3) reported by overseas observers with high definiteness rating

Analyst's Notes: The June 1998 SID Report omitted A-80 King, England from the list of contributors. The report transmitted to the National Geophysical Data Center properly credited A-80 with many SID event observations. My sincerest apologies to A-80 for the omission which was solely my responsibility.

SID program observers should continue to send e-mail reports and stripchart results to the addresses given in the masthead of this report for the SID Analyst. Preferably the results should be submitted by the 10th of each month succeeding the recording. The timely delivery of SID results facilitates the preparation of both the NGDC and Solar Bulletin reports. All observers are commended for their diligence in sending reports early each month.

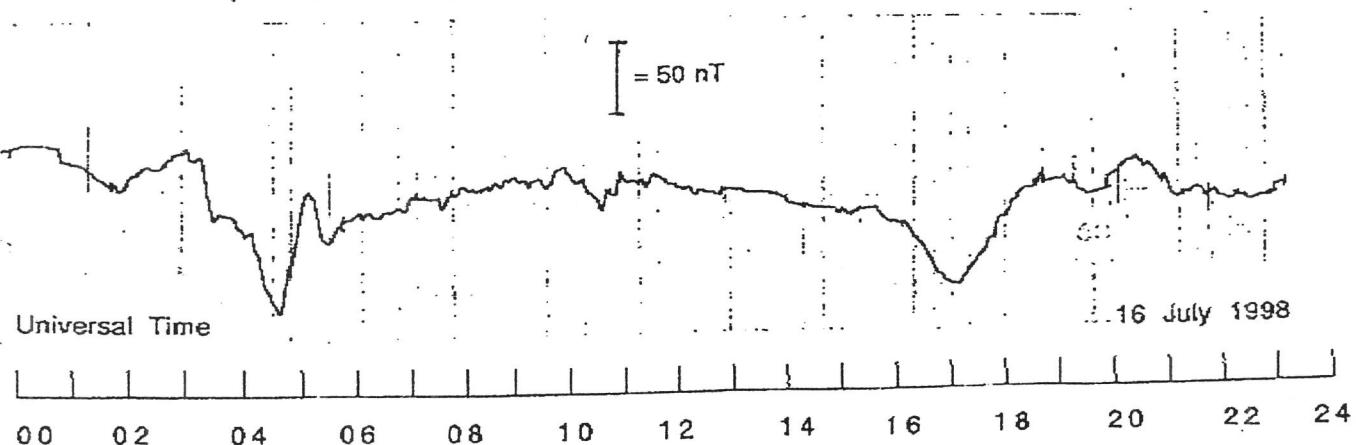
J. Lawrence (A-82)  
SID Analyst

The SID section of the May Solar Bulletin had a reproduction of a magnetogram recorded by Danie Overbeek, A-52, in South Africa along with a description of the McWilliams magnetometer Danie used to make the recording. There was another magnetic storm in July and this time we have two recordings of the storm, one made by Danie Overbeek and the other by new SID observer, Jim Mandaville, A-90, in Arizona. Jim also recorded whistlers associated with the magnetic activity of July and these are reproduced as well.

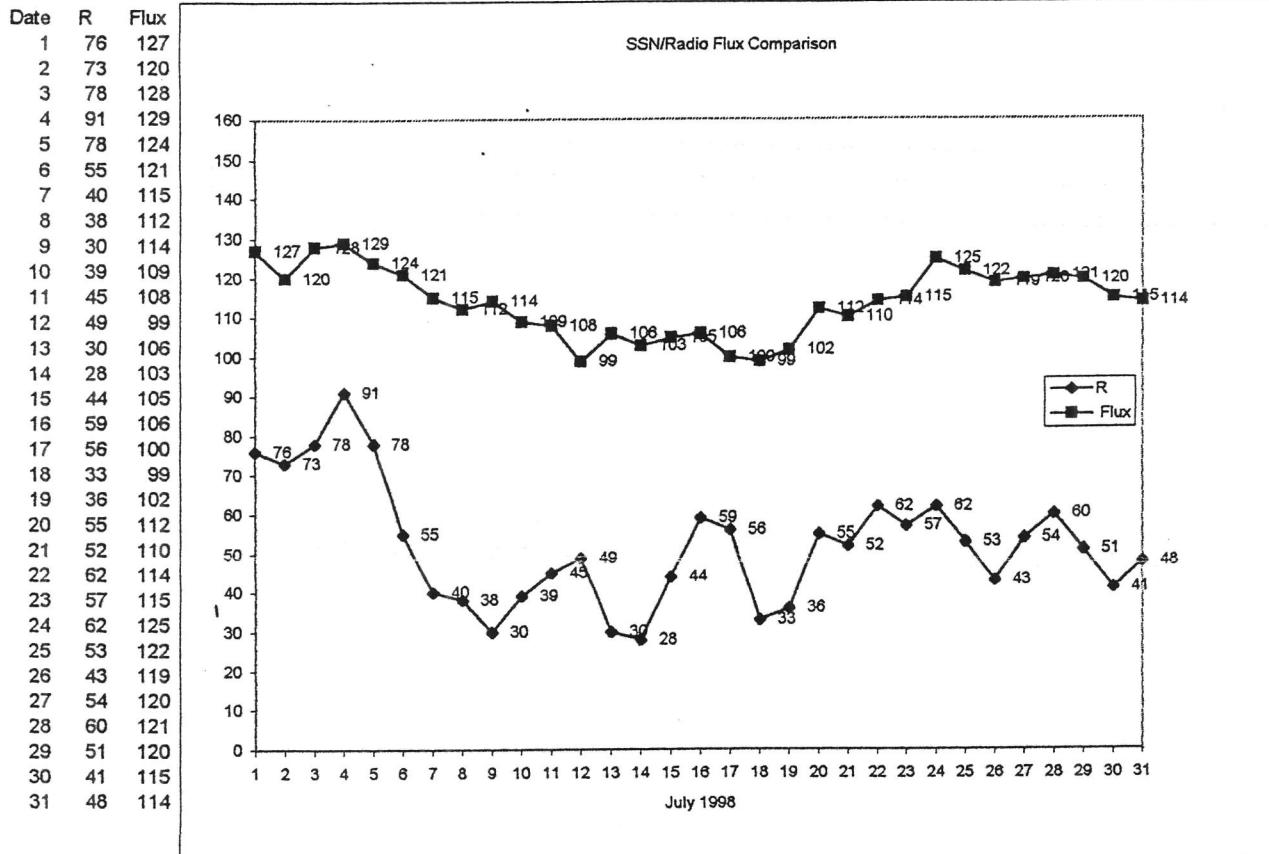


The chart above is a microbarograph recording made by Steve Hansen, A-59, in Amherst, New Hampshire, USA. It records the passage of a front starting at 1930 UT on 10 July 1998. Vertical scale markings are arbitrary and correspond to 25 microbar per division. Microbarograph recordings of violent storms can show acoustic gravity waves that reach high enough in the atmosphere to change the height of the ionosphere and leave a signature on AAVSO SES recordings. The recording above was made with software intended to record and analyze earthquakes. The sampling rate is five times per second. Steve uses additional channels to make SES recordings that show detail missed by Rustrak recordings that sample thirty times per minute. One of the signals Steve records is CFH in Nova Scotia, Canada on 73.6 khz.

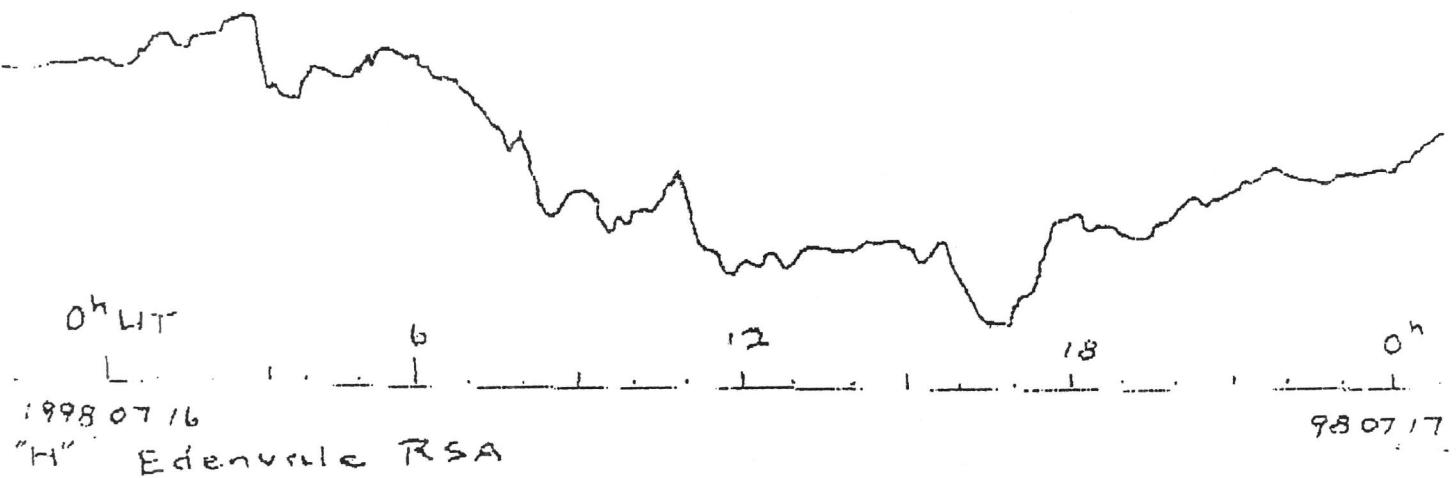
Horizontal component, Oro Valley, AZ ( $32^{\circ} 23.4'N$ ,  $110^{\circ} 56.8'W$ ), geomag. lat.  $40^{\circ} N$



The magnetogram above records July's magnetic storm. It was made by Jim mandaville who is new observer, A-90. Jim recently retired and returned to the USA from Saudi Arabia where he had lived since he was 13 years old. Jim was lucky to get this 24 hour recording without any offsets from neighbors moving cars in their driveways. He uses a magnetometer similar to the McWilliams magnetometer and these are very sensitive to nearby cars as described in the May Solar Bulletin.

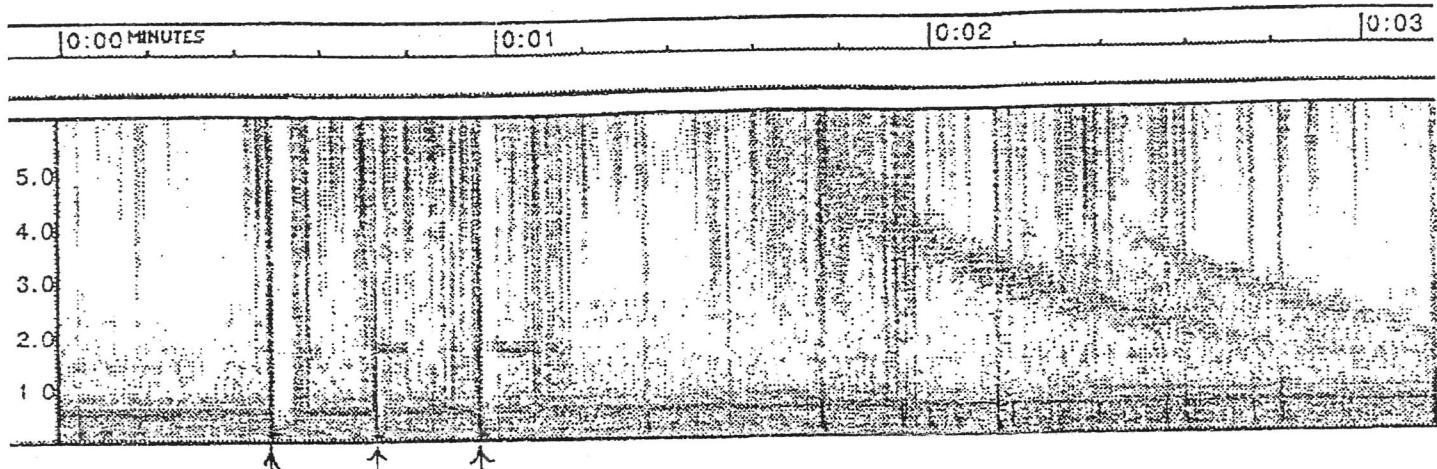


The above graph was plotted by Tom Lizak who is a very active amateur radio operator very much interested in radio propagation forecasting so he can work lots of DX. The sunspot numbers were computed from the observations of seven observers who count according to the Zurich system. Many members of the Solar Division are ham radio operators who may find these data interesting and useful. Tom would appreciate your comments. [walswv@edgenet.net](mailto:walswv@edgenet.net) is his e-mail address



The above magnetogram made by Danie Overbeek, A-50, Shows the same magnetic storm A-90 recorded. Danie uses a McWilliams magnetometer and his trace made in South Africa is very similar to Jim's made in Western USA. Magnetic storms are closely associated with solar activity most of record as SESSs. Another closely associated phenomenon is whistlers, some examples of which are shown below

The whistler recording below was made with a home built receiver designed by Bill Forgey. The receiver's output was recorded on a Sony cassette recorder for several hours to search for whistlers. Software used to analyze the small section that contained the whistler and produce the spectrum was Sound Edit 16 by Macromedia designed primarily for audio processing and editing by musicians. Jim's e-mail address is .zygo@azstarnet.com if you want more details.



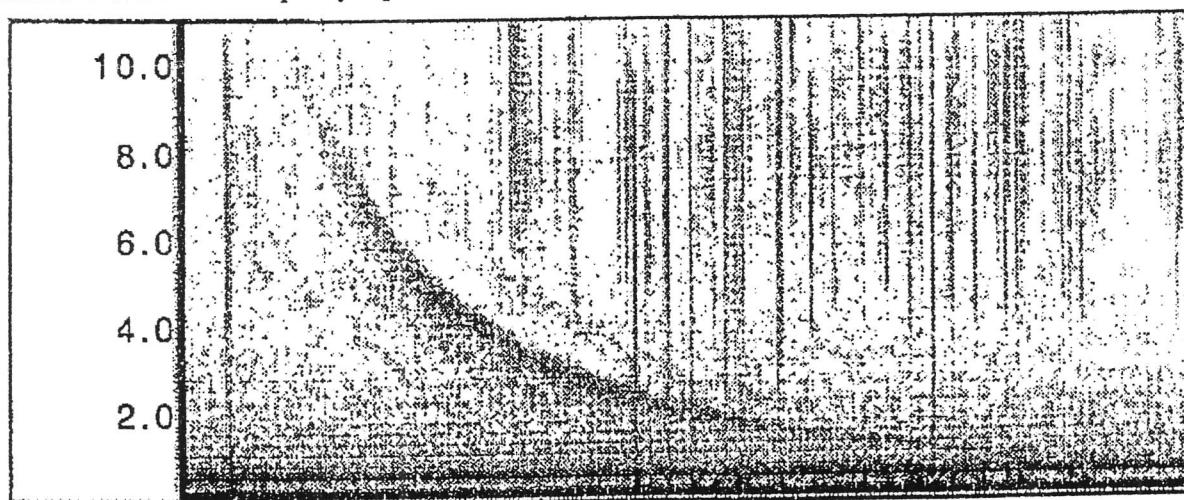
Multiple whistlers recorded 0505 L.T. (1205 UT) 8 August 1998. These like all of the many others that morning, were two-hop events with strong causative sferics evident. The delay between the causative sferics (indicated here by arrows) and the appearance of the whistler at the observing site is approximately 1.3 seconds. This represents the time for the sferic impulse to travel from the Northern hemisphere and to return from the Southern hemisphere after reflection there. Whistler mode propagation, being in an ionized medium within the Earth's magnetic field, is considerably slower than the speed of light and is frequency dependent. The distance the signals traverse is also much greater than the great circle distance on the Earth's surface, often extending out several Earth radii into the magnetosphere.

The causative sferics were strong enough to overload the whistler receiver and/or the tape recorder, as shown by the white dead periods immediately following the first and third impulses. The second impulse, being much weaker than the other two, results in only a very faint whistler between the two stronger ones.

Note that the units in the horizontal time scale are labeled "minutes", but the numbers following the colons are whole seconds. Each division on the time scale is thus equal to 0.2 seconds

The dark bars following each sferic just below 2 khz are almost certainly instrument artifacts, possibly representing ringing after strong impulsive overloads.  
Jim Mandaville

Below is a one hop whistler recorded 7 July at 0520 LT. The causative sferic for this one is in the Southern hemisphere near the reflection point. Because it traveled only one way it is less dispersed and its audible whistle on the tape recording would be shorter. Travel time is frequency dependent and causes the dispersion and therefore the whistle.



NOTE; Due to reorganization in the Solar Division there are no SES charts in this July issue of the Solar Bulletin. I would like to include SES charts in the coming August issue. If you have nice SES recordings suitable for publication please send them to me. I need the whole day including the sunrise and sunset patterns. Good photocopies will do and can be made in two pieces which I will piece together. Please send charts for visual analysis to Joseph Lawrence at his address above.

C.H.H.