Solar Bulletin

THE AMERICAN ASSOCIATION OF VARIABLE STAR OBSERVERS
SOLAR SECTION

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Summary*of sunspot observations by members of the Solar Division AAVSO.

The tables on the following pages have been kindly prepared by Miss Rosemary Farren, student assistant of Dr. Sarah J. Hill, Wellesley College, Mass.. We are very grateful to Miss Farren and to Dr. Hill for these summaries which enable us to check our observations.

The classic Wolf formula for the socalled "Relative Sunspot Number" "R" is:

$$R = k(10g + s)$$

where g equals the total number of spot groups;
s equals the total number of individual umbrae counted even when surrounded by one penumbral field;
k is the observer's correction coefficient, i.e. a statistical factor employed to bring an individual's count to the scale used by Zürich.

The socalled k-factor accounts more or less for the following effects:
a) variation in instrument properties; size, magnification, mode;
b) the individual's seeing acuity and homogeneous efforts;
c) meteorological conditions affecting seeing;
d) evolutionary changes in spots;
e) miscellaneous.

What can an observer do to get systematically reasonable values?

First a) use always the same instrument, magnification, diaphragm and sun glass (if used) and mode of observation i.e. direct visual or projection;

b) only experience and the frequency of careful observations help here; careful, preferably projection drawings should be used to follow the sunspot evolution and thus to enable one to make the proper group divisions(counts);

c) observe, when ever possible, under the best seeing conditions, usually early mornigs or late in the afternoon; use observations made under adverse seeing conditions only as a guide for next days observations;

d) you can do nothing about this one; however it is such changes that also account for variations in spot counts;

e) minimize all adverse conditions such as unclean optical surfaces (particularly important with reflectors); frail mountings; looking over heated rooftops, ect., etc.

Many people want to know why there are differences between Zürich Sunspot Numbers and American ones (R_A). The great advantage of the relative ease which permits one to evaluate overall solar activity from this solar index is also responsible for the discrepancies in R-numbers. Zürich computes "Provisional" sunspot numbers from observations secured at Zürich, Locarno and Arosa, all in Switzerland. Final, or socalled "definitive" Zürich Numbers, are available only at the end of each year. A comparison between the two series shows that some differences cannot be avoided. However, since it is only monthly

(Sunspot Numbers)

mean values that are used in solar reasearch, and for the overall study of the solar cycle, even these are smoothed, minor discrepancies do not matter. (In the January 1953 S.D.Bulletin Bondy showed that there were discrepancies in the yearly mean values between the sunspot area measures made at Greenwich and the US Naval Observatory amounting to more than 10%!). The final Zürich Numbers include all Zürich observations made under good seeing conditions, while for the other days values from other stations all over the world are weighed to give the definitive number. The socalled American Relative Numbers are based on observations made in all parts of the globe and computed as a weighed mean. The various k-factors of participating stations are computed each year at Zürich to keep their scale more or less constant and they vary in value ±10%. The k-factors of "American" observers are computed on a logarithmic scale, and they are kept, together with another factor (w), which expresses more or less how an observer's estimates fluctuate, for several years constant.

How can an observer compute his own k-factor? Since the standard sunspot number R (Zürich scale) should theoretically follow the equasion: $R = kR_i$ where R_i is the individual's "number", it follows that:

$$k = R : R_i$$

To give k a meaningful statistical value, it is necessary to employ the sum total of great many numbers. It is advisable to use at least 200 observations and reject all observations made under adverse seeing conditions. The following is only a poor example how this is done by using parallel observations.

date: 1957	R_i	R_Z provision.	R_Z definitive
Jan.5	238	217	226
13	139	123	134
18	144	126	143
27	186	134	150
28	153	125	141
Mar.2	166	164	164
3	122	137	137
10	208	186	186
13	196	228	228
14	166	164	175
16	128	146	146
17	177	155	150
18	160	148	147
May 3	123	123	118
5	105	92	92
7	143	136	140
8	158	150	150
9	174	162	162
10	153	195	195
12	179	207	204
TOTALS:	3218	3118	3188

$k = R_{Zp} : R_i$

Total R_{Zp} = 3118

Total R_i = 3218

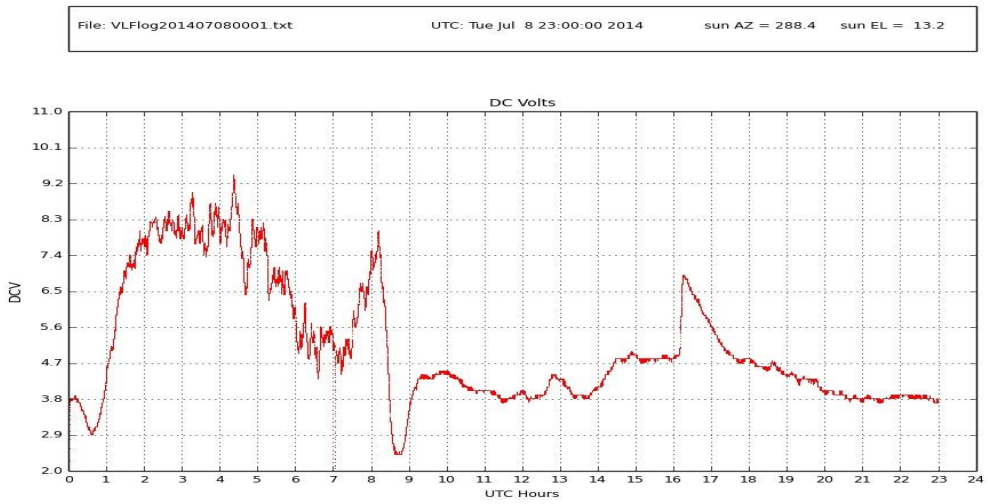
k = 0.97

(With $R_{Zdef.}$ k=0.99)

(The provisional values are adequate)

Here are two pages from the July – September, 1958 Solar Bulletin, editor and chair - Harry Bondy. He describes how the AAVSO computes the American Relative (Ra) index. Things have not changed in the last 56 years, we still compute the American Ra the same way.

Sudden Ionospheric Disturbance Report

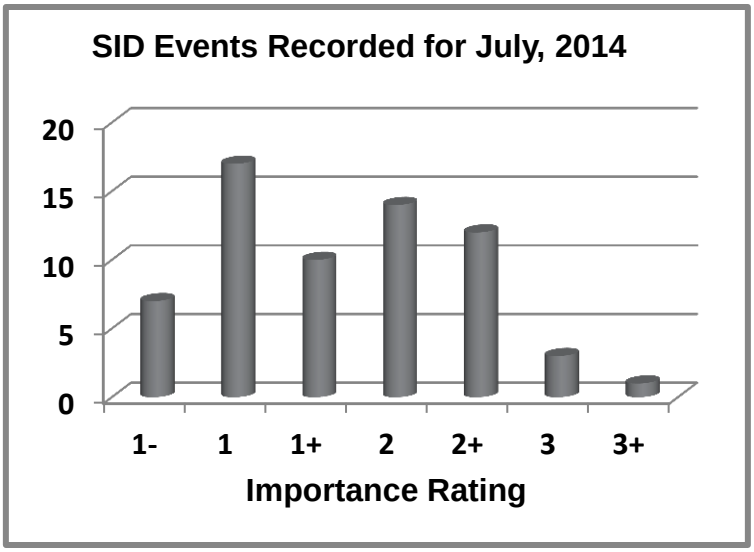


The largest M class flare this month (M6.2); July 08, 2014. Graph from John DuBois in Boxborough Massachusetts, recording of NAA at 24 kHz

Sudden Ionospheric Disturbances (SID) Records During July, 2014

Date	Max	Imp	Date	Max	Imp	Date	Max	Imp
140701	0608	2	140706	0025	1+	140712	0853	2+
140701	0736	1+	140706	0700	1	140712	1325	1
140701	0741	1-	140706	0814	1+	140712	1409	2
140701	0909	2	140706	0824	2+	140712	1418	1+
140701	0919	2	140707	0751	1-	140713	0855	2+
140701	1018	2	140707	0803	1	140713	0903	1
140701	1118	1+	140708	0901	2	140715	0305	1
140701	1131	2+	140708	0911	3	140723	0542	2+
140703	0700	1	140708	1613	2+	140724	0150	1
140703	1627	1	140708	1622	1+	140725	0704	1-
140704	0346	2	140708	1633	3	140727	0550	1
140704	0538	1	140709	0023	2+	140729	1618	1-
140704	1252	3	140709	0307	1	140729	1632	2+
140704	1441	1	140709	1839	1	140730	0252	2+
140704	1547	1-	140710	0253	2	140730	1616	1+
140705	0601	1	140710	2112	2	140730	1848	1-
			140710	2234	2	140731	0208	2+
			140711	0044	2	140731	0928	1+
			140712	0715	1-	140731	1115	1+
						140731	1519	2

Solar Events

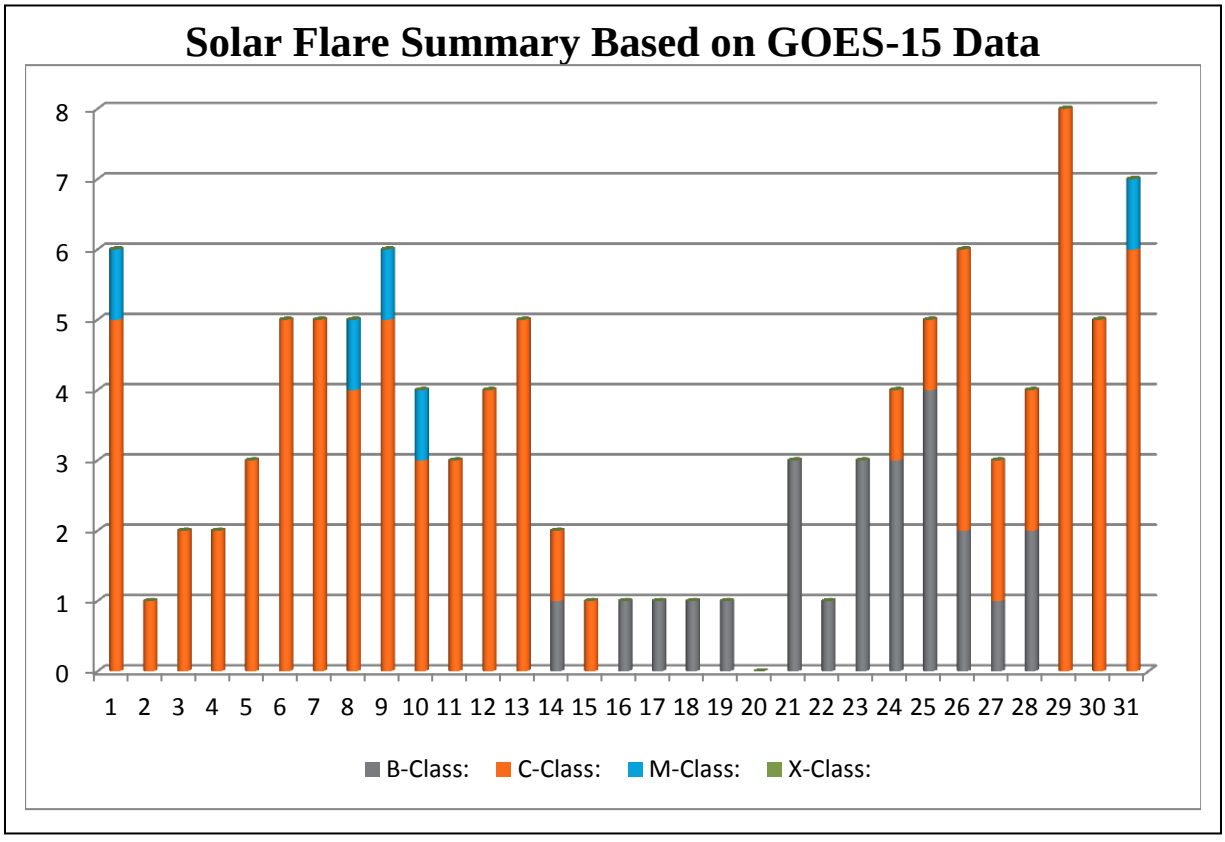


Importance rating: Duration (min)	1-: <19	1: 19-25	1+: 26-32	2: 33-45	2+: 46-85	3: 86-125	3+: >125

Sudden Ionospheric Disturbances (SID) Observers During July, 2014

Observer	Code	Station(s) monitored	Observer	Code	Station(s) monitored
A McWilliams	A94	NML	R Green	A134	JJI NWC
J Wallace	A97	NAA	R Mrllak	A136	GQD NSY
L Loudet	A118	GQD NAA	S Aguirre	A138	NWC
F Adamson	A122	NWC	F Francione & C Re	A139	HWU NAA NSY
S Oatney	A125	NLK NML	I Ryumshin	A142	DHO GQD
J Karlovsky	A131	DHO NSY	R Rogge	A143	DHO GBZ GQD

There were 107 solar flares measured by GOES-15 for July, 2014: Five M class, 78 C class and 24 B class flares. Far fewer flares this month compared to last. There were 12 AAVSO SID observers who submitted reports this month.



American Relative Sunspot Numbers (Ra) for July, 2014 [**boldface = maximum, minimum**]

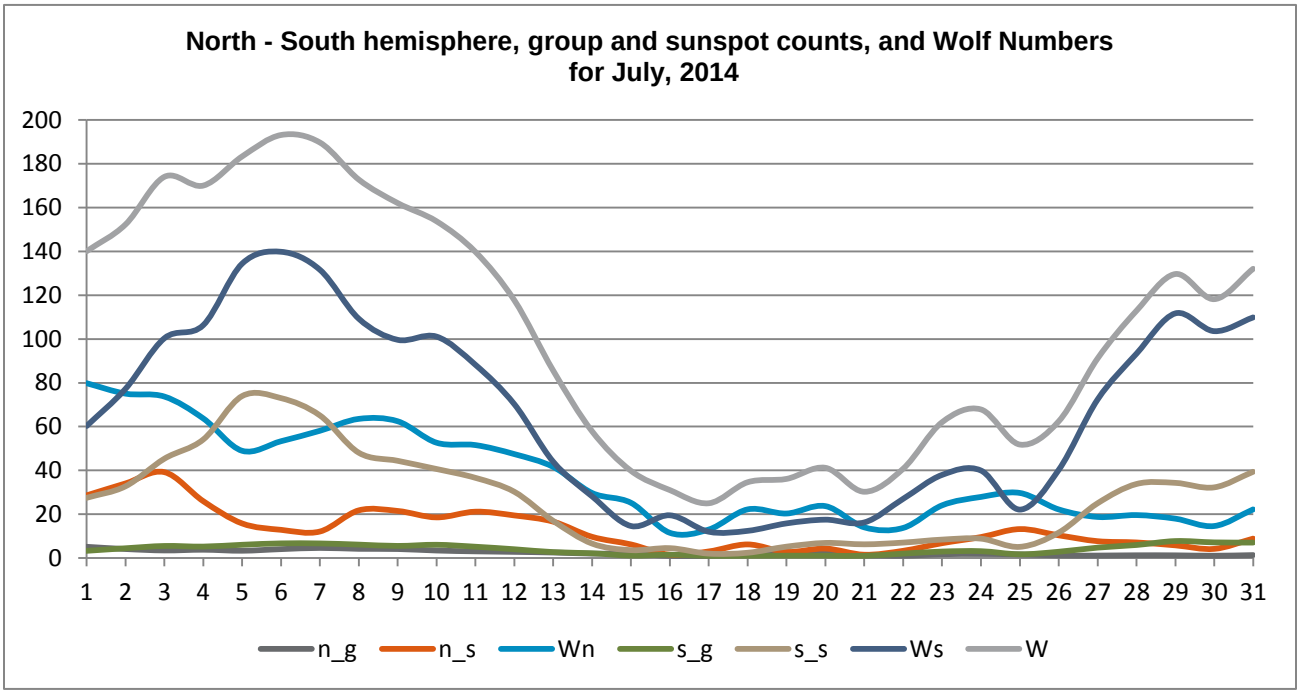
DAY	NumObs	RAW	Ra
1	44	126	96
2	35	148	109
3	36	164	126
4	29	173	125
5	38	174	132
6	42	174	**141**
7	36	178	134
8	28	173	129
9	34	154	124
10	39	152	117
11	40	134	105
12	41	115	88
13	40	77	61
14	35	51	39
15	42	20	15
16	37	4	3
17	38	3	**1**
18	34	18	14
19	27	32	24
20	43	31	23
21	43	18	13
22	46	39	29
23	41	59	43
24	33	66	49
25	32	53	38
26	40	60	45
27	37	84	64
28	29	108	80
29	39	128	94
30	38	115	87
31	35	127	99
Average	**37.1**	**95.3**	**72.5**

Obs	#Obs	Name
AAX	16	Alexandre Amorim
AJV	22	J. Alonso
ARAG	31	Gema Araujo
ASA	12	Salvador Aguirre
BARH	10	Howard Barnes
BDDA	16	Diego Bastiani
BERJ	20	Jose Alberto Berdejo
BMF	20	Michael Boschat
BRAB	31	Brenda Branchett
BRAF	16	Raffaello Braga
BROB	31	Robert Brown
BSAB	25	Santanu Basu
BXD	16	Alexandru Burda
CHAG	30	German Morales Chavez
CIOA	16	Ioannis Chouinavas
CKB	30	Brian Cudnik
CNT	8	Dean Chantiles
CVJ	15	Jose Carvajal
DGP	19	Gerald Dyck
DJOB	21	Jorge del Rosario
DUBF	24	Franky Dubois
FAM	5	Fabio Mariuzza
FERJ	24	Javier Ruiz Fernandez
FJAE	12	Dr.John Alan Freeman
FLET	23	Tom Fleming
FLF	14	Fredirico Luiz Funari
FTAA	7	Tadeusz Figiel
FUJK	21	K. Fujimori
HAYK	24	Kim Hay
HMQ	4	Mark Harris
HOWR	28	Rodney Howe
JGE	11	Gerardo Jimenez Lopez
JJMA	15	Jessica M.Johnson
KAND	31	Kandilli Observatory
KAPJ	27	John Kaplan
KNJS	21	James & Shirley Knight
KROL	27	Larry Krozel
LEVM	21	Monty Leventhal
LKR	19	Kristine Larsen
MCE	22	Etsuiku Mochizuki
MGAA	4	Gael Mariani
MILJ	12	Jay Miller
MJHA	30	John McCammon
MMI	29	Michael Moeller
MUDG	9	George Mudry
OATS	13	Susan Oatney
OBSO	22	IPS Observatory
ONJ	9	John O'Neill
RLM	9	Mat Raymonde
SCGL	16	Gerd-Lutz Schott
SIDM	28	Monika Sidor
SIMC	10	Clyde Simpson
SMNA	2	Michael Stephanou
SONA	18	Andries Son
STAB	31	Brian Gordon-States
SUZM	20	Miyoshi Suzuki

TESD	23	David Teske
URBP	26	Piotr Urbanski
VARG	23	A. Gonzalo Vargas
WAU	3	Artur Wargin
WGI	2	Guido Wollenhaupt
WILW	25	William M. Wilson
WKM	2	Michael Wiskirken

Total Observers: 64
Total Observations: 1182

There were 35 out of 64 observers who submitted North and Southern hemisphere group and sunspot counts this month. The 17th was a day with only 1 sunspot on the disk! The Southern hemisphere seems predominate although there are many days of crossover before and after the minimum sunspot day.



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