Solar Bulletin

THE AMERICAN ASSOCIATION OF VARIABLE STAR OBSERVERS
SOLAR COMMITTEE

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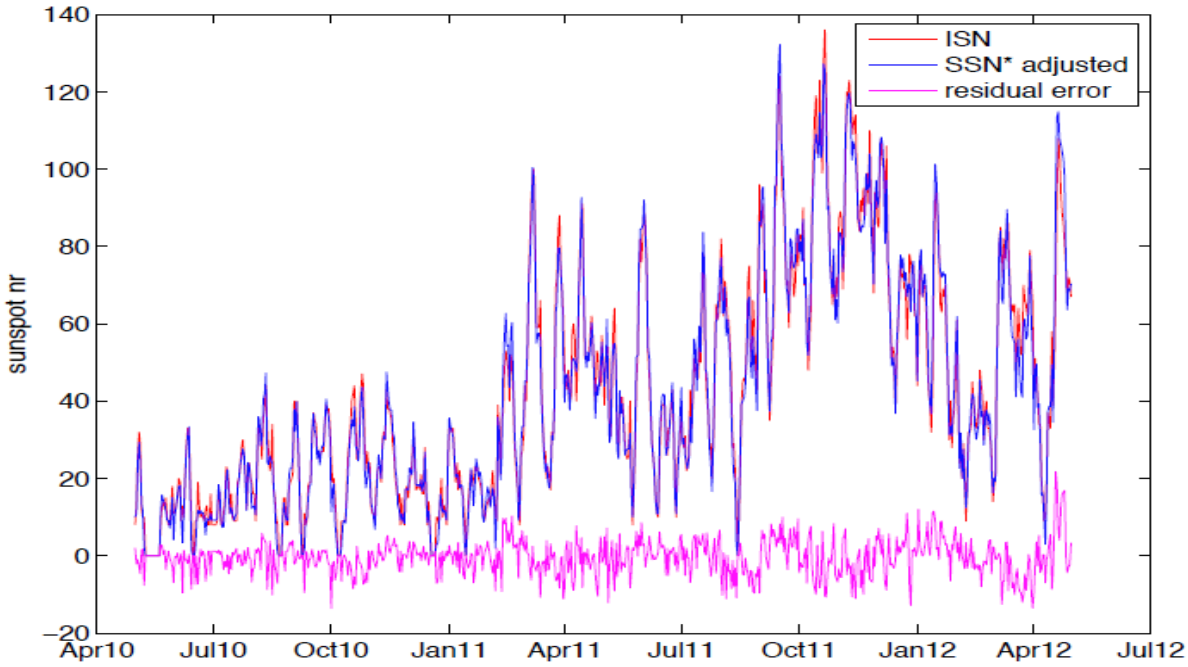
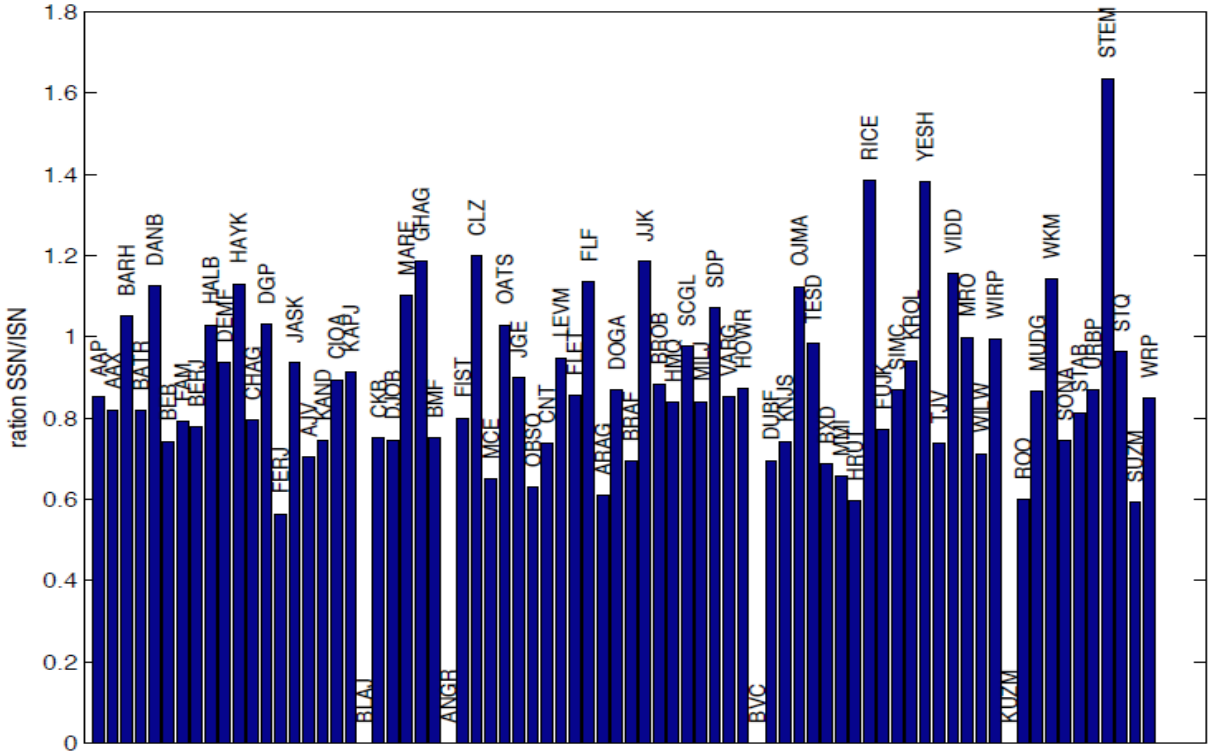
Here the AAVSO Sunspot database data include observations from May, 2010 through April, 2012; the AAVSO SSN data when compared to SIDC ISN data shows a very close match! The graph and analysis below is courtesy of Thierry Dudok du Wit, Orleans, France. What is interesting about this analysis is there is no use of the AAVSO observer's k factors, only their raw group and sunspot counts, i.e. Wolf number as sunspot number (SSN).

The value of SSN* and that of the international sunspot number (ISN) are compared below. In doing so, I adjusted the gain of the former in order to get the best matching. In magenta I show the residual error. Surprisingly, the residuals do not behave as white noise but show modulations on time scales of a few months. This is not so welcome. I checked that these modulations really come from the observations and not from the interpolation.

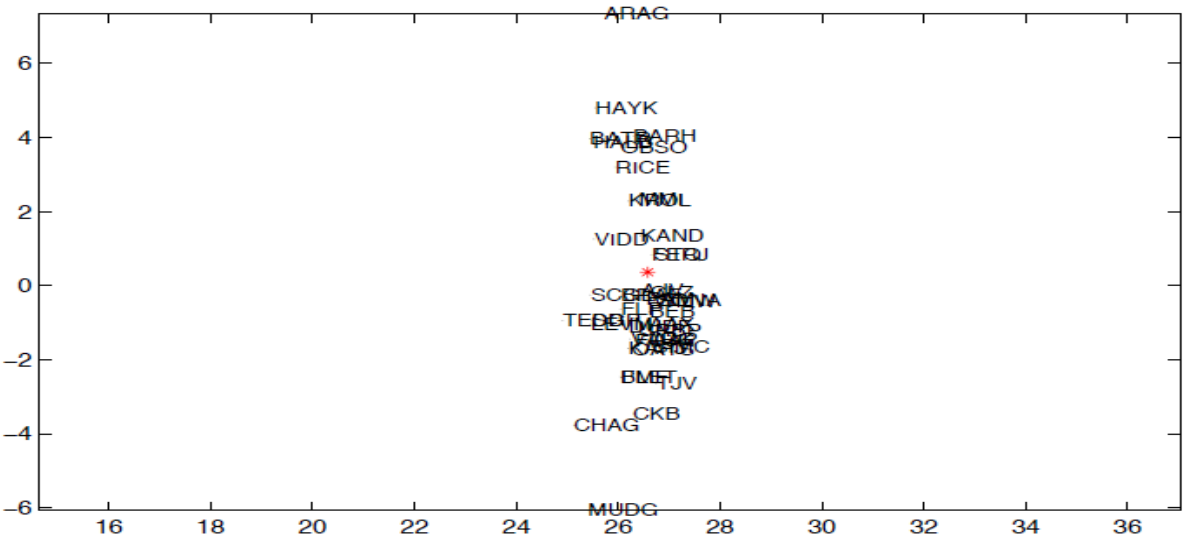


Note that the agreement between both sunspot numbers is remarkably good, compared to their noise level. The gains of the individual sunspot numbers, however, often departs from 1, as shown below



Some observers have 0 gain because they simply had not enough observations to enable a meaningful reconstruction of the missing data.

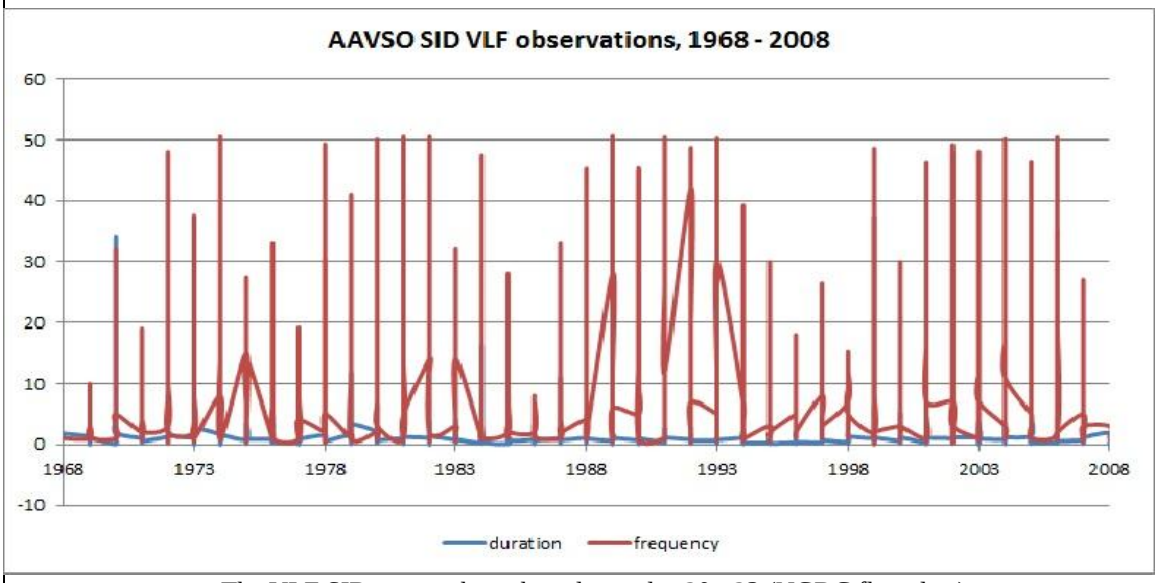
Let us now discard these outliers and keep the other ones. This is what the new cluster looks like



There still is some scatter but the cluster is now much smaller. Note the red cross in the middle, which corresponds to the international sunspot number. From this I immediately conclude that :

1. all clusters are roughly aligned, which means that, as a first approximation, they differ by one contribution (or one degree of freedom). Otherwise you would have ended up with a cloud of points.
2. the observations are highly correlated indeed, for their separation is small.
3. all these observations are fully compatible with the ISN, because the latter is at the center of the cluster. If the ISN had been located near the border of the cluster, or outside it, then one would have concluded that it contains an extraneous contribution that is not properly reproduced by the AAVRO dataset.

Sudden Ionospheric Disturbance Report

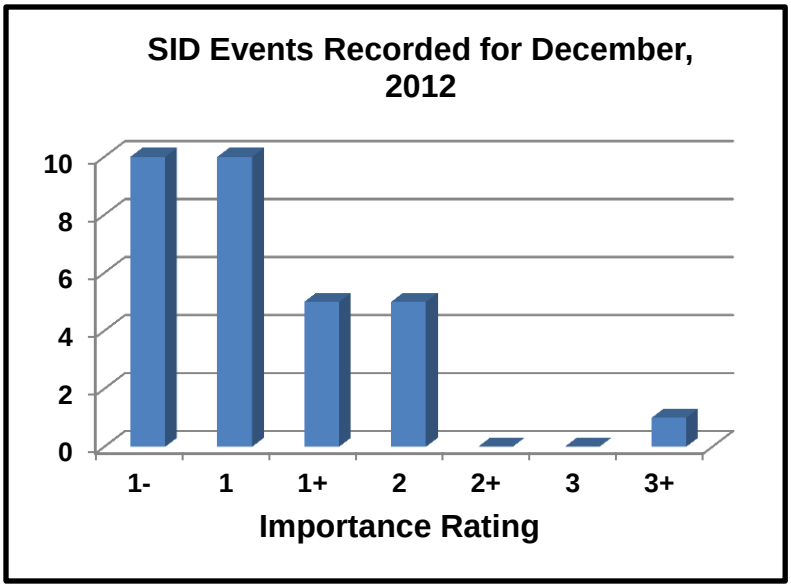


The VLF SID events show the solar cycles 20 - 23 (NGDC flare data)

Sudden Ionospheric Disturbances (SID) Records During December, 2012

Date	Max	Imp	Date	Max	Imp	Date	Max	Imp
121201	0835	1	121212	0647	1+	121225	1717	1-
121201	1029	1	121212	0726	1	121226	0344	1+
121205	1442	2	121216	1921	1-	121226	0424	2
121205	2116	1	121217	1655	2	121226	0455	2
121205	2211	1	121222	0135	1+	121226	1125	1-
121209	1842	1+	121222	0343	1	121226	1435	1-
			121225	1304	1	121226	1621	1-
			121225	1515	3+	121226	2112	2
						121227	0224	1-

Solar Events

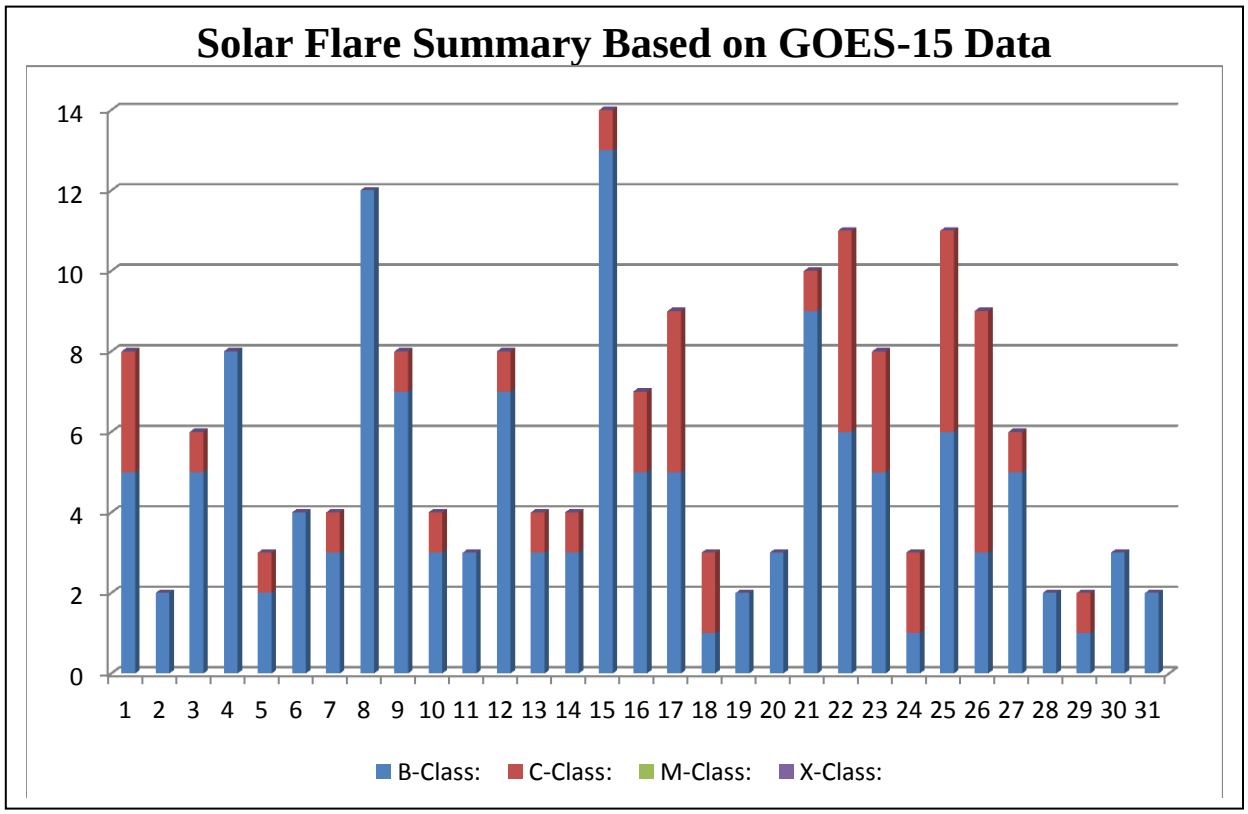


Importance rating: Duration (min)	1-: <19	1: 19-25	1+: 26-32	2: 33-45	2+: 46-85	3: 86-125	3+: >125

Sudden Ionospheric Disturbances (SID) Observers During December, 2012

Observer	Code	Station(s) monitored	Observer	Code	Station(s) monitored
A McWilliams	A94	NML	B Terrill	A120	NWC
R Battaiola	A96	HWU	F Adamson	A122	NWC
J Wallace	A97	No Data	S Oatney	A125	NLK NML
L Loudet	A118	TBB	E Soubrouillar	A132	HWU
J Godet	A119	GBZ GQD	R Green	A134	NWC

There were 183 solar flares measured by GOES-15 for December, 2012, 44 C class and 139 B class flares. The sun was not very active with C class flares this month. There were 10 AAVSO SID Observers who submitted reports on a month with few C class and no M, or X class flares.



American Relative Sunspot Numbers (Ra) for December, 2012 [**boldface = maximum, minimum**]

DAY	NumObs	RAW	Ra
1	26	51	37
2	29	45	32
3	33	44	33
4	22	44	31
5	26	47	34
6	31	27	23
7	23	24	**17**
8	27	41	30
9	29	41	30
10	26	44	30
11	32	43	31
12	31	62	44
13	30	60	45
14	23	48	36
15	21	60	46
16	21	67	47
17	18	63	45
18	19	55	37
19	18	55	37
20	19	60	41
21	21	60	42
22	22	71	52
23	28	72	55
24	26	50	36
25	20	52	38
26	29	45	35
27	21	50	36
28	24	54	34
29	29	41	30
30	32	49	35
31	23	85	**60**
Average	**25.1**	**52**	**37.4**

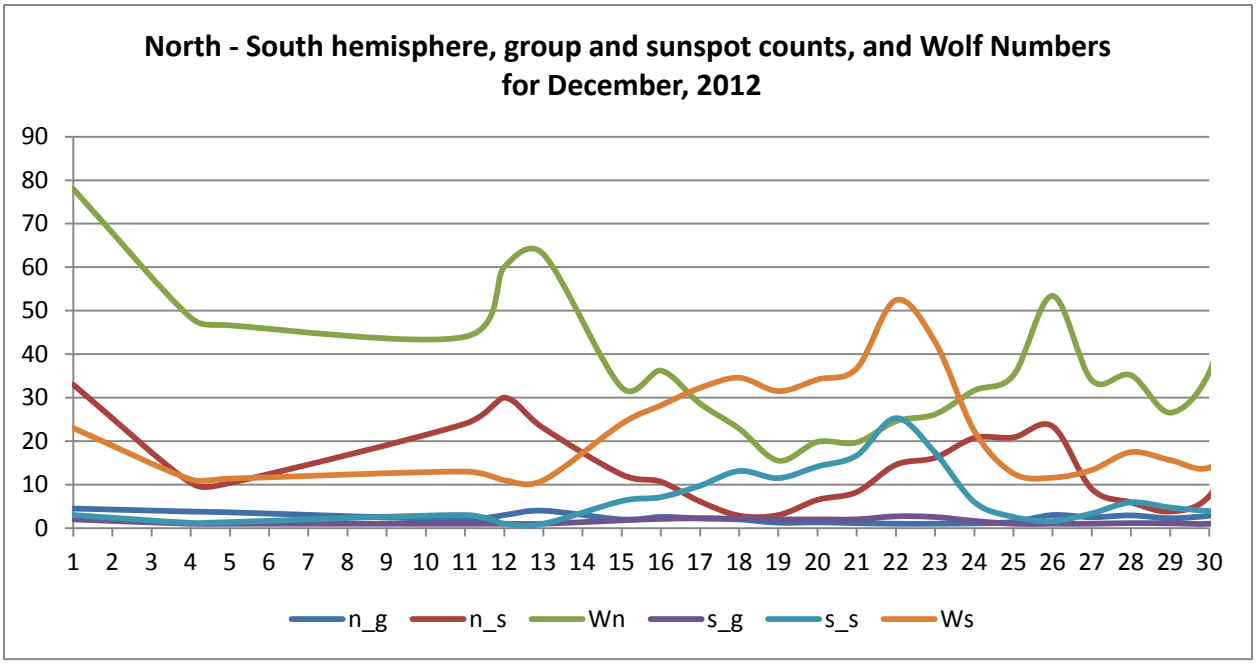
Obs	#Obs	Name
AAP	1	A. Patrick Abbott
AAX	14	Alexandre Amorim
AJV	10	J. Alonso
AMG	6	Margarete J. Amorim
ARAG	27	Gema Araujo
ASA	10	Salvador Aguirre
BARH	8	Howard Barnes
BDDA	16	Diego Bastiani
BERJ	11	Jose Alberto Berdejo
BMF	11	Michael Boschat
BRAB	30	Brenda Branchett
BRAF	6	Raffaello Braga
BROB	19	Robert Brown
CFO	3	
CHAG	23	German Morales Chavez
CIOA	9	Ioannis Chouinavas
CKB	22	Brian Cudnik
CNT	12	Dean Chantiles
CVJ	9	Jose Carvajal
DELS	1	Susan Delaney
DEMF	1	Frank Dempsey
DGP	16	Gerald Dyck
DJOB	10	Jorge del Rosario
DUBF	18	Franky Dubois
FAM	9	Fabio Mariuzza
FERJ	18	Javier Ruiz Fernandez
FLET	23	Tom Fleming
FLF	13	Fredirico Luiz Funari
FTAA	4	Tadeusz Figiel
FUJK	21	K. Fujimori
HAYK	7	Kim Hay
HOWR	22	Rodney Howe
HRUT	6	Timothy Hrutkay
JASK	8	Krystyna Wirkus
JGE	8	Gerardo Jimenez Lopez
JJK	1	Jerry Klotz
KAND	13	Kandilli Observatory
KAPJ	18	John Kaplan
KNJS	25	James & Shirley Knight
KROL	11	Larry Krozel
LEVM	18	Monty Leventhal
LKR	2	Kristine Larsen
MARE	10	Enrico Mariani
MCE	23	Etsuiku Mochizuki
MGAA	2	Gael Mariani
MILJ	6	Jay Miller
MJHA	29	John McCammon
MMI	10	Michael Moeller
MUDG	1	George Mudry
OATS	15	Susan Oatney
OBSO	15	IPS Observatory
RICE	7	E. C. Richardson
RLM	7	Mat Raymonde
SCGL	15	Gerd-Lutz Schott
SIMC	1	Clyde Simpson

SMNA	2	Michael Stephanou
SONA	4	Andries Son
STAB	23	Brian Gordon-States
SUZM	25	Miyoshi Suzuki
TESD	13	David Teske
URBP	12	Piotr Urbanski
VARG	18	A. Gonzalo Vargas
VIDD	6	Daniel Vidican
WILW	13	William M. Wilson
WRP	2	Russell Wheeler

Total Observers: 65

Total Observations: 779

Twenty seven of our sixty five observers submitted data on the sunspot and group counts for the Sun's north and south hemispheres. It is interesting to note how the Wolf numbers of groups and Sunspots counts cross over on the 17th and 24th of the month.



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