

# Solar Bulletin

THE AMERICAN ASSOCIATION OF VARIABLE STAR OBSERVERS  
SOLAR SECTION



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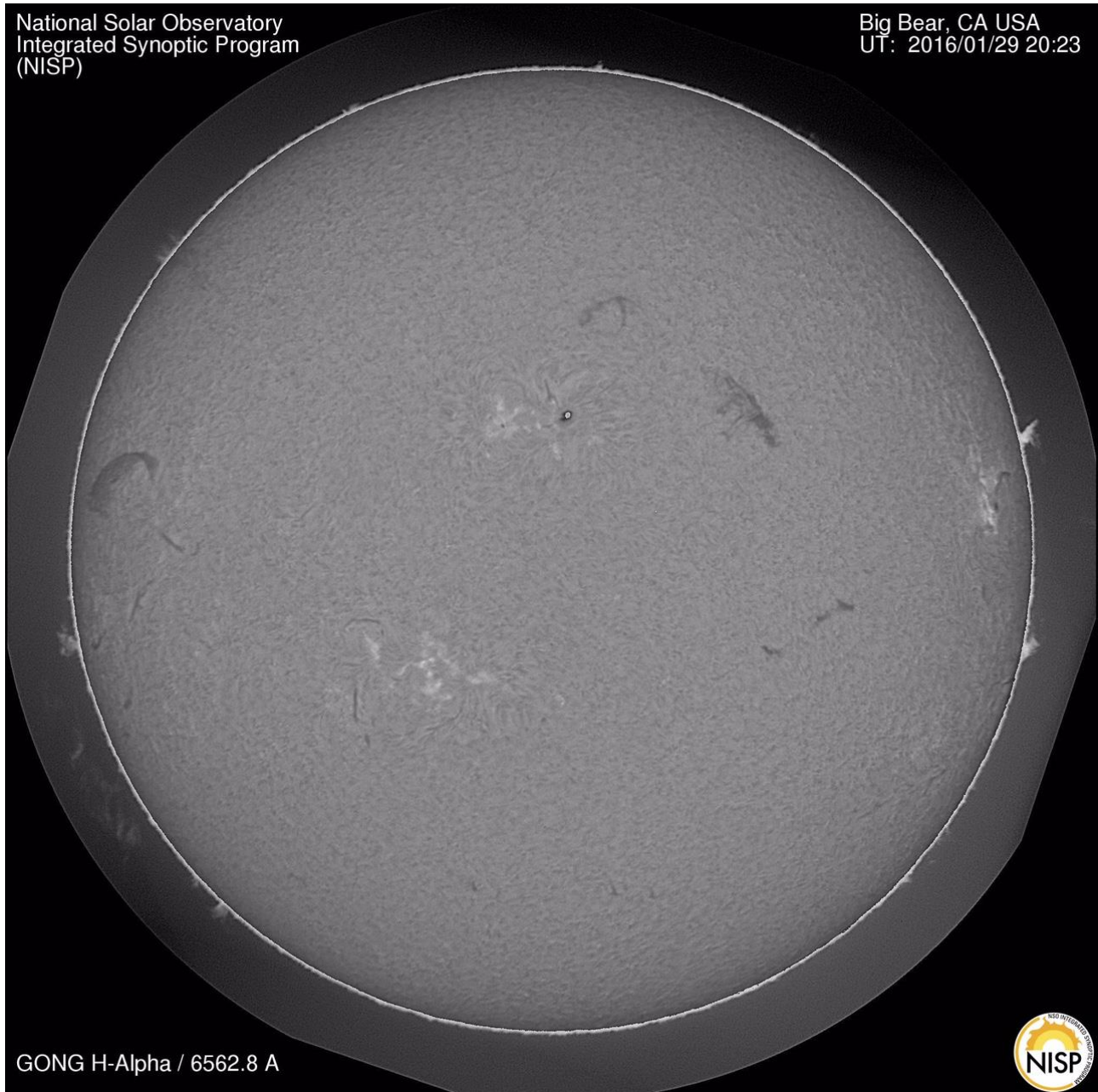
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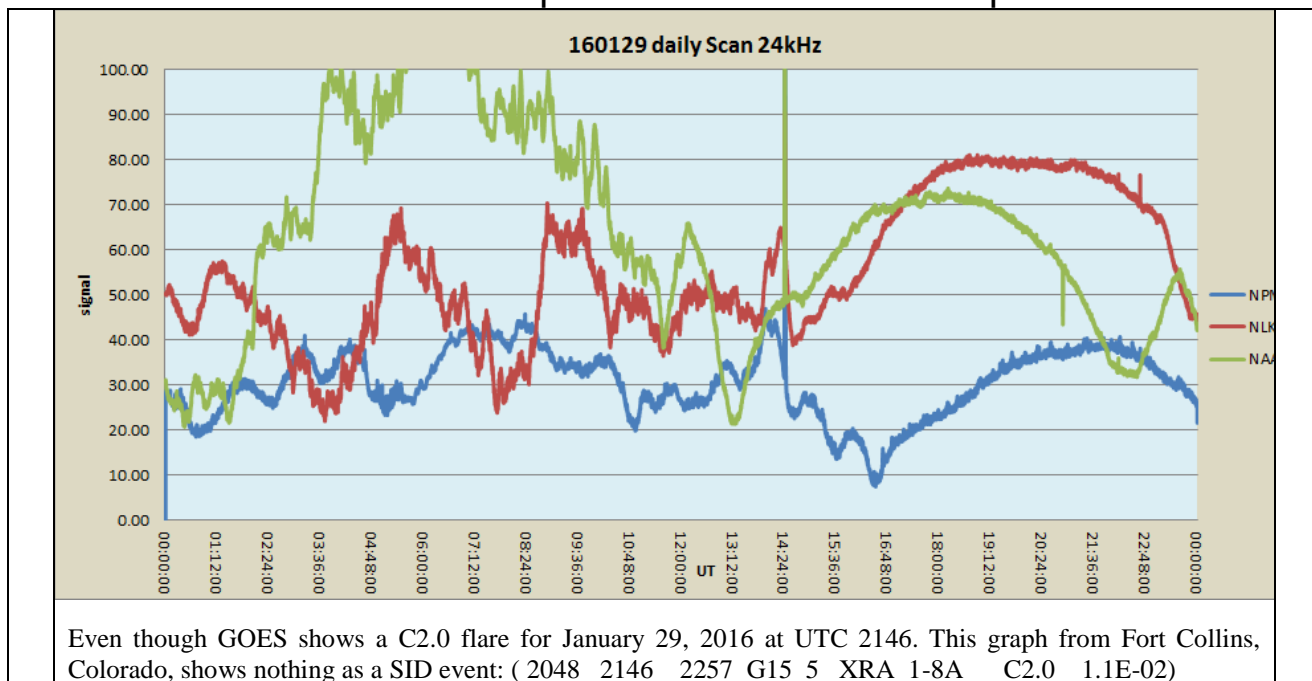
Volume 72 Number 1

January, 2016



Here's an H-Alpha image for January, 29<sup>th</sup>, from the Big Bear Solar Observatory, California. Active Region 2489 was in line of sight for us here on Earth. <http://nisp.nso.edu/>  
<http://halpha.nso.edu/keep/hag/201601/20160129/20160129202354Bh.jpg>

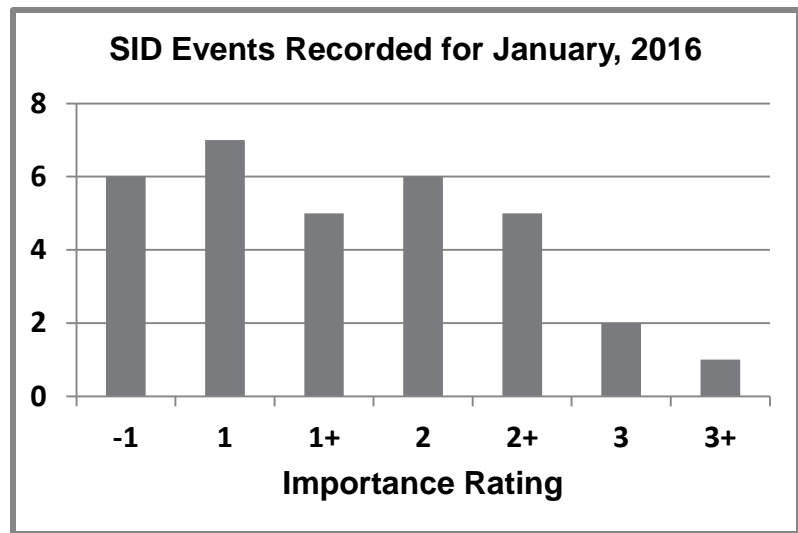
# Sudden Ionospheric Disturbance Report



## Sudden Ionospheric Disturbances (SID) Records During January, 2016

Date	Max	Imp	Date	Max	Imp	Date	Max	Imp
160101	645	2	160116	1517	1	160127	1330	-1
160101	947	-1	160120	1120	2+	160128	521	2
160101	2340	3+	160121	148	1+	160128	652	1
160101	2346	2+	160121	1330	1+	160128	703	2
160115	241	2	160121	1338	1	160128	1201	2
160115	2033	-1	160122	651	3	160129	410	1
160116	655	2+	160124	508	3	160129	428	2
			160125	907	1	160129	817	1
						160129	1635	-1
						160130	1158	2+

# Solar Events

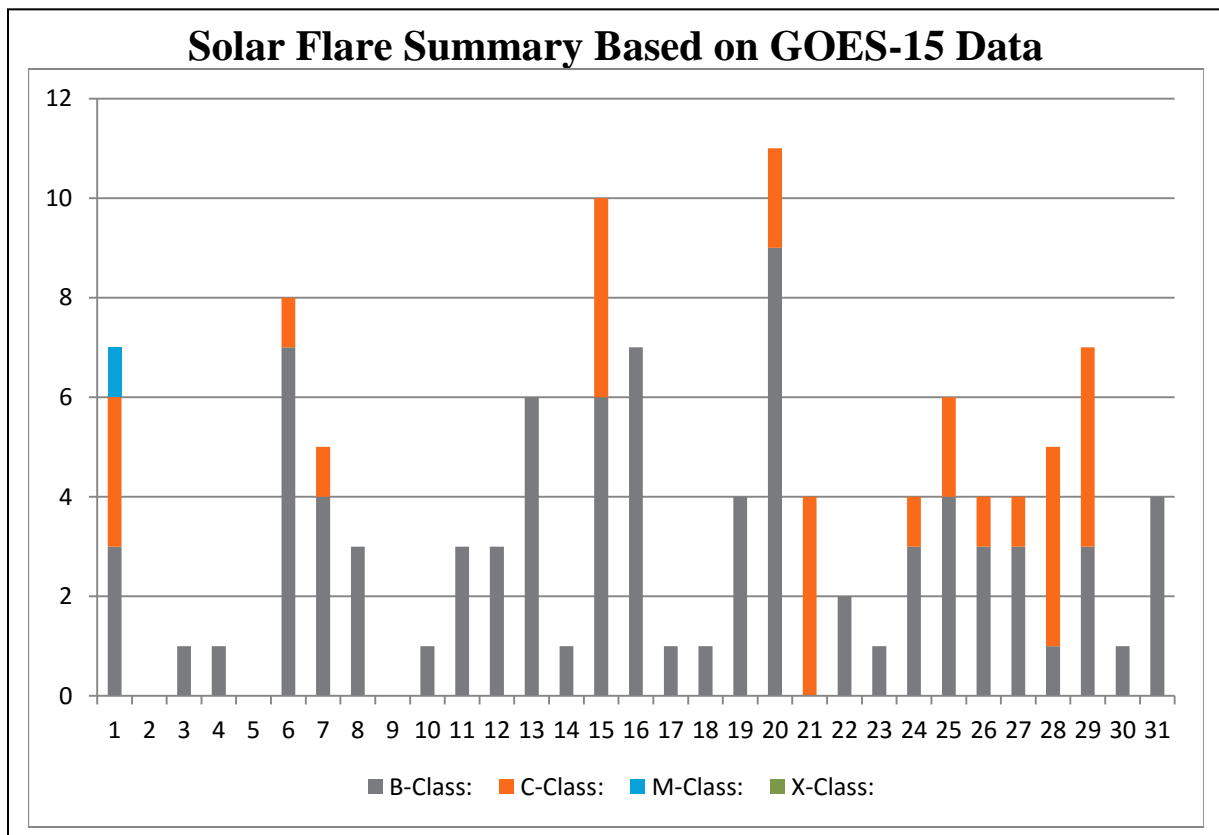


Importance rating: Duration (min)	1-: <19	1: 19-25	1+: 26-32	2: 33-45	2+: 46-85	3: 86-125	3+: 125
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## Sudden Ionospheric Disturbances (SID) Observers During January, 2016

Observer	Code	Station(s) monitored	Observer	Code	Station(s) monitored
A McWilliams	A94	NML	J Karlovsky	A131	DHO NSY
R Battaiola	A96	GQD	R Green	A134	NWC
J Wallace	A97	NAA	R Mrlak	A136	GQD NSY
L Loudet	A118	DHO	S Aguirre	A138	NML
J Godet	A119	GBZ GQD ICV	G Silvis	A141	NAA NLK
B Terrill	A120	NWC	I Ryumshin	A142	DHO GQD
F Adamson	A122	NWC	K Menzies	A146	NAA
S Oatney	A125	NLK	R Russel	A147	NML

There were 115 solar flares measured by GOES-15 for January, 2016: One M class, 28 C class and 86 B class flares. Far less flaring this month compared to last, with two days of no flares. There were 16 AAVSO SID observers who submitted reports this month.



American Relative Sunspot Numbers (Ra) for  
January, 2016 [**boldface = maximum, minimum**]

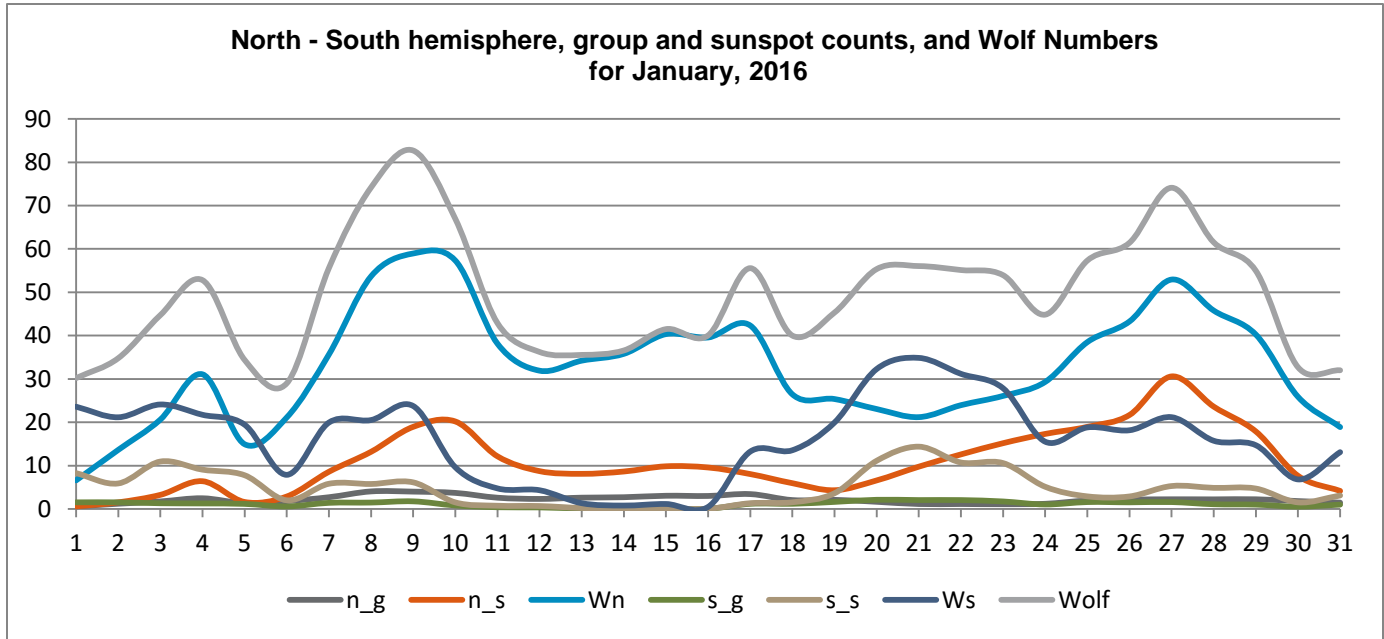
DAY	NumObs	RAW	Ra
1	23	26	<b>20</b>
2	29	31	24
3	23	43	34
4	21	43	31
5	27	29	22
6	22	27	<b>20</b>
7	20	52	37
8	24	69	52
9	24	81	<b>59</b>
10	27	59	45
11	28	39	28
12	32	34	26
13	26	33	25
14	23	33	26
15	29	38	30
16	29	39	30
17	27	47	34
18	28	32	22
19	27	36	26
20	22	48	37
21	29	54	43
22	27	54	41
23	32	50	37
24	31	44	33
25	31	54	42
26	24	57	43
27	22	68	49
28	31	59	46
29	25	54	39
30	24	29	23
31	23	29	22
<b>Average</b>	<b>26.1</b>	<b>44.9</b>	<b>33.7</b>

Obs	#Obs	Name
AAX	19	Alexandre Amorim
AJV	20	J. Alonso
ARAG	29	Gema Araujo
ASA	25	Salvador Aguirre
BARH	9	Howard Barnes
BATR	1	Roberto Battaiola
BDDA	10	Diego Bastiani
BERJ	15	Jose Alberto Berdejo
BRAB	25	Brenda Branchett
BRAF	8	Raffaello Braga

BROB	17	Robert Brown
BSAB	11	Santanu Basu
BXD	5	Alexandru Burda
CHAG	27	German Morales Chavez
CIOA	11	Ioannis Chouinavas
CKB	21	Brian Cudnik
CNT	6	Dean Chantiles
DEMF	1	Frank Dempsey
DJOB	9	Jorge del Rosario
DUBF	19	Franky Dubois
FERJ	13	Javier Ruiz Fernandez
FLET	22	Tom Fleming
FLF	9	Fredirico Luiz Funari
FTAA	5	Tadeusz Figiel
FUJK	22	K. Fujimori
HAYK	6	Kim Hay
HOWR	28	Rodney Howe
JDAC	15	David Jackson
JGE	4	Gerardo Jimenez Lopez
JJMA	7	Jessica M.Johnson
KAND	21	Kandilli Observatory
KAPJ	10	John Kaplan
KNJS	30	James & Shirley Knight
KROL	23	Larry Krozel
LEVM	15	Monty Leventhal
LKR	7	Kristine Larsen
LRRR	11	Robert Little
MARE	7	Enrico Mariani
MILJ	11	Jay Miller
MJAF	31	Juan Antonio Moreno Quesada
MJHA	28	John McCammon
MWU	8	Walter Maluf
OATS	6	Susan Oatney
OBSO	11	IPS Observatory
ONJ	2	John O'Neill
RLM	10	Mat Raymonde
SCGL	15	Gerd-Lutz Schott
SDOH	31	Jan Alvestad (SDO)
SIDM	9	Monika Sidor
SIMC	2	Clyde Simpson
SONA	9	Andries Son
SPIA	4	Piotr Skorupski
STAB	23	Brian Gordon-States
SUZM	27	Miyoshi Suzuki
TESD	21	David Teske
URBP	11	Piotr Urbanski
VARG	19	A. Gonzalo Vargas

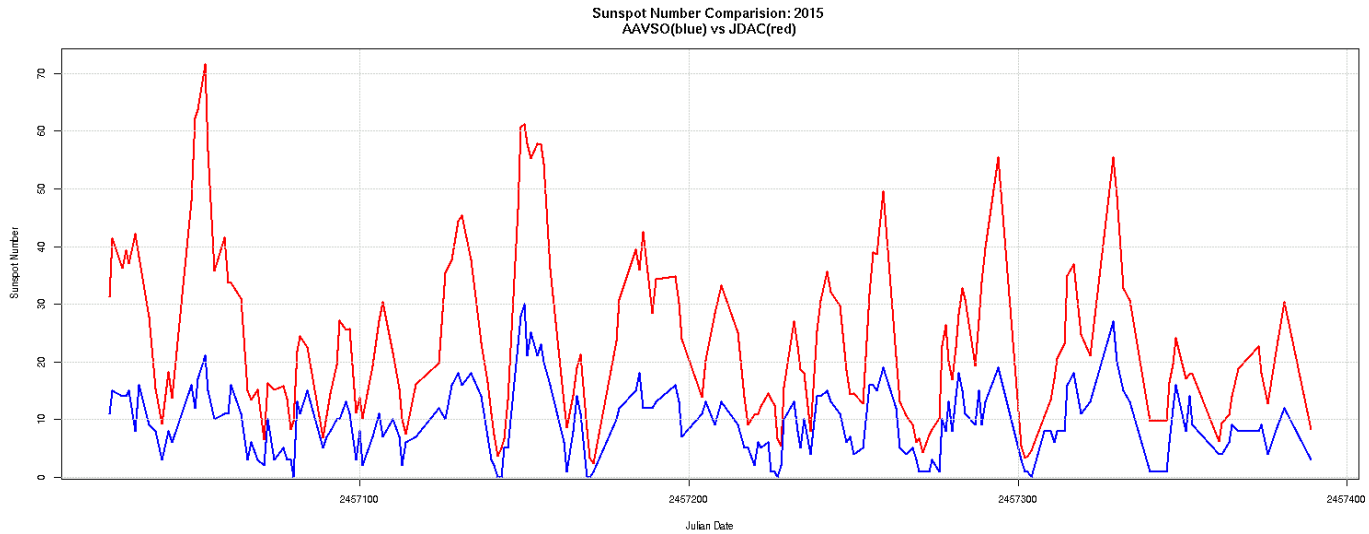
VIDD	7	Daniel Vidican
WAW	1	Artur Wargin
WILW	17	William M. Wilson
WRP	4	Russell Wheeler

**Total Observers: 61**  
**Total Observations: 850**



There were 39 out of 61 observers who counted northern and southern hemisphere groups and sunspots this month. It looks like the northern hemisphere was predominant with days of crossover on the 3<sup>rd</sup>, 5<sup>th</sup>, and 19<sup>th</sup>, 24<sup>th</sup>.

*Illustration by David Jackson, JDAC*



*AAVSO data are in red and my data are in blue. All observations were made with a Meade ETX125 + 1000 Oaks filter)*

The purpose of this plot is to compare my daily Wolf Number of 187 days in 2015 with the (average daily Wolf numbers for AAVSO (12,327 observations) SunEntry database for 2015. I took the following steps:

- 1) The first step in the process involved importing all AAVSO daily observations into a SQLite database. SQLite3: <http://sqlite.org>
- 2) The second step involved using SQL (Spatialite) statements to create a table containing only my observations. Spatialite: [https://www.gaia-gis.it/fossil/spatialite\\_gui/index.html](https://www.gaia-gis.it/fossil/spatialite_gui/index.html)
- 3) The third step was to use the Structured Query Language (SQL) to create a summary table that contains one record for each matching Julian Dates (JD) between my observations and the AAVSO table. In addition to JD each record contained a field for the average counts for sunspots, group and Wolf number.
- 4) Fourth, I used R (language) + SQLite + RSQLite to create the plot. RSQLite: <https://cran.r-project.org/web/packages/RSQLite/index.html> and R Project: <https://www.r-project.org/>

Finally, while I wasn't surprised that there would be a difference in counts between my numbers and the main AAVSO database, I was (pleasantly) surprised to see how the two plot lines ran approximately parallel. There are other ways that this project could have been completed (Python/Pandas, Google graphic api, Plot.ly api and even MS-Access and Excel.)

JDay	#Obs	Wolf_#	Wolf_Std	Adjusted_Ra	Adjusted_Std
57388	24	27.08	13.17	20.74	10.32
57389	31	32.42	10.73	24.06	5.67
57390	24	45.00	17.91	34.66	11.25
57391	23	47.00	24.44	34.72	16.90
57392	29	30.76	13.08	22.58	9.10
57393	23	28.09	9.57	20.54	5.42
57394	21	53.81	28.50	38.70	19.42
57395	25	72.52	26.33	54.67	16.77
57396	25	82.60	22.87	60.79	19.48
57397	28	60.96	24.73	46.22	17.44
57398	29	40.59	16.38	29.19	11.17
57399	33	34.82	11.16	25.37	4.16
57400	27	33.19	14.14	25.84	11.01
57401	24	34.08	9.68	25.98	6.08
57402	30	38.57	10.51	29.23	4.25
57403	30	40.17	10.65	30.52	6.02
57404	29	50.62	22.03	36.17	12.14
57405	29	34.93	29.69	25.07	19.05
57406	29	39.00	24.59	28.27	16.16
57407	24	51.17	15.66	38.11	9.97
57408	31	54.90	11.29	42.62	11.40
57409	28	54.68	11.11	41.47	7.56
57410	33	50.55	15.32	38.12	11.65
57411	32	44.72	14.50	33.66	9.10
57412	32	56.03	19.04	43.83	14.07
57413	25	58.96	18.66	44.93	14.10
57414	24	70.17	26.64	52.23	21.71
57415	32	59.53	19.13	47.17	15.10
57416	26	53.92	15.87	39.87	13.54
57417	25	29.92	13.39	24.15	11.33
57418	25	29.92	13.20	22.36	8.99

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850 observations, aRa Number = 40.30  
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Above would be an AAVSO report similar to the SILSO calculations (Adjusted Ra) for their ISN report using no k – factors for a subset of all their observers – The SILSO relative mean sunspot number is 43.3 for January, 2016. (See last page of their January Solar Bulletin):

<http://www.sidc.be/sunspots/bulletins/monthly/monthlybull201601.pdf>

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**SID Solar Flare Reports – Rodney Howe [ahowe@frii.com](mailto:ahowe@frii.com)**