Solar Bulletin

THE AMERICAN ASSOCIATION OF VARIABLE STAR OBSERVERS
SOLAR SECTION

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AAVSO — SOLAR DIVISION

AMERICAN SUNSPOT NUMBER OBSERVATIONS

MONTHLY MEAN R_A' = 187.0 MARCH 1958 MONTHLY MEAN R_Z = 189.4

OBSERVER	Ki	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
Adams	.96	10,96			16,97	18,93	16,94								14,84	15,77											17,126	19,118	17,98			
Arber		9,37			7,67		8,90	8,74	8,85	8,83	8,60	7,70	6,57	7,56	7,68	6,63	11,56	11,73	8,50	11,69	10,82	8,71	9,75	11,88	12,87	12,89	10,109	11,125	12,114			
Beetle	1.06				13,100	17,130			14,148				9,64		13,117	14,97		13,55		14,110												
Bondy	.89						10,104		11,96	11,81		11,79		13,63			11,113	10,86					11,76		12,73				13,126	17,141		
Buckstaff	1.11						11,43		10,48	9,48	9,41		11,37				8,24					9,34	10,30	9,28		10,45	12,73	12,44	13,60	13,64	14,73	13,72
Cragg	.92	5,30		11,130	11,123	11,144		10,112	10,135	10,115	11,77		12,74	11,94			8,35	11,71	11,74	9,65			10,59			10,86			14,197	14,171		
DeKinder	.80									9,72		12,108		12,116				8,57	8,63				10,66			13,128	12,133	13,190	14,170	14,151	17,216	
Ellas	.73	8,71	6,64	11,108	11,146	12,160		12,187	12,166	8,109	10,157	9,104	8,124	11,143	9,108	10,88		12,94	12,110	12,110	13,129	11,106	10,100	13,107	13,156			11,188	13,202	13,194	15,189	15,253
Estremadoyro,V	.80		6,47	9,56	9,75						6,55	10,100	10,89	9,81		10,60	13,83	10,72	13,78	12,79	8,43	9,85	11,70	12,83		10,83	11,130	13,112	14,154	15,146	14,133	14,130
Fernald	1.02						13,73	8,69	12,84	11,90	16,77	12,64						8,62	8,63	11,67								12,80	15,87	16,118	14,126		
Fisher		4,35								4,44	4,35														11,60	12,100			12,108	11,105		
Itabashi			6,53			8,92		10,126	11,128	8,125	8,128		7,96		8,105		11,97			9,63				10,69					13,152	15,133	15,189	
Loebbick	1.02								6,88		7,74			6,51		7,57		8,56			6,60	7,77	8,67	7,61			9,90	10,99			10,112
Luft	.98	6,64	8,61			10,155	11,156		9,118	8,99		8,117		11,124			13,100	14,117					13,132	15,148	14,157				14,203	17,257	15,220	
Maher	.90	7,30		12,36	12,59	13,72					15,59	14,66	16,51		11,62	10,50	10,61		11,58	9,50		9,62	11,70	15,58	15,69		15,94	16,99			15,108	
Moore	.78		8,39		7,47								8,42																		13,96
Nicolini		9,22	3,41	7,92	6,109	6,120				5,24	6,92	4,75		4,101	5,64					7,26	7,84	6,94		10,97		9,61	10,81	12,91	10,154	12,166	12,159	
Pilsworth	.86								10,122				12,117	11,87									10,96	12,114			11,138		15,205	14,193	15,176	
Raine		3,11	4,18													10,32	7,30		8,51	8,42	8,36	8,44									
Rosebrugh	.68		9,36			11,69	15,82	10,58	13,69	13,76		11,71	11,51	10,69		11,63	10,56	4,21	13,92				13,62	14,86	11,61				18,86	20,157	16,129	
Thomas	.84	5,37		10,61		9,96	14,101		6,61	5,46	9,65	9,57			9,33		9,33		6,17					12,81		11,106	12,144	10,121	14,145	15,147		
Thrussell	1.47			7,31	6,48		10,43		7,43	7,44	7,55		6,36	7,39	8,44		10,39	9,37		7,28	7,37		8,34	9,36	10,39			10,74	11,42			
Trathen	1.28	5,10	5,14	6,25	6,29	8,36	11,36	9,43	7,40	9,40		6,32		8,40		9,26	10,36	10,33	9,28	10,33			9,28			12,38					14,68	14,73
Venter	1.28		5,40	8,43	7,72	8,80	13,107			9,84	7,69	7,54	7,66		8,75			8,63	10,56	8,40		9,81	8,58		13,70	10,57	10,81	12,89		13,110	13,144	14,125
Wells																														8,46		
Womelsdorff				6,44	7,71				7,58		8,64	6,54			7,34	6,36				8,39	7,36							9,68			11,67	10,70
R_A'		120	114	159	186	214	212	185	182	173	171	162	163	166	200	166	169	171	151	168	144	160	166	191	208	189	233	243	237	287	278	268
R_Z		109	90	140	185	203	215	220	187	177	181	168	156	145	158	165	155	164	162	155	154	156	163	187	204	180	194	226	292	302	338	342

⌑ ADVERSE SEEING
✳ RECEIVED LATE

NUMBER BEFORE COMMA = TOTAL GROUPS
NUMBER AFTER COMMA = TOTAL SPOTS

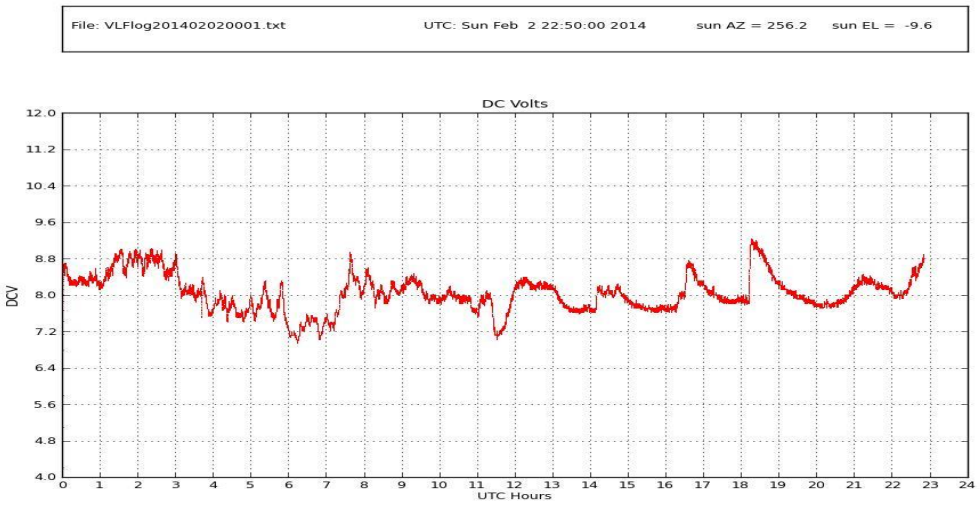
NOTE: R_A' = AMERICAN RELATIVE SUNSPOT NUMBER AND IS COMPUTED FROM OBSERVATIONS MADE BY MEMBERS OF THE SOLAR DIVISION OF THE AMERICAN ASSOCIATION OF VARIABLE STAR OBSERVERS. R_A' IS COMPUTED FOR THE NATIONAL BUREAU OF STANDARDS.

R_Z = ZURICH PROVISIONAL SUNSPOT NUMBER AND IS DEPENDENT ON OBSERVATIONS MADE AT THE FEDERAL OBSERVATORY IN ZURICH AND ITS STATIONS IN LOCARNO AND AROSA.

THE WOLF RELATIVE SUNSPOT NUMBER R IS BASED ON THE FORMULA:
R = K(10G + F) WHEREIN K = OBSERVATORY COEFFICIENT, G = TOTAL NUMBER OF GROUPS, AND F = TOTAL NUMBER OF SPOTS (UMBRAE).

Here are some relics from the past. Left is an AAVSO archive image of Herbert Luft and Casper Hossfield, circa 1966. http://www.aavso.org/aavso-1966-annual-meeting and the above spreadsheet is from March, 1958 and was at the peak of solar cycle 19. The above chart is how Harry Bondy, (Solar Chair) had his assistant compile the monthly American Relative (Ra) numbers; for that month the average Ra was 187.0, The average Ra for this month, (56 years later), February, 2014 is 93.8. Today's American Relative number for solar cycle 24 is half the Ra number of 56 years ago. Solar cycle 19 which was at its peak around the time of this spreadsheet, and may now be considered to be the grand maximum of the last 400 years: http://en.wikipedia.org/wiki/File:Sunspot_Numbers.png.

Sudden Ionospheric Disturbance Report



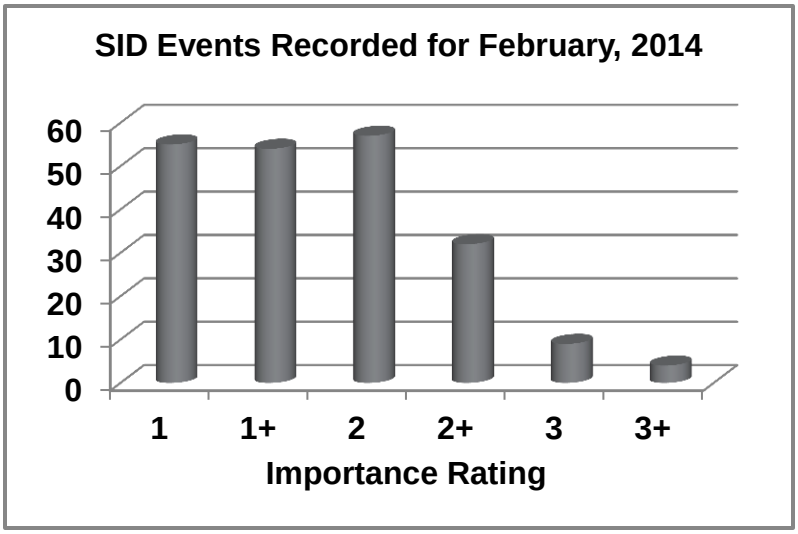
NAA recorded by John Dubois, the most M and C class flares in one day this month, February 2, 2014.

Sudden Ionospheric Disturbances (SID) Records During February, 2014

Date	Max	Imp	Date	Max	Imp	Date	Max	Imp
140201	0545	1+	140203	1257	1	140204	1354	2
140201	0656	1+	140203	1326	1	140204	0115	2+
140201	0130	2	140203	2233	1	140204	1941	2+
140201	0719	2	140203	0101	1+	140204	0123	3
140201	0018	2+	140203	0620	1+	140204	0400	3
140201	0124	2+	140203	0830	1+	140205	1619	1
140201	1452	2+	140203	1338	1+	140205	0752	1+
140202	0414	1	140203	1409	1+	140205	1843	1+
140202	0605	1	140203	2307	1+	140205	0545	2
140202	0630	1	140203	1251	2	140205	1938	2
140202	0743	1	140203	1936	2+	140205	2219	2
140202	0900	1	140203	0535	3	140205	0951	2+
140202	1152	1	140204	1108	1	140205	1249	2+
140202	2202	1+	140204	1436	1	140206	1453	1
140202	0116	2	140204	1703	1	140206	2258	1+
140202	0304	2	140204	2237	1	140206	0251	2
140202	0755	2	140204	0959	1+	140206	0423	2
140202	0819	2	140204	1218	1+	140206	2307	2
140202	0930	2	140204	1530	1+	140207	0008	1+
140202	0939	2	140204	1657	1+	140207	1029	1+
140202	1813	2	140204	2009	1+	140207	1415	1+
140202	2132	2+	140204	2021	1+	140207	2240	2
140202	1747	3+	140204	0944	2	140207	0019	2+
140203	1102	1	140204	0953	2	140207	0454	3

Date	Max	Imp	Date	Max	Imp	Date	Max	Imp
140207	2230	3	140213	0545	2	140219	2350	1
140208	0215	1+	140213	0708	2	140219	2238	1+
140208	1832	1+	140213	1032	2	140220	0747	2
140208	1918	1	140213	1245	2	140220	2253	2
140209	1559	2+	140213	2028	2	140220	0335	2+
140209	1615	2+	140213	1050	2+	140220	0757	2+
140209	1834	2+	140213	1013	1	140220	0610	1
140209	1415	1	140214	1327	1	140221	2159	3+
140211	1439	1	140214	0251	1+	140221	0918	1
140211	1353	1+	140214	0430	1+	140222	1539	1+
140211	0330	2	140214	0642	1+	140222	1543	1+
140211	1857	2	140214	0652	1+	140222	1650	2
140211	0425	2+	140214	1043	1+	140222	1150	1
140211	2008	2+	140214	1725	1+	140223	1335	1
140211	1120	3	140214	1238	2	140223	0608	3
140211	1143	1	140214	1243	2	140223	1450	1
140212	1235	1	140214	0320	1+	140224	1206	1+
140212	0352	1+	140215	0554	2	140224	1115	2
140212	1551	1+	140215	0203	2+	140224	2138	2
140212	0420	2	140215	0927	2+	140224	0025	2+
140212	0658	2	140215	0927	1	140224	0436	1
140212	1944	2	140216	2157	1	140225	1510	1
140212	0359	2+	140216	2249	1	140225	1748	1
140212	1601	2+	140216	1401	1+	140225	0046	2
140212	0957	1	140216	2018	2+	140225	0249	3+
140213	1039	1	140216	1040	3	140225	1501	1
140213	0140	1+	140216	1404	1	140226	0400	2+
140213	0600	1+	140217	0259	2	140226	1231	1+
140213	0611	1+	140217	2237	2+	140227	1251	2+
140213	0814	1+	140217	1323	1	140227	0229	1
140213	1554	1+	140218	0132	1+	140228	0358	1
140213	2243	1+	140218	0958	1+	140228	0050	1+
140213	0233	2	140218	2300	2	140228	0955	2
140213	0252	2	140218	0725	1	140228	2238	3+

Solar Events

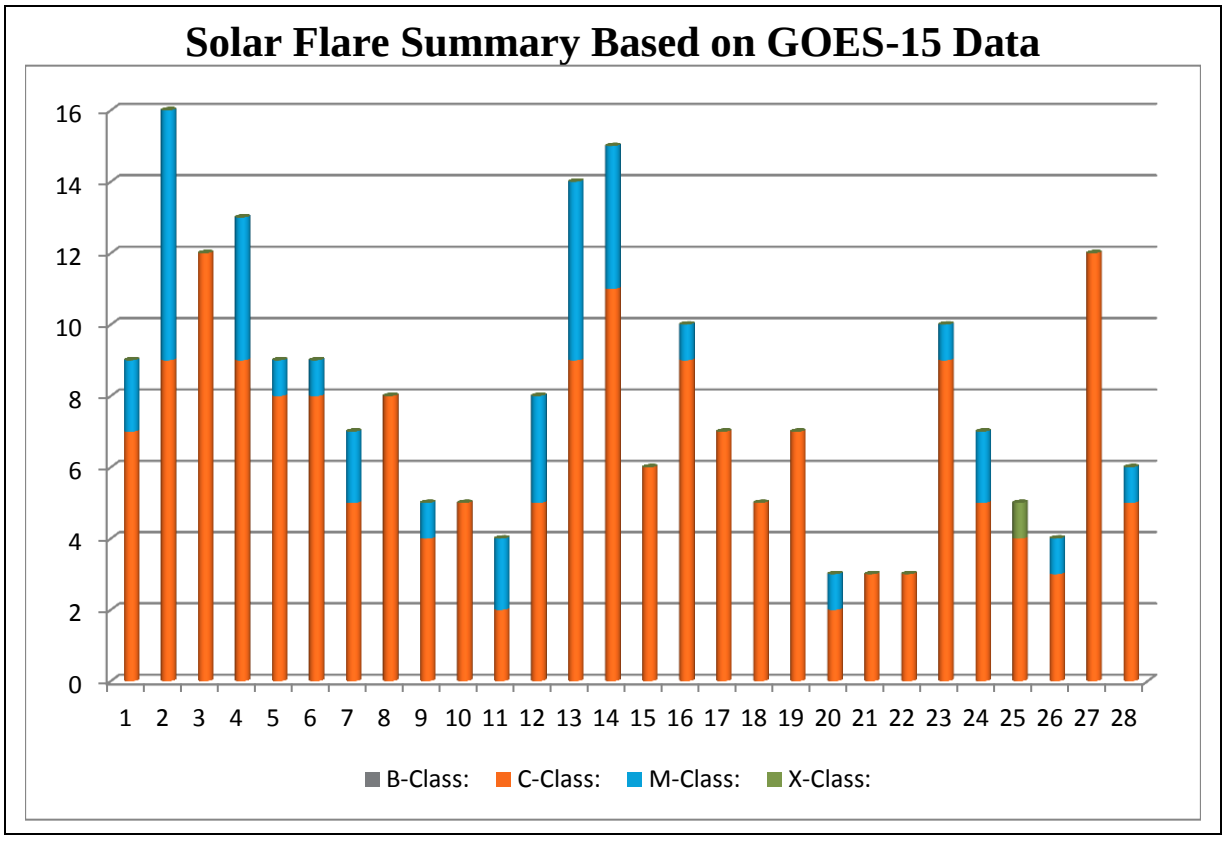


Importance rating: Duration (min)	1-: <19	1: 19-25	1+: 26-32	2: 33-45	2+: 46-85	3: 86-125	3+: >125

Sudden Ionospheric Disturbances (SID) Observers During February, 2014

Observer	Code	Station(s) monitored	Observer	Code	Station(s) monitored
A McWilliams	A94	NML	J Karlovsky	A131	DHO NSY
R Battaiola	A96	HWU	R Green	A134	JJI NWC
J Wallace	A97	NAA	R Mrllak	A136	GQD NSY
L Loudet	A118	GQD NAA TBB	D Koawl	A137	HWU NAA NWC
B Terrill	A120	JJI NWC	S Aguirre	A138	NML
F Adamson	A122	NWC	F Francione & C Re	A139	HWU NAA NSY
S Oatney	A125	NLK NML	I Ryumshin	A142	DHO GQD HWU
K Cotar	A129	DHO GBZ			

There were 222 solar flares measured by GOES-15 for February, 2014: 1 X class, 39 M class, 182 C class and no B class flares. More active this month compared to last, with many C and M class flares. There were 15 AAVSO SID observers who submitted reports this month.



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

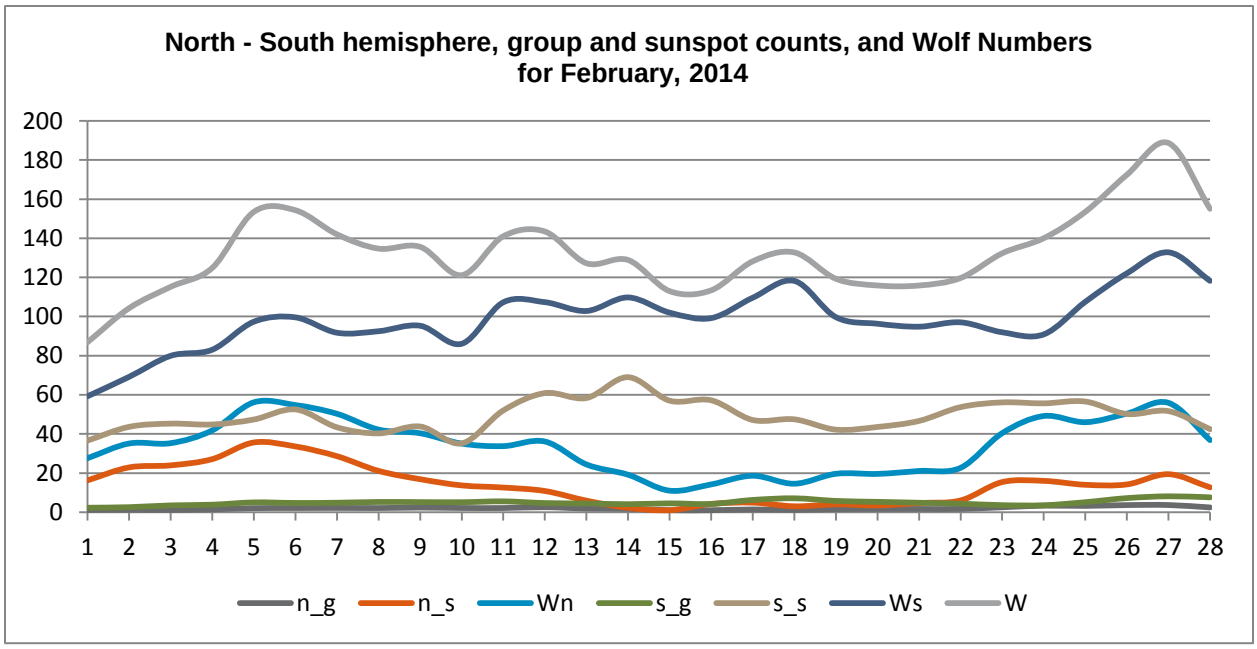
DAY	NumObs	RAW	Ra
1	27	86	65
2	30	105	79
3	22	118	85
4	30	124	95
5	26	147	104
6	29	149	108
7	31	133	103
8	33	130	103
9	30	136	99
10	34	120	93
11	27	134	104
12	33	129	101
13	29	124	91
14	25	109	80
15	23	96	72
16	37	85	**64**
17	41	98	77
18	29	110	83
19	29	109	80
20	31	117	88
21	33	116	84
22	38	121	92
23	45	130	99
24	32	135	98
25	32	143	107
26	36	167	125
27	29	172	**134**
28	23	150	117
Average	**30.9**	**124.8**	**93.8**

Obs	#Obs	Name
AAX	17	Alexandre Amorim
AJV	11	J. Alonso
ARAG	24	Gema Araujo
ASA	22	Salvador Aguirre
BARH	8	Howard Barnes
BDDA	12	Diego Bastiani
BERJ	14	Jose Alberto Berdejo
BMF	17	Michael Boschat
BRAB	23	Brenda Branchett
BRAF	8	Raffaello Braga
BROB	20	Robert Brown
BSAB	26	Santanu Basu
BXD	12	Alexandru Burda
CHAG	23	German Morales Chavez
CIOA	6	Ioannis Chouinavas
CKB	16	Brian Cudnik
CLZ	1	Laurent Corp
CNT	8	Dean Chantiles
CVJ	4	Jose Carvajal
DEMF	4	Frank Dempsey
DGP	19	Gerald Dyck
DJOB	14	Jorge del Rosario
DUBF	22	Franky Dubois
FAM	1	Fabio Mariuzza
FERJ	15	Javier Ruiz Fernandez
FLET	14	Tom Fleming
FLF	17	Fredirico Luiz Funari
FTAA	17	Tadeusz Figiel
FUJK	22	K. Fujimori
HALB	3	Brian Halls
HAYK	11	Kim Hay
HMQ	4	Mark Harris
HOWR	22	Rodney Howe
JASK	18	Krystyna Wirkus
JGE	2	Gerardo Jimenez Lopez
JJMA	12	Jessica M.Johnson
KAND	10	Kandilli Observatory
KAPJ	19	John Kaplan
KNJS	21	James & Shirley Knight
KROL	20	Larry Krozel
LEVM	12	Monty Leventhal
LKR	12	Kristine Larsen
MARE	3	Enrico Mariani
MCE	21	Etsuiku Mochizuki
MGAA	4	Gael Mariani
MILJ	6	Jay Miller
MJHA	23	John McCammon
MMI	23	Michael Moeller
MUDG	2	George Mudry
OATS	5	Susan Oatney
OBSO	16	IPS Observatory
ONJ	10	John O'Neill
RICE	4	E. C. Richardson
RLM	4	Mat Raymonde
RRO	4	Ralph Rogge
SCGL	23	Gerd-Lutz Schott
SDOH	28	SDO-Jan Alvestad
SIMC	7	Clyde Simpson

SMNA	1	Michael Stephanou
SONA	2	Andries Son
SPIA	12	Piotr Skorupski
STAB	26	Brian Gordon-States
SUZM	20	Miyoshi Suzuki
TESD	13	David Teske
URBP	18	Piotr Urbanski
VARG	12	A. Gonzalo Vargas
VIDD	4	Daniel Vidican
WAU	3	Artur Wargin
WILW	12	William M. Wilson
WKM	1	Michael Wiskirken
WRP	2	Russell Wheeler

Total Observers: 71
Total Observations: 892

41 of our 71 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 group and sunspot counts do not cross over any day this month; the southern hemisphere is predominant.



Reporting Addresses:
Sunspot Reports – Kim Hay

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SID Solar Flare Reports – Rodney Howe

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Errata from January's Solar Bulletin: These observers were not shown in the bulletin, although their numbers were included in the final report for January, 2014.

JASK	8	Krystyna Wirkus
LEVM	22	Monty Leventhal
SPIA	7	Piotr Skorupski