Solar Bulletin

THE AMERICAN ASSOCIATION OF VARIABLE STAR OBSERVERS - SOLAR COMMITTEE

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Table I. American Relative Sunspot Numbers (Ra) for December 2003 [boldface = maximum, minimum]

Day	N	Raw Mean	Ra
1	23	120	85
2	20	107	71
3	22	99	72
4	19	88	63
5	20	77	55
6	25	53	41
7	31	51	36
8	26	32	24
9	28	28	22
10	28	34	26
11	22	39	29
12	25	36	25
13	30	47	34
14	24	46	34
15	31	48	32
16	24	61	40
17	22	93	67
18	23	99	69
19	24	101	72
20	27	99	71
21	33	95	70
22	28	120	**83**
23	26	104	70
24	26	91	62
25	26	70	50
26	27	56	42
27	29	51	36
28	26	48	35
29	23	38	28
30	20	26	17
31	28	19	**14**
Means:	**25.4**	**66.9**	**47.6**

Total No. of Observers: 60

Total No. of Observations: 786

Table II. December Observers

12	AAP	P.Abbott
19	ARAG	G.Araujo
9	BARH	H.Barnes
6	BATR	R.Battaiola
2	BEB	R.Berg
9	BERJ	J.Berdejo
9	BMF	M.Boschat
22	BOSB	B.Bose
29	BRAB	B.Branchett
21	BRAR	R.Branch
15	BROB	R.Brown
4	CAMP	P.Campbell
13	CARJ	J.Carlson
26	CHAG	G.Morales
31	CKB	B.Cudnik
12	CLZ	C.Laurent
4	COMT	T.Compton
28	DEJV	J.van Delft
15	DGP	G.Dyck
20	DRAJ	J.Dragesco
9	FEEC	C.Feehrer
15	FERJ	J.Fernandes
23	FLET	T.Fleming
22	GIOR	R.Giovanoni
3	GOEM	M.Goetz
6	GOLA	A.Golovin
25	GUNM	M.Gundlach
7	HAYK	K.Hay
10	HRUT	T.Hrutkay
19	JAMD	D.James
8	JEFT	T.Jeffrey
10	KAPJ	J.Kaplan
9	KHAR	R.Khan
1	KROL	L.Krozel
10	LARJ	J.Larriba
6	LERM	M.Lerman
17	LEVM	M.Leventhal
12	MALK	K.Malde
8	MARE	E.Mariani
22	MARJ	J.Maranon
26	MCE	E.Mochizuki
17	MMI	M.Moeller
10	OBSO	IPS Observatory
8	RICE	E.Richardson
11	RITA	A.Ritchie
16	SCGL	G.Schott
1	SDP	D.Sharples
4	SIMC	C.Simpson
4	STEF	G.Stefanopoulis
12	STEM	G.Stemmler
11	STQ	N.Stoikidis
25	SUZM	M.Suzuki
10	SZAK	K.Szatkowski
20	TESD	D.Teske
7	THR	R.Thompson
13	TJV	J.Temprano
13	URBP	P.Urbanski
4	VARG	A.Vargas
13	WILW	W.Wilson
13	YESH	H.Yesilyaprak

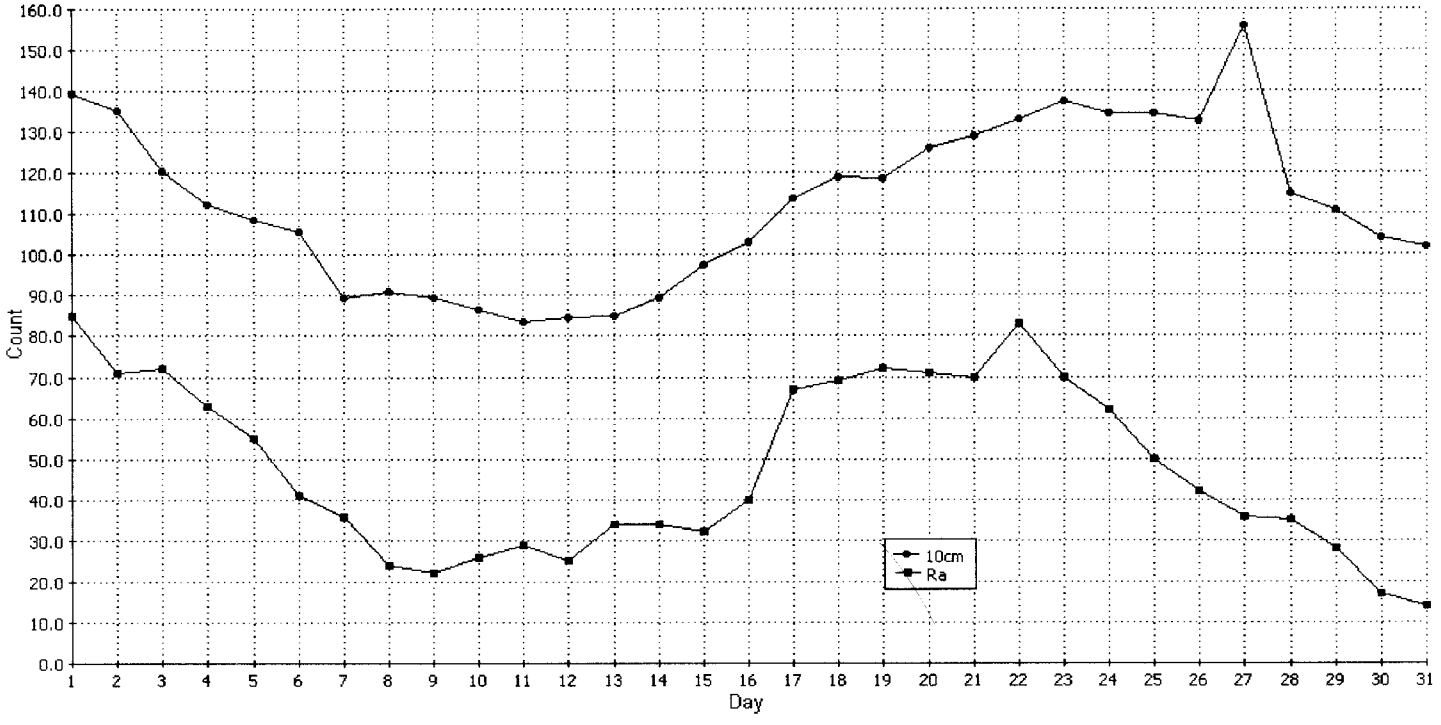
Reporting Addresses

Sunspot Reports -- **email:** solar@aavso.org
postal mail: AAVSO, 25 Birch St. Cambridge, MA 02138
FAX *(AAVSO):* (617) 354-0665

SID Solar Flare Reports -- **email:** noatak@aol.com
postal mail: Mike Hill
114 Prospect St. Marlboro, MA 01752

Table III. Means of Raw Group Counts (RG) and Ratios of Spots to Groups (S:G) in December 2003

Day	RG	S:G	Day	RG	S:G	Day	RG	S:G	Day	RG	S:G
1	7.2	6.6	**9**	2.4	2.0	**17**	6.5	4.3	**25**	3.3	10.8
2	6.7	6.0	**10**	2.9	1.8	**18**	7.0	4.3	**26**	2.6	11.6
3	6.8	4.6	**11**	3.1	2.7	**19**	6.4	5.8	**27**	2.5	10.2
4	5.6	5.8	**12**	2.8	2.7	**20**	5.9	6.7	**28**	2.9	6.6
5	4.7	6.5	**13**	3.5	3.4	**21**	5.2	8.3	**28**	2.6	4.6
6	3.3	6.1	**14**	3.1	4.9	**22**	6.3	8.9	**30**	1.9	4.0
7	3.4	4.8	**15**	3.0	6.1	**23**	5.0	10.9	**31**	1.3	4.8
8	2.4	3.3	**16**	3.9	5.5	**24**	4.7	9.6	**Mn.**	**4.2**	**6.0**



13.Fig. 1. 10 cm Solar Flux and American Relative Sunspot Numbers (Ra) for December 2003
10 cm source: http://www.drao.nrc.ca/icarus

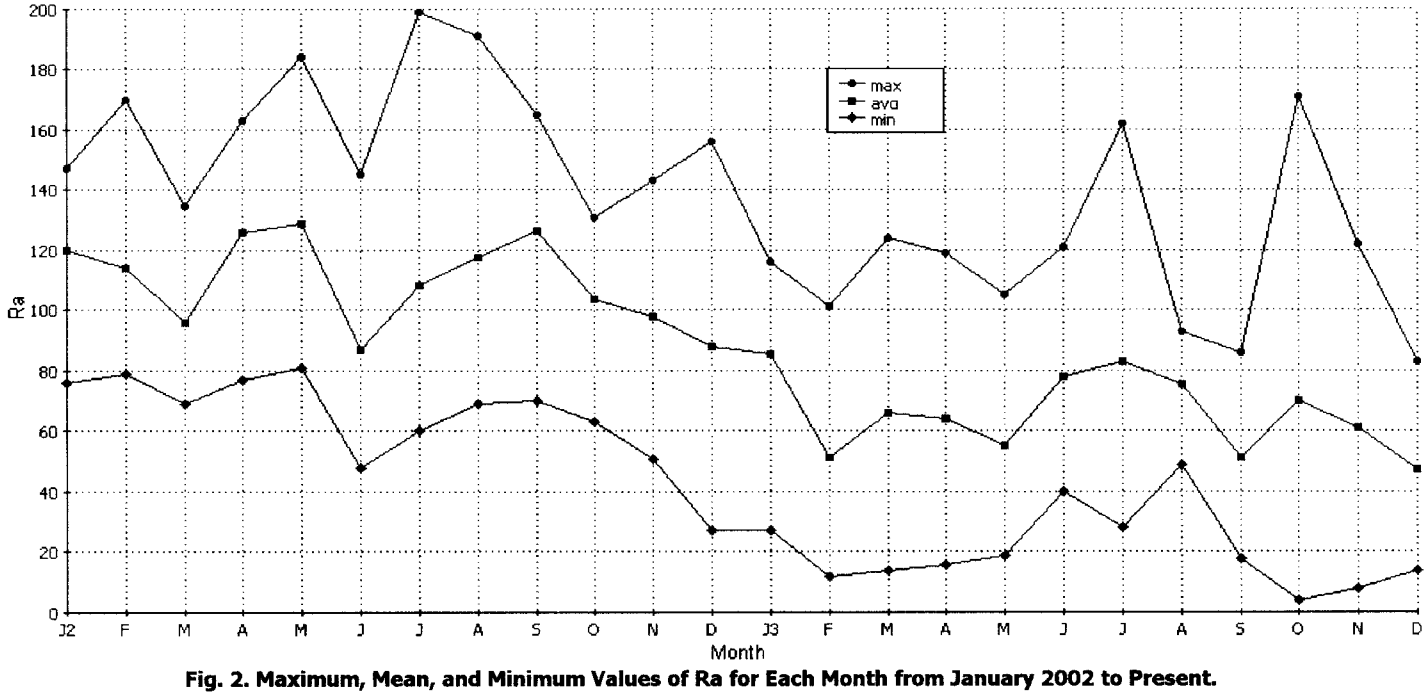


Fig. 2. Maximum, Mean, and Minimum Values of Ra for Each Month from January 2002 to Present.

Table IV. Sunspot and SID Observers Who Contributed Reports During 2003.

Sunspot Observers

AAP	Patrick Abbott	Canada
ARAG	Gema Araujo	India
ATON	Antonio Attanasio	Italy
BARH	Howard Barnes	New Zealand
BATR	Roberto Battaiola	Italy
BEB	Ray Berg	USA
BERJ	Jose Berdejo	Spain
BLAJ	John Blackwell	USA
BMF	Michael Boschat	Canada
BOJP	Piotr Bojda	Poland
BOSB	Biswajit Bose	India
BRAB	Brenda Branchett	USA
BRAD	David Branchett	USA
BRAR	Robert Branch	USA
BROB	Bob Brown	USA
BURS	Scott Burgess	USA
BWJ	John Bohdanowicz	Canada
CAMP	Paul Campbell	Canada
CARJ	Jim Carlson	USA
CHAG	German Morales	Bolivia
CKB	Brian Cudnik	USA
CLZ	Laurent Corp	France
COMT	Thomas Compton	USA
CORA	Angel Coroas	Cuba
CR	Tom Cragg	Australia
CVJ	Jose Carvajal	Spain
DEJV	Jacques van Delft	South Africa
DELS	Susan Delaney	USA
DEMF	Frank Dempsey	Canada
DGP	Gerald Dyck	USA
DRAJ	Jean Dragesco	France
DUBF	Franky Dubois	Belgium
ELR	Ed Reed	USA
ERRA	Adriana Errico	Spain
FEEC	Carl Feehrer	USA
FERJ	Jose Fernandez	Spain
FLET	Tom Fleming	USA
FUJK	Kenichi Fujimori	Japan
GIOR	Richard Giovanoni	USA
GOEM	Martin Goetz	Germany
GOLA	Alexander Golovin	Ukraine
GOTS	Steve Gottschalk	USA
GUNM	Marcello Gundlach	Boliva
HALB	Brian Halls	England
HAYK	Kim Hayk	Canada
HRUT	Timothy Hrutkay	USA
HUZR	Richard Huziak	Canada
JAMD	David James	USA
JEFT	Thomas Jeffrey	USA
JENJ	Jamey Jenkins	USA
JENS	Simon Jenner	England
KAPJ	John Kaplan	USA
KHAR	Rana Khan	India
KNJS	James Knight	South Africa
KROL	Larry Krozel	USA
KUZM	Mikhail Kuzmin	Russia
LARJ	Jose Larriba	Spain
LERM	Michel Lerman	Canada
LEVM	Monty Leventhal	Australia
LUBT	Thomas Lubbers	USA
MALK	Kjell Malde	Norway
MARE	Enrico Mariani	Italy

Sunspot Observers (cont'd.)

MARJ	Jose Maranon	Spain
MCE	Etsuiku Mochizuki	Japan
MILJ	Jay Miller	USA
MMI	Michael Moeller	Germany
MUDG	George Mudry	Canada
OBSO	IPS Observatory	Australia
PARN	Norman Parker	USA
REYD	Darryl Reynolds	USA
RICE	E. C. Richardson	England
RITA	Arthur Ritchie	USA
SCGL	Gerd Lutz Schott	Germany
SCHG	Greg Scholl	USA
SDP	Diane Sharples	USA
SHUM	Maxim Shulga	Russia
SIMC	Clyde Simpson	USA
STAB	Brian Gordon-States	England
STEF	George Stefanopoulos	Greece
STEM	Gerhard Stemmler	Germany
STQ	Nick Stoikidis	Greece
SUZM	Miyoshi Suzuki	Japan
SYP	Paul Soron	Canada
SZAK	Kryzstoff Szatkowski	Poland
SZUM	Mieczyslaw Szulc	Poland
TESD	David Teske	USA
THR	Raymond Thompson	Canada
TJV	Javier Temprano	Spain
URBP	Piotr Urbanski	Poland
VALD	Daniel del Valle	Puerto Rico
VARG	Alberto Vargas	Boliva
VELM	Maria Vela	Romania
VIDD	Daniel Vidican	Romania
WILW	William Wilson	USA
YESH	Hulya Yesilyaprak	Turkey
ZDM	Dimitry Zhdanok	Russia

SID Observers

A-09	Werner Scharlach	USA
A-29	Andy Clerkin	USA
A-50	Jerry Winkler	USA
A-52	Domenic Toldo	South Africa
A-63	James Ellerbe	Spain
A-80	Peter King	England
A-83	Alex Panzer	USA
A-84	Walter Moos	Switzerland
A-87	Mike Hill	USA
A-91	Len Anderson	Australia
A-93	Guglielmo Di Fillipo	Italy
A-95	Ted Poulos	USA
A-96	Roberto Battaiola	Italy
A-97	Jon Wallace	USA
A-99	Michael King	England
A-100	Paul Campbell	Canada
A-101	Giorgio Bressan	Italy
A-102	Francois Steyn	South Africa
A-103	Biswajit Bose	India
A-104	Doug Welch	Canada
A-107	Nick Stoikidis	Greece
A-108	Paul Mortfield	USA
A-110	Truman State Univ.	USA

Sudden Ionospheric Disturbance Report

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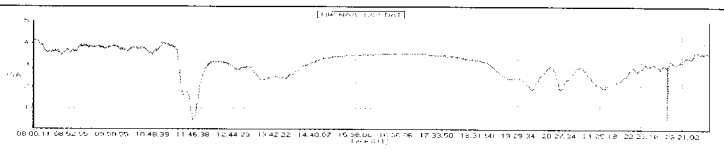


Sudden Ionospheric Disturbances (SID) Recorded During December 2003

(Analysis performed by Michael Hill, SID Analyst)

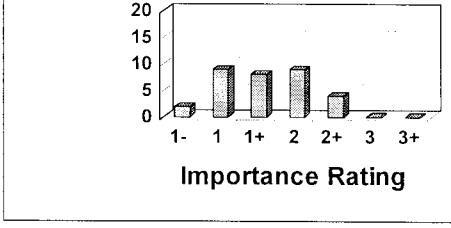
Date	Max	Imp	Date	Max	Imp	Date	Max	Imp
031202	0807	2+	031223	1022	1+			
031202	0947	1+	031225	0822	2			
031202	1308	1+	031226	1035	2			
031202	2108	1	031226	1621	1			
031206	0747	1	031226	1929	2			
031206	0948	1	031231	1733	1-			
031206	1110	2	031231	1824	2			
031206	1543	2						
031207	0256	2+						
031207	0616	1-						
031207	0628	1						
031210	1440	2						
031217	0312	2+						
031217	0622	1						
031218	0735	1+						
031218	0931	1+						
031219	0815	2						
031219	1231	1+						
031219	1646	1						
031221	0251	2+						
031221	0418	1+						
031221	1301	1+						
031222	1605	1						
031223	0736	1						
031223	1015	2						

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

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

1) Event reported by two or more observers within ±5 minutes
2) Event matched to GOES-8 XRA event to within ±15 minutes and event time < 1000 UT
3) reported by observer with a quality rating > 8 (scale 1-10)

Observer	Code	Station(s) monitored
A Clerkin	A29	NAA
J Winkler	A50	NAA NPM NXX
D Toldo	A52	NAA NSS NWC
J Ellerbe	A63	ICV
P King	A80	HWU
W Moos	A84	FTA ICV
M Hill	A87	NAA
G DiFillipo	A93	DHO HWU
T Poulos	A95	NAA
J Wallace	A97	NAA
M King	A99	HWU
P Campbell	A100	NLK
F Steyn	A102	NWC
P Mortfield	A108	NLK



Solar Events

December was a relatively quiet month for SID Events especially compared to the very active months of October and November with 133 and 69 events respectively. This month there were only 32 SID events. This is more in line with the position within the solar cycle that we are in as it declines to minimum. Most of the SID events were of average intensity with no long term events. The GOES-12 satellite recorded only 79 X-Ray events which is quite low. Of these events, five were M-Class events. There were no X-Class events. The most active days were on the 6th and the 18th. The period from the 17th to the 27th was more active than most other times during the month.

I read about an interesting affect of the large solar flares back in October just recently. The spacecraft flying to Mars carrying the first Rover, Spirit, performs attitude control operations using a star tracker which compares the view of the stars with maps stored in memory in order to determine where it is pointed. The spacecraft also contains a backup attitude determination system that relies on a Sun Sensor. Sun sensors use the sun as a reference for attitude determination. Apparantly the burst of high energy particles coming from the X17.1 flare on Oct 28th caused the star tracker to see points of light that were not really stars thereby comprimising its operation for a while. The backup Sun Sensors had to be used to take over until the Star Tracker could be brought back to operational status. The large flares do affect us in many ways. This is just one example and is one of the reason spacecraft electronics have to be radiation hardened and why systems have to include backups and redundancy. Any mission in space has to take the solar cycle into consideration. This includes orbiting satellites, scientific satellites or manned spacecraft.