

# Solar Bulletin

THE AMERICAN ASSOCIATION OF VARIABLE STAR OBSERVERS - SOLAR DIVISION

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## Daily Mean Sunspot Numbers, $R_a$ for December 1999

(computational analysis performed by Joseph Lawrence)

simple average

k-corrected

Day	$R_a$ avg	Std. Dev.	$R_a$ k	Std. Dev.
1	105	6.4	98	5.2
2	91	5.0	79	4.0
3	82	4.7	69	3.3
4	75	4.5	61	2.7
5	68	4.3	61	3.6
6	77	6.1	69	5.9
7	75	4.7	63	2.8
8	101	5.7	85	4.5
9	119	6.6	100	4.9
10	135	8.5	114	4.1
11	116	6.4	98	4.6
12	120	7.1	101	5.3
13	111	6.6	93	4.8
14	118	9.4	92	5.5
15	112	15.1	91	9.0
16	115	11.4	95	7.4
17	117	9.5	106	6.1
18	116	6.4	104	4.4
19	124	6.5	102	3.5
20	112	8.7	101	5.0
21	118	8.7	103	6.6
22	125	12.4	99	6.8
23	114	10.6	92	6.1
24	109	6.8	94	5.1
25	98	5.4	89	4.1
26	106	10.3	86	7.9
27	88	5.8	73	3.2
28	85	4.8	72	2.3
29	88	6.3	73	5.1
30	68	7.6	62	7.5
31	70	5.5	58	5.4

Observer	Code	Country	Days Obs.
Abbott, P	AAP	Canada	14
Anderson, E	ANDE	USA, NY	4
Attanasio, A	ATON	Italy	3
Berg, R	BEB	USA, IN	3
Blackwell, J	BLAJ	USA, NH	8
Boschat, M	BMF	Canada	12
Bose, B	BOSB	India	26
Branchett, B	BRAB	USA, FL	23
Branchett, D	BRAD	USA, FL	16
Branch, R	BRAR	USA, CA	27
Carlson, J	CARJ	USA, MA	17
Morales, G	CHAG	Bolivia	16
Charles, J	CJL	USA	2
Cudnik, B	CKB	USA, TX	22
Clemens, C	CLEC	USA, PA	15
Corp, L	CLZ	France	4
Compton, T	COMT	USA, MI	7
Cragg, T	CR	Australia	23
Dempsey, F	DEMF	Canada	8
Dragesco, J	DRAJ	France	17
Dubois, F	DUBF	Belgium	15
Del Valle, D	DVA	Puerto Rico	19
Reed, E	ELR	USA, TX	28
Feehrer, C	FEEC	USA, MA	21
Ruiz, J	FERJ	Spain	18
Fleming, T	FLET	USA, TX	25
Fujimori, K	FUJK	Japan	20
Gallo, M	GALM	Argentina	4
Giovanoni, R	GIOR	USA, MD	23
Gotschalk, S	GOTS	USA, IA	15
Halls, B	HALB	England	2
Hay, K	HAYK	Canada	8
Hrutkay, T	HRUT	USA, PA	7
Ibrahim, A	IBRA	Egypt	29
Jenner, S	JENS	England	2
Jennings, V	JENV	USA, VA	15
Kaplan, J	KAPJ	USA, MN	19
Knight, J	KNJS	South Africa	10
Lariba, J	LARJ	Spain	16
Lerman, M	LERM	Canada	4
Leventhal, M	LEV M	Australia	16
Lizak, T	LIZT	USA, RI	12
Mariani, E	MARE	Italy	5
Jarboles, J	MARJ	Spain	30
Mochizuki, E	MCE	Japan	21
McHenry, L	MCHL	USA, PA	1
Miller, J	MILJ	USA, MD	6
Moeller, M	MMI	Germany	14
Mudry, G	MUDG	Canada	3
Nilsson, B	NILB	Denmark	2
Prestage, N	OB SO	Australia	11
Randall, T	RANT	USA, NY	5
Richardson, E	RICE	England	20
Ritchie, A	RITA	USA, MA	21
Ramsey, J	RMAJ	USA, AR	1
Schoot, G	SCGL	Germany	11
Stefanopoulos, G	STEF	Greece	9
Stoikidis, N	STQ	Greece	14
Suzuki, M	SUZM	Japan	25
Takuma, H	TAKH	Japan	27
Teske, D	TESD	USA, MS	12
Thompson, R	THR	Canada	2
Vazquez, C	VAZC	Argentina	7
Wilson, W	WILW	USA, TN	11
Witkowski, L	WITL	USA, FL	21
Yesilyaprak, H	YESH	Turkey	20

Monthly Mean  $R_a$  avg = 101.8

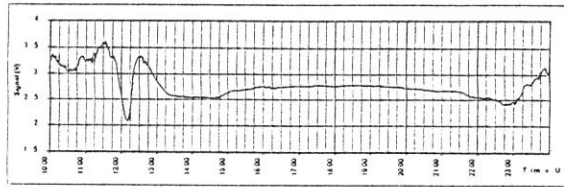
Monthly Mean  $R_a$  k = 86.5

AAVSO Sunspot Observers Codes  
January 1, 2000

AAP	A. Patrick Abbott	JENJ	James Jenkins
ANDE	Eric Anderson	JENS	Simon Jenner
ATAT	Tamer Atac	JENV	Vernon Jennings
ATKG	Gerald Atkinson	KAPJ	John Kaplan
ATON	Antonio Attanasio	KNJS	James & Shirley Knight
BARH	Howard Barnes	KOS	Attila Kosa-Kiss
BARW	Bill Barton	KUEK	Kevin Kuehl
BATR	Roberto Battaiola	LARJ	Jose Marco Larriba
BEB	Ray Berg	LAWJ	Joseph D. Lawrence
BERJ	Jose Alberto Berdejo	LERM	Michel Lerman
BLAB	Bill Black	LEVM	Monty Leventhal
BLAJ	John A. Blackwell	LGN	Gennaro Lopriore
BMF	Michael Boschat	LIZT	Tom Lizak
BOSB	Biswajit Bose	LOPJ	Jerry Lop
BRAB	Brenda Branchett	LUBT	Thomas Lubbers
BRAD	David Branchett	LUNH	Hugh Lund
BRAR	Robert Branch	LWT	Todd Lohvinenko
BROR	Rodney Brooks	MALK	Kjell Inge Malde
BURS	Scott Burgess	MARE	Enrico Mariani
CARJ	James Carlson	MARH	Hubert Martin
CHAG	German Morales Chavez	MARJ	Javier Jarboles Maranon
CHOJ	John Chouinavas	MCE	E. Mochizuki
CJL	Jeff Charles	MCHL	Larry McHenry
CKB	Brian Cudnik	MILJ	Jay Miller
CLEC	Carl Clemens	MMI	Michael Moeller
CLZ	Laurent Corp	MOJH	Hector Mojica
COLB	Bill Collins	MUDG	George Mudry
COMT	Thomas Compton	NILB	Brian Nilsson
CONG	Gregory Conlin	NYLH	Heikki Nylander
CR	Thomas Cragg	OBSO	Nigel Prestage
DAVT	Thomas F. Davis	PAIM	Marie-Therese Pain
DEMF	Frank Dempsey	PARN	Norm Parker
DGP	Gerald P. Dyck	QUAG	George R. Qualley
DRAJ	Jean Dragesco	RANT	Thomas Randall
DUBF	Franky Dubois	REYD	Darryl Reynolds
DVA	Daniel del Valle	RICE	E. C. Richardson
ELEG	Gontran Eleizalde	RITA	Arthur Ritchie
ELLJ	Jaime Ellerbe	RMAJ	Jim Ramsey
ELR	Ed L. Reed	RMAS	Sharon Ramsey
EVAC	Charles Evans	ROSG	George Rosenberg
FEEC	Carl Feehrer	SCGL	Gerd-Lutz Schott
FERJ	Javier Ruiz Fernandez	SCHG	Gregg Scholl
FLEN	Nicolas Alejandro Fleming	SIMC	Clyde Simpson
FLET	Tom Fleming	SPEP	Pam Spence
FUJK	K. Fujimori	SPER	Robert Spellman
GALE	Enrique Galvez Ferreyros	STAB	Brian Gordon-States
GALM	Mauro Gallo	STEE	Elizabeth Stephenson
GIOR	Richard Giovanoni	STEF	George Stefanopoulis
GOTS	Steve Gottschalk	STEM	Gerhard Stemmler
GUNM	Marcelo Mojica Gundlach	STQ	Nick Stoikidis
GUTD	David Montes Gutierrez	SUZM	M. Suzuki
HALB	Brian Halls	TAKH	H. Takuma
HANS	Stanley Hanna	TESD	David Teske
HAYK	Kim Hay	THR	Raymond Thompson
HRUT	Timothy Hrutkay	TORM	Marcello Torsoli
HSF	Casper Hossfield	VARG	Gonzalo Vargas
IBAJ	Jose Oporto Ibanez	VARP	Paraskhos Vardaxoglou
IBRA	Aymen Ibrahim	VART	Thomas Varsos
IMPR	Ruth Imperi	VAZC	Carlos Angueira Vazquez
ISKJ	Jozsef Iskum	WHIM	Matthew Whitehouse
ISLJ	John E. Isles	WILW	William M. Wilson
JANJ	Jan Janssens	WISM	Michael Wiskirken
JEFT	Thomas Jeffrey	WITL	Leonard Witkowski
		WKW	Kenneth Watts
		WYDK	Krzysztof Wydra
		YESH	Hulya Yesilyaprak

# Sudden Ionospheric Disturbance Report

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## Sudden Ionospheric Disturbances (SID) Recorded During December 1999 (correlation analysis performed by Joseph Lawrence, SID Analyst)

Date	Max	Imp	Date	Max	Imp	Date	Max	Imp	Date	Max	Imp
991203	1954	1-	991217	0757	1+	991218	1910	1+	991225	1733	2+
991205	0926	1-	991217	0935	1	991219	1632	1-	991226	0850	2
991207	1017	1+	991217	1000	1	991221	1718	2	991226	1142	1-
991207	1601	1	991217	1857	1-	991222	1053	2	991229	0925	2+
991207	2037	2+	991218	0130	1+	991222	1902	2+	991231	1640	1+
991208	1915	2	991218	0430	1	991223	0700	1	991231	1852	1+
991209	1957	2+	991218	1705	2+	991223	1006	1-	-	-	-
991216	0837	1	991218	1803	2	991224	0805	2	-	-	-
991217	0538	1+	991218	1832	1+	991224	0934	2	-	-	-

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

- 1) reported in at least two observers' reports.
- 2) visually analyzed with definiteness rating = 5 on submitted charts
- 3) reported by overseas observers with high definiteness rating

Observer	Code	Station(s) Monitored
Scharlach, W	A-09	NAA
Winkler, J	A-50	NAA, NPM
Overbeek, D	A-52	NAA, NPM, NSW
Toldo, D	A-52	NAA, NPM, NSW
Stokes, A	A-62	NAA
Ellerbe, J	A-63	ICV
Witkowski, L	A-72	NAA
Landry, A	A-81	NAA
Panzer, A	A-83	NAA
Moos, W	A-84	FTA, GBZ, ICV
Hill, M	A-87	NAA

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

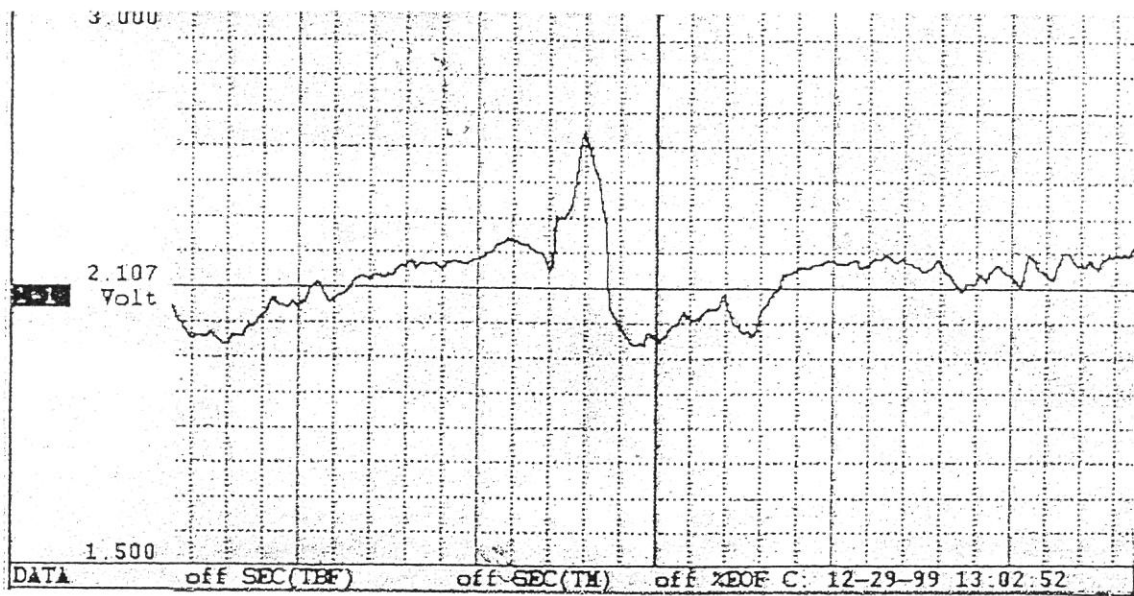
Editor's Note: Sadly I announce the passing of our fellow sunspot observer Jose Manuel Oporto Ibanez (IBAJ, Spain). I received the following letter from his friend Jose Alberto Berdejo (BERJ).

" I grieve to notify you that my friend and solar observer, Jose Manuel Oporto Ibanez passed away on December 29, 1999. He was 42 years old. He was with influenza and fever, but suddenly his heart failed. He received an AAVSO Observer Award and traveled from Spain to Hyannis last October to attend the AAVSO 88<sup>th</sup> Annual Meeting. He received his award in person. He returned to Spain very happy and (with) plenty of energy to do much more in astronomy, because he found a lot of people who he didn't know before and they received him with open arms and lots of friendship. He talked to us about those things in two of our weekly meetings and he transmitted us his enthusiasm. I would like to transmit to the AAVSO the thanks of his widow, Pilar Mantecon, for all those good times that Jose Manuel had in your meeting."

Those who attended the Hyannis meeting last Fall will surely remember Jose Manuel for his ease of overcoming the language differences to make many friends. His spirit and monthly sunspot report will be missed.

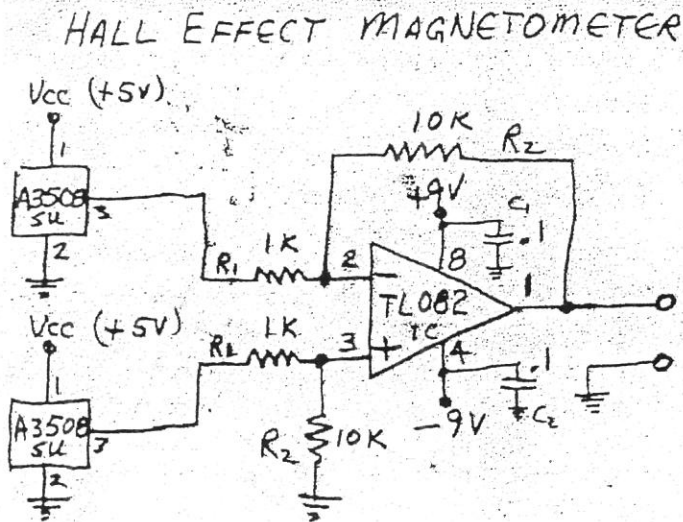
# Sudden Ionosphere Disturbances Recorded during December

Prepared by  
Casper H. Hossfield



The recording of a magnetic storm on 29 December was made by Jerry Winkler, A-52, in Houston, Texas. Jerry has been experimenting with Hall Effect devices for some time trying to use them in place of the photocells on the McWilliams magnetometer most AAVSO observers use. They are available from Radio Shack and cost about the same as the photocells and light source. They have the advantage that the magnetometer does not have to be enclosed in a light tight box. The schematic below shows how the signal from the Hall Effect devices is amplified ten times by half of a Radio Shack TL082 dual op amp. It is necessary to use a bipolar power supply because both inputs of the TL082 are used to make it a differential amplifier.

Usually magnetometer recordings are made on Rustrak recorders running 1/4-inch / hr. Jerry made his recording above on a computer using the WinDAQ recording system available from Radio Shack. WinDAQ runs in Windows and an old 486 computer with Windows 3.1 or later is all you need to run it. You can find out complete details on WinDAQ's web site, ([www.dataq.com](http://www.dataq.com)). The web site also shows an 800 number where you can order the WinDAQ system. This might be easier than having Radio Shack order it for you. The cost of the A/D converter and related software is \$99. There are two recording channels. WinDAQ is a 12-bit system and the sampling rate can be as high as 240/sec. AAVSO's SID observers could use WinDAQ to multiplex two SES signals. If you are interested in building a Hall Effect magnetometer Jerry will be glad to send you detailed instructions on how to build it and set it up to record magnetic storms. His address: 16015 Buccaneer Lane, Houston Texas 77062, USA. Email address: <JWink38223@aol.com>



- RADIO SHACK No.
- R<sub>1</sub> - 1K - 271-1321
  - R<sub>2</sub> - 10K - 271-1335
  - C<sub>1</sub> - .1 uF - 272-135
  - C<sub>2</sub> - .1
  - IC - TL082 - 276-1715
  - HALL DEVICE - RSU12036109 - A3508SU
  - WINDAQ - A/D CONVERTER - RSU12135844
  - DATAQ INSTRUMENTS
  - DI-251RS 2 CHANNEL DATA ACQUISITION SYSTEM

The chart below was made by new SID observer, A-92, Carl Feehrer in Bedford Massachusetts. Carl is an AAVSO sunspot observer who recently became interested in detecting solar flares by the sudden enhancement of signal, SES, method. Carl uses the Gyrator II very low frequency, VLF, receiver designed by Art Stokes, A-62. He uses a Rustrak recorder that was recently donated to the AAVSO by Al McWilliams, designer of the famous McWilliams magnetometer that most AAVSO observers use to record magnetic storms associated with solar activity. Carl's SES receiver is tuned to the powerful NAA signal in Cutler, Maine on 24kHz. NAA is a one megawatt VLF transmitter used by the US Navy to communicate with submerged submarines. VLF signals can penetrate seawater to a small fraction of their very long wavelength due to the Brewster scattering principal familiar in optics.

A-92 is our newest SID observer and a chart showing the same SES made by our oldest observer is shown below for comparison. The lower chart was made by Werner Scharlach, A-9, who has been observing for over 40 years. I helped Werner build his first SEA receiver when he was a student. He is now a retired radio astronomy observer from Hat Creek observatory in northern California. Werner is our most faithful observer. He has maintained his SID station and sent the Solar Division his charts each month for most of his lifetime.

