

Solar Bulletin

THE AMERICAN ASSOCIATION OF VARIABLE STAR OBSERVERS - SOLAR DIVISION

Carl E. Feehrer, Editor
9 Gleason Rd.
Bedford, MA 01730

Email: cfeehrer@hotmail.com

ISSN 0271-8480

Volume 56 Number 11

November 2000

Table I. Mean Sunspot Numbers for November

Day	N	Raw	s.d.	K-corrected	s.d.	s.e.
1	28	172	10.3	144	5.9	1.11
2	30	158	8.6	135	8.3	1.52
3	29	173	11.5	147	8.3	1.54
4	27	177	12.0	146	7.2	1.39
5	36	167	6.5	138	4.3	0.72
6	27	142	7.8	121	5.9	1.14
7	27	168	8.7	137	5.7	1.10
8	26	153	7.4	122	4.0	0.78
9	21	120	5.3	98	3.3	0.72
10	23	129	6.0	107	2.4	0.50
11	33	110	4.8	93	2.9	0.50
12	25	91	3.4	72	2.2	0.44
13	21	97	5.8	78	3.0	0.65
14	24	114	5.8	93	3.1	0.63
15	30	116	5.5	97	4.2	0.77
16	21	111	6.0	94	4.0	0.87
17	20	129	8.1	103	5.0	1.12
18	28	162	6.9	130	3.9	0.74
19	29	168	8.3	133	4.6	0.85
20	21	143	8.6	115	5.4	1.18
21	24	144	8.6	116	6.3	1.29
22	32	139	7.5	110	4.6	0.81
23	30	127	7.0	101	4.1	0.75
24	26	125	7.0	97	4.2	0.82
25	21	96	6.3	76	3.8	0.83
26	24	93	7.3	76	4.2	0.86
27	22	128	8.8	103	4.8	1.02
28	22	160	10.4	121	5.6	1.19
29	25	160	8.0	125	4.4	0.88
30	23	170	12.2	133	7.6	1.58
31	---	---	---	---	---	---

Means: 138.1 112.0

No. of Observations: 776

No. of Observers: 59

Table II. November Observers

14 AAP P.Abbott	19 MALK K.Malde
10 BARH H.Barnes	4 MARE E.Mariani
7 BATR R.Battiola	27 MARJ J.Maranon
9 BEB R.Berg	19 MCE E.Mochizuki
4 BLAJ J.Blackwell	17 MMI M.Moeller
28 BOSB B.Bose	3 MUDG G.Mudry
26 BRAB B.Branchett	3 NILB B.Nilson
22 BRAR R.Branch	11 OBSO IPS Obs.
15 BROB B.Brown	19 RITA A.Ritchie
16 CARJ J.Carlson	17 SCGL G.Schott
30 CHAG G.Morales	4 SIMC C.Simpson
9 CKB B.Cudnik	10 STEF G.Stefanopoulos
2 CLZ C.Laurent	18 STEM G.Stemmler
21 COLJ J.Collins	19 STQ N.Stoikidis
5 COMT T.Compton	18 SUZM M.Suzuki
4 DEMF F.Dempsey	11 SZAK K.Szatkowski
12 DRAJ J.Dragesco	9 TESD D.Teske
12 DUBF F.Dubois	9 THR R.Thompson
24 ELR E.Reed	14 URBP P.Urbanski
13 FEEC C.Feehrer	15 VARG A.Vargas
14 FLET T.Fleming	12 WILW W.Wilson
20 FUJK K.Fujimori	24 YESH H.Yesilyaprak
23 GIOR R.Giovannoni	
3 GOTS S.Gottschalk	
5 HAYK K.Hay	
15 HSF C.Hossfield	
22 IBRA A.Ibrahim	
3 IMPR R.Imperi	
22 JAMD D.James	
6 JEFT T.Jeffries	
1 JENS S.Jenner	
9 JENV V.Jennings	
9 KAPJ J.Kaplan	
15 KNJS J&S Knight	
6 LERM M.Lerman	
12 LEVM M.Leventhal	
6 LIZT T.Lizak	

Reporting Addresses

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

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

Magnetometer Reports -- email: capaavso@aol.com
postal mail: Casper Hossfield
PO Box 23, New Milford, NY 10959
FAX: (973) 853-2588

Table III. Means of Raw Group Counts for November 2000

Day	Mn.	Day	Mn.	Day	Mn.	Day	Mn.
1	9.6	9	8.2	17	7.5	25	5.5
2	9.5	10	9.3	18	8.7	26	5.4
3	9.8	11	8.2	19	8.1	27	6.9
4	10.1	12	6.6	20	7.9	28	8.3
5	10.9	13	6.6	21	7.9	29	9.2
6	9.8	14	7.2	22	8.2	30	9.5
7	12.2	15	8.0	23	7.6	31	---
8	10.5	16	7.1	24	7.0	Mn.	8.38

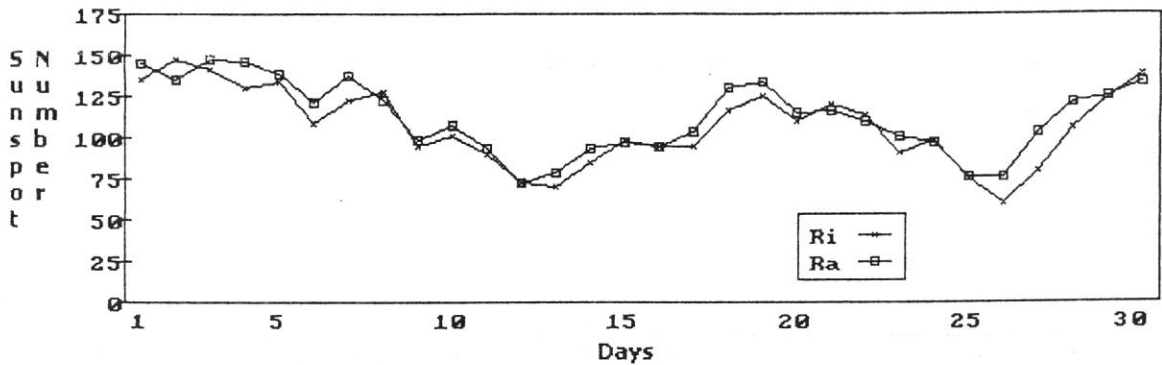


Fig. 1. Comparison of Ri (provisional) and Ra estimates for November.
 (Ri Source: www.oma.be/KSB-ORB/SIDC/index.html)

Smoothed Mean Sunspot Number (Rsm) for May 2000: 123.5

Editor's Notes

Two new columns have been added to Table I this month. The first (N) presents the number of observers whose reports are included in the means for a given day. The second (s.e.) presents the standard error associated with each k-corrected mean. The latter measure, computed as the standard deviation divided by the square root of N, provides a measure of the uncertainty of each mean value. It can be of use in judging the reliability of tabled estimates when, on some days, the number of observers is particularly small or there is much variance in the reports. (Note that standard errors printed here relate only to the k-corrected means. Standard errors for the raw values are computed similarly, using the standard deviations appropriate to those values.)

This month for the first time, the complete Solar Bulletin will be posted to AAVSO's website. The purpose of this is to acquaint visitors to the site with one of the organization's publications that they might not otherwise see. If the number of hits and downloads over the next month or so suggests strong interest, we will arrange to make the Bulletin regularly available in electronic form.

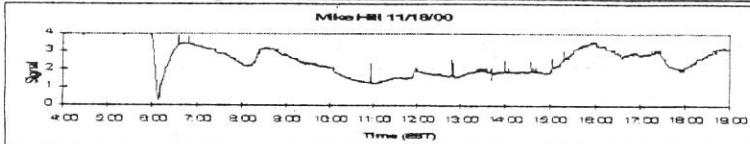
Over the past few months, several new observers have expressed interest in the activities of the Division and have begun to send their reports. This month, I want to welcome John Collins (COLJ), a solar observer in Arizona, who has made many drawings of sunspots during the last three years and has contributed his first formal report this month. I want also to welcome Guglielmo Filippo (A-93), a SID observer in Italy, who actually sent his first report last month and about whom more is said in the SID Supplement included in this issue. Thank you both for your efforts and for contributing to the work of the Solar Division.

Clear Skies,

CEF

Sudden Ionospheric Disturbance Report

Michael Hill, SID Analyst
 114 Prospect St
 Marlborough, MA 01752 USA
 noatak@aol.com



Sudden Ionospheric Disturbances (SID) Recorded During November 2000

(Analysis performed by Michael Hill, SID Analyst)

Date	Max	Imp	Date	Max	Imp	Date	Max	Imp
001101	1317	1-	001123	1426	1-			
001101	1616	1+	001124	1515	3			
001101	1842	2	001125	0915	1-			
001103	1900	2	001125	1538	1-			
001103	2103	1+	001125	1553	1			
001104	1032	2+	001125	1720	2+			
001107	1055	1-	001125	1840	2+			
001107	1207	2	001125	1940	1			
001108	0957	2	001126	1514	1			
001108	1144	1+	001126	1645	3+			
001108	1624	2+	001129	1218	2			
001108	1810	2	001130	0928	2+			
001109	1607	2	001130	1335	2+			
001109	2120	2	001130	1415	1			
001114	1635	2+						
001115	1816	1+						
001118	1104	2						
001118	1325	2+						
001118	1655	2+						
001119	1410	1+						
001120	1320	2						
001121	1445	1+						
001121	1916	2+						
001122	1622	1						
001122	1635	2						

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

- 1) Reported in at least two observer reports
- 2) Visually analyzed with definiteness rating = 5
- 3) Reported by overseas observers with high definiteness rating

Observer	Code	Station(s) monitored
C. Hossfield	A05	NAA
J. Winkler	A50	NAA, NPM
A. Stokes	A62	NAA
P. King	A80	FTA
A. Panzer	A83	NAA
W Moos	A84	FTA,GBZ,ICV
G. Filippo	A93	GZB
M. Hill	A87	NAA

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

Solar Events

Greetings ! November was a fairly active SID month. If not for the number of SID events then for the magnitude. Of the 168 flares recorded by the Goes-8 spacecraft, fourteen of them were M-Class flares and 5 of them were X-Class flares. Our observers detected 38 of those. The most active periods were on November 8, November 18 and November 24/25 . November 8th had 3 M-Class flares and resulted in a very large proton event that was accompanied by significant aurora. November 18th had two relatively minor M-Class flares (M1.5) but produced very Large SID events. Guglielmo Fillipo (A93) sent me a copy of his SID data for that day and I was quite surprised at the magnitude of his response. A copy of that chart has been included in Cap Hossfields SID Report which follows. My chart recording for that date is at the top of the previous page. November 24/25 of course were the most active days of the month where 4 of the 5 X-ray events occurred.

I have noticed a couple of interesting points as I get more familiar with the analysis, and patterns are starting to form in my view of the data that I review. One is that sometimes an observer will not record an M-Class event and yet will record a lesser C-Class event. This points to the fact that the sensitivity of the ionosphere to these flares is dependent on factors other than the flare strength. It probably is due to localized conditions since other observers do detect the ones that others miss. Another interesting fact is that the SID events are not always directly related to an X-Ray flare event. If a reported event does not correspond to one of the Goes-8 X-Ray events, I then look at the entire event list for that day as published by NOAA. One interesting event was on Nov 25 at 1940 UT. The SID event was reported by two observers, A05 and A83. It did not correlate with an X-Ray event but upon examination it did correspond with a series of very strong Radio Outbursts from the sun from 1833 to 1942 UT. These were associated with the strong X-Ray event at 1840 UT but occurred at a later time. I looked at the correlation of these radio outbursts and realized that most M-Class events and all X-Class events are accompanied by them and that the strength of the outbursts are directly proportional to that of the X-Ray flare events themselves. For the X-Ray event at 1840 UT there was a series of strong radio outbursts almost simultaneously and then another series an hour later. Both the X-Ray event and the strong radio outbursts later on resulted in a significant effect on our ionosphere and both events were detected by our observers.

I hope you all have a nice Holiday season. Thank you all again for your quick response in sending in data at the end of the month and for presenting data in the proper format.

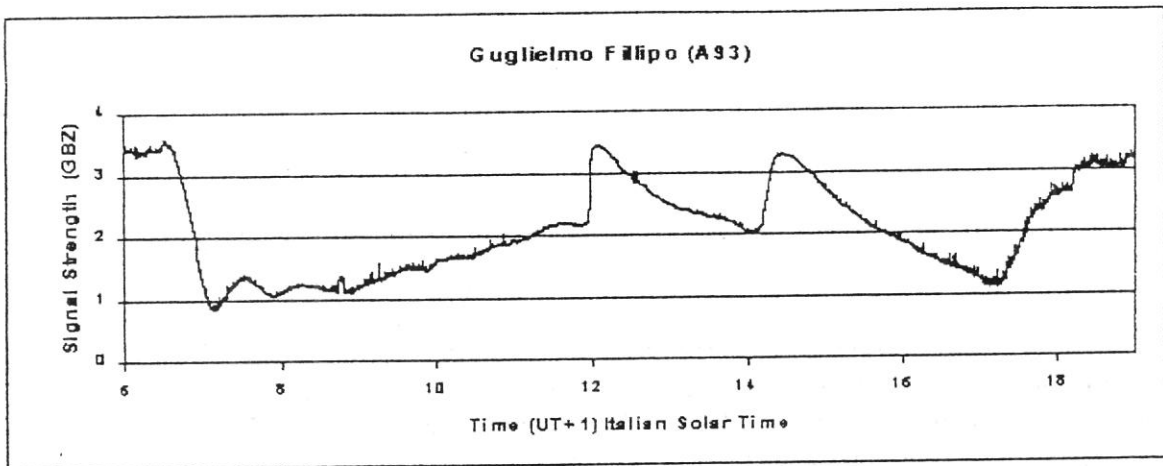
SUDDEN IONOSPHERIC DISTURBANCES SUPPLEMENT

Casper H. Hossfield, SID Sup. Editor
PO Box 23
New Milford, NY 10959, USA

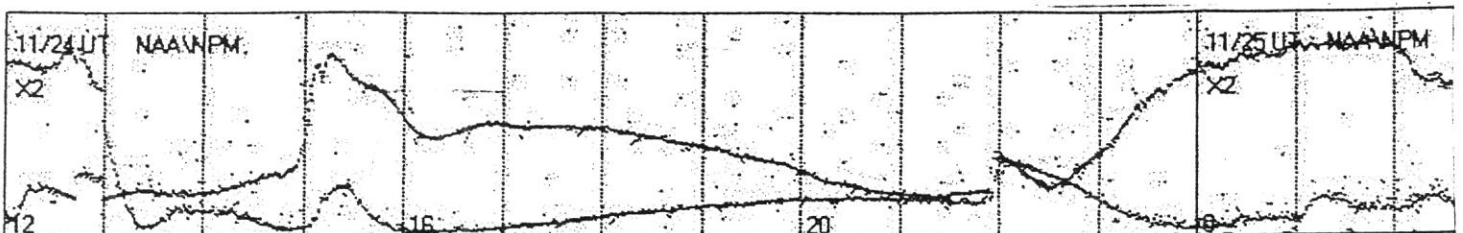
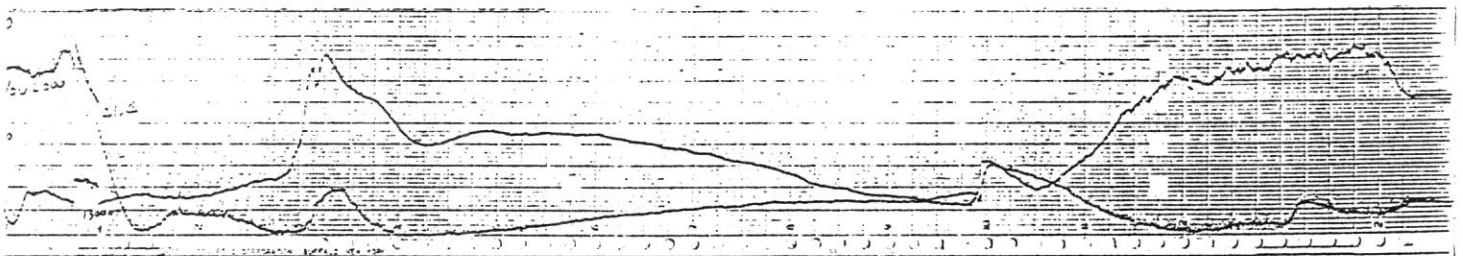
SUDDEN IONOSPHERIC DISTURBANCES
RECORDED DURING NOVEMBER, 2000

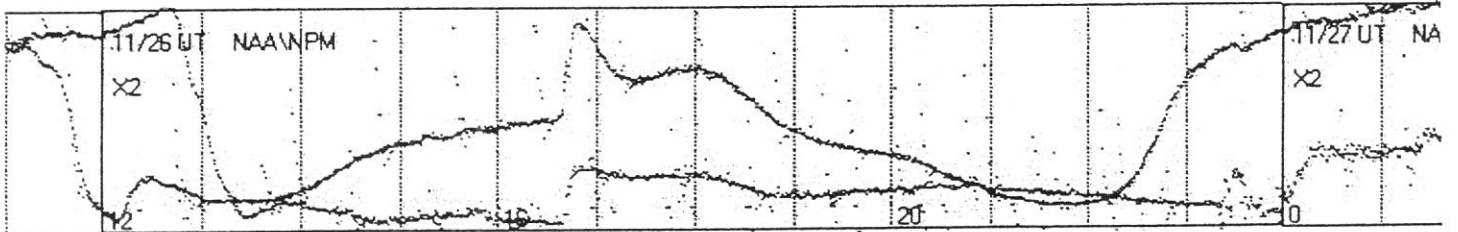
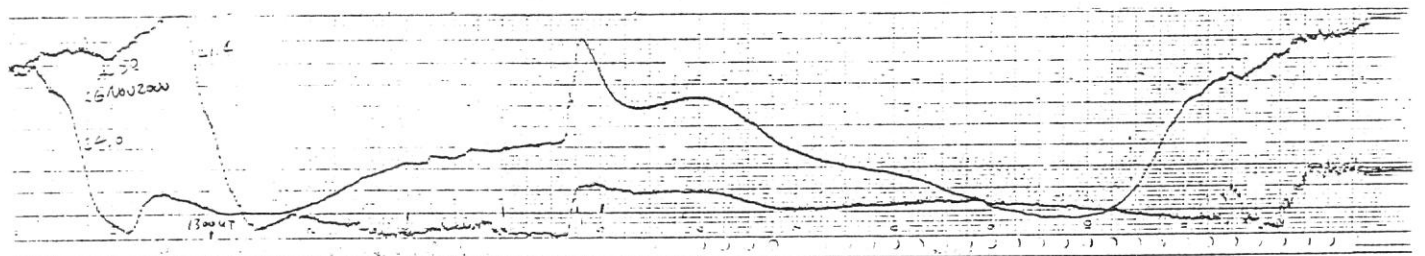
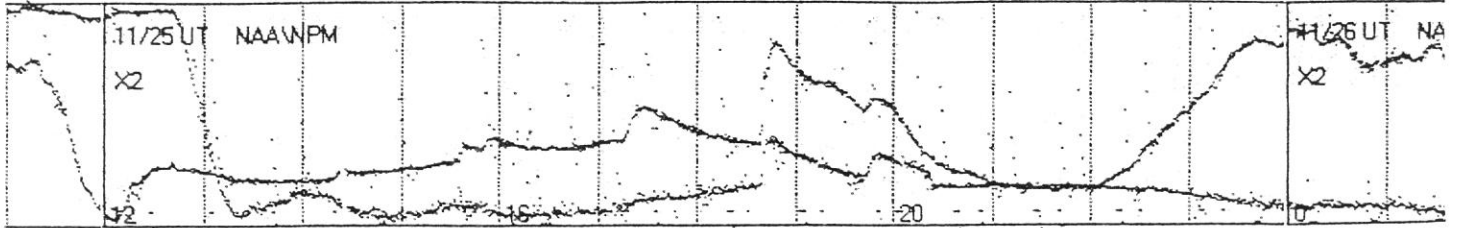
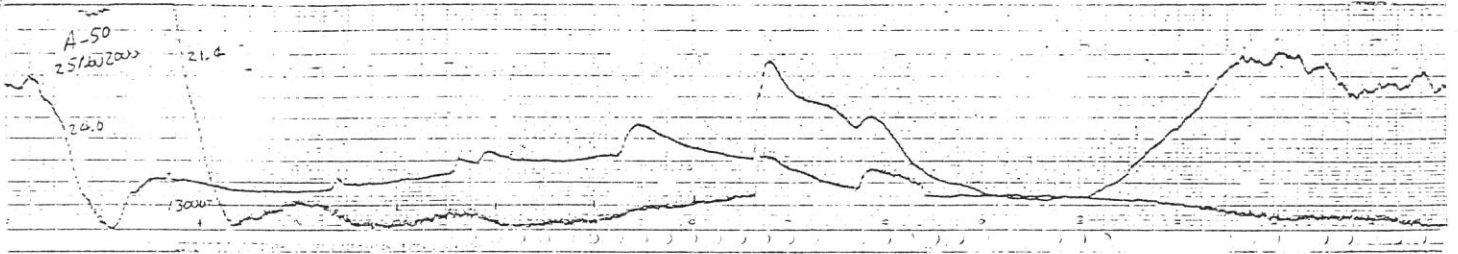
capaavso@aol.com
Fax 973 853 2588

A new observer's recording of two nice SESs is shown below. He is Guglielmo Di Filippo, A-93, in Italy. Guglielmo lives near Teramo in Southern Italy and records GBZ in Criggon, Wales, UK transmitting on 19.6 kHz. He uses a Gyrator II receiver that he built himself and 75 cm square loop that is inductively coupled into the gyrator receiver. It produces a nice clean chart with beautiful sunrise and sunset patterns. Notice the two humps following the sunrise drop. These are typical of a signal west of the receiver and similar to the humps we get in the USA when we record NPM west of us in Hawaii. Guglielmo built his own MAX 186 A/D converter and used Joseph Lawrence's LOGGER software to compile a DAT file which was then plotted in XCL to make the chart below.

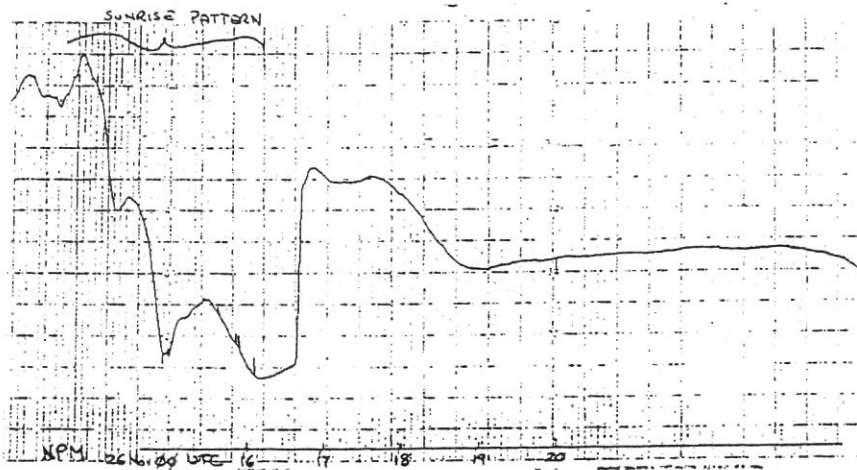


Charts below for 24, 25 and 26 November were made by Jerry Winkler, A-50 and show the solar flare activity those days as recorded on a Rustrak strip chart recorder and also as recorded 1/2 size and sent by email using that option in the new plotting program, Picklogger32D, that Al McWilliams recently wrote. The Rustrak charts were reduced to 1/2 size on a photocopy machine. This also reduces the thickness of the line to 1/2 its original thickness. The thickness of the trace line on the email charts is not reduced so they don't look as nice as the reduced to 1/2 size Rustrak charts. Next month we will have Jerry send the email charts normal Rustrak size and reduce them to 1/2 size on the photocopy machine and they should then have a nice thin trace line like the Rustrak charts. This is the sort of thing you learn by experience when using a new plotting program.





Jim Mandaville, A-91 also made a nice recording of the big X-class flare on the 26th. He records NPM in Hawaii transmitting on 21.4 kHz. The SES was recorded right after the sunrise pattern. Only a great flare can record so strong at that time.



Jim Just happened to be listening to BBC on 17.84 MHz when this big flare started. Here is his story of its short wave fade:

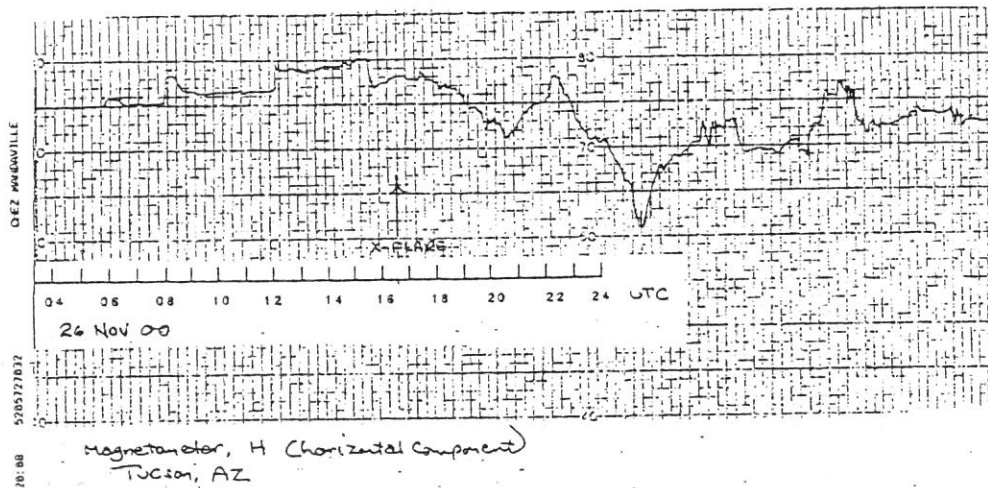
On 26 November around 1630 UTC I had BBC on 17.840 MHz, waiting for the news coming up at 1700. The relay on this frequency comes from stations in far eastern Canada or the southeastern U.S. As usual, the signal was very strong. Around 1645 I suddenly became aware of the fact that the signal had totally disappeared. I went to the receiver to check the tuning for drift but found it right on. I then tuned down through the HF range to about 15 MHz and found that there were no

strong. Around 1645 I suddenly became aware of the fact that the signal had totally disappeared. I went to the receiver to check the tuning for drift but found it right on. I then tuned down through the HF range to about 15 MHz and found that there were no signals whatever, except one weak fluttery SWBC station. I then looked over at my SID recorder and saw that the pen was in the middle of a very steep climb upward. This developed into a very strong SID with a duration of over two hours. Meanwhile I was monitoring 17.840 MHz, and BBC started to come back, weak and fluttery, around 1710 UTC. The signal continued to build, and was back to its normal, strong self by 1800. This was my first experience of an HF blackout coinciding with a SID.

Later I checked NOAA's Solar Events List and found that the GOES 8 satellite had detected an X-class x-ray flare beginning at 1634 UTC. It's maximum was listed as 1648, about the time I noticed HF propagation loss. This was doubtless the big flare that I had detected starting at 1637 and which had coincided with the HF propagation blackout.

I then checked my magnetometer and saw that after several days of a very quiet field, a disturbance had started. This, over subsequent hours, developed into a fair to middlin' storm. The relationship between the flare and the magstorm is somewhat problematic, as a positive magnetic disturbance had started a few hours even before the flare affected the earth's ionosphere

J. M.



The above magnetogram is the one referred to above made at the time of the big X-class flare that caused the short wave fadeout on 26 November. The magnetogram below was made by Ed reed and shows a magnetic storm with sudden commencement on November 7. Both magnetograms were made with McWilliams torsion-balanced magnetometers.

