# Solar Bulletin

THE AMERICAN ASSOCIATION OF VARIABLE STAR OBSERVERS - SOLAR DIVISION

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## Daily Mean Sunspot Numbers, $R_a$ for October 1998

(computational analysis performed by Grant Foster, AAVSO Headquarters)

| | simple average | | | k-corrected | |
|---|---|---|---|---|---|
| Day | $R_a$ avg | Std. Dev. | | $R_a$ k | Std. Dev. |
| 1 | 31 | 3.3 | | 24 | 3.1 |
| 2 | 29 | 4.1 | | 20 | 2.5 |
| 3 | 28 | 3.4 | | 18 | 2.0 |
| 4 | 24 | 2.3 | | 19 | 0.9 |
| 5 | 46 | 4.0 | | 32 | 3.4 |
| 6 | 62 | 6.1 | | 46 | 4.5 |
| 7 | 103 | 8.5 | | 75 | 4.9 |
| 8 | 99 | 8.5 | | 72 | 5.6 |
| 9 | 100 | 11.1 | | 78 | 7.6 |
| 10 | 65 | 5.0 | | 52 | 3.6 |
| 11 | 56 | 4.4 | | 43 | 2.8 |
| 12 | 47 | 3.7 | | 38 | 2.5 |
| 13 | 67 | 3.7 | | 56 | 3.1 |
| 14 | 83 | 5.3 | | 64 | 3.2 |
| 15 | 93 | 5.9 | | 76 | 4.2 |
| 16 | 95 | 4.3 | | 81 | 2.5 |
| 17 | 107 | 8.5 | | 85 | 5.3 |
| 18 | 118 | 8.1 | | 92 | 5.6 |
| 19 | 97 | 6.9 | | 75 | 5.6 |
| 20 | 81 | 5.9 | | 65 | 4.4 |
| 21 | 66 | 4.9 | | 51 | 3.4 |
| 22 | 51 | 5.4 | | 41 | 2.6 |
| 23 | 49 | 4.0 | | 37 | 2.4 |
| 24 | 55 | 3.9 | | 44 | 3.0 |
| 25 | 38 | 3.7 | | 29 | 2.5 |
| 26 | 30 | 4.3 | | 21 | 2.5 |
| 27 | 22 | 2.8 | | 16 | 1.5 |
| 28 | 36 | 3.1 | | 28 | 2.3 |
| 29 | 61 | 4.0 | | 47 | 2.5 |
| 30 | 62 | 4.0 | | 48 | 2.0 |
| 31 | 53 | 3.2 | | 43 | 2.4 |

**Monthly Mean $R_a$ avg = 62.06**
**Monthly Mean $R_a$ k = 48.90**

(Based on 754 observations contributed by 49 observers)

**Dear AAVSO Solar Observers,**

As reported in last month's issue of the *Solar Bulletin*, we are beginning implementation of new sunspot number analysis and data archiving software. The programs developed by Grant Foster at AAVSO headquarters make use of individual observer k-coefficients for computation of daily mean $R_a$ sunspot numbers. An algorithm for computation of observer k-coefficients has been developed which addresses the issue of sunspot number inflation described separately by Schaefer and Foster (**JAAVSO**, V26 #1, 1997). This algorithm requires continual maintenance of a database for trending each observer's results compared to the daily mean $R_a$ sunspot number. Compilation of each monthly Bulletin requires the enormous task of organizing and keypunch entering individual observer reports. A number of problematic issues have surfaced which can most easily be resolved with the aid and cooperation of our much appreciated conscientious solar observers. The goal in all this effort is to increase the computation efficiency and accuracy of the final American Relative sunspot numbers. The AAVSO Solar Division gratefully recognizes the efforts of our worldwide network of sunspot observers and we ask your assistance in simplifying the effort of preparing the monthly Solar Bulletin by adopting the following practices when submitting individual observer reports.

- ***Make ALL report submissions to Joseph Lawrence, Solar Division Chairman, by the 10th day of the month succeeding your observations.*** The preferred order of submission methods is indicated:

  (1) Electronic Mail: Simple ASCII file (no embedded graphics) report sent as body of message.
  Address: **lawrence@ipfw.edu**
  E-mail submissions will as a matter of policy receive a reply message acknowledging data receipt within 72 hours of transfer. Please do not attach word processor document files, spreadsheet data files, or other software specific files. These other file formats require additional steps to convert into a useable report form. In the near future, a data entry program will be made available to interested IBM users which will format your monthly report for direct import into the sunspot number data archives.

  (2) FAX Transmission: Legible font (at least 12 point) hardcopy *or* AAVSO Solar Report Form
  Phone: **219-451-6033 Attn: Joseph Lawrence M/S 613 Ext. 6365**
  FAX submissions will not receive a reply message acknowledging data receipt except for the usual hardware return signal.

  (3) Postal Mail: AAVSO Solar Report Form (copies available upon request)
  Address: **Joseph Lawrence**
  **1808 N. Anthony Blvd.**
  **Fort Wayne, IN 46805**
  **USA**

- ***Consistently use a specific equipment setup and observing method for sunspot counting.***
  Observer k-coefficients are necessary to correct for variations among observers' equipment, observation methods, seeing conditions, and personal expertise. The determination of an accurate k-coefficient depends upon consistently using the same equipment and observation method for all sunspot counts reported. Each observer is strongly encouraged to become proficient with a specific telescope setup and observing method (projection or direct). Deviations from this standard setup will increase the variance in the observer's results, produce a less accurate k-coefficient for the observer, and diminish the usefulness of his report. Accordingly, results from observers with well-defined stable k-coefficients are preferentially weighted higher in the computation of the daily mean $R_a$.

- ***Multiple observers submitting one report MUST identify observed days separately.***
  Some institutions submit one report with several observers ambiguously listed as sunspot count contributors. Ideally each of these observers will be assigned a k-coefficient, but this is not possible unless the sunspot count for each day on the report is associated with a specific observer. If more than one observer performs sunspot counts on a given day, then separate reports should be filed to avoid confusion.

Since the new sunspot count data archive requires careful identification of individual reports, each established solar observer is being assigned a unique identification code. These observer IDs will be used to track results and credit the observer for his contribution much as other AAVSO variable star observers receive recognition. As these observer IDs are issued, each observer is requested to prominently report his ID in all Solar Division correspondence, and especially in all observation reports. Hopefully none of these requested reporting habits will burden any AAVSO solar observer, but it is expected that with everyone's adoption of these practices the production of the monthly Solar Bulletin will proceed more smoothly.

Joseph Lawrence, Chairman

# Sudden Ionospheric Disturbance Report

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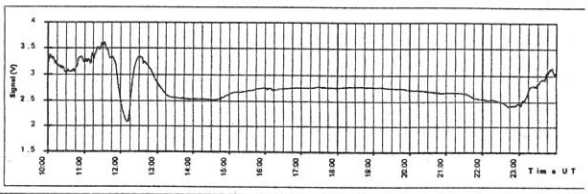

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## Sudden Ionospheric Disturbances Recorded During October 1998

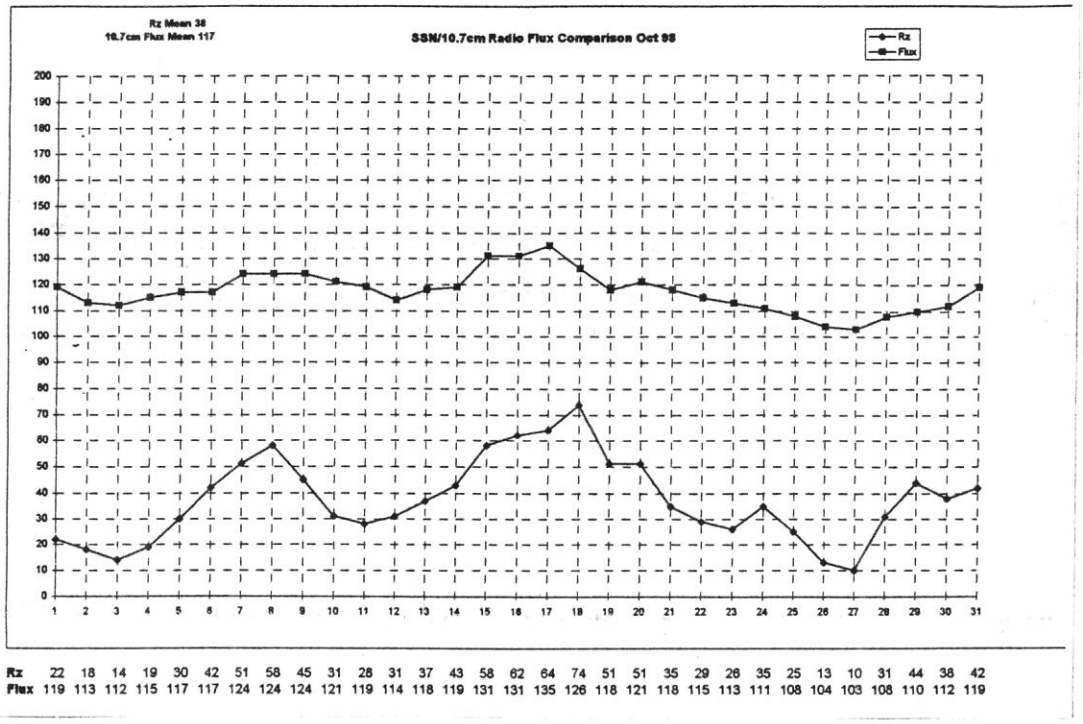
| Date | Max | Imp | Date | Max | Imp | Date | Max | Imp | Date | Max | Imp |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 981007 | 1045 | 1- | 981009 | 0745 | 1+ | 981017 | 1849 | 2+ | 981020 | 1802 | 2 |
| 981007 | 1249 | 1+ | 981010 | 0610 | 1+ | 981017 | 2231 | 2+ | 981020 | 2045 | 2+ |
| 981007 | 1520 | 1 | 981010 | 0938 | 1 | 981018 | 0005 | 2+ | 981021 | 1535 | 2+ |
| 981007 | 1542 | 2 | 981010 | 1140 | 1 | 981018 | 0146 | 2 | 981021 | 1828 | 2+ |
| 981007 | 1620 | 2+ | 981010 | 1317 | 2 | 981018 | 0540 | 1+ | 981024 | 0450 | 1+ |
| 981007 | 1715 | 2+ | 981010 | 1955 | 2+ | 981019 | 1228 | 2 | 981026 | 1820 | 1+ |
| 981007 | 1948 | 1 | 981011 | 0746 | 1- | 981019 | 2233 | 1 | 981028 | 1324 | 2 |
| 981008 | 0840 | 1 | 981014 | 1716 | 1+ | 981020 | 0150 | 1 | | | |
| 981008 | 1704 | 1+ | 981016 | 2132 | 2 | 981020 | 1428 | 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

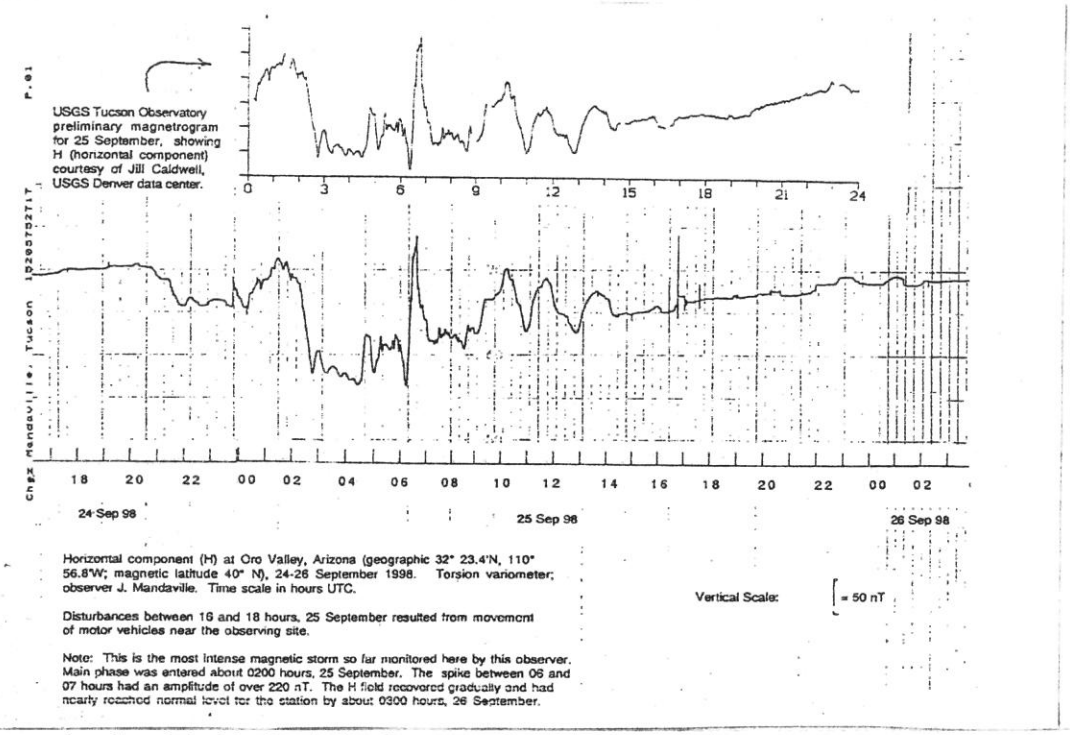
The following observers submitted reports and/or charts for October:
A-40 Parker, California * A-50 Winkler, Texas * A-52 Overbeek & Toldo, Republic of South Africa * A-62 Stokes, Ohio
A-63 Ellerbe, Spain * A-72 Witkowski, Florida * A-80 King, England * A-81 Landry, New Hampshire
A-82 Lawrence, Indiana * A-84 Moos, Switzerland. * A-87 Hill, Massachusetts * A-90 Mandaville, Arizona

Editor's Note: Last month's issue of the *Solar Bulletin* was mistakenly serialized as Volume 54 Number 8. The September 1998 issue should correctly be ordered as Volume 54 Number 9. The editor gratefully acknowledges Daphne Downer of the University of Toronto Astronomy library for bringing this oversight to my attention.

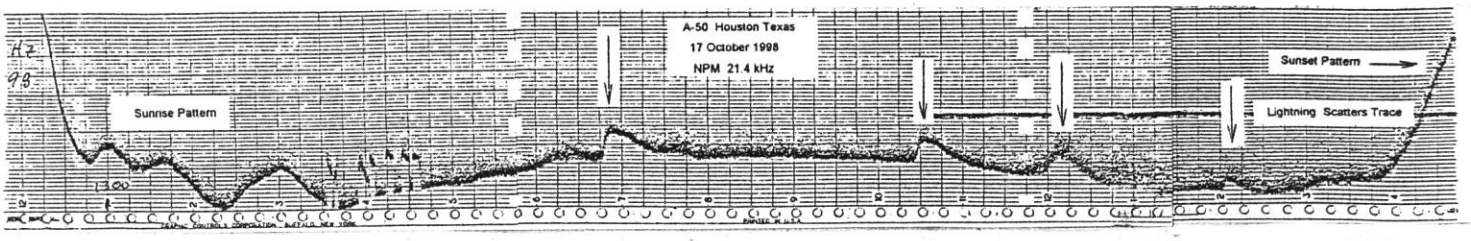
Joseph Lawrence
AAVSO SID Analyst

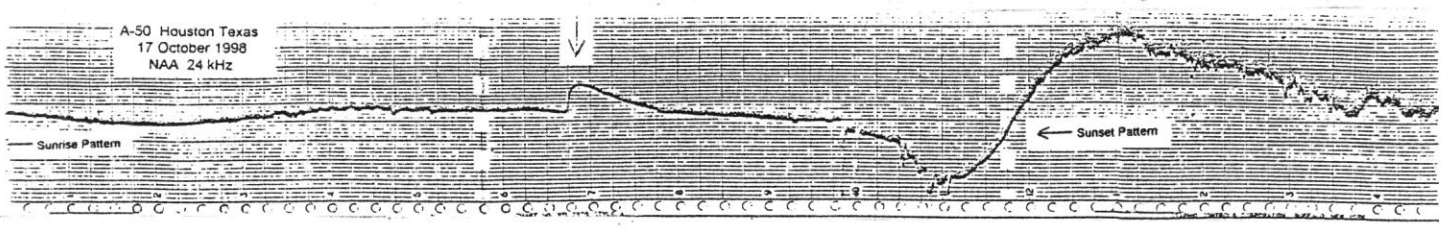


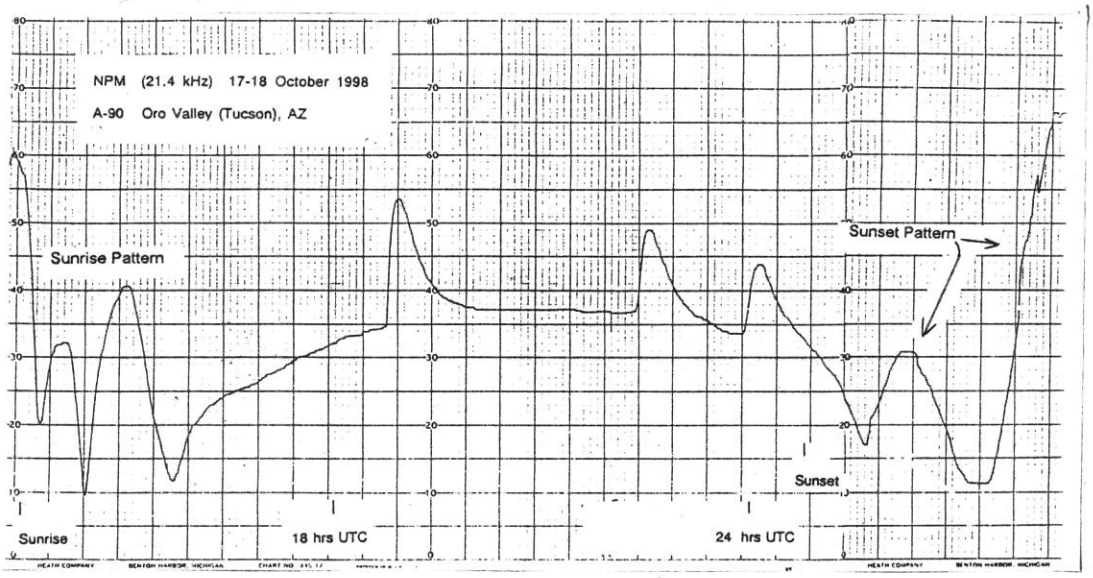

The graph above shows 10.7 cm flux plotted against Zurich sunspot numbers computed from observations of seven AAVSO sunspot observers who count according to the Zurich system. The Zurich reduction formula was used to reduce the counts to true Zurich Relative Sunspot Numbers, Rz. The graph was prepared by AAVSO sunspot observer, Tom Lizak.




Magnetic storms are closely related to the Solar flares we detect by the SES method and several AAVSO observers have magnetometers to record them. Last month the September Solar Bulletin published A-90's excellent recording of a storm that occurred on 25 September. This month we reproduce that recording above along with a recording made by the US Geological Survey magnetic observatory in Tucson, Arizona, USA. The USGS station operates a professional Flux-gate magnetometer in a protected location but yet there is no noticeable difference in the two recordings. The very simple instrument A-90 uses was described in detailed drawings with instructions how to build it in the September Solar Bulletin. Despite its simplicity it makes recordings that are indistinguishable from the nearby USGS magnetometer. We hope this will encourage others to build this easy project that Al MacWilliams designed 20 years ago and is still the best. If you need more information contact Jim Mandaville, A-90, at <Zygo@azstarnet.com> or 10150 N. Calle del Camero, Tucson, Arizona 85737, USA.




Two charts by A-50 above record flare activity on 17 October. The top chart that records NPM in Hawaii recorded four SESs two or which occur after 2400 UT and so are recorded early on the 18th with the earliest one starting at the beginning of the day at 0000 UT. Beneath it is A-50's recording of NAA in Maine that only recorded the first event starting at 1845 UT. The three later events are lost in NAA's sunset pattern as is the case with most USA observers who record NAA. A-90 is the only other US observer recording NPM in Hawaii and his chart recorded the first three SIDs but the fourth is lost in the big bump that regularly precedes his sunset rise. A-50 regularly does not have a hump before his sunset rise so he was able to record the fourth SID. It seems strange that recordings of the same signal produce a hump when recorded in Arizona but lack it when recorded farther East in Houston, Texas. Another interesting difference is A-50 always has three humps after his sunrise drop but A-90 always has two.