

## ANNUAL REPORT OF THE DIRECTOR FOR THE FISCAL YEAR 1989 - 1990

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For my 17th Annual Report for fiscal year 1989 - 1990, I would like to take you on a 'time-machine' journey during which we will travel from the early days of AAVSO to the present and march on to the future.

I would like to describe briefly where we were and where we are, using the Milestones in the AAVSO curve (Figure 1).

The AAVSO was founded in 1911 at Harvard College Observatory by Observatory Director Edward C. Pickering and William Tyler Olcott, an amateur astronomer and lawyer from Connecticut. In 1911, about 6,000 observations were compiled, mostly from observers in the northeastern part of the United States. The observations were handplotted and published in **Harvard Annals**. In 1915 Leon Campbell became the first director (then called recorder) of the AAVSO. In the following years, the number of observations grew by leaps and bounds and came from all corners of the world. In 1946, the 1 millionth observation was made. In 1949 Leon Campbell retired and Margaret W. Mayall was elected to lead the AAVSO.

In 1954, the AAVSO was forced to leave Harvard College Observatory. It became an independent organization with one-room Headquarters at 4 Brattle Street in Cambridge. In 1956, approximately 48,000 observations were being received annually from observers worldwide, and we were microfilming some of the publications of recent data to provide security for the them. Observations were still being hand-plotted on the light curves of each star.

In 1965, the AAVSO moved its Headquarters to a larger, two-room office at 187 Concord Avenue in Cambridge. In 1967, about 140,000 observations were being received. Margaret Mayall made a very wise and far-sighted decision to computerize the observations from 1960 onwards, keying them in on computer cards. This was a very long and tedious, but essential, process. The AAVSO did not have any computers at that time, so Harvard College Observatory and Smithsonian Astrophysical Observatory, through the efforts of Dr. Owen Gingerich and Barbara Welther, made their computers available to the AAVSO for the processing and publishing of the computerized data. In 1973, Margaret Mayall retired and I was elected by the Council to be AAVSO's third director.

By 1976, we were receiving about 176,000 observations a year. Instead of trying to catch up with the computerization of the data from 1960 on, we decided to computerize first the incoming observations each month, thus providing immediate access to the data, and catch up on the data from 1960 on as time permitted. That year, we also put all of the computer-readable observations onto magnetic tape for security and quick accessibility. Thus, from 1976 on, current observations became computer-readable.

By 1981, we were receiving about 188,000 observations a year from observers worldwide, and these observations were still being keyed in on computer cards. The two rooms of the AAVSO Headquarters had expanded to five, and these five rooms were almost taken over by computer cards - we even made walls with computer cards! That year, through a grant from Research Corporation, we bought our first microcomputer for Headquarters, and, consequently, the medium for keying in observations changed from computer cards to floppy diskettes. The observations continued to be stored on magnetic tapes which were copied frequently to avoid loss of data. By this time, we had also computerized all the data from 1960 to 1976, and we decided to start computerization of the data of about 2 million observations from 1911 to 1960.

In 1986, a miracle happened: through the generosity of Clinton B. Ford, the AAVSO bought a building and moved into its own Headquarters at 25 Birch Street in Cambridge. Our new Headquarters, three times larger than our previous one, provided us with the opportunity to

increase the efficiency of our operations and our services to our members and the astronomical community.

In 1988 and 1989, the annual number of incoming observations had risen to approximately 250,000 from our observers worldwide. Through grants from the National Aeronautics and Space Administration and the Astrophysics Research Fund, we expanded our Headquarters microcomputer facilities, and added a modem and a Fax machine, thus increasing our communication capabilities worldwide. We developed computer programs to process our data at Headquarters, to generate computer-plotted light curves for each star (until this time, due to the limitation of our computer facilities, the observations were still being hand-plotted). These developments opened up a wide range of possibilities for the publication and dissemination of our data.

Our time travel has brought us to the beginning of this fiscal year. In the following sections, I will report on the activities of the Association in the fiscal year 1989 - 1990.

## **1. Data Management and Data Processing**

### **1.1. Increasing Computer Hardware Capabilities and Data Storage**

We added two large hard disks, creating 600 megabytes of memory to store our computer-readable observations, and installed cartridge tape drives for large-storage-capacity cartridges in our microcomputers.

### **1.2. Data Transport**

We transported to AAVSO Headquarters microcomputers the four-and-one-half million observations from 1960 to date that were stored on magnetic tapes at the Harvard-Smithsonian Center for Astrophysics. We backed up these data on cartridges and made copies and stored them in different locations. We continue to store the data on magnetic tapes as well.

### **1.3. Computer Software Development**

We developed computer programs for the following aspects of our data plotting, evaluation, and publication procedures:

- a. To access data easily and quickly from the data files of about 3600 stars in our observing program;
- b. To plot light curves at any scale and for any time interval, with or without background grid lines;
- c. To superimpose various data files on the same graph;
- d. To evaluate the data on-screen, and identify any observation on a light curve with the observer's initials;
- e. To obtain mean light curves of a star's data;
- f. To fit higher-order mean curves on any light curve.

Figure 2 shows for Mira the light curve of individual observations with one of the predicted light curves for the HIPPARCOS Mission superimposed.

Figure 3 shows the light curve of SS Cas with a mean curve running through the data and selected individual observations initialed.

### **1.4. Current Data Processing**

We have been up-to-date in the entry and processing of monthly incoming observations, with data processing being completed within one week after the end of the month the observations are received.

We developed and distributed to interested observers a computer program for the entry and reporting of monthly observations. A significant number of observers are now using these programs to send in their data on diskette, which has helped us in keeping up-to-date with the current observations.

### 1.5. Computerization of the Archival Data from 1911 to 1963

We have reached the 90% completion mark in this major project and hope that soon it will be completed, providing access to computer-readable data from 1911 to the present.

## 2. Requests for AAVSO Data

The observations that you, our observers, provide continue to play a major role in both ground-based and space variable star research. This year we have filled 192 requests for AAVSO data. This is the largest number of such requests that we have ever had in a year. These requests came from astronomers, researchers, teachers, students, and writers around the world. A list of these individuals and their affiliations and locations is given in Table 4 at the end of my report. Figure 4 is the histogram of the number of requests for AAVSO data filled each year since 1974. The list below and Figure 5 show the types of variable stars for which the data have been requested:

- a. Cataclysmic variables (41%) - dwarf novae (34%), recurrent, nova, novalike (7%)
- b. Long Period variables (29%) - Mira type (21%), semiregular (8%)
- c. R CrB stars (6%)
- d. Eclipsing binaries (5%)
- e. RV Tau stars (4%)
- f. The sun (2%)
- g. Symbiotic stars (1%)
- h. Miscellaneous (12%) - quasars, Cepheids, S Dor variables, suspected variables, nebular variables

The categories listed below and shown in Figure 6 give the areas in which AAVSO data and services have been used this year:

- a. Correlation of ground-based multiwavelength data with the optical data (34%).
- b. Scheduling observing runs using ground-based telescopes such as those at David Dunlap and McDonald Observatories and satellites such as HIPPARCOS and IUE for long period variables, R CrB stars, cataclysmic variables, and RV Tau stars (26%).
- c. Reporting variable star observations to the astronomical community via the **International Astronomical Union Circulars** (13%).
- d. Reference materials for PhD theses, articles, books on variable stars, research on variable stars, and related subjects (8%).
- e. Science projects for college and high school students (8%).
- f. Simultaneous monitoring of observing targets during observing runs with ground-based telescopes and satellites (5%).
- g. Data analysis using AAVSO observations, particularly in search of chaotic behavior in variable stars (5%).
- h. Setting up observing programs for high schools and colleges (1%).

I would like to share some examples of the requests for AAVSO data that we have filled this year.

One of our major projects continues to be the coordination and provision of data support for the observations of large amplitude variable stars (mostly long period variables) with the HIPPARCOS satellite. This European astrometric satellite, launched on August 8, 1989, was unable to achieve its scheduled geostationary high orbit because of the failure to ignite the apogee motor boosters, despite many attempts. The future of HIPPARCOS was thus quite uncertain in the beginning of the fiscal year. However, due to much work by the European Space Operation Center and the HIPPARCOS Science Team, major revisions were implemented in the operational procedures, the orbit was raised from its initial perigee of 200 km to 500 km, and the acquisition of data, including on variable stars, began and is continuing successfully.

Despite the initial uncertainties with HIPPARCOS, throughout the year we continued to communicate closely with the members of Input Catalogue team and in particular with Dr. M.-O. Mennessier, the Variable Star Coordinator. Every two months ephemerides (predicted light

curves) on large amplitude stars in the HIPPARCOS observing program were prepared by her and sent to the AAVSO to be checked against recent observations provided by observers around the world. She was alerted immediately to any discrepancies so that the predictions could be revised and/or refined. To optimize our contribution to this project, I met with Dr. Mennessier and her assistants and went over in detail the ephemerides of each star. The observations of variable star observers worldwide are crucial in preparing good ephemerides, which assure efficient allocation of satellite observing time for these stars. HIPPARCOS Input Catalogue and Science Team members are very appreciative and thank all observers for their important contribution to the mission. The AAVSO is grateful to NASA for its continuing financial support of the AAVSO in this project.

Another major space research project that we have participated in this year is the x-ray observation of cataclysmic variables with the ROentgen x-ray SATellite (ROSAT). In its first six months of operation, ROSAT surveyed the sky to detect sources of x-ray emission. Of particular interest were cataclysmic variables, and so each month we sent out Alert Notices to inform observers around the world of the cataclysmic variables in those fields that were being surveyed that month. When any of these objects went into outburst, observers alerted us at AAVSO Headquarters and we, in turn, telephoned the interested ROSAT astronomers to inform them of the brightening of these stars. Thanks to these fast alerts, several of the stars were observed not only with ROSAT but also with other satellites and ground-based facilities, thus providing multiwavelength coverage.

A third satellite that we have been involved with this year is the International Ultraviolet Explorer (IUE). Dr. Albert Holm, of the Computer Science Corporation at the Space Telescope Science Institute, continued his observations of cataclysmic variables at minimum, and we provided data support and alerted him before and during his observing runs to the state of his target objects. Drs. Geoffrey Clayton and Barbara Whitney, of the National Aeronautics and Space Administration and the Harvard-Smithsonian Center for Astrophysics, respectively, have been interested in monitoring R CrB stars during minimum with the IUE. Of their four R CrB-star observing targets which we monitored very closely for them, RY Sgr went into minimum and they were able to obtain very interesting ultraviolet data on it. Drs. Ronald Polidan of NASA Goddard Space Flight Center and John Cannizzo of Kenyon College have been interested in observing SS Cyg with the IUE satellite, particularly during one of its anomalous outbursts. Every time SS Cyg went up, thanks to the information from our observers, we alerted Dr. Polidan so that the IUE could be scheduled to observe this star.

ASTRO-1 is another mission that we will be involved with, when it is finally launched on the Space Shuttle Columbia. Cataclysmic variables, quasars, and active galactic nuclei are among the observing targets of the mission for which we will provide up-to-date information, alerting the astronomers to the state of the variability, particularly to the outbursts of cataclysmic variables. This mission, equipped with ultraviolet and x-ray detectors and a polarimeter, was originally scheduled to be launched in 1986, but was delayed until this year due to the Challenger disaster. Just in this year, its launch has been delayed three times and every time it is rescheduled the observing targets have to be changed extensively.

The Hubble Space Telescope (HST), launched in April 1990, had several variable stars in its scheduled observing program while it was going through its testing phase. Dr. Francesco Paresce from the Space Telescope Science Institute called on August 20 to ask what the brightness of R Aqr system was at that time and what it would be in the coming few months. This symbiotic type close binary system consisting of a long period variable star and a white dwarf embedded in nebulosity was to be one of the observing targets of the Hubble Space Telescope. After checking our recent observations, within a few hours, we were able to inform him that R Aqr was about 10.5 magnitude and 52 days passed its predicted minimum. This information was important in order to figure out the filters to be used at the time of the HST observations later that month. Dr. Paresce informed me about 10 days later they had obtained very impressive images of R Aqr system with the faint object camera of HST that showed two dark knots at the center of the image, probably containing the close binary system itself, and an extended nebulosity with detailed filamentary features emanating from the core representing hot gas that has been ejected



from the binary system. He mentioned that the AAVSO information on R Aqr was very helpful for their observations. It is exciting that our observers with their moderate size telescopes are providing information to guide astronomers observing with HST!

As the above requests indicate, we have been significantly involved in space research of variable stars and the contributions of our observers are very much recognized and acknowledged in the astronomical community.

We were happy that we had reorganized our files and made our data easily accessible when we received a call one afternoon at 4 o'clock Eastern Standard Time from Dr. Charles H. Townes, at University of California, who requested data on alpha Ori for his presentation at the American Astronomical Society's meeting a few days later - he needed the data urgently. We were able to extract from our data files the observations of alpha Ori for the past several years, generate computer-plotted light curves, and fax the data to him within two hours of his request. He was very appreciative of this assistance and used the data in his presentation.

Dr. Andrej Udalski, visiting York University in Canada from Poland, has been interested in obtaining high speed photometry of SU UMa-type dwarf novae during their superoutbursts in order to determine the orbital periods of these stars. We alerted Dr. Udalski to the superoutbursts of BZ UMa, TT Boo, and UV Per, and, thanks to our alerts, he was able to obtain good high speed photometry during the superoutbursts, particularly for UV Per and TT Boo.

The above are only a few examples of the requests for AAVSO data and services that we have responded to this year. As is clear from the listing of these requests in Table 4, astronomers around the world depend on the observations of AAVSO observers to provide them with information to help maximize their research with today's sophisticated technology.

### 3. Scientific Collaborations with Astronomers

a. Dr. Albert Holm and colleagues from Space Telescope Science Institute: Ultraviolet monitoring with the IUE of cataclysmic variables during minimum to obtain information about the white dwarf component of the close binary system.

b. Drs. Ronald Polidan of NASA Goddard Space Flight Center and John Cannizzo of Kenyon College: Observations of the anomalous outbursts of SS Cyg with the IUE to determine whether ultraviolet emission lags behind optical emission at the onset of these types of outbursts.

c. For HIPPARCOS: with HIPPARCOS Input Catalog Consortium and in particular Dr. Marie-Odile Mennessier of University of Montpellier, improvements in the predictions of Mira variable light curves; and with Dr. Michel Grenon of Geneva Observatory, revisions to and development of finder charts.

d. Drs. Geoffrey Clayton of NASA and Barbara Whitney of Harvard-Smithsonian Center for Astrophysics: Observations of R Coronae Borealis stars.

e. Dr. Margarita Karovska of Harvard-Smithsonian Center for Astrophysics: Optical and IUE observations of bright Mira variables.

f. Drs. Robert Cadmus and Lee Anne Willson of Iowa State University: Period analysis of semiregular variables that show periods of inactivity or small-amplitude variations.

g. Dr. Constanze la Dous of NASA Goddard Space Flight Center: Analysis of cataclysmic variable light curves.

### 4. Summary of Observations

As always, our observers' enthusiasm, dedication, and devotion to variable star astronomy continue to amaze and impress us. The continuing widespread participation in the observations of large amplitude stars for the HIPPARCOS project is remarkable and gratifying.

We had a milestone in our observing record this year, with Harald Marx of West Germany making the 6.5 millionth observation in the AAVSO database with his observation of CM Cygni on Julian Day 2447939.2 at magnitude 12.5. We sent a congratulatory telegram informing him of this and thanking him for his astronomical contributions to the AAVSO.

During the fiscal year 1989 - 1990, we received 260,318 visual and photoelectric observations from 573 observers from around the world. These totals include 93,578 observations from 195 observers in 40 states of the United States and 166,740 observations from 378 observers in 32 countries. New York with 20,262 observations, Massachusetts with 10,515, and Colorado with 6,852 lead the states in the USA, while France with 27,176, South Africa with 20,672, and Hungary with 18,966 lead the countries abroad. This year Orion variables are no longer being counted ten observations for one.

Table 1 lists the number of observers and the total observational contribution from each country for this fiscal year. Table 2 gives the same information for each state in the USA. Table 3 is an alphabetical list of observers, giving each person's observing initials, name, location, annual total of observations, and total of inner sanctum observations (magnitude 13.8 or fainter, and/or "fainter than" 14.0 or fainter).

This year 41 observers reported between 1000 and 2000 observations, 8 between 2000 and 3000, 12 between 3000 and 4000, and 2 between 4000 and 5000. Michel Verdenet reported 5,115 observations, Sergio Dominguez 5,797, and Marvin Baldwin 5,897. William Albrecht reported 6,095 observations, and Paul Vedrenne 6,626. Wayne Lowder with 8,740, Gerry Dyck with 10,108, and Daniel Overbeek with 17,290 observations are our top three observers this year.

Gerry Dyck sent in the highest number of inner sanctum observations with 6,303 (62% of his observations), followed by Michel Verdenet with 2,779 (54% of his observations), and Michael Idem with 1,896 (44% of his observations).

We have received 1312 photoelectric observations from 24 of our photometrists. Howard Landis devotes his time generously to see that all our photoelectric data are computerized, reduced in a standard format, and archived by star. Scientific papers continue to be published using the AAVSO photoelectric data.

My special thanks go to each observer for his or her contribution. Remember, it is the quality, not the quantity, of observations that counts. Sometimes, even one observation can make a critical difference in evaluating the behavior of a variable star.

My special thanks also go to observers who call in their observations and keep us informed of the activity of specific stars in our program. I particularly thank observers who participate in ground-based and satellite observing programs for which our assistance is requested.

## 5. International Cooperation

The First European Meeting of the AAVSO in Brussels was a testimony to the cooperation and collaboration among variable observer groups around the world. The enthusiastic response that we have received from the meeting participants has been an additional testimony to this spirit.

In addition, our cooperation with variable star observer groups around the world has increased significantly, particularly due to the important role the observers are playing in research on variable stars with satellites such as HIPPARCOS, ROSAT, and IUE.

We continue to receive valuable data from members of the Variable Star Section of the Royal Astronomical Society of New Zealand, sent by Director Dr. Frank Bateson. These data on southern long period variables help immensely in refining the annual predictions of maxima and minima for these stars. Dr. Bateson continues to telefax, monthly, the RASNZ observations of HIPPARCOS stars so that they may be included in our data files and utilized in the checking of the ephemerides prepared for the satellite. We are very appreciative of and grateful for this fast transmission of data on southern stars.

Members of the following variable star associations sent in observations to the AAVSO, either individually or as a group, for inclusion in our data files for processing and publication:

- a. Asociacion Argentina Amigos de la Astronomia
- b. Association Française des Observateurs d'Étoiles Variables (France)
- c. Astronomical Society of Southern Africa, Variable Star Section
- d. Astronomischer Jugendclub (Austria)
- e. Berliner Arbeitsgemeinschaft für Veränderliche Sterne (West Germany)

- f. British Astronomical Association, Variable Star Section (England)
- g. British Astronomical Association of New South Wales (Australia)
- h. Liga Ibero-Americana de Astronomia (South America)
- i. Nederlandse Vereniging Voor Weer-en Sterrenkunde, Werkgroep Veranderlijke Sterren (Netherlands)
- j. Norsk Astronomisk Selskap, Variable Stjernegruppen (Norway)
- k. Planetario e Observatorio Astronomico do Colegio Estadual do Parana (Brazil)
- l. Pleione Változócsillagészlelo Hálózat (Hungary)
- m. Red de Observadores de Estrellas Variables - MIRA (Spain)
- n. Royal Astronomical Society of Canada
- o. Royal Astronomical Society of New Zealand, Variable Star Section
- p. Scandinavian Astronomisk Selskap
- q. Uniao Brasileira de Astronomia, Variable Star Commission (Brazil)
- r. Variable Star Observers League in Japan
- s. Vereniging Voor Sterrenkunde, Werkgroep Veranderlijke Sterren (Belgium).

The exchange of literature with observatories, universities, and colleges around the world continues at an increased rate.

## 6. Membership

This year at the 78th Annual Meeting in Cambridge, Massachusetts, and at the meeting in Brussels, we elected 74 new members. Of these 65 joined as adult annual, 4 junior annual, 3 sustaining, and 2 sponsored. 13 changed their membership from annual to sustaining, thus supporting the operation of the Association with double the annual dues rate.

## 7. AAVSO Publications

This year we have published two major works many years in the making:

a. **Maxima and Minima of Long-Period Variables 1949-1975** contains the maxima and minima dates and corresponding magnitudes for 384 long period variable stars from 1949 through 1975. This work was prepared by Janet A. Mattei, Margaret W. Mayall, and Elizabeth O. Waagen, together with help from many AAVSO assistants. I am delighted that it is published at last.

b. The Second Edition the **AAVSO Variable Star Atlas**, prepared by Charles E. Scovil, in a new format of 8.5 x 11 inch sheets in a ring binder.

Both of these publications have been well received by the astronomical community and our members and observers.

The following were also published by the AAVSO during this fiscal year:

a. **Journal of the AAVSO**, Vol. 18, No. 1, edited by Charles A. Whitney and prepared by Elizabeth O. Waagen and Susan M. Power.

b. **AAVSO Bulletin 53**, the 1990 predicted dates of maxima and minima of 559 long period variable stars, prepared by Janet A. Mattei. This publication is used extensively by observers in planning their observations and by astronomers in scheduling observing runs.

c. **AAVSO Circular**, No. 228 - 239, edited and published by John E. Bortle and Charles E. Scovil;

d. **AAVSO Alert Notices**, No. 120 - 132, prepared by Janet A. Mattei.

e. **AAVSO 1990 Ephemerides for Eclipsing Binaries and RR Lyrae Stars**, prepared by Gerard Samolyk and Marvin E. Baldwin.

f. **AAVSO Photoelectric Photometry Newsletter**, Vol. 10, No. 1 - 3, edited and published by John R. Percy.

g. **AAVSO Solar Bulletin**, Vol. 45, No. 10 - 12, Vol. 46, No. 1 - 9, edited and published by Peter O. Taylor.

h. **AAVSO Newsletter**, No. 7, prepared by Susan M. Power.

My very sincere thanks and appreciation go to Marvin E. Baldwin, John E. Bortle, John R.

Percy, Susan M. Power, Gerard Samolyk, Charles E. Scovil, Peter O. Taylor, Elizabeth O. Waagen, and Charles A. Whitney for the contribution of their time, wisdom, and expertise in the preparation of the above publications which represent the AAVSO in the astronomical community and astronomical literature.

### 8. Other Publications with AAVSO Participation

a. Predicted maxima and minima dates of bright long period variables, ephemerides of a few easy-to-observe stars, and an article on Rho Persei were published in the **1990 Observers' Handbook** of the Royal Astronomical Society of Canada.

b. Monthly predictions of maxima and minima dates of bright long period variables were published by Janet A. Mattei in **Sky & Telescope** magazine.

c. Four articles were published in the **Confrontation Between Stellar Pulsation and Evolution**: "AAVSO Data Files on Pulsating Stars and Chaos Studies on Three Long Period Variables" by J. A. Mattei, J. K. Cannizzo, and D. A. Goodings; "Long Term Changes in Mira Variables" by J. R. Percy, T. Colivas, W. B. Sloan, and J. A. Mattei; "Period Changes and Evolution of RV Tauri Stars" by J. R. Percy, D. D. Sasselov, A. Alfred, G. Scott; and "A New Approach to the Analysis of Mira Light Curves" by M.-O. Mennessier, D. Barthes, and J. A. Mattei.

d. An article in **From Miras to Planetary Nebulae: Which Path for Stellar Evolution?** entitled "The Contribution of the Preparation of the HIPPARCOS Mission to Solving the Evolutionary Problems of LPV's" by D. Barthes, J. A. Mattei, M.-O. Mennessier, and E. O. Waagen.

e. An article using AAVSO photoelectric data and entitled "The Photometric Variability of EU Delphini" by J. R. Percy, H. J. Landis, and R. E. Milton was published in **Publ. Astron. Soc. Pacific**, 1989, Vol. 101, 893.

f. An article entitled, "Cataclysmic Variables" by J. A. Mattei was published in **Interacting Close Binaries**.

### 9. Meetings Attended and Talks Given

Attending meetings and presenting talks on the AAVSO is important for informing the astronomical community and the public at large of our activities and our data, in bringing about collaborations, and being informed of recent research on variable stars.

My sincere thanks to NASA and the AAVSO for travel funds that made it possible for me to attend the following meetings:

a. 177th Meeting of the American Astronomical Society, in Washington, D.C. This meeting was particularly valuable in being informed of recent research, and for participating in discussions of the Astronomy & Astrophysics Survey Committee involved in preparing the report on Astronomy and Astrophysics for the next decade which will contain recommendations of areas of focus.

b. Education Workshop of the Astronomy & Astrophysics Survey Committee Policy Panel, in Washington, D.C. This small workshop, with invited participants selected for their experience in astronomy or in teaching astronomy, focused on how to improve science education and increase awareness in astronomy. The opportunities for astronomy to contribute to education, objectives, strategies, and recommendations made by the participants were published with support from NASA in a booklet entitled, "An Education Initiative in Astronomy" and widely distributed by Space Telescope Science Institute to the members of the American Astronomical Society.

c. Meeting with the HIPPARCOS Variable Star Coordinator and her assistants, in Montpellier, France. We discussed the behavior and the nature of stars that show discrepancies with the predicted light curves, the methods used for the predictions, and ways to refine the predictions. We also worked on the collaborative paper to be presented at the meeting in Bologna, Italy. Dr. Lee Anne Willson, who was in Europe at the time, made a special trip to



Montpellier at this time and gave a talk to the group on the physics of the Mira light curves and made valuable contributions to the discussions on the astrophysical significance of the methods we were using in preparing the predicted light curves for HIPPARCOS satellite.

d. "Confrontation Between Stellar Pulsation and Evolution", in Bologna, Italy. I presented a poster paper, and was a co-author to three other papers given at this meeting. (see Other Publications with AAVSO Participation).

In addition to these meetings, I have attended four meetings of the NASA Astrophysics Division, Science Operation Management Operation Working Group, in which I have been serving as a member since 1988.

I have also given talks at:

a. Sigma Xi Society at Lincoln Laboratory of Massachusetts Institute of Technology, on AAVSO and Its Activities.

b. Yale University, on AAVSO and Its Involvement with Space Research on Variable Stars.

c. Burlington High School, Burlington, Massachusetts, on Highlights of Astronomy from Space.

d. Youth Group in Lowell, Massachusetts, on recent advances in astronomy from space.

## 10. Personnel at Headquarters

We continued to have a significant turn-over in Headquarters staff this year, which made it extremely difficult to carry on the heavy load of operations of the Association, meet the demands of the projects we are involved in, and in particular to prepare for the First European Meeting in Brussels, Belgium.

Barbara Savage and Lois Rich were hired as administrative assistants. Unfortunately, personal circumstances forced Barbara to leave the AAVSO, and Lois, as well as administrative assistant Melissa Gallagher, left the AAVSO to pursue other interests.

Susan M. Power, our administrative assistant, left at the end of the summer to attend graduate school in writing. We will miss her, and we wish her the best of luck.

Presently our staff consist of: Elizabeth O. Waagen, our senior technical assistant; E. Grant Foster, our technical assistant specializing in computer programming; Pamela Moffat, our administrative assistant; Barbara J. Silva, our data entry technician; Elisha F. Polomski, our technical assistant; Jennifer Rogers and Michael Saladyga, our summer technical assistants; and Katherine S. Hazen, Frank M. McCorrison, Tomotaka Mikaya, and George M. Raymond, our volunteer assistants.

My sincere appreciation and thanks to our dedicated, hardworking, team-spirited staff!

## 11. Acknowledgements

We wish to express our special thanks and gratitude to Dr. Clinton B. Ford for his generous contributions to our operations, for his continuing generous support of the Association through his grants for special projects, and of course, for the permanent Headquarters he has provided for the AAVSO and in which we continue to take great pride and joy.

We have been very fortunate to receive strong financial support from government agencies and institutions this year. We gratefully acknowledge the financial support of the following government agencies:

National Aeronautics and Space Administration (NASA), for the grant award to provide data support for the HIPPARCOS satellite in the observation of large-amplitude variable stars; and an Astrophysics Data Program grant award for cataloguing of AAVSO optical data for NASA Master Directory and IUE;

National Oceanic and Atmospheric Administration (NOAA), for its continued grant award for the operation of the activities of the AAVSO Solar Division.

Our special thanks to the following institutions and individuals:

Smithsonian Astrophysical Observatory, for the computer time granted to us through the

efforts of Prof. Owen Gingerich and Barbara Welther;

Erindale College of the University of Toronto, for the funding of the printing and mailing of the **AAVSO Photoelectric Photometry Newsletter** which is edited and published by Prof. John R. Percy;

Stamford Museum, for allowing Charles Scovil and John Griese to use the 22-inch telescope at Stamford Observatory for variable star observations, and for Charles to use the facilities of the observatory to prepare charts and the **AAVSO Circular**, and to revise the **AAVSO Variable Star Atlas**;

Dr. Michel Grenon and his observing team at Geneva Observatory in Switzerland, for obtaining photoelectric sequences for stars in the HIPPARCOS observing program for which we had no or poor sequences;

Van Vleck Observatory of Wesleyan University, for allowing John Griese to use its astronomical facilities to obtain photoelectric sequences for some of our charts;

The Astronomy Department of Colgate College, and particularly Dr. Thomas Balonek, for the loan of their Cuffey photometer for the measurement of comparison star magnitudes for our finder charts;

James Belfiore for his assistance in converting our computer programs from Digital VMS systems to IBM MS-DOS so we can process our incoming monthly data using Headquarters computers;

Mrs. David Rosebrugh for her generous contribution in memory of her beloved husband and long-time AAVSO member, Dave;

Our members who have additionally contributed generously toward the operation of the Association to carry out its scientific responsibilities;

My sincere appreciation and thanks to our Committee Chairmen, Marvin E. Baldwin, Kenneth J. Beckmann, Thomas A. Cragg, Robert O. Evans, Clinton B. Ford, Howard J. Landis, Charles E. Scovil, and Peter O. Taylor, who give very generously of their time and wisdom to run their committees;

My special thanks to John R. Percy, our President, for his leadership and for his chairing the Scientific Committee of our First European Meeting in Belgium;

My special thanks to Theodore H. N. Wales, our Treasurer, for managing the finances of the Association so well, and for giving so much of his wisdom and time to help with financial matters of the operations of our Association, and for giving me sound advice when I ask for it;

My gratitude and thanks to our Secretary, Clinton B. Ford, and Vice-President, Martha L. Hazen, and to our Council Members, Louis B. Cox, George L. Fortier, John W. Griese, Dorrit Hoffleit, Walter S. Houston, Gerard Samolyk, Arthur J. Stokes, and Barbara L. Welther, for their generous contributions of their time and wisdom to assist in the successful operation of the Association;

My personal thanks to my husband Mike for his support, understanding, and tolerance of my long hours of work and absence to attend meetings;

My very sincere thanks to all our members and observers, for their support with valuable astronomical and financial contributions. This support is the foundation of our progress.

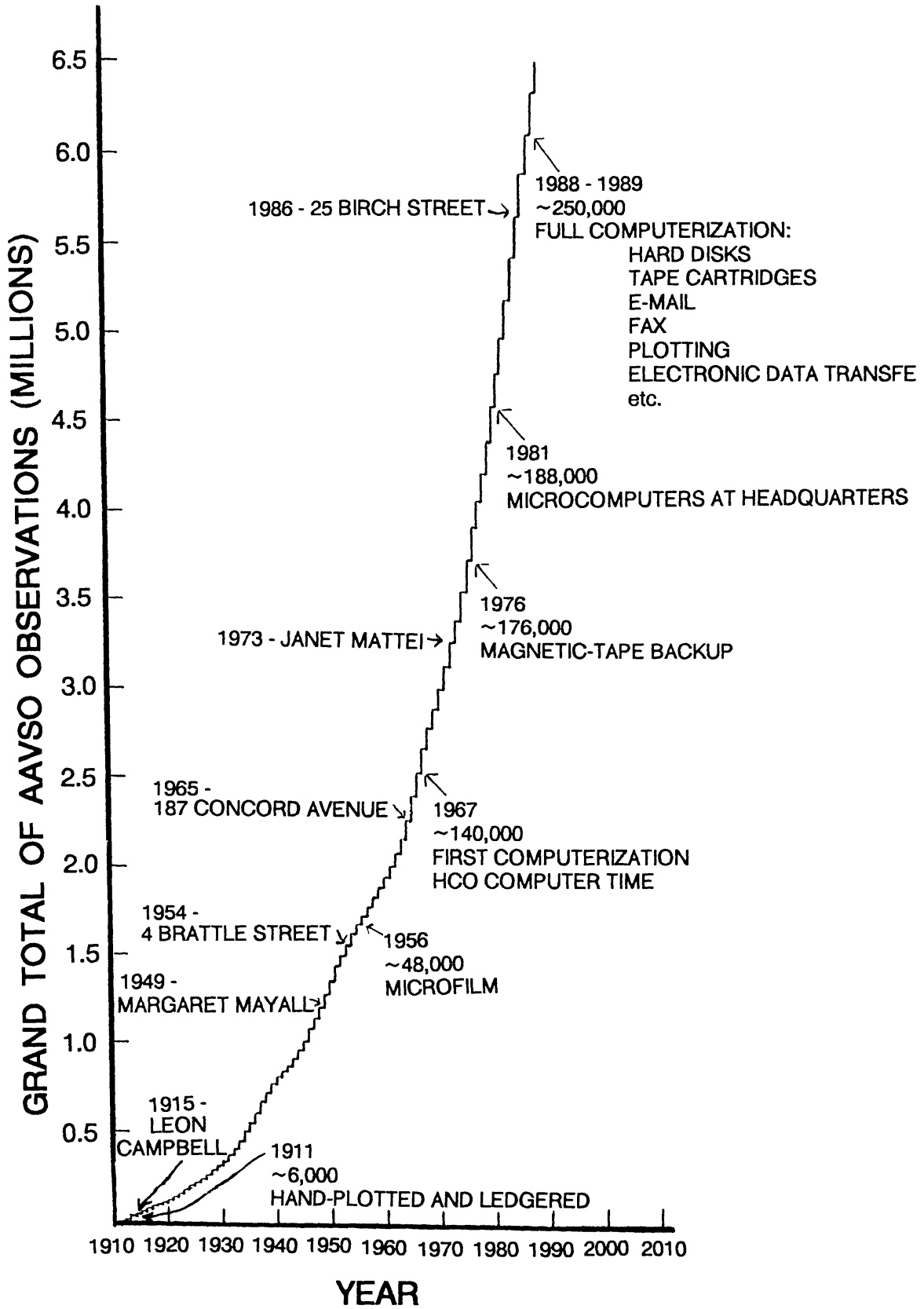


Figure 1. Milestones in the AAVSO. See text for description.

1990JAVSO...19

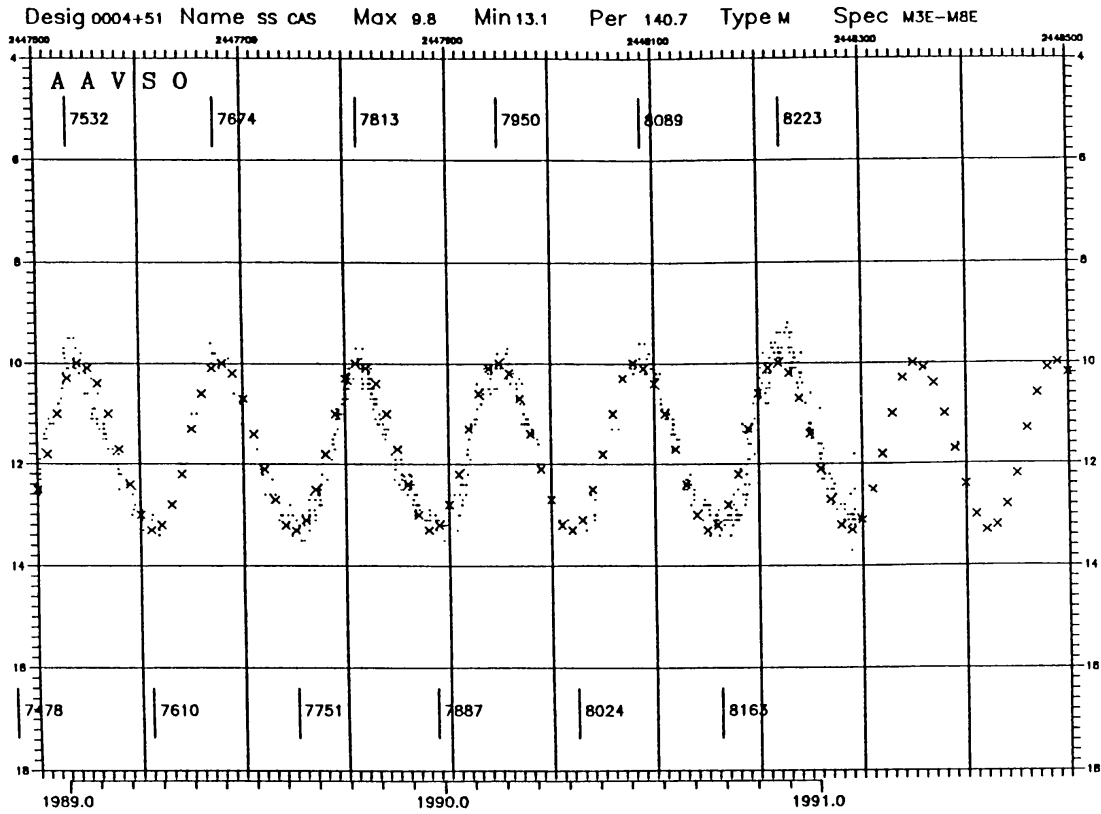


Figure 2. AAVSO light curve of SS Cas (each dot is one observation), with predicted light curve for HIPPARCOS mission (each X is a ten-day mean), and observed maxima and minima dates marked.

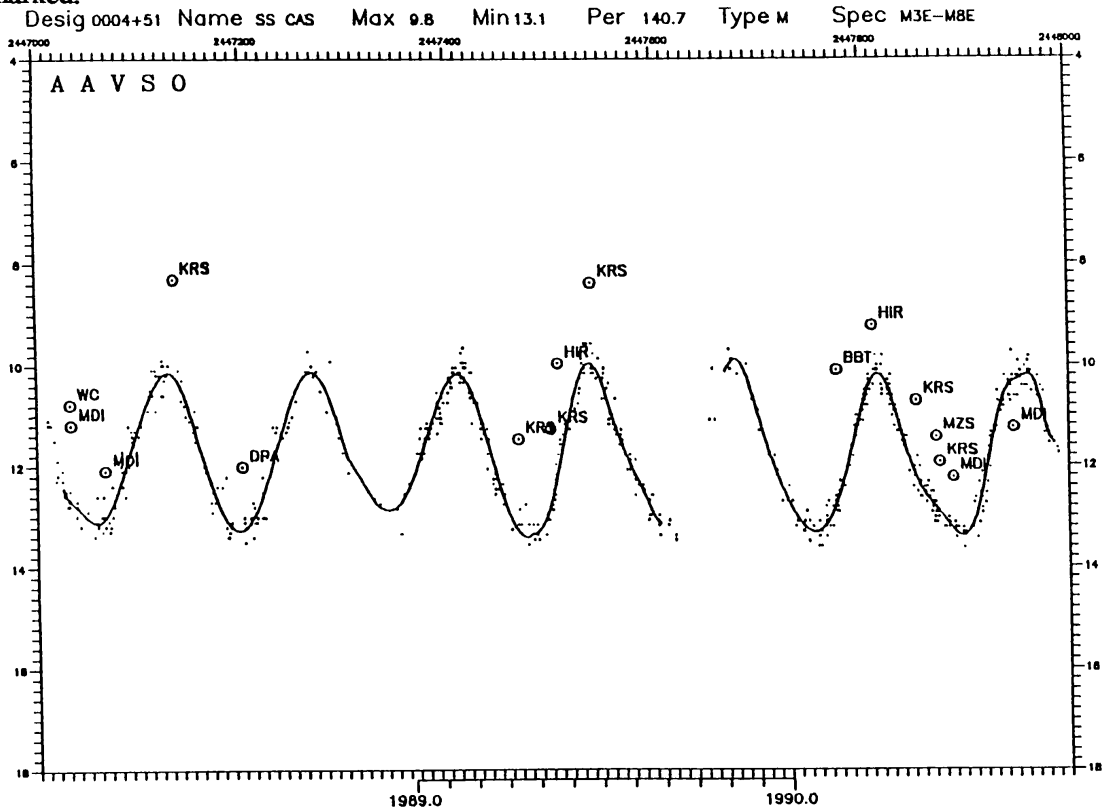


Figure 3. AAVSO light curve of SS Cas, with a mean curve running through the data and selected individual observations initialed.



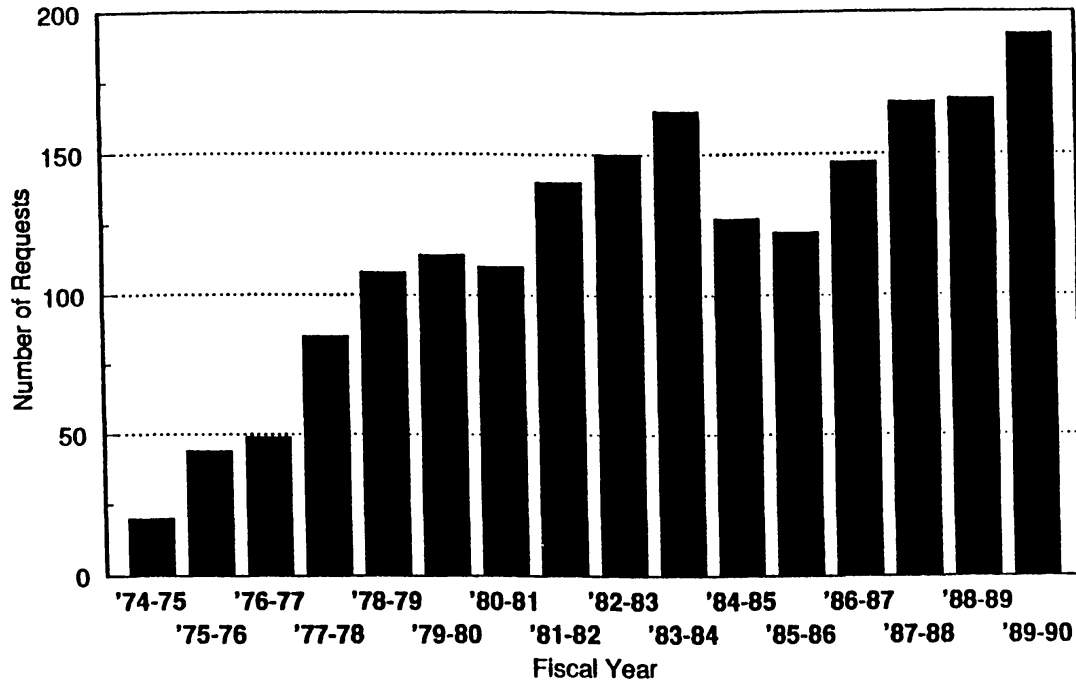


Figure 4. Number of requests for AAVSO data filled each year since 1974.

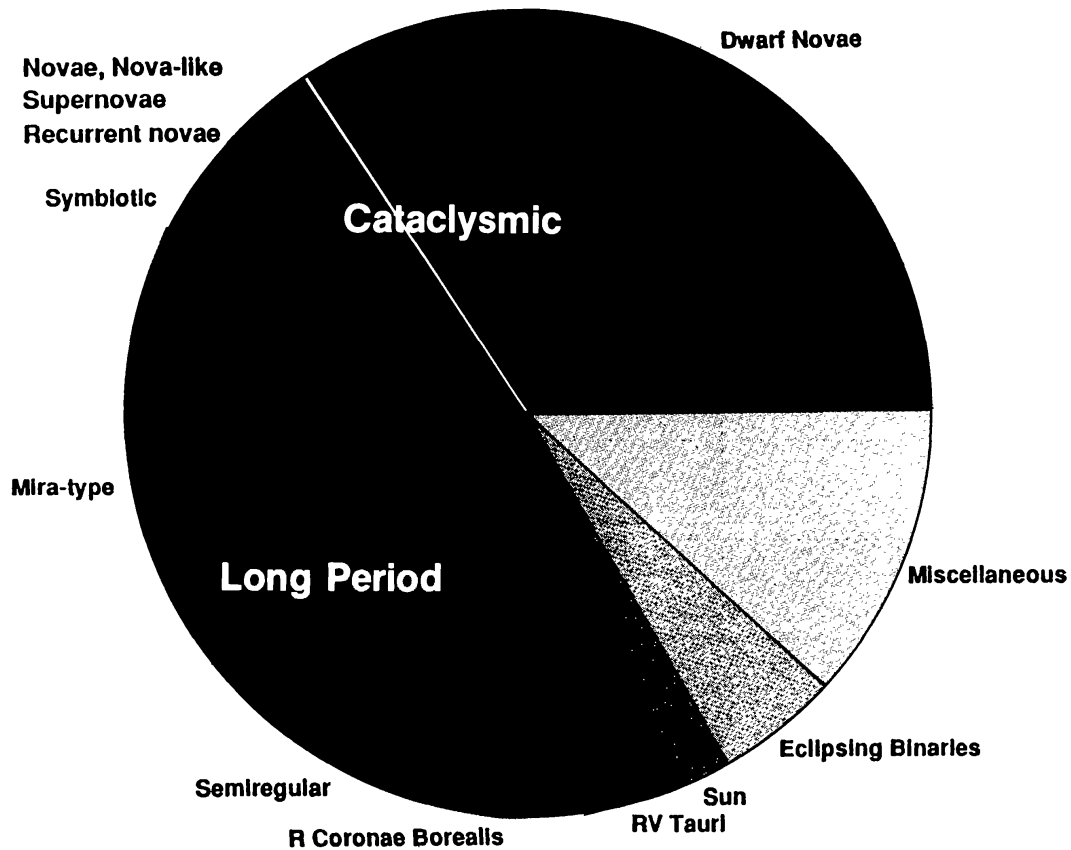


Figure 5. Types of variable stars for which AAVSO data were requested in 1989-90.

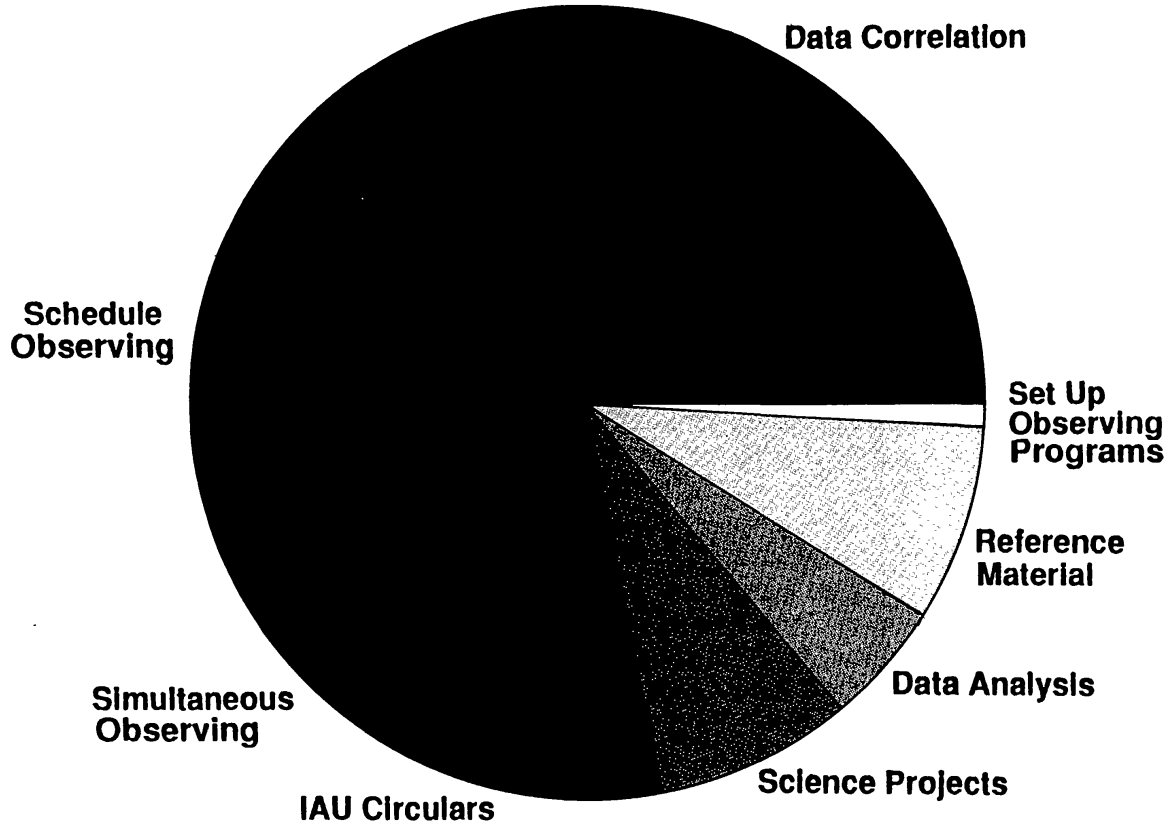


Figure 6. Areas in which AAVSO data and services were used in 1989-90.

Table 1. AAVSO Observer Totals 1989 - 1990 by Country

<i>Country</i>	<i>No. Observers</i>	<i>Obs.</i>	<i>Country</i>	<i>No. Observers</i>	<i>No. Obs.</i>
ARGENTINA	10	5958	JAPAN	29	10302
AUSTRALIA	4	2013	LITHUANIA	2	1185
AUSTRIA	3	271	MALAYSIA	1	27
BELGIUM	3	420	MALTA	1	1303
BOTSWANA	1	1384	NETHERLANDS	14	7343
BRAZIL	5	2315	NEW ZEALAND	39	3058
CANADA	20	11645	NORWAY	7	2683
CZECHOSLOVAKIA	7	2892	POLAND	9	7943
DENMARK	6	1268	ROMANIA	3	5363
ENGLAND	8	6793	USA	195	93578
FINLAND	1	3141	SOUTH AFRICA	10	20672
FRANCE	47	27176	SPAIN	23	4146
GERMANY	25	9268	SWITZERLAND	5	922
GREECE	2	2306	TURKEY	1	45
HUNGARY	68	18967	VENEZUELA	1	89
INDIA	1	180			
ISRAEL	5	2702	TOTAL	573	260318
ITALY	17	2960			

Table 2. AAVSO Observer Totals 1989 - 1990 USA by State

<i>State</i>		<i>No. Observers</i>	<i>No. Obs.</i>	<i>State</i>		<i>No. Observers</i>	<i>No. Obs.</i>
ALABAMA	(AL)	1	162	MISSOURI	(MO)	3	127
ARIZONA	(AZ)	7	2191	NEVADA	(NV)	1	26
ARKANSAS	(AR)	1	34	NEW HAMPSHIRE	(NH)	4	1335
CALIFORNIA	(CA)	20	2262	NEW JERSEY	(NJ)	5	1650
COLORADO	(CO)	6	6852	NEW MEXICO	(NM)	2	74
CONNECTICUT	(CT)	12	3380	NEW YORK	(NY)	11	20262
FLORIDA	(FL)	6	4722	OHIO	(OH)	4	1451
GEORGIA	(GA)	1	159	OKLAHOMA	(OK)	1	49
HAWAII	(HI)	2	6113	OREGON	(OR)	1	5
IDAHO	(ID)	1	13	PENNSYLVANIA	(PA)	10	2507
ILLINOIS	(IL)	12	6137	RHODE ISLAND	(RI)	2	129
INDIANA	(IN)	8	6471	SOUTH DAKOTA	(SD)	1	228
IOWA	(IA)	2	120	TENNESSEE	(TN)	2	51
KANSAS	(KS)	1	26	TEXAS	(TX)	8	3018
LOUISIANA	(LA)	1	99	VERMONT	(VT)	3	574
MAINE	(ME)	4	439	VIRGINIA	(VA)	6	4102
MARYLAND	(MD)	8	1792	WASHINGTON	(WA)	7	1156
MASSACHUSETTS	(MA)	10	10515	WEST VIRGINIA	(WV)	3	131
MICHIGAN	(MI)	6	402	WISCONSIN	(WI)	7	3931
MICRONESIA	(FM)	1	23				
MINNESOTA	(MN)	4	860	TOTAL		195	93578

Table 3. AAVSO Observers, 1989 - 1990

Code	Name	No. Obs.	No. I.S.	Code	Name	No. Obs.	No. I.S.
AAP	A. P. ABBOTT, CANADA	492	8	COA	A. COULOMBE, CANADA	24	
AB	W. B. ALBRECHT, HI	6095	77	CR	T. A. CRAGG, AUSTRALIA	1853	457
AAA	A. A. ALVES, BRAZIL	454		CNO	N. CRAMER, SWITZERLAND	2	1
AMO	M. AMORETTI, ITALY	53	10	CJH	J. H. CRAST, PA	71	
AJ	J. A. ANDERER, AR	34		CRR	R. E. CRUMRINE, NY	151	
AOD	O. ANDERSEN, NORWAY	13		CSE	^ D. CSERI, HUNGARY	1	
AJR	J. R. ANDRESS, AZ	152		CSI	^ I. CSOTTI, HUNGARY	22	
AWR	R. S. ANDREWS, NY	36		CSM	^ M. CSUKAS, ROMANIA	31	
AZP	^ P. ANTALICZ, HUNGARY	2		CGS	M. J. CUMMINGS, IL	23	
ARN	* L. ARNOLD, FRANCE	75	21	CUO	D. R. CUROTT, AL	162	
ARQ	* B. ARQUIER, FRANCE	22		DAH	H. DAHLE, NORWAY	109	2
BOZ	^ B. BAGO, HUNGARY	33	1	DMI	* M. DAHM, GERMANY	112	
BZR	^ E. BALAZS, HUNGARY	3		DSL	L. DA SILVA, BRAZIL	9	
BM	M. E. BALDWIN, IN	5897		DYJ	* J. DAUBY, FRANCE	282	
BMQ	* M. BARANDA-GOMEZ, SPAIN	93		DAJ	J. F. DAVIS, MD	22	4
BBC	* R. BARBOSA, SPAIN	4		DZX	% C. DAWSON, NEW ZEALAND	1	
BEW	W. L. BARNES, ENGLAND	9		DCA	* A. DECARHALVO, SPAIN	108	
BSF	S. F. BARNHART, OH	248		DBR	* B. DECOTTIGNIES, FRANCE	83	1
BSR	S. BARONI, ITALY	400		DFP	* C. DEFFAYET, FRANCE	22	3
ABA	A. BARTOLINI, ITALY	114		DLJ	^ J. DELI, HUNGARY	6	
BBA	B. B. BEAMAN, IL	136	19	DEA	R. DEMARTINO, CT	316	19
BJS	J. R. BEDIENT, MN	2		DFR	F. S. DEMPSEY, CANADA	38	
BTY	T. BENNER, PA	708	245	DNO	O. A. DEREN, POLAND	1324	
BID	% I. D. BENNIE, NEW ZEALAND	5		DEF	F. T. DESTEFANO JR., ME	81	
BBE	^ B. BERENTE, HUNGARY	40	2	DRG	R. DIETHELM-SUTTER, SWITZERLAND	4	
BNS	* S. BERGERON, FRANCE	91		DRD	R. D. DIETZ, CO	5	
BIO	* P. BERRIOT, FRANCE	79	1	DIL	W. G. DILLON, TX	61	
BSA	M. BESANA, ITALY	45		MDS	M. DIONISI, ITALY	286	20
BEZ	* J. BEZECOURT, FRANCE	4		DAX	% A. W. DODSON, NEW ZEALAND	46	
BIC	* L. BICHON, FRANCE	304	1	DPL	P. L. DOMBROWSKI, CT	717	124
BTX	% L. BIGGINS, NEW ZEALAND	1		GDB	^ G. DOMENY, HUNGARY	17	1
BGB	B. BLAGG, TX	41		DZS	S. DOMINGUEZ, ARGENTINA	5797	1
BAX	A. BOATTINI, ITALY	1365	205	DXX	% S. DREVES, NEW ZEALAND	34	
BOH	D. BOHME, GERMANY	353	1	DUS	* R. DUBOIS, FRANCE	98	
BJI	^ J. BOROVICKA, CZECHOSLOVAKIA	10		DMO	* M. DUMONT, FRANCE	688	
BRJ	J. E. BORTLE, NY	3472	1167	DDR	^ O. R. DUNAL, HUNGARY	6	
BMU	& R. J. BOUMA, NETHERLANDS	351	7	DUP	* P. DUPASQUIER, FRANCE	1062	83
BDS	R. R. BOYD, CA	150		DGP	G. P. DYCK, MA	10108	6303
BJX	% A. J. BRADBROOK, NEW ZEALAND	1		EL	J. E. ELLERBE, SPAIN	14	
BZK	* R. BRANZK, GERMANY	30		EPE	* P. ENSKONATUS, GERMANY	9	
BAQ	* A. BRAS, FRANCE	77		EWK	K. EWING, FL	8	
BDL	D. L. BRESLIN, MA	42		FMA	M. FADDA, ITALY	50	
BTB	T. C. BRETT, MN	40	5	FEO	^ E. FARKAS, HUNGARY	102	
BHN	& H. BRIL, NETHERLANDS	69		FKF	^ F. FARKAS, HUNGARY	2	
BSM	S. M. BRINCAT, MALTA	1303	7	FMX	% F. FARRELL, NEW ZEALAND	101	
BKF	F. BROCKMEIER, GERMANY	1		FJB	* J. B. FAURE, FRANCE	14	
BOS	E. BROENS, BELGIUM	5		FJH	& H. FEIJTH, NETHERLANDS	3221	886
BBT	R. R. BROWNING, NJ	204		FKJ	^ J. FEKETE, HUNGARY	121	
BYV	* Y. BRUCHER, FRANCE	144		FJL	J. L. FERREIRA, CA	130	11
BOA	* A. BRUNO, FRANCE	118	9	FRD	R. FIADONE, ARGENTINA	17	
BDX	% D. BRUNT, NEW ZEALAND	7		FRF	^ R. FIDRICH, HUNGARY	1219	145
BKX	% K. BRYANT, NEW ZEALAND	1		FEM	E. M. FLYNN, MO	10	
BUI	* H. BURILLIER, FRANCE	227		FDA	^ A. FODOR, HUNGARY	181	
CBA	* A. CABRERA RODRIGUEZ, SPAIN	281		FFC	^ F. FOLDESI, HUNGARY	1431	5
CMN	R. D. CAMERON, AUSTRALIA	49		FD	C. B. FORD, CT	40	27
CMQ	% P. CAMILLERI, NEW ZEALAND	9		FGL	G. FORGIE, MI	2	
CMP	R. J. CAMPBELL, FL	380	3	FEL	E. FRANCIOSINI, ITALY	43	2
CFN	* F. CAMPOS, SPAIN	48		FRI	L. A. FRIGON, CA	15	
CJA	J.A.D.S. CAMPOS, S. AFRICA	77		FAA	A. FROSINA, ITALY	8	
CEA	* B. CANDELA, FRANCE	2403	65	FFA	F. FUCCI, ARGENTINA	4	
CJR	J. R. CARUSO, MA	35	2	FMG	G. C. FUGMAN, IA	84	3
CCN	R. CHACON-DIAZ, ARGENTINA	14		GLR	^ A. GAAL, HUNGARY	3	
CYA	A. CICHY, POLAND	1096		GWB	W. B. GABLE, VA	22	
TCE	* E. CIFUENTES-TORRES, SPAIN	136		GBZ	O. GABZO, ISRAEL	882	
CPH	* P. CLAISSE, FRANCE	49		GEC	E. C. GALE, IA	36	
CLK	W. E. CLARK, MO	21	1	GFA	F. GALLI, ITALY	23	
CLP	% G. CLARKE, NEW ZEALAND	1		GXX	% T. GARFIELD, NEW ZEALAND	5	
CWP	W. P. CLARKE, CA	171		GKR	R. D. GECKELER, GERMANY	22	
CJN	J. COGGINS, ENGLAND	148		GCP	C. GERBER, GERMANY	496	
COL	P. L. COLLINS, CO	1004		GMJ	M. J. GEYSER, S. AFRICA	11	
CMG	& G. COMELLO, NETHERLANDS	3002	389	GIR	W. A. GILCHRIST JR., TX	57	
CGG	G. CONLIN, WA	21		GLN	* J. M. GILLAIN, BELGIUM	346	
CKX	% G. W. COOK, NEW ZEALAND	5		GZG	^ G. GLASZ, HUNGARY	1	
COM	T. COOPER, S. AFRICA	1001	20	GHA	* H. GOLDBAHN, GERMANY	48	



Table 3. AAVSO Observers, 1989 - 1990 (continued)

Code	Name	No. Obs.	No. I.S.	Code	Name	No. Obs.	No. I.S.
GPX	% W. GOLTZ, NEW ZEALAND	375	28	KYJ	^ L. KAROLY, HUNGARY	6	
GOT	* T. GOMEZ, SPAIN	20		KEI	E. KATO, AUSTRALIA	97	9
GZN	* A. GONZALES, SPAIN	59		KTA	* T. KATO, JAPAN	363	9
GOP	P. N. GOODWIN, LA	99	15	KTL	L. KEITH, WI	320	
GLM	L. M. GORSKI, IL	7		KKP	& P.C.A.KERKVIET, NETHERLANDS	78	
GRL	B. H. GRANSLO, NORWAY	1329	154	KRB	R. P. KING, MN	466	144
GMI	M. GRENON, SWITZERLAND	15	1	KSI	* S. I. KIYOTA, JAPAN	254	
GJF	J. A. GRIESE, WI	51		KON	O. KLINTING, DENMARK	40	
GRI	J. W. GRIESE III, CT	976	655	KPE	* P. KLIX, GERMANY	19	
GSC	* C. GROS, FRANCE	68	1	KMT	^ T. KMETOVITS, HUNGARY	5	
GML	M. GRUNANGER, AUSTRIA	232		KGT	G. KNIGHT, ME	226	
GCT	C. GRUNNET, DENMARK	301		KSP	S. P. KNIGHT, ME	126	25
GJU	J.GUERRERO-ORDAS, VENEZUELA	89		KS	J. H. KNOWLES, NH	40	
GUN	* J. GUNTHER, FRANCE	1292	77	KOC	^ A. KOCSIS, HUNGARY	1279	
GMF	M. A. GUTRIDGE, IL	3		KDF	D. F. KOCYLA, CT	28	
HCS	^ C. HADHAZI, HUNGARY	33		KKF	K. F. KOEHLER, AZ	578	1
HTY	T. HAGER, CT	257	45	KLG	G. A. KOHL, AZ	72	
HK	E. A. HALBACH, CO	3567	154	KHL	M. KOHL, SWITZERLAND	880	2
HMG	^ G. HALMI, HUNGARY	393		KRS	R. S. KOLMAN, IL	1240	179
HMR	R. HAM, CO	1359	6	KMA	M. A. KOMOROUS, CANADA	1127	
HAN	J. H. HANNON, CT	38		KMC	M. KONACKI, POLAND	395	
HPR	C. T. HARPER, NHG	72		KRF	R. F. KONIOR, NY	239	9
HIX	% E.HARRIS-HARRIES, NEW ZEALAND	39		KRT	S. KORTH, GERMANY	1375	647
HAV	R. P. HARVAN, MD	285	135	KOS	^ A. KOSA-KISS, ROMANIA	1798	7
HNO	* N. HASEGAWA, JAPAN	10	1	KOA	M. KOSHIRO, JAPAN	3688	730
HKP	K. P. HASLAG, VA	23		KVI	^ I. KOVACS, HUNGARY	601	4
HSB	W. HASUBICK, GERMANY	56		KWO	* W. KRIEBEL, GERMANY	161	
HAB	R. H. HAYS JR., IL	1171		KJS	G. KRISCH, GERMANY	621	
HLS	L. T. HEEN, NORWAY	878		KRK	K. KRISCIUNAS, HI	18	
HEF	M. A. HEIFNER, CO	871	180	KSA	* A. KUCINSKAS, LITHUANIA	1002	
HCE	C. E. HEIL, MD	24		KUD	^ G. KUDOR, HUNGARY	4	
HYN	N. HENRY, ISRAEL	3		KPG	& G. KUIPERS, NETHERLANDS	100	9
HEN	C. HENSHAW, BOTSWANA	1384		KYT	* T. KUNIYASU, JAPAN	47	
HGZ	^ Z. HERCEG, HUNGARY	17		KBO	R. J. KUPLIN, PA	20	
HGC	G. C. HERDMAN, NEW ZEALAND	150		KCF	C. KURTZ, ARGENTINA	46	
HJN	J. HERS, S. AFRICA	60	27	LDT	^ T. LADANYI, HUNGARY	132	
HEV	^ Z. HEVESI, HUNGARY	131		LAR	R. LAMBERT, TX	231	4
HE	F. L. HIETT, VA	3305		LND	H. J. LANDIS, GA	159	
HXX	% M. HILL, NEW ZEALAND	1		LTW	T. W. LANGHANS, CA	101	
HRI	R. E. HILL, AZ	506		LMF	M. F. LARA, BRAZIL	373	
HZR	R. HINZPETER, GERMANY	30		LKG	K. G. LARSON, CA	94	
HGI	* M. HIRAGA, JAPAN	47		LZT	T. LAZUKA, IL	1749	
HIR	Y. HIRASAWA, JAPAN	698	112	LKD	D. C. LEAKE, IL	92	
HSK	* K. HIROSAWA, JAPAN	80		LEB	* R. LEBERT, FRANCE	429	
HWD	W. D. HODGSON, ENGLAND	32		LST	* S. LECOMTE, FRANCE	151	
HFF	T. C. HOFFELDER, FL	164		LRU	* R. LEGENDRE, FRANCE	6	
HFO	* G. HOFFER, GERMANY	99		LNZ	G. F. LENZ, CT	34	
HLT	G. M. HOLTER, WA	52		LSX	% MRS. A. LESLIE, NEW ZEALAND	65	
HZJ	J. W. HOLTZ, PA	318		LEV	A. J. LEVEQUE, CA	63	
HOO	& G. J. HOOGEVEEN, NETHERLANDS	27		LVY	D. H. LEVY, AZ	72	14
HJA	J. A. HUDSON, CA	62		LWO	W. LEWANDOWSKI, POLAND	798	
HGR	R. C. HULKENBERG II, MD	4		LGS	* C. LIANGORIDIS, FRANCE	5	
HOX	% O. R. HULL, NEW ZEALAND	210		LKB	K. B. LINSLEY, MA	9	
HMX	% MRS. O. R. HULL, NEW ZEALAND	11		LOB	* J. LOBO-RODRIGUEZ, SPAIN	111	
IML	M. IDEM, NY	4347	1896	LWT	T. W. LOHVINENKO, CANADA	286	
ARM	* A. IIDA, JAPAN	23		LGN	G. R. LOPRIORE, MA	60	
ILE	^ E. ILLES, HUNGARY	2		LEJ	E. J. LOS, NH	21	
IPA	P. A. INGRASSIA, ARGENTINA	24		LOT	H. LOUTH, WA	673	
ITA	* A. ITOH, JAPAN	17		LVT	J. LOVETT, NH	1202	
IFJ	F. J. IVES, NEW ZEALAND	676		LX	W. M. LOWDER, NY	8740	
JJA	J. JAHN, GERMANY	22	1	LTB	T. F. LUBBERS, MN	352	
JM	R. A. JAMES, WI	4		LBG	G. C. LUBCKE, WI	856	25
JKK	K. K. JENSEN, NORWAY	22		LKA	K. D. LUEDEKE, WA	72	
JCH	& C. JOHANNINK, NETHERLANDS	209		LEX	% E. LUMLEY, NEW ZEALAND	172	
JOG	G. E. JOHNSON, MD	204		LBB	B. A. LUX, PA	175	
JR	R. G. JOHNSON, MD	89	18	MDW	W. J. MACDONALD II, CANADA	26	
JA	% A. F. JONES, NEW ZEALAND	490		MDH	H. C. MADDOCKS, VA	44	
JRW	R. W. JONES, S. AFRICA	1602	14	MKN	* N. MAKIGUCHI, JAPAN	17	
JOO	^ I. JOO, HUNGARY	2		MEK	^ J. MANEK, CZECHOSLOVAKIA	178	7
KDA	D. H. KAISER, IN	191		MKE	R. P. MANSKE, WI	153	1
KB	W. J. KAMINSKI, SD	228	8	MJZ	* J. MANZORRO, SPAIN	202	
KIT	* K. KANAI, JAPAN	285		MCO	M. MARCARIO, CA	65	12
KJO	J. KAPLAN, IN	40		MRQ	* G. MAREKFA, GERMANY	129	
KDS	^ M. KARDOS, HUNGARY	4		MIC	* C. MARILLER, FRANCE	119	

Table 3. AAVSO Observers, 1989 - 1990 (continued)

Code	Name	No. Obs.	No. I.S.	Code	Name	No. Obs.	No. I.S.
MJU	J. C. MARIONI, ARGENTINA	3		PN	A. E. PEARLMUTTER, MA	179	
MKM ^	M. MARTIN, HUNGARY	1		PEI	E. PEDERSEN, DENMARK	22	
MTO *	E. MARTIN-MATEOS, SPAIN	53		PEG *	C. PEGUET, FRANCE	330	
MZO *	D. MARTINEZ-DELGADO, SPAIN	3		PMR	M. R. PERALA, FINLAND	3141	131
MRX	H. MARX, GERMANY	1867	62	PML *	M. PERROT, FRANCE	11	
MGE	G. MAVROFRIDIS, GREECE	1902		POD *	D. PESTANA GALVAN, SPAIN	679	
MYR	E. H. MAYER, OH	1081	411	PZP ^	P. PETROVITZ, HUNGARY	41	
MJW	J. W. MAYER, PA	520	26	PKI	O. R. PIECHOWSKI, MI	17	
MAZ	M. J. MAZUREK, CA	2		PIA	A. PIEMONTE, ITALY	42	
MGU	T. J. MCCAGUE, IL	35		PTZ *	J. PIETZ, GERMANY	386	
MDV	D. B. MCCOLLUM, VA	54		PJI ^	J. PIRITI, HUNGARY	96	
MDP	P. MCDONALD, CANADA	17		PLR	R. M. POOLE, PA	430	5
MGG	G. L. MCGINNIS, WA	127	16	PLL	M. R. PORCELLINO, IL	4	
MKJ	J. F. MCKENNA, NJ	1272	41	POS ^	O. POSA, CZECHOSLOVAKIA	97	
MIB	I. B. MEDIAAS, NORWAY	257		POH *	T. POSCHE, GERMANY	13	
MED	K. J. MEDWAY, ENGLAND	3095	2	PSZ ^	K. POSZTOBANYI, HUNGARY	14	
MHI	H. I. MENALI, TURKEY	45		PWR	R. E. POWASKI, OH	5	
MNZ	E. MENEGUZZO, ITALY	43		PPX %	D. POWELL, NEW ZEALAND	1	
MDI	I. A. MIDDLEMIST, ENGLAND	1178	1	PHD	H. D. POWELL, TN	49	
MOK	O. MIDTSKOGEN, DENMARK	591	165	POX	M. POXON, ENGLAND	2268	
MCQ	C. MILLER, NJ	3		PYG	G. POYNER, ENGLAND	48	
MJI	J. R. MINER, IN	10		PDO	D. P. PRAY, RI	39	
MZS ^	A. MIZSER, HUNGARY	1559	60	PCJ	C. J. PREDOM, CT	78	1
MCE	E. MOCHIZUKI, JAPAN	299		PRI	L. H. PRICE, NY	9	
MMI	M. MOELLER, GERMANY	2519		PDO *	D. PROUST, FRANCE	43	5
MOD	D. G. MOHRBACHER, OH	117	1	PJI	J. C. PRYAL, WA	25	
MOL	J. MOLNAR, VA	654		RPY ^	P. RAPAVY, HUNGARY	95	
MMM*	M. MOMOSE, JAPAN	430		RGA	G. J. RAWLINGS, WV	6	
MAR	R. MONELLA, ITALY	185	141	RCO ^	R. RECSEK, HUNGARY	15	
MDE	D. R. MONGER, FL	131		RJT	J. T. REED, OK	49	3
MOR	R. L. MONSKE, PA	214	4	REC	C. REESE, TN	2	
MJ	A. C. MONTAGUE, MI	290		REP	P. REINHARD, AUSTRIA	18	
MNN	N. MONTECCHIARI, ITALY	41		RJI	J. I. RIGGS, NY	220	22
MOJ	J. E. MORGAN, AZ	78	20	RGH	G. H. RIPLEY, ME	6	
MOI *	E. MORILLON, FRANCE	464		RLR	R. L. ROBINSON, WV	7	
MOQ *	R. MORISHITA, JAPAN	25		RFE *	F. RODRIGUES, SPAIN	53	
MYM	M. MORIYAMA, JAPAN	35		RZG	G. D. RODRIGUEZ, ARGENTINA	39	
MOW	W. C. MORRISON, CANADA	4537	136	RJA *	J. P. ROHART, FRANCE	159	
MHX %	J. MOSEY, NEW ZEALAND	1		RGB	G. B. ROSENBERG, CA	132	
MJX ^	J. MOSONYI, HUNGARY	2		ROG	G. M. ROSS, MI	84	38
MKH	S. MUKHERJEE, INDIA	180		RGL	G. ROTEM, ISRAEL	2	
MDU	D. MULINSKI, POLAND	654		RR	R. E. ROYER, CA	289	28
MNS *	S. MUNIER, FRANCE	4		RJV *	J. RUIZ, SPAIN	160	
MKU *	K. MURASE, JAPAN	28		RPH	H. RUMBALL-PETRE, FM	23	
MYE	K. J. MYERS, IN	4		RKR	K. RUMINSKI, POLAND	490	
NZO ^	Z. NAGY, HUNGARY	746		SJC	J. C. SADOW, NM	43	
NMA ^	A. NAGY-MELIKUTI, HUNGARY	21		SGK	K. L. SAGE, CA	2	
NKA *	K. NARUMI, JAPAN	1483	13	SJQ ^	A. SAJTZ, ROMANIA	3534	
NLX %	P. NELSON, NEW ZEALAND	3		SSU	S. I. SAKUMA, JAPAN	459	29
NRH	R. H. NELSON, CANADA	195		SAH	G. SAMOLYK, WI	2456	20
NWL &	W. NOBEL, NETHERLANDS	26		SSR	R. SAMPSON, CANADA	232	
NVK	M. W. NOVAK, TX	473	41	SEF *	F. SANCHEZ, SPAIN	1	
NOG	G. T. NOWAK, VT	142		SNZ *	J. SANCHEZ, SPAIN	17	
OBT	T. V. O'BRIEN, CT	2		SSX *	A. SANTOS, FRANCE	39	
OCN	S. O'CONNOR, CANADA	228		SGI *	M. SANTOS, SPAIN	15	
OKJ %	J. O'KANE, NEW ZEALAND	50		SPO ^	C. SAPI, HUNGARY	371	4
OER	E. OFEK, ISRAEL	1116		SJG	J. SARGENT, MI	4	
OJO	J. O. OLESEN, DENMARK	182		SGU ^	G. SARI, HUNGARY	193	
ON	L. ONDRA, CZECHOSLOVAKIA	7		SOZ *	M. SATO, JAPAN	52	
ONO *	O. ONODERA, JAPAN	362		SCO	T. A. SCHELL, TX	53	1
OOC *	C. OOISHI, JAPAN	1		SEC *	R. SCHERTLER, FRANCE	63	
OV	E. G. ORAVEC, NY	2880		SMF	F. SCHMIDT, NY	35	
ORW	R. W. ORTEL, RI	90		SAO &	A. SCHOLTEN, NETHERLANDS	64	
OSW	W. OSBORN, MI	5		SLZ	G. L. SCHOTT, GERMANY	8	
OJR	J. R. OSORIO, SPAIN	1996	275	SCZ *	E. SCHWEITZER, FRANCE	3192	177
OSV ^	L. OSVALD, HUNGARY	194	2	SCX	E. V. SCIARONI, MO	96	
OB	M. D. OVERBEEK, S. AFRICA	17290	225	SCE	C. E. SCOVIL, CT	823	354
PLA	A. PADILLA FILHO, BRAZIL	853		SEZ *	J. SEGONZAT, FRANCE	960	5
PJZ ^	J. PALANKI, HUNGARY	3		SRZ ^	Z. SERES, HUNGARY	45	
PJU ^	J. PALOS, HUNGARY	2		SEN &	P. SERNE, NETHERLANDS	104	
PPS ^	S. PAPP, HUNGARY	2820	88	SVY	N. SEVERIJNS, BELGIUM	69	
PJX %	J. L. PARK, NEW ZEALAND	1		SHS	S. B. SHARPE, CANADA	3228	20
PLZ	L. PAZZI, S. AFRICA	33		SSA	A. P. SHARPLESS, WA	186	1
PEX %	A. PEARCE, NEW ZEALAND	10		SHQ	O. SHEMER, ISRAEL	699	1

Table 3. AAVSO Observers, 1989 - 1990 (continued)

Code	Name	No. Obs.	No. I.S.	Code	Name	No. Obs.	No. I.S.
SHW	W. R. SHERMAN, IN	314		TDM	D. M. TROIANI, IL	175	8
SIO	* H. SHIOI, JAPAN	33		TCK	G. E. TUCKER, MA	16	
SIH	* M. SILHOL, CZECHOSLOVAKIA	2248		TSJ	* S. TUJI, FRANCE	30	
SKD	D. SKILLMAN, MD	67		TUC	C. TURK, S. AFRICA	119	
SJX	J. A. SMIT, S. AFRICA	386		TDX	% D. TURNER, NEW ZEALAND	6	
SMO	M. S. SMITH, AZ	733		TYS	R. L. TYSON, NY	133	
SRV	R. V. SMITH, CA	44		UND	G. E. UNDERHAY, CA	117	1
SNX	L. F. SNYDER, NV	26		VFR	* F. VACLIC, CZECHOSLOVAKIA	67	
SSZ	^ Z. SOOS, HUNGARY	85		VBR	H. VAN BEMMEL, CANADA	2	
SOH	H. SORENSEN, DENMARK	132		VDH	& H. VAN DEN HIL, NETHERLANDS	6	
SOI	M. S. SOUKUP, NM	31		VDM	& M. VANDENNEHEUVEL, NETHERLANDS	28	
SJZ	J. SPEIL, POLAND	1502		VPL	P. VARELA, ARGENTINA	7	
SPO	J. SPONGSVEEN, NORWAY	75		VED	* P. VEDRENNE, FRANCE	6626	
SC	C. E. SPRATT, CANADA	167		VC	% C. VENIMORE, NEW ZEALAND	19	
SSP	P. A. STAMUS, CO	46		VET	* M. VERDENET, FRANCE	5115	2779
SYJ	J. B. STANBURY JR., MA	17		VEZ	* T. VEZAUSKAS, LITHUANIA	183	
STR	R. H. STANTON, CA	105	85	VIA	* J. VIALLE, FRANCE	168	
SKS	T. STECKNER, CANADA	30		VNZ	^ Z. VICIAN, HUNGARY	678	17
STF	G. STEFANOPOULOS, BRAZIL	626		VRA	* J. VIEIRA, SPAIN	106	
STI	P. C. STEFFEY, FL	3292	459	VGP	* P. VIGNIER, FRANCE	1153	57
SGP	P. E. STEGMANN, NJ	89		VMO	M. VILLI, ITALY	8	
SET	C. STEPHAN, FL	747	38	VIN	J. V. VINCENT, S. AFRICA	93	
SLW	L. R. STEVENS, CANADA	12		VGJ	G. J. VINCI, CT	71	6
SWT	R. J. STEWART, NJ	82	1	VII	* I. VINCZE, FRANCE	187	
STQ	N. STOIKIDIS, GREECE	404		VIT	* F. A. VIOLAT, FRANCE	96	
STG	G. STONE, MA	4		VFK	* F. VOHLA, GERMANY	93	
SAX	A. J. STUDER, VT	27	1	VOI	* P. VOITH, HUNGARY	1	
SUK	M. T. STUKA, CA	8		VJS	S. VOJTECH, CZECHOSLOVAKIA	285	
SGH	* H. SUGAI, JAPAN	19		VOL	W. VOLLMANN, AUSTRIA	21	
SGA	^ G. SULE, HUNGARY	5		WKP	P. R. WALKER, VT	405	25
SUS	D. SUSSMANN, GERMANY	721		WKR	T. D. WALKER, OR	5	
SVN	P. L. SVENTEK, TX	2042	53	WND	* D. WALLIAN, FRANCE	10	
SBT	^ R. SZABO, HUNGARY	84		WKX	% T. WARDLE, NEW ZEALAND	6	
SZW	^ R. SZAJ, POLAND	659		WMA	* M. WATANABE, JAPAN	124	
SZX	^ Z. SZALMA, HUNGARY	160		WTT	* T. WATANABE, JAPAN	367	
SKV	^ L. SZARKA, HUNGARY	1719	16	WNY	* Y. WATANABE, JAPAN	1	
SAO	^ A. SZAUER, HUNGARY	215		WDX	% MRS. D. WATSON, NEW ZEALAND	76	
SNO	^ L. SZENTASKO, HUNGARY	7	1	WER	R. J. WEBER, KS	26	
SOO	^ A. SZOLLOSI, HUNGARY	701	8	WEI	D. D. WEIER, WI	91	11
SUC	^ L. SZUCS, HUNGARY	31		WC	R. E. WEND, IL	1502	6
SUZ	^ P. SZUTOR, HUNGARY	55		WET	T. WESELAK, POLAND	1025	
TAM	* M. TALERO, SPAIN	32		WEM	M. E. WESOLOWSKI, CANADA	25	
TPI	* P. TASSIE, FRANCE	107		WEF	F. R. WEST, MD	1097	
TDB	D. B. TAYLOR, CANADA	512	16	WTJ	J. E. WEST, TX	60	18
TNX	% N. W. TAYLOR, NEW ZEALAND	106	1	WTK	^ K. WIESZT, HUNGARY	1098	
TSZ	^ S. TEICHNER, HUNGARY	92		WI	D. B. WILLIAMS, IN	4	
TJV	* J. TEMPRANO, SPAIN	12		WPX	% P. WILLIAMS, NEW ZEALAND	177	
TIS	^ I. TENGER, HUNGARY	1		WLX	% L. J. WILLIAMSON, NEW ZEALAND	119	
TPS	^ I. TEPLICZKY, HUNGARY	1096		WSN	T. W. WILSON, WV	118	31
TSE	* S. TERABAYASHI, JAPAN	162		WUX	% R. D. WINNETT, NEW ZEALAND	29	
TMS	* F. TERMIS-SOTO, SPAIN	36		WNX	% A. WINTON, NEW ZEALAND	1	
TAX	A. THOMAS, GERMANY	78		WKM	M. WISKIRKEN, ID	13	
THR	R. R. THOMPSON, CANADA	463		WNG	L. WONG, MALAYSIA	27	
TRB	R. THOMSEN, ARGENTINA	7		WJM	J. E. WOOD, CA	309	
THU	* B. THOUET, FRANCE	414		WRO	R. L. WRIGHT, CA	180	
TSR	^ I. TIZINGER, HUNGARY	40		YAM	* M. YAMADA, JAPAN	593	2
TAN	^ A. TOLGYESI, HUNGARY	632		YRK	D. O. YORK, CA	223	31
TMB	M. TOMBELLI, ITALY	29	6	YON	R. R. YOUNG, PA	40	
TOO	J. TOONE, ENGLAND	15		ZAG	^ G. ZAJACZ, HUNGARY	54	
TOM	& M. TOONEN, NETHERLANDS	58	1	ZUT	S. ZANUT, ITALY	225	
TTK	^ K. TOTH, HUNGARY	30		ZPA	P. A. ZELLER, IN	11	
TTH	^ T. TOTH, HUNGARY	166		ZIN	S. T. ZINN, PA	11	
TFN	F. N. TRAYNOR, AUSTRALIA	14		ZRE	R. E. ZISSELL, MA	45	13
TRF	C. F. TREFZGER, SWITZERLAND	21	3	ZW	W. P. ZUKAUSKAS, CANADA	4	
TBX	% B. TREGASKIS, NEW ZEALAND	47					

\* also member of or observations received by AAVSO through Association Francaise des Observateurs d'Etoiles Variables (AFOEV).

& also member of Nederlandse Vereniging Voor Weer-en Sterrenkunde, Werkgroep Veranderlijke Sterren (Netherlands).

^ also member of or observations received by AAVSO through Pleione Változócsillag-észlelo Hálózat (PHV) (Hungary).

% also member of or observations received by AAVSO through Royal Astronomical Society of New Zealand (RASNZ).

Table 4. Individuals Requesting AAVSO Data During Fiscal Year 1989 - 1990

<i>Name</i>	<i>Affiliation</i>
J. Andrews	Tucson, AZ
C. Bartolini	Universita Degli Studi Di Bologna, Italy
J. Bauer (2)	Cambridge, MA
W. Hagen-Bauer	Wellesley College, MA
E. Belserene	Maria Mitchell Observatory, MA
P. Benson	Wellesley College, MA
S. Birney	Wellesley College, MA
W. Blair (3)	Johns Hopkins University, MD
R. Boninsegna	Dourbes, Belgium
L. Bryson	University of Hawaii, HI
R. Buss	NASA Ames Research Center, CA
G. Clayton (8)	NASA HQ, Washington, DC
P. Cleveland	Fincastle, VA
G. Conalizo	Cambridge, MA
H. Crull	U.S. Naval Observatory, Washington, DC
D. DiCicco	Sky & Telescope Magazine, MA
R. Dickman	University of Massachusetts, MA
J. Drew (6)	University of Oxford, England
D. Dunham	Silver Spring, MD
T. English	Gardner-Webb College, NC
M. Feast	South African Astronomical Observatory, South Africa
R. Feinberg	Sky & Telescope Magazine, MA
J. Field	Portage, MI
R. Fleet	Hayes End, England
W. Forest	University of Rochester, NY
R. Garrison	University of Toronto, Canada
R. Gehrz	University of Minnesota, MN
A. DiGiacomo	Osservatorio Astrofisica di Arcetri, Italy
J. Graham	Carnegie Institute of Washington, DC
D. Green (6)	Harvard-Smithsonian Center for Astrophysics, MA
M. Grenon	Geneva Observatory, Switzerland
G. Henry	Tennessee State University, TN
L. Hobson	Lexington, SC
J. Hocher	Mankato State University, MN
A. Holm (6)	Space Telescope Science Institute, MD
S. Hunt	Scarborough, Canada
T. Iijima	Osservatorio Astrofisico, Italy
H. Izumiura	National Astronomical Observatory, Japan
D. Kaiser (2)	Columbus, IN
M. Karovska (3)	Harvard-Smithsonian Center for Astrophysics, MA
S. Kim	University of Texas, TX
S. Korth	Monkheim, W. Germany
P. Lampens	Royal Observatory of Belgium, Belgium
A. Lebre (5)	Universite de Montpellier, France
P. Lecuyer	Santa Fe, NM
K.-C. Leung	University of Nebraska, NE
I. Little-Marenin	Wellesley College, MA
J. Lockwood	Tucson, AZ
G. Long	Tigard, OR



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<i>Name</i>	<i>Affiliation</i>
C. Lloyd	Rutherford Appleton Laboratory, England
D. Luttermoser	University of Colorado, CO
A. MacRobert	Sky & Telescope Magazine, MA
A. Magalhaes	University of Wisconsin, WI
C. Maizels	Los Angeles, CA
B. Marsden (18)	Harvard-Smithsonian Center for Astrophysics, MA
I. Martinez-Pais	Instituto de Astrofisica de Canarias, Spain
K. Mason (11)	Mullard Space Science Laboratory, England
C. Mauche (3)	Lawrence Livermore National Laboratory, CA
S. Meier	George Mason University, VA
M.-O. Mennessier (8)	University de Montpellier, France
K. Menten (2)	Harvard-Smithsonian Center for Astrophysics, MA
A. Moffat	Universite de Montreal, Canada
J. Moravec	Denver Museum of Natural History, CO
P. Moskalik	Copernicus Astronomical Center, Poland
P. Newton	Camerio, CA
M. Nook (3)	University of Wisconsin, WI
S. O'Meara	Sky & Telescope Magazine, MA
D. Oesper	Ames, IA
J. Osborne	Leicester University, England
F. Paresce (2)	Space Telescope Science Institute, MD
J. Percy (3)	University of Toronto, Canada
S. Pezzuto	Osservatorio Astronomica, Italy
R. Polidan (5)	NASA Goddard Space Flight Center, MD
J. Powell	Brigham Young University, UT
C. Ratering	Astronomisches Institut, W. Germany
H. Reeder (2)	Braintree, England
F. Ringwald	Dartmouth College, NH
E. Rubinstein	Columbia University, NY
C. Ruesch	Hales Corners, WI
V. Sassone	Stamford, CT
K. Scannell	Massachusetts Institute of Technology, MA
L. Schillinger	New Yorker Magazine, NY
E. Schlegel (4)	NASA Goddard Space Flight Center, MD
E. Schmidt	University of Nebraska, NE
S. Shore	NASA Goddard Space Flight Center, MD
L. Slack	Renton, WA
T. Spaight	University of Santa Clara, CA
R. Spangler	Massachusetts Institute of Technology, MA
M.J. Taylor	University of Wisconsin, WI
G. Torres	Harvard-Smithsonian Center for Astrophysics, MA
C. Townes (4)	University of California, CA
J. Truran	University of Illinois, IL
A. Udalski (6)	York University, Canada
M. Valora	Harrisburg, PA
A. Vanture	University of Washington, WA
R. Wade	University of Arizona, AZ
M. Wagner	Lowell Observatory, AZ
G. Wahlgren	NASA Goddard Space Flight Center, MD

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<i>Name</i>	<i>Affiliation</i>
G. Wallerstein	University of Washington, WA
C. Williams	Little Rock, AR
L.A. Willson (2)	Iowa State University, IA
J. Wood	Garden Grove, CA
J. Woods	University of Oxford, England

Note: A number in parentheses after the name indicates multiple requests.