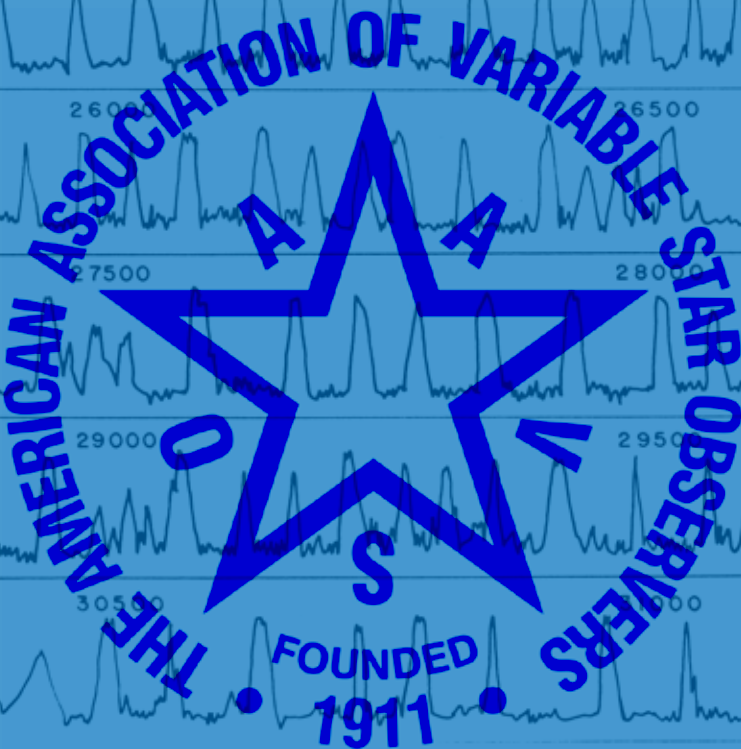


# AAVSO



## The American Association of Variable Star Observers



Annual Report  
2015–2016



# The American Association of Variable Star Observers

AAVSO

Annual Report  
2015–2016



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### ***On the cover...***

*Ken Menzies, AAVSO Merit Award recipient, with AAVSO President Kristine Larsen and Director Stella Kafka. Donn Starkey, Olcott Award recipient, with AAVSO President Kristine Larsen. Attendees at the 2016 AAVSO Spring Meeting, St. Louis, Missouri.*

### ***Picture credits***

*In addition to images from the AAVSO and its archives, the editors gratefully acknowledge the following for their image contributions: Glenn Chapple, Michael Cook, Giorgio De Scala, Shawn Dvorak, Mary Glennon, Bill Goff, Barbara Harris, Carl Knight, Mario Motta, NASA, Gary Poyner, Msgr. Ronald Royer, the Mary Lea Shane Archives of the Lick Observatory, Chris Stephan, and Wheatley, et al. 2003, MNRAS, 345, 49. Thanks to Richard Berry and Roger Kolman for the meeting photos.*

# Table of Contents

<b>1. About the AAVSO</b>	
Vision and Mission Statement	1
About the AAVSO	1
What We Do	2
What Are Variable Stars?	3
Why Observe Variable Stars?	3
The AAVSO International Database	4
Observing Variable Stars	6
Services to Astronomy	7
Education and Outreach	9
<b>2. The Year in Review</b>	
Introduction	11
Winter Council e-Meeting	11
Spring Council Meeting	12
Summer Council e-Meeting	12
Annual Council Meeting	13
The 105th AAVSO Spring Meeting, St. Louis, Missouri	14
The 105th AAVSO Annual Meeting, Burlington, Massachusetts	15
Papers Presented; Deceased Members, Observers, Colleagues; Awards	19
New Members 2016	40
Annual Report of the Director	43
AAVSO Observer Totals	52
Variable Star Observing Campaign Highlights	61
The International Variable Star Index (VSX)	69
The AAVSO Network of Remote, Robotically Controlled, and Automatically Queued Telescopes (AAVSONet)	75
The AAVSO Photometric All-Sky Survey (APASS)	77
<i>The Journal of the American Association of Variable Star Observers</i>	79
JAAVSO Editorial Staff and Editorial Board	80
Papers and abstracts published in <i>JAAVSO</i> Volume 44	81
Section Reports	89
Charts and Sequences	89
Eclipsing Binary	91
Exoplanets	93
Long Period Variable	94
Nova Search	95
Photoelectric Photometry	96
Short Period Pulsator	98
Solar	99
Young Stellar Object	101
Treasurer's Report	102
<b>3. AAVSO Officers, Staff, Volunteers, and Contract Help</b>	
Officers, Council, and Section Leaders	105
Headquarters Staff	106
Volunteers	107
<b>4. Science Summary: AAVSO in Print</b>	111
<b>5. Word from the Astronomical Community</b>	135
<b>6. Support for the AAVSO</b>	
The Argelander Society	139
Benefactors	140
Planned Giving	144
AAVSO Funds	145





# 1. About the AAVSO



*Participants in the AAVSO's 105th Annual Meeting, 2016*

## AAVSO Vision

Discovering the Universe through variable stars.

## The AAVSO's Mission

The AAVSO is an international non-profit organization of variable star observers whose mission is to enable anyone, anywhere, to participate in scientific discovery through variable star astronomy. We accomplish our mission by carrying out the following activities:

- observation and analysis of variable stars
- collecting and archiving observations for worldwide access
- forging strong collaborations between amateur and professional astronomers
- promoting scientific research, education, and public outreach using variable star data.

## About the AAVSO

The American Association of Variable Star Observers (AAVSO) is a non-profit worldwide scientific and educational organization of amateur and professional astronomers who are interested in stars that change in brightness—variable stars.

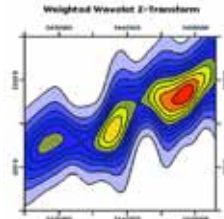
The AAVSO was founded in 1911 to coordinate variable star observations—made largely by amateur astronomers—for Harvard College Observatory. The AAVSO was incorporated in the Commonwealth of Massachusetts in 1918 as a non-profit scientific and educational organization. Today, as an independent, private research organization headquartered in Cambridge, Massachusetts, with active participants in 108 countries, and an archive of over 32 million variable star observations, it is the world's largest association of variable star observers.

## 1. About the AAVSO

Membership in the AAVSO is open to anyone—professionals, amateurs, and educators alike—interested in variable stars and in contributing to the support of valuable research. Professional astronomers have neither the time nor the telescopes needed to gather data on the brightness changes of thousands of variables, and amateurs make a real and useful contribution to science by observing variable stars and submitting their observations to the AAVSO International Database.

### What We Do

The AAVSO coordinates, evaluates, compiles, processes, publishes, and disseminates variable star observations to the astronomical community throughout the world.



Observers send their data to Headquarters, where they are checked, processed, and added to the AAVSO International Database. The AAVSO and its observers frequently provide the professional community with archival data, intensive monitoring of interesting variable stars, and target-of-opportunity event notification for coordinated observing campaigns and satellite observations.

AAVSO publications provide the astronomical community with valuable information. The type of published information is diverse, and includes *The Journal of the AAVSO*, a peer-reviewed collection of scientific papers focused on variable stars, the *Manual for Visual Observing*, now available in fifteen languages, the *AAVSO CCD Observing Manual* (five languages), the *AAVSO DSLR Observing Manual* (three languages), the quarterly *AAVSO Newsletter*, the *AAVSO Bulletin*, the *Eclipsing Binary and RR Lyrae Ephemerides*, and the *AAVSO Annual Report*.



Additionally, the AAVSO is actively involved in education and outreach. We have several programs designed to assist with disseminating information to educators and the public.

The AAVSO has an active Mentor Program that is available to any observer requesting personal instruction in observing techniques and methods.

The Speakers Bureau is a service established for people and groups looking for enthusiastic, knowledgeable speakers.

Our Presentation Library offers free POWERPOINT™ presentations on variable stars, observing techniques, and other astronomical topics.



*Variable Star Astronomy (VSA)* is a flexible set of hands-on educational materials, activities, and investigations, based on the AAVSO's unique electronic database of variable star measurements.

Members and observers have a unique opportunity to present and exchange ideas at the AAVSO meetings. The AAVSO organizes two meetings a year, one in October-November and one in April-July. The October-November meeting is the official AAVSO annual meeting that is usually held at or near the AAVSO Headquarters in Cambridge, Massachusetts. The April-July meeting is held outside of the state of Massachusetts with the intention of attracting more members and observers to attend. Everyone interested in the AAVSO and its activities is invited and encouraged to participate in these exciting events.

### What Are Variable Stars?

Variable stars are stars that change in brightness. The brightness changes of these stars can range from a thousandth of a magnitude to as much as twenty magnitudes over periods of a fraction of a second to years, depending on the type of variable star. Over 394,000 variable stars are known and catalogued, and many thousands more are suspected to be variable.



*The variable star U Geminorum in its faint state (left) and its bright state (right)*

There are a number of reasons why variable stars change their brightness. Pulsating variables, for example, swell and shrink due to internal forces. An eclipsing binary will dim when it is eclipsed by a faint companion, and then brighten when the occulting star moves out of the way. Some variable stars are actually extremely close pairs of stars, exchanging mass as one star strips the atmosphere from the other.

The different causes of light variation in variable stars provide the impetus for classifying the stars into different categories. Variable stars are classified as either intrinsic, wherein variability is caused by physical changes such as pulsation or eruption in the star or stellar system, or extrinsic, wherein variability is caused by the eclipse of one star by another, the transit of an extrasolar planet, or by the effects of stellar rotation.

### Why Observe Variable Stars?

Variable stars need to be systematically observed over decades in order to determine their long-time behavior. Professional astronomers have neither the available time nor the unlimited telescope access needed to gather data on the brightness changes of

## 1. About the AAVSO

thousands of variable stars. Thus, it is amateur astronomers utilizing visual, photographic, photoelectric, and CCD techniques who are making a real and highly useful contribution to science by observing variable stars and submitting their observations to the AAVSO International Database. These important data are needed to analyze variable star behavior, to schedule satellite observations of certain stars, to correlate data from satellite and ground-based observations, and to make computerized theoretical models of variable stars possible.

Research on variable stars is important because it provides information about stellar properties, such as mass, radius, luminosity, temperature, internal and external structure, composition, and evolution. Some of this information would be difficult or impossible to obtain any other way. In many cases, it is the nature of the variability that provides the clues to the answers. This information can then be used to understand other stars.

Variable stars continue to play a crucial role in our understanding of the universe. Cepheid variables have played a major part in determining distances to far-away galaxies and determining the age of the Universe. Mira variables give us a glimpse into the future evolution of our own star, the Sun. Accretion disks in cataclysmic variables help us to understand larger scale disk behavior, such as the activity inside active galaxies with super-massive black holes. Supernovae have led us to the surprising realization that the expansion of the Universe is accelerating. Even the search for extra-terrestrial life is illuminated by variable stars. Transiting extrasolar planets provide clues into the processes of planetary formation, and the very stuff of life as we know it comes from the hearts of stars that explode in the final stages of their evolution.

### **The AAVSO International Database**

The AAVSO International Database has over 32 million variable star observations going back over one hundred years. It is the largest and most comprehensive digital variable star database in the world. Over 1,000,000 new variable star brightness measurements are added to the database every year by over 800 observers from all over the world.

#### *Quality*

The AAVSO International Database is not only the largest but also the highest quality variable star database available to researchers. The AAVSO and its technical staff spend more time and resources on database maintenance and quality control than any other organization of its kind.

Quality control begins before the observation is even made. Extensive training materials are sent to new AAVSO observers and a large section of the AAVSO website is designed

specifically for observing techniques. We also have a thriving group of volunteers devoted to revising and developing new sequences for variable stars. The AAVSO holds two meetings per year where members come together to discuss their observing strategies, compare results, and much more. Workshops are routinely held at these meetings, bringing the best professionals in the field in contact with the observers. Since 2000, workshops have been held on CCD imaging, Eclipsing Binary star observing, GRB afterglow hunting, data mining, data analysis, and spectroscopy. The AAVSO also has an active mentoring program for new observers.

We have data entry error checks at every stage in the process. Our on-line data entry tool WebObs runs error checking routines which automatically identify the most common data entry errors. In addition, we frequently review observations using both human scrutiny and automated programs to look for misidentifications, typos, and any other errors. The best check, however, is the observers themselves who check their own submitted data by using the many tools the AAVSO makes available: Light Curve Generator, WebObs Search, and our Zapper application which lets volunteers highlight questionable observations and bring them to the attention of AAVSO staff. All revisions to the database are themselves tracked, and no observation is ever marked discrepant without thorough checking. Observations requested to be deleted by the observer or discovered to be a duplicate are removed to a separate data table but are not physically deleted.

### **Observers**

The AAVSO International Database would not exist without the dedication, tireless effort, and enthusiasm of thousands of variable star observers. Our observers come from all over the world. Over two-thirds of AAVSO observers contributing data come from outside of the United States.

Thanks to this broad network of observers we have coverage across most time zones and latitudes regardless of weather or other regional disruptions.

To make it easier for the widely-scattered AAVSO members and observers to gather together in person, the AAVSO meeting held every April-July takes place in different parts of the United States or, as often as possible, in different countries.



*Mary Glennon, AAVSO member-observer since 1999*

## 1. About the AAVSO

The AAVSO receives observations from members of other variable star observing associations around the world for inclusion in the AAVSO International Database and dissemination to the astronomical community worldwide. These observations are sent regularly by the group leader/representative or directly by the group members themselves. The AAVSO values these fruitful, mutually beneficial collaborations, and truly appreciates the ongoing efforts of everyone involved in working together for the benefit of the astronomical community.

### *Access*

Observations from the AAVSO International Database are available to anyone at anytime, a free resource for the global scientific community. For raw observations, simply fill out our online request form. For access to light curves, use our Light Curve Generator which works in all browsers (you do not need JAVA or any special plug-ins), and for really quick access to recent data, use the QuickLook utility on our website. Our online systems are instantly updated every time data are submitted to the AAVSO.

### **Observing Variable Stars**

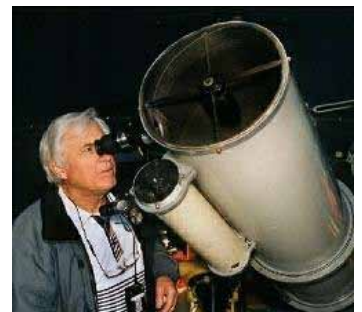
Astronomy is a unique science that cannot be studied in a typical laboratory setting here on Earth. Instead, astronomers turn their attention and telescopes to the sky in order to study their subjects. Since professional astronomers often do not have the telescope time needed to follow a particular star or group of stars, the dedication of amateur astronomers is often an invaluable means of collecting information. Nowhere is this more true than in the field of variable star astronomy. Since 1911, thousands of amateur astronomers from all over the world and from all backgrounds have contributed observations, one at a time, to make up the over 32 million data points housed in the AAVSO International Database!

Anyone can be a variable star observer. All you really need to begin observing are:

- your unaided eyes, a pair of binoculars, or a telescope
- some variable star charts to help you navigate your way through the sky
- some basic instructions
- a little patience

For those interested in observing activity on our closest star, the Sun, or a particular type of variable, such as the Eclipsing Binary or RR Lyrae type stars, or if hunting for novae, supernovae, or optical counterparts to energetic Gamma-Ray Bursts strikes your fancy, we have observing programs designed to help satisfy your appetite.

The AAVSO Mentor Program is available to all observers to assist newcomers in the methods and techniques of visual variable star observation, as well as CCD, PEP, and DSLR observation.



*Msgr. Ron Royer, AAVSO member observer since 1953*

### Services to Astronomy

The AAVSO provides a wide range of services to the astronomical community. AAVSO International Database data are disseminated extensively to astronomers around the world, upon request, and are freely available from the AAVSO website. AAVSO data and services have been used, referenced, and acknowledged in hundreds of professional astronomical publications.



*Mario Motta, M.D., former AAVSO President, and an AAVSO member-observer since 1985, at his 32-inch telescope in Gloucester, Mass.*

### Services to Astronomers

AAVSO services are sought by astronomers for the following purposes:

- real-time, up-to-date information on unusual stellar activity
- scheduling of variable star observing programs coordinating earth-based large telescopes and instruments aboard satellites
- simultaneous optical observations of program stars and immediate notification of their activity during earth-based or satellite observing programs
- correlation of AAVSO optical data with spectroscopic, photometric, and polarimetric multi-wavelength data
- collaborative statistical analysis of stellar behavior using long-term AAVSO data

Collaboration between the AAVSO and professional astronomers for real-time information or simultaneous optical observations has enabled the successful execution of hundreds of observing programs using satellites such as:

- Hubble Space Telescope
- Chandra X-Ray Observatory
- Spitzer Space Telescope
- XMM-Newton X-Ray Observatory
- Herschel Space Observatory
- Extreme Ultraviolet Explorer
- High Energy Astronomical Observatories 1 and 2
- International Ultraviolet Explorer
- Roentgen Satellite
- European X-Ray Observatory Satellite
- High Precision Parallax Collecting Satellite (HIPPARCOS)



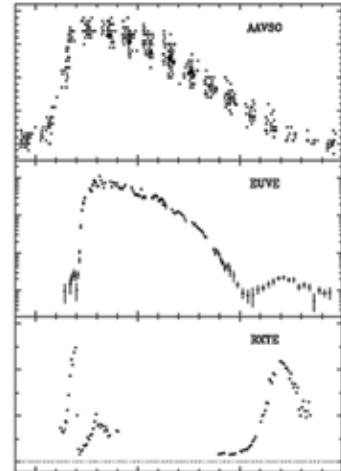
*AAVSO services have been used by researchers affiliated with such satellites as Chandra, XMM, RXTE, FUSE, HST, Spitzer, and many more*

## 1. About the AAVSO

A significant number of rare events have been observed with these satellites as a result of timely notification by the AAVSO.

In recent years, the SWIFT satellite has been sending real-time notification to ground-based observers in the AAVSO High-Energy Network to alert them of Gamma-Ray Bursts (GRBs). Several GRB optical afterglows have been detected by AAVSO observers. In this way, AAVSO observers are contributing to cutting-edge, high-energy astrophysics.

*With the outburst detected by AAVSO Observers, simultaneous AAVSO visual, EUVE, and RXTE observations of SS Cygni were triggered, providing astronomers with important information about the behavior of dwarf novae (from Wheatley et al. 2003, MNRAS, 345, 49)*

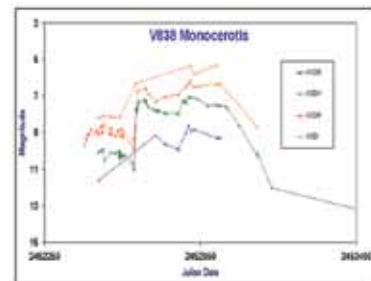


### **Services to Observers and Members**

The AAVSO enables variable star observers to contribute vitally to variable star astronomy by accepting their observations, incorporating them into the AAVSO International Database, publishing them, and making them available to research astronomers. Incorporating an observer's observations into the AAVSO archives means that future researchers will have access to those observations, so the observer is contributing to the science of the future as well as the present.

The AAVSO coordinates observing campaigns between professional and amateur astronomers, in which observations from amateur astronomers play an important role in correlating observations obtained with special instruments at earth-based observatories or aboard satellites.

On request, the AAVSO will help set up an appropriate observing program for an individual, an astronomy club, an elementary school, a high school, college, and so forth. In this way observers, students, and faculty are able to make the best use of their resources to do valuable science. The AAVSO can also assist in teaching observing techniques and in suggesting stars to be included in a program through the AAVSO Mentor Program.



## Education and Outreach

*The AAVSO believes that Education and Outreach are important to our mission:*

- to attract, train, and retain new variable star observers and members of all ages
- to increase awareness, understanding, and appreciation of variable star astronomy and variable star observing among amateur and professional astronomers, educators, students, and the general public
- to improve science education and literacy through the unique power of variable stars and variable star observing to motivate students young and old.

### *Projects, Programs, and Activities*

The AAVSO Mentor Program connects experienced observers with new observers to assist them in observing, recording, and reporting observations of variable stars to the AAVSO International Database.



*The AAVSO has much experience in hosting successful educational lectures such as the series of High-Energy Astrophysics Workshops for Amateur Astronomers*

The Speakers Bureau is a service established for people and groups looking for enthusiastic, knowledgeable speakers to provide informative presentations for astronomy clubs, star parties, banquets, Scout Troops, Astronomy Day activities, and other public and private astronomy functions.

Our Presentation Library contains POWERPOINT™ presentations on variable stars, observing techniques, and other astronomical topics. These are available free to the public to use in making your own presentations.

*Variable Star Astronomy (VSA)* is an AAVSO educational project, originally developed as *Hands-On Astrophysics (HOA)* with funds from the National Science Foundation. It is a flexible set of hands-on educational materials, activities, and investigations based on the AAVSO's unique electronic database of variable star measurements. Students will be able to experience the excitement of doing real science with real data! By carrying out all aspects of the research process, they can develop and



*Gary Poyner, AAVSO member-observer since 1991, with his 14-inch telescope*

## 1. About the AAVSO

integrate skills in science, math, computing, and other areas. VSA has been converted to a web-based format and is available via the AAVSO website (<https://www.aavso.org/education/vsa>).

VStar is the Java software that accompanies the activities for VSA. Developed by volunteer David Benn as part of the Citizen Sky project, which had funding from the National Science Foundation, to replace the HOA DOS software, multi-platform VStar has evolved into a very powerful yet easy-to-use variable star data visualization and analysis tool. Data for a star can be read from the AAVSO database, from a text file of your own creation, or from other databases via a plug-in.



*On January 28, 2010, AAVSO member-observers Barbara Harris (left) and Shawn Dvorak (right) detected a rare outburst of the recurrent nova U Scorpii, which set in motion satellite observations by the Hubble Space Telescope, Swift gamma-ray satellite, and the Spitzer Space Telescope.*



*Glenn Chaple, AAVSO member-observer since 1980*



*Bill Goff, an AAVSO observer since 1981. His telescope is a Planewave 20" CDK with an Apogee U9 camera.*



*Chris Stephan, AAVSO member-observer since 1975*





## 2. The Year in Review

### Introduction


Each year the AAVSO holds two meetings of the membership and four meetings of the Council. The Spring meeting of the Association is held outside of Massachusetts during April–June and the Annual meeting of the Association is typically held in Massachusetts during October–November. The Council meets in person prior to each membership meeting and electronically between meetings.

Spring and Annual Council meetings are attended in person by the entire Council, if at all possible. The Winter and Summer Council e-meetings are usually attended in person by Council members living near Headquarters. At all meetings, those unable to attend in person participate via internet meeting software (GoToMeeting) which allows everyone to observe who is in attendance at any moment. All votes are taken via roll call and recorded as such.

In 2016, the 105th Spring Meeting was held on May 6–7, 2016, in St. Louis, Missouri, at the Crowne Plaza, with the Spring Council meeting held there on May 5. The 105th Annual Meeting was held November 11–12 at the Burlington Marriott in Burlington, Massachusetts, with the Council meeting held there on November 10. The Winter Council e-Meeting was held on February 25, and the Summer e-Meeting was held on August 22.

### Winter Council e-Meeting

The Council met electronically via GoToMeeting on Saturday, February 25, at 6:00 p.m. EST. The council voted to adopt the minutes posted by the secretary for the Annual Meeting. Director Dr. Stella Kafka presented the FY 2016 Budget. It was a balanced budget as a result of less than a full staff. Expectations are that staff positions will be filled in the April and May time frame of 2016, with web support from an alternate solution. The APASS grant was awarded after resolving the overhead percentage issue. The late start will push the finish of this grant into 2017. The NASA/CANN proposal was refused. We did get a grant through Dr. Jenő Sokoloski for \$50,000 to develop an observing tool. Other grant sources were reported as dubious for various reasons. Council approved a motion defining and establishing the Funds for AAVSO which was requested by our



auditors. Council approved a 3% raise for staff. Council voted to accept the results of the council election, held electronically. The participation increased from 25% to 33%. President Dr. Kristine Larsen presented a formal communication policy defining the appropriate channels for staff/council communication. President Larsen adjourned the meeting at 9:08 p.m. EST.

### **Spring Council Meeting**

The Council met at the Crowne Plaza in St. Louis, Missouri, on Thursday, May 5, 2016. Along with the ordinary business items including the Secretary's and Treasurer's Reports, the agenda included a short version of the Director's Report to be given at the membership meeting on June 6 (see details below).

Director Dr. Stella Kafka gave a report on deceased members, observers, and friends: James Aldrich, Emilia P. Belserene, Ian A. Middlemist, and Mercedes T. Richards. Council stood for a moment of silence.

The Director reported that the Director's Digest to Council will continue. She also reported that we hired Kathy Spirer as the Operations Manager. She also reported on the difficulties in finding grant funding for AAVSO-AISL, FAR Dunham grants, etc., were discussed. Council nominated and approved Donn Starkey for the Olcott Award and Ken Menzies for the Merit Award. Gold and Company were approved as the auditors for 2016. Stella gave a report on AAVSONet. Gary Walker gave a report on the AAVSONet finances showing that expenses have been covered by donations for all except staff support. Council decided that AAVSONet was not a core activity, but that its popularity as a source of funding made it necessary to continue. It was decided to spin it off as a self-supporting activity. A Task Force was enabled and Stella and Kristine will choose five to seven members from the stake holders, donors, users, site managers, technical expertise, council members, and at least one member outside council. The charge was for AAVSONet to become self-sufficient by the end of FY2017.

### **Summer Council e-Meeting**

The Council met electronically on Monday, August 22, 2016, at 11 a.m. The meeting was hosted at AAVSO Headquarters by Director Dr. Stella Kafka, and Council members called in via GoToMeeting software. The Council voted to accept the minutes from the Secretary for the 105th Spring 2016 meeting held in St. Louis. Mike Simonsen reported that the annual Campaign raised \$41,000 with \$39,000 collected to date. This highlighted the need for a policy on pledged assets and gifts and how to handle them. Kevin Marvel agreed to write up such a policy.

The 2017 Budget was discussed. It was moved to approve a budget of \$910,828 (5% withdraw from Investments) for FY 2017. The revised communications policy was approved by council. Council discussed the possibility of having non-council members serve on the standing committees. It was felt that Governance and Budget should continue to be all council members, but that Investment would benefit from outside expertise within the organization.

The AAVSONet Task Force (TF) report was given by Gary Billings and Ken Menzies. It was accepted as an excellent report, but council set the TF off to eliminate the quarter-time support by the Staff Astronomer—consistent with the edict from the Director to not support AAVSONet activities with AAVSO funds. President Dr. Kristine Larsen adjourned the meeting at 2:07 pm.

### **Annual Council Meeting**

The Council met at the Burlington Marriott on Thursday, November 10, 2016. Along with the regular business items including the Secretary's Report and the Treasurer's Report, the agenda included a short Director's Report—the full details were given at the Membership Meeting.

Director Dr. Stella Kafka reported on deceased members, observers, and friends for the year: James Aldrich, Emilia Belserene, Geoff Gaherty Jr., Robert Manske, Ian A. Middlemist, Seiji Tsuji, and Mercedes T. Richards. Council stood for a moment of silence.

The Director's Annual Report to Council included details regarding current membership, observation totals for the AAVSO International Database, updates on AAVSONet assets and their deployment, a Development report, status of Bright Star Monitor (BSM) projects, current APASS and 2nd Generation Synoptic Survey (2GSS) progress, outcomes from recent collaborations, future travel plans, and many other projects.

The AAVSONet TF gave its final report. By using Dropbox, along with some custom software, it was believed that all the functions of AAVSONet could be self-contained and not require HQ support. Dick Post was appointed as the single point of contact with the Director for AAVSONet matters. A synopsis of the discussions on AAVSONet was that the systems were going to be capped at six Bright Star Monitors and three Large Telescopes. Effort was to focus on new reliable mounts, updating parts that are not reliable, and running the net with volunteers.

Council reviewed the mission and charge for the Fundraising Committee to ensure fundraising is undertaken in a strategic way, consistent with the mission and the purpose

## 2. The Year in Review

of the AAVSO. Council reviewed a policy on non-council members serving on standing committees. The policy will allow some non-council members to serve.

Council held elections for 2017. Dr. Kristine Larsen was elected President, Dr. Roger S. Kolman was elected First Vice President, Dr. Kevin Marvel was elected Second Vice President, William Goff was elected Treasurer, and Gary Walker was elected Secretary. Elizabeth Waagen was appointed resident agent.

### 105th AAVSO Spring Membership Meeting

The Spring Membership meeting was opened by President Dr. Kristine Larsen on Saturday, May 7, 2016, at 9:00 a.m. Director Dr. Stella Kafka greeted the membership. Gary Walker gave the Secretary's Report and Bill Goff gave the Treasurer's Report. He reported receipts of \$572,000 and disbursements of \$452,000. He reported that our Investment funds were at \$12.2 million. Half is managed by TIFF—a non-profit who have \$11 billion under investment. The other half is with Greystone-Morgan Stanley, who have \$200 billion under investment.

Stella gave her Director's Report. She noted that James Aldrich, Emilia P. Belserene, Ian A. Middlemist, and Mercedes T. Richards were friends and members who we lost this year. The membership stood for a moment of silence.

Stella reiterated that the AAVSO is an international organization whose mission is to enable anyone, anywhere to participate in the scientific discovery through variable star astronomy. Stella introduced the members of the Council. They stood for a moment of recognition.



*Attendees at the 2016 AAVSO Spring Meeting*

Stella reported a membership of 1,000. Among observers, visual observers are 66%, while CCD are 27% and the other 7% DSLR, PEP, and Photovisual. She noted that 32% are from the USA, 23% from the UK, 9% from Spain, and 60 other countries are represented. Interestingly enough, only 10% of the webpage downloads are from the USA. Japan and the UK also had 10% each, while 70% of downloads were from other countries. It was reported that 30,665,437 data points were in the AID.

Stella reported that twelve *AAVSO Alert Notices* and ten *AAVSO Special Notices* related to observing campaigns and novae were issued, and 170 papers in 2016 with AAVSO data reported, while the number in 2015 was much less.

Awards were then made. 25-year membership pins were presented to Wayne Clarke, Horace Smith, and Lee Anne Willson, all of whom have been members for well over 25 years. AAVSO Variable Star Observer Awards were announced and the following observer awards were made to those observers present: Kristine Larsen 100 visual observations, Mark Harris 1000 visual, David Turner 1,000 visual, David Turner 1,000 photovisual, Bob Manske 1,000 DSLR (registered for meeting but did not attend due to illness), Marco Ciocca 1,000 CCD, David Cowell 1,000 CCD, William Pellerin 1,000 CCD, Horace Smith 1,000 CCD, Gary Walker 50,000 CCD, Richard Sabo 200,000 CCD. Kristine Larsen and Richard Glassner were recognized for accomplishing Kristine's presidential challenge to the membership to complete the Astronomical League's Binocular Variable Star Observing program; this AL challenge is still in effect. Stella closed the meeting at 10:23 a.m.

Paper sessions and talks from this AAVSO meeting (which was themed Pulsating Stars), including Dr. Horace Smith's keynote address on "Learning from Pulsating Stars: Progress over the Last Century," having been held and given before and after the Membership Meeting in accordance with the schedule for the meeting, the Banquet was the last main event of the meeting. After dinner the winners of the silent auction were announced and raffle prize winners were drawn, and the meeting was adjourned.

### **105th AAVSO Annual Membership Meeting**

The Membership Meeting was held Saturday, November 12, 2016, at the Marriott Hotel, Burlington, Mass. The meeting was called to order by President Dr. Kristine Larsen at 9:00 a.m. Secretary Gary Walker read the minutes from the last meeting. Bill Goff gave the Treasurer's Report. We expect a withdraw of \$624,000 from investments. The total receipts were \$914,000. Disbursements were: staff \$745,000; building and utilities \$31,000; general operations \$42,000; Technical operations \$20,000; miscellaneous \$72,000, for a total disbursement of \$918,000. Donations from 2015–2016 were: Annual Campaign \$55,000; AAVSONet \$29,000; Building Fund \$500; Solar Fund \$1,950; Scholarship Fund \$4,200; Mattei Fellow Fund \$2,300; Mayall Assistantship \$12,000. Our investments are with two investment advisors. TIFF, which serves non-profits only and has a total of \$6 billion under management and twenty analysts on staff, is managing \$6.4 million of our assets. Greystone, which also only serves non-profits only, has a total of \$200 billion under investment and buys all instruments, both stocks and funds;

## 2. The Year in Review



*Attendees at the 2016 AAVSO Annual Meeting*

they are managing \$6.4 million of our assets. We have been taking 5% of the five-year backward average from the investments.

Director Dr. Stella Kafka mentioned the members and friends who left us this year: James F. Aldrich, Emilia P. Belserene, Geoff Gaherty Jr., Robert P. Manske, Ian A. Middlemist, Mercedes T. Richards, and Seiji Tsuji. We stood for a moment of silence.

Stella introduced the staff and thanked them for their efforts. Her director's report included the following main points: Members for the last eight years; 1,059, 1,147, 1,156, 1,082, 1,244, 1,072, 1,325, and 1,059. Of current members, 65% were from US, and 56 countries were represented. We had 1,231 observers, representing 54 countries. Contributions to the AID were 65% visual, 27% CCD, 6% DSLR, and 2% PEP and Photovisual. 34% of the observers were from the USA, while the UK, Spain, France, Canada, Germany, and Hungary were also significant contributors. The USA made only 11% of the web page downloads. We currently have 400,000 variable astronomical objects in the International Variable Star Index (VSX). 25 *AAVSO Alert Notices* and 15 *AAVSO Special Notices*, all related to observing campaigns and/or novae, were published this year. 200 papers with AAVSO data were published in 2016. Stella worked with Astronomers Without Borders, and the Astronomical League. Future AAVSO meetings include the 106th Spring meeting with the Society for Astronomical Sciences (SAS) June 15–17, 2017, in Ontario, California, and the 106th Annual meeting November 2–4, 2017, at Vanderbilt University, Nashville, Tennessee.

Kristine reported that Drs. Jenó Sokolsoski, Barbara Harris, Joe Patterson, and Aaron Price have finished their terms on Council, and thanked them for their service. She announced the Council election results: elected to two-year terms were Richard Berry, Tom Calderwood, Dr. Michael Joner, Dr. Katrien Kolenberg, and Dr. Gregory Sivakoff, and to a one-year term, Dr. Richard Post.

We held an awards ceremony in which Stella recognized: AAVSO staff member Sebastián Otero for five years of service; Variable Star Observer Awards for Visual, CCD, PEP, DSLR observations; Solar Observer Awards for Sunspot Observations and for SIDs; and Data Digitizer Awards. A one-time recognition was made for participants of the AAVSO Nova Search program (discontinued in 2010)—100 volunteers were acknowledged, with certificates where possible, for their contribution of 113,841 nova-search observations. A one-time recognition with certificates was also made for the 22 volunteers who digitized the more than 108,000 Eggen data cards. Stella also presented AAVSO Special Awards to Exoplanet Section head Dennis Conti for his leadership in developing the section and related training materials, to Francis Hemsher for his development of the new AAVSO Light Curve Generator, to George Silvis for his leadership of the Eggen Cards project and the design/development of the database and related tools, and to Patrick Wils for his contributions to AAVSO infrastructure and technical needs through his work on VSX and his development of APIs for AAVSO software. Stella also acknowledged 25-year to 50-year members David Levy (50 years), Jay Miller (49), Doug Welch (42), Ed Los (36), Ray Berg (32), Jack Davis (32), and Paula Szkody (25).

We held a Panel Discussion (videotaped and available on the AAVSO website) on the Role of the AAVSO in the Era of Multi-wavelength, All-sky Photometric Surveys (the theme of the meeting). The discussion was led by Drs. Meredith Rawls, Octavi Fors, David Ciardi, Ryan Oelkers, Joey Rodriguez, and Alessandro Ederoclite. We identified the need for two-way communication during campaigns with liberal feedback—KELT may be a good model. AAVSO is not going to be out of a job because of the parameter space—brightness, SNR, sky coverage, cadence, and filters. These surveys do not eliminate opportunities for the AAVSO observers, in fact, quite to the contrary, it is believed that the opportunities will be enhanced in the future. The model is that the surveys find candidates, and extensive ground-based follow-up characterizes them. The question of what can we do to prepare for the onslaught was asked. David suggested multi-filter observations as an expansion. TESS fields will be up and can be observed at the same time as the TESS spacecraft observes. The professionals' advice to our member observers: get specialized, define your science, choose asteroids, CVs, multi-filter photometry, become citizen astronomers, learn spectroscopy, suggest using a z' filter for exoplanets. David suggested acquiring the Sloan u'g'r'i'z' filters because Sloan is coming; the Sloan band passes were chosen to separate quasars from non-quasars. He also suggested not using RGB "pretty

## 2. The Year in Review

pictures" filters for photometry. Very active and productive dialogue between the panel members and audience members present and online made for an excellent discussion.

The membership meeting was adjourned at 12:00 noon by President Kristine Larsen.

Paper sessions and talks having been held and given before and after the Membership Meeting in accordance with the schedule for the meeting, Saturday evening's Banquet was the final event of the meeting. Before dinner was served, the now-traditional Trivia Contest (teams by table) was held, with questions taken from the panel discussion. The 47th AAVSO Merit Award was presented to Kenneth T. Menzies, and the 13th AAVSO William Tyler Olcott Distinguished Service Award was presented to Donn R. Starkey. Both recipients were heartily congratulated by everyone. A delicious buffet dinner was enjoyed along with good conversation. Following dinner the winners of the silent auction were announced and raffle prize winners were drawn, after which President Larsen adjourned the meeting.



### **Papers Presented; Deceased Members, Observers, Colleagues; Awards**

*Papers and Posters Presented at the 105th Spring Meeting of the AAVSO, Held in St. Louis, Missouri, May 5–7, 2016*

*Paper Session: "Pulsating Variable Stars I"*

"Miras, Mass Loss, and the Ultimate Fate of the Earth"  
Invited Talk: Lee Anne Willson

"Discovery of a  $\delta$  Scuti Variable Star in the Field of a Suspected Planetary Transit Candidate"  
Michael Joner

*Paper Session: "Pulsating Variable Stars II"*

"A Detailed Survey of Pulsating Variables in Five Globular Clusters"  
Brian W. Murphy

"Establishing a CCD Light Curve for BW Vul"  
David Cowall

"Studying RR Lyrae Stars with Kepler/K2"  
Charles Kuehn

*Paper Session: "Pulsating Variable Stars III"*

"Unsolved Problems for Main-Sequence Variable Stars Revealed by the NASA Kepler Data"  
Joyce Guzik

"Type C Semiregulars and Irregulars: the Forgotten Pulsating Luminous Stars"  
David G. Turner

"Identification of ASAS Ellipsoidal Variables Misclassified as Miscellaneous in VSX" (poster)  
Kristine Larsen, Corwin Hoover

"Utilizing the AAVSO's Variable Star Index (VSX) in Undergraduate Research Projects" (poster)  
Kristine Larsen

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## 2. The Year in Review

*papers and posters, cont.*

“RR Lyrae in Sagittarius Dwarf Globular Clusters” (poster)

Barton J. Pritzl, Thomas J. Gehrman; Elyn Bell; Ricardo Salinas; Horace A. Smith; Maircio Catelan

“A Photometric Study of Three Eclipsing Binary Stars” (poster)

Austin Ryan

“First Look at Photometric Reduction via Mixed-Model Regression” (poster)

Eric Dose

### ***Paper Session: “Pulsating Variable Stars IV”***

“Studying Variable Stars with Undergraduate Students at the University of Nebraska Kearney”

William Lee Powell Jr.

“Photometry and Spectroscopy of V2455 Cygni”

Michael D. Joner

“Exoplanets and Multiverses”

Invited Talk: Virginia Trimble

### ***General Paper Session I***

“St. Louis Astronomical Society (SLAS) Library Telescope Program”

James Small

“Three New Z Cam Stars”

Mike Simonsen

### ***General Paper Session II***

“Converting Differential Photometry results to the Standard System using Transform Generator and Transform Applier”

Marco Ciocca

“V571 Lyr is a Multiple System”

Gary Billings

“The mystery of V523 Lyrae”

Mike Simonsen

### *Deceased Members, Observers, Colleagues, and Friends*

#### *Members and Observers*

Aldrich, James F.                      Walnut Grove, Missouri

#### *Colleagues and Friends*

Belserene, Emilia Pisano              Port Angeles, Washington  
Middlemist, Ian Alastair              Stockport, Cheshire, England  
Richards, Mercedes T.                Kingston, Jamaica

## 2. The Year in Review

### *AAVSO Observer Awards* (presented or announced at the *105th Spring Meeting, St. Louis, Missouri, May 5–7, 2016*)

<i>Award/recipient</i>	<i>Affiliation**</i>	<i>Country</i>	<i>Interval</i>	<i>Total</i>
<b>Over 225,000 Visual Observations*</b>				
Gary Poyner	20	England	1991–2015	244,417
Rod Stubbings	14	Australia	1997–2015	233,756
<b>Over 100,000 Visual Observations*</b>				
Frank Vohla	02	Germany	1990–2015	104,811
Hiroshi Matsuyama		Japan	1978–2015	103,709
<b>Over 50,000 Visual Observations*</b>				
Andrew Pearce		Australia	1990–2015	58,208
Alan Plummer	29	Australia	2001–2015	51,828
<b>Over 25,000 Visual Observations*</b>				
Alexandre Amorim	36	Brazil	2000–2015	26,492
Joerg Neumann	02	Germany	1993–2015	25,960
Dieter Suessmann	02	Germany	1973–2015	25,188
<b>Over 10,000 Visual Observations*</b>				
Colin Henshaw	20	England	1969–2015	12,158
Guus Gilein	04	Netherlands	1998–2015	10,469
Chretien Otten	05	Belgium	1993–2015	10,242
Sandor Keszthelyi	03	Hungary	1977–2015	10,180
Kerstin Raetz	02	Germany	1991–2015	10,160
<b>Over 5,000 Visual Observations*</b>				
Chris P. Maloney		USA	2012–2015	6,928
Bogdan Kubiak		Poland	2009–2015	5,611
Gustav Holmberg	19	Sweden	2013–2015	5,498
Gary M. Ross		USA	1966–2015	5,197
Adrian Kovacs	03	Slovakia	2002–2015	5,149
Salvador Aguirre		Mexico	2006–2015	5,096
Dietmar Augart	02	Germany	2002–2015	5,092

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*Observer Awards, cont.*

<i>Award/recipient</i>	<i>Affiliation**</i>	<i>Country</i>	<i>Interval</i>	<i>Total</i>
<b>Over 1,000 Visual Observations*</b>				
Xavier Domingo Martínez	15	Spain	2015–2015	3,870
Patrick Grocaut		France	2015–2015	1,939
Charles Calia		USA	2006–2015	1,604
Jordi Marco		Spain	2014–2015	1,273
Marek Muciek		Poland	2001–2015	1,245
David G. Turner		Canada	2005–2015	1,149
Costantino Sigismondi		Italy	2000–2015	1,111
Akos Nagy–Melikuti	03	Hungary	1980–2015	1,069
Laszlo Juhasz	03	Hungary	2011–2015	1,068
Willian C. De Souza	13	Brazil	2000–2015	1,040
Mark S. Harris		USA	2005–2015	1,103
Bohdana Zhuravlova		Ukraine	2015–2015	1,000
<b>Over 100 Visual Observations*</b>				
Lewis P. Cason		USA	1998–2015	981
Varvara Prodanets		Ukraine	2014–2015	940
Yana Pavlenko		Ukraine	2015–2015	939
Bodo Wichert		Germany	2015–2015	626
Dennis Merrill		USA	2010–2015	616
Mauro Rana		USA	2015–2015	539
Nikolai Buchholz		Germany	2015–2015	463
Elena Gryshchenko		Ukraine	2015–2015	454
Igor Yatsenkov		Russia	2014–2015	411
Egor Maleev		Ukraine	2014–2015	382
Mikhail Moiseenko		Ukraine	2015–2015	380
Tibor Lacko	03	Hungary	2013–2015	349
Ruslan Velikazov		Ukraine	2015–2015	340
Bartosz Salwiczek		Poland	2014–2015	299
David W. Majors		USA	2009–2015	275
Maria Zabaluy		Ukraine	2015–2015	262
Lucas Brooks		USA	2014–2015	248
Robert D. Rea	14	New Zealand	2007–2015	246
Alexander Toth		Hungary	1974–2015	213
Kim Hay	27	Canada	2001–2015	196
Ross C. Mattingly	14	Australia	1966–2015	183

*continued on next page*

## 2. The Year in Review

### Observer Awards, cont.

<i>Award/recipient</i>	<i>Affiliation**</i>	<i>Country</i>	<i>Interval</i>	<i>Total</i>
Heinz Kerner		Germany	2015–2015	181
Colin McKenzie		Canada	2014–2015	163
Michael W. Prokosch		USA	2009–2015	161
Peter G. Spital		England	2015–2015	151
Charles G. Taylor	20	Scotland	2014–2015	149
Maurizio Barlazzi		Italy	2014–2015	143
Luigi Pirozzi		Italy	2001–2015	135
Richard Miles	20	England	2004–2015	129
James D. Sykes		USA	2010–2015	123
Mick J. Crook		England	2005–2015	117
Damian Jakubek		Poland	2011–2015	115
Pierre Reiss		France	2013–2015	114
Elizabeth Robinson		England	2009–2015	105
Yile Qiu		China	2013–2015	104
Volodymyr Kucharchuk	09	Ukraine	2000–2015	103
Jorge Rallo		Spain	2014–2015	103
Kristine M. Larsen		USA	1996–2015	100
Over 1.4 Million CCD Observations*				
Franz–Josef Hambsch	05	Belgium	2002–2015	1,431,797
Over 500,000 CCD Observations*				
Shawn Dvorak		USA	1981–2015	530,943
Over 300,000 CCD Observations*				
Teofilo Arranz		Spain	2005–2015	333,305
James L. Jones		USA	2003–2015	301,638
Over 200,000 CCD Observations*				
David Boyd	20	England	2003–2015	249,406
Richard Sabo		USA	2006–2015	227,478
William L. Stein		USA	2008–2015	214,348
David Cejudo Fernandez		Spain	2010–201	202,398

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*Observer Awards, cont.*

<i>Award/recipient</i>	<i>Affiliation**</i>	<i>Country</i>	<i>Interval</i>	<i>Total</i>
<b>Over 100,000 CCD Observations*</b>				
Dieter Husar	02	Germany	1998–2015	119,015
Gordon Myers		USA	2007–2015	110,606
<b>Over 50,000 CCD Observations*</b>				
Maarten Vanleenhove	05	Belgium	2014–2015	68,109
Gary Walker		USA	1994–2015	64,592
James A. Boardman		USA	2012–2015	51,852
Michael Heald		USA	2001–2015	50,297
<b>Over 10,000 CCD Observations*</b>				
Rolf Carstens	14	New Zealand	2011–2015	35,387
Douglas E. Barrett		France	2007–2015	23,570
Paul Benni		USA	2014–2015	13,408
Donald F. Collins		USA	2006–2015	13,114
John J. Ott		USA	1998–2015	11,774
Thomas Wikander	19	Sweden	2012–2015	11,080
<b>Over 1,000 CCD Observations*</b>				
Tamas Tordai	03	Hungary	1986–2015	9,283
Franky Dubois	05	Belgium	2014–2015	8,621
Joseph W. Moody		USA	2015–2015	6,257
Stephen M. Brincat		Malta	1984–2015	4,815
Horace A. Smith		USA	1968–2015	4,656
David E. Cowall		USA	1993–2015	4,097
Otmar Nickel	02	Germany	2004–2015	3,677
Enrique de Miguel		Spain	2011–2015	3,551
Seiji Tsuji		Japan	1990–2015	3,299
Michael W. Richmond		USA	2009–2015	3,171
Francisco Campos		Spain	2013–2015	3,020
Nikolay Mishevskiy		Ukraine	2015–2015	2,713
Nick Quinn	20	England	2003–2015	2,488
Marco Ciocca		USA	2011–2015	2,377
William D. Pellerin		USA	1998–2015	2,161

*continued on next page*

## 2. The Year in Review

### Observer Awards, cont.

Award/recipient	Affiliation**	Country	Interval	Total
Arie Verveer		Australia	2015–2015	1,889
Richard B. Potter		USA	2004–2015	1,676
David Romeuf		France	2015–2015	1,649
Robert C. Weir		USA	2014–2015	1,594
Florian Signoret		France	2015–2015	1,460
Tiziano Colombo		Italy	2010–2015	1,331
Faustino de la Cuesta Garcia	06	Spain	2013–2015	1,125
Steve E. Girard		USA	2011–2015	1,104
Damien Lemay	27	Canada	1973–2015	1,072
Tadeusz Smela		Poland	2014–2015	1,027
Jason S. Kendall		USA	2012–2015	1,001
Over 1,000 PEP Observations*				
Glenn M. Thurman		USA	2014–2015	2,099
Over 100 PEP Observations*				
James M. Kay		USA	2013–2015	166
Over 1,000 PTG/PV Observations*				
David G. Turner		Canada	2005–2015	1,648
Over 500 PTG/PV Observations*				
Wayne Osborn		USA	1979–2015	612
Over 100 PTG/PV Observations*				
Jean-Louis Penninckx		France	2015–2015	133
Over 1,000 DSLR Observations*				
Bob Manske		USA	1987–2015	7,472
Steven Sharpe		Canada	1973–2015	1,967
Giuseppe Frustaci	18	Italy	2014–2015	1,745
Penko G. Jordanov		Bulgaria	2009–2015	1,688
Over 500 DSLR Observations*				
Alberto Tieppo		Italy	2015–2015	956
Roger Pieri		France	2010–2015	584

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*Observer Awards, cont.*

<i>Award/recipient</i>	<i>Affiliation**</i>	<i>Country</i>	<i>Interval</i>	<i>Total</i>
Richard Biernikowicz		Poland	2013–2015	565
Erik Wischnewski	02	Germany	2014–2015	547
<b>Over 100 DSLR Observations*</b>				
Ronald L. Fournier		USA	1995–2015	404
Aniruddh N. Deshpande		India	2013–2015	348
Jyrki T. J. Porio	17	Finland	2015–2015	265
Jean–Louis Penninckx		France	2015–2015	255
Des Loughney	20	Scotland	2005–2015	238
Sandor Hadhazi	03	Hungary	1983–2015	219
Martin Sblewski		Germany	2015–2015	149
Dietmar Boehme	02	Germany	1972–2015	132
Maurizio Barlazzi		Italy	2014–2015	121
Jesús Manjón		Spain	2015–2015	112
<b>Over 100 Visual Observations FROM Digital Image Observations*</b>				
Ivan Sergej		Belarus	2003–2015	315
Philip Steffey		USA	1974–2015	144
Richard L. Tyson		USA	1972–2015	122

\* Years include total AAVSO observing interval (not only PEP/CCD observing). Total includes only visual or PEP/CCD observations, depending on award.

A number preceding a name indicates observer is also affiliated with the group below:

- 02 Bundesdeutsche Arbeitsgemeinschaft für Veränderliche Sterne e.V.(Germany)
- 03 Magyar Csillagászati Egyesület, Valtozócsillag Szakcsoport (Hungary)
- 04 Koninklijke Nederlandse Vereniging Voor Weer–en Sterrenkunde, Werkgroep Veranderlijke Sterren (Netherlands)
- 05 Vereniging Voor Sterrenkunde, Werkgroep Veranderlijke Sterren (Belgium)
- 06 Madrid Astronomical Association M1 (Spain)
- 09 Ukraine Astronomical Group, Variable Star Section
- 13 Rede de Astronomia Observacional (Brazil)
- 14 Royal Astronomical Society of New Zealand, Variable Star Section
- 15 Agrupacion Astronomica de Sabadell (Spain)
- 17 URSA Astronomical Association, Variable Star Section (Finland)

*continued on next page*

## 2. The Year in Review

### *Observer Awards, cont.*

- 18 Unione Astrofili Italiani (Italy)
- 19 Svensk Amator Astronomisk Forening, variabelsektionen (Sweden)
- 20 British Astronomical Association, Variable Star Section
- 27 Royal Astronomical Society of Canada
- 29 Variable Stars South
- 36 Nucleo de Estudo e Observacao Astronomica—Jose Brazilicio de Souza (Florianopolis, Brazil)

### *Papers Presented at the 105th Annual Meeting of the AAVSO, Held in Burlington, Massachusetts, November 10–12, 2016*

#### *Paper Session 1*

“The Crucial Role of Amateur-Professional Networks in the Golden Age of Large Surveys”  
Keynote Speaker: Joey Rodriguez

“The Transiting Exoplanet Survey Satellite”  
Ryan J. Oelkers

“Photometric Surveys (and Variability Studies) at the Observatorio Astrofísico de Javalambre”  
Alessandro Ederoclite

#### *Paper Session 2*

“The Role of Small Telescopes in the Upcoming Era of the Giant Magellan Telescope and Other Extremely Large Telescopes”  
Charles Alcock

“Big Software for Big Data: Scaling Up Photometry for LSST”  
Meredith Rawls

“The Galactic Plane Exoplanet Survey (GPX) Amateur Designed Transiting Exoplanet Wide-Field Search”  
Paul Benni

“The AAVSO Photometric All-Sky Survey (APASS) at Data Release 10”  
Steve Levine

“SidDataGrabber Training Workshop”  
George Silvis

#### *Paper Session 3*

“Kepler and K2: Spawning a Revolution in Astrophysics from Exoplanets to Supernovae”  
Keynote Speaker: David R. Ciardi

*continued on next page*

## 2. The Year in Review

*papers and posters, cont.*

“Exploration of the Time Domain”

George Djorgovski

“Clear sky forecasting for variable star observers”

Frank Dempsey

### ***Paper Session 4***

“Cepheids and Miras: recent results and prospects for the era of large surveys”

Lucas Macri

“Gravitational Radiation in ES Ceti”

Joseph Patterson

“Observing the low states of VY Scl stars”

Linda Schmidtbereich

“Advances in Exoplanet Observing by Amateur Astronomers”

Dennis Conti

“The Impact of Large Optical Surveys on Stellar Astronomy and Variable Star Research”

Zeljko Ivezik

“Engaging AAVSO members in Stellar Astrophysics follow-up from The Evryscope data”

Octavi Fors

Panel Discussion: “Role of the AAVSO in the Era of Multi-wavelength, All-sky Photometric Surveys”

Panelists: Meredith Rawls, Octavi Fors, David R. Ciardi, Ryan J. Oelkers,

Joey Rodriguez, Alessandro Ederoclite

### ***Paper Session 5***

“Using AAVSO Tools to Calibrate Secondary Standard Stars”

Mike Joner

“Using the SSP-4 Photometer to Collect Solar Infrared Data for the J and H bands”

Rodney Howe

*continued on next page*

*papers and posters, cont.*

"Variations in the Orbital Light Curve of the Magnetic Cataclysmic Variable Star QQ Vulpeculae"

Sanaea Cooper Rose

### *Paper Session 6*

"Coast-to-Coast Photometry: A Study in Consistency"

Tom Calderwood, Jim Kay

### *Deceased Members, Observers, Colleagues, and Friends*

#### *Members and Observers*

Geoff, Gaherty	Montreal, Canada
Manske, Robert P.	Waunakee, Wisconsin

#### *Colleagues and Friends*

Hillier, John A.	Lexington, Massachusetts
Tsuji, Seiji	Sanda-Shi, Hyogo, Japan

## 2. The Year in Review

### *AAVSO Merit Award Recipient (presented at the 105th Annual Meeting in Burlington, Massachusetts, November 12, 2016)*

**Kenneth T. Menzies** was awarded the 47th AAVSO Merit Award for "his devoted service to the AAVSO as a meticulous and prolific observer, contributing more than 250,000 CCD observations; his outstanding commitment to improving the quality of all AAVSO data through mentoring new observers; his financial and intellectual contributions to the VPHOT Software team; and his thoughtful instruction of multiple VPHOT CHOICE courses. Kenneth has been an active member of the TG/TA Transformation team and the AAVSONet Task Force, a volunteer image inspector in AAVSONet, and a patient, thoughtful and ever-present resource on many forums, especially the VPHOT forum."



*Ken Menzies, AAVSO Merit Award recipient, with AAVSO President Kristine Larsen and Director Stella Kafka*

### *AAVSO William Tyler Olcott Award Recipient (presented at the 105th Annual Meeting in Burlington, Massachusetts, November 12, 2016)*

**Donn R. Starkey** received the William Tyler Olcott Distinguished Service Award "...for his enthusiastic commitment to educating and mentoring both the current and next generation of variable star observers, and assuring the future success of the AAVSO through his forward-thinking service on Council, lending his considerable business acumen to the Investment and Budget Committees, and serving as a tireless advocate for the observation of variable stars."



*Donn Starkey, Olcott Award recipient, with AAVSO President Kristine Larsen*

*AAVSO Solar Observer Awards (presented and announced at the 104th Annual Meeting in Woburn, Massachusetts, November 14, 2015)*

***Sunspot Observers***

***100 observations***

Juan Antonio Moreno Quesada  
Piotr Skorupski

***500 observations***

Ioannis Chouinavas

***1,000 observations***

Alexandre Amorim  
Raffaello Braga

John McCammon

***1,500 observations***

Salvador Aguirre  
Rodney Howe  
Larry Krozel

Jan Alvestad  
Brian Gordon-States

***2,000 observations***

Javier Alonso  
Susan Oatney

***3,000 observations***

Monty Leventhal

***4,000 observations***

Franky Dubois  
Kenichi Fujimori

James and Shirley Knight  
William M. Wilson

***4,500 observations***

Robert Brown  
Brian Cudnik

David Teske

*continued on next page*

## 2. The Year in Review

*Solar Observer Awards, cont.*

### ***Sunspot Observers***

***5,500 observations***

German Morales Chavez

### ***SID Reports***

Jean-Pierre Godet

Lionel Loudet

Alexander McWilliams

Susan Oatney

Ralph Rogge

Igor Ryumshin

George Silvis

Robert Terrill

Jon Wallace

***AAVSO Membership Awards (announced at the 104th Annual Meeting in Woburn, Massachusetts, November 14, 2015)***

### ***50 Years or more***

John Bortle

David Levy

New York

Arizona

### ***25 Years or more***

Ray Berg

Jack Davis

Edward J. Los

Jay H. Miller

Paula Szkody

Doug Welch

Indiana

Maryland

New Hampshire

Maryland

Washington

Canada



### *AAVSO Special Recognition Awards (announced and presented at the 105th Annual Meeting in Burlington, Massachusetts, November 12, 2016)*

Special recognition awards were made to:

**Dennis Conti** "...for his invaluable volunteer work in developing the AAVSO Exoplanet Observing Section and Database and providing to the amateur observing community the means of acquiring the necessary exoplanet transit observing skills."

**Francis Hemsher** "...for his invaluable volunteer contribution to the AAVSO and to the astronomical community through his designing and developing the new AAVSO Light Curve Generator, an essential resource that will be used by countless variable star observers and researchers."

**George A. Silvis** "...for his extremely valuable volunteer contribution through his development and refinement of the Eggen Card Database, user interface, and procedures for interpreting and recording the contents of the cards, and his oversight of the project, enabling the classification of the nearly 110,000 observation cards of variable star astronomer Olin J. Eggen."

**Patrick Wils** "...for his ongoing and invaluable volunteer contributions to the infrastructure and technical needs of the AAVSO through his work on the International Variable Star Index and his development of numerous Application Programming Interfaces for AAVSO software."

### *AAVSO Digitizer Awards (presented and announced at the 105th Annual Meeting in Burlington, Massachusetts, November 12, 2016)*

Bruno Billiaert	20,000 historical variable star observations
Terry Moon	10,000 historical variable star observations
Stuart Morris	5,000 historical variable star and sunspot observations

## 2. The Year in Review

*Eggen Card Project Volunteers (presented and announced at the 105th Annual Meeting in Burlington, Massachusetts, November 12, 2016)*

<i>Name</i>	<i>Location</i>	<i>Cards Processed</i>
Carlos Adib	Brazil	40
Wendy H. Bauer	Massachusetts	783
Michael J. Cook	Canada	1
Jack H. Crast	New York	18,960
Mark S. de Jong	Canada	1,183
Duane A. Dedrickson	Oregon	6,754
Michael Geldorp	Canada	319
Richard Glassner	Missouri	48
David Jackson	Ohio	99
James M. Kay	Vermont	90
Kristine M. Larsen	Connecticut	2
Ranald McIntosh	New Zealand	260
Bob Neuman	Vermont	96
John Ritzel	New York	37,013
Jeff W. Robertson	Arkansas	327
Michael Saladyga	Massachusetts	5,275
Edward Schmidt	Nebraska	3,436
George A. Silvis	Massachusetts	22,852
Elizabeth O. Waagen	Massachusetts	1,679
Glen Ward	West Virginia	1,337
Doug Welch	Canada	606
Paul F. York	Australia	782

**AAVSO Nova Search Participants (presented and announced at the 105th Annual Meeting in Burlington, Massachusetts, November 12, 2016)**

**AAVSO Nova Search Participants 1972–2010**

*\*receiving certificate; ^deceased; no symbol, no contact information available*

Andrew Barrett	Australia	926
*Kenneth C. Beckmann	Missouri	21810
Alan J. Birkner	Illinois	6
*Carmine V. Borzelli	New Jersey	18121
*David Branchett	Florida	181
Tristan Brelstaff	England	500
Nick Brown	Australia	96
*Robert Browning	New Jersey	894
Robert Buss	North Dakota	56
Roger Callus	Netherlands	32
Joseph Caruso	New York	24
*Jose Castano	Spain	2
John Coggins	England	10912
Scott Coltrain	Iowa	7
Andy Corkill	??	38
Daniel Costanzo	Virginia	511
*Michael Crook	United Kingdom	20
C. Csiszar	Hungary	62
Istvan Csoti	Hungary	5
James D. Currie	Ohio	114
Greg Davidson	Kansas	2
*Daniel Del Valle	Puerto Rico	1089
^DeLorne Diedrich	Ohio	31
^George Diedrich	Ohio	48
*William G. Dillon	Texas	215
*Manfred Dürkfälden	Germany	12310
Aaron Evans	??	2
*Steven Fanutti	Canada	23
Frank Farr	Australia	43
Alan M. Ference	Pennsylvania	21
*Robert Fidrich	Hungary	444
C. J. Fisher	United Kingdom	3

*continued on next page*

## 2. The Year in Review

### *Nova Search Participants, cont.*

L. Folden	??	4
*Ferenc Foldesi	Hungary	4
D. Fraser	Australia	167
*Peter Garnavich	Maryland	102
Dennis Hall	??	42
Robert Harnois	Massachusetts	4
William P. Harper	??	3
Derek Hartley	United Kingdom	40
*Richard Harvan	Pennsylvania	2
^F. Lancaster Hiett	Virginia	97
R. Hill	North Carolina	417
*Charles Howard	New Jersey	462
*Timothy Hrutkay	Pennsylvania	226
Donna Hughes	Nevada	1
Robert R. Hunter	Ohio	155
^Carolyn Hurless	Ohio	6
N. Janos Schlineider	Hungary	3
George Kelley	Virginia	12
Dennis Kocyla	Connecticut	22
James L. Kuhns	Georgia	28
*David Levy	Arizona	757
*Thomas Lubbers	Minnesota	44
Diane Lucas	Ohio	2
^Herbert Luft	New York	649
Robert Luoma	New York	39
Barbara Lux	Pennsylvania	188
Peter Martin	Australia	221
Alan Massey	Australia	3
*Michael Mattei	Massachusetts	7
*Matthew Mazurek	Arizona	10
J. McFadden	N. Ireland	1
David Megginson	Missouri	3
Pearson T. Menoher	Connecticut	2
Jerry Mogelinski	New Jersey	1
*Warren C. Morrison	Canada	8353
Zoltan N.	Hungary	10
*Gary Nowak	Vermont	20666

*continued on next page*

*Nova Search Participants, cont.*

*Stephen O'Connor	Bermuda	17
J. Parker	Texas	2
*Pablo Pecorell	Argentina	41
*John Pickett	Arizona	5823
*Luigi Pirozzi	Italy	53
R. Price	Australia	2
D. Robbins	Massachusetts	22
Ian Robinson	Australia	446
Thomas M. Sarna	Michigan	62
Robert R. Schlesinger	New York	123
*Frank Schmidt	New York	151
James F. Scholl	New York	953
Tod Schwartz	Michigan	22
Ernest Sciaroni	Missouri	13
*Stephen Shervais	Virginia	29
*Christopher Spratt	Canada	97
*Phillip Steffey	CA	107
C. J. Sullivan	Virginia	22
Z. Szab	??	50
*Szilard Teichner	Hungary	102
J. Tejero	??	62
? Toth	??	109
J. Trainor	Australia	571
Frank Traynor	Australia	155
*Daniel Troiani	Illinois	218
*Massimo Uberti	Italy	29
^Theodore H. N. Wales	Massachusetts	2
Karl A. Wells	New York	8
Krisztian Wieszt	Hungary	10
*Thomas W. Wilson	West Virginia	3197
M. Zalcik	Canada	42

***AAVSO Staff Recognition Awards (presented at the 105th Annual Meeting in Burlington, Massachusetts, November 12, 2016)***

Sebastiàn Otero – 5 years

*The full text of citations, and more information about other awards made over the years, can be found on the AAVSO's Awards and Honors page at <https://www.aavso.org/honors-and-awards>*

## 2. The Year in Review

### New Members 2016

J	Anahory, Sam, Great Britain		
	Anderson, Tom, South Carolina	J	Dumbleton, Andrew, Great Britain
	Andrus, Kimberly, Canada		Durkee, Haley, Minnesota
S	Angeloni, Rodolfo, Chile		Ederoclite, Alessandro, Spain
J	Angle, Maureen, California		Evans, Anthony, Portugal
J	Apolonio, Gilvan, Utah	S	Fenton, William, Connecticut
	Aristoff, Jeff, Colorado		Finer, Mitchell, Massachusetts
J	Bandy, Gabe, Georgia		Fitzgerald, Michael, Australia
	Barbieri, Mauro, Chile		Frasca, Andrew, California
J	Barr, Jake, Texas		Freeman, James, Texas
	Berkowitz, Edward, California	J	Frohardt, Allen, California
	Bove, James, Connecticut		Furlong, Dora, Missouri
	Boyajian, Tabetha, Louisiana		Gagnon, David, Massachusetts
	Brackenridge, Peter, Australia		Gallo, Girolamo, Italy
J	Bradley, Mark, Ohio		Gause, Gary, Washington
	Brooksby, Sydney, Australia	J	Hamilton, David, Nebraska
	Brunelli, Antonio, Italy	J	Hamilton, Joshua, Michigan
J	Buyschaert, Bram, France		Heavner, Lorrie, Tennessee
J	Caffey, Jim, Missouri		Hemphill, Paul, Tennessee
	Cantrell, Simon, Maryland		Hemsher, Francis, Pennsylvania
J	Cash, Philip, Australia		Henderson, Robert, Great Britain
	Chakravarti, Soumya, India		Hilburn, Jerry, California
	Chaplin, Geoff, Great Britain		Ilas, Peter, Slovakia
	Chomiuk, Laura, Michigan		Isler, Jedidah, Tennessee
	Clark, Maurice, Texas		Jackson, Sean, Great Britain
	Coates, Daniel, New Jersey	J	Jacquesson, Michel, France
	Cornect, Robert, Australia		Johnstone, Morgan, Massachusetts
	Dahl, Jeff, Maryland		Jones, Paul, North Carolina
	Danthine, Philippe, Belgium		Kader, Gary, Ohio
	Darriba Martinez, Adolfo, Spain		Kerski, David, Minnesota
	Davis, Gerry, Pennsylvania		Klinke, Mike, Arizona
	DeCoster, Rich, Illinois		Koban, Zakery, Pennsylvania
	Deshpande, Aniruddh, India		Konstantopoulos, George, Cyprus
J	Dilger, Chris, Australia		Koontz, Steven, Texas
	Dos Santos, Juan Pablo, Argentina	J	Kuehn, Charles, Colorado
	Dubois, Franky, Belgium	J	Kwieciak, Michal, Poland
			Landay, David, District of Columbia

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*new members, cont.*

	Lange, Thorsten, Germany		Peteanu, Razvan, Canada
	Lasley, Christopher, Arkansas		Pittendreigh, William, Florida
	Layden, Andrew, Ohio		Polakis, Tom, Arizona
	Lenart, Kenyon, Mississippi		Powell, William, Arizona
	Leppanen, Jyrki, Portugal		Rana, Mauro, Virginia
S	Levine, Philip, Massachusetts		Rawls, Meredith, Oregon
	Lewin, Pablo, California		Raymonde, Mat, France
	Long, Michael, California	J	Richardson, Noel, Ohio
	Malo, Lison, Hawaii		Riggle, Chad, Brazil
S	Mateo, Mario, Michigan		Ripka, William, California
	Matera, Renato, Italy		Roberts, Mallory, United Arab Emirates
	McClain, David, Arizona		Robertson, C. W., Kansas
S	McDowell, Jonathan, Massachusetts		Robinson, George, California
	McNeil, Stephen, Idaho		Robinson, Jon, Canada
	McWilliams, Alexander, Minnesota		Rodriguez, Rene, California
	Means, Dennis, Arizona		Romanishin, William, Oklahoma
	Megson, Ian, Great Britain	J	Rose, Sanaea, Massachusetts
J	Melillo, Frank, New York		Roth, Brian, New York
	Merand, Bernard, France	J	Ryan, David, Massachusetts
	Merrill, Matthew, California	J	Salwiczek, Bartosz, Poland
J	Meyer, Angela, Indiana		Sanborn, Jason, Arizona
	Molnar, Lawrence, Michigan		Sanchez, Richard, Wyoming
J	Monteiro, Diogo, Portugal	J	Savant, Vaibhav, Ireland
J	Moosey, Thomas, Texas		Schmidtobreck, Linda, Chile
J	Morales Socorro, Carlos, Spain		Shlyonskov, Vladimir, Russia
	Murphy, Brian, Indiana	J	Sibille, Susan, Oklahoma
J	Myers, Casey, Massachusetts		Sivakoff, Gregory, Canada
	Naveira, Xavier, Sweden		Smith, Frank, New Hampshire
	Nebula, Andrea, Italy		Steer, Robert, Canada
	Neilson, Eric, Texas		Stephanou, Michael, Greece
S	Nelson, Reid, Kansas		Stoikidis, Nick, Greece
S	Nelson, Thomas, Pennsylvania		Stone, Geoffrey, California
	Nissinen, Markku, Finland		Strasburger, David, Massachusetts
J	Oltion, Raymond, Wyoming		Stratmann, Henry, Missouri
J	Ortmann, Charlyn, Missouri		Stuessi, Peter, Switzerland
J	Patrone, Maria, Massachusetts		Toft, Søren, Switzerland
J	Pedersen, Viggo, Denmark		Usatov, Maxim, Czech Republic

*continued on next page*

## 2. The Year in Review

*new members, cont.*

Van Deventer, Bruce, Washington  
van Leuven, Paul, New Zealand  
Velasquez, Luis, Florida  
Wadhwa, S., Australia  
Wieting, Robert, California

J

Wright, Irving, Texas  
Zawal, Radzimir, Poland  
Zharkov, Igor, Great Britain  
Zubanel, Douglas, Kansas

*J = junior membership*  
*S = Sustaining membership*



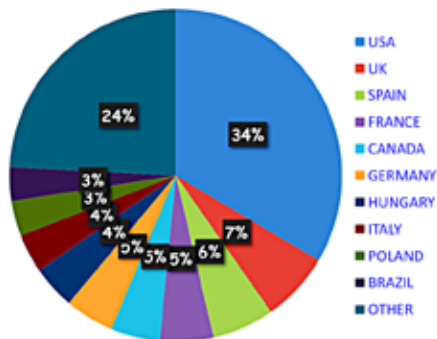
## Annual Report of the Director for Fiscal Year 2015–2016

Stella Kafka, Director



### AID—the core of our program

In 2016 alone, 1,231 observers contributed to the AAVSO International Database (AID), representing 54 countries. The top three countries contributing observations are the USA (34% observations), UK (7% observations), and Spain (6% observations). Figure 1 presents a breakdown of the top 10 countries having contributed to the AID, demonstrating the international character of our observers.



1231 observers; 54 countries represented

Figure 1. The top ten countries contributing observations to the AAVSO International Database

Looking at the data submitted to the AID in 2016, 65% of them are visual observations, 27% CCD, and 6% DSLR, with a small number of PEP, visual estimates from digital images (VISDIG), and photographic plates (PTG). In 2016, we also reached 32 million data points (from 30 million at the end of 2015) in our international database (Figure 2). At the same time, we also reached 400,000 entries in the Variable Star Index (VSX). VSX is our super-catalogue which contains updated information on variable stars, providing periods, variability types, nomenclature, eruption years (for eruptive variables), and anything else that is published in the literature on the variable stars in this database.

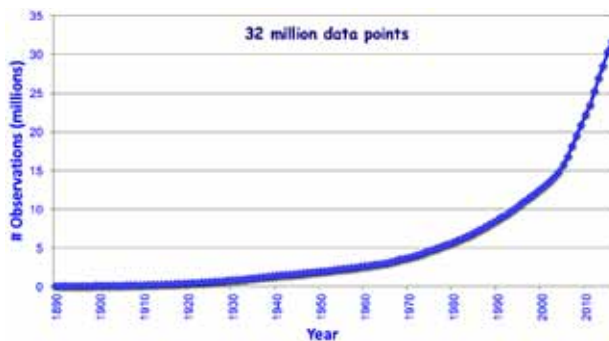


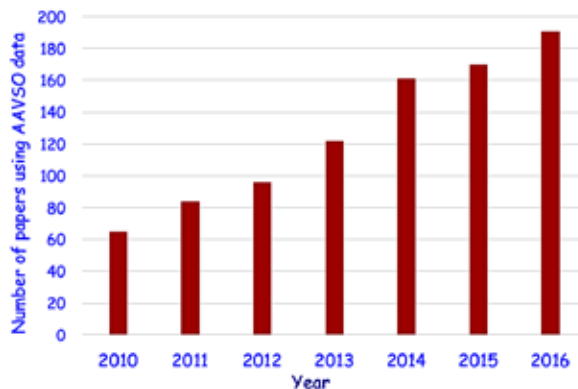
Figure 2. Annual observations submitted to the AAVSO International Database, 1911–2016

## 2. The Year in Review

### *Our science program*

In 2016, we posted 25 alerts and 15 special notices and campaigns. Most of them were projects in conjunction with space-based or ground-based observations. Thanks to the immediate response from our observers, most of those projects are close to being concluded, with scientists analyzing the relevant AAVSO data and writing relevant manuscripts. At the AAVSO, we follow closely the number of manuscripts in professional refereed papers published every year; Figure 3 showcases the increased number of our data presented in scientific papers with time. In 2016, our light curves and information appeared in 191 reviewed manuscripts (these are papers that we could trace through NASA/ADS and arXiv). Among those, there were data from the APASS project, the use of VSX in research, and variable star light curves of objects of interest.

Figure 3. AAVSO in print: number of papers using AAVSO data, 2010–2016



### Looking for jets in CVs



*Alert Notice 505:  
Monitoring of Northern  
dwarf novae for radio jets*

Dr Deanne Coppejans;  
Radboud University Nijmegen  
(Netherlands) and University  
of Cape Town

One of the projects that were concluded in 2016 was the Ph.D. thesis of Dr. Deanne Coppejans (Radboud University Nijmegen, Netherlands, and University of Cape Town, South Africa) who requested AAVSO observer assistance in monitoring several dwarf novae in support of her and her collaborator's campaign to observe those objects in outburst (AAVSO Alert Notices 505 and 539). Dr. Coppejans used the Very Large Array (VLA) to search for radio jets during outbursts of those objects, therefore an early notification of the beginning and

evolution of outbursts was critical for her project. Because of our observers' response to the request for data, Dr. Coppejans successfully completed and defended her doctoral thesis in October 2016, and has already published some of her results in *Monthly Notices of the Royal Astronomical Association* (Coppejans et al.; MNRAS 2015, vol. 451, p. 3801).

### ***Completing digitization of the Eggen card project***

2016 also found the completion of a key archival project at the AAVSO, the digitization of Olin Eggen's legacy. This comprised 108,000 hand-written index cards with information on photometry and astrometry of variable stars observed from Cerro Tololo Inter-American Observatory by Dr. Eggen, a prolific astronomer of the last century known for his seminal 1962 manuscript on the formation of the Milky Way Galaxy (as the result of a collapse of a gas cloud). Dr. Eggen was one of the best observational astronomers of his time, but most of his data were not published. Dr. Eggen passed away in 1998, and it wasn't until 2007 that his data (cards) were transferred on loan to AAVSO HQ. Scanning of the cards and their digitization started soon thereafter. However, a serious push towards completing the project commenced in 2013, when one of our colleagues, Mr. George Silvis, assumed ownership of the project and put out a call for volunteers to help with the data. Mr. Silvis created the online portal for digitized cards, along with a short YouTube video tutorial to train volunteers interested in helping. Between 2013 and 2016, 22 volunteers worked on the project (our president, Professor Kristine Larsen, was one of them), and I extend heartfelt thanks for their time and devotion to the project.

More information on Dr. Eggen and the project along with the relevant video can be found under <https://www.aavso.org/olin-eggen-observation-cards>. Selected light curves from the collection will be extracted and submitted to the AID; the full collection of cards is available in digitized form to researchers through a portal (<https://www.aavso.org/content/eggen-card-project>) and is an additional archival resource on southern hemisphere variable stars.

### ***Our science program—observer support and training***

In 2016, we aimed at providing more information on variable stars by working towards reviving some of our observing sections. We are slowly transitioning our Observing section web pages, from individual Google pages to AAVSO-branded (and hosted) web pages. This is an opportunity to update observing section page content and include target lists and new features. For observing sections to be successful, active section leaders need to be involved and engaged, ensuring that content is being updated as needed. This will also allow for observing sections to better serve their relevant communities. The biggest challenge is to identify and recruit such individuals. Towards this direction,

## 2. The Year in Review

we worked with our volunteers to transition observing section pages to AAVSO pages, update their information, and suggest targets of interest to observers whose interests lie with those variable stars. We started with the Long Period Variables (LPV) section, which now has updated information on LPVs, targets of interest and, thanks to the observing section leaders Andrew Pearce and Frank Schorr, a short monthly article on the “LPV of the month” (<https://www.aavso.org/lpv-month>). The section leaders also created an interesting new link “Why observe LPV’s?”, providing value and motivation to those who are interested in open questions and existing active science conducted on those variables. The LPV observing section can be found at: <https://www.aavso.org/aavso-long-period-variable-section> and welcomes contributions from those who are interested in those variables.

A new observing section on Exoplanet Observing was created out of the necessity of supporting exoplanet transit research. The observing section leader, Dr. Dennis Conti, included information on the history of exoplanet transit observations, on various detection techniques (focusing on the photometric transit technique), and on the value and accuracy needed from ground-based transit observations. He also provided a new observing manual for the section, and a number of targets (transiting exoplanets with known ephemerides) for those of our observers who are interested in acquiring data in support of a Hubble Space Telescope program. Exoplanet transit observations will be requested from AAVSO observers in support/follow-up of upcoming satellite observations (e.g. TESS), therefore training our observers to acquire relevant data will be a focus for the years to come.

We welcome all of you who are interested in specific types of objects to join the observing section of your interest. It would be a way to share information on your favorite stars with our community, help provide new interesting page content, and be more actively involved with section members.

### *Synergy with sister associations and key projects*

***BRITE Constellation*** We continue our involvement with the BRITE Constellation collaboration as part of the Ground Based Observation Team (GBOT). Updated targets are shared with the AAVSO community through <http://www.brite-constellation.at/>. These are stars brighter than fifth magnitude, showcasing both short- and long-term variations. Some of those targets change at the order of 1% of magnitude and are ideal for our PEP and DSLR observers; a subset with large variations are good visual targets. The BRITE scientists also requested spectra; although the AAVSO is not supporting spectroscopic observations, we encourage our observers to send their data directly to the BRITE scientists (who are listed as connections) for analysis.

***Astronomical League (AL)*** The AAVSO has been co-organizing observing sections (variable stars, binoculars) with the AL in order to attract more AL observers to observations of the variable night sky. At the recent annual AL meeting (Washington, D.C.), I met with the president of AL, John Goss, and we agreed to work on joint projects which will help both associations grow and serve our communities. As of this year, the AAVSO participates in the AL's Young Scholars Awards, providing one-year memberships to winners of those awards. We are rewarding the hard work and dedication of future young scientists as they make their first few steps exploring science on their own.

***General Catalogue of Variable Stars (GCVS), Moscow group*** We have been in contact with the GCVS group this year, to ensure strong synergy between the two groups, and fruitful collaborations. In September I visited the GCVS leader, Dr. Nicolai Samus, and members of the group, and had the chance to get a first-hand account of their operations and their future plans, and ensure that the AAVSO can support the group's work as long as it complements VSX. Our priority remains to ensure that VSX is a modern and updated resource for scientific research, regardless of the future directions of GCVS.

***Astronomers Without Borders*** At the beginning of the year, we worked with AWB to introduce their international community to the principles of variable stars and their observations. HQ staff worked with AWB staff to create material (similar to our ten-star tutorial) for AWB web pages, and a call for observations was issued as part of AWB's "astronomy month." We hope that this will help spread the AAVSO's work to international communities which are currently beyond our reach.

### ***Technical updates—website maintenance***

Early in Spring 2016, we realized that we needed to update our web pages' content manager from Drupal 6 to Drupal 7, as Drupal 6 would no longer be maintained. At the same time, our web pages are complicated in that they consist of the Drupal content management software, Drupal custom modules, and applications (such as WebObs) which are in Django. We are therefore grateful to our volunteers who helped us with the page migration, pointing out various page links that were not working as before and applications that seemed to be incompatible. We have updated all necessary modules in support of various sites and tools which were not compatible with the new Drupal version. According to information posted online, Drupal intends to maintain version 7 for a while, so I hope that we will not have to go through such a migration in the near future (at least the next 5 years).

In Summer 2016, after considering our options for our webmaster needs, we contracted the American Astronomical Society's services for our Drupal page maintenance and

## 2. The Year in Review

security. An initial three-year contract was signed, and we are working with the AAS webmaster, Scott Idem, and his group to complete issues that emerge from our web page migration, to ensure that our web pages are following best practices and that they are secure. As all our products and services are now almost exclusively online, we are aiming to provide a secure and stable environment for you, our members and observers, and maintain and satisfy the increasing needs of our growing databases.

### *HQ visits and work*

***Student internships/work at HQ*** This year, we have had three students working at HQ (mostly in the summer): Olivia Harden was hired as a summer intern to work on various online and archival projects; John Weaver was the 2016 Mayall fellow, and is working on developing our spectroscopic database (still involved in the project); Aaron Sliski is being contracted through the APASS grant to work on APASS (his contract will end in Summer of 2017, upon the APASS grant's completion).

***Scientist visits*** Dr. Michael Joner (Brigham Young University) is spending part of his Sabbatical year (September and November 2016 and March and May 2017) at AAVSO HQ, and is the 2016–2017 Janet Mattei fellow. Dr. Joner is staying in the AAVSO's guest suite, and attended the 2016 Annual meeting. Dr. Linda Schmidtobreich (ESO) spent two weeks in November at HQ working on research projects after attending the AAVSO Annual meeting.

### *Travel highlights—participation in conferences*

Part of my job as director of the AAVSO is traveling to conferences, meeting with members and observers, getting feedback from our community on the services the AAVSO provides, and discussing with you, our colleagues, future directions of the Association. Attending conferences is also an excellent opportunity to showcase the AAVSO's work to the professional astronomical community and brainstorm with scientists about projects that would be of interest to our observers. In 2016, I gave a total of 19 presentations at various venues, talking about our work and the growth of citizen astronomy under the auspices of the AAVSO. A list of my talks is presented elsewhere in this report; some highlights are the following:

- The American Astronomical Society allows for specialized symposia (“meetings within meetings”) to take place during the conference of the society. This year, I was co-organizer and chair of such a meeting in San Diego, California, which was focusing on “Science with small telescopes,” and had the chance to give a talk on “The AAVSO as a Community of Practice.” After that, I participated in a “Student Astronomical Research

Opportunities workshop” (also in San Diego, where I talked about possible student projects on variable stars). As we need to attract more young scientists to variable star research, I will continue actively participating in such symposia, opening the variable star sky to younger generations.

- At the “Accretion Processes in Cosmic Sources” conference in St. Petersburg (Russia), I gave a talk about “the AAVSO as a Resource of Variable Object Research” and discussed our work with scientists from all over the world. The conference’s theme included all aspects of accretion processes in all astrophysical sources—from star and exoplanet formation to cataclysmic variables and black holes at the centers of galaxies. After the meeting, I visited Moscow, where I gave presentations at the Institute of Astronomy (Russian Academy of Science, Moscow) and at the Sternberg Institute of Astronomy. This visit was combined with extended discussions with the GCVS team (see above).
- “European Conference of Amateur Variable Star Observers.” This two-day meeting took place in Hamburg (Germany). I had the chance to meet with some of our European observers and members, and discuss their research and work. As we are an international association, tight connections with our international community are essential.

I also gave talks as an invited speaker at various astronomy clubs, such as the Rolnick Observatory (Westport, Connecticut), the Central Florida Astronomical Society (Orlando, Florida), and the Maria Mitchell Observatory (Nantucket, Massachusetts). I attended the Connecticut Star Party (Goshen, Connecticut) this year, although it was entirely clouded out so I didn’t have the chance to use my new visual observing skills and look at some of my favorite variable stars under entirely dark skies. I did give a presentation on the variable night sky, and had the chance to make new friends among members of the New Haven Astronomical Association and the Westport Astronomical Society. I hope to successfully attend a star party next year.

- In 2016, I gave the following presentations:

*January 5* “The AAVSO,” Society of Physics Students, Evening of Undergraduate Research at the January AAS meeting (Washington, D.C.).

*January 13* “Variable Stars and their Stories,” Central Florida Astronomical Society (Orlando, Florida).

*January 14* “The AAVSO Program: A Resource for Variable Star Research,” Embry-Riddle Aeronautical University (Daytona Beach, Florida).

## 2. The Year in Review

*February 5* “The AAVSO as a Resource for Variable Star Research,” Institute de Ciencies de l’Espai (Barcelona, Spain).

*March 25* “The AAVSO Program: A Resource for Variable Star Research,” University of Pittsburgh (Pennsylvania).

*April 25–27* Visit at Vanderbilt University/talks about the AAVSO and science (Nashville, Tennessee).

*May 17* “Variable stars and their stories,” visit and presentation at the Rolnick Observatory (Westport, Connecticut).

*May 23* “Living with a star,” seminar at Seminar at Girls, Inc. (Lynn, Massachusetts).

*June 1–4* Visit at Maria Mitchell Observatory (Nantucket, Massachusetts). Three presentations (one public talk and two for summer interns) and started working with one summer intern on a research program.

*June 12* “Spectroscopic Projects for Students” and two talks on the Journal of the AAVSO, Student Astronomical Research Opportunities workshop (San Diego, California).

*June 13–15* “The AAVSO as a Community of Practice,” at AAS meeting-in-meeting “Science with small telescopes” (San Diego, California), section co-organizer and chair.

*June 16–18* “Spectroscopy with Small Telescopes” and discussion on spectroscopic database, Society for Astronomical Sciences (SAS) meeting (Ontario, California).

*September 5* “The AAVSO as a Resource of Variable Object Research,” at “Accretion Processes in Cosmic Sources” conference St. Petersburg (Russia).

*September 12* “The AAVSO program—a Resource for Variable Object Research,” at the Institute of Astronomy, Russian Academy of Science, Moscow (Russia).

*September 14* “The AAVSO program—a Resource for Variable Object Research,” at Sternberg Institute of Astronomy, Moscow (Russia).

*September 17* “The AAVSO at the Forefront of Variable Star Astronomy,” at the “European Conference of Amateur Variable Star Observers”, Hamburg (Germany).



*October 1* “Variable Stars and their Stories,” at the Connecticut Star Party (Goshen, Connecticut).

*October 17* “The AAVSO Program—a Resource for Variable Object Research,” at Boston University (Boston, Massachusetts).

*October 20* “The AAVSO Program—a Resource for Variable Object Research,” at the University of Florida, Gainesville.

## 2. The Year in Review

Table 1. AAVSO Observer Totals 2015–2016 by Country.\*

Country	No. Observers	No. Obs.	Country	No. Observers	No. Obs.	Country	No. Observers	No. Obs.
Argentina	18	2108	Hungary	42	27210	Slovakia	4	2952
Australia	24	75360	India	5	800	Slovenia	3	364
Austria	5	2467	Iran	3	3676	South Africa	3	2006
Belarus	2	827	Ireland	4	75	Spain	53	248299
Belgium	11	215300	Israel	1	97	Sweden	12	9072
Bermuda	1	297	Italy	30	5290	Switzerland	5	723
Bolivia	1	57	Japan	3	3549	Taiwan	1	95
Brazil	26	1550	Luxembourg	1	82	Turkey	3	4997
Bulgaria	3	2662	Malta	1	7349	Ukraine	16	24527
Canada	36	111292	Mexico	1	159	United Kingdom	64	114143
China	7	1901	Netherlands	9	2315	United States	271	926591
Colombia	1	84	New Zealand	9	25945	Uruguay	1	4
Croatia	1	7	Norway	1	178	Venezuela	1	783
Cyprus	2	9	Pakistan	4	34			
Germany	41	24484	Philippines	1	328	TOTAL	846	1981653
Denmark	4	1633	Poland	27	11396			
Estonia	1	73	Portugal	5	2287			
Finland	9	11081	Romania	8	2501			
France	44	99093	Russian Federation	11	944			
Greece	3	2121	Serbia	2	709			

Table 2. AAVSO Observer Totals 2015–2016 USA by State or Territory.\*

State	No. Observers	No. Obs.	State	No. Observers	No. Obs.	State	No. Observers	No. Obs.
Alabama	1	24	Louisiana	3	147	Oregon	5	113092
Arizona	13	4610	Maine	4	213	Pennsylvania	10	2495
Arkansas	4	8473	Maryland	10	5413	Rhode Island	1	220
California	23	313709	Massachusetts	16	97313	South Carolina	3	164
Colorado	8	3528	Michigan	11	7107	Texas	20	10237
Connecticut	4	574	Minnesota	6	822	Vermont	3	2730
Delaware	1	77	Missouri	6	3717	Virgin Islands	1	79
District of Columbia	1	30	Montana	1	38494	Virginia	11	1762
Florida	10	59275	Nebraska	2	84	Washington	5	861
Georgia	5	5392	New Hampshire	5	11131	West Virginia	1	2132
Hawaii	1	548	New Jersey	1	2	Wisconsin	5	93905
Illinois	12	58416	New Mexico	8	39559	Wyoming	2	416
Indiana	7	7260	New York	11	12454	unknown	3	161
Iowa	2	139	North Carolina	2	8200			
Kansas	4	6246	Ohio	17	2251	TOTAL	271	926591
Kentucky	1	2761	Oklahoma	3	214			

\* Totals reflect observations made during fiscal 2015–2016 and do not include historical data (data preceding fiscal 2015–2016) submitted during fiscal 2015–2016.

Table 3. AAVSO Observers, 2015–2016.\*

<i>Code</i>	<i>Org.</i>	<i>Name</i>	<i>No. Obs.</i>	<i>Code</i>	<i>Org.</i>	<i>Name</i>	<i>No. Obs.</i>
AMAD		M. Abbasi, Iran	24	BPAD		P. Benni, Massachusetts	7167
AAP		P. Abbott, Canada	89	BEB		R. Berg, India	98
AAN	02	A. Abe, Germany	34	BGMB	18	G. Bertani, Italy	4
APGA	20	P. Abel, United Kingdom	15	BYF	04	H. Betlem, Netherlands	67
ACN	13	C. Adib, Brazil	160	BADA		A. Bielawny, Poland	1
AHM		H. Adler, Massachusetts	1156	BALB		A. Biheza, Belarus	50
ASA		S. Aguirre, Mexico	159	BBI	05	B. Billiaert, Belgium	694
ARL		R. Alencar Caldas, Brazil	6	BLOA		L. Bing, China	4
AFSA		F. Alfarop, Spain	1055	BMNA		M. Binhani, India	3
ACO	20	C. Allen, Sweden	2176	BPAA		P. Bishop, United Kingdom	12
AJC		J. Almeida, Brazil	5	BMAH		M. Biskupski, Poland	49
AJV	15	J. Alonso, Spain	636	BXT	08	T. Bjerkgaard, Norway	178
ARC		R. Altenburg, Pennsylvania	32	BRAC		R. Black, Oklahoma	40
AKV		K. Alton, New Jersey	2	BKL		J. Blackwell, New Hampshire	33
AAX	36	A. Amorim, Brazil	837	BVZ		J. Blanco Gonzalez, Spain	64
AMIA		M. Anderlund, Sweden	19	BLD	10	D. Blane, South Africa	1949
ACDA		C. Andrione, Argentina	2	BEU		E. Blankenship, Virginia	39
AROA		R. Apitzsch, Germany	162	BWZ		E. Blown, New Zealand	574
AJN	27	J. Appleyard, Canada	1	BJAA		J. Boardman, Wisconsin	12330
AJLA		J. Araújo, Brazil	22	BOH	02	D. Boehme, Germany	52
AAM		A. Armiński, Poland	723	BSCC		S. Boerner, Missouri	10
ARJ		J. Arnold, Texas	8	BHQ	29	T. Bohlson, Australia	2568
ATE		T. Arranz, Spain	137854	BPAF		P. Bonifacio, Argentina	26
AALB		A. Arranz Lázaro, Spain	243	BRJ		J. Bortle, New York	3721
APAA	27	P. Ashmore, Canada	10	BDLA		D. Boulet, Delaware	77
AUMA		U. Asim, Pakistan	9	BMU	04	R. Bouma, Netherlands	19
ATI	03	T. Asztalos, Hungary	52	BJAH		J. Bove, Connecticut	83
ATDA		T. Atwood, Louisiana	90	BDG	20	D. Boyd, United Kingdom	9573
AAUA		M. Audejean, France	3002	BGAC		G. Boyle, United Kingdom	48
ADI	02	D. Augart, Germany	231	BPSA	20	P. Brackenridge, Australia	11
ARX		R. Axelsen, Australia	727	BMK		M. Bradbury, Indiana	8
BJAN	03	J. Bacsas, Hungary	17	BMAK		M. Bradley, Ohio	132
BOZ	03	B. Bago, Hungary	2633	BRAF		R. Braga, Italy	6
BFAC		F. Bahrani, Iran	2014	BJFA		J. Brandie, China	1863
BWW		W. Bakewell, California	8	BNW	02	W. Braune, Germany	30
BFO	03	J. Bakos, Hungary	4475	BQC	01	J. Breard, France	9
BFU	18	F. Baldanza, Italy	5	BTB		T. Bretl, Minnesota	47
BALJ	14	A. Baldwin, New Zealand	60	BHA	02	H. Bretschneider, Germany	305
BGEB		G. Ballan, Argentina	3	BQE	27	E. Briggs, New York	10
BGAF		G. Bandy, Georgia	2	BSM		S. Brincat, Malta	7349
BDKA	03	D. Banhidi, Hungary	10	BJFB		J. Briol, Minnesota	29
BGZ		G. Banialis, Illinois	680	BLUA		L. Brooks, Virginia	253
BTAD		T. Banys, Poland	3	BDHC		D. Brown, Georgia	5
BSBB		S. Baranowski, Poland	37	BEJA		E. Brown, Connecticut	279
BMAI		M. Barlazzi, Italy	174	BANG		A. Brunelli, Italy	1085
BSR	18	S. Baroni, Italy	92	BOA	01	A. Bruno, France	13389
BPO		D. Barrett, France	38328	BJRA		J. Bruton, California	258
BARM	20	M. Barrett, United Kingdom	590	BYQ		T. Bryant, Maryland	116
BBA		B. Beaman, Illinois	3330	BHAF		H. Bu, China	10
BWX	27	A. Beaton, Canada	116	BHU		R. Buchheim, California	10
BSJ		S. Beck, Massachusetts	4	BNBA		N. Buchholz, Germany	424
BDQ		A. Bedard, Washington	615	BROE		R. Bukhari, Pakistan	18
BCP	20	C. Beech, United Kingdom	455	BMID		M. Bulat, Texas	2
BZX		A. Beltran, Bolivia	57	BSO		S. Burgess, Maine	8
PNQ		R. Benavides Palencia, Spain	4	BIW	29	N. Butterworth, Australia	17100
BHS		H. Bengtsson, Sweden	419	CALC		A. Cabello Sánchez, Spain	441
BVLA		V. Benishek, Serbia	179	CTOA		T. Calderwood, Oregon	86
BDJB	34	D. Benn, Australia	63	CFJA		F. Caleya Salamanca, Spain	15
BTY		T. Benner, Pennsylvania	667	CCB		C. Calia, Connecticut	198

## 2. The Year in Review

Table 3. AAVSO Observers, 2015–2016, cont.\*

<i>Code</i>	<i>Org.</i>	<i>Name</i>	<i>No. Obs.</i>	<i>Code</i>	<i>Org.</i>	<i>Name</i>	<i>No. Obs.</i>
CLUB	36	L. Camargo Da Silva, Brazil	10	CKB		B. Cudnik, Texas	3636
CMN		R. Cameron, Australia	5	DJEE		J. Dahl, Maryland	6
CMQ		P. Camilleri, Australia	186	DPWA		P. Dalley, Louisiana	4
CMLA		M. Campbell, Virginia	2	DPHA		P. Danthine, Belgium	119
CMP		R. Campbell, Florida	2184	DGSA	20	G. Darlington, United Kingdom	744
CFRA		F. Campos, Spain	396	DAM		A. Darriba Martinez, Spain	1163
CQP		A. Capetillo Blanco, Spain	132	DABA		A. Das, India	11
CMAE		M. Cappellini, Italy	87	DAJ		J. Davis, Maryland	1
CADA	36	A. Cardoso, Brazil	41	DMA		M. Davis, South Carolina	58
CARP		P. Carroll, Ireland	11	DJX	27	M. De Jong, Canada	56
CROA	14	R. Carstens, New Zealand	9909	DROE		R. De Lorenzo, Italy	2
CRI	15	R. Casas, Spain	2	DPP		P. De Ponthiere, Belgium	4510
CLQ		L. Cason, South Carolina	30	SWQ	13	W. De Souza, Brazil	17
CJE	01	J. Castellani, France	619	DSJ	13	J. De Souza Aguiar, Brazil	4
CRAB		R. Castillo, Spain	13	DSJA		S. Dean, United Kingdom	11
CGRC		G. Castro, Argentina	10	DANF		A. Debackère, France	819
CWO		W. Castro, Florida	19	DJEF		J. Dechoz, France	26
CDZ		D. Cejudo Fernandez, Spain	78751	DMIB		M. Deconinck, France	175
CQJ		J. Centala, Iowa	81	DDAA		D. Dedrickson, Oregon	176
CDPA		D. Cerqueira, Brazil	8	DLM	01	M. Deldem, France	2
CNT		D. Chantiles, California	158	DMID		M. Dellepere, Florida	18
CGF		G. Chaple, Massachusetts	5	DFR	27	F. Dempsey, Canada	76
CGZ	20	G. Chaplin, United Kingdom	716	DDE		D. Denisenko, Russian Federation	108
CXIA		X. Chen, Texas	7	DAT		A. Derdzikowski, Poland	805
CNOA		N. Chetnik, Virginia	79	DNO		O. Deren, Poland	914
CCY		C. Chiselbrook, Georgia	3179	DSSA		S. Deshmukh, India	15
CMAG		M. Chrzanowska, Poland	21	DAND		A. Deshpande, India	742
CMF	02	M. Chudy, Germany	286	DJED		J. Desrosiers, Canada	7
CMAA		M. Ciocca, Kentucky	2761	DPK		P. Detterline, Pennsylvania	54
CWJA		W. Clark, United Kingdom	9	DSI		G. Di Scala, Australia	1213
CWP		W. Clarke, Arizona	1460	DCAA		A. Dicristofaro, Ohio	1
CPE		P. Closas, Spain	549	DXAA	15	X. Domingo Martinez, Spain	4797
CPP		P. Coker, Colorado	123	DSN		S. Donnell, Colorado	88
CFO		J. Coliac, France	12	DROD		R. Donner, New York	56
CDK		D. Collins, North Carolina	7240	DERA		E. Dose, Kansas	6203
CJOB		J. Collins, United Kingdom	3	DDJ		D. Dowhos, Canada	261
CME	18	E. Colombo, Italy	391	DRCA	20	R. Dryden, United Kingdom	306
CTIA		T. Colombo, Italy	685	DDP		D. Duarte Cavalcante Pinto, Brazil	3
CDSA	20	D. Conner, United Kingdom	222	DUBF	05	F. Dubois, Belgium	12781
CEMB	01	E. Conseil, France	32	DPV	09	P. Dubovsky, Slovakia	1319
CDEC		D. Conti, Maryland	336	DRTA	03	R. Dudas, Hungary	61
CGIA		G. Conzo, Italy	119	DROB		R. Dudley, Vermont	8
COO		L. Cook, California	72864	DVLA		V. Dumitrescu, Romania	8
CMJA		M. Cook, Canada	19655	DMO	01	M. Dumont, France	741
CK		S. Cook, Arizona	1673	DGTA		G. Duranko, New Hampshire	10
CWT		W. Cooney, Texas	609	DRZ		R. Durkee, Minnesota	712
CLZ		L. Corp, France	8779	DMPA		M. Durkin, New York	75
CAI		A. Correia, Portugal	1062	DFEA		F. Dutton, Michigan	4
CNQ		N. Costa, Portugal	74	DKS		S. Dvorak, Florida	45976
CMM		M. Costello, California	681	DJAC		J. Dziurko, Poland	17
CKLA		K. Cotar, Slovenia	243	DMAC	06	M. Díaz, Spain	94
COV		V. Coulehan, New York	90	ELYA		L. Easley, Texas	30
CDJA		D. Coulter, Michigan	1180	ETOA		T. Eenmae, Estonia	73
CWD		D. Cowall, Maryland	2083	EHEA		H. Eggenstein, Germany	73
CLEA		L. Crary, Florida	14	EMA		M. Eichenberger, Switzerland	42
CTX		T. Crawford, Oregon	2722	EER		E. Eker, Turkey	2
CMY		M. Crook, United Kingdom	10	EJAA		J. Emming, Michigan	164
CBLA		B. Crosby, South Carolina	76	EPE	01	P. Enskonatus, Germany	117
CSM	03	M. Csukas, Romania	702	EJO	03	J. Erdei, Hungary	1119

Table 3. AAVSO Observers, 2015–2016, cont.\*

<i>Code</i>	<i>Org.</i>	<i>Name</i>	<i>No. Obs.</i>	<i>Code</i>	<i>Org.</i>	<i>Name</i>	<i>No. Obs.</i>
EEY		E. Erdelyi, California	375	GCO		C. Gualdoni, Italy	49
EMIB		M. Erdmann, Germany	104	GLZ	03	L. Gubicza, Hungary	2
ELTA	06	L. Espasa, Spain	55	GFRB		F. Guenther, Maryland	1676
EAJA		A. Evans, Portugal	15	GLUA	27	L. Gurban, Canada	1
ERW	14	R. Evans, New Zealand	6	GGX	01	G. Guzman, France	597
FYAA		Y. Faerman, Israel	97	HCS	03	C. Hadhazi, Hungary	2704
FJAA		J. Falcon, Spain	1	HDH	03	S. Hadhazi, Hungary	378
FRGA		R. Farfán, Spain	19	HIVB		I. Hajdinjak, Croatia	7
FJG		A. Favaron, Brazil	9	HKB		B. Hakes, Illinois	242
FFAD		F. Feijo, Brazil	47	HJW		J. Hall, Colorado	171
FPAA		P. Fernandez Blanco, Spain	404	HMB	05	F. Hamsch, Belgium	177689
FSJ	01	J. Fis, France	96	HJEA		J. Hamel, Canada	250
FANB		A. Fitzgerald, Texas	5	HJRA		J. Hamilton, Michigan	9
FDGA		D. Flood, Massachusetts	5	HHAB	02	H. Hammerl, Germany	337
FDA	03	A. Fodor, Hungary	534	HBB		B. Harris, Florida	10415
FBZ	03	B. Fodor, Hungary	61	HMQ		M. Harris, Georgia	2
FSE		S. Foglia, Italy	3	HAB		R. Hays, Illinois	466
FJQ		J. Foster, California	33812	HQA		A. Henden, New Hampshire	1196
FRL		R. Fournier, Ohio	949	HMV		M. Hessom, California	125
FDU		D. Fowler, Ohio	158	HNDA		N. Hewitt, United Kingdom	5
FXJ		J. Fox, New Mexico	173	HXT	20	T. Heywood, United Kingdom	1166
FGJA		G. Frey, Arizona	25	HKEB		K. Hills, United Kingdom	2508
FGIA	18	G. Frustaci, Italy	159	HDHA		D. Hinzel, Virginia	21
FMG		G. Fugman, Nebraska	82	HTCA		T. Hiscox, New Zealand	38
FRTA		R. Fuller, Texas	151	HFF		T. Hoffelder, Maine	1
FRIC		R. Furgoni, Italy	333	HGUA	19	G. Holmberg, Sweden	416
FSRA		S. Futch, United Kingdom	114	HKAB	19	K. Holmquist, Sweden	18
GSTB		S. Gagnon, Virginia	12	HGLA		G. Holub, Illinois	2
GMQA	20	M. Gainsford, United Kingdom	703	HCOC		C. Honson, Ohio	1
GTN		T. Gandet, Arizona	1	HOO	04	G. Hoogeveen, Netherlands	7
GFDB	06	F. Garcia, Spain	1210	HMIA		M. Hotka, Colorado	64
GME		J. Gardner, California	2	HSP	14	S. Hovell, New Zealand	3210
GAA		P. Garey, Illinois	102	HSW		S. Howerton, Kansas	1
GJP		J. Garlitz, Oregon	329	HJA		J. Hudson, California	54
GALB		A. Garofide, Romania	160	HQV	20	V. Hull, United Kingdom	85
GADB		A. Garro, Ohio	1	HKD	20	R. Hunt, United Kingdom	611
GMIA		M. Garro, Ohio	1	HUR	20	G. Hurst, United Kingdom	1887
GKI		K. Geary, Ireland	5	HUZ		R. Huziak, Canada	73
GMD		M. Geldorp, Canada	42	IPEA		P. Ilas, Slovakia	162
GQR		R. Gherase, Romania	4	ILE	03	E. Illes, Hungary	6
GGU	04	G. Gilein, Netherlands	491	IPA	12	P. Ingrassia, Argentina	15
GSEB		S. Girard, Oklahoma	42	ILUA		L. Izzo, Italy	6
GRIB		R. Glassner, Missouri	130	JDAC		D. Jackson, Ohio	12
GATH		A. Glazier, Ireland	5	JPM	10	P. Jacobs, South Africa	6
GZN		A. Glez-Herrera, Spain	6503	JJB	11	J. Jacobsen, Denmark	4
GLG		G. Gliba, Maryland	56	JMA		M. Jacquesson, France	94
GFB	31	W. Goff, California	28869	JTP	01	P. Jacquet, France	273
GOT	06	T. Gomez, Spain	211	JDAA		D. Jakubek, Poland	555
GED		E. Goncalves, Brazil	3	JM		R. James, New Mexico	16364
GCJ		J. González Carballo, Spain	580	JKE		K. Janeco, Ohio	1
GGZ	03	Z. Gorgei, Hungary	50	JZO	03	Z. Jankovics, Hungary	125
GSE		S. Gouaichault, France	7	JDAB		D. Jarkins, Missouri	81
GKA		K. Graham, Illinois	2963	JJEA		J. Jenkins, New Mexico	2
GPMA	27	P. Gray, Canada	1	JRBA	34	R. Jenkins, Australia	1566
GFS	20	K. Griffiths, United Kingdom	24	JSI		S. Jenner, United Kingdom	2
GVD	16	V. Grigorenko, Russian Federation	82	JYUA		Y. Jia, USA	35
G VIA		V. Grossi, Illinois	22	JGE	06	G. Jimenez Lopez, Spain	54
GPI		P. Grudniewski, Poland	47	JSJA	20	S. Johnston, United Kingdom	8614
GELB		E. Gryshchenko, Ukraine	526	JJI		J. Jones, Oregon	109779

## 2. The Year in Review

Table 3. AAVSO Observers, 2015–2016, cont.\*

<i>Code</i>	<i>Org.</i>	<i>Name</i>	<i>No. Obs.</i>	<i>Code</i>	<i>Org.</i>	<i>Name</i>	<i>No. Obs.</i>
JOT	20	T. Jones, United Kingdom	12	KJAF		J. Kvapil, Sweden	13
JPG		P. Jordanov, Bulgaria	142	KMIC		M. Kwieciak, Poland	482
JLZ	03	L. Juhasz, Hungary	131	LCR	15	C. Labordena, Spain	694
KMY		M. Kaczmarech, Brazil	1	LHS		H. Lacombe, Canada	14
KKS		S. Kafka, Massachusetts	10	LSA	17	S. Lahtinen, Finland	8
KB		W. Kaminski, New Mexico	15	LPB		P. Lake, Australia	830
KAM	02	A. Kammerer, Germany	2	LLPA		L. Lamoureux, Canada	19
KTU		T. Kantola, Finland	3527	LPAB		P. Lampens-Vancauterem, Belgium	38
KMO		M. Kardasis, Greece	640	LALB		A. Lamperti, Pennsylvania	63
KSF		S. Karge, Germany	1	LMAD		M. Lanari, Ohio	7
KBJB	19	B. Karlsson, Sweden	8	LPEA		P. Lancaster, Australia	5
KTHA	19	T. Karlsson, Sweden	1508	LDWA		D. Landay, District of Columbia	30
KAD	03	A. Karpati, Hungary	192	LMIB		M. Landl, Austria	15
KEI		E. Kato, Australia	119	LDJ	27	D. Lane, Canada	3842
KBJ		R. Kaufman, Australia	18	LTO	02	T. Lange, Germany	6
KJMB		J. Kay, Vermont	120	LFK	11	F. Larsen, Denmark	1
KMQ	06	M. Kearns, Spain	5	LKR		K. Larsen, Connecticut	14
KHEA		H. Kerner, Germany	76	RLJA		R. Lawless, France	8
KSZ	03	S. Keszthelyi, Hungary	284	LZT		T. Lazuka, Illinois	898
KJMA		J. Ketchum, Missouri	67	LJW	01	J. Lechopier, France	14
KAYA		A. Khrushchev, Russian Federation	1	LMT		M. Legutko, Poland	163
KMR	20	M. Kidger, United Kingdom	537	LCLA		C. Lemaire, Germany	2635
KTHC		T. Killestein, United Kingdom	25	LPD	01	P. Lemarchand, France	42
KRAA		R. King, Virginia	158	LMA	27	D. Lemay, Canada	3727
KMM	09	M. Kititsa, Ukraine	2332	LVY		D. Levy, Arizona	98
KPC		P. Klages, United Kingdom	9	LFEA		F. Limón Martínez, Spain	28
KKJ	03	K. Klajnik, Hungary	9	LMK		M. Linnolt, Hawaii	548
KKAA		K. Klindt-Jensen, Denmark	587	LCO		C. Littlefield, New York	1886
KRAB		R. Kneip, Luxembourg	82	LRJ	20	R. Livesey, United Kingdom	113
KPL		P. Kneipp, Louisiana	53	LGIB		G. Locatelli, Italy	6
KCD	20	C. Knight, New Zealand	295	LGV		G. Lopatynski, California	52
KG T		G. Knight, Maine	24	LOCA		O. Lopez, Venezuela	783
KSP		S. Knight, Maine	180	LDS	20	D. Loughney, United Kingdom	358
KZAB		Z. Koban, Pennsylvania	1	LSJB	14	S. Lowther, New Zealand	11631
KOC	03	A. Kocsis, Hungary	185	LJUA		J. Lozano De Haro, Spain	107
KLO		L. Kocsmaros, Serbia	530	LBG		G. Lubcke, Wisconsin	846
KHL		M. Kohl, Switzerland	619	LWHA		W. Ludington, North Carolina	960
KTAA	03	T. Komaromi, Hungary	13	LCHD		C. Lugova, Ukraine	408
KMA		M. Komorous, Canada	2028	MDW		W. MacDonald, Canada	1976
KGED		G. Konstantopoulos, Cyprus	7	MRGA		R. MacPhail, Canada	257
KSLA		S. Koontz, Texas	62	MATA	03	A. Madai, Hungary	9
KMAH		M. Kord Zangeneh, Iran	1638	MQA		A. Maidik, Ukraine	2739
KOS	03	A. Kosa-Kiss, Romania	1397	MLI		L. Maisler, New York	3
KLX		L. Koscianski, Maryland	7	M DAV		D. Majors, California	30
KTJA		T. Kosteley, Washington	50	MVO	17	V. Makela, Finland	258
KCLA		C. Kotnik, Colorado	742	MEGA		E. Maleev, Ukraine	470
KAF	03	A. Kovacs, Slovakia	452	MJHN	20	J. Mallett, United Kingdom	23
KFK		F. Krafka, Texas	50	MCPA		C. Maloney, Arkansas	1882
KJOA		J. Kribbel, Austria	17	MBJA		B. Mansdahl, Sweden	1
KWO	02	W. Kriebel, Germany	1282	MKE		B. Manske, Wisconsin	133
KIS	02	G. Krisch, Germany	1896	MAND		A. Mantero, Italy	22
KNAA		N. Krumm, California	1346	MJOE		J. Marco, Spain	421
KTZ		T. Krzyt, Poland	374	MTON	20	T. Markham, United Kingdom	6429
KROB	02	R. Kubala, Germany	1	MCHB		C. Marlot, France	1123
KBA		B. Kubiak, Poland	1817	MXS	03	S. Marosi, Hungary	6
KUC	01	S. Kuchto, France	1520	MMN	18	M. Martignoni, Italy	149
KYUA		Y. Kunitsa, Ukraine	574	MYC		C. Martin, Nebraska	2
KBO		R. Kuplin, Arizona	12	MJEI		J. Martin, Michigan	58
KSQ		S. Kuznetsov, Russian Federation	35	MJCA		J. Martin, USA	27

Table 3. AAVSO Observers, 2015–2016, cont.\*

<i>Code</i>	<i>Org.</i>	<i>Name</i>	<i>No. Obs.</i>	<i>Code</i>	<i>Org.</i>	<i>Name</i>	<i>No. Obs.</i>
MJOD		J. Martin, Spain	130	NPHA		P. Nguyen, USA	99
MVIA		V. Marttila, Finland	8	NMI		M. Nicholas, Arizona	849
MANH		A. Maslennikov, Ukraine	1451	NOT	02	O. Nickel, Germany	1177
MREN	18	R. Matera, Italy	3	NJL	01	J. Nicolas, France	39
MTH		H. Matsuyama, Japan	3113	NCH		C. Norris, Texas	192
MPR		P. Maurer, Germany	127	NAO		A. Novichonok, Russian Federation	50
MJHA		J. McCammon, Colorado	268	OMIC		M. O'Connell, Ireland	54
MCOA		C. McCann, Arkansas	74	OCX		L. O'Connor, Massachusetts	8
MDAE		D. McClain, Arizona	323	OCN		S. O'Connor, Bermuda	297
MCJB		J. McCullough, Ohio	1	ONJ		J. O'Neill, Massachusetts	852
MDP	27	P. McDonald, Canada	2291	OJEA		J. Oaster, Pennsylvania	85
MCOB		C. McKenzie, Canada	119	OAS		A. Odasso, Italy	9
MKK		K. McKeown, New Mexico	80	OYE		Y. Ogmen, Turkey	4992
MJB		J. McMath, Arkansas	6453	OJMA	17	J. Ojanpera, Finland	164
MMAE		M. McNeely, Indiana	16	OAR	17	A. Oksanen, Finland	5670
MED		K. Medway, United Kingdom	2459	OARA		A. Olech, Poland	41
MIQ	20	I. Megson, United Kingdom	280	ORGA		R. Oltion, Wyoming	1
MFR		F. Melillo, New York	42	OPR		P. Ossowski, Poland	11
MYAA		Y. Melnikov, Austria	96	OSE		S. Otero, Argentina	4
MHI		H. Menali, Massachusetts	2	OJJ		J. Ott, Colorado	1694
MQG		M. Menegotto, Argentina	30	OCR	05	C. Otten, Belgium	88
MZK		K. Menzies, Massachusetts	81961	PLA	13	A. Padilla Filho, Brazil	287
MBEA		B. Merand, France	74	PSD		S. Padovan, Spain	1636
MAGB	12	A. Merlo, Argentina	10	PLP		L. Palazzi, Italy	75
MDEN		D. Merrill, California	22	PCAB	12	C. Palou, Argentina	10
MHL		E. Michaels, Texas	4397	PVIB	12	V. Paniagua Checchia, Argentina	10
MVH		V. Mihai, Romania	123	PTFA		T. Papadimitriou, Greece	73
MIW	20	I. Miller, United Kingdom	17882	PPS	03	S. Papp, Hungary	2636
MMGA		M. Miller, Texas	1	PTQ		T. Parson, Minnesota	3
MMEA		M. Millward, Australia	12	PST		S. Parsons, Florida	1
MJEF		J. Minda, Poland	10	PJJ	15	J. Pastor, Spain	65
MNIC		N. Mishevskiy, Ukraine	12060	PTT		R. Paterson, United Kingdom	385
MOBM	20	M. Moberley, United Kingdom	6	PGRA		G. Patrick, France	2337
MHH		J. Moehlmann, Pennsylvania	948	PNIB		N. Paul, India	29
MALJ		A. Mohn, Texas	9	PYAB		Y. Pavlenko, Ukraine	1163
MOD		D. Mohrbacher, Ohio	21	PEX		A. Pearce, Australia	13035
MISA		I. Monks, United Kingdom	97	PRCA		R. Pearce, United Kingdom	856
MEV	01	E. Morelle, France	17294	PEI	11	E. Pedersen, Denmark	1041
MJAF		J. Moreno Quesada, Spain	9	PNPA		N. Pedicino, Argentina	10
MAEA		A. Morozov, Russian Federation	207	PEG	01	C. Peguet, France	1316
MJLA		J. Morris, Maryland	8	PWD		W. Pellerin, Texas	472
MOW		W. Morrison, Canada	5482	PARB		A. Pena, California	141
MPS	27	P. Mozel, Canada	119	PJED		J. Penninckx, France	797
MMH		M. Muciek, Poland	575	PAE		A. Pereira, Portugal	74
MMIG	12	M. Mudir, Argentina	10	PRVA		R. Pereira, Brazil	16
MULP	20	P. Mulligan, United Kingdom	72	PAPA		A. Pereira Novaes, Brazil	1
MMU		M. Munkacsy, Rhode Island	220	PCX	15	C. Perello, Spain	19
MGAB		G. Murawski, Poland	354	PJVA		J. Perez, Spain	7
MMIC		M. Muro Serrano, Spain	199	PLFA		L. Perez, Spain	1203
MUY	05	E. Muyllaert, Belgium	10565	PEJ	01	J. Perrard, France	96
MGW		G. Myers, California	70512	PWL		W. Perry, Arizona	23
NDQ	01	D. Naillon, France	101	PGD		G. Persha, Michigan	2031
NXAA	19	X. Naveira, Sweden	5	PVA	27	V. Petriew, Canada	66868
NRNA		R. Naves, Spain	1704	PRJA		R. Piacenti, Brazil	3
NABA		A. Nebula, Italy	136	PXR	20	R. Pickard, United Kingdom	16651
NLX		P. Nelson, Australia	12457	PROC		R. Pieri, France	397
NAL	03	A. Nemes, Hungary	6	PJAA		J. Pioro, Poland	9
NJO	02	J. Neumann, Germany	1492	PIJ	03	J. Piriti, Hungary	891
NBMA		B. Neylon, Australia	1	PWMA		W. Pittendreigh, Florida	164

## 2. The Year in Review

Table 3. AAVSO Observers, 2015–2016, cont.\*

<i>Code</i>	<i>Org.</i>	<i>Name</i>	<i>No. Obs.</i>	<i>Code</i>	<i>Org.</i>	<i>Name</i>	<i>No. Obs.</i>
PPL		P. Plante, Ohio	317	RJV		J. Ruiz Fernandez, Spain	1213
PAW	29	A. Plummer, Australia	2849	RDJB		D. Ryan, Massachusetts	2882
AST	12	R. Podesta, Argentina	17	RZM		M. Rzepka, Poland	8
PJGA	27	J. Pontes, Canada	48	SRIC		R. Sabo, Montana	38494
PVEA		V. Popov, Bulgaria	2516	SJQ		A. Sajtz, Romania	106
PJOF		J. Poppele, Minnesota	27	SSU		S. Sakuma, Japan	433
PJTA	17	J. Porio, Finland	406	SAAB		A. Saleem, Pakistan	1
PRV		R. Potter, Michigan	418	SIMA	12	I. Salvalai, Argentina	5
PWR		R. Powaski, Ohio	8	SBAH		B. Salwiczek, Poland	732
POX		M. Poxon, United Kingdom	1038	SAH		G. Samolyk, Wisconsin	72615
PYG	20	G. Poyner, United Kingdom	8032	SBIB		B. Sanders, Arkansas	64
PEMB		E. Primucci, Argentina	1917	SXY		A. Sankowski, Poland	6
PVAA		V. Prodanets, Ukraine	62	SSIM		S. Santini, Italy	170
PALA		A. Prokofyev, Cyprus	2	SLVA		Á. Santos, Brazil	3
PMB		M. Prokosch, Texas	44	SVA		A. Saw, Australia	77
PDQ	01	D. Proust, France	22	SEDB		E. Sawyer, Canada	352
PMIA		M. Pugnaire Sáez, Spain	1	SMAI		M. Sblewski, Germany	352
PUJ	06	F. Pujol-Clapes, Spain	661	SDAV		D. Scanlan, United Kingdom	511
PARA		A. Purroy, Spain	22	SFS		S. Schiff, Virginia	446
PHG		H. Purucker, Germany	28	SRBR		R. Schippers, Netherlands	660
PALE		A. Purves, Maryland	1124	SPK	01	P. Schmeer, Germany	2
PAGB	12	A. Pérez, Argentina	10	SRAB	02	R. Schoenfeld, Germany	593
QULA		U. Quadri, Italy	183	SFRA		F. Schorr, Georgia	2204
QCTA		C. Quandt, Germany	26	SYU	02	M. Schubert, Germany	737
RKE	02	K. Raetz, Germany	367	SBEA	02	B. Schwarz, Germany	304
RGJA		G. Raineault, Canada	12	SJEA	01	J. Sciolla, France	545
RJOC		J. Rallo, Spain	181	SJTS	20	J. Screech, United Kingdom	16482
RMAF		M. Rana, Virginia	685	SDPB		D. Scriven, Michigan	455
RMW		M. Rapp, Texas	49	SJIA		J. Seargeant, New Mexico	306
RMAH		M. Rath, Virginia	12	SKRA	03	K. Segesdi, Hungary	1
RJEA		J. Rayon, France	27	SDMA		D. Selmo, Brazil	2
RWSA	29	W. Rea, New Zealand	222	SSAB		S. Sementsov, Russian Federation	9
REP	24	P. Reinhard, Austria	382	SIV		I. Sergey, Belarus	777
RFP	13	P. Reis Fernandes, Brazil	60	SMRC	01	M. Serreau, France	21
PREB		P. Reiss, France	85	SDEA		D. Severin, Argentina	9
RMIC		M. Remartinez Peinado, Spain	4	SDEC		D. Shaddock, Massachusetts	1
RAAB		A. Repnoy, Ukraine	1	SSTA	27	S. Shadick, Canada	6
RJG		J. Ribeiro, Portugal	1062	SSHA		S. Shaffer, Wyoming	415
RMP		M. Ricard, Canada	41	SJDA	20	J. Shanklin, United Kingdom	170
RNO		N. Richardson, Ohio	14	SHS		S. Sharpe, Canada	2836
RCCA		C. Riou, France	30	SDP		D. Sharples, New York	2
OJR		J. Ripero Osorio, Spain	3831	SQN		L. Shaw, California	4
RIZ		J. Ritzel, New York	6485	SFY	20	J. Shears, United Kingdom	3681
RJJC		J. Rivet, Texas	17	SPT	01	P. Sheldrick, France	2
REE		E. Robinson, United Kingdom	14	SVLA		V. Shlyonskov, Russian Federation	5
RPT		P. Rochford, Alabama	24	SANF		A. Shmagun, Ukraine	206
RAEA		A. Rodda, United Kingdom	1784	SLH		L. Shotter, Pennsylvania	605
RDAE		D. Rodriguez, Spain	2	SGQ		C. Sigismondi, Italy	332
RHE	26	H. Rodriguez, Uruguay	4	SFLB		F. Signoret, France	131
RFC		F. Rodriguez Bergali, Spain	2	SKED		K. Sikes, Arizona	131
RMU	06	M. Rodriguez Marco, Spain	40	SPAO	18	P. Siliprandi, Italy	651
RZD		D. Rodriguez Perez, Spain	752	SMCA	37	M. Silveira, Brazil	1
ROE		J. Roe, Missouri	3423	SGEO		G. Silvis, Massachusetts	141
RFDA		F. Romanov, Russian Federation	10	SNE		N. Simmons, Wisconsin	7981
RDAC		D. Romeuf, France	183	SXN		M. Simonsen, Michigan	2002
RPHA		P. Rosa, Brazil	2	SANG		A. Sing, Philippines	328
ROG		G. Ross, Michigan	292	SGOR		G. Sjöberg, Massachusetts	1206
RGN		G. Rossi, Italy	250	SDN		D. Slauson, Iowa	58
RDU		D. Ruck, Ohio	1	SDAB		D. Smales, United Kingdom	288



Table 3. AAVSO Observers, 2015–2016, cont.\*

<i>Code</i>	<i>Org.</i>	<i>Name</i>	<i>No. Obs.</i>	<i>Code</i>	<i>Org.</i>	<i>Name</i>	<i>No. Obs.</i>
STAC		T. Smela, Poland	3566	TDG		D. Turner, Canada	202
SHA		H. Smith, Michigan	494	TYS		R. Tyson, New York	84
SJE		J. Smith, California	33	TSAA		S. Tzikas, Virginia	55
SMJD	20	M. Smith, United Kingdom	104	UAN	03	A. Uhrin, Hungary	8
STAK		T. Soejima, Japan	3	UJHA		J. Ulowetz, Illinois	47817
SROD		R. Solomon, Australia	287	UIS01		B. University of Illinois Springfield, Illinois	166
SZOL	03	Z. Sonkoly, Hungary	10	UMAA		M. Urbanik, Slovakia	1019
SPGA		P. Spital, United Kingdom	34	VTY	20	T. Vale, United Kingdom	520
SXR	03	M. Sragner, Hungary	8	VCEA		C. Valencia Gallardo, France	3
SBL		B. Staels, Belgium	5949	BVE	04	E. Van Ballegoij, Netherlands	421
SVAE		V. Stanimirov, Bulgaria	4	VBRB		B. Van Deventer, Washington	70
SDB		D. Starkey, Indiana	7120	VDE	04	E. Van Dijk, Germany	41
SPET		P. Starr, Australia	14406	VNL	05	F. Van Loo, Belgium	1061
SYO		T. Steck, Indiana	6	VLYA		L. Van Rooijen-McCullough, Netherlands	31
SABB		A. Steenkamp, United Kingdom	28	VUG	04	G. Van Uden, Netherlands	202
STI		P. Steffey, Florida	448	VWS	05	J. Van Wassenhove, Belgium	1806
SWOA		W. Stegmüller, Germany	9	VANA		A. Vasilev, Ukraine	1362
SWIL		W. Stein, New Mexico	22582	VKAB	12	K. Vassallo, Argentina	10
SET		C. Stephan, Ohio	626	VBE		B. Vatant, France	3
SMDB		M. Stewart, Kansas	23	VMAF		M. Vaupotic, Slovenia	21
SGEA		G. Stone, California	104312	VED	01	P. Vedrenne, France	5883
SDI	20	D. Storey, United Kingdom	2	VRUB		R. Velikazov, Ukraine	236
SWIA		W. Strickland, Texas	113	VBPA		B. Vietje, Vermont	2602
SNJ		N. Stritof, Slovenia	100	VBL	03	B. Vilagos, Hungary	5
SRX	14	R. Stubbings, Australia	123	VFRA		F. Villano, Italy	27
SAC	02	A. Sturm, Germany	395	VII	03	I. Vincze, Hungary	201
SUS	02	D. Suessmann, Germany	669	VGK		G. Vithoukas, Greece	1408
SPP		P. Sullivan, California	39	VAQA		A. Vodniza, Colombia	84
SJAR		J. Suomela, Finland	933	VFK	02	F. Vohla, Germany	8062
SWV		D. Swann, Texas	383	VOL		W. Vollmann, Austria	1957
SSW		S. Swierczynski, Poland	16	WEO		E. Waagen, Massachusetts	16
SJME		J. Sykes, Washington	113	WCR	27	R. Wagner, Canada	16
SAO	03	A. Szauer, Hungary	141	WGR		G. Walker, New Hampshire	7735
SLY	03	L. Szegedi, Hungary	135	WZIB		Z. Wang, China	15
SNO	03	L. Szentasko, Hungary	2	WJOB	19	J. Warell, Sweden	1
SFQ	03	T. Szentasko, Hungary	3	WAU		A. Wargin, Poland	60
TUO		U. Tagliaferri, Italy	77	WAB		B. Warner, Colorado	378
TMAA		M. Talero, Spain	116	WCB		C. Webster, Pennsylvania	8
TFK	03	F. Tamasko, Hungary	60	WPT		P. Wedepohl, South Africa	51
TJOB		J. Tapioles, Spain	1	WSHA		S. Wei, China	1
TCGA	20	C. Taylor, United Kingdom	100	WRCA		R. Weir, New Hampshire	2157
TDB	27	D. Taylor, Canada	398	WWC		W. Weiss, Arizona	1
TACA		A. Teixeira Juelle, Brazil	1	WKL	02	K. Wenzel, Germany	1023
TPV		P. Temple, New Mexico	37	WROC		R. Werder, Germany	770
TCI	03	C. Tepliczky, Hungary	32	WIAA		I. Wheelband, Canada	1
TPS	03	I. Tepliczky, Hungary	625	WJAA		J. Whinfrey, United Kingdom	223
TTU		T. Tezel, Turkey	3	WNIB		N. White, United Kingdom	73
TPJB		P. Thibault, Minnesota	4	WBOA		B. Wichert, Germany	130
TJP	20	J. Thorpe, United Kingdom	31	WFOA		F. Wierda, Finland	107
TIA	03	A. Timar, Hungary	392	WWK		K. Wierchos, Florida	36
TLEB		L. Tkachook, Ukraine	539	WTHB	19	T. Wikander, Sweden	4488
TSCB		S. Toft, Switzerland	14	WTHA		T. Will, Germany	6
TRE		R. Tomlin, Illinois	1728	WI		D. Williams, Indiana	7
TOO	20	J. Toone, United Kingdom	4352	WPX	29	P. Williams, Australia	7701
TRT	03	T. Tordai, Hungary	8997	WAJA	20	A. Wilson, United Kingdom	2
TTN	03	T. Torok, Hungary	1	WWJ		B. Wilson, United Kingdom	67
TRF		C. Trefzger, Switzerland	44	WBH		R. Wilson, Arizona	12
TYGA		Y. Tsao, Taiwan	95	WSN		T. Wilson, West Virginia	2132
TXA		A. Tudorica, Romania	1	WERB	02	E. Wischnewski, Germany	120

## 2. The Year in Review

Table 3. AAVSO Observers, 2015–2016, cont.\*

Code	Org.	Name	No. Obs.	Code	Org.	Name	No. Obs.
WKM		M. Wiskirken, Washington	13	YBA		B. Young, Oklahoma	132
WPB	20	P. Withers, United Kingdom	1980	YDV		D. Young, Massachusetts	1897
WTW	01	J. Wittwer, Switzerland	4	YON		R. Young, Pennsylvania	32
WWD		W. Wood, Arizona	2	ZALB	37	A. Zanardo, Brazil	1
WUB	04	E. Wubbena, Netherlands	417	ZPA		P. Zeller, Indiana	5
WCG		C. Wyatt, Australia	1	ZGEA		G. Zhao, California	2
XTSA		T. Xu, China	1	ZBOA		B. Zhuravlova, Ukraine	398
YBRA		B. Yang, China	7	ZTAA		T. Zia, Pakistan	6
YIGA		I. Yatsenkov, Russian Federation	236	ZUD		D. Zubenel, Kansas	19
YADA		A. Yore, Missouri	6	ZALC		A. Zverev, Russian Federation	201

\*Totals reflect observations made during fiscal 2015–2016 and do not include historical data (data preceding fiscal 2015–2016) submitted during fiscal 2015–2016.

These codes, which appear in the Table (AAVSO Observers 2015–2016), indicate observers are also affiliated with the groups below:

01	Association Française des Observateurs d'Étoiles Variables (AFOEV)	14	Royal Astronomical Society of New Zealand, Variable Star Section
02	Bundesdeutsche Arbeitsgemeinschaft für Veränderliche Sterne e.V. (BAV) (Germany)	15	Agrupacion Astronomica de Sabadell (Spain)
03	Magyar Csillagászati Egyesület, Valtözocsillag Szakcsoport (Hungary)	16	Association of Variable Star Observers "Pleione" (Russia)
04	Koninklijke Nederlandse Vereniging voor Weer-en Sterrenkunde, Werkgroep Veranderlijke Sterren (Netherlands)	17	URSA Astronomical Association, Variable Star Section (Finland)
05	Vereniging voor Sterrenkunde, Werkgroep Veranderlijke Sterren (Belgium)	18	Unione Astrofili Italiani (Italy)
06	Madrid Astronomical Association M1 (Spain)	19	Svensk Amatör Astronomisk Förening, Variabelsektionen (Sweden)
08	Norwegian Astronomical Society, Variable Star Section	20	British Astronomical Association, Variable Star Section
09	Ukraine Astronomical Group, Variable Star Section	24	Astronomischer Jugendclub (Austria)
10	Astronomical Society of Southern Africa, Variable Star Section	26	Red de Observadores (Montevideo, Uruguay)
11	Astronomisk Selskab (Scandinavia)	27	Royal Astronomical Society of Canada
12	Liga Iberoamericana de Astronomia (South America)	29	Variable Stars South (New Zealand)
13	Rede de Astronomia Observacional (Brazil)	31	Center for Backyard Astronomy
		34	Astronomical Society of South Australia
		36	Nucleo de Estudio e Observacao Astronomica--Jose Bazilio de Souza (Florianopolis, Brazil)
		37	Clube De Astronomia De Sao Paulo (Brazil)

Table 4. Observation statistics for fiscal year 2015–2016.\*

Observations (increments of 1000)	No. Observations per increment	% of All Observations	No. Observers per increment
0 – 999	103243	5	681
1000 – 1999	83731	4	58
2000 – 2999	70984	4	29
3000 – 3999	48788	2	14
4000 – 4999	32011	2	7
5000 – 5999	22984	1	4
6000 – 6999	32073	2	5
7000 – 7999	52293	3	7
8000 – 8999	42484	2	5
9000 – 9999	19482	1	2
10000+	1473580	74	34

\*Totals reflect observations made during fiscal 2015–2016 and do not include historical data (data preceding fiscal 2015–2016) submitted during fiscal 2015–2016.

## Variable Star Observing Campaign Highlights

**Elizabeth O. Waagen**

The AAVSO participates in many observing campaigns on variable stars. These campaigns arise from the request for assistance by an astronomer, or from the AAVSO itself in response to unusual stellar activity. Campaigns may run from a few days to weeks or months, or may be ongoing. A complete list may be found at <https://www.aavso.org/observing-campaigns>. Below are some highlights.

Many papers are published that are based in part or in total on variable star data obtained by AAVSO observers. One such paper is “GW Librae: Still Hot Eight Years Post-Outburst” (Paula Szkody, Anjum S. Mukadam, Boris T. Gaensicke, Paul Chote, Peter Nelson, Gordon Myers, Odette Toloza, Elizabeth O. Waagen, Edward M. Sion, Denis J. Sullivan, Dean M. Townsley), which was published in 2016 in the *Astronomical Journal* (2016AJ....152...48S). Since a very rare large-amplitude outburst of GW Lib was reported in 2007 by Peter Nelson (*AAVSO Special Notices #40 and #42, AAVSO Alert Notice 349*), this star has been closely studied by Drs. Paula Szkody and Boris Gaensicke and numerous colleagues. Several times AAVSO observing campaigns have been carried out in support of observations being made by the Hubble Space Telescope (HST), including in 2010 (*Alert Notice 417 and Special Notice #199*), 2011 (*Alert Notice 433 and Special Notice #238*), 2012–2013 (*Alert Notice 471 in 2012 and Special Notice #354 in 2013*), and 2015 (*Alert Notice 513 and Special Notice #403*). Not only were ongoing observations of value, but AAVSO coverage was essential to verify that GW Lib had not brightened prior to the HST observations in order to protect the sensitive on-board instrumentation.

### *Highlights from FY 2016*

In early February 2016, Dr. James Miller-Jones (International Centre for Radio Astronomy Research, Curtin University, Perth, Western Australia) and colleagues requested AAVSO assistance in monitoring the dwarf nova SS Cyg for a complex radio campaign. As in previous radio campaigns on SS Cyg with Dr. Miller-Jones and his colleagues, extremely close monitoring and immediate reporting was essential in order to catch the very start of an outburst in order to trigger radio observations, this time with the radio telescope arrays e-MERLIN and AMI-LA, both located in the United Kingdom. NASA’s Swift X-ray satellite was later added to the satellite mix! The duration of the campaign depended on when the next outburst of SS Cyg occurred, whether its onset was suitably timed for detection by AAVSO observers, and whether the type of outburst was suitable for the campaign (*AAVSO Alert Notice 536*). The first outburst that could be observed was an anomalous one, so the e-MERLIN observations were not carried out (because no

## 2. The Year in Review

anomalous outburst had been observed in radio before) but the AMI-LA ones were carried out (for the very same reason), and the AAVSO observed this outburst very closely, as a result obtaining the first radio data on an anomalous outburst of SS Cyg. The campaign was continued in order to catch an outburst that all the instrumentation could follow (*AAVSO Special Notice #414*). The normal outburst of SS Cyg in April was successfully observed. The very interesting thread on this campaign, with numerous substantial comments from the astronomers, is at the AAVSO's Campaigns and Observation Reports forum at (<https://www.aavso.org/ss-cyg-radio-campaign>).

In late February, Dr. Donald Collins (Swannanoa, North Carolina), Dr. Robert Zavala (US Naval Observatory, Flagstaff Station), and Jason Sanborn (Lowell Observatory) requested time series photometry of the bright eclipsing system b Per (not beta Per) to detect a secondary eclipse of the third star of the system by the other two stars in the system. Coverage was requested before, during, and after the eclipse predicted for 2016 March  $7 \pm 1$  week (*Alert Notices 537* and *540*). AAVSO observers provided multicolor time series photometry that showed the secondary eclipse on March 10–11 UT (Figure 1). The astronomers were very appreciative and are currently carrying out an analysis.

Also in late February, Dr. Jenő Sokoloski (Columbia University) and graduate student Adrian Lucy (Columbia University) requested multicolor time series observations of the jet-driving symbiotic star V694 Mon (MWC 560), which was in outburst, in support of upcoming Chandra satellite observations to investigate the state of the inner accretion disk during the outburst. Coverage was requested through April 30 (*AAVSO Alert Notice 538*). AAVSO observers contributed good coverage (Figure 2), and the campaign was concluded. In July, the astronomers re-opened the campaign, asking AAVSO observers to observe V694 Mon to see if the star was flickering or even still in outburst. These data would help the astronomers evaluate whether they should extend their X-ray research

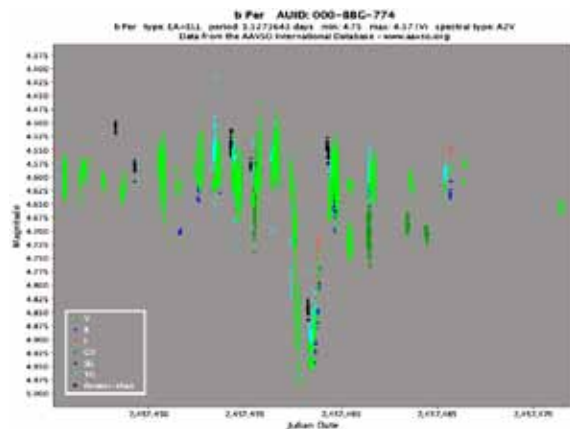


Figure 1. 26 February 2016–23 March 2016

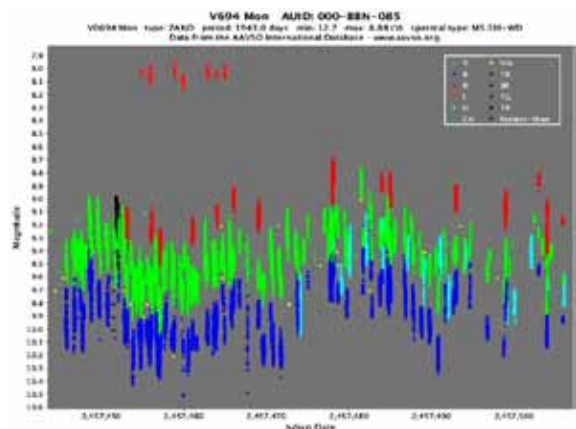


Figure 2. 25 February 2016–27 April 2016

and whether AAVSO observers should keep following this star, and would help correlate their radio data being obtained through January 2017. AAVSO coverage provided the needed information.

In early April the AAVSO issued a call to monitor the symbiotic recurrent nova T CrB, which had entered a super-active state, and was brighter and bluer than it had been since before its last outburst, which occurred in 1946 (*AAVSO Special Notice #415*). Multicolor and visual ongoing observations were requested; they have showed that although the star has not gone into outburst, it has not returned to the magnitude it was before the brightening, but appears to have stabilized at about one magnitude brighter. Close coverage of this star is continuing. T CrB has been observed twice in outburst, in 1866 and 1946. Each time it brightened rapidly to  $V \sim 2.0$ , then declined back to pre-outburst levels. Extremely interesting research by U. Munari et al. reveal an intriguing correlation between the previous outbursts and the recently-seen behavior: a similar brightening followed the 1866 outburst by about 70 years, and it is now 70 years since the 1946 outburst. If the pattern continues, T CrB may be on track for an outburst in 2026.

In mid-August, Dr. Thomas Marsh (University of Warwick) and colleagues requested fast-cadence optical photometry through mid-September in support of XMM Newton satellite observations of the extremely interesting binary AR Sco scheduled for September 10–11 (*AAVSO Alert Notice 548*). The campaign was successfully carried out. This fascinating binary system was the subject of an exciting paper in the July 2016 issue of *Nature* (“A radio-pulsing white dwarf binary star”, T. R. Marsh et al.) (<http://www.nature.com/nature/journal/vaop/ncurrent/full/nature18620.html>). A pre-print version is available at arXiv (<http://arxiv.org/abs/1607.08265>). A press release from the European Southern Observatory is available at <http://www.eso.org/public/news/eso1627/?lang>.

As an example of a very long-running AAVSO observing campaign, in January 2016, Dr. George Wallerstein (University of Washington) requested AAVSO coverage of the long period/symbiotic variable R Aqr in support of high-resolution spectroscopic observations (*AAVSO Alert Notice 535*). Coverage was requested to continue at least for the next several years to cover the eclipse which occurs every 43–44 years and is predicted for 2022 (but which may come early). Several other astronomers are also studying R Aqr closely and will be carrying out multi-mode, multiwavelength observations in the near future. R Aqr, both a Mira and a symbiotic variable, is a close binary system consisting of a hot star and a late-type star (the Mira), both enveloped in nebulosity. The cause of the eclipse, which lasts for years, is unknown; several theories have been proposed, and careful investigation of this upcoming event should help to resolve this question. Ongoing spectroscopy over the next several years was also recommended.

## 2. The Year in Review

### *Other observing campaigns the AAVSO successfully participated in during FY 2016*

Monitoring the Cepheids X Cyg, SZ Cyg, TX Cyg, VX Cyg, and the RV Tau star MZ Cyg for correlation with spectra to be obtained during radial velocity studies (AAVSO *Alert Notice 529*)—Dr. George Wallerstein (University of Washington). Campaign ongoing.

Monitoring the enigmatic variable star KIC 8462852, discovered in October 2015, to further characterize the star's variability (AAVSO *Alert Notice 532*)—AAVSO. Campaign ongoing.

Monitoring the X-ray black hole binary V404 Cyg (AAVSO *Alert Notice 520*) during and also subsequent to the official campaign, as the December 2015 outburst that followed its June spectacular outburst demonstrated that its behavior around outburst events is clearly unpredictable (AAVSO *Alert Notices 520 and 522*)—AAVSO and many astronomers. Excellent coverage obtained, campaign ongoing.

Monitoring of the dwarf novae RX And, Z Cam, YZ Cnc, U Gem, and SU UMa in support of observations to be made with the Very Large Array (VLA), providing observations to enable knowing the quiescence/outburst status of each target at time of VLA observations and to help schedule the VLA observations, as well as for correlation with the VLA data (AAVSO *Alert Notice 539*)—Deanne Coppejans (PhD candidate, Radboud University Nijmegen (Netherlands) and University of Cape Town) and colleagues. Very successfully concluded.

Obtaining and reporting images of 20 cataclysmic variables according to a precise schedule in order to determine final target list for observations with the William Herschel Telescope (WHT) (AAVSO *Alert Notice 543*, AAVSO *Special Notice #416*)—Roque Ruiz-Carmona (PhD candidate, Institute of Mathematics, Astrophysics and Particle Physics, Radboud University Nijmegen, The Netherlands). Campaign quite successful despite schedule alterations mid-campaign due to technical problems with WHT.

Time-series observations of the intermediate polar cataclysmic variable FO Aqr in support of the astronomers' study of multiple periods and their evolution in FO Aqr as it returned to maximum (AAVSO *Alert Notice 545*)—Dr. Colin Littlefield (University of Notre Dame) and colleagues. Campaign successfully concluded.

Optical photometry of the bright colliding-winds binary V1687 Cyg (WR 140, HD 193793) in support of a multi-wavelength campaign studying dust behavior as the system passes through periastron (AAVSO *Alert Notice 546*, AAVSO *Special Notice #419*)—Dr. Noel Richardson (University of Toledo) and colleagues. Campaign continuing until at least August 2017.

Visual and V monitoring of the Z Cam-type cataclysmic variable RX And in support of target-of-opportunity observations to be obtained by the Chandra X-ray satellite (AAVSO Alert Notice 549)—Dr. Christian Knigge (University of Southampton) and colleagues. Campaign successfully concluded.

Monitoring of the cataclysmic variable GDS\_J1701281-430612 in support of HST/COS observations (AAVSO Alert Notice 551)—Dr. Mark Reynolds (University of Michigan) and colleagues. Campaign successfully concluded.

Monitoring before, during, and after the Gaia16aye microlensing event predicted for early October 2016 (AAVSO Alert Notice 552)—Dr. Kirill Sokolovsky (National Observatory of Athens and Sternberg Astronomical Institute, Moscow State University). Campaign successfully concluded.

Monitoring of the symbiotic variable AG Peg (Figure 3) following its outburst in late May 2015 (AAVSO Alert Notice 521), the first outburst since its only other known outburst, which occurred in 1860-1870 (it took about 10 years to reach maximum). It was unknown how this outburst would progress, and it was very interesting! The January 2016 issue of the *AAVSO Newsletter* (<https://www.aavso.org/aavso-newsletter>) contained an article on AG Peg by Dr. Gavin Ramsay et al. A paper by Ramsay et al. which utilized AAVSO data as a fundamental resource was published in the *Monthly Notices of the Royal Astronomical Society* (2016MNRAS.461.3599R)—Dr. Gavin Ramsay (Armagh Observatory, N. Ireland). Campaign successfully concluded; continued coverage requested until star has completed its return to minimum.

Monitoring of component A of the classical T Tauri star RW Aur that was begun in early 2015 continued throughout FY 2016 but at a less intense level to support a

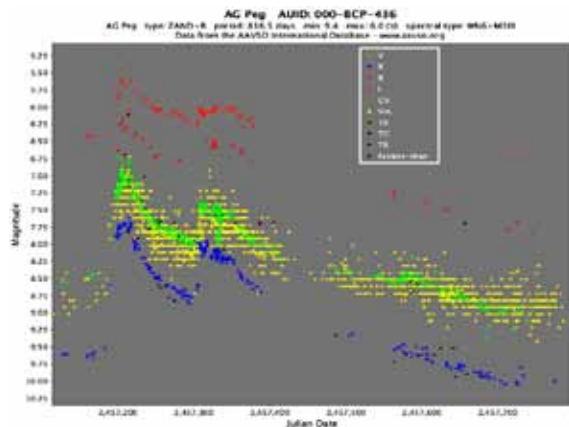


Figure 3. 1 April 2016–31 January 2017

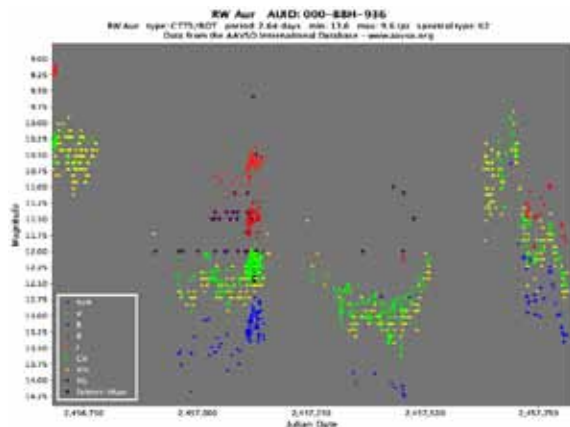


Figure 4. 23 January 2014–25 February 2017

## 2. The Year in Review

multiwavelength study investigating whether dimming of the star, when component B has no accretion disk, may have been caused by RW Aur B passing by A and pulling matter out of the disk around A (Figure 4; *AAVSO Alert Notice 514*)—Dr. Hans Moritz Guenther (Massachusetts Institute of Technology). Ongoing study.

Monitoring the rare FU Ori object 2MASS J06593158-0405277 as part of a multiwavelength campaign to observe it from the optical to the infrared; only about two dozen of these objects are known; it is poorly understood and is one of the brightest such objects seen in recent times (*AAVSO Alert Notice 518*)—Dr. Fabienne A. Bastien (Hubble Postdoctoral Fellow, Pennsylvania State University). Ongoing campaign.

Monitoring V1400 Cen = J1407 (1SWASP J140747.93-394542.6) to look for eclipses (to explain dips in light curve) in this possibly multi-body system (*AAVSO Alert Notice 462*)—Dr. Eric Mamajek (CTIO, U. Rochester). Ongoing campaign.

Multicolor monitoring of the semiregular variable CH Cyg (multiple *AAVSO Alert* and *Special Notices*, most recently *AAVSO Special Notice #320*)—Dr. Margarita Karovska (Harvard-Smithsonian Center for Astrophysics (CfA)). Ongoing campaign.

Multicolor monitoring of the symbiotic star RT Cru before, during, and after observations by the X-ray satellites Chandra and Swift which were carried out in November 2015 (*AAVSO Special Notice #411*)—Dr. Margarita Karovska (CfA). Ongoing campaign.

Visual and instrumental monitoring of the symbiotic nova candidate ASAS J174600-2321.3 before, during, and after eclipse which occurred during the outburst (*AAVSO Alert Notice 510*)—S. Otero, P. Tisserand, K. Bernhard, and S. Hümmerich. Campaign ongoing, particularly until nova begins to decline, and then until it returns to minimum.

Monitoring eclipse of the long period eclipsing binary EE Cep (Be star w/orbiting dusty disk belonging to unseen companion) (*AAVSO Alert Notice 502*, *AAVSO Special Notice #387*)—Dr. Cezary Galan (Nicolaus Copernicus Astronomical Center). Eclipse detected and campaign very successfully concluded; ongoing observations requested.

Post-eclipse monitoring of epsilon Aur to look for expected coherent pulsation (*AAVSO Alert Notice 504*)—Dr. Robert Stencel (University of Denver). Pulsation observed, ongoing study.

Monitoring of the S Dor (Luminous Blue Variable) P Cyg (*AAVSO Alert Notice 440*)—Ernst Pollmann (Active Spectroscopy in Astronomy (ASA) group, Germany). Ongoing campaign.



Monitoring of HMXBs and SFXTs (*AAVSO Alert Notice 377*)—Dr. Gordon Sarty (University of Saskatchewan). Ongoing campaign.

Monitoring of faint Mira QX Pup (*AAVSO information page*)—Dr. Arne Henden (formerly AAVSO, now retired). Ongoing observations requested.

Monitoring of Blazars (*AAVSO Alert Notice 353*)—Dr. Markus Boettcher (Ohio University). Ongoing study.

### ***Novae***

In addition to the above campaigns on established variable stars, observing campaigns were carried out on the eight galactic novae discovered in FY 2016:

V1831 Aql (Nova Aql 2015 = ASASSN 15-qd = PNV J19215012+1509248): Highly reddened classical nova. Independently discovered 2015 October 5 at unfiltered magnitude 12.4 by K. Itagaki, and on 2015 October 1 at  $V=15.2$  by ASAS-SN as reported by B. J. Shappee (Hubble Fellow, Carnegie Observatories) et al. (*AAVSO Alert Notice 530*). (Itagaki is considered the first discoverer because he reported his discovery much earlier, even though his date of discovery is later than that of Shappee et al.). As of 2015 November 18.0132 UT was  $17.901V \pm 0.598$  (J. Hamsch, Mol Belgium).

V2949 Oph (Nova Oph 2015 No. 2 = TCP J17344775-2409042): Highly reddened classical nova. Independently discovered by K. Nishiyama and F. Kabashima and by S. Fujikawa on 2015 October 11 at unfiltered magnitude 11.8-12.1 (*AAVSO Alert Notice 531*). As of 2016 April 2.775 UT it was visual magnitude  $<15.0$  (A. Pearce, Nedlands, W. Australia).

V5850 Sgr (Nova Sgr 2015 No. 4 = PNV J18225925-1914148): He/N nova. Independently discovered 2015 October 31 UT by H. Nishimura, M. Yamamoto, and S. Fujikawa at unfiltered magnitude 11.5-11.8 (*AAVSO Alert Notice 534*). As of 2015 November 9.036 UT it was visual magnitude  $<14.4$  (B. Cudnik, Houston, Texas).

V3661 Ophiuchi (Nova Oph 2016 = PNV 17355050-2934240): Highly reddened classical nova. Independently discovered 2016 March 11 UT by Minoru Yamamoto and by Yuji Nakamura at unfiltered CCD magnitude  $\sim 10.6$  (*AAVSO Alert Notice 541*). As of 2016 June 2.7235 UT it was magnitude  $16.9V \pm 0.15$  (P. Nelson, Ellinbank, Victoria, Australia).

V1655 Sco (Nova Sco 2016 = PNV J17381927-3725077): Classical nova. Discovered 2016 June 10.629 UT by Hideo Nishimura at unfiltered CCD magnitude 12.4 (*AAVSO Alert Notice 544*). As of 2016 November 3.4398 UT it was magnitude  $17.4 \pm 0.2$  (P. Nelson, Ellinbank, Victoria, Australia).

## 2. The Year in Review

V5853 Sgr (Nova Sgr 2016 No. 2 = ASASSN-16ig = TCP J18010780-2631434): Fe II-type classical nova. Independently discovered 2016 August 6 and 8 UT, respectively, by the All Sky Automated Survey for SuperNovae (ASAS-SN) and by Koichi Nishiyama and Fujio Kabashima at unfiltered CCD magnitude 12.4 (AAVSO *Alert Notice 547*). As of 2016 November 4.9983 UT it was magnitude 15.099 V  $\pm$ 0.111 (J. Hamsch, Mol Belgium; Figure 5).

V1656 Sco (Nova Sco 2016 No. 2 = PNV J17225112-3158349 = ASASSN-16kd): Highly reddened Fe II-type classical nova. Independently discovered 2016 September 6 UT by ASAS-SN and by Shigehisa Fujikawa at magnitude 12.13 V and unfiltered CCD magnitude 11.6, respectively (AAVSO *Alert Notice 550*). As of 2016 October 28.4224 UT it was magnitude 15.92 V  $\pm$ 0.03 (P. Nelson, Ellinbank, Victoria, Australia).

V407 Lup (Nova Lup 2016 = PNV J15290182-4449409 = ASASSN-16kt): Classical nova (fast type). Discovered 2016 September 24.010 UT by ASAS-SN at magnitude 9.11 V (AAVSO *Alert Notice 553*). As of 2017 February 24.8347 UT it was visual magnitude 13.9 (A. Pearce, Nedlands, W. Australia).

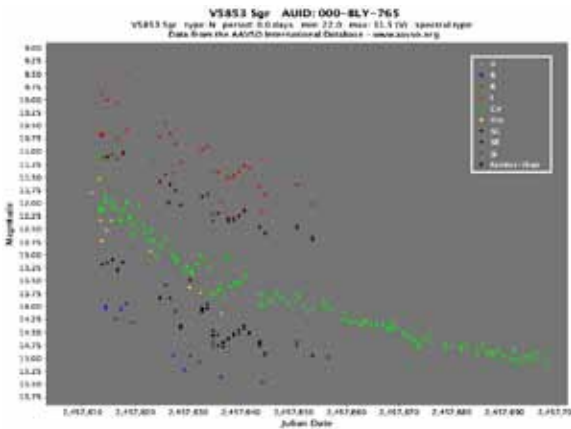


Figure 5. 8 August 2016–5 November 2016

## The International Variable Star Index (VSX)

**Sebastián Otero and Patrick Wils**

The International Variable Star Index is a continuously evolving database including most available variable star catalogues and stars published in variable star listings/journals plus new discoveries submitted by individual researchers. It was created by amateur astronomer Christopher Watson and is kept by the AAVSO with the valuable input of individual contributors who revise known variable stars and submit new ones. All that information is included in our database after a strict moderation process.

VSX is mostly maintained by staff member Sebastián Otero and volunteer Patrick Wils. Sebastián reviews all submissions/revisions and contacts the observers so they can correct or improve the uploaded information. Questions about catalogues and data analysis—and especially issues concerning variable star classification—are continuously being discussed by e-mail as part of the moderation process. Sebastián also adds stars from alert pages, works on updates of existing records, prepares new lists of objects for upload, hides duplicate entries and works on inconsistencies between VSX, VSD (The Comparison Star Database), and the AID (AAVSO International Database). He also deletes comparison stars from sequences (the Sequence Team then replaces the “lost” comparison if needed).

Patrick works with data updates from journals and some other miscellaneous sources. He uploads lists of variable stars prepared by Klaus, Sebastián, and himself, helps replace AUIDs in VSX when an already existing AUID in VSD is found, and does some of Sebastián’s duties when he’s not available. He is always behind the scenes making changes and improvements to the database structure and the user interface, and correcting bugs—all things that may go unnoticed but make the VSX process faster and more efficient. More recently, some volunteers have joined us in this endeavor.

### *Volunteers*

As years go by, more and more new variable stars are being discovered, not only by the growing number of sky surveys but also by amateurs equipped with CCD or DSLR cameras. It is a challenge to keep our database up to date with such a flood of information but we struggle to reach that goal without compromising the quality of the data included in VSX. Also, the number of alerts that we need to check grows faster, just think about ASAS-SN, MASTER, CRTS, and Gaia and how popular they are nowadays. We are even correcting some mistakes made by the survey teams as we add those stars to VSX. Collaboration between groups is essential.

## 2. The Year in Review

This is where our volunteers play a major role. Patrick Wils has dedicated a lot of volunteer work over these years to add new variables or corrections made on known variables as they are published in journals, alert pages, or even in web resources. Since the number of incoming data grew exponentially, he needed help to keep up with this task. We made a call for volunteers last year and some people offered their help and are now part of the VSX Team. We still have to process some of the duplicate records Tamás Zalezsák detected over the last couple of years and check some potential wrong cross-identifications in crowded fields for objects with poor positions coming from the ASAS survey. Tamás is now submitting revisions and new additions mostly on mira stars.

Klaus Bernhard continued working actively on preparing lists for VSX import. It is not something straightforward because each paper or each variable star list comes with its own format and we need to extract the information in a format suitable for our database needs. A very important step in this work is to make sure that the new variables added are not actually duplicates of stars already included in VSX. So a thorough cross-identification of the new stars with our own records is always performed. Klaus also checks the reliability of the published data so we can avoid overwriting good information with wrong numbers in the case of revisions and we make sure that we are adding bona-fide new variables in the case of the new entries. Then Sebastián makes some final checks and Patrick uploads them. That is a nice example of team work!

Bruno Billiaert started helping the team checking Astro-ph papers right when David Hinzl had to leave (in January). He submitted the newly published variables and revised the already known ones based on the recent publications. He did that work until April, when he had to leave due to work priorities. Thanks, Bruno! David Hinzl joined us again in September and took up the Astro-ph work right where Bruno left.

Paul York has also started working with us in June and he has been updating VSX with information found in *JAAVSO* papers. We hope that he continues to do so until our journal information is completely imported to VSX. We need more volunteers. If you have some experience with variable star classifications, light curves, and if you have used VSX in the past, you might want to give these tasks a try:

- checking Astro-ph papers;
- checking various online journal papers;
- preparing lists for VSX upload;
- revising VSX records with obvious mistakes or missing information.

If you want to join us, your help is welcome. Send a message to us ([vsx@aaavso.org](mailto:vsx@aaavso.org)). Our need for volunteers will only grow.

### *VSX forum*

The VSX forum is a platform for discussion of any VSX issue and to inform our members of some news or improvements we may make to VSX. If you have some question related to VSX, post it there and not to the other forums, so the discussions can be found more easily (<https://www.aavso.org/forums/about-aavso/vsx>).

### *New variability types added*

We always try to update our variability types document by adding the most recent variable star types recognized in the literature.

The new DIP subtype (for T Tauri and rotational variables) has been incorporated to VSX this year after the discovery of several (mostly) young stars showing fast dimming events.

### *Number of submissions and revisions*

This year, 580 new variable stars were submitted to VSX by individual users (other than VSX Team members). There were 680 submissions in 2014–2015. Thus, the mean number of new submissions per month was 48 against 57 from last year.

The number of average monthly revisions made by users decreased from 14 (total = 164) last year, to 9 (total = 110) in 2015–2016. This tendency continues: people prefer to submit their new discoveries rather than revising existing objects.

We currently have 311 different users that have submitted at least one submission or revision to VSX. 40 of them had their first VSX experience this year, 15 more than last year.

We encourage everyone in the variable star community to submit revisions of VSX stars with up-to-date data from the literature or with new observations both original and obtained from public survey databases.

Sebastián's personal average count of revisions per month increased from 164 last year to 292, with 3,498 revisions made over the whole year (1,968 last year). He added 673 stars (134 last year, this increase is mostly due to the beginning of the Gaia alerts).

The VSX Team (including Sebastián's revisions) updated data on 43,112 (!) variable stars.

Last year we had added 9,844 stars and I predicted that in the following year that number would have to be multiplied several times because of the increasing amount

## 2. The Year in Review

of team work with published lists. My prediction came true and we added 63,929 new objects (including Sebastián's additions) during the fiscal year. This means a total of 64,509 objects (adding the 580 objects submitted by individuals).

Let me make another prediction: the number of objects in VSX will more than double next year so our numbers will also grow up exponentially. At the time we write this report we have pending lists including thousands of new objects so 2017 will be a very busy year! You can check what's new on VSX by trying one of the special searches (like "Changes since last login") in the VSX search page.

### *Duplicate records*

VSX has currently more than 400,000 records. We don't call them stars because there are still many duplicate records among them that were created when we initially populated VSX in 2005 with all known variable star lists. At that time we decided to strive for completeness, and as a result we ended up with thousands of duplicate entries in our database. Since then, our main goal has been to avoid duplications and give priority to quality.

Sebastián Otero spends a fraction of his working hours hiding duplicate records and improving the information in VSX so the user can have the latest information available on a given object. Hiding duplicates also helps avoid confusion when an observer finds two stars at nearly the same position and it is difficult to decide if there are actually two variable stars there or they are just one and the same. Software can be fooled by these duplicates too, and our International Database may suffer the consequences with spurious reports being submitted. We surely don't want that!

In the framework of this primary record creation work (which means that all the information available is used to update a star's detail sheet), Sebastián hid 137 duplicate entries this year plus 15 unclassified duplicate objects. 6,243 duplicate records were hidden since the primary record creation work started back in 2011 (6,384 counting the unclassified ones). Patrick hid another 52 records this year after cross-identifications were made while importing new lists. A total of 23,435 objects have been hidden since VSX was launched in 2005.

### *Incorrect identifications corrected*

More incorrect identifications are being found in the process of cleaning up the VSX database. 14 incorrect cross-identifications in VSX have been corrected this year (usually incorrect identifications made by surveys).

21 GCVS/NSV identifications have also been corrected and reported to the GCVS team (none of them were incorrectly cross-identified in VSX).

It is nice that observers report incorrect identifications when they find them. Let us know if you find any.

### ***Cross-identifications (between existing entries) added***

114 new cross-identifications between VSX records were established this year (2,817 in total since 2011) and the 114 resulting duplicates were deleted.

### ***Work on VSX/AID inconsistencies and problems with submitted data***

Work to clean up the AAVSO International Database (AID) from errors caused by duplicate entries in VSX (most of them not visible to the public) has also continued as a by-product of the other VSX tasks.

We still need to merge lots of data from different pairs of duplicates but if observations are not reported to the wrong records anymore that will be a big help so we can do our task without having to check over and over again (once Sara Beck merges all the observations in the star's primary record, we delete the AUID so people can't submit data under the wrong name anymore). We corrected 35 such records this year and in the year to come we are going to do a massive data merging of hundreds of records that we already identified.

We have also contacted several observers to modify wrong observations reported to the AID that are found while analyzing AAVSO data to improve the information delivered in VSX. We urge observers to double-check their images to properly identify the stars being reported.

Remember that we periodically update the list of stars with companions that may cause identification or photometry problems (<https://www.aavso.org/variable-stars-companions>).

### ***Work on VSX/VSD: comparison stars that turned out to be variable***

Finally, we don't want variable stars to be used as comparison stars, but this may happen sometimes. There were not enough data some years ago to judge if some stars were variable or not and they could have been selected as good comp stars based on color or proximity. Now, with more survey data available or with observations provided by our observers, we can identify that some of those comp stars are actually variable. Work is

## 2. The Year in Review

being done to eliminate these stars from our sequences and find suitable replacements. 36 stars have been eliminated so far.

### *VSX is a core application*

VSX interacts with almost everything else in the AAVSO universe, from other software tools to the observers submitting data via WebObs. We try to improve it every day, solving inconsistencies and updating the database with the most recent data available.

We thank all the people who submit new discoveries and revisions to VSX and all on the AAVSO staff who help in the cleaning-up process.



## **The AAVSO Network of Remote, Robotically Controlled, and Automatically Queued Telescopes (AAVSONet)**

**Richard C. S. Kinne and Arne A. Henden**

The AAVSO Robotic Telescope Network, AAVSONet, started in 2005 with a single telescope, SRO35, located in Sonoita, Arizona. In 2008 we added OC61 by partnering with the University of Canterbury in New Zealand at Mt. John Observatory. 2009 saw the addition of the first Bright Star Monitor at Astrokolkozh Observatory near Cloudcroft, New Mexico. In 2016 there were nine active telescopes: the BSM systems (NM, South, Hamren, Berry, and HQ), Coker30, SRO50, TMO61, and OC61.

Each of these telescopes uses identical software: MaximDL for image acquisition; ACP and ACP Scheduler for controlling the telescope, camera, and scheduling observations; and FocusMax for focusing each system. Each telescope is either at a University or located at a private site. Volunteers perform any local maintenance and operation. AAVSO members, as a free benefit, can propose to observe specific targets. These proposals are reviewed by a small Telescope Allocation Committee. Those approved are then put on the telescope queues. When images are taken, they are transferred back to AAVSO Headquarters where they are automatically dark-subtracted and flat-fielded. Processed images are then placed on the AAVSO ftp site, and/or uploaded to the VPhot cloud analysis program at the discretion of the individual investigator. In the background we also extract all stars in every image to be placed into the on-line Epoch Photometry Database at a later date.

Keeping nine telescopes running with an all-volunteer effort at low cost is challenging. Each of our systems has been down for a fraction of the time this year. This last year has seen the semi-retirement of Arne Henden, with Richard Kinne stepping in as the AAVSONet manager. Dr. Henden has graciously remained active with AAVSONet providing an invaluable transition service.

We continue to consider options to improve the reliability of the AAVSONet system, to automate and make the entire process more efficient, and to draw more volunteers into the operation and quality control aspects of the network. We have many new volunteers to examine the images acquired by the AAVSONet telescopes, looking for weather- and instrument-related problems. They have been extremely helpful in finding issues early on, so that repairs can be made. Many thanks to Robert Dudley, Damien Lemay, Ken Menzies, Lou Cox, Willie Buning, Dave Hinzl, Duane Dedrickson, JoDee Baker, and Paolo Maria Ruscitti for performing this valuable service. In addition, we'd like to thank our site managers as well: Helmar Adler, Arne Henden, Nigel Frost, Bart Staels, Jon Holtzman,

## 2. The Year in Review

Dirk Terrell, Walt Cooney, John Gross, Tom Smith, Bill Goff, Peter Nelson, Greg Bolt, the Linnolt brothers, and Bill Stein.

Volunteer George Silvis has been working on a new system allowing AAVSONet to maintain and manage jobs put to the telescopes using comma-delimited EXCEL files. Using this system, jobs can be easily input, modified, and managed at the local level using common software. This system is in the process of being rolled out to the BSM-class telescopes.

During 2016, a total of seven new proposals were accepted, from professionals as well as amateurs. These included individual research, monitoring of objects for campaigns, and time series observations for some professional members of the AAVSO. One student, Amber Malpais, is completing her thesis at the University of Canterbury, using OC61 to acquire light curves of transiting exoplanets discovered from the KELT survey. The AAVSONet telescopes collected 185,896 images of over 2,000 targets. Many of these are part of the BSM survey of all variables brighter than 8th magnitude.

The AAVSONet Committee was constituted in 2016 in order to work on the future of AAVSONet. Some extensive documentation on its current state and how various areas work were done by Richard Kinne and Dr. Stella Kafka, with assistance by Dr. Arne Henden. This report, and updates to it, were published and used by the AAVSO Council during their Spring 2016 meeting.

Byron Engler, a student at University of Canterbury, worked with Nigel Frost (Mt. John Superintendent) and Malcolm Locke (University of Canterbury) to get the Shelyak eShel spectrograph working on OC61. A new instrument selector was installed, so that one can switch between imaging and spectroscopy in just a few minutes. The focal length on the telescope is a bit long, and so the star profile overfills the small science fiber. This loss of light means we can't go as faint as we would like. A focal reducer specifically for the spectrograph has been ordered to overcome this limitation. We also have a LISA spectrograph for TMO61 in the north, donated by Bart Staels. This spectrograph has been tested on the telescope by Jon Holtzman and Gary Walker and works fine. The intent over the near term is to do instrument swaps on a monthly basis, and then eventually modify the telescope top end to provide a second instrument port so that both imaging and spectroscopy can be available. Other telescopes, such as BSM\_NM and BSM\_Berry, have diffraction gratings for low-resolution spectroscopy, and have been used to acquire spectra of novae.

## The AAVSO Photometric All-Sky Survey (APASS)

Arne A. Henden

APASS started in late 2009 in the north, and about a year later in the south. The goal is to cover the entire night sky, with every object being observed on at least four photometric nights. The main survey covers the magnitude range  $10 < V < 17$  in the Johnson B&V and the Sloan g'r'i' passbands. The expected final astrometry will be within 150 milliarcseconds; the photometry should be better than 0.02 magnitude for bright objects. This catalog was designed to do for photometry what the positional catalogs (such as UCAC and USNO-A) did for astrometry: provide calibrated references in every CCD field of view.

The original survey was funded by the Robert Martin Ayers Sciences Fund. In 2014, the NSF awarded the AAVSO a two-year grant to both complete the observations as well as produce a final catalog. As part of the NSF proposal, we are extending the catalog with a Bright Star Extension, covering the range  $7 < V < 12$  and with BVu'g'r'i'zY passbands. In 2016, we asked for and received a one-year no-cost extension to the original NSF grant.

The equipment at each site is composed of two ASA N8 20cm astrographs, Apogee Aspen CCD CG16m (KAF-16083 sensor) cameras and filter wheels, coaligned on a Paramount ME. The northern system is located at Weed, NM; the southern system is at CTIO in the MEarth roll-off building.

To date, over 530,000 images have been taken on about 1,400 nights (combined north and south). Nine data releases have been made, with the most recent one occurring in January 2015. In DR9, a total of 60 million objects have a minimum of two observations each, covering about 99% of the sky. DR9 mainly added southern photometry, which was already nearly complete and so only a few million new objects are present. This completed the processing of northern and southern images taken through 2013. The APASS “means catalog” can be searched on-line at the AAVSO web site. The Epoch Photometry (individual measures) can also be searched on-line if you are an AAVSO member.

Work on Data Release 10 (DR10) is underway. This is a complete reprocessing of all data collected to date. We are using SExtractor for star-finding and centroiding, DAOPHOT routines for aperture photometry, and astrometry.net plate solving for the basic astrometry. As before, we are making additional photometric and astrometric corrections to improve the catalog. Doug Welch (McMaster) has been the key person in this data reprocessing, gaining access to the Canadian SHARCnet parallel processing computer.

## 2. The Year in Review

APASS is being used by many groups worldwide, and is also being used by individual researchers for obtaining precise photometry of their favorite targets. We get over a dozen requests annually from professionals who want access to the entire catalog. Within the AAVSO, APASS is being used primarily for the generation of photometric sequences around program stars, and photometric confirmation of new submitted variable stars to VSX. The VisieR group in France hosts DR9 publicly.

A great many people have been involved in the APASS development. The PI of the project is Arne Henden; Dirk Terrell has provided computers, software and analysis; Stephen Levine is the primary astrometry expert; Doug Welch is archiving all images and photometry, serving catalogs and performing the SExtractor and astrometry.net initial processing; and Ulisse Munari is providing quality control and external comparisons. In addition, there are a large number of volunteers, staff and students, including at least: Tom Smith, Aaron Sliski, Alan Sliski, Ken Launie, Shouvik Bhattacharya, Anisha Sharma, Patrick Wils, John Gross, Sebastian Otero, Matt Templeton, Richard Kinne, and Sara Beck. The UNC group (especially Kevin Ivarsen and Josh Haislip) provided on-site support when APASS South was at Prompt; Jonathan Irwin has been enormous help since the system moved to MEarth, along with the CTIO telescope operators. We've also had equipment and software contributions from Tom Bisque (Software Bisque), Bob Denny (DC3 Dreams), Doug George (Diffraction Ltd.), Apogee CCD, and Don Goldman (Astrodon). We thank them all—without their support and help, this project would never have happened!

## ***The Journal of the American Association of Variable Star Observers***

**John R. Percy, Editor**

The *Journal of the American Association of Variable Star Observers* (ISSN 0271-9053 print; ISSN 2380-3606 online) is the peer-reviewed research publication of the AAVSO, dedicated to variable star astronomy and a wide variety of related topics. It exists to disseminate the scholarly work of AAVSO members, observers, and others to the astronomical community at large; to demonstrate the scientific value of AAVSO data and thereby motivate AAVSO observers; to record the scientific content of AAVSO meetings; and to inform and inspire our members and others about variable star astronomy. It demonstrates, among other things, that small observatories and skilled amateur astronomers can continue to make significant contributions to variable star astronomy.

In 2015–2016, we published two issues, with over 200 pages of content in total, in our (relatively) new large-page format. We are now routinely using an automated manuscript-handling system, and “blind” refereeing. The published papers covered the usual wide range of variable star topics, including papers on research with new data and old; instruments, methods, and techniques; data; education and outreach; history; book reviews; and abstracts of papers presented at AAVSO meetings. The authors come from countries around the world, and include professional astronomers, amateur astronomers, and students. A typical issue contains about a dozen research papers and two dozen abstracts. In volume 44, number 2, we published two review articles, on topics suggested by the Editorial Board—variable star research with the Kepler space telescope, and the use of pulsation period changes to study stellar evolution. We thank the authors of these reviews for the substantial amount of thought and work involved. I have also continued to provide editorials on topics which I hope are both relevant and interesting. I would be happy, at any time, to receive suggestions about any aspect of *JAASO*, including possible topics for future editorials or review articles.

As always, I am grateful to the Editorial Board for their advice and assistance, to the many voluntary and anonymous referees who ensure the integrity of the *JAASO* content, and to the AAVSO Headquarters staff, especially Michael Saladyga and Elizabeth Waagen, for their hard work and excellent judgment in carefully editing and attractively formatting over 200 pages of informative but complex material.

## 2. The Year in Review

### *JAAVSO Editorial Staff and Editorial Board*

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### ***Papers and abstracts published in JAAVSO Volume 44, Number 1, 2016***

#### ***Editorial***

The (Variable) Stars Belong to Everyone

*John R. Percy*

#### ***Variable Star Research***

Appearance of Special UGSU-type Phenomenon in the Light Curve of UGZ White Dwarf Nova RX Andromedae

*András Timár*

Analysis of the Petersen Diagram of Double Mode High Amplitude  $\delta$  Scuti Stars

*Riccardo Furgoni*

Period Analysis, Photometry, and Astrophysical Modelling of the Contact Eclipsing Binary BC Gruis

*David J. W. Moriarty*

TU Comae Berenices : Blazhko RR Lyrae Star in a Potential Binary System

*Pierre de Ponthière, Franz-Josef (Josch) Hamsch, Kenneth Menzies, Richard Sabo*

Times of Minima and New Ephemerides for Southern Hemisphere Eclipsing Binary Stars Observed in 2015

*Hristo Pavlov, Anthony Mallama, Brian Loader, Stephen Kerr*

A Photometric Study of the Eclipsing Binary Star V2790 Orionis

*Edward J. Michaels*

Long-Term Radial Velocity Monitoring of the Hel 6678 Line of  $\zeta$  Tauri

*Ernst Pollmann*

Analysis of Pulsating Components in the Eclipsing Binary Systems LT Herculis, RZ Microscopii, LY Puppis, V632 Scorpii, and V638 Scorpii

*Margaret Streamer, Terry Bohlsen, Yenal Ogmen*

Intermittent Multi-Color Photometry for V1017 Sagittarii

*Arlo U. Landolt*

The Variable Star V Sculptoris

*Arlo U. Landolt*

A Photometric Study of the Eclipsing Binary Star V958 Monocerotis

*Edward J. Michaels*

## 2. The Year in Review

### *Instruments, Methods, and Techniques*

Monitoring the Continuing Spectral Evolution of Nova Delphini 2013 (V339 Del) with Low Resolution Spectroscopy

*Howard D. Mooers, William S. Wiethoff, Alexander Evich*

Observing Globular Cluster RR Lyrae Variables with the BYU West Mountain Observatory

*Elizabeth J. Jeffery, Michael D. Joner*

### *Variable Star Data*

Recent Maxima of 74 Short Period Pulsating Stars

*Gerard Samolyk*

Recent Minima of 193 Eclipsing Binary Stars

*Gerard Samolyk*

### *Education and Outreach*

An Undergraduate Research Experience on Studying Variable Stars

*Ariel Amaral, John R. Percy*

### *Book Review*

*Solar Science: Exploring Sunspots, Seasons, Eclipses, and More*

*John R. Percy*



### *Abstracts of Papers and Posters Presented at the 104th Annual Meeting of the AAVSO, Held in Woburn, Massachusetts, November 13–14, 2015*

#### *General Paper Session Part I*

##### **AAVSO Research Highlights on CV Research**

*Stella Kafka*

##### **The Great UXOR Hunt—an Update**

*Michael Poxon*

##### **The First Results from the DESK Survey**

*Joey Rodriguez (The KELT Team)*

##### **Revisiting Caroline Furness's *An Introduction to the Study of Variable Stars* on its Centenary (Poster)**

*Kristine Larsen*

##### **Identifying SRD Variables Among “Miscellaneous” ASAS Stars (Poster)**

*Michael Quinonez, Kristine Larsen*

##### **How Accurately Can We Predict Eclipses for Algol? (Poster)**

*David Turner*

##### **Searching for Atmospheric Signatures of Other Worlds**

*Mercedes Lopez-Morales*

##### **Hubble Exoplanet Pro/Am Collaboration**

*Dennis M. Conti*

##### **The Quest for Identifying BY Draconis Stars within a Data Set of 3,548 Candidate Cepheid Variable Stars**

*Jessica Johnson*

#### *General Paper Session Part II*

##### **An Update on the Status of RR Lyrae Research—Report of the RRL2015 Meeting (October, Hungary)**

*Katrien Kolenberg*

##### **Observing RR Lyrae Variables in the M3 Globular Cluster with the BYU West Mountain Observatory**

*Michael D. Joner*

##### **Time Series Observations of the 2015 Eclipse of $\beta$ Persei (not beta Persei)**

*Donald F. Collins*

##### **Astronomical League Observing Programs Supported by the AAVSO**

*Mike Simonsen*

##### **Mr. Birmingham and His New Star**

*John O'Neill*

## 2. The Year in Review

Impacts of Extended Periods of Low Solar Activity on Climate

*William F. Denig*

Should We Try to Re-Construct the American Relative Sunspot Index (Ra)?

*Rodney Howe*

Why are the Daily Sunspot Observations Interesting? One Observer's Perspective

*Frank Dempsey*

*General Paper Session Part III*

Last Rites for Cataclysmic Variables: Death by Fire, or Ice?

*Joseph Patterson*

APASS as a Tool for Calibrating the Cepheid Period-Luminosity Relation

*David Turner*

New Release of the BSM Epoch Photometry Database

*Arne Henden*

A Chart Display and Reporting App for Windows

*Michael Poxon*

Finding New Variable Stars

*Michael D. Joner*

The AAVSO Hall of Fame

*Mike Simonsen*

### ***Papers and abstracts published in JAAVSO Volume 44, Number 2, 2016***

#### ***Editorial***

The Publishing Landscape: It's the "Wild West" Out There

*John R. Percy*

#### ***Variable Star Research***

CCD Photometry and Roche Modeling of the Eclipsing Overcontact Binary Star System TYC 01963-0488-1

*Kevin B. Alton*

Studies of the Long Secondary Periods in Pulsating Red Giants

*John R. Percy, Emily Deibert*

First Photometric Analysis of the Solar-Type Binary, V428 (NSV 395), in the field of NGC 188

*Ronald G. Samec, Jeremy Clark, David Maloney, Daniel B. Caton, Danny R. Faulkner*

New Observations of V530 Andromedae: a Critical Contact Binary?

*Ronald G. Samec, Heather Chamberlain, Daniel B. Caton, Danny R. Faulkner, Jeremy D. Clark, Travis Shebs*

The High Amplitude  $\delta$  Scuti Star AD Canis Minoris

*Roy Andrew Axelsen, Tim Napier-Munn*

UY Puppis—A New Anomalous Z Cam Type Dwarf Nova

*Rod Stubbings, Mike Simonsen*

Discovery and Photometric Analysis of the  $\delta$  Scuti Variable TYC 2168-132-1

*Michael D. Joner, Eric G. Hintz, Giorgio Corfini*

A Photometric Study of the Eclipsing Binary Star PY Boötis

*Edward J. Michaels*

Two High-Latitude UXORs

*Michael Poxon*

#### ***Instruments, Methods, and Techniques***

Crowded Fields Photometry with DAOPHOT

*Elisabetta Artusi, Giancarlo Conselvan, Antonio Tegen, Danilo Zardin*

## 2. The Year in Review

### *Variable Star Data*

#### 50 Forgotten Miras

*Thomas Karlsson, Hans Bengtsson, Tomas Wikander, Gustav Holmberg, Robert Wahlström, Chris Allen*

#### Recent Minima of 194 Eclipsing Binary Stars

*Gerard Samolyk*

### *Review Papers*

#### Variable Stars with the *Kepler* Space Telescope

*László Molnár, Róbert Szabó, Emese Plachy*

#### Period Changes and Evolution in Pulsating Variable Stars

*Hilding R. Neilson, John R. Percy, Horace A. Smith*

### *Abstracts of Papers and Posters Presented at the 105th Spring Meeting of the AAVSO, Held in St. Louis, Missouri, May 5–7, 2016*

#### Learning from Pulsating Stars: Progress over the Last Century (Abstract)

*Horace Smith*

#### Miras, Mass Loss, and the Ultimate Fate of the Earth (Abstract)

*Lee Anne Willson*

#### A Detailed Survey of Pulsating Variables in Five Globular Clusters (Abstract)

*Brian W. Murphy*

#### Establishing a CCD Light Curve For BW Vul (Abstract)

*David Cowall*

#### Studying RR Lyrae Stars with Kepler/K2 (Abstract)

*Charles Kuehn*

#### Unsolved Problems for Main-Sequence Variable Stars Revealed by the NASA Kepler Data (Abstract)

*Joyce Ann Guzik*

#### Type C Semiregulars and Irregulars: the Forgotten Pulsating Luminous Stars (Abstract)

*David G. Turner*

#### Identification of ASAS Ellipsoidal Variables Misclassified as Miscellaneous in VSX (Poster abstract)

*Kristine Larsen, Corwin Hoover*

#### Utilizing the AAVSO's Variable Star Index (VSX) in Undergraduate Research Projects (Poster abstract)

*Kristine Larsen*

### RR Lyrae in Sagittarius Dwarf Globular Clusters (Poster abstract)

*Barton J. Pritzl, Thomas J. Gehrman, Ellyn Bell, Ricardo Salinas, Horace A. Smith, Maircio Catelan*

### A Photometric Study of Three Eclipsing Binary Stars (Poster abstract)

*Austin Ryan*

### First Look at Photometric Reduction via Mixed-Model Regression (Poster abstract)

*Eric Dose*

### Studying Variable Stars with Undergraduate Students at the University of Nebraska Kearney (Abstract)

*William Lee Powell Jr.*

### Photometry and Spectroscopy of V2455 Cygni (Abstract)

*Michael D. Joner*

### Exoplanets and Multiverses (Abstract)

*Virginia Trimble*

### SLAS Library Telescope Program (Abstract)

*James Small*

### Three New Z Cam Stars (Abstract)

*Mike Simonsen*

### Converting Differential Photometry Results to the Standard System using Transform Generator and Transform Applier (Abstract)

*Marco Ciocca*

### V571 Lyrae is a Multiple System (Abstract)

*Gary Billings*

### The Mystery of V523 Lyrae (Abstract)

*Mike Simonsen*

### Eggen Card Project: Progress and Plans (Abstract)

*George Silvis, Jack Crast*

### *Erratum*

### Erratum. Current Light Elements of the $\delta$ Scuti Star V393 Carinae

*Roy Andrew Axelsen*

### Index to Volume 44

## 2. The Year in Review

## Section Reports

### *Charts and Sequences*

*Section Leader: Tom Bretl, 2400 Garland Lane N, Plymouth, MN 55447*

The Charts and Sequences Team is made up of volunteers and staff who work behind the scenes to keep the Variable Star Plotter (VSP) as up-to-date, accurate, and useful as possible. The current members of the team are Arne Henden, Barbara Harris, Bob Stine, Bruce Sumner, John Toone, Robert Fidrich, Keith Graham, Mike Simonsen, Jim Jones, Patrick Wils, Sara Beck, Sebastián Otero, Tim Crawford, Tom Bretl, Natalia Virnina, Brad Walter, Matthew Templeton, Mati Morel, Stella Kafka, and Elizabeth Waagen.

The team continued to be very active during 2016. Although the number of existing sequences in need of updating dropped, CHETs and requests for new sequences increased. The numbers tell the story:

<i>Year</i>	<i>New/Revised Sequences</i>
2016	597
2015	695
2014	259
2013	787
2012	860
2011	655

The team resolved 126 CHETs and created 415 new sequences during the 2016 calendar year. The new sequences included 140 for ASASSN variables.

CHET submissions are made online at <https://www.aavso.org/chet>, and requests for new sequences are made via email to [compstars@aavso.org](mailto:compstars@aavso.org). Complete instructions for doing so are given at <https://www.aavso.org/request-comparison-stars-variable-star-charts>.

The most active team members continued to concentrate on several important tasks during 2016: Tim Crawford fulfilled most of the requests for new sequences, Jim Jones created sequences for most of the newly discovered ASASSN (All Sky Automated Survey for SuperNovae) objects, Tom Bretl responded to most of the CHET submissions, and

## 2. The Year in Review

Sebastián Otero updated VSX, checked for agreement between VSX and VSP, and advised us all on a wide variety of other topics. We worked together to fulfill requests as quickly as possible, often within just a day or two.

SeqPlot continues to serve as the primary tool for sequence creation, and APASS provides an ever increasing number of appropriate comparison stars covering almost the entire sky. The VSD Admin tool allows experienced team members to access, edit, add, and delete information from the comp star database. Less experienced members send their work to the section leader who checks their submissions before uploading. The team shares its work via the sequence team mail list and by recording each new or revised sequence in a Google spreadsheet accessible to the public at

<https://docs.google.com/spreadsheets/d/1mR4l7bEIFYZI5lwkkVEBwByCNXwiKCMzIPS1IAx0QvQ/edit?hl=en&pref=2&pli=1#gid=317284472>

Every few months all observers are made aware of new and revised sequences via the AAVSO website News.

The sequence team has its own website where team members, especially new team members, can find instructions on how to use SeqPlot, guidelines for sequence creation and revision, photometric resources outside of SeqPlot, a tutorial on how to use ASAS data, and a list of current projects and priorities. The site was revised somewhat during 2016, but is probably due for a major update.



## *Eclipsing Binary*

**Section Leaders:** *Gerard Samolyk, P.O. Box 20677, Greenfield, WI 53220*  
*Gary Billings, P.O. Box 263, Rockyford, Alberta T0J 2R0, Canada*

In the past year, most of the stars on the legacy program were observed. Most of the neglected stars listed in last year's report were observed in 2016. Steve Cook and Neil Simmons were among the observers who observed stars on that list. The stars below are the ones that are currently in need of observation:

Not been observed since 2013: V342 Aql, SS Lib, V505 Sgr

Not been observed since 2014: FT Ori

Observations received last year included data on 30 stars from the "Otero+" list. These are stars identified and published by Sebastián Otero and his co-authors in numerous *IBVS* and *OEJV* papers. Many have no published times of minima since the original publication, and only ASAS or NSVS light curves are available. It requires one or two times of minima per observing season to refine the light elements of these stars and check the stability of the periods. Ken Menzies has been a major contributor of data on these stars. A list of 1000 of these stars can be found on the EB section website.

Two papers containing 619 times of minima of 344 stars observed by 13 observers were submitted to *JAAVSO* in 2016. Observers who would like to contribute data to these papers in the future should upload their observations to the AID and send a copy to [gsamolyk@wi.rr.com](mailto:gsamolyk@wi.rr.com).

Although  $\beta$  Per (Algol) is the brightest eclipsing star in the sky (as well as the first eclipsing star discovered), it is often neglected by observers. It is an excellent target for those of us who set up for observing bright stars with CCDs as well as DSLR observers. One word of caution: beware of differential extinction between the variable and comparison stars. It is best to use comparison stars that are close to the variable, even though they are a bit fainter. About four years ago, Algol underwent another period change as shown in the O-C plot below. The points are from visual times of minima and the circled points are from PEP or CCD observations.

Recent light curves of  $\beta$  Per observed in the V band are shown in Figures 1 and 2. The equipment used was an ST9XE camera with a 50mm camera lenses. That camera was mounted piggyback on an LX200 while a second camera was taking images of another eclipsing star, IU Per.

## 2. The Year in Review

VV Cep is one of the largest known stars. The system consists of a M super giant and a giant B star. The orbital period is 20.3 years and the two-year eclipse will begin in August of 2017. Because VV Cep is also a pulsating star, the light curve will be complicated. Since the B star will be eclipsed, the deepest eclipse will be observed in the U and B bands. The predicted dates for the contacts are:

- T1 04 Aug 2017
- T2 27 Oct 2017
- T3 06 Feb 2019
- T4 16 May 2019

The light curve (Figure 3) is from Hopkins J. L. et al. *The Society for Astronomical Sciences 34th Annual Symposium on Telescope Science*.

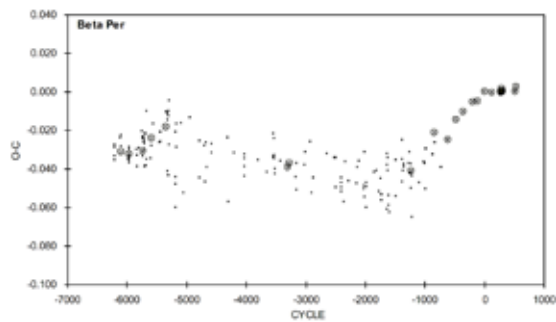


Figure 1.  $\beta$  Per, O-C plot.

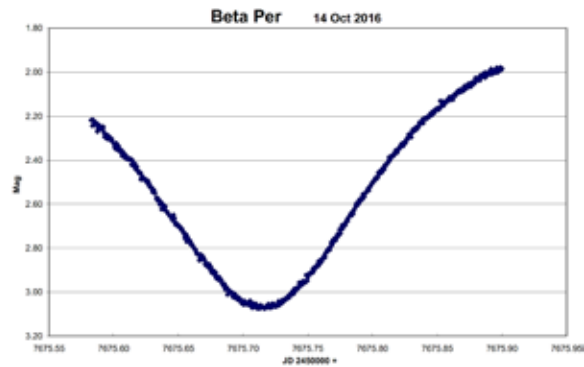


Figure 2.  $\beta$  Per, V-band light curve.

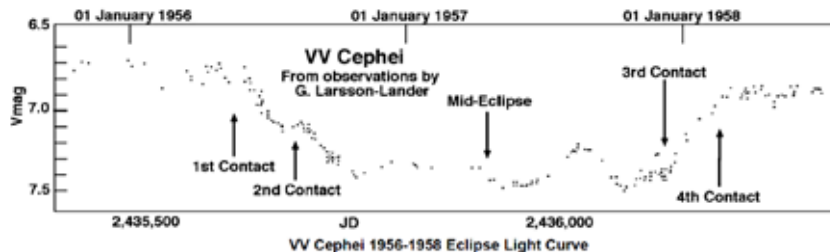


Figure 3. VV Cephei eclipse light curve, 1956–1958

### *Exoplanets*

**Section Leader:** *Dennis Conti, 141 E. Bay View Drive, Annapolis, MD 21403*

2016 represented the inaugural year for the AAVSO's Exoplanet Section. The principal pro/am collaboration that the section sponsored was one involving ground-based observations in the visible spectrum of the transits of some 15 exoplanets that a Hubble science team was observing in the near-infrared. The purpose of the Hubble study was to "...define the extent to which clouds occur in exoplanetary atmospheres...."

During 2016, the section leader gave a number of presentations and workshops to foster the use of small telescopes in exoplanet observing and research, as well as to describe the AAVSO's plans in this area. These included:

1. A presentation on "Detection of Exoplanets by Amateur Astronomers" at the Northeast Astrolmaging Conference (NEAIC).
2. A presentation during the Pro/Am Session at the Northeast Astronomy Forum (NEAF).
3. An online presentation on the Astrolmaging Channel.
4. A workshop at the University of Maryland on "Exoplanet Analysis and Modeling using AstrolmageJ."
5. A presentation at the Society for Astronomical Sciences (SAS) June 2016 meeting.
6. A presentation at NASA Goddard's Exoplanet Club Seminar on September 27, 2016.
7. A presentation at a workshop during the Skyscrapers Club of Rhode Island annual meeting (AstroAssembly 2016) and the dinner speech on the closing day.
8. A workshop entitled "Exoplanet Observing with Small Telescopes," on October 29–30, 2016, sponsored by the Boyce Research and Initiatives Foundation (BRIEF).
9. A presentation at the AAVSO Fall 2016 Meeting.
10. A presentation entitled "Detecting Exoplanets via Microlensing" to the December 16, 2016, meeting of the AAI (Amateur Astronomers, Inc.) club of New Jersey.

Also during 2016, efforts got underway to develop an AAVSO Exoplanet Database. Finally, the material for a CHOICE course on Exoplanet Observing was completed and scheduled for its first offering in February 2017.

## 2. The Year in Review

### *Long Period Variable (LPV)*

**Section Leaders:** *Andrew Pearce, 35 Viewway, Nedlands, Western Australia 6009*  
*Frank Schorr, 431 Hunters Cove Court, Lawrenceville, GA 30044*

The AAVSO LPV section commenced a rejuvenation process in 2016. Andrew Pearce and Frank Schorr stepped in as section leaders in 2016 and proceeded to work on a number of initiatives and activities to predominantly update and improve the LPV Section web page.

The most significant change was moving the LPV Section web page from the existing Google site to the AAVSO's own web site. This took a considerable effort due to the large number of formatting changes required and our thanks are extended to Owen Tooke at HQ who assisted with this. The LPV Section web page is now fully functioning and can be found at <https://www.aavso.org/aavso-long-period-variable-section>.

A number of further initiatives, activities, and additions to the web page included:

- An LPV of the month page was established, and so far brief written descriptions have been added and preliminary analysis performed focusing on L2 Pup, T UMi, RS Eri, LX Cyg, S Cep, TT Cen, and R Aur up until the end of 2016. All observers are invited to contribute articles on their favorite LPVs.
- Dr. John Percy (JAAVSO Editor) wrote an interesting article on why observers should monitor LPVs and this has been placed on a prominent page within the LPV Section web site.
- Links to recent scientific papers regarding LPVs where AAVSO observations have been used or referenced are now being updated on a quarterly basis.
- A list of target LPVs for both northern and southern hemisphere has been promoted throughout the year. These stars generally have displayed interesting features in their light curves.
- Frank Schorr continues to maintain the LPV Hump page which contains a lot of data and discussion on these interesting longer period Miras which show a hump or double maximum in their light curve.
- The LPV Section web page is now updated on a monthly basis where possible so all observers are encouraged to visit it often.

Work planned in early 2017 includes reviewing the existing LPV Legacy and LPV Program stars lists. These were originally developed back in 2009 and identified important LPVs to follow to ensure that we continue the long observational history of these stars; they reflect the long tradition of the AAVSO. The review work will determine whether stars on these lists should remain on and will also identify additional stars that we should consider adding. The list may also be expanded to include more of the better observed southern LPVs as currently these lists contain predominantly northern LPVs. Updated lists will be uploaded to the web pages in early 2017.

The primary goals of the LPV section are: to facilitate the long-term observation, both visually and electronically, of the Legacy LPVs in the program; and to promote other scientifically significant LPV targets for observers to follow. We are particularly interested in encouraging and guiding visual observers to include LPVs in their target selection and in building their own observing programs. As with all Sections, the LPV section requires interest from the larger observer community. The AAVSO encourages both LPV observers and users of AAVSO LPV data in their research to get involved with the AAVSO LPV section.

### ***Nova Search***

The Nova Search Section is being redesigned. Information will be available on the AAVSO website as work in this section develops.

### *Photoelectric Photometry (PEP)*

*Section Leader: James M. Kay, 26 Steeplebush Road, Shelburne, VT 05482*

The AAVSO Photoelectric Photometry (PEP) program had a very active year, which in keeping with our astronomical roots I am defining to be from winter solstice to winter solstice. So, from December 21, 2015, to December 21, 2016, the section's twelve active observers contributed 2,625 observations of 110 stars, in seven bands covering both visual and infrared wavelengths. The stars observed were of various types, with 64 semiregular stars and 14 eclipsing binaries. The remaining 32 stars were a mix of Miras, symbiotic, and Cepheids, as well as several that are now considered constant. Observation of these constant stars was encouraged to allow comparison among observers to detect potential observation or instrumental errors.

Along those same lines, the section also spent a significant amount of its observing time working to quantify our various error sources and to determine the level of agreement we could expect among observers. Activities included using common red/blue pairs of stars to determine our transformation coefficients, estimating or measuring first order extinction for all bands, and comparing our measurements on a set of slowly varying stars. A subset of observers also made the effort to correct for second order extinction in the B band. Most of this work has been collected in a paper that will be submitted to *JAAVSO* entitled "Inter-observer Photometric Consistency using Optec Photometers." Four observers (BSO, BVE, CTOA, KJMB) contributed to this paper, the abstract of which is as follows.

"Four observers, over a wide geographic range, observe the same stars in Johnson B and V bands using Optec SSP-3 and SSP-5 photometers on telescopes of modest size. We find very close agreement among them. In paired same-night observations, the median absolute difference between observers was 7 mmag. For the two observers with the most measurements in common, we estimate a systematic difference of 3.2 mmag or less."

Most of our observations are of stars brighter than magnitude 7, which fills a niche not covered by most of the upcoming all sky surveys. Demonstration of highly reliable observations with quantified errors in this brightness range will continue to be of great value to researchers, and I applaud the section for their focus on observation and data reduction quality.

A special recognition is due to Gerald Persha (PGD), who contributed 1,937 of the section's observations. He also designed the SSP3, SSP4, and SSP5 photometers that

are used by every observer in the section. He continues to share his deep knowledge as well as his innovation in automating his observing setup. Thanks Gerry, and I wish you clear skies.

Near-IR photometry continues, with two observers providing 44 observations of Betelgeuse in the J and H bands. Photometry in these bands is expected to increase in the coming years as two other observers are working on H-band calibrations using new custom filters specified and procured by CTOA. The goal is to improve the transformation to the standard system.

Thanks to all the observers who contributed in the past year, as well as the HQ staff which continues to provide invaluable guidance and assistance. As always an open invitation goes out to anyone wanting to try PEP. We have a range of long term and new observers, but could always use more, and several photometers are available for loan to anyone with interest. More information is available at the AAVSO PEP webpages at:

<https://www.aavso.org/aavso-photoelectric-photometry-pep-program>

### *AAVSO International Database PEP data contributors 2015–2016*

BSO	Scott Burgess	Maine	8
BVE	Erwin van Ballegoij	Netherlands	30
CCB	Charles Calia	Connecticut	51
CTOA	Tom Calderwood	Oregon	86
FXJ	James Fox	New Mexico	198
KCD	Carl Knight	New Zealand	30
KPL	Paul Kneipp	Louisiana	87
KJMB	James Kay	Vermont	122
LPD	Patrice LeMarchand	France	49
PGD	Gerald Persha	Michigan	1937
RPT	Patrick Rochford	Alabama	14
UIS01	University of Ill.	Illinois	13
		TOTAL	2625

## 2. The Year in Review

### *Short Period Pulsator*

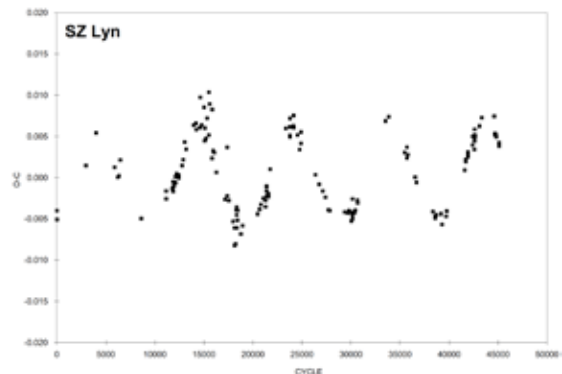
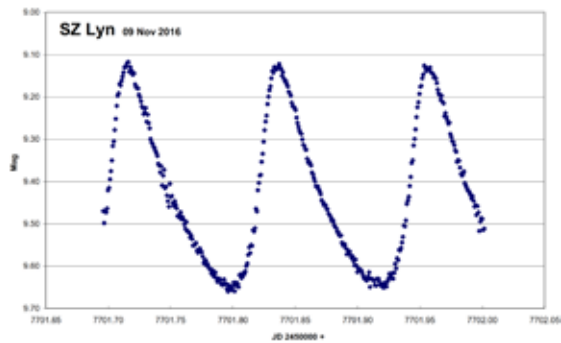
**Section Leader:** Gerard Samolyk, P.O. Box 20677, Greenfield, WI 53220

**Section Webmaster:** Shawn Dvorak, 1643 Nightfall Drive, Clermont, FL 34711

In 2016, all of the stars on the AAVSO legacy program were observed. This is the first time I recall for this. At the time of this writing, a paper to list the times of maxima reduced from these observations is in the works.

A paper containing 283 times of maxima of 74 stars was published in *JAAVSO*. This paper contained the reduction of data sent to the section chair by six observers in 2015. Any observer who would like to contribute data to these papers in the future should upload their observations to the AID and send a copy to [gsamolyk@wi.rr.com](mailto:gsamolyk@wi.rr.com).

One of the  $\delta$  Sct type stars on the AAVSO legacy program is SZ Lyn. The light curve as seen below is very regular, indicating that this is a single mode pulsating star. What makes this an interesting target to observe is that it is part of a binary system. The binary nature is revealed in the O–C plot below (containing data since 2002) for the times of maxima. The system rotates and the star moves back and forth from our point of view by about 2.3 AU with a period of just over three years, producing the sinusoidal variation of the O–C value. Observations going back to 1967 indicate that the pulsation period of SZ Lyn has increased during the past half century.





## Solar

**Section Leader and SID Group Leader: Rodney Howe, 3343 Rivaridge Drive,  
Fort Collins, CO 80526**

**Sunspot Group Leader: Kim Hay, 76 Colebrook Road, Yarker, ON K0K 3N0, Canada**

### Sunspot Report

The sun is now approaching the quiet time and is now becoming less active as we go into the solar minimum. Kim Hay from Yarker, Ontario, Canada, has done an excellent job of collecting, cleaning, and creating the monthly American Relative numbers for the *Solar Bulletin*. There was a total of 80 sunspot observers who contributed 12,017 observations (September 2015–September 2016). Their efforts should be applauded as they continue to monitor our nearest star. We also have many awards to be given for our sunspot observers based on past certificates, and running numbers for FY 2016, see table below.

<b>Observer Initials</b>	<b>Observer</b>	<b>2016 Award</b>
AAX	Alexandre Amorim	1000
AJV	J. Alonso	2000
ASA	Salvador Aguirre	1500
BRAF	Raffaello Braga	1000
BROB	Robert Brown	4500
CHAG	German Morales Chavez	5500
CIOA	Ioannis Chouinavas	500
CKB	Brian Cudnik	4500
DUBF	Franky Dubois	4000
FUJK	K. Fujimori	4000
HOWR	Rodney Howe	1500
KNJS	James and Shirley Knight	4000
KROL	Larry Krozel	1500
LEVM	Monty Leventhal	3000
MJAF	Juan Antonio Moreno Quesada	100
MJHA	John McCammon	1000
OATS	Susan Oatney	2000
SDOH	Solar Dynamics Obs - HMI	1500
SPIA	Piotr Skorupski	100
STAB	Brian Gordon-States	1500
TESD	David Teske	4500
WILW	William M. Wilson	4000

## 2. The Year in Review

Figure 1 shows how the daily Wolf number is becoming less active and has a negative trend as we move toward the Solar Minimum.

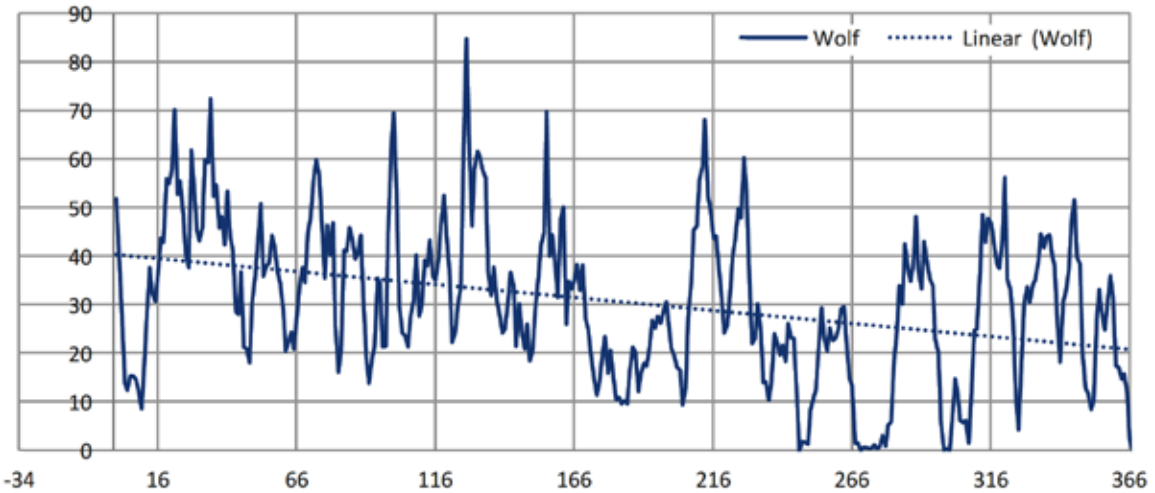


Figure 1. Daily Wolf number for FY 2015–2016. The daily Wolf number is becoming less active and has a negative trend as we move toward the Solar Minimum

### ***Solar Ionospheric Disturbance (SID) Report***

For the last 12 months, overall SID Activity has been stable. Our observer ranks have remained consistent with between 14 and 17 submissions each month. There was a total of 18 observers submitting reports and a total of 312 reports were sent in for fiscal year 2016. Thanks to all observers for their efforts in monitoring, data analysis, and report generation.

Nine observers are eligible for the traditional award for over 40 observations this year.

<b><i>Observer Initials</i></b>	<b><i>Observer</i></b>
A-94	Al McWilliams, St. Cloud, Minnesota
A-97	Jon Wallace, Durham, Maine
A-118	Lionel Loudet, Southern France
A-119	Jean-Pierre Godet, Beauvais, France
A-120	Bob Terrill, Ballarat, Australia
A-125	Susan Oatney, Partridge, Kansas
A-141	George Silvis, Bourne, Massachusetts
A-142	Igor Ryumshin, Shchigry, Russia
A-143	Ralph Rogge, Konstance, Germany

### *Young Stellar Object (YSO)*

**Section Leader:** *Michael Poxon, 9 Rosebery Road, Great Plumstead,  
Norfolk NR13 5EA, England*

This year saw the eventual rise back from the deep minimum of RW Aur, which was well-followed by members and will prove useful in a more detailed analysis of this fascinating system. However, hardly had our hero regained his full strength than a new fading set in that sees RW Aur currently at magnitude 12, visible in modest instruments.

While more observers are making estimates of YSOs I would still like to see more of our Southern observers pitching in. With many starforming regions in the far-southern regions not only are there doubtless more YSOs to be discovered in such areas but quite a lot of known stars are underobserved or even unobserved. Don't forget, a huge optical system is not necessary for all these stars, and you can filter for brightness on the YSO section pages.

## 2. The Year in Review

### Treasurer's Report October 1, 2015–September 30, 2016

Bill Goff, *Treasurer, AAVSO, 49 Bay State Road, Cambridge, MA 02138*

### Audited Financial Statements

#### American Association of Variable Star Observers Statement of Financial Position September 30, 2016

##### Assets

###### Current Assets

Cash and cash equivalents	\$ 464,201
Grants receivable	—
Prepaid expenses	9,781
Investments	12,202,821
<b>Total Current Assets</b>	<b>12,676,803</b>

Property and Equipment, Net of Accumulated Depreciation 1,378,116

**Total Assets** \$ **14,054,919**

##### Liabilities and Net Assets

###### Current Liabilities

Accounts payable and accrued expenses	\$ 39,177
Prepaid membership dues and meetings	27,026
<b>Total Current Liabilities</b>	<b>66,203</b>

###### Net Assets

Unrestricted	10,331,640
Temporarily restricted	292,257
Permanently restricted	3,364,819

**Total Net Assets** 13,988,716

**Total Liabilities and Net Assets** \$ **14,054,919**

**American Association of Variable Star Observers  
Statement of Activities and Changes in Net Assets  
For the Year Ended September 30, 2016**

**Changes in Unrestricted Net Assets**

<b>Unrestricted Revenues, Gains, and Other Support</b>	
Contributions and grants	\$ 39,965
Investment interest and dividends	240,666
Membership dues and fees	79,810
Sales of publications and related material	6,538
Meeting fees	30,947
Unrealized losses on available-for-sale securities	500,012
Gain on sale of investments	135,954
	<u>1,033,892</u>
Net assets released by restrictions	143,428
<b>Total Unrestricted Revenues, Gains, and Other Support</b>	<u><b>1,177,320</b></u>

**Expenses**

Program Services—research, data collection, publications, and meetings	618,220
General and administrative	365,141
Fundraising	66,775
<b>Total Expenses</b>	<u>1,050,136</u>
<b>(Decrease) in Unrestricted Net Assets</b>	<u>127,184</u>

**Changes in Temporarily Restricted Net Assets**

Contributions and grants	240,003
Investment interest and dividends	4,014
Gain on sale of investments	2,268
Assets released from Program restrictions	(143,428)
<b>(Decrease) in Temporarily Restricted Net Assets</b>	<u>102,857</u>

**Changes in Permanently Restricted Net Assets**

Contributions and grants	11,475
<b>Increase in Permanently Restricted Net Assets</b>	<u>11,485</u>

**(Decrease) in Net Assets** 241,516

**Net Assets—Beginning of Year** 13,747,200

**Net Assets—End of Year** \$ 13,988,716

## 2. The Year in Review



# 3. Officers, Staff, and Volunteers

## AAVSO Officers, Council Members, and Section Leaders for Fiscal Year 2016–2017

*You may contact these persons through AAVSO Headquarters.*

### *Officers*

Director	Stella Kafka	(term of office 1 February 2015—)
President	Kristine M. Larsen	(2015–2017)
1st Vice President	Roger S. Kolman	(2015–2017)
2nd Vice President	Kevin B. Marvel	(2015–2017)
Secretary	Gary Walker	(2009–2017)
Treasurer	Bill Goff	(2014, 2014–2017)
Clerk	Arne A. Henden	(2009–2017)

### *Council Members*

Richard Berry	(2016–2018)
Tom Calderwood	(2016–2018)
Joyce A. Guzik	(2015–2017)
Michael Joner	(2016–2018)
Katrien Kolenberg	(2014–2018)
Richard S. Post	(2016–2017)
Richard Sabo	(through February 2017)
Gregory R. Sivakoff	(2016–2018)
William Stein	(2015–2017)

### 3. Officers, Staff, and Volunteers

#### *Section Leaders*

Charts and Sequences	Tom Bretl
Eclipsing Binary	Gerard Samolyk, Gary W. Billings
Exoplanets	Dr. Dennis Conti
Long Period Variable	Andrew Pearce, Frank Schorr
Science Advisors	Dr. John Percy, Dr. Lee Anne Willson
Photoelectric Photometry	James M. Kay
Short Period Pulsator	Gerard Samolyk, Shawn Dvorak
Science Advisors	Dr. Doug Welch, Dr. Horace Smith
Solar	
Section Chair	Rodney H. Howe
Sunspot Group Leader	Kim Hay
Solar Flare/SID Observing Group	Rodney H. Howe
<i>Solar Bulletin</i> Editor	Rodney H. Howe
Young Stellar Objects	Michael Poxon
Science Advisor	Dr. William Herbst
<i>Journal of the AAVSO</i> Editor	Dr. John R. Percy

#### **AAVSO Headquarters Staff**

Sara J. Beck	Technical Assistant (Science Operations), Special Projects
Gloria Ortiz Cruz	Data Entry Technician
Stella Kafka, Ph.D.	Director
Richard Kinne	AAVSONet Manager
Sebastián Otero	External Consultant, VSX Team, Spanish Translations
Michael Saladyga, Ph.D.	Technical Assistant, <i>JAAVSO</i> , <i>Newsletter</i> , and <i>Annual Report</i> Production Editor
Kathy Spirer	Operations Manager
Owen Tooke	Administrative Assistant
Kathy Vnek	Bookkeeper
Elizabeth O. Waagen	Senior Technical Assistant (Science Operations), <i>JAAVSO</i> Associate Editor, <i>AAVSO Newsletter</i> and <i>Annual Report</i> Editor



#### AAVSO Volunteers

AAVSO members are very generous with their time and talents. Many of the programs and services we offer would not be possible without the participation of member volunteers: they are regularly involved in teaching new observers; writing articles for our publications; helping to keep the *Variable Star Index* up to date and functional, and submissions vetted; and the creation of charts and comparison star sequences.

We take this opportunity to recognize these special people who volunteered during the fiscal year, and to say *thank you* for another year of valuable contributions of time and expertise.

#### *Mentor Program*

Patrick Abbott	Jim Fox	Ken Menzies
Umair Asim	Jaime Garcia	Gordon Myers
Barry Beaman	Bill Goff	Peter Nelson
David Benn	Keith Graham	Sebastián Otero
John A. Blackwell	Tim Hager	Stefano Padovan
Tom Bretl	Barbara Harris	Roger Pieri
John Centala	Jerry Hubbell	Alan Plummer
Tim Crawford	Rick Huziak	Chuck Pullen
Michael Deconinck	Stella Kafka	Mike Simonsen
Shawn Dvorak	Roger Kolman	Donn Starkey
Robert Fidrich	Michael Linnolt	Chris Stephan
Ron Fournier	Morgan MacLeod	Bob Stine

#### *Variable Star Index (VSX) Team*

Klaus Bernhard	David Hinzl	Paul York
Bruno Billiaert	Patrick Wils	Tamas Zalezsak

#### *Charts and Sequences*

Arne Henden	Robert Fidrich	Mati Morel
Tom Bretl	Keith Graham	Brad Walter
Tim Crawford	Jim Jones	

### 3. Officers, Staff, and Volunteers

#### *Speakers Bureau*

Tom Bretl  
Tim Crawford  
Pamela Gay  
Keith Graham  
Albert Holm

Roger S. Kolman  
Mario Motta  
Gordon Myers  
Chuck Pullen

Michael Richmond  
Chris Stephan  
Bob Stine  
Paul Temple

#### *AAVSO Headquarters*

Arne Henden

John O'Neill

George Silvis

#### *APASS*

Andor CCD  
Shouvik Bhattacharya  
Tom Bisque  
CTIO telescope operators  
Bob Denny  
Doug George

Don Goldman  
John Gross  
Josh Haislip  
Jonathan Irwin  
Kevin Ivarsen  
Ken Launie

Ulisse Munari  
Anisha Sharma  
Aaron Sliski  
Alan Sliski  
Tom Smith  
Patrick Wils

#### *AAVSONet*

Helmar Adler  
JoDee Baker-Maloney  
Richard Berry  
Willie Buning  
Lou Cox  
Duane Dedrickson  
Jean-Bruno Desrosiers

Robert Dudley  
Bill Goff  
Arne Henden  
Dave Hinzl  
Damien Lemay  
Mike Linnolt  
Ken Menzies

Gordon Myers  
Dick Post  
Richard Sabo  
Bart Staels  
Bill Stein  
Gary Walker

#### *Archival Digitization and Special Archival Projects*

Bruno Billiaert  
Terry Moon

Stuart Morris  
George Silvis

#### *CHOICE*

JoDee Baker-Maloney  
Mark Blackford  
Blake Crosby

Barbara Harris  
Kenneth Menzies  
Philip Sullivan

Bradley Walter  
Ed Wiley

#### ***AAVSO Newsletter Contributing Authors***

Sara Beck	Jim Kay	Gavin Ramsay
Robert Bucheim	Richard Kinne	Gerry Samolyk
Tom Calderwood	Carl Knight	Neil Simmons
Dennis Conti	Paul Kuin	Mike Simonsen
Deanne Coppejans	John O'Neill	David Thompson
Rodney Howe	Andrew Pearce	Judith Thompson
Kiyanoush Jahaandideh	John Percy	David Weier
Kiyoshi Kasai	Michael Poxon	

#### ***Software Development and Support***

David Benn	<i>VStar</i>	Phil Manno	<i>Find a Member, CHET</i>
Dennis Conti	<i>Exoplanet Database Tools</i>	Kenneth Menzies	<i>VPhot</i>
Francis Hemsher	<i>LCGv2</i>	George Silvis	<i>VPhot</i>

#### ***Eggen Card Project***

Carlos Adib	David Jackson	Ed Schmidt
Wendy Bauer	James Kay	George Silvis
Michael Cook	Kristine Larsen	Elizabeth Waagen
Jack Crast	Ranald McIntosh	Glen Ward
Duane Dedrickson	Bob Neuman	Doug Welch
Mark de Jong	John Ritzel	Paul York
Michael Geldorp	Jeff Robertson	
Richard Glassner	Michael Saladyga	

### 3. Officers, Staff, and Volunteers

#### *Translators*

French Translation, *AAVSO Guide to CCD Photometry*

Manon Bouchard

Jean-Bruno Desrosiers

Jean-Bernard Pioppa

Pierre Cheyssac

Jean-Claude Mario

Florian Signoret

German Translation, *Manual for Visual Observations of Variable Stars*

Ilka Petermann

Persian Translation, *AAVSO Guide to CCD Photometry*

Fatemeh Bahrani

Polish Translation, *Manual for Visual Observations of Variable Stars*

Ariel Majcher

Marcin Biskupski

Piotr Guzik

Bogdan Kubiak

Michał Kwieciak

Polish Translation, *AAVSO Guide to CCD Photometry*

Roman Korczyk

Dominik Gronkiewicz

Maciej Nowaczyk

Łukasz Socha

Adam Popowicz

Krzysztof Kida

Russian Translation, *Manual for Visual Observations of Variable Stars*

Nikolai Samus

Spanish translations, *AAVSO Newsletter*

Jaime R. García

#### *Interns*

Olivia Harden

Aaron Sliski

John Weaver



## 4. Science Summary: AAVSO in Print

These pages present a partial listing of all literature using AAVSO data or resources. The majority of these listings were taken from the arXiv.org preprint archive (preprint number given after title), with others contributed directly by the authors themselves. It is intended to show the extent to which the observations of AAVSO observers are used in modern astronomical literature.

AAVSO data contributed by thousands of observers over decades is vital to variable star research. Annually, AAVSO Headquarters receives from 200 to 300 requests for data from researchers, members, observers, and educators. The AAVSO data are used extensively to correlate multi-wavelength observations of variable stars, to schedule ground-based and satellite observations, and for analysis of stellar behavior. Papers using AAVSO data are published by researchers, members, observers, and AAVSO staff. These papers are a testimony to the dedication and contribution of thousands of observers around the world who contribute data to the AAVSO International Database.

Thomas E. Harrison, "Abundance Derivations for the Secondary Stars in Cataclysmic Variables from Near-Infrared Spectroscopy" (1609.09763) (Sep 30, 2016)

Taichi Kato, Ryoko Ishioka, Keisuke Isogai et al., "RZ Leonis Minoris Bridging between ER Ursae Majoris-Type Dwarf Nova and Novalike System" (1609.08791) (Sep 28, 2016)

A. Bódi, K. Szatmáry, L.L. Kiss, "Periodicities of the RV Tau-type pulsating star DF Cygni: a combination of Kepler data with ground-based observations" (1609.07944) (Sep 26, 2016)

N. Ding, X. Zhang, D. R. Xiong and H. J. Zhang, "The physical properties of Fermi TeV BL Lac objects jets" (1609.05704) (Sep 19, 2016)

I. Bozhinova, A. Scholz, G. Costigan et al., "The disappearing act: A dusty wind eclipsing RW Aur" (1609.05667) (Sep 19, 2016)

A. Derekas, E. Plachy, L. Molnar et al., "The Kepler Cepheid V1154 Cyg revisited: light curve modulation and detection of granulation" (1609.05398) (Sep 17, 2016)

#### 4. Science Summary: AAVSO in Print

- N. Vogt, M. R. Schreiber, F.-J. Hamsch et al., "The orbital ephemeris of the classical nova RR Pictoris: presence of a third body?" (1609.05274) (Sep 17, 2016)
- Joel D. Green, Olivia C. Jones, Luke D. Keller et al., "The Mid-Infrared Evolution of the FU Orionis Disk" (1609.01765) (Sep 6, 2016)
- Z. G. Maas, C. A. Pilachowski, K. Hinkle, "Chlorine Abundances in Cool Stars" (1609.01626) (Sep 6, 2016)
- E. Harvey, M.P. Redman, P. Boumis, S. Akras, "Modelling the structure and kinematics of the Firework nebula: The nature of the GK Persei nova shell and its jet-like feature" (1609.01363) (Sep 6, 2016)
- Colin Littlefield, Peter Garnavich, Mark R. Kennedy et al., "Return of the King: Time-Series Photometry of FO Aquarii's Initial Recovery from its Unprecedented 2016 Low State" (1609.01026) (Sep 5, 2016)
- M. Bonnefoy, G. Chauvin, C. Dougados et al., "The 2008 outburst in the Young Stellar System Z CMa. III—Multi-epoch high-angular resolution images and spectra of the components in near-infrared" (1608.08035) (Aug 29, 2016)
- Albert Bruch and Marcos P. Diaz, "Time resolved spectroscopy and photometry of three little known bright cataclysmic variables: LS IV -08° 3, HQ Monocerotis and ST Chamaeleontis" (1608.07181) (Aug 25, 2016)
- T. Shahbaz, D.M. Russell, S. Covino et al., "Time-resolved optical/near-IR polarimetry of V404 Cyg during its 2015 outburst" (1608.06947) (Aug 24, 2016)
- Deanne L. Coppejans, Elmar G. Koerding, James C.A. Miller-Jones et al., "Dwarf nova-type cataclysmic variable stars are significant radio emitters" (1608.06295) (Aug 22, 2016)
- P. Mroz, A. Udalski, P. Pietrukowicz et al., "The awakening of a classical nova from hibernation" (1608.04753) (Aug 16, 2016)
- T. V. Tomov, K. A. Stoyanov, R. K. Zamanov, "AG Pegasi—now a classical symbiotic star in outburst?" (1608.02980) (Aug 9, 2016)
- S. Marinoni, E. Pancino, G. Altavilla et al., "The Gaia spectrophotometric standard stars survey—III. Short-term variability monitoring" (1608.00759) (Aug 2, 2016)

- Paul Berlioz-Arthaud, "Long Period Variables: questioning the pulsation paradigm" (1608.00232) (Jul 31, 2016)
- David Pulley, George Faillace, Derek Smith et al., "Observing NY Vir and the quest for circumbinary planets" (1608.00078) (Jul 30, 2016)
- T. R. Marsh, B. T. Gänsicke, S. Hümmerich et al., "A radio pulsing white dwarf binary" star (1607.08265) (Jul 27, 2016)
- M. J. Darnley, M. Henze, M. F. Bode et al., "M31N 2008-12a—the remarkable recurrent nova in M31: Pan-Chromatic observations of the 2015 eruption" (1607.08082) (Jul 27, 2016)
- Henri M.J. Boffin, Thomas Rivinius, Antoine Merand et al., "The LBV HR Car has a partner: Discovery of a companion with the VLTI" (1607.07724) (Jul 26, 2016)
- Krystian Ilkiewicz, Joanna Mikolajewska, Kiril Stoyanov et al., "Active phases and flickering of a symbiotic recurrent nova T CrB" (1607.06804) (Jul 22, 2016)
- John R. Percy and Emily Deibert, "Studies of the Long Secondary Periods in Pulsating Red Giants" (1607.06482) (Jul 21, 2016)
- U. Munari, S. Dallaporta, F. Castellani et al., "The 2016 outburst of the unique symbiotic star MWC 560 (= V694 Mon), its long-term BVRI evolution and a marked 331 days periodicity" (1607.06309) (Jul 21, 2016)
- A. Loh, S. Corbel, G. Dubus et al., "High-energy gamma-ray observations of the accreting black hole V404 Cygni during its June 2015 outburst" (1607.06239) (Jul 21, 2016)
- Mariko Kimura, Keisuke Isogai, Taichi Kato et al., "Repetitive Patterns in Rapid Optical Variations in the Nearby Black-hole Binary V404 Cygni" (1607.06195) (Jul 21, 2016)
- Á. Kóspál, P. Ábrahám, J. A. Acosta-Pulido et al., "Multi-wavelength study of the low-luminosity outbursting young star HBC 722" (1607.05925) (Jul 20, 2016)
- K. H. Hinkle, T. Lebzelter, O. Straniero, "Carbon and oxygen isotopic ratios for nearby miras" (1606.08478) (Jun 27, 2016)
- Gavin Ramsay, J. L. Sokoloski, G. J. M. Luna et al., "Swift observations of the 2015 outburst of AG Peg—from slow nova to classical symbiotic outburst" (1606.07397) (Jun 23, 2016)

#### 4. Science Summary: AAVSO in Print

- Colin A. Navin, Sarah L. Martell and Daniel B. Zucker, "New halo stars of the Galactic globular clusters M3 and M13 in the LAMOST DR1 Catalog" (1606.06430) (Jun 21, 2016)
- Erik Wischniewski, "Revised Elements and Blazhko Effect of the RR Lyrae Star AR Herculis" (1606.03321) (Jun 10, 2016)
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- Adela Kawka and Stephane Vennes, "Extreme abundance ratios in the polluted atmosphere of the cool white dwarf NLTT19868" (1602.05000) (Feb 16, 2016)
- T. W.-S. Holoién, C. S. Kochanek, J. L. Prieto et al., "ASASSN-15oi: A Rapidly Evolving, Luminous Tidal Disruption Event at 216 Mpc" (1602.01088) (Feb 2, 2016)
- A. Santerne, G. Hébrard, J. Lillo-Box et al., "EPIC211089792 b: an aligned and inflated hot jupiter in a young visual binary" (1601.07680) (Jan 28, 2016)

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- Néstor Espinoza, Rafael Brahm, Andrés Jordán et al., "A Neptune-sized Exoplanet Consistent with a Pure Rock Composition" (1601.07608) (Jan 28, 2016)
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- G. Torrealba, S. E. Kuposov, V. Belokurov et al., "The feeble giant. Discovery of a large and diffuse Milky Way dwarf galaxy in the constellation of Crater" (1601.07178) (Jan 26, 2016)
- Bradley E. Schaefer, "KIC 8462852 Faded at an Average Rate of  $0.165 \pm 0.013$  Magnitudes Per Century From 1890 To 1989" (1601.03256) (Jan 13, 2016)
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- Josep Martí, Pedro L. Luque-Escamilla, and María T. García-Hernández, "Multi-colour optical photometry of V404 Cygni in outburst" (1601.01941) (Jan 8, 2016)
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- Joseph E. Rodriguez, Keivan G. Stassun, Michael B. Lund et al., "An Extreme Analogue of  $\epsilon$  Aurigae: An M-giant Eclipsed Every 69 Years by a Large Opaque Disk Surrounding a Small Hot Source" (1601.00135) (Jan 2, 2016)

- E. de Miguel, J. Patterson, D. Cejudo et al., "Accretion-disc precession in UX Ursae Majoris" (1512.08687) (Dec 29, 2015)
- Dongwon Kim, Helmut Jerjen, Dougal Mackey et al., "Kim 3: an Ultra-faint Star Cluster in the Constellation of Centaurus" (1512.03530) (Dec 11, 2015)
- Riccardo Furgoni, "Seventeen New Variable Stars Detected in Vulpecula and Perseus" (1512.03014) (Dec 9, 2015)
- Daniel Huber, Stephen T. Bryson, Michael R. Haas et al., "The K2 Ecliptic Plane Input Catalog (EPIC) and Stellar Classifications of 119,000 Targets in Campaigns 1-7" (1512.02643) (Dec 8, 2015)
- Franz-Josef Hamsch, Stefan Hümmerich, Klaus Bernhard and Sebastián Otero, "New Photometric Observations and the 2015 Eclipse of the Symbiotic Nova Candidate ASAS J174600-2321.3" (1512.01467) (Dec 4, 2015)
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- Evan Sinukoff, Andrew W. Howard, Erik A. Petigura et al., "Ten Multi-planet Systems from K2 Campaigns 1 & 2 and the Masses of Two Hot Super-Earths" (1511.09213) (Nov 30, 2015)
- S. Ciceri, L. Mancini, T. Henning et al., "HATS-15 b and HATS-16 b: Two massive planets transiting old G dwarf stars" (1511.06305) (Nov 19, 2015)
- D. J. Armstrong, C. E. Pugh, A.-M. Broomhall et al., "The Host Stars of Keplers Habitable Exoplanets: Superflares, Rotation and Activity" (1511.05306) (Nov 17, 2015)
- Vasily Belokurov and Sergey Koposov, "Stellar streams around the Magellanic Clouds" (1511.03667) (Nov 11, 2015)
- Giovanni Carraro, Anton F. Seleznev, Gustavo L. Baume et al., "The complex stellar populations in the lines of sight to open clusters in the third Galactic quadrant" (1511.03182) (Nov 10, 2015)
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Quan-Zhi Ye, Peter G. Brown, Charles Bell et al., “Bangs and Meteors from the Quiet Comet 15P/Finlay” (1510.06645) (Oct 22, 2015)

M. Hackstein, M. Haas, Á. Kóspál et al., “Light curves of the latest FUor: Indication of a close binary” (1510.06612) (Oct 22, 2015)

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Myungshin Im, Changsu Choi, Sung-Chul Yoon et al., “The Very Early Light Curve of SN 2015F in NGC 2442: A Possible Detection of Shock-Heated Cooling Emission and Constraints on SN Ia Progenitor System” (1510.02084) (Oct 7, 2015)

Noel D. Richardson, Anthony F. J. Moffat, Raphaël Maltais-Tariant et al., “Spectroscopy, MOST Photometry, and Interferometry of MWC 314: Is it an LBV or an interacting binary?” (1510.0324) (Oct 1, 2015)

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Alexander Kurtenkov, “Searching for twins of the V1309 Sco progenitor system: a selection of long-period contact binaries” (1609.06595) (Sep 21, 2016)

N. Vogt, A. Contreras-Quijada, I. Fuentes-Morales et al., “Determination of pulsation periods and other parameters of 2875 stars classified as MIRA in the All Sky Automated Survey (ASAS)” (1609.05426) (Sep 16, 2016)

K. V. Sokolovsky, P. Gavras, A. Karamelas et al., “Comparative performance of selected variability detection techniques in photometric time series data” (1609.01716) (Sep 6, 2016)

R. I. Anderson, S. Casertano, A. G. Riess et al., “Vetting Galactic Leavitt Law Calibrators using Radial Velocities: On the Variability, Binarity, and Possible Parallax Error of 19 Long-period Cepheids” (1608.00556) (Aug 1, 2016)

M. Libralato, D. Nardiello, L. R. Bedin et al., “A PSF-based approach to Kepler/K2 data. II. Exoplanet candidates in Praesepe (M 44)” (1608.00459) (Aug 1, 2016)

- D. R. S. Boyd, "Observation and analysis of the new W-type W UMa eclipsing binary VSX J053024.8+842243" (1606.09215) (Jun 29, 2016)
- Marek Skarka, Jiří Liška, Reinhold F. Auer et al., "The SERMON project: 48 new field Blazhko stars and an investigation of modulation-period distribution" (1606.09114) (Jun 29, 2016)
- Noriyuki Matsunaga, Michael W. Feast, Giuseppe Bono et al., "A lack of classical Cepheids in the inner part of the Galactic disk" (1606.07943) (Jun 25, 2016)
- Erik Wischniewski, "Revised Elements and Blazhko Effect of the RR Lyrae Star AR Herculis" (1606.03321) (Jun 10, 2016)
- Taichi Kato, Franz-Josef Hamsch, Berto Monard et al., "Survey of Period Variations of Superhumps in SU UMa-Type Dwarf Novae. VIII: The Eighth Year (2015-2016)" (1605.06221) (May 20, 2016)
- D. Kjurkchieva, V. A. Popov, D. Vasileva et al., "Photometric observations and light curve solutions of the W UMa stars NSVS 2244206, NSVS 908513, CSS J004004.7+385531 and VSX J062624.4+570907" (1605.01884) (May 6, 2016)
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- A. Arellano Ferro, A. Luna, D. M. Bramich et al., "RR Lyrae stars and the horizontal branch of NGC 5904 (M5)" (1604.03981) (Apr 13, 2016)
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- E. Plachy, L. Molnár, R. Szabó et al., "Target selection of classical pulsating variables for space-based photometry" (1603.07579) (Mar 24, 2016)
- Zhibin Dai, Paula Szkody, Peter M. Garnavich et al., "Cataclysmic Variables observed during K2 Campaigns 0 and 1" (1603.03859) (Mar 12, 2016)
- Jake D. Turner, Kyle A. Pearson, Lauren I. Biddle et al., "Ground-based near-UV observations of 15 transiting exoplanets: Constraints on their atmospheres and no evidence for asymmetrical transits" (1603.02587) (Mar 8, 2016)

#### 4. Science Summary: AAVSO in Print

- Riccardo Furgoni, "Analysis of the Petersen Diagram of Double-Mode High-Amplitude  $\delta$  Scuti Stars" (1602.07254) (Feb 23, 2016)
- V. Lipunov, E. Gorbovskoy, V. Afanasiev et al., "Discovery of an unusual bright eclipsing binary with the longest known period: TYC 2505-672-1 / MASTER OT J095310.04+335352.8" (1602.06010) (Feb 19, 2016)
- Scott G. Gregory, Fred C. Adams, Claire L. Davies University of St Andrews et al., "The influence of radiative core growth on coronal X-ray emission from pre-main sequence stars" (1601.07919) (Jan 28, 2016)
- Z. Garai, T. Pribulla, L. Hambálek et al., "Search for transiting exoplanets and variable stars in the open cluster NGC 7243" (1601.04562) (Jan 18, 2016)
- Josep Martí, Pedro L. Luque-Escamilla, and María T. García-Hernández, "Multi-colour optical photometry of V404 Cygni in outburst" (1601.01941) (Jan 8, 2016)
- Y. T. Tanaka, R. Itoh, M. Uemura et al., "No Evidence of Intrinsic Optical/Near-Infrared Linear Polarization for V404 Cygni During its Bright Outburst in 2015: Broadband Modeling and Constraint on Jet Parameters" (1601.01312) (Jan 6, 2016)
- Bruce Margon, J. Xavier Prochaska, Nicolas Tejos et al., "The Bright Symbiotic Mira EF Aquilae" (1512.04075) (Dec 13, 2015)
- K. Bernhard, S. Huemmerich, E. Paunzen, "Magnetic, chemically peculiar (CP2) stars in the SuperWASP survey" (1512.03875) (Dec 12, 2015)
- Riccardo Furgoni, "Seventeen New Variable Stars Detected in Vulpecula and Perseus" (1512.03014) (Dec 9, 2015)
- D. J. Armstrong, J. Kirk, K. W. F. Lam et al., "K2 Variable Catalogue II: Machine Learning Classification of Variable Stars and Eclipsing Binaries in K2 Fields 0-4" (1512.01246) (Dec 3, 2015)
- D. Tasselli, "New CCD Photometry Study of RV UMa" (1511.08457) (Nov 26, 2015)
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D. Tasselli, "New CCD Photometric Study of AM Cnc" (1510.02837) (Oct 9, 2015)

P. Klagyivik, Sz. Csizmadia, T. Pasternacki et al., "The Berlin Exoplanet Search Telescope II Catalog of Variable Stars. II. Characterization of the CoRoT SRc02 field" (1510.01936) (Oct 7, 2015)

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*(note: many papers in addition to those listed here include AAVSO members/observers among their authors or co-authors)*

N. Vogt, M. R. Schreiber, F.-J. Hamsch et al., "The orbital ephemeris of the classical nova RR Pictoris: presence of a third body?" (1609.05274) (Sep 17, 2016)—AAVSO member/observer among co-authors

J. M. Vaquero, L. Svalgaard, V. M. S. Carrasco et al., "A Revised Collection of Sunspot Group Numbers" (1609.04882) (Sep 15, 2016)—AAVSO member/observer among co-authors; AAVSO sunspot data used in analysis

G. Bhatta, S. Zola, L. Stawarz et al., "Detection of Possible Quasi-periodic Oscillations in the Long-term Optical Light Curve of the BL Lac Object OJ 287" (1609.02388) (Sep 8, 2016)—AAVSO data analysis software WWZ used

Colin Littlefield, Peter Garnavich, Mark R. Kennedy et al., "Return of the King: Time-Series Photometry of FO Aquarii's Initial Recovery from its Unprecedented 2016 Low State" (1609.01026) (Sep 5, 2016)—AAVSO members/observers among co-authors; AAVSO observing campaign for this research cited (see *AAVSO Alert Notice 545*)

Rainer Gröbel, Stefan Hümmerich, Ernst Paunzen et al., "HD 240121—an ACV variable showing anti-phase variations of the B and V light curves" (1609.00355) (Sep 1, 2016)—AAVSO members/observers among co-authors

Stefan Hümmerich, Rainer Gröbel, Franz-Josef Hamsch et al., "NSV 1907—A new eclipsing, nova-like cataclysmic variable" (1608.07610) (Aug 26, 2016)—AAVSO members/observers among co-authors

Deanne L. Coppejans, Elmar G. Koerding, James C.A. Miller-Jones et al., "Dwarf nova-type cataclysmic variable stars are significant radio emitters" (1608.06295) (Aug 22, 2016)—AAVSO members among co-authors

#### 4. Science Summary: AAVSO in Print

Luca Bertello, Alexei A. Pevtsov, Andrey Tlatov et al., “Correlation Between Sunspot Number and Ca II K Emission Index” (1606.01092) (Jun 3, 2016)—AAVSO Solar Section analysis references

Joyce A. Guzik, Katie Kosak, Paul A. Bradley et al., “Amplitude Variability in gamma Dor and delta Scuti stars observed by the Kepler Spacecraft” (1605.04443) (May 14, 2016)—AAVSO data plotting/analysis software VStar used

Pierre de Ponthiere, Franz-Josef Hamsch, Kenneth Menzies et al., “TU Comae Berenices: Blazhko RR Lyrae Star in a Potential Binary System” (1605.03242) (May 10, 2016)—AAVSONet telescope(s) cited as data source

Jeremy J. Drake, Laura Delgado, J. Martin Laming et al., “Collimation and asymmetry of the hot blast wave from the recurrent nova V745 Scorpii” (1604.04537) (Apr 15, 2016)—used *AAVSO Alert Notice 497*

Hilding R. Neilson, Scott G. Engle, Edward F. Guinan et al., “The Secret Lives of Cepheids: Evolution, Mass Loss, and Ultraviolet Emission of the Long-Period Classical Cepheid I Carinae” (1604.03128) (Apr 11, 2016)—authors include AAVSO members

Richard W. Schmude Jr., Ronald E. Baker, Jim Fox et al., “The Secular and Rotational Brightness Variations of Neptune” (1604.00518) (Apr 2, 2016)—authors include AAVSO members

Karen Masters, Eun Young Oh and Joe Cox, Brooke Simmons and Chris Lintott et al., “Science Learning via Participation in Online Citizen Science” (1601.05973) (Jan 22, 2016)—used *Advancing Variable Star Astronomy, the Centennial History of the American Association of Variable Star Observers* (Williams and Saladyga)

Akito Tajitsu, Kozo Sadakane, Hiroyuki Naito et al., “The 7Be II Resonance Lines in Two Classical Novae V5668 Sgr and V2944 Oph” (1601.05168) (Jan 20, 2016)—used *AAVSO Alert Notice*

Igor Andreoni, Paolo D'Avanzo, Sergio Campana et al., “A time domain experiment with Swift: monitoring of seven nearby galaxies” (1601.03739) (Jan 14, 2016)—used *AAVSO Alert Notice*

E. de Miguel, J. Patterson, D. Cejudo et al., “Accretion-disc precession in UX Ursae Majoris” (1512.08687) (Dec 29, 2015)—authors include AAVSO members

- J. O. Stenflo, "Transition of the Sunspot Number from Zurich to Brussels in 1980: A Personal Perspective" (1512.06229) (Dec 19, 2015)—AAVSO Solar data used
- K. Bernhard, S. Huemmerich, E. Paunzen, "Magnetic, chemically peculiar (CP2) stars in the SuperWASP survey" (1512.03875) (Dec 12, 2015)—authors include AAVSO members
- Franz-Josef Hamsch, Stefan Hümmerich, Klaus Bernhard and Sebastián Otero, "New Photometric Observations and the 2015 Eclipse of the Symbiotic Nova Candidate ASAS J174600-2321.3" (1512.01467) (Dec 4, 2015)—authors include AAVSO members
- S. Uttenthaler, R. Greimel, and M. Templeton, "Is the semi-regular variable RU Vulpeculae undergoing a helium-shell flash?" (1511.03224) (Nov 10, 2015)—authors include AAVSO staff member
- M. Hackstein, M. Haas, Á. Kóspál et al., "Light curves of the latest FUor: Indication of a close binary" (1510.06612) (Oct 22, 2015)—authors include AAVSO members
- R. E. Mennickent, S. Otero and Z. Kolaczowski, "Interacting binaries W Serpentids and Double Periodic Variables" (1510.05628) (Oct 19, 2015)—authors include AAVSO member
- Richard W. Schmude Jr., Ronald E. Baker, Jim Fox et al., "Large Brightness Variations of Uranus at Red and Near-IR Wavelengths" (1510.04175) (Oct 14, 2015)—authors include AAVSO member
- N. G. Kantharia, Prasun Dutta, Nirupam Roy et al., "Insights into the evolution of symbiotic recurrent novae from radio synchrotron emission: V745 Scorpii and RS Ophiuchi" (1510.02203) (Oct 8, 2015)—used *AAVSO Special Notice #380*

## 4. Science Summary: AAVSO in Print



# 5. Word from the Astronomical Community

Cataclysmic Variables (CVs) were thought to be the only accreting objects that did not launch jets, but recent observations of SS Cyg indicate otherwise. By means of radio observations of CVs on the rise to outburst, we will determine whether CVs launch jets and consequently establish if there is a universal link between accretion and jets. The AAVSO has made this project possible. The type of monitoring needed for this project (long-term and high-cadence) is not possible at professional observatories—the AAVSO, however, excels at it. Thank you so much to all the observers. In particular, through your fast outburst-notifications, we were able to get VLA observations right at the time when we predicted the radio emission to peak. I have really enjoyed working with the AAVSO and am looking forward to working with you in future projects. Clear skies,

**Deanne Coppejans**  
Ph.D. candidate,  
Radboud University  
Nijmegen (Netherlands)  
and University of Cape Town

I am very grateful to the AAVSO for their continuing observations of variable stars and especially for the wonderful campaign and continuous observations of some of the objects that I and my colleagues study using space-based facilities. These include CH Cyg, Mira, RT Cru, and many others.

I am impressed also by the efficiency and the kindness of the Headquarters personnel.

With hope for many great observations to come, and best wishes to all,

**Margarita Karovska**  
*Harvard-Smithsonian  
Center for Astrophysics*

## 5. Word from the Astronomical Community

The VSP [Variable Star Plotter, creates finder charts for variable stars] system continues to be an outstanding service that the AAVSO provides. I'm a visual observer and follow a large number of stars and without accurate charts, it would make it very difficult to produce meaningful results. Similarly the chart team are to be commended for their timely response to my requests for sequence for little observed southern stars. Regards,

**Andrew Pearce (PEX)**  
*Nedlands, Western Australia*

One of my goals this year was to start doing photometry, DSLR in particular.

I decided the VPHOT course would be a good way to get my head into that space and I was right. The course run by Blake Crosby and Mike Simonsen was awesome. I learned so much and was able to help someone in the VPHOT forum, apply it to the DSLR course, and help Mark Blackford with use of VPHOT.

The DSLR course run by Mark Blackford was also superb and I am getting close to being able to do DSLR photometry with my own setup. Again, I learned an enormous amount. I've already expressed my thanks to Mark.

Running the VStar course was very full-on and also rewarding. Again, I learned from the participants and received much useful feedback. Watching JoDee Baker run the course and seeing how she and Brad Walter are running with it this year is fantastic.

**David Benn (BDJB)**  
*Klemzig, South Australia*

"Wonderful and friendly staff always there to help. CHOICE courses are a great way to learn new skills. VPhot and VStar provide superb data reduction and analysis. AAVSONet allows access to telescopes around the world. Best of all is getting together with the other members at meetings where we can share our experiences, learn from each other, and have fun."

**Dave Cowall (CWD)**  
*Nanticoke, Maryland*

## 5. Word from the Astronomical Community

Are you interested in variable stars? AAVSO. Do you want to share your interest with others? AAVSO. Do you want to observe and contribute to the understanding of variable stars with anything from eyeballs to binoculars to observatories with massive scopes, CCDs, and spectrographs? AAVSO.

In the comfort of my home, I can access AAVSO's website, research a variable star (VSX, etc.), download charts to locate and observe the variable star (Variable Star Plotter), upload my observations to the database (WebObs), and then see how my observations and the observations of others continue to spin the thread of rich photometric history (over 100 years, in some cases, and still going strong!) of the variable star I've observed (Light Curve Generator). I ask: How cool is that?

**Bob Stine (SRB)**  
*Newbury Park, California*

When I joined the AAVSO, the only way we could get charts was to order the Blue-print copies at \$0.25 per chart and then wait until they were sent via snail-mail. A great improvement was made when the charts were available via the CD format, but that did not involve refinements to the charts. Now, thanks to the AAVSO Chart Committee, we can download charts and are made aware of updates.

Going back, my reports needed to be reported via paper copy. Today, we are able to submit data via the Internet—a great improvement. We also have the opportunity to check the quality of our observations in almost real time.

The CHOICE program, in my humble opinion, is one of the AAVSO gems. I have taken two of the courses and have found them to be high quality. Again, IMHO, members of the AAVSO would be missing out on a great benefit if they do not take advantage of one of the best benefits of membership.

**Roger Kolman (KRS)**  
Glen Ellyn, Illinois

## 5. Word from the Astronomical Community

The AAVSO has been at the forefront in making astronomical resources available to the public. Put that together with the magazine *Australian Sky and Telescope*, (AS&T, also going to New Zealand), the offspring of the parent *Sky & Telescope*, a supportive editor (crucial) and we have a useful relationship. Both the previous Editor, Greg Bryant, and the current one, Jonathan Nally, are supporters of the AAVSO, and eight issues a year, from 2010 until today, have included a small column on VSOing, and a finder chart for the month's target.

The thinking in starting the column was that this was one of the easiest ways into useful astronomy. The *AAVSO Bulletin* is useful in target selection, if a brightish LPV is selected. It would ideally be picked up at or near maximum light, in a good position in the sky. The more southerly the target, the better. Sometimes I can sneak in a more challenging target, like the dwarf nova BV Centauri. The AAVSO Variable Star Plotter is used with every column to generate a finder chart. The web site generally is used to find papers or features on the target selected. A few Variable Stars of the Season have been utilized—for instance, on pulsating stars, RCBs, or dwarf novas.

With great good luck, I have pre-empted some observing campaigns. I write 3 to 4 months in advance, and to have the issue hit the stands as the *AAVSO Special Notice* is released, is gratifying. These being S Doradus, V854 Cen, and ETA Carinae. Follow ups of *Special Notices* have included T Pyxis, and others. Put simply, this would not be possible if not for the AAVSO on one hand, and AS&T on the other.

**Alan Plummer (PAW)**  
Linden, NSW, Australia

I would like to comment about benefits of the CHOICE courses that I have taken. Besides providing the basic background information about variable stars, the CHOICE courses have given me confidence that I'm doing things the "right way" and not missing significant steps while making observations, as well as allowing me to maximize efficiency in planning and making variable star observations. The photometry-related courses have been especially helpful in allowing me to overcome obstacles that occur with technology and software that I most likely would have found too frustrating to deal with alone, without the excellent instructors and other students in the courses.

**Frank Dempsey (DFR)**  
Locust Hill, Ontario, Canada





# 6. Support for the AAVSO

## The Argelander Society

Named for Friedrich Argelander, who is considered to be "the father of variable star astronomy," **The Argelander Society** offers membership benefits to those individuals who have given substantial financial support to the AAVSO over many years. Once a benefactor has donated a cumulative total of \$35,000.00 to the AAVSO, they are eligible for a lifetime membership in the organization, free registration to annual meetings, invitations to special events, special awards, and tokens of the association's appreciation.



Friedrich Wilhelm August Argelander  
(1799–1875)

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*The AAVSO's 50th Anniversary Meeting at Harvard College Observatory, 1961*

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## 6. Support for the AAVSO

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*A sampling from the AAVSO Archives. Counterclockwise from upper right: souvenir of the 4th Spring Meeting, May 1917; The Practical Observing of Variable Stars, 1918; General Instructions to Observers pamphlet; catalogue of the AAVSO C. Y. McAteer Library; blueprint and photographic charts; letters and postcard (1919-1921) from Charter Member Prof. Anne S. Young of Mount Holyoke College.*



## 6. Support for the AAVSO

### Planned Giving

Charitable contributions to the American Association of Variable Star Observers can have benefits that last a lifetime—and beyond. A bequest or life-income gift that includes the Association will support variable star research and education for generations to come. Your legacy can be made in a variety of ways that can help you reach your philanthropic goals and provide tax benefits to help you reach your financial objectives. To include the AAVSO in your financial planning, you might consider one or more of these options:

- A Bequest through your Will
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- Establish a Charitable Lead Trust
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- Consider a Deferred Gift Annuity
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- Utilize your Retirement Account

To discuss these and the many other options available to you, please contact the AAVSO, phone 617-354-0484, or by email at [donations@aavso.org](mailto:donations@aavso.org).

The AAVSO is recognized by the Internal Revenue Service and the Commonwealth of Massachusetts as a non-profit scientific and educational organization. Gifts of all denominations are welcomed, and may include cash, securities, and other gifts. Unrestricted contributions may be made in any amount, and are tax-deductible to the extent allowed by the law.



*The AAVSO's 75th Anniversary Meeting at Harvard University, 1986*

### AAVSO Funds

The following is a list of the specific funds to which you may contribute. If you do not wish to specify how you would like your donation to be used, the AAVSO will determine the fund where it is needed most and place it there.

**General Fund** This fund is unrestricted and supports the general operations of the Association.

**Endowment Fund** This is a professionally managed fund, invested for the perpetuity of the AAVSO. From time to time, transfers from this fund into the General Fund are made as necessary to meet operating deficits of the Association.

**Annual Campaign Fund** Donations to this fund provide additional support for the essential and important day to day functions, tools, and programs of the AAVSO, including website maintenance, member services, observer support, CHOICE course development, AAVSO publications, and online tools (Chart Plotter, Light Curve Generator, VPHOT, VStar, WebObs, etc.).

**Building Fund** This fund is dedicated to replenishing the Endowment Fund for the cost of purchasing the new headquarters building (49 Bay State Road, Cambridge, MA 02138), to provide funds to refurbish the building, and to cover other costs incurred with the original purchase.

**Janet A. Mattei Research Fellowship Program** This fund enables a visiting scientist, postdoctoral researcher, or student to perform research at AAVSO Headquarters with the goal of disseminating the results throughout the astronomical community.

**Margaret Mayall Assistantship Fund** This fund helps finance a summer student at AAVSO Headquarters who works on variable star-related projects and research while learning about the AAVSO and variable stars in general. Only the accumulated interest and not the principal may be used.

**Solar Fund** This fund helps to pay the staff costs of administering the section and publishing the *Solar Bulletin*, and to offset travel expenses for visiting solar researchers.

**AAVSONet Fund** This fund pays for refurbishment and maintenance of telescopes, cameras, mounts, computers, software, and hardware required to operate the AAVSO's robotic telescope network.

**Member Sponsorship Fund** Funds donated to this program pay the membership dues for those active variable star observers who want to become members of the Association but cannot afford the dues.

**Visiting Astronomer Travel Fund** Contributions to this fund supply travel grants to astronomers invited to or wishing to participate in the AAVSO's annual and spring meetings.

**Student Meeting Scholarship Fund** Donations to this fund will pay for up to 10 student registrations per annual meeting of the AAVSO.

**JAAVSO Fund** Donations to this fund will be used to support the editorial, publication, and website costs associated with the *Journal of the AAVSO*.

**VPHOT Fund** Donations to this fund support the cost of cloud computing, maintenance, and development of the AAVSO's online photometric analysis software, VPHOT.

**Director's Discretionary Fund** The corpus, contributions, and income derived from the investments allocated to the Director's Discretionary Fund are considered temporarily restricted for the unrestricted use by the Director for the benefit of the Organization.

**Contributor-Specified Restricted Funds** Gifts and contributions made to the Association for restricted purposes as specified by the donor thereof. All such restricted funds of the Association shall be administered in strict accordance with the instructions of the donor. The Association is not obliged to accept any assets so offered.

# The American Association of Variable Star Observers



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**USA**

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