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ISSUE NO. 70 OCTOBER 2016 WWW.AAVSO.ORG

# AAVSO

## Newsletter

SINCE 1911...

*The AAVSO is an international non-profit organization of variable star observers whose mission is: to observe and analyze variable stars; to collect and archive observations for worldwide access; and to forge strong collaborations and mentoring between amateurs and professionals that promote both scientific research and education on variable sources.*

## FROM THE DIRECTOR'S DESK

STELLA KAFKA



### Planning our future

Colleagues,

Lately, every time I meet with our observers, I hear concerns about the future of variable star observations. “Will surveys do our work in the near future?” “Will

we become obsolete?” “How would the AAVSO contribute to variable star astronomy, since all-sky surveys will provide all the data professional astronomers need for their work?” Considering the flood of data from existing and upcoming surveys which advertise all-sky coverage, these are all very legitimate questions. And I understand that it can be disheartening for someone who likes to explore properties of the variable night sky to learn about the scale and impact of upcoming surveys. Are surveys a threat?

Variable stars are now of vast interest to the professional scientific community; we are all excited by the possibilities of new science that all those surveys will enable. And we are all getting ready to look at the same stars in a different way, a way that those surveys will enable. Yet...surveys are not everything, they do not provide all the information we need. All those projects will reveal a plethora of new objects and new modes of variability, and will provide material for scientific research for the decades to

come. At the same time, all those projects are filter-limited, cadence-limited, and site-limited and have limiting lifespans (always depending on funding!). Furthermore, telescopes conducting ground-based surveys are subject to local weather conditions and to technical problems that could arise on the way. Looking at the details of those surveys and of those upcoming missions, one can realize the AAVSO's potential to be part of the scientific discovery.

Here's an example: TESS and PLATO, both exoplanet space missions from NASA and ESA respectively, will look at nearby stars for earth-like exoplanets, discovering many hot Jupiter/hot Saturn systems and many unknown stellar variability modes as a side-product. Follow-up observations will be imperative to understand fundamental properties of those systems and, although the unprecedented accuracy of space-based facilities will be necessary to observe Earth-size planets, all other science cases will have to be accommodated by AAVSO observations from the ground. Looking in the distant future: LSST will scan the entire night sky, providing one magnitude measurement per star every ~3 days. Furthermore, it saturates in brightness at 16th magnitude, so brighter transients of interest will need observations from AAVSO observers to “fill” the light curve and complement x-ray and radio observations. We are already working with surveys: our ongoing collaboration with KELT demonstrates how our observers contribute to the survey's observations on targets of interest, even

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## PRESIDENT'S MESSAGE

KRISTINE LARSEN



Forget the Harvest Moon, Let's Harvest Some Variables!

Fall is finally in the air! The kids (from kindergarten through college) are back at school, white shoes are decidedly gauche, and everything pumpkin is in vogue. The daylight hours are waning

just as the cool, crisp observing hours are waxing, and it won't be long before we spend far too much time here in New England raking up the leaves. It's time to celebrate the Halloween season, but with a decidedly astronomical twist.

Let's start with the obvious connection, the so-called Ghoul Star, Algol. Perseus is well-placed for observing in the fall, and with a bright magnitude and rapid period, this eclipsing binary star provides an interesting target for DSLR observers. But let's not forget that there many eclipsing binaries in the AAVSO database! If Dancing with the (Binary) Stars interests you, check out the Eclipsing Binary section's website [<https://www.aavso.org/content/aavso-eclipsing-binary-section>].

If you're like me, you are waiting with baited breath for the Season 7 premiere of The Walking Dead. If you are fascinated by the undead, you might want to bide your time until we find out who got

CONTINUED ON NEXT PAGE

**DIRECTOR'S MESSAGE  
CONTINUED...**

though the KELT project is an all-sky survey both in the northern and the southern hemispheres. And our work with the BRITE collaboration is an example on how the AAVSO can provide the necessary ground-based support for extended multi-color monitoring of interesting sources that are studied in space for only 6 weeks at a time.

We do live in a renaissance of variable star astronomy, and I want all of you to be part of it. The AAVSO needs to be at the center of action, providing targets of interest, training our observers, discussing interesting science, and interfacing with surveys and the scientists who need data from us. My priority is to ensure that the AAVSO is relevant and prepared to address the challenges that will arise and that have an active part of the relevant surveys by continuously placing the AAVSO on the radar of the professional scientific community and by making the appropriate connections with scientists who work on those surveys. I also want to include you, our members and observers, in the discussion. Therefore, we are dedicating our upcoming meeting to this subject, opening a dialogue between all AAVSOers and professional astronomers who represent a number of those “hot” present and future surveys. We will hold a panel, where we will be discussing the role of the AAVSO in the era of large surveys and variability missions and projects. We have invited scientists from both ground-based and space-based major projects (K2, KELT, TESS, LSST, Evryscope, J-Plus) to meet

with you, our members and observers, discuss their projects, and answer questions from you. We will openly broadcast the panel discussion to all our members through GoTo meeting, and the recordings will be available for you to listen to if you can't be present in real time. I invite you all to join us, and participate in the discussion. In fact, I would like to encourage you to attend the full meeting, in person or remotely, to hear about those projects and learn about new science that is coming from our colleagues at the AAVSO.

A new era of variable star observing is here, and the AAVSO is enabling it. And I am delighted you are part of it!

Best wishes—clear skies. ★

*Ed. note: the Spanish language version of Stella's message can be found on page 6.*

**PRESIDENT'S MESSAGE  
CONTINUED...**

“Lucille’d” by observing cannibalistic zombie stars. If a solar-mass stellar corpse called a white dwarf is in a binary system, it can devour gas from its unlucky neighbor. As the material spirals into an accretion disk toward the gravitational maw of the undead dwarf, it occasionally reaches the necessary temperature to achieve nuclear fusion, and we see a significant outburst in brightness, creating one of many different kinds of cataclysmic variables (depending on the particulars of the system). Many different types of technologies, from visual to CCD and everything in between, can be used to observe these stars (temporarily) rise from the dead. You can find more information on stars that need your attention at the CVnet website, <https://sites.google.com/site/aavsovcvsection/>.

Spooky best describes the behavior of one particular time of cataclysmic variable, the Z Cams. These have occasional “stand-stills” in which their brightness sticks close to average for as many cycles as that particular star feels like. Each stand-still can be different from the next, as can each Z Cam. If you like stars that go BOO (when one comes out of a stand-still), why not add Z Cams to your repertoire? Orange is the color of the season, so why not observe some pumpkin-hued variables? Stars of the K spectral type can be found among many different types of variables, so there is literally something for everyone! After doing a search for K variables on VSX (putting K% under spectral class), I found a veritable potpourri of stars, including DX And, RX Cas, AG Dra, RW Peg, RZ Psc, and the famous SS Cyg! I invite you to check out one or more of these stars this season—you won't be disappointed. Finally, I would be remiss (and you would suspect that I had been replaced with a pod person from

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The *AAVSO Newsletter* is published in January, April, July, and October. Items of general interest to be considered for the *Newsletter* should be sent to [ewaaagen@aaavso.org](mailto:ewaaagen@aaavso.org). Photos in this issue courtesy of K. Larsen and City of Florence, Alabama.

Membership in the AAVSO is open to anyone who is interested in variable stars and in contributing to the support of valuable research. Members include professional astronomers, amateur astronomers, researchers, educators, students, and those who love variable star astronomy.

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*The Copernican Observatory at Central Connecticut State University appropriately decked out for Halloween.*

Invasion of the Body Snatchers) if I failed to point out that my personal favorite variable star, the Sun, looks orange when viewed through a Thousand

Oaks Type II glass filter. If you'd like to join us in the Solar Section, check out <https://www.aaavso.org/solar>.

Clear skies are calling, so put on your favorite astronomically themed sweatshirt (you know you own one or two—or more), get out there, and observe! ★

*Ed. note: the Spanish language version of Kris's message can be found on page 7.*

# NEWS AND ANNOUNCEMENTS

## AAVSO 105TH ANNUAL MEETING— PRELIMINARY SCHEDULE

November 10–12, 2016  
Boston Burlington Marriott Hotel,  
Burlington, Massachusetts

*Times listed are local time EST. Add 5 hours for UT.*

### Thursday, November 10

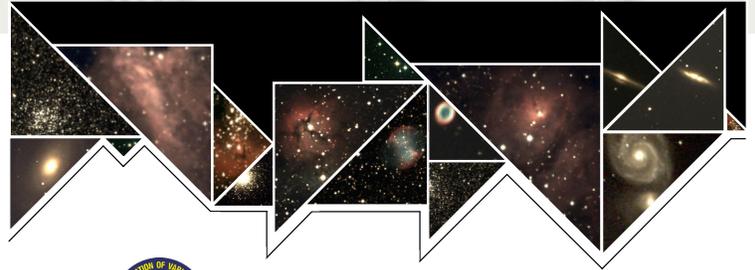
8:00am–5:00pm AAVSO Council Meeting  
(council members only)

### Friday, November 11

8:00am–9:00am Continental Breakfast Buffet  
8:30am–Registration opens  
9:00am–9:15am Welcome–Stella Kafka  
9:15am–10:30am Paper Session 1  
10:30am–11:00am: Coffee Break  
11:00am–Noon Paper Session 2  
Noon–2:00pm: Lunch Break  
2:00pm–3:30pm Paper Session 3  
3:00pm–3:30pm Poster Introductions (5 min each)  
3:30pm–4:00pm: Coffee Break  
4:00pm–5:00pm: Paper Session 4

### Saturday, November 12

8:00am–9:00am Continental Breakfast Buffet  
8:30am–Registration opens  
9:00am–10:30am: AAVSO Membership Meeting: Minutes, Treasurer's & Director's Reports, AAVSO Awards  
10:30am–11:00am: coffee break  
11:00am–11:45am: Paper Session 5  
11:45am–Noon: Group Picture  
Noon–2:00pm: Lunch Break  
2:00pm–3:30pm: Panel Discussion (AAVSO's Role in the Age of Large Surveys)  
3:00pm–3:30pm: Coffee Break  
3:30pm–4:30pm: Paper Session 6  
6:00pm: Cash bar opens  
7:00pm–10:00pm: AAVSO Closing Banquet, Trivia Contest, Silent Auction, Raffle



AMERICAN ASSOCIATION OF  
VARIABLE STAR OBSERVERS

## 2016 ANNUAL MEETING

NOVEMBER 10-12, 2016

BOSTON/BURLINGTON MARRIOTT, BURLINGTON, MA

### Learn About the AAVSO's Role in the Age of Large Surveys

The Annual AAVSO Meeting will feature a panel of scientists representing LSST, Kepler-2, KELT, TESS, and Evryscope. They will be discussing the role of the AAVSO in the era of multi-wavelength, all-sky photometric surveys. Join us!

For schedule updates and registration information please visit:  
[www.aavso.org](http://www.aavso.org)

Follow us on these platforms:    | Photos by Richard Berry



Please see the registration site

(<https://www.aavso.org/apps/meetings/Fall2016/>)

for information on attending the meeting virtually (remotely), and for updates on what portions of the meeting will be available remotely (online) free of charge.

## CREDIT WHERE CREDIT IS DUE

In the July 2016 issue of the *AAVSO Newsletter*, Mike Simonsen's article on the AAVSO Spring Meeting in St. Louis included a number of photos. We did not have credit information for these photos when we went to press, and would like to acknowledge them now. The dramatic group photo with the St. Louis Arch in the background was taken by Carol Beaman. The other photos—of AAVSO Director Stella Kafka, keynote speaker Virginia Trimble, and attendees listening to a talk—were taken by Roger Kolman. Sincere thanks to Carol and Roger!

We always appreciate photos taken at AAVSO meetings, and are happy to use them if we can. If you take photos at our meetings you would like to share, please send them to us at [aavso@aavso.org](mailto:aavso@aavso.org). Thank you! ★

## KUDOS TO KRIS!

Our President, Dr. Kristine Larsen, wears a great many hats in addition to her AAVSO hat and her teaching hat as Professor of Astronomy at Central Connecticut State University.

Her work while wearing one of them was recognized when Kris was presented with the Astronomical League's Special Service Award for 2015 for her "outstanding service, dedication, attention to detail, and performance in her role as volunteer Assistant Editor of the magazine Reflector."

We didn't learn about this until recently, but it's never too late to say Congratulations for a well-deserved honor, or Thank You for all that is done for the astronomical community present, future, and potential.

Congratulations and thank you, Kris! ★



Kris Larsen

## VSOING IN AUSTRALIAN SKY & TELESCOPE

ALAN PLUMMER (PAW, LINDEN, NSW, AUSTRALIA)

Further to the recent AAVSO Forum discussion on variable stars in *Sky & Telescope*, in which interest was expressed in seeing more and regular content on variable stars, here's what's happening in the affiliated southern offspring—*Australian Sky & Telescope*. First let me thank both mags for supporting the AAVSO. We get lots of northern copy in ours, and I can think of two features without looking: the last U Scorpii eruption, and watching for next V2487 Ophiuchus event. In the south we've had our own VS feature or two also.

Current *AS&T* editor Jonathan Nally, and his predecessor Greg Bryant, have both actively promoted the idea of amateur observers doing scientifically useful work. Since 2010 we've had a regular column of 200 words and a chart growing to 250–300 words plus chart today. I am fortunate enough to write them. I stick to brightish easy to observe visual targets—although I've managed to sneak in a challenge or two over the years.

Remembering I write for the south (hint: but dream of syndication and world domination) here's a few I've enjoyed: We had a column on S Doradus out just before it entered the last SDOR phase, and one out on T Pyxidis while it was still bright. Add to that some more Large Magellanic Cloud LBVs, the obvious RCBs (RY Sgr, V854 Cen, and I'm saving R CrB itself...) plus some very interesting LPVs. I've introduced the LPV Section and Andrew Pearce (miss-spelling his name, to my endless embarrassment). Other observers I've enjoyed introducing include Alexander Roberts, plus John Tebbutt, Albert Jones, and Sebastian Otero, and so on.

To what end is all this support from these two sister publications? Speaking for myself only: there may be a new observer or two, but I'm not certain, and that's not my business. My intention, as a visual observer and sometime writer, is to let people know Who, What, Why, and Where we are, and How we do it. Not to promote VSOing, because we don't need that, but to be attractive to interested readers. ★

## SCIENCE SUMMARY: AAVSO IN PRINT

ELIZABETH O. WAAGEN (WEO),  
AAVSO SENIOR TECHNICAL ASSISTANT

AAVSO data are constantly being used by researchers around the world in presentations and publications.

In the past, we have listed in the Newsletter the publications appearing during the previous quarter on the [arXiv.org](https://arxiv.org) server that used AAVSO data or resources and/or acknowledged the AAVSO. This listing has also appeared on the AAVSO website.

As of issue Number 69, we are not listing the publications but instead giving a summary of the numbers of publications from arXiv that used different AAVSO resources. The listing of publications still appears on the AAVSO website at <https://www.aavso.org/aavso-print>. The articles are categorized by AAVSO resource used.

From 2016 June 22 through September 26, the arXiv.org preprint server included the following numbers of publications:

- Publications using the AAVSO International Database (AID): 28
- Publications using the AAVSO Photometric All-Sky Survey (APASS): 34
- Publications using the International Variable Star Index (VSX): 8
- Publications using other AAVSO resources:
  - AAVSO Alert and/or Special Notices: 1
  - AAVSO Data analysis software (WWZ): 1
  - AAVSO Solar Section analysis references: 1
  - AAVSO member(s) among authors: 6

Note: Many variable star publications include AAVSO members/observers among their authors in addition to the ones indicated here.

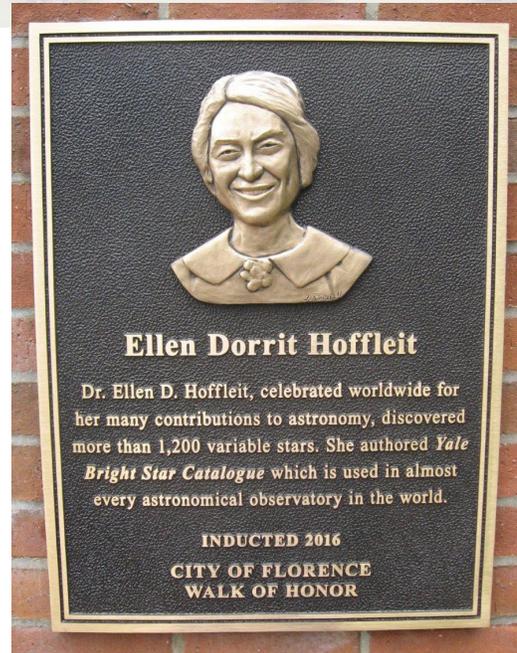
We thank these researchers for including the AAVSO and its resources in their work, and for acknowledging the AAVSO in their publication. We urge all those writing for publication to include the word "AAVSO" in their list of keywords. ★

## DORRIT HOFFLEIT HONORED

We were delighted to learn that long-time AAVSO member, officer, and stalwart supporter Dr. Dorrit Hoffleit, research astronomer at Yale and Harvard Observatories, was recently honored by the City of Florence, Alabama, Dorrit's birthplace.

Dorrit's name and accomplishments were memorialized August 4, 2016, as part of Florence's Walk of Honor, located at the Marriott Shoals Conference Center in Florence.

According to the City of Florence, "The Walk of Honor, located in the beautiful River Heritage Park, recognizes individuals of Florence and Lauderdale County who have achieved national or international acclaim. This is a means to give honor and perpetuate the name and achievement of deserving individuals, either current or former citizens, through a form of civic recognition. Areas of national or international accomplishment include, but not limited to: agriculture, art, athletics, business, education, government, humanities, literature, medicine, military, music, public service, religion, and science and technology."



Dorrit's Walk of Fame plaque reads:

*Dr. Ellen D. Hoffleit, celebrated worldwide for her many contributions to astronomy, discovered more than 1,200 variable stars. She authored Yale Bright Star Catalogue which is used in almost every astronomical observatory in the world.*

Inducted with Dorrit in the same ceremony were: philanthropist Charles C. Anderson; African-American Congressman Oscar S. Depriest; and Spanish-American War commander Rear Admiral John Hood.

After receiving nominations from the public, the Walk of Honor Selection Committee chose the four inductees. These Inductees join the thirty-five individuals selected from previous years. A bronze plaque with a picture of the inductee, along with a brief inscription of their accomplishment, has been placed on the Walk of Honor monuments in the park. The public is invited to visit the site. More detailed information on these individuals is available in the Local History and Genealogy Department at the Florence-Lauderdale Public Library. ★



## TALKING ABOUT THE AAVSO

## Events

AAVSO members, observers, and friends have given or will be giving presentations about the AAVSO and variable stars at the following venues:

*August 5, 2016—Jessica Johnson* (JJMA, New Britain, Connecticut) gave the talk, “Breezy Hill Rocks!”, at the 2016 Stellafane Convention, Breezy Hill, Springfield, Vermont.

*August 5, 2016—Mario Motta* (MMX, Gloucester, Massachusetts) spoke on the “Human and Environmental Effects of LED Street Lighting” at Stellafane, Breezy Hill, Springfield, Vermont. The very large audience listened closely and asked numerous questions afterwards. There was a lot of discussion about this topic during the rest of the Stellafane convention.

*August 6, 2016—Mario Motta* spoke about “WD1145+017, a White Dwarf Destroying a Planet. How Pro-Am Collaboration Helped Solve a Mystery” at Stellafane, Breezy Hill, Springfield, Vermont.

*August 6, 2016—Jessica Johnson* repeated her talk, “Breezy Hill Rocks!”, at Stellafane, Breezy Hill, Springfield, Vermont.

*August 6, 2016—John O’Neill* (ONJ, Topsfield, Massachusetts, and Rush, Ireland) gave a talk entitled “Where have all the (Bright) Novae Gone?” at Stellafane, Breezy Hill, Springfield, Vermont.

*August 6, 2016—Glenn Chaple* (CGF, Townsend, Massachusetts) gave a presentation on “Small Telescope Astronomy” that included LPVs and participating in observing campaigns, at Stellafane, Breezy Hill, Springfield, Vermont.

*August 6, 2016—Kristine Larsen* (LKR, New Britain, Connecticut) spoke on “Observing Programs of the AAVSO” at Stellafane, Breezy Hill, Springfield, Vermont. Following her talk, which had a very large audience, AAVSOers held a meet-and-greet with attendees to talk about variable star observing and the AAVSO, and answered a great many questions. Some new observers are bound to join our ranks after this outreach effort led by Kris!

*September 2, 2016—Sebastián Otero* (OSA, Buenos Aires, Argentina) gave a talk entitled “Estrellas Variables y los Aficionados” (Variable stars and the amateur astronomers) at the “Bella Vista al Cosmos” star party at the La Providencia College, Buenos Aires, Argentina.

*September 5, 2016—Stella Kafka* (KKS, Cambridge, Massachusetts) spoke on “The AAVSO as a Resource of Variable Object Research” at the Accretion Processes in Cosmic Sources conference in St. Petersburg, Russia.

*September 12, 2016—Stella Kafka* gave a presentation entitled “The AAVSO program: a Resource for Variable Object Research” at the Institute of Astronomy, Russian Academy of Science, Moscow, Russia.

*September 14, 2016—Stella Kafka* spoke on “The AAVSO program: a Resource for Variable Object Research” at the Sternberg Institute of Astronomy, Moscow, Russia.

*September 15, 2016—Dennis Conti* (CDEC, Annapolis, Maryland) gave a presentation on “Amateur Astronomers’ Role in Exoplanet Research” as guest speaker to the Howard County (Maryland) Astronomical League meeting.

*September 17, 2016—Stella Kafka* spoke on “The AAVSO at the Forefront of Variable Star Astronomy” at the European Conference of Amateur Variable Star Observers, Hamburg, Germany.

*September 18, 2016—Mike Simonsen* (SXN, Imlay City, Michigan) gave a remote talk on the “The Z Campaign: Past, Present, and Future” to the European Conference of Amateur Variable Star Observers, Hamburg, Germany. Mike notes his presentation time was 5:30 a.m. his local time!

*September 27, 2016—Dennis Conti* gave a talk on “The Role of Amateur Astronomers in Exoplanet Research” in the Exoplanet Club Seminar Series at NASA Goddard Space Flight Center, Greenbelt, Maryland. Dennis provides the abstract of his talk: “Amateur astronomers have successfully been conducting exoplanet observations for more than a decade, and they have been doing so with surprising accuracy. They have collaborated with professional astronomers to help confirm exoplanet candidates, to refine the ephemeris of known exoplanets, to provide Transit Timing Variation (TTV) data for the detection of additional planets, and they have even conducted their own surveys to discover new exoplanets. Although amateur astronomers have predominately used the transit method in their observations, some have successfully conducted radial velocity studies using off-the-shelf spectrographs, as well as participated in microlensing follow-up observations.

“This presentation will review the role that amateur astronomers have played thus far in exoplanet research, what contributions they have made to date, what their technical capabilities are and the techniques they use. In particular, it will discuss the support that amateur astronomers are providing to an on-going HST study of the atmosphere of some 15 exoplanets. Recent observational techniques that may ultimately lead to the direct detection and imaging of exoplanets by amateur astronomers will also be postulated. Finally, the future role that amateur astronomers can play in upcoming exoplanet surveys, as well as the resources they can provide professional astronomers will be discussed. Exoplanet researchers who are interested in using an established world-wide network of amateur astronomers to assist in their exoplanet studies might also find this presentation useful.”

*September 29, 2016—Mike Simonsen* gave a talk entitled “Stand Back! I’m Going to Try Science” (opportunities for citizen science projects for amateurs) at the Okie-Tex Star Party, Camp Billy Joe, Kenton, Oklahoma.

*September 29–October 2, 2016—Chris Stephan* (SET, Newton Falls, Ohio), will be an invited speaker and a vendor at Michigan’s largest star party, the Great Lakes Star Gaze (<http://www.greatlakesstargaze.com/>). Chris will be speaking on “The AAVSO and Visual Variable Star Observing”. Several hundred people attend this annual event.

*October 1, 2016—Stella Kafka* will give the presentation “Variable Stars and their Stories” at the Connecticut Star Party, Goshen, Connecticut.

*October 6, 2016—Gary Poyner* will speak on “Historic Novae” at the Rugby Astronomical Society, Worcestershire, England.

*October 24, 2016—John O’Neill* will repeat his talk entitled “Where have all the (Bright) Novae Gone?” to the Irish Astronomical Society (members and public), 8 p.m., Ely House, 8 Ely Place, Dublin 2, Ireland.

*November 11, 2016—Tom Calderwood* (CTOA, Bend, Oregon) will give a talk for the general public entitled “Arlington Touches the Stars: Peter Schwamb and the Mt. Wilson Observatories”, 7:00 p.m., general public talk, Old Schwamb Mill, 17 Mill Lane, Arlington, Massachusetts. This talk tells the story of fabricating the mount for the 100-inch Hooker telescope.

*January 13, 2017—Simone Santini* (SSIM, Prato, Italy) will give a talk for a general public astronomy course entitled “Variable stars” (Le Stelle Variabili, in Italian) at the Associazione Astronomica “Quasar” c/o Centro di Scienze Naturali, Via di Galceti 74, 59100, Prato, Italy. Topics covered will be general information about variable stars, star evolution and the role of amateur astronomers and related organizations (including AAVSO).

Thank you, speakers!

We know many of you are involved in outreach related to the AAVSO and variable stars - let us help you spread the word! Send us information about your event (upcoming or past) for inclusion in the January 2017 AAVSO Newsletter (submission deadline December 15, 2016). Many thanks for your education and outreach efforts on behalf of the AAVSO and variable star observing! ★

## IT'S THAT TIME AGAIN!

**MIKE SIMONSEN**  
**AAVSO MEMBERSHIP DIRECTOR/DEVELOPMENT OFFICER**

It's that time again!

Here in the northern US, the weather has begun to cool, leaves on the trees have begun to turn, football is being played on weekends, the AAVSO Annual Fall Meeting has been announced—and it is time to renew your AAVSO membership for 2017.

You can do this online. We've made it easy as 1, 2, 3. Simply go to <https://www.aavso.org/apps/member/>

If you prefer, you can fill out and print the 2017 membership renewal form here <https://www.aavso.org/sites/default/files/AAVSOMembershipRenewalForm2017.pdf>—and mail it to AAVSO, 49 Bay State Road, Cambridge, MA 02138, USA.

We accept payment by credit card or check. If you would rather call in your credit card information, or have questions about membership or about the AAVSO in general, please call us at +1 (617) 354-0484 Monday-Friday, 9am to 5pm (Eastern, US).

Your membership in the AAVSO has several benefits, including:

- Full and immediate access to the AAVSO's refereed research publication *Journal of the AAVSO*,

- Waiver of page charges for publication in the Journal (currently \$100/page for non-members),
- Substantial discount on CHOICE short courses and CCD School Streaming Video downloads,
- Access to exclusive members-only CHOICE courses,
- Eligibility for the Mentor Program,
- Use of the AAVSO's online photometric analysis tool, VPhot and the VPhot User Guide,
- Reduced registration rates for AAVSO meetings and workshops,
- Eligibility to vote in elections and serve as an AAVSO Officer or Councilor.

You can also use this opportunity to check your personal information and make any updates to your email address, phone number, home address, or any other important information.

If you can afford to, now is a good time to donate to the General Fund or one of the many special funds listed in the drop-down menu when you renew online. They are also listed on the renewal form as well as on this page—<https://www.aavso.org/funds>

We hope to see you all return as dues-paying members for 2017. Your continued support makes possible the development, administration, and maintenance of all the tools and services we provide to our observers, members, and the scientific community.

Here's wishing you clear skies and a prosperous and happy 2017. ★

*Ed. note: following are the Spanish language texts of the Director's and President's messages.*

## MENSAJE DEL DIRECTOR

**STELLA KAFKA**

### Planeando nuestro futuro

Colegas,

Ultimamente, cada vez que me encuentro con nuestros observadores, escucho preocupación acerca del futuro de la observación de estrellas variables. “¿Los surveys van a hacer nuestro trabajo en un futuro cercano?” “¿Vamos a pasar a ser obsoletos?” “¿Cómo contribuirá la AAVSO a la astronomía de estrellas variables cuando los surveys de cielo completo van a darles a los astrónomos profesionales todos los datos que necesitan para su trabajo?” Considerando el aluvión de datos de surveys existentes y futuros que planean cubrir todo el cielo, estas son todas preguntas muy legítimas. Y entiendo que pueda ser desincentivante para alguien a quien le gusta explorar el cielo nocturno variable enterarse de la escala y del impacto de los futuros surveys. ¿Son una amenaza?

La comunidad científica profesional actualmente está muy interesada en las estrellas variables; es excitante pensar en las posibilidades de nueva ciencia que todos esos surveys posibilitarán. Nos estamos preparando para mirar a las mismas estrellas de una forma diferente, una forma que esos surveys nos permitirán. Sin embargo..., los surveys no son todo, no nos dan toda la información que necesitamos. Todos esos proyectos revelarán una enorme cantidad de nuevos objetos y nuevos modos de variabilidad y nos proveerán de material para la investigación científica durante varias décadas. Pero al mismo tiempo, todos esos proyectos tienen límites en cuanto a sus filtros, su cadencia y los sitios donde se encuentran, y tienen una vida limitada (¡siempre dependen de la financiación!). Más aún, los telescopios que realizan surveys desde tierra están sujetos a las condiciones climáticas locales y a los problemas técnicos que pudiesen surgir. Echando un vistazo a los detalles de esos surveys y a los de las misiones que se vienen, uno puede darse cuenta del potencial de la AAVSO para ser parte del descubrimiento científico.

Aquí tenemos un ejemplo: TESS y PLATO, misiones espaciales de exoplanetas de la NASA y la ESA respectivamente, mirarán estrellas cercanas en busca

de exoplanetas de tipo terrestre, descubriendo muchos sistemas tipo Júpiteres/Saturnos calientes y muchos modos estelares de variabilidad desconocidos como efecto colateral. Las observaciones de seguimiento serán primordiales para entender las propiedades fundamentales de esos sistemas y, aunque la precisión sin precedentes de esos observatorios espaciales será necesaria para observar planetas del tamaño de la Tierra, todos los demás ejemplos de ciencia se podrán adaptar a las observaciones desde tierra de la AAVSO. Mirando hacia el futuro distante: LSST barrerá el cielo nocturno completo ofreciendo una medición de magnitud por estrella cada ~3 días. Sin embargo, este survey sufrirá de saturación en magnitud 16, así que objetos transitorios de interés que sean más brillantes requerirán de los observadores de la AAVSO para “llenar” la curva de luz y complementar las observaciones de rayos X y de radio. Ya estamos trabajando con surveys: nuestra colaboración en desarrollo con KELT demuestra cómo nuestros observadores contribuyen a las observaciones de los surveys de objetos de interés, incluso cuando el proyecto KELT estudia todo el cielo, tanto en el hemisferio norte como en el sur. Y nuestro trabajo con la colaboración BRITTE es un ejemplo de cómo la AAVSO puede proveer el apoyo necesario desde

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## MENSAJE DEL DIRECTOR CONTINUED

tierra para el monitoreo extendido multi-color de fuentes interesantes que se estudian desde el espacio sólo durante 6 semanas por vez.

Vivimos un renacimiento de la astronomía de estrellas variables y quiero que todos ustedes sean parte de él. La AAVSO necesita estar en el centro de la acción, ofreciendo objetivos de interés, entrenando a nuestros observadores, debatiendo acerca de aspectos científicos interesantes e interactuando con los surveys y los científicos que necesitan nuestros datos. Mi prioridad es asegurar que la AAVSO sea relevante y esté preparada para enfrentar los desafíos que surgirán y que tenga un papel activo junto a los surveys y colocar continuamente a la AAVSO en el radar de la comunidad científica profesional generando las conexiones apropiadas con los científicos que trabajan en esos surveys. También quiero incluirlos a ustedes, nuestros miembros y observadores, en el debate. Por lo tanto, dedicaremos nuestro próximo encuentro a este tema, abriendo el diálogo entre todos los miembros de AAVSO y los astrónomos profesionales que representan a una cantidad de estos surveys del presente y el futuro. Armaremos un panel donde estaremos discutiendo el rol de la AAVSO en la era de los grandes surveys y los proyectos y misiones de variabilidad. Hemos invitado a científicos de grandes proyectos tanto terrestres como espaciales (K2, KELT, TESS, LSST, Evryscope, J-Plus) para que se encuentren con ustedes, nuestros miembros y observadores, expliquen sus proyectos y respondan sus preguntas. Transmitiremos de forma abierta este panel de debate a todos nuestros miembros a través de GoTo meeting, y las grabaciones estarán disponibles para que las escuchen si no pueden estar presentes en tiempo real. Los invito a todos a unirse con nosotros y a participar en el debate. De hecho, me gustaría incentivarlos a ser parte del encuentro entero, en persona o remotamente, para escuchar sobre estos proyectos y aprender de la nueva ciencia que está llegando con nuestros colegas de la AAVSO.

Una nueva era de la observación de estrellas variables está aquí y la AAVSO la está haciendo posible. ¡Y yo estoy encantada de que ustedes sean parte de ella!

Los mejores deseos—cielos claros. ★

## MENSAJE DEL PRESIDENTE

KRISTINE LARSEN

**¡Olvídense de la luna de cosecha, vamos a cosechar variables!**

¡El otoño boreal está aquí, finalmente! Los chicos (desde jardín de infantes hasta la universidad) están de vuelta en la escuela, los zapatos blancos son decididamente incómodos y todo las calabazas están de moda. Las horas de luz menguan al igual que el fresco, las nítidas horas de observación crecen y no ha de pasar mucho tiempo antes que pasemos demasiado tiempo aquí en Nueva Inglaterra rastrillando hojas. Es el momento de celebrar la temporada de Halloween, pero con un toque decididamente astronómico.

Vamos a empezar con la conexión obvia, la llamada estrella Ghoul, Algol. Perseo está bien localizado para observarla en el otoño y, con su magnitud brillante y su corto periodo, esta estrella binaria eclipsante proporciona un objetivo interesante para los observadores con DSLR. Pero ¡no olvidemos que hay muchas binarias eclipsantes en la base de datos de AAVSO! Si le interesa Bailar con las Estrellas (binarias) eche un vistazo a la página web de la sección Binarias Eclipsantes [<https://www.aavso.org/content/aavso-eclipsing-binary-section>]. Si es como yo, seguro está esperando con ansiedad el estreno de la temporada 7 de *The Walking Dead*. Si usted está fascinado por los muertos-vivos, es posible que desee tomarse su tiempo hasta que sepamos quién consiguió “Lucille’ d” observando estrellas zombi canibales. Si un cadáver estelar de una masa solar llamado enana blanca está en un sistema binario, puede devorar el gas de su desafortunada vecina. A medida que el material cae en espiral en un disco de acreción hacia las fauces gravitacionales de la enana muerta-viva puede, ocasionalmente, alcanzar la temperatura necesaria para lograr la fusión nuclear y vemos un aumento significativo en el brillo, creando una de las muchas clases diferentes de variables cataclísmicas (dependiendo de la particularidades del sistema). Hay muchos tipos de tecnologías desde la visual a la CCD (y

todas las demás entre ellas) que se pueden utilizar para observar estas estrellas que, temporalmente, se levantan de entre los muertos. Puede encontrar más información sobre aquellas estrellas que requieren su atención en el sitio web CVNet, <https://sites.google.com/site/aavsovcvsection/>.

El espanto describe mejor el comportamiento de un momento determinado de las variables cataclísmicas: las Z Cams. Estas tienen ocasionales “momentos de quietud” en los que su brillo se clava cerca de la media durante tantos ciclos como le convengan a la estrella en particular. Cada momento de quietud puede ser diferente del otro para cada Z Cam. Si te gusta estrellas que hacen ¡Bu! (cuando sale de su momento de quietud), ¿por qué no añadir las Z Cams a su repertorio?

El naranja es el color de la temporada, así que ¿por qué no observar algunas variables con tonos de calabaza? Las estrellas del tipo espectral K se pueden encontrar en muchos tipos diferentes de variables, por lo que resulta, literalmente, ¡algo para todos! Después de hacer una búsqueda de variables K en VSX (poniendo K% en la clase espectral) he encontrado un verdadero popurrí de estrellas, incluyendo DX And, RX Cas, AG Dra, RW Peg, RZ Psc y ¡la famosa SS Cyg! Los invito a visitar una o más de estas estrellas de esta temporada, no se decepcionará.

Por último, sería negligente (y se sospecharía que fui reemplazada por una persona receptáculo de *Invasion of the Body Snatchers*), si terminase sin señalar que mi estrella variable favorita personal, el Sol, se ve de color naranja cuando se la observa a través de un filtro de vidrio de Tipo II de Thousand Oaks. Si desea unirse a nosotros en la Sección Solar, eche un vistazo a <https://www.aavso.org/solar>.

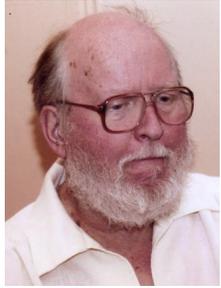
¡El cielo despejado está llamando! ¡Póngase su remera favorita de temática astronómica (ya se sabe que dispone de una o dos - o más), salga y a observar!

Pie de foto: El Observatorio Copérnico de la Universidad Central del Estado de Connecticut apropiadamente decorado para Halloween. ★

### A NOTE ON THE TRANSLATIONS

We are grateful to Sebastián Otero and Jaime García for providing, respectively, the Spanish language versions of the Director's and President's messages. We hope that readers of the *Newsletter* will enjoy this feature.

## IN MEMORIAM

MEMBERS, OBSERVERS, COLLEAGUES,  
AND FRIENDS OF THE AAVSO

Geoff Gaherty

## GEOFF GAHERTY

Dr. Geoffrey Gaherty, Jr.  
(1941–2016)

Geoff Gaherty passed away on July 7, 2016, from complications following a kidney transplant. He was an AAVSO member, an enthusiastic observer of variable stars and other

sky objects. Even more: he was a passionate and effective communicator and mentor to thousands of other sky watchers around the world.

Geoff was born and raised in Montreal where, as a teen-ager, he got “hooked” on astronomy by Comet Arend-Roland. He was very active in the Montreal Centre of the Royal Astronomical Society of Canada (RASC), as a planetary observer, and an observer of variable stars. David Levy was a fellow member, as were AAVSO Presidents Frank DeKinder, George Fortier, and Charles Good.

Then, for many decades, he was distracted from astronomy by education and career. He received a BSc in math and physics from McGill University, and a PhD in anthropology from the University of Toronto. He subsequently taught anthropology at McMaster University in Hamilton, University of Waterloo, and the University of California at Santa Barbara. There, he met his first wife, whose interest in reptiles, and his interest in conservation coincided, and he became a Director at the non-profit Reptile Breeding Foundation, and generously supported the building of the Reptile House at the famous Gerald Durrell Wildlife Park in Jersey, Channel Islands. After their divorce, he became interested in counselling, and trained in this field. He was an early entrant into personal computing, and taught this in the University of Toronto’s School of Continuing Studies, and later developed a consulting firm

dedicated to data analysis. Geoff was also actively involved in music, playing lute and recorder in an early music quintet appropriately called Cassiopeia.

In 1997, he was hooked again by a comet—Hale-Bopp—and gradually returned to astronomy with rekindled energy and enthusiasm. He was a planetarium instructor at the Royal Ontario Museum in Toronto from 2004 to 2007, and a writer of educational and popular articles, notably for Space.com. His computer interests morphed into a job providing content and technical support for Starry Night software. He was moderator of two popular Yahoo groups, “Talking Telescopes” (his ‘family’ of telescopes numbered 25) and “Starry Nights”, gave regular talks on skywatching for the RASC Toronto Centre and other groups, responded to the “ask an astronomer” page on the RASC website, contributed a regular column “Through the Eyepiece” to the Journal of the RASC, and wrote the text portion of “The Sky Month by Month” in the RASC’s annual *Observers Handbook*. He made over 1500 variable star estimates (AAVSO observer initials GHT), and encouraged others to observe variable stars through his talks, blogs, and his “RASC Toronto Centre Variable Star Observing Challenge”. His many awards include the Chant Medal, the RASC’s highest award for astronomical achievement.

His wife Louise sends the following anecdote: “At Hallow’een, Geoff would set up a telescope on the sidewalk, and the little witches and goblins were treated to a view of whatever was visible that night. The same kids came back, year after year, to what they called “the good house.” One evening, a city bus stopped because the driver wanted to see what was visible, and he and the passengers tramped up to the telescope. Geoff was a true educator, in astronomy, music, and all walks of life.”

His memorial service was held outdoors, at his home in Moonstone, Ontario, and was followed by solar observing. He leaves his wife Louise Gervais, and their son David, to whom go our deepest condolences.

*Prepared by John Percy, University of Toronto, with additional information from Space.com and from Geoff’s wife Louise Gervais.*

**JOHN A. HILLIER** (Lexington, Massachusetts) died September 2, 2016, following heart surgery. John was the husband of longtime AAVSO member/observer Anna Hillier (HNL), and he frequently accompanied Anna to astronomical events in the New England area. We extend our deepest condolences to Anna, their daughter Cynthia, and all of John’s family and friends.



Seiji Tsuji

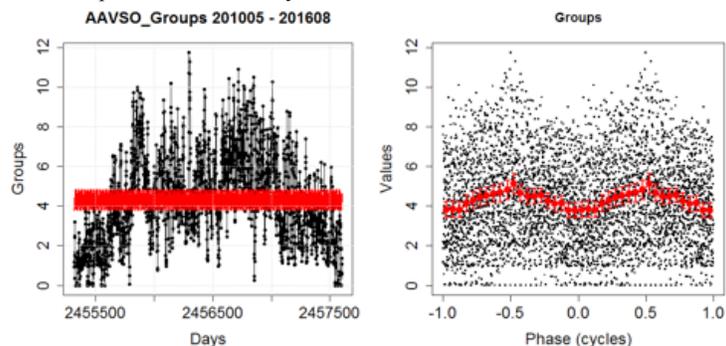
**SEIJI TSUJI** (TSJ, Sanda-Shi, Hyogo, Japan) died in February 2016. He contributed 3,447 visual and multicolor CCD observations made from December 1989 through May 2015 to the AAVSO International Database. He received an AAVSO Observer Award in 2012 for

his contribution of over 100 visual observations. As a volunteer, Seiji translated the *AAVSO Manual for Visual Observing of Variable Stars* into Japanese. In addition to his membership dues, he supported the AAVSO through his contributions to the Janet A. Mattei Research Fellowship, the General Fund, and the 2014 Annual Campaign. Interested in astronomy from the age of 12, Seiji returned to it after a number of years and began observing a variety of objects, including variable stars. At the time of his death, his particular interest was observing galaxies from his home’s roof-top observatory despite the significant light pollution. We extend our deepest sympathy to Seiji’s family, including his daughter Midori, and his friends and colleagues.

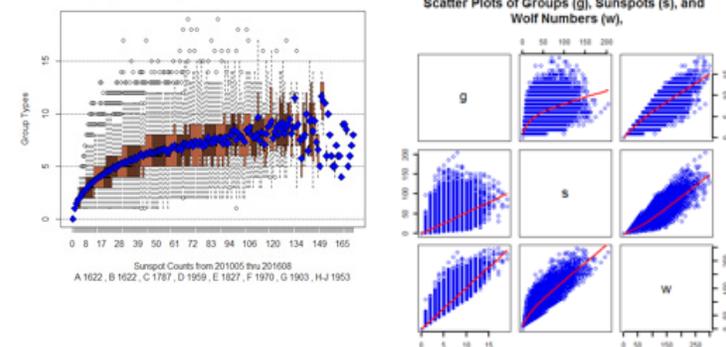
## A BRIEF LOOK AT THE AAVSO DATA FOR THIS CYCLE 24; GROUP COUNTS AND SUNSPOT DENSITY COUNTS AS A MEASURE OF ZURICH CLASSIFICATIONS

RODNEY HOWE, AAVSO SOLAR SECTION CHAIR

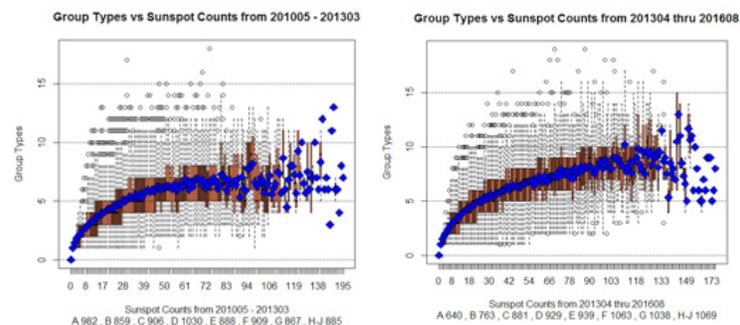
AAVSO group counts data from May, 2010, through August, 2016, show this cycle 24 to be bi-modal, i.e. having two phases, with an average Carrington Rotation period of 26.137 days:



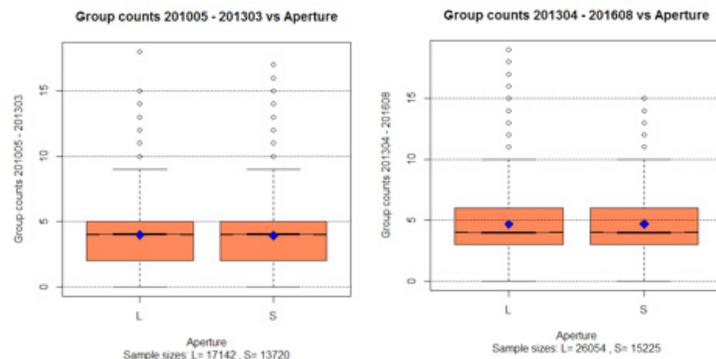
It's also interesting to look at the scatter of groups and sunspot counts ranked as the Zurich classifications (left below). In the right plot below, notice how broad the sunspot scatter (middle panels) is compared to the group scatter and Wolf number scatter.



Now look at daily count averages for each 'phase'. The first phase goes from 201005 (2010 May) through 201303 (2013 March), the second phase from 201304 (2013 April) to 201608 (2016 August). Notice the small groupings A and B (bottom of these Group Types scatter graphs are the number of observations per Zurich group type) in the first phase have more sunspot counts compared to the second phase, and there are larger sunspot counts in the larger Zurich group classes in the second phase (large sunspot counts, over 94 causes large scatter):



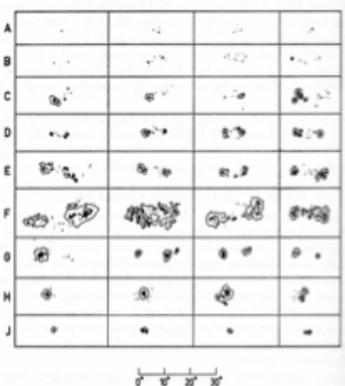
Below, look at the aperture size of the telescopes being used, where S (small) apertures are below 100 mm and L (large) apertures are above 100 mm (many of which may be projection systems). Also, the blue diamonds are the mean values and the horizontal lines are the median values.



### Discussion

In this brief study there are observations from 120 observers over the last 6 years of this solar cycle 24. From these observers the AAVSO collects data on their group and sunspot counts, and these sunspot counts can be used as a measure of 'density' in an approximation of the Zurich classification scheme (slide below from Frederic Clette, SILSO (2009)), rather than area in millionths of the solar disc (MSD) as is used by the Royal Greenwich Observatory (RGO) (Usoskin et al. 2016).

- A: unipolar spot or group of small spots without penumbra (appearance)
- B: symmetrical dipolar group with small spots without penumbra
- C: asymmetrical dipolar group with a penumbra on one side
- D: dipolar group with penumbrae on both sides. At least one of the principal spots has a simple structure. Extent <math>< 10^\circ</math>
- E: like D but more complex structure and extent <math>> 10^\circ</math>, <math>< 15^\circ</math>
- F: like E but extent <math>> 15^\circ</math> and often many secondary spots and penumbrae between the main spots (maximum development)
- G: large dipolar group with simple structure and no small secondary spots between the principal spot: Extent <math>> 15^\circ</math> (decline of types F)
- H: unipolar group with a single big spot with penumbra: extent <math>> 2.5^\circ</math> (decline)
- J: like H but extent <math>< 2.5^\circ</math> (decline)



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## GROUP AND SUNSPOT COUNTS CONTINUED...

At times a small A or B group shows up on the surface of the sun, and not all observers see it a few hours later under similar seeing conditions. Groups like that spring up and disappear in a matter of hours. This statistical analysis might show that this activity is random and therefore cancels itself out; however, the number of small group's peak at the time of the first phase, and the peak of the large groups, is delayed by about 2 - 3 years, which is seen in the second phase (Kilcik 2011). Also, in the AAVSO network of observers there is the perennial issue that since there is no reference observatory as with SILSO or RGO, it is important to rely on all observers and the different aperture sizes for the telescopes being used.

### References

- F. Clette, 2009, personal communication.  
 G.A. Kovaltsov, T. Chatzistergos, 2016, Dependence of the Sunspot-group Size on the Level of Solar Activity and its Influence on the Calibration of Solar Observers, c Springer ••• (<https://arxiv.org/abs/1609.00569>).  
 A. Kilcik, et al., Time Distributions of Large and Small Sunspot Groups Over Four Solar Cycles, 2011 (<https://arxiv.org/ftp/arxiv/papers/1111/1111.3999.pdf>).  
 Rprogs.R software by Grant Foster: <https://www.aavso.org/software-directory>  
 Frequency sunspot counts in R by Dr. Jamie Riggs ([http://www.spesi.org/?page\\_id=65](http://www.spesi.org/?page_id=65)). ★

## RW AURIGAE—A STAR TO KEEP AN EYE ON! MIKE POXON (POX), AAVSO YOUNG STELLAR OBJECTS SECTION LEADER

The unprecedented fall of RW Aur in 2015 was well-followed by our observers, and anyone who attended the AAVSO meeting in Woburn last November will have heard Joey Rodriguez speak about the amazing things that are going on there. Well, it appears that this episode (whatever it was) is over as evidenced by some recent observations below submitted to the AAVSO International Database. I have italicized “appears” for a very good reason! This is precisely the time where visual observers need to be on their guard against bias. As someone who makes his fair share of ‘one-comp’ estimates I shall use at least two comp stars with RW Aur to help eliminate any taint of seeing what I expect to see.

RW Aur	2457633.8625	2016 Sep. 02.36250	11.1 Vis.	KMA
RW Aur	2457632.8521	2016 Sep. 01.35210	10.6 Vis.	KMA
RW Aur	2457630.5576	2016 Aug. 30.05760	11.3 Vis.	POX
RW Aur	2457629.00214	2016 Aug. 28.50214	10.560 ± 0.002 V	SGEA
RW Aur	2457629.00104	2016 Aug. 28.50104	10.574 ± 0.002 V	SGEA
RW Aur	2457626.92317	2016 Aug. 26.42317	10.928 ± 0.012 V	DKS
RW Aur	2457604.97156	2016 Aug. 04.47156	11.156 ± 0.155 V	SGEA
RW Aur	2457506.58403	2016 Apr. 28.08403	12.3 Vis.	MCPA

This return to a bright state may just be a hiatus in more activity. After all, it's likely that whatever caused the recent fading episode must have been pretty drastic and we should assume that it has not gone away permanently. And of course, don't forget that there are other active stars out there!

*Ed. note: for activity in RW Aur since Mike's article, please see the entry on RW Aur in Observing Campaigns Update, pp. 15–16. ★*

## PEP CALIBRATION UPDATE

TOM CALDERWOOD (CTOA, BEND, OREGON)

As promised, I have been observing the red/blue star pairs used for calibrating transformations (I am eagerly looking for a southern hemisphere observer to join this effort). One of the problems we face is that the reference magnitudes for these pairs come from unknown sources. There is reason to believe that the Leo Minor pair magnitudes came from Dyer Observatory and are highly reliable. By reputation, the Orion pair is also good. The Aquarius pair has been suspect for many years.

I have been able to collect data on the pairs in Hercules, Pegasus, Andromeda, and Perseus to compare with my LMi calibration. Using magnitudes from the General Catalog of Photometric Data, the pairs in Hercules and Perseus give transformation coefficients that compare favorably with those from Leo Minor. Andromeda does not work as well, and Pegasus is way off. Results derived from the reference magnitudes listed in the PEP calibration instructions are not as good. Below are the deltas needed for epsilon B and V determinations with Hercules, Perseus, and Andromeda, as taken from the GCPD. Observers should avoid the Pegasus and Aquarius pairs, and use Andromeda with circumspection. At some point we will update the instruction document.

Hercules: delta V= 1.465 delta B= 0.071 delta(B-V)= -1.394  
 Perseus: delta V= 1.476 delta B= 0.070 delta(B-V)= -1.406  
 Andromeda: delta V=-0.006 delta B=-0.715 delta(B-V)= -0.709

A given pair should be observed three different times to establish a reliable epsilon, with the individual results weight-averaged by their standard errors. Any pair can still be used for establishing second-order extinction in B band, since the procedure depends only upon observed magnitudes. ★

## PHOTOELECTRIC PHOTOMETRY PROGRAM UPDATE

**JIM KAY (KJMB, AAVSO PEP SECTION LEADER)**

### Observations

The section had a productive quarter with 8 observers contributing a total of 960 observations of 37 stars in 3 bands (B, V, R). Year to date we total 1824 observations which speaks to the dedication of the PEP observers given each observation takes on average half an hour.

Erwin van Ballegoij (BVE, Netherlands) contributed a total of 18 observations in V and B. Two of eps Aur, 6 of P Cyg, and 10 of rho Cas.

New PEP observer Scott Burgess (BSO, Winterport, Maine) Contributed 6 observations 2 each of rho Cas and P Cyg. Scott is fully up and running now and has joined our accuracy campaign using rho Cas which continues to be well placed for observations in the coming months.

Charles Calia (CCB, Ridgefield, Connecticut) contributed a total of 15 V band observations of R Lyr, V441 Her, and W Boo.

Tom Calderwood (CTOA, Bend, Oregon) provided 80 observations in the B and V bands of rho Cas, P Cyg, R Lyr, XY Lyr, Ch Cyg, V2119 Cyg, and W Boo.

Jim Fox (FXJ, Mayhill, New Mexico) submitted a total of 44 V observations of P Cyg, CH Cyg, V2291 Oph, V441 Her, V533 Oph, tau4 Ser, FP Vir, FH Vir, FS Com, SW Vir, and TV UMa.

Jim Kay (KJMB, Shelburne, Vermont) submitted 48 observations in the B and V bands of rho Cas, R Lyr, XY Lyr, CH Cyg, and W Boo.

Paul Kneipp (KPL, Bossier City, Louisiana) submitted a total of 20 V observations of rho Cas, V1070 Cyg, CH Cyg, AB Cyg, V441 Her, V973 Cyg, and AC Her.

Gerald Persha (PGD, Lowell, Michigan) submitted a total of 729 observations in the V, B, and R bands. Stars included U Del, EU Del, V1687 Cyg, V2119 Cyg, P Cyg, V398 Lyr, HK Lyr, XY Lyr, R Lyr, V636 Her, g Her, ST Her, X Her, T CrB, V1023 Cyg, AG Peg, V382 Cyg, GO Cyg, TX Cyg, SZ Cyg, TU CVn, Y CVn, and TV UMa. He captured some nice time series of the eclipsing binaries V1023 Cyg, V382 Cyg, and GO Cyg.

Thanks go to everyone for a productive quarter.

### Campaigns

The section contributed a total of 28 observations in B and V of CH Cyg and two of eps Aur supporting the campaigns detailed in *AAVSO Special Notices #320* and *#131*. CH Cyg will remain well place for observation in the fall evenings, and eps Aur in the early morning hours. Consider adding these stars to your program as these are astrophysically interesting stars suitable for PEP observing.

Support to the BRITE campaign on bet Lyr never got traction within the group, partially because of nearby field stars corrupting measurements for those with apertures over an arc minute. More details on the BRITE campaign are provided in the last newsletter and on the AAVSO website. I will send out information as new targets become available.

### Accuracy Challenge

The PEP section is off to a great start on our internal accuracy challenge. A number of observers took measurements of the same star as close in time as our different longitudes and weather permitted. Rho Cas was observed most. Other stars included in the challenge were W Boo, P Cyg, and XY Lyr. This campaign has provided focus on tuning up our transformation coefficients as well as dealing with second order extinction in the B band. We are still working through some issues but preliminary results are good, with some readings agreeing within a few millimags. This campaign has also caused us to revisit the accuracy of the magnitudes of the red/blue star pairs given on the web page for determining our transformation coefficients. Tom Calderwood details this activity in a separate article within this newsletter.

This campaign has shown that there is quite a lot of variance in how PEP data are reduced. For example, the PEP Obs tool does not always handle non-UTC time correctly, so if you are using this tool make sure you use UTC time rather than your local time. Several errors remain in the database due to this issue especially for the star W Boo.

Second order extinction is also not handled correctly by some of the data reduction methods in use. This is critical as it is the most significant correction in the B band, often amounting to 0.015 magnitude or more.

To address the issues above we are beginning to develop standard tools, and observing techniques to ensure we can achieve the accuracy inherent in PEP observations. A spreadsheet for V-only observations is being developed to help new observers get started, and will be followed by additional multi-band tools, depending upon interest. We will also be defining several pieces of useful metadata, which we will request you include in the comment field of your observations. If you are interested in participating in the development of any of these tools please drop me a note.

Overall results from the accuracy challenge will be available at the fall (annual) meeting.

### New Observers

A warm welcome goes out to Scott Burgess (BSO) of Winterport, Maine, and Patrice Lemarchand (LPD) of Saint Parres aux Tertres, France, our new PEP observers.

### Contact

We encourage participation from PEP observers of all levels. Additional information is available at the AAVSO PEP webpages at:

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

## AAVSO OBSERVING CAMPAIGNS UPDATE

ELIZABETH O. WAAGEN (WEO), AAVSO  
SENIOR TECHNICAL ASSISTANT (SCIENCE OPERATIONS)

Each campaign is summarized on the AAVSO Observing Campaigns page (<http://www.aavso.org/observing-campaigns>), which also includes complete lists of all AAVSO Alert and Special Notices issued for each campaign. AAVSO Alert Notices are indexed at <https://www.aavso.org/alert-notice-archive> and AAVSO Special Notices at <https://www.aavso.org/special-notice-archive>.

It's been a very busy quarter for our observers!

### Campaigns concluded since July 1, 2016

The campaign begun in March from Ms. Deanne Coppejans (Ph.D. candidate, Radboud University Nijmegen (Netherlands) and University of Cape Town) and colleagues to monitor the Northern 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) (*AAVSO Alert Notice 539*) concluded in late July with the successful observation of RX And. All of the targets were successfully observed at minimum by the VLA, thanks to monitoring from AAVSO observers. Data analysis is underway—stay tuned for results!

### Campaigns initiated or re-activated since July 1, 2016

The campaign from Dr. Jenő Sokoloski (Columbia University) and graduate student Adrian Lucy (Columbia University) on the jet-driving symbiotic star **V694 Mon (MWC 560)**, which had concluded at the end of April 2016 (*AAVSO Alert Notice 538*), has just been re-opened. V band photometry (and/or other bands) is requested to see if the star is flickering or even still in outburst. These data will help evaluate whether they should extend their X-ray research and whether AAVSO observers need to keep following this star, and will help correlate their radio data being obtained through January 2017. H-alpha or H-beta spectra would also be very welcome. 52 observers worldwide have contributed 41,698 multicolor and visual observations of this star since the campaign began 26 February 2015.

In mid-July, Dr. Colin Littlefield (University of Notre Dame) and colleagues requested AAVSO observers' assistance in providing time-series observations of the intermediate polar cataclysmic variable **FO Aqr** until the system returns to maximum or goes into conjunction and is no longer observable. FO Aqr, which in its high state (maximum) is  $V \sim 13.4$ , was  $V \sim 15$  in mid-July. The observations were requested to support the study of multiple periods and their evolution as FO Aqr returns to maximum (*AAVSO Alert Notice 545*). As of 2016 Sep. UT, it was  $14.491 V \pm 0.032$  (ATE, T. Arranz, Navas De Oro, Spain). 21 observers have contributed 37,664 multicolor observations to this campaign since it began July 13.

In early August, a campaign on the bright ( $V \sim 6.7$ ) colliding-winds binary **V1687 Cyg (WR 140, HD 193793)** was initiated at the request of Dr. Noel Richardson (University of Toledo) and colleagues, who asked for optical photometry in support of multi-wavelength campaign studying dust behavior as the system passes through periastron. The campaign will run until at least August 2017 (*AAVSO Alert Notice 546* and *AAVSO Special Notice #419*). 10 observers have contributed 90 multicolor observations to this campaign since it began August 3.

In mid-August, Dr. Thomas Marsh (University of Warwick) and colleagues requested fast-cadence optical photometry through mid-September in support of XMM observations of the extremely interesting binary **AR Sco** scheduled for September 10–11 (*AAVSO Alert Notice 548*). 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>. 2 observers have contributed 1,590 multicolor observations to this campaign since it began August 18.

At the beginning of September, Dr. Christian Knigge (University of Southampton) and colleagues requested coverage of the Z Cam-type cataclysmic variable **RX And** in support of target-of-opportunity observations to be obtained by Chandra. Visual observations and V photometry were requested through the 2016 observing season, or until concluded by Dr. Knigge (*AAVSO Alert Notice 549*). 68 observers have contributed 768 multicolor observations to this campaign since it began September 1.

In late September, Dr. Mark Reynolds (University of Michigan) and colleagues requested that AAVSO observers monitor the cataclysmic variable **GDS\_J1701281-430612** in support of HST/COS observations scheduled for early October. VRI photometry was requested through October 2016 for this system, which is  $\sim 15.2\text{--}16.2 R (V-R \sim 0)$  (*AAVSO Alert Notice 551*). 2 observers have contributed 1,067 multicolor observations to this campaign since it began September 20.

Also in late September, Dr. Kirill Sokolovsky (National Observatory of Athens and Sternberg Astronomical Institute, Moscow State University) requested AAVSO monitoring for the **Gaia 16aye microlensing event** predicted for early October 2016. Multicolor photometry was requested for this  $\sim 14.6 V$  object through at least the end of October (*AAVSO Alert Notice 552*). 18 observers have contributed 2,124 multicolor observations to this campaign since it began September 20.

### Campaigns in progress

The call by the AAVSO in early April to monitor the symbiotic recurrent nova **T CrB** continues. T CrB, which entered a super-active state in February 2016, and was brighter and bluer than since before its last outburst in 1946, has faded somewhat after a very interesting episode (Figures 1 and 2). However, it has not returned to its normal minimum, and **it is important to continue the multicolor and visual observations for as long as possible this season and pick it up again as soon after conjunction as possible**. The most recent observations in the AAVSO International Database show T CrB at visual magnitude 9.8–10.0 on 2016 September 28.0 UT (respectively, OJR, J. Ripero, Madrid, Spain; BRJ, J. Bortle, Stormville, NY) and  $9.979 V \pm 0.007$  (PEP) on September 25.0358 UT (PGD, G. Persha, Lowell, MI). T CrB has been observed twice in outburst (maximum at  $V \sim 2.0$ ), in 1866 and 1946. Extremely interesting research by U. Munari et al. reveal an interesting correlation between the pre-outburst activity in previous outbursts and the current behavior. Please see *AAVSO Special Notice #415* for details.

Dr. George Wallerstein's (University of Washington) request continues for AAVSO coverage of the long period/symbiotic variable **R Aqr** (*AAVSO Alert Notice 535*). Optical and spectroscopic coverage is requested and recommended, respectively, to continue at least for the next several years to cover the eclipse

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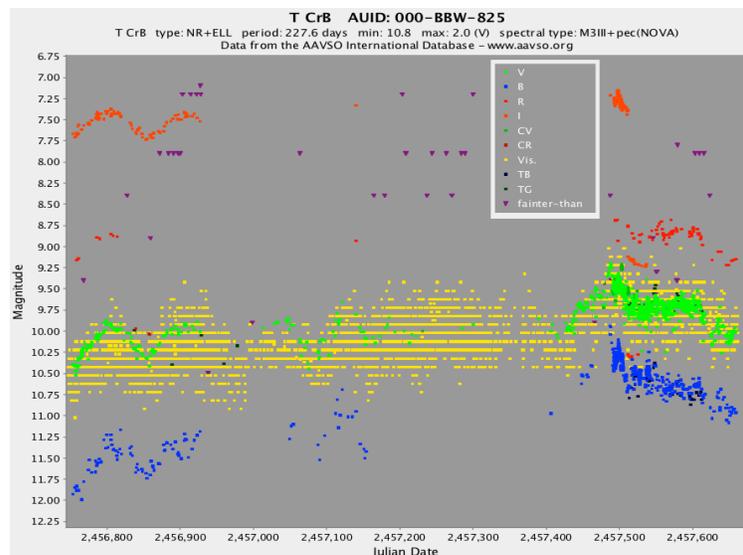
CAMPAIGNS UPDATE  
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Figure 1. AAVSO light curve of the symbiotic recurrent nova *T CrB* JD 2456744–2457659 (27 March 2014–27 September 2016). 240 observers worldwide contributed 9,256 visual and multicolor observations to this light curve.

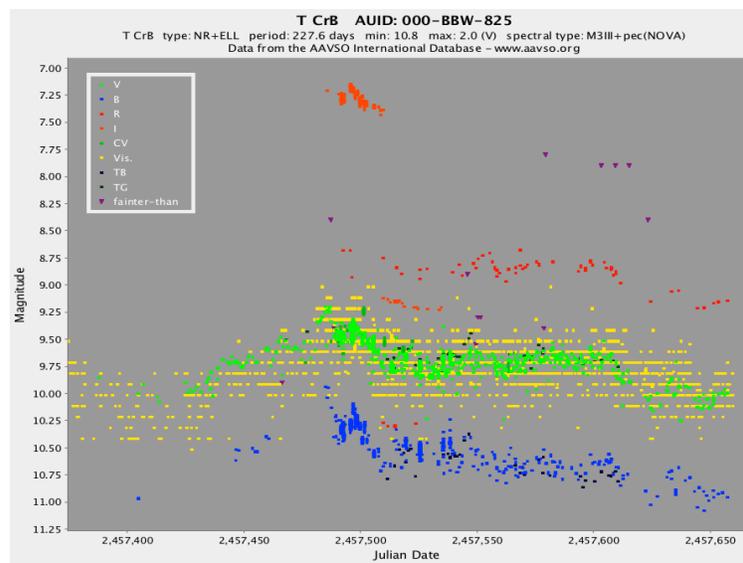


Figure 2. AAVSO light curve of the symbiotic recurrent nova *T CrB* JD 2457375–2457659 (18 December 2015–27 September 2016). 196 observers worldwide contributed 5,347 visual and multicolor observations to this light curve.

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. Figure 3, recent AAVSO data on *R Aqr*, shows that the minimum of December 2015 was indeed faint, and the minimum in progress now is somewhat shallow. Thus *R Aqr* needs to be watched closely! A historical light curve dating from 1843 was shown as Figure 1 in the January 2016 issue of the newsletter (<https://www.aavso.org/aavso-newsletter>).

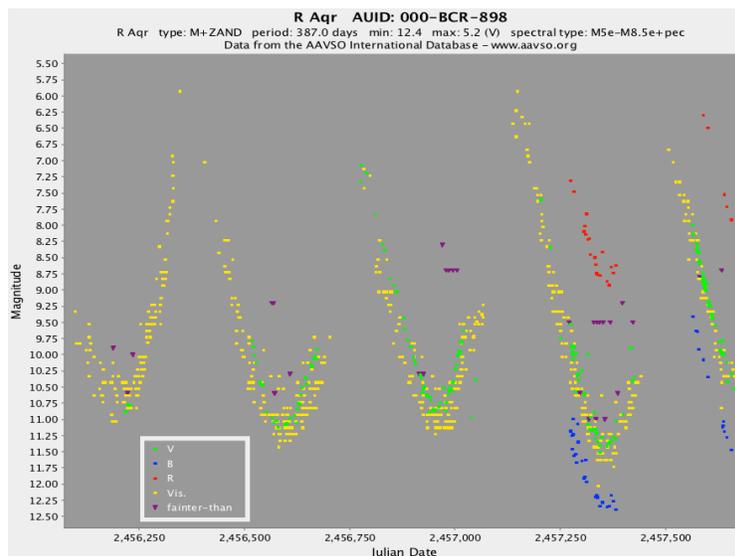


Figure 3: AAVSO light curve of the symbiotic Mira *R Aqr* JD 2456092–2457658 (14 June 2012–27 September 2016). 64 observers worldwide contributed 976 visual and multicolor observations to this light curve.

The campaign begun in October 2015 continues on the enigmatic variable object **KIC 8462852** (*AAVSO Alert Notices 532* and *542*). Filtered time-series observations (BVRI) are requested in order to study the variations occurring at all timescales. This interesting star shows aperiodic dips (cause unknown) of a few tenths of a magnitude, which can last for days but show variations on very short timescales, and is rotating. Since the campaign began October 20, 78 observers have submitted 27,719 visual and multicolor observations.

The campaign on the X-ray black hole binary **V404 Cyg** (*AAVSO Alert Notice 520*) was officially concluded once it returned to minimum by 2015 July 23–August 1 after its spectacular outburst on 2015 June 15. After a subsequent shorter and fainter outburst December 30–January 3, it again returned to minimum, where it has been since. As its behavior following these outbursts is clearly unpredictable, AAVSO observers are asked to continue obtaining multicolor photometry as well as visual observations. Since the campaign began, 91 observers have submitted 71,641 multicolor and visual observations.

Dr. Margarita Karovska's (Harvard-Smithsonian Center for Astrophysics) HST and Chandra campaign on **CH Cyg** (*AAVSO Alert Notice 454* and *AAVSO Special Notices #267, 294, and 320*) continues at least through the 2016 observing season. Please continue your visual and especially your V and B observations. The V and B data are crucial for detecting certain significant system changes key to her research. Visual observations are also important! See Figure 4.

Dr. Margarita Karovska and colleagues' request continues for AAVSO observer assistance in their campaign on the symbiotic variable **RT Cru** (11.2–12.6 visual magnitude). Chandra and Swift observations took place successfully in November 2015 (*AAVSO Special Notice #411*). Follow-up continuing weekly or more frequent monitoring (B and V photometry and visual observations) is requested. High-resolution spectroscopy around H $\alpha$  and the [OIII]5007 A line, as well as the spectrum of the full range (echelle, for example), would be very helpful and most welcome! Since this campaign began 2014 August 6, 20 observers have contributed 8,565 multicolor observations of this star.

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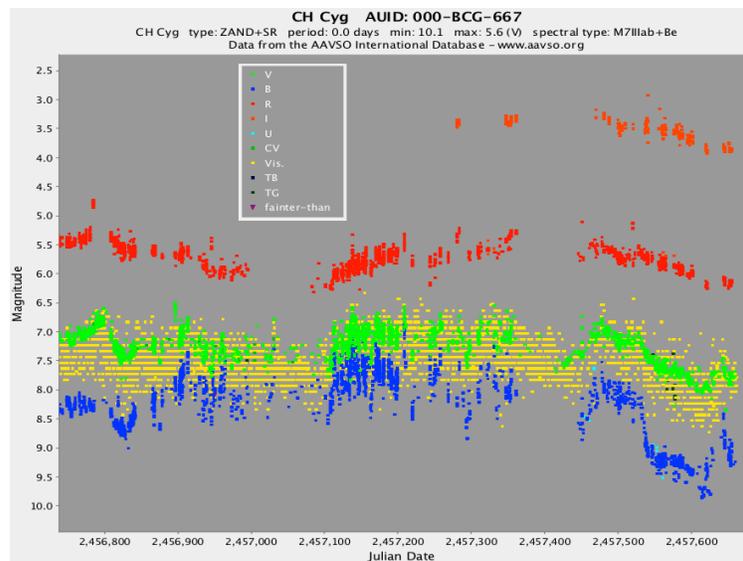
CAMPAIGNS UPDATE  
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Figure 4: AAVSO light curve of the symbiotic star **CH Cyg** JD 2456737–2457659 (20 March 2014–27 September 2016). 183 observers contributed 11,653 visual and multicolor observations to this light curve.

Although the 2014–2015 campaign on **EE Cep** is officially concluded (*AAVSO Alert Notice 502*, *AAVSO Special Notice #387*), Dr. Cezary Galan (Nicolaus Copernicus Astronomical Center) writes that continuing observations, especially in I or even better in near-IR, would be very valuable and very much appreciated. Please continue to monitor **EE Cep** until at least April 2017.

This campaign on the rare **FU Ori** object **2MASS J06593158-0405277**, which originally ran April–July 2015 (*AAVSO Alert Notice 518*), continues after being re-activated by Dr. Fabienne A. Bastien (Hubble Postdoctoral Fellow,

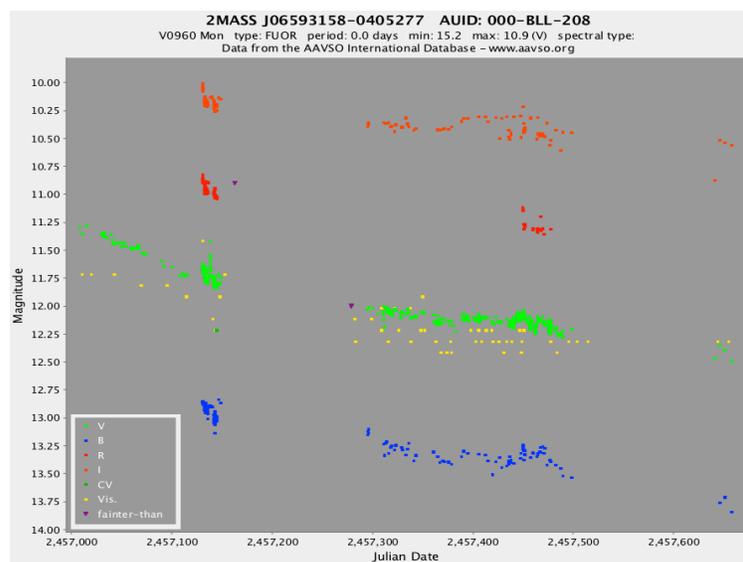


Figure 5: AAVSO light curve of the **FU Ori** object **2MASS J06593158-0405277** JD 2457000–2457659 (9 December 2014–27 September 2016). 21 observers contributed 1,338 visual and multicolor observations to this light curve, which includes data from before the campaign began.

Pennsylvania State University). Please continue your observations at least through the 2016 observing season. Dr. Bastien writes: “... We have very few constraints on what causes [these rare objects] to undergo their eruptions... We would like to continue to monitor its behavior from the optical to the infrared (BVRIJHK and/or the equivalent Sloan filters) as it appears to be changing.” After plateauing from its slow decline (that was underway when the campaign began) for a few months, the star was more active and appeared to be resuming its decline, very slowly, shortly before disappearing behind the Sun in early May. Now that it has returned, the decline can be seen to have continued very slightly (most evident in B; Figure 5). Since the campaign began, 21 observers have contributed 1,295 multicolor and visual observations. Thank you to Shawn Dvorak (DKS) and Brian Cudnik (CKB) for picking up **2MASS J06593158-0405277** so soon after conjunction.

The campaign continues on the symbiotic nova candidate **ASAS J174600-2321.3** initiated in January by S. Otero, P. Tisserand, K. Bernhard, and S. Hümmerich (*AAVSO Alert Notice 510*). The predicted eclipse has occurred, but the nova is still at maximum at  $12.194 V \pm 0.010$  on 2016 September 26.9774 UT (HMB, J. Hamsch, Mol, Belgium). Otero writes that knowing when the eruption starts to fade will be very important, and that ongoing data are essential. Observers are requested to continue visual and instrumental monitoring. Since this campaign began 2015 March 5, 15 observers have contributed 1,741 multicolor and visual observations to the AID.

The campaign organized by Dr. George Rieke (University of Arizona) and colleagues on four stars with developing planetary systems (*AAVSO Alert Notice 511*)—**RZ Psc**, **HD 15407A**, **V488 Per**, and **HD 23514**—continues. The Spitzer Space Telescope observations have been completed, but your observations throughout at least the 2016 observing season will be appreciated. Since this campaign began 2015 March 13, 40 observers have contributed 5,721 multicolor and visual observations to the AID.

**RW Aur** still continues to surprise! The campaign on this classical T Tauri star (component A) organized by Dr. Hans Moritz Guenther (Massachusetts Institute of Technology) continues but at a less intense level (*AAVSO Alert Notice 514*). Dr. Guenther wrote: “RW Aur continues to be an exciting target. How long does the dimming last? Will it come back up to the usual brightness? ... Does the color change, when (if?) RW Aur comes back to normal? ...” Last year, since August 2015, its brightness decreased, plateaued, and increased again. When it entered its seasonal gap at the end of April 2016, RW Aur had brightened from its plateau magnitude of 13.0–13.3 (many observers) to about 12.3 visual (three observers) and  $12.081 V \pm 0.009$  (DKS, S. Dvorak, Clermont, FL). On emergence from its seasonal gap in early August 2016, it had brightened to  $11.156 V \pm 0.155$  (SGEA, G. Stone, Auberry, CA) and since then has been fluctuating on the order of slightly less than one magnitude (about 10.4–11.4) on a scale of a few to several days! It appears to be continuing to brighten—as of 2016 Sep. 27.3014 UT it was visual magnitude 10.45 (KMA, M. Komorous, London, Ont, Canada) and as of Sep. 27.3664 it was  $10.272 V \pm 0.001$  (SGEA, Stone). See Figures 6 and 7. **Please continue to follow RW Aur closely.**

Dr. Robert Stencel’s (University of Denver Astronomy Program) request to monitor **epsilon Aur** (*AAVSO Alert Notice 504*) continues as modified. Dr. Stencel writes that studies of the system are continuing and ground- and space-based observations are being carried out and proposed. “For these studies, a reasonable coverage of the light curve is important. Furthermore, we are approaching quadrature in a few years, and detailed studies like these are likely to continue, albeit less frequently... If skilled observers each could obtain good

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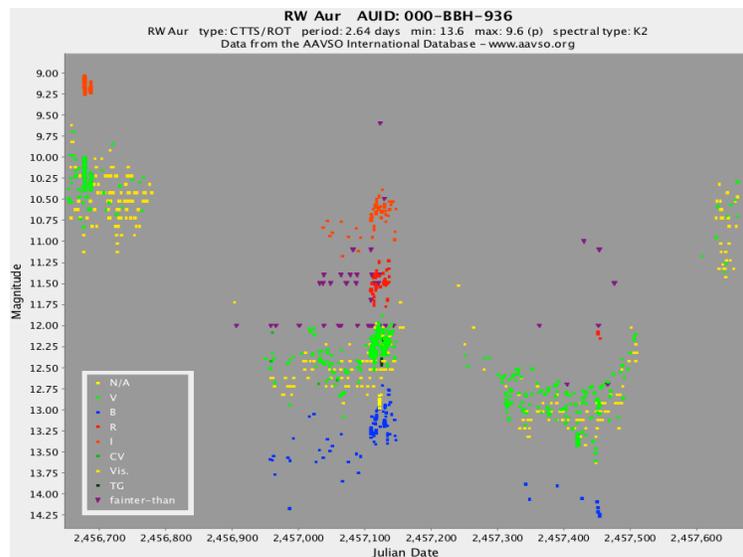
CAMPAIGNS UPDATE  
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Figure 6. AAVSO light curve of the T Tauri star RW Aur JD 2456650–2457658 (23 December 2013–27 September 2016). 76 observers worldwide contributed 2,682 visual and multicolor observations to this light curve.

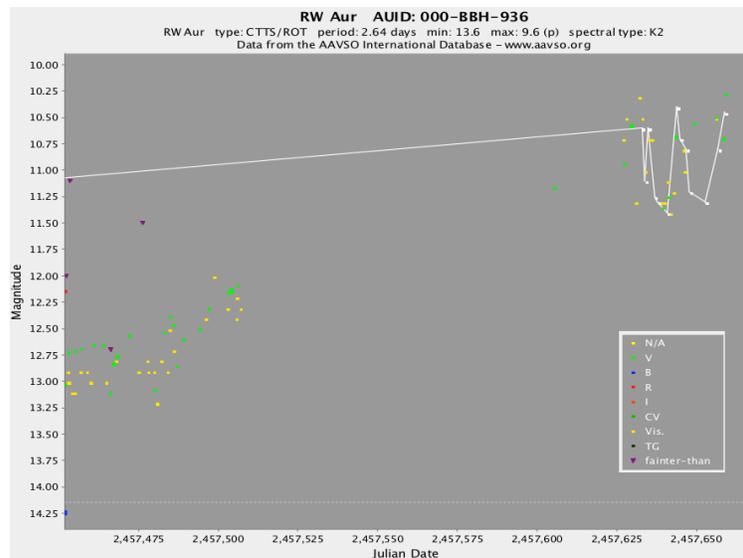


Figure 7. AAVSO light curve of the T Tauri star RW Aur JD 2457452–2457658 (4 March 2016–27 September 2016). 19 observers worldwide contributed 101 visual and multicolor observations to this light curve. The white line connecting one observer's observations (white dots) demonstrates the fluctuation. The visual and V observations by other observers for the most part show a reasonable to very good agreement. (The long solid white line and the white dashed line may be ignored.)

photometry *ONCE A MONTH*, we should see a reasonably complete light curve continuing, benefiting the long term studies.” Observers are asked to carry out CCD, DSLR, or PEP photometry (V, B, R, U; no time series) once a month. Since this post-eclipse campaign began 2014 September 17, 87 observers have contributed 1,907 multicolor and visual observations.

Dr. Eric Mamajek’s campaign on **V1400 Cen = J1407 (ISWASP J140747.93–394542.6)** (*AAVSO Alert Notice 462*) continues through 2016. Since the campaign began in July 2012, AAVSO observers have continued to provide excellent coverage in search of the eclipse. Please continue your observations, as they are extremely important in helping to solve the puzzle of this interesting and possibly complex system (*AAVSO Alert Notice 462*). 5 observers have contributed 3,291 multicolor observations to date.

Ernst Pollmann’s campaign on **P Cyg**, an S Dor (= Luminous Blue Variable) variable (*AAVSO Alert Notice 440*), continues at least through the 2016 season and likely “for several more years.” Since May 2011, 117 observers have contributed 6,222 observations to this campaign ideally suited to PEP and DSLR observers. See *Alert Notice 440* for comparison and check star information. Many thanks for your observations, and please keep on observing P Cyg!

Since Dr. Arne Henden suggested the very interesting and faint Mira variable **QX Pup** to AAVSO observers in 2008 as an observing exercise (<http://www.aavso.org/qx-pup>), 5+ cycles have been observed in I, along with a smattering of fainter-thans and a few R and two V observations, and the period in I<sub>c</sub> has been determined by Sebastian Otero at 551.0 days. A single V observation at/near the minimum shown in I shows the V minimum may be 18.2 or fainter (MZK, K. Menzies, Framingham, MA). QX Pup is now just past maximum. I have been challenging you to obtain a V range for QX Pup, which is embedded in a reflection nebula (the Rotten Egg Nebula). However, the nebula obscures the Mira itself, and there is a close companion, so making positive observations in V is complicated and very difficult. If you want to try V observations, be sure to read the information and instructions on the webpage referenced above.

**HMXBs and SFXTs**—High-Mass X-ray Binaries and Super Fast X-ray Transients, Dr. Gordon Sarty’s list (*AAVSO Alert Notices 348, 354, and 377, AAVSO Special Notices #118, #129, #143, #213, and #220*, and description of research program in *JAAVSO*, Vol. 35, p. 327; article viewable at <http://adsabs.harvard.edu/abs/2007JAVSO...35..327S>).

**Blazars**—Dr. Markus Boettcher’s list (*AAVSO Alert Notice 353* at <http://www.aavso.org/aavso-alert-notice-353>)

**Novae and R CrB**

Three galactic novae have been discovered since July 1. Also, several recent novae continue to provide good observing opportunities, and R CrB is continuing to recover from minimum.

**V5853 Sgr (Nova Sgr 2016 No. 2 = ASASSN-16ig = TCP J18010780-2631434)** was independently discovered by Koichi Nishiyama (Kurume, Japan) and Fujio Kabashima (Miyaki, Japan) on 2016 August 8.53233 UT at unfiltered CCD magnitude 10.7, and by the All Sky Automated Survey for SuperNovae (ASAS-SN) on 2016 August 6.96 UT at V~13.3 (*AAVSO Alert Notice 547*). It has been fading in an interesting manner (Figure 8), and as of 2016 Sep. 28.0182 UT was 14.232 V ± 0.036 (HMB, J. Hamsch, Mol, Belgium). There was some confusion over the name Nova Sgr 2016 No. 2, as the first nova in Sagittarius in

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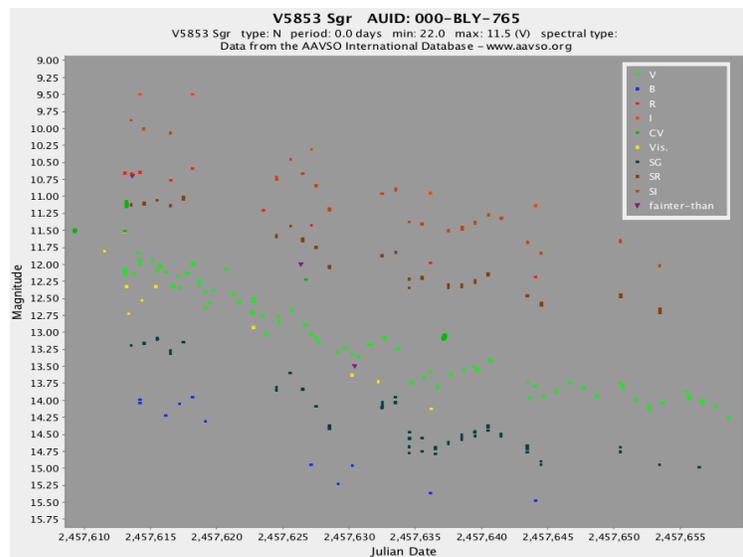
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Figure 8. AAVSO light curve of V5853 Sgr (Nova Sgr 2016 No. 2) JD 2457600–2457659 (31 July 2016–28 September 2016). 22 observers worldwide contributed 477 visual and multicolor observations to this light curve.

2016 was faint and was never widely announced (that nova was OGLE-2016-NOVA-02. R.A. 17 49 57.33 Dec.–29 14 37.9 in Sgr, range 13.5:–<21.2 Ic).

**V1656 Sco (Nova Sco 2016 No. 2 = PNV J17225112-3158349 = ASASSN-16kd)** was independently discovered by Shigehisa Fujikawa (Kan'onji, Kagawa, Japan) on 2016 September 06.481 UT at unfiltered CCD magnitude 11.6, and by the All Sky Automated Survey for SuperNovae (ASAS-SN) on 2016 September 06.00 UT at magnitude 12.13 V (*AAVSO Alert Notice 550*). As of Sep. 12.03264 UT, it was visual magnitude 12.3 (SLH, L. Shoter, Uniontown, PA), and as of Sep. 12.44236–.44856, it was 12.562 V  $\pm 0.013$ , 13.878 B  $\pm 0.039$ , 10.962 R  $\pm 0.059$ , and 9.745 I  $\pm 0.042$  (BHQ, T. Bohlens, Armidale, NSW, Australia).

**Nova Lup 2016 (PNV J15290182-4449409 = ASASSN-16kt)** was discovered on 2016 September 24.010 UT by the All Sky Automated Survey for SuperNovae (ASAS-SN) at 9.11 V  $\pm 0.01$  (*AAVSO Alert Notice 553*). It quickly brightened to visual magnitude 5.6 on Sep. 25.40280 UT (SRX, R. Stubbings, Tetoora Road, Vic, Australia), and as of Sep. 27.958 UT has faded to visual magnitude 7.54 (OSE, S. Otero, Buenos Aires, Argentina).

Older novae that are still within observing range include:

**V1655 Sco (Nova Sco 2016 = PNV J17381927-3725077)** was discovered on 2016 June 10.629 UT by Hideo Nishimura (Kakegawa, Shizuoka-ken, Japan) at unfiltered CCD magnitude 12.4 (*AAVSO Alert Notice 544*). Its interesting behavior is seen in Figure 9; as of 2016 Sep. 8.9682–.9665 UT it was 17.162 V  $\pm 0.221$ , 17.727 B  $\pm 0.296$ , and 14.511 R  $\pm 0.232$  (HMB, J. Hamsch, Mol, Belgium). 20 observers have contributed 2,052 multicolor observations since its discovery.

**V3661 Oph (Nova Oph 2016 = PNV 17355050-2934240)** was discovered independently on 2016 March 11.8 UT by Minoru Yamamoto (Okazaki, Aichi-ken, Japan) and by Yuji Nakamura (Kameyama, Mie, Japan) at magnitude  $\sim 10.6$

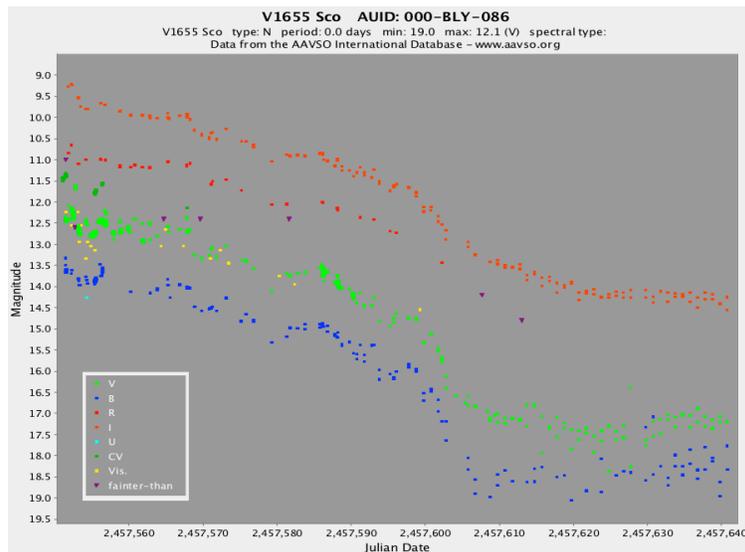


Figure 9. AAVSO light curve of V1655 Sco (Nova Sco 2016) JD 2457550–2457640 (10 June 2016–8 September 2016). 20 observers worldwide contributed 2,052 visual and multicolor observations to this light curve.

(*AAVSO Alert Notice 541*). It faded very rapidly to magnitude 15 and fainter, and since at least April has been 16.9–17.0 V. Its current magnitude is unknown; as of June 2.7235 UT it was 16.9 V  $\pm 0.15$  (NLX, P. Nelson, Ellinbank, VIC, Australia).

**V5669 Sgr (Nova Sgr 2015 No. 3 = PNV J18033275-2816054)**, discovered on 2015 September 27 UT at unfiltered magnitude 9.9–10.5 (*AAVSO Alert Notice 528*), continues to fade. Its current magnitude is unknown; as of 2016 May 13.7623 UT it was 14.71 V  $\pm 0.09$  (NLX, P. Nelson, Ellinbank, VIC, Australia).

**V5667 Sgr (Nova Sagittarii 2015 = PNV J18142514-2554343)**, discovered on 2015 February 12 UT (*AAVSO Alert Notice 509*), continues to fade. As of 2016 Sep. 4.5528 UT it was visual magnitude 13.6 (PEX, A. Pearce, Nedlands, W. Australia), but there is a possibility that this magnitude not may be of the nova but of a very close-by star.

**V5668 Sgr (Nova Sagittarii 2015 Number 2 = PNV J18365700-2855420)**, discovered on 2015 March 15 UT (*AAVSO Alert Notice 512*), having recovered from its dust event, continued to fade to 10.576 V  $\pm 0.011$  on 2016 Sep. 1.5254 UT (HQA, A. Henden, Center Harbor, NH) and visual magnitude 10.25 on 2016 Sep. 1.8472 UT (SGQ, C. Sigismondi, Rome, Italy). The most recent observations, however, may show a slight brightening, and as of 2016 Sep. 26.8342 UT it was visual magnitude 9.93 (Sigismondi). 140 observers worldwide have contributed 4,401 multicolor observations through September 28.

**V2944 Oph (Nova Ophiuchi 2015 = PNV J17291350-1846120)** was discovered in March and reached maximum on April 14 at magnitude V=9.2. After fading with oscillations to about magnitude 12, it plateaued for about three months before brightening slightly and then continuing to fade. As of 2016 Sep. 8.0247 UT it was 15.958 V  $\pm 0.064$  (DKS, S. Dvorak, Clermont, FL). 38 observers worldwide have contributed 1,103 multicolor observations through September 28.

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## CAMPAIGNS UPDATE CONTINUED...

**V2659 Cyg (Nova Cygni 2014 = PNV J20214234+3103296)**, a highly reddened classical Fe II-type nova which had been very active as it declined, continues to fade steadily. As of 2016 Sep. 11.963 UT it was visual magnitude 15.8 (PYG, G. Poyner, Birmingham, UK) and as of 2016 Sep. 24.221 UT it was 15.852  $V \pm 0.076$  (DKS, S. Dvorak, Clermont, FL). 82 observers worldwide have contributed 3,869 multicolor observations through September 28.

**V1369 Cen (Nova Centauri 2013 = PNV J13544700-5909080)** continues to decline slowly. As of 2016 Sep. 6.4767-.4786 UT it was 11.624  $V \pm 0.012$  and 12.578  $B \pm 0.015$  (JRBA, R. Jenkins, Salisbury, S. Australia). 71 observers worldwide have contributed 13,401 multicolor observations through September 28.

**V339 Del (Nova Delphini 2013 = PNV J20233073+2046041)** continues to fade slowly. As of 2016 Sep. 27.10066-.10084 UT it was 14.296  $V \pm 0.016$ , 15.348  $B \pm 0.011$ , 13.987  $R$ , and 15.499  $I$  (SRIC, R. Sabo, Bozeman, MT), and as of 2016 Sep. 27.9194 UT it was visual magnitude 14.2 (OJR, J. Ripero, Madrid, Spain). 552 observers worldwide have contributed 79,025 multicolor observations through September 28.

### R CrB

Since July 2007, when it began fading from its maximum visual magnitude of 6.0, the prototype variable **R CrB** has been in some state of minimum. In July 2015 it appeared to be brightening, but it turned around again and had been slowly but steadily fading. After plateauing in late March-mid April 2016 it began brightening again and is continuing to brighten—as of September 28 it was about visual magnitude 10.9 (several observers; Figure 10). Keep on watching R CrB—what is it going to do next?

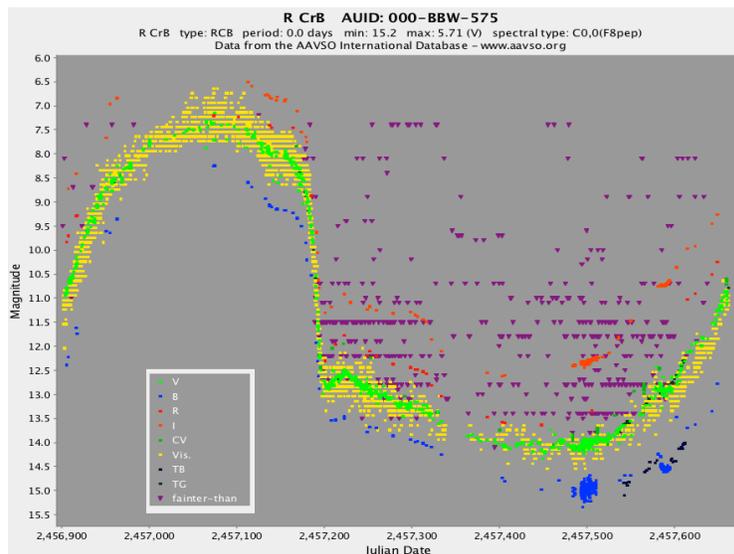


Figure 10: AAVSO light curve of R CrB JD 2456900–2457659 (30 August 2014–28 September 2016). 257 observers contributed 7,125 visual and multicolor observations to this light curve.

Please keep observing and participating in as many campaigns as your schedule and equipment permit. The astronomers and we at AAVSO Headquarters are grateful to all of you who are participating in AAVSO Observing Campaigns, and we thank you for your contributions. You have been and continue to be a vital part of variable star research! ★

## LOOKING AT LEGACY STARS

### STARS OBSERVED RECENTLY AND RECOMMENDATIONS FOR THE NEXT FEW MONTHS

ELIZABETH O. WAAGEN (WEO), AAVSO SENIOR TECHNICAL ASSISTANT (SCIENCE OPERATIONS)

SARA J. BECK (BSJ), AAVSO TECHNICAL ASSISTANT

This column is a quarterly summary of popular and important targets of the previous quarter as observed by the AAVSO community. This will help keep observers up to date on the observations being submitted to the AAVSO archives, and more importantly on what stars may need improved coverage by the community.

We encourage observers to keep a smaller subset of variables at the top of their observing planning via the Legacy and Program lists for LPVs and CVs (see <https://sites.google.com/site/aavsolpvsection/Home/lpv-files> for the LPV lists, and <https://sites.google.com/site/aavsocvsection/aauso-legacy-cvs> for the CV list). These lists were established to provide guidance on which stars had the best-observed light curves and thus had greatest potential for science if those stars continued being observed. There are thousands of other stars that are still regularly observed, and many objects not on the lists above remain worthy targets for variable star observers, visual and CCD alike.

Twenty best-covered stars of the LPV Legacy program, as measured (mainly) by number of nights observed (both visual and CCD observing considered), 2016 June 16 through September 15:

Name	Con	R.A.(J2000)	Dec.(J2000)	N(vo)	N(von)	N(co)	N(con)
T Cas	Cas	00:23:14.27	+55:47:33.2	35	60	8	31
W Cas	Cas	00:54:53.85	+58:33:49.2	35	64	5	22
Z UMa	UMa	11:56:30.22	+57:52:17.6	62	91	2	11
S Bo	Boo	14:22:52.91	+53:48:37.2	19	35	6	30
R Ser	Ser	15:50:41.73	+15:08:01.1	57	84	4	14
X Her	Her	16:02:39.16	+47:14:25.2	34	71	4	31
RU Her	Her	16:10:14.52	+25:04:14.3	29	68	7	21
X Oph	Oph	18:38:21.12	+08:50:02.7	54	85	3	12
R Lyr	Lyr	18:55:20.1	+43:56:45.8	27	69	7	46
R Aql	Aql	19:06:22.24	+08:13:48	45	82	6	28
CH Cyg	Cyg	19:24:33.06	+50:14:29	66	91	26	69
R Cyg	Cyg	19:36:49.38	+50:11:59.4	28	51	6	42
khi Cyg	Cyg	19:50:33.91	+32:54:50.6	89	89	4	35
S Aql	Aql	20:11:37.47	+15:37:14.5	15	34	6	22
EU Del	Del	20:37:54.7	+18:16:06.3	45	85	3	16
U Del	Del	20:45:28.23	+18:05:24	48	86	3	16
T Cep	Cep	21:09:31.78	+68:29:27.1	55	82	6	20
S Cep	Cep	21:35:12.82	+78:37:28.1	27	66	6	22
miu Cep	Cep	21:43:30.49	+58:46:48	50	89	4	44
R Aqr	Aqr	23:43:49.45	-15:17:04.1	15	38	4	31

*N(vo)* = number of observers making visual observations

*N(von)* = number of nights with visual observations

*N(co)* = number of observers making CCD observations

*N(con)* = number of nights with CCD observations

Target lists for observers vary throughout the year, and the number of observations received changes depending upon a star's observability in a given season as well as whether there is special interest—for example, an observing campaign or recent notable activity. Quarterly totals also help to highlight what new and interesting data sets the AAVSO now holds.

Below are the most- and least-observed stars of the LPV and CV Legacy lists, showing the number of visual and CCD observers (*N(vo)* and *N(co)*) along with the total number of nights observed (*N(von)* and *N(con)*).

Twenty least-observed stars of the LPV Legacy program (both visual and CCD observing considered), 2016 June 16 through September 15:

Name	Con	R.A.(J2000)	Dec.(J2000)	N(vo)	N(von)	N(co)	N(con)
R Ari	Ari	02:16:07.1	+25:03:23.6	9	23	3	5
S Per	Per	02:22:51.7	+58:35:11.4	13	28	2	3
R Lep	Lep	04:59:36.34	-14:48:22.5	5	17	0	0
W Ori	Ori	05:05:23.71	+01:10:39.3	4	6	0	0
RX Lep	Lep	05:11:22.84	-11:50:57.1	6	17	0	0
alf Ori	Ori	05:55:10.3	+07:24:25.4	13	22	0	0
X Aur	Aur	06:12:13.38	+50:13:40.4	6	19	0	0
eta Gem	Gem	06:14:52.66	+22:30:24.5	7	25	0	0
UU Aur	Aur	06:36:32.83	+38:26:43.8	8	21	1	1
R Gem	Gem	07:07:21.27	+22:42:12.7	1	1	1	1
Z Pup	Pup	07:32:38.05	-20:39:29.2	2	2	0	0
S CMi	CMi	07:32:43.07	+08:19:05.1	1	1	0	0
R Cnc	Cnc	08:16:33.82	+11:43:34.5	1	1	0	0
X Cnc	Cnc	08:55:22.87	+17:13:52.5	2	2	0	0
R Car	Car	09:32:14.59	-62:47:19.9	7	25	0	0
R LMi	LMi	09:45:34.27	+34:30:42.8	3	4	1	1
R Leo	Leo	09:47:33.48	+11:25:43.7	17	17	0	0
SS Vir	Vir	12:25:14.4	+00:46:10.9	8	17	1	1
R Vir	Vir	12:38:29.94	+06:59:18.9	13	28	4	5
RS UMa	UMa	12:38:57.54	+58:29:00.2	11	23	2	3

Observations are strongly encouraged as these stars become observable. Observers should consider adding any of these stars to their observing programs to improve coverage of the legacy stars.

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LEGACY STARS  
CONTINUED...

Twenty best-covered stars of the CV Legacy program, as measured (mainly) by number of observers and nights observed (both visual and CCD observing considered), 2016 June 16 through September 15:

Name	Con	R.A.(J2000)	Dec.(J2000)	N(vo)	N(von)	N(co)	N(con)
WW Cet	Cet	00:11:24.72	-11:28:42.9	2	2	6	78
EG And	And	00:44:37.19	+40:40:45.6	33	70	3	14
RX And	And	01:04:35.52	+41:17:57.8	49	82	27	69
KT Per	Per	01:37:08.51	+50:57:20.4	18	62	3	34
TZ Per	Per	02:13:50.94	+58:22:52.7	13	66	8	41
T CrB	CrB	15:59:30.16	+25:55:12.6	93	92	17	78
AG Dra	Dra	16:01:41.01	+66:48:10.1	35	83	3	10
AH Her	Her	16:44:10.01	+25:15:02	30	78	10	52
DQ Her	Her	18:07:30.25	+45:51:32.4	4	24	9	18
V426 Oph	Oph	18:07:51.68	+05:51:47.8	9	64	6	39
UZ Ser	Ser	18:11:24.85	-14:55:34.1	4	25	6	81
MV Lyr	Lyr	19:07:16.29	+44:01:08.6	14	71	3	17
CH Cyg	Cyg	19:24:33.06	+50:14:29.1	66	92	26	70
EM Cyg	Cyg	19:38:40.11	+30:30:28.4	23	79	8	34
PU Vul	Vul	20:21:13.31	+21:34:18.6	9	62	2	18
HR Del	Del	20:42:20.34	+19:09:39.3	10	59	3	20
VW Vul	Vul	20:57:45.06	+25:30:25.7	6	47	9	39
SS Cyg	Cyg	21:42:42.78	+43:35:09.8	93	92	17	85
AG Peg	Peg	21:51:01.97	+12:37:32	48	82	8	42
DX And	And	23:29:46.7	+43:45:04.6	13	55	4	17

Stars in CV Legacy list with no visual or CCD observations (both visual and CCD observing considered), 2016 June 16 through September 15:

Name	Con	R.A.(J2000)	Dec.(J2000)	N(vo)	N(von)	N(co)	N(con)
KR Aur	Aur	06:15:43.91	+28:35:09	0	0	0	0
CW Mon	Mon	06:36:54.54	+00:02:17.6	0	0	0	0
HL CMa	CMa	06:45:17.21	-16:51:34.7	0	0	0	0
IR Gem	Gem	06:47:34.51	+28:06:23.5	0	0	0	0
AW Gem	Gem	07:22:40.74	+28:30:16.9	0	0	0	0
SV CMi	CMi	07:31:08.45	+05:58:49.1	0	0	0	0
YZ Cnc	Cnc	08:10:56.63	+28:08:33.2	0	0	0	0
CP Pup	Pup	08:11:46.06	-35:21:05	0	0	0	0
CC Cnc	Cnc	08:36:19.17	+21:21:05.5	0	0	0	0
SW UMa	UMa	08:36:42.71	+53:28:37.8	0	0	0	0
EG Cnc	Cnc	08:43:04.02	+27:51:49.7	0	0	0	0
BZ UMa	UMa	08:53:44.15	+57:48:40.6	0	0	0	0
AK Cnc	Cnc	08:55:21.23	+11:18:15.1	0	0	0	0
SY Cnc	Cnc	09:01:03.31	+17:53:56	0	0	0	0
DI UMa	UMa	09:12:16.19	+50:53:54.2	0	0	0	0
AG Hya	Hya	09:50:29.75	-23:45:17.2	0	0	0	0
CI UMa	UMa	10:18:13.13	+71:55:44	0	0	0	0
QZ Vir	Vir	11:38:26.81	+03:22:06.8	0	0	0	0
TW Vir	Vir	11:45:21.16	-04:26:05.7	0	0	0	0
V485 Cen	Cen	12:57:23.28	-33:12:06.5	0	0	0	0
FQ Sco	Sco	17:08:04.45	-32:42:02	0	0	0	0
V2051 Oph	Oph	17:08:19.11	-25:48:30.3	0	0	0	0
AT Ara	Ara	17:30:33.8	-46:05:58.8	0	0	0	0
MM Sco	Sco	17:30:45.24	-42:11:41.7	0	0	0	0
BF Ara	Ara	17:38:21.33	-47:10:41.4	0	0	0	0
MU Ser	Ser	17:55:52.77	-14:01:17.1	0	0	0	0
V618 Sgr	Sgr	18:07:56.9	-36:29:36.9	0	0	0	0
V1830 Sgr	Sgr	18:13:50.65	-27:42:21	0	0	0	0
V4021 Sgr	Sgr	18:38:14.88	-23:22:47.1	0	0	0	0
PW Vul	Vul	19:26:05.04	+27:21:57.7	0	0	0	0
NQ Vul	Vul	19:29:14.75	+20:27:59.7	0	0	0	0
QU Vul	Vul	20:26:46.02	+27:50:43.2	0	0	0	0
TU Ind	Ind	20:33:10.55	-45:26:00.8	0	0	0	0

As above, observations are strongly encouraged as these stars become observable and observers should consider adding any of these stars to their observing programs to improve coverage of the legacy stars. ★

GET THE LATEST  
CAMPAIGN NEWS...

Subscribe online to receive AAVSO *Alert Notices* and *Special Notices* directly to your email's inbox. Stay on top of stellar activity and get detailed information on current and upcoming observing campaigns by visiting

<http://www.aavso.org/observation-notification>

to subscribe today!

Sign up for the AAVSO online forums to read about or contribute to discussion on observing campaign targets. Postings will be sent to you by email and will also be available for viewing online. Visit <http://www.aavso.org/forums>

## JULIAN DATE / MOON PHASE CALENDARS

2,450,000 plus the value given for each date

## OCTOBER 2016

Sun	Mon	Tue	Wed	Thu	Fri	Sat
						1 7663
2 7664	3 7665	4 7666	5 7667	6 7668	7 7669	8 7670
9 7671	10 7672	11 7673	12 7674	13 7675	14 7676	15 7677
16 7678	17 7679	18 7680	19 7681	20 7682	21 7683	22 7684
23 7685	24 7686	25 7687	26 7688	27 7689	28 7690	29 7691
30 7692	31 7693					

## NOVEMBER 2016

Sun	Mon	Tue	Wed	Thu	Fri	Sat
		1 7694	2 7695	3 7696	4 7697	5 7698
6 7699	7 7700	8 7701	9 7702	10 7703	11 7704	12 7705
13 7706	14 7707	15 7708	16 7709	17 7710	18 7711	19 7712
20 7713	21 7714	22 7715	23 7716	24 7717	25 7718	26 7719
27 7720	28 7721	29 7722	30 7723			

## DECEMBER 2016

Sun	Mon	Tue	Wed	Thu	Fri	Sat
				1 7724	2 7725	3 7726
4 7727	5 7728	6 7729	7 7730	8 7731	9 7732	10 7733
11 7734	12 7735	13 7736	14 7737	15 7738	16 7739	17 7740
18 7741	19 7742	20 7743	21 7744	22 7745	23 7746	24 7747
25 7748	26 7749	27 7750	28 7751	29 7752	30 7753	31 7754

Moon calendars courtesy StarDate online  
<http://stardate.org/nightsky/moon/>

## THE AAVSO MENTOR PROGRAM

Since the earliest days of the AAVSO, experienced observers have helped new observers by corresponding, answering questions, and even providing personal guidance at the telescope.

If you would like to talk with an experienced variable star observer, contact the AAVSO and we will put you in contact with the mentor program coordinator, Donn Starkey. Just send us an email ([mentor@aavso.org](mailto:mentor@aavso.org)), or call 617-354-0484 to let us know you are interested in this program.

Ideally, Donn will be able to provide you with names, addresses, and phone numbers of active AAVSO observers near you. If there are none located in your area, he can at least provide you with more distant contacts. A simple phone chat with an experienced observer may provide all the feedback you need to continue progressing as an AAVSO observer.

Visit the AAVSO mentor program webpage:

<http://www.aavso.org/mentor-program>



## BY POPULAR DEMAND!

A set of twenty pdf centennial posters exhibited at AAVSO Headquarters is available for downloading from our ftp site.

The posters show portraits of the AAVSO's Directors, Presidents, Secretaries, Treasurers, Council members, and Staff from 1911 to 2011, and the top Visual, CCD, PEP, and Photographic/Photovisual observers. For more information go to: <http://www.aavso.org/aavso-100th-anniversary-commemorative-posters>

or use this link:

<http://tinyurl.com/cge9t9s>

## THE AAVSO WALTER A. FEIBELMAN SUITE

The Feibelman Suite at AAVSO Headquarters is available to guests who are in the Boston/Cambridge area to perform an AAVSO-related task, that is, the purpose of their visit is to do something for or related to the AAVSO. For details about the suite or making a reservation, please visit

<http://www.aavso.org/walter-feibelman-guest-suite>.



*See the following pages for important information about membership renewals and contributions.*

# JOIN THE AAVSO!

## AAVSO 2017 New Member Form

Please send application, first year's dues, and application fee to:

AAVSO, 49 Bay State Road  
Cambridge, MA 02138, USA

Date: \_\_\_\_\_  
 Full Name: \_\_\_\_\_  
 Full Address: \_\_\_\_\_  
 \_\_\_\_\_  
 Telephone 1: \_\_\_\_\_ Telephone 2: \_\_\_\_\_  
 E-Mail: \_\_\_\_\_  
 Birth Date: \_\_\_\_\_ Vocation: \_\_\_\_\_  
 Telescopic Equipment: \_\_\_\_\_  
 \_\_\_\_\_  
 Astronomical Experience (if any): \_\_\_\_\_  
 \_\_\_\_\_  
 How did you learn about the AAVSO? \_\_\_\_\_

### Types of Membership Offered and Dues

Annual:	Adult	US \$75.00 per year
	Associate (Under 21)/Pension/Limited Income	US \$37.50 per year
Sustaining:		US \$150.00 per year
Developing country <sup>†</sup>	(for members residing in low income countries):	US \$25.00 per year

Membership is prorated through the end of the year, starting with the current month.

**All applicants also add a one-time, \$10.00 application fee.**

Please consult the following table to find out how much to pay, including application fee.

	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept*	Oct*	Nov*	Dec*
Annual	\$75.00	\$68.75	\$62.50	\$56.25	\$50.00	\$43.75	\$37.50	\$31.25	\$100.00	\$93.75	\$87.50	\$81.25
A/P/LI	\$37.50	\$34.38	\$31.25	\$28.13	\$25.00	\$21.88	\$18.75	\$15.63	\$50.00	\$46.88	\$43.75	\$40.63
Sustaining	\$150.00	\$137.50	\$125.00	\$112.50	\$100.00	\$87.50	\$75.00	\$62.50	\$200.00	\$187.50	\$175.00	\$162.50
Developing Country <sup>†</sup>	\$25.00	\$22.92	\$20.83	\$18.75	\$16.67	\$14.58	\$12.50	\$10.42	\$33.33	\$31.25	\$29.17	\$27.08

\*Please note that if joining in September-December, the following year's dues are already being collected, so we request that you pay for the end of this year and for the following year.

<sup>†</sup>Developing countries EXCLUDE Australia, Austria, Belgium, Canada, the Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Israel, Italy, Japan, the Korean Republic, Luxembourg, the Netherlands, New Zealand, Norway, Poland, Portugal, the Slovak Republic, Slovenia, Spain, Sweden, Switzerland, the United Kingdom, the United States.

Dues (see chart): US \$ \_\_\_\_\_ Application fee: US \$ 10 \_\_\_\_\_

Donation (optional): US \$ \_\_\_\_\_ to \_\_\_\_\_ fund (see box on right)

Total payment (dues + fee + donation): US \$ \_\_\_\_\_

Contributions (see last page for descriptions):	
AAVSO General Fund	\$ _____
The Endowment Fund	\$ _____
Annual Campaign Fund	\$ _____
Building Fund	\$ _____
Janet A. Mattei Research Fellowship	\$ _____
Margaret Mayall Assistantship Fund	\$ _____
Solar Fund	\$ _____
AAVSONet Fund	\$ _____
Member Sponsorship Fund	\$ _____
Student Meeting Scholarship Fund	\$ _____
Contributor-Specified Restricted Funds	\$ _____

\_\_\_\_\_ I have enclosed a check / money order \_\_\_\_\_ Please charge my credit card (Visa or Mastercard)

Credit card #: \_\_\_\_\_ Exp. Date: \_\_\_\_\_ Security Code (on back of card): \_\_\_\_\_

Cardholder's Name (as on card): \_\_\_\_\_

Billing address (if different from above): \_\_\_\_\_

Signature: \_\_\_\_\_

# 2017 MEMBERSHIP RENEWAL

On this page is a copy of the AAVSO membership renewal form for 2017. You may also renew your membership online. Safe and secure online payments are possible by visiting <https://www.aavso.org/membership-renew>. If your postal or email address has changed, please also take a minute to update your personal profile online. Simply click "User login" at the upper right of the home page, then go to "My account." In addition to your dues, your contributions to the AAVSO further support the organization's activities and are very much appreciated. Also, on the next page you will find descriptions of the various funds to which you may contribute.



**AAVSO**  
**Membership and Subscriptions**  
49 Bay State Rd  
Cambridge, MA 02138-1203

Name \_\_\_\_\_  
Address \_\_\_\_\_  
City \_\_\_\_\_  
State/Province \_\_\_\_\_  
Zip/Postal Code \_\_\_\_\_  
Country \_\_\_\_\_

## Payment and Contact Information

My **check** for \$ \_\_\_\_\_ is enclosed.  
*Checks must be in US funds and made payable to AAVSO.*

For payment by **credit card** please complete the section below.  
*All fields are required.*

Visa  Mastercard  
Card Number \_\_\_\_\_  
Exp Date: \_\_\_\_/\_\_\_\_

Card Security Code (3-digit number on the back of your card): \_\_\_\_  
Total to be charged: \$ \_\_\_\_\_

Name on card: \_\_\_\_\_  
Signature: \_\_\_\_\_

**If the billing address for this credit card is different from your address above, please provide it here:**

Billing Address \_\_\_\_\_ City \_\_\_\_\_  
State/Province \_\_\_\_\_ Zip/Postal Code \_\_\_\_\_ Country \_\_\_\_\_

**Please make any changes necessary to correct and complete your membership contact information below:**

Name: \_\_\_\_\_  
Address: \_\_\_\_\_  
City: \_\_\_\_\_ State/Province: \_\_\_\_\_  
Zip/Postal code: \_\_\_\_\_ Country: \_\_\_\_\_  
Phone: \_\_\_\_\_ Email: \_\_\_\_\_

## 2017 Membership Dues Renewal Form

### Membership Type *(please check one)*

Annual \$75     Sustaining \$150  
 Student/Limited Income \$37.50

### Contributions *(see next page for descriptions)*

AAVSO Building Fund	\$ _____
AAVSO General Fund	\$ _____
AAVSONet Fund	\$ _____
Annual Campaign	\$ _____
Contributor-Specified Restricted Funds	\$ _____
Endowment Fund	\$ _____
Janet A. Mattei Research Fellowship	\$ _____
Margaret Mayall Assistantship	\$ _____
Member Sponsorship Fund	\$ _____
Solar Fund	\$ _____
Student Meeting Scholarship Fund	\$ _____
<b>TOTAL ENCLOSED</b>	<b>\$ _____</b>

# SUPPORT THE AAVSO

In order to sustain the AAVSO and its operations, we rely on the generous support provided by members, sponsors, donors, and staff. Together we are the AAVSO. Your gift is a way for you to say that you believe in what we are doing and that you want it to continue moving forward. Every dollar given and membership purchased benefits the AAVSO in a necessary and unique way.

**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.

## **AAVSO General Fund**

This fund is an unrestricted one 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.

## **AAVSO 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 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 running the section, publishing the *Solar Bulletin*, and 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.

## **Student Meeting Scholarship Fund**

Donations to this fund pay for up to 10 student registrations per annual meeting of the AAVSO.

## **Contributor-Specified Restricted Funds**

These are 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.

If you wish to contribute to one or more of these funds please fill in the amount on the appropriate line on your renewal form and include it in the total. *All contributions are tax-deductible in the USA.*

You may also donate online at: <https://www.aavso.org/support-aavso>

**Thank you for your support of the AAVSO!**