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AAVSO Newsletter

FROM THE DIRECTOR'S DESK

STELLA KAFKA



*The value of mentoring:
building a future for variable
star astronomy*

In April 2015, I went to New Zealand to attend the 50th anniversary of the Mt. John Observatory and the annual meeting of the Royal Astronomical Society of New Zealand (RASNZ). The former was a celebration of 50 years of contributions from a great observatory, which also hosts one of the AAVSONet telescopes. The latter was an opportunity to meet with and talk to members of our community in the southern hemisphere, learn about their research interests, and share some of mine. As the new AAVSO director, I received a very warm welcome from Variable Stars South and RASNZ members, as we discussed ways we will all work together to better serve our community. I came back with many good ideas and a rolodex full of new friends.

Upon my return, I received an email from Carl Knight, one of our NZ members whom I met during my trip, informing me that Tessa, a high school student also from NZ, was interested in working on an observational astronomy project for her science fair project, and she needed help. He asked me if I could act as a co-mentor for Tessa, as she needed scientific guidance for her project. At the same time, Carl was willing to help her with observations. Naturally, I



INTERNATIONAL
YEAR OF LIGHT
2015

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.

jumped at the opportunity; we designed a visual observing project in which Tessa would obtain data on a Cepheid variable in order to derive an updated pulsation period for the object. Tessa successfully completed the project and presented it to her region's science fair at the end of August. The judges at the fair were really impressed – and gave her a distinction prize for her work (since most of the “official” science fair prizes were tailored for agriculture or applied physics) and lots of encouragement. She is now preparing a paper for *JAAVSO* summarizing her findings.

Here's what is special about Tessa's story: she is a brilliant young student, passionate for astronomy, willing to learn how to observe, and wanting to work on variable stars. She initially approached her teachers for astronomy projects but they tried to dissuade her because “astronomy is difficult”; they wanted to convince her to work on something else for her science project. At the same time, she was determined. So, she found Carl and me, who were thrilled to be part of her support team. And, after her great success at the science fair, the same teachers who didn't think astronomy was a good idea for her project are now interested in building an astronomy program for more students in her school district.

I am sure we all know students like Tessa, whose heart is in astronomy but whose educators (or friends) are not very keen on helping or encouraging them to pursue their passion. Or we may have neighbors

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SINCE 1911...

PRESIDENT'S MESSAGE

JENO SOKOLOSKI



Back in college, when I first encountered the Fourier transforms that many people use to analyze light curves, these transforms seemed like magic. I was awed by how that magic could uncover patterns. And I followed my wonder into a career investigating variable stars. Nowadays,

the entire professional community seems to have discovered the joys of objects whose brightnesses flicker and flare and pulse and dip. Multiple wide-field, professional variability surveys will be active within the next decade. Some researchers are even calling this the dawn of the “Golden Age of Time-Domain Astrophysics.”

As an organization of variable star aficionados that has been charting the variable sky for over 100 years, what is the AAVSO's role in this era of time-domain astronomy? The surge in professional all-sky, timing surveys leads to a fork in the road for the AAVSO. We could sit back and watch while professional surveys make some of the contributions of amateurs less scientifically relevant. Or, realizing that our specialty is taking center stage, we can spring into action. Steps to take advantage of the increasing

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

or coworkers who are doing astrophotography with their DSLR camera and are interested in observing variable stars but they don't know where to start. This is where having a mentor can be a valuable resource. A mentor would be a person who could provide advice on observing techniques, propose targets, or overall guide a new observer when needed on their project. Many of us have had a great mentor early on in our observing career, a person who gave us pointers on our first attempts to acquire data, provided useful hints on how to star-hop (especially when it came to visual observing), and shared her/his experiences from when they first navigated the night sky. In principle, we are all mentors and mentees at

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the same time: during our face-to-face discussions at the AAVSO meetings or when we participate in forums, we share observing experiences, we talk about troubleshooting, and we exchange observing stories all while learning from each other. Peer mentorship takes place when we share light curves and seek the community's input on interpreting our results. We can learn something new every day, and we become better because of those exchanges. And for some of us, this trip started because we had a strong hand to guide us at the beginning of our astro career.

The AAVSO has a very active mentoring program, and I would like you to take advantage of it. Please consider joining it as a mentor or a mentee. Please consider taking under your wing a new observer; it is a very rewarding experience, and it makes a real difference in people's lives. Mentoring could be as simple as providing encouragement to a colleague or to a friend who wants to be more involved in observing and in research. Or it can be helping someone to start their observations – a “how-to” tutorial, derived from your own experiences. It is very likely that there is a new observer somewhere who would like to learn from you and would appreciate the words of wisdom and your support.

I know that Tessa will do great in her professional life (whatever that will be). I also know that her astronomy experience made her a strong advocate of the variable night sky, and I am looking forward to receiving more of her data. I am sure she will be willing to share her experiences with others – she is already doing that in her school district – so she is a mentor in a way! Maybe Tessa will be the new AAVSO President in 30 years from now. I am already very proud of her achievement, and I am honored to know that I have influenced her astro-future in a small way. We all had to start from somewhere. Let's help new observers to start up their observing tenure, too. ★

Ed. note: the Spanish language version of Stella's message can be found on page 14.

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

community interest in variable stars could include: 1) educating AAVSO members about professional surveys (their cadences, sky coverage, brightness limits, and other capabilities) and where amateur observers are needed; 2) educating professionals regarding the capabilities of amateurs; 3) fostering productive communication among all parties; and

**THE AMERICAN ASSOCIATION OF
VARIABLE STAR OBSERVERS**

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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 eowaagen@aaavso.org. Photos in this issue courtesy of S. Beck, R. Buchheim, C. Knight, and J. Percy.

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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ultimately 4) building more professional-amateur (pro-am) partnerships. You can probably guess which path I advocate! I believe the current growth of time-domain astronomy, which is extremely conducive to pro-am collaboration and citizen science, presents a tremendous opportunity for the AAVSO.

So, what are these professional surveys that are on the horizon? The biggest upcoming project is the Large Synoptic Survey Telescope (LSST), with first light projected for 2019. But LSST will not emerge from a vacuum. It is a natural outgrowth of past and existing surveys. In the introduction to their paper on the Catalina Real-Time Transient Survey (CRTS), Drake et al. (2009, *ApJ*, **696**, 870) give a nice review of how early surveys either covered a large fraction of the sky with minimal timing sensitivity (such as the Sloan Digital Sky Survey [SDSS] and the Two

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PRESIDENT'S MESSAGE CONTINUED...

Micron All Sky Survey [2MASS]) or searched for specific types of variables in smaller fields of tens to hundreds of square degrees (e.g., MACHO, Alcock et al. 2000; OGLE, Udalski et al. 1994; EROS, Aubourg et al. 1995; ROTSE, Akerlof et al. 2000; and the Lick Observatory Supernova Search (LOSS), Filippenko et al. 2001). It is only more recently that both timing sensitivity and extensive sky coverage have been combined in surveys like Pan-STARRS (Panoramic Survey Telescope and Rapid Response System), the Robotic Optical Transient Search Experiment (ROTSE-III; Akerlof et al. 2003), CRTS, the Palomar Transient Factory (PTF), and the All Sky Automated Survey (ASAS-3, Pojmański 2001). All of these surveys affect amateurs.

Far from putting amateur observers out of business, however, the flourishing of professional time-domain astronomy increases the need for pro-am collaboration. Large, professional surveys generally have inflexible, pre-defined cadences, filters, and brightness limits. LSST, for example, will only visit the same patch of sky approximately once per month in blue (u-band) and green (g-band) filters. And the LSST detectors will saturate when transients become brighter than about 15th magnitude. So, surveys such as LSST cannot do what amateurs can do. They will discover many stellar eruptions

in the Galaxy, raise the profile of variable star observing, and generate new exciting questions about variable stars, exoplanets, and other transients. But they do not have the range and flexibility for the in-depth study of individual targets that will be needed to answer many of these intriguing scientific questions. With wise leadership and the support of our members, I envision the AAVSO serving as a clearinghouse for pro-am collaborations during the era of time-domain astronomy.

Since I have been on Council, we have hired an energetic and creative Director with inside knowledge of the largest upcoming professional time-domain project (LSST). We have also tried to improve the effectiveness of our governance by using standing committees to tackle our most important responsibilities, increasing communication among members of Council, and most recently, establishing a Fundraising committee to work with headquarters to ensure that the AAVSO has the resources it needs. I believe that these actions will help the AAVSO to play a vital role in the coming "Golden Age" of variable stars.

For the wonderful staff at headquarters to have the resources they need to make sure that amateur observers fully benefit from and participate in this Golden Age, we also need your help. If you support

citizen science, please consider making a donation to the AAVSO. If you are someone who wants to open the doors of discovery for grandkids to grandparents across the globe, please consider making a donation. Or encourage a friend or relative who loves to hear about the universe to make a donation or become a member. Many schools and museums explain to the public what is already known about the universe. The AAVSO, on the other hand, is one of a few organizations that help people with a passion for the night sky to participate in creating new knowledge.

Serving as the President of the AAVSO for the past two years has been a wonderful and rewarding experience. Thank you all. I learned from everyone that I met, and with whom I worked. As I finish my term, I encourage you to embrace the exciting developments in the field of variable star astronomy. Given the ample new opportunities, and Director Stella Kafka's capable leadership, I anticipate a bright future for the AAVSO and professional-amateur collaboration. I look forward to being a part of that future, and to the many magical Fourier transforms that it will bring. ★

Ed. note: the Spanish language version of Jenó's message can be found on page 14.

AAVSO JOINS THE GLOBAL #GIVINGTUESDAY MOVEMENT

MIKE SIMONSEN (SXN), AAVSO HQ, MEMBERSHIP AND DEVELOPMENT DIRECTOR

The AAVSO has joined #GivingTuesday, a global day of giving that harnesses the power of charities, businesses, families, and individuals to encourage philanthropy and generosity worldwide.

#GivingTuesday is held annually on the Tuesday after Thanksgiving—this year, December 1, 2015—to kick-start the holiday giving season and to inspire people to take action and give back in better, smarter ways to the non-profits and causes they support. More than 27,000 corporate and non-profit organizations in 68 countries have participated in the initiative.

In a world increasingly influenced by social media, the AAVSO is hoping to leverage this initiative to encourage the 10,000+ followers we have on Facebook and 2,500+ followers of our Twitter Feed to make thousands of smaller donations that can add up to significant sums in support of AAVSO operations and programs.

"#GivingTuesday is a counter-narrative to Black Friday and Cyber Monday because it reminds us that the spirit of the holiday giving season should be about community and not just consumerism," said Kathy Calvin, CEO of the UN Foundation. "The most meaningful gift we can give our children, loved ones, friends, and neighbors is the commitment to help build a better world."

In the coming weeks we will be providing more information about how you can help the AAVSO #GivingTuesday initiative. You don't need to be rich or powerful to make a meaningful contribution. #GivingTuesday is all about ordinary people coming together to do extraordinary things. As AAVSO members, we are all familiar with that concept. ★

THE 104TH AAVSO ANNUAL MEETING

The 104th AAVSO Annual Meeting will be held November 12–14, 2015, at the Hilton Hotel in Woburn, Massachusetts. Following the successful format of last year, on Thursday, November 12, we will hold an informal first-time-AAVSO-meeting-attendee gathering. This is a wonderful networking opportunity for those of you who have never before been to an AAVSO meeting and would like to get the most out of the weekend. Also, for the first time, virtual attendance at the entire meeting is available for those not able to attend in person.

Friday, November 13, will feature morning and afternoon paper and poster sessions with plenty of time during the breaks for socializing and connecting with friends—new and old. Based on the abstracts submitted so far, it looks like there will be a variety of very informative talks to suit all interests.

Saturday, November 14, will begin with the AAVSO membership meeting. This includes reports from the Director, Treasurer, and others as well as the Council election results (please don't forget to vote!!!). Another paper/poster session will follow in the afternoon.

The meeting will close Saturday evening with an awards banquet featuring a delicious meal as well as the ever-popular trivia contest and raffle drawing.

PRELIMINARY SCHEDULE

Thursday, November 12, 2015

Morning	AAVSO Council Meeting (council members only)
Late Afternoon	First-time Attendee Gathering

Friday, November 13, 2015

9:00 a.m.–noon	General Paper Session & Posters
noon–2:00 p.m.	Lunch break
2:00–5:00 p.m.	General Paper Session & Posters

Saturday, November 14, 2015

9:00 a.m.–noon	AAVSO Membership Meeting
noon–2:00 p.m.	Lunch break
2:00–5:00 p.m.	General Paper Session & Posters
6:00 p.m.	cash bar opens
7:00 p.m.	AAVSO Closing Banquet

We hope you will be able to join us and help make this meeting a very memorable one!

If you are unable to attend the meeting in person, there is still a way to take part! By registering to attend the meeting virtually, you will be able to hear the talks, see the presentations, and ask questions of the speakers.

For updates, information on accommodations, travel, etc., and to register for the meeting (to attend either in person or virtually) please visit:

<https://www.aavso.org/apps/meetings/Fall2015/#updates>

ANNUAL MEETING DEADLINES TO REMEMBER

- October 23, 2015—Early Registration Deadline and Early Abstract Submission Deadline
- October 31, 2015—Hotel Reservation Deadline

THE 105TH AAVSO SPRING MEETING

Meet us in St. Louis.... The 105th AAVSO Spring Meeting will be held May 5–7, 2016, at the Crowne Plaza in St. Louis, Missouri. Details will be posted on the AAVSO website meetings page (<https://www.aavso.org/apps/meetings>) as they become available. *Ed. note: the date of the meeting has changed since the original publication of the Newsletter.*

Save the dates and join us under the Arch! ★

AAVSO AT THE WHITE HOUSE

Open Science and Innovation: Of the People, By the People, For the People

Only a small fraction of Americans are formally trained as “scientists,” but that doesn’t mean that only a small fraction of Americans can participate in scientific discovery and innovation. Citizen science and crowdsourcing are approaches that educate, engage, and empower the public to apply their curiosity and talents to a wide range of real-world problems. To raise awareness of these tools and encourage more Americans to take advantage of them, the White House Office of Science and Technology Policy and the Domestic Policy Council hosted a live-webcast forum, on September 30, 2015.

Presenting at the forum, Dr. France A. Córdova Director, National Science Foundation, talks about how the AAVSO’s backyard astronomers contributed to helping her gain her PhD. A video of her talk can be seen at:

<https://www.aavso.org/aavso-white-house-video>

A NEW STAR

Longtime AAVSO member/observer Chris Stephan (SET) announces a new star in his family constellation, with the arrival of his first grandchild. Gabriel Orion Stephan was born August 11, 2015, weighing 9 lb 9 oz. Gabriel’s parents are Chris’ son Andrew (an AAVSO observer as a youth, SAA) and Jasmine Stephan.

We look forward to a third generation of Stephan variable star observers, and will be delighted to assign Gabriel his AAVSO observer initials when the time comes....

Welcome Gabriel, and congratulations to Andrew and Jasmine, Chris, and all their family! ★

SUCCESSFUL PRESENTATION OF ASTRONOMY PROJECTS FOR STUDENTS TO TEACHERS

CARL KNIGHT (KCD), BULLS, NEW ZEALAND

Ed. Note: The student in this article, Tessa Hiscox, won a Distinction Award at her school's science fair for her astronomy project. This award was unique, as there was no award category for astronomy because astronomy projects were considered too difficult! Read Dr. Stella Kafka's column on page 1 for more on Tessa's story.

As an AAVSO and Variable Stars South member I take a particular interest in getting secondary school students interested in variable star astronomy.

I have recently had the opportunity to present astronomy projects for students to the science faculty at the High School my wife and my own children attended and that our youngest child still attends.

This opportunity was due in no small part to another student (12–13 year old) at the High School who has been canvassing her science teachers for more astronomy since she started there in year 9.

Tessa Hiscox is a year 11 student at Freyberg High School. She is also a member of my local astronomical society, the Palmerston North Astronomical Society (PNAS). Tessa is a keen science student, particularly of astronomy. She encountered reluctance among the science teachers for astronomy projects, being told in effect that they are too difficult and require specialist equipment.

I have myself approached the school and made various suggestions for suitable student projects that I can assist with and received no encouragement either.

Tessa entered a science fair determined to do an astronomy project. With assistance from AAVSO Director Dr. Stella Kafka, we selected UU Muscae, a southern hemisphere Cepheid, as a suitable target. We then started doing time series photometry in V and R and visual estimates.

Tessa is not shy and is very enthusiastic. She gave regular progress reports to her teachers. The evidence of an astronomy project getting real data and going somewhere significantly altered the mindset of the teachers. Tessa's mother, Lynn, wrote a very flattering letter of introduction to the teacher at the school who is Tessa's biology mentor. These things in combination set up an opportunity for me to approach the school again.

Mairi Borthwick is the HoD Science at Freyberg High School. I contacted Mairi on a Monday and found myself at the end of the conversation having to come up with a presentation of astronomy science projects for the entire science faculty by the time of their weekly meeting of the Wednesday of the same week!

I immediately contacted a number of people, Stella, Stan Walker (Variable Stars South Director), and Jeremy Moss (PNAS president and ex-science teacher) among them. Via rapid fire email we came up with a number of ideas to present as potential projects to the teachers in my allotted 20–30 minutes.

I threw together a presentation based upon Tessa's project, as this had generated plenty of interest already. I also included eclipsing binary and contact binary



Lynn and Tessa Hiscox with Tessa's award-winning science fair project

stars with animations, Miras, and a science history piece on “the immutable heavens” using an animation of the passage of Barnard's Star.

When I presented an example classroom lesson on ionization and recombination using Tessa's light curve of UU Muscae, I concluded asking, “Now can you imagine putting together an exciting lesson plan based on that?” An excited teacher called out, “How could you not!?”

I concluded my presentation on time and asked, “So how might we—AAVSO, VSS, and PNAS—help you?”

The science staff were very interested in seeing real rather than contrived data. The 20–30 minute talk I told my boss I'd be away from work for blew out to the full hour, leaving the staff to conclude their scheduled business in the last two minutes! The question time took up most of the time and I had to apologise and make the excuse that I needed to return to work!

We discussed the curriculum, where data might be obtained to help teach the curriculum:

“What data could we get to teach about black holes?” BL Lac object light curves spring to mind.

“How about exo-planets?” What about MicroFUN or an exo-planet transit light curve such as that obtained by Sergison? (Sergison, D. (2013). “High precision photometry: Detection of exoplanet transits using a small telescope,” *Journal of the British Astronomical Association*, 123(3))

“We teach nucleosynthesis, there's that star somewhere near the Southern Cross, what's it called?” Eta Carinae. “Yes, that's it. Is there something we could look at when teaching about nucleosynthesis?” You could get light curves for highly evolved stars and talk how their behavior is different from when they were less mature and about how they've moved through different burning stages and moved off the main sequence.

“Why are supernovae needed to make bigger elements?” The slow neutron capture process stops at Bi because it captures neutrons, one of which decays to a proton giving Po which in turn by alpha emission becomes Pb, and you need a rate of neutron capture that is faster than that alpha decay by polonium to get

CONTINUED ON NEXT PAGE

ASTRONOMY PROJECTS CONTINUED...

any further, and that only occurs in a supernova. (By the way, I was supposed to avoid more advanced topics, but the teachers raised all sorts of more advanced topics themselves so I'm off the hook for that one!)

I mentioned the opportunity to "publish" (excitement) in a "peer-reviewed" (swoon!) journal and that led to some of the most animated discussion.

I had the opportunity to talk to one of Tessa's teachers as I left. He said it had made a huge difference that there had been an achievable project, with follow through on promises made as so often those things fail and the student is left disillusioned and reluctant to engage again.

We also discussed the teachers' perspective when approached by someone like myself. This leads me to the all important conclusions section.

Conclusions

The conclusions below are taken from the feedback received from the teachers as well as from emails and discussions with Tessa and her mother.

- Don't expect teachers to leap at the opportunity for astronomy projects. They are very busy and probably wary of what is being offered. It would be very useful for the AAVSO, VSS, RASNZ, or the local society to provide an information pack to teachers to help establish a working relationship. I suspect that word of mouth, once a good impression is made, will also lead to opportunities beyond the first school approached.

- The Freyberg science teachers who participated in the presentation Q&A clearly did not know what is potentially available to them. Lynn, Tessa's mother, notes, "Her very enthusiastic Biology mentor at school didn't see how a physics Science project could be done by a student under her own steam. This is a v [sic] happy outcome." This is not the case now, I am happy to report.

- We should take the time to find out what astronomy is present in the curriculum and tailor projects we offer to that curriculum where possible.

- The teachers were particularly receptive to the idea that they could get REAL data to work with—from raw images as I showed them (V and R images of UU Muscae), to the reduced magnitudes in a file—to then analyze themselves with students.

- The idea that their students could get something published and even peer-reviewed with some assistance was a real game changer. This caused some of the more animated discussion at the presentation and so I believe we should ensure this is mentioned when presenting what we can offer to schools.

- "Do we have materials to show the teachers what to do?" This is my paraphrase of a number of questions. "Powerpoints" were requested, but I believe we could make the material we develop for our own membership available; so long as this is backed up with support and mentoring it should prove adequate. We should be open to addressing feedback regarding ease of use in a teaching context if we are going to help teachers and students.

- AAVSO, VSS, RASNZ, or local societies should consider endorsing members who act as mentors to students. Effectively, this would be an acknowledgement that this person is someone we know and whom we trust to mentor a student in astronomy. In my case this was implicit in Ian Cooper (past PNAS president) putting Tessa in touch with me. For reasons of safety for all parties, I believe this endorsement should come with some accountability back to a parent body. We should probably inform schools that if a person offers to mentor students in astronomy projects they can expect that person to be able to show a connection to and endorsement from "us" (whether RASNZ, VSS, PNAS, or the AAVSO). We should provide a means by which schools or parents can check that endorsement.

- We should require our members to involve the parents of the student, and teachers should be made aware that this is a requirement. As a parent myself I want to know what my children are doing and who they are involved with. Lynn said, "...your initial email explained our visit clearly and was reassuring as I hadn't met you." And, "...my [Lynn's] involvement was required to accompany her [Tessa]." Lynn is referring to the fact that I insisted that if Tessa was going to come out to the observatory that it must be with a parent. Lynn further wrote: "A welcome email to the parent as well as the teenager at the point of first contact with the Astronomy group. With info and outlining the aim of including/developing young people as Astronomers [sic], which would normalize their presence in the group and reassure the parents. This activity involves meeting with older blokes at night!"

- Tessa notes that in considering an astronomy science project there is a "more advertising/presence" required.

- Regular contact with and encouragement of the teacher(s) and the student(s) is essential. In Tessa's case I kept her posted with the photometry in graphical format so she could see for herself that we were getting meaningful results.

- We should expect some bumps along the way in our relationship with schools, teachers, and students. Thus far I have experienced something of a "honeymoon" phase. There will be glitches, a necessity to set expectations to something achievable, and a period of discovering what that even might be. Beyond that I am confident we can achieve more than has been done to date.

I hope you feel encouraged as a membership to attempt to engage teachers and students. Let's learn, share, adapt, and encourage one another in providing an ability for teachers and students to do real astronomy. ★



Carl Knight and Tessa Hiscox

GOODBYE, OUR STAR

There are two people in the AAVSO that *everybody* knows: 1) **THE DIRECTOR**, and 2) **REBECCA**.

After twenty years on the job, AAVSO staff member Rebecca Turner has heeded the call to new professional horizons. We wish her well, but we will miss her greatly.

A native of Atlanta, Georgia, Rebecca came to the AAVSO in 1995 with a B.S. in physics and astronomy from the University of Georgia. AAVSO Director Janet Mattei put her to work as a technical assistant, helping to coordinate data requests. One of her first innovations at headquarters was the *AAVSO News Flash*. Not long after her start, Janet asked her to take on the additional responsibilities of meetings coordinator. This is where Rebecca's organizational and communication skills came to the forefront, and from which came the next logical steps in her career development at the AAVSO. From project manager (overseeing AAVSO's Citizen Science project, for example) to sponsored research officer (working with NASA, NSF, and other funding agencies), to operations director (making sure that all things AAVSO run smoothly, to completion, and on budget), Rebecca embraced and mastered each of these roles. She will be a hard act to follow.

The staff at AAVSO Headquarters want to take this opportunity to share with our *Newsletter* readers some photos from Rebecca's goodbye party; and we hope you will say with us, "Farewell, Rebecca, and Good Luck!" ★

If you are a member or observer and are logged in to the AAVSO website, you may post a message to Rebecca at the thread:

<https://www.aavso.org/thank-you-1>



NEWS AND ANNOUNCEMENTS

From the AAVSO Archives

MERIT BEHIND THE MERIT

compiled by Michael Saladyga, AAVSO Headquarters



Fred Jones in 1949

Of course, we must thank AAVSO member and observer Leslie Peltier for his lifetime of variable star observations, but we should also thank him for having been the inspiration for establishment of the AAVSO Merit Award.

AAVSO Recorder Leon Campbell considered Peltier “one of the best...” and, by 1930, felt that Peltier’s effort should be recognized. What convinced the AAVSO Council to approve creation of a Merit Award was Peltier’s 1933 observation of the recurrent nova RS Oph as it was brightening.

The first AAVSO Merit Award, presented to Peltier at the 1934 Annual Meeting, was designed and illuminated by AAVSO member Fred E. Jones of Allston (Boston), Massachusetts. Fred was the brother of another top AAVSO observer, Eugene Jones.

Fred Jones, an AAVSO member, but not an observer, was proud to be able to offer his artistic talent to the AAVSO. His Merit Awards 1 through 13 (1934–1954) were hand-lettered scrolls. Each scroll was a unique design, yet similar to the others in overall appearance.

Since the award itself was given to the recipient to keep, Fred Jones thought it would be appropriate to make replica award scrolls for display at AAVSO Headquarters. The AAVSO Archives is fortunate to have Leslie Peltier’s original Merit Award, as well as the thirteen “replicas.” It is clear that Jones



The first AAVSO Merit Award (left), presented to Leslie Peltier in 1934, and the “replica” intended for display at AAVSO Headquarters, both designed and inked by Fred Jones.



used the term “replica” with quite a bit of artistic license; the miniatures were not meant to be exact copies of the original, just representative copies. Still, Leon Campbell referred to the awards hung in the Pickering Memorial Room at HCO as “close replicas in miniature,” in his 14th Annual Report 1944–1945 (*Variable Comments*, Vol. 4, p. 63).

Award number 13, the last of the Fred Jones illuminations, was made to Roy A. Seely in 1954.

Award number 14, to Margaret and Newton Mayall, was the first to use the standardized design created by AAVSO member-observer Edgar M. Paulton of the New York City area, who also created the AAVSO Membership Certificate.

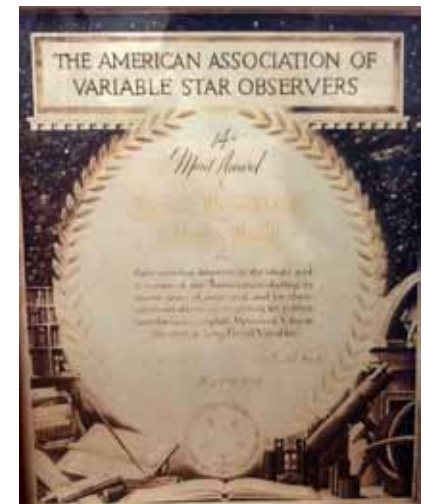
Fred Jones worked as a sewer engineer for the city of Somerville, Massachusetts, and was also an amateur painter and photographer, like his brother Gene. By late 1954, old age and infirmity had caught up with him, and he regretted that he was no longer able to continue his Merit Award designs for the AAVSO. He died in December 1954. ★



“Replica” of the fourth AAVSO Merit Award presented to Eugene Jones, brother of Fred Jones, in 1937. Compare this similar-but-unique design to that of the Peltier replica, above.



Letter from Fred Jones to AAVSO Director Margaret Mayall, March 1953, in which he discusses ideas for his next Merit Award design.



First of the new Merit Award design by Edgar M. Paulton was presented to Margaret and Newton Mayall in 1956.

IN MEMORIAM

MEMBERS, OBSERVERS, COLLEAGUES,
AND FRIENDS OF THE AAVSO

RAYMOND RAMSAY (RAY) THOMPSON

*David Thompson (Los Alamos National Laboratory)
Judith Thompson (Dalhousie University, Halifax, NS)
John Percy (University of Toronto)*

Ray Thompson, prolific AAVSO observer and data analyst, died June 22 at his home in Halifax, at the age of 91. He was born in Gillingham, England (Dickens country; he was a truly Dickensian character), and grew up in Bermuda. He was educated at the University of Toronto, Toronto Normal School, and the Royal Conservatory of Music in Toronto, then began a long career, first as an elementary teacher and principal in the public schools, and later as a private music teacher. But he was more than this—husband (of musician and Holocaust survivor Ilse), father (of David and Judith), poet, artist, philosopher, pipesmoker, composer, carpenter, handyman, storyteller, teacher, gardener, brewmaster, socialist, humanist—and astronomer. He was interested in astronomy since his teens, but after settling in the then-tiny rural village of Maple, Ontario (as principal he taught grades 5–8 and the other teacher grades 1–4) just north of Toronto, he began to expand the reach of both his instrumentation and his astronomical activities. The first Maple Observatory housed a 6-inch Unitron refractor and then also a 4-inch Gerrish polar axis telescope which conveniently allowed him to observe from indoors. In 1971 a larger two-storey structure housed the Gerrish and 8-inch f/15 and 6-inch f/10 refractors, later replaced by a 10-inch SCT.

Never just interested in looking at celestial objects, Ray concentrated on ways in which he could make useful contributions to science. He accumulated over 10,000 visual observations for the AAVSO, and later added photoelectric photometry to his repertoire; when he “retired,” he was the AAVSO’s most prolific PEP observer. He also made nearly daily sunspot observations for almost 50 years. He authored, co-authored, or contributed to many scientific papers, especially in collaboration with one of us (JRP). He also never tired of introducing students, Boy Scouts, or anyone else to astronomy.

Ray was a Life Member of the Royal Astronomical Society of Canada, President of its Toronto Centre from 1963 to 1964, and winner of its Chant Medal in 1967 for his many contributions to instrumentation, observational astronomy, and education, and of the 1996 Ken Chilton Prize for his work in photoelectric photometry. He received the “Friends of NSERC”



Ray Thompson

(Canada’s equivalent of NSF) award for his “citizen science” research.

A true renaissance man, Ray was an accomplished pianist and violist who loved both orchestral and chamber music. He sang or played in numerous choirs and orchestras, including Toronto’s prestigious Mendelssohn Choir. He was an enthusiastic gardener and also a witty writer and even a talented artist—some of his children’s fondest memories are of the stories he made up for them when they were young, illustrating them as he told them. He was widely read and his (left-wing) politics were never long left out of any conversation.

Ray was an amateur in the best sense of the word, contributing to astronomy for the sheer love of it.

Editor’s note: Ray Thompson (THR) made 18,297 variable star observations for the AAVSO from 1962 through 2007.



João Rui Correia

JOÃO RUI GIVELHO ALVEIRINHO CORREIA

(CJGB, Amadora, Portugal), died July 15, 2015, at the age of 46. João Rui contributed 2,902 CCD observations made May 2014 to February 2015 to the AAVSO International Database. He was

very involved in variable star observing—his companion, Claudia, shared with us an excellent PowerPoint presentation João Rui had created for a talk he gave recently on observing variable stars (visual, CCD, DSLR, via robotic telescopes, and spectroscopy) (find it at <https://www.aavso.org/presentation-library-0>).

At the time of his death he was building spectroscopic instrumentation for an observatory he had designed and built in the mountains of eastern Portugal. João Rui received an AAVSO Observer Award in 2015 for his contribution of over 1,000 CCD observations. Outside of astronomy, his interests were wide-ranging, from geology and architecture to photography and psychology and beyond. He was a humble man and a faithful friend, kind, caring, and generous, always ready to listen and to help. Our deepest condolences go to João Rui’s companion, Claudia, his parents, and his family and friends.



Jeff Hopkins

JEFFREY L. HOPKINS

(HPO, Phoenix, Arizona), died July 28, 2015, of cancer at the age of 75. An AAVSO member since 2012, Jeff contributed 2,559 photoelectric photometric observations of epsilon Aurigae made September 1982–November

2009 to the AAVSO International Database. In 2010 he received an AAVSO Observer Award for his contribution of over 1,000 PEP observations to the AAVSO International Database.

Jeff was involved in instrumental observing for many years, whether photoelectric photometry, DSLR, CCD, or spectroscopic. His interest in instrumentation was reflected in his career with the General Electric Company for 13 years and the Motorola Corporation Government Electronics Department for 10 years. A veteran, Jeff served in the United States Marine Corps in the 1960s. Jeff was the author of several books related to astronomy and observing, including *Using Commercial Amateur Astronomical Spectrographs*. Jeff was a longtime member of the International Amateur Professional Photometry (IAPPP), the Association of Lunar and Planetary Observers (ALPO), Society for Astronomical Sciences (SAS), and the Saguaro Astronomy Club in Phoenix. Despite a severe loss of hearing, he was a frequent presenter at meetings and was very involved in public outreach at events such as star parties. Minor planet (187283) *Jeffhopkins* is named in his honor. We extend our sincere sympathies to Jeff’s family and many friends and colleagues.

(Photo courtesy Robert Buchheim)

CONTINUED ON NEXT PAGE

IN MEMORIAM CONTINUED...

Several astronomers whose work impacted variable star astronomy and the AAVSO or captivated our imaginations have passed away recently, including:



Claudia Alexander

CLAUDIA JOAN ALEXANDER (California) died July 11, 2015, at the age of 56 of breast cancer. Her specialty was planetary astronomy and geophysics, in particular the Jovian system, Venus, the evolution of comets, plate tectonics, and the solar wind. At NASA's Jet

Propulsion Laboratory she had been the last project manager of the Galileo mission to Jupiter, and was project manager and scientist of the NASA part of the European Space Agency's Rosetta mission. In 2015 a feature on comet 67P/Churyumov-Gerasimenko (Rosetta's target) was named the C. Alexander Gate. In addition to her professional writing, she was an author of children's books and science fiction. We extend our sincere condolences to her family, friends, and colleagues.



Alexander Boyarchuk

ALEXANDER A. BOYARCHUK (Moscow, Russia) died August 10, 2015, at the age of 84 after a serious illness. He was an astrophysicist whose specialties included spectroscopy, stellar atmosphere composition (particularly Be and metal-rich stars, giants, supergiants), novae,

symbiotics, modeling mass exchange in close binaries, ultraviolet astronomy, and instrumentation. Among the large-scale projects he was responsible for were the long-duration ASTRON space experiment, and the Spektr-UV (also known as World Space Observatory-Ultraviolet, WSO-UV), a UV astrophysical observatory with a 1.7-m telescope scheduled for launch in 2017. He served as President of the International Astronomical Union in 1991–1994, Science Supervisor of the Russian Academy of Sciences, and Editor-in-Chief of the journal *Reports on Astronomy*, and was a member of many professional international organizations. He received numerous awards from the Soviet and Russian governments in recognition of his many contributions to science and to the nation over the years. Minor planet (2563) *Boyarchuk* was named in his honor. We extend our deep condolences to his family, colleagues, and friends.



William Erickson

WILLIAM C. ERICKSON

(Hobart, Tasmania, Australia) died September 5, 2015, at the age of 84. Interested in astronomy since childhood and an amateur radio operator as a young teenager, Dr. Erickson was a pioneer in low frequency radio astronomy. He was involved

in siting, designing, and building numerous radio telescopes in the United States, particularly at Clark Dry Lake, California, where for decades he and his students at the University of Maryland carried out research on astronomy and instrumentation; many aspects of his designs are reflected in instrumentation in use around the world. He was involved in numerous radio sky surveys, many of which are still in use today, and he was also a pioneer in very long baseline interferometry. He was an early radio researcher in such major areas of astronomy as solar and planetary radio science, galactic and extragalactic radio astronomy, and interplanetary and interstellar propagation effects. His seminal and far-reaching contributions were recognized in 2005 as the first recipient of the Grote Reber Foundation's Grote Reber Medal "for lifetime innovative contributions to radio astronomy." He continued to be active in solar research with his wife, Hilary, also a low frequency radio astronomer, and utilized his private radio observatory in Tasmania until shortly before his death. When not pursuing science, he loved deep-water sailing, fishing, and gardening. We extend our sincere sympathies to his wife and family, and to his students, colleagues, and friends.



James Houck

JAMES R. HOUCK

(Ithaca, New York) died September 18, 2015, at the age of 74. Dr. Houck was not an AAVSO member or observer, but he contributed greatly to the study of variable stars as a pioneer in infrared astronomy. Based at Cornell University, where he was a

professor of astronomy, he had been involved since the 1960s in designing detectors and spectrographs used in above-the-Earth research, from sounding rockets and airborne observatories to the Infrared Astronomical Satellite (IRAS), which carried out the first all-sky infrared survey, and the Spitzer Space Telescope, for which he was the Principal

Investigator of the Infrared Spectrograph. At Cornell, he led the development of their instrumentation for the Palomar Observatory Hale Telescope. His awards included NASA Exceptional Scientific Achievement Medals for his work on both IRAS and Spitzer, and the American Astronomical Society's Joseph Weber Award for Astronomical Instrumentation (in 2008). His research interests included ultraluminous infrared galaxies, of which he was a discoverer using IRAS, and dust formation in the early Universe. He was recognized as an exceptional scientist and greatly appreciated as a colleague and friend, and we extend our sincere sympathy to his family, friends, and colleagues.



Stephen Murray

STEPHEN S. MURRAY

(Lexington, Massachusetts) died August 10, 2015, at the age of 70. An area vital to all researchers in astronomy and astrophysics to which Dr. Murray contributed was as the Principal Investigator for NASA's Astrophysics

Data System (ADS), which provides free access to published literature in astronomy and astrophysics and has replaced the library literature search. Apart from ADS, he spent over 40 years in the High Energy Division of the Smithsonian Astrophysical Observatory of the Harvard-Smithsonian Center for Astrophysics (CfA), where he designed and built instruments for four major high-energy missions: NASA's Uhuru (Small Astronomical Satellite-1, the first X-ray astronomy survey satellite), Einstein (High Energy Astronomical Observatory-2, the first fully-imaging X-ray telescope in space), and Chandra X-ray Observatory (for which he was Principal Investigator for the High-Resolution Camera), and the Germany-USA-UK X-ray satellite ROSAT (ROentgen SATellite). He also served as an administrator at CfA in several capacities over the years. In addition, in recent years he was a research professor at Johns Hopkins University, teaching undergraduates and working on instrument designs, and a senior researcher at the Space Telescope Science Institute. Besides instrumentation, his research interests included active galactic nuclei, clusters of galaxies, large-scale structure, and cosmology. At the time of his death, at Johns Hopkins he was the Principal Investigator for the Wide Field X-ray Telescope concept study, and at the CfA the deputy Principal Investigator for the NASA Whipple mission (in technology development phase) to study icy bodies in the outer solar system. We extend our sincere sympathies to his family and many friends and colleagues.

TALKING ABOUT THE AAVSO

ELIZABETH O. WAAGEN (WEO), AAVSO HQ

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

May 11, 2015—**Andrew Pearce** (Nedlands, Western Australia) gave a talk entitled “The fascinating world of variable stars” to the Astronomical Society of Western Australia, Perth, W. Australia.

June 13, 2015—**John Percy** (Toronto, Ontario, Canada) gave an invited presentation on “The David Dunlap Observatory (DDO): The Prehistory,” at the DDO 80th Anniversary Symposium, Richmond Hill, Ontario, Canada. See John’s recent editorial in the *Journal of the AAVSO*: <http://www.aavso.org/apps/jaavso/article/3106/>

July 11, 2015—**Mike Simonsen** (SXN, Imlay City, Michigan) gave a talk on “Citizen Science and the AAVSO” at ALCon (the Astronomical League annual convention) in Las Cruces, NM.

August 15, 2015—**Bill Goff** (GFB, Sutter Creek, California) gave a talk on variable stars “with heavy emphasis on AAVSO” at the first meeting of the West Coast Video Star Party to a group of about 30. He said it was great fun!

August 22, 2015—**John Percy** gave his annual public lecture at the David Dunlap Observatory on “Mysteries of the North Star.” John adds, “For those of you who don’t know: Polaris is a 4-day Cepheid with an increasing period (common) and a decreasing amplitude (rare). Because of controversies about its distance—even though it is the nearest Cepheid—many of its other properties are not agreed on by the experts.”

September 3, 2015—**Gary Poyner** (PYG, Birmingham, UK) spoke on “Historical Novae” to the Herefordshire Astronomical Society, Hereford, England. About 40 in the audience, with lots of interest and questions at the end!

September 11–November 3, 2015—**John Percy** is teaching a 10-week course on “Discover the Universe!” for 160 later-life learners at Glendon College, York University; see: <http://llir.ca/course-outline-2015-fall-b-discover-the-universe/>

September 14, 2015—**Gary Poyner** gave an “Introduction to Variable Star Observing” to the Northamptonshire Natural History Society (Astronomy

Section), Northampton, England. Gary reports that there were around 40 in the audience, and they had a good selection of questions; he has spoken to this group many times.

October 13, 2015—**Gary Poyner** gave a talk on “Variable Stars—How and why they vary” to the Monmouth Astronomical Research Society, Monmouth, Wales. This was a new Society for him to visit.

October 19, 2015—**Gary Poyner** spoke on “Historical Novae” to the Chipping Norton Amateur Astronomy Group, Chipping Norton, Oxfordshire, England. Gary reports that he gave the “Variable Stars—How and why they vary” talk to them last year, and there seemed a good deal of interest.

October 28, 2015—**Damien Lemay** (LMA, Saint-Anaclet, Quebec, Canada) will speak at the monthly meeting of the Club d’astronomie maskoutain in Saint-Hyacinthe, Quebec, Canada.

November 7, 2015—**Damien Lemay** will speak at the Annual General Meeting of the New Brunswick Center of the RASC, at Mt. Allison University, Sackville, New Brunswick, Canada.

November 14, 2015—**Damien Lemay** will speak at the 18th Colloque CCD of the Fédération des Astronomes Amateurs du Québec (FAAQ, <http://www.faaq.org>) in Montreal, Quebec, Canada. He will talk specifically about the use of the CCD camera for variable star observing and where/how to report observations.

June 13, 2016—**Gary Poyner** will give an “Introduction to Variable Star Observing” to the Wolverhampton Astronomical Society, West Midlands, England. As past President of this Society, Gary says he has visited many times to give talks—“all Variable Star related of course.”

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 2016 *AAVSO Newsletter* (submission deadline December 15, 2015). Many thanks for your education and outreach efforts on behalf of the AAVSO and variable star observing! ★

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. Below is a listing of some of the publications that appeared 2015 July 2 through September 24 on the arXiv.org preprint server and used AAVSO data or resources and/or acknowledged the AAVSO. To access these articles, type the preprint number into the “Search or Article-id” box at <http://www.arXiv.org>.

- J.E. Andrews, Kelsie M. Krafton, Geoffrey C. Clayton et al., “Early Dust Formation and a Massive Progenitor for SN 2011ja?” (arXiv:1509.06379) [Sep 21, 2015]
- Rod Stubbings, “Discovery of an “Eclipse” in the WC9d-Type Wolf-Rayet Star, WR 53” (arXiv:1509.05780)[Sep 18, 2015]
- Ashley Pagnotta, Bradley E. Schaefer, James L. Clem et al., “The 2010 Eruption of the Recurrent Nova U Scorpii: The Multi-Wavelength Light Curve” (arXiv:1509.05431)[Sep 17, 2015]
- T. Kangas, S. Mattila, E. Kankare et al., “Supernova 2013fc in a circumnuclear ring of a luminous infrared galaxy: the big brother of SN 1998S” (arXiv:1509.05389)[Sep 17, 2015]
- P. C. Schneider, K. France, H. M. Günther et al., “X-ray to NIR emission from AA Tauri during the dim state - Occultation of the inner disk and gas-to-dust ratio of the absorber” (arXiv:1509.05007)[Sep 16, 2015]
- A.V. Dodin, N.V. Emelyanov, A.V. Zharova et al., “Orbital motions and light curves of young binaries XZ Tau and VY Tau” (arXiv:1509.04966)[Sep 16, 2015]
- A. Furniss, K. Noda, S. Boggs et al., “First NuSTAR Observations of Mrk 501 within a Radio to TeV Multi-Instrument Campaign” (arXiv:1509.04936)[Sep 16, 2015]
- R. Jurdana-Sepic, U. Munari, “The past photometric history of the FU Ori-type young eruptive star 2MASS J06593158-0405277 = V960 Mon” (arXiv:1509.04642)[Sep 15, 2015]
- Joseph E. Rodriguez, Joshua Pepper, Keivan G. Stassun, “First Results from the Disk Eclipse Search with KELT (DESK) Survey” (arXiv:1509.04351) [Sep 14, 2015]
- K. L. Page, J.P. Osborne, N.P.M. Kuin et al., “Swift detection of the super-swift switch-on of the super-soft phase in nova V745 Sco (2014)” (arXiv:1509.04004)[Sep 14, 2015]
- Thomas E. Harrison and Ryan T. Hamilton, “Quantifying the Carbon Abundances in the Secondary Stars of SS Cygni, RU Pegasi, and GK Persei” (arXiv:1509.03664)[Sep 11, 2015]
- Mudit K. Srivastava, N. M. Ashok, D. P. K. Banerjee and D. Sand - Astronomy and Astrophysics Division et al., “Near Infrared studies during maximum and early decline of Nova Cephei 2014 and Nova Scorpii 2015” (arXiv:1509.02660)[Sep 9, 2015]
- Rudolf B. Kuhn, Joseph E. Rodriguez, Karen A. Collins et al., “KELT-10b: The First Transiting Exoplanet from the KELT-South Survey -- A Hot Sub-Jupiter Transiting a $V = 10.7$ Early G-Star” (arXiv:1509.02323)[Sep 8, 2015]
- Ryan C. Terrien, Suvrath Mahadevan, Rohit Deshpande et al., “A Near-Infrared Spectroscopic Survey of 886 Nearby M Dwarfs” (arXiv:1509.01565)[Sep 4, 2015]
- Andrew R. Casey and Kevin C. Schlaufman, “Chemistry of the Most Metal-poor Stars in the Bulge and the $z > 10$ Universe” (arXiv:1509.01252)[Sep 3, 2015]
- Bradley E. Schaefer and Zachary I. Edwards, “Photometry of the Stingray Nebula (V839 Ara) from 1889-2015 Across the Ionization of Its Planetary Nebula” (arXiv:1509.01202)[Sep 3, 2015]
- Taisiya G. Kopytova, Wolfgang Brandner, Emanuele Tognelli et al., “Single stars in the Hyades open cluster. Fiducial sequence for testing stellar and atmospheric models” (arXiv:1509.00053)[Aug 31, 2015]
- S. A. Macfarlane, R. Toma, G. Ramsay et al., “The OmegaWhite Survey for Short-Period Variable Stars I: Overview and First Results” (arXiv:1508.06277)[Aug 25, 2015]
- C. E. Ferreira Lopes, V. Neves, I. C. Leão et al., “The variability behavior of CoRoT M-giant Stars” (arXiv:1508.05358)[Aug 21, 2015]
- MAGIC Collaboration: M. L. Ahnen, S. Ansoldi, L. A. Antonelli et al., “Very-high-energy gamma-ray observations of novae and dwarf novae with the MAGIC telescopes” (arXiv:1508.04902)[Aug 20, 2015]
- V. Testa, R. P. Mignani, C. Pallanca et al., “Gemini optical observations of binary millisecond-pulsars” (arXiv:1508.04780)[Aug 19, 2015]
- Norbert Zacharias, Charlie Finch, John Subasavage et al., “The First U.S. Naval Observatory Robotic Astrometric Telescope Catalog (URAT1)” (arXiv:1508.04637)[Aug 19, 2015]
- T. N. Tarasova, “Spectroscopic Study of the Envelope of the Hybrid Nova V458 Vul and Surrounding Nebula” (arXiv:1508.03990)[Aug 17, 2015]
- X. Haubois, M. Wittkowski, G. Perrin et al., “Resolving asymmetries along the pulsation cycle of the Mira star X Hya” (arXiv:1508.03180)[Aug 13, 2015]
- Michael B. Lund, Robert J. Siverd, Joshua A. Pepper et al., “Metrics for Optimization of Large Synoptic Survey Telescope Observations of Stellar Variables and Transients” (arXiv:1508.03175)[Aug 13, 2015]
- M. Hackstein, Ch. Fein, M. Haas et al., “The Bochum Survey of the Southern Galactic Disk: II. Follow-up measurements and multi-filter photometry for 1323 square degrees monitored in 2010-2015” (arXiv:1508.01701)[Aug 7, 2015]
- Nissim Fraija, José Ignacio Cabrera, Erika Benítez and David Hiriart, “Flaring activity of Mrk 421 in 2012 and 2013: orphan flare and multiwavelength analysis” (arXiv:1508.01438)[Aug 6, 2015]
- M. Netopil, E. Paunzen, G. Carraro, “A comparative study on the reliability of open cluster parameters” (arXiv:1508.01296)[Aug 6, 2015]
- Ashley L. King, Jon M. Miller, John Raymond et al., “High Resolution

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SCIENCE SUMMARY CONTINUED...

Chandra HETG spectroscopy of V404 Cygni in Outburst” (arXiv:1508.01181)[Aug 5, 2015]

Xinyu Yao, Lingzhi Wang, Xiaofeng Wang et al., “Photometry of Variable Stars from THU-NAOC Transient Survey I: The First 2 Years” (arXiv:1507.08018)[Jul 29, 2015]

Frédéric Clette, Laure Lefèvre, Marco Cagnotti et al., “The revised Brussels-Locarno Sunspot Number (1981-2015)” (arXiv:1507.07803)[Jul 28, 2015]

Taichi Kato, “WZ Sge-Type Dwarf Novae” (arXiv:1507.07659)[Jul 28, 2015]

Chelsea X. Huang, K. Penev, J. D. Hartman et al., “High Precision Photometry for K2 Campaign 1” (arXiv:1507.07578)[Jul 27, 2015]

Taichi Kato, Franz-Josef Hamsch, Pavol A. Dubovsky et al., “Survey of Period Variations of Superhumps in SU UMa-Type Dwarf Novae. VII: The Seventh Year (2014-2015)” (arXiv:1507.05610)[Jul 20, 2015]

David Pulley, Derek Smith, George Faillace et al., “A new and improved ephemeris for the hot subdwarf eclipsing binary SDSS J082053.53+000843.4” (arXiv:1507.04097)[Jul 15, 2015]

B. J. Shappee, A. L. Piro, T. W.-S. Holoiën et al., “The Young and Bright Type Ia Supernova ASASSN-14lp: Discovery, Early-Time Observations, First-Light Time, Distance to NGC 4666, and Progenitor Constraints” (arXiv:1507.04257)[Jul 13, 2015]

Mohaddeseh Azimlu, J. Rafael Martinez-Galarza, August A. Muench, “A WISE Census of Young Stellar Objects in Perseus OB2 Association” (arXiv:1507.02966)[Jul 10, 2015]

Vishal Joshi, D. P. K. Banerjee, N. M. Ashok et al., “Infrared studies of Nova Scorpii 2014: an outburst in a symbiotic system sans an accompanying blast wave” (arXiv:1507.02487)[Jul 9, 2015]

H. Worpel, A. D. Schwöpe, “XMM-Newton and optical observations of the eclipsing polar CSS081231:071126+440405” (arXiv:1507.02411)[Jul 9, 2015]

Julian P. Osborne, “Getting to know Classical Novae with Swift” (arXiv:1507.02153)[Jul 8, 2015]

We thank the above 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. ★

NEW AAVSO FORUM—VARIABLE STARS IN EDUCATION

The AAVSO has added a new forum to its menu of discussion forums—Variable Stars in Education. To quote the forum’s moderator, Carl Knight (KCD, Bulls, New Zealand): “This forum is all about supporting AAVSO members reaching out to and mentoring students and educators who want to do real astronomy. We want to present variable star science as a great way to learn and teach fundamental stellar physics with real data and the opportunity to genuinely contribute to the advancement of the same. Not only is mentoring students and educators fun, but it can set a young person’s direction for life—creating the next generation of astronomers one young person at a time!”

“If this is what you do, would like to do better or what you would like to START to do, then this forum has you in mind.

- Do you need help finding suitable variable star projects for student/educator projects?
- Do you have a success story to share?
- What worked for you and what didn’t?
- Help lighten the load: share, adapt and extend materials.

“Let’s encourage one another, help where we can and set students and teachers up for the sort of success that makes lifetime astronomers!”

The forum URL is:

<https://www.aavso.org/forums/variable-star-observing/variable-stars-education>

Anyone may read the forum postings. To post to any forum, you need to have an account on the AAVSO website (free) and be logged in.

For those not familiar with the forums, they are an excellent resource for information on, and a good way to chat with others about, a broad range of topics from general questions about the AAVSO and observing to different types of variable stars, transient objects, observing campaigns, photometry, spectroscopy, VPhot, VStar, and so on. The forums may be accessed from the homepage under the Community tab or by going directly to <https://www.aavso.org/forums>. You may sign up (free) to receive postings via email from any thread or forum that interests you.

Take a look and join one of the discussions! ★

Ed. note: following is the Spanish language text of Stella's Director's message.

MENSAJE DEL DIRECTOR STELLA KAFKA

El valor de las tutorías: construyendo un futuro para la astronomía de estrellas variables

En abril de 2015, fui a Nueva Zelanda para asistir al 50° aniversario del Observatorio Mt. John y al encuentro anual de la Royal Astronomical Society of New Zealand (RASNZ). La primera fue una celebración por los 50 años de contribuciones de un gran observatorio, que además alberga uno de los telescopios de AAVSO.net. El segundo fue una oportunidad de encontrarme y charlar con miembros de nuestra comunidad en el hemisferio sur, enterarme de sus intereses en investigación y compartir con ellos algunos de los míos. Como nueva directora de la AAVSO, recibí una muy cálida bienvenida de parte de Variable Stars South y los miembros de la RASNZ, mientras que discutíamos formas en las que trabajaremos todos juntos para servir mejor a nuestra comunidad. Volví con muchas buenas ideas y una agenda llena de nuevos amigos.

Ya de vuelta, recibí un e-mail de Carl Knight, uno de nuestros miembros de NZ con quien me encontré durante mi viaje, informándome que Tessa, una estudiante secundaria también de NZ, estaba interesada en trabajar en un proyecto observacional de astronomía para la feria de ciencias de su escuela y necesitaba ayuda. Carl me preguntaba si podía actuar como co-mentora de Tessa, ya que ella necesitaba una guía científica para su proyecto. Al mismo tiempo, él estaba dispuesto a ayudarla con sus observaciones. Naturalmente, aproveché la oportunidad; diseñamos un proyecto de observación visual en el cual Tessa obtendría datos de una variable cefeida para poder determinar un período de pulsación actualizado de la estrella. Tessa completó su proyecto con éxito y lo presentó en la feria de ciencias de su región a fines de agosto. Los jueces de la feria quedaron realmente impresionados y le dieron una distinción por su trabajo (ya que la mayoría de los premios “oficiales” de la feria de ciencias estaban destinados a la agricultura o a la física aplicada) y mucho estímulo. Ahora ella está preparando un paper para JAAVSO resumiendo sus hallazgos.

Esto es lo especial de la historia de Tessa: ella es una joven y brillante estudiante, apasionada por la astronomía, dispuesta a aprender cómo observar y deseosa de trabajar con estrellas variables. Al principio se acercó a sus maestros con proyectos de

astronomía pero trataron de disuadirla porque “la astronomía es difícil”; querían convencerla para que trabajara en otra cosa para su proyecto de ciencias. Pero ella estaba decidida. Así que, nos encontramos a Carl y a mí, que estuvimos encantados de ser parte de su grupo de apoyo. Y, después de su gran éxito en la feria de ciencias, los mismos maestros que no creían que la astronomía fuese una buena idea para su proyecto, ahora están interesados en armar un programa para más estudiantes en su distrito escolar.

Estoy segura de que todos nosotros conocemos estudiantes como Tessa, que tienen su corazón en la astronomía pero tienen educadores (o amigos) que no están muy dispuestos a ayudarlos o incentivarlos a llevar adelante su pasión. O podemos tener vecinos o compañeros de trabajo que están haciendo astrofotografía con su cámara DSLR y están interesados en observar estrellas variables pero no saben por dónde empezar. Ahí es donde tener un mentor puede ser un recurso invaluable. Un mentor vendría a ser una persona que les de consejo acerca de las técnicas de observación, que les proponga objetos o les de una guía general a los observadores nuevos cuando lo necesiten para sus proyectos. Muchos de nosotros hemos tenido un gran mentor al principio de nuestra carrera de observación, una persona que nos dio indicaciones en nuestros primeros intentos de obtener datos, nos dio pistas útiles sobre cómo encontrar las estrellas (especialmente cuando se trata de observación visual) y compartió sus experiencias de cuando navegó en el cielo por primera vez. En principio, todos somos mentores y aprendices al mismo tiempo: durante nuestras charlas cara a cara en los encuentros de AAVSO o cuando participamos en los foros, compartimos experiencias de observación, hablamos cómo solucionar problemas e intercambiamos historias observacionales, todo ello mientras aprendemos los unos de los otros. La tutoría de pares tiene lugar cuando compartimos curvas de luz y buscamos la opinión de la comunidad para interpretar nuestros resultados. Cada día podemos aprender algo nuevo y nos convertimos en mejores personas a causa de esos intercambios. Y para algunos de nosotros, este viaje comenzó porque tuvimos una mano firme que nos sirvió de guía en los comienzos de nuestra astro-carrera.

La AAVSO tiene un programa de tutoría muy activo y me gustaría que lo aprovecharas. Por favor, considera unirse, ya sea como mentor o como aprendiz. Por favor, considera tomar bajo tus alas a un nuevo observador; es una experiencia muy reconfortante y provoca una diferencia real en la vida de las personas. Hacer de tutor podría ser tan simple como estimular a un colega o a un amigo que quiere involucrarse más en observación

y en investigación. O podría ser ayudar a alguien a comenzar con sus observaciones, una guía paso a paso derivada de tus propias experiencias. Es muy probable que haya un nuevo observador en alguna parte que quiera aprender de tí y que apreciaría tus palabras sabias y tu apoyo.

Sé que a Tessa le irá muy bien en su vida profesional (sea lo que sea que haga). También sé que su experiencia en astronomía la convirtió en una gran defensora del cielo nocturno variable y estoy esperando ansiosamente recibir más de sus datos. Estoy segura de que ella estará dispuesta a compartir sus experiencias con otros —ya lo está haciendo en su distrito escolar— así que de alguna manera ¡ya es una mentora! Tal vez Tessa sea la nueva Presidente de la AAVSO en 30 años. Ya estoy muy orgullosa de sus logros y tengo el honor de saber que he dejado una pequeña marca en su astro-futuro. Todos tuvimos que empezar por algo. Ayudemos también a los nuevos observadores a comenzar su camino en la observación. ★

MENSAJE DEL PRESIDENTE JENO SOKOLOSKI

En épocas de estudiar en la universidad, cuando me encontré por primera vez las transformadas de Fourier, que muchas personas utilizan para analizar curvas de luz, me parecían mágicas. Estaba impresionada por la forma mágica en que podía descubrir patrones. Y seguí con mi asombro en mi carrera como investigadora de las estrellas variables. Hoy en día, toda la comunidad profesional parece haber descubierto el deleite de objetos cuyo brillo parpadea y centellea, pulsa y disminuye a lo profundo. Los levantamientos de variabilidad profesionales múltiples y de gran campo estarán activos en la próxima década. Algunos investigadores, incluso, están llamando a esto los albores de la “Edad de Oro de la Astrofísica en el dominio del tiempo”.

Como organización de aficionados a las estrellas variables que ha sido trazando el cielo de las variables para más de 100 años, ¿cuál es el papel de AAVSO en esta era de la astronomía en el dominio del tiempo? El aumento repentino de estos estudios profesionales de corta cadencia y de todo el cielo parece un palo en la rueda para AAVSO. Podríamos sentarnos y mirar mientras los levantamientos profesionales hacen algunas de las contribuciones de los aficionados menos relevantes, científicamente hablando. O, al darnos cuenta que nuestra especialidad se está tornando el centro del escenario, podemos entrar en acción. Los pasos para aprovechar el interés de la comunidad, cada vez mayor, en las estrellas

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MENSAJE DEL PRESIDENTE CONTINUED...

variables podrían ser: 1) educar a los miembros de AAVSO acerca de las levantamientos profesionales (sus cadencias, cobertura del cielo, límites de brillo y otras capacidades) y dónde son necesarios los observadores aficionados; 2) educar a los profesionales con respecto a las capacidades de los aficionados; 3) fomentar la comunicación productiva entre todas las partes; y, finalmente, 4) construir más colaboraciones profesional-amateur (pro-am). ¡Probablemente ya adivinó cuál es el camino que defiendo! Creo que el crecimiento actual de la astronomía en el dominio del tiempo es muy propicio para la colaboración pro-am y la ciencia ciudadana, lo que representa una gran oportunidad para AAVSO.

Así que, ¿cuáles son estos levantamientos profesionales que están en el horizonte? El mayor proyecto próximo es el Gran Telescopio para Rastros Sinópticos (LSST), con su primera luz proyectada para 2019. Pero el LSST no saldrá de la nada. Es una consecuencia natural de los estudios detallados pasados y existentes. En la introducción a su artículo científico en el Catalina Real-Time Transient Survey (CRTS), Drake et al. (2009, ApJ, 696, 870) dan una buena revisión de cómo los levantamientos anteriores han cubierto, por un lado, una gran fracción del cielo con una gran resolución en el tiempo (como el Sky Survey Sloan Digital [SDSS] y el Two Micron All Sky Survey [2MASS]), o, por otro, han buscado determinados tipos de variables en campos más pequeños de decenas a cientos de grados cuadrados (por ejemplo, MACHO, Alcock et al 2000; OGLE, Udalski et al 1994; EROS, Aubourg et al 1995; ROTSE, Akerlof et al. 2000; y el Lick Observatory Supernova Search (LOSS), Filippenko et al 2001). Es sólo recientemente que tanto la sensibilidad temporal como la extensa cobertura del cielo se han combinado en estudios detallados como Pan-Starrs (Panoramic Survey Telescope and Rapid Response

System), el experimento Robotic Optical Transient Search (ROTSE-III; Akerlof et al., 2003), CRTS, el Palomar Transient Factory (PTF) y el All Sky Automatic Survey (ASAS-3, Pojmanski 2001). Todas estas levantamientos afectan a los aficionados.

Lejos de dejar a los observadores aficionados fuera del juego, el florecimiento de la astronomía profesional en el dominio del tiempo aumenta la necesidad de colaboración pro-am. Los grandes estudios detallados profesionales generalmente tienen cadencias predefinidas, filtros y límites de brillo inflexibles. El LSST, por ejemplo, sólo visitará el mismo trozo de cielo aproximadamente una vez por mes, en los filtros azul (u-banda) y verde (g-banda). Y los detectores del LSST se saturan cuando los fenómenos transitorios se vuelven más brillantes que la magnitud 15, aproximadamente. Así, los levantamientos como el LSST no pueden hacer lo que los aficionados si pueden hacer. Ellos descubrirán muchas erupciones estelares en la Galaxia, elevarán el perfil de la observación de estrellas variables y generarán nuevas preguntas interesantes acerca de las estrellas variables, los exoplanetas y otros fenómenos transitorios. Pero ellos no tienen el alcance y la flexibilidad para el estudio en profundidad de los objetivos individuales que serán necesarios para responder a muchas de estas interesantes preguntas científicas. Con un liderazgo sabio y el apoyo de nuestros miembros, me imagino a la AAVSO sirviendo como un centro de intercambio de colaboraciones pro-am durante la era de la astronomía en el dominio del tiempo.

Desde que he estado en el Consejo, hemos contratado a una Directora enérgica y creativa con profundo conocimiento del más grande y más próximo proyecto profesional en el dominio del tiempo, el LSST. También hemos tratado de mejorar la eficacia de nuestro gobierno mediante el uso de comisiones permanentes para hacer frente a nuestras responsabilidades más

importantes, el aumento de la comunicación entre los miembros del Consejo y, más recientemente, el establecimiento de un comité de recaudación de fondos para trabajar con la sede para asegurar que la AAVSO tenga los recursos que necesita. Creo que estas acciones ayudarán a AAVSO a desempeñar un papel vital en la próxima "Edad de Oro" de las estrellas variables.

Para que el personal maravilloso de la sede tenga los recursos que necesitan para asegurarse que los observadores aficionados se beneficien plenamente y participen en esta Edad de Oro, también necesitamos de su ayuda. Si usted apoya la ciencia ciudadana, por favor, considere realizar una donación a la AAVSO. Si es de los que quiere abrir las puertas del descubrimiento desde los nietos hasta los abuelos de todo el mundo, por favor considere hacer una donación. O anime a un amigo o a un familiar que le encanta escuchar sobre el universo a hacer una donación o convertirse en miembro. Muchas escuelas y museos explican al público lo que ya se sabe sobre el universo. La AAVSO, por el contrario, es una de las pocas organizaciones que ayudan a las personas apasionadas por el cielo nocturno a participar en la creación de nuevo conocimiento.

Servir como el Presidente de AAVSO durante los últimos dos años ha sido una experiencia maravillosa y gratificante. Gracias a todos. Aprendí de todo el mundo que conocí y de aquellos con los que trabajé. Como termino mi mandato, lo animo a abrazar las prometedoras desarrollos en el campo de la astronomía de las estrellas variables. Dadas las amplias nuevas oportunidades y el liderazgo capaz de la Directora Stella Kafka, preveo un futuro brillante para la AAVSO y la colaboración profesional-amateur. Espero poder ser parte de ese futuro y de las muchas mágicas transformadas de Fourier que traerá consigo. ★

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.

V610 CYG OBSERVING CAMPAIGN

KIYOSHI KASAI (KKI), MUTTENZ, SWITZERLAND

According to the Lichtenknecker-Database of the BAV (<http://bav-astro.eu/index.php?sprache=en>), the eclipsing binary V610 Cyg was observed in eclipse for the first time on June 28, 1938, by the German astronomer Cuno Hoffmeister, who afterwards observed 13 minima, the last one in 1948. No other minimum has been published in the literature up to now.

I observed this variable in 2011 and found no variations. There were some observations in the AAVSO International Database that also showed no signs of variability. In July 2015 I analyzed SuperWASP data and found neat evidence of eclipses. Then I combined the observations from SuperWASP with the epochs of minima observed by Hoffmeister so all minima fall at phase 0.0 in the phase plot (Figure 1). I determined a period of 1.498021 days with epoch HJD 2454402.53.

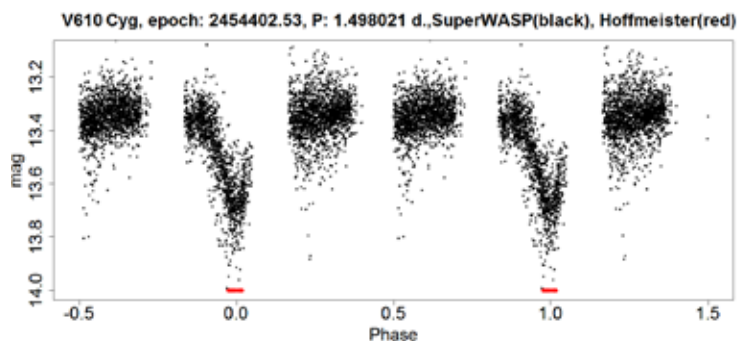


Figure 1. SuperWASP observations and Hoffmeister's minima (their magnitudes are set at 14.0 for convenience) folded with the elements calculated by the author.

To verify these elements I (K. Kasai, AAVSO = KKI, VSOLJ = Kai) observed the system on the night of August 3/4, 2015, and caught the ascending branch of an eclipse (Figure 2).

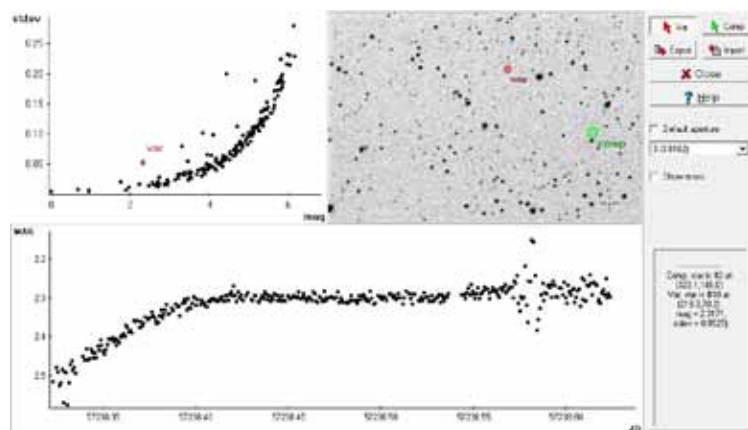


Figure 2. Finding chart (North is left and West is up), and the final part of an eclipse recorded by the author on August 3/4, 2015.

Because of its period of 1.5 days (which meant an eclipse was going to be observed at the same time every three nights), it was going to be impossible to observe minima of this variable over the next months from my observing site in Switzerland, so I decided to ask a Japanese colleague to catch minima from Japan. Yutaka Maeda (VSOLJ member, Mdy) in Nagasaki successfully observed two eclipses, one on August 6/7 and the other on August 9/10, 2015 (Figure 3).

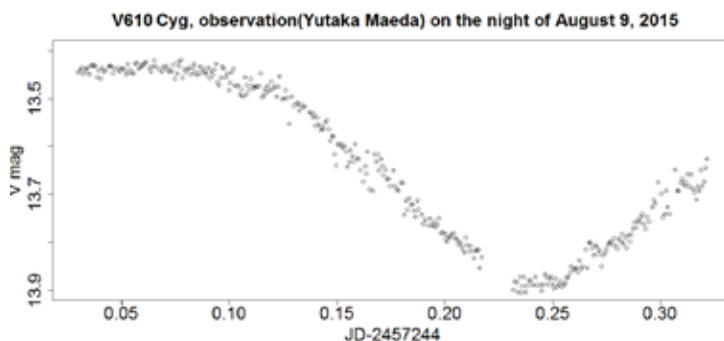


Figure 3. Eclipse detected by Yutaka Maeda from Japan on the night of August 9/10, 2015.

With the new observations I was able to adjust the period a bit to 1.498000 days.

Due to the lack of a secondary eclipse in the phase plot (Figure 4), it seemed that V610 Cyg's period was actually 3.0 days instead of 1.5 days, with two similar eclipses in the cycle. I consulted Sebastián Otero from the VSX Team and he agreed with my opinion.

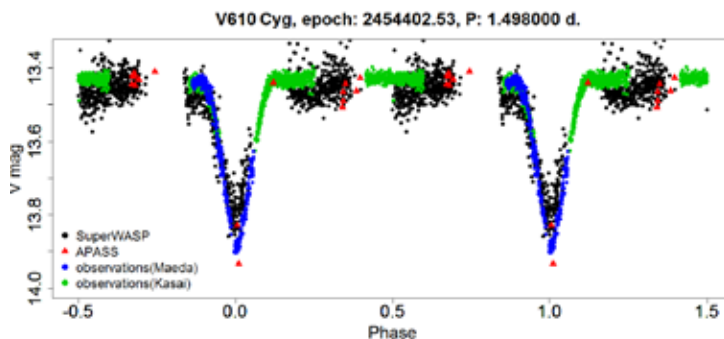


Figure 4. Phase plot with data from Maeda and Kasai (VSOLJ) combined with observations from the SuperWASP and APASS surveys.

To verify this hypothesis, it was necessary to observe the secondary eclipse, especially its magnitude, to see if there was any difference in depth between the two eclipses. Unfortunately, it was going to be impossible to observe Min II both from Japan or Europe over the next months this year, because it was going to fall between 05 and 06 UT in August and between 04 and 05 UT in September.

Sebastian encouraged me to make a call for observations on the AAVSO forum so other AAVSO observers could help. I started a thread called "Request to observe the eclipsing variable V610 Cyg" on August 14. Since then the response from the AAVSO community has been fantastic! In five weeks we obtained 4057 observations made by 12 different observers.

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V610 CYG CONTINUED...

The secondary eclipse was caught twice (on August 19/20 and 28/29) completely, and other out-of-eclipse observations helped to almost complete the phase coverage.

After analyzing all the data, it seems that the period of V610 Cyg has shortened, because Hoffmeister's minima are off from phase 0.0 and 0.5, respectively. A period of 2.99604 days is found if one combines the current data with the old photographic minima (Figure 5).

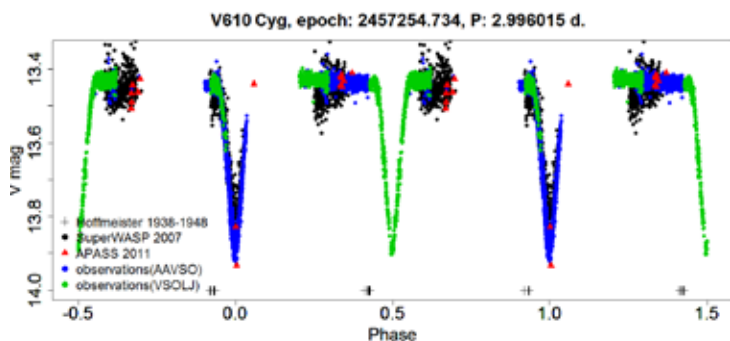


Figure 5. Phase plot of V610 Cyg including all the data from around the world and showing the new period of 2.996015 days and the new epoch.

The magnitudes of Min I and II seem to be the same within the observational errors ($V=13.88 \pm 0.01$).

The following AAVSO observers contributed to the campaign: Helmar Adler (AHM), Teófilo Arranz (ATE), James Foster (FJQ), Franklin Guenther (GFRB), Gustav Holmberg (HGUA), Vance Petriew (PVA), John Ritzel (RIZ), Diego Rodríguez Pérez (RZD), George Silvis (SGEO), Gary Walker (WGR), Bradley Walter (WBY), and Yenal Ogmen (OYE).

I have submitted a revision of V610 Cyg elements to VSX and it has already been approved. Without the collaboration of the AAVSO observers it would have been impossible to make such a revision. This is an example of teamwork in the global age. A big Thank You to the AAVSO community!

My special thanks go to Sebastian Otero, who encouraged me to start this campaign and write this article for the AAVSO Newsletter, helped me analyze the data, and also helped me finish this article! ★

PEP DATA STUDY—UPDATE

TOM CALDERWOOD (CTOA), BEND, OREGON

As promised in the July newsletter, I have been studying the quality of historical AAVSO PEP data, using the accuracy of check star measurements as a proxy for the accuracy of program star measurements. I found 22 check stars which, after quality filtering, had at least 400 PEP records available in the database. The challenge was that PEP program star magnitudes are transformed and approximately corrected for differential extinction, while check star magnitudes are not.

I wrote a program to apply estimated adjustments for these factors to the check star data. Comparing the adjusted check magnitudes with the “catalog” magnitudes used in the PEP program, I found that the absolute value of the difference between the two ranged from 2 mmag to 47 mmag, with a median of 13.5 mmag.

Figure 1 shows the implied accuracy for the program stars evaluated. Table 1 lists the stars and the corresponding identifying numbers used in Figure 1. U Del and EU Del share the same check and comp stars. The raw check magnitudes for U and EU Del were combined into a single dataset. The same applies for W Cyg and V1339 Cyg.

There are various hazards associated with this analysis, but I think it offers an interesting perspective. I can supply details to any interested parties (tjc at cantordust dot net). ★

Table 1. Stars in this study and corresponding identifying numbers used in Figure 1.

1	rho Cas	9	CE Tau	17	R Lyr
2	RS Cnc	10	V2048 Oph	18	FS Com
3	AC Her	11	CH Cyg	19	TV Psc
4	FP Vir	12	RZ Ari	21	eta Gem
5	miu Cep	13	Tau 4 Ser	22	V441 Her
6	W Cyg	14	W Boo	22	IM Peg
7	P Cyg	15	EG And		
8	TX Psc	16	U Del		

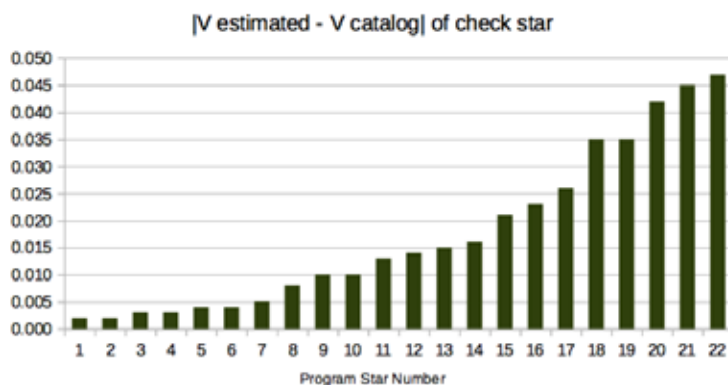


Figure 1. Implied accuracy of measurements (in millimag) for 22 stars in the AAVSO PEP observing program. See Table 1 for key to x-axis numbers.

PHOTOELECTRIC PHOTOMETRY PROGRAM UPDATE

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



Outgoing PEP Section leader
Jim Fox

Leadership

With the end of the third quarter of 2015 (September 30), a transition in leadership of the AAVSO PEP Section takes place. Section chair Jim Fox is stepping down after 10 years of dedicated work. For all of your service and contributions, the good advice you have given, and the mentoring you have done, thank you very much, Jim! Jim says that he is interested in continuing to mentor new observers, for which we also thank him.

The new AAVSO PEP Section leader is James M. Kay (KJMB) of Shelburne, Vermont. Jim, whose background is in engineering, is an experienced PEP observer and owns both an SSP-3 and an SSP-4. He will introduce himself in the next newsletter. Welcome, Jim, and thank you for accepting this position!

Observations

This quarter was also another productive one for AAVSO PEP observers, with seven observers making 652 observations of 32 different stars.

Gerald Persha (PGD, Lowell, Michigan) continued to be very active, observing 20 stars for a total of 572 BVRc observations, including R Lyr and XY Lyr (57 observations each), P Cyg, V2119 Cyg, X Her, and ST Her (40 each), AG Peg (38), HK Lyr (36), g Her, V636 Her, and V398 Lyr (34 each), U Del and EU Del (28 each), Y CVn and RS CVn (18 each), and 30 observations of 5 other stars.

Charles Calia (CCB, Ridgefield, Connecticut) contributed a total of 25 V-band observations of P Cyg, R Lyr, and V395 Vul.

Outgoing PEP section chair Jim Fox (FXJ, Mayhill, New Mexico) contributed 24 observations of the campaign star CH Cyg (1V/1B), and 22 V observations of 9 other stars.

Incoming PEP Section Chair Jim Kay (KJMB, Shelburne, Vermont) contributed a total of 16 observations of R Lyr (4V/4R) and XY Lyr (4V/4B).

Tom Calderwood (CTOA, Bend, Oregon) contributed a total of 8 observations of P Cyg (3V/3B) and V2119 Cyg (1V/1B).

AAVSO Councilor John Martin (UIS01, Springfield, Illinois) contributed 6 observations of miu Cep (1V/1B) and V2048 Oph (2V/2B).

Hans Nielsen (NHS, Nimtofte, Denmark) contributed 2 V observations of AC Her.

The sixteen most-observed stars this quarter were: R Lyr (79), XY Lyr (65), P Cyg (47), V2119 Cyg (42), X Her and ST Her (40 each), AG Peg (38), HK Lyr (37), V636 Her, g Her, and V398 Lyr (34 each), U Del and EU Del (28 each), Y CVn and RS CVn (18 each), and V395 Vul (11).

Other notable stars include: Z Psc and RZ Psc (8 each), V2048 Oph (7), TU CVn (6), W Boo, V441 Her, TX Psc, and XZ Psc (4 each), and V533 Oph (3).

The other stars observed were: miu Cep, CH Cyg, V2291 Oph, tau4 Ser, and NSV 11271 (2 each), and V973 Cyg and AC Her (1 each).

Campaigns

The observing campaign that began in March 2015 to study dust production in developing planetary systems IS NOW ACTIVE AGAIN. The target suitable for PEP observing, **HD 15407A** ($V = 6.95$), is located at R.A. 02 30 50.66, Dec. +55 32 54.2 (2000.0). The Spitzer observations will take place November 7-December 28, but please resume observing this star as soon as your location permits. Please see AAVSO Alert Notice 511 for details on the campaign and observing instructions.

The multi-year campaigns on **CH Cyg**, **eps Aur**, and **P Cyg** continue—your ongoing observations of these stars are important to following and understanding the behavior of these unpredictable stars. Please see *AAVSO Special Notices #320* and *#131* for details and instructions on CH Cyg and eps Aur, respectively. *AAVSO Alert Notice 440* discusses the PEP campaign on P Cyg (that notice covers the 2011 season but the campaign is continuing for at least the next few years).

Thanks go to everyone for your contributions, particularly to those of you who contributed to observing campaigns this quarter. We encourage you to observe these campaign stars and all others in the AAVSO PEP Program.

As noted by Dr. Matthew Templeton, errors in the values of delta (B-V) [var-comp] were corrected for W Boo and lambda And. Observers using PEPObs on the AAVSO website do not need to adjust any data submitted, but observers who reduce their own data may need to recalculate their transformed magnitudes. Also, please make sure you are using the current comparison stars for these objects: SAO 83427 for W Boo and SAO 53355 for lambda And. Contact Matthew by email (matthewt@aavso.org) with any questions.

Discussion opportunities

Opportunities for online discussion about PEP continue with the AAVSO's online photometry forum:

<http://www.aavso.org/forums/variable-star-observing/photometry>

and Tom Calderwood's community mailing list (to which the AAVSO subscribes and is participating in) hosted on his personal server:

<http://lists.cantordust.net/listinfo.cgi/peptalk-cantordust.net>

Clear skies, and Good observing! ★

USING AAVSO VLF SID EVENTS DATA, THE CLIMAX NEUTRON MONITOR RECORDS, AND AAVSO SUNSPOT GROUP COUNTS TO LOOK INTO THE ANTI-CORRELATION OF THE SUNSPOT CYCLES AND COSMIC RAY FLUX

RODNEY H. HOWE (HOWR VARIABLES, HRHA SOLAR), AAVSO SOLAR SECTION CHAIR

The AAVSO Solar Section has collected data from sunspot observers since 1944. All these daily data are currently located on the NOAA NGDC site under American sunspot numbers: <http://www.ngdc.noaa.gov/stp/space-weather/solar-data/solar-indices/sunspot-numbers/american/>

The question being asked here is not a new one—it has been known for a long time (Potgieter 2013) that cosmic ray counts from various observatories show an “anti-correlation” of the cosmic rays with the 11.8-year solar cycle. Data chosen here come from the Climax Neutron Monitor station in the Climax mine at Leadville, Colorado (<ftp://ulysses.sr.unh.edu/NeutronMonitor/DailyAverages.1951-.txt>) (Climax 2006).

Also, there are Very Low Frequency (VLF) Sudden Ionosphere Disturbance (SID) data that have been collected by the AAVSO VLF observers since 1958 (<http://www.ngdc.noaa.gov/stp/space-weather/ionospheric-data/sids/aaavso/>).

In taking a look back through these AAVSO solar data, with the American relative index data it is possible to “de-convolve” the raw Wolf numbers $W = (10g + s)$ into group (g) and sunspot (s) counts. Once we have the group count data we can compare those with both the SID frequency counts and the Climax Neutron Monitor flux counts (Figure 1).

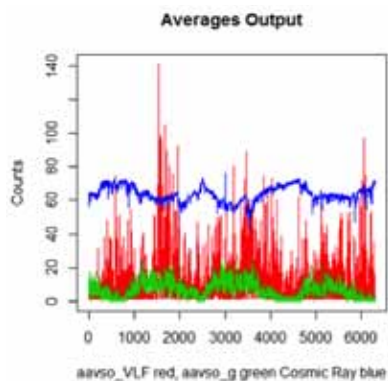


Figure 1. Group counts in green (bottom line), the VLF frequency counts in red, and the Climax Neutron Monitor flux counts (flux/60) in blue. These data cover four solar cycles, from 1966 through 2006, when the collection of Cosmic Rays from Climax was shut down. The X-axis is in days.

It's easy to see that when the group and SID event data reach their maximum, the cosmic ray flux approaches its minimum. This is what is meant by the anti-correlation. The question, though, is: do the cosmic ray counts data anti-correlate more closely with the AAVSO group counts data or with the AAVSO SID Events data?

These data streams are stacked, as in Figure 2, to show visually how each compare to the other. Note the Y axis is different for each data stream.

If we graph cubic spline fits to these different data, we can see how similar, and different, they are. For example, the SID Events data are recording the effects of solar flares on the Earth's ionosphere (Figure 3), and the sunspot group

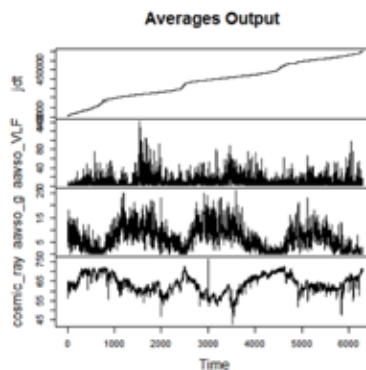


Figure 2. Showing how the anti-correlation is not quite so obvious. Which has the most influence on modulating cosmic rays reaching the Climax Neutron counters? The VLF SID Events from solar flares or the sunspot active regions counted as groups by AAVSO visual observers? It will take some statistics to determine which has the tightest anti-correlation.

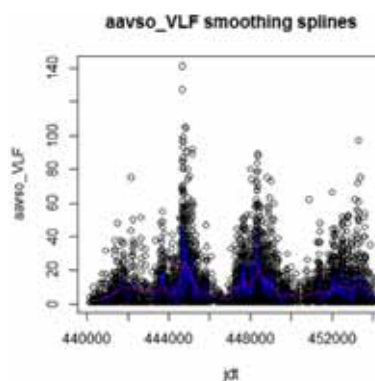


Figure 3. Showing the daily frequency counts of VLF SID events, which seems to have a lot of variability from cycle 20 through cycle 23.

counts measuring white light active regions are observations made from small telescopes. These active regions may or may not cause solar flaring, however; they do seem to show a more distinct maximum and minimum (Figure 4).

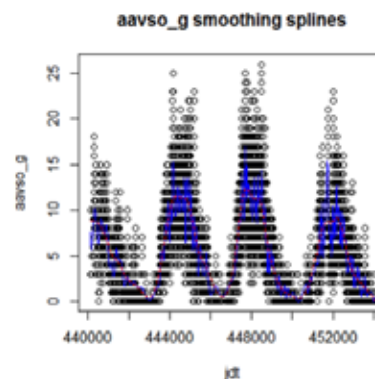


Figure 4. Showing how the group counts begin to scatter during the peak in solar activity. Note that these four solar cycles show bi-modal peaks.

CONTINUED ON NEXT PAGE

SUNSPOT CYCLES CONTINUED...

The Climax cosmic ray flux data also show some variability from solar cycle to solar cycle, but not as much as the SID Events data (Figure 5). In Figures 2 and 5 the cosmic ray “light curve” has distinct dips which appear to match to the solar maximum times, and cosmic ray maximum peaks which appear to match to the solar minimum times.

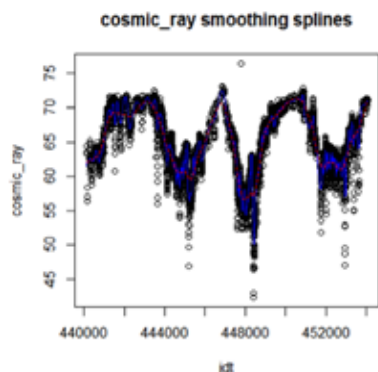


Figure 5 might also show that there are phenomena other than active region group counts or solar flares recorded as SID Events which are being modulated by the sun (1998, Mavromichalaki et al., and see Neutron Monitor Database: http://www.nmdb.eu/sites/default/files/NMDB_Brochure_1.pdf).

So, what do the statistics show? The first step is to take the first difference of the group counts data, the first difference of the Climax Neutron Monitor data, and the difference of the SID Events data. These “first differences” (one data element subtracted from the next data element in the time series: <http://people.duke.edu/~rnau/411diff.htm>), can then be compared to a normal distribution. From this we can draw regression lines and do a pairwise comparison to look at positive or negative slopes.

Welch Two Sample t-test

data: [VLF] and [CR] $t = -0.0059$, $df = 6361.541$, $p\text{-value} = 0.9953$
 95 percent confidence interval: -0.2902110 0.2884591
 sample estimates: mean of x 0.0003175611
 mean of y 0.0011935059

data: [group] and [CR] $t = -0.1197$, $df = 9354.027$, $p\text{-value} = 0.9047$
 95 percent confidence interval: -0.04832768 0.04276506
 sample estimates: mean of x -0.001587806
 mean of y 0.001193506

From the two sample t-test (Welch) it looks as though the VLF SID Events frequency counts are NOT as anti-correlated as are the sunspot group counts. Here’s another statistical test:

Pearson’s product-moment correlation

data: [VLF] and [CR] $t = 1.2899$, $df = 6296$, $p\text{-value} = 0.1971$
 95 percent confidence interval: -0.008447781 0.040935190
 sample estimates: $cor = 0.01625362$

data: [group] and [CR] $t = -1.4756$, $df = 6296$, $p\text{-value} = 0.1401$
 95 percent confidence interval: -0.043272259 0.006106686
 sample estimates: $cor = -0.01859412$

The Pearson’s correlation test also shows that the SID Events data are not as anti-correlated (negative correlation) as the AAVSO group counts data. Figure 6 shows regression lines drawn through the pairwise scatter plots.

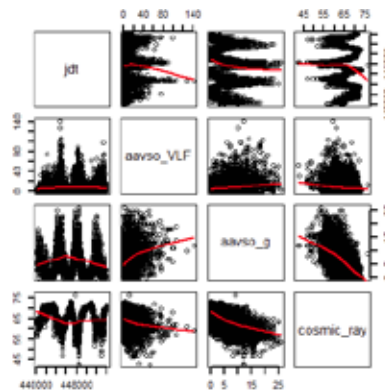


Figure 6. Looking at both left and right sides of the diagonal scatter plots, the VLF SID data do not show as negative a slope as the sunspot group active region regression line.

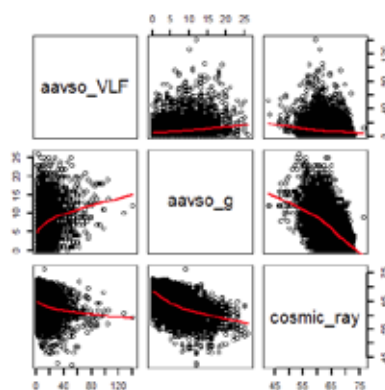


Figure 7. Showing a blowup of the slopes for data tested with the Welch and Pearson’s statistical tests. The AAVSO group and VLF SID data show a positive slope and correlation, however both data sets show some anti-correlation with the cosmic ray counts from the Climax Neutron Monitor data, with the strongest anti-correlation between groups active regions and cosmic ray flux.

So it seems that from these statistical tests there is a tighter anti-correlation with the AAVSO group counts of solar active regions than with the flaring activity recorded from the AAVSO SID Events data.

References

- General reading on cosmic ray cycles: http://www.nmdb.eu/sites/default/files/NMDB_Brochure_1.pdf
- Mavromichalaki, H., et al. 1998, Simulated effects at neutron monitor energies: evidence for a 22-year cosmic-ray variation <http://ruby.fgcu.edu/courses/twimberley/EnviroPol/EnviroPhilo/Simulated.pdf>
- Potgieter, M. S. 2013, Solar Modulation of Cosmic Rays <http://arxiv.org/pdf/1306.4421.pdf>
- AAVSO Solar SID Databases: <http://www.aavso.org/sid-database> and <http://www.aavso.org/ngdc-database-aavso-sid-events-back-1958>
- Climax mine at Leadville, Colorado: <ftp://ulysses.sr.unh.edu/NeutronMonitor/DailyAverages.1951-.txt> Climax: Version 4.8 21 December 2006, “National Science Foundation Grant ATM-0339527”
- NOAA NGDC site, American sunspot numbers: <http://www.ngdc.noaa.gov/stp/space-weather/solar-data/solar-indices/sunspot-numbers/american/>
- R statistical package: <http://www.r-project.org/>
- Help from Dr. Jamie Riggs at www.spannedolutions.com

These AAVSO data come from our most consistent AAVSO solar sunspot observers from all over the globe who contribute monthly sunspot counts data, and SID Events data from VLF observers’ submissions all over the globe. ★

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, introduced in AAVSO Newsletter 54 (October 2012), 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/aavsovcvsection/aavso-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.

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 ($N(\text{vo})$ and $N(\text{co})$) along with the total number of nights observed ($N(\text{von})$ and $N(\text{con})$).

Seventeen best-covered stars of the LPV Legacy program, as measured (mainly) by number of nights observed (both visual and CCD observing considered), 2015 June 16 through September 15:

Name	Con	R.A.(J2000)	Dec.(J2000)	$N(\text{vo})$	$N(\text{von})$	$N(\text{co})$	$N(\text{con})$
Z UMa	UMa	11:56:30.22	+57:52:17.6	63	86	1	8
R Ser	Ser	15:50:41.73	+15:08:01.1	52	80	4	19
X Her	Her	16:02:39.16	+47:14:25.2	31	64	4	27
T Her	Her	18:09:06.2	+31:01:16.2	26	47	11	23
W Lyr	Lyr	18:14:55.87	+36:40:13.1	37	67	8	24
X Oph	Oph	18:38:21.12	+08:50:02.7	54	87	4	14
R Lyr	Lyr	18:55:20.1	+43:56:45.8	32	72	8	39
R Aql	Aql	19:06:22.24	+08:13:48	60	85	5	16
CH Cyg	Cyg	19:24:33.06	+50:14:29	58	91	10	35
AF Cyg	Cyg	19:30:12.84	+46:08:52	48	88	4	16
khi Cyg	Cyg	19:50:33.91	+32:54:50.6	106	91	9	47
S Aql	Aql	20:11:37.47	+15:37:14.5	14	36	6	26
EU Del	Del	20:37:54.7	+18:16:06.3	39	78	4	24
U Del	Del	20:45:28.23	+18:05:24	45	82	4	23
T Cep	Cep	21:09:31.78	+68:29:27.1	49	80	6	21
W Cyg	Cyg	21:36:02.49	+45:22:28.4	52	90	4	17
miu Cep	Cep	21:43:30.49	+58:46:48	44	89	4	26

$N(\text{vo})$ = number of observers making visual observations

$N(\text{von})$ = number of nights with visual observations

$N(\text{co})$ = number of observers making CCD observations

$N(\text{con})$ = number of nights with CCD observations

Eighteen least-observed stars of the LPV Legacy program (both visual and CCD observing considered), 2015 June 16 through September 15:

Name	Con	R.A.(J2000)	Dec.(J2000)	$N(\text{vo})$	$N(\text{von})$	$N(\text{co})$	$N(\text{con})$
R Ari	Ari	02:16:07.1	+25:03:23.6	6	11	1	1
W Per	Per	02:50:37.89	+56:59:00.3	6	13	1	3
W Tau	Tau	04:27:57.18	+16:02:36.1	3	11	1	1
R Lep	Lep	04:59:36.34	-14:48:22.5	6	11	1	1
W Ori	Ori	05:05:23.71	+01:10:39.3	2	3	1	1
RX Lep	Lep	05:11:22.84	-11:50:57.1	6	12	1	1
alf Ori	Ori	05:55:10.3	+07:24:25.4	7	22	0	0
X Aur	Aur	06:12:13.38	+50:13:40.4	3	13	1	2
eta Gem	Gem	06:14:52.66	+22:30:24.5	7	16	1	1
R Gem	Gem	07:07:21.27	+22:42:12.7	3	4	0	0
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	2	2	0	0
R Cnc	Cnc	08:16:33.82	+11:43:34.5	2	2	0	0
X Cnc	Cnc	08:55:22.87	+17:13:52.5	2	3	0	0
R Car	Car	09:32:14.59	-62:47:19.9	6	15	1	1
R LMi	LMi	09:45:34.27	+34:30:42.8	5	4	0	0
R Leo	Leo	09:47:33.48	+11:25:43.7	10	8	0	0
SS Vir	Vir	12:25:14.4	+00:46:10.9	8	20	1	1

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.

CONTINUED ON NEXT PAGE

LEGACY STARS
CONTINUED...

Eighteen best-covered stars of the CV Legacy program, as measured (mainly) by number of observers and nights observed (both visual and CCD observing considered), 2015 June 16 through September 15:

Name	Con	R.A.(J2000)	Dec.(J2000)	N(vo)	N(von)	N(co)	N(con)
RX And	And	01:04:35.52	+41:17:57.8	32	79	8	21
BX Pup	Pup	07:54:15.55	-24:19:36.3	0	0	2	34
BR Lup	Lup	15:35:53.09	-40:34:05	0	0	1	11
T CrB	CrB	15:59:30.16	+25:55:12.6	60	90	1	2
HP Nor	Nor	16:20:49.56	-54:53:22.8	0	0	4	53
AH Her	Her	16:44:10.01	+25:15:02	26	83	11	54
V426 Oph	Oph	18:07:51.68	+05:51:47.8	10	66	13	43
YY Her	Her	18:14:34.18	+20:59:20.9	13	65	6	21
AM Her	Her	18:16:13.33	+49:52:04.1	11	64	6	12
AY Lyr	Lyr	18:44:26.75	+37:59:51.9	18	80	7	9
MV Lyr	Lyr	19:07:16.29	+44:01:08.6	11	66	4	11
BF Cyg	Cyg	19:23:53.51	+29:40:29.2	34	88	5	15
CH Cyg	Cyg	19:24:33.06	+50:14:29.1	58	91	10	35
EM Cyg	Cyg	19:38:40.11	+30:30:28.4	24	70	9	36
AB Dra	Dra	19:49:06.37	+77:44:22.9	17	65	3	14
V404 Cyg	Cyg	20:24:03.83	+33:52:02.8	20	70	42	28
SS Cyg	Cyg	21:42:42.78	+43:35:09.8	89	91	17	50
AG Peg	Peg	21:51:01.97	+12:37:32	65	88	21	68

Stars in CV Legacy list with no visual or CCD observations (both visual and CCD observing considered), 2015 June 16 through September 15:

Name	Con	R.A.(J2000)	Dec.(J2000)	N(vo)	N(von)	N(co)	N(con)
AQ Eri	Eri	05:06:13.06	-04:08:07.9	0	0	0	0
SS Lep	Lep	06:04:59.13	-16:29:03.9	0	0	0	0
V344 Ori	Ori	06:15:18.95	+15:31:00	0	0	0	0
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
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
UY Pup	Pup	07:46:31.25	-12:57:09.1	0	0	0	0
BV Pup	Pup	07:49:05.25	-23:34:00	0	0	0	0
YZ Cnc	Cnc	08:10:56.63	+28:08:33.2	0	0	0	0
RX Pup	Pup	08:14:12.3	-41:42:29	0	0	0	0
AT Cnc	Cnc	08:28:36.89	+25:20:02.9	0	0	0	0
CC Cnc	Cnc	08:36:19.17	+21:21:05.5	0	0	0	0
EG Cnc	Cnc	08:43:04.02	+27:51:49.7	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
SY Mus	Mus	11:32:10.01	-65:25:11.6	0	0	0	0
V803 Cen	Cen	13:23:44.53	-41:44:29.6	0	0	0	0
V504 Cen	Cen	14:12:49.18	-40:21:37.5	0	0	0	0
V2051 Oph	Oph	17:08:19.11	-25:48:30.3	0	0	0	0
FV Ara	Ara	17:35:10.05	-63:02:50.3	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
V1830 Sgr	Sgr	18:13:50.65	-27:42:21	0	0	0	0
FM Sgr	Sgr	18:17:18.25	-23:38:27.8	0	0	0	0
V4021 Sgr	Sgr	18:38:14.88	-23:22:47.1	0	0	0	0
RR Tel	Tel	20:04:18.54	-55:43:33.2	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. ★

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MONITORING OF NORTHERN DWARF NOVAE FOR RADIO JETS CAMPAIGN—UPDATE 2

DEANNE COPPEJANS, ON BEHALF OF ELMAR KOERDING, JAMES MILLER-JONES, MICHAEL RUPEN, CHRISTIAN KNIGGE, GREGORY SIVAKOFF, PAUL GROOT, AND PATRICK WOUTD

In [the July 2015 *AAVSO Newsletter*, <https://www.aavso.org/aavso-newsletter>] we gave you an update on our campaign to detect radio emission and jets from Dwarf Novae (DN) in outburst. With your observations and alerts, we were able to trigger radio observations of five DN with the Very Large Array (VLA)—namely U Gem, YZ Cnc, RX And, SU UMa, and Z Cam (Figures 1–5).

We now have a really exciting result to report: Radio emission was detected from all five DN! With your help we have tripled the number of DN detected in the radio and have obtained radio light curves for all of these objects, whereas previously this had only been done for SS Cyg.

Thank you again for all your observations and emails which allowed us to catch the beginning of [each] outburst. This is vital to answer our science question “Do DN launch jets?” As soon as we know more I will write to you with another update.

Clear skies! ★

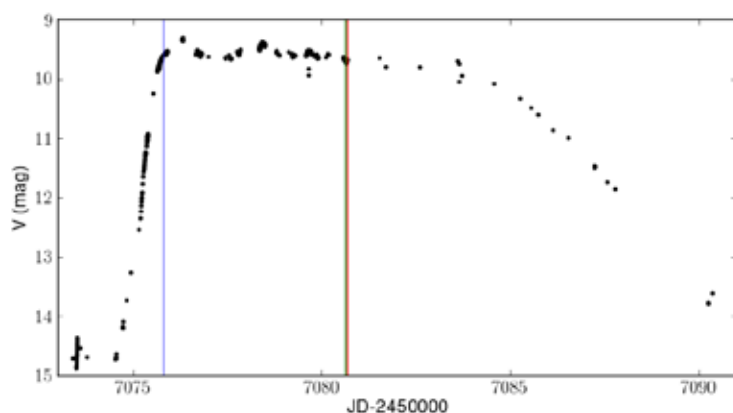


Figure 1. U Gem, JD 2457073–2457090. Observations from the AAVSO International Database, with VLA observation times marked.

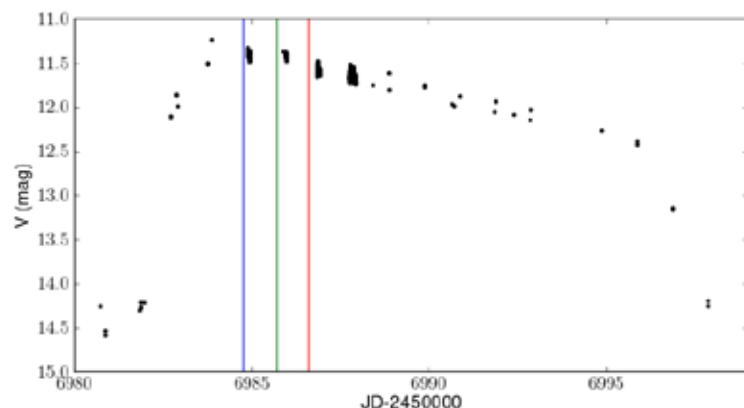


Figure 2. YZ Cnc, JD 2456980–2456997. Observations from the AAVSO International Database, with VLA observation times marked.

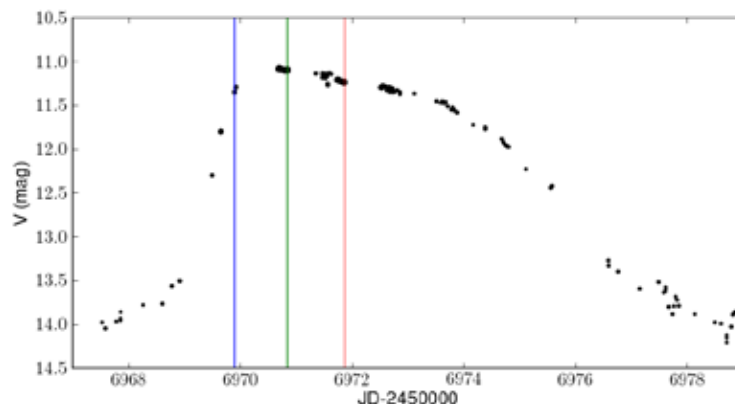


Figure 3. RX And, JD 2456967–2456978. Observations from the AAVSO International Database, with VLA observation times marked.

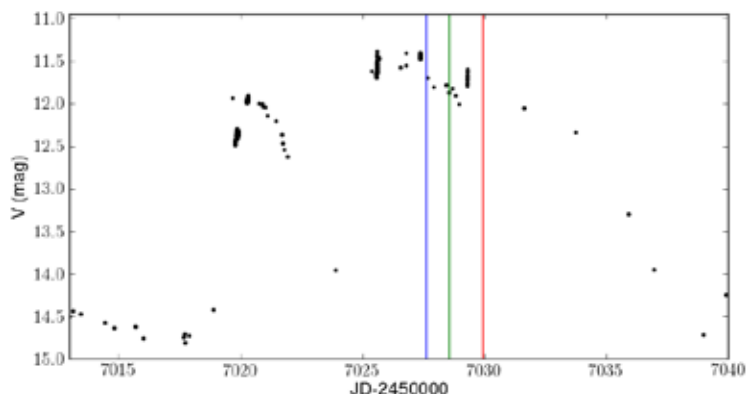


Figure 4. SU UMa, JD 2457012–2457039. Observations from the AAVSO International Database, with VLA observation times marked.

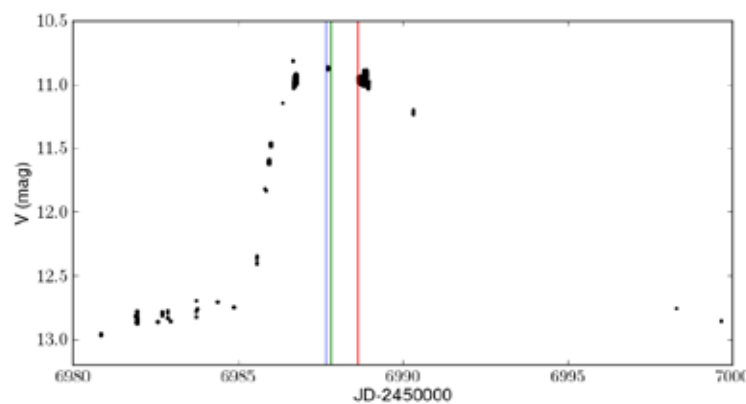


Figure 5. Z Cam, JD 2456980–2456999. Observations from the AAVSO International Database, with VLA observation times marked.

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.

EXCITING NEWS!! Please see a second update in this newsletter from Deanne Coppejans and colleagues on their campaign searching for radio jets in several **Northern dwarf novae** (*AAVSO Alert Notice 505*, *AAVSO Special Notice #391*) that concluded in mid-March.

Campaigns concluded since July 1, 2015

The X-ray black hole binary **V404 Cyg** returned to minimum by 2015 July 23—August 1 after its spectacular outburst on 2015 June 15, its first X-ray and optical outburst since 1989 (*AAVSO Alert Notice 520*). A great many observations were obtained by the professional and amateur communities across the spectrum from X-ray to radio, documenting the remarkable behavior seen during this event, and enabling detailed studies of the system. AAVSO observers worldwide obtained excellent multicolor photometry as well as visual observations (Figures 1, 2, 3). 78 AAVSO observers worldwide contributed 70,344 visual and multicolor observations to the AAVSO International Database for this campaign.

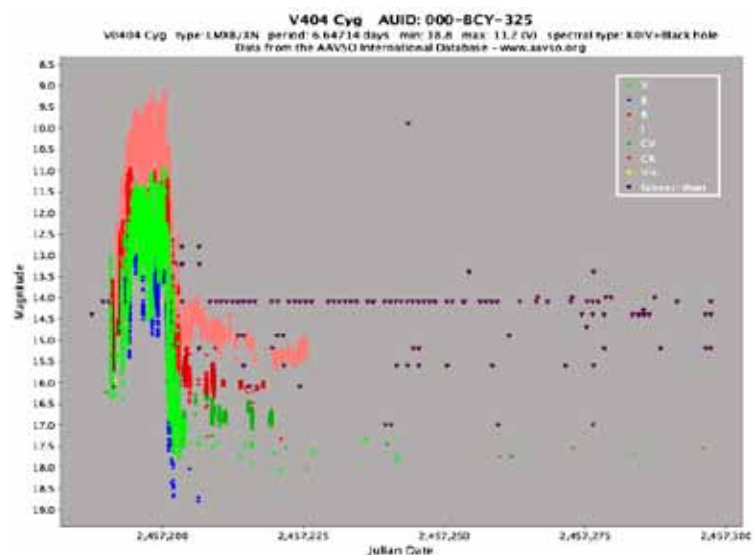


Figure 1: AAVSO light curve of the X-ray black hole binary V404 Cyg JD 2457187–2457298 (13 June–2 October 2015).

The July campaign requested by Roque Ruiz-Carmona (Institute of Mathematics, Astrophysics and Particle Physics, Radboud University Nijmegen, The Netherlands) on **17 cataclysmic variables** (*AAVSO Alert Notice 524*, see below under Campaigns initiated) was successfully concluded, with all stars imaged and the images submitted to Roque, who then carried out his observations with the William Herschel Telescope. Observers have been encouraged to reduce their images and submit the resulting photometry to the AAVSO International Database. Six observers were each able to image some or all of the targets.

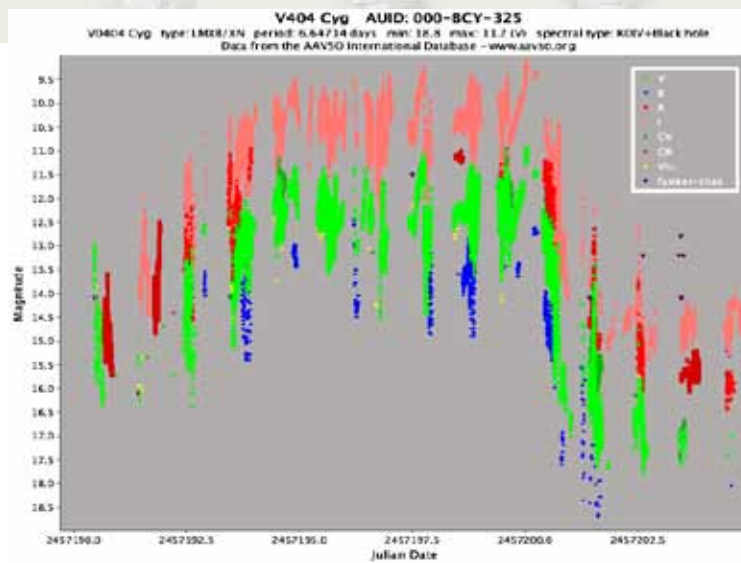


Figure 2: AAVSO light curve of the X-ray black hole binary V404 Cyg JD 2457189–2457205 (15 June–1 July 2015).

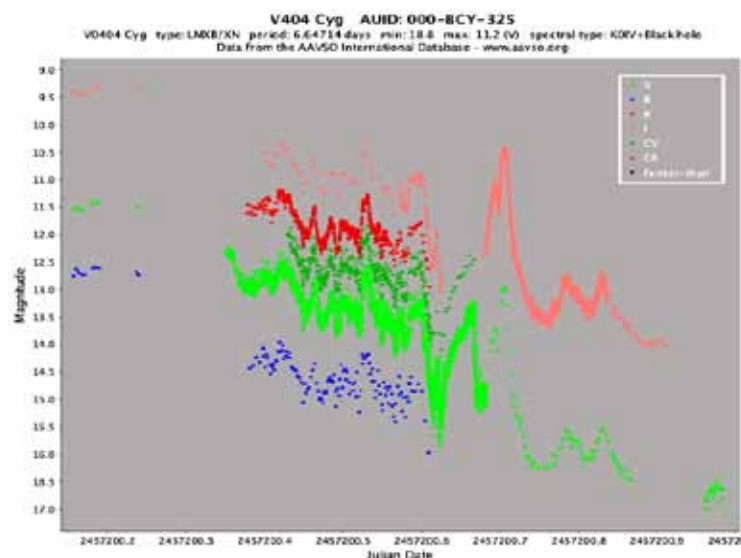


Figure 3: AAVSO light curve of the X-ray black hole binary V404 Cyg JD 2457200–2457201 (night of 2015 June 26–27), showing substantial variations on short timescales.

At the beginning of the campaign, Roque wrote directly to the observers (via the AAVSO forum thread on this campaign): “Thank you so much for your interest in the campaign! The observations are very timely for my research. There are a few targets fainter than 18 in quiescence, but they might be brighter if they are outbursting. Even non-detections are useful, because I could interpret that as quiescence if I see other stars in the field.” At the end of the campaign he wrote: “This is the final update of the campaign. I observed very extensively PTFS1119h [V1504 Cyg], which seemed to be in superoutburst. It is the first system that I’m able to study during superoutburst, so I’m looking forward to the results. Thanks a lot to everyone! I am preparing another campaign for the end of August, hope I can count on you. :)”

The July campaign on the eclipsing binary system **KIC 02856960** requested by Dr. Thomas Marsh (University of Warwick) (*AAVSO Alert Notice 525*, see below under Campaigns initiated) was concluded in late August. 26 observers

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CAMPAIGNS UPDATE CONTINUED...

contributed 4,307 multicolor observations of this very challenging system, and they are among the data Dr. Marsh is currently analyzing from all of the global participants in the campaign.

The August campaign on the pulsating helium and zirconium-rich hot subdwarf **LS IV -14 116** requested by Prof. Simon Jeffery (Armagh Observatory; Trinity College Dublin) in support of HST and VLT/UVES spectroscopy (*AAVSO Alert Notice 526*, see below under Campaigns initiated) was successfully concluded. Seven observers contributed 1,551 multicolor and visual observations.

The August campaign requested by Roque Ruiz-Carmona (Institute of Mathematics, Astrophysics and Particle Physics, Radboud University Nijmegen, The Netherlands) on the **second set of 17 cataclysmic variables** (*AAVSO Alert Notice 527*, see below under Campaigns initiated) was successfully concluded, with all stars imaged and the images submitted to Roque. Six observers (not all the same as in Roque's July campaign) were each able to image some or all of the targets on each of the two nights, so complete coverage was obtained on both nights. This campaign was even trickier than Roque's first campaign, as the windows for taking images and submitting them to him were extremely tight. Roque wrote (again, via the forum thread for this campaign): "Thank you for your interest in this campaign, and for all your images. They provided me with all the information I needed. Thanks a lot for your effort!.... More campaigns will follow in the future, since this is an ongoing research programme. I count on you!"

Campaigns initiated or re-activated since July 1, 2015

In July, Ph.D. candidate Roque Ruiz-Carmona (Institute of Mathematics, Astrophysics and Particle Physics, Radboud University Nijmegen, The Netherlands) requested images of 17 cataclysmic variables in order to determine his final target list for observations with the William Herschel Telescope (*AAVSO Alert Notice 524*). AAVSO observers were requested to obtain one image per star per observer within a specific window on a specific night, and submit their images to Roque by a specific time. The stars were **VZ Aqr, FX Cep, VW CrB, V1504 Cyg, V592 Her, V844 Her, V344 Lyr, V364 Peg, V367 Peg, V369 Peg, HS2141+1231, 1RXS J165658.7+212141, 1RXS J174827.1+505053, 1RXS J203242.4+104937, SDSS J162520.29+120308.7, SDSS J165359.06+201010.4, and USNO-B1.0 1053-00654452**. This campaign was successfully concluded (see above).

In late July, as part of an international campaign, Dr. Thomas Marsh (University of Warwick) requested AAVSO assistance in obtaining time-series observations of the eclipsing binary system **KIC 02856960**, a possible triple system that exhibits enigmatic behavior. The eclipse behavior of the short-period component of the system is well understood. This campaign was focused on the longer-period, small-amplitude eclipses that occur approximately every 204 days and have not been successfully modeled. AAVSO observations before, during, and after the eclipse predicted for early August would provide additional constraints for the modeling efforts (*AAVSO Alert Notice 525*). This campaign was successfully concluded (see above).

In August, Prof. Simon Jeffery (Armagh Observatory; Trinity College Dublin) requested photometric monitoring through September 2 of the pulsating helium and zirconium-rich hot subdwarf **LS IV -14 116** in support of upcoming HST and VLT/UVES spectroscopy (*AAVSO Alert Notice 526*). This campaign was successfully concluded (see above).

In August, Roque Ruiz-Carmona requested images of another set of 17 cataclysmic variables in order to determine his final target list for observations with the William Herschel Telescope (*AAVSO Alert Notice 527*). This time, AAVSO observers were requested to obtain one image per star per observer within a specific window on each of two nights, and submit their images to Roque by specific times. The stars were **VZ Aqr, QT Aqr, QU Aqr, BG Ari, V1504 Cyg, CP Eri, V344 Lyr, V367 Peg, V521 Peg, AY Psc, NSV 14652, CSS 101214:021308+184416, CSS 110513:210846-035031, OT J012059.6+325545, PNV J21095047+1348396, SDSS J204817.85-061044.8, and SDSS J220553.98+115553.7**. This campaign was successfully concluded (see above).

In early October, Dr. George Wallerstein (University of Washington) requested AAVSO assistance in monitoring **X Cyg, SZ Cyg, TX Cyg, VX Cyg, and MZ Cyg** now through December 2015 (*AAVSO Alert Notice 529*). He is working to complete the radial velocity curves for these stars, and needs optical light curves for correlation with the spectra he will be obtaining. Observers are asked to provide nightly visual and V observations (no time series).

Also in October, the enigmatic variable object **KIC 8462852** was discovered and the AAVSO issued a request for observations beginning immediately and continuing through at least early 2016 (*AAVSO Alert Notice 532*). 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. Not known to be a close binary or a young stellar object, and without infrared emission, it is a puzzle, and observations are needed to further characterize the star's variability. Filtered time-series observations (BVRI) have been requested in order to study the variations occurring at all timescales. This campaign began just two days ago, and 10 observers have already submitted 63 visual and multicolor observations.

This campaign on the rare FU Ori object **2MASS J06593158-0405277**, begun in April 2015 and concluded in July (*AAVSO Alert Notice 518*), has been re-activated at the request of Dr. Fabienne A. Bastien (Hubble Postdoctoral Fellow, Pennsylvania State University). Now that the star is observable again, please continue your observations. Dr. Bastien writes: "...At the moment, only about two dozen of these objects are known, and we have very few constraints on what causes them 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." Since the campaign began in April 17 observers have contributed 480 multicolor and visual observations.

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. He says: "There were observed increases in I-band by several hundredths of a magnitude, three times at phase ~0.2 after eclipses at epochs E = 8, 9, 10 (see the paper with summary of the 2003 and 2008/9 campaigns: *A&A* 544, A53 (2012)). I suppose the amplitude of this phenomenon observed in near-IR could be larger. Its nature is not clear, but it can be important for solving the mystery of this system. We are currently 13 months after minimum, roughly at phase ~0.19. So it is time for such observations and I think it is worth to continue it let's say, for a one and half of year, up to phase ~0.4-0.5." Please continue to monitor EE Cep from now until at least April 2017.

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CAMPAIGNS UPDATE
CONTINUED...*Campaigns in progress*

The outburst of the symbiotic variable **AG Peg** continues. It went into outburst in late May 2015 (*AAVSO Alert Notice 521*) for the first time since its only other known outburst, which occurred in 1860–1870 (it took about 10 years to reach maximum). It was unknown how this outburst would progress, and so far it has been very interesting! After declining to $V = 8.0$, in mid-October it abruptly began to brighten again (Figure 4). Currently AG Peg is magnitude $V = 7.381$ as of October 20.3247 UT (SBL, B. Staels, Hofstade, Belgium).

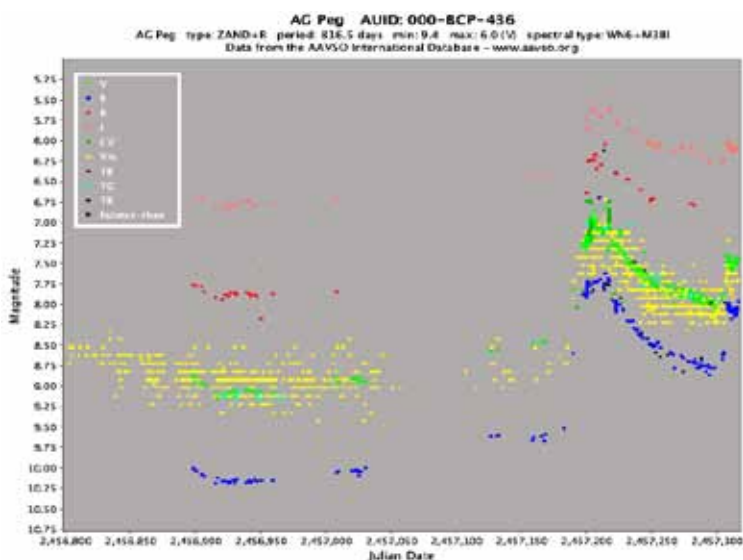


Figure 4: AAVSO light curve of the symbiotic variable AG Peg JD 2456800–2457315 (22 May 2014–19 October 2015). 122 observers contributed 2,351 visual and multicolor observations to this light curve.

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 5.

The campaign continues on the symbiotic nova candidate **ASAS J174600-2321.3** initiated in January by S. Otero, P. Tisserand, K. Bernhard, and S. Hummerich (*AAVSO Alert Notice 510*). The predicted eclipse has occurred, but the nova is still at maximum. 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, 17 observers have contributed 1,544 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 are underway now through December, so your observations are extremely important. As Dr. Rieke writes: “A key part of our

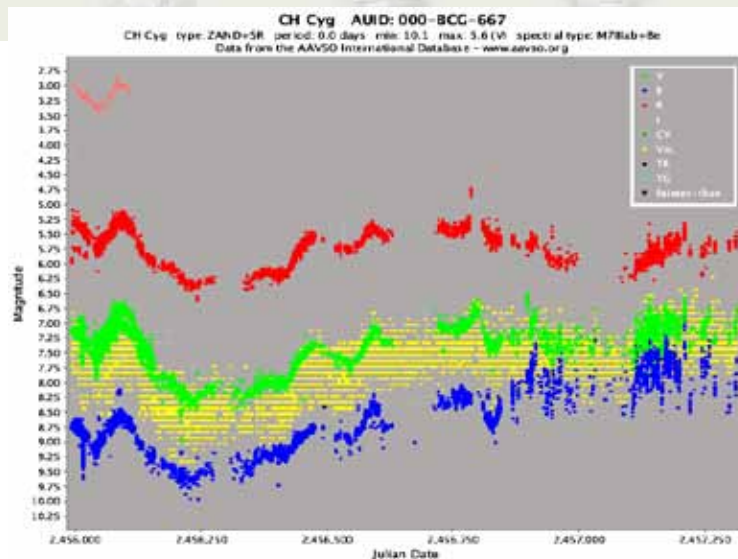


Figure 5: AAVSO light curve of the symbiotic star CH Cyg JD 2455988–2457317 (1 March 2012–21 October 2015). 223 observers contributed 26,485 visual and multicolor observations to this light curve.

program is to obtain optical photometry of the same stars that we are observing in the infrared under the Spitzer program. The optical data are needed to verify that any changes we see in the infrared are not just driven by changes in the brightness of the star, but are truly due to changes in the structure or dust content of the debris disk....” Since this campaign began 2015 March 13, 12 observers have contributed 2,054 multicolor and visual observations to the AID.

The campaign on the classical T Tauri star **RW Aur** (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 writes: “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? So, it would be great if [observers] can pick it back up, but I don’t think we need the dense monitoring we had in spring....”

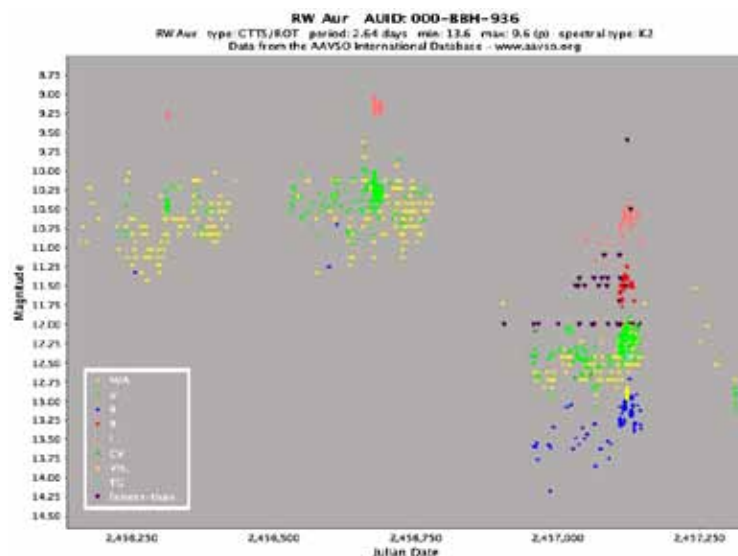


Figure 6: AAVSO light curve of the T Tauri star RW Aur JD 2456156–2457315 (16 August 2012–19 October 2015). 68 observers contributed 2,663 visual and multicolor observations to this light curve.

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CAMPAIGNS UPDATE CONTINUED...

Since RW Aur has emerged from behind the Sun, its brightness, which had been increasing, is now decreasing again (Figure 6).

Dr. Robert Stencel's (University of Denver Astronomy Program) request to monitor **epsilon Aur** (*AAVSO Alert Notice 504*) continues and **has been 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.... Given the now well-identified 67 day quasi-period of eps Aur ~ 0.1 mag V band variations, if skilled observers each could obtain good 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, 58 observers have contributed 1,085 multicolor and visual observations.

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), which is a fascinating member of a new class of hard X-ray emitting symbiotic binaries. Your observations are very important to learning more about this star! Weekly or more frequent monitoring (B and V photometry and visual observations) is requested in support of upcoming Chandra observations still to be scheduled (*AAVSO Alert Notice 503*). Since this campaign began 2014 August 6, 12 observers have contributed 6,330 multicolor observations of this star.

Dr. Eric Mamajek's campaign on **J1407 (1SWASP J140747.93-394542.6)** (*AAVSO Alert Notice 462*) continues through 2015. 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*). Three observers have contributed 2,069 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 2015 season and likely "for several more years." Since May 2011, 110 observers have contributed 5,206 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!

My challenge to you observers remains! Since Dr. Arne Henden suggested the very interesting 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. A single V observation at/near the minimum shown in I shows the V minimum is 18.2 or fainter (MZK, K. Menzies, Framingham, MA) (Figure 7). **Wouldn't some observer like to take on QX Pup as a challenge to determine the V range?** Arne's page on QX Pup gives a lot of information about this variable embedded in a reflection nebula (the Rotten Egg Nebula).

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

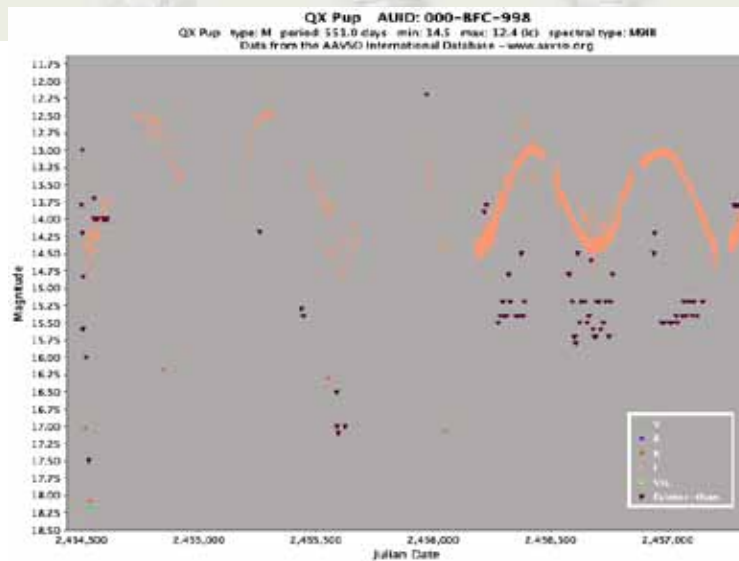


Figure 7. AAVSO light curve of the Mira variable QX Pup JD 2454500–2457315 (3 February 2008–19 October 2015). 19 observers contributed 2,147 multicolor and visual observations to this light curve.

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, new and old—and R CrB

The nova drought is over!! Three galactic novae have been discovered recently. Also, several recent novae continue to provide good observing opportunities, and R CrB continues its musings at minimum.

V5669 Sgr (Nova Sgr 2015 No. 3 = PNV J18033275-2816054), a classical Fe II nova, was independently discovered by Koichi Itagaki (Teppo-cho, Yamagata, Japan), by Akira Takao (Kitakyushu, Japan), and by Yuji Nakamura (Kameyama, Mie, Japan) on 2015 September 27 UT at unfiltered magnitude 9.9–10.5 (*AAVSO Alert Notice 528*). It reached maximum around 2015 October 4 at visual magnitude about 8.8, and has been fading, with one rebrightening around October 12, and appears to be undergoing another rebrightening. As of 2015 October 22.7153 UT it was visual magnitude 10.3 (BLD, D. Blane, Henley-on-Klip, South Africa). 32 observers have contributed 222 observations to date.

V1831 Aql (Nova Aquilae 2015 = ASASSN 15-qd = PNV J19215012+1509248) is a faint, highly reddened classical nova independently discovered on 2015 October 5 at unfiltered magnitude 12.4 by Koichi Itagaki (Teppo-cho, Yamagata, Japan), and on 2015 October 1 at V = 15.2 by the All-Sky Automated Survey for Supernovae (ASAS-SN) as reported by B. J. Shappee (Hubble Fellow, Carnegie Observatories) et al. (*AAVSO Alert Notice 530*). (Itagaki is considered the first discoverer because he reported his discovery much earlier, even though his date of discovery is later than that of Shappee et al.) As of 2015 October 21.0498 UT it was 17.321 V ± 0.343 (HMB, J. Hamsch, Mol Belgium). 156 observations have been contributed by 18 observers to date.

Nova Oph 2015 No. 2 (TCP J17344775-2409042) is also a faint, highly reddened classical nova. It was independently discovered by Koichi Nishiyama (Kurume, Japan) and Fujio Kabashima (Miyaki, Japan) and by Shigehisa Fujikawa (Kan'onji, Kagawa, Japan) on 2015 October 11 at unfiltered magnitude 11.8–12.1

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CAMPAIGNS UPDATE
CONTINUED...

(*AAVSO Alert Notice 531*). As of 2015 October UT it was magnitude 13.427 $V \pm 0.029$ (MZK, K. Menzies, Framingham, MA). Discovered only 10 days ago, 20 observations have been contributed by 5 observers to date.

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 has been slowly but steadily fading. As of 2015 October 16.7854 UT it was visual magnitude 13.3 (OJR, J. Ripero, Madrid, Spain). Keep watching R CrB—what will it do this quarter?

Older novae that are still within observing range include:

V1535 Sco (Nova Scorpii 2015 = PNV J17032620-3504140), discovered by Tadashi Kojima (Gunma-ken, Japan) on 2015 February 11.837 UT (*AAVSO Alert Notice 508*), reached maximum on February 13 at visual magnitude 9.2. The nova continues to fade and as of October 14.9799 UT was 15.125 $V \pm 0.047$ (HMB, J. Hamsch, Mol, Belgium).

V5667 Sgr (Nova Sagittarii 2015 = PNV J18142514-2554343), independently discovered by Hideo Nishimura (Shizuoka-ken, Japan) and by Koichi Nishiyama (Kurume, Japan) and Fujio Kabashima (Miyaki, Japan) on 2015 February 12 UT (*AAVSO Alert Notice 509*), reached maximum on February 24 at V magnitude 9.1–9.2. As of October 18.0889 UT it was visual magnitude 13.2 (CKB, B. Cudnik, Houston, Texas).

V5668 Sgr (Nova Sagittarii 2015 Number 2 = PNV J18365700-2855420) was discovered by John Seach (Chatsworth Island, NSW, Australia) on 2015 March 15 UT (*AAVSO Alert Notice 512*). Since the last newsletter update on this star in July, when dust production had begun and its magnitude was plummeting (*AAVSO Alert Notice 519*), the nova has recovered from the dust event (Figure 8), and as of October 22.7396 UT it was visual magnitude 8.7 (SGQ, C. Sigismondi, Rome, Italy).

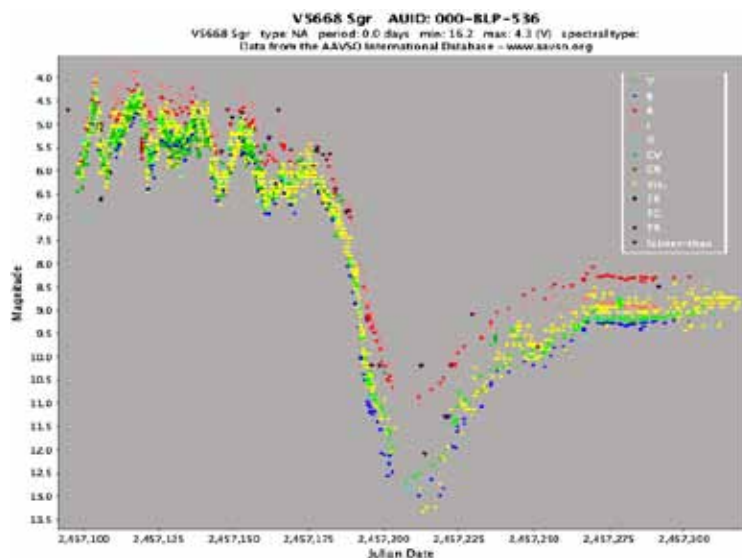


Figure 8: AAVSO light curve of V5668 Sgr (Nova Sgr 2015 No. 2) JD 2457094–2457318 (12 March–22 October 2015). 123 observers contributed 3,266 multicolor observations to this light curve.

V2944 Oph (Nova Ophiuchi 2015 = PNV J17291350-1846120) was discovered by (Yukio Sakurai, Ibaraki-ken, Japan) in March at unfiltered magnitude 12.2, 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 (Figure 9). As of 2015 October 18.1479 UT it was visual magnitude 12.3 (CKB, B. Cudnik, Houston, Texas).

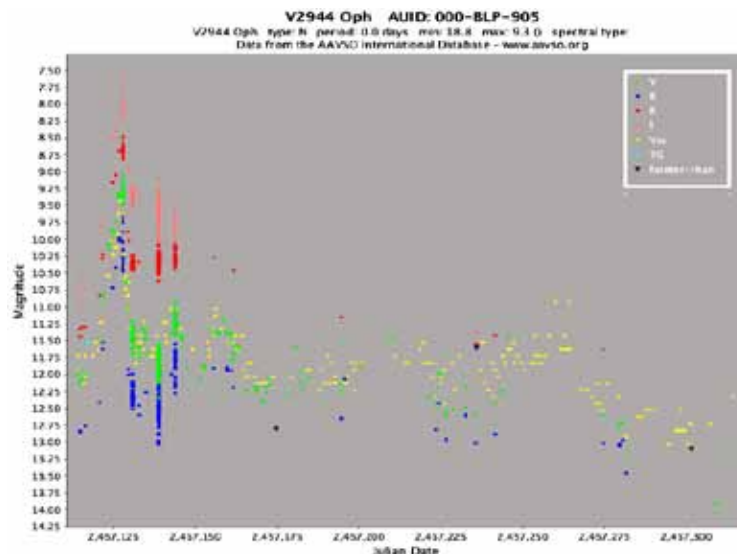


Figure 9: AAVSO light curve of V2944 Oph (Nova Oph 2015) JD 2457112–2457318 (30 March–22 October 2015). 33 observers contributed 990 multicolor observations to this light curve.

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 2015 October 15.0398 UT, it was 14.64 $V \pm 0.0$ (DKS, S. Dvorak, Clermont, Florida) and on October 12.921 it was visual magnitude 14.4 (PYG, G. Poyner, Birmingham, UK). 80 observers worldwide have contributed 3,806 observations through 2015 October 22.

V1369 Cen (Nova Centauri 2013 = PNV J13544700-5909080) continues to decline slowly. As of 2015 September 25.9279 UT it was 10.438 $V \pm 0.016$ (HMB, J. Hamsch, Mol, Belgium), and as of October 1.4188 UT it was visual magnitude 10.8 (PAW, A. Plummer, Linden, NSW, Australia). 71 observers worldwide have contributed 13,327 observations through 2015 October 22.

V339 Del (Nova Delphini 2013 = PNV J20233073+2046041), a very fast classical nova (class NA), continues to fade. As of 2015 October 14.8096 UT it was 13.643 $V \pm 0.007$ (JSJA, Steve Johnston, SJ; Warrington, Cheshire, England), and as of October 20.7896 it was visual magnitude 13.3 (MUY, E. Muylaert, Oostende, Belgium). 549 observers worldwide have contributed 77,582 multicolor observations through 2015 October 22.

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! ★

JULIAN DATE / MOON PHASE CALENDARS

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

OCTOBER 2015

Sun	Mon	Tue	Wed	Thu	Fri	Sat
				1	2	3
				729	7298	7299
4	5	6	7	8	9	10
7300	7301	7302	7303	7304	7305	7306
11	12	13	14	15	16	17
7307	7308	7309	7310	7311	7311	7313
18	19	20	21	22	23	24
7314	7315	7316	7317	7318	7319	7320
25	26	27	28	29	30	31
7321	7322	7323	7324	7325	7326	7327

NOVEMBER 2015

Sun	Mon	Tue	Wed	Thu	Fri	Sat
1	2	3	4	5	6	7
7328	7329	7330	7331	7332	7333	7334
8	9	10	11	12	13	14
7335	7336	7337	7338	7339	7340	7341
15	16	17	18	19	20	21
7342	7343	7344	7345	7346	7347	7348
22	23	24	25	26	27	28
7349	7350	7351	7352	7353	7354	7355
29	30					
7356	7357					

DECEMBER 2015

Sun	Mon	Tue	Wed	Thu	Fri	Sat
		1	2	3	4	5
		7358	7359	7360	7361	7362
6	7	8	9	10	11	12
7363	7364	7365	7366	7367	7368	7369
13	14	15	16	17	18	19
7370	7371	7372	7373	7374	7375	7376
20	21	22	23	24	25	26
7377	7378	7379	7380	7381	7382	7383
27	28	29	30	31		
7384	7385	7386	7387	7388		

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@aaavso.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.aaavso.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.aaavso.org/aaavso-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.aaavso.org/walter-feibelman-guest-suite>.



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

JOIN THE AAVSO!

AAVSO 2015 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 [†]	(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 [†]	\$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.

[†]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: _____

2015 MEMBERSHIP RENEWAL

On this page is a copy of the AAVSO membership renewal form for 2015. You may also renew your membership online. Safe and secure online payments are possible by visiting <http://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. *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.*



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: _____

2015 Membership Dues Renewal Form

Membership Type *(please check one)*

- Annual \$75 Sustaining \$150
 Associate (under 21) \$37.50
 Pension/Limited Income \$37.50
 Developing Country \$25

Contributions *(see next page for descriptions)*

- | | |
|--|----------|
| AAVSO Building Fund | \$ _____ |
| Janet A. Mattei Research Fellowship | \$ _____ |
| Margaret Mayall Assistantship | \$ _____ |
| Solar Fund | \$ _____ |
| AAVSONet Fund | \$ _____ |
| Member Sponsorship Fund | \$ _____ |
| AAVSO General Fund | \$ _____ |
| The Endowment Fund | \$ _____ |
| Contributor-Specified Restricted Funds | \$ _____ |

TOTAL ENCLOSED \$ _____

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.

The General Fund This fund is an unrestricted one and supports the general operations of the Association.

The 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.

The 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: <http://www.aavso.org/support-aavso>

Thank you for your support of the AAVSO!