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AAVSO Newsletter

SINCE 1911...

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

FROM THE DIRECTOR'S DESK

STELLA KAFKA

Be part of our AAVSO collaboration!

This April, along with a number of colleagues, I was fortunate to witness the launch of NASA's Transiting Exoplanet Survey Satellite (TESS). For most of us, TESS represents another set of eyes on the dynamic universe. It will monitor segments of the sky and will unveil the secret everyday lives of stars in our neighborhood. It will tell stories of short-term stellar variability, ways stars change on timescale of days, stellar eruptions and interactions. Like the *Kepler* satellite, it will provide hints of the presence of planetary systems in nearby stars. TESS is unique because, by itself, it is an exploratory mission—"to boldly go, where no-one has gone before."

At the same time, TESS will simply point to interesting objects. Its stories will be incomplete, its light curves will leave our community wanting more data to understand its discoveries and make sense of variable stars and of exoplanets. TESS will be looking at parts of the night sky for only a month and then will point somewhere else. Ground-based follow-up will be essential for TESS to be a successful mission. In a sense, TESS is another opportunity for our AAVSO observer community to actively participate in scientific discovery.... It is also one of the few collaborations that had an open call, asking for help from the non-professional community. It is one of the few international collaborations offering help to train observers for its exoplanet follow-up program. AAVSO observers are collaborators and an essential part of the mission. And this is what will make TESS a success.

I believe that the TESS model will become ubiquitous in the upcoming years. Non-professional astronomers are members of the international astronomical community, and they participate in designing and executing observing programs alongside the largest professional telescopes in the world. Simple truth: with old and new variable objects showcasing peculiar behaviors, as new techniques are being developed to study the variable sky, as new missions are being planned and executed, more ground-based support is necessary to achieve the science objectives of any project. The AAVSO community plays a critical role here: there are not enough ground-based telescopes in the world to provide data on interesting targets. As a member of the AAVSO community, your invaluable contribution to

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PRESIDENT'S MESSAGE

KRISTINE LARSEN

Fall is finally here, and with it a return to 12-plus hour long cool, clear nights without mosquitoes. If you've interrupted your observing schedule for the summer, it's time to get back to the eyepiece or camera and collect that all-important data that is at the heart of what the AAVSO does. Every data point on a light curve is precious, and has the potential to help astronomers understand our starry universe just a little bit better.

John Dobson was famous for saying that the true value of a telescope is measured by how many people look through it. I'd like to amend that slightly to say that the value of a light curve (beyond its scientific worth) is how many eyes/binoculars/telescopes/cameras went into making it. Light curves not only bring together individual data points in order to paint a story of that star's life (and perhaps death), they more importantly bring together individual observers, each contributing a special and unique piece of

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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@aavso.org.

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. Photos courtesy of Higgins Chaple, Rodney Howe.

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science starts every time you respond to an alert and acquire data for any AAVSO project. The impact of your observations to science is clear: you see your data discussed in conferences, you see your name included in scientific papers, you receive requests for more data, and you are in demand by professional astronomers worldwide. I hope that you realize by now that the AAVSO is a large collaboration of colleagues who collectively try to understand some of the most fascinating phenomena in the night sky....

So, thank you for being part of this collaboration. Thank you for supporting the AAVSO through your data and thank you for your financial contributions. Your donations enable us to curate the rich and valuable AAVSO International Database, hosting more than a century of data by you, our observers. Your financial support helps us offer training, data checks, and personalized observer help. You are the AAVSO, by being part of our international community. We all explore the universe in any way we can, and we play our part in gathering data, analyzing data, interpreting and discussing data, and presenting/publishing data. We piece this puzzle together… and we are better human beings because of it.

Best wishes—clear skies,

Stella.

PRESIDENT'S MESSAGE CONTINUED...

that story. We are all the co-authors of every light curve we have ever contributed to by not only observing that star, but more importantly by submitting our observations to the AAVSO.

We can expand the circle of our family of light curve co-authors by introducing our friends, family, and even random strangers to the joys of variable star observing. Think small, and think local.

These autumn evenings are perfect for getting others hooked on variable stars, even if they don't have access to a telescope yet (besides yours, of course). The easy-to-find unaided eye variables eta Aquilae (a Cepheid), beta Lyrae (an eclipsing binary), and gamma Cassiopeiae (an irregular eruptive variable) are perfect for introducing people of all ages not only to the process of making visual estimates, but the palette of flavors variable stars offer to the observer. Encourage history buffs to Google the story of Henrietta Leavitt and how her discovery of the period-luminosity relationship for Cepheids led to our understanding of the expansion of the universe, or Antonia Maury and her struggles to understand the behavior of beta Lyrae. The human aspect of variable star observing is sometimes just as riveting as the stars themselves. Don't forget that the AAVSO has a Ten Star Training Program [https://www.aavso.org/sites/default/files/10startutorial-2013.pdf] available on its website to help newcomers to variable star observing get their feet wet (not literally of course—that much dew is annoying!).

For those with binoculars, autumn has some great semiregulars that are well-placed in the early evening sky, coincidentally rather close to my unaided eye examples. I can personally recommend CT Del, EU Del, U Del, and nearby FI Vul for those who want a quick run of the bases around the Dolphin, HK Lyr and XY Lyr for those who prefer to triangulate near the head of Lyra, and rho Cas for those of you who want a circumpolar buddy that you can monitor all year long.

The future of the AAVSO is first and foremost our people, our community of members and observers. Let's make our future one of the first magnitude by being the spark that stokes the fire of curiosity in someone who could be the Olcott Award recipient in 2035, or the Merit Award recipient in 2030. Every award recipient has their very first variable star observation—will you be the person who gives them that life changing opportunity?

Now if we can only get some decent sunspots….

Ed. note: the Spanish language versions of the Director's and President's messages can be found on pages 7 and 8.

AAVSO MEETINGS

Next meeting

107th Annual Meeting: November 15–17, 2018, Lowell Observatory, Flagstaff, Arizona (2018 Annual Meeting)

A provisional schedule and information about accommodations, location, and speakers is linked to on the AAVSO meetings page:
https://www.aavso.org/aavso-meetings

Meeting Registration is open. Seating space for the paper sessions is just about filled, so if you have not yet registered, please do so as soon as possible.

Reminder—the Early Registration discount ends October 15.

Lowell Observatory Tour—November 18, 2018

On Sunday, November 18, following the AAVSO Annual meeting in Flagstaff, Lowell Observatory will provide a private tour for AAVSO meeting participants and their families. There is no charge for the tour. Lowell is planning to do telescope viewing through their Clark Telescope and give a Pluto Telescope Dome tour. The tour is expected to start at 5:00 p.m. and end at 10:00 p.m.

Sunset is at 5:19 p.m., so they plan to hold the Pluto tour at 5:00 p.m. and then proceed with telescope viewing at 6:00 p.m.

The schedule will be as follows:

5:00–6:00 p.m., Pluto Telescope Dome Tour
6:00–10:00 p.m., Pluto Telescope Dome Open House
6:00–10:00 p.m., Telescope viewing through the Clark telescope

If you would like to take the tour you may select it as an option on your Annual Meeting registration. The hotel has extended the room meeting rate to include Sunday night. Lowell Observatory would like to know in advance of our meeting how many people will participate in the tour, so please be sure to mark your registration accordingly!

Upcoming meeting

2019 Spring Meeting: June 13–16, AAVSO-RASC, Toronto, Canada (108th Spring Meeting)
Joint meeting of the AAVSO and the Royal Astronomical Society of Canada. When more information is available, it will be linked to on the AAVSO meetings page and announced.

Most recent meeting

107th Spring Meeting: July 6–8, 2018, AAVSO-British Astronomical Association (BAA), University of Warwick, Coventry, England (2018 Spring Meeting)
https://www.britastro.org/node/10727

The group photo from the AAVSO-BAA joint meeting may be viewed on the AAVSO website:
https://www.aavso.org/group-photographs#2010s

Missed the 2017 AAVSO Annual Membership meeting? Now you can watch it here:
https://www.aavso.org/aavso-membership-meeting-november-4th-2017

AAVSO MEMBERSHIP RENEWAL CHALLENGE

Happy New Fiscal Year! October 1 marks the beginning of the AAVSO's fiscal year, and with it, time to start thinking about renewing your AAVSO membership. Our membership year runs January–December, but it is not too early to renew your membership for 2019. In fact, over 200 AAVSO members have already done so (thank you!).

Start the new year off as an AAVSO member and continue to enjoy all the benefits of membership. Also, renewing now helps us to know that you are continuing your support of the AAVSO and its work for next year. And, it doesn't cost you any more to renew now—you've already paid for the rest of 2018 (thank you)—and you will be able to check it off of your list of end-of-year things to do. How good to have one less thing to think about in December!

Our 2019 Membership Drive goal is to have all ~1,200 AAVSO members renew before January 1—our October challenge to you is to help us achieve this goal!

P.S. If you are not an AAVSO member, today is a great time to become one!

To renew or to join, please visit our membership pages at https://www.aavso.org/join-aavso, and thank you for your support.

NEW AAVSO WEBPAGES FOR SITE AND EQUIPMENT INFORMATION

Now you can tell us more about your observing site and the equipment packages you use to observe. The information you provide will not be seen on your profile page, nor will it be available to anyone except AAVSO HQ. We urge everyone to provide this information—it will be necessary in the (near) future in order to be able submit observations to the exoplanet or spectroscopic databases, and it may be used in the future for other observing applications or programs.

There are two relevant tabs on your My Account webpage—one for Sites and one for Equipment. For more information and for instructions, please visit: https://www.aavso.org/site-and-equipment-documentation.

Many thanks, and good observing!

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

MENSAJE DEL DIRECTOR

STELLA KAFKA

¡Sé parte del equipo de colaboración de AAVSO!

El pasado abril, junto a varios otros colegas, tuve la suerte de ser testigo del lanzamiento del Transiting Exoplanet Survey Satellite (TESS) de la NASA. Para la mayoría de nosotros, TESS representa otro par de ojos en el dinámico universo. Registrará zonas del cielo y revelará las vidas cotidianas de las estrellas de nuestro vecindario. Contará historias de la variabilidad de corto período de las estrellas, formas en que estas cambian en escalas temporales de días, erupciones estelares e interacciones. Como el satélite Kepler, nos dará pistas acerca de la presencia de sistemas planetarios en estrellas cercanas. TESS es única porque, en sí misma, es una misión exploratoria—"ir valientemente donde nadie ha ido antes."

Al mismo tiempo, TESS apuntará a objetos interesantes pero sus historias serán incompletas, sus curvas de luz dejarán a nuestra comunidad en busca de más datos para entender sus descubrimientos y darle sentido a esas estrellas variables y exoplanetas. TESS mirará ciertas partes del cielo nocturno por sólo un mes y luego apuntará a otro lado. El seguimiento desde Tierra será esencial para que TESS sea una misión exitosa. De algún modo, TESS es otra oportunidad para la comunidad de observadores de AAVSO de participar activamente en el descubrimiento científico. También es una de los pocos proyectos que emitió un llamado abierto solicitando la ayuda la comunidad no-profesional. Es una de las pocas colaboraciones internacionales que ofrece ayuda para entrenar observadores para su programa de seguimiento de exoplanetas. Los observadores de AAVSO colaboran y son una parte esencial de la misión. Y esto es lo que hará que TESS sea un éxito.

Creo que el modelo de TESS se volverá muy común en los próximos años. Hay astrónomos no-profesionales miembros de la comunidad astronómica internacional que participan en el diseño y la ejecución de programas de observación al lado de los telescopios profesionales más grandes del mundo. La verdad es que con objetos variables nuevos o conocidos mostrando comportamientos peculiares, a medida que se desarrollan nuevas técnicas para estudiar el cielo variable y mientras se planean y ejecutan nuevas misiones, se necesita más apoyo desde Tierra para alcanzar los objetivos científicos de cualquier proyecto. La comunidad de AAVSO juega un rol muy importante aquí: no hay suficientes telescopios terrestres en el mundo para recolectar datos de objetos interesantes. Como miembros de la comunidad de AAVSO, su invalorable contribución a la ciencia comienza cada vez que responden a un alerta y obtienen datos para cualquiera de los proyectos de la asociación. El impacto de sus observaciones en la ciencia es claro: ven sus datos mencionados en conferencias, ven sus nombres incluídos en publicaciones científicas, reciben pedidos de más datos y son requeridos por astrónomos profesionales de todo el mundo. Espero que ahora se den cuenta de que la AAVSO es un gran equipo de colegas que colectivamente tratan de entender algunos de los más fascinantes fenómenos del cielo nocturno.

Así que, gracias por ser parte de este equipo. Gracias por apoyar a la AAVSO con sus datos y gracias por sus contribuciones financieras. Sus donaciones hacen posible que mantengamos la rica y valiosa Base de Datos Internacional de AAVSO, que contiene más de un siglo de datos de ustedes, nuestros observadores. Su apoyo económico nos ayuda a ofrecer entrenamiento, chequeo de datos y ayuda personalizada a los observadores. Ustedes son la AAVSO al ser parte de nuestra comunidad internacional. Todos nosotros exploramos el cielo de la forma en que podemos y hacemos nuestra parte al recolectar datos, analizarlos, interpretarlos, debatirlos y presentarlos/publicarlos. Completamos juntos este rompecabezas… y somos mejores seres humanos por esa razón.

Con los mejores deseos—cielos claros,
Stella.

MENSAJE DEL PRESIDENTE

KRISTINE LARSEN

El otoño finalmente está aquí y, con él, el regreso a las noches frías y claras de más de 12 horas y sin mosquitos. Si interrumpió su programa de observación durante el verano, es hora de volver al ocular o la cámara y recopilar todos los datos importantes que constituyen el núcleo de lo que hace la AAVSO. Cada punto de datos en una curva de luz es precioso y tiene el potencial de ayudar a los astrónomos a entender un poco mejor nuestro universo estrellado.

John Dobson fue famoso por decir que el verdadero valor de un telescopio se mide por la cantidad de personas que miran a través de él. Me gustaría enmendarlo ligeramente para decir que el valor de una curva de luz (más allá de su valor científico) es cuántos ojos / binoculares / telescopios / cámaras se involucraron para hacerla. Las curvas de luz no solo reúnen puntos de datos individuales para dibujar la historia de la vida de esa estrella (y tal vez la muerte), sino que, lo más importante, reúnen a observadores individuales, cada uno aportando una pieza especial y única de esa historia. Todos somos coautores de cada curva de luz a la que hemos contribuido, no tan solo observando esa estrella sino también y más importante aún, enviando nuestras observaciones a AAVSO.
Podemos expandir el círculo de nuestra familia de coautores de curvas de luz presentando a nuestros amigos, familiares e incluso extraños elegidos al azar la divertidísima observación de estrellas variables. Piense en pequeño, piense en lo local.

Estas tardes de otoño son perfectas para que otros se enganchen con las estrellas variables,

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MENSAJE DEL PRESIDENTE
CONTINUED

incluso si aún no tienen acceso a un telescopio (además del tuyo, por supuesto). Las variables, a ojo desnudo, fáciles de encontrar, eta Aquilae (una cefeida), beta Lyrae (una binaria eclipsante) y gamma Cassiopeiae (una variable eruptiva irregular) son perfectas que personas de todas las edades puedan ser introducidas no solo al procedimiento de hacer estimaciones visuales, sino también a la variedad de "sabores" que las estrellas variables ofrecen al observador. Alienta a los fanáticos de la historia a buscar en Google la historia de Henrietta Leavitt y cómo su descubrimiento de la relación período-luminosidad para las Cefeidas llevó a nuestra comprensión de la expansión del universo, o a Antonia Maury y su lucha por entender el comportamiento de beta Lyrae. El aspecto humano de la observación de estrellas variables a veces es tan fascinante como las estrellas mismas. No olvides que la AAVSO tiene un programa de capacitación de diez estrellas [https://www.aavso.org/sites/default/files/10startutorial-2013.pdf] disponible en su sitio web para ayudar a los recién llegados a la observación de estrellas variables a probar "mojándose un pie" (no literalmente, ¡por supuesto, esa cantidad de rocío es molesta!).

Para aquellos con binoculares, el otoño tiene algunas magníficas semirregulares que están bien ubicadas en el cielo de la tarde, casualmente bastante cerca de mis ejemplos a ojo desnudo. Personalmente puedo recomendar CT Del, EU Del, U Del, y FI Vul cercana para aquellos que quieren una corrida rápida de bases alrededor del Delfín, HK Lyr y XY Lyr para aquellos que prefieren triangular cerca de la cabeza de Lyra y rho Cas para aquellos de ustedes que quieren una compañera circumpolar que pueden vigilar durante todo el año.

El futuro de AAVSO es, ante todo, nuestra gente, nuestra comunidad de miembros y observadores. Hagamos que nuestro futuro sea de primera magnitud volviéndonos la chispa que aviva el fuego de la curiosidad en alguien que podría ser el ganador del Premio Olcott en 2035, o el receptor del Premio al Mérito, en 2030. Cada ganador de estos premios tiene su primerísima observación de estrellas variables: ¿serás la persona que les brinde esa oportunidad de cambio de vida?

Ahora, si solo podemos obtener algunas manchas solares decentes ...

A NOTE ON THE TRANSLATIONS

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

IN MEMORIAM

MEMBERS, OBSERVERS, COLLEAGUES, AND FRIENDS OF THE AAVSO

John Westfall

JOHN E. WESTFALL (WJH, Antioch, California) died July 26, 2018, at the age of 79. He was not really a variable star observer—although he contributed four observations of SN 1987A to the AAVSO International Database—but was a renowned lunar and planetary observer. John was a member since his teens of the Association of Lunar and Planetary Observers (ALPO), and served in many leadership roles there, including as Director from 1985 to 1995.

In his professional career, John was a Professor of Geography and Environmental Sciences at San Francisco State University for nearly 40 years. This career, and his love of history, meshed well with his lifelong love of astronomy. He was a member of the Eastbay Astronomical Society (EAS) since the age of 7, when he was invited to join after his fascination with astronomy (triggered by seeing a photograph of Saturn) was recognized and encouraged. John was fortunate to grow up and live during the exciting decades of the development and rise of the lunar and planetary sciences, and to be able to participate in many related projects and research opportunities from an early age. His areas of activity included occultations (when that work was just beginning), leading a coordinated effort to map the South Polar Region of the moon, transits of Venus and Mercury, solar eclipses (13 total and 4 annular), to name only a few. He was the author of several books related to solar system transit, eclipse, and satellite phenomena, and of many articles written for a variety of readerships.

Having been the recipient of wonderful mentoring, he paid it forward through being a mentor himself to many starting out or wanting to increase their knowledge and skills. Many AAVSOers who are also ALPOers have benefitted from his wise assistance and encouragement. We extend our deepest condolences to his wife Elizabeth, and all of his family and many friends and colleagues.

Photo courtesy of Higgins Chapel

OBSERVER'S CORNER

Note: This column will include advice on observing practices and tips for observing for visual, DSLR, PEP, and CCD observers.

THE AAVSO CIRCULARS—SEE WHAT'S BEEN HAPPENING IN THE NIGHT SKY AS YOU PLAN YOUR OBSERVING PROGRAM!

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

The AAVSO has numerous observing aids designed to help you make the most efficient use of your valuable observing time. Well-known ones (we hope!) include the AAVSO Target Tool, the *AAVSO Bulletin* (for long period variables) that is prepared by me, and the *Eclipsing Binary Ephemeris* and *RR Lyrae Stars Ephemeris* that are prepared by Gerry Samolyk.

Each Observing Section and each mode of observing has a variety of resources—be sure to visit these pages and explore the links. The best place to start is the Observing at a Glance—for Observers page (https://www.aavso.org/observers).

Another set of resources that may not be as well known is the *AAVSO Circulars*. These publications are issued automatically every Friday morning (US Eastern time), and cover the preceding four weeks. They summarize observations submitted to the AAVSO International Database for all stars of the relevant type(s) for which the AAVSO has received data during that interval.

The four *AAVSO Circulars* cover the following types of variable objects:

- AAVSO AGN Circular—AGN, QSOs, and Blazars/BL Lac objects
- AAVSO CV Circular—Cataclysmic variables of all types
- AAVSO LPV Circular—Long Period Variables (Miras, semiregulars, symbiotics)
- AAVSO RCB Circular—R CrB variables

Each *Circular* includes for each star the star name, variability type, average magnitude for each date for which observations were submitted, and the observer codes of observers whose observations were used in determining that average. A table of all contributing observers is included at the end of the circular. Samples of each circular and a typical observer table are shown below.

Use these *Circulars* to see what "your" stars have been doing or find new stars to observe as you plan your observing. Is a CV in outburst (or overdue)? Is an RCB star fading (or finally approaching maximum after a prolonged fade)? Is your favorite Mira a lot fainter than you expected it would be at this point in its cycle? Are there only a few observations—or none—of stars that should be covered regularly? Is there unexpected behavior reported that you think should be followed up on?

Let the *Circulars* assist, inform, and intrigue you!

To subscribe to any of these circulars, please email Elizabeth Waagen (eowaagen@aavso.org). Also, if you presently subscribe to a circular and wish to unsubscribe, please let Elizabeth know.

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AAVSO AGN Circular for Aug 29, 2018 to Sep 28, 2018:

Format: each line has the following information
        * Star name
        * (Variable type)
        * Average mag. (date observed)
        * Observer codes

3C 66A                          (BLLAC) 154(7) 152(11) 152(14) 153(15) 152(16) 153(19) 155(21) 157(23)
156(24) BOZ,DKS,PYG,WKL

DA 55                           (QSO) <162(10) LMK

HP AND                          (GALAXY) <145(1) <145(3) <150(7) <145(8) <160(10) <145(11) <145(12) <150(14)
<150(15) <145(17) <145(18) <145(19) <140(25) <140(27) LMK,MUY,PYG

PKS 2345-16                     (QSO) <164(10) LMK

4C 28.07                        (QSO) 162(1) 153(16) 154(17) 154(18) 157(20) 158(23) 159(24) DAM,WKL

OQ 530                          (BLLAC) 152(2) 152(15) 153(16) 153(20) DAM
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AAVSO CV Circular for Aug 29, 2018 to Sep 28, 2018:

Format: each line has the following information
        * Star name
        * (Variable type)
        * Average mag. (date observed)
        * Observer codes

1RXS J015017.0+375614           (UGZ:) 176(9) 173(14) <145(17) <145(18) 175(19) 178(21) 166(22) 175(23)
177(27) DKS,MNIC,MUY

AR AND                          (UGSS) <135(30) <142(1) 123(3) 133(5) 146(7) <142(8) <154(11) <142(12)
<147(13) <154(14) <157(15) <150(16) <142(17) <157(18) <150(19) <154(21) <142(22) <142(23) <135(24) <140(25)
<140(26) <140(27) <140(28) BOZ,DPV,KLO,MUY,OJR,PEI,PYG

ASASSN-15PO                     (UGWZ) <162(31) PYG

CSS 090918:001538+263657        (UGSU) <142(14) <142(15) <142(17) <142(18) MUY

DX AND                          (UGSS) <141(30) <145(1) <145(3) <145(5) 152(7) <145(8) <141(10) <145(11)
<145(12) 153(13) 152(14) 151(15) <145(17) <145(18) <145(19) <141(20) <141(21) 150(22) <145(23) 150(25)
<141(27) BOZ,MUY,OJR,PYG,SEDB,SFS
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AAVSO LPV Circular for Aug 8, 2018 to Sep 7, 2018:

Format: each line has the following information
        * Star name
        * (Variable type)
        * Average mag. (date observed)
        * Observer codes

AI AND                            (M) 141(11) 141(12) 144(20) 144(21) SGEA

AK AND                            (M) 116(31) DERA

AQ AND                            (SRB) 77(9) 77(12) 77(13) 78(15) 78(16) 77(20) 72(22) 80(23) VFK

AZ AND                            (M) 130(13) 141(30) DERA

BE AND                            (SRB) 93(12) 91(20) 91(21) SGEA

BG AND                            (M) 99(11) 98(17) 98(7) MZK

BU AND                            (M) 115(11) 122(14) 116(17) 121(19) 122(7) MZK,VGK
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AAVSO RCB Circular for Aug 22, 2018 to Sep 21, 2018:

Format: each line has the following information
        * Star name
        * (Variable type)
        * Average mag. (date observed)
        * Observer codes

S APS                           (RCB) 99(25) 97(2) 97(9) HSP,RFP

ES AQL                          (RCB) 118(24) 118(29) 118(30) 118(1) 115(2) 117(3) 118(5) 116(6) 117(7)
117(8) 119(10) 118(11) 118(12) 118(13) 117(14) 118(15) 117(17) 118(18) 118(19) ACO,FBZ,MUY,OJR,PWD,PYG

U AQR                           (RCB) 180(2) <162(8) <180(9) <154(10) DKS,PEX,PWD

ASAS J164124-5147.8             (RCB) <150(10) PEX

ASAS J165444-4925.9             (RCB) 124(10) PEX

V0943 ARA                       (RCB) 140(10) PEX

ASASSN-V J053213.93+340601.4    (RCB) 168(4) OCN
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List of contributing observers:

BOZ: B. Bago (HU)
DAM: A. Darriba Martinez (ES)
DKS: S. Dvorak (US)
DMIB: M. Deconinck (FR)
DPV: P. Dubovsky (SK)
EEY: E. Erdelyi (US)
HKEB: K. Hills (GB)
LDJ: D. Lane (CA)
LMK: M. Linnolt (US)
MUY: E. Muyllaert (BE)
NOT: O. Nickel (DE)
OJR: J. Ripero Osorio (ES)
PYG: G. Poyner (GB)
RZD: D. Rodriguez Perez (ES)
WKL: K. Wenzel (DE)
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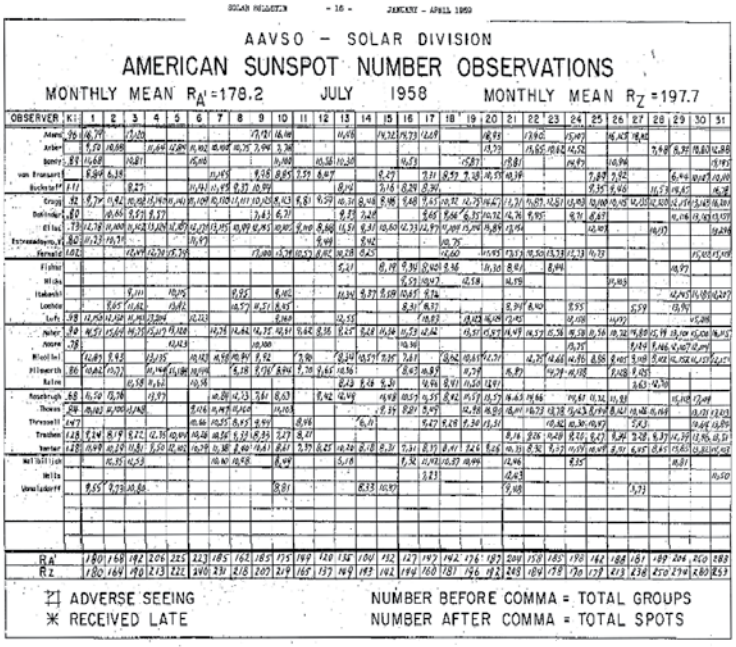
AAVSO SOLAR OBSERVERS BOTH PAST AND PRESENT AND LONG TIME OBSERVATIONS OF VISUAL OBSERVERS

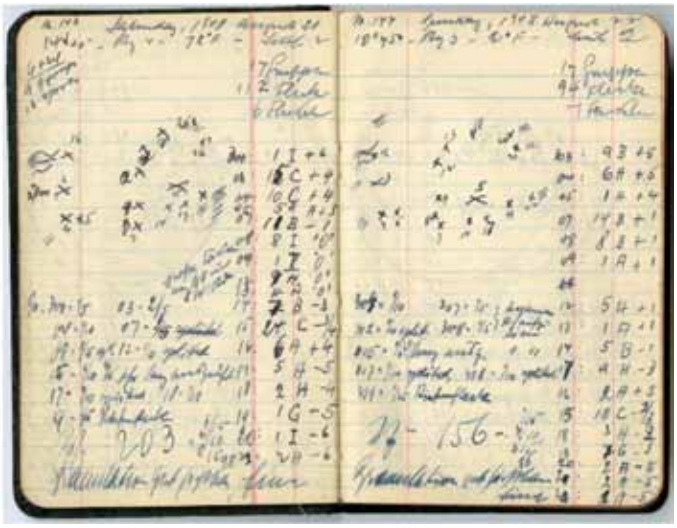
RODNEY H. HOWE (HRHA, AAVSO SOLAR SECTION LEADER)

In 1958 there were 23 AAVSO solar observers. Sunspot and group counts create the first American Relative index in 1949, from Alan Shapley (1949) at NIST. There is little evidence of change in observers. Reporting behavior since 1924, as every observer uses the Zurich classification scheme as described in the AAVSO Solar Observing Guide (Dempsey 2017).



Sunspot observers submit monthly counts to the Solar Chair (Casper Hossfield, above left). Herbert Luft (above right) began submissions in 1924, continued until his death in 1988.

The Luft notebooks (shown below), which show counts through time with daily recordings of group and sunspot counts projected right on the notebooks.



Each visual observer records a representation of different counts. Statistical test for differences in means between two samples establish the American Relative Index R_a = (10g + s) * k, where g = group, s= sunspots and k is the observer's k-factor.

Thomas Cragg (1947–2010). Both Luft and Cragg (below left) used the projection method for drawing group and sunspot counts. Multiple observers (~60) worldwide provide counts to the AAVSO Solar Section; (~35) use the projection method. With many observers reporting their data, can filter out variability due to observer, observer experience, seeing conditions. With their data we can create time series plots from 1924 to 1986 from Luft, 1947 to 2010 from Cragg, and now with Etsuiku Mochizuki from 1947 to present (below right).

Etsuiku Mochizuki (MCE) uses the projection method to count groups and sunspots; both north and south hemispheres, data from 1947 to present!

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SOLAR
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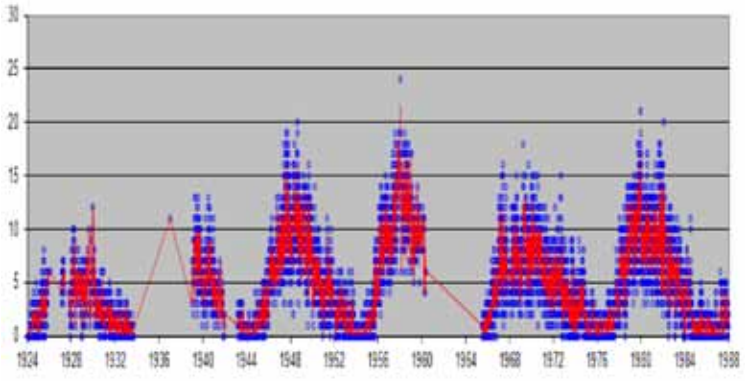
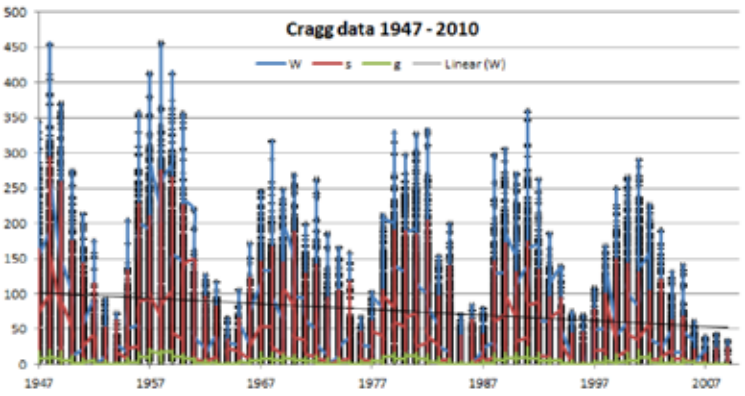
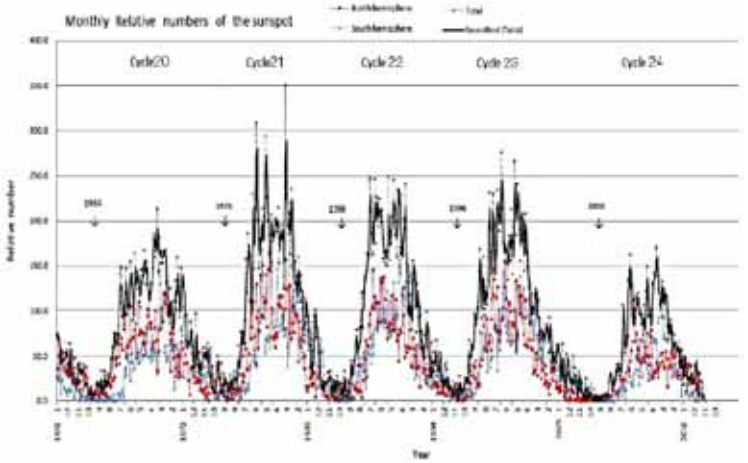
Sunspot groups show the solar cycle. The graph below shows group data from 1924 to 1986 from Luft.



Group, sunspot, and Wolf data from 1947 to 2010 from Cragg (shown in graph below). Wolf numbers are used to create the American Relative index. Wolf number = (10g + s).



Monthly Sunspot Counts through the decades show five solar cycles from MCE.



Monthly Sunspot Counts through the decades, North/South hemisphere counts from Galileo to today (Owens 2013)

ObserverReporting Behavior—Of course some observers are just learning. Will they record the daily sunspot and group counts for the *Solar Bulletin*?

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SOLAR
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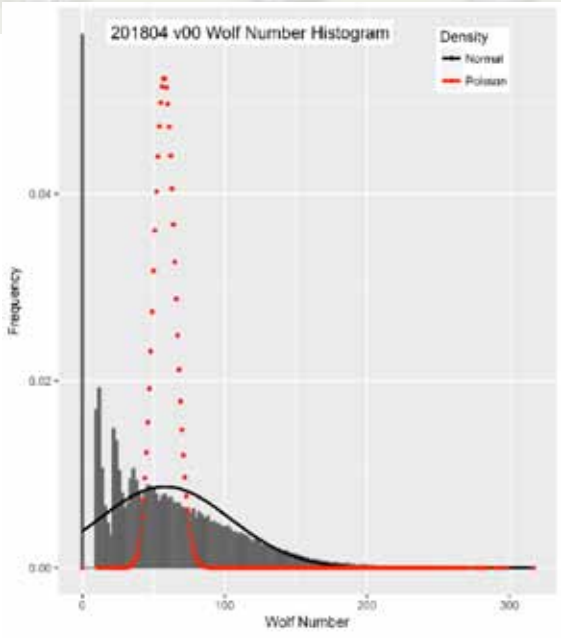
Are sunspot group count discrepancies due to observer inconsistency? If reporting behavior does not change during solar minimum, it is likely to be the Wolf number. Time series plots suggests no difference in counts reporting from 1924 to present as visual observers all use the Zurich classification scheme for Wolf numbers. However, the relative Sunspot Number and zero Wolf numbers show that a clear statistical difference is apparent. A significant change in group count implies a change in the relative sunspot number.

The graph (show at right) from the May 2018 *Solar Bulletin* shows a Gaussian fitted line (black) or normal curve (not a good fit!), and a Poisson fitted line (dotted red), no fit at all. Notice the large number of zeros at the left of the graph. A statistically significant shift exists during solar maximum and solar minimum due to zero counts during solar minimum. When the variance is larger than the mean, we have a condition known as over-dispersion.

Mean & Variance: 57.39 & 2107.96

As there is no clear change in reporting behavior over the last 90 years, trying to fit a line with different distributions is not successful.



References

AAVSO. May 2018 Solar Bulletin (https://www.aavso.org/sites/default/files/solar_bulletin/AAVSO_SB_2018_05.pdf).

Dempsey, F. 2017, *AAVSO Solar Observing Guide* (https://www.aavso.org/solar-observing-guide).

Owens, B. 2013, *Slow Science* (https://www.researchgate.net/publication/236070514_Long-term_research_Slow_science).

Shapley, A. 1949, http://iopscience.iop.org/article/10.1086/126109/pdf.

EXOPLANET OBSERVING SECTION UPDATE

DENNIS M. CONTI, EXOPLANET SECTION LEADER

TESS (Transiting Exoplanet Survey Satellite) is now in full science operation!

For the next 12 months, TESS will be downloading full-frame and "postage stamp" images of thousands of targets in the Southern Ecliptic hemisphere. Potential exoplanet transit detections first go through both an automated and a human vetting process before a target is declared a Target of Interest (TOI). TOIs then must successfully pass through a rigorous set of ground-based, follow-up observations before being declared a "confirmed exoplanet."

Follow-up observations in this confirmation pipeline are first done by the so-called Seeing Limited Subgroup (SG1). More than a dozen AAVSO members are already participating in SG1 through an AAVSO qualification program. Observations by SG1 members will help:

1. Verify that the target star was the source of a TESS detected transit.

2. Identify stars near the target star that might be causing the TESS detected event. Two common examples of such "false positive" sources are near-by eclipsing binaries (NEBs) and variable stars.

3. Verify that, even for events too shallow for us to detect from the ground, there are no events in near-by stars.

4. Refine the ephemerides of TESS detected transits, since TESS will only be observing a part of the sky, in many cases, for only 28 days.

Finally, beta testing is underway of the new AAVSO Exoplanet Database. Many thanks to George Silvis and Phil Manno for their help on this.

LONG PERIOD VARIABLE SECTION UPDATE

ANDREW PEARCE, LPV SECTION LEADER

Observers are reminded of the long term monitoring program of selected LPV's requested by Michael Stroh of the University of New Mexico in support of a VLA campaign studying SiO masers which will continue until October 2019. The VLA monitoring program will begin next month; AAVSO monitoring is underway.

Michael has selected a list of LPVs where some have a history of good AAVSO coverage. V photometry is preferred and he also encourages visual observations. All stars have a good comparison star sequence. Some caution should be exercised with selection of stars as the list contains stars with magnitude ranges expressed in R and I which generally means these will be much fainter in V and B. Further information is contained in *AAVSO Alert Notice 645* (https://www.aavso.org/aavso-alert-notice-645).

Also, observers are again reminded of the multi-year campaign to follow the Z And / Mira star, R Aqr, which is continuing for the next few years. R Aqr is now well placed for observing. R Aqr shows not only a Mira pulsation but also complex eclipse behavior as the two stars interact. The period of Mira variation is approximately 387 days and the eclipse period is approximately 44 years, with the next one due around 2022. Further information is contained in *AAVSO Alert Notice 535* (https://www.aavso.org/aavso-alert-notice-535).

Finder charts with sequences for all of these stars may be created using the AAVSO Variable Star Plotter (VSP; https://www.aavso.org/vsp).

PHOTOELECTRIC PHOTOMETRY SECTION UPDATE

TOM CALDERWOOD, AAVSO PEP SECTION LEADER

Eye for an I

I'd like to see the PEP group become active in I band photometry. Our photometers have good response in that range, and red supergiants have plenty of I band light to give. There is, however, a question to be resolved. The I filter sold by Optec conforms much more closely to the Johnson than Cousins I band, and since Cousins is the passband used by professionals, we want to be sure that our data will be useful. Cousins I runs from about 700–900 nm, while Johnson continues out to 1100 nm–a substantial difference. There are two schools of thought about this situation. One holds that if a Johnson filter is calibrated (for transformation) using stars with Cousins magnitudes, it will give satisfactory Cousins photometry. The other holds that while this approach may work under certain circumstances, it is unreliable. This is because the Johnson band is twice the width of Cousins, which is inviting trouble, since Johnson will pick up extra flux that Cousins will not see. Moreover, the Johnson passband extends into a wavelength range that is subject to considerable water vapor absorption in the earth's atmosphere. Lastly, the wider passband will span strong molecular absorption features in the atmospheres of very cool stars. Can the Johnson passband really do Cousins photometry for us?

Early Cousins I photometry was conducted with photomultiplier tubes having red cut-offs near 920 nm. Schott RG9 colored glass filters were predominantly used, having a passband of about 720 to 1100 nm. The red "end" of the system was, therefore, defined by the sensor, not the filter. In the 1990s, photometric guru Michael Bessell recommended RG9 filters for I band work with CCDs. Though the Bessell I filter is sometimes presented as Cousins I, it clearly is not (see Figure 1). For CCD photometry, this isn't such a big issue, because the sensitivity of the detector is falling off in the region beyond 900 nm (though Bessel himself noted that photometry for very red stars would need adjustments during data reduction). But for the SSP3, matters are different. Our

Figure 1. Low-budget sketch of (I-r) Cousins I, RG9, and CCD (KAF-16803) response curves.

photodiodes have peak sensitivity at about 970 nm. The response then does fall off quickly, but we still get about 30% of peak at 1070 nm.

I have begun comparing the performance of the Optec filter against a Cousins counterpart. No vendor sells an off-the-shelf Cousins I filter for the SSP3, so I had Chroma Technology make me a custom interference filter based upon Bessell's recommendation for the actual Cousins passband. The Chroma and Optec I filters were then calibrated against the same stars in conjunction with an Optec V filter, and some photometry of red stars was then undertaken. My results are very preliminary, but go like this: when the program and comparison stars are of similar color, the two I filters give very similar results. However, for a wide color difference, the Optec filter gives magnitudes about 0.05 brighter than "true" Cousins. The paucity of bright stars with well-established Cousins magnitudes makes it hard to draw airtight conclusions, but it is clear that the two filters do not give equivalent results. Experiments will continue.

Note: In regard to the "constant" targets from the last newsletter, we have updated the comparison magnitudes for VW Dra: V = 6.72, B–V = 0.50, Δ(B–V) = 0.594. There is a new PEP star file, dated Sep. 6, on the web page (https://www.aavso.org/pep-starparm).

OBSERVING CAMPAIGNS UPDATE

The detailed report on observing campaigns and novae discoveries given in earlier issues of the *AAVSO Newsletter* has been discontinued. Observers may read about the observing campaigns underway and recent novae via the list below of the *AAVSO Alert Notices* issued for these targets. (Also included are two *AAVSO Special Notices* for which no related *Alert Notice* was issued.) Links to *AAVSO Special Notices* associated with an *Alert Notice* may be found by clicking on the *Alert Notice* link.

Also, the stars which are targets of observing campaigns are given in the Alerts/Campaigns list of the AAVSO Target Tool.

Current and ongoing observing campaigns

Date *Name* *Subject*

20180927 *Alert Notice 651*—Monitoring of T Pyx needed for HST observations
20180914 *Alert Notice 650*—More symbiotic candidates for fast photometry
20180824 *Alert Notice 649*—Dwarf nova outburst of GK Per (N Per 1901)
20180814 *Alert Notice 648*—Semiregular variable reclassified as symbiotic: outburst of ASASSN-V J195442.95+172212.6 = Vend47 (Sge)
20180813 *Alert Notice 647*—Nova in Ophiuchus—N Oph 2018 No. 3 = PNV J17422408-2053088
20180806 *Alert Notice 646*—VW Hyi in outburst and monitoring needed for multiwavelength campaign
20180730 *Alert Notice 645*—Monitoring of LPVs for Maser Study
20180727 *Alert Notice 644*—FO Aqr monitoring for faint-state study
20180725 *Alert Notice 643*—Monitoring for Red Dots #2 campaign
20180724 *Alert Notice 642*—ASASSN-18pe observing campaign
20180724 *Alert Notice 641*—V1490 Cyg multiwavelength campaign
20180705 *Alert Notice 640*—Immediate Monitoring of VW Hyi Requested
20180703 *Alert Notice 639*—CH Cyg coverage requested
20180702 *Alert Notice 638*—Nova in Scutum—N Sct 2018 = TCP J18292290-1430460
20180605 *Alert Notice 637*—Nova in Lupus—N Lup 2018 = PNV J15384000-4744500
20180511 *Alert Notice 634*—Nightly monitoring requested for V1280 Sco = N Sco 2007
20180430 *Alert Notice 633*—Nova outburst of V392 Per = TCP J04432130+4721280
20180425 *Alert Notice 63*2—Fast photometry of symbiotic candidates requested
20180424 *Alert Notice 631*—Coverage requested for current outburst of AG Dra
20180411 *Alert Notice 629*—Nova in Sagittarius—N Sgr 2018 = PNV J18040967-1803581
20180326 *Alert Notice 627*—Nova in Canis Major = N CMa 2018 = TCP J07134590-2112330
20180321 *Alert Notice 626*—Nova in Carina = ASASSN-18fv
20180321 *Alert Notice 625*—ASASSN-18ey = MAXI J1820+070 coverage needed for VLT and XMM
20180319 *Alert Notice 62*4—Observations requested for MAXI J1820+070 = ASASSN-18ey
20180315 *Alert Notice 622*—N Oph 2018 No. 2 = TCP J17140253-2849233 = PNV J17140261-2849237
20180315 *Alert Notice 621*—Optical monitoring of NSV 24045 = HD 163296
20180306 *Alert Notice 619*—Nova Ophiuchi 2018 = PNV J17244011-2421463
20180305 *Alert Notice 618*—Monitoring SDSS J153817.35+512338.0 for HST observations
20180213 *Alert Notice 616*—Nova Sco 2018 No. 2 = PNV J16484962-4457032
20180131 *Alert Notice 613*—Nova Cir 2018 = PNV J13532700-6725110
20180131 *Alert Notice 612*—Nova Sco 2018 = PNV J17180658-3204279
20180126 *Alert Notice 611*—Flaring of Blazar 3C 279
20180115 *Alert Notice 609*—Nova Muscae 2018 = PNV J11261220-6531086
20171017 *Alert Notice 602*—CE Tau observations requested to supplement BRITE-Constellation
20170906 *Alert Notice 598*—Intermediate polar FO Aqr fading and photometry needed now
20170816 *Alert Notice 593*—VV Cep eclipse monitoring requested
20170807 *Alert Notice 590*—V1117 Her observations requested

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CAMPAIGNS UPDATE
CONTINUED

20170804 *Alert Notice 589*—R Aqr coverage needed for Chandra and HST observations
20170721 *Alert Notice 588*—Long-term CCD monitoring of ER UMa-type variable DDE 48 in Vulpecula
20170630 *Alert Notice 585*—Monitoring of Evryscope targets requested for follow-up
20170621 *Alert Notice 584*—Monitoring of PDS 110 requested to cover upcoming eclipse by exoplanet
20170616 *Alert Notice 583*—Photometry requested for Red Dots campaign
20170516 *Alert Notice 577*—SN 2017eaw in NGC 6946 (PSN J20344424+6011359)
20170428 *Alert Notice 575*—Monitoring of Swift J1357.2-0933 (CRTS J135716.8-093238) requested
20170425 *Alert Notice 574*—Monitoring of EPIC 204278916 requested
20170403 *Alert Notice 572*—AG Dra monitoring requested
20170316 *Alert Notice 571*—Observations Requested of Exoplanet Proxima Centauri b
20170131 *Alert Notice 566*—Beta Pic observations requested for BRITE-Constellation
20161028 *Alert Notice 561*—Nova in Sagittarius = ASASSN-16ma = PNV J18205200-2822100 [V5856 Sgr]
20161024 *Alert Notice 560*—TCP J18102829-2729590 = Nova in Sagittarius [V5855 Sgr]
20161004 *Alert Notice 556*—Monitoring of V2487 Oph requested
20160927 *Alert Notice 553*—Nova Lup 2016 = PNV J15290182-4449409 = ASASSN-16kt [V407 Lup]
20160803 *Alert Notice 546*—Campaign on V1687 Cyg (WR 140)
20160408 *Alert Notice 542*—Continuing observations requested for KIC 08462852
20170502 *Special Notice #429*—V694 Mon (MWC 560) spectroscopy requested
20160119 *Alert Notice 535*—R Aqr observing campaign
20160408 *Special Notice #415*—T CrB brighter and bluer—monitoring requested
20150618 *Alert Notice 520*—X-ray nova and LMXB V404 Cyg in rare outburst
20150415 *Alert Notice 518*—Observations of 2MASS J06593158-0405277 needed
20150324 *Alert Notice 514*—RW Aur monitoring requested
20150313 *Alert Notice 511*—Monitoring requested for developing planetary systems dust production study
20150305 *Alert Notice 510*—Observations of the symbiotic nova ASAS J174600-2321.3
20140917 *Alert Notice 504*—Epsilon Aur monitoring during predicted pulsation phase
20140806 *Alert Notice 503*—Request for regular monitoring of the symbiotic variable RT Cru
20140709 *Alert Notice 502*—EE Cep observations requested for upcoming eclipse
20120625 *Alert Notice 462*—Monitoring of J1407 for next extrasolar ring system transit
20120302 *Alert Notice 454*—Monitoring of CH Cyg requested for Chandra and HST observations
20110517 *Alert Notice 440*—PEP Observing Campaign on P Cygni
20070711 *Alert Notice 353*—Monitoring of Blazars requested for VERITAS/XMM TOO
20070406 *Alert Notice 348*—Observe HMXBs; monitor AR UMa; update on *Alert Notice* 345
20080502 *Alert Notice 377*—Request extended to observe HMXBs in support of radial velocity observations
20070813 *Alert Notice 354*—Extending Request to Observe HMXBs in Support of Radial Velocity Observations
20070813 *Alert Notice 355*—Correction to Subject Title of *Alert Notice 354*