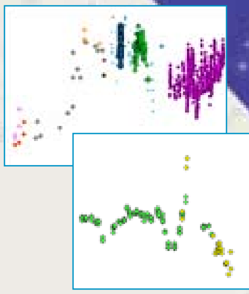
IN THIS ISSUE:

Complete table of contents on page 2



ISSUE NO.44 | APRIL 2010 | WWW.AAVSO.ORG

AAVSO Newsletter

SINCE 1911...

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

FROM THE DIRECTOR'S DESK

ARNE A. HENDEN

It has been five years since I became Director. A lot has happened in that time span: we've moved headquarters to a new building, upgraded computer systems, converted the observation database to a MySQL relational database, created the VSP chart plotter, updated thousands of sequences, translated the visual observing manual into many languages, won a major NSF grant, started AAVSOnet and APASS, etc. What hasn't changed during that same period are the people–observers, members, and volunteers–who are the heart of the AAVSO. One of the main reasons that I joined the AAVSO was the fun and excitement I felt when attending meetings or reading the discussion group postings. People were enjoying their hobby (the true meaning of amateur), and it was a refreshing change from the seriousness of a professional meeting. That doesn't mean their research was less valuable, just celebrated differently!

We've also experienced major changes in the astronomical world during the same five years. The first amateur-discovered microlensing event took place; Kepler was launched; Hubble was repaired; PanSTARRs began its survey; Planewave telescopes entered the market; a z = 8.3 GRB afterglow occurred; John Percy's variable star book and Bruce Gary's exoplanet observing book were published; Pluto was demoted. Every field saw advances during this period. We're learning more about the Universe that we live in, and you are contributing to the quest.

So what's up for the next five years? Certainly we're supporting our observers, with APASS planned to finish (providing calibrated stars over the entire sky), a new website due out shortly, improved planning tools, Photometrica availability, and more telescopes in our robotic network. Our 100th anniversary celebration will occupy much of the coming year. We'll complete the Citizen Sky project, and hope to have many other similar projects funded. A spectroscopic database will be started. We'll form major partnerships with professional surveys. We'll work to unify the world-wide variable star organizations, so that everyone cooperates and shares data.

We will need the involvement of everyone. Volunteers to help in programming and maintaining our database. Testers to try out new software. Participants to suggest features for planning tools, or upgrades to existing programs. Observers to provide the variable star estimates needed for new campaigns. Researchers to use the database. Donors and benefactors to help pay for the new projects.

I'm looking forward to the future—it seems bright and exciting from where I stand. I hope you feel the same way; and if not, then I hope that you get involved, offer your suggestions, and make the AAVSO the best organization you've ever known! ★

PRESIDENT'S MESSAGE

JAIME R. GARCIA

While I was writing this message, a disaster happened close to my home on the opposite side of the Andean mountains. Chile, a country with plenty of astronomical observatories, suffered a very big earthquake on February 27, with hundreds of people lost or dead, and millions of people affected. I would like to extend my deepest sympathies, on behalf of our Association, to the families of those who suffered losses.

Despite the economic troubles nowadays, we on the Council are very enthusiastic about this year. This is because we are facing important changes in the way the AAVSO will serve our members and observers. AAVSOnet is growing smoothly, our International Database is growing cataclysmically, and plans for accessing data are growing, too.

The second year of our exciting citizen science project about epsilon Aurigae is underway and we are experiencing interesting interactions on our special

CONTINUED ON NEXT PAGE

PRESIDENT'S MESSAGE
CONTINUED...

Citizen Sky website citizensky.org. The star is now in the depths of the eclipse, and many of you who are enjoying the spectacle (I cannot) are also contributing observations, ideas, models, observing techniques, and so on.

Since observing variable stars is our goal, and new observers need fresh materials for learning how to do that, we have a new edition of our Visual Observing Manual, with several interesting updates and changes. We are also working on updating the translations. The Manual is the most important ally to our successful Mentor program.

The new structure of AAVSO Sections is underway, with several sections having coordinators, science advisors, special websites, and several other services with interesting interaction between observers or data miners. You have access to these Sections through the home page of our website.

I am very glad to write this message when we are approaching to our first AAVSO "Spring" Meeting in Latin America and also in the southern hemisphere, to be held at Valle Grande, Mendoza, Argentina, on April 15–18, 2010. I am looking forward to meeting you there. Even if you are not able to take part in our meeting in person, I would like to hear your ideas of how the AAVSO can contribute to the future of variable stars.

Have a nice Spring/Fall season and good observing! ★

CONTENTS

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

MENSAJE DEL PRESIDENTE

JAIME R. GARCIA

Mientras escribía este mensaje, un desastre estaba ocurriendo cerca de mi casa, en el lado opuesto de la cordillera de los Andes. Chile, un país con muchos observatorios astronómicos, sufrió un terremoto muy grande el 27 de febrero, con centenares de personas desaparecidas o víctimas fatales, y millones de otras dañadas. Deseo expresar mi más sentido pésame, en nombre de nuestra Asociación, a las familias de aquellos que sufrieron pérdidas.

A pesar de los problemas de la economía de hoy, en el Consejo, estamos muy entusiasmados para este año. Esto es porque estamos frente a importantes cambios en la forma en que la AAVSO servirá a nuestros miembros y observadores. AAVSOnet está creciendo sin problemas, nuestra base de datos internacional está creciendo cataclísmicamente y los planes para cómo acceder a los datos también lo hacen.

El segundo año de nuestro interesante proyecto de ciencia por el ciudadano sobre épsilon Aurigue está en marcha y estamos percibiendo interesantes interacciones en nuestro Citizen Sky sitio web especial citizensky.org. La estrella se encuentra en las profundidades del eclipse y muchos de ustedes que están disfrutando del espectáculo (yo no puedo) también están aportando observaciones, ideas, modelos, técnicas de observación, etc.

Dado que observar las estrellas variables es nuestra meta, y los nuevos observadores necesitan de nuevos materiales para el aprendizaje de cómo hacerlo, tenemos un nueva edición de nuestro Manual para la observación visual, con varios cambios e interesantes actualizaciones. También estamos trabajando en la actualización de las traducciones. El manual es el más importante aliado de nuestro exitoso Programa Mentor.

La nueva estructura de Secciones de AAVSO está en marcha, con varias secciones con coordinadores, asesores científicos, sitios web especiales y varios otros servicios y con interesante interacción entre observadores o "mineros de datos". Usted tiene acceso a las Secciones en la página principal de nuestro sitio web,

Estoy muy contento de escribir este mensaje cuando nos acercamos a nuestra reunión de AAVSO de "Primavera", la primera en América Latina y también, en el hemisferio sur, que se celebrará en Valle Grande, Mendoza, Argentina, 15–18 de abril de 2010. Tengo muchas ganas de encontrarlos allí. De todos modos, si no pudieren tomar parte de nuestra reunión, me gustaría escuchar sus ideas sobre cómo la AAVSO puede contribuir al futuro de las estrellas variables.

¡Buena estación (primavera / otoño) y buenas observaciones! ★

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 gamze@aavso.org. Photos and images in this issue courtesy of Sara Beck, Shawn Dvorak, Barbara Harris, Sebastian Otero, Phil Plait, Rod Stubbings, and as noted.

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

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THE DISCOVERY OF THE RECURRENT NOVA U SCORPII

BARBARA HARRIS (HBB)
NEW SMYRNA BEACH, FLORIDA

Editorial note: This article is reprinted with permission from Barbara Harris's website, http://www.bar-jobservatory.com/USco.html.

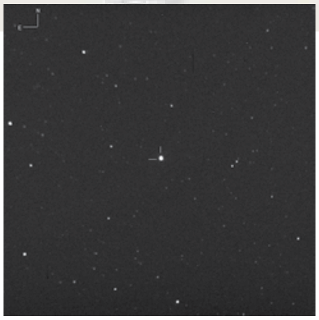
We are grateful for Barbara's permission to reprint her account of the discovery and her images. Congratulations, Barbara!

During the early morning of January 28, 2010, I was awakened by the bark of one of my dogs, Arctic. I have four Akitas but I knew it was Arctic because he is the speaker for the group. I did not want to respond to his bark because it was 5 am and I had just gone to bed 2 hours earlier. Five minutes after the first bark I heard another bark. My husband was sleeping through the barks so I knew if someone did not get up soon he was just going to persist and I would never get any sleep. I got up to let him outside. I noticed that the morning sky was gorgeous. I normally wake up at that time of the morning but that morning I was not planning on it. I wanted to sleep late. I had been opening the observatory every clear morning for the past month to take an image of U Scorpii, a recurrent nova that was expected to go into outburst very soon. I figured since Arctic had gotten me out of bed I might as well take my image then go back to sleep.

My observatory is a third-story domed observatory. I have it set up so that I can control everything from inside the house. This was great because it was cold by Florida standards (44 degrees F). I got back into bed and sat up in bed with my laptop. I connected to the observatory computer, opened the dome, turned on and started cooling the camera, slewed to U Sco. I took an image of 5 secs to make sure I was centered on the field. 24 hours earlier I had measured U Sco at 18.2 magnitude, which is extremely faint, so I did not expect to see a star at the center of the image in a 5-sec exposure. My 5-sec exposure revealed a very bright star in the center of the image. I assumed that I had slewed to the wrong coordinates. U Sco is about 8.5 degrees from Antares so I thought maybe I had slewed to that star or another bright star in Scorpius. I slewed to U Sco again and took an image. The same image appeared with a bright star at the center. I did a quick plate solve (determine the center coordinates of the image). I measured the coordinates of the bright, center star. It matched the coordinates of U Sco. My heart started to race. I was getting excited. It looked like I had caught the long awaited outburst of U Sco!!

I took a few quick images that were not overexposed, measured the magnitude of the star, and went online to AAVSO to submit my observations. As I signed on to the AAVSO website, I had a brief deflated feeling. I thought surely someone else must have caught the outburst before me. I knew that my observation 24 hours earlier showed that U Sco was still very faint at 18.2 magnitude. I knew that Mike Linnolt in Hawaii had also submitted a very faint observation 5 hours after my observation on January 27th. Surely someone in the past 19 hours in some part of the world caught the outburst and submitted it to the AAVSO database. As I looked up the observations of U Sco in the AAVSO database, my heart started to race when I noticed that Mike Linnolt's faint observation was the last observation submitted. I hurried and uploaded my observation of magnitude 8.05 into the database.

Pre-discovery: U Sco at magnitude 18.2



Discovery: U Sco at magnitude 8

By this time it was around 5:45 am. I wanted to call Brad Schaefer from LSU. Brad is a professional astronomer at LSU who has been studying this rare group of recurrent novae and had predicted that U Sco should erupt in 2009.3 +/- 1.0 year. He had emailed his home phone number a month earlier to call if I noticed an outburst since he knew that I was trying to monitor this star on a regular basis. I was hesitant to wake him up so early (it was 4:45 am his local time). I looked over my images again and made sure that the bright star that I was looking at was indeed U Sco. I was sure. I picked up the phone and gave him a call. I told him that I just caught U Sco in outburst. He let out a scream and multiple thank yous. He said that he had to get off the phone and start notifying observatories.

A few minutes later I received an email from Arne Hendon, director of AAVSO. He wanted to know if the observation that I had just submitted was a typo. I emailed back that it was no typo and attached the discovery image to prove it. A few minutes later I also received an email from Matthew Templeton from AAVSO asking the same thing. Around 6:30 am EST, Shawn Dvorak submitted an email to the AAVSO group that he had an image from 11:23 UT showing U Sco in outburst, about 55 minutes after my first image. About 4-5 hours after my first image, I received an email from Brad Schaefer again thanking me for my observation and forwarding me a copy of the IAU Circular on the Discovery. ★

From IAU Circular No. 9111 (Daniel W. E. Green, Ed.), January 28, 2010:

U SCORPII

B. E. Schaefer, Louisiana State University, reports that B. G. Harris (New Smyrna Beach, FL, USA) has discovered the recurrent nova U Sco (cf. IAUC 7749, 8279) to be in outburst. On Jan.28.4385 UT, U Sco was recorded with CCD images and visual observations to be at magnitude V = 8.05. This discovery has been confirmed by B. E. Schaefer with a 15.2-cm telescope and by S.Dvorak (Clermont, FL, USA) at mag about 8.8 visually. M. Templeton, AAVSO, reports the following previous magnitudes for U Sco: Jan.27.450, V = 18.2 (Harris); 27.627, [16.5 (M. Linnolt, Hoolehua, HI, USA; visual). This is the tenth discovered eruption, with the last being in 1999 (cf. IAUC 7113), when it reached visual mag 7.5.U Sco is located at R.A. = 16h22m30s.80, Decl. = -17o52'43".0 (equinox 2000.0). The entire peak (from quiescence to peak, to one mag below peak) occurring inside of one day. This fast event requires fast reaction to get observations near the peak.

Sky & Telescope article: http://www.skyandtelescope.com/news/83025892.html

Universe Today article: http://www.universetoday.com/2010/01/28/long-anticipated-eruption-of-u-scorpii-has-begun/#more-52563

A GREAT WAY TO START THE DAY

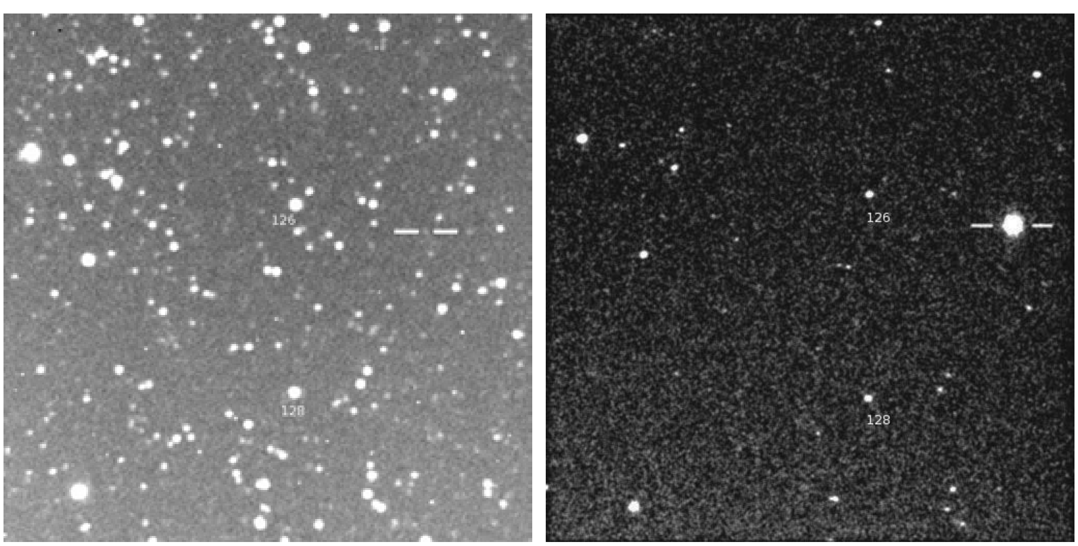
SHAWN DVORAK (DKS)
CLERMONT, FLORIDA

The evening of January 27, 2010, started out as typical observing night. I rolled the roof off my observatory at dusk and started up my LX200 to get images of a few bright RVTau- and ZAnd-type stars in the darkening sky. I then started a time series on KT Eri, the odd, flickering nova. The autoguider in the CCD would keep the target centered and the image monitoring software would page me if there were problems, so I grabbed a few hours of sleep. By midnight KT Eri was getting too low and I had to crawl out of a nice, warm bed to point at a new target, this time an eclipsing binary. I set the alarm again, this time for 5:15 AM. My wife and I usually go to the gym at this time; early morning seems to be the only time we can fit it in, but it sometimes conflicts with observing. When the alarm went off the gym really didn't sound very appealing. I was tired, the bed was warm, and something I ate the night before was disagreeing with me. However, I'd been making a special effort to observe U Sco since my southerly location allowed me to catch it shortly after it emerged from the sun's glare. This winter has been especially bad for observing and I had only made a half-dozen observations so far, so wasting a rare clear morning was not acceptable.

The first pointing images started coming up on my computer in the house as the telescope fine-tuned its pointing. The stars were trailing as the final pointing was done but I already knew that something was wrong, and that the telescope's pointing had been thrown off. There was a bright star trail moving across the screen and I knew there shouldn't be anything that bright here. As the telescope came to a stop, fainter stars became visible and slowly it dawned on me that this looked like the right field, except for the bright star. The star fields are pretty rich in that part of the sky and it's easy to find similar-looking fields so I thought that the telescope pointing was off. It still took another minute or so to convince my half-asleep brain that this was the right field, and that the bright star was in the exact position of U Sco. It had finally gone off! I let out a yell and sprinted out the door, heading to the observatory to adjust the focus. My wife was a bit concerned to say the least, thinking that something terrible had happened, perhaps a repeat of the sudden rain cloud fiasco a few years ago (I had to remove the corrector and pour the water out after that one).

Frantically I started a time series, keeping the exposures short to avoid saturating the nova, and quickly checked email to see if anyone had put out the alert. I knew that Brad Schaefer wanted to be notified immediately so he could get early-outburst observations, and when I saw that no one had posted anything I hurriedly dashed off a message to Matt Templeton at the AAVSO, as well as the AAVSO Photometry list and a few cataclysmic variable lists. As soon as I hit "send" my excitement suddenly turned to terror. Was I still somehow mistaking another, similar field for the one around U Sco? Would I have to send out an "oops, never mind" email to all of those recipients? As I fretted over this I ran one of the images through my processing pipeline to match the image to a reference star list and was immensely relieved when the image with the matching stars labeled popped up on the screen and the bright star had a red circle over it with a label reading "U Sco" next to it!

In the coming hours I got to exchange emails with a number of people, include Matt Templeton, Brad Schaefer, Mike Simonsen (who did a great job spreading the word about the outburst and popularizing the role the AAVSO played), and Barbara Harris, a fellow Floridian who independently detected the outburst about 30 minutes before me. The entire experience has re-ignited my enthusiasm. My wife, Deb, is a school teacher who has saved me the bother of bragging to our friends by sending out a link to the *Sky & Telescope* article on the discovery written by Mike Simonsen. A number of her fellow teachers have asked for me to come in as a guest speaker, and I look forward to using my fifteen minutes of fame to help expose elementary and middle school students to astronomy. ★



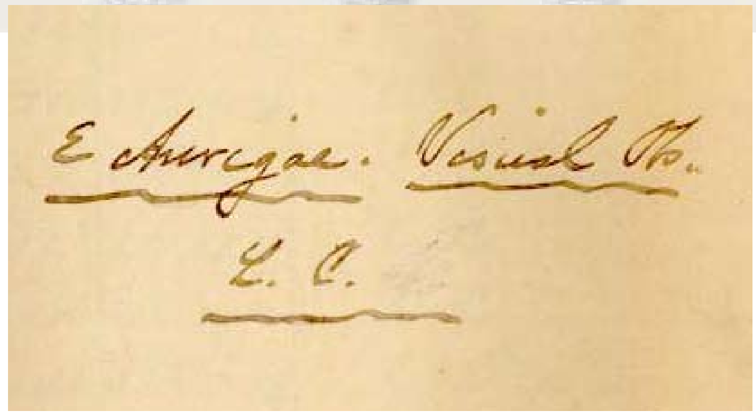
U Sco in quiescence (left image) and in outburst (right image). *The faint state is a stack of images from 4/26/2009 with a total of 18 minutes of exposure through a clear filter. The bright state is a stack of the discovery images Shawn took on 1/27; the total exposure time was 2 minutes through a V filter. All images were taken with an ST9-XE on an LX200 10-inch telescope. Shawn measured it at magnitude 18.01 on the faint image and in the bright state it was 7.98.*

From the AAVSO Archives...

EPSILON AURIGAE "LOST" VISUAL OBSERVATIONS OF 1900–1901 FOUND!

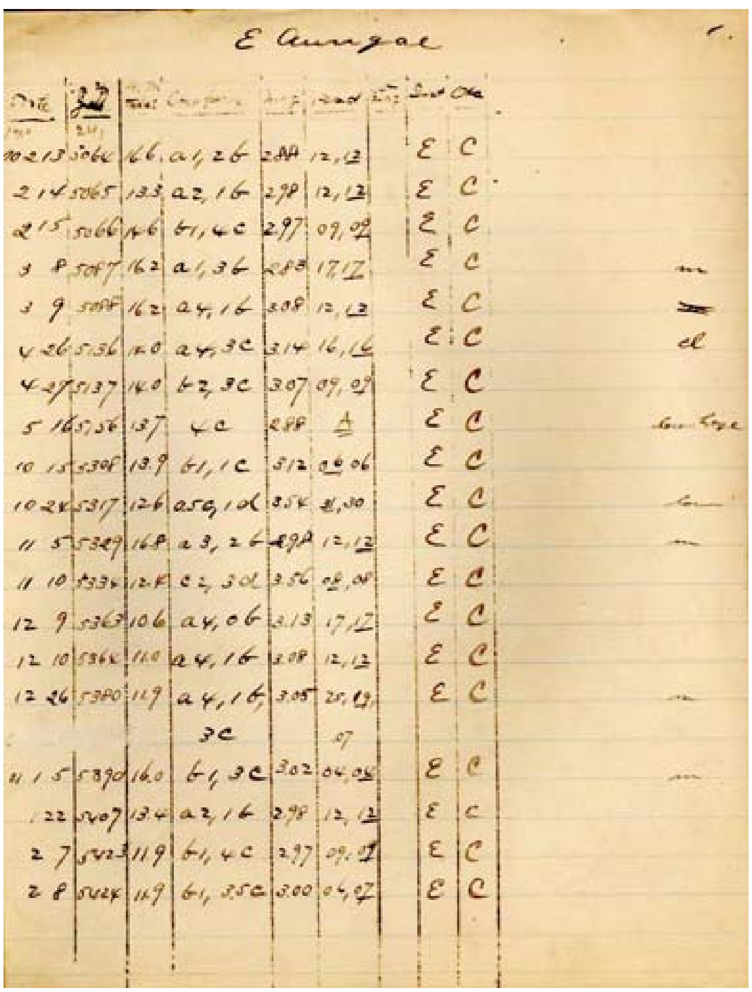
MICHAEL SALADYGA AAVSO HEADQUARTERS

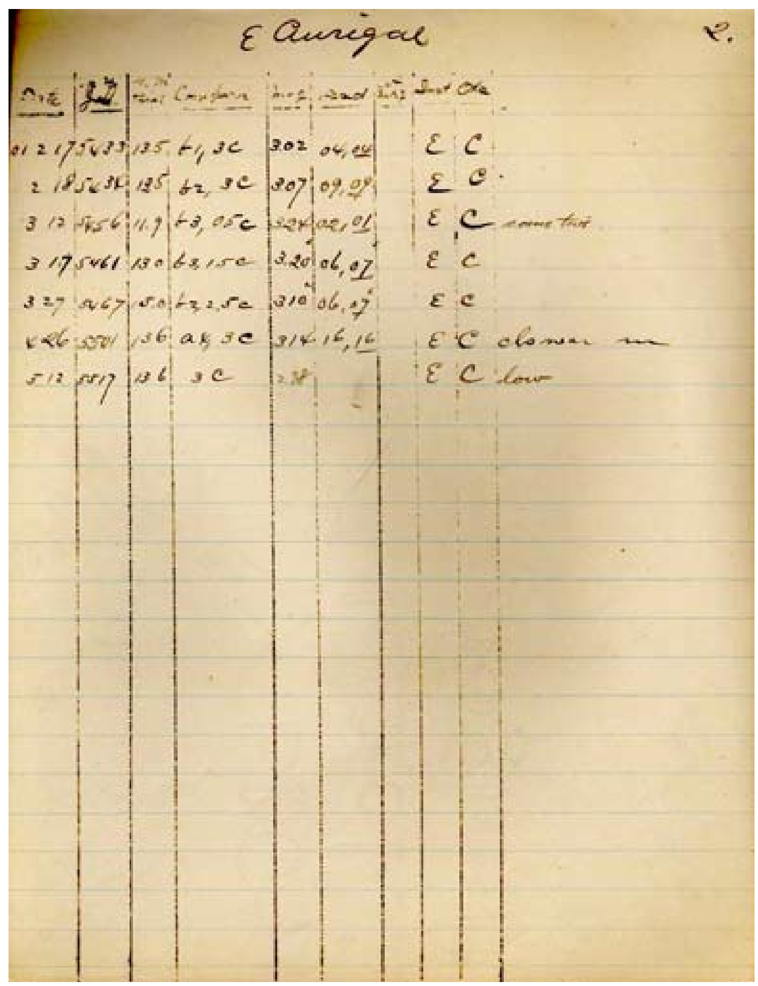
While on a search for historical information about epsilon Aurigae for the CitizenSky newsletter, I found a document listing twenty-six observations of the star that were made by Leon Campbell in 1900 and 1901! These "lost observations" had been filed with the folders of mean light curves that had not been used for some forty years, and thus were overlooked at the time of the AAVSO's archival data entry project in the 1980s–1990s. These observations are now included in the AAVSO International Database.



The cover page: "ε Aurigae. Visual Obs. L. C."

The twenty-six observations shown here run from February 1900 to March 1901 (JD 2415064–2415517). When he began making the observations, Leon Campbell had turned nineteen just one month earlier. The lad had begun working as a staff assistant at Harvard College Observatory in 1899, at age eighteen, learning how to observe variable stars on the observatory roof. By the end of that year he was an accomplished observer, and, of course, in 1915 he would be mentoring AAVSO founder W. T. Olcott, and become the AAVSO Recorder. It is interesting to see Campbell making observations of this star at such an early date; the first campaign-wide effort to observe eps Aur in eclipse did not take place until 1928. ★





The two pages of twenty-six observations of epsilon Aurigae made by Leon Campbell in 1900–1901

A REPORT ON THE GALWAY ASTROFEST

JOHN O'NEILL (ONJ)
DUBLIN, IRELAND

The 7th annual Galway Astrofest took place on 12–13 February 2010 at Galway City, Ireland. Over the weekend, ten talks were given on a range of topics from the Asian Space Programme to extra-galactic astronomy. Those attending were also treated to dark sky observing outside the city in Connemara, with two clear nights in a row (a rare thing in Ireland)!

Of particular interest to variable star observers were a couple of talks. Dr. Don Pollacco (Queen's University, Belfast) covered SuperWASP. This is a project which has resulted in the discovery of several interesting exoplanets by the transit method. SuperWASP stands for "Wide Angle Search for Planets" and this aptly describes the setup—eight 200mm focal length f/1.8 telephoto lenses scan the sky at each of the two observatories involved. The observatories are at the Roque de Los Muchachos Observatory, La Palma, Canary Islands, for the northern hemisphere and at the South African Astronomical Observatory (SAAO) for the southern hemisphere.

Dr. Vitaly Neustroev (National University Ireland, Galway) talked on "Amateur Astronomers and Cataclysmic Variables." He mentioned that variable star observing was one of the few areas in which amateurs could contribute to science. Since he often uses AAVSO data for his research, he was very enthusiastic in his encouragement for amateurs to take up variable star observing and submit their data to the AAVSO. Dr. Neustroev is from Kazan, Russia.

AAVSO staffer Sara Beck extols the virtues of variable star observing to the crowd at the Galway Astrofest

There was also an AAVSO/VSOG variable star stand manned by Sara Beck and John O'Neill. The main topics on the display were epsilon Aurigae and Citizen Sky. VSOG ("Variable Star Observers Group") is the name of the Irish variable star group. ★

AAVSO SPRING MEETING

We are very happy to invite our members, observers, and friends to the 99th Spring Meeting of the AAVSO. This meeting will be held in Mendoza, Argentina, April 15–18, 2010, at the Valle Grande Hotel and Resort, which is close to San Rafael City in the southern region of Mendoza province.

For more information and for registration, please visit the URL below:

http://www.aavso.org/aavso/meetings/spring10.shtml

AAVSO ON THE ROAD

★ AAVSO council member Pamela Gay will be one of the featured speakers at the 19th annual Northeast Astronomy Forum & Telescope Show, April 17–April 18, 2010, Rockland Community College, Suffern, New York.

http://www.rocklandastronomy.com/neaf.htm

★ Also featuring Pamela Gay and AAVSO visiting scientist Stephen Levine is the Northeast Astro-Imaging Conference, April 15th and 16th, 2010, Holiday Inn, Suffern, New York.

http://www.rocklandastronomy.com/NEAIC/

★ AAVSO staff Virginia Renehan and Mike Simonsen will be attending NEAF also.

IN MEMORIAM

MEMBERS, OBSERVERS, COLLEAGUES, AND FRIENDS OF THE AAVSO

GEORGE F. LENZ (LNZ), AAVSO member and observer since 1984, died February 11, 2010, from complications due to pneumonia. In his 26 years with the AAVSO, George contributed 2,892 visual observations. He taught at the University of New Orleans and at Tulane University in mathematics and philosophy. In Wilton, Connecticut, where he had lived for most of his life before moving to New Orleans, George, a Korean War veteran and holder of the Air Medal, was Justice of the Peace and Registrar of Voters. George attended many AAVSO annual meetings, some with his wife Carolyn, and was an occasional and always cheerful visitor to AAVSO Headquarters.

ADVENTURES IN SCOTLAND

JOHN O'NEILL (ONJ) DUBLIN, IRELAND
SARA BECK (BSJ) AAVSO HEADQUARTERS

AAVSO'ers Sara Beck and John O'Neill made a brief astronomical tour in Scotland in February, 2010, and came back with lots of new information and these pictures. (Photos by S. Beck except as noted.)

John and Tom with the Gregory telescope. This 0.94-m (37-inch) Schmidt-Cassegrain reflector is fitted with a research quality CCD camera for direct imaging and has the distinction of being the largest operational optical telescope in the UK.

AAVSO members/observers John O'Neill (ONJ) and Thomas Lloyd Evans (LTE), standing in front of the observatory housing the Gregory Telescope at St. Andrew's University in Scotland.

The "Old High School" observatory, housing the 12.5-inch telescope, on Spittal Street in the center of Stirling, Scotland. Note the sundial over the door.

The telescope is a beautiful 12.5-inch f/9 Newtonian reflector, designed, constructed, and installed by William Peck (1862–1925) in 1889. Today the Stirling Astronomical Society is fortunate to have the use of the telescope located on the roof of the former High School, now The Barcelo Stirling Highland Hotel. The telescope belongs to Stirling Council and is preserved and maintained by Society members. John and Sara were graciously given a tour by Hamish McPhee, a member of the Society. Photo from the Sterling Astronomica Society website: http://www.stirlingastronomicalsociety.org.uk/telescope.html

THANKS TO OUR SPONSORS!

Small Amplitude Challenges for Visual Observers

SEBASTIAN A. OTERO (OSE)
BUENOS AIRES, ARGENTINA

Although traditionally visual observers have been following large amplitude variables, specially LPVs, CVs, or Cepheids, in this article we present several examples of other classes of variable stars that could benefit from a careful and continuous visual monitoring and also from a literature search for previously published observations.

Kappa Canis Majoris and the Be stars

The Be stars are a subset of the B-type stars. Be stars show emission lines in their spectra, arising from an extended atmosphere or a gas disk surrounding the star. These disks are ejected from the star's equatorial plane due to its large rotational speed (up to 500 km/s) and, depending on the orientation of the star axis to our line of sight, they can cause brightenings (for those stars seen pole-on, where the disk adds to the star's brightness) or fadings (for stars seen equator-on, where the disk is occulting part of the star's photosphere).

The Be-ness of a star is usually a transient phenomenon. The star may be a run-of-the-mill B star at times. Also, the variations displayed by Be stars are heterogeneous. Pulsations, outbursts, binary interaction, disk precession, and other factors may cause light variations in these stars. That's why their light curves usually combine short-, mid-, and long-term variations superposed. The long-term changes are those the visual observer can detect and record more easily and may help with the understanding of this fascinating family of stars.

Kappa CMa is one of the brighter examples of the class. The *General Catalogue of Variable Stars* (GCVS; Kholopov et al. 1985) classifies it as a GCAS variable with a range in V from 3.78 to 3.96. When I started observing it back in 1997, I immediately realized something wasn't right. My estimate was 3.7, so either I was estimating it too bright or the star was not behaving as expected. Furthermore, my visual memories from years before becoming a VSOer, when I was devoted to deep sky observing, told me that the star

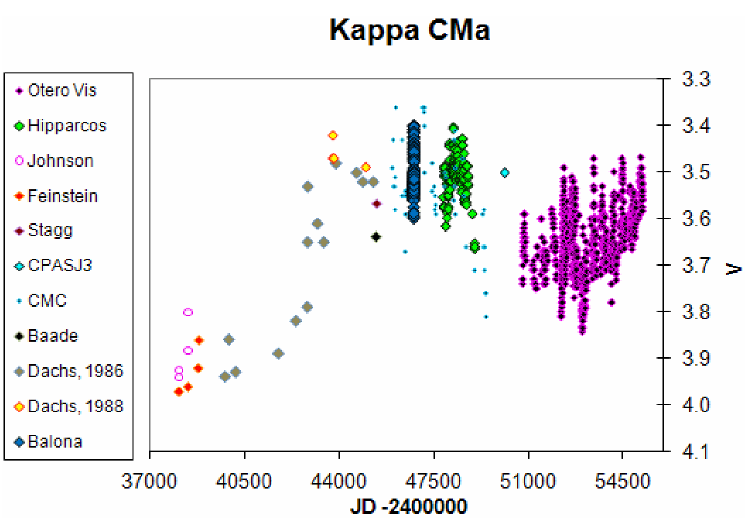


Figure 1. Light curve of kappa CMa including all the data published in the literature. The GCVS range was based only on Johnson's and Feinstein's observations that turned out to be in the quiescent state.

had been this bright (or even brighter) from the very first time I saw it. Years passed by and I collected more and more observations of kappa CMa. With time I became a data-miner and one of my projects was searching the literature to find as much data as possible on every star I observe. So I was able to plot kappa CMa observations published since 1963 and the resulting light curve (see Figure 1) clearly showed how the star brightened dramatically over the years and got even brighter than V = 3.4 between 1984 and 1987. A very long and slow outburst had taken place and no one seemed to have noticed. Although it faded slowly after that peak, kappa CMa never returned to its previous faint state and after a minimum around 2002–2003 (V = 3.7) it has been slowly brightening again in recent years (V = 3.5 as you read this in 2010).

The moral for the kappa CMa history is: never believe blindly in catalogue values. Observe and report what you see. Stars (especially those of the eruptive kind) may show unprecedented behavior and you may be the first person to notice that.

V382 Carinae and the irregular yellow supergiants

V382 Car was classified in the GCVS as a classical Cepheid with an amplitude of 0.18 magnitude. I started to observe it, also in 1997, to see if I could detect its variations. I couldn't, or at least no Cepheid light curve came up, so I dropped it from my observing program.

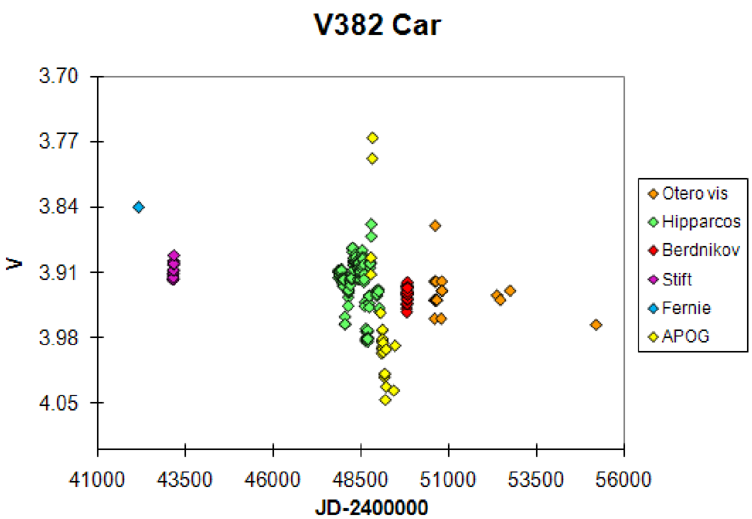


Figure 2. Historical light curve of V382 Car showing why the star can be confused with a constant star if not observed long enough.

I recently did the same literature search as I did with kappa CMa and found out interesting things about this G0 hypergiant (hypergiants are even brighter than supergiants, with absolute magnitudes higher than –7).

In 1995 Berdnikov and Turner published a paper that used 29 observations on 25 nights to state that "V382 Car is not a variable star." Theirs was an example of jumping to conclusions. By that time, the Hipparcos satellite had been measuring V382 Car for more than 3 years and the Auckland Photometry Observers Group (New Zealand) had a lot of unpublished observations of the star (Figure 2). Together these two datasets had recorded a 0.28-magnitude

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OTERO: CHALLENGES
CONTINUED...

brightening and fading event in 1992–1993 (see Figure 3). The Auckland data, collected by Harry Williams and Stan Walker from Milton Road, recorded the brightest and faintest magnitudes measured for V382 Car (V = 3.77 and 4.05) and proved that even boring stars can be fun at times.

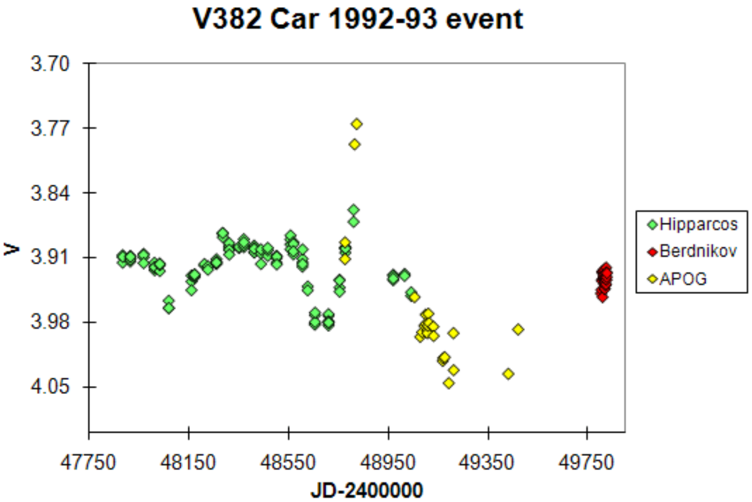


Figure 3. Light curve of V38 Car showing a rapid brightening followed by a fading to a fainter-than-normal magnitude. Auckland observers were lucky to record the brightest and faintest magnitudes of the star in history.

V382 Car is not the only irregular very luminous yellow variable. Several yellow super/hypergiants show irregular variations and thus can't be classified as SRd, the only variability class in the GCVS one can think of for stars like these. These are not Cepheids, these are not RV Tauri stars, and these are not semirregulars. The same way as late type SRb giants have their Lb counterparts and late type SRc supergiants have their Lc relatives, a new Ld class to include these variables would be a natural result of these findings.

More bright examples of this kind are NSV 4199 (b Vel, F0Ia), that varies irregularly between V = 3.76 and 3.91 (see an article in Spanish about it at http://www.surastronomico.com/variable_200903.htm); delta CMa (F8Ia), that varied between V = 1.82 and 1.85 during the Hipparcos mission; iota1 Sco (F3Ia), also with an amplitude of 0.03 magnitude between V = 3.00 and 3.03; and gamma Cyg (F8Ib), varying between V = 2.20 and 2.24.

V382 Car has the highest luminosity and—as expected—its amplitude is also larger.

Unsolved eclipsing binaries

A third and final example of a good project both for visual and CCD observers is the continuous monitoring of eclipsing binary systems with no known period. Most of them have eclipses recorded by the different sky surveys (ASAS-3, Hipparcos, NSVS; Pojmański 2005, Perryman et al. 1997, Woźniak et al. 2004, respectively) but the number of dimmings is not enough to allow a period determination. This is a gold mine for visual observers who can watch them often and are spread all over the Earth. The greater the number of eclipses caught, the higher the chances to find the orbital period. A list of the unsolved stars is kept on my variable star webpage: http://varsao.com.ar/eclipsing_binaries_observing_plan.htm.

As time passes, more observations from the surveys become available and some of the systems get solved, but due to their long periods or their brightness (too bright to avoid CCD saturation or too faint to have reliable data) most of them are still in need of more observations. One example is NSV 17304, an eclipsing binary in Puppis (Figure 4).

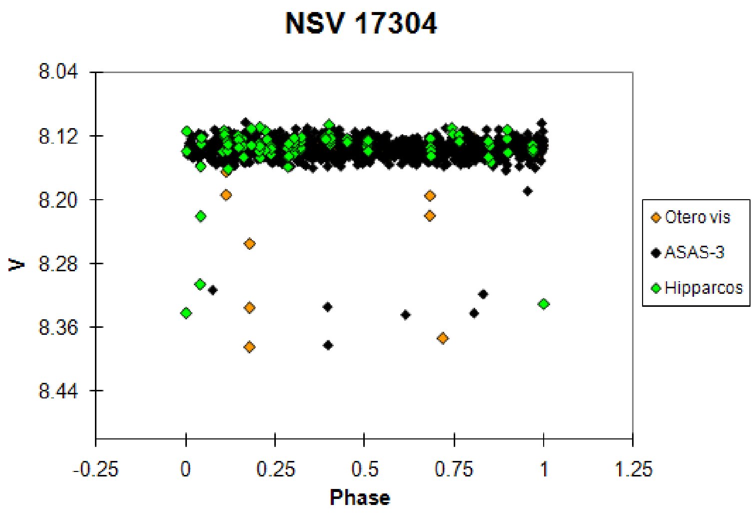


Figure 4. Light curve of NSV 17304, one of the unsolved eclipsing binaries, folded with no specific period to show how a very small percentage of the observations fall at fainter magnitude. This system is in Puppis and has an amplitude of 0.25 magnitude in V.

Nine stars have been solved using visual observations in the framework of this project up to now; they are shown in Table 1 with the star name, V magnitude, amplitude, and the observer(s) who observed them to determine the solution.

Table 1. Project stars solved using visual observations.

Star	*V*	*Amplitude*	*Observer(s)*
V438 Pup	6.0	0.24	Otero
KV CMa	7.2	0.24	Otero
VZ PsA	5.7	0.17	Otero
LS CMa	5.6	0.16	Otero
V353 Hya	7.4	0.60	Otero and Chris Stephan
V975 Cen	7.4	0.39	Federico Claus and Otero
GSC 3612-1565	11.1	0.60	Pavol Dubovsky
GSC 4257-0906	10.0	0.62	Dubovsky
NSV 15737	6.9	0.56	Dubovsky

Although most of the stars in the program show small amplitudes, some can be followed visually and observers may wish to push their skills to the limit to see if they can detect these small variations. One way to check if you're doing well with small brightness differences is observing a known small amplitude eclipser for a long time (a whole season) without consulting its ephemeris in order to see if a representative light curve is obtained. I recommend two systems for this task: GU CMa, (amplitude 0.25 magnitude, chart at http://varsao.com.ar/Carta_X_Mon.htm) and V4407 Sgr (amplitude 0.21 magnitude, chart at http://varsao.com.ar/Carta_V4407_Sgr.htm). I did well with both! ★

REFERENCES ON PAGE 20

EYEPIECE VIEWS

CONDUCTED BY GAMZE MENALI (MGQ) AAVSO HEADQUARTERS

Spring is around the corner... well, almost! With Spring comes the AAVSO's spring meeting! This year it will be in Argentina. For more detailed information, please visit the URL below:

http://www.aavso.org/aavso/meetings/spring10.shtml

Most you are reading about or participating in it, but for those of you who might not have gotten the chance to follow, there has been a very productive discussion going on in our discussion group regarding the state of visual observing and visual observations' scientific value. Our hope is that this fruitful discussion will spark even greater interest in visual observing. Please know that visual data are, as they always have been, greatly appreciated. Our visual observers play as equally important a role as any other. Sure, the technology is a wonderful thing, sure, there is a lot to be said about imaging techniques… but these take nothing away from the importance of visual observing. As one of the discussion group posts stated, visual observing is not being replaced by any one thing. There is always room for all. Harmony is the key.

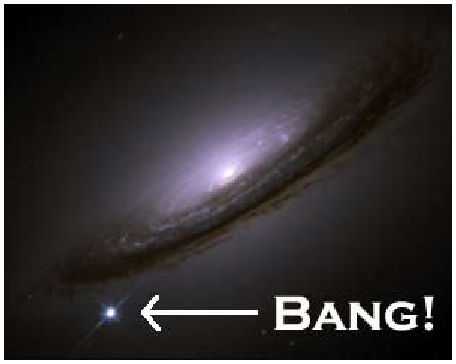
Until next time, thanks and good observing!

Gamze Menali
AAVSO Technical Assistant

Dwarf Merging Makes for an Explosive Combo

PHIL PLAIT, BAD ASTRONOMY

Type Ia supernovae are very important exploding stars. It's thought that this particular type of supernova has a very special property: they all explode with about the same energy. This makes them very valuable, because it means that if you can simply measure how bright they appear to be, you can figure out how far away they are. It's like seeing headlights on the highway; dim ones are far away, and bright ones are close.

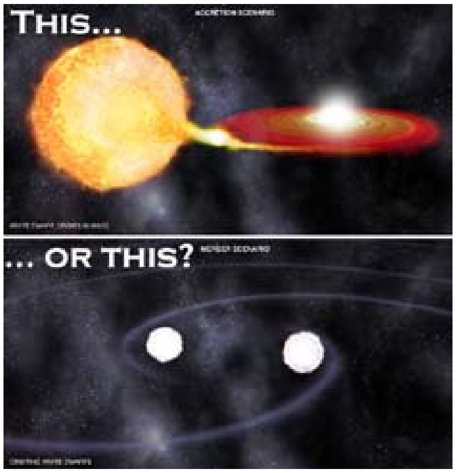


SN 1994d from the Hubble Space Telescope

Of course, in reality, it's not that easy. But after a Herculean effort, astronomers in the late 1990s figured they had been able to account for any small differences in brightness and could use these stars as "standard candles," benchmarks to calculate cosmic distances. Because they're so bright, they make great milestones because they can be seen pretty much all the way to the edge of the observable Universe.

The thing is, it's not clear how a type Ia actually forms. There are two models, both involving white dwarfs. These are the ultradense remnants of dead stars, the exposed cores of stars after they shed their outer layers. The Sun will one day be a white dwarf (in about 6 – 7 billion years, so don't hold your breath).

Because of complicated quantum physics, it turns out that white dwarfs can only have so much mass; if they exceed about 1.4 times the mass of the Sun they can collapse, either forming an even denser neutron star, or exploding as a supernova.



Model of a type Ia white dwarf

The first model of a Type Ia is a white dwarf orbiting a star like the Sun. The intense gravity of the dwarf draws material off the normal star, a process called accretion. The matter piles up, the mass limit is exceeded, and BANG! Supernova.

Well, it's a lot more complicated than that, but close enough.

The second idea is that you have two white dwarfs orbiting each other. Over time they spiral in (this time due to relativistic effects called gravitational waves), get too close together, merge, and BANG! Supernova.

Astronomers have always assumed that the accretion scenario is the far more common of the two, because it takes a long time for two dwarfs to merge, whereas accretion can happen easily if a dwarf happens to be paired up with a normal star (which should be pretty common). But how do you tell which is which?

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PLAIT: EXPLOSIVE COMBO
CONTINUED...

It turns out that the two different scenarios leading up to the explosion have two very different effects: accretion makes a lot of X-rays, while a merger does not. So astronomers did what you'd expect: they pointed the Chandra X-Ray Observatory at a bunch of galaxies and observed supernovae. What they found was pretty surprising: the amount of X-rays from Type Ia supernovae in nearby galaxies was 30–50 times lower than what would be expected from accretion. In other words, their observations strongly favor the idea that it's the merger of white dwarfs that causes Type Ia supernovae.

Well! I was pretty surprised to hear that. Like other astronomers, I figured it was accretion that was the culprit. Now mind you, there are some caveats here. They observed elliptical galaxies, which tend to have an older population than spirals, so you might see more mergers than accretions. Also, it's possible things were different in the past, and when we observe very distant galaxies were seeing them as they were billions of years ago.

But still, you just don't expect to see what the astronomers saw, so it seems to me like they're on to something here.

This has some interesting ramifications. It certainly affects a lot of fields of astronomy, like how binary stars form and change over time. But it may also affect cosmology, the study of the birth, evolution, and eventual fate of the Universe itself. If Type Ias are caused by a different scenario than previously thought, could it mean that our measurements of the distant Universe are wrong?

I asked this question specifically at the Chandra press conference, and was told that the two different scenarios produce explosions with pretty much the same energy, so this may only affect cosmological measurements a small amount. However, right now our theoretical models of the merger scenario are still pretty rough, so it's unclear if the peak brightnesses of the two models are the same.

This may affect our measurements of dark energy, the mysterious pressure that seems to be accelerating the expansion of the Universe. My gut reaction is that this won't matter a huge amount, since we have lots of independent ways of measuring dark energy, and they all appear to be in rough agreement. But this means we have one more thing to take into account in those measurements. And it may prove to be useful; if we can distinguish between the two supernova generators, our measurements will get that much more accurate.

I have to say I'm pleased with this; I studied supernovae in college and grad school, eventually studying one for my Ph.D. (though it was of an entirely different flavor from this kind). I remember reading a long technical paper about the different Type Ia scenarios back then: it's been a mystery for a long, long time. But with perseverance, the right equipment, and more than a touch of cleverness, we're a big step closer to figuring this all out! ★

Images courtesy of NASA, ESA, The Hubble Key Project Team, and The High-Z Supernova Search Team, and NASA/CXC/M.Weiss (adapted a bit by The Bad Astronomer)

The Nearest Variable Star—Our Sun

MIKE SIMONSEN (SXN)
IMLAY CITY, MICHIGAN

We often hear the distance to the nearest star quoted as being 4.2 light years away, and while Proxima Centauri is 4.2 light years distant, the nearest star to us is our Sun. Yes, the Sun is a star, a rather average star as it turns out, but still an awesome thing to behold, once you understand the power and majesty of such a beast.

Most stars are so far away that even in the largest telescopes they appear as pinpoints of light. But our Sun is comfortably close. Close enough that we can make out the solar disk with the unaided eye. So close we can feel the radiation from it when we look up on a sunny day. This gives us the opportunity to study a star, our Sun, in much greater detail than we can study any other star.

So what do we know about our Sun? First thing—it's big. Its diameter is 1,329,000 km, about 109 Earths stretched end to end. You could fit 1.3 million Earths into the volume of the Sun. The Sun is mostly hydrogen, about 71% by mass, 27% helium, with heavier elements making up the remaining 2%. The energy in its core, produced by nuclear reactions, is transferred to the surface layer, the photosphere, by radiation until it is about two-thirds of the way to the surface. It is carried the rest of the way through convection. Remarkably, it takes about 10 million years for energy created in the core to make it to the surface of the Sun. The temperature in the core of the Sun is estimated to be 15.6 million kelvins (K). The temperature at the surface is around 5700 K.

The Sun is not a solid body like the Earth, so different regions rotate at different rates. At the equator the Sun rotates one full turn in 25 days. At 40 degrees latitude it takes 27–28 days, and near the poles the period is 33.5 days. This differential plays an important part in creating some of the Sun's most active and interesting features.

The Sun has a powerful magnetic field, generated by the kinetic energy of the hot, highly ionized gases in the core. The magnetic field lines under the photosphere that run from pole to pole are twisted parallel to the equator by the Sun's differential rotation. Active regions on the Sun are thought to be distorted magnetic field lines breaking through the photosphere.

The calm, steady, warming face of the Sun as seen by the unaided eye belies a roiling, boiling, turbulent pandemonium of activity. Through even a small telescope, the Sun presents some very interesting, constantly changing features.

Solar disk with sunspots (photo courtesy of NASA)

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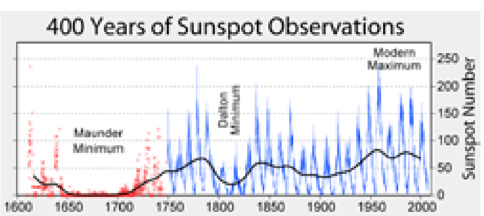
SIMONSEN: OUR SUN
CONTINUED...

WARNING: Never look directly at the Sun with a telescope. Improper use of a telescope or binoculars to observe the Sun will result in blindness. Always use approved solar filters, or project the image of the Sun onto a screen.

The most obvious features visible in a small telescope are sunspots. Sunspots are areas on the photosphere that appear dark because they are cooler than the surrounding areas. Most well-developed sunspots have an inner dark region called the umbra and a larger, lighter area called the penumbera. Spots usually appear in pairs, and they tend to be confined to an area from about 40 degrees latitude to the equator. Spots can vary in size from small spots about 300 km across, called pores, to groups stretching out 100,000 km. The largest spots usually last the longest, up to 6 months.

Sunspot activity waxes and wanes with a complex rhythm that researchers are still sorting out. The most famous rhythm is the 11-year sunspot cycle. When at maximum, the Sun may have as many as 100 sunspots on its surface. At minimum, this number may be 10 or less. The numbers of sunspots have been tracked and recorded by observers for several hundred years (including AAVSO solar observers since the 1940s), revealing this approximately 11-year sunspot cycle.

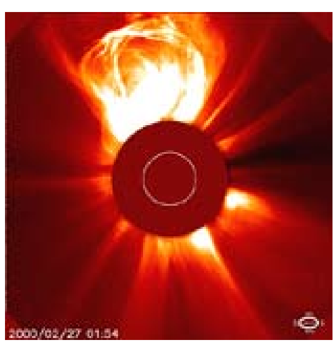


In reality, this cycle ranges in length from 9 to 12 years. Some cycles are intense, while others exhibit very little solar activity. In the 17th century, during a period called the "Maunder Minimum," the cycle appeared to stop and the Sun went quiet for about 70 years. No one knows why. The current solar minimum is also one for the record books. The near total lack of sunspots and other activity on the Sun in 2008–2009 took everyone by surprise, which just shows how much more we have to learn to understand our nearest star.

Solar flares are another phenomena associated with active regions on the Sun that we don't understand very well. These are sudden explosions releasing energy that heats up and accelerates gas in the Sun's atmosphere. Temperatures can reach hundreds of millions of degrees and particles are ejected into space almost at the speed of light. Most of the radiation is emitted as X-rays, but flares are also observed in visible light and in radio waves as Sudden Ionospheric Disturbances. Charged particles ejected by flares are potentially hazardous to humans and sensitive electronic equipment in space.

Solar flares are not well understood (photo courtesy of NASA)

Surges of extreme ultraviolet (EUV) photons released by flares can heat Earth's upper atmosphere, causing it to "puff up" and drag down low-orbiting satellites. EUV rays also break apart atoms and molecules, creating a layer of ions in the upper atmosphere that can severely disturb radio signals.



A coronal mass ejection (CME) (photo courtesy of NASA)

The largest scale ejection of matter from the Sun is called a coronal mass ejection (CME). Matter is shot into space at speeds ranging from 10 to 3000 km per second. CMEs can have a profound effect, producing a shock wave followed by a disturbance in the solar wind. When these disturbances reach the Earth they can cause geomagnetic storms. Electrical currents in the ground induced by one of these storms can damage power grids, while currents in the ionosphere can wreck satellites. The frequency of CMEs varies with the sunspot cycle. At solar minimum there may be one CME per week. During solar maximum the average can rise to two or three per day!

When energy from the Sun interacts with the Earth's outer atmosphere, it can excite oxygen and nitrogen molecules some 100 and 400 km above the surface, respectively, emitting a green (oxygen) or red (nitrogen) glow. This in turn excites observers on the ground, who can watch the aurora borealis dance across the sky for hours. This is commonly referred to as the "Northern Lights" in the northern hemisphere, or "Southern Lights" (aurora australis) in the southern hemisphere.

There may just be a glow to the north over the horizon (south if you live in the southern hemisphere), or you may see arcs or bands of light, sometimes with vertical rays spiking high into the night sky. During strong events you may witness the famous curtain effect, or the "coronal effect" in which all the rays appear to converge almost directly overhead.

For all its potential destructive power, life on Earth could not exist without the Sun. It gives us the light, heat, and energy we need to live. Our weather is driven by the energy from the Sun being redistributed through our atmosphere and oceans in currents and eddies. The Sun and everything in its environment, including the Earth, forms an immense, dynamic, interconnected system.

When studying the effect of the Sun on the Earth, scientists measure the amount of solar energy, in all wavelengths, that falls on a given area of the top of the Earth's atmosphere. They called this the "solar constant." But, it turns out this "constant" varies by as much as 0.1% over the 11-year sunspot cycle, and perhaps even more over longer periods, so now scientists use the term "total solar irradiance." Although the Sun appears constant, it is a variable star that emits constantly changing energy.

Obviously, with all this interaction between the Sun and the Earth, scientists are very interested in understanding, and one day, predicting, the Sun's activity. In February NASA launched the most

CONTINUED ON NEXT PAGE

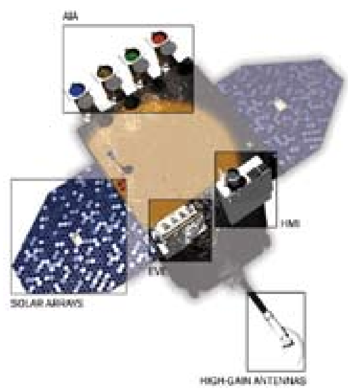
SIMONSEN: OUR SUN
CONTINUED...

EYEPIECE VIEWS

advanced solar observatory ever built, the Solar Dynamics Observatory (SDO).

SDO is designed to probe solar variability unlike any other mission in NASA history. It will observe the sun faster, deeper, and in greater detail than any previous observatory. SDO will record IMAX-quality images of the sun every 10 seconds using a bank of multi-wavelength telescopes called the Atmospheric Imaging Assembly (AIA). SDO will also observe the sun at wavelengths in which the sun is most variable, the extreme ultraviolet (EVE). The satellite's Helioseismic Magnetic Imager (HMI) can actually look inside the sun at the solar dynamo itself.

The spacecraft is designed to transmit unprecedented amounts of data from Earth orbit.



The Solar Dynamics Observatory (SDO) (photo courtesy of NASA)

It should send back 150 million bits of data every second of every day, more than any other previous NASA Mission. To put that in perspective, that's like downloading 500,000 songs a day. NASA has set up two 59-foot satellite dishes in New Mexico just to handle that duty.

Modern telescopes and spacecraft have penetrated the sun's blinding glare and found a maelstrom of unpredictable activity. As the nearest star, the Sun is the one star in the Universe we can investigate close up. The processes going on in the Sun are the same as those at the centers of other stars in the sky. What we learn about our star we can apply to the rest of the stars in the cosmos, including the vast number of variable stars. ★

DOUBLE DIPPING (SPRING)
Variable Stars Near Deep Sky Treats

MIKE SIMONSEN (SXN)
IMLAY CITY, MICHIGAN

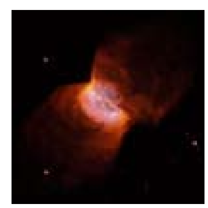
March is typically the time of year observers take on the challenge of the Messier Marathon. The Messier Marathon is an attempt to view all 110 Messier objects in one night, and it takes the entirety of a night to achieve it. You have to start as early as you can, to get the first few objects, as Cetus and Pisces are setting, and the last few objects in Aquarius and Capricorn are a challenge, even if you've managed to say fresh after a whole night. I personally have never completed the marathon, and I can't say I know anyone who has actually done it.

The important thing for this piece is that as warmer spring temperatures arrive, there is no shortage of deep sky treats to keep your friends and relatives entertained. Meanwhile, you and I will figure out how to squeeze in some variable star observing in between galaxies, nebulae, and star clusters. It will be a bit of a challenge at this time of year because there just aren't that many stars in the sky. As fate would have it, in spring the plane of the Milky Way lines up pretty closely with the horizon in early evening. So we don't see the fullness of the galaxy in the sky. Instead, everywhere we look we are looking out into deep space, away from the center or arms of the Milky Way.

We ended our winter tour in Orion, so we'll head east and start with the brightest star in the sky, Sirius. Glowing at magnitude –1.08, alpha Canis Majoris is a blinding object in a telescope. 8.5 arc minutes southeast, embedded in the glare from Sirius, is the UGZ type variable, HL CMa. Ranging from magnitude 10–14.5, it is an active, unpredictable star that is visible most of the time in 10-inch or bigger scopes. Four degrees south of Sirius is the beautiful star cluster, M41. It contains about 100 stars, including several red giants, the brightest glowing at magnitude 6.9 and situated near the cluster's center.

Heading north into Monoceros, we are going to luck out and observe two nebulae that have variable stars embedded inside them. It doesn't get any easier than that. Two for one, two times in one constellation!

First on the tour is NGC 2346, also known as Butterfly NGC 2346. Discovered by William Herschel in 1785, NGC 2346 is fairly conspicuous and has been extensively studied. Among its most remarkable characteristics are its unusual butterfly shape and its unusually cool central star, V651 Mon, which varies irregularly from 11.3 to 15.3.



NGC 2346 (photo courtesy of NASA/STScI)

The variable is a spectroscopic binary and has a period of about 16 days. Variability is probably due to clouds of dust in orbit around the binary. As this dust is heated by the central star, it glows brightly in the infrared.

The evolutionary track taken to create this dusty, double variable system is pretty interesting. Millions of years ago, the more massive star expanded to become a red giant, swallowing up its companion and setting in motion a process that created this butterfly effect. As the less massive companion spiraled inward towards its massive partner, rings of gas were expelled. As the hot core of the red giant was gradually exposed, powerful stellar winds inflated two huge bubbles of gas, producing the butterfly effect.

Continuing north through Monoceros, we come to NGC 2261, "Hubble's Variable Nebula." It's named after Edwin P. Hubble, who carried out some of the early studies on this object. The nebula is a fan-shaped cloud of gas and dust that is illuminated by R Mon, the bright star at the apex of the nebula. The variability comes from dense condensations of dust near the star casting shadows out into the nebula. As they move, the illumination changes, giving

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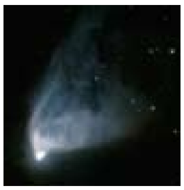
SIMONSEN: DOUBLE DIPPING
CONTINUED...

rise to the variations first noted by Hubble. There is probably a symmetrical counterpart of the fan-shaped nebula on the southern side of the star, but it is heavily obscured from view by dust lying between this lobe and our line of sight.

The star, R Mon, can't be seen directly, but only through light scattered off of dust particles in the



NGC 2346 (photo courtesy HST/NASA/JPL)

surrounding nebula. R Mon is believed to be a massive young star, with a mass of about 10 times the Sun, and may be only 300,000 years old. It varies irregularly from about magnitude 11to 13.2.

By this time, someone will have asked you, "Hey, what is that bright red star up there?" You can make their day as you tell them it's the planet Mars. Unfortunately, it will have shrunken to about 10.4 arc seconds by mid-March and will be a pretty underwhelming site in most telescopes on an average night. But everyone will want to look anyway, just so they can say they saw it.

Luckily for us, about 35 arc seconds away to the southwest lies RR Cnc, a pretty interesting Mira with a range of 9.8–15. Mars never moves far from RT Cnc in March, so you can use the red planet as a guidepost to one of my favorite red stars in Cancer.

Continuing east-southeast you'll run smack into the enormous star cluster M44, the Beehive Cluster, or Praesepe (Latin for manger). This cluster is easily visible to the naked eye from suburban skies and contains several variable stars within it, including the eclipsing binary TX Cnc and several delta Scuti variables. But I'm going to point you to U Cnc, about 1 degree southwest of the center of the cluster. U Cnc is a Mira that varies from 8.5 to 15.5. The charts and sequence have been extensively revised to cover the entire range adequately, making this star a joy to observe nowadays.

The other open cluster in Cancer is of course, M67. M67 is one of the oldest known open clusters, believed to be about 3.5 billion years old. Open clusters usually self-destruct before reaching this age. Being such a mature cluster, it has many evolved red giants within its population of 500 or so stars. To me, M67 is merely a star hop jumping-off point to get to AK Cancri, a nice little cataclysmic variable in Cancer. For such a small constellation, Cancer is endowed with lots of cataclysmic variables, namely DW, AK, SY, GY, GZ, DE, CC, AT, EG, YZ, and HH Cnc, and SDSS0808.

AK Cnc is dangerously close to the ecliptic, so it's not unusual to find an asteroid or two in the field when observing. You need to be sure you are actually witnessing an outburst or you may find yourself embarrassed by a pesky asteroid.

Regulus is another bright star in the spring sky, and makes a perfect place to begin your star hop to one of the all-time favorite Miras in the AAVSO program, R Leo. From Regulus, alpha Leonis, you pan west to nu Leo and then about the same distance again to 18 and 19 Leo. R Leo is just south of 19 Leo. Once you've found the triangle of 18 and 19 Leo and the star due east of this pair, you will never forget it. R Leo varies from 4.4 to 11.3, so it is always visible in a small telescope, and often only binoculars are needed.

Leslie Peltier recounts in *Starlight Nights* how, after several unsuccessful attempts at locating it, he finally found and observed his first variable, R Leonis, on March 1, 1918. As many of us, after that first success, feel foolish when we realize our mistakes that prevented our initial success, so did Peltier. He wrote, "every March first since that night, whenever the skies were clear, R Leonis and I have recalled our first meeting by making a mutual estimate of our brightness." Even though there isn't a deep sky wonder of any consequence nearby, I think a spring night out with the telescope warrants a visit to R Leo. As it happens, the active cataclysmic variable X Leo resides just northeast of the anonymous member of the trio with 18 and 19 Leo, making this location a frequent stop on my patrols.

10.5 degrees north of R Leo is one of the finest galaxies in the sky that is not a Messier object, NGC 2903. How Messier ended up missing this bright galaxy has got to be purely bad luck. Three of Messier's comet discoveries came very close to this galaxy and one, the second comet of 1760, actually passed within 1.6 degrees of it on the night of March 11–12, 1760. William Herschel eventually discovered it in November of 1784.

Two-thirds of a degrees east-southeast is AB Leo, a semiregular variable with a range of 10.7–13.2.

NGC 2346 (photo courtesy NAO)

This one is easy to find—there are plenty of stars and asterisms to help identify the field—and the current AAVSO charts cover the range nicely.

Also in Leo is M105, a bright elliptical galaxy that actually looks like a comet in the eyepiece. It is flanked closely by NGC 3384 and NGC 3389, forming a nice trio of deep sky delights. 1.5 degrees to the northeast is W Leo, a Mira with a period of 392 days, varying between 8.9 and 14.8. There are so many galaxies in this region of the sky you'll be forgiven if you end up off the beaten track and miss W Leo. But she's a fine Mira worthy of your attention once you've taken in an eyeful of galaxies.

Heading due east through the Lion's tail, beta Leo, and then on another 10.5 degrees, lies M88, an impressive spiral galaxy. The infrequently outbursting cataclysmic variable AL Com lies in the same field of view, and is not likely to be in outburst when you visit, so go ahead and take some time to wander in the "Realm of Galaxies" here. There are a lot of Messier galaxies around here—M49, 58, 59, 60, 64, 84, 85, 86, 87, 88, 89, 91, 98, 99, 100—you get the idea. You may spend more time looking at galaxies than variables tonight, but we'll let it go this time.

For this season's "piece de resistance" we have a trio made in heaven. The constellation Virgo features the giant spiral galaxy M61, host of at least six supernovae, the planet Saturn with its rings opening up from edge on, and the excellent Mira variable SS Virginis. Together they form a nice triangle with something to please everyone at each apex. I would start with M61, to get people looking for faint fuzziness and to sharpen their eyepiece skills, then move to the variable before ruining your night vision staring at brilliant Saturn and his impressive rings.

We'll continue this series with the final installment in summer. So long for now. ★

Enjoying the Unexpected

ROD STUBBINGS (SRX)
TETOORA ROAD, VICTORIA, AUSTRALIA

Having made my first observation of a variable star in 1993, I could not have imagined it would lead to such a rewarding hobby. The involvement with professionals and observers all around the world brings many observing experiences.

The view from Rod Stubbings' observatory (photo courtesy of Nicole Emanuel)

In the first few years of observing variable stars I developed a very obsessive passion for these crazy stars. I would observe for two nights in suggestion without sleep, check the night sky on cloudy nights every half hour searching for breaks in clouds, stay in the observatory and observe in between rain and storms, and set the alarm each night when the Moon was present to avoid it. Back then contact with headquarters (RASNZ) was through letters, fax, or, if important, by phone. There was a special program on the SU UMa-type eclipsing star OY Car which required satellite observations. I still remember detecting an outburst of OY Car at 2:00 one morning. Having never telephoned anyone outside of Australia before, and at that time of the night, I was a bit hesitant, and also I was about to alert the Director of the Variable Star Section of New Zealand. I decided to make the call and to my surprise, the director, Dr. Frank Bateson, answered instantly! Just a quick, "Okay, Rod," was the reply, but it was a great feeling knowing the satellite observations took place. This communication situation changed with the availability of the Internet and became much easier.

One time I received an email from Frank Bateson in regard to the SU UMa stars. When one went into outburst he wanted me to observe the star every minute. I replied that I usually went through my list in under two hours, went inside for a cup of tea, then back outside to observe some more, so I would endeavor to make these estimates every minute when a SU UMa star went into outburst. Frank wrote back and commented that it was just as well that we no longer observing flare stars since there would be no dashing in for cups of tea. He well understood the problems of making observations at minute intervals: "Flare stars involved making a visual estimate every 30 seconds for unbroken spells of at least four hours. I was the only 'nut' ever to do this with temperatures well below freezing at Mt. John. It did bring rewards as when major flares occurred I got the entire flares whereas a German graduate who was recording photoelectrically lost the major part of the flares when his recorder ran off scale. Mind you I was younger then and even crazier than I am today."

Well, two SU UMa stars went off one night and after a couple of night's observations, I sent a note to Frank. "I thought this would happen, as there were two SU UMa stars up the other night I decided to stay on TU Men. I have watched for 2 hours the past two nights, having found the second night a little easier to look at the same field so long. I started to see a variation of 0.1 mag. every 3 to 4 minutes if that's possible. On the first night I [had] also seen this and thought maybe my eyes [were] playing tricks but came up with the same result on the second night. Do stars in outburst behave like this?" Frank replied that, "…in SU UMa stars you can observe both the orbital period and, in the case of supermaxima, the superhump period. The former will show a small variation in a few minutes that remains constant for any particular star but differs in both period and amplitude from one star to another. The superhump amplitude varies slightly as the superoutburst progresses and the period may also change slightly. I was glad that you kept with TU Men."

I once commented to Albert Jones that in the early years of his variable star observing he had all the southern sky to himself. Albert mentioned that, looking back, he realized how lucky he was to be "in at the start" of monitoring CVs. He read that VW Hyi was the brightest star of that class in the southern sky, but there did not seem to be any charts for it, although a French bulletin showed a finder chart showing only the brighter stars. Evidently VW Hyi had been discovered on Harvard patrol plates but had not been observed visually. Albert had been able to purchase an old set of CPD catalogues and had a go at plotting a chart showing the CPD stars. The very next night was clear and when he looked, VW Hyi was at maximum and faded over the following days. He later told Frank Bateson what he had been up to and started sending him observations of VW Hyi. Around that time Albert was corresponding with some French amateurs, two of whom, Brun and Petit, were compiling an Atlas of UG stars (which was published later in a Russian variable star journal), and Monsieur Brun asked him to plot a number of southern fields because he did not have catalogues for southern regions. Some were known UGs while others were only suspected and had only "temporary" numbers from Sonneberg Observatory. Hoffmeister had gone to South Africa, taken lots of photos, then taken them back to Sonneberg to study them. On some fields he found one image, so he suspected those might be U Gem stars' "short maxima." Albert kept a watch on these, then Z Cha showed up and later EK TrA. He had the whole sky to himself at first, and then others became interested and looked for outbursts. VW Hyi and Z Cha are two of the most observed stars in the southern sky and today still attract a lot of attention from professionals.

I was observing a lot of unstudied CVs in star fields that had no decent charts until Bruce Sumner offered to produce the charts. I was sky checking the fields for Bruce. This obsession led to a number of stars being caught in outburst for the very first time. One in particular, CG CMa, was discovered by Verlooy on Franklin-Adams plates taken in 1934. CG CMa was considered to be a possible classical nova and one of the most distant in our Galaxy. Duerbeck (1987) identified the possible quiescent counterpart, a star around magnitude 16.4. The cataclysmic classification, however, became less likely when Zwitter and Munari (1995) took the spectrum of the suggested quiescent counterpart, which showed an isolated white dwarf. After observing this star for only two months, I caught an outburst in 1999, the first recorded outburst since its discovery in 1934 on photographic plates. CCD observations showed that the outbursting object was slightly offset from the suggested quiescent counterpart and that the true CG CMa was a 20th magnitude star. The outburst

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STUBBINGS: UNEXPECTED
CONTINUED...

EYEPIECE VIEWS

lasted for 22 days, and CG CMa was reclassified as a new SU UMa-type dwarf nova. CG CMa has had no further outbursts to date.

Still in my memory is the outburst of V4641 Sgr, a black hole binary system 1,600 light years away. On September 15, 1999, I went outside to make a few observations in between clouds. First up was V4641 Sgr. I found the star had exploded to magnitude 8.8, so I sent off an alert. CCD images from Kyoto University, Japan, confirmed the outburst. Astronomers at MIT diverted an X-ray satellite to take a look and it showed a rapid rise and fall in X-ray brightness. Within 24 hours radio telescopes around the world were observing V4641 Sgr. Optically this outburst lasted less than 8 hours. V4641 Sgr still exhibits X-ray outbursts and flares each year and is a great target for the visual observer (it has been brightening to visual magnitude 11). To this day I am still the only person to visually see and record the outburst at magnitude 8.8. This emphasizes the scientific value of visual observations in variable star astronomy.

In 1997 the planetary nebula V651 Mon, which is a spectroscopic binary with an orbital period of almost 16 days, began to show fading episodes. As the star was too low for northern observers, Rafael Costero from Mexico contacted me to see if I could get some observations from the southern hemisphere before the Sun ended the show in late June. I observed V651 Mon for the first time on 30th May and it was fainter than 14.4. My next observations were on June 2 and 3 at around magnitude 11, and I sent these on to Rafael. Apparently I was the first and only observer who had reported data on V651 Mon in the preceding three weeks and observed the emerging of the star from behind the cloud on or about June 2. V651 Mon was now predicted to re-enter the cloud again, stay quite weak for a few days, and then once again rebrighten. I only had a short window of opportunity to observe this star, and I wasn't going to let the usual cloud, rain, and haze beat me. I did observe the next fading around June 15, and again I was able to follow the star's brightening right up to June 22, when it was only 10 degrees above the horizon. The next challenge was to follow the object as soon as it became observable again, July 22, to see if the fading episodes were still ongoing. V651 Mon was bright and remained bright, so the occultations were clearly over. It was great exchanging emails with Rafael on the antics of V651 Mon and I also learned a lot more about the star.

The polar star EF Eri was added to my list in June 1997 after a request from Dr. Frank Bateson. Apparently professionals in the UK and USA had Target of Opportunity (TOO) observations on two satellites for observations. My observations showed that EF Eri was not in an active state and fainter than magnitude 15.0. Three months later observations were still required now that EF Eri had emerged from conjunction with the sun. Frank received a message from the controllers of the EUVE and XTE satellites. "These birds were positioned to observe EF Eri as soon as we can report it is brightening." EF Eri was still fainter than 15.0. Eight months on the program was still running but no outbursts. Two years of observing EF Eri now with no outbursts or activity but the satellite people in the UK and USA still had TOOs on two satellites and assured us that the star does rise to 13th magnitude. I never heard much about the program on EF Eri after this and assumed it was ended but still keep it on my list. Well after 9 years of negative observations I got the biggest shock when I caught EF Eri bright in June 2006 at magnitude 15.6. The next night it rose to 14.2. I still wonder if the satellite observations ever took place.* This star was supposed to have died but came back to life!

I continue to observe these crazy stars at every opportunity and still get a rush of blood every time an outburst is detected. ★

**Editorial note: Rod's observations and notification of the outburst of EF Eri were clearly essential to the astronomers who were able to study EF Eri and publish their results in the* Astrophysical Journal *(Vol. 652, pp. 709–723 (2006)), as evidenced by their acknowledgement to him.*

Last Night's Star Party in Okeechobee, Florida

CHRIS STEPHAN (SET)
SEBRING, FLORIDA

Editorial note: This article originally was posted on the Citizen Sky (http://www.citizensky.org/) website on February 14, 2010. The author, Chris Stephan, submitted his posting for our readers to enjoy, with an added intro and end note. Chris is the administrator of the Citizen Sky 20/20 Vision Team.

One of the exciting aspects of being a part of Citizen Sky has been the opportunity to share my hobby of astronomy with many new people all over the world. I am the Administrator of the 20/20 Vision Team of Citizen Sky. I have had opportunities to teach people in Canada, Spain, India, England, and here in the USA. I have given training on variable star observing, general night sky observing, tips on binocular and telescope use and selection. This article is a sample of one event that we had a few weeks ago. I'd like to encourage people involved in Citizen Sky who are hosting events like this to post them on the Citizen Sky events calendar. The National Science Foundation, which is supporting Citizen Sky, is going to look at the calendar as one aspect of how successful Citizen Sky has been.

—

Hello Citizen Sky members,

I just wanted to share about our "Star Gazing with Creatures of the Night" event that was listed on the Citizen Sky events calendar. This event was held last night February 13, 2010, at Arnold's Wildlife Rehabilitation Center in Okeechobee, Florida. We had several panthers in large pens, owls, peacocks running around all over the place and sitting in the trees around us. Lots of cats in pens from the wilds of Africa that are being rehabilitated.

Sue Arnold asked if Riverwoods Field Lab would volunteer to send me, their Education Specialist, along with a few other amateur astronomers, to set up telescopes and have a star party for the public. This was advertised on local radio.

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STEPHAN: STAR PARTY CONTINUED...

Approximately 40–50 people showed up. We had perfect skies with temperatures in the upper 30s, F. Kye Ewing, fellow AAVSOer, Kim Mohlenhoff, Dennis Randolph, and I volunteered our time and equipment. We had skies that were close to 6th magnitude naked eye limit.

I did a night sky show with a green laser pointer and taught everyone the constellations and bright stars by name. Kye (with her laser pointer) and I spent a fair amount of time on a few famous variable stars. I pointed out epsilon Aur and its comparison stars and their magnitudes. I told about Citizen Sky, and about the epsilon Aur project. The people were fascinated. I also pointed out omicron Ceti, Mira, which was near naked eye limit, and taught them a bit about it. I showed them that just two months ago it was at a brightness between two of the brighter stars in the head of Cetus the Whale.

Kye and I pointed out Algol, and Kye told the folks about it and the mythology behind the name "Demon Star" and Medusa. I explained that it is an eclipsing binary star and pointed out the stars we use as comparison stars to make a magnitude estimate of it. I explained what an eclipsing binary star was.

Dennis, Kye, Kim, and I had four telescopes and a pair of binoculars on a tripod. We showed a large variety of deep sky objects and Mars. I even had several folks split Rigel in a 12-inch reflecting scope, which was a pretty difficult job for new observers, but many said they could see the companion star.

Most folks stayed for a good two hours. They loved it, and said they want us to do it again. We are already talking about a possible second event next month.

This was so much fun for the four of us putting this on. It was really neat to hear the wild animals in the background in the dark while we were observing. Coffee and goodies were provided.

I'd like more people to connect with nature organizations like Arnold's and use this as an avenue to teach astronomy and show people the night sky. Thanks for letting me share this.

—

Since posting of this article, we now have a follow-up event, a second star party, scheduled for Saturday March 20, 2010. ★

NEW TYPE OF VARIABLE STARS DISCOVERED WITH JUST A DASCH OF EVIDENCE

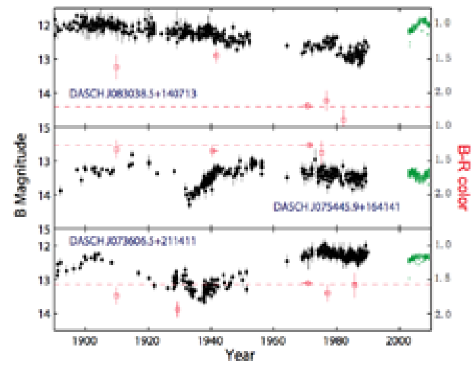
MIKE SIMONSEN (SXN)
IMLAY CITY, MICHIGAN

It's not every day someone discovers an entirely new class of variable stars, but that's what astronomers at the Harvard-Smithsonian Center for Astrophysics appear to have done. Even more remarkable is the way they did it: by using photographic plates dating back to the late 19th century.

The Harvard College Observatory (HCO) maintains a collection of over 500,000 photographic plates, dating from the 1880s to the 1980s. This collection is the only continuous record of that one hundred year period of the entire sky in existence. Every point on the sky has been "measured" between 500 and 1,000 times. The Digital Access to a Century of Sky at Harvard (DASCH) is a collaboration that has developed a high speed plate scanner in an effort to digitize the entire collection and make it available online. They have begun by scanning some 7,000 or so plates in six different fields. One of those fields, an area around the cluster M44, has yielded some surprising results.::

Star cluster M44 (The Beehive Cluster) in Cancer (Courtesy of NASA)

From 1,200 plates, containing over 400 variable stars in the vicinity of M44, they discovered three unusual variables that changed by at least a full magnitude over unusually long time scales of 10–100 years. The first one, DASCH J083038.5+140713 (J0830 hereafter), appears to have faded more or less continuously, from 1880 to 1980, by a full magnitude. This star was previously discovered in ASAS data (ASASJ083038+1407.3; Pojmański, G. 2002) and labeled as MISC, since it was noted to have become 0.3 magnitude brighter in V gradually from 2003 to 2007, and then 0.1 magnitude fainter from 2008 to 2009.



DASCH variable light curves. Black dots are Harvard plate data, green dots are recent ASAS data, red symbols are estimated B–R color indices. (from Tang et al. 2010)

DASCH J075445.9+164141 (J0754 hereafter) showed a sharp fading episode around 1930, and then slowly recovered over a period of ten years. An earlier dip was shown around 1892, but unfortunately, due to lack of data, the profile of the dip is lost in obscurity. There are just enough data to make it very interesting. To my eye it looks like another fading and recovery could easily have been missed in the years 1990–2003.

DASCH J073606.5+211411 (J0736 hereafter) exhibits a fading and recovery between 1930 and 1950 of about one magnitude. Over the entire 100+ years of the data it appears to vary by 2.5 magnitudes or more. J0754 and J0736 are new discoveries by the DASCH team.

Both J0830 and J0736 appear to have become redder as they became fainter, but the evidence for this, from photographic plates, is sketchy at best. That is unfortunate, because if these fading episodes were caused by dust obscuration events we would expect the colors of the stars to be redder when fainter. Spectra taken at the F. L. Whipple Observatory and Gemini North reveal that all three stars are K2 giants, with a luminosity of III. J0736 shows significant radial velocity changes at three different epochs, so it is probably a close binary. The other two appear to be single stars.

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SIMONSEN: DASCH
CONTINUED...

According to current models, pulsations driven by ionization or convective instabilities cannot be sustained over time periods of 10–100 years in K type giants, so these are probably not pulsating variables. The light curves resemble those of RCB type variables (highly evolved carbon stars that exhibit dramatic fading episodes attributed to dust being coughed up into their atmosphere at irregular intervals) but none of them are post-AGB supergiants, like RCBs, and they are much cooler than RCB stars. The fading events are also much slower and not anywhere near as deep as RCB events. Some symbiotic variables show long-term changes and variation, but none of these three stars show any of the typical characteristics of symbiotic variables.

So what are they? They may be some new form of dust-creating variable, similar to RCBs, but it is hard to imagine a process that could produce and sustain dust events over such long time frames and with such a slight effect on the overall brightness. They could well be stars that have burned up most of the hydrogen and then helium in their cores and are now entering the stage where helium is beginning to burn in the surrounding shell. Stars entering this phase of evolution are believed to expand and cool, which would result in their becoming redder and less luminous. The bottom line is that there just aren't any models for red giant stars that fit these three odd ducks neatly. We really don't know what these stars are, other than they are variable stars of some type, most likely some new type.

It is important to note that stellar evolution in stars occurs on very long time scales, millions or billions of years. Evolutionary-driven changes occurring on human time scales of 100 years or less are rarely seen, and can only be discovered in data with 100-year or more time domains, like the plate collection at HCO and the AAVSO International Database. Due to a lack of funds, only a very small percentage of the Harvard plates have been digitized to date. I hope that the DASCH team eventually realizes the dream of scanning and digitizing the entire half million plates one day, so we don't need to collect data for another one hundred years to discover things that are already hiding in the Harvard plate collection, just waiting to be found. ★

OBSERVING CAMPAIGNS UPDATE

MATTHEW TEMPLETON
AAVSO HEADQUARTERS CAMPAIGNS COORDINATOR

It's time again for an update on AAVSO Campaigns for our Newsletter. The AAVSO is running a number of observing campaigns for researchers around the world. There are just a few highlights from the past several months.

Scorpius was just becoming visible again after solar conjunction when our two-year campaign on U Sco finally came to an end (and a beginning) with the star's long-awaited nova eruption on January 28, 2010. Two AAVSO observers, Barbara Harris and Shawn Dvorak, caught U Sco in the pre-dawn hours, and their quick action set in motion a global network of ground- and space-based telescopes covering the eruption. Our long-term monitoring campaign has now become an intensive photometric campaign to track the eruption of this important nova.

Amateur observers have contributed an enormous number of observations, and this eruption of U Sco is likely to be not only the best observed U Sco observation in history, but one of the best-observed novae as well. As I write this on February 25, U Sco remains around V = 14.5 while showing large amplitude eclipses. Visual and instrumental observers are both providing an important record of this nova, and researchers today and in the future are going to have a wonderful data set to work with once U Sco returns to quiescence.

You can follow the progress of U Sco's eruption and decline at its campaign page: http://www.aavso.org/news/usco.shtml

As U Sco comes into view, another important cataclysmic variable—TT Ari—is approaching conjunction. In late summer 2009 observers began to notice a slow fade in TT Ari. It subsequently became the second major rapid fading event in TT Ari's history, and its first since the early 1980s. Unlike the event of the 1980s, the AAVSO community has a greater capability of performing time-series observations of faint objects, and it was soon discovered that TT Ari's true quiescence (around V = 16.5) was being interrupted by sudden flares of two magnitudes or more. This phenomenon had never been seen before, and has the theoretical community puzzled.

TT Ari is a member of the VY Sculptoris class of novalike variables, whose deep fades are believed caused by the temporary cessation of mass transfer from the secondary to the primary. The causes of the flaring events aren't known. They do not appear to be events on the secondary like solar-type flares. Are they brief episodes of mass transfer, where a small amount of matter spills off of the secondary and falls ballistically onto the white dwarf? If so, why is the mass transfer behaving this way?

Continued observations of TT Ari are needed. The AAVSO has an excellent data set from while TT Ari was in season, but it is now rapidly approaching conjunction as we near the equinox. We ask all visual and CCD observers to pick up TT Ari again after conjunction. You can learn more at this URL: http://www.aavso.org/news/ttari_campaign.shtml

The AAVSO has several other long-term campaigns currently in progress. Most notable is the ongoing eclipse of epsilon Aurigae. The eclipse started around August of 2009 and will continue for nearly two years. See the Citizen Sky website for more information: http://www.citizensky.org

The nova KT Eri (Nova Eri 2009) erupted in November 2009, and has been the subject of a number of ground- and space-based observations. We have an incredible light curve of this object, with over 21,000 visual and CCD observations submitted to date. This slow nova is still brighter than V = 12, and is a good evening target for both visual and CCD observers all over the world. Its season is coming to an end in April, so catch it while you can, or pick it up when it returns next August.

We last issued a call for observations of high-mass X-ray binaries in Special Notice #186 on January 4. Dr. Gordon Sarty has an active research program on these stars and AAVSO observers have been actively involved. Dr. Sarty sent the following update for this *Newsletter*:

> The HMXB observing program (outlined in JAAVSO 35, 327 (2007)) began with a suggestion from my University College London collaborator Kinwah Wu in 2005 and the first observations by Rick Huziak shortly after. The CCD photometric observations by AAVSO observers have been critical for interpreting

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TEMPLETON: CAMPAIGNS UPDATE
CONTINUED...

HMXB spectra obtained with the 72-inch telescope at Canada's Dominion Astrophysical Observatory (DAO). Eleven two-week-long observing runs at DAO have now been completed, with more to come, as we search for orbital periods expected to be about 2 years long. More DAO observing runs are planned; there will be lots of opportunity for AAVSO observers to provide simultaneous data as we continue the game of getting clear sky over two places at once! Our first HMXB paper has been published (MNRAS, 392, 1242 (2009)) and more are being written. The AAVSO data have also been instrumental in getting time on two space telescopes so far: on the MOST Canadian space telescope and on the Spitzer infrared space telescope. Thanks to all the HMXB observers for your data!

The project to monitor magnetically active stars for Dr. Stella Kafka is still on, and several stars now have comparison sequences. This is a challenging project, and useful data will require transformations and extinction corrections. If you're ready to add a challenge to your CCD observing program, please take a look at the campaign page for these stars: http://www.aavso.org/news/kafka_2009.shtml

For an object a *little* further afield, the blazar 3C 66A has been in one of the brightest optical states in its history. VERITAS hasn't yet been able to observe this object during the current episode, but Dr. Markus Boettcher of Ohio University strongly encourages its continued monitoring. It remains around V = 14, and has been for several months. For more background on the campaign, please see AAVSO Alert Notice #353: http://www.aavso.org/publications/alerts/alert353.shtml

We are always looking for new and interesting observing opportunities where AAVSO observers can really make a difference in cutting edge variable star research, for visual and CCD observers in both hemispheres. If you're an observer looking for an interesting idea for a new target to observe, please browse our Campaigns page to see if any of our current projects looks interesting or challenging for you: http://www.aavso.org/new/campaigns.shtml

And if you're a researcher looking for more data, please let us know! AAVSO observers are ready and waiting for new and exciting projects.

Clear skies!

PHOTOELECTRIC PHOTOMETRY PROGRAM UPDATE

MATTHEW TEMPLETON
AAVSO HEADQUARTERS PEP COORDINATOR

The past few months since the last newsletter have been quiet but productive for the AAVSO Photoelectric Photometry program, with eight observers contributing 174 observations to the AAVSO International Database. Many of our PEP observers are located in parts of the United States where the weather has been less than "stellar" this season, and large portions of the United States have had uncharacteristically large snowfalls. Some people are lucky to be able to get out their front door, let alone get to their telescopes!

Brian McCandless (MBE) continues to run his multicolor photometric campaign and is currently making observations of epsilon Aurigae and a few other stars in multiple filters, including BVRIJH and Optec Wing filters. Thomas Rutherford has also been monitoring both Epsilon and Zeta Aurigae in J and H. PEP Committee Chair Jim Fox has relocated to south-central New Mexico and has reestablished his PEP observing program there, in between the massive snowfalls in the Sacramento Mountains this winter. Our other observers this season included Hans Nielsen, Adrian Ormsby, Glen Ward, and David Williams.

The star of the season continues to be Epsilon Aurigae, with 88 photoelectric observations made since January 1, 2010 by seven different observers. Epsilon Aurigae is an important object and data for this star will be put to very good use almost immediately. But don't forget the many other stars in the AAVSO PEP program, especially bright Betelgeuse! Alpha Ori is actually one of the most challenging objects for observers because it's so bright, and photoelectric observers have consistently provided millimag-precision photometry of this star for decades. If you're an AAVSO PEP observer, please catch Betelgeuse while you can this season!

When time permits, I have been searching for more archival photoelectric data to enter into the AAVSO International Database. Those of you who have been with the AAVSO for a long time may remember the late John Ruiz, who was a devoted and talented photoelectric photometrist from the 1950's through this death in the early 1980s. While many of Ruiz' observations were published in research journals under his own name or in papers by other astronomers, none of his observations appear in the AAVSO International Database because photoelectric data were not kept in the AID prior to the early 1970s. I've found several hundred observations of stars like 12 Lac (= DD Lac) and * u Her (= 68 Her) in the AAVSO Archives with the help of Dr. Michael Saladyga, but these hardcopy observations still have to be digitized, and I'm on the lookout for more. Furthermore, there were several other early PEP observers like Lewis Boss whose data are also not found in our archives. The location and digitization of these archives is important, and will be done as time (and funding and volunteer interest) permit.

Finally, I should note that the AAVSO currently has two SSP-3 photometers available for loan to AAVSO members in good standing who are interested in photoelectric photometry. If you're interested in becoming a PEP observer and are willing to commit to making regular photoelectric observations, please contact Jim Fox at makalii45@gmail.com , or myself (Dr. Matthew Templeton) at matthewt@aavso.org.

Clear skies, and good observing!

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JULIAN DATE / MOON PHASE CALENDARS

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

MARCH 2010

Sun	Mon	Tue	Wed	Thu	Fri	Sat
	1 5257	2 5258	3 5259	4 5260	5 5261	6 5262
7 5263	8 5264	9 5265	10 5266	11 5267	12 5268	13 5269
14 5270	15 5271	16 5272	17 5273	18 5274	19 5275	20 5276
21 5277	22 5278	23 5279	24 5280	25 5281	26 5282	27 5283
28 5284	29 5285	30 5286	31 5287			

APRIL 2010

Sun	Mon	Tue	Wed	Thu	Fri	Sat
				1 5288	2 5289	3 5290
4 5291	5 5292	6 5293	7 5294	8 5295	9 5296	10 5297
11 5298	12 5299	13 5300	14 5301	15 5302	16 5303	17 5304
18 5305	19 5306	20 5307	21 5308	22 5309	23 5310	24 5311
25 5312	26 5313	27 5314	28 5315	29 5316	30 5317	

MAY 2010

Sun	Mon	Tue	Wed	Thu	Fri	Sat
						1 5318
2 5319	3 5320	4 5321	5 5322	6 5323	7 5324	8 5325
9 5326	10 5327	11 5328	12 5329	13 5330	14 5331	15 5332
16 5333	17 5334	18 5335	19 5336	20 5337	21 5338	22 5339
23 5340	24 5341	25 5342	26 5343	27 5344	28 5345	29 5346
30 5347	31 5348					

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

OTERO: CHALLENGES CONTINUED...

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