British Astronomical Association

VARIABLE STAR SECTION CIRCULAR

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Contents

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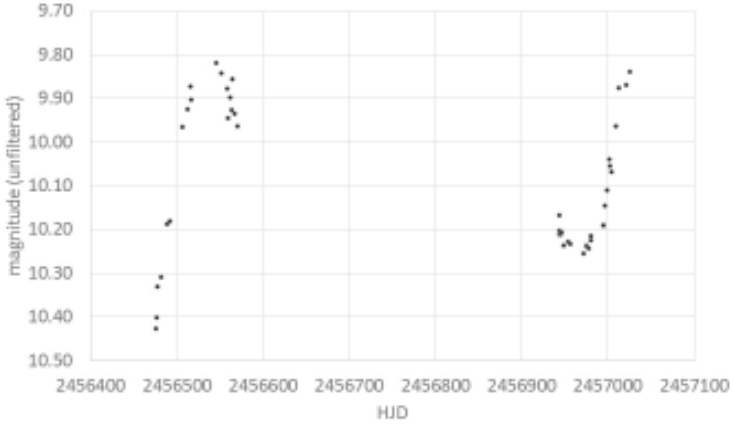
Apologies to David Conner

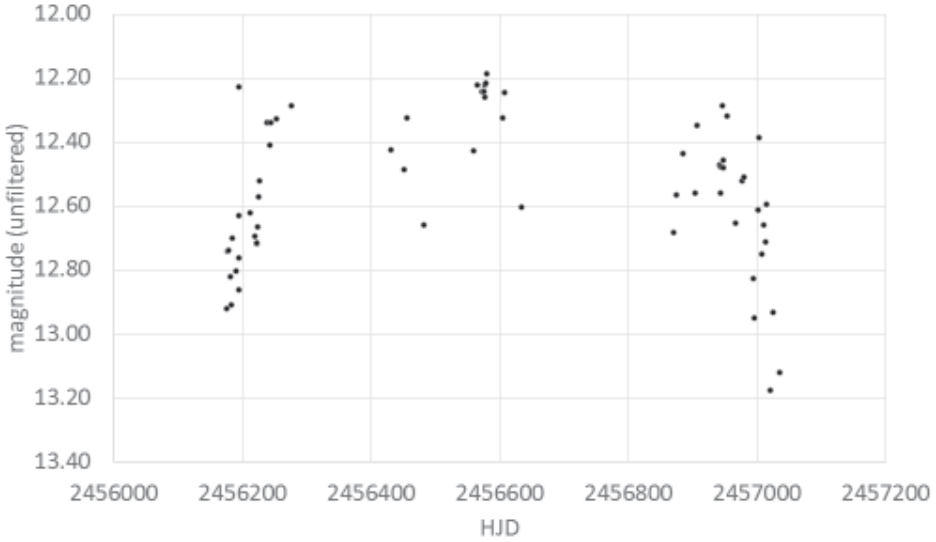
I am very sorry that a mix up occurred in the process of laying out David Conner's article: "The Discovery of Three New Variable Stars using the Bradford Robotic Telescope and the Software Package Muniwin", pages 12 - 15, VSSC 163. This has been corrected in the latest pdf copy of the Circular. The details which should have been under Figure 1, as below, appeared under Figure 5, thus hiding the notification that the image was from the Bradford Robotic Telescope "**Original image © BRT**". Figure 3 appeared twice as Figure 3 and Figure 4.

Figure 1: Light curve of GSC 02763-02208



RA 23h 06m 08.57s, Dec +36deg 20m 00.7s. A semi-regular variable of spectral type M4. V magnitude 11.48 at maximum, with an unfiltered range of 0.6 magnitudes. (Data from VSX. Light curve based on photometry with AIP4WIN)

Figure 4, light curve of GSC 04024-00551



RA 00h 45m 47.42s, Dec +65deg 09m 43.7s. A semi-regular variable of spectral type C. V magnitude 13.5 at maximum, with an unfiltered range of 0.8 magnitudes.
(Data from VSX. Light curve based on photometry with AIP4WIN)

Janet Simpson

FROM THE DIRECTOR

ROGER PICKARD

BAA Merlin Medal and Gift

I am delighted to advise that at its Meeting at the end of May the BAA Council voted unanimously in favour of Andy Wilson being presented with the Merlin Medal and Gift. This was for his outstanding work in setting up the VSS Database in its modern web accessible form.

The citation reads, in part:-

Andy has worked on the Variable Star Section Database for many years and has overcome all sorts of technical difficulties. Indeed, the amount of time and work Andy has put into the database is astonishing. He has also had to liaise closely with the American Association of Variable Star Observers (AAVSO) to ensure that the output is compatible with their system. The end result is that almost all VSS observations, going back to 1840 February 10th, are now accessible to researchers around the world.

Andy took over the "visual" observers database in April 2006, and soon after also took on the CCD Database. His first priority however was the visual database. The crowning point came on 1st January 2012 when the whole database went "live". Anyone could now view light curves and download the data.

Indeed, the light curve generator is a joy to use and makes that of the AAVSO seem very outdated.

By mid 2013, Andy had developed and was able to release a further major enhancement. This was in the form of an interface that made it easy for observers to submit their observations on line and which also carried out important checks on the data before committing it to the database.

In addition, whenever possible improvements have been suggested, Andy has usually implemented them without delay, provided that the changes have been technically feasible.

Andy is also an observer, and having contributed observations to both the Visual and CCD databases, knows just what observers require.

To quote from the conditions of the award:

"This award shall be made in recognition of a notable contribution to the advancement of astronomy." We feel that in this particular case, the work Andy has put into achieving a first class database is indeed "a notable contribution to the advancement of astronomy".

The citation was signed by Tony Markham and myself.

Congratulations Andy.

Hunting Outbursting Young Stars

You will read elsewhere in this Circular about a programme suggested by Dr Dirk Froebrich

from the University of Kent which I hope those observers suitably equipped will consider undertaking. The equipment needed is either a DSLR or CCD camera, and what is more, filters are not necessary!

I met Dirk at the BAA Meeting in Ashford on the 26th April after asking him if he would be prepared to give a talk "from the Professional side of observing". This article is a result of that talk.

My talk concentrated on "More Pro-Am Projects", but more of that another time.

Spectroscopy workshop

A reminder that there will be a workshop on spectroscopy on Saturday 10th October 2015 at the Norman Lockyer Observatory, near Sidmouth, Devon. Further details appeared in the last Circular (Issue 163), or can be found on the website at:

http://www.britastro.org/vss/Spectroscopy_workshop_announcement.pdf

David Boyd passes the Quarter Million mark

I have just been advised by our Database Secretary, Andy Wilson, that David Boyd has just passed the quarter of a million mark in the number of CCD observations he has contributed to the BAAVSS database. His total currently stands at 253,810 which makes him the leading contributor to the CCD Database.

Congratulations to David.

* * *

HUNTING OUTBURSTING YOUNG STARS WITH THE CENTRE OF ASTROPHYSICS AND PLANETARY SCIENCES (HOYS-CAPS)

Dr Dirk Froebrich

HOYS-CAPS is a new citizen science project run by the University of Kent. It aims to engage amateur astronomers in the search for and characterisation of highly variable young stellar objects. This article briefly summarises the science goals of the project and the requirements for participation. More detailed information can be obtained from Dirk Froebrich or on the project webpage, which also showcases first results and images:

http://astro.kent.ac.uk/~df/hoyscaps/index.html

Science Goals

Understanding the mass accretion process onto young stellar objects is one of the fundamental problems in star formation. In particular, the variation of accretion rates on timescales of several years is not well understood. Observed mass accretion rates of young stars tend to be much lower than predicted by theory. One solution for this

problem is that young stars undergo rare and short, but intense bursts of increased accretion activity during which a large fraction of their total mass is accumulated. These bursts can be observed as increases in luminosity by up to (or even in excess of) a factor of 100. Recent work has shown that the most intense of these, the FU-Ori type bursts, are very rare and only happen every 5-50 thousand years for a particular young star. It is still not clear how long these bursts last; some known bursts have lasted for more than 100 years.

Our goal is to measure the occurrence rate of these bursts more accurately than the current order of magnitude estimate. This is important as it will allow us to accurately determine what fraction of their total mass young stars accrete during these bursts. Due to their intensity and thus vastly increased output of energetic radiation, these bursts have a severe impact on the chemistry and distribution of the material in the stellar accretion discs. Thus they are ultimately a great influence on the formation of planetary systems in these discs.

To identify these rare events we plan to photometrically monitor a number of nearby young clusters and to search for new, highly variable objects. Using clusters of young stars has the advantage that we know the distance and ages of all objects, as well as the total number of the monitored stars, all vital information for the scientific analysis. The envisaged long term monitoring will not just identify outbursting objects, but also other, rare events such as occultations of objects by their accretion discs (such as in KH 15D or V* V582 Mon) which can be used to study these discs in great detail.

Participating in the Observations

Our main aim is to find highly variable or outbursting objects, hence there are no particularly high requirements for the image quality. Nevertheless, to increase the usefulness and accuracy of the brightness measurements, all images should be subject to a bias and flatfield correction. This removes most of the systematic noise in the images and greatly improves the detectability of brightness variations, in particular for fainter objects. The project website has some detailed notes of the required data reduction procedures, and we are also able to run a workshop for small groups of interested participants should this be of interest.

There are no other stringent requirements for the images. Any image is useful and much appreciated. The website lists a number of target clusters/regions, and this list will be extended should more participants join the project. Please centre your images on the provided coordinates to maximise the number of monitored stars. The field of view, filter used and integration times do not matter. Based on our experience in the first observing season, and the subsequent data analysis, the best 'strategy' seems to be if every observer concentrates his/her efforts on a small number of targets and spends a larger integration time on target to monitor fainter cluster members. Images can be taken at any time, ideally one every few weeks, but even a single image is helpful.

When you have done the data reduction of your images (dark current and flatfield corrections) you can upload your final images to our Dropbox account (details on request). We will then perform photometry of your images as soon as possible and check if there are new, highly variable stars in the image. We have started to develop software which automatically analyses the lightcurves for all stars in all images, hence the processing will eventually be done very quickly. Should any new potentially erupting objects be

detected, we aim to perform follow up observations with a number of telescopes to verify their nature. Currently we will be able to quickly get access to the St. Andrews Observatory, the Liverpool Telescope, the Thuringian State Observatory in Germany and the newly constructed Beacon Observatory at the University of Kent.

Data Analysis and first Results

During the first observing season we have gathered 42 images of seven individual targets. We have analysed the six different RGB images of NGC2264 (Christmas Tree Cluster) in some detail. We attached an accurate coordinate system to every image using the *astrometry.net* software and then co-added all images with the Montage software package. This deep image was used to detect stars using the SourceExtractor software, and photometry of all stars has subsequently been performed in each of the individual images. Using the assumption that on average all the stars in the image are not variable, the fluxes of all images are set equal and stars which are much more variable than the typical stars of the same brightness are selected. This procedure easily recovers many of the known and obvious variable stars in the images. Finally, the magnitudes of the stars are calibrated using the photometry from the Sloan Digitized Sky Survey.

In Figure 1 we show the typical variability of the stars in NGC2264 as a function of their R-band magnitude. Bright stars vary by about 0.1 magnitude (or 10%), due to saturation and non-linearity in the detector. The size of the variation depends on the observing conditions such as the seeing and transparency of the atmosphere. For a range of magnitudes (R=13.5—15.5) the typical variability (or accuracy of the photometry) is

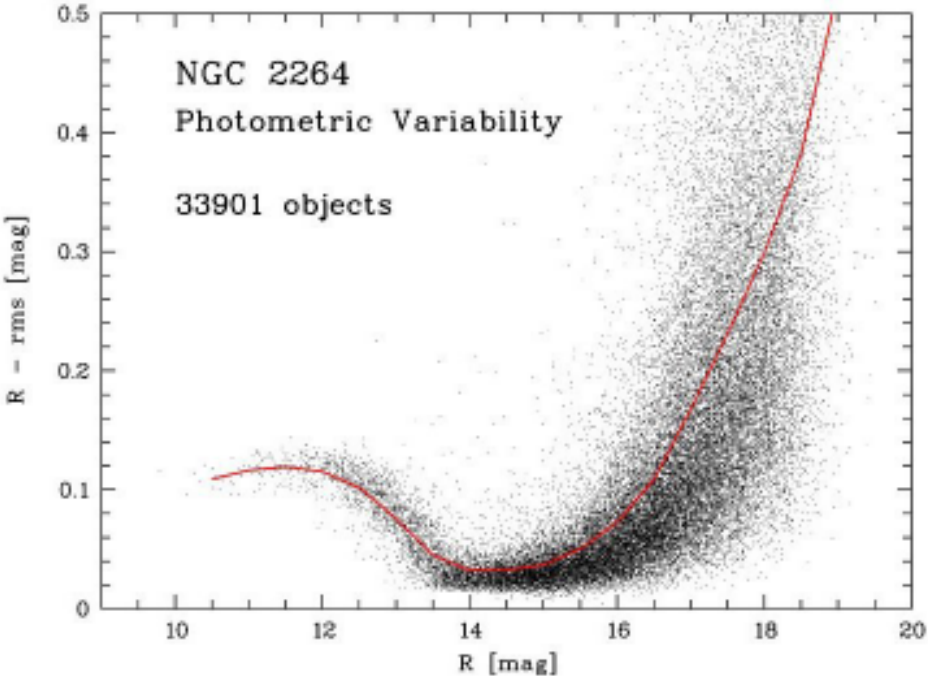


Figure 1 Typical variability of the stars in NGC2264

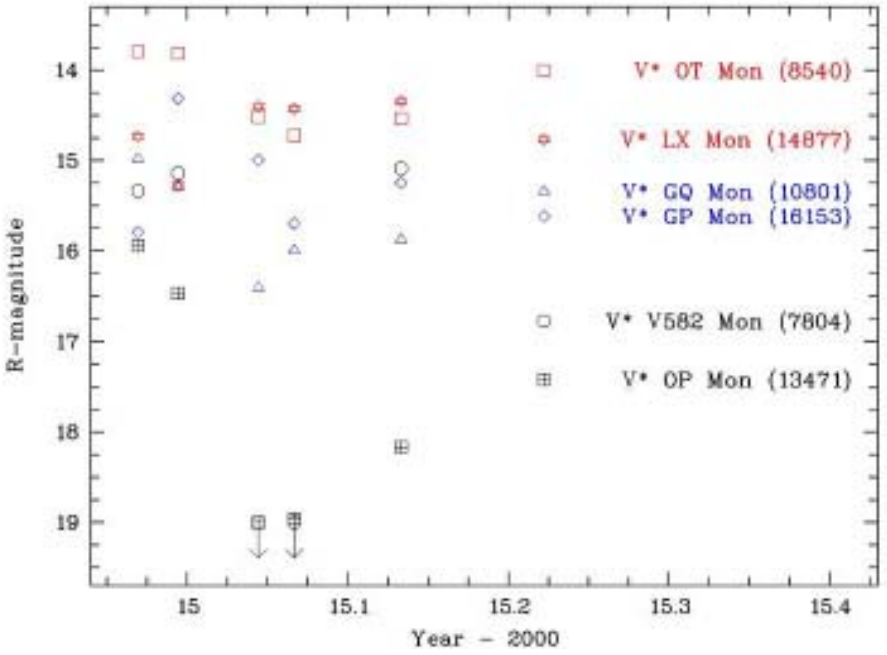


Figure 2. R-band magnitudes of six selected variable objects

better than 0.05 magnitude (or 5%). The faintest objects detected in the images are about R=18 magnitude.

In Figure 2 we show the R-band magnitudes, as a function of time, of six of the selected and well known highly variable objects. All of them vary by at least one magnitude and two of them completely disappear below the detection limit in at least one of the images. Hence some of the stars change their flux by almost a factor of 100.

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ECLIPSING BINARY NEWS -MAY 2015

DES LOUGHNEY

Video Technique for Observing Eclipsing Binary Stars

A paper, written by Hristo Pavlov and Anthony Mallama, has been published in the JAAVSO Volume 43, 2015, on the above subject. The abstract reads:

"*Video recording has been used for more than a decade to time astronomical events such as stellar occultations. We present a technique for using video to determine the time of minimum of eclipsing binary stars and we examine various aspects of using video. The free open source software packages occurec and tangra have been enhanced to offer better support for the recording and reduction of video observations of eclipsing binaries. We present our work in a style and detail that is appropriate for*

both video observers unfamiliar with variable stars, and for variable star observers unfamiliar with video. We present the results of ten times of minima of southern eclipsing binary stars determined using the video technique."

It will be interesting to hear if any BAA members intend to experiment with this technique.

Catalogue and Atlas of Eclipsing Binaries (CALEB)

This is a website which was set up by the Eastern University, Pennsylvania, USA. It appears to contain a lot of useful information on EBs although the last input seems to have been in 2005 so it is not up to date. It also contains information of unclear origin. The data for the system AH Cephei states that the V magnitude is 6.794. This compares with 6.88 on the Krakow site, 6.87 from the Hipparcos survey and 6.78 on the GCVS. The (B-V) on the CALEB site is 0.30, on Krakow 0.22 and on Hipparcos 0.242.

The data for the system CW Cephei states that the V magnitude is 7.62 compared with 7.67 on Krakow, 7.64 on Hipparcos and 7.60 on GCVS. The (B-V) is 0.4 compared with 0.30 on Krakow and 0.339 on Hipparcos.

It seems remarkable that there still exist significant differences in published data. The AAVSO quote the GCVS data, although I have been advised that the Hipparcos data is, in fact, the most reliable and should be used in respect of comparison and check stars.

Any comments on this issue would be welcome.

Low Amplitude Eclipsing Binaries (LAEBs)

Last on the list of ten LAEBs (*published in VSSC No 160, June 2014, EB News*) is V1061 Tauri. This is an eclipsing binary discovered in 1990. It is classified as an over contact EB system with a current period of 1.3852288 days. The magnitude at maximum is 8.03V. The primary eclipse has a depth of 0.4 magnitude and the secondary 0.3 magnitude .

The V1061 Tauri system is straightforward to find as it is about midway between Elnath (1.62 magnitude) and Aldebaran (0.84 magnitude). As it is an EB system it is in constant eclipse so can be observed at any time (when Taurus is above 30 degrees in the sky). Useful DSLR measurements can be made every fifteen or twenty minutes (except around primary eclipse when it should be done more often).

The V1061 Tauri system is worth observing for a number of reasons. The first is that the period is changing. A determination of the current period would be useful. More evidence on whether the primary eclipse is total (when the light curve is flat for a period of time) is needed. The stars are so close together that the light curve shows ellipsoidal variation.

V 1425 Cygni is beginning its season of observation at the time of writing. It is 8th on the list of LAEBs. It is also an EB system with a period of 1.2523878 days. At maximum it is magnitude 7.73V. It is thought to be a near contact system (see Figure 1)*.

The primary eclipse is of depth 0.4 magnitude and the secondary 0.3 magnitude.
See the light curve in Figure 2*, as published in a 1996 paper*.

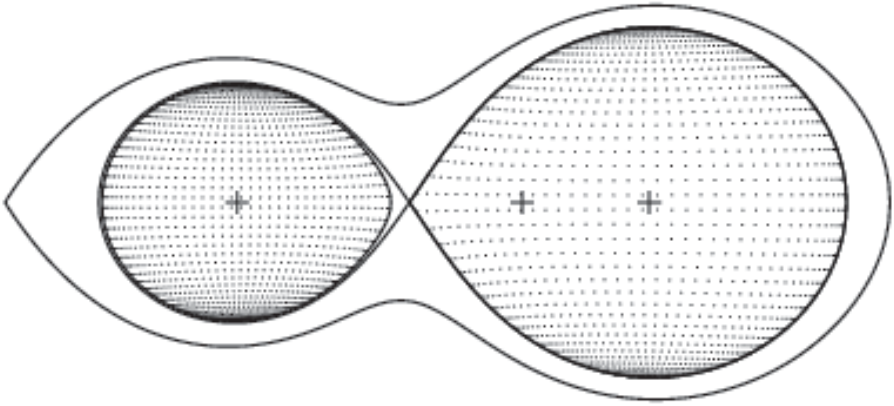

Figure 1: Schematic of a near contact EB system

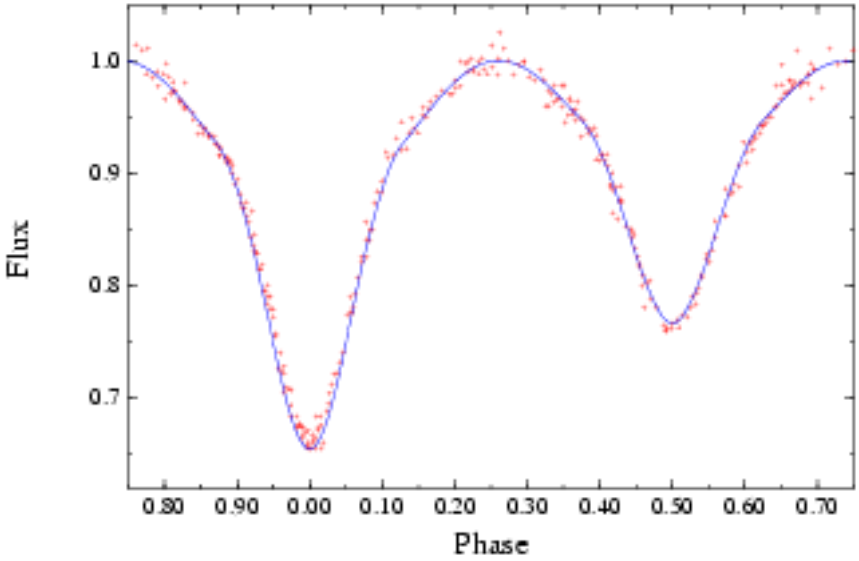

Figure 2: Light curve of the V 1425 Cygni system

The V 1425 Cygni system is a bit removed from bright stars in Cygnus, but has Alderamin (magnitude 2.43) in the same field of view when using a 100 mm lens. The system is worth studying because of ellipsoidal variations in the light curve and changing period.

For suggestions regarding comparison stars and a check star please get in touch.

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*Both Figures come from the paper refered to on page 8, "Photometric Analysis of the Eclipsing Binary V1425 Cygni" 1996, by O L Degirmenci et al, Astrophysics and Space Science Vol 241, Issue 2, pp 327-332.

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SIMULTANEOUS OUTBURSTS OF THE EARLIEST KNOWN DWARF NOVAE

John Toone

On the 21st February 2015 both U Gem and T Leo (also known as QZ Vir since 2006) rose to outburst simultaneously. They joined SS Cyg which had gone into outburst a week earlier and were in turn joined by Z Cam that commenced a slow rise to outburst on the 24th February 2015. This meant that by the 24th February 2015 the four earliest known dwarf novae[1] were in simultaneous outburst, which is a very rare event indeed. Images of U Gem and T Leo in outburst on the 22nd February 2015, secured by Denis Buczynski, are reproduced on the following pages.

The T Leo outburst (Figure 1) was quite remarkable because there was a normal outburst (4 days above magnitude 15.0) that triggered a super-outburst (15 days above magnitude 15.0) which in turn was followed by a re-brightening event (2 days above magnitude

Image by Denis Buczynski.

Figure 1: T Leonis near the peak of the normal outburst on the 22nd February 2015

15.0). All in all there was outburst activity spread over 30 days which is illustrated by the accompanying light curve (Figure 2). A couple of points are worth noting from this light curve:

1. Although the super-outburst rise was missed, it would seem that this super-outburst was no brighter than the normal outburst that preceded it.

2. The fading trend either side of the re-brightening event was pretty much linear.

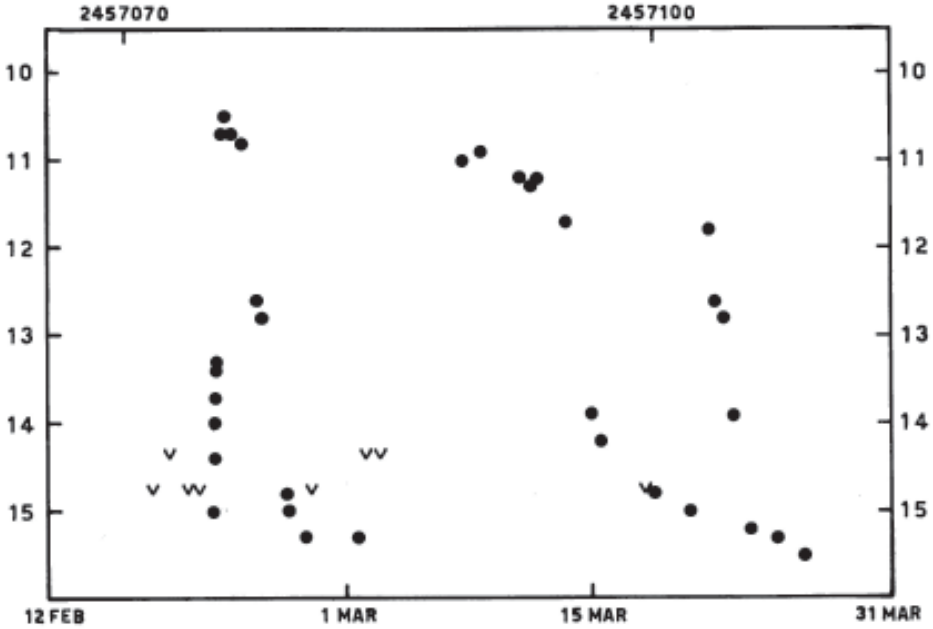

Figure 2: Thirty days of outburst activity in T Leonis in February/March 2015 as recorded by visual observers Rod Stubbings and John Toone.

A comparison of this light curve (Figure 2) with the light curve derived from observations made by C H F Peters in 1862[(2)] supports the interpretation that Peters saw a re-brightening event. In both cases it would seem that the re-brightening event peaked slightly above magnitude 12.0 and occurred 6 - 7 days after the preceding super-outburst had faded below magnitude 13.0 (6 days after in 1862, 7 days after in 2015).

The outburst of U Gem (Figure 3) was also notable because it came after a long period of quiescence. The longest confirmed interval between outbursts of U Gem is 255 days, from 18th September 1928 to 1st June 1929[(3)], whereas the time elapsed since the last recorded outburst on 24th May 2014 was 273 days. It is possible there was a short outburst during solar conjunction in July/August 2014, but this is unlikely because the last outburst was right at the end of the previous apparition, and no short outburst has been recorded in U Gem since September 2012.

The February 2015 outburst lasted 16 days above magnitude 14.0 which is illustrated in

Image by Denis Buczynski.

Figure 3: U Geminorum approaching peak brightness on the 22nd February 2015.

the accompanying light curve (Figure 4).

Three points are worth noting from this light curve (Figure 4):

1. There was a slight dip in brightness two days into the outburst which resembled a normal outburst closely merged with a UGSU super-outburst. This is something that I have noted previously in several long outbursts of UGSS dwarf novae. It was also previously recorded in U Gem as far back as April 1885 by the LAS VSS[4].

2. There was a recovery to mag 14.0 some 7 days after U Gem had faded below magnitude 13.0

3. The quiescent brightness following the outburst was brighter than it was preceding the outburst.

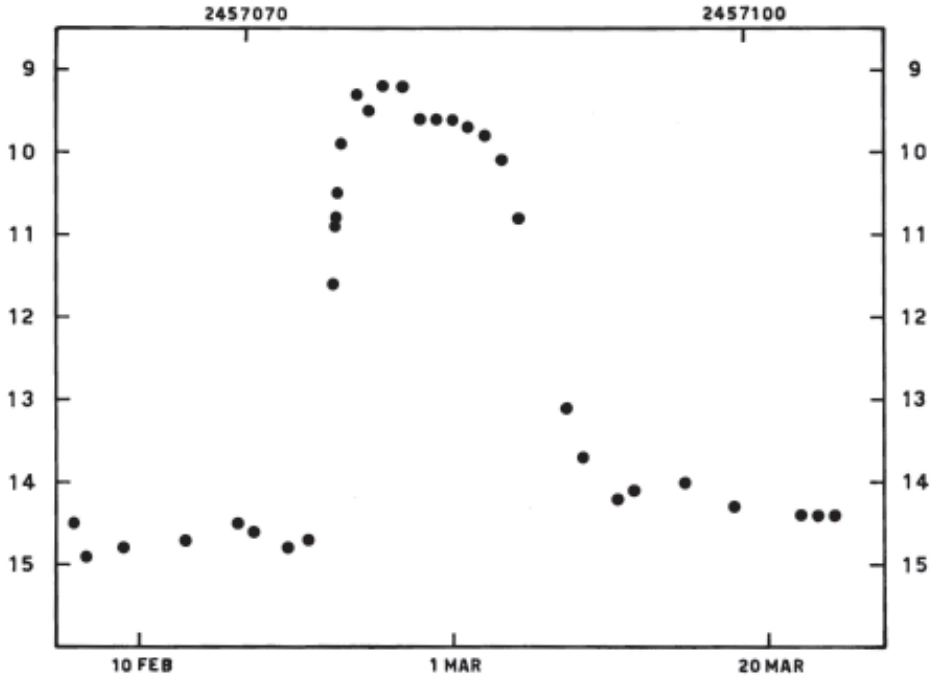

Figure 4: The long outburst of U Geminorum in February/March 2015 as recorded by visual observer John Toone.

With a bit of imagination the light curve of U Gem resembles an accelerated (or time - compressed) version of the T Leo light curve, with the normal and main outbursts merged, and the re-brightening event suppressed. Therefore it seems to me that the same basic astrophysics is at work here. Higher resolution systematic photometry during future outbursts may well clarify this impression. In particular it would be interesting to establish if the dip in brightness in the early stage of the U Gem outburst only appears when there is an absence of short outbursts. The implication being that the short and long outbursts are merged, and this in turn might explain why the period has effectively doubled in recent years. Alternatively, the doubling of the period might simply be explained by the short outbursts not occurring.

The light curves shown here are constructed exclusively from data provided by two systematic visual observers and show several interesting features. Furthermore the February 2015 outbursts of all four dwarf novae were first detected and notified by visual observers. Therefore in terms of CV monitoring the visual observer is still performing a very useful function.

References

1. BAA VSS Circular, **No 158**, 14 (December 2013)

2. BAA VSS Circular, **No 162**, 17 (December 2014)

3. BAA VSS Circular, **No 108**, 3 (June 2001)

4. JBAA , **120**, 141 (June 2010)

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FIVE YEAR LIGHT CURVE OF THE HERBIG AE STAR PV CEPHEI

David Boyd

PV Cephei is a fairly typical 3.5 solar mass Herbig Ae star with spectral type A5e and luminosity at its brightest approaching 100 times that of the Sun. It is less than a million years old and about 500pc distant from the Sun. It is still in the process of contracting out of the molecular cloud surrounding the young star from which it formed. It has a rather massive circumstellar disc which we see almost edge-on containing about 20% of the mass of the star. Material from the disc accreting onto the surface of the star causes periods of increased brightness. Obscuration by either the edge of the disc or dust close to the star may contribute to occasional fading of the star. Light from the star illuminates part of the molecular cloud close to the star creating Gyulbudaghian's Variable Nebula.

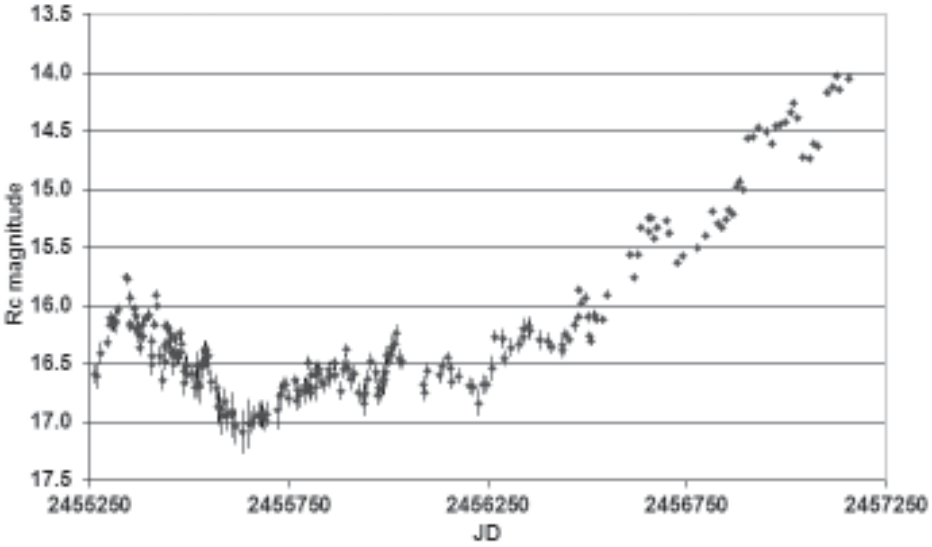
In the course of an on-going project to investigate the relationship between the changing brightness of PV Cep and that of the adjacent nebula, I have been observing the star on approximately a weekly basis since March 2010. The resulting five year light curve is shown in Figure 1. I observe it with an Rc filter as both the star and the nebula are brighter in this part of the spectrum, because of the star's strong H-alpha emission.

Figure 1 shows considerable variation around Rc magnitude 16.5 over the first two and a half years, but more recently a steady brightening of the star with minor ups and downs. At Rc magnitude 14.05 on 2015 May 16 it is now brighter than it has been for almost a decade.

The historical published record of the brightness of PV Cep is patchy. There is evidence in a paper by Cohen et al. in 1981[(1)], based on iris photometry from photographic plates, that it reached a "red magnitude" of about 11 in 1978 and 13 in 1979, although they express some doubt about the absolute calibration of these measurements. Kun et al. in 2011[(2)] report an Rc magnitude of 13.28 in late 2005 and Lorenzetti et al. in 2011[(3)] report peak Rc magnitudes of 15.06 and 15.18 in early 2008. Since then, and prior to the current rise, it has remained in the Rc magnitude range 16 – 17.

So what will PV Cep do next? The only way to find out is to keep observing it, which I intend to do.

Figure 1: Five year Rc light curve of PV Cephei.



References

1. Cohen M. et al., Astrophysical Journal, **245**, 920 (1981)
2. Kun M. et al., Monthly Notices of the Royal Astronomical Society, **413**, 2689 (2011)
3. Lorenzetti D. et al., Astrophysical Journal, **732**, 69 (2011)

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JANET SIMPSON

6110 HD 106426, a new multiperiodic delta Scuti variable. (Honkova, et al, 2014)
6111 The 2014 Eclipse of EE Cep: Announcement for a Third International Observational Campaign. (Galan, et al, 2014)
6112 Seven New Period-Change Eclipsing Binary Stars. (Nelson, 2014)
6113 ASAS 000709+2621.5 is an overcontact eclipsing binary, not a delta Sct variable. (KJURKCHIEVA, DIMITROV, & IBRYAMOV, 2014)
6114 Collection of Minima of Eclipsing Binaries. (Zasche, et al, 2014)
6115 V363 And - A Detached Eclipsing Binary. (Nelson, 2014)

6116 New Galactic Double Periodic Variables. (Mennickent, & Rosales, 2014)
6117 CH Cygni: new brightening in 2014. (Rspaev, Kondratyeva, & Aimuratov, 2014)
6118 BAV Results of observations - Photoelectric Minima of Selected Eclipsing Binaries and Maxima of Pulsating Stars. (HUBSCHER, 2014)
6119 Light time effect in the system V2294 Cyg. (Liska, 2014)
6120 Another Component in the V523 Cassiopeiae Eclipsing Binary System. (Castelaz, 2014)
6121 New spectroscopy of multiple stars RR Lyncis and HT Virginis. (BENSCH, DIMITROV, et al, 2014)
6122 Photometry of High-Amplitude Delta Scuti Stars in 2013. (Wils, Ayiomamitis, et al, 2014)
6123 Investigation of the eclipsing binary system OT Lyr. (Agerer, 2014)
6124 CzeV615 - a new eclipsing binary. (Liska & Liskova, 2014)
6125 Times of Minima of Eclipsing Binaries and Mid-Transit Times of Transiting Exoplanets. (BASTURK, BAHAR, et al, 2014)
6126 Resolved photometry of the binary components of RW Aur. (Antipin, Belinski, et al, 2015)
6127 Null correlation between the O'Connell effect and orbital period change for SW Lac, CN And, and V502 Oph. (Koju & Beaky, 2015)
6128 Minima Times of Some Eclipsing Binary Stars. (TERZIOGLU, GURSOYTRAK, et al, 2015)
6129 High-Amplitude, Rapid Photometric Variation of the New Polar MASTER OT J132104.04+560957.8 (Littlefield, et al, 2015)
6130 New Times of Minima of Some Eclipsing Variables. (Lacy, 2015)
6131 CCD Minima for Selected Eclipsing Binaries in 2014. (Nelson, 2015)
6132 AR Ser: photometric observations of a Blazhko star. (Bonnardeau, & Hambsch, 2015)
6133 CCD Times of Minima of Eclipsing Binaries. (Kubicki, 2015)
6134 LO Andromedae - A W-Type Overcontact Eclipsing Binary (Nelson, & Russell, 2015)
6135 TYC3551-1535-1: a new variable star of delta Sct type. (Gaynullina, Serebryanskiy, & Khalikova, 2015)
6136 A variable star in the field around TrES-4. (Gaynullina, et al, 2015)
6137 New variables in M5 (NGC 5904) and some identification corrections (Arellano Ferro, et al, 2015)
6138 Call for Follow-Up Observations of the Dynamically Changing Triple Star KIC 2835289. (CONROY et al, 2015)
6139 Photometric evolution and peculiar dust formation in the gamma-ray Nova Sco 2012 (V1324 Sco). (Munari, et al, 2015)
6140 PSN J07285387+3349106 in NGC 2388: an extremely rapidly declining luminous supernova. (Tsvetkov, et al, 2015)
6141 New results on spectral and photometric variability of V806 Cassiopeiae. (Kondratyeva, Rspaev, & Aimuratov, 2015)
6142 An Updated Period Analysis for AC Bootis. (Nelson, 2015)
6143 Hot Dust Revealed During the Dimming of the T Tauri Star RW Aur A. (Shenavrin, et al, 2015)
6144 Search for variables in the open cluster King 12. (Paunzen, et al, 2015)

RW BOOTIS

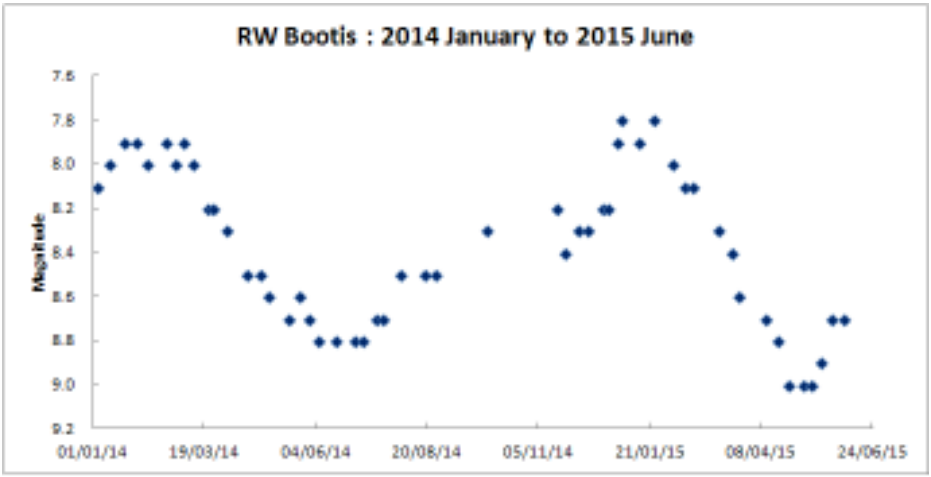
Tony Markham

Here is my light curve for one of the less fashionable semi-regular variables, RW Bootis, showing its brightness changes from 2014 January to 2015 June.

The VSS binocular programme lists it as type SRB, with a range of 7.4-8.9 and a period of 209 days. The AAVSO VSX gives the same type and period, but with a brightness range of 7.5-8.6 V.

As can be seen, RW Boo was varying over most of its listed amplitude during these 18 months, making this its most active spell for many years - it was last this active back in the late 1990s.

The light curve does, however, suggest a period of around 11 months - this is around 50% longer than the listed 209 day period.



BINOCULAR PROGRAMME

Melvyn Taylor

The various Priority levels of the Binocular Programme can now be found on the VSS web site at: *http://www.britastro.org/vss/bin_prog_priority_191013.htm*
or for a full listing in constellation order at:
http://www.britastro.org/vss/chartcat_binoc.htm

In addition, these listings can be obtained in paper format from Roger Pickard, and of course they can be viewed in Circulars 157 - 160.

ECLIPSING BINARY PREDICTIONS – WHERE TO FIND THEM

DES LOUGHNEY - *desloughney@blueyonder.co.uk*

The publication of Eclipsing Binary Predictions is now discontinued in the VSS Circular. Predictions for RZ Cas, Beta Per and Lambda Tau can still be found in the BAA Handbook. Predictions, completed on a monthly basis, are available on the BAA VSS website at:

http://www.britastro.org/vss/dpredict.html

If readers require paper copies of the predictions please contact me.

The best source for predictions for Eclipsing Binaries is the Mt. Suhora Astronomical Observatory, Cracow Pedagogical University website (known as the Krakow website)at:

http://www.as.up.krakow.pl/o-c/index.php3

Click on 'Constellation List', choose your constellation and then choose your system.

A webpage will then appear with lots of useful information regarding the system. In the section entitled 'Light Elements' there is a link entitled 'current minima and phase'. When you click on this link, in the example of Beta Lyrae, you get predictions of primary and secondary eclipses for a period of three months. For systems with very short periods such as RZ Cas the predictions are for one week. For a system such as SW Cyg, with a period of around 4.57 days, the predictions are for a month.

The Krakow website does not tell you how much of an eclipse will be observable at a particular time of the year at your latitude and longitude. However, it has some useful literature references for each system, although they may not necessarily be up to date. Nor are references to the 'Information Bulletin on Variable Stars' included, but these can be found at:

http://www.konkoly.hu/IBVS/IBVS.html

Although the Krakow website lists the depth of eclipses it does not list the actual V magnitudes at maximum and minimum. For an indication of these magnitudes you will need to visit the 'General Catalogue of Variable Stars' website at:

http://www.sai.msu.su/groups/cluster/gcvs/gcvs/

Click on 'GCVS Query Form', type in a designation such as SW Cyg, and click on 'Search'. The resulting information displayed shows that maximum is 9.24V, primary minimum 11.83V, and secondary minimum 9.30V. These magnitudes, however, may have been determined some time ago.

The GCVS website gives SW Cyg a period of 4.57313411 days but the Krakow website lists the period of SW Cyg as 4.572986 days. The latter is more likely to list the most up to date period. It must always be borne in mind that small changes in a period can result in significant changes in the times of minima if the period was determined a few years ago.

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The following charges are made for the Circulars. These cover one year (4 issues). PDF format subscriptions are £3.00 per year. Make cheques out to the BAA, and send to the Director Roger Pickard (address on back cover); or you can now pay on-line.

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* ***** *

The charges for other publications are as follows. Make cheques out to the BAA and please enclose a large SAE with your order, [*for items below, but not for the Circulars*]

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Binocular Charts	Chart Secretary	Free
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Observation Report Forms	Director or Binocular Secretary	Free
Chart Catalogue	Director	Free
Observing Guide to Variable Stars	BAA Office	£5.00
CCD Guide	BAA Office	£7.50
Binocular Booklet	Director or BAA Office	£2.50
CD-ROM of the last 3 items	BAA Office	£7.50

Charts are downloadable from the VSS web pages at
http://www.britastro.org/vss/chartcat/wfb.php

For more information, please visit our web pages at **http://www.britastro.org/vss**

CONTRIBUTING TO THE CIRCULAR

If you would like to prepare an article for consideration for publication in a Variable Star Section Circular, please read the *Notes for Authors*, published on the web pages at:
http://www.britastro.org/vss/circs.htm; reproduced in full in VSSC132 p 22, or contact the editor (details on back cover) for a pdf copy of the guidelines.

If you are unsure if the material is of a suitable level or content, then please contact the editor for advice.

The **deadline for contributions** to the next issue of VSSC (number 165) will be 7th August 2015. All articles should be sent to the editor (details are given on the back of this issue).

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First telephone the Nova/Supernova Secretary, Guy Hurst: 01256 471074
If only answering machine response, leave a message and then try the following:
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Glyn Marsh 01624 880933, or
Martin Mobberley 01284 828431.

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