British Astronomical Association

VARIABLE STAR SECTION CIRCULAR

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TWO LIGHT CURVES OF W UMA TYPE SHORT PERIOD CONTACT ECLIPSING BINARY SYSTEMS.

LAURENT CORP

Figure 1: V1128 Tauri

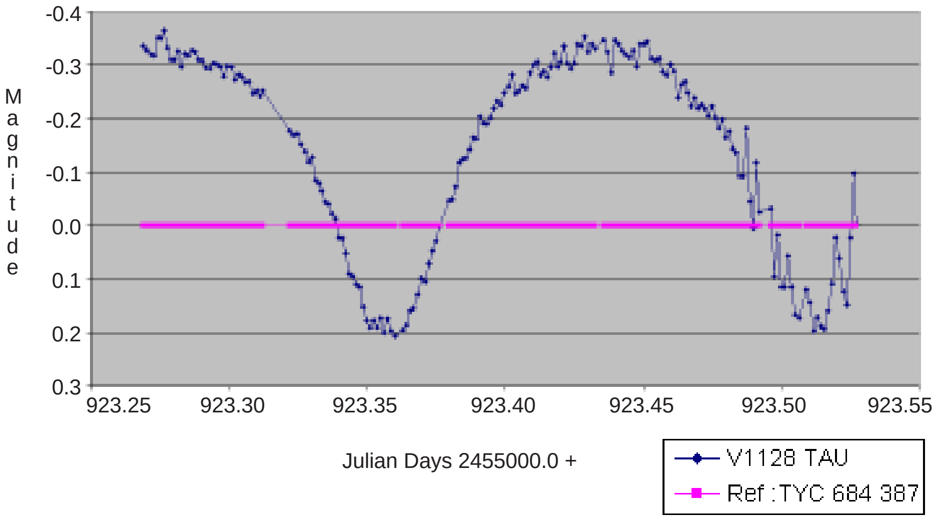
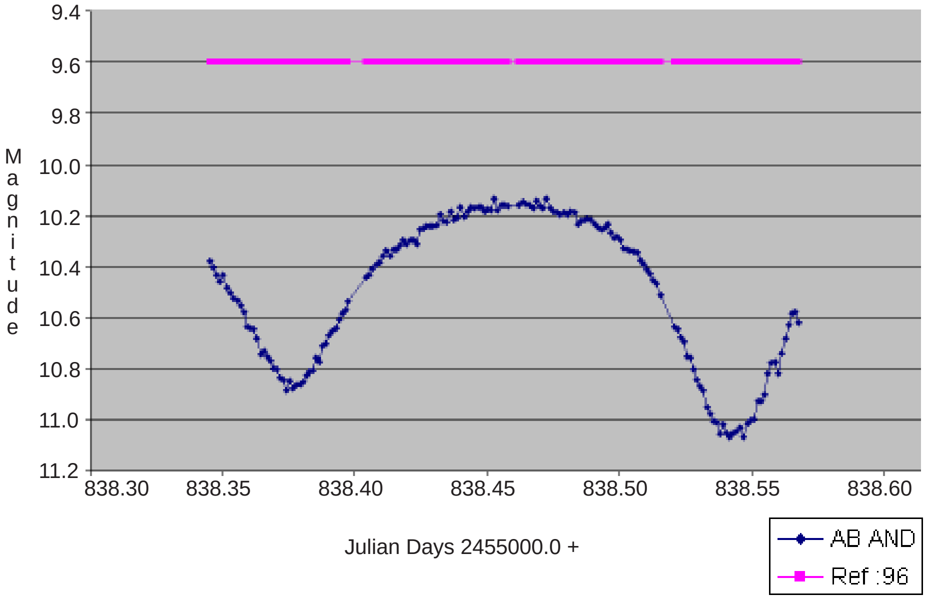


Figure 2: AB Andromedae



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FROM THE DIRECTOR

ROGER PICKARD

VSS Database now on-line - IMPORTANT. Please read all of this as it involves YOU

I am delighted to advise that, with many thanks to Andy Wilson, the VSS database is now on-line, see:

http://britastro.org/~vssdb/
and the link from the front page.

At the moment this includes all the visual data from about 1890 to the end of 2010, and also the CCD data.

Further improvements will be made from time to time but in the meantime please feel free to browse the database. Note that data can easily be downloaded and displayed in a spreadsheet, or simply displayed in an interactive way on the web site.

To do this, go into the database and select 'Review Data for a Star'. Then Select 'Object' by clicking the down arrow and typing, for example, 'S'. This will take you to the start of the 'S's'. Use the scroll bar to find, again for example, 'S Per' and click on it. Then go back and click 'Light Curve' and if necessary wait a few moments for it to appear. If you wish to see the data, click 'Data Table' instead. If you do select the Data Table, you then have the option to download it.

If you just want your own data then go to 'Observers' and select your own name.

However, as interesting and as useful as that is, one thing that becomes glaringly obvious is that quite often there appears to be large gaps in the data.

MISSING DATA - PLEASE HELP

In an effort to rectify this problem of missing data I would like to ask all observers to check whether they feel their data is all in the database.

As a first step, enter the database and go to 'Lists and Summaries'. From there go to 'Observers' (inc. summary) and click on the initials of your name. How long you will have to wait for the summary to appear will depend on how many observations you have in the database, but it should only take a few seconds. You will then have a complete summary of all your data (including any CCD data) in the form of Variable / Number of Observations / First Observation / Latest Observation / Minimum Magnitude / Maximum Magnitude. Have a look through these and see if you feel they are correct or if you think some may be missing.

Another, perhaps easier way to check for possible missing observations is to go into the 'Review Data for a Star' as detailed above, making sure you select only your own observations, and then look at the light curve. In addition, when doing this but selecting 'all observers' it is possible to see if some data is at variance with the main. If it is, check it out to see if it is yours, and if so investigate why, and report it to Andy Wilson. If you feel that some of your data is missing or wrong, then please advise Andy and myself, and we may have to ask you to re-submit it.

If all observers could do this then in a year's time we could have a much more complete database.

Submitting Observations

Clive Beech has now re-written the Excel Spreadsheet mentioned in the previous Circular (which also runs under the free 'Open Office' suite of programmes), to assist members reporting visual observations. This can now be downloaded from the VSS website at:

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

The spreadsheet comes with instructions on its use (which are very straightforward) and includes a number of self-checking procedures. There are several sheets on the spreadsheet, and the last one (the Output page) contains the observations formatted as they have been in the past. This 'Output' page is built automatically when entering observations on the 'Observation Entry page'. All that the observer needs to do, after entering their personal details such as name, year, address, and instruments used on the 'Observer Details' page, is to enter their observations on the 'Observation Entry' page. To submit the observations, the observer just needs to save the 'Output' page as a text file (tab delimited), details are given on how to do this, and then email it to Clive (e-mail address supplied). The file can now be any name that the observer wishes, as Clive will rename it if there is a problem.

If you feel the file is too large for you to download (it is almost 4Mb) then please email Clive to ask for a copy on CD-ROM.

Unless you are using John Saxton's suite of programmes to submit your data please use this spreadsheet as other forms of data submission are no longer acceptable. If you do not have Internet access but do have a computer you can still request a copy of the programme as detailed above and then submit your observations twice yearly to Clive on a CD-ROM. (Indeed, we already have one observer on the continent who has been doing this for some years).

Many thanks for your cooperation.

Next Variable Star Section Meeting

At the last Officers Meeting back in June 2011 it was agreed that in future Members Meetings would be held about every 18 months, and that the next one would be around Spring 2013 (the last one being in Autumn 2011). However, it was recently pointed out by Tony Markham that this year celebrates the centenary of George Alcock's birth, and it was felt we should have a special meeting, probably with novae as the theme. As Guy Hurst, our Novae/Supernovae Secretary is also Editor of The Astronomer it has been agreed that we will have a joint meeting with TA, probably in October, so watch out for the announcement of the actual date, hopefully in the next Circular.

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CAPAS UPDATE

LAURENT CORP

Pro-Am Conference on Stellar Astrophysics
28th September - 1st October 2012
Onet Le Chateau, Rodez, France
Official languages - French and English

http://rr-lyr.ast.obs-mip.fr/capas2012/index.php

PROGRAM

See preliminary program below

Sessions

- Eclipsing and spectroscopic binaries
- Double and multiple stars: astrometry
- Pulsating stars
- Exoplanets, beginning and end of star life ...

Schedule, Travel, Accomodation, Registration, and Deadlines - see VSSC No 150

General public conferences

- Extra-solar planets , **Roger Ferlet (IAP, Paris, France)** (in French)
- Latest news from the planet MARS, **Maurice Sylvestre and collaborators (IRAP, Toulouse, France)** (in French)

Preliminary program

List of talks planned so far, more to come .... Speakers, in each session, are classified in alphabetic order .

Session: Eclipsing and spectroscopic binaries

- Amateur spectrometric study of Albireo, **David Antao**
- The state of eclipsing binary observations by amateurs, **Laurent Corp (4A, GEOS, AAVSO)**
- The rare eclipse stars ε Aur and ζ Aur: a report on 2011 eclipses, **Jeff Hopkins**, in video-conference.
- The use of DSLR photometry in measuring the magnitude of variable stars, **Des Loughney (BAA, VSS)**
- Classification of eclipsing binaries: extreme and unusual systems, **Oleg Malkov (Institute of Astronomy, Moscow)**
- Role of binary and variable stars in cosmic distance scale, **David Valls-Gabaud (Observatoire de Paris)**
- A Study of 200 Eclipsing Stars recently discovered in Cygnus and Auriga,**Stan Waterman (BAA, VSS)**

Session: Astrometric double and multiple stars

- Dembowski or the use of the 26-inch telescope in Johannesburg, **Bob Argyle**
- Title to be defined, **Pierre Durand (SAF)**
- Binary star database: state of affairs and prospects, **Oleg Malkov (Institute of Astronomy, Moscow)**
- Title to be defined, **Edgar Soulié (SAF)**
- Interférométrie des tavelures sur étoiles doubles avec des moyens amateurs, **Bernard Trégon (SAF)**

Session: Pulsating stars

- Photometric study of pulsating star BL Cam, **Stéphane Fauvaud (GEOS, Associa tion T60)**
- The GEOS RR Lyr Survey, **Jean-François Le Borgne (IRAP, GEOS)**
- Pulsating stars in the space missions context, **Philippe Mathias (IRAP)**
- Pulsating stars, **Mike Simonsen (AAVSO)**, in video-conference

Session: Exoplanets, beginning and end of star life ...

- Supernovae, explosive death of the stars, **Remi Cabanac (IRAP)**
- Success of a Pro-Am collaboration: Be stars, **François Cochard (Shelyak)**
- Searching for Low Amplitude Variable Stars and Transiting Exoplanets, **Stan Waterman (BAA VSS)**

Abstracts of many talks can be found on pp. 36-39
If interested please contact Laurent Corp - *laucorp@wanadoo.fr*

ROD STUBBINGS JOINS THE 200K CLUB

John Toone

At 21:15 GMT on 24th January 2012 I received the following e-mail from Rod Stubbings:

"I remember some time ago when you inquired about my observing totals and you mentioned about letting you know when I have reached 200,000 visual observations. Well this milestone has been achieved last night! My first observation was in May 1993 so the 200,000 observations have taken 18 years and 8 months. I must take some time now to re-discover my family for a few weeks, then get back into it!"

I asked Rod to elaborate a little more on the circumstances of the milestone observation and I received a second e-mail as follows:

"The date and time was 24/01/2012 at 22hrs 31 min. The 200,000th observation was the 78th of the night and I observed a total of 115 until 1:30am before clouds filled the sky. I came inside and typed up some selected observations of 4 new outbursts and current activity on 16 previous outbursts which were still ongoing. By the time I got to bed it was 3:00am. The next morning I sent you the email before I went to work. Leading up to this I had 9 straight clear nights with basically the same pattern. I must admit that I had my 200,000th marked on my log book and I wanted to observe T Pyxidis. T Pyx was special because I had discovered the pre-outburst activity leading up to its outburst. This has only been documented in three other novae."

Rod is based in the State of Victoria, Australia and the initial e-mail was transmitted at 07:15 local time some 8 hours 44 minutes after making the landmark observation. I feel privileged that Rod still found time to send me that e-mail before going to work after maybe only 3 hours sleep. Rod has subsequently advised me that he has clocked up 1,600 observations in the month of January 2012.

Rod's achievement of 200,000 visual observations of variable stars in such a short time is truly astonishing. When Rod started to observe variable stars in 1993 I had already made over 54,000 observations but we both reached 100,000 at the same time in 2002 and now he is 50,000 ahead of me. So I can say with absolute confidence that Rod deserves complete and utter respect for his industrious and dedicated work in monitoring variable stars over the past two decades. It defies belief that he has also raised a family of four daughters and held down a demanding plumbing job throughout this same period.

Rod is only the seventh person to achieve the milestone of 200,000 visual observations of variable stars:

Total	**Observer**	**Country**	**Years**
463,657	Albert Jones	New Zealand	1960-2010
319,621	Hiroaki Narumi	Japan	1975-2009
299,723	Taichi Kato	Japan	1975-2010
292,710	Daniel Overbeek	South Africa	1952-2007
247,666	Gary Poyner	United Kingdom	1975-2011
208,571	Wayne Lowder	USA	1949-2005
200,000	Rod Stubbings	Australia	1993-2012

Note 1: Albert Jones' full total is well in excess of 500,000 observations as his observing career began as early as 1942.

Note 2: All of the above observers with the exception of Daniel Overbeek and Wayne Lowder (both deceased) are still generating visual observations in 2012.

I had the pleasure of meeting Rod at the AAVSO meeting in Hawaii in 2002 a couple of weeks after he had registered his 100,000th observation. Rod was there to receive the AAVSO Directors Award from Janet Mattei, and the accompanying photo shows the three of us together on the afternoon preceding the award ceremony. Rod immediately struck me as an intensely dedicated observer but also a friendly and most likeable person. He was quiet initially but that soon changed after the consumption of a couple of Mai Tais.

Many congratulations Rod, you have done Australia proud and variable star science has benefited as a result. Please do let us know when you reach your next observing milestone as that would be a good excuse to update the above table of very special people.

Rod Stubbings, John Toone, and Janet Mattei at the AAVSO meeting in Hawaii, 2002

Photograph courtesy of Hazel McGee

200,000 MILESTONE

Rod Stubbings

My introduction to Astronomy started in 1986 while reading a magazine with stunning pictures of the Planets. With a 60mm refractor telescope I set off outside to observe the night sky and detect some of these planets! At first I could barely focus on the stars let alone find anything! But, miraculously I spotted one, my first planet! I raced inside to tell my family the incredible news, and they all came out to see my finding. My family was extremely proud and praised my apparent natural talent for observing. Embarrassingly, I returned to my family later in the evening, to re-inform them that it had not been a planet that I detected but a speck of dust on the lens! However, not to be deterred, I headed to the newsagents for some books on astronomy. My choice was 'Astronomy without a telescope' by Patrick Moore. This book showed the names of the brightest stars in each constellation with lots of well-known objects, double stars and of course where to find these elusive Planets. My observing career had begun!

A few years later I joined the Latrobe Valley Astronomical Society, a small local Astronomy club and Peter Nelson was giving a talk on variable stars. I took up the challenge and made my first observation of a variable star, in May 1993, called L Carinae, a naked eye Cepheid variable. I was now a member of the Royal Astronomical Society of New Zealand, Variable Star section.

My first month of observing produced 10 observations, with countless hours of star hopping and locating variable star fields. I progressed up through the stages of observing from naked eye, binoculars, 60mm, 150mm, 250mm, 320mm, and now a Meade DS-16 reflecting telescope. As I was spending so much observing time outside I built an observatory to protect me from the wind and cold. I started to monitor the dwarf novae class of variable stars for outbursts. I was now averaging over 1400 observations a month and detecting between 30 – 50 dwarf novae outbursts each month. These detections were sent to the AAVSO news flash and VSNET alert mailing lists.

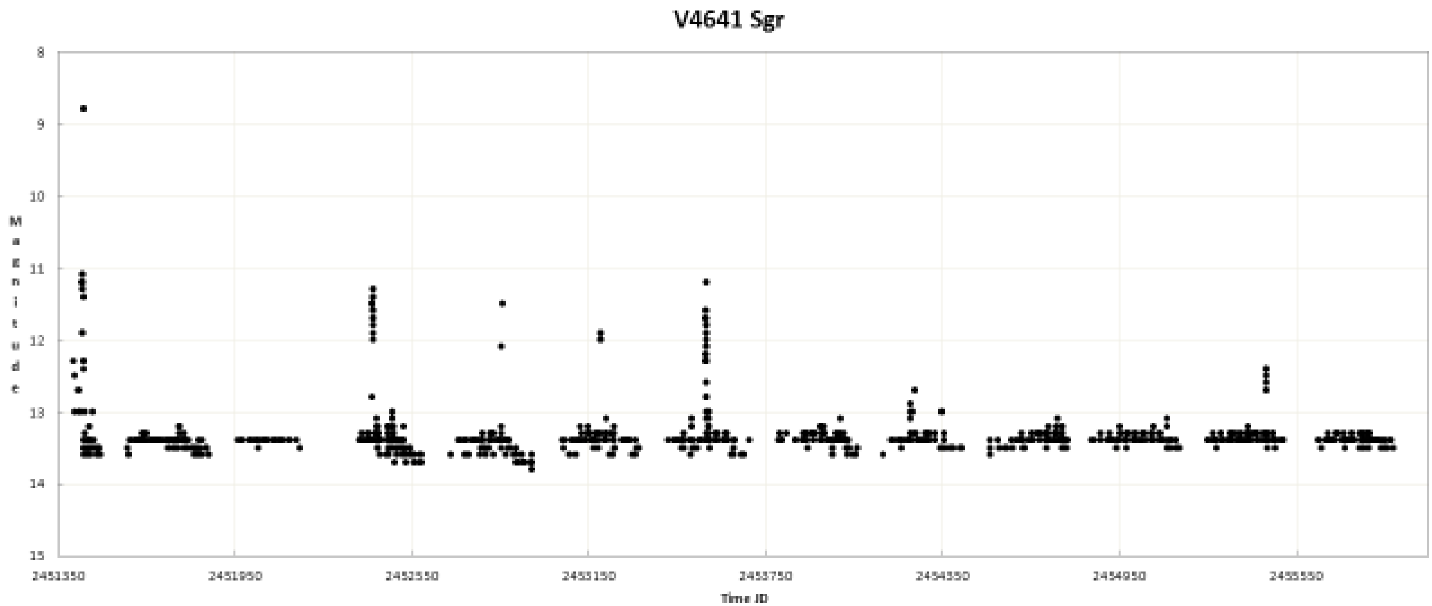
Photograph courtesy of Cassie Stubbings

On June 8, 2002, my 9th year of observing, I recorded my 100,000th visual observation on KK Telescopium (a SU UMa type dwarf nova.) In this year I was also privileged to receive the AAVSO's director's award from Janet Mattei. On January 24, 2012 I made my 200,000th visual variable star estimate on the recurrent nova T Pyxis which was visible at 12.5. This was achieved in 18 years and 8 months.

My observing schedule and program is to observe on every clear night. I monitor up to 200 objects a night with CVs as my central focus but I am adding more unobserved Miras, Wolf-Rayet and symbiotic stars to my observing list. I also send data to professional astronomers on certain stars.

Admittedly it has been hard to find balance between observing, self-employment and family life, not to mention having four daughters! But you somehow adapt and work out an irregular system that includes all. For instance, taking two cars to family occasions so I can do a Houdini and sneak away earlier than others to get a few observations in! Other times you just have to sacrifice a clear night for the family, and unfortunately vice versa.

Of all the stars that I monitor one in particular keeps coming back to me as something special, and that is V4641 Sagittarii, a black hole binary system. V4641 Sgr normally sits around magnitude 13.4, but on September 15th 1999 I observed it at magnitude 8.8. That night an X-ray satellite was diverted 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. Each year V4641 Sgr still exhibits X-ray outbursts and flares to visual magnitude 11.0. I have been lucky to detect all outbursts to date as shown in my light curve. To this day, I am still the only person to visually see and record the outburst at magnitude 8.8.



SUPERNOVA 2011HT IN UGC 5460

Guy Hurst

On 2011 Sept. 29.18, Tom Boles of Coddenham recorded an apparent supernova of magnitude 17.0 in UGC 5460, a mag 15 galaxy in Ursa Major. The discovery was made during searches for the UK Nova/Supernova patrol and later was announced on TA E-Circular 2770 after Tom had confirmed its presence on further images of Sept 30. The measured position was:

RA 10h 08m 10.58s DEC +51 50' 57.1" (2000) 12.4"E and 17.2"N from the nucleus.

An initial appeal appeared on the 'Transients Object Confirmation Page' on WWW of the Central Bureau and a temporary designation PSN J10081059+5150570 allocated. This procedure is needed until a spectrum can confirm the nature of the object.

Andrea Pastorello, Dipartimento di Astronomia, Universita di Padova et. al., quickly advised that a spectrum of Sept. 30 suggested it might be an eruption of a luminous blue variable (LBV) often referred to as a 'supernova imposter'. The catalogued distance of 19.2 Mpc suggested the absolute magnitude would be about -14.4 which is regarded as sub-luminous and the object was not given a supernova designation as it might be a supernova imposter.

However by 2011 October 26, the author measured a V magnitude of 14.6 using the Sierra Stars 0.61-m Cassegrain (BAA partially funded project) thus showing a substantial brightening (figure 1). The light curve in figure 2 showed a V maximum of 14.1 around 2011 Nov 22 followed by a typical linear decline but suggested a revision to the absolute magnitude to -17, too bright for a supernova imposter and more typical of a supernova. This resulted in a belated re-designation to SN 2011ht.

As so often happens after maximum, observers' coverage became sparse and by 2012 January 27 the object had faded to 15.5 on unfiltered images. However, totally unexpectedly, an unfiltered image by the coordinator using the Bradford Robotic Telescope at first seem to suggest the object had disappeared! Further inspection of the image did show a faint star near the limit at about magnitude 18.1 using the TA sequence.

Unfortunately follow-up photometry with the Sierra Stars 0.61-m Cass was prevented due to a jammed dome. Martin Mobberley was contacted for assistance and his image of 2012 Feb 24.381 recorded it at 19.7 unfiltered. Astrometry by Martin Mobberley allowed comparison with the original discovery shots by Tom Boles confirming it was within 0.3" of discovery and that the object was one and same:

Mobberley 2012 Feb 24 RA 10h 08m 10.57s DEC +51 50' 57.4" (2000)

Boles 2011 Sept 29 RA 10h 08m 10.58s DEC +51 50' 57.1" (2000)

The deep decline from magnitude 15.5 to 19.7 in such a short period may be more symptomatic of a dust event and optical obscuration. If the fade has continued at the time of writing this, it will become very difficult to follow but should a dust event be involved a

Figure 1

Possible SN 'imposter' in UGC 5460, 2011 Oct 26 13h03mUT
30 sec V filter with Sierra Stars 0.61-m Cassegrain: Guy M Hurst

re-brightening cannot be ruled out, so further images would be welcomed. Please report to the coordinator all measurements or negative results if below the limit of exposures.

Discovery of such unusual objects such as this by Tom Boles provide valuable information to investigate the behaviour of these mysterious LBVs. It is also important that supernovae are followed well beyond maximum to help with analysis.

Guy M Hurst
Coordinator

Guy@tahq.demon.co.uk

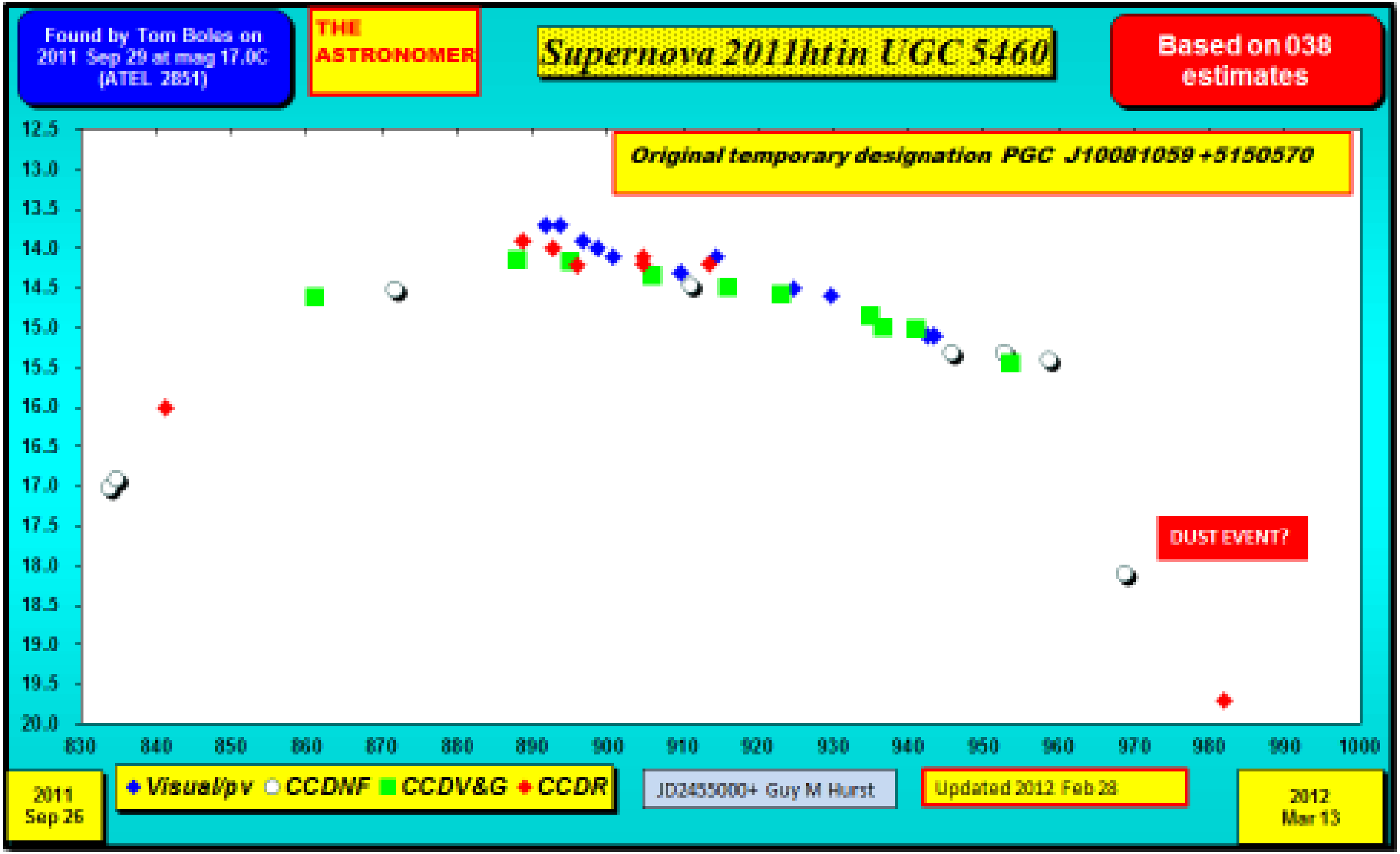


Figure 2. Guy Hurst

OT J001952.2+433901: A NEW SU UMA/WZ SGE-TYPE SYSTEM IN ANDROMEDA.

DENIS BUCZYNSKI

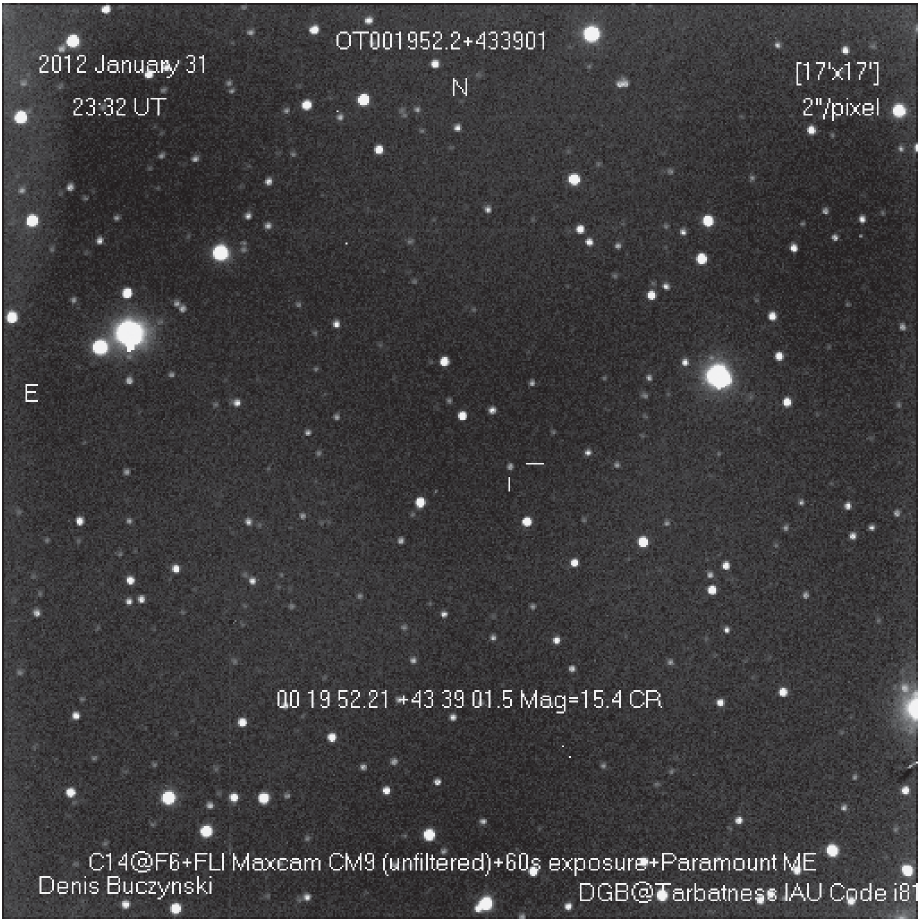


Figure 1: OT J001952.2+433901

A transient was was discovered in Andromeda by (CRTS) Catalina Real-Time Transient Survey, and an alert was sent out by vsnet on January 31st at 12:52, 2012.

Denis imaged the transient as part of a time series. Figure 1, above, is number 48 of the series and was taken on January 31st 2012 at 23:32.

A message was forwarded by Enrique de Miguel on February 1 at 01:49 to say that according to vs-net alert, OT J001952.2+433901 was a new SU UMa/WZ Sge-type which had superhump modulations of ~0.22 mag amplitude, and a tentative period of 0.0556 d.

ECLIPSING BINARY NEWS - MARCH 2012

DES LOUGHNEY

Zeta Aurigae (and epsilon Aurigae)

The international epsilon Aurigae campaign collected measurements of the zeta Aurigae eclipse that took place towards the end of 2011. The measurements are reported in the final Newsletter 24 of the campaign, which can be downloaded from its website at <*http://www.hposoft.com/Campaign09.html*>. The same edition contains a report by Dr Bob Stencel on the epsilon Aurigae eclipse which lists the main facts that have come out of the international campaign between 2009 and 2011.

The zeta Aurigae eclipse seems, more or less, to have occurred as predicted. Figure 1 below shows my own measurements using DSLR photometry. Ingress was fairly clear cut but egress seems to have been confused by variations in the primary star. The depth of the recent eclipse was the same as the previous eclipse.

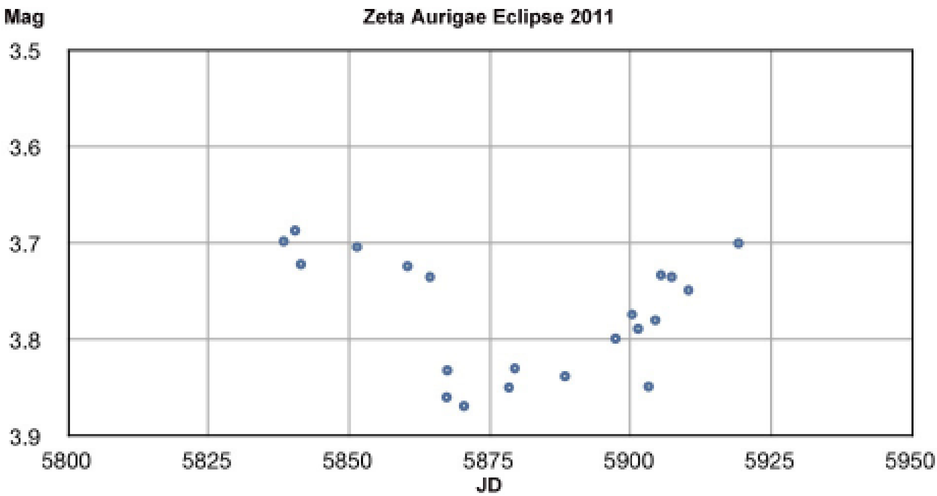


Figure 1.

Eta Geminorum

In the last edition of the Circular we announced the start of an observing campaign of Eta Geminorum (BAA's Variable Star of the Year for 2012). Its eclipse is scheduled to take place between late August and mid November. Figure 2 on page 14 shows DSLR measurements in late 2011 and early 2012 which indicate the current nature of the out of eclipse semi-regular variability. It can be seen to be varying between about magnitude 3.5 and 3.2 with some evidence of variations with a 0.1 amplitude over a period of 20/25 days.

All observations and measurements are welcome.

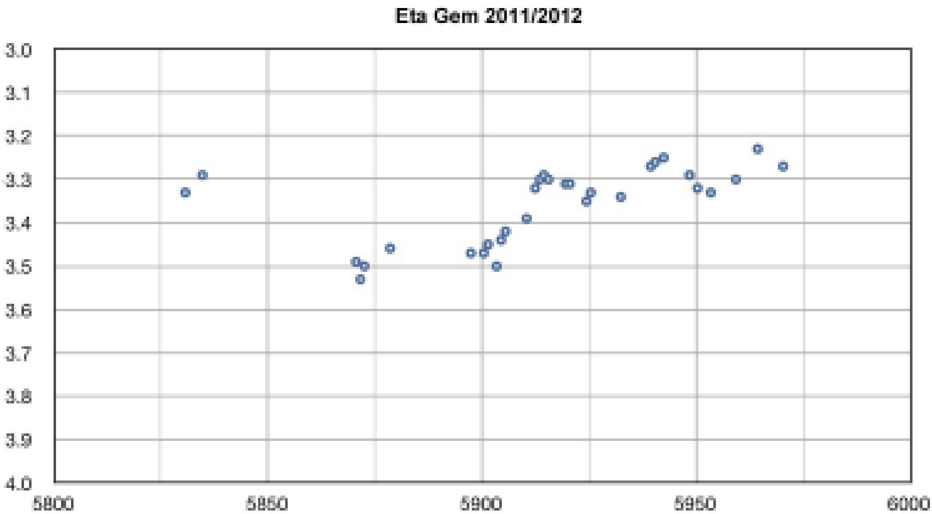


Figure 2.

W Ursae Minoris

I was asked to construct an up to date phase diagram of the W Ursae Minoris eclipsing system, which was discovered independently by T. H. Astbury and C. R. Davison in 1913. The system is classified by the GCVS as EA/SD with a primary eclipse from 8.51V to 9.59V, and a secondary eclipse from 8.51V to 8.66V. The latest elements according to the Krakow website are HJD = 245200.3956 + E x 1.7011382.

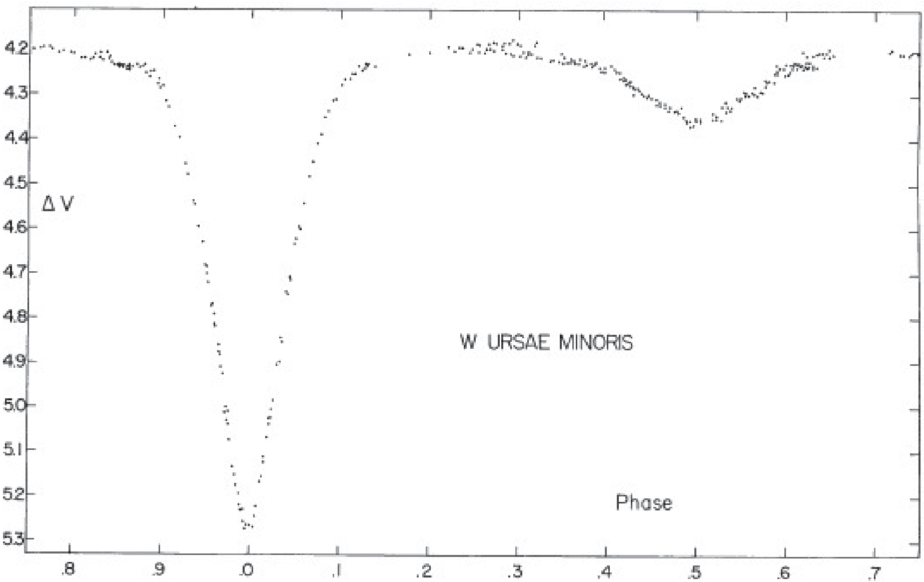


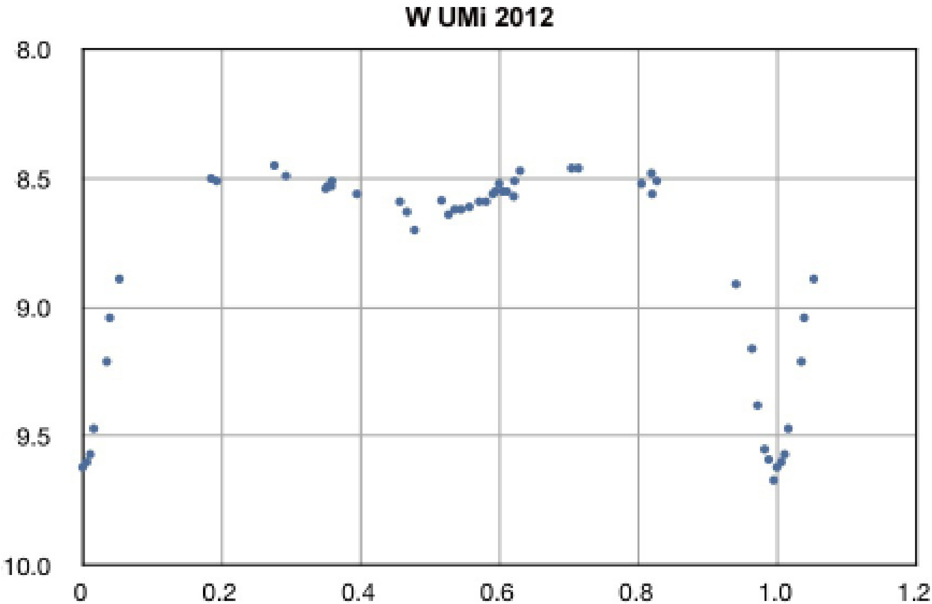
Figure 3. W Ursae Minoris: The individual observations of D.S.H. and D.H.W. in V, where ΔV is differential magnitude in the sense of W UMi minus δ UMi. Copyright: Astronomical Society of the Pacific. Provided by the NASA Astrophysics Data System.

‘Figure 3 (on page 14) originally appeared in an article in the Publications of the Astronomical Society of the Pacific (Devinney, Hall, & Ward, 1970PASP...82...10D). Copyright 1969 Astronomical Society of the Pacific; reproduced with permission of Professor Edward Devinney, and the Editors .’

There was an intensive study of the system which was reported in the article mentioned above, ‘Two independent photoelectric light curves and solutions of W Ursae Minoris’ by Devinney, Hall and Ward*, from which Figure 3 was taken. It is said to be a light curve which shows differential reflection and tidal distortion in two stars in close proximity.

I have made my measurements in 2012 and am well on the way to constructing the required phase diagram (based on the Krakow elements). The system is easy to find as it is very near Polaris and delta U Minoris. The settings used for a Canon 450D DSLR with a 200 mm lens were: exposure 5 seconds, ISO 800 and f2.8. Each point on my light curve (Figure 4 below) represents the average of ten images analysed with AIP4WIN.

Figure 4. W Ursae Minoris 2012



Normally a five second exposure, with an undriven camera and a 200 mm lens, would result in unacceptable blurring of stars. However for a system close to Polaris unacceptable blurring does not happen.

There is no BAAVSS chart for this system. However, I was able to find a reliable nearby comparison which was HIP 80561 at 8.63V.

It can be seen that the light curve is similar to that of 1970. The secondary minimum, even though it only has an amplitude of 0.15V has been picked out. It seems that eclipses are occurring as predicted by the latest Krakow elements.

DSLR Photometry and Flat Fields

For some years, in carrying out DSLR photometry using AIP4WIN, I have subtracted a dark frame from my images. I had thought that this was sufficient, and that it was not necessary to also subtract a flat field in the processing of an image. In 2011 it was pointed out to me that this was a mistake. Subtracting a flat field is essential. I now always subtract a flat field. It has been very convenient to have discovered on David Haworth's website <*http://www.stargazing.net/david/qsi/ccdperfflats.html*> a relatively quick and satisfactory way of producing a master flat field.

The method is to use a modern computer monitor screen for which I choose a dark grey monochrome colour. I then get my camera with a particular configuration eg. 85 mm lens (focused the same as for the stars), set at f5, ISO200, 5 second exposure. I press the camera with its rubber hood against the monitor screen. To make the images a bit darker I put two pages of white paper between the camera and the monitor. The pages are then held in place by the pressure of the hood. (It seems that the grey field of a modern monitor is uniform for the small proportion of the screen imaged by the camera. The sheets of white paper help in realising a uniform field by smoothing out any pixel effect). I take 20 images for the flat field and then, with the same camera configuration, 20 flat darks.

I check the flat field images on AIP4WIN to confirm that they are not saturated. Then using AIP4WIN I process the 40 images to construct a master flat field for use in calibrating the stars I currently study with that camera configuration.

I have made master flats using this method for all my settings and lenses.

* SAO/NASA Astrophysics Data System (ADS)
Title: Two Independent Photoelectric Light Curves and Solutions of W Ursae Minoris.
Authors: Devinney, E. J., Jr., Hall, D. S., and Ward, D. H.
Journal: Publications of the Astronomical Society of the Pacific, Vol. 82, No. 484 (February 1970), pp.10-52
Bibliographic Code: 1970PASP...82...10D
http://www.jstor.org/stable/40674831

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AN ENCOUNTER WITH RR LYRAE STARS

(The second of three articles)

GRAHAM SALMON

B. Pulsation in RR Lyrae Stars

In my previous article I described how I came to observe RR Lyrae stars. They divide into two groups, ‘ab’ whose light curve is characterised by a rapid rise and slow decline, like that of SW Andromedae (Figure 4), and group ‘c’ which are much more sinusoidal, like that of RW Arietis (Figure5). (The ‘ab’ group was originally divided into ‘a’ and ‘b’, but it was later recognised that there was no real distinction between them.) They differ because ‘ab’ stars oscillate in the fundamental, and ‘c’ stars do so in the first overtone.

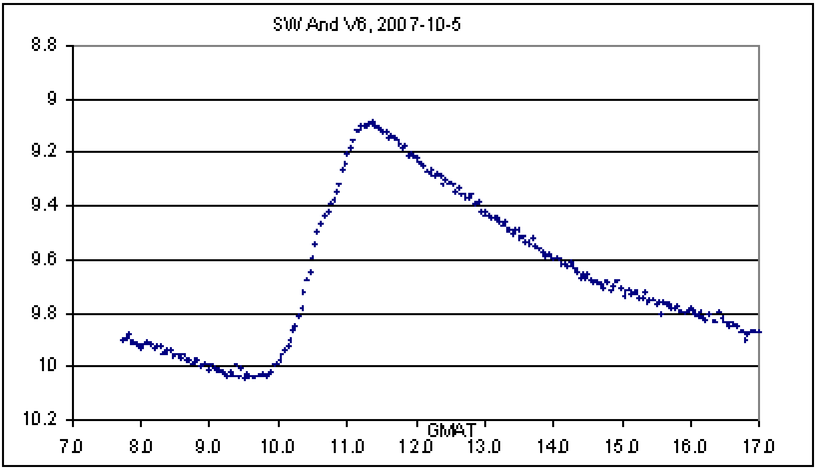
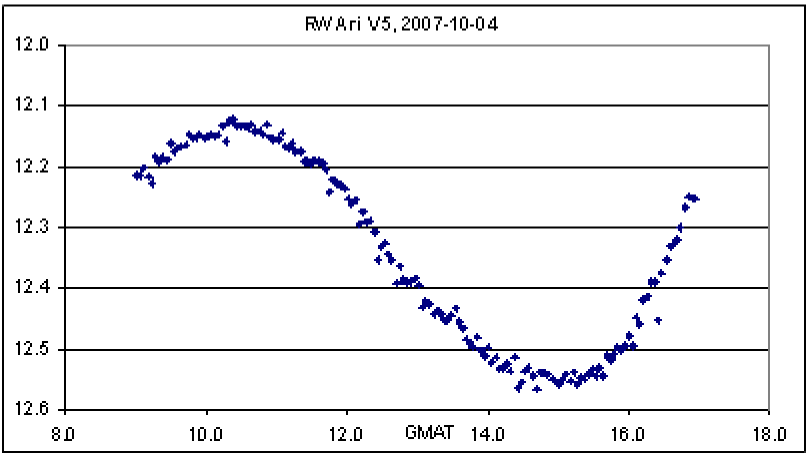


Figure 4: Light curve for SW Andromedae.

Figure 5: Light curve for RW Arietis.



SW Andromedae has a period of 0.4423d (10.614h) and an amplitude of magnitude 0.94, and RW Arietis has a period of 0.3543d (8.503h) and an amplitude of magnitude 0.43.

Stationary Waves

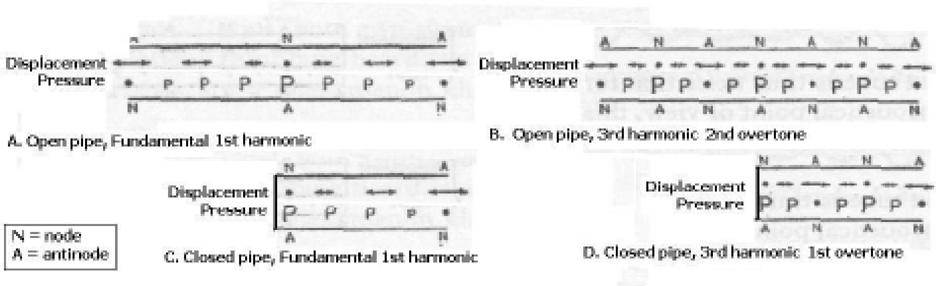


Figure 6: A - D The formation of stationary waves in organ pipes with the changes in displacement and pressure, and the corresponding nodes and antinodes in each.

In Figure 6A, the wavelength is equal to the length of the pipe. At each open end the pressure is constant (equal to the air pressure), while the displacement is at maximum (the air is rushing in and out creating the sound). In the centre the change of pressure is maximum and the displacement, zero. Because of this central displacement node, the pipe can effectively be 'cut in half' and closed at this point and the same conditions will be created, as in Figure 6C.

In Figure 6B, the same length of pipe can also vibrate at twice or three times (or higher) frequencies (second and third harmonics, first and second overtones) but only the third harmonic can be 'cut in half' as it has a displacement node in the centre, Figure 6D, while the second harmonic has a displacement antinode there.

I gather that '1st harmonic' means the fundamental, the 1st overtone is the 2nd harmonic – if there is one, which in the case of the closed pipe, there is not, so in that case the 1st overtone is the 3rd harmonic.

If we compare the organ pipe with the star, the closed end corresponds to the solid core of the star where there is change in pressure but no displacement.

The top of the pipe corresponds to the effective surface of the star where there is no change of pressure, it remains at zero, but there is a large displacement as the star expands and contracts.

The differences between the pipe and the star are, of course, large and numerous and should not be pushed. A difference is in the means of excitation. The closed organ pipe has a small vibrating air jet to initiate the production of the sound. The star has a layer a little way beneath the surface which is at such a temperature that it is partially ionized and has a varying opacity which can shut off the radiation coming from below. This is the helium ionisation region in which each atom has lost its first electron but not its second. Any random compression causes the temperature to rise which increases the secondary ionisation and absorbs a substantial amount of energy in doing so. This effectively increases the opacity, bottles up the radiation and therefore raises the temperature still more, so increasing the ionisation. This continues until the helium in the region is fully ionised. The absorption by ionisation then stops, effectively decreasing the opacity to minimum. The temperature and pressure begin to fall allowing the passage of radiation to increase despite the large number of free electrons. The recombination of these electrons releases further energy so that with both effects the light wave increases and over-shoots its mean level, and the expansion of the star continues so that the radius overshoots its mean. It then begins to collapse and the infalling material then steadily increases the temperature and pressure until the starting point is reached and the cycle starts again.

OBSERVATIONS

The principal purpose of observing RR Lyrae stars is to determine the time of maximum and record it to see if there is any variation in the period. This is done with an Observed versus Calculated (O-C) diagram as in this example for RW Arietis in which the period is slowly changing.

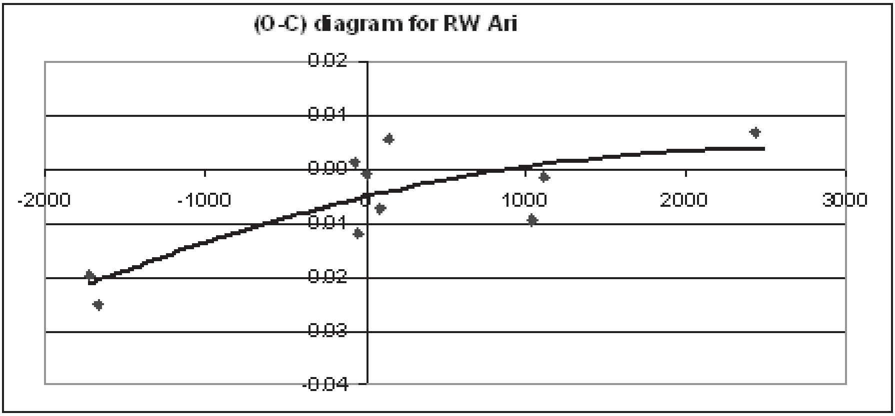


Figure 7. (O-C) diagram for RW Arietis

An (O-C) diagram shows the deviation of the observed time of maximum from that calculated. The GCVS provides the accepted time and date of the epoch, generally that of the first maximum observed, and also the accepted period. The calculated time of maximum is derived from these two figures. If the accepted period is in error or the period of the star has changed then the (O-C) diagram will display the increasing deviation.

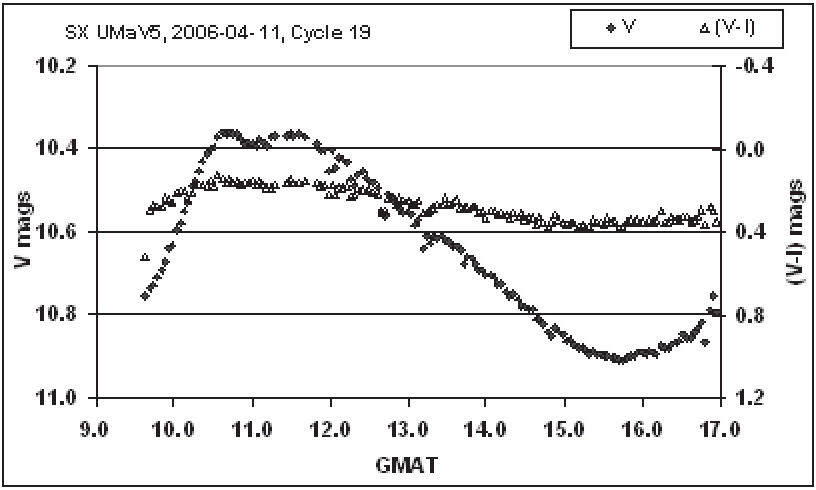


Fig 8. Light curve for SX Ursae Majoris.

One of the stars I observed was SX Ursae Majoris and was immediately intrigued by the double maximum that it showed. On looking on the Internet I discovered there was information about it on the website of Groupe Européen d'Observations Stellaires (GEOS), with all the observations of its maxima taken over the last hundred years. It included the (O-C) diagram shown below.

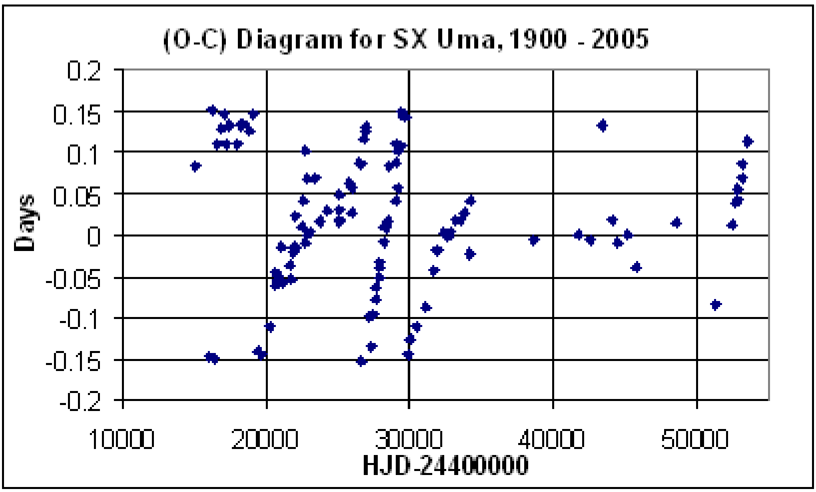


Fig 9. (O-C) diagram for SX Ursae Majoris

Norman Walker kindly went over these observations inserting cycles as required to produce a more realistic result using a period of 0.3071278. The star was quite well observed until 1950 but only infrequently after then. The gaps before 1950 and the ones later meant that the number of cycles which had passed became very uncertain.

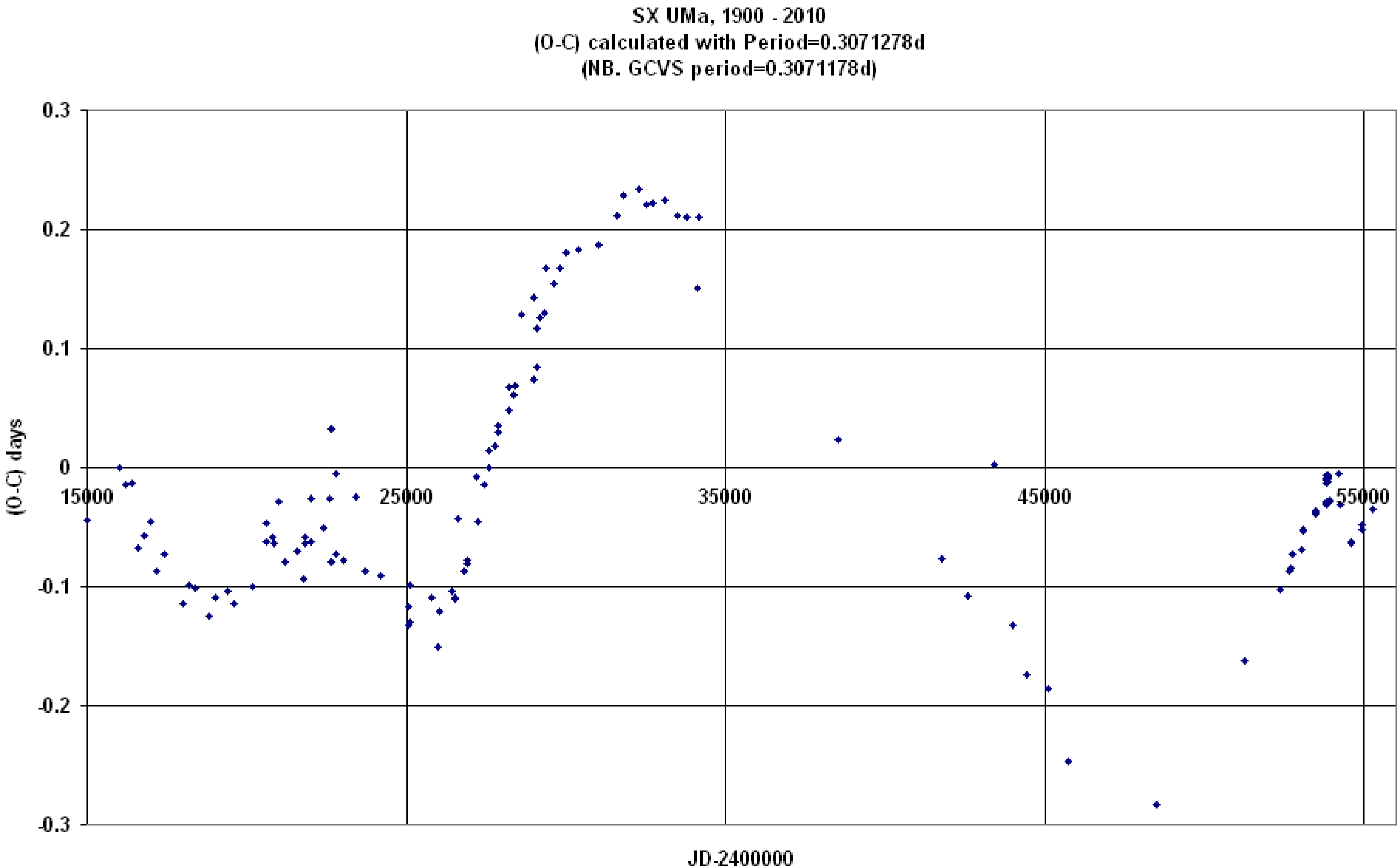


Figure 10. Revised (O-C) diagram for SX Ursae Majoris. RR Lyrae stars are not as constant and boring as often thought. The explanation of the double maximum in this light curve was continuing to elude me – but more of that next time.

RU CEPHEI - THE BRIGHTEST SRD STAR NEAR POLARIS.

Melvyn Taylor

RA 01h 21m 11.8s Dec +85° 07' 55.6" (J2000.0) SRD G6-M3.5III 109d (GCVS)

The general description of the semi-regular SRD class is: giants or supergiants with some emission lines and periods ranging 30d to 1100d, and amplitudes from 0.1 to 4.0 magnitudes.

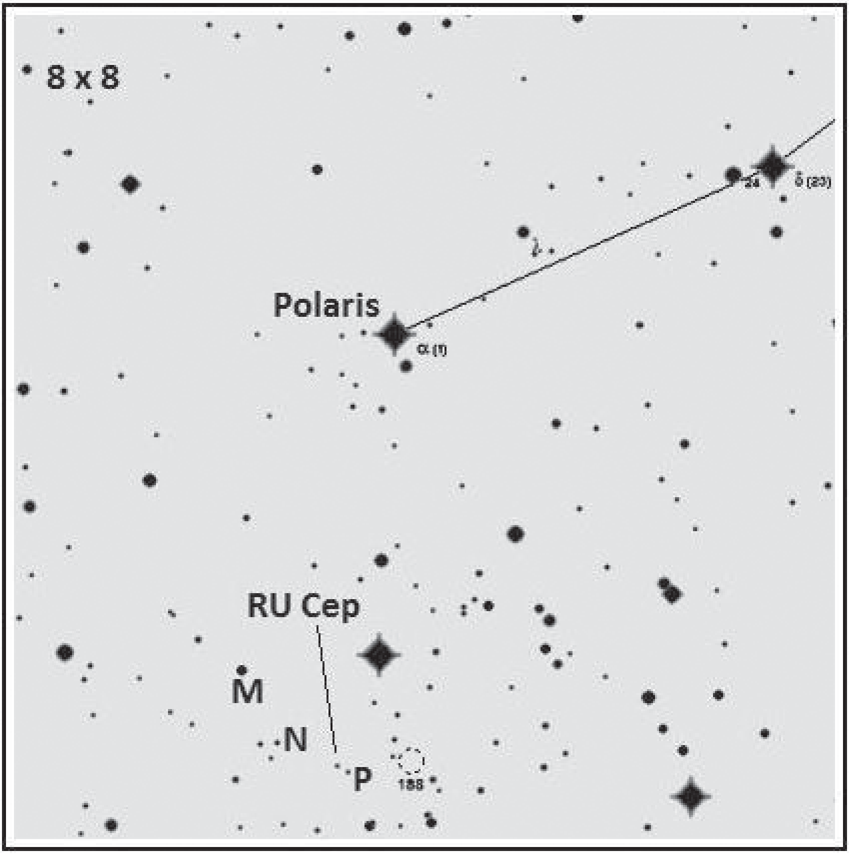
The light curve from 1982 to 2001 from the recently announced BAAVSS database comprises 2170 light estimates. Forty-five observers as listed below are contributing to the whole database set of this object.

The average magnitude in this interval is 9.05 (s.d. 0.21) and the magnitude varies from a mean maximum of 8.3 to a mean minimum of 9.3. Maxima range from 8.3 to 8.9 and minima from 9.0 to 9.3. A cursory assessment of a mean period is 101d taking into account well defined phases of the typical semi-regular changes. Another tentative period may be about 235d. The line variation shown on the plots is the two point moving average function provided by MS Excel .

A SkyMapPro (v.11) version of the BAAVSS chart, dated 1985 May 06, is shown as a 8° square with comparisons M,N and P identified. (Fig.1)

Albrighton	Ramsey	McNaught	Jackson	Granslo
Day	Allmand	Swain	Mormyl	Johnston
Hollis	Fleet	Baransky	Taylor	O'Halloran
Livesey	Hurst	Freeman	Brelstaff	West
Price	Marriott	Isles	Gough	Currie
Allen	Shanklin	Middlemist	Jobson	Hather
Dryden	Anderson	Tanti	Newman	Koushiappas
Hufton	Fraser	Beesley	Watts	Pezzarossa
Lubek	Hutchins	Gardner	Clayton	Wise

Figure 1: A SkyMapPro (v.11) version of the BAAVSS chart for RU Cephei.



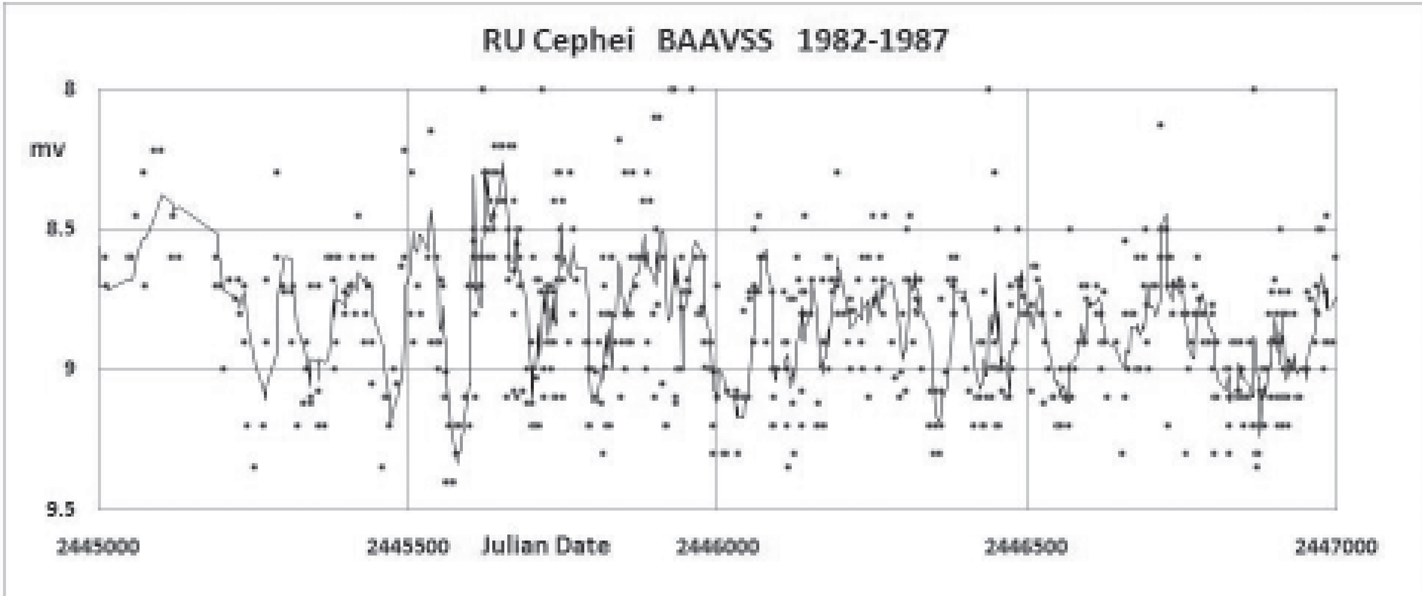

RU Cephei BAAVSS 1982-1987
mv
8
8.5
9
9.5
2445000
2445500
Julian Date
2446000
2446500
2447000

Figure 2.

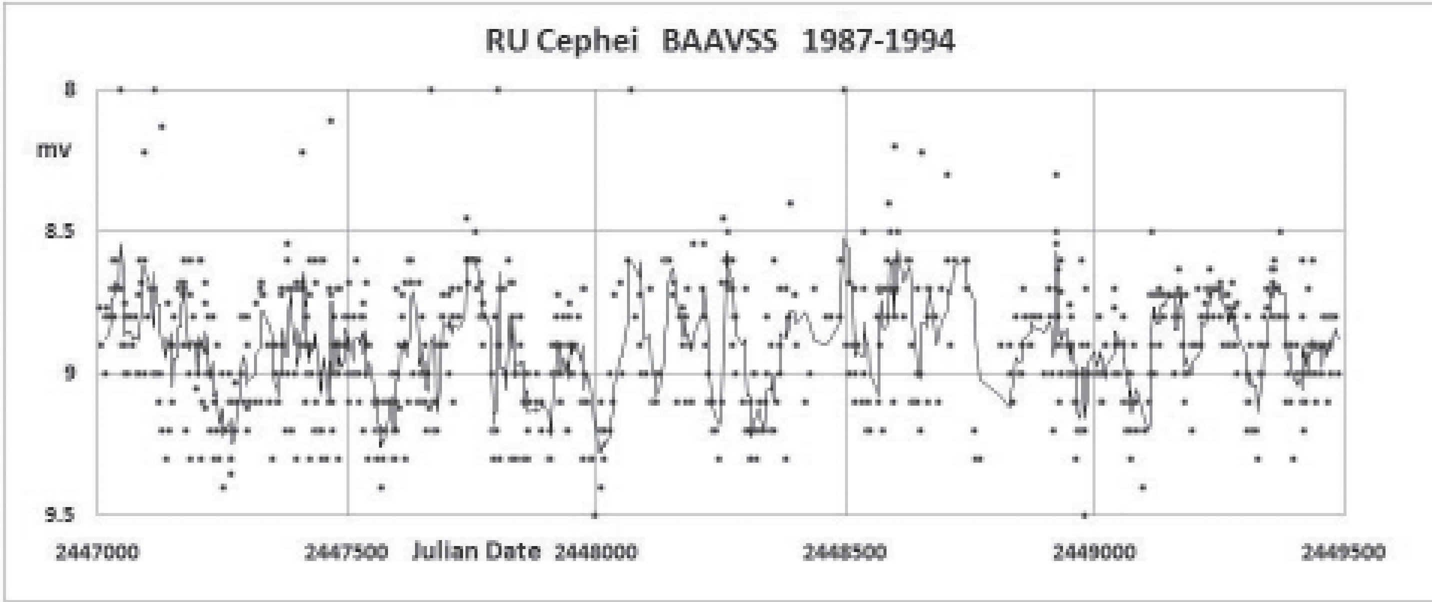

RU Cephei BAAVSS 1987-1994
mv
8
8.5
9
9.5
2447000
2447500
Julian Date
2448000
2448500
2449000
2449500

Figure 3.

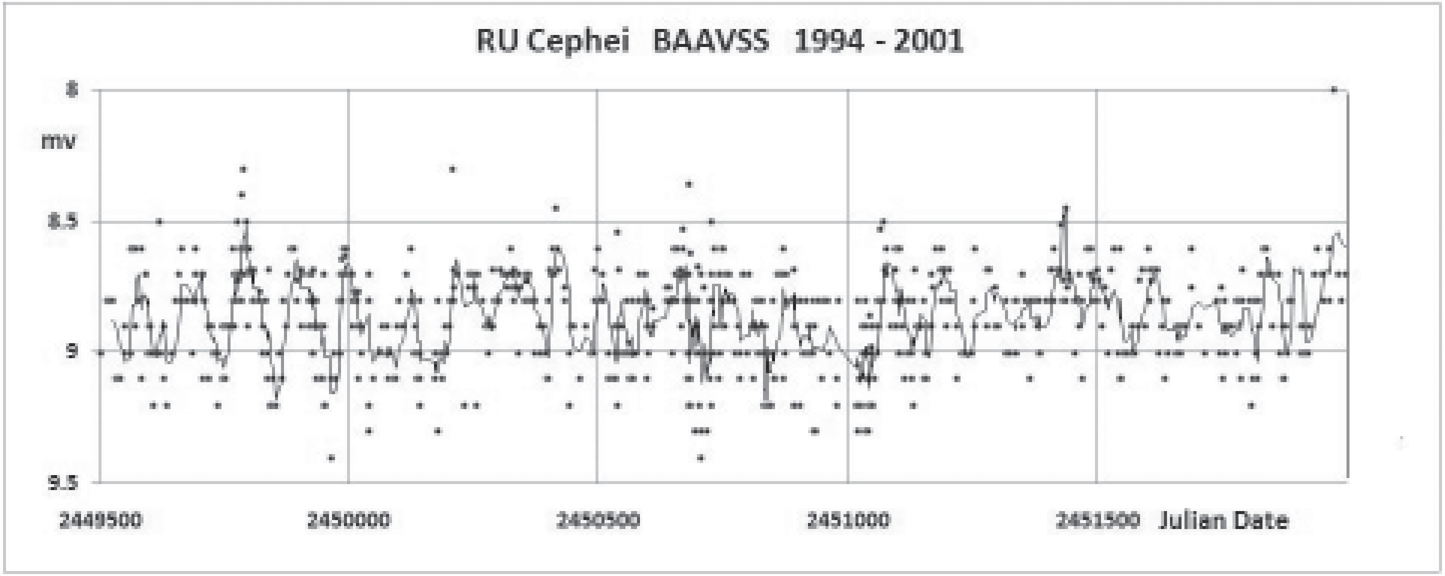
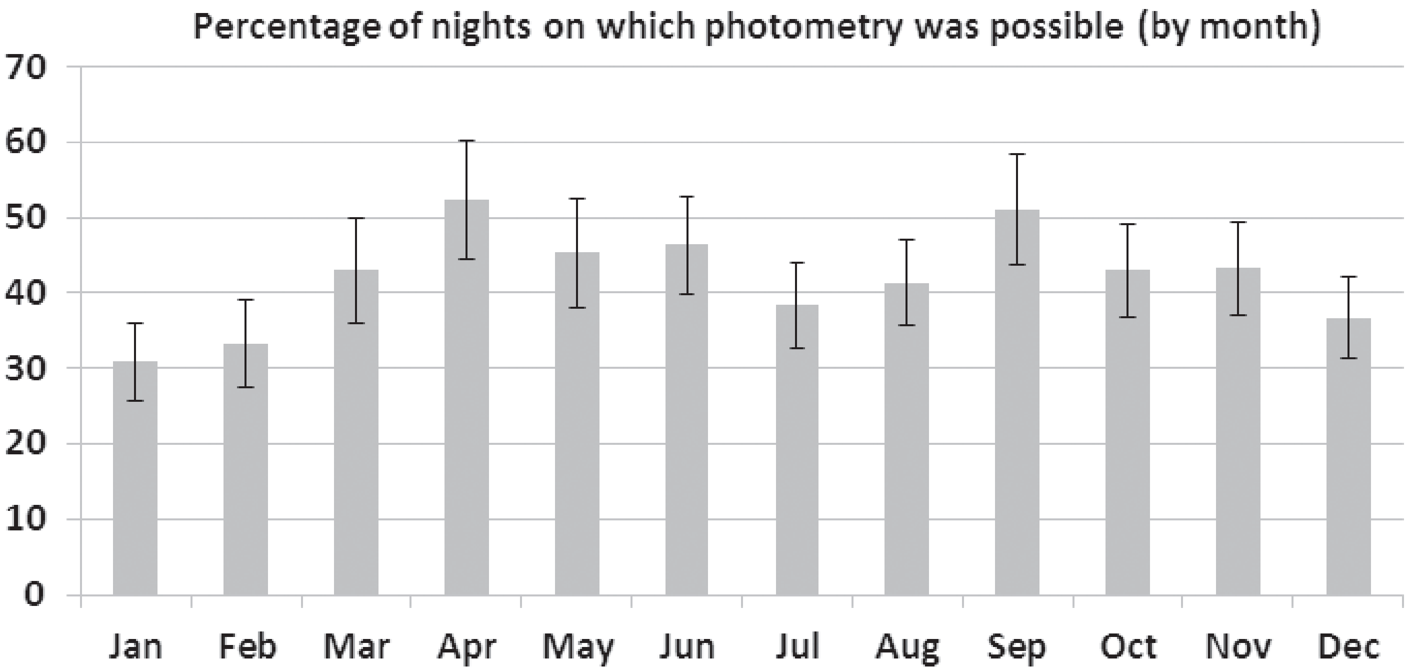

RU Cephei BAAVSS 1994 - 2001
8
mv
8.5
9
9.5
2449500
2450000
2450500
2451000
2451500
Julian Date

Figure 4.

STATISTICS ON USEABLE NIGHTS FOR PHOTOMETRY IN SOUTH OXFORDSHIRE OVER THE LAST SEVEN YEARS.

DAVID BOYD

Table 1.



Prompted by John Toone's article about night time cloud cover in the December 2011 VSSC (No 150), I thought readers might be interested in some statistics I have been collecting about the frequency of nights suitable for photometry from my observatory in South Oxfordshire.

Since the beginning of 2005 I have recorded at the end of each month the number of nights during the month on which I was potentially able to observe, thus eliminating nights when I was on holiday, away at meetings or had some other commitment. I also recorded on how many of these available nights I had been able to obtain useful photometry. My observing is generally between the onset of full darkness and midnight or sometimes later, particularly in summer. For each month I could then calculate the percentage of my available nights on which useful photometry was possible. The results are graphed by month, and averaged over the years, in Table 1; and by year, averaged over the months, in Table 2. Statistical uncertainties in the numbers are shown as error bars.

The best months are April and September with over 50% useable nights and the worst January and February, although even these have over 30% useable nights. For some reason January 2012 has been unusually good with a remarkable 75% useable nights! There is no significant annual variation over the last 7 years with the average percentage of nights producing useful photometry over this period being 42%. So it seems that our climate is not as bad for astronomy as is sometimes made out, at least as far as variable star observing is concerned. Perhaps we should make more of this in trying to attract observers into this field.

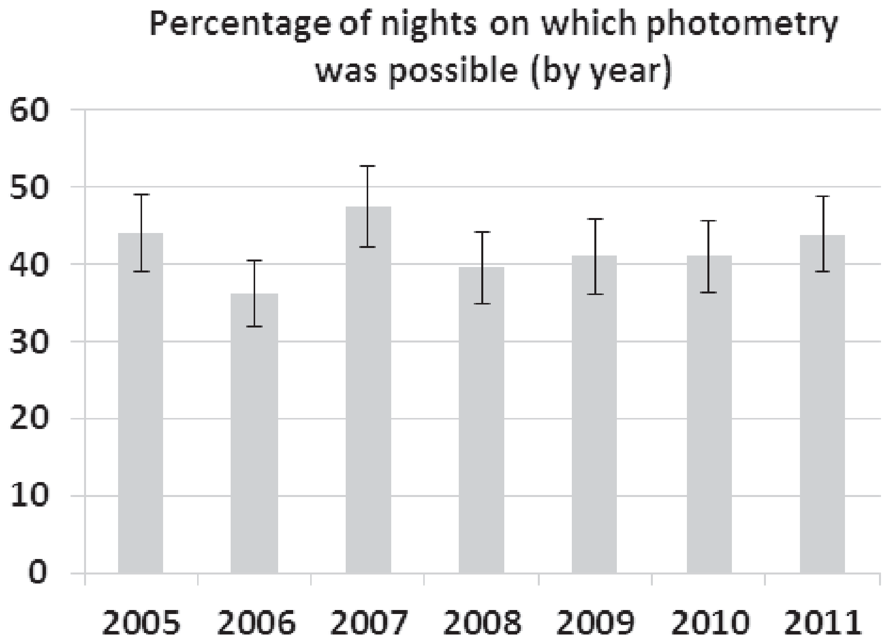


Table 2.

THE DECEMBER 2011 OUTBURST OF SS AURIGAE.

JOHN TOONE

A fine series of partly clear nights in December 2011 allowed me to secure 25 visual observations of SS Aurigae on 21 nights, which is the highest figure I have achieved for a single calendar month. This fortunately coincided with a long outburst that turned out to be the widest on record according to the BAA VSS and AAVSO databases. (The term "width" of an outburst refers to the time interval between rising and falling intersections of the light curve with a chosen magnitude line).

In common with many other dwarf novae SS Aur exhibits three distinct types of outburst: shorts, longs and anomalous. Short outbursts are the most frequent, faintest and last between 2 and 6 days (most often 4 days) above magnitude 12.0. Long outbursts are normally the brightest and last more than 7 days (most often 11 days) above magnitude 12.0. Anomalous outbursts are the least frequent, are characterized by a slow rise and can last as long as either short or long outbursts.

The AAVSO undertook an analysis of 494 outbursts recorded during the period 1907 to 1984 and presented the results in the JAAVSO, Vol 15, No 1, pages 3-14. This paper reported that the longest recorded outbursts above magnitude 12.0 were two at 14 days and six at 13 days (not well covered by BAA VSS data). However, a review of the current data within the AAVSO light curve generator does not conclusively support that any of these outbursts exceeded 12 days above magnitude 12.0.

The BAA VSS undertook an analysis of 283 outbursts recorded during the period 1920 to 1969 and presented the results in the JBAA, Vol 87, No 2, pages 176-193. This paper reported that the longest recorded outburst above magnitude 12.0 was in September/October 1948 and lasted 12.5 days (not well covered by AAVSO data).

Since the above reports were published coverage has improved from the visual observers and within the last 10 years the visual work has been increasingly supplemented by CCD data. A review of the BAA VSS database and the AAVSO light curve generator during the period 1985 to 2010 has yielded three outbursts lasting 13 days above magnitude 12.0:

28 March to 10 April 1989
18 December to 31 December 1998
31 January to 12 February 2006

Light curves of the 1989 and 1998 outbursts based on BAA VSS data were reproduced in VSS Circular No 99 March 1999, Page 10. The 1989 outburst had a clear 'long' shape but the 1998 outburst was surprisingly anomalous.

Since 1936 there have been no significant changes in the sequences used by the AAVSO and BAA VSS that would impact on the measurement of outburst widths at magnitude 12.0.

The mean period of SS Aur is 55 days and in 2011 there were long outbursts in February and June followed by a short outburst in August. So by the time December came SS Aur had spent twice its normal period length at minimum and was long overdue an outburst.

I suspected that the next outburst might be a bright long so I intensified my normal monitoring with the C8 telescope in an attempt to catch SS Aur on the rise. SS Aur cannot be seen at minimum with the C8 and depending on the seeing conditions, moonlight, and altitude, I record negative observations fainter than L (12.5), N (13.1), R (13.9), or S (14.6) using sequence 003.03. Between the 1st and 11th December I recorded negative observations on 7 nights despite having to spend nights away from home in both Oslo and Manchester.

Coverage of the December 2011 outburst began on the morning of the 13th when SS Aur was recorded rising at magnitude 11.9. Visual observations were then made as frequently as possible sometimes twice nightly because in December there is 13 hours of darkness available. It peaked at magnitude 10.6 on the 18th, and then started a slow decline of 0.07mag/day until the 26th. SS Aur was recorded at magnitude 11.7 on the morning of the 27th exactly 14 days after it was first seen at magnitude 11.9 and I put out a BAA VSS alert notice. From the 26th a rapid decline set in of 0.61mag/day and SS Aur was last seen fading at magnitude 13.5 on the morning of the 30th some 17 days after first being seen. Throughout the outburst I managed to secure 18 observations on 15 nights. From analysis of the light curve shown in **Figure 1** the outburst width was measured as:

Above magnitude 11.0mv: 14.1 Dec to 23.9 Dec = 9.8 days
Above magnitude 12.0mv: 13.2 Dec to 27.7 Dec = 14.5 days
Above magnitude 13.0mv: 13.1 Dec to 29.3 Dec = 16.2 days

The above can be used to compare with historical visual data acquired during previous long and anomalous outbursts of SS Aur.

I checked AAVSO CCDV data secured during the outburst with the intention of comparing it to the visual data. AAVSO CCDV data was available from 5 observers covering 12 nights which was good enough to define the overall shape and accurately measure the width of the outburst. From the light curve shown in **Figure 2** the outburst width was measured as:

Above magnitude 11.0V: 14.2 Dec to 22.9 Dec = 8.7 days
Above magnitude 12.0V: 13.2 Dec to 27.1 Dec = 13.9 days
Above magnitude 13.0V: 13.1 Dec to 28.9 Dec = 15.8 days

The above can be used to compare with CCDV data acquired during future long and anomalous outbursts of SS Aur.

Figure 3 shows the visual data plotted together with the CCDV data. I had intended to do an mv to V conversion prior to combining the data sets but that was abandoned once it became apparent that the data was similarly calibrated scale wise. The most notable feature is that maximum occurs two days earlier (16th) with the CCDV data and is brighter than the visual data pre maximum but systematically fainter post maximum. The difference is no more than 0.2 magnitude but it is a feature which was also recorded with SW Ursae Majoris in 2010 (see VSS Circular No 147, March 2011, page 13). So it would seem that SS Aur peaks in V earlier than mv (presumably a colour change at or near the point of maximum is the reason) and correspondingly fades earlier as well resulting in a reduction of the outburst width. This is something for analysts to note when comparing historical visual data with current and future V data.

Normally the outbursts of SS Aur cannot be fully covered by a single observer in a fixed location and even the collective efforts of the BAA VSS and AAVSO observers in the past have not been sufficient to establish conclusively any outbursts exceeding 13 days above magnitude 12.0. So it is immensely pleasing that a visual observer based in the cloud prone UK can occasionally defy the statistical odds and produce a result that compares favourably with the work of CCD observers spread across the globe.

Figure 1.

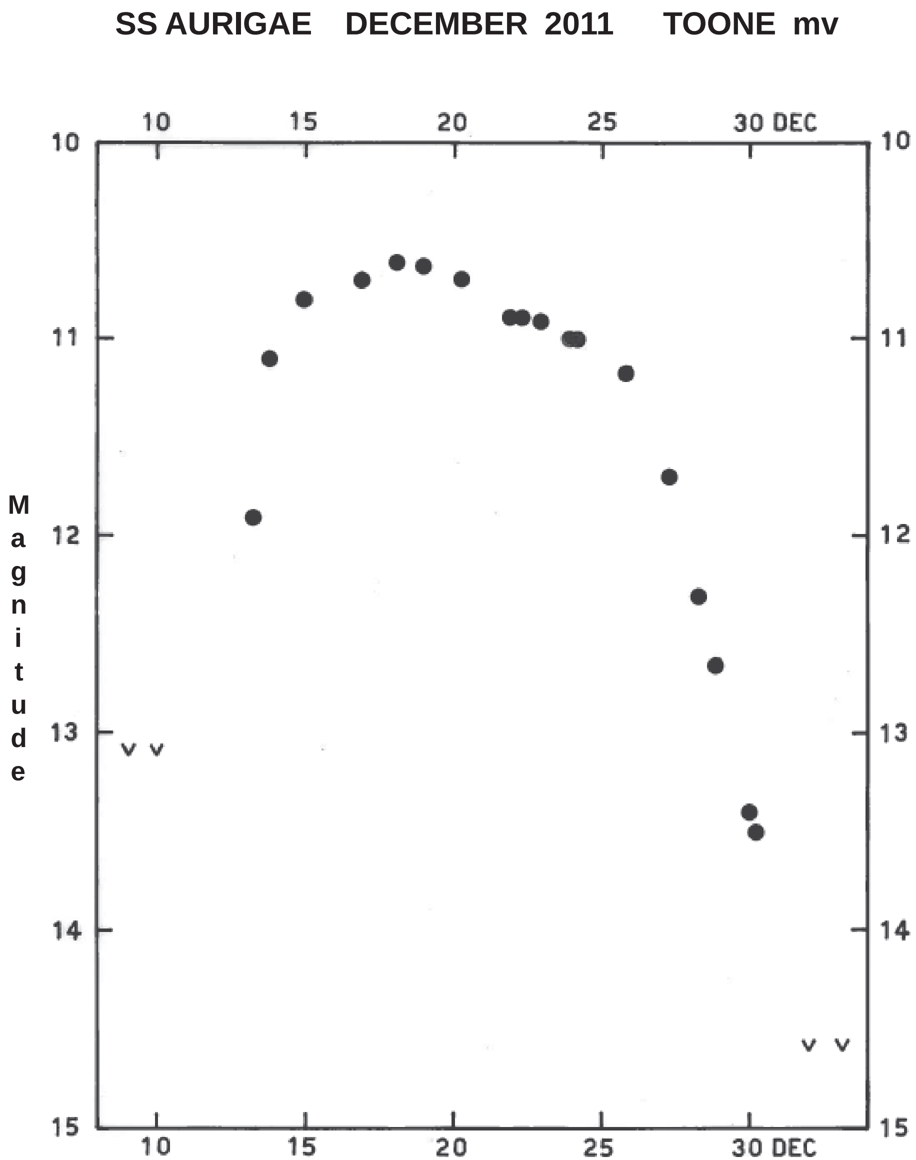


Figure 2.

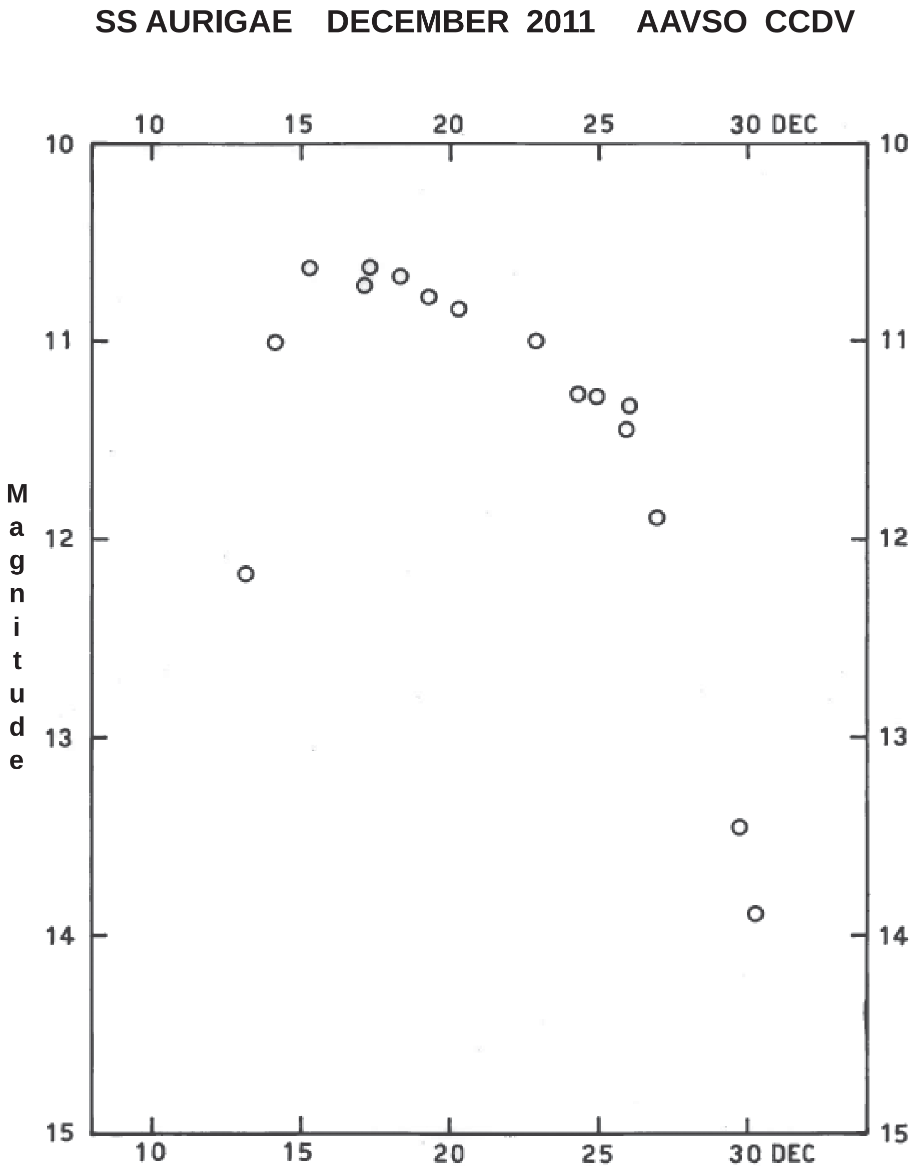
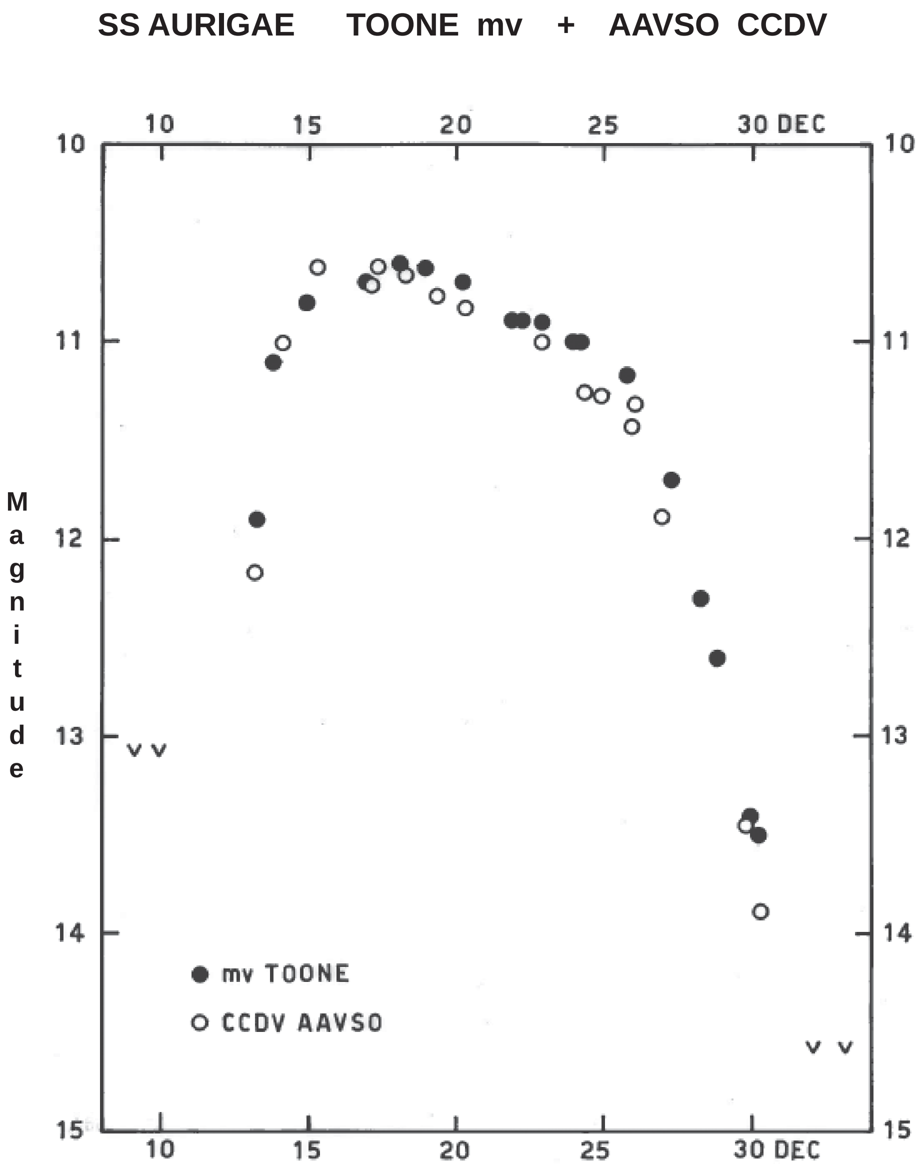

SS AURIGAE DECEMBER 2011 AAVSO CCDV
10
15
20
25
30 DEC
10
11
12
13
14
15
Magnitude

Figure 3.


SS AURIGAE TOONE mv + AAVSO CCDV
10
15
20
25
30 DEC
10
11
12
13
14
15
Magnitude
mv TOONE
CCDV AAVSO

SS AURIGAE – NOT JUST A WINTER OBJECT

John Toone

The British Isles is well positioned, latitude wise, to fill in the gap that often appears in the data for SS Aurigae from the end of May to mid-July. SS Aur is circumpolar and despite its low altitude within the all night twilight glow that extends a month either side of the summer solstice, useful visual observations can be secured with only moderate sized instruments. In June the full moon is low down in the opposite side of the sky and providing Capella is not immersed in noctilucent cloud an 8 inch telescope can normally pick up comparison L at magnitude 12.5 on the 003.03 sequence. All conventional outbursts of SS Aur reach a magnitude brighter than comparison L so in theory there is no reason not to miss out on detecting outbursts through the summer months.

I have had some success in picking up outbursts in the summer months of June and July within the past 20 years. Outbursts have been recorded within the four week period either side of solar conjunction on 24th June for the following years:

1991, 1993, 1996, 1997, 1999, 2000, 2001, 2002, 2006, 2008, 2009, and 2011.

No observations, other than mine, have been reported to either of the BAA VSS or AAVSO databases covering the outbursts in 2008 and 2009. The rise and fall of the 2009 outburst was sufficiently covered to confirm it was a long outburst lasting 12 days above magnitude 12.0 (see my attached light curve).

SS Aur has a period of 55 days so it is not surprising that an outburst often falls in the 8 week period centered on 24th June. The sun passes 24 degrees to the south of SS Aur on 24th June, and SS Aur is only 9 degrees above the northern horizon from my latitude. To maximize my chances of securing useful observations in minimal twilight I usually turn to the SS Aur field precisely at midnight (the time of the suns maximum depression below the horizon ranges from 23:57GMT on 28th May to 00:06GMT on 22nd July).

It is important to have a full record of the SS Aur outbursts and also if possible define the type of each outburst (long, short or anomalous). This can be done by recording sufficient data to plot a light curve that shows the shape and duration of the outburst above magnitude 12.0. The job of the analyst is so much easier if he/she can be confident that there are no outbursts missed.

SS Aur was the third dwarf novae to be positively identified after U Geminorum and SS Cygni, and has a well-documented, but sometimes fragmented history. So if you want to help to plug a gap in an important data set and observe a winter star in summer conditions why not point your telescope at Capella on the northern horizon and star hop to the field of SS Aur. I get a very warm feeling every time I see SS Aur outbursting in the all night twilight of early summer.

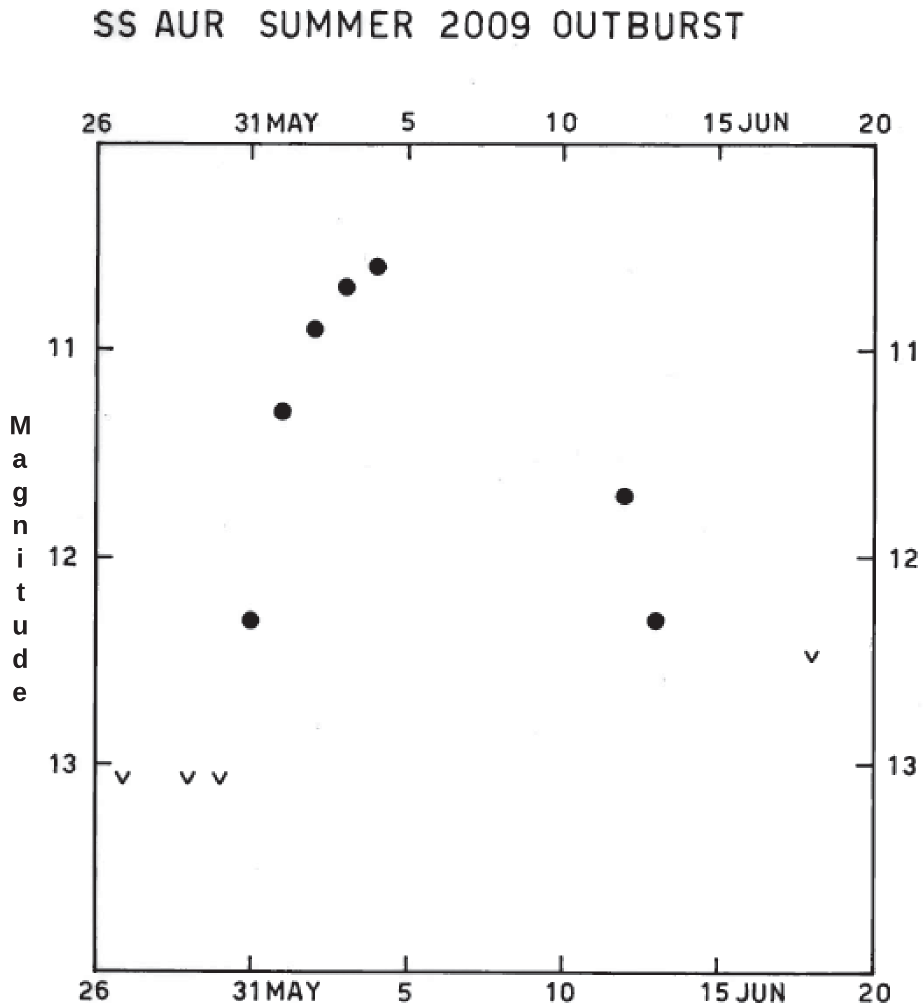


Figure 1: The rise and fall of the 2009 outburst was sufficiently covered to confirm it was a long outburst lasting 12 days above magnitude 12.0

Session: Eclipsing and spectroscopic binaries

- **Amateur spectrometric study of Albireo, David Antao**
  (translated from French)

Amateurs now have the means to monitor or investigate particular stars. However, apart from taking part in the project BeSS which analyses Be stars, and studying some individual stars such as Epsilon Aurigae, it is not always easy to choose our targets and to study their characteristics in depth.

This presentation will show the results of observations performed on the double star Albireo, and the information that has been deduced (temperature, radial velocity). A call will be issued to professional astronomers to get help on this study topic.

David ANTAO <*davidant@neuf.fr*>

- **The state of eclipsing binary observations by amateurs, Laurent Corp (4A, GEOS, AAVSO)**
  (translated from French)

This presentation is about eclipsing binary stars measured by amateur astronomers. It aims to explain the issues, the means, and the resources to use, to ensure proper monitoring.

Laurent CORP <*astro.laucorp@orange.fr*>

- **The rare eclipse stars ε Aur and ζ Aur: a report on 2011 eclipses, Jeff Hopkins, *in video-conference***

Two very interesting star systems easily seen from the Northern hemisphere are eclipsing binary systems epsilon and zeta Aurigae. These stars are to the south east of Capella and are part of a triangular group known as the kids. The third star in the group is eta Aurigae. Eta is often used as a comparison star for photometry. Zeta eclipses every 2.7 years. The eclipse last 44 days. Epsilon is the grand champion of long period eclipsing binary stars systems with a period of 27.1 years and an eclipse lasting nearly 2 years. While epsilon Aurigae concluded its eclipse in mid 2011, the most recent eclipse of zeta Aurigae was in the late fall of 2011. The zeta Aurigae eclipse was during a time when zeta Aurigae was high in the sky at reasonable hours making observing very easy. In 2006 an International Campaign was formed for the epsilon Aurigae eclipse and during the fall of 2011 a smaller Campaign for the zeta Aurigae eclipse. These Campaigns organized and coordinated both photometric and spectroscopic observations of the eclipses. This presentation will describe more details of these two Campaigns and their results.

Jeff HOPKINS <*phxjeff@hposoft.com*> *www.hposoft.com/Astro/astro.html*
International Epsilon Aurigae Campaign: *http://www.hposoft.com/Campaign09.html*

- **The use of DSLR photometry in measuring the magnitude of variable stars, Des Louhgney (BAA, VSS)**

I would illustrate the presentation with studies of some eclipsing binaries and other stars such as Rho Cas.

Des LOUGHNEY <*desloughney@blueyonder.co.uk* >

- **Classification of eclipsing binaries: extreme and unusual systems, Oleg Malkov (Institute of Astronomy, Moscow)**

We have compiled a catalogue of eclipsing binaries, containing some 7200 systems. It is the largest catalogue, containing classified eclipsing binaries. We have also developed a procedure for the classification of eclipsing binaries. In this talk I present data on several eclipsing binaries, which can not be classified. Observational data for them is too contradictory. Additional observations are needed to attribute them to one or another class, or perhaps, new classes should be introduced to find their places in the evolutionary scheme. Such observations can be made both by professional and by amateur astronomers.

Oleg Yu. MALKOV <*malkov@inasan.ru*>

- **Role of binary and variable stars in cosmic distance scale, David Valls-Gabaud (Observatoire de Paris)**
  (translated from French)

I shall talk about the latest work taking in spectroscopic Eclipsing Binaries, Cepheids, and also color-magnitude diagrams.

David VALLS-GABAUD <*david.valls-gabaud@obspm.fr*>

- **A Study of 200 Eclipsing Stars recently discovered in Cynus and Auriga, Stan Waterman (BAA, VSS)**

Session: Astrometric double and multiple stars

- **Dembowski or the use of the 26-inch telescope in Johannesburg, Bob Argyle**

- **Title to be defined, Pierre Durand (SAF)**

- **Binary star database: state of affairs and prospects, Oleg Malkov (Institute of Astronomy, Moscow)**

The Binary star database contains data on about 100,000 stellar systems of multiplicity 2 to 22, taken from a large variety of published catalogues for all types of binary stars. Positional, kinematic, photometric, spectroscopic, orbital and astrophysical parameters are provided when available.

The database can be queried by identifier, coordinates, catalogue and stellar/orbital parameters of objects. Also, the database provides links to some other on-line services, both of general purpose and on binary stars.

Oleg Yu. MALKOV <*malkov@inasan.ru*>

- **Title to be defined, Edgar Soulié (SAF)**

- **Interférométrie des tavelures sur étoiles doubles avec des moyens amateurs.**
  'Speckle interferometry of binary stars with amateur means.'
  Bernard Trégon (T60)
  (translated from French)

Speckle interferometry is a technique which restores the theoretical resolution of an instrument, by overcoming the natural degradation caused by a turbulent atmosphere. The principle of speckle is based on the wave nature of light. The methodology of speckle interferometry, which was implemented for the first time in the 1970s, is now accessible to amateurs thanks to the availability of rapid and sensitive video cameras, used together with large diameter telescopes, and particularly effective processing software for amateur images. This presentation proposes to describe the basic principles of interferometry, and includes the various stages of implementing the technique on double stars. The work started in 2008 using the 60cm telescope of the Pic du Midi Observatory is presented, and a number of perspectives can already be identified.

Bernard TRÉGON <*tregon@lkb.ens.fr*>

Session: Pulsating stars

- **Photometric study of pulsating star BL Cam, Stéphane Fauvaud (GEOS, Association T60)**
  (translated from French)

Listed among the stars of SX Phoenicis - of short-period pulsating, high light amplitude, consistent with population II stars, ie metal-poor - the variable BL Camelopardalis has been the object of an observation campaign 'Photometric International (2005-2007)', combining professional and amateur astronomers, which led to a better characterization of its oscillations. On the other hand, the analysis of old and recent data showed that BL Cam is a multiple system, double or even triple. The methodology to achieve these results will be displayed and recent data will be presented.
Keywords. Asteroseismology - pulsating star - multiple system - CCD photometry - Method C-O - BL Cam

Stéphane FAUVAUD sfauvaud@gmail.com

- **The GEOS RR Lyr Survey, Jean-François Le Borgne (IRAP, GEOS)**

- **Pulsating stars in the space missions context, Philippe Mathias (IRAP)**

MOST, CoRoT and Kepler are space missions dedicated (or partly dedicated) to asteroseismology of various pulsating stars, from solar-like to red-giant stars, from delta Scuti to white-dwarves stars...

With quasi-uninterrupted data sets recorded during unprecedent time-basis lengths, the frequency spectrum resolution allows the detection of hundreds (often more than 1500) frequencies from which asteroseismic parameters can be derived, and among them one might access to fundamental values such as the stellar age, mass, radius, differential rotation...

To be efficient, asteroseismology is an iterative process between these observed frequencies, their identification, and stellar models. However, in order to converge, this procedure should at least be based on the localisation of the star on the HR Diagram. Indeed, for instance, the frequency spectrum of a beta Cephei star totally mimics that of a delta Scuti star.

Presently, we deal with gamma Doradus, where gravity-modes, probing the inner envelope, are involved. From CoRoT, more than 3000 candidates are suggested by the CoRoT Variable Classifier in the EXO fields, that is based on the morphology of the light curve and the values of the three first frequencies.

As said above, this is unsufficient to determine the status of the star, and additionnal measurements have to be done. From a photometric point of view, it is essential to get multicolour measurements to derive basic fundamental parameters such as effective temperature and luminosity.

The magnitude of the concerned stars are between 11 and 16: the brighter ones can be observed with an “amateur” telescope equipped with classical filters to determine their position in the HR Diagram.

Philippe MATHIAS <Philippe.Mathias@irap.omp.eu>

- **Pulsating stars, Mike Simonsen (AAVSO), in video-conference Session**: Exoplanets, beginning and end of star life ... ...

- **Supernovae, explosive death of the stars, Remi Cabanac (IRAP)**
  (translated from French)

The stars that end their lives by one process or another with a mass above the Chandrasekar limit (mass> 1.4 $M_\odot$) explode as supernovae, on summarizing and rejecting the heavy elements in the interstellar medium , such as iron. In this talk I will discuss the variety of supernova, the underlying methods of physics, and applications of discoveries of supernovae of type Ia.

Rémi CABANAC <rcabanac@irap.omp.eu>

- **Success of a Pro-Am collaboration: Be stars, François Cochard (Shelyak)**

- **Searching for Low Amplitude Variable Stars and Transiting Exoplanets, Stan Waterman (BAA, VSS)**

French translated by Google with the help of the Editor. Mistakes are due to the Editor.

BINOCULAR PRIORITY LIST

MELVYN TAYLOR

(Includes *XX Cam*, *Mira*, *R CrB*, and *R Hya* which are also on the telescopic programme)

Variable		RA (2000) Dec	Range	Type	Period	Chart	Prog
AQ	***And***	00 28 +35 35	8.0-8.9	SR	346d	303.01	
EG	***And***	00 45 +40 41	7.1-7.8	ZAnd		072.02	
V	***Aql***	19 04 -05 41	6.6-8.4	SRb	353d	026.04	
UU	***Aur***	06 37 +38 27	5.1-6.8	SRb	234d	230.02	
AB	***Aur***	04 56 +30 33	6.7-8.4	Ina		301.01	
V	***Boo***	14 30 +38 52	7-12	Sra	258d	037.01	
RW	***Boo***	14 41 +31 34	7.4-8.9	SRb	209d	104.01	
RX	***Boo***	14 24 +25 42	6.9-9.1	SRb	160d	219.01	
ST	***Cam***	04 51 +68 10	6.0-8.0	SRb	300d?	111.02	
XX	***Cam***	04 09 +53 22	7.3-9.7	RCB		068.01	T/B
X	***Cnc***	08 55 +17 04	5.6-7.5	SRb	195d	231.01	
RS	***Cnc***	09 11 +30 58	5.1-7.0	SRc	120d?	269.01	
V	***CVn***	13 20 +45 32	6.5-8.6	SRa	192d	214.02	
WZ	***Cas***	00 01 +60 21	6.9-8.5	SRb	186d	1982Aug16	
V465	***Cas***	01 18 +57 48	6.2-7.8	SRb	60d	233.01	
γ	***Cas***	00 57 +60 43	1.6-3.0	GCAS		064.01	
Rho	***Cas***	23 54 +57 29	4.1-6.2	SRd	320d	064.01	
W	***Cep***	22 37 +58 26	7.0-9.2	SRc		312.01	
AR	***Cep***	22 52 +85 03	7.0-7.9	SRb		1985May06	
Mu	***Cep***	21 44 +58 47	3.4-5.1	SRc	730d	112.01	
O	***Cet***	02 19 -02 59	2.0-10.1	M	332d	039.02	T/B
R	***CrB***	15 48 +28 09	5.7-14.8	RCB		041.04	T/B
W	***Cyg***	21 36 +45 22	5.0-7.6	SRb	131d	062.03	
AF	***Cyg***	19 30 +46 09	6.4-8.4	SRb	92d	232.01	
CH	***Cyg***	19 25 +50 15	5.6-10.5	ZAnd+SR	97	089.03	
U	***Del***	20 46 +18 06	5.6-7.9	SRb	110d?	228.01	
EU	***Del***	20 38 +18 16	5.8-6.9	SRb	60d	228.01	
TX	***Dra***	16 35 +60 28	6.6-8.4	SRb	78d?	106.02	
AH	***Dra***	16 48 +57 49	7.0-8.7	SRb	158d	106.02	
NQ	***Gem***	07 32 +24 30	7.4-8.0	SR+ZAnd	70d?	077.01	
X	***Her***	16 03 +47 14	6.1-7.5	SRb	95d	223.01	
SX	***Her***	16 08 +24 55	8.0-9.2	SRd	103d	113.01	
UW	***Her***	17 14 +36 22	7.0-8.8	SRb	104d	107.01	
AC	***Her***	18 30 +21 52	6.8-9.0	RVA	75d	048.03	
IQ	***Her***	18 18 +17 59	7.0-7.5	SRb	75d	048.03	
OP	***Her***	17 57 +45 21	5.9-7.2	SRb	120d	1984Apr12	
R	***Hya***	13 30 -23 17	3.5-10.9	M	389d	049.02	T/B
RX	***Lep***	05 11 -11 51	5.0-7.4	SRb	60d?	110.01	
Y	***Lyn***	07 28 +45 59	6.5-8.4	SRc	110d	229.01	
SV	***Lyn***	08 84 +36 21	6.6-7.9	SRb	70d?	108.03	
U	***Mon***	07 31 -09 47	5.9-7.9	RVB	91d	029.03	
X	***Oph***	18 38 +08 50	5.9-9.2	M	328d	099.01	
BQ	***Ori***	05 57 +22 50	6.9-8.9	SR	110d	295.01	

Variable		RA (2000) Dec	Range	Type	Period	Chart	Prog
AG	***Peg***	21 51 +12 38	6.0-9.4	Nc		094.02	
X	***Per***	03 55 +31 03	6.0-7.0	GCas+Xp		277.01	
R	***Sct***	18 48 -05 42	4.2-8.6	RVA	146d	026.04	
Y	***Tau***	05 46 +20 42	6.5-9.2	SRb	242d	295.01	
W	***Tri***	02 42 +34 31	7.5-8.8	SRc	108d	114.01	
Z	***UMa***	11 57 +57 52	6.2-9.4	SRb	196d	217.02	
ST	***UMa***	11 28 +45 11	6.0-7.6	SRb	110d?	102.02	
VY	***UMa***	10 45 +67 25	5.9-7.0	Lb		226.01	
V	***UMi***	13 39 +74 19	7.2-9.1	SRb	72d	101.02	
SS	***Vir***	12 25 +00 48	6.9-9.6	SRa	364d	097.01	
SW	***Vir***	13 14 -02 48	6.4-8.5	SRb	150d?	098.01	

Updated 7th February 2010, M.T.

* *

ECLIPSING BINARY PREDICTIONS

Des Loughney

The following predictions, based on the latest Krakow elements, should be usable for observers throughout the British Isles. The times of mid-eclipse appear in parentheses, with the start and end times of visibility on either side. The times are hours UT, with a value greater than '24' indicating a time after midnight. 'D' indicates that the eclipse starts/ends in daylight; 'L' indicates low altitude at the start/end of the visibility, and '<<' indicates that mid eclipse occurred on an earlier date/time.

Please contact the EB secretary if you require any further explanation of the format.

The variables covered by these predictions are :

RS CVn	7.9 - 9.1V	AI Dra	7.2 - 8.2	U Sge	6.45 - 9.28V
TV Cas	7.2 - 8.2V	Z Vul	7.25 - 8.90V	RW Tau	7.98 - 11.59V
U Cep	6.8 - 9.4	Z Dra	10.8 - 14.1p	HU Tau	5.92 - 6.70V
U CrB	7.7 - 8.8V	TW Dra	8.0 - 10.5v	X Tri	8.88 - 11.27V
SW Cyg	9.24 - 11.83V	S Equ	8.0 - 10.08V	TX Uma	7.06 - 8.80V
V367 Cyg	6.7 - 7.6V	Z Per	9.7 - 12.4p	Del Lib	4.9 - 5.9
Y Psc	10.1 - 13.1	SS Cet	9.4 - 13.0	RZ Cas	6.3 - 7.9

Note that predictions for Beta Per and Lambda Tau can be found in the BAA Handbook.

For information on other eclipsing binaries see the website:
http://www.as.ap.krakow.pl/o-c/index.php3

Again please contact the EB secretary if you have any queries about the information on this site and how it should be interpreted.

April

2012 Apr 1 Sun
Z Dra.........D20(20)22
RZ Cas......D20(21)24
AI Dra..........22(23)25
2012 Apr 2 Mon
U Cep........03(08)04D
U CrB........D20(20)25
TW Dra..D20(25)28D
RZ Cas......24(26)28D
2012 Apr 3 Tue
Z Dra.........02(05)04D
AI Dra.......03(04)04D
SW Cyg......L20(21)27
del Lib.....L22(22)28D
2012 Apr 4 Wed
S Equ.......L03(04)04D
TV Cas......03(07)04D
U Cep........D20(19)24
Z Vul..........L23(23)28
2012 Apr 5 Thu
TW Dra.....D20(20)25
Z Dra.........D20(22)24
TV Cas......23(27)28D
del Lib........24(30)28D
V367 Cyg..24(68)28D
2012 Apr 6 Fri
U CrB........01(06)04D
AI Dra.......D20(18)20
V367Cyg.L23(44)28D
U Sge..........L24(22)28
2012 Apr 7 Sat
U Cep........02(07)04D
Z Dra.........04(06)04D
HU Tau......D20(16)20
RZ Cas......D20(21)23
TV Cas......D20(22)26
RW Tau......20(25)22L
AI Dra..........22(23)24
V367Cyg.L23(20)28D
2012 Apr 8 Sun
TW Dra.....D20(15)20
X Tri.......D20(22)20L
V367Cyg.L22(<<)28D
RZ Cas.........23(25)28

2012 Apr 9 Mon
RS CVn....02(08)04D
AI Dra......03(04)04D
U CrB.......D20(17)23
HU Tau.....D20(18)21
TV Cas.....D20(18)22
U Cep......D20(19)24
X Tri......D20(22)20L
Z Dra..........21(24)26
Z Vul.........L23(20)26
2012 Apr 10 Tue
U Sge........02(07)04D
RZ Cas.....04(06)04D
RW Tau..D20(19)22L
X Tri......D20(21)20L
del Lib....L22(22)28D
2012 Apr 11 Wed
S Equ......L02(01)04D
HU Tau..D20(19)22L
X Tri......D20(20)20L
2012 Apr 12 Thu
U Cep.......02(07)04D
Z Vul........02(07)04D
X Tri......D20(20)20L
SW Cyg.D20(24)28D
U CrB.......22(28)28D
del Lib......23(30)28D
2012 Apr 13 Fri
RZ Cas.....D20(20)23
HU Tau..D20(20)22L
RS CVn....21(27)28D
AI Dra.........22(23)24
Z Dra..........23(25)28
2012 Apr 14 Sat
TW Dra....01(06)04D
Z Per.........D20(15)20
TX UMa..D20(16)20
U Cep.......D20(19)23
Z Vul.........L22(18)24
RZ Cas........22(25)27
2012 Apr 15 Sun
TV Cas.....00(04)04D
AI Dra......03(04)04D
HU Tau..D20(22)22L
2012 Apr 16 Mon
RZ Cas.....03(06)04D
U CrB.......D20(15)21
Z Dra........D20(18)21
TV Cas..D20(24)28D
TW Dra....20(25)28D
U Sge......L23(26)28D
Z Vul........24(29)28D

2012 Apr 17 Tue
U Cep.........02(07)04D
Z Per...........D20(17)21
TX UMa....D20(17)22
HU Tau....D20(23)22L
del Lib.........L21(21)28
2012 Apr 18 Wed
Z Dra..........01(03)04D
S Equ..........L02(<<)04
TV Cas.......D20(19)23
RS CVn....D20(22)28D
2012 Apr 19 Thu
U Cep.........D20(18)23
RZ Cas.......D20(20)22
TW Dra......D20(21)26
U CrB......D20(26)28D
HU Tau.......20(24)21L
AI Dra...........22(23)24
del Lib.........23(29)28D
2012 Apr 20 Fri
Z Per........D20(18)22L
TX UMa....D20(19)23
Z Dra.........D20(20)23
RZ Cas..........22(24)27
2012 Apr 21 Sat
AI Dra........02(04)04D
S Equ..........03(09)04D
RW Tau....D20(21)21L
SW Cyg......22(28)28D
Z Vul........L22(27)28D
2012 Apr 22 Sun
U Cep.........01(06)04D
Z Dra..........02(05)04D
RZ Cas.......03(05)04D
TW Dra.......D20(16)21
2012 Apr 23 Mon
RS CVn......D20(17)24
Z Per........D20(19)22L
TX UMa....D20(20)25
U Sge...........L22(20)26
2012 Apr 24 Tue
TV Cas.......02(06)03D
U Cep.........D20(18)23
Z Dra..........D20(22)24
del Lib.........L21(21)27
V367Cyg..L21(59)27D
2012 Apr 25 Wed
RZ Cas........D20(19)21
TV Cas.......21(25)27D
V367Cyg..L21(35)27D
AI Dra...........21(23)24

2012 Apr 26 Thu
SW Cyg.....D20(17)24
Z Per........D20(21)22L
TX UMa....D20(22)26
U CrB.....D20(24)27D
V367.Cyg L21(11)27D
RZ Cas..........21(24)26
Z Vul........L22(25)27D
del Lib........22(29)27D
U Sge..........23(29)27D
2012 Apr 27 Fri
U Cep........01(06)03D
AI Dra........02(04)03D
TV Cas.......D20(21)25
V367Cyg.L21(<<)27D
2012 Apr 28 Sat
S Equ.......L01(06)03D
TW Dra......02(07)03D
RZ Cas.......02(04)03D
Z Dra............21(24)26
2012 Apr 29 Sun
U Cep........D21(18)22
Z Per........D21(22)22L
TX UMa.D21(23)27D
2012 Apr 30 Mon
Z Per..........L02(<<)03
TW Dra......21(26)27D

May

2012 May 1 Tue
SW Cyg......01(07)03D
RZ Cas.......D21(18)21
del Lib........D21(20)27
AI Dra..........21(23)24
Z Vul........L21(23)27D
2012 May 2 Wed
U Cep........01(06)03D
RW Tau...D21(23)21L
Z Per........D21(23)21L
TX UMa.D21(25)27D
RZ Cas..........21(23)26
Z Dra.........23(25)27D
2012 May 3 Thu
RS CVn......01(08)03D
AI Dra........02(03)03D
Z Per.......L02(<<)03D
U CrB......D21(21)27D
TW Dra......D21(22)27
U Sge.......L22(23)27D
del Lib........22(28)27D

2012 May 4 Fri
RZ Cas......01(04)03D
U Cep........D21(17)22
TV Cas......23(27)27D

2012 May 5 Sat
S Equ.......L01(03)03D
Z Dra.........D21(19)21
SW Cyg..D21(21)27D
Z Per.......D21(25)21L
TX UMa...22(26)27D

2012 May 6 Sun
Z Per.......L02(01)03D
TW Dra.....D21(17)22
TV Cas......D21(22)26
Z Vul.........L21(21)26

2012 May 7 Mon
U Cep........00(05)03D
Z Dra.........01(03)03D
U CrB........02(08)03D
U Sge.........03(08)03D
RS CVn..D21(27)27D
AI Dra..........21(22)24

2012 May 8 Tue
TV Cas......D21(18)22
del Lib........D21(20)26
RZ Cas......D21(23)25
TX UMa...23(28)27D

2012 May 9 Wed
Z Per.......L02(02)03D
AI Dra.......02(03)03D
Z Vul..........02(08)03D
U Cep........D21(17)22
Z Dra.........D21(20)23

2012 May 10 Thu
RZ Cas......01(03)03D
U CrB........D21(19)25
U Sge..........L21(18)23
del Lib........22(28)27D

2012 May 11 Fri
Z Dra.........02(05)03D
Z Vul.........D21(18)24

2012 May 12 Sat
U Cep........00(05)03D
S Equ.......L00(00)03D
TX UMa...01(05)03D
Z Per.......L02(03)03D
TW Dra.....03(08)03D
RS CVn...D21(22)27D

2012 May 13 Sun
Z Dra.........D21(22)24
AI Dra.......D21(22)24
V367Cyg.D21(49)27D
U Sge.......L21(27)27D

2012 May 14 Mon
U CrB........00(06)03D
Z Vul..........00(05)03D
TV Cas.......00(04)03D
U Cep........D21(17)22
RZ Cas......D21(22)24
SW Cyg...D21(24)27D
V367Cyg.D21(25)27D
TW Dra......22(27)27D

2012 May 15 Tue
Z Per........L01(05)03D
AI Dra........02(03)03D
TX UMa....02(07)03D
Y Psc.......L02(04)03D
V367Cyg.D21(01)27D
del Lib........D21(20)26
TV Cas....D21(24)27D

2012 May 16 Wed
RZ Cas.......00(03)03D
V367 Cyg..D21(<<)22
Z Vul..........D21(16)22
U Cep........24(29)26D

2012 May 17 Thu
U CrB........D21(17)22
RS CVn......D21(17)23
TV Cas.......D21(19)23
TW Dra D21(22)26D
del Lib.....D21(27)26D
Z Dra...........21(24)26

2012 May 18 Fri
Z Per..........01(06)02D
Z Vul..........22(27)26D
S Equ..........L24(20)26

2012 May 19 Sat
Y Psc.......L02(<<)02D
AI Dra........D21(22)23

2012 May 20 Sun
TW Dra......D21(18)23
U Sge.......D21(21)26D
RZ Cas......D21(21)24
U CrB........22(28)26D

2012 May 21 Mon
AI Dra........02(03)02D
Z Dra.........23(25)26D
U Cep........23(28)26D
RZ Cas.......24(26)26D

2012 May 22 Tue
S Equ..........02(07)02D
del Lib........D21(19)26

2012 May 23 Wed
TV Cas.......02(06)02D
Z Vul.......D21(25)26D
SW Cyg......22(28)26D

2012 May 24 Thu
U Sge..........00(06)02D
TV Cas....D21(25)26D
del Lib.....D21(27)26D

2012 May 25 Fri
AI Dra........D22(22)23

2012 May 26 Sat
Z Dra.........01(03)02D
TV Cas.......D22(21)25
RZ Cas.......D22(21)23
U Cep........23(28)26D

2012 May 27 Sun
RS CVn......01(07)02D
AI Dra........02(03)02D
U CrB.....D22(25)26D
RZ Cas.......23(26)26D

2012 May 28 Mon
SW Cyg.....D22(18)24
Z Dra.........D22(20)23
Z Vul.......D22(23)26D
TW Dra......23(28)26D
S Equ.......L23(28)26D

2012 May 29 Tue
del Lib........D22(19)25

2012 May 30 Wed
Y Psc.......L01(05)02D
U Sge.......D22(24)26D

2012 May 31 Thu
AI Dra........D22(22)23
TW Dra...D22(23)26D
RS CVn...D22(26)26D
del Lib.....D22(27)26D
V367Cyg.D22(64)26D
U Cep........23(28)26D

June

2012 Jun 1 Fri
RZ Cas.......D22(20)23
Z Dra.........D22(22)25
V367Cyg.D22(40)26D

2012 Jun 2 Sat
AI Dra.......01(03)02D
SW Cyg.....01(07)02D
V367Cyg.D22(16)26D
Z Vul.......D22(21)26D
RZ Cas......23(25)26D
TV Cas......23(27)26D

2012 Jun 3 Sun
Y Psc......L01(<<)02D
V367Cyg.D22(<<)26D
TW Dra.....D22(19)24
U CrB.....D22(23)26D

2012 Jun 4 Mon
TV Cas...D22(22)26D
S Equ.......L23(25)26D

2012 Jun 5 Tue
TX UMa...D22(17)22
del Lib.......D22(18)25
RS CVn..D22(22)26D
Z Dra......D22(24)26D
U Cep........22(27)26D

2012 Jun 6 Wed
U Sge.........D22(19)24
SW Cyg..D22(21)26D
AI Dra.......D22(22)23

2012 Jun 7 Thu
Z Vul.........D22(19)24
RZ Cas......D22(20)22
del Lib.....D22(26)26L

2012 Jun 8 Fri
AI Dra.......01(03)02D
X Tri.........01(04)02D
TX UMa...D22(19)24
RZ Cas......22(24)26D

2012 Jun 9 Sat
X Tri.......L01(03)02D
U Sge.........22(28)26D
Z Dra.........23(26)26D

2012 Jun 10 Sun
Z Vul.........00(05)02D
X Tri.......L01(02)02D
RS CVn.....D22(17)23
U CrB.....D22(21)26D
U Cep........22(27)26D

2012 Jun 11 Mon
X Tri.......L01(02)02D
TX UMa...D22(20)25
S Equ.......L22(22)26D
TW Dra.....24(29)26D

2012 Jun 12 Tue

TV Cas.......00(04)02D
X Tri........L01(01)02D
del Lib........D22(18)24
AI Dra........D22(22)23

2012 Jun 13 Wed

X Tri........L01(00)02D
TV Cas....D22(24)26D

2012 Jun 14 Thu

Z Dra..........01(03)02D
X Tri........L01(00)02D
AI Dra........01(02)02D
U CrB.........02(07)02D
TX UMa.D22(22)26D
RZ Cas....D22(24)26D
TW Dra...D22(24)26D
del Lib......D22(26)25L
Z Vul.......D22(27)26D

2012 Jun 15 Fri

X Tri..........L01(<<)02
TV Cas.......D22(19)23
SW Cyg...D22(25)26D
U Cep......D22(27)26D

2012 Jun 16 Sat

X Tri..........L01(<<)01
Z Dra..........D22(20)23
U Sge.......D22(22)26D

2012 Jun 17 Sun

U CrB........D22(18)24
TW Dra.....D22(19)25
TX UMa.D22(24)26D
Z Per..........L23(20)24

2012 Jun 18 Mon

Y Psc.......L00(01)02D
S Equ.........D22(19)24
AI Dra.......D22(21)23

2012 Jun 19 Tue

del Lib.......D22(17)24
Z Vul.......D22(25)26D
V367Cyg.D22(54)26D

2012 Jun 20 Wed

RS CVn......01(07)02D
AI Dra.......01(02)02D
U Sge.........01(07)02D
Z Dra.........D22(22)25
RZ Cas......D22(23)26
TX UMa.D22(25)26D
U Cep.....D22(26)26D
V367Cyg.D22(30)26D
Z Per........L23(21)26D
U CrB........23(29)26D

2012 Jun 21 Thu

TV Cas.......02(06)02D
V367Cyg.D22(06)26D
del Lib......D22(25)25L
S Equ..........24(29)26D
Y Psc..........L24(19)24

2012 Jun 22 Fri

RZ Cas.......02(04)02D
V367Cyg.D22(<<)26D
TV Cas....D22(25)26D

2012 Jun 23 Sat

TX UMa.D22(27)26D
Z Per........L23(22)26D

2012 Jun 24 Sun

TV Cas.......D22(21)25
AI Dra........D22(21)23
Z Vul.......D22(23)26D
Z Dra.......D22(24)26D
RS CVn...D22(26)26D
SW Cyg......22(28)26D

2012 Jun 25 Mon

U Cep......D22(26)26D

2012 Jun 26 Tue

TW Dra....00(06)02D
AI Dra......01(02)02D
del Lib......D22(17)23
RZ Cas.....D22(23)25
U Sge.....D22(25)26D
Z Per......L23(24)26D
TX UMa..23(28)26D

2012 Jun 27 Wed

U CrB....D22(27)26D

2012 Jun 28 Thu

RZ Cas.....01(03)02D
del Lib....D22(25)24L
TW Dra.D22(25)26D
S Equ.....D22(26)26D
Z Dra........23(26)26D

2012 Jun 29 Fri

SW Cyg...D22(18)24
Z Vul.....D22(21)26D
RS CVn.D22(21)26D
Z Per......L22(25)26D

2012 Jun 30 Sat

TX UMa..01(06)02D
AI Dra......D22(21)22
U Cep....D22(26)26D

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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.

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The **deadline for contributions** to the next issue of VSSC (number 152) will be 7th May, 2012. All articles should be sent to the editor (details are given on the back of this issue).

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