British Astronomical Association

VARIABLE STAR SECTION CIRCULAR

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Contents

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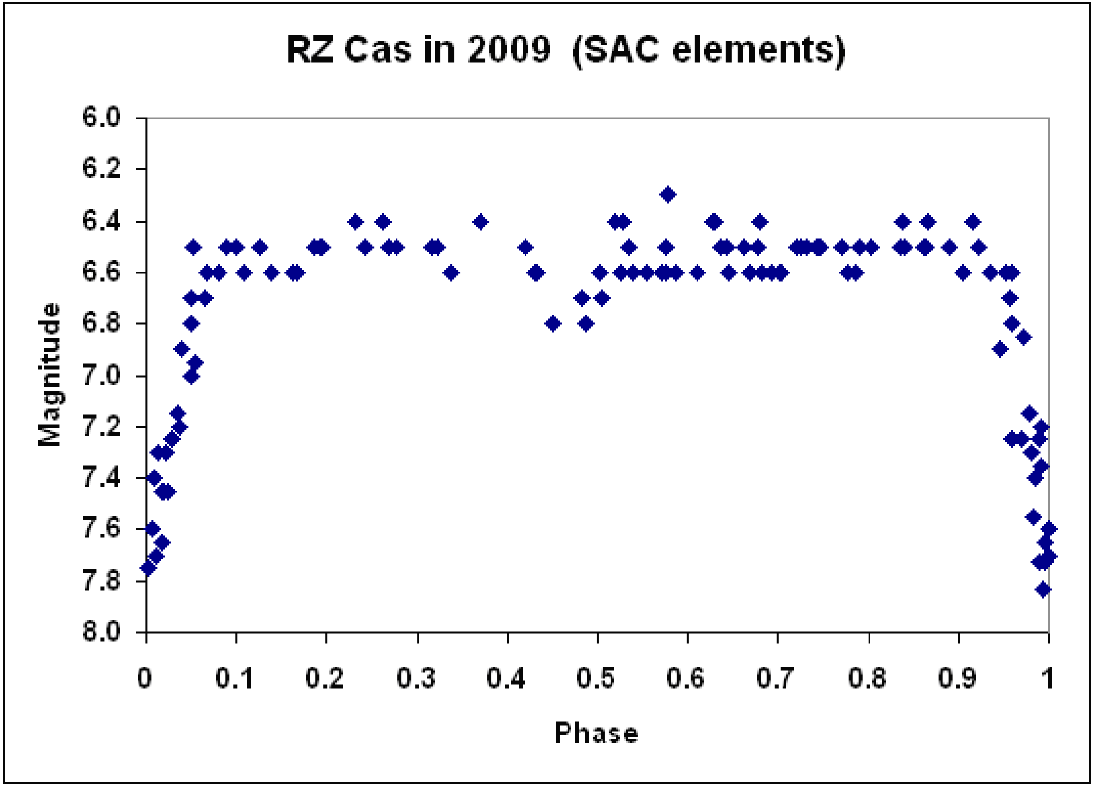
Office: Burlington House, Piccadilly, London, W1J 0DU

RZ CASSIOPEIAE 2009 PHASE DIAGRAM

Tony Markham



The light curve is derived from all of my observations of RZ Cassiopeiae during 2009. Rather than concentrate solely on the time around primary eclipse, I also made brightness estimates at many other times and it is rewarding to see evidence of the secondary eclipse near phase 0.5.

Obviously, visual estimates are never going to be accurate enough to derive the exact phase at which such a shallow secondary eclipse occurs, but it is interesting to see that they can nevertheless detect its existence.

FROM THE DIRECTOR

Roger Pickard

Chart Catalogue 10.1

A slightly revised version of the Chart Catalogue, version 10.1 is now available on the web site, or alternatively by sending a large SAE to the Director for a paper copy.

VSS Meeting

I can now confirm the next members Meeting will be at Pendrell Hall, Codsall Wood, South Staffordshire WV8 1QP (*http://www.pendrell-hall.org.uk/*) on Saturday 1st May 2010. This is located near Wolverhampton and on the way to Telford. Note, the Monday is a Bank Holiday in the UK so those of you travelling some distance may care to consider it as part of a short break?

I am still completing the programme, but can confirm that one of the professional speakers will be Professor Albert Zijlstra on “The central stars of planetary nebulae” and I am still trying to arrange another. I have two for next year but am having trouble arranging a second for this year!

In addition to our professional colleagues we will have some more familiar names from the amateur fraternity, namely Clive Beech, Des Loughney, Robin Leadbeater, and our President, David Boyd. It’s still not too late to let me know if you’d like to give a short presentation.

Don’t forget as well that posters are always very welcome, as there will be plenty of display space.

Costs will be the same as in previous years, namely £10 per head to include refreshments upon arrival and in the afternoon. A light lunch will be available for around £5.00

Do keep an eye on the web site for the latest information.

Stars you no longer observe

I was intrigued to read Tony Markham’s article about stars he rarely, if ever, observes nowadays and feel it would be interesting to get other observers comments about any stars they no longer observe. So, don’t be shy, we’d love to hear from you.

The ‘L’ comment in Variable Star reports

Possibly, very few people noted the error on the web site (now corrected) about the abbreviation ‘L’.

‘L’ means low, for low in the sky, and intends to mean less than around 25 degrees altitude where the atmosphere is starting to attenuate the light from a star more noticeably.

However according to “Submitting Visual Observations to the BAA VSS” link on the home page, ‘L’ was used to indicate Light Pollution. This was incorrect, and has now been corrected as stated above. If you have made any observations using this incorrect annotation, please amend it for future observations.

However if you followed the link to the VSSC 77 conventions, the notation was correct.

By the way, the correct abbreviation for artificial light intrusion is ‘A’!

Ron Godden

It is with much regret that we heard that Ron Godden from Basingstoke passed away on February 5th this year at the age of 85. Ron was an active visual observer who first started submitting observations to the Variable Star Section in 1974. We thank Neil Perry from Basingstoke Astronomical Society for kindly informing us.

***Revised address**: Please note a slightly revised address for Janet Simpson on the back cover.*

ECLIPSING BINARY NEWS

DES LOUGHNEY

Epsilon Aurigae

It is estimated that ‘totality’ was reached on the 16th January 2010, though ‘totality’ means in this case, that half the primary star is obscured by the mysterious cloud of dust and gas. The V magnitude at totality is around 3.72 but this will vary due to the intrinsic variability of the primary star. This variation can be around 0.1 magnitude. Therefore it is possible that during the long ‘totality’ phase the star could vary between 3.65 and 3.75 magnitudes. Superimposed on this variation may be changes due to variations in the density of the cloud. Judging by previous eclipses there will be a brightening at mid eclipse of 0.1 magnitude. This may signify a hole in the cloud in which there sits another star. Mid eclipse is scheduled for 4th August 2010 when epsilon is near the sun. Despite the difficulties observations are encouraged during the period mid May to mid August to try and pick up the brightening.

**See Page 24 for database of amateur eps Aur spectra.*

Professional observations of the eclipse are starting to be reported. Here is an extract from wikipedia.

‘*At the January 2010 meeting of the American Astronomical Society, Donald Hoard of NASA’s Spitzer Science Center at the California Institute of Technology in Pasadena has reported that observations from NASA’s Spitzer Space Telescope along earlier observations point to the primary being a post-asymptotic giant branch star with about 2.2–3.3 times the mass of the Sun, periodically eclipsed by just a single B class star inside a disk. This was accomplished by pointing Spitzer at the star using the corner of four of Spitzer’s pixels, instead of directly at one, to effectively reduce the telescope’s sensitivity and preventing the star from overloading the telescope, then using exposures of one-hundredth of a second, the shortest duration images that can be obtained by Spitzer. The data supports the presence of the companion star’s disk, and* *establish the particle sizes as being like gravel rather than like fine dust.'*

W Ursae Majoris

This is a well known eclipsing binary system which is the prototype for the EW class of eclipsing binaries. These are systems where the two stars are in contact or are almost in contact. The system is a good one to observe because it is relatively bright. It is a binocular object varying from about 7.7 to 8.5. As the stars are in contact the eclipse is continuous and the period is only about eight hours. Therefore the whole eclipse can be observed in one session. It is well placed for observation at this time of the year.

The system has been made the AAVSO's Variable Star of the Season in 2010. More information can be viewed on < *www.aavso.org/vstar/vsot/* >.

The system is worth observing because the period is changing. The change can be studied by constructing a phase diagram of all observations within, say, a one month period. If the period has not changed then the primary eclipse should be centred around 1.0 and the secondary around 0.5. If there have been changes the midpoint of the eclipses will be displaced from these points. The current 'latest' elements (2452500.1688 +0.3336348) are over seven years old so any changes should be relatively easy to pick up.

If instrumental methods are used for making estimates so that precision is +/- 0.04 magnitude then small changes to the light curve can be seen due to large star spots. There may be bumps on the light curve and the maxima may be of unequal height.

TX Ursae Majoris

The other eclipsing binary on the BAAVSS observing list in Ursa Major is TX Ursae Majoris. It varies from about 7.1 to 8.8 magnitudes. It has a period of 3.06 days and the full primary eclipse lasts 13 hours. It is not too difficult to find as it is in the binocular field of view of ψ Ursae Majoris, a magnitude 3 star.

It is classified as an EA/SD eclipsing binary. It is an actual Algol type. The stars in the system are of very unequal mass. There is active, direct, mass transfer with a gas stream connecting both stars without the formation of an accretion disk. The secondary minimum is only 0.06 magnitude deep and lasting 9.7 hours. To study the secondary minimum might be an interesting exercise for an instrumental determination of magnitude.

It was probably chosen to be on the BAA VSS list because the system has some peculiarities. If there is active mass transfer the period ought to be increasing but in fact is decreasing. The system is subject to period jumps. From reading some of the literature the explanation seems to be complex interactions between the gas stream and the systems magnetic fields.

Therefore, all observations of this system which allow the fresh determination of the current period (and the ongoing monitoring of period changes) are very useful. Please get in touch if you wish to co-ordinate observations.

desloughney@blueyonder.co.uk

KT ERIDANI (=NOVA ERIDANI 2009)

GUY M. HURST - UK Nova/Supernova Patrol Coordinator

K. Itagaki of Yamagata, Japan reported on CBET 2050 his discovery of a possible magnitude 8.1 nova on 2009 Nov. 25.536 UT with his 0.21 metre patrol system. A confirming image by him on Nov. 25.545 with a 0.60 metre reflector showed the object at: RA 04h 47m 54.21s DEC-10 10' 43.1"(2000). Itagaki noted that there is a faint (magnitude about 15) object near this position on his archival patrol images.

Yamaoka suggests that it might be the brightening of a magnitude 15 blue star that is contained in many catalogues (USNO-B1.0 position end figures 54.19s, 42.9"), though the suggested amplitude of seven magnitudes is perhaps rather large for a dwarf nova but small for a rapid classical nova. Yamaoka adds that the ASAS-3 system (Pojmanski 2002, Acta. Astron. 52, 397) also detected this object at the following V magnitudes: 2009 November; 10.236 UT, <14.0; 19.241 UT, 7.34; 22.179 UT, 7.98; 24.269 UT, 8.12.

Ernesto Guido and Giovanni Sostero advise that using the 0.25 metre, f/3.4 reflector + CCD, from GRAS Observatory (near Mayhill, New Mexico) they confirmed the presence of the optical transient on 2009 Nov 26.36 UT at magnitude 8.2, based on using an unfiltered CCD. They derived the following position (UCAC2 Catalogue reference stars):

RA 04h 47m 54.12s, DEC -10 10' 43.1" (2000)

They add that a comparison with a DSS red plate (limiting magnitude about 20), obtained on 1990, Nov. 23, shows the proximity of a magnitude 15 star to the position of the possible nova in Eridani.

R. J. Rudy, The Aerospace Corporation, and others report on CBET 2055, 0.9-micron to 2.5-micron spectroscopy obtained on 2009 Nov. 26.4 UT which suggested that this object may be a nova of the helium/nitrogen type.

Various observers also report the object was brighter at earlier dates than at discovery including "Pi of the Sky" automated equipment which recorded it at magnitude 5.8 on November 14th (unfiltered). **It is possible observers obtaining images for their Leonid watch may also have recorded it pre-discovery. Please send any images to the coordinator for analysis.**

The chart has been prepared courtesy of the AAVSO, and any observations should be sent to the BAAVSS quoting the reference '1507em'.

Please also send estimates by e-mail weekly to the coordinator at:
guy@tahq.demon.co.uk

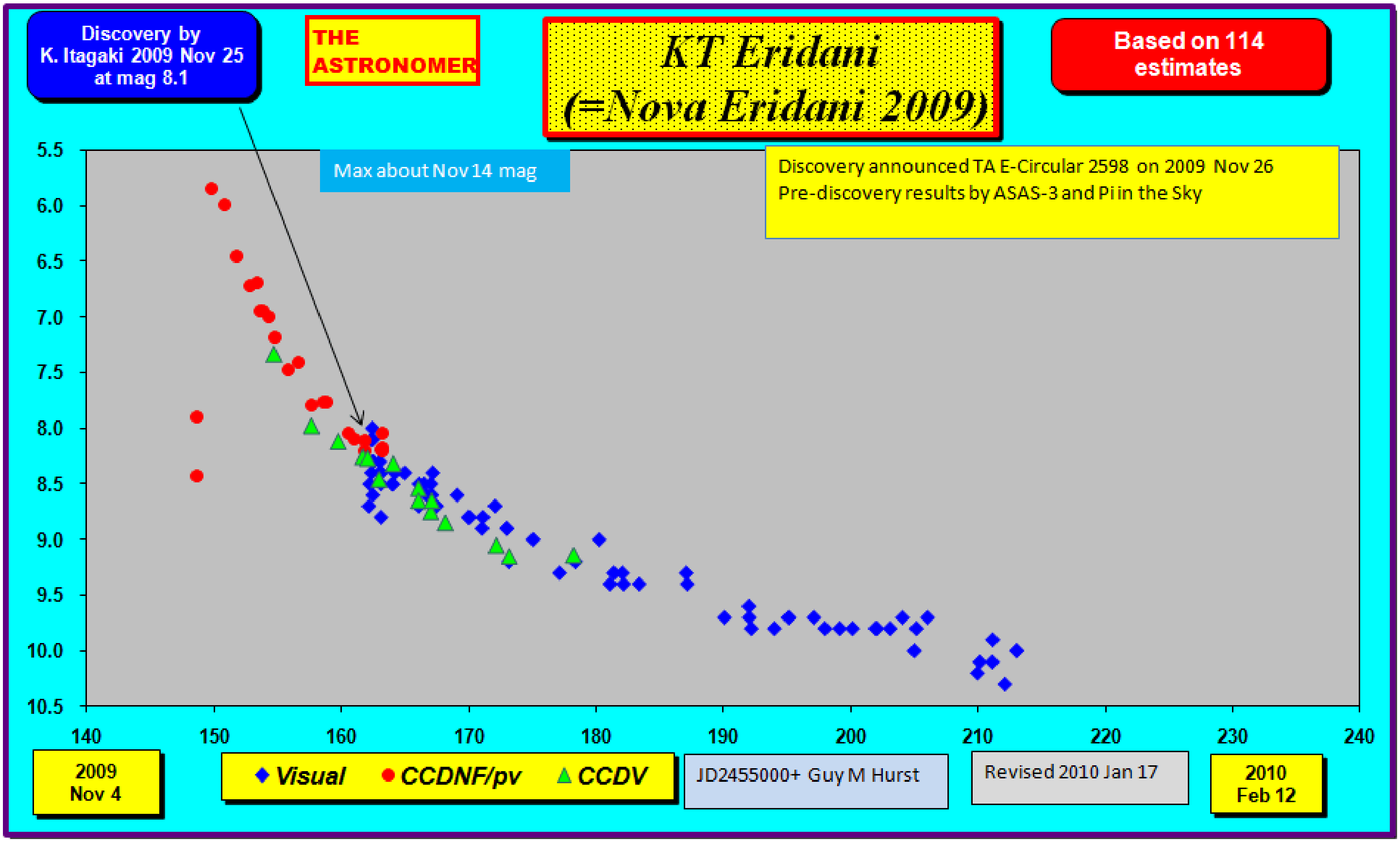


Figure 2: Light curve of KT Eridani (Nova Eridani 2009)

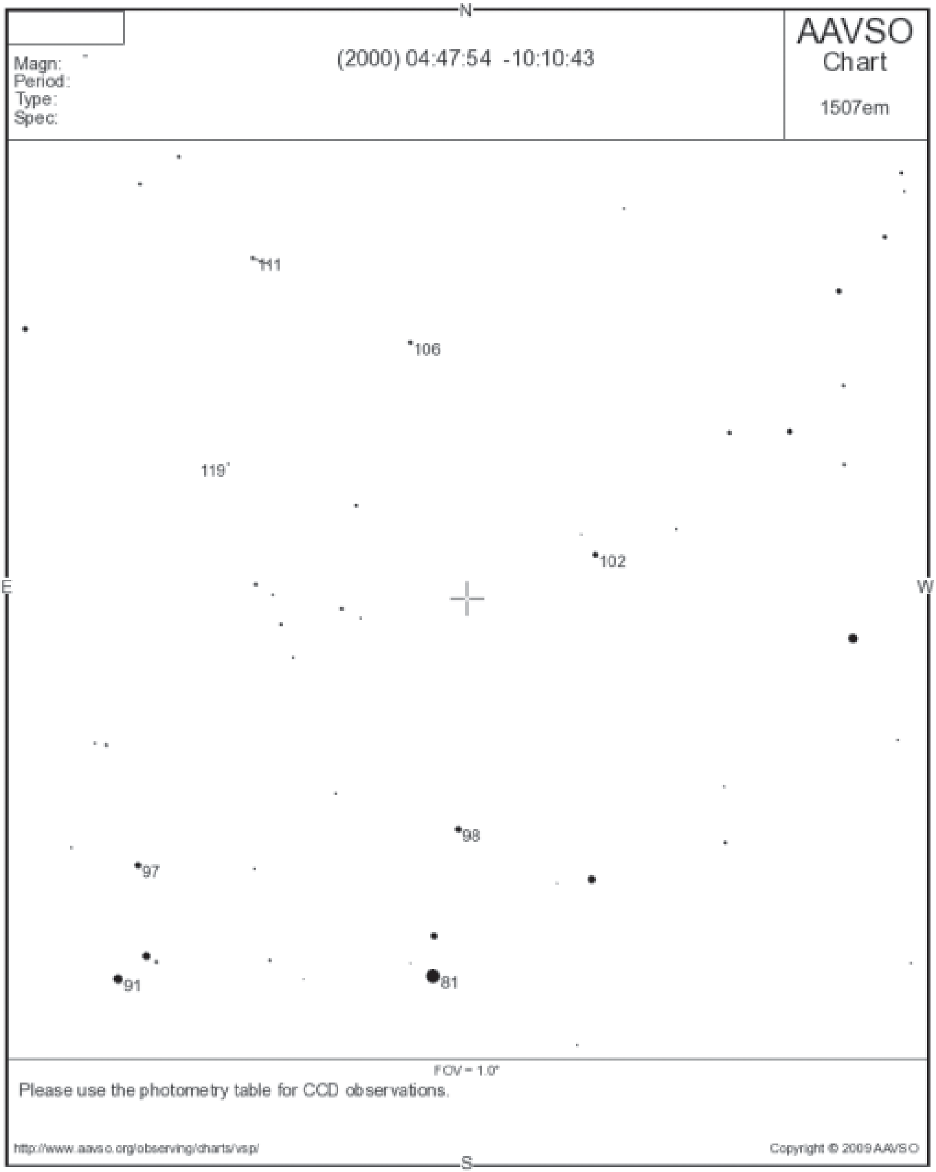


Figure 2: Chart for KT Eridani (Nova Eridani 2009)

Chart prepared courtesy of the AAVSO

VARIABLE STAR SECTION MEETING, CARDIFF UNIVERSITY, PART 2.

SATURDAY, 13TH JUNE 2009

MAPPING THE ACCRETION FLOWS IN COMPACT BINARIES.

DR. DANNY STEEGHS (Warwick University)

Astro-tomography: dissecting accretion onto white dwarfs, neutron stars and black holes using indirect imaging.

Interacting binary star systems provide very rewarding targets, offering complex light curves to track by variable star observers, and providing astrophysicists with powerful laboratories that one can use to test our understanding of stellar and binary evolution.

However, on top of their often complex composition and variability, there is no way of resolving such binaries directly given their orbital separations and distances. To this end, indirect imaging methods have been developed that aim to overcome this by exploiting the diagnostic power of the emission lines that are formed in the accretion flow. In analogy with medical CAT scanning methods, we can use the time-dependent shapes of the emission lines, observed in the spectra of close binaries, to recover images that map their emission regions. Doppler tomography combines the diagnostics provided through the Doppler effect with image reconstruction via de-projection to calculate such emission line maps.

In these maps we can spatially resolve individual components in the binary, such as emission components from the heated companion stars around compact objects, and map the dynamics of the mass transfer in detail. Key results include the discovery of tidally driven spiral arms in the outer regions of accretion discs around white dwarfs, permitting a direct comparison with theoretical simulations. A sequence of Doppler maps in time can also resolve global changes in the accretion geometry as a function of time in, for example, a dwarf nova outburst.

Doppler tomography can also be used to constrain the masses of the compact objects. Although indirectly, in many cases it offers the only means through which we can dynamically constrain neutron star and black hole masses.

Finally, the population of ultra-compact double white dwarfs is currently receiving a lot of interest in the binary star community. Using large telescopes, we can now also employ astro-tomography techniques to study the accretion process in these extreme binaries, which have orbital periods of the order of 10 minutes.

* *

SOME STARS I DON'T OBSERVE ...

Tony Markham

Over the years I've observed almost all of the stars on the Binocular programme, most of the stars on the Eclipsing Binary programme, and the brighter stars on the Telescopic programme. However, while I have clocked up hundreds of observations of many of these stars, there are others that I've tried observing but which I hardly ever (if at all) observe nowadays. Looking through annual totals in the BAA VSS databases suggests that my "neglected" stars are in most cases also neglected by other observers. The stars are also often poorly covered in AAVSO light curves.

Based on their catalogued ranges, these variables would seem good candidates for visual observers. Why are they losing out ? There can be various reasons for this. Here is a summary of why I no longer (or at least very rarely) observe certain stars and could easily have dropped some others.

Boring !!!!

These are so-called variable stars that never seem to vary. Actually, there aren't any stars I've dropped for this reason. I'm very patient in the hope that they will "do something" one day. Stars that could easily have been dropped for this reason include gamma Cassiopeia, SW Coronae Borealis, P Cygni, BQ Geminorum, TV Piscium. Of course, gamma Cassiopeia and P Cygni fare well in annual totals, probably because they are bright and easy to locate and are famous for their past glories. In addition to the above five stars, there are also quite a few others in which I've seen brief periods of activity but nothing else before or after that time.

Its not me, it's the comparison stars !

U Camelopardalis, Z Piscium, AR Lacertae, beta Persei

Estimates made using certain companions seemed to generate deduced magnitudes very different from those made using other comparisons. This was obviously very off-putting. The number of sequences suffering from this problem is fortunately reducing as strongly coloured comparison stars are being dropped – indeed some of the above stars have had their sequences revised in recent years, so maybe I need to give them another try.

The issue for beta Persei is different – being a naked eye star, the comparison stars are located some distance on the sky from the variable and hence may be differentially affected by haze or street lighting. I really wonder why new observers are often still encouraged to start by observing naked eye variables. I strongly suspect that the supposed variations of naked eye stars such as epsilon Pegasi and beta Leonis are entirely due to such issues.

Its not me, its everyone else !

AT Draconis, IQ Persei, P Cygni, rho Cassiopeia, Nova Cygni 1992

I could very easily have stopped observing these stars after discovering that my estimates were significantly different from those of other observers – I'm over half a magnitude bright for IQ Persei, half a magnitude faint for P Cygni and rho Cassiopeia and nearly a magnitude faint for AT Draconis. For Nova Cygni 1992 I was around a magnitude fainter than other observers. Discrepancies such as these can be particularly disturbing for new observers who inevitably assume that they are doing something wrong. Fortunately I realised that despite the magnitude discrepancies, the rises and falls in brightness I was seeing were not out of step with those seen by other observers and so I've continued to observe them. As for the reason for the discrepancies, I'm mystified – these aren't strongly coloured red variables.

Out of Bounds

BZ Andromedae, W Canis Majoris, NSV4031 Lyncis, PR Persei, TX Piscium

Too much faith is placed in the catalogued ranges of variable stars. Particularly troublesome are listings of red variables that are actually quoting photographic ranges. New observers can easily assume that if their estimate is outside of the catalogued range then they must be making a mistake … and in the worst cases assume that they therefore aren't any good at making visual estimates and give up. In less serious cases, they merely switch to variables they are more "comfortable" with.

Some of my discrepancies can be put down to the strong red colour of some stars and my lower sensitivity to red light. The NSV4031 issue was presumably a cataloguing error (originally listed as 8.0-8.8, actually a magnitude fainter).

They're southerners

U Hydrae, delta Librae, S Scuti, V566 Ophiuchi, U Ophiuchi

Although the above stars reach a fairly reasonable altitude from the UK (and the latter two actually have small northerly declinations), all too often they are at an altitude at which the effect of haze/thin cloud makes comparing brightnesses a bit tricky. As a result, this haze induced scatter can swamp the actual variation of the stars involved. In the case of delta Librae, the benefit of the larger magnitude range is undone by the different altitudes of its comparison stars.

R Scuti and omicron Ceti are of course at similar declinations to these stars. However, their brightness ranges are much larger, and thus scatter due to hazy conditions is relatively small compared to their observed ranges.

Out in the wilderness

V Arietis, V Coronae Borealis, CM Lacertae, RV Monocerotis, SX Monocerotis

Being located in relatively bland areas of the sky makes "star-hopping" harder. For variables near the limit of my binoculars, this also leads to doubt about whether I am really seeing the variable or a similarly faint comparison star.

Can't get a clear shot

SU Andromedae, RV Cygni, U Cygni, NQ Geminorum, KK Persei, lambda Tauri,
RX Virginis

The presence of another star close to the variable or close to comparison stars makes brightness estimates difficult. These stars might actually be better targets for small telescopes using higher magnifications.

Mind the Gap !

Ideally comparison stars should be fairly close to the field of view when observing the variable. If the comparison star is distant then there is time to forget the brightness of the variable by the time that the comparison star is located. Similarly, the comparison stars used should be no more than half a magnitude brighter or fainter than the variable, otherwise estimating differences accurately becomes too difficult. Unfortunately there is a 1.2 magnitude gap between A and B in the RU Herculis sequence and the dropping of some nearby TX Draconis comparisons made estimating its magnitude harder.

Time for Bed !

U Monocerotis, R Leonis, RW Virginis, RX Virginis, BK Virginis, SW Virginis

U Monocerotis, once found, is of course located near a brightish group of stars. The problem for U Mon and the other stars listed here is that there is not much else coming into view at the same time of night (or at least in an easy to observe area of the eastern sky) … so should I stay up just to see U Mon … or go to bed.

How can the BAA VSS help ?

In reality, the BAA VSS lacks the resources to move variables to less bland areas of the sky or further north, or to create new stars to fill gaps in sequences. When selecting comparison stars John Toone obviously has to work with whatever stars are nearby, so its really just a case of avoiding being over zealous when it comes to rejecting comparison stars based on their colour/variability. New finder charts already no longer include magnitude ranges. However, dropping the ranges from programme listings is not really feasible as observers need some indication of the typical brightness of the variable.

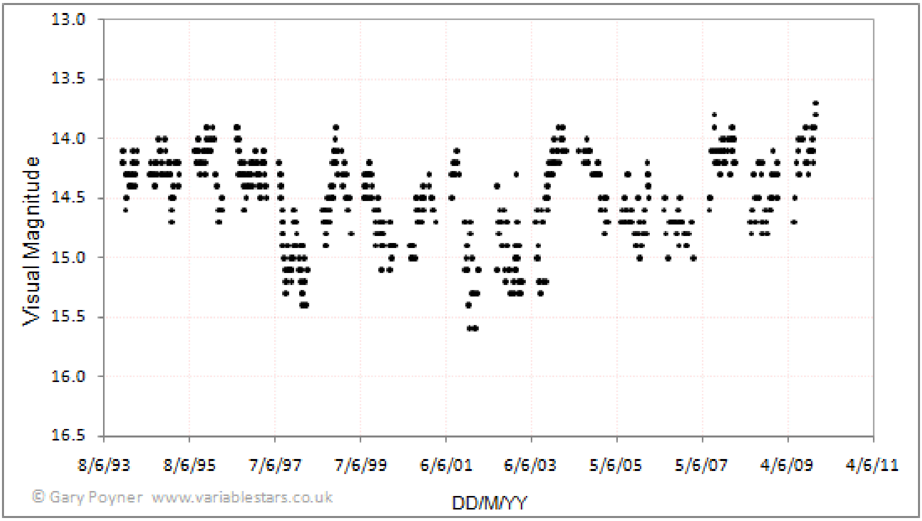
3C66A

GARY POYNER

The intermediate BL Lacertae object 3C66A has reached a 17 year high in it's visual magnitude during February 2010. At the time of writing (Feb 03) mv is 13.6, with the possibility that this might be surpassed in the coming weeks.

First observed in 1993 as part of the International OJ287 campaign, which was to peak in 1995, this active Blazar has shown intraday and long period variations since my observations began. Several high states have been observed during this period, each one peaking between visual magnitude 13.8-14.0. The February 2010 high state has been the first to break through this barrier. Although 3C66A was bright in the Winter/Spring of 2009 at magnitude 14.1 for a short period, it was not sustained and faded back to 14.7 by the early Summer. Since July the brightness has been increasing at a slower rate to where it now stands.

Along with 3C66B, 3C66A makes up the 3C66 pairing. 3C66A is a compact point source with a redshift measured at 0.444, and the host galaxy appearing fainter than R19.0. 3C66B is identified with UGC 01841, a large elliptical galaxy associated with the Abell 347 cluster.



3C66A Light Curve

RECURRENT OBJECT NEWS

Gary Poyner

U Scorpii:

Over the past couple of years, Dr. Bradley Schaefer (Louisiana State University) has been requesting observers around the world to monitor the Recurrent Nova U Scorpii for a predicted outburst around the period 2009.3 +/- 1 year, in order to test his theory outlined in his 2005 ApJ paper [1]. The AAVSO announced an observing campaign on AN 367 (January 2008), requesting observers to monitor U Sco every night, and as close as possible to pre and post Solar conjunction. To make matters more difficult, U Sco is known to undergo short outbursts, making nightly patrols even more valuable. The last outburst of U Sco occurred on Feb 25 1999, and was detected early in it's rise by Patrick Schmeer.

The long awaited outburst was eventually detected by AAVSO observer Barbara G. Harris of New Smyrna beach, Florida, on the morning of Jan 28.429 UT, and confirmed shortly after by Shawn Dvorak (Clermont, Florida) on Jan 28.47 – near the limit, but inside Schaefer's predicted window! The outburst appears to have been caught at or very near to maximum brightness of 8.0V. Twenty four hours after detection U Sco had already faded by one magnitude in V-band, and at the time of writing (Feb 03) the magnitude has reached 11.4 visual.

Spectroscopic observations obtained in India and Japan have revealed findings similar to those observed in past outbursts, namely broad emission lines indicative of a high velocity expanding gaseous shell [2]. Further information is expected to be released as the outburst progresses.

As the outburst is still ongoing at the time of writing, updates are posted on the AAVSO U Sco news pages [2].

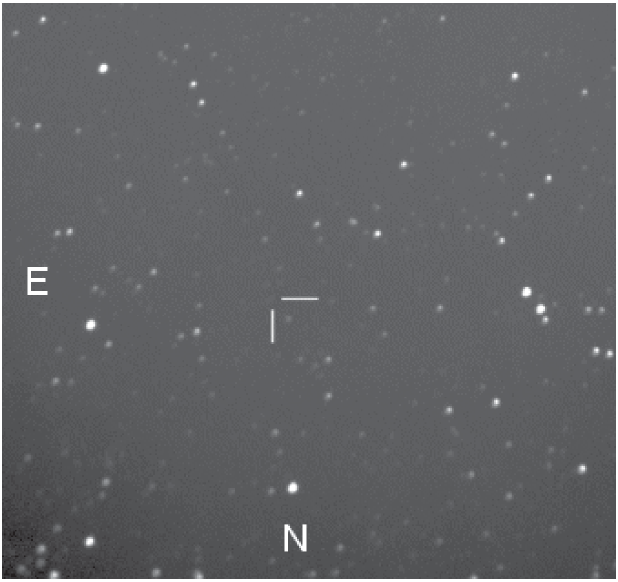


Figure 1: U Scorpii. Aug 22.919 UT 2009. Magnitude17.8C Cropped Bradford Robotic Telescope image. Gary Poyner

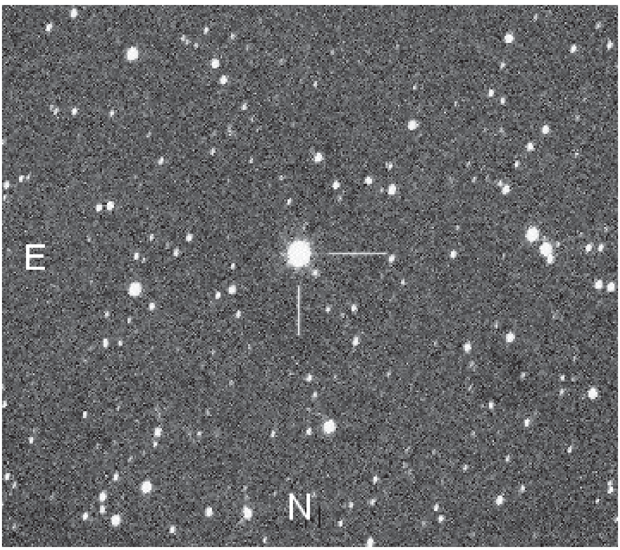


Figure 2: U Scorpii. Jan 29.772 UT 2010. Cropped GRAS 006 image (Australia). Martin Mobberley

1: A test of Nova Trigger Theory, Schaefer 2005 ApJ, 621L 53S

2: Long Term Monitoring of the NR U Sco. AAVSO news
http://www.aavso.org/news/usco.shtml

Some of the more interesting outbursts to have occurred during 2009…

WX Ceti:

Detected in outburst by Hazel McGee on July 08.444 UT using GRAS remote telescope at magnitude 12.6C, and the first detected outburst since October 6.882 UT 2007. Further observations revealed this to be a normal outburst.

V1454 Cygni:

Detected in superoutburst by Ian Miller and Gary Poyner on August 07.98 UT at 14.4C and 14.5 visual. The previous outburst occurring in November 2006. Vsnet-alert 11403 reports a secure superhump period of 0.05757(4)d obtained by Maehara and J. Hambsch, in good agreement with the Superoutburst of 2006.

V336 Persei:

Detected in outburst by Jeremy Shears on August 27.971 at 15.2C, this was the first detected outburst since January 2002, and the first reported to the ROP database. Time series photometry by J. Shears, I. Miller and D. Boyd was inconclusive as to the type of outburst, and revealed only a possibly low amplitude superhump during the available coverage. Outburst images and t/s plots can be seen on the BAAVSS web pages at…
http://www.britastro.org/vss/v366per.htm

EG Cancri:

The first outburst since the 'phenomenal' series of outbursts witnessed in 1996 was detected by Ian Miller on October 12.138 at 14.3C. We were however disappointed not to see a recurrence of those memorable events (see the ROP page on the BAAVSS website for a light curve of the 1996 outburst). Vsnet-alert 11555 reported short term modulations in the light curve observed by Maehara and Miller, yielding a probable orbital period of 0.0594(6) d, and of a low amplitude (<0.1 mag). Richard Miles also obtained V-magnitude data with an interrupted run on Faulkes Telescope North on October 12. By October 14.1 UT, EG Cnc had returned to V-mag 17.4, with no signs of any rebrightening.

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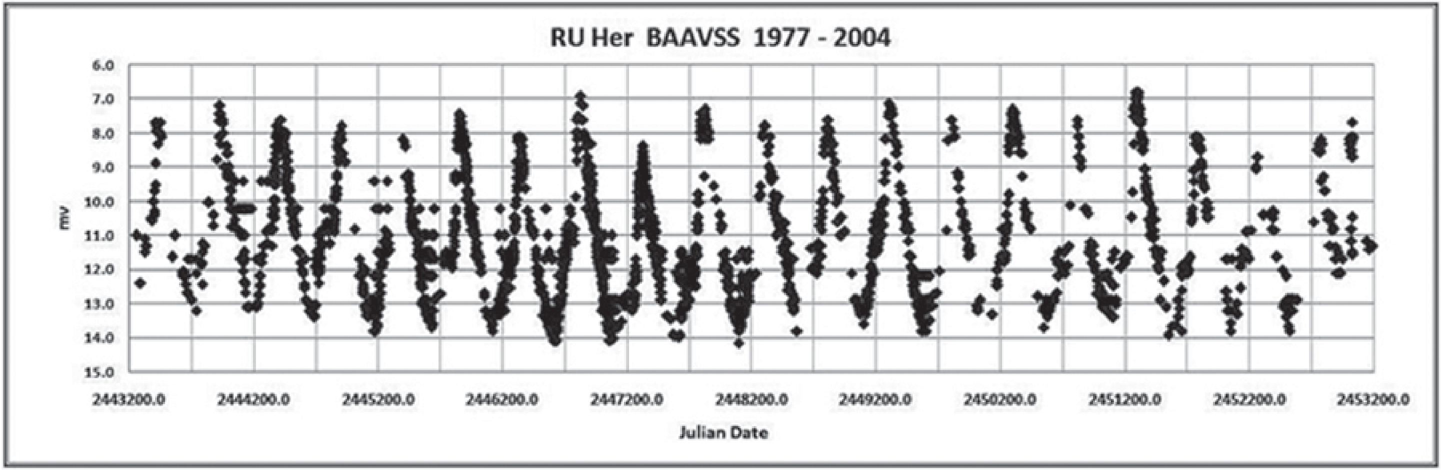
RU HERCULIS LIGHT CURVE

MELVYN TAYLOR



The plot of VSS data from 1977 to 2004 shows maxima differing by about 1.0 magnitude (7.0 to 8.0) and minima by 0.5 magnitude (14.0 to 13.5). A mean period in this interval is 492d against the GCVS figure of 485d.
Observers in the data set were; Albrighton, Bell, Bouma, Brookes, Brookman, Burgess, Chambers, Coady, Dryden, Ells, Feijth, Fraser, Gainsford, Gardner, Godden, Gough, Granslo, Grundy, Higgins, Hollis, Hoste, Howard-Duff, Howarth, Hurst, Isles, Jones, Kay, Leyland, Lubbock, Lunn, Markham, McNaught, Metson, Mettam, Middlemist, Nicholls, Paterson, Peel, Pickard, Pickup, Poyner, Rock, Saw, Smith, Snook, Stevens, Taylor, Toone, Wheeler, Wise, Withers, Youngs.
Typical instrumentation used were 50mm to 80mm binoculars and reflectors (mainly) from 150mm to 406mm in aperture.

This Mira type star on the telescopic list is at RA 16h10m Dec.+25°04’ (2000) and is less than one degree arc from SX Her the SRD type star on VSS binocular programme. A light curve of SX Her appeared in VSSC 136 (2008 June).

FIRST ACQUAINTANCE WITH AI DRACONIS

Janet Simpson

On a rare clear night of the 27/28th July 2008 I decided to look for the eclipsing binary AI Draconis. I had tried to find it once before on a night of full moon, but without success!

First I found it in Sky Atlas 2000. My version is spiral backed so I am able to bend it back open on the right page and slip it into its plastic sleeve to protect it from the damp when I take it outside.

This time the star system proved very easy to find. I had both the BAA and the AAVSO charts showing comparison stars, in order to make visual magnitude estimates. Charts generally should not be mixed, although sometimes it can be tempting as it gives you more comparisons! This time I thought I would try them both out to see which I preferred.

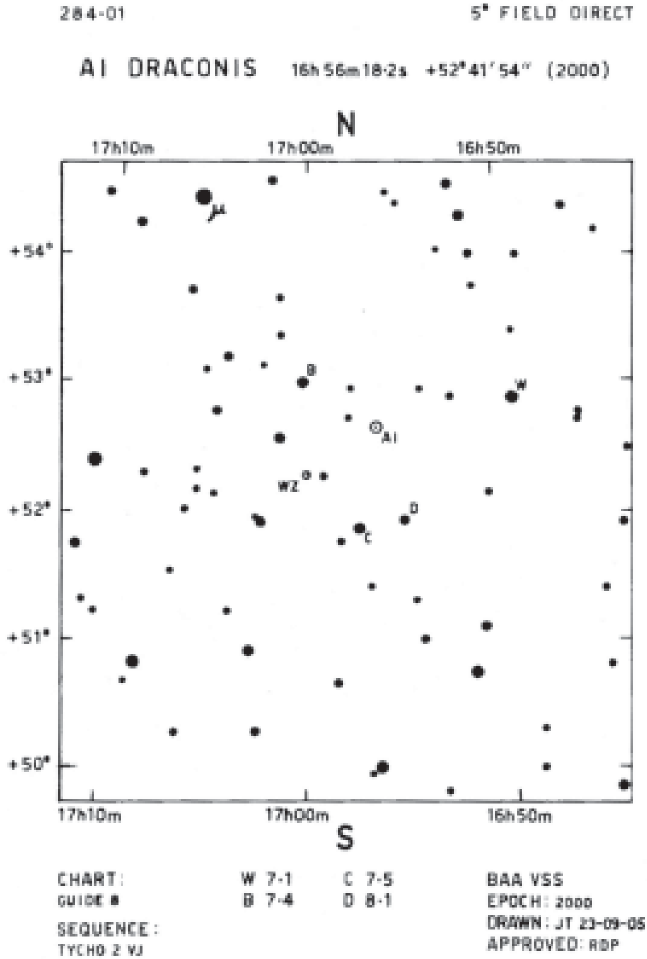
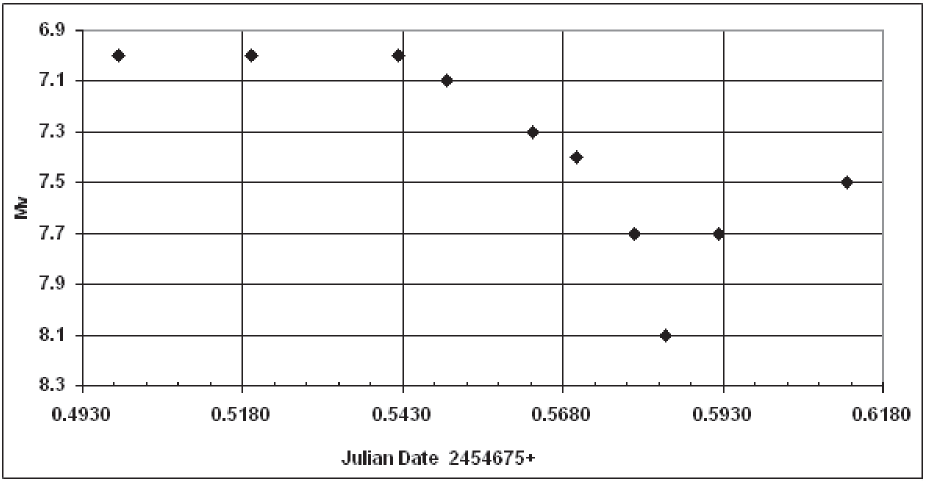


Figure 1: BAA Chart

On checking the VSS circular 'EB predictions', and the Krakow website: <http://www.as.up.krakow.pl/minicalc/DRAAI.HTM>, I realised that an eclipse was due that night if I was prepared to stay up late. So I continued observing AI Draconis, (fitting in observations of a few other stars), and trying out both charts which on this occasion seemed about equal. I have since used the BAA chart.

The visibility fluctuated as usual but what ever was up there remained reasonably transparent. By 01:30 UT twilight began to reduce visibility. At 02:01 UT, AI Draconis must have been very close to mid eclipse when I observed it at 8.1 magnitudes. (Afterwards I estimated the mid-eclipse to be 02:03 UT, which is 14 minutes earlier than Krakows calculation of 02:17 UT). Then it became 'Catch 22', as the sky and the star brightened together and I could barely see the star any more. I only managed two more observations and the last I most probably should not have made. I could just see the star intermittently with averted vision looking to the side of, not at it; I could also just about see the comparison star 'C', also intermittently.

Figure 2: AI Draconis light curve 27/28 July 2008



AI Draconis is a binocular star that varies in brightness between 7.1 to 8.2 magnitudes, is circumpolar, and has a period of 1.199 days. It seemed to me that you could see pretty much the whole of the primary eclipse in two hours. It is a partial eclipse so the mid minimum is sharp. (Though some eclipses I have observed since have not shown this!) The secondary eclipse varies by only 0.1 magnitude. It is classified as an Algol type semi detached system EA/SD, spectra type A0V.

It is more interesting observing stars if you can find out a bit about them, and how they work, so I surfed the net to see what else I could find about this star system.

In 1998, D.M.Z. Jassur et al., believed their combination of UVB light curve analysis and spectroscopic data indicated that both components of the system, a main sequence primary, and an evolved subgiant secondary, were inside their Roche lobes.

Degirmenci et al. in 2000, suggested that the system might have an unseen component which orbits around the mass centre of the triplet system with a period of about 23 years, but that this should be checked with interferometric and spectroscopic observations. With photometry in B and V bands, they found the ascending branches of both minima to be slightly steeper than the descending branches. Collapses at both shoulders of the primary minima were detected. They said Olson and Weis pointed out in 1974 that this may indicate circumstellar material in the system. Degirmenci et al suggested that these anomalies could be due to the gas stream flowing from the secondary, which fills its Roche lobe, to the primary component.

It was suggested by Narusawa et al. 2002, that AI Draconis is a delta Scuti star, based on their findings of short periodic oscillations outside eclipses. Later photometry by Kiss 2002 did not back this up.

C. Lazaro et al. in 2003/4, pointed out that the nature of the primary eclipse seemed unclear from previously published light curve analysis. Because of the small contribution of the secondary cool star to the total light in Algol systems, secondary eclipses are rather shallow, and can be significantly changed by small changes in the data. In the infrared (IR) which they used, the secondary eclipse is much deeper and better defined, which increased confidence in the analysis. They obtained their own spectra, and concluded that the primary star was type A0V. Initially by subtracting an A0V template spectrum from their spectra of AI Draconis, they found the secondary could be between F8V and G4V. They obtained new radial velocity curves, and the rotational velocity of the secondary star. The values were compatible with the assumption that both components are rotating synchronously with the orbital period and with the secondary filling its Roche lobe, which was backed up by results from their infrared light curves and spectra.

I really enjoyed this research, though I doubt if I would have thought of doing it without being keen to observe AI Draconis myself.

References

Up-to-Date Ephemerides of Eclipsing Binary Stars, prepared by J.M. Kreiner: *http://www.as.up.krakow.pl/ephem/*

D.M.Z. Jassur et al. 1998: UBV light curves of eclipsing binary AI Draconis and absolute parameters.

Degirmenci et al. 2000: Photometric analysis of the eclipsing binary star AI Draconis.

Narusawa et al. 2002: Short period variability of the Algol system AI Dra. IBVS 5279

C. Lazaro et al. 2004: The fundamental parameters of the Algol binary AI Draconis revisited.

I made use of NASA's Astrophysics Data System Bibliographic Services to find the papers by Lazaro et al., and Degirmenci et al.

This piece has been revised, and a major blunder recognised and corrected, since it was first written for the Journal of Stirling Astronomical Society, October 2008. I have permission to reproduce it here from Mercury's editor Alex Houston.

LONG TERM POLAR MONITORING PROGRAMME – AN INTERIM REPORT.

GARY POYNER

In 2006 a new VSS observing programme was launched to monitor magnetic CV's over a long period. This was announced in VSSC 129 (September 2006), to coincide with an article written in that Circular by Dr. Boris Gaensicke. Although only 3.5 years into the programme, I present here an interim report on observer response and object activity.

I have been slightly disappointed in the response to this programme so far. Very few people have shown interest, which has surprised me somewhat. Although Polars lack the immediate impact of an outbursting Dwarf Nova, they do show extremely interesting behaviour, but over longer time scales, and much valuable work can be undertaken by a dedicated observer with a CCD or moderate to large visual telescope who is willing to give over some observing time to these fascinating objects. Observers are advised to read – in particular – the last paragraph of Dr. Gaensicke's article in the aforementioned circular.

At present there are eighteen objects on the programme, with at least seven bright enough to be seen in high state with a 30cm telescope or larger. The monitoring for a change in state is one of the main aims of the programme. Each object has a useable chart, several of which have been produced by the AAVSO. Charts, light curves and details of the programme can be found on the BAAVSS web pages: *http://www.britastro.org/vss*

V-band photometry by G. Poyner was obtained from the AAVSO Robotic Telescope Network AAVSOnet. Details can be found at: *http://www.aavso.org/news/aavsonet.shtml*

FL Ceti: Range 14.7p-17.6p P_orb 0.060516 : In low state since first observations in 2007. Range 16.5V-17.9V. Large orbital variations noted.

AI Trianguli: Range 15.5V-18.0V P_orb 0.191745d : Long period Polar. High state since first observations obtained in October 2006. Mean magnitude 15.5V. Orbital variations of the order of one magnitude observed. Visual, C and V-band data obtained.

V1309 Orionis: Range 15.2V-17.3V P_orb 0.332612d : Another long period Polar (8h). A slight fade from initial observations made in 2006 of a mean visual magnitude of 15.5 to a mean of 16.5V in late 2009 early 2010. Is this a normal progression to low state for this object? Again a one magnitude orbital variation is observed.

GG Leonis: Range 16.5V-18.8V P_orb 0.055471d : Low state – 17.6C-18.6V

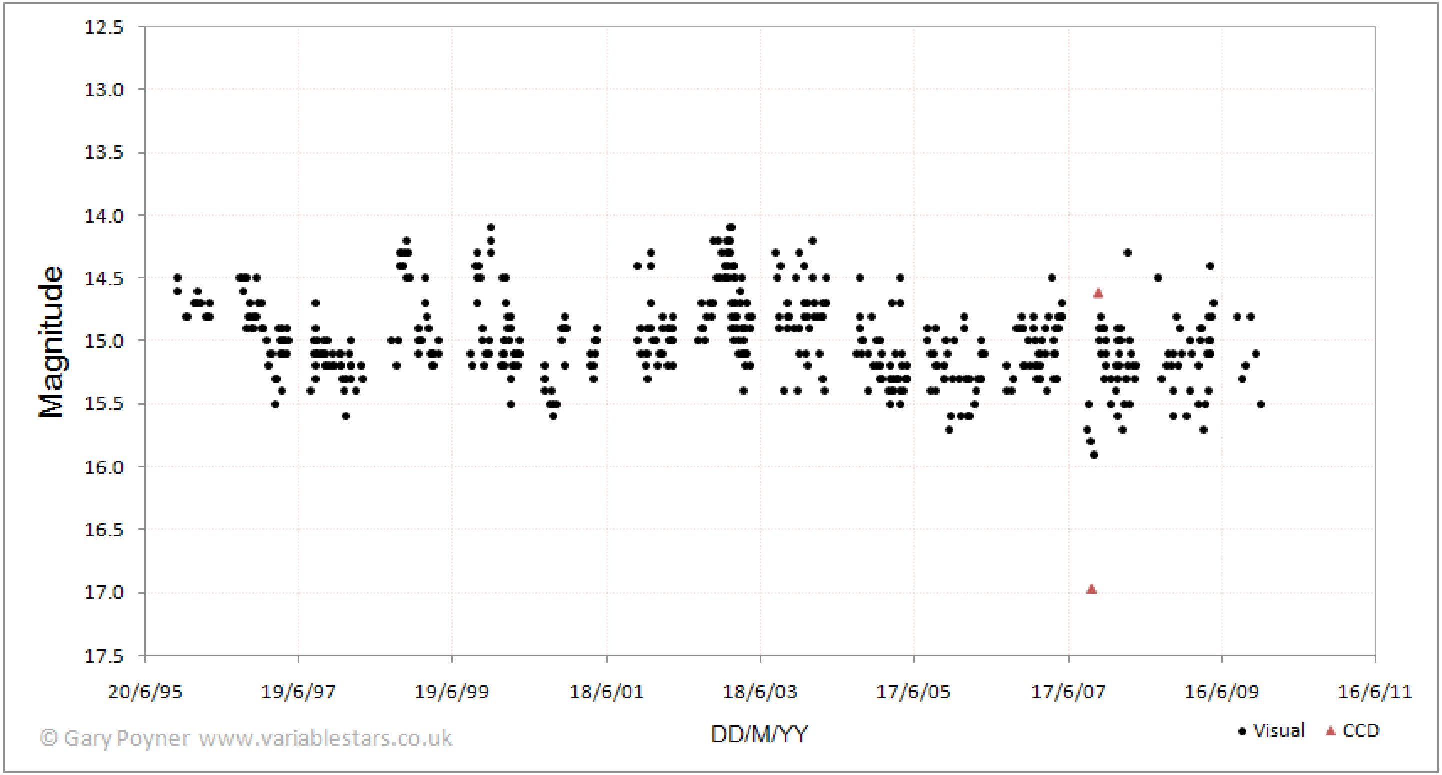
WX Leonis Minoris: Range ?-17.5V P_orb 0.116389d : Mean magnitude 16.3V - from previous C and visual measures obtained before the programme was put together. The high state value looks to be 15.8

AN Ursae Majoris: Range 13.8B-20.2B P_orb 0.079753d : Low state of 19th magnitude reached in May 2009. Not surprisingly, very few observations obtained at this level. Slow recovery to mid 16th magnitude followed.

AR Ursae Majoris: Range 13.3V-16.5V P_orb 0.080501d : Currently in low state 16.5V mean following brief high states to 14.5 visual in January 2007 & January 2008.

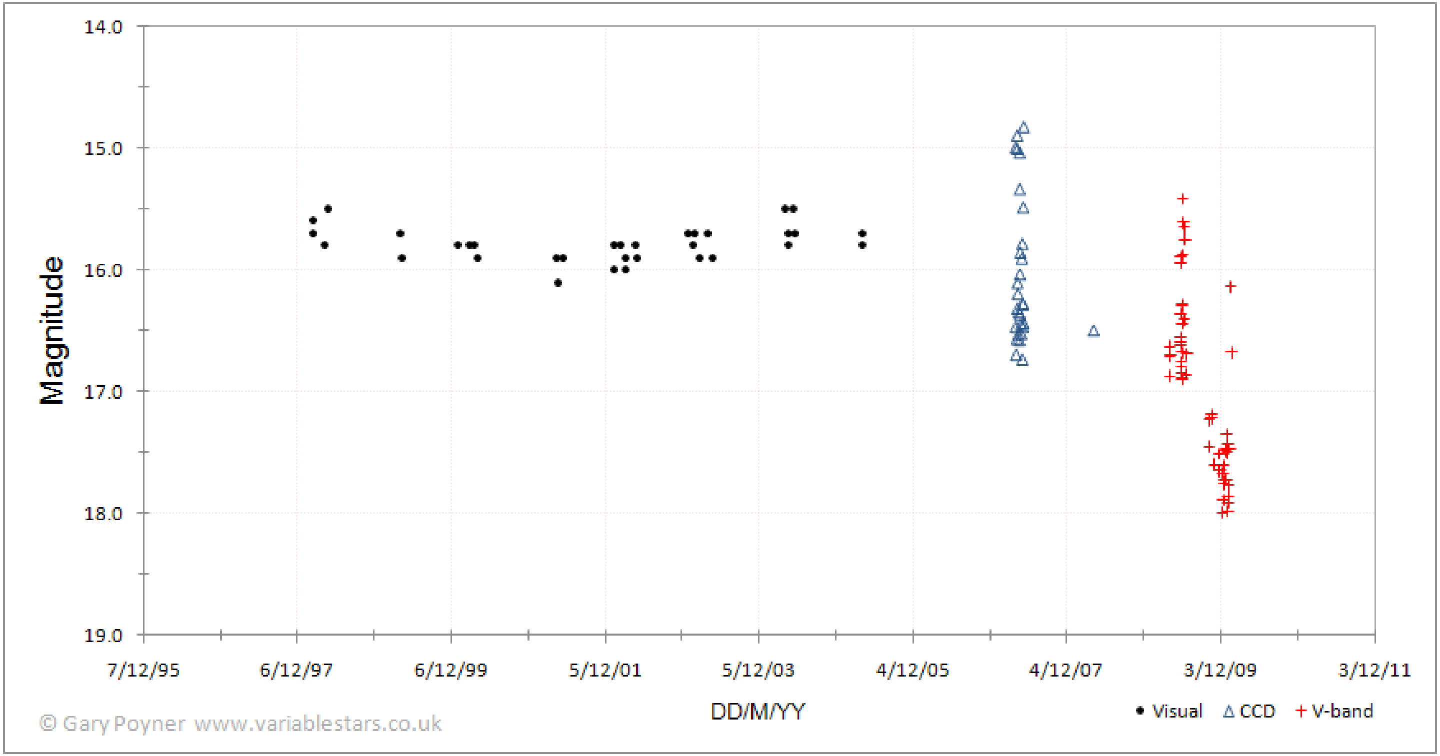
DP Leonis: Range 17.5B-19.5B P_orb 0.062363d : Low state. Some unfiltered CCD observations obtained with the Bradford Robotic Telescope show mid to low 18th mag.

Figure 1: BY Camelopardalis



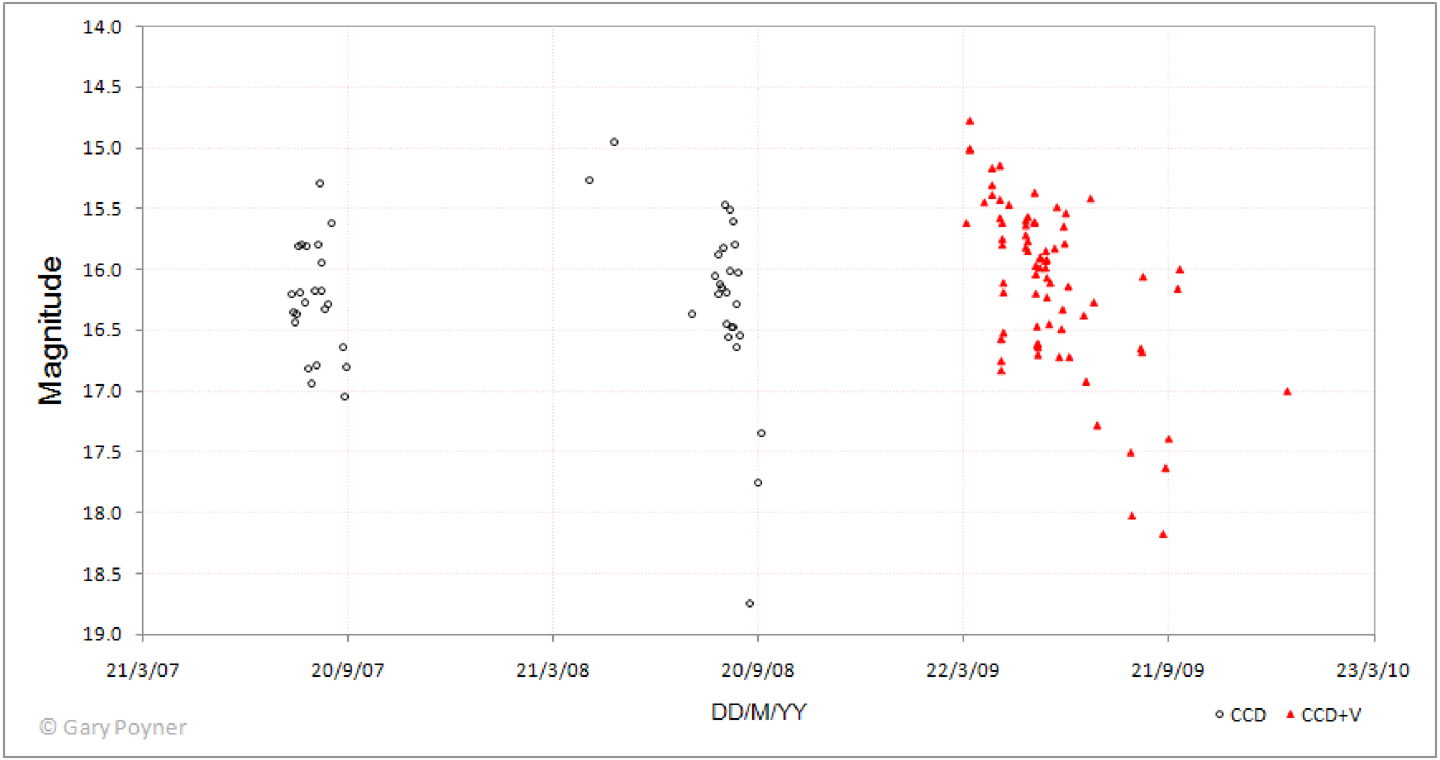
BY Cam: Range 14.6V-17.5V P_orb 0.139753d : The search for the elusive low state of BY Cam continues. Large orbital variation of _2 magnitudes present on the light curve. Mean magnitude 15.3. Remains one of the most popular AM Her stars on the programme.

Figure 2: ST Lionis Minoris



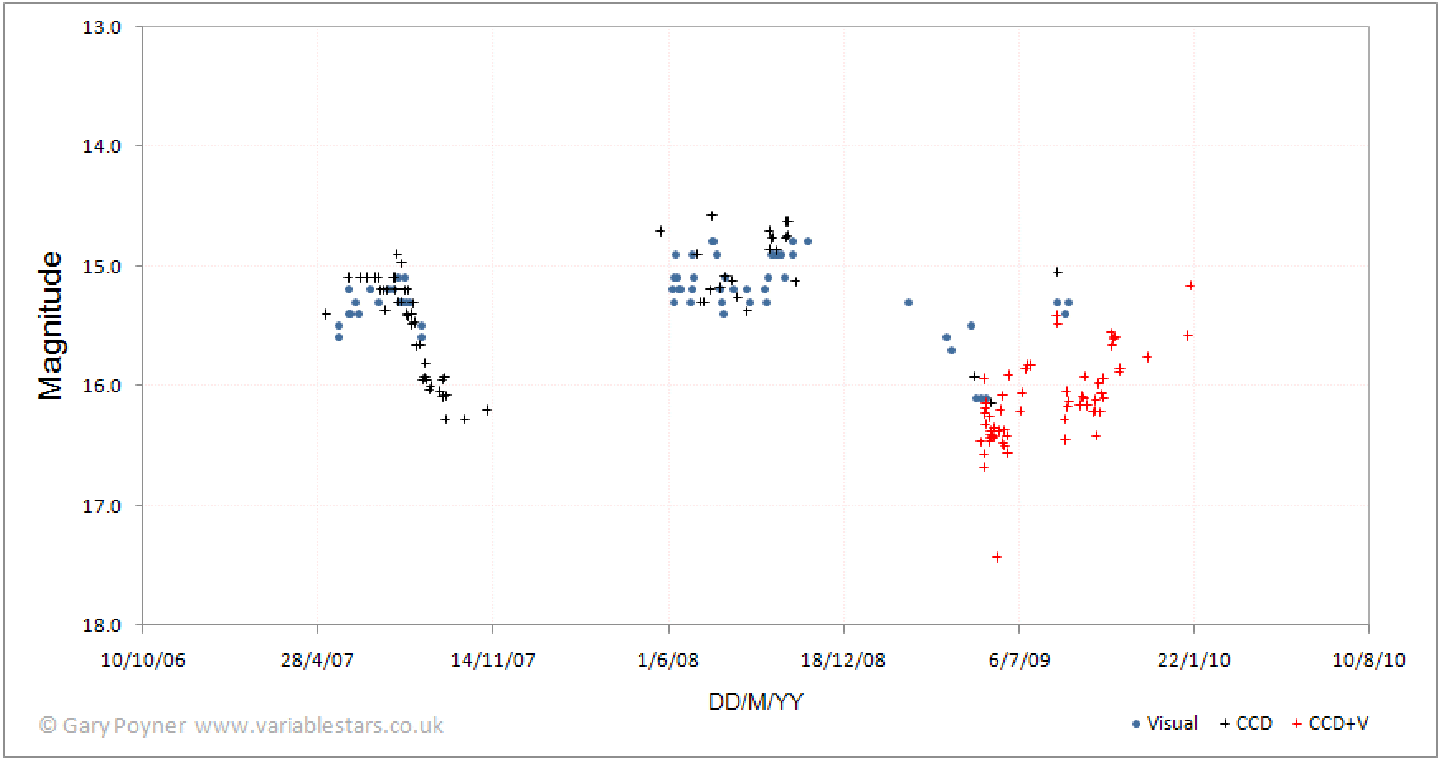
ST LMi: Range 15.0V-17.2V P_orb 0.079753d : A popular star amongst some observers. Visual and CCD data going back in to the 1990's. High state (15.8 visual mean) from 1997-2006. Now in low state with a mean V-value of 17.5V. ST LMi is a single pole accretor. The accreting pole is visible as the white dwarf rotates.

Figure 3: IRXSJ161008+035222



1RXSJ161008+035222: Range 15.9V-? P_orb 0.132200d : Range 15.5V-17.0V until mid 2009 when the mean value dropped to below 17.0V. Large orbital variations noted. Low state limit unknown, so the object could be in low state now. Future observations will hopefully reveal the lower limit of this object.

Figure 4: V884 Herculis



V884 Her: Range 14.5V-? P_orb 0.078480d : Another high magnetic system. Bright enough for visual observations to be made, although a large orbital variation can make this frustrating as the range in high state is 15.0-16.0v. Mean value around one magnitude fainter in mid 2009 at 16.0V, although V844 Her looks now to be recovering to a normal high state. Low state limit unknown.

EU Ursae Majoris: Range 16.5B-? P_orb 0.062600d : Low state. Observed range 17.3C-18.3V

MR Serpentis: Range 14.9V-17.0V P_orb 0.078798d : Range 14.8V-15.8V up to March 2009, when a low state of mid 17th magnitude was reached. Currently remains in low state.

AP Coronae Borealis: Range 16.8B-? P_orb 0.105462d : High state of mean 17.0V. Orbital variations in the order of one magnitude observed. AP CrB has the second highest known magnetic field (after AR UMa). These high magnetic systems are generally less active than those with a lower magnetic field. Our knowledge of these systems will benefit from long term monitoring programmes.

V2301 Ophiuchi: Range 16.1V-21.0V P_orb. 0.078450d : First data obtained in early 2009, since when V2301 Oph has been in high state, with a mean V-value of 16.8V. V2301 Oph is an eclipsing system with the weakest magnetic field yet detected in a AM Her system. Originally thought to be an IP.

QQ Vulpeculae: Range 14.5B-15.5B. P_orb 0.15452d : Another visual target currently in high state – mean value 15.0V. Orbital variations of 1.5 magnitudes detected by R. Pickard in June 2008. Indeed the variations shown in the light curve are predominantly due to the orbital period, making QQ Vul seemingly a very quiet system – at least since early 2006. It is thought that QQ Vul may also display eclipses.

IBVS 5911-5926

JANET SIMPSON

5911 Optical Light Curves of the High Mass X-Ray Binary 4U 2206+54. (Bugno, et al, 2009)
5912 2007 Photometry of UV Leonis. (Heckert, 2009)
5913 Period Changes in the Eclipsing Binary System V861 Her. (Antipin, et al, 2009)
5914 V1032 Oph Is A Dwarf Nova. (Wils, & Henden, 2009)
5915 The Recovery Phase after the 2009.0-event of eta Carinae. (Fernandez-Lajus, Farina, et al, 2009)
5916 New Cataclysmic Variables from 6dFGS Spectroscopy. (Wils, 2009)
5917 CCD Minima of Eclipsing Binary Stars. (Marino, Arena, et al, 2010)
5918 BAV-Results of Observations - Photoelectric Minima of Selected Eclipsing Binaries and Maxima of Pulsating Stars. (Hubscher, Lehmann, et al, 2010)
5919 Limits on Transit Timing Variations in HAT-P-6 and WASP-1. (Szabo, Haja, et al, 2010)
5920 Timings of Minima of Eclipsing Binaries. (Diethelm, 2010)
5921 CSS091215:060708-060335 : An Optically Emergent Eruptive Near the Head of Herbig Haro 866 West. (Greaves, 2010)
5922 Minima Times of Some Eclipsing Binary Stars. (Gokay, Demircan, et al, 2010)
5923 The Polar CSS 081231:071126+440405 at a Low Accretion Rate. (Thorne, et al, 2010)
5924 New Times of Minima of Some Eclipsing Binary Stars. (Erkan, Erdem, et al, 2010)
5925 Short-period Oscillations in the Algol-type Systems V: SX Draconis. (Dimitrov, Kraicheva, et al, 2010)
5926 8 RR Lyrae Stars with Variable Periods. (Haussler, et al, 2010)

The Information Bulletin on Variable Stars (IBVS) can be accessed through the WWW in HTML format at the following URL…. *http://www.konkoly.hu/IBVS/IBVS.html*

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			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

2010 Apr 1 Thu
TV Cas.....01(05)04D
TX UMa..02(07)04D
Z Dra........02(04)04D
U CrB....D20(23)28D
del Lib.......L22(19)26
Z Vul.........L23(22)27

2010 Apr 2 Fri
U Cep.......D20(20)25
Z Per......D20(23)23L
AI Dra.........20(21)23
TV Cas........20(24)28
SW Cyg..22(28)28D

2010 Apr 3 Sat
S Equ......L03(07)04D
RZ Cas.....D20(19)21
Z Dra.......D20(22)24
del Lib....L22(27)28D

2010 Apr 4 Sun
TW Dra....01(06)04D
AI Dra.........01(02)03
U Sge........02(08)04D
TX UMa..03(08)04D
Z Vul........04(09)04D
TV Cas.....D20(20)24
RZ Cas........21(24)26

2010 Apr 5 Mon
U Cep.......03(08)04D
U CrB.......04(09)04D
Z Dra........04(06)04D
Z Per.........20(25)23L

2010 Apr 6 Tue
RS CVn....00(07)04D
RZ Cas.....02(04)04D
Z Per......L04(01)04D
TW Dra....20(25)28D
Z Vul.........L23(20)25

2010 Apr 7 Wed
U Cep......D20(20)24
SW Cyg....L20(18)24
Z Dra...........21(23)26
RW Tau.....21(26)22L

2010 Apr 8 Thu
HU Tau....D20(17)20
U CrB.......D20(20)26
AI Dra.........20(21)23
Z Per.........21(26)23L
del Lib.......L22(19)25

2010 Apr 9 Fri
Z Vul...........02(07)04D
Z Per.........L04(02)04D
RZ Cas........D20(18)21
TW Dra.......D20(21)26

2010 Apr 10 Sat
AI Dra............01(02)03
TV Cas........02(06)04D
S Equ.........L02(04)04D
U Cep..........03(07)04D
HU Tau.......D20(18)22
RW Tau.....D20(20)22L
RS CVn....D20(26)28D
RZ Cas...........21(23)25
del Lib.......L22(27)28D
U Sge.........L23(26)28D

2010 Apr 11 Sun
TV Cas........22(26)28D
V367 Cyg..L22(62)28D
Z Per............23(27)23L
Z Dra.............23(25)27
Z Vul............L23(18)23

2010 Apr 12 Mon
RZ Cas........01(04)04D
U CrB..........01(07)04D
SW Cyg.......02(08)04D
Z Per.........L04(03)04D
TW Dra.......D20(16)21
HU Tau.....D20(19)22L
U Cep.........D20(19)24
V367 Cyg..L22(38)28D

2010 Apr 13 Tue
TV Cas........D20(21)25
V367 Cyg..L22(14)28D
Z Vul...........23(29)28D

2010 Apr 14 Wed
Z Dra...........D20(18)21
HU Tau.....D20(21)22L
AI Dra.........D20(21)22
V367 Cyg.L22(<<)28D

2010 Apr 15 Thu
U Cep..........02(07)04D
Z Per.........L03(05)04D
TV Cas........D20(17)21
RZ Cas........D20(18)20
U CrB.........D20(18)24
RS CVn.......D20(21)27
del Lib..........L21(19)25

2010 Apr 16 Fri
Z Dra........00(03)04D
AI Dra..........01(02)03
SW Cyg.....D20(22)28
HU Tau..D20(22)22L
RZ Cas.........20(22)25

2010 Apr 17 Sat
S Equ......L02(01)04D
U Cep.......D20(19)24
del Lib.....L21(26)28D
U Sge.........L23(20)26

2010 Apr 18 Sun
RZ Cas......01(03)04D
TW Dra.....02(07)04D
Z Per.......L03(06)04D
Z Dra........D20(20)22
HU Tau...D20(23)21L
Z Vul.......L22(26)28D
U CrB.......23(29)28D

2010 Apr 19 Mon
TV Cas......04(08)04D
TX UMa..D20(16)20

2010 Apr 20 Tue
U Cep.......02(07)04D
Z Dra........02(04)04D
RS CVn.....D20(16)22
AI Dra.......D20(21)22
HU Tau......21(25)21L
TW Dra.....21(26)28D
TV Cas......23(27)28D
U Sge.........24(30)28D

2010 Apr 21 Wed
Z Per.......L03(07)04D
RW Tau..D20(22)21L

2010 Apr 22 Thu
AI Dra..........00(02)03
U CrB.......D20(16)22
TX UMa...D20(17)22
U Cep.......D20(19)23
Z Dra........D20(22)24
RZ Cas.....D20(22)24
TV Cas......D20(23)27
del Lib........L21(18)25

2010 Apr 23 Fri
TW Dra.....D20(21)26
Z Vul.......L22(24)27D

2010 Apr 24 Sat
RZ Cas........00(03)03D
S Equ...........L01(<<)03
RW Tau.......D20(17)21
TV Cas........D20(18)22
del Lib.......L21(26)27D

2010 Apr 25 Sun
U Cep.........02(06)03D
TX UMa.....D20(19)23
SW Cyg....D20(25)27D
U CrB.........21(27)27D

2010 Apr 26 Mon
TW Dra.......D20(17)22
AI Dra.........D20(21)22
Z Dra............21(23)26

2010 Apr 27 Tue
S Equ...........03(08)03D
U Cep.........D20(18)23
U Sge........L22(24)27D

2010 Apr 28 Wed
AI Dra............00(02)03
TX UMa.....D20(20)25
RZ Cas.......D20(21)24
Z Vul.........L22(22)27D

2010 Apr 29 Thu
del Lib.........D21(18)24
RZ Cas........24(26)27D
RS CVn.......24(30)27D

2010 Apr 30 Fri
TV Cas........01(05)03D
U Cep.........01(06)03D
SW Cyg.......D21(15)21
V367 Cyg..L21(52)27D
Z Dra..........23(25)27D

May

2010 May 1 Sat
TX UMa.....D21(22)26
TV Cas.....D21(24)27D
del Lib......D21(26)27D
V367 Cyg..L21(28)27D

2010 May 2 Sun
TW Dra.......02(07)03D
U Cep.........D21(18)23
AI Dra.........D21(21)22
RW Tau.....D21(24)21L
U CrB.......D21(24)27D
V367 Cyg..L21(04)27D

2010 May 3 Mon
TV Cas.......D21(20)24
V367 Cyg...L21(<<)24
Z Vul...........L21(20)25
2010 May 4 Tue
AI Dra...........00(01)03
S Equ........L01(05)03D
RZ Cas.......D21(21)23
TX UMa.D21(23)27D
RS CVn...D21(25)27D
U Sge..........L22(18)24
TW Dra......22(27)27D
SW Cyg......23(29)27D
2010 May 5 Wed
Z Dra..........00(03)03D
U Cep.........01(06)03D
RZ Cas.......23(25)27D
2010 May 6 Thu
Z Vul..........02(07)03D
del Lib........D21(17)24
2010 May 7 Fri
U Cep........D21(18)22
Z Dra.........D21(20)22
TW Dra...D21(22)27D
TX UMa.D21(25)27D
U Sge..........22(27)27D
2010 May 8 Sat
Y Psc........L03(01)03D
AI Dra........D21(21)22
del Lib.....D21(25)27D
Z Vul...........L21(18)23
2010 May 9 Sun
Z Dra..........02(05)03D
TV Cas.......02(06)03D
SW Cyg......D21(18)24
RS CVn...D21(21)27D
U CrB......D21(22)27D
2010 May 10 Mon
AI Dra...........00(01)03
U Cep.........01(05)03D
TW Dra......D21(18)23
RZ Cas.......D21(20)23
TX UMa....22(26)27D
TV Cas.......22(26)27D
Z Vul..........23(29)27D
2010 May 11 Tue
S Equ L00(02)03D
del Lib........03(09)03D
Z Dra.........D21(22)24
RZ Cas.......22(25)27D

2010 May 12 Wed
U Cep.........D21(17)22
TV Cas.......D21(21)25
2010 May 13 Thu
del Lib........D21(17)23
TX UMa....23(28)27D
2010 May 14 Fri
SW Cyg......02(08)03D
RS CVn......D21(16)22
AI Dra........D21(20)22
U Sge.......D21(22)27D
2010 May 15 Sat
U Cep.........00(05)03D
Z Dra.........D21(23)26
del Lib.....D21(25)27D
Z Vul..........21(27)27D
AI Dra...........24(25)26
2010 May 16 Sun
RZ Cas.......D21(20)22
U CrB.........D21(20)26
2010 May 17 Mon
TX UMa....01(05)03D
U Cep.........D21(17)22
RZ Cas.......22(24)26D
S Equ........L24(23)26D
2010 May 18 Tue
U Sge..........01(07)02D
del Lib........02(09)02D
SW Cyg...D21(22)26D
V367 Cyg...22(66)26D
TW Dra......23(28)26D
2010 May 19 Wed
V367Cyg.D21(42)26D
Z Dra..........23(25)26D
TV Cas.......23(27)26D
U Cep.........24(29)26D
2010 May 20 Thu
U CrB.........01(07)02D
TX UMa....02(07)02D
del Lib........D21(16)23
V367Cyg.D21(18)26D
AI Dra........D21(20)22
Z Vul.......D21(24)26D
2010 May 21 Fri
V367Cyg.D21(<<)26D
U Sge..........D21(16)22
TV Cas....D21(23)26D
TW Dra...D21(23)26D
AI Dra...........24(25)26

2010 May 22 Sat
Z Per.........L01(<<)02
RZ Cas......D21(19)21
del Lib....D21(24)26D
2010 May 23 Sun
Y Psc......L02(03)02D
U CrB.......D21(17)23
TV Cas.....D21(18)22
RZ Cas.....D21(24)26
RS CVn.....24(30)26D
2010 May 24 Mon
Z Dra........01(03)02D
TW Dra....D21(18)23
U Sge.....D21(25)26D
S Equ.........L23(20)25
U Cep.......24(28)26D
2010 May 25 Tue
Z Per......L01(<<)02D
del Lib.......02(08)02D
RZ Cas.....02(04)02D
Z Vul......D22(22)26D
2010 May 26 Wed
Z Dra........D22(20)22
U CrB.......22(28)26D
2010 May 27 Thu
Y Psc........L02(<<)02
del Lib......D22(16)22
SW Cyg.D22(25)26D
AI Dra......24(25)26D
2010 May 28 Fri
Z Per.......L01(00)02D
S Equ........01(06)02D
RS CVn..D22(25)26D
2010 May 29 Sat
TV Cas.....01(05)02D
RZ Cas.....D22(23)26
del Lib....D22(24)26D
U Cep.......23(28)26D
2010 May 30 Sun
Z Vul........D22(20)25
Z Dra........D22(22)24
TV Cas..D22(24)26D
2010 May 31 Mon
Z Per.......L00(01)02D
RZ Cas.....01(04)02D
U Sge........D22(19)25

June

2010 Jun 1 Tue
del Lib........01(08)02D
TV Cas.......D22(20)24
TW Dra......23(28)26D
2010 Jun 2 Wed
Z Vul..........02(07)02D
RS CVn...D22(20)26D
U CrB......D22(26)26D
AI Dra........23(25)26D
2010 Jun 3 Thu
Z Per........L00(02)02D
del Lib........D22(16)22
Z Dra.......D22(24)26D
U Sge..........23(28)26D
S Equ........L23(27)26D
U Cep.........23(28)26D
2010 Jun 4 Fri
Z Vul..........D22(18)23
RZ Cas.......D22(23)25
TW Dra...D22(24)26D
2010 Jun 5 Sat
del Lib.....D22(23)26D
SW Cyg......23(29)26D
Z Per........L24(28)26D
2010 Jun 6 Sun
RZ Cas.......01(03)02D
V367Cyg.D22(57)26D
Z Vul..........24(29)26D
2010 Jun 7 Mon
Y Psc........L01(04)02D
TW Dra......D22(19)24
V367Cyg.D22(33)26D
Z Dra..........23(25)26D
2010 Jun 8 Tue
del Lib........01(07)02D
V367Cyg.D22(09)26D
TV Cas....D22(26)26D
U Cep.........23(27)26D
AI Dra........23(25)26D
2010 Jun 9 Wed
Z Per...........00(05)02D
V367Cyg.D22(<<)26D
U CrB......D22(24)26D

2010 Jun 10 Thu
TX UMa..D22(17)22
SW Cyg....D22(19)25
TV Cas.....D22(21)25
RZ Cas.....D22(22)24
U Sge.....D22(23)26D
S Equ.....L22(24)26D

2010 Jun 11 Fri
Y Psc.....L01(<<)02D
Z Vul.....D22(27)26D

2010 Jun 12 Sat
RZ Cas.....00(03)02D
Z Dra.......01(03)02D
Z Per........02(06)02D
del Lib...D22(23)26L

2010 Jun 13 Sun
TX UMa..D22(19)24
U Cep......22(27)26D

2010 Jun 14 Mon
Z Dra.......D22(20)23
AI Dra........23(24)26

2010 Jun 15 Tue
del Lib......01(07)01L

2010 Jun 16 Wed
TW Dra......00(05)02D
TX UMa....D22(20)25
U CrB.....D22(21)26D
RZ Cas.......D22(21)24
Z Vul.......D22(25)26D
RS CVn......23(30)26D

2010 Jun 17 Thu
U Sge..........D22(17)23
S Equ.......D22(21)26D
TV Cas.......23(27)26D
RZ Cas.......24(26)26D

2010 Jun 18 Fri
Z Dra.........D22(22)24
TW Dra...D22(25)26D
U Cep.....D22(27)26D

2010 Jun 19 Sat
TX UMa D22(22)26D
SW Cyg...D22(22)26D
del Lib.....D22(23)25L
TV Cas....D22(23)26D

2010 Jun 20 Sun
U Sge.......D22(26)26D
AI Dra...........23(24)26

2010 Jun 21 Mon
TV Cas.......D22(18)22
TW Dra......D22(20)25
Z Vul.......D22(22)26D
RS CVn...D22(25)26D

2010 Jun 22 Tue
del Lib........00(06)01L
Y Psc..........01(06)02D
X Tri..........02(04)02D
RZ Cas.......D22(21)23
TX UMa.D22(24)26D
Z Dra......D22(24)26D

2010 Jun 23 Wed
X Tri..........01(03)02D
U CrB........D22(19)25
U Cep.....D22(26)26D
RZ Cas.......23(26)26D

2010 Jun 24 Thu
X Tri........L00(03)02D
S Equ..........D22(18)23

2010 Jun 25 Fri
X Tri........L00(02)02D
TX UMa.D22(25)26D
V367Cyg.D22(47)26D
Y Psc.......L24(24)26D

2010 Jun 26 Sat
X Tri........L00(01)02D
RS CVn...D22(20)26D
Z Vul..........D22(20)26
del Lib.....D22(22)25L
V367Cyg.D22(23)26D
AI Dra...........23(24)25
Z Dra.........23(25)26D

2010 Jun 27 Sun
X Tri........L00(01)02D
U CrB.........00(06)02D
TV Cas.......01(05)02D
V367Cyg.D22(<<)26D
U Sge.......D22(20)26D
S Equ..........23(29)26D

2010 Jun 28 Mon
X Tri........L00(00)02D
RZ Cas.......D22(20)23
TV Cas....D22(24)26D
SW Cyg...D22(26)26D
U Cep......D22(26)26D
TX UMa.D22(27)26D
del Lib.........24(30)25L
X Tri........L24(23)26D

2010 Jun 29 Tue
RZ Cas.......23(25)26D
X Tri...........L24(23)25

2010 Jun 30 Wed
TW Dra......01(06)02D
U CrB.........D22(17)23
TV Cas.......D22(20)24
U Sge..........24(29)26D
X Tri...........L24(22)24

DATABASE FOR AMATEUR SPECTRA OF EPSILON AURIGAE.

Robin Leadbeater

I am maintaining a database of amateur epsilon Aurigae spectra as part of the international campaign and anyone is welcome to contribute:

http://www.threehillsobservatory.co.uk/astro/epsaur_campaign/epsaur_campaign_spectra_table.htm

A rather long address but it should be linked from the main campaign site by the time the circular comes out:

http://www.hposoft.com/Campaign09.html

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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 144) will be 7th May, 2010. All articles should be sent to the editor (details are given on the back of this issue).

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Nova and Supernova discoveries

First telephone the Nova/Supernova Secretary. If only answering machine response, leave a message and then try the following: Denis Buczynski 01524 68530, Glyn Marsh 01624 880933, or Martin Mobberley 01284 828431.

Variable Star Alerts Telephone Gary Poyner (see above for number)