



## Report for 2009

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*Dr Tom Richards*

*Director*

It is with pleasure I present this report of Variable Stars South, the first since it was renamed in January 2009 and I was appointed Director. I would like to thank Pauline Loader very sincerely for the fine work she did "holding the fort" since the late Dr Frank Bateson resigned.

I had three principal tasks in reshaping VSS.

*The first* was bringing it into the online age. There are now no "headquarters", just cyberspace. Our website is [www.varstars.org](http://www.varstars.org), and I'm slowly building it up to be a repository of news, information, and in particular everything about our research projects including data and reports. There is also an email group for members, [vss-members@googlegroups.com](mailto:vss-members@googlegroups.com). Subscriptions are handled online by Bob Evans, who is responsible for managing our finances. Even the *Newsletter* is now published online. Administrative documents are available to all VSS officers via Google Docs.

*The second task* was to refocus VSS towards specific projects, run by individual members. The old pattern of collecting monthly data on a wide range of southern variables has now gone. Not that this is less important; but since all such data was being forwarded the International Variable Star Database, hosted by the American Association for Variable Star Observers, we now simply ask all observers to send their data directly there, where anybody can access it.

In 2009 we set up seven projects, which are reported on below by those responsible.

*The third task* was to reshape the membership and leadership. Membership is now by subscription, to cover expenses - principally our Internet presence. A number of members have been appointed to specific roles in VSS, as follows:

Bob Evans: finances.

Paddy McGee: Coordinating work on cataclysmic variables

Alan Plummer: Coordinating visual research

Tom Richards: Eclipsing binaries and the website

Stan Walker: *Newsletter* Editor and coordinating work on pulsating variables

In addition, Bernard Heathcote took on the role of encouraging spectroscopy, but it became apparent that there was insufficient interest. I am very grateful to my colleagues for the work they have put in to make VSS a broader and more effective organisation, and for their tolerance of me pushing a heavy pace of development. Often this has involved a great deal of time, and particularly at the beginning, a lot of joint planning and not a few false starts.

### **Finances and Membership**

At the end of the year we had 45 members, with the usual two national rivals neck and neck:

New Zealand    21

Australia        20

USA 2

Cook Islands 1

North Cyprus (Turkey) 1

It is unfortunate we have no members from Africa or South America. The membership fee stands at NZ\$20, but most members very generously took Foundation Membership at \$50, which was available for a short initial period. Membership year commences on May 1<sup>st</sup>.

At the end of the year our bank balance stood at \$4064.36. At the start we were fortunate to have some monies from the old VSS rolled in; and also from the Southern Photometry Group, now defunct, courtesy of Stan Walker. The balance is artificially high since the 2009 Internet expenses have not been brought to account.

## Newsletter

Our online *Newsletter*, edited by Stan Walker, appears quarterly, and can be downloaded from our website. The first number was in February 2009. It contains a mix of news, personal interest articles, and research notes. Being very good publicity for VSS, it is free to members and non-members alike. Stan deserves, and has received from many quarters, high praise for the quality of this magazine.

## Reports from Research Areas

### Visual Research (Report by Alan Plummer)

This report marks the end of the first year in my position of Visual Research Co-ordinator. It will be shown below that there have been some real and immediate achievements, and it is important to keep up the effort and see that it is well directed. Variable Stars South is a team effort and as such I always welcome feedback on any area of interest. What follows will be broken into sections for discussion.

#### Public Information

Some efforts have been made at publicising the VSS for the purpose of recruiting new visual observers. The visual bias here is deliberate and valid in order to be focused. Electronic observers need a completely different skill set and interested people are directed elsewhere within the VSS.

In Australia the initial promotion of the VSS and an observing program outlined below was via the AVSON website for variable star observers. Next, a short essay was submitted to the Sydney Observatory blog on the 19/2/2009, found here <http://www.sydneyobservatory.com.au/blog/> This was viewed by a wider population, and was immediately successful in generating at least one new and active member. There was a follow up entry on the 20/5/2009, and another will be sent soon.

VSS presentations have been given at the Sydney City SkyWatchers (Sydney Observatory), the Western Sydney Amateur Astronomical Group, the Hawkesbury Astronomical Society, and Linden Observatory. These presentations may have been good PR, but as far as I am aware, only one new VSS member was found.

The 2009 RASNZ Wellington Conference was a major event for the VSS, with new visual observers putting their hands up to join in.

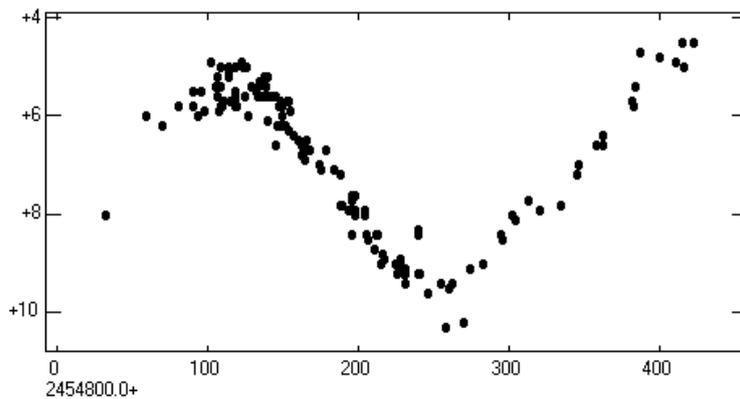
Neither the Astronomical Society of New South Wales publication *Universe*, nor *Australian Sky and Telescope* would lend their support and run a piece on visual observing and the VSS. On both counts I find this surprising; I have little trouble publishing internationally, and here was an indisputably 'good cause'. I will re-submit shortly.

## The Beginners' Project

This project suitable for beginners is the observation of R and ETA Carinae, which data will be entered into the AAVSO International database. In addition, John Tebbutt's observations of the late 19<sup>th</sup> century will be also be entered, extending the historical record. Historical and scientific issues will be discussed, and the extended light curves examined and published.

At present 15 VSS observers are participating, although to what extent for each remains to be seen; the objects are only just now convenient evening objects again. The life of the project was to be only one year, but no firm date has been set for the finish; possibly in May, but I wish to be flexible.

Figure 1 shows the lightcurve of R Car so far using only the observations of project participants. The first two points are mine, and it can be seen how enthusiastically VSS members joined in. There is good news here; one observer, Yitping Kok, joined the VSS as an absolute beginner in response to the Sydney Observatory blog report, and his observations are of a high standard. He works with binoculars under light polluted skies. As for other 'beginners', it is a privilege to have Albert Jones and Peter Williams on board.



## Publications relevant to the VSS

'The VSS RASNZ Variable Star Charts: a Story of Co-Evolution', with Mati Morel, *JAAVSO* Volume 38, 2010

'The VSS RASNZ legacy and the evolving BV Centauri' with Mati Morel *Southern Stars* Volume 48 no.2

'Observers Wanted' Sydney Observatory blog 19/2/2009

'Z Canis Majoris' Sydney Observatory blog 20/5/2009

'VSOing, South and North' in the upcoming newsletter of the Western Sydney Amateur Astronomical Group

## Concluding Remarks

It is most gratifying to receive on-going communications from those starting out in variable star observing, in both Australia and New Zealand. It would be more gratifying to receive more, of course. Time will tell how many will continue in the field and stay with the VSS.

The position of 'Visual Research Co-ordinator' necessarily overlaps some other project areas. I have encouraged new observers in particular to participate, if possible, in the Dual Max Mira project, and also to observe different objects, as their interests may take them.

Another visual special project is needed soon, and more efforts at public information need to be made. Another blog entry will be submitted to Sydney Observatory, and more submissions will be made to *Universe* and *Australian Sky and Telescope*. The upcoming NACAA will be a big event for the VSS. To name two of the many opportunities available for the VSS, the presentation titled 'Variable

Stars; Observing Stellar Evolution' will feature VSS observers, and our Director is giving an invited talk.

## **Pulsating Variables (Report by Stan Walker)**

Stan Walker is presently coordinator of the group studying pulsating variable stars of assorted types. Measures of LPVs and Miras are being sent directly to the International Database of the AAVSO. These are mostly of large amplitude, longer period stars. Two specific projects conducted by the group are described below.

### **1. Dual Maxima Miras**

The small number of Mira stars showing double maxima contain some of the most interesting of all Mira stars. Two of the five or six known examples have changing periods, evolving light curves and changing amplitudes. This project involves measures from visual to UBVRI and JH photometry.

The long periods associated with these stars mean that none have gone through a full cycle since the project start so the colour changes can not be examined in detail as yet. Visual observers include Peter Williams, Alan Plummer and Glen Schrader with six electronic observers providing BVRI and a little JH photometry.

### **2. Bright Cepheids**

This project targets 12-20 stars which are too bright for the ASAS3 survey, with periods ranging from 5 days to 42 days. Most of those with periods in excess of 14 days have shown period variability over the last few decades. A feature of the project is new charts with modern values of comparison stars and dense sequences ensuring much better measures.

Initially the observations have been made by three visual observers - Aline Homes, Bob Evans and Glen Schrader and epochs for 2009 have been calculated for several of the stars. Period changes are evident.

Experimental measures with digital and video cameras have taken place and it is expected that these can be used to measure those targets like MY Puppis with low amplitudes.

### **Papers**

One paper has been published during the period:

W S G Walker , BH Crucis: Period Magnitude and Color Changes, *Journal of the AAVSO*

## **Cataclysmic Variables (Report by Paddy McGee)**

### **Organisation**

Subsequent to the first announcement of observing projects for the Cataclysmic Variables Programme, several observers communicated their interests and capabilities in this area. At the moment, this capability is visual only. Whilst, clearly, this limits the magnitudes to which CV's may be observed, it does still allow a number of valuable monitoring projects to be covered. One observer already makes regular contributions a number of observing programmes.

### **Results**

With regard to the Projects suggested in the CV Programme, the most significant result has been an early observation of the current outburst of the recurrent nova U Scorpii in 2010. This was a visual detection of the nova at magnitude 7.9, only a few hours after the initial discovery by U.S.-based observers.

News of this outburst spread rapidly around the globe, and was passed on to an Adelaide-based researcher who is involved with the HESS gamma-ray telescope in Africa. Such an outburst is something that team has been waiting for, and the detection, confirmations and notifications allowed

that object to be added to the HESS telescopes' observing schedule. At this stage, the results of any such gamma-ray observations are not yet known.

### **Further work**

Improvements here lie at the Programme Co-ordinator's feet... more communication with potential and active observers, promotion and selection of targets. The addition of CCD observations (planned or hoped for by some of the observers!) would be a bonus by virtue of expanding the range of potential targets and observing projects.

That said, the current range of visual-only observing is producing valuable results and is to be congratulated and encouraged!

## **Eclipsing Binaries**

### **QZ Carinae (Report by Stan Walker)**

QZ Carinae is one of the most massive and luminous systems in the Galaxy. Comprising two pairs of stars with around 100 solar masses in total we plan to establish a light curve for the non-eclipsing pair and determine a better orbital model of both pairs using light time effects.

Progress in 2009 was slight as the project began late and the difficulties of bright star BV photometry using CCDs turned out to be greater than imagined. Terry Bohlsen and Stan Walker are the chief contributors and have established a more useful procedure for 2010.

### **Equatorial Eclipsing Binaries (Report by Tom Richards)**

This was mounted jointly with the Variable Star Section of the British Astronomical Association, to study a range of equatorial eclipsing binaries, principally EAs. Cooperation from the north has been very good, with contributions from David Boyd (current BAA President), Des Loughney (coordinator of their eclipsing binaries section) and Roger Pickard (immediate past president and director of their VSS). Yenal Ogmen from North Cyprus has also made valuable contributions. In the south we have received data from 11 members: Phil Evans, David O'Driscoll, Tom Richards, Neil Butterworth, Aline Homes, Margaret Streamer, Steve Kerr, Bob Evans, Peter Williams, Alan Plummer, and Andrew Dallow.

There have been seven target stars so far in this project: V1243 Aql, V1692 Aql, CU Hya, Delta Lib, SZ Psc, UV Psc and WZ Cet. Most data has been CCD time series, but Des Loughney and Steve Kerr contributed DSLR data – a technology I am very keen to foster as it shines with targets too bright for CCDs and has a wider field of view. Delta Librae, though already well researched, was a deliberate experiment to see how well visual researchers performed on an eclipser with a one-magnitude eclipse – and visual observers responded magnificently. This is where we got all the DSLR data too, and I hope to present some interesting results to the upcoming RASNZ conference. I have been greatly helped by Ranald McIntosh's analysis work on this star's data.

Results so far have been up and down (sorry!) with some stars getting volumes of data from many observers, and one or two getting none. It's a matter of balancing the menu of targets with the number of observers. In most cases where there has been good data, it is apparent that there are surprises in the results. It's a field where often there has been little or no data for half a century or more, and original data is often poor, being photographic, leading even to complete misclassifications.

Results will be published in due course as appropriate; but for all targets we need some confirming data as the stars come around again this year. And more targets will be added.

## **Conclusion**

The first year for VSS has been quite good, but the second year will be the test. Will the membership hold up? Will projects come to a conclusion with publishable results? Will my colleagues and I handle the workload? Time will tell.