The American Association of Variable Star Observers: Serving the Research Community in 2010 and Beyond

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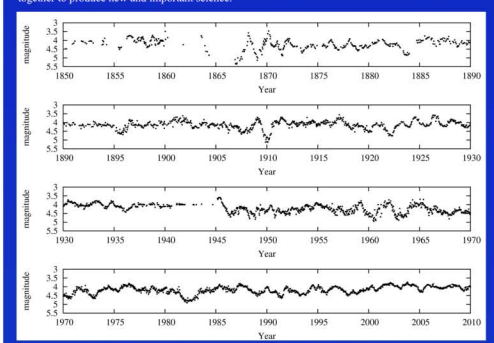
The **American Association of Variable Star Observers** (AAVSO) holds the largest single online database of variable star observations in the world, collected from thousands of amateur and professional observers during the past century. One of our core missions is to preserve and distribute these data to the research community in service to the science of variable star astronomy. But as an organization, the AAVSO is much more than a data archive. Our services to the research community include: monitoring for and announcement of major astronomical events like novae and supernovae; organization and management of observing campaigns; support for satellite and other TOO observing programs by the professional community; creation of comparison star sequences and generation of charts for the observer community; and observational and other support for the amateur, professional, and educator communities in all things related to variable stars. As we begin a new century of variable star astronomy we invite you to take advantage of the services the AAVSO can provide, and to become a part of our organization yourselves. In this poster, we highlight some of the most important services the AAVSO can provide to the professional research community, as well as suggest ways in which your research may be enhanced with support from the AAVSO.

The American Association of Variable Star Observers

The **AAVSO** is an organization devoted to the science of variable stars and the pursuit of variable star observing and research. We are an association of both amateur and professional astronomers involved in variable star research, as well as educators using variable star science as a teaching and outreach tool. The dissemination of our data archives and the support of our community of members and observers are our overriding aims, but the services we offer to the astronomical community are diverse and extensive.

As part of our efforts to support the observer and researcher communities, we have developed several services for the wider community over the past 20 years, with particular emphasis on the extensive web services deployed during the past five years: data download, our chart plotter (VSP) and related comparison star database, the International Variable Star Index (VSX), and more.

Several new initiatives are underway to improve and simplify your access to the AAVSO's data archives, to facilitate communication between the amateur and professional communities, and to make the AAVSO more responsive to the demands of modern astrophysical research. The AAVSO observer community is capable of conducting high-level observing programs and producing high-quality data and research results, and our mission is to help the professional research and amateur observers work together to produce new and important science.



The AAVSO visual light curve of mu Cephei, 1850-2010 (14-day averages)

AAVSO data archives

The AAVSO International Database (AID) contains over 18 million variable star observations spanning more than a century. Our visual data span the longest time period, providing accurate photometric measures of stellar light curves over **more than a century** for some stars. CCD observations currently constitute approximately 25% of the total database, but *well over 80%* of the number of observations currently submitted per year, and this fraction is growing every year.

The AAVSO is introducing new data access tools that will allow researchers to search not only for data on specific stars, but also for data on multiple stars based on key selection criteria, enabling large-scale studies of variable star *classes* (e.g. Miras, dwarf novae), as well as area or limiting magnitude searches. We are also adding *explanatory material* to our website on a daily basis, providing information to researchers on *how to access, analyze, and interpret AAVSO visual and instrumental data*. Finally, we are introducing new observer training initiatives to teach observers how to fully calibrate and transform their data to standard systems, and to follow best observing practices whenever possible.

Our goal is to increase the value of the AAVSO archives for the community, and ensure that they are effectively used by researchers to the fullest extent possible.

Annie J. Cannon (2nd from left) and William T. Olcott (2nd from right), 1933

Dorrit Hoffleit

Leslie Peltier

Notes on visual observations of W Virginis by Paul S. Yendell, circa early 1900s

Historical archives

The AAVSO maintains a large collection of historical documents. Our archives include an extensive collection of letters and other communications between the AAVSO, its Directors and staff, and amateur and professional astronomers throughout its entire history. We maintain a historical archive of variable star charts, many of which were created by the AAVSO or its members and observers. Finally, we have an extensive collection of photographs and moving pictures featuring many historical figures related to the AAVSO or its prehistory. Our historical archives are available for historical and other researchers at AAVSO headquarters by appointment or by special arrangement.

APASS Telescope, Dark Ridge Obs. New Mexico

Mt. John Univ. Obs. 61-cm Telescope New Zealand

AAVSOnet: Robotic Telescope Network

The AAVSO has established a network of six telescopes sited around the world. These currently include four in New Mexico, one in Arizona, and one in New Zealand. More telescopes are currently planned or under construction, with additional telescopes planned in Massachusetts, Argentina, and Australia. These telescopes together have very broad capabilities, including:

- Large Aperture: Sonoita 50-cm (AZ) and Mt. John 61-cm (NZ) for faint photometry/spectroscopy
- Time-series: The Wright 28- and 30-cm telescopes are used for both time-series and field photometry
- Wide Field: APASS (NM) has 3° x 3° field size
- Bright Stars: Bright Star Monitor (NM) can do precision photometry between 2nd and 9th magnitude

Time on AAVSOnet telescopes is a membership benefit of the AAVSO, and all AAVSO Members may apply for time. Members of the community may also collaborate with the AAVSO to be awarded Discretionary Time, but all are welcome and encouraged to join the AAVSO. If you have interest in using AAVSOnet, please consider joining the AAVSO today!

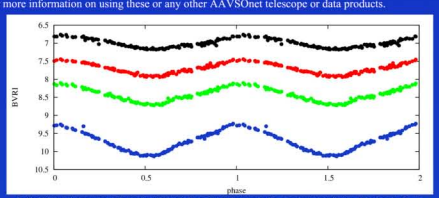
The AAVSO Bright Star Monitor
Astrokolkhoz Obs.
New Mexico

Photometric databases

The primary motivation for the **APASS** and **Bright Star Monitor** telescopes was to provide calibrated photometry in standard filters to the astronomical community. APASS, the *AAVSO Photometric All-Sky Survey* is designed to survey the entire sky during 2009 through 2011 in the B, V, g, r, and i filters. APASS will provide field calibrations down to V=16 at least, providing a new calibrated database of stellar photometry for the use of the observing community. *Bright Star Monitor* (BSM) is performing targeted observations of thousands of bright variables in the magnitude range of 2 < V < 9. Many of these variables have not been regularly observed in decades, but many are ideal targets for current and future generations of optical and infrared interferometers, and many more are also interesting astrophysical targets in their own right.

The data products of both APASS and BSM will be released to the community over the next two years. Calibrated photometry of the sky from APASS has highest priority, but all data -- including time-series -- will be released via the AAVSO website. Eventually, the community will have access to up-to-date *Johnson and Sloan photometry for nearly every star in the sky down to magnitude 16*. This represents a major new resource not just for variable star observers but for the entire optical astronomical community.

Both BSM and APASS are running several projects along with their photometric survey programs, and can provide targeted photometry for a number of projects on non-photometric nights. Please contact us for more information on using these or any other AAVSOnet telescope or data products.



Folded BVRcIc light curves of the Cepheid FN Aql obtained with the Sonoita 30-cm, prior to installation of the Sonoita 50-cm

Photometrica

The AAVSO hosts the **Photometrica** online image analysis system. Photometrica was designed by Geir Klingenberg as a means for robotic telescope users to analyze remotely acquired images online, without requiring local software or long downloads of large image files. Photometrica is an easy-to-use aperture photometry package where observers can perform differential and ensemble photometry of standard FITS images from any telescope. Served from the Amazon Cloud server, it requires only an internet connection to work, and doesn't require any downloads to local machines, making it ideal for observers with limited bandwidth.

Use of Photometrica is a membership benefit of the AAVSO, available via the member section of the AAVSO website. For more information, visit Photometrica today:

http://www.photometrica.org

Interactive aperture photometry with Photometrica, using an ensemble of AAVSO comparison stars

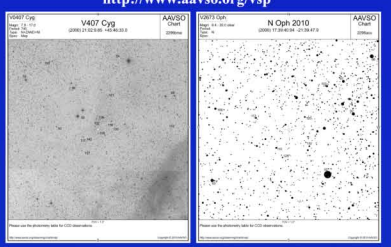
Charts and comparison stars

The AAVSO has released *thousands* of variable star charts over the course of its history, and charts and sequences are still a major focus of the organization. The AAVSO's **Variable Star Plotter** (VSP) is an online plotting program designed by Michael Koppelman and Clockwork Active Media in partnership with the AAVSO. It will create plotted charts using the NOMAD star catalog, as well as image-based charts using the Digital Sky Survey. VSP may be freely accessed through the AAVSO website, allowing anyone to make customized charts around any known variable star or coordinate center. If sequences exist, they are automatically plotted on any chart, and all available sequence photometry is available through VSP.

AAVSO Comparison star sequences are established and corrected by the AAVSO Sequence Team, a group of expert amateurs, led by Michael Simonsen, who have volunteered to check and correct thousands of old sequences and comparison stars, and to create new sequences for variable star fields. We also partner with other variable star organizations world-wide, including the BAA and RASNZ chart groups to maintain consistent and accurate charts across all variable star organizations.

AAVSO charts are routinely used by amateur and professional variable star observers around the world, and new and revised sequences are added daily. We invite you to try the AAVSO's VSP today:

http://www.aavso.org/vsp

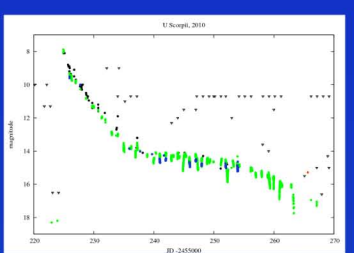


The International Variable Star Index (VSX)

The AAVSO hosts the **International Variable Star Index** (VSX), an online database and repository for variable star information first designed and developed by Christopher Watson. VSX is a volunteer-refereed interactive database and search engine, allowing users to search for variable star information as well as submit new variables and correct existing records. Users of the database can submit revisions to existing star entries as well as submit new, previously undiscovered variables and have them checked by experienced volunteer moderators. All revisions and submissions are carefully checked by moderators, often within minutes or hours of submission. New variable star discoveries announced via IBVS, CBAT/IAUC, ATel, and other sources are also often submitted within hours of publication. Most importantly, VSX serves as the primary identification database for the AAVSO International Database of observations.

VSX is the most up-to-date online database of variable stars in the world, and all variable star astronomers are encouraged to use this important facility:

http://www.aavso.org/vsx



Light curve of the 2010 U Sco outburst obtained from the AAVSO's Observing Campaign

AAVSO Observing Campaigns

Community support is a major focus of the AAVSO, and AAVSO observers routinely carry out observations requested by the professional community. AAVSO Observing Campaigns are established in collaboration with both amateur and professional astronomers at the discretion of AAVSO headquarters. AAVSO observers can provide a wide range of observational services including:

- Monitoring for and rapid notification of major events (e.g. the 2010 U Sco nova outburst)
- Targeted time-series photometry of important targets (photometry of bright HMXBs, Cepheids)
- Ground-based support for major TOO projects (e.g. support for HST observations)
- Long-term photometric observing in support of multiwavelength or multi-site campaigns

The AAVSO will be adding new capabilities to our website in 2010 allowing PIs to communicate directly with the observational community, provide mentoring and feedback to observers, as well as keeping the observers informed of important developments and the status of ongoing research projects and publications in progress. Such a capability will also provide an avenue for E/PO activities that many funding agencies now require as part of research programs.

For more information on establishing an AAVSO Campaign, please contact us today!

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