THE AAVSO AND ITS VARIABLE STAR DATA BANK

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ABSTRACT

The American Association of Variable Star Observers (AAVSO) is the largest organization of variable star observers in the world that coordinates observations, and evaluates, compiles, processes, publishes, and disseminates them to the astronomical community. The organizational structure of the AAVSO, its visual and photoelectric observing programs, data management, publications, and services to the astronomical community are discussed.

I. ORGANIZATION

The American Association of Variable Star Observers (AAVSO) was founded in 1911 at Harvard College Observatory to coordinate variable star observations made largely by amateur astronomers, evaluate the accuracy of these observations, compile, process, and publish them, and make them available to professional astronomers. In 1954, it became an independent, private research organization, and today, with members in 43 countries, the AAVSO is the largest organization of variable star observers worldwide. Funding for Association operations comes from the interest from an Endowment Fund established by members, membership dues, grants from US government agencies and private foundations, subscriptions and sales of AAVSO publications, and data user fees.

The scientific activities of the AAVSO are coordinated by the Director of the Association, who is a professional astronomer.

II. OBSERVING PROGRAM

The AAVSO Visual Observing Program contains 3600 variable stars. Stars best suited for visual observations have amplitudes of variation more than one magnitude ($\Delta m \geq 1$). Therefore pulsating variables (long-period, semiregular, irregular, R Coronae Borealis, RV Tauri, Cepheid, RR Lyrae types), eruptive variables (nova, dwarf nova, recurrent nova, nova-like, symbiotic types,), nebular and flare stars, quasars with optical variability, and eclipsing binaries make up the visual observing program. The accuracy of the visual observations is between ± 0.2 and

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±0.4 magnitude and the limiting magnitude is 16.5. The AAVSO Photoelectric Observing Program contains 50 stars with amplitudes of variation less than one magnitude ($\Delta m \leq 1$) such as semiregular, symbiotic, RV Tauri, R Coronae Borealis, and irregular variables. Most of these stars are also in the visual observing program, as they show long-term, large-amplitude variations. Thus, the photoelectric and the visual observing programs complement each other. The accuracy of photoelectric observations is ±0.008 magnitude. AAVSO finder charts are available for most stars in the program, with the variables and comparison stars of known magnitudes identified.

III. DATA MANAGEMENT

AAVSO Headquarters receives between 240,000 and 265,000 000 observations yearly, more than 50% of which come from observers outside of the USA. These observations are computerized and processed using AAVSO microcomputers and Digital VAX computers at the Harvard-Smithsonian Center For Astrophysics. Over 6 million observations of variable stars have been compiled since the AAVSO's founding in 1911. Of these, 4 million observations from 1963 to the present are in computer-readable form on magnetic tapes, chronologically by star. Light curves of all program stars are kept up-to-date. AAVSO observations from 1911 to 1963 are being computerized at AAVSO. When this project is completed, the AAVSO will have computer-readable variable star data files, of mostly large-amplitude stars, going back 75 years and more.

IV. PUBLICATIONS OF AAVSO

Journal of the AAVSO: (Semi-annual) Scientific papers on variable star research presented at meetings and additional papers submitted to the Journal; Reports of AAVSO Committees; Annual Report of the AAVSO Director; Treasurer's Report; Table of AAVSO Observers' annual totals; Book Reviews; Letters to the Editor;

AAVSO Bulletin: (Annual) Annual predictions of maxima and minima of long period variable stars;

AAVSO Circular: (Monthly) Preliminary results on some eruptive and other interesting variable stars; Director's request for more data on selected stars;

AAVSO Alert Notices: (Irregular) Mail hotline to alert observers to discoveries of novae, supernovae, and other rare activities of variable stars, and to inform them of requests from astronomers for simultaneous observing;

AAVSO Monographs: (Irregular) Computer-generated long-term light curves (20 years or more) of AAVSO observations, one star per Monograph;

AAVSO Reports: (Irregular) Computer-generated light curves of variable

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stars in the observing program of AAVSO, usually covering an interval of 1000 days;

AAVSO Photoelectric Photometry Newsletter: (Quarterly) News on AAVSO photoelectric photometry activities, unusual behavior of small-amplitude stars and requests from astronomers for photoelectric observations;

AAVSO Solar Bulletin: (Monthly) Daily American and International sunspot numbers; Sudden Ionospheric Disturbance data;

AAVSO Newsletter: (Irregular) Information and news about AAVSO members and activities;

V. SERVICES TO THE ASTRONOMICAL COMMUNITY

AAVSO data, both published and unpublished, are disseminated to about 100 astronomers per year on request. AAVSO services are sought by astronomers a) to receive real-time, up-to-date information on unusual stellar activity; b) to assist in scheduling and executing variable star observing programs using earth-based large telescopes and instruments aboard satellites; c) to request optical coverage of observing targets and immediate notification of their activity during earth-based or satellite observing programs; d) to correlate optical data with spectroscopic, photometric, and polarimetric multi-wavelength data; e) to carry on collaborative statistical analysis of stellar behavior using long-term AAVSO data.

AAVSO data may be obtained by writing to the Director and stating the purpose of the request and the type of AAVSO data or services needed. When real-time information or simultaneous optical coverage is requested, the Director alerts observers via **AAVSO Alert Notices** distributed to about 500 observers and members. She receives the data from observers via telephone, evaluates the accuracy of the observations, and transmits them to the interested astronomer. This type of collaboration between the AAVSO and the professional astronomer has enabled the successful execution of many observing programs, particularly those using satellites such as Apollo-Soyuz, High Energy Astronomical Observatories 1 and 2 (HEAO 1 and 2), International Ultraviolet Explorer (IUE), and the European X-Ray Satellite (EXOSAT). A significant number of rare events have been observed with these satellites as a result of timely notification by the AAVSO.

The AAVSO plays an important role in astronomy in providing accurate, long-term variable star observations and real-time information for research.

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