PLOTTING VARIABLES WITH A HOME COMPUTER

GERALD P. DYCK
418 High Hill Road
N. Dartmouth, MA 02747

Received 29 June 1987

Abstract

In this paper I describe how AAVSO observations can be processed and plotted with an inexpensive home computer. Sample screen tracings of six cataclysmic variables demonstrate that data from a single observer can yield viable light curves.

* * * * *

It is a source of satisfaction to realize that one's variable star observations are being channeled through AAVSO Headquarters, joining forces with observations from half a thousand others and forming the mosaic of a monograph made available to the astronomical community. Observational gaps are filled, personal errors are minimized, and the most accurate possible stellar profile can emerge.

There is another realm of satisfaction available to every AAVSO member who has access to a personal computer. After bidding farewell to your monthly report you needn't let its carbon copy lie idle. You can crunch your own numbers and see them in graphic form, albeit with less data density than at HQ.

The benefits are numerous. First of all, it helps you to know your stars more intimately and to partially anticipate their behavior. Secondly, the practice of graphing acts as a motivational force - to preserve data continuity with frequent observations. And lastly, a well-documented computerized light curve doesn't make a bad show-and-tell at a club meeting or convention.

The process works best, of course, if you have frequent observations of a few stars, and here cataclysmic variables (CV) are highly suitable, as they can be observed every clear night. In Massachusetts, at least, the weather will prevent undue data density! Here is my procedure.

My three-score CV observations are made 10 to 20 times a month with a 17.5" Dobsonian in a merry-go-round building. They are entered into a customized BASIC filing program which stores, sorts, graphs, and prints out my monthly reports. My computer is an inexpensive Atari 800XL with excellent graphic and sound capabilities. Low-resolution graphics can plot only one month of data (no example shown). Medium-resolution graphics can handle 160 days. Four examples are given in Figures 1 through 4 (SS Cyg, SU UMa, SY Cnc, GK Per). With split-screen graphics 320 days fit in one screen (see Figure 5). With high-resolution and triple split-screen graphics 1000 days of data can be seen at once (see Figure 6). Data can be graphed with the "drawto" command (connected points - Figure 5) or with the "plot" command (discrete points - Figures 1-4 and 6). In the absence of a graphics printer these light curves were traced off the monitor screen. The light curves, bad weather gaps and all, show many salient stellar features. (See captions.)

The author invites inquiries concerning computer programs mentioned in this paper.

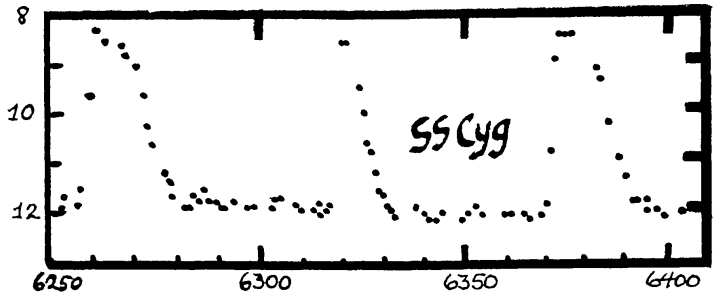

Figure 1. SS Cyg: Alternating broad and narrow outbursts with minor fluctuations during 40-day quiescent periods.

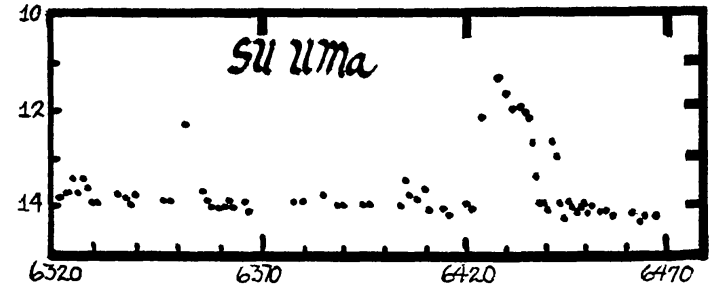

Figure 2. SU UMa: A short outburst of 2-magnitude amplitude and a supermaximum of 3-magnitude rise lasting about 12 days.

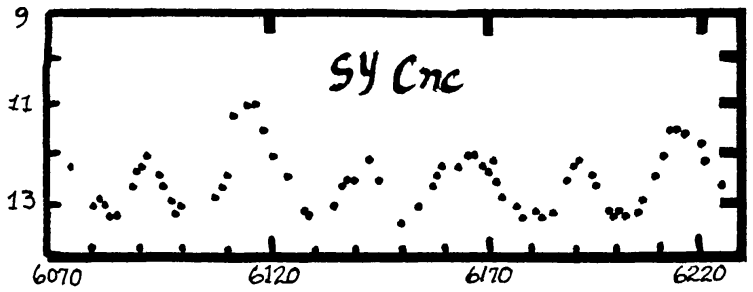

Figure 3. SY Cnc: Almost sinusoidal behavior with no significant period of quiescence. My CN Ori, AH Her, and RX And curves look quite similar.

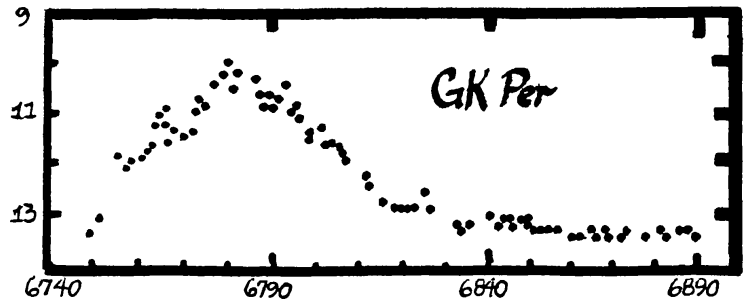

Figure 4. GK Per: The minor outburst of Nova 1901 which began in November, 1986, and lasted approximately 70 days.

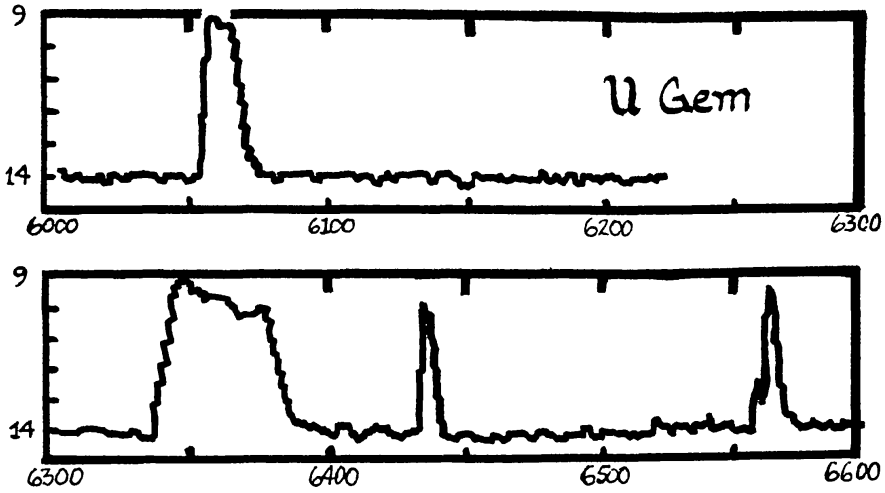

Figure 5. U Gem: Shown here is an interval of interesting activity. Regular observers of this star will recall that it faded into the western sun in June, 1985 (JD 2446225), already more than 50 days "overdue" in its average period. After it returned to the morning sky (JD 2446300) it had a spectacular outburst which lasted more than 40 days. The next two outbursts were very short, the last one shown here having a noticeable dip in the upward slope.

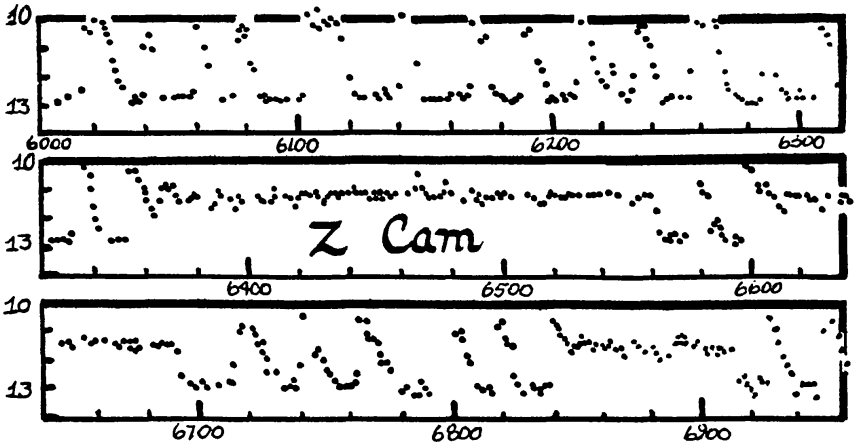

Figure 6. Z Cam: This circumpolar star has no "sun gaps," only "weather gaps." The data clearly show the standstill behavior which is the hallmark of stars of its class.