

## VISUAL OBSERVATIONS OF NINE NEGLECTED SOUTHERN LONG PERIOD VARIABLES

**Thomas A. Cragg**

19 Belar Street

Coonabarabran, NSW 2357

Australia

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### Abstract

Visual light curves of the author's observations are presented for the following nine neglected Southern long period Mira- and semiregular-type variables: U For, YY Cen, TW Sco, GH Ara, RZ Pav, SY Sco, DF Pav, BR Tuc, and RU Phe. Values for O-C and M-m and visual ranges are also given, as are new periods for YY Cen (365 d), DF Pav (~180 d), and BR Tuc (~218 d). The author's results are compared with those values in the *General Catalogue of Variable Stars* (GCVS).

### 1. Introduction

I have embarked on a project using my 0.31-m reflector of bringing up to date the data on eight Southern Mira variables and one semiregular variable which, while all appear on charts of program stars for the American Association of Variable Star Observers (AAVSO) and the Variable Star Section of the Royal Astronomical Society of New Zealand (RASNZ), are not regularly observed.

In order to identify accurately those variables which become fainter than the stars shown on the existing chart(s), I used the ESO Schmidt Survey and Palomar Sky Survey plates to make freehand sketches of the fields down to about magnitude 16.

Below are summaries of my data and results for the nine stars I have observed. In these summaries, "GCVS Values" for Epoch (E), Period (P), Range, and for light increase from minimum to maximum (M-m) are from the 4th edition of the GCVS (Kholopov *et al.* 1985). "Cragg Values" of P, M-m, Range, and Observed minus Calculated maxima dates (O-C) are results I have found from interpretation of my observations. Since the observations are scattered over a number of years, the effects of any unusual individual cycle should have been randomized. In all light curves, an open square represents a positive observation, and a "v" indicates a fainter-than observation (the variable could not be seen down to the magnitude indicated by the vertex of the v).

## 2. 0340-25 U For

The observations show a progressive O-C shift of some -85 days in 7000 days, suggesting a 3.8-day shortening of the period.

### GCVS Values

E: JD 2440202

P: 318.50 d

Range: 9.8 – <15.0 (V)

### Cragg Values

O-C: -85 d

M-m: ~0.38 P

Range: 9.8 – ~16.0 visual

Chart used: Bateson *et al.* 1975, *Publ. Roy. Astron. Soc. New Zealand, Var. Star Sec.*, No. 3, 44, sequence by Menzies

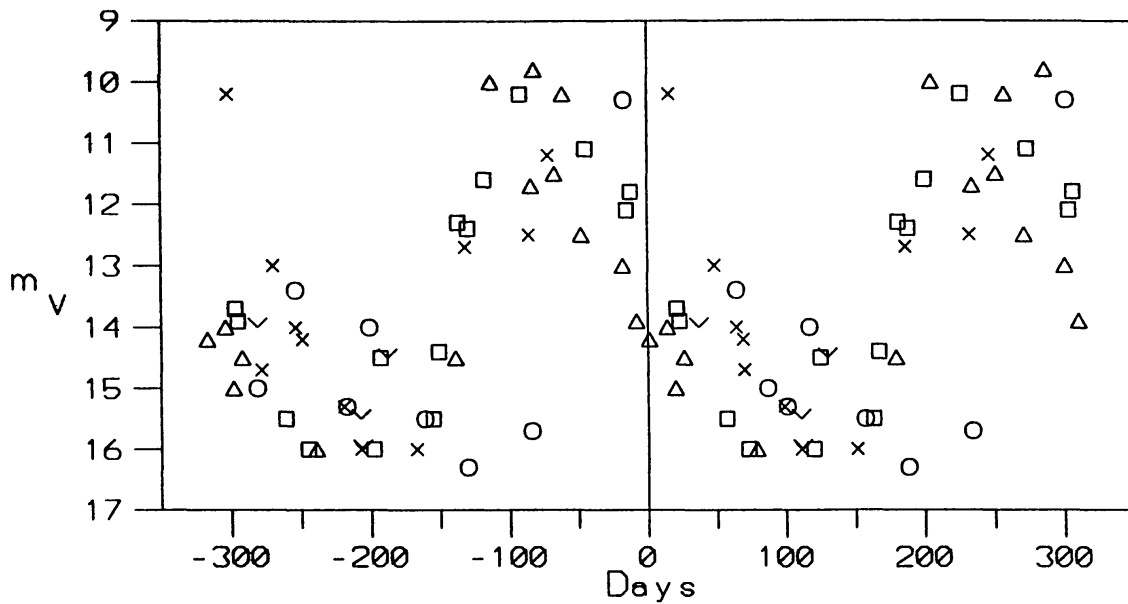


Figure 1. U For. 52 visual observations made by Cragg JD 2443132–2450154. Open circles are observations made JD 2443132–2444644; x's are JD 2444907–2446458; open squares are JD 2446499–2448981; open triangles are JD 2449007–2450154. Note the progressive O-C shift of approximately -85 days in 7000 days.

### 3. 1230-54 YY Cen

This star is in the regular observing program of the RASNZ, and additional information on it may be obtained through them.

GCVS Values

E: JD 2428696

P: —

Range: 12.5 - <14.3 (p)

Cragg Values

M-m: ~0.44 P

P: ~365 d

Range: ~10½ - ~15¼ visual

Charts used: RASNZ Nos. 121 ("b" scale), 122 ("d"), 123 ("e")

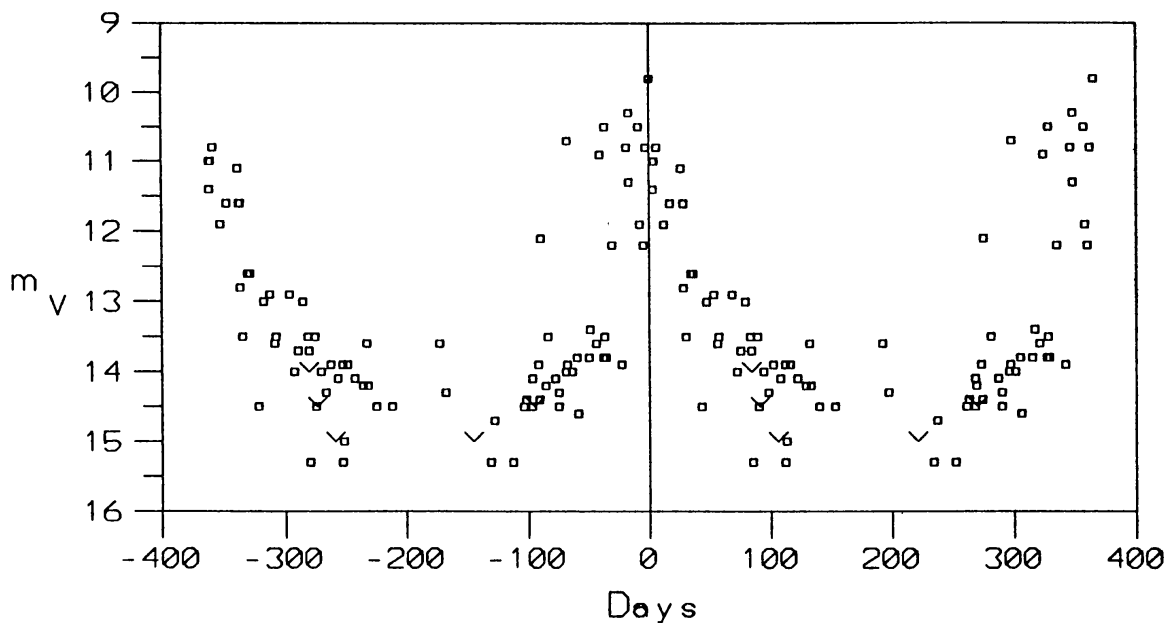


Figure 2. YY Cen. 88 visual observations made by Cragg JD 2442977–2450164.

## 4. 1604-22 TW Sco

GCVS Values

E: JD 2440783

M-m: 0.40 P

P: 199.8 d

Range: 12.8 - &lt;15.0 (p)

Cragg Values

O-C: ~0 d

M-m: 0.38 P

Range: 10½ - 15¾ visual

Chart used: RASNZ No. 882 ("b" scale); freehand sketch

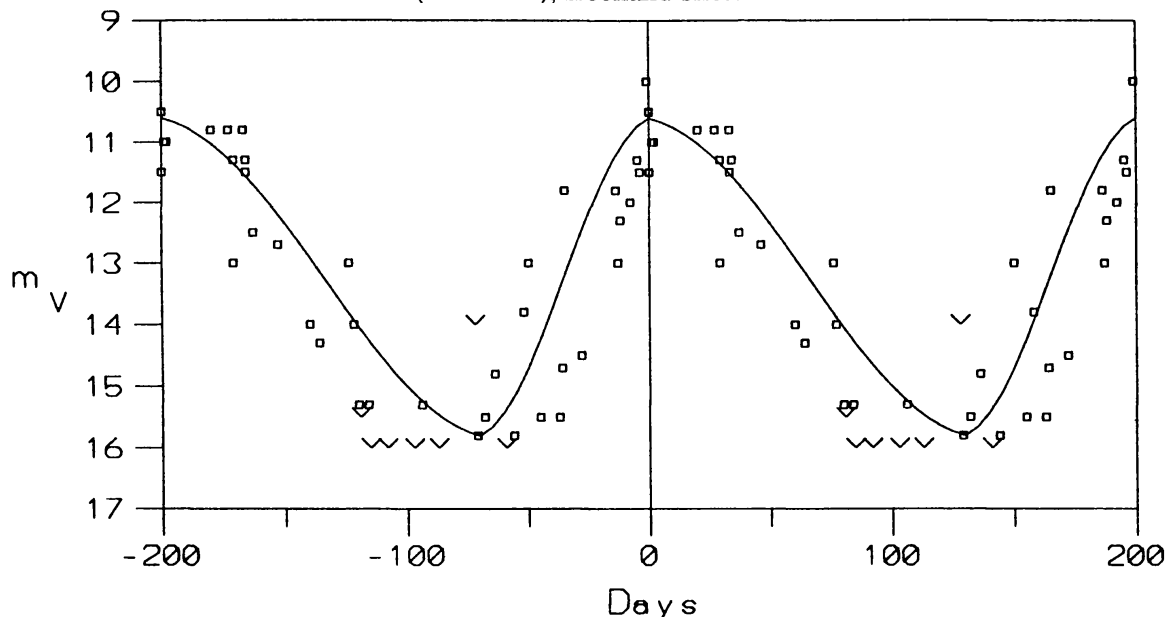


Figure 3. TW Sco. 45 visual observations made by Cragg JD 2446921–2450168.

## 5. 1727-56 GH Ara

GCVS Values

E: JD 2425380

P: 329 d

Range: 11.2 - &lt;16.5 (p)

Cragg Values

O-C: ~+160 d or ~-170 d

M-m: 0.30 P

Range: ~10¼ - &lt;16 visual

Chart used: RASNZ No. 420 ("b" scale); freehand sketch

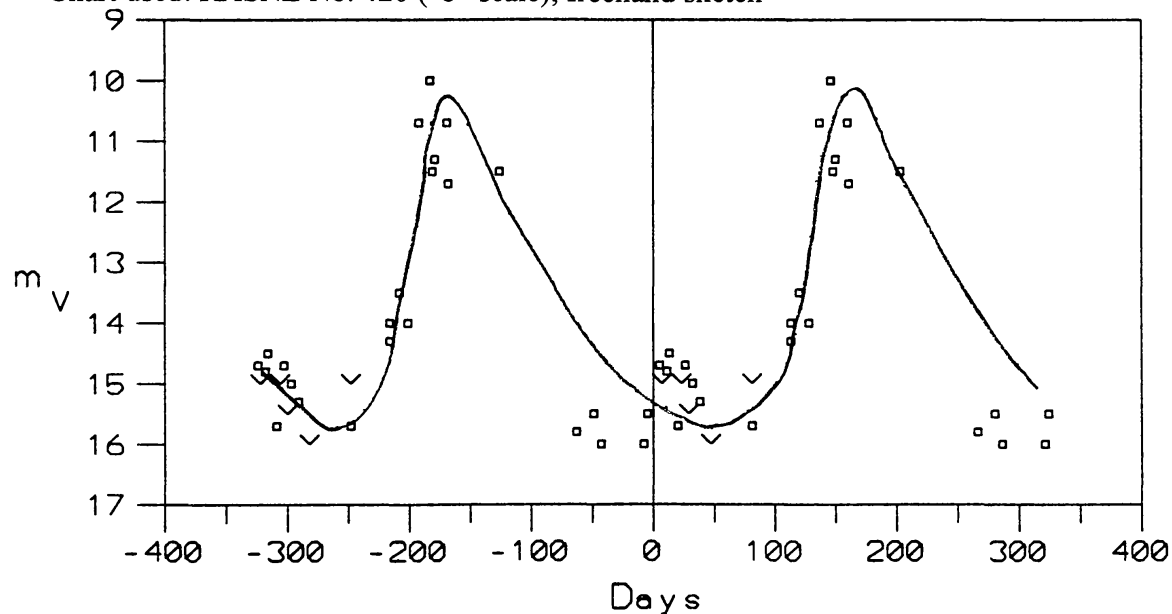


Figure 4. GH Ara. 29 visual observations made by Cragg JD 2444798–2449951.

**6. 1740-58 RZ Pav**GCVS Values

E: JD 2426460

P: 288.5 d

Range: 9.6 – 16.3 (p)

Cragg Values

O-C: ~+40 d

M-m: ~0.4 P

Range: ~9 – ~15½ visual

Chart used: RASNZ No. 420 (“b” scale); freehand sketch

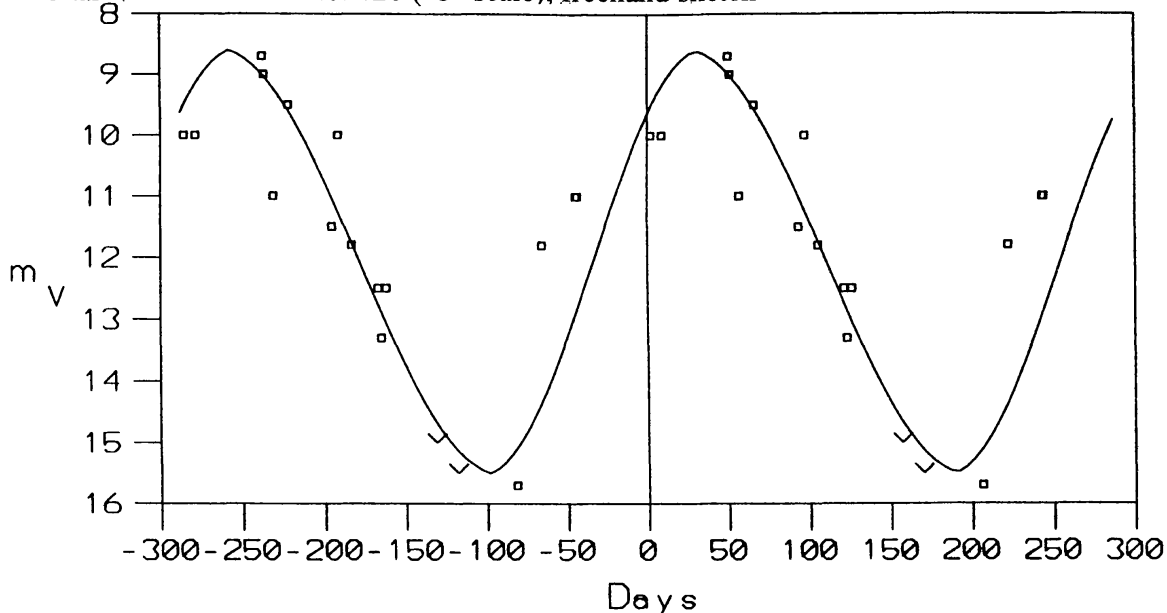


Figure 5. RZ Pav. 24 visual observations made by Cragg JD 2444882–2449951.

**7. 1747-34A SY Sco**GCVS Values

E: JD 2429458

P: 234.9 d

Range: 10.5 – &lt;15.0 (p)

Cragg Values

O-C: ~+55 d

M-m: 0.49 P

Range:  $9\frac{3}{4}$  –  $\sim 15\frac{3}{4}$  visual

Charts used: RASNZ Nos. 682 (“b” scale), 896 (“d”), and 897 (“e”)

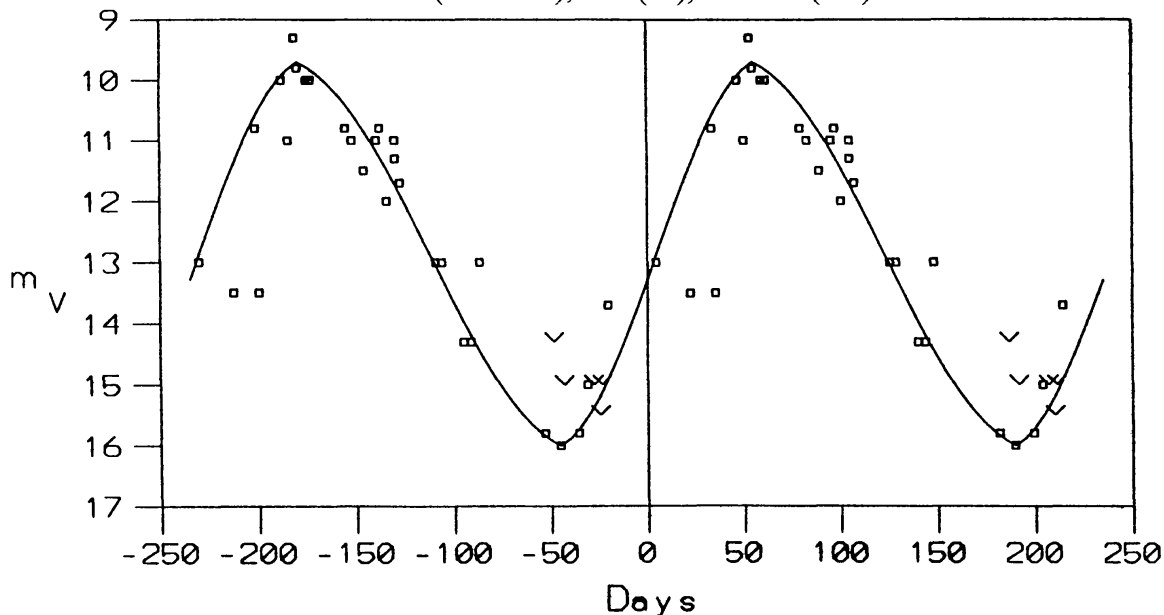


Figure 6. SY Sco. 43 visual observations made by Cragg JD 2438985–2449949.

### 8. 1809-65 DF Pav

This semiregular variable (type SRa) was designated as a Mira in the third edition of the GCVS (Kukarkin *et al.* 1969), and was re-designated a SRa in the fourth edition. While the observations around minima show evidence of the GCVS period, there is also a significant concentration around a 180-day period.

#### GCVS Values

E: JD 2440768

P: 374 d

Range: 11.9 – 14.8 (p)

#### Cragg Values

P': 180 d

Range: ~10 – ~15 visual

Charts used: RASNZ Nos. 632 ("b" scale) and 1067 ("d")

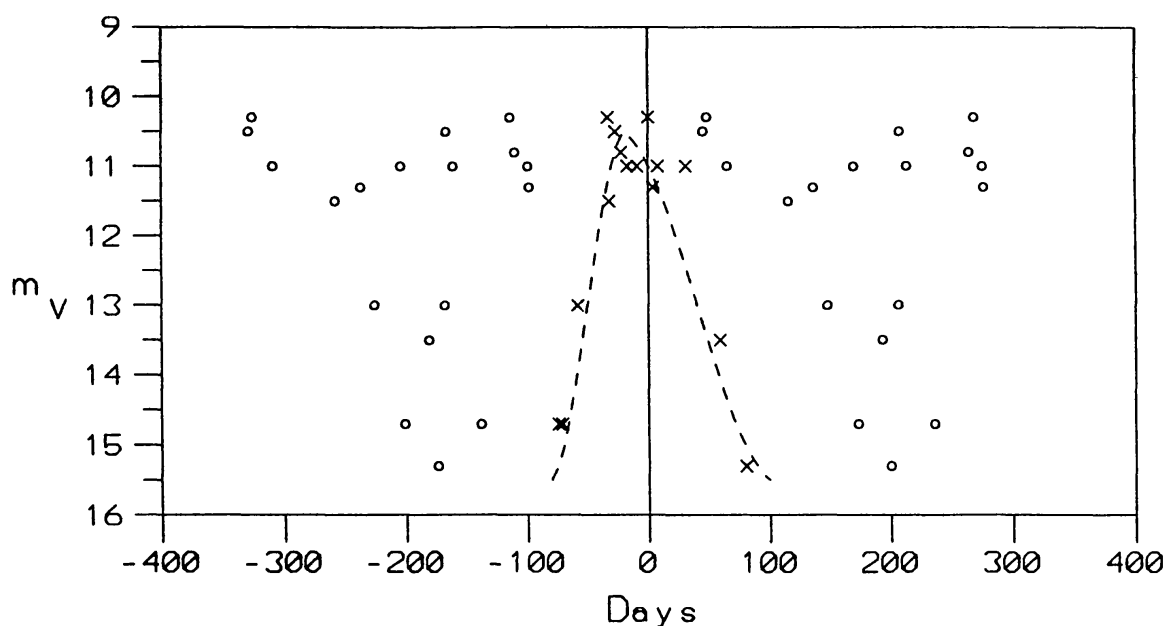


Figure 7. DF Pav. 20 visual observations made by Cragg JD 2445617–2449951. Dots show the data fit to the GCVS  $P = 374$  d; x's show the data fit to Cragg's  $P' = 180$  d.

**9. 2257-64 BR Tuc**GCVS Values

E: —

P: —

Range: 12.6 - &lt;17.5 (p)

Cragg Values

M-m: ~0.50 P

P: ~218 d

Range: 11½ - &lt;16 visual

Chart used: RASNZ No. 797 ("b" scale); freehand sketch

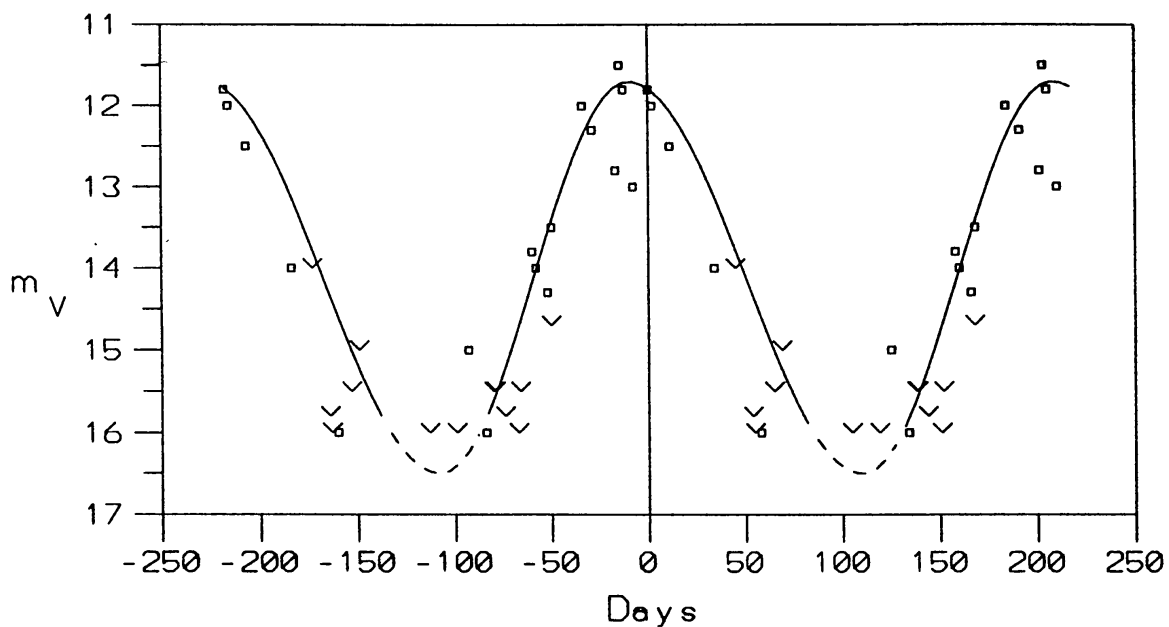


Figure 8. BR Tuc. 31 visual observations made by Cragg JD 2446355–2450070.

### 10. 2322-48 RU Phe

The data show strong evidence for a secondary maximum (similar to R Cen). Note that the *secondary* maximum is currently occurring close to the predicted time of *primary* maximum.

#### GCVS Values

E: JD 2428366

P: 289 d

Range: 10.8 – <12.9 (p)

#### Cragg Values

O-C (primary maximum): ~-130 d

Range: ~10¼ - ~14½ visual

Secondary maximum at ~11.0 visual

Chart used: RASNZ No. 797 (“b” scale); freehand sketch

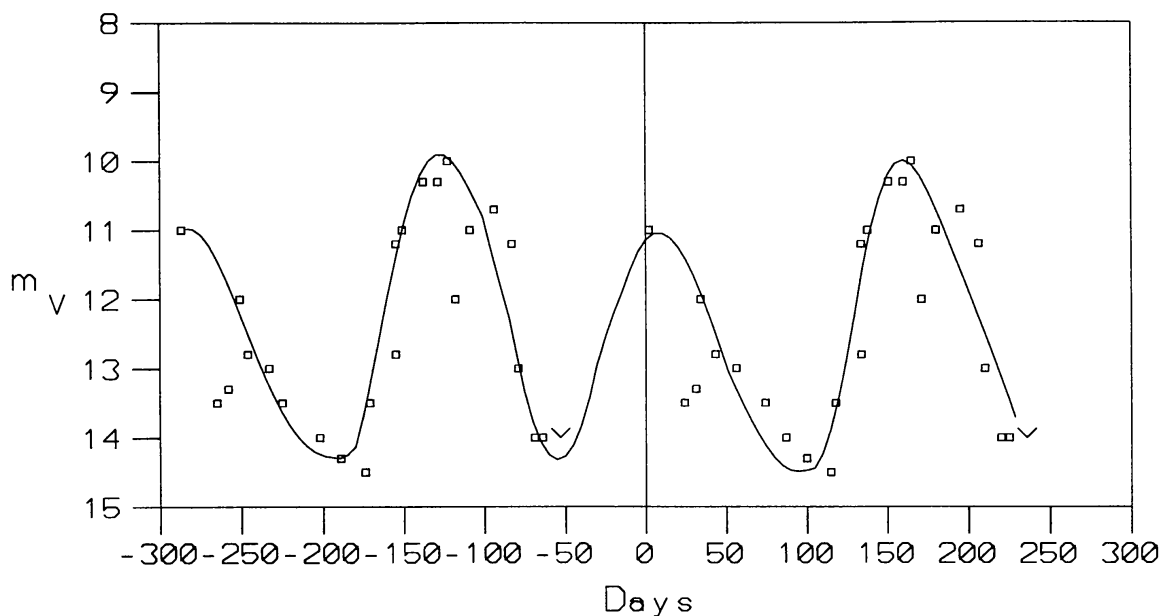


Figure 9. RU Phe. 26 visual observations made by Cragg JD 2443783–2449683. Note the evidence of an apparent secondary maximum, currently occurring near the predicted time of primary maximum.

### 11. Conclusion

Making long-term visual observations of variable stars is a way in which an amateur astronomer can make a valuable contribution to the field of variable star astronomy.

### References

- Bateson, F. M., Jones, A. F., and Menzies, B. 1975, *Publ. Roy. Astron. Soc. New Zealand, Var. Star Sec.*, No. 3, 44.  
 Kholopov, P. N., et al. 1985, *General Catalogue of Variable Stars*, 4th Ed., Moscow.  
 Kukarkin, B. V., et al. 1969, *General Catalogue of Variable Stars*, 3rd Ed., Moscow.