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V759 Cyg, a RR Lyr variable with a small amplitude Blazhko effect

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SUMMARY

Results of a set of V and R CCD measurements of V759 Cyg : the period of this RRab has not changed any more since 2000 and the Blazhko effect is confirmed.

RÉSUMÉ

Résultats d'une série de mesures CCD V et R de V759 Cyg : la période de cette RRab n'a plus changé depuis 2000 et l'effet Blazhko est confirmé.

RIASSUNTO

Nuove osservazioni CCD (nei filtri V e R) della variabile RRab V759 Cyg confermano l'effetto Blazhko e la costanza del periodo dal 2000.

RESUMEN

Resultados de una serie de medidas CCD en V y R de V759 Cyg: el periodo de esta RRab no ha variado desde el año 2000, y se confirma la presencia de efecto Blazhko.

1. INTRODUCTION

In the GCVS 85, V759 Cyg (= GSC 3566 463) is catalogued as a RRab type star (20h 00m 26.8s ; +48° 59' 37.8") with mag. 12.1 to 13.8 (p). Elements are HJD 2437522.398 + 0.36005448 (1) with a rising amplitude of 12% of the period. The reference is of these data is based on Beljawsky (1936). In the notes of the GCVS, the period of V759 Cyg is indicated as being variable with ephemeris HJD 2434513.427 + 0.36001476 valid for JD 2414430 – 34570 and a Blazhko effect (Tsesevitch, 1966).

V759 Cyg was principally observed by B.P. Tsesevitch and all the times of maxima at display in the GEOS RR Lyrae database (Le Borgne et al. 2000-2010) are mostly photographic and seldom visual before 1991. The first non normal CCD maximum has been observed by F. Agerer in 2004.

The long period evolution of field RRab was study in Le Borgne et al. (2007) and V759 Cyg is one of the stars identified to exhibit an irregular period.

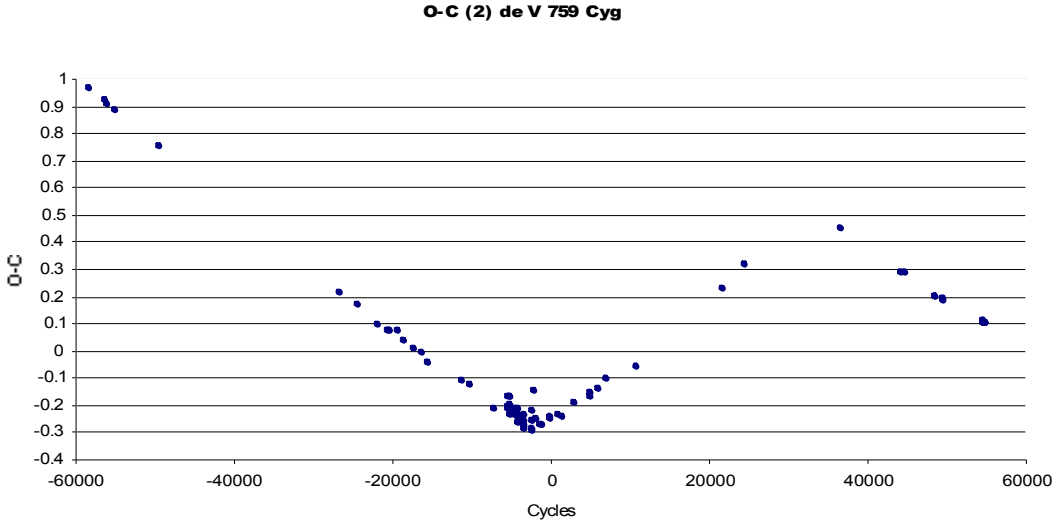
2. NEW OBSERVATIONS

Noting that V759 Cyg was no more observed since several years, J. Vandenbroere put it in her visual program and found that its Blazhko effect need to be study with CCD cameras in more detail. F.-J. Hambsch found the target interesting and measured it from Mol (Belgium), using V and R Schuler filters, as often as possible between JD 2455074 – 133 (2009, August – October). The check stars were GSC 3566 391, mag. 13.3 (±0.31) and GSC 3566 397, mag. 13.0 (±0.31).

3. PERIOD ANALYSIS AND STUDY OF THE BLAZHKO EFFECT

F.-J. Hambsch could determine 11 times of maximum in V and R from his measurements. The O-C's results together with all the maxima of V759 Cyg now at our disposal (see fig. 1) shows that its long term period is really irregular with at least two abrupt changes during the 111 years of observations. In fact, its period nowadays has returned nearly to its value as from 1898 to 1953.

Fig. 1 : O-C (2) curve of all the maxima of V759 Cyg



Since the year 2000, with the 31 times of maximum at our disposal, we obtain by linear regression a period of 0.36002037 d (±0.0000006), whereas J. Jurcsik et al. (2009) announced recently a period of 0.360014 d from measurements during 74 nights spreading over 152 days. As for the ephemeris obtained by linear regression with all the 95 times of maximum of fig. 1, covering 111 years, we have:

HDJ 2435396.7503 (±0.057) + 0.36003702 (±0.000002) (2).

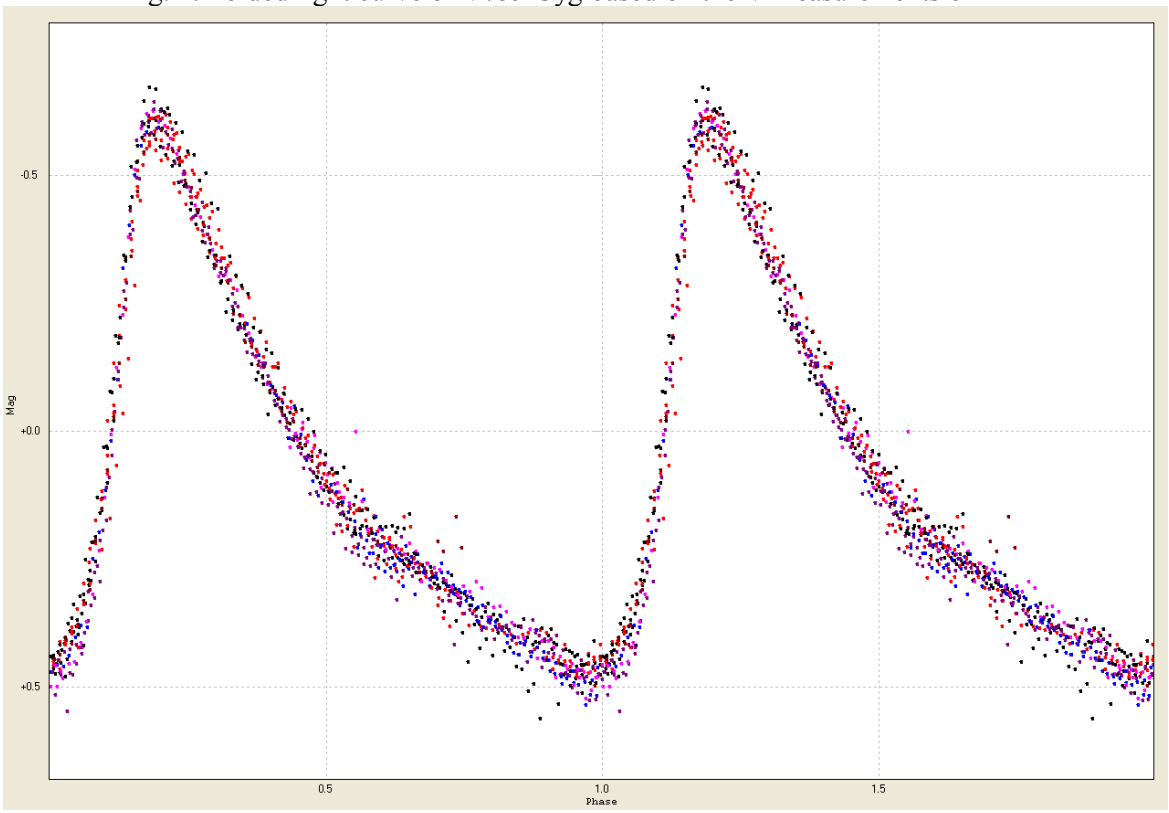
Table 1: New times of maximum of V759 Cyg

Observer	Mode	HJD (2400000+)	Accuracy	E (2)	O-C (2)	Mag V,R at max
HMB	CCD V	55075.530	0.003	54749	+0.104	- 0.5592
HMB	CCD R	55075.530	0.003	54749	+0.104	+0.0424
HMB	CCD V	55082.370	0.0035	54768	+0.103	- 0.6445
HMB	CCD R	55082.370	0.004	54768	+0.103	- 0.0372
HMB	CCD V	55083.450	0.005	54771	+0.104	- 0.6357
HMB	CCD R	55083.450	0.004	54771	+0.103	- 0.0123
HMB	CCD V	55087.410	0.002	54782	+0.103	- 0.6201
HMB	CCD R	55087.411	0.0015	54782	+0.103	- 0.0023
HMB	CCD V	55088.488	0.0015	54785	+0.100	- 0.5932
HMB	CCD R	55088.489	0.002	54785	+0.101	+0.0103
HMB	CCD V	55092.455	0.001	54796	+0.107	- 0.5834
HMB	CCD R	55092.455	0.002	54796	+0.107	+0.0296
HMB	CCD R	55101.452	0.0035	54821	+0.103	+0.0124
HMB	CCD V	55101.453	0.002	54821	+0.104	- 0.5871
HMB	CCD R	55118.373	0.002	54868	+0.103	- 0.0180
HMB	CCD V	55118.374	0.002	54868	+0.103	- 0.6259
HMB	CCD R	55119.452	0.0015	54871	+0.101	- 0.0043
HMB	CCD V	55119.452	0.0015	54871	+0.101	- 0.6340
HMB	CCD R	55122.334	0.002	54879	+0.103	+0.0098
HMB	CCD V	55122.336	0.002	54897	+0.105	- 0.5962
HMB	CCD V	55127.376	0.001	54893	+0.104	- 0.6348
HMB	CCD R	55127.376	0.001	54893	+0.104	- 0.0124

Notes : HMB = F.-J. Hambsch ; the mag. at max are differential magnitudes.

The CCD V measurements of V759 Cyg of Table 1 were analyzed in order to obtain information about the Blazhko effect clearly seen in the folded light curve shown in Fig. 2. The Blazhko effect was yet mentioned in the notes of the GCVS and during the redaction of the GEOS Circular we found new information about it in Jurcsik et al., 2009. We have thus tested our data with the Blazhko period of 16.0 days and the amplitude

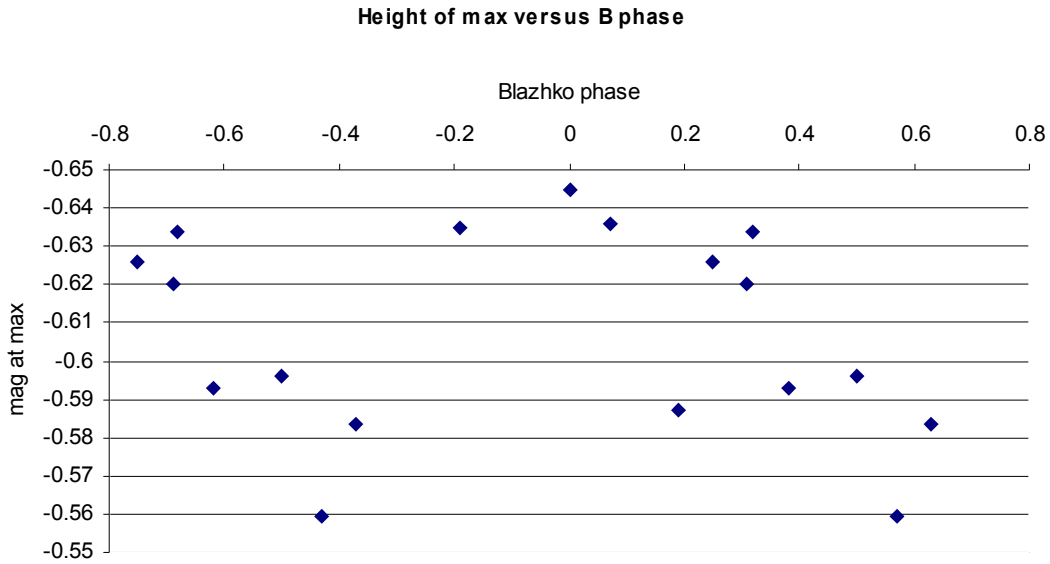
Fig. 2: Folded light curve of V759 Cyg based on the V measurements of HMB



of 0.12 magnitude V at maximum of the latter paper where a complex multiperiodicity of the modulation is also noted.

The height of our eleven V maxima (see Table 1) are ranging from –0.6445 to –0.5592 which corresponds to a rounded amplitude of 0.085 magnitude. It is less than the 0.12 mag. of the Jurcsik et al. (2009) result probably because we have only 11 maxima on 59 days so that the extremes of the Blazhko effect could have been easily lost. The O-C of our maxima obtained with the present best period of 0.36002037 day are going from +0.004 to –0.003 day yielding a very small fluctuation of 0.007 day or at least 0.004 day taking into account the accuracy of the extreme values.

Fig. 3: V759 Cyg : magnitude at maximum versus Blazhko phase



Period searches using several different programs were performed with the V magnitudes of our maxima, but it was impossible to find a unique solution. Thus we have used the 16.0 days period of the Jurcsik et al. (2009) paper to fold the heights of our maxima (see Fig. 3). The result is acceptable if we take into account

the complex multiperiodicity of the modulation detected with the period of 16 days. The closest period appearing in our searches has been 15.27 days by a Fourier program.

4. CONCLUSION

The long term period of V759 Cyg is irregular, but it has been constant since the year 2000. The Blazhko effect of this RRab has a small amplitude with still smaller changes of the O-C. A Blazhko period of 16 days based on Jurcsik et al., (2009) is also compatible with our measurements.

5. REFERENCES

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