GEOS
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REVISED EPHEMERIS FOR THE ECLIPSING VARIABLE V 2203 OPHIUCHI

ABSTRACT : *In this paper, 33 visual minima obtained by GEOS observers on the eclipsing variable V2203 Oph are examined. A new ephemeris, that slightly ameliorates the previous one, is calculated :*

$$\text{Min I : JD } 2442812{,}649 \pm 8 + 0{,}4550021 \pm 9 \; .E$$

RIASSUNTO : *In questo articolo sono esaminati 33 istanti di minimo ottenuti visualmente da osservatori GEOS sulla variabile ad eclisse V2203 Oph. E' stata calcolata una nuova effemeride, che migliora leggermente quella precedente. La nuova effemeride e' la seguente :*

$$\text{Min I : JD } 2442812{,}649 \pm 8 + 0{,}4550021 \pm 9 \; .E$$

RESUME : *Dans cet article, on examine 33 minimums de la variable à éclipses V 2203 Oph observés visuellement par des membres du GEOS. Cette étude permet le calcul d'une nouvelle éphéméride un peu plus précise que la précédente :*

$$\text{Min I : JJ } 2442812{,}649 \pm 8 + 0{,}4550021 \pm 9 \; .E$$

RESUMEN : *En este artículo, se examinan 33 mínimos de la variable eclipsante V 2203 Oph observados visualmente por miembros del GEOS. Este estudio permite el cálculo de una nueva efeméride un poco más precisa que la precedente :*

$$\text{Min I : JD } 2442812{,}649 \pm 8 + 0{,}4550021 \pm 9 \; .E$$

1. INTRODUCTION

V 2203 Oph (CSV 7725, NSV 9738) was discovered by L. Stiegler (1) from photographic plates taken between 1930 and 1939; the amplitude observed was 10,9 - 12,2 p. Later, Surikov (2) catalogued it as an eclipsing variable of W UMa type, finding the following ephemeris :

$$\text{Min I : JD } 2442812{,}645 + 0{,}455001.E \quad \langle 1 \rangle$$

and an amplitude from 11,6 to 12,0 B. These elements are quoted in the 67th name-list of variable stars (3).

2. OBSERVATIONS

V 2203 Oph was added to GEOS visual observations programme in 1983, when the star was still catalogued as a suspected variable.

Observations were made chiefly using Argelander's method. Times of minimum were derived from the light curve of each observer, using the tracing paper method.

The map used is shown in fig. 1. As the magnitude of comparison stars were unknown, light curves were plotted using Argelander's degrees instead of magnitude.

From 1982 to 1988, nine european observers collected 33 times of minimum. Tab. 1 reports all observers with their respective number of minima.

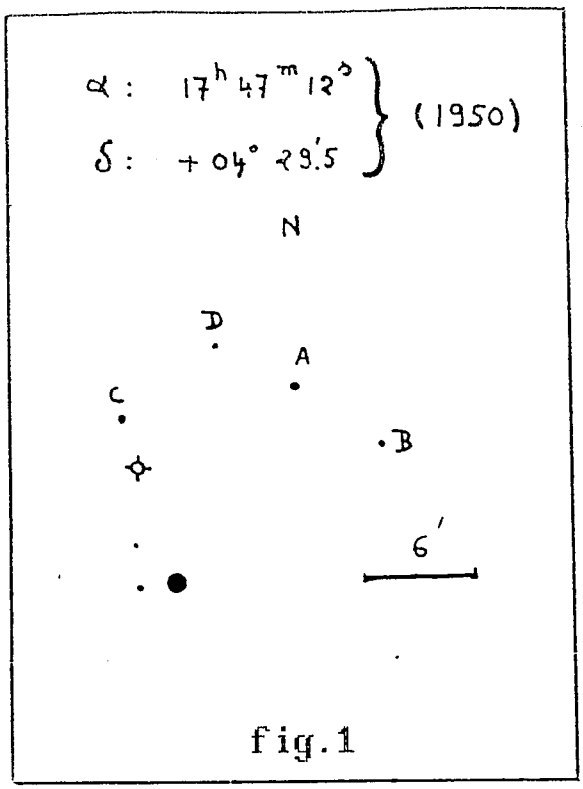

fig.1

Tab. 1

OBSERVER	Abbr	SITE		N. of minima
A. MARAZITI	MRZ	Catanzaro	(I)	13
R. BONINSEGNA	BNN	Dourbes	(B)	5
S. FERRAND	FND	Bougival	(F)	4
P. ROUSSELOT	RST	Besançon	(F)	3
F. ACERBI	ACR	Codogno	(I)	2
J. FABREGAT	FBG	Valencia	(E)	2
A. MANNA	MAA	Minusio	(CH)	2
R. DEQUINZE	DQZ	Jemeppe/Sambre	(B)	1
P. RALINCOURT	RAL	Nantes	(F)	1

Some of the light curves are shown in fig. 2-4.
The complete list of minima is reported in tab.2. The column "O-C <1>" reports the O-Cs with respect to ephemeris <1>. One can note a clearly positive trend, that indicates that the ephemeris is no longer valid.

To establish a new ephemeris, GEOS observations were merged with Surikov photographic mean minima (a primary minimum and a secondary one) obtained from the paper (2). These mean minima are :

Min I : JD 2443073,361 <2>

Min II : JD 2443073,588 <3>

These minima were weighted 3 (while visual minima were weighted 1) to account for their smaller uncertainty (they were obtained from a mean light curve composed by some tens of observations).

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Minimi V2203 Oph

effemeride (1): 2442812.645 + 0.455001 * E

(4): 2442812.649 + 0.4550021 * E

n	obs	min. jd hel. 2400000+...	E	O-C (1)	O-C (4)
1	BNN	45545.403	6006.0	0.022	0.011
2	RST	45903.479	6793.0	0.012	0.001
3	BNN	45903.486	6793.0	0.019	0.008
4	DQZ	45903.500	6793.0	0.033	0.022
5	FND	45903.503	6793.0	0.036	0.025
6	RST	45905.528	6797.5	0.014	0.002
7	BNN	45905.535	6797.5	0.021	0.009
8	BNN	45910.524	6808.5	0.005	-0.007
9	RST	45915.538	6819.5	0.014	0.002
10	MRZ	46622.383	8373.0	0.015	0.001
11	MRZ	46999.350	9201.5	0.013	-0.001
12	MRZ	47011.415	9228.0	0.021	0.007
13	MRZ	47024.384	9256.5	0.022	0.008
14	MRZ	47037.339	9285.0	0.010	-0.004
15	FND	47303.522	9870.0	0.017	0.002
16	FND	47336.507	9942.5	0.015	0.000
17	MRZ	47350.386	9973.0	0.016	0.001
18	MRZ	47352.440	9977.5	0.023	0.008
19	MRZ	47353.337	9979.5	0.010	-0.005
20	MRZ	47355.378	9984.0	0.003	-0.012
21	RAL	47357.428	9988.5	0.006	-0.009
22	MRZ	47360.377	9995.0	-0.003	-0.018
23	MRZ	47362.433	9999.5	0.006	-0.009
24	FND	47362.447	9999.5	0.020	0.005
25	FBG	47385.424	10050.0	0.019	0.004
26	BNN	47387.474	10054.5	0.021	0.006
27	FBG	47387.474	10054.5	0.021	0.006
28	ACR	47388.370	10056.5	0.007	-0.008
29	MAA	47388.384	10056.5	0.021	0.006
30	MRZ	47388.387	10056.5	0.024	0.009
31	MRZ	47392.453	10065.5	-0.005	-0.020
32	ACR	47392.457	10065.5	-0.001	-0.016
33	MAA	47392.458	10065.5	0.000	-0.015

TABLE 2

A revised ephemeris was calculated by a linear regression :

$$\text{Min I} : \text{JD } 2442812{,}649 + 0{,}4550021 \cdot E \qquad \langle 4 \rangle$$
$$\pm\ 8 \qquad \pm\ 9$$

(95% level of confidence for error bars)

The resulting O-Cs for GEOS minima are reported in tab.2 under the column "O-C <4>" ; the O-C for photographic minima <2> and <3> is $-0{,}004^d$ for both minima.

The variance of residuals is $\sigma = 0{,}010^d$, that represents a typical value for visual estimates. All observations lie between $\pm 3\sigma$, that states for the good quality of visual observations.

As the magnitudes of comparison stars were unknown, nothing can be concluded about the amplitude of the star.

3. CONCLUSION

GEOS observations made between 1982 and 1988 lead to a new ephemeris for V 2203 Oph, that ameliorates the first elements given by Surikov. The new ephemeris is :

$$\text{Min I} : \text{JD } 2442812{,}649 + 0{,}4550021 \cdot E$$
$$\pm\ 8 \qquad \pm\ 9$$

(95% level of confidence for error bars)

No further visual observation is planned by GEOS on this star.

Antonio Maraziti

BIBLIOGRAPHIE

(1) Beobachtungen von Leo Stiegler, A.N. 281, page 16

(2) O.G. Surikov, Variable stars 4.253. 1982

(3) P.N. Kholopov et al. ; IBVS n° 2861, 1985

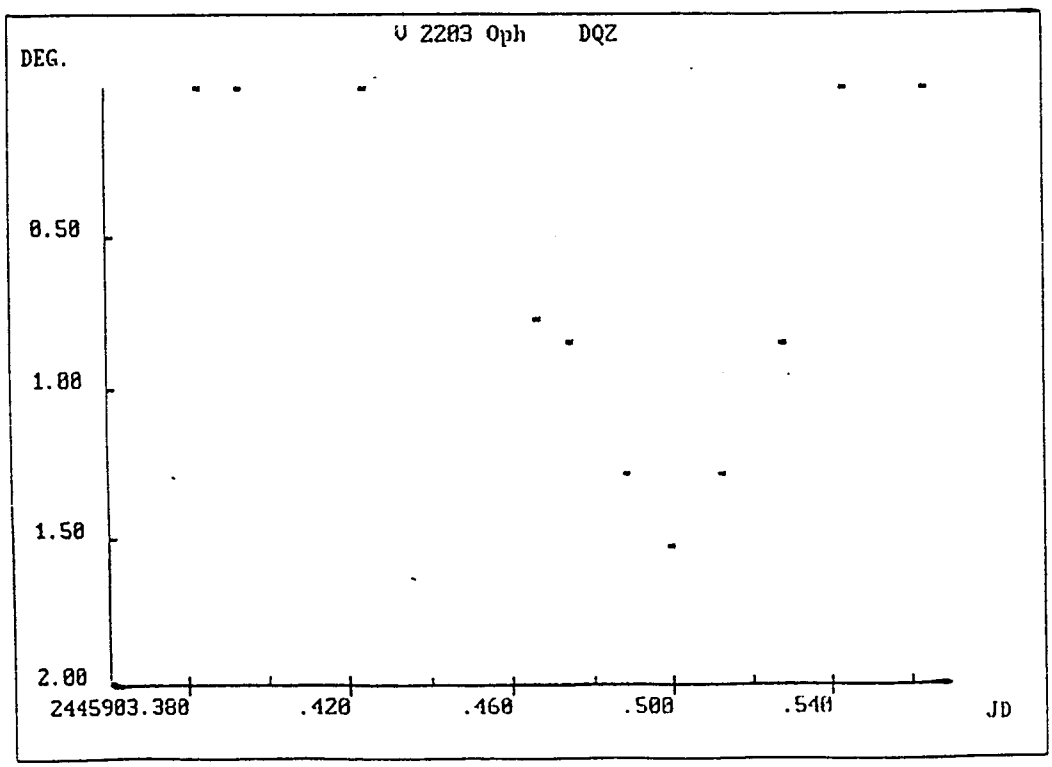

fig.2

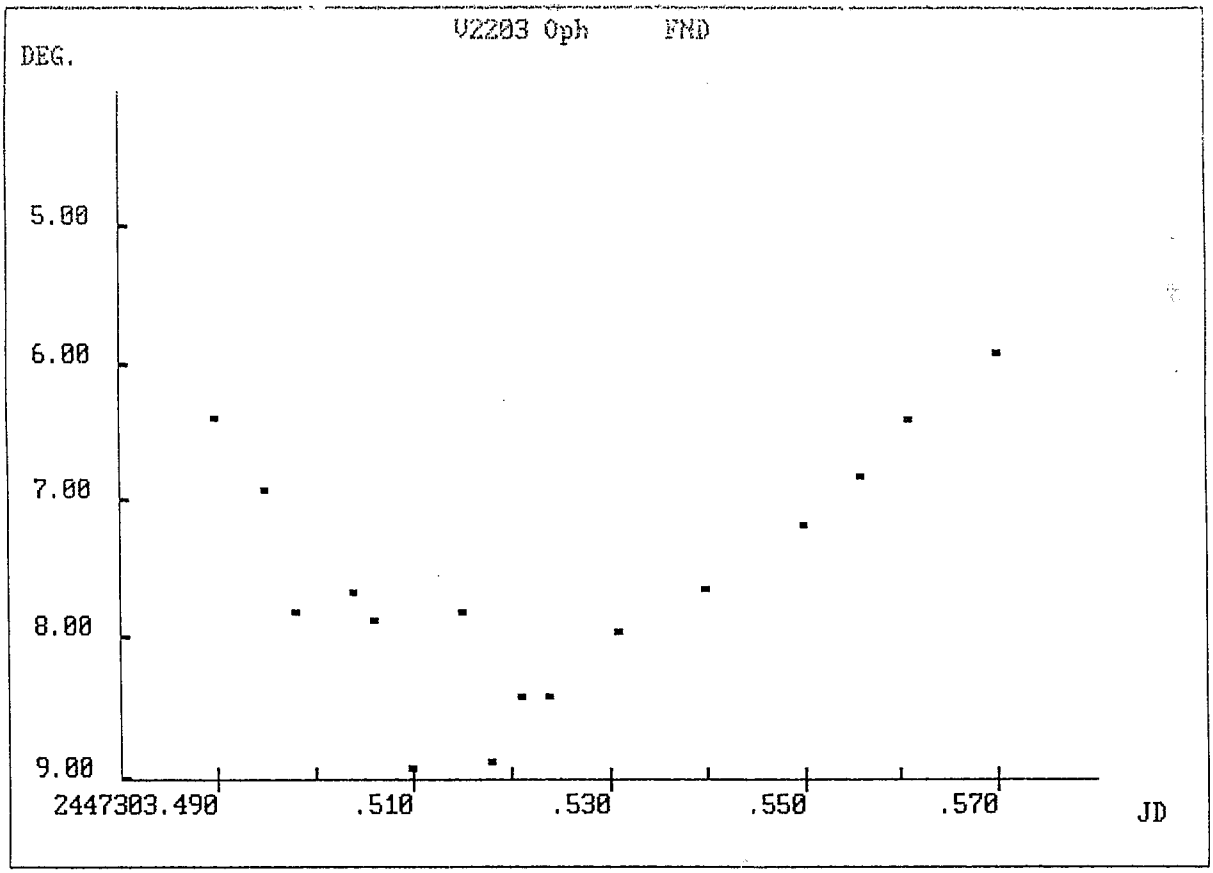

fig.3

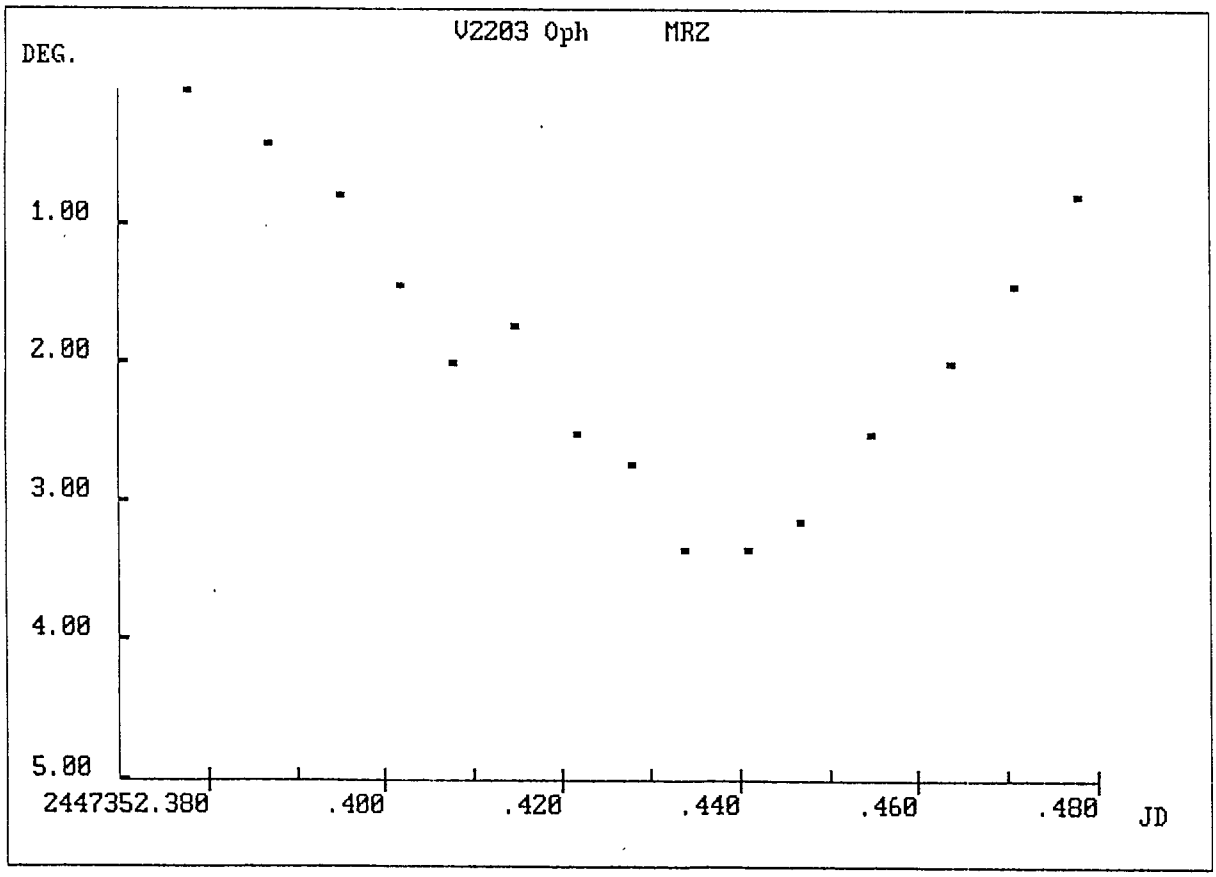

fig.4

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