

COMMISSIONS 27 AND 42 OF THE IAU  
INFORMATION BULLETIN ON VARIABLE STARS

Number 5225

Konkoly Observatory  
Budapest  
23 January 2002

HU ISSN 0374 – 0676

**HadV67 = V648 Oph, A REMARKABLY REGULAR MIRA**

KAZAROVETS, E. V.; PASTUKHOVA, E. N.

Institute of Astronomy, Russian Academy of Sciences, 48, Pyatnitskaya Str., Moscow 109017, Russia

In 1925, F. Ross suspected variability of the star located at  $18^{\text{h}}32^{\text{m}}06^{\text{s}}$ ,  $+08^{\circ}06^{\text{m}}9$  (1875), later designated Ross 51 (Ross, 1926). No finding chart was published. Ten years later, Hoffmeister (1936) discovered a Mira variable in the field of Ross 51 and decided it was a rediscovery of Ross 51. As usual for his rediscoveries, Hoffmeister did not present a finding chart either. Ahnert (1942) studied Hoffmeister's star, gave improved variability range ( $12^{\text{m}}5 - < 17^{\text{m}}$ ) and the star's light elements ( $\text{Max} = 2425665 + 168^{\text{d}}7 \cdot E$ ). His paper also does not give a finding chart. Until recently, we were not aware of any other studies of this star, known as V648 Oph in the system of GCVS names, and the star's accurate position remained unknown.

In 2000, K. Haseda (Aichi, Japan) discovered the variable HadV67. This discovery was announced by Kato (2000) who remarked that the star's position was close to that of V648 Oph. The star can be identified with IRAS 18358+0810. Its coordinates in the USNO A2.0 catalog (Monet *et al.*, 1998) are  $18^{\text{h}}38^{\text{m}}17^{\text{s}}.59$ ,  $+08^{\circ}13'22''.7$  (2000.0), and its brightness and color are  $b = 16^{\text{m}}0$ ,  $b - r = 2^{\text{m}}5$ . From a limited number of observations of 1997–2000, with four brightenings, the star was considered a possible Mira with variations within  $11^{\text{m}}2 - < 13^{\text{m}}9$  *V*. Greaves (2000) noted that bright estimates of HadV67 during the above time interval agreed with the GCVS period value for V648 Oph ( $169^{\text{d}}$ ).

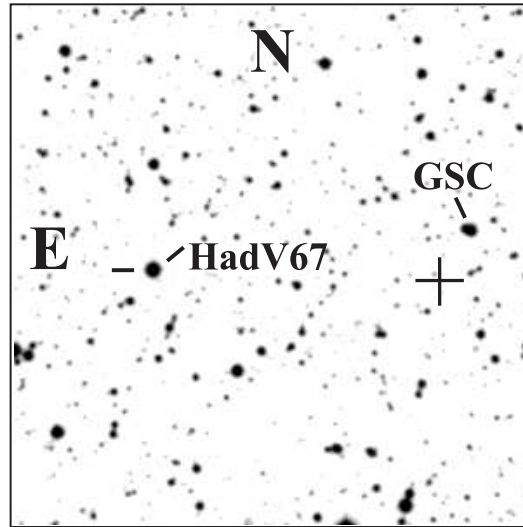
We attempted to prove or reject the identification of HadV67 with V648 Oph on the base of our estimates of HadV67 on 114 plates of the 40 cm astrograph of the Sternberg Institute's Crimean Laboratory (JD 2445198–2447749). The estimates were made by E.N.P. The magnitude scale of the comparison stars relies on blue magnitudes of the USNO A2.0 catalog.

Figure 1 presents a  $5' \times 5'$  finding chart for HadV67 based upon the blue image of the second POSS. The cross is the nominal position of Ross 51. HadV67 is obviously strongly variable and red, judging from POSS I and POSS II images available at the Digitized Sky Survey and at the USNO Image and Catalogue Archive. Along with HadV67, we also estimated the star GSC 1024.3127, situated in  $0'.5$  to the north-west of the nominal position of Ross 51 and having, in the USNO A2.0 catalog,  $b = 14^{\text{m}}2$ ,  $b - r = 2^{\text{m}}2$ . This star ("GSC" in Fig. 1) was found constant for the whole time interval of our observations.

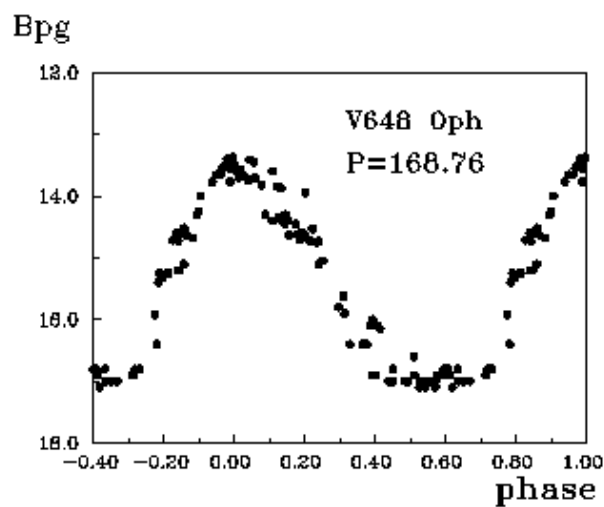
Our estimates confirm Mira-type variability of HadV67 within  $13^{\text{m}}3 - 17^{\text{m}}1$   $B_{pg}$ . The star's light elements are  $\text{Max} = 2447059 + 168^{\text{d}}76 \cdot E$ . The light curve with these elements is presented in Fig. 2. It is remarkably regular for a Mira. The four brightenings from Kato (2000) are in a good agreement with our light elements, whereas the old epoch of maximum from Ahnert (1942) gives  $O - C = +39^{\text{d}}$ .

The period we find is very close to the value from Ahnert (1942), thus we conclude that HadV67 is identical with V648 Oph.

Thanks are due to S.V. Antipin and N.N. Samus for their attention and assistance. Our variable star studies are supported, in part, by grants from the Russian Foundation for Basic Research and from the Council of the Program of Support for Leading Scientific Schools of Russia. We used the Digitized Sky Survey images provided by the Hubble Space Telescope Science Institute under support from grant NAG-W2166 of the USA Government and images provided by the US Naval Observatory Image and Catalogue Archive.



**Figure 1.** The finding chart of HadV67 = V648 Oph ( $5' \times 5'$ ). The cross is the nominal position of Ross 51. “GSC” is GSC 1024.3127.



**Figure 2.** The light curve of HadV67 = V648 Oph.

## References:

- Ahnert, P. 1942, Mitt. veränd. Sterne, Nr. 3
- Greaves, J. 2000, vsnet-newvar No. 558 (<http://www.kusastro.kyoto-u.ac.jp/vsnet/Mail/vsnet-newvar/msg00558.html>)
- Hoffmeister, C. 1936, Astron. Nachr., **259**, 37
- Kato, T. 2000, vsnet-newvar No. 557 (<http://www.kusastro.kyoto-u.ac.jp/vsnet/Mail/vsnet-newvar/msg00557.html>)
- Monet, D., Bird, A., Canzian, B. *et al.* 1998, USNO-A V2.0. A Catalog of Astrometric Standards, US Naval Observatory, Washington, DC (11 CD-ROMs)
- Ross, F. 1926, Astron. J., **36**, 122