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**A NEW VERY LONG PERIOD VARIABLE STAR IN NORMA**

IAU Circular 4075 reported the possible photographic discovery on May 27, 1983 of a nova by W. Liller, and the same IAUC reported that the object's existence had been confirmed by R.H. McNaught and D. Overbeek, and by D. Baade and J. Krautter. The last pair of observers obtained a spectrogram which showed several strong, narrow Balmer lines in emission plus FeII at 492.3nm, but also "strong molecular bands as in stars of spectral type M3-M5". They go on to say that "the object may be related to the class of symbiotic stars although no trace of emission due to [O III] 495.9 and 500.7-nm and HeII 468.6-nm are seen". McNaught noted that the star appeared "clearly red" and further reported that a search of "10 photographic charts back to 1916 shows its variation from mag 13 to fainter than  $B = 15^m.9$ . He also gave a precise position (Equinox 1950):

$$\text{R.A.} = 16^{\text{h}}03^{\text{m}}02^{\text{s}}.92, \text{ Dec.} = -51^{\circ}56'32''.6$$

The variable appears in the Hubble Guide Star Catalog; its average position from two GSC determinations is (Equinox 2000):

$$\text{R.A.} = 16^{\text{h}}06^{\text{m}}51^{\text{s}}.67, \text{ Dec.} = -52^{\circ}04'34''.7$$

The GSC magnitudes listed are 11.73 and 12.27. Duerbeck (1987) includes the star as "N Nor 1985/2 ... variable of late type" (p. 74-75) and provides a finding chart (p. 179).

His curiosity aroused, A.F. Jones began to make visual observations of the star while Liller continued to take photographs of this region of the Southern Milky Way as a part of his continuing PROBLICOM nova search program. Later, with the acquisition of a CCD, Liller started to follow the brightness changes of the star using a 20-cm f/1.5 Schmidt camera and various filters.

As of this writing eight maxima have been observed, and Figure 1 shows the light curve around the well-observed maximum of 1993 as measured visually by Jones and with an unfiltered CCD by Liller. The more than 2-magnitude difference in the peak magnitudes obviously results from the strong red (and by inference infrared) continuum reported in IAUC 4075 by Baade and Krautter and the extended red and infrared sensitivity of the CCD. Especially noteworthy are (1) the pre-maximum standstill clearly visible in the CCD measurements and just barely detected by Jones; and (2) the much slower decrease in brightness after maximum as measured with the CCD than visually (0.6 mag compared with 2.6 mag during the first 100 days). However, the two times of occurrence of peak brightness agree very closely at JD 2,449,034.

Combining all the observations available, we arrive at a mean period of 558.8 days (1.53 years). Times of maximum for the rest of this century are herewith predicted to be on or about Oct. 20, 1997 and May 1, 1999.

The period of the Norma variable is considerably longer than the 278 days given by Hoffmeister et al. (1985) as the maximum of the period distribution of all Mira variables; indeed, only 13 Miras (of 2,994) are listed as having periods longer than 550 days. However

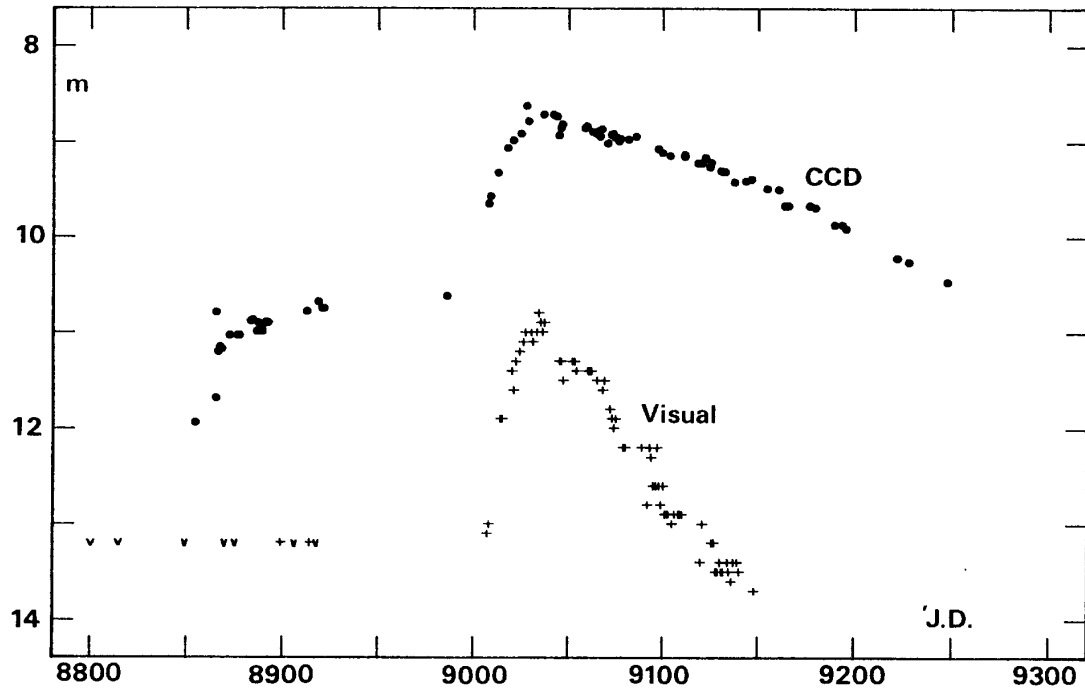


Figure 1. The light curve of the new variable in Norma showing Jones's visual magnitudes (crosses) and Liller's non-filtered CCD magnitudes (closed circles). The v's represent selected "fainter than" estimates. Note the two positive visual sightings near J.D. 2,448,900; both were very close to the limit of detectability on those nights.

the period of the Norma variable is still far less than that of the 1374-day period given for BX Mon and listed as a symbiotic Mira variable (Sp. M4ep + F) in the 4th edition of the General Catalogue of Variable Stars (Kholopov et al., 1985).

We intended to publish elsewhere all the observations which we have accumulated; meanwhile the numerical data can be obtained by writing the first author.

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#### References:

- Duerbeck, H.W., 1987, A Reference Catalogue and Atlas of Galactic Novae, (Dordrecht, Reidel)
- Hoffmeister, C., Richter, G. and Wenzel, W., 1985, Variable Stars. (New York, Springer-Verlag), p. 55
- Kholopov, P.N., Samus, N.N., Frolov, M.S., Goranskij, V.P., Gorynya, N.A., Kazarovets, E.V., Kireeva, N.N., Kukarkina, N.P., Kurochkin, N.E., Medvedeva, G.I., Perova, N.B., Rastorguev, A.S. and Shugarov, S. Yu., 1985, General Catalogue of Variable Stars, Vol. 2, 4th edition (Moscow, Nauka), p. 183