

REVISION OF THE PERIODS OF LO AURIGAE AND VX URSAE MAJORIS

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Received: July 21, 1993

Abstract

A period of 369 days (R-band data) or 359 days (V-band data) is found for the Mira variable LO Aurigae and a revised period of 520 days (R data) or 507 days (V data) is given for the Mira variable VX Ursae Majoris. The errors in these periods are estimated at about ten days. These periods are based on R- and V-filter CCD observations made between November 1990 and August 1992.

The *General Catalogue of Variable Stars* (Kholopov *et al.* 1985) (GCVS) lists the period of the class M8e Mira variable VX Ursae Majoris as 215.2 days and lists no references to this star other than the survey in which it was discovered. No period is listed for the M8-9 Mira LO Aurigae.

V- and R-band CCD images of LO Aur and VX UMa have been taken at the Wellesley College and Wesleyan University observatories since November 1990. Data taken before August 1991 were collected in the senior thesis of Elan Grossman (1992). Data taken after August 1991 were added to Grossman's data to produce light curves for each variable star.

For each of the variable stars, photometry was done on the star of interest and several bright stars in the same CCD image field. Since varying atmospheric conditions caused the apparent magnitudes of all stars in the CCD fields to vary from night to night, differential magnitudes were found by subtracting the magnitude of each variable star from the magnitude of a comparison star or stars. For the Wellesley images, a non-variable comparison star similar in magnitude and spectral type to each of the stars of interest was chosen. The Wesleyan images showed a narrower field, so the choice of comparison stars was more restricted. For both LO Aur and VX UMa, Grossman summed the fluxes of three comparison stars, all fainter than the star of interest. He calculated a magnitude equivalent to this total flux to use as a comparison for the determination of differential magnitudes, using equation (1):

$$m_{\text{comp}} = -2.5 \log(10) f_{\text{comp}} \quad (1)$$

where f_{comp} is the total flux of the three comparison stars. He then added a constant to each of the differential magnitudes calculated from Wellesley data in order to fit them to the same curve as the differential magnitudes from Wesleyan data. Because all data since January 1992 were from observations made at Wellesley, it was found to be more convenient to add a constant to the Wesleyan data points to fit them to the Wellesley data.

The light curves of LO Aur (Figures 1 and 2) and VX UMa (Figures 3 and 4) were plotted using the combined Wellesley and Wesleyan data in R and V filters. The error in magnitude for each of the data points is less than 0.1 magnitude. A modified version of a computer program written by Press and Teukolsky (1988) was used to determine the periods, given the R and V data sets. The period of VX UMa was

determined to be approximately 369 days for the R data and 359 days for the V data. For LO Aur, approximate periods of 520 days for the R data and 507 days for the V data were found. Each of these periods is accurate to within about ten days, due to gaps in the data. Since the light curves do not include observations of a minimum or maximum, the phase of these stars' variation could not be determined.

I would like to thank Priscilla Benson for her advice. Thanks also to Elan Grossman and the observers at Wesleyan and Wellesley. I would also like to thank the Pew Charitable Trust for its grant to NECUSE, which supported this research. This research was also supported by NSF grant AST8910013 awarded to Priscilla Benson at Wellesley College.

References

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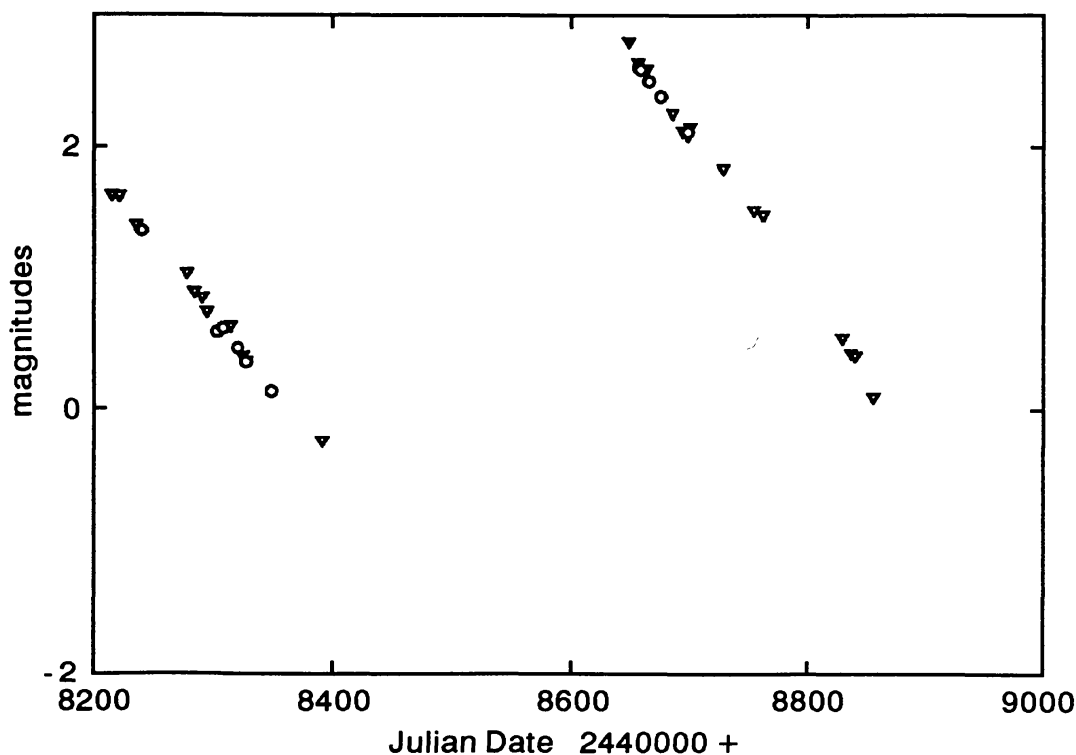


Figure 1. Differential CCD magnitudes for LO Aurigae in R filter. Circles are Wesleyan data; triangles are Wellesley data.

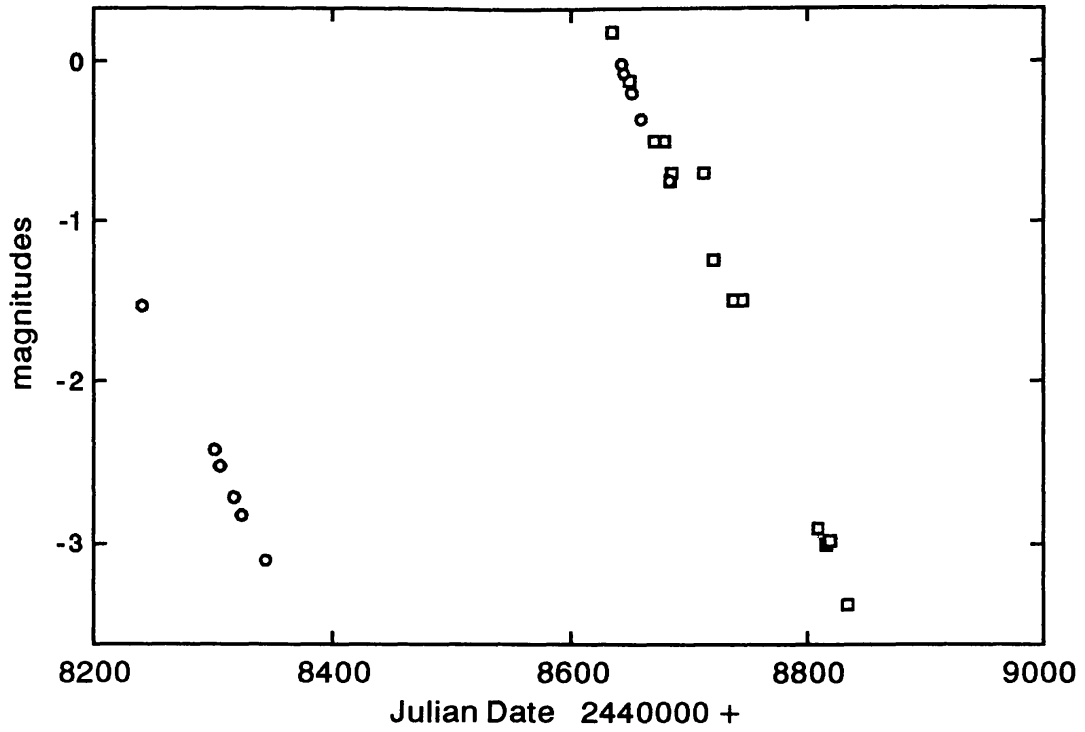


Figure 2. Differential CCD magnitudes for LO Aurigae in V filter. Circles are Wesleyan data; squares are Wellesley data.

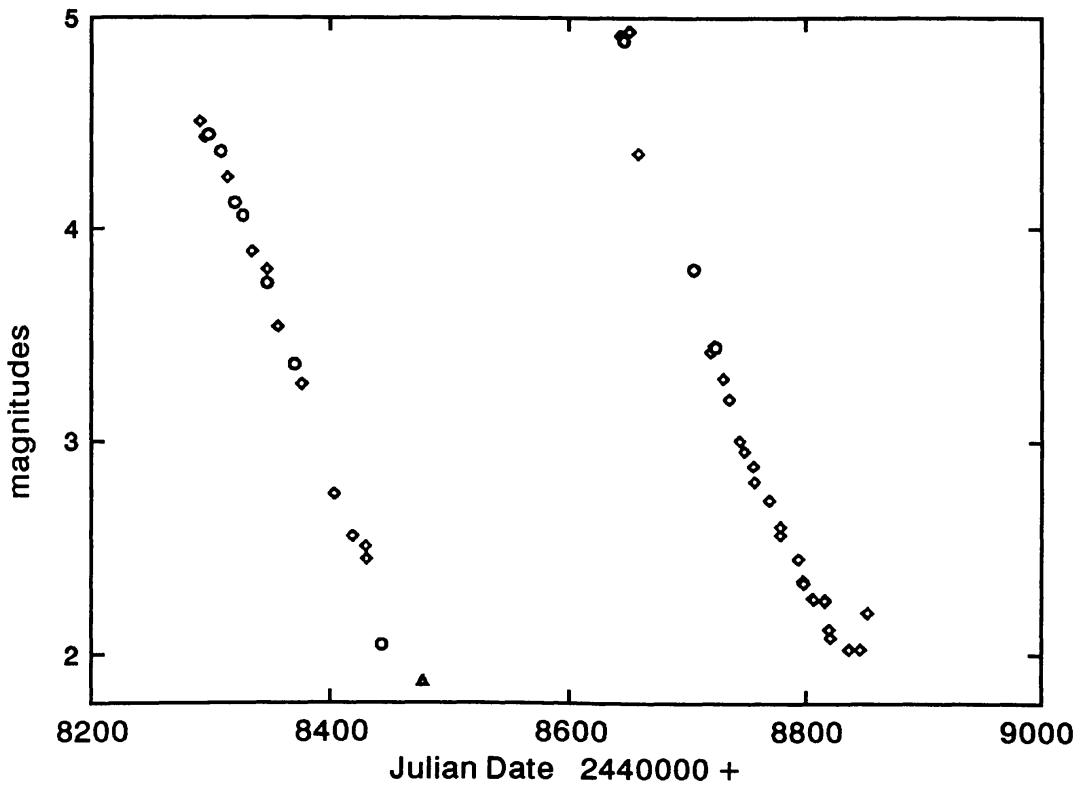


Figure 3. Differential CCD magnitudes for VX UMa in R filter. Circles are Wesleyan data; diamonds are Wellesley data.

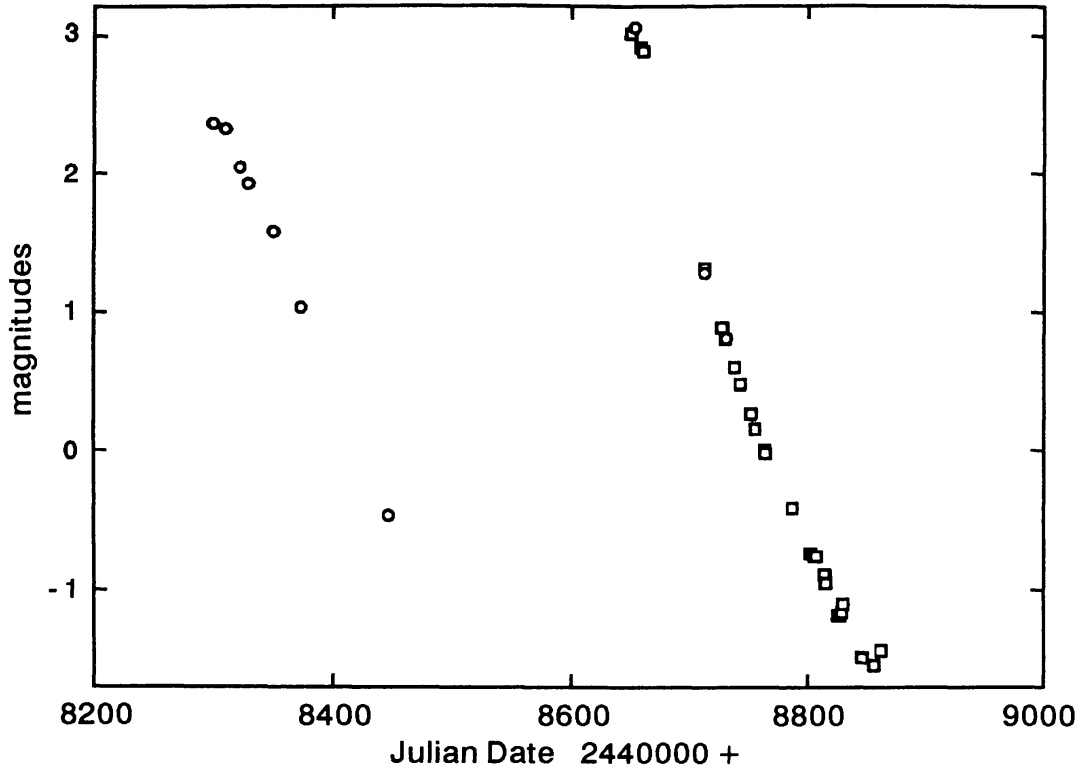


Figure 4. Differential CCD magnitudes for VX UMa in V filter. Circles are Wesleyan data; squares are Wellesley data.