A REVISION AND UPDATE FOR V1176 SAGITTARII

Holly Jessop
Maria Mitchell Observatory
Nantucket, MA 02554

Received: August 7, 1991

Abstract

The period of V1176 Sagittarii decreases rapidly, at the rate of 1.36×10^{-6} days per year. Parabolic elements derived for 1957 to 1990 are:

$$JD_{max} = 2441555.368 + 0.35480410\ E - 7.0 \times 10^{-10}\ E^2.$$

Both the amplitude and the shape of the light curve change.

V1176 Sagittarii is a short-period RR Lyrae star of type RRab. Its elements were first determined by Erleskova (1953), and were subsequently revised (Tsesevich 1969), most recently by K. Gloria (1985). She found large variations in the period and derived separate linear elements for several intervals of time. These variations required further study, including an examination of the behavior since 1985.

The present study is based on magnitude estimates from the Maria Mitchell Observatory photographic plate collection. Data for the recent years were collected, using Gloria's comparison sequence, and combined with data of earlier epochs previously recorded by Gloria. Light curves were plotted for each year with phases calculated from the linear elements (Gloria 1985):

$$JD_{max} = 2438266.620 + 0.3548148\ E. \quad (1)$$

A mean curve was calculated from a year with particularly copious data, by means of a computer procedure which separates the data into phase bins and averages the magnitudes and phases within each bin. This mean light curve was then compared to each annual curve to find the value of O-C in that year using the method of Belserene (1986).

The O-C data are shown in Figure 1, with a least-squares parabolic fit, from which the following elements are derived:

$$JD_{max} = \underset{\pm 0.002}{2441555.368} + \underset{\pm 0.00000021}{0.35480410\ E} - \underset{\pm 0.2 \times 10^{-10}}{7.0 \times 10^{-10}\ E^2} \quad (2)$$

The rate of change of period is -1.36×10^{-6} days per year $\pm 0.05 \times 10^{-6}$.

In addition to the large changes in period, V1176 Sgr also exhibits some curiosities regarding the shape of the light curve. Figure 2 shows the typical shape of the light curve, in this case for 1962. Figure 3, for 1959, shows a more nearly sinusoidal shape. Similar changes are noted in later years and are accompanied by a small increase in the brightness at minimum, of about two-tenths of a magnitude. V1176 Sgr is a star of continuing interest and deserves further study both for its rapid period change and for its light curve of varying shape and amplitude.

This work was funded by NSF grant number AST-8922809. Thanks are cordially extended to Dr. Emilia Belserene for her guidance and assistance.

References

Belserene, E. P. 1986, *J. Amer. Assoc. Var. Star Obs.*, 15, 243.
Erleskova, T. E. 1953, *Russian Variable Stars*, 9, 219.
Gloria, K. 1985, *J. Amer. Assoc. Var. Star Obs.*, 14, 59.
Tsesevich, V. P. 1969, *RR Lyrae Stars*, IPST Press, Jerusalem.

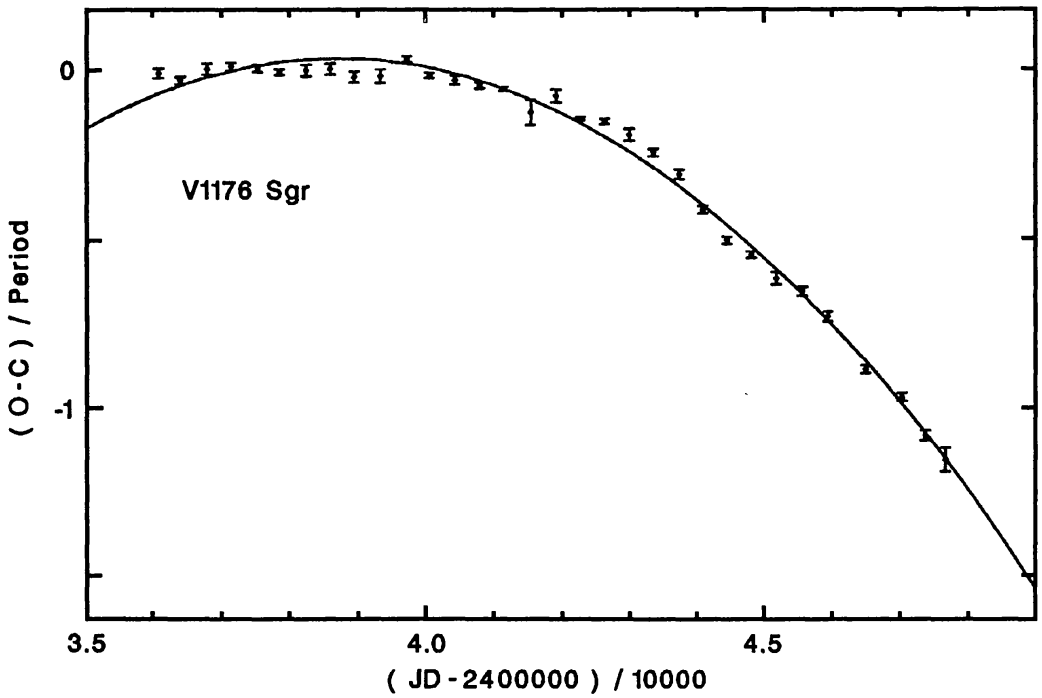

Figure 1. The O-C diagram for V1176 Sgr, for the years 1957 to 1990, with the least-squares parabola. C is defined by equation (1) in the text.

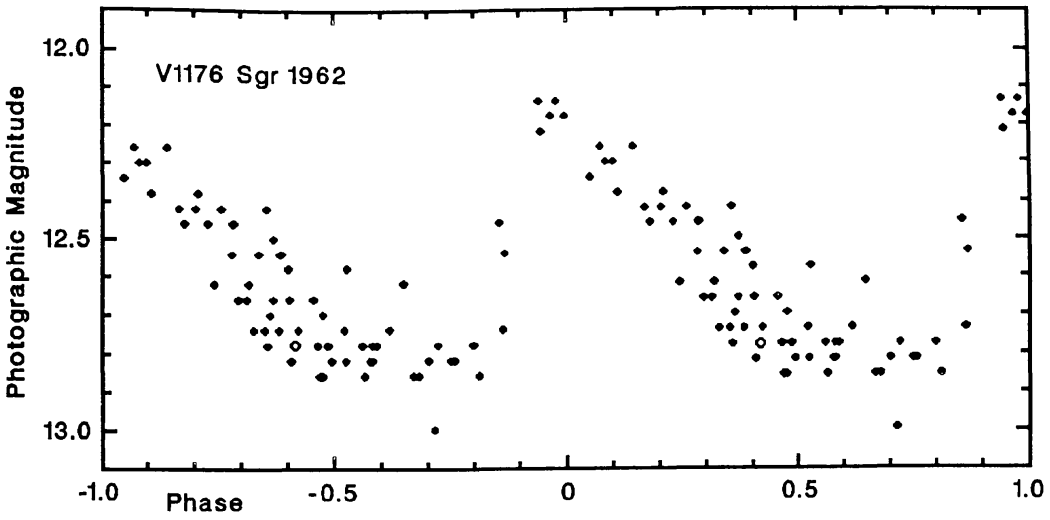

Figure 2. The light curve for V1176 Sgr in 1962, showing the typical shape. Elements are those of equation (1).

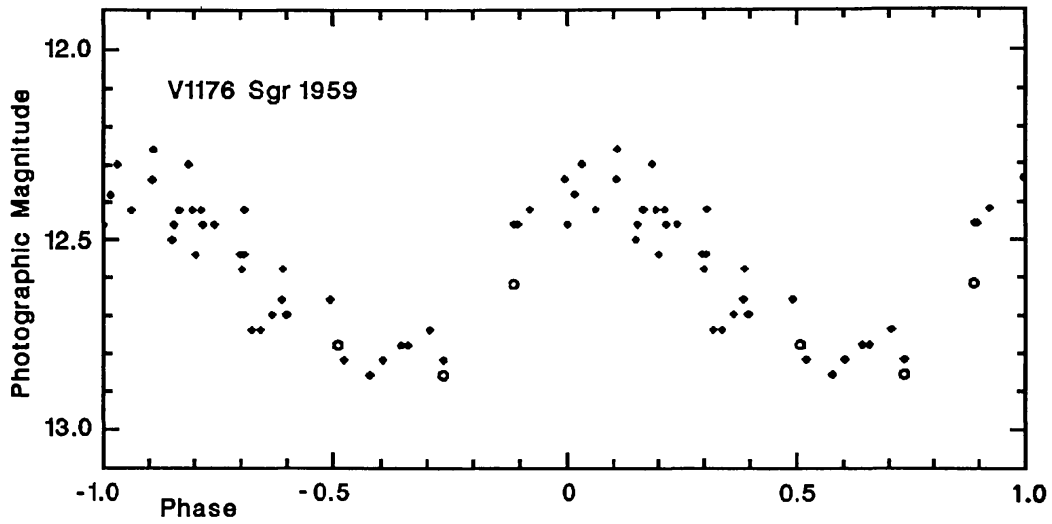

Figure 3. The light curve for V1176 Sgr for 1959. Note the more nearly sinusoidal shape compared with Figure 2.