SW Horologii—A Mira Variable Star

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Abstract Visual observations of the little studied Mira variable star SW Hor during the eighteen-year interval 1986 through 2003 are presented. These provide the basic parameters of its variability, information that had previously been lacking from the catalogue data. An extreme visual magnitude range of 9.9 to fainter than 15 is found and a mean period of 283 ± 13 days determined. Elements for maximum brightness are JD 2447124 + 283 ± 13 days.

1. Introduction

SW Hor is one of the many relatively bright southern Mira stars for which the basic data in the *General Catalogue of Variable Stars* (Kholopov *et al.* 1985) are either incomplete or missing. In an attempt to rectify this, a number of these stars have been under regular observation by the author. The results of eighteen years of observations of SW Hor are presented here.

SW Hor is shown on RASNZ Chart 796 (Bateson and Morel 1984) but its placement is incorrect due to the initial catalogue position being of low accuracy. This error was corrected by Morel and McNaught (1986) following identification of SW Hor on plates from the U.K. Schmidt telescope at Siding Spring Observatory.

Chart 796 is reproduced here as Figure 1, with SW Hor correctly plotted. The inset is that shown by Morel to provide for better identification when this star is faint.

Unfortunately, no reliable magnitudes are available for the comparison stars and they have been identified by lower case lettering on the chart. The author has used two additional fainter stars and these are shown on the chart insert with upper case lettering.

To allow for reduction of the observations, preliminary *Guide Star Catalog* magnitudes (Space Telescope Science Institute 1992) have been allocated to the comparisons. While GSC magnitudes are known to be of limited accuracy, they are sufficient for the purposes of this paper and are also indicated on Figure 1. Star B has a visual magnitude estimated by the author.

2. Observations

The normal observing season for SW Hor is September through April with occasional observations obtained outside these months when the star is a morning object. A seasonal gap is therefore present in the data. A mean period of 283.2 days, rounded to 283 ± 13 days, is found from the 17 maxima observed, individual

cycles ranging between 264 and 305 days. Details of these are listed in Table 1, where Column 1 gives the observed date of maximum, Column 2 the probable error based in completeness of the light curve, Column 3 the interval to the following maximum, and Column 4 lists the cycle number, with the defining epoch as the well-observed maximum of JD 2447124. Column 5 lists the maximum brightness and Column 6 gives the O–C value relative to the above period and the defining epoch of JD 2447124.

A mean visual maximum of 10.6 magnitude is found with maximum brightness ranging between magnitudes 9.9 and 11.1. Nothing can be said about the behavior of SW Hor at minimum as this falls below the limiting magnitude of the telescopes used, although a number of positive observations at the limit of visibility during this phase of the light curve suggest SW Hor may fade to not much below magnitude 15. This, however, could only be verified by observation with telescopes reaching to a fainter limit.

A number of these cycles are not well observed and the light curve is incomplete in places. All observations have therefore been plotted according to phase relative to the above maximum and period. This phase plot is shown as Figure 2 and suggests the current behavior of SW Hor can be represented by the elements JD 2447124 + 283 ± 13 days.

3. Conclusion

SW Hor is a typical Mira variable star of visual magnitude range 9.9 to fainter than 15. Elements for determining maximum brightness are JD 2447124 + 283 ± 13 days.

References

Bateson, F. M., and Morel, M. 1984, *Charts For Southern Variables, Series 17*, Astronomical Research Ltd., Tauranga, New Zealand.

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Space Telescope Science Institute 1992, *The Guide Star Catalog*, Version 1.1, STScI, Baltimore.

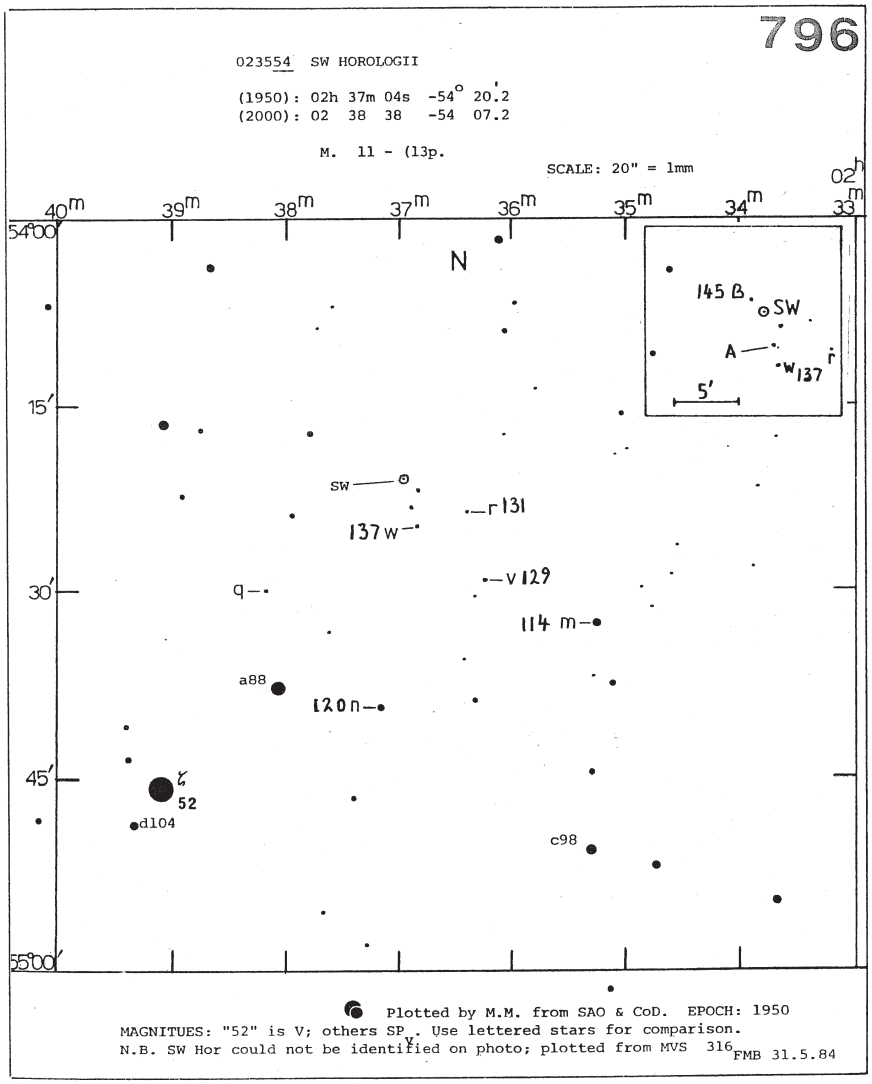

Figure 1. Chart of the SW Hor field. Chart 796 is from *Charts for Southern Variables, Series 17* (Bateson and Morel 1984). The inset (added by the author) is from Morel and McNaught (1986) and provides the corrected position of the variable star. Chart and inset used by permission of RASNZ. Preliminary magnitudes for lettered stars are from the *Guide Star Catalog*. Star B visual magnitude determined by the author.

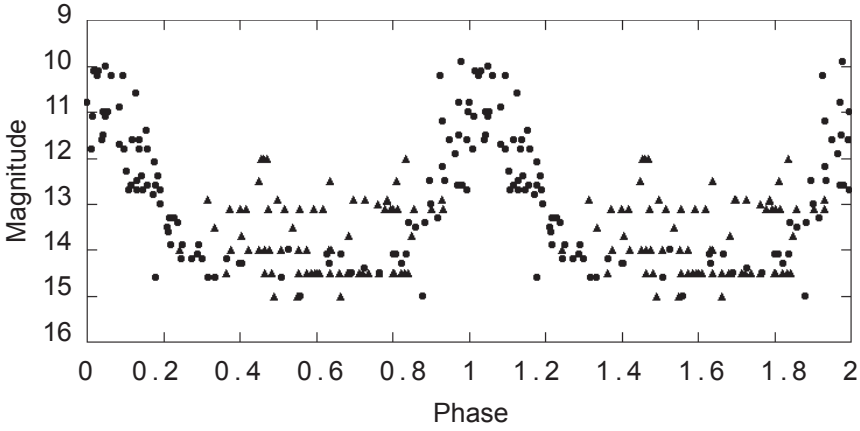

Figure 2. Phase diagram for SW Hor. Period 283 ± 13 days. Circles represent positive visual observations; triangles are upper limits.

Table 1. Details of observed maxima of SW Horologii, 1986 through 2003.

Maximum JD JD 2400000+	*Error*	*Interval*	*Cycle Number (E)*	*Magnitude*	*O–C (283 days)*
46838	±3	286	–1	11.0	–3
47124	±3	300	0	10.0	0*
47424	±3	(552)	1	10.9	+17
47976	±5	287	3	11.0	+3
48263	±3	292	4	10.1	+7
48555	±5	264	5	10.5	+16
48819	±5	291	6	11.0	–3
49110	±5	273	7	10.1	+5
49383	±3	280	8	11.1	–5
49663	±3	304	9	11.0	–8
49967	±5	275	10	11.0	+13
50242	±5	265	11	10.0	+5
50507	±3	294	12	9.9	–13
50801	±5	290	13	10.5	–2
51091	±5	(845)	14	11.0	+5
51936	±3	283	17	11.0	+1
52219	±3	—	18	10.1	+1

**Defining epoch for the O–C calculation.*