

THE 2007 AUGUST NORMAL OUTBURST OF AW SGE

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Abstract: CCD observations of the normal outburst of AW Sge in 2007 August were taken over four days covering the whole outburst. The magnitude at maximum was probably $V = 14.5$ and the outburst lasted little more than two days, with the star being visible above the typical discovery limit of $V = 15$ for about 18 hours.

AW Sge is a faint and poorly observed dwarf nova and until recently was considered to have rare outbursts. In recent times these have occurred every two years but as they reach only magnitude 14.5 it is likely that some have been missed. The history has been discussed in detail by Lloyd (2007a) who suggests that the outburst interval is about 286 days.

Very few outbursts of AW Sge have been seen. Wolf and Wolf (1906) first reported AW Sge as a variable and found it visible on two plates in 1901 and 1905. The first recognisable outburst was reported by Meinunger (1965) from Sonneberg plates in 1961. Systematic visual observations began in the early 1990s and the first outburst in recent times was seen in 1996. Since then the star has been seen in outburst in 2000, 2002, 2004 and 2006 (see Lloyd 2007a, Shears et al. 2008 for details). The 2000 outburst showed superhumps for the first time establishing AW Sge as a UGSU system. The 2006 outburst, which is the best observed to date (Shears et al. 2008) was also a superoutburst, and it seems likely that the 1961 outburst was also a superoutburst (Lloyd 2007a). On the basis of the timings of the recent outbursts Lloyd (2007b) predicted one during July or August 2007 and this was subsequently discovered on August 27 by Pickard (2007).

Normal outbursts of dwarf novae do not usually merit a detailed description, but AW Sge is unusual in that so few outbursts have been seen, and even fewer are well observed. The observations reported here were made using a Meade LX200 30-cm telescope and a Starlight Xpress SXV-H9 CCD camera from the Shobdon Observatory, Herefordshire, UK using V and R filters. The comparison stars are taken from the calibration by Henden (1999) and details are given in Table 1. Appendix 1 gives the finding chart for AW Sge taken from the POSSII F plate (r band) showing the variable in quiescence marked by +, with the three comparison stars indicated. Appendix 2 lists the V data.

Table 1: Comparison star data for AW Sge

C	Star	RA (2000)	Dec (2000)	V	$B - V$	$V - R$ †
	AW Sge	19 58 37.08	+16 41 28.5	19.308	-0.160	
1	GSC 1616-0607	19 58 52.95	+16 42 43.5	12.094	0.752	0.416
2	A2 1050-15896431	19 58 51.07	+16 44 40.3	14.739	0.598	0.344
3	A2 1050-15902769	19 58 56.34	+16 43 51.6	15.178	0.695	0.393

† Calculated from $(V - I) = 0.508(B - V) + 0.040$

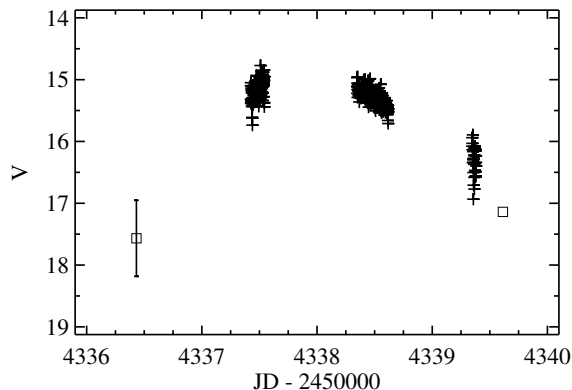


Figure 1: Light curve of the 2007 August outburst of AW Sge showing the mean of the R observations near quiescence, the steep rise prior to maximum and the subsequent fade, with Poyner's unfiltered observation (open square).

The calibration images show AW Sge in quiescence at $V = 19.3$ (Henden and Sumner 2000¹) and observations in the AAVSO archive give quiescent magnitudes of 18 – 19 (Shears et al. 2008). On the night before the outburst the star was seen a magnitude above quiescence at $R \sim 17.6$. During the outburst the star was caught on the rise at $V = 15.3$ and brightened by 0.2 magnitudes over the following 3 hours. The maximum was not seen but given the shape of the light curve the magnitude was probably $V \sim 14.5$, which is similar to that seen in previous outbursts, giving an outburst amplitude of nearly 5 magnitudes. During a longer run on the following night the star faded from $V = 15.1$ to 15.5, and a short run on the third night found the star at $V = 16.3$. An unfiltered observation a few hours later put the star at 17.1C (Poyner 2007). The whole light curve is shown in Figure 1 and details of both long runs are shown in Figure 2. During the first night of the outburst there is a suggestion of

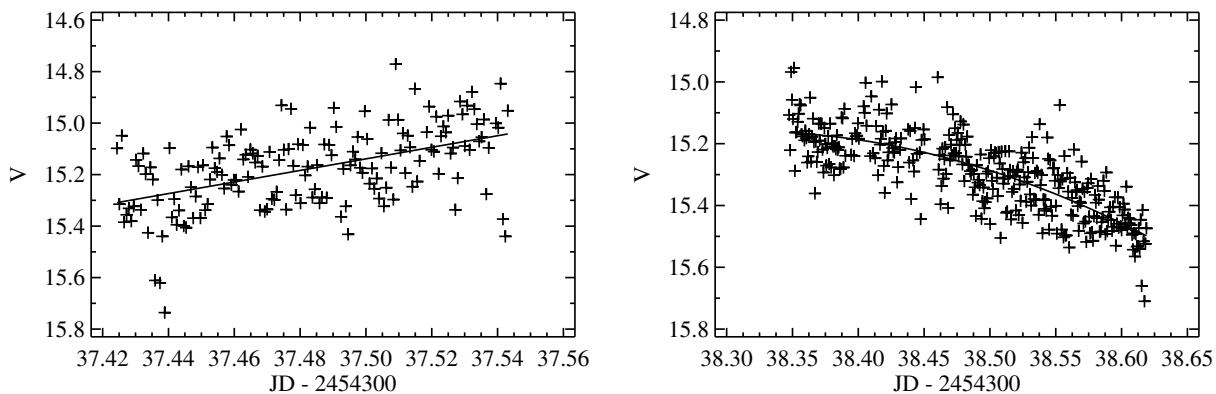


Figure 2: a) (left) The first night of the outburst with the linear fit superimposed, and b) (right) the second night showing a steepening of the decline rate and quadratic fit.

¹Confusingly, slightly different versions of this file can be found on the internet.

a weak cyclical variation superimposed on the general increase in brightness, but a period analysis of the data reveals that this variation is not significant. Any variations are certainly smaller than those reported by Vanmunster (2002) who found irregular variations of ~ 0.3 magnitude during the 2002 normal outburst. The light curves have also been examined for flickering but nothing significant was found above the random variations.

The second night appears to show a steepening of the decline rate during the run of observations, shown by a quadratic fit to the data. The average decline rate over this and the following night is 1.15 magnitudes/day, which is slightly steeper than that seen in previous normal outbursts. Overall the outburst lasted scarcely more than 2 days; it was brighter than magnitude 16.0 for about 1.5 days and brighter than 15.0, which is the typical discovery magnitude, for no more than 18 hours. Clearly, these outbursts are very brief and easily missed. According to the ephemeris the next outburst is expected to occur within a month of 2008 May 18.

Acknowledgements

This research has made use of the VizieR catalogue access tool and the SIMBAD database, operated at CDS, Strasbourg, France, and NASA's Astrophysics Data System.

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