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ON THE CYCLE LENGTHS OF V1113 CYG

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V1113 Cyg is an SU UMa-type dwarf nova, whose nature was revealed by Kato et al. (1996). In spite of its very usual appearance of superhumps and their development, Kato et al. (1996) discussed that V1113 Cyg has slightly different properties from those of other well-known SU UMa-type dwarf novae: the short recurrence time ($\sim$ 10 d) as inferred from the discovery observation by Hoffmeister (1966) contradicts with the large outburst amplitude ($\sim$ 6 mag). Kato et al. (1996) proposed the possible presence of active and inactive phases, but further observations were undoubtedly needed to draw a more definite conclusion. Since the discovery of its SU UMa-type nature, the object has been well monitored by visual observers, as a part of VSNET Collaboration (http://www.kusastro.kyoto-u.ac.jp/vsnet/). A total of 992 observations were reported between 1994 July 15 and 2001 May 31, the rate corresponding to one observation per 2.5 d. The number of positive detections was 149, corresponding to the outburst duty cycle of 15%. However, this value may have suffered some degree of bias, since not all observations were made irrespective of the outburst state. However, thanks to the dense coverage by these observations, the selection of outbursts and its classification can be almost always unambiguously done. The result is summarized in Table 1 and Figure 1.

As is always evident from the table, almost all superoutbursts were detected since 1994 July. The intervals of successive superoutbursts relatively strongly varied between 169 and 229 d (during the 404 d interval between JD 2451124 and 2451528, one superoutburst was likely to be missed), 189.8 d in average. A noteworthy feature is the low number ratio of (normal outbursts)/(superoutbursts). The total number of observed outbursts is 30, while 12 of them are superoutbursts. The number ratio suggests only two normal outbursts in each supercycle. This ratio is very low for an SU UMa-type dwarf nova with the short supercycle of 189.8 d (cf. Nogami et al. 1997). In order to estimate the possibility of missed outbursts, owing to the observational gaps, we applied Monte-Carlo simulations on actual observations. $\sim$ 50% of simulated normal outbursts were detected using the actual timings of observations. The reduced detectability is mainly caused by the observational gaps, and not by limiting magnitudes. Even though this detectability of normal outbursts would raise the number ratio to $\sim$ 4, this is still small for a system with a short supercycle.

We know another example, V503 Cyg, which normally shows only 2–3 normal outbursts in one 89-d supercycle (Harvey et al. 1995; Ishioka et al. 2001). There should be a still poorly understood mechanism common to these objects, which suppresses normal outburst while maintaining a high frequency of superoutbursts. A notable exception can be found

Table 1: Outbursts of V1113 Cyg

JD start	peak magnitude	duration (d)	type
2449597	13.3	15	super
2449826	13.5	> 4	super
2449893	13.9	3	normal
2449956	13.8	3	normal
2450025	13.4	11	super
2450203	13.6	> 8	super
2450280	13.8	2	normal
2450308	14.0	1[a]	normal
2450333	13.8	2	normal
2450372	13.4	> 6	super
2450420	13.9	1[a]	normal
2450546	13.9	11	super
2450689	13.8	2	normal
2450728	13.7	11	super
2450816	14.0	2	normal
2450929	13.9	> 8	super
2450956	15.2	1[a]	normal
2450999	14.4	1[a]	normal
2451037	14.8	2	normal
2451124	13.8	> 9	super
2451296	13.9	2	normal
2451367	14.5	2	normal
2451528	13.8	> 4	super
2451664	14.1	3	normal
2451716	13.5	12	super
2451746	14.7	2	normal
2451818	14.9	2	normal
2451839	13.9	3	normal
2451902	13.7	> 2	super?
2452025	14.0	3	normal

[a] single observation

after the JD 2451716 superoutburst. The shortest interval between normal outburst was 21 d. Since the object was equally frequently and deeply monitored in the preceding season, this increased detections may actually reflect the increased activity of this star. This phenomenon, if confirmed, would provide a support to the idea of active and inactive phases, proposed by Kato et al. (1996).

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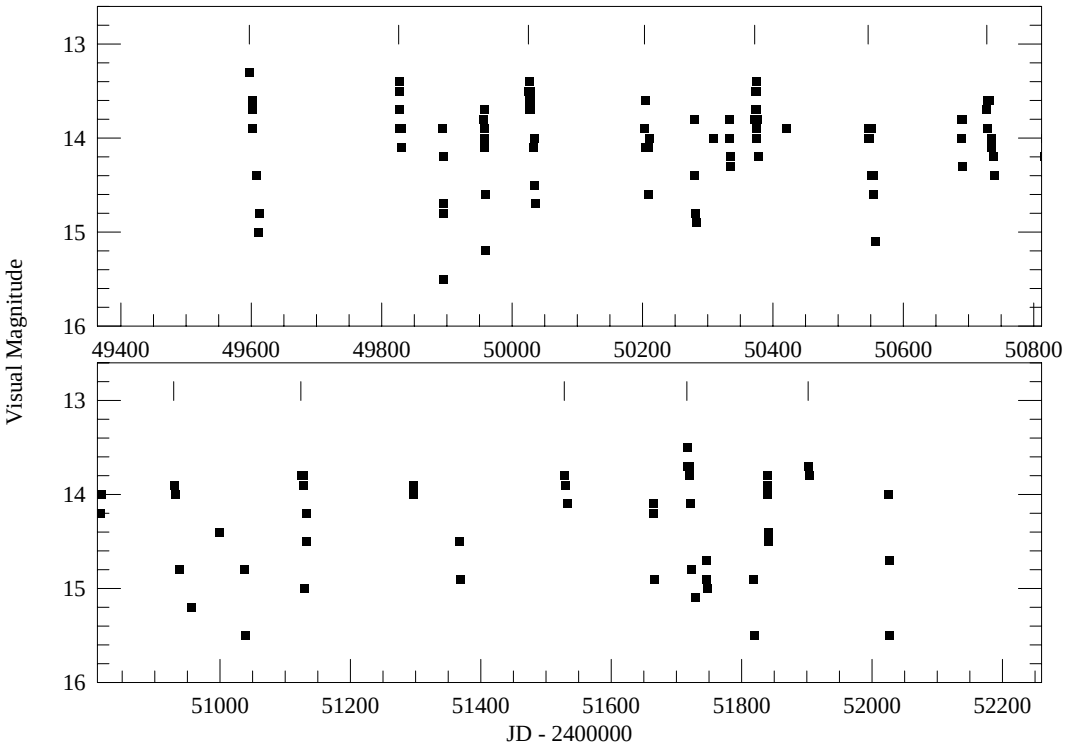

Figure 1. Overall light curve of V1113 Cyg. Superoutbursts are marked with ticks. Upper limit observations are not plotted for simplicity

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