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V893 Sco IS NOT AN ER UMa-TYPE STAR

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V893 Sco is a recently rediscovered bright dwarf nova (Kato et al., 1998). The star was subsequently found to be an eclipsing dwarf nova below the period gap (Thorstensen, 1999; Matsumoto et al., 2000; Bruch et al., 2000). Most recently, Mason et al. (2001) proposed an idea that V893 Sco is an ER UMa-type dwarf nova. From their analysis of the evolutionary state of V893 Sco, Mason et al. (2001) proposed that all ER UMa stars may be newly formed cataclysmic variables (CVs).

ER UMa stars are a class of SU UMa-type dwarf novae (for a recent review of SU UMa-type dwarf novae, see Warner, 1995), whose known members are ER UMa, V1159 Ori, RZ LMi, DI UMa and IX Dra (Kato, Kunjaya, 1995; Robertson et al., 1995; Nogami et al., 1995; Kato et al., 1996a; Ishioka et al., 2001). ER UMa stars are known to show extremely short (19–50 d) supercycles (intervals between successive superoutbursts), short intervals (3–5 d) between normal outbursts, low amplitudes of superoutbursts (<3 mag), and extremely large (0.30–0.45) duty cycles of superoutbursts (see folded figures in Robertson et al., 1995; Kato, 2001). A comparison of basic parameters of ER UMa stars can be found in Table 1 of Kato et al. (1999). ER UMa stars are also known to show large-amplitude superhumps during the earliest or rising stage of an superoutburst (Kato et al., 1996b).

Mason et al. (2001) analyzed the light curve from VSNET[1], and identified outburst intervals of ∼30 d as being a supercycle and normal outburst with amplitudes of <1 mag every few days. Here we report an argument against this interpretation.

First, a supercycle of ER UMa-type dwarf novae is largely occupied by a long-lasting superoutburst (Kato et al., 1999). In contrast to the usual duty cycle (0.30–0.45) of superoutbursts in ER UMa stars, the outbursts of V893 Sco, which occur every ∼30 days, last only less than a few days (see Figure 1), and amount to a duty cycle of only ∼0.1. Furthermore, no superhumps, which are always seen during ER UMa-type superoutbursts, have yet been observed during these outbursts (S. Kiyota, private communication). The observations on 1999 May 12 and 13 by Matsumoto et al. (2000) were done during a rise of such an outburst, and no signature of superhumps was observed, in spite of the fact that all known ER UMa stars exhibit strong superhumps even during the rise to superoutburst (Kato et al., 1996b). These outbursts bear all characteristics of normal outbursts rather than those of superoutbursts.

[1] http://www.kusastro.kyoto-u.ac.jp/vsnet

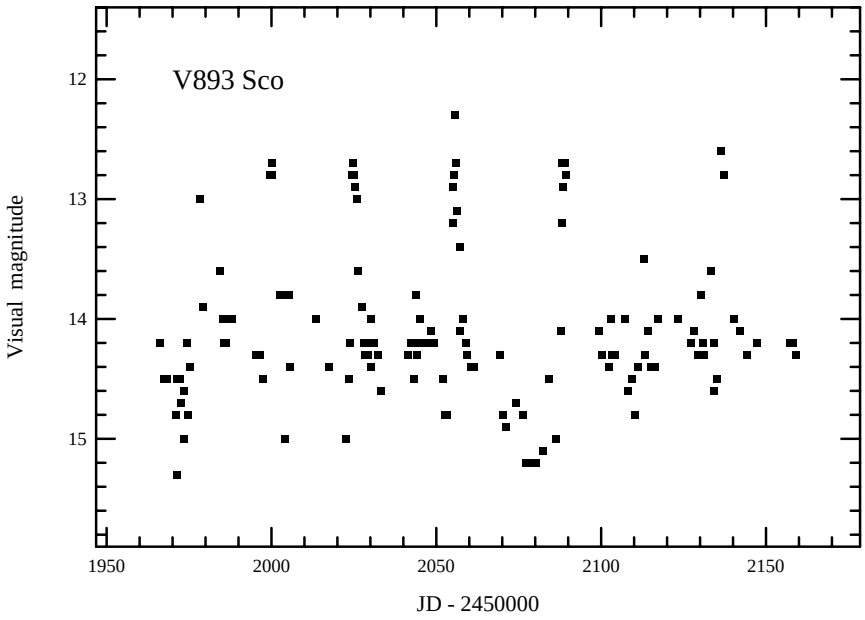

Figure 1. Representative long-term light curve of V893 Sco from visual observations reported to VSNET.

Secondly, what were referred to as possible minioutbursts (<1 mag) every few days in Mason et al. (2001) are not evident as shown in Figures 1 and 2. Both visual and CCD observations show only *irregular* variations which are frequently met in CVs. Furthermore, normal outbursts of ER UMa have amplitudes of ∼2 mag (Figure 2, lower panel), which are significantly larger than the variation seen in V893 Sco. The presence of quiescent variations in V893 Sco had also been independently discovered and discussed by Bruch et al. (2000). Bruch et al. (2000) found a variation up to 0.5 mag from one orbit to next. The amplitude of this variation is quite comparable to the one described in Mason et al. (2001). Furthermore, the time scale of this variation is an order of an orbit (∼0.076 d), which is far shorter than the time scales of dwarf-nova outbursts. As pointed out by Bruch et al. (2000), the short-term variations of V893 Sco in some aspects bear similarity to those of OY Car and Z Cha (cf. Cook, Warner, 1984; Wood et al., 1989). These variations may therefore be better understood as an enhanced activity sometimes observed in high-inclination systems (Kato et al., 2001) and references therein.

From these findings, we conclude that V893 Sco bears no similar characters with ER UMa star, and that the argument in Mason et al. (2001) according to which V893 Sco provides evidence that all ER UMa stars may be newly formed CVs needs to be reconsidered.

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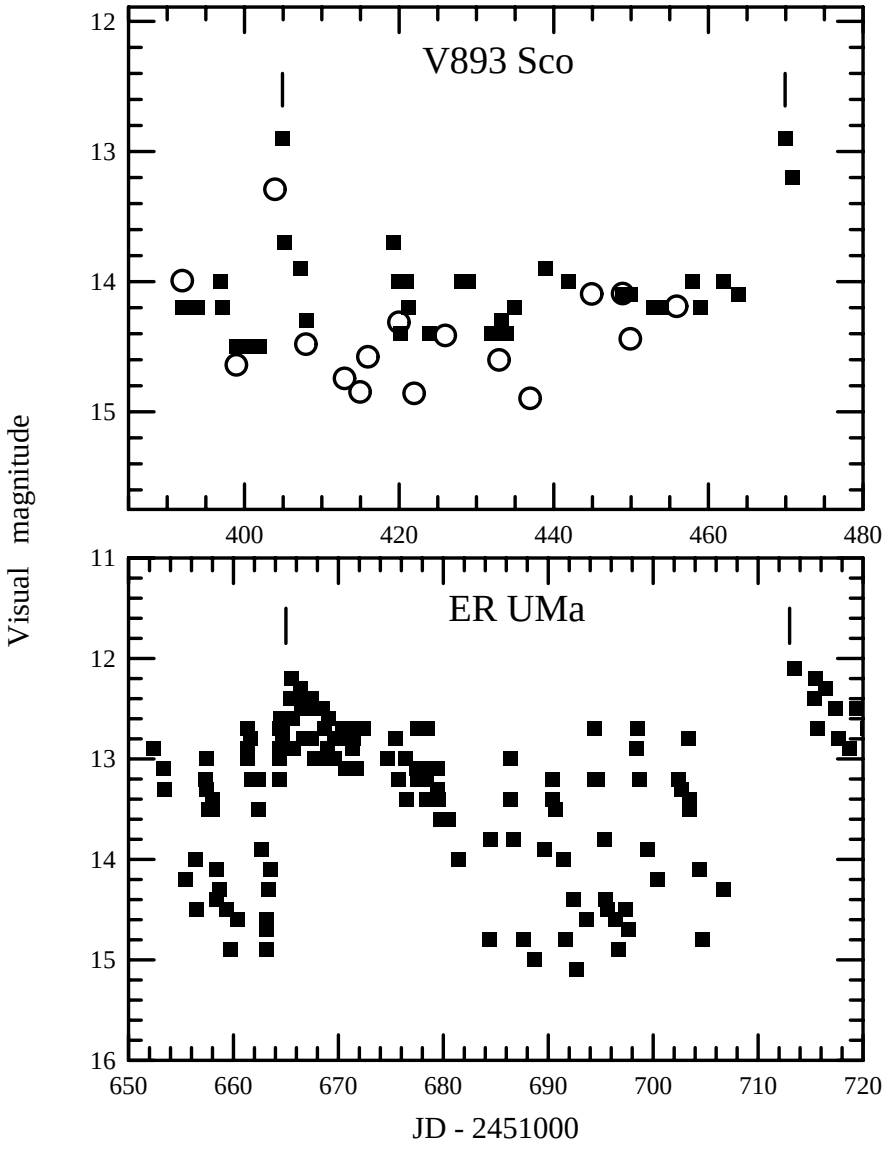

Figure 2. Comparison of light curves between V893 Sco (upper) and ER UMa (lower). Filled squares and open circles represent visual observations by VSNET observers and CCD observations by the authors. CCD observations were carried out using a 25-cm Schmidt-Cassegrain telescope and an ST-7 CCD. The zero-point adjustment was made using Kiyota's CCD observation (private communication). The typical errors of observations are 0.2 mag (visual), 0.1 mag (CCD). The light curve of V893 Sco is strikingly different from that of ER UMa in that it completely lacks long-lasting superoutbursts (ER UMa, marked with ticks) and frequent short outbursts between superoutbursts.

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