The Variability Type and Period of V348 Aql

K. V. Sokolovsky

Max Planck Institute for Radio Astronomy, Bonn, Germany; Astro Space Center of Lebedev Physical Institute, Moscow, Russia; and Sternberg Astronomical Institute, Moscow, Russia

Star Name:	V348 Aql, USNO-B1.0 0904-0422027
Coordinates (J2000):	19 11 20.03, +00 29 11.7
Variability type:	EB; **Limits, System:** 12.6-13.2 (V); **Spectrum:** A5V + late F/G
Period:	0.6658369(5) d; **Epoch(min):** JD (UTC) 2455396.418

Remarks:

Variability of V348 Aql was discovered by Hoffmeister (1931). Meinunger (1966) classified it as an eclipsing binary with a period very close to 1 day, noting however that the period and derived minima times were uncertain due to the low variability amplitude. As of July 2011, the O–C gateway (Paschke & Brat 2006; Paschke 2009) lists, in addition to Meinunger's photographic data, 2 visual and 3 CCD times of minima from Paschke (1988, 1996, 2006), Stepan (1995), Brát et al. (2007). The data are summarized in Table 1.

Table 1. Minima times of V348 Aql

HJD(UT)	Obs. Type	Min. Type	E	O-C [d]	Reference
2425447.446	pg	II	-44980	0.038	Meinunger (1966)
2425535.319	pg	II	-44848	0.020	Meinunger (1966)
2427214.506	pg	II	-42326	-0.033	Meinunger (1966)
2437542.350	pg	II	-26815	0.015	Meinunger (1966)
2437543.370	pg	I	-26813	0.036	Meinunger (1966)
2437544.360	pg	II	-26812	0.027	Meinunger (1966)
2437559.340	pg	I	-26789	0.026	Meinunger (1966)
2437575.300	pg	I	-26765	0.006	Meinunger (1966)
2437577.320	pg	I	-26762	0.028	Meinunger (1966)
2437587.270	pg	I	-26747	-0.009	Meinunger (1966)
2437876.580	pg	II	-26313	-0.006	Meinunger (1966)
2437886.560	pg	II	-26298	-0.013	Meinunger (1966)
2447304.490	vis	I	-12153	-0.013	Paschke (1988)
2449516.467	vis	I	-8831	0.054	Stepan (1995)
2449934.552	CCD	I	-8203	-0.007	Paschke (1996)
2453923.595	CCD	I	-2212	0.007	Paschke (2006)
2451758.446	CCD	I	-5464	0.160	Brát et al. (2007)
2455396.418	Swift/UVOT	I	0	0	this work

V348 Aql was within the field of view of the Ultraviolet/Optical Telescope (UVOT, Roming et al. 2005) during *Swift* (Gehrels et al. 2004) observations of the neutron star harboring the low mass X-ray binary Aql X-1 (e.g., Miller-Jones et al. 2010) located 6' away from V348 Aql. A total of 73 observations from the *Swift* satellite (each consisting of one or more satellite pointings) of the Aql X-1 field were performed in 2006–2010 (Wijnands et al. 2006; Campana 2007; Maitra et al. 2010).

I analyzed the *Swift*/UVOT data with the VaST software (Sokolovsky & Lebedev 2005) in the way similar to that described by Sokolovsky (2009). Thanks to the observations obtained from the low Earth orbit, it became clear that the actual period of V348 Aql is close to 2/3 d. The lightcurve with two wide minima of unequal depth is typical of β Lyrae (EB) systems. No significant difference in eclipse depth between the optical and ultraviolet

lightcurves could be detected within the measurements accuracy (~0.05 mag).

The period derived from *Swift*/UVOT data alone was not accurate enough to account for the historical times of minimum. Instead, it was used as a starting point for the O–C analysis, which resulted in the linear light elements presented above. The minima types, primary (I) or secondary (II), were assigned on the basis of their position on the O–C diagram for the above period (all previous observers believed they were exclusively observing primary minima). One CCD time of minimum measurement (Brát et al. 2007; observations by P. Hajek and K. Koss) is inconsistent with the suggested light elements. Since the elements describe all the historical data well, with the exception of this discrepant point, a measurement error may be suspected in this case. However, it underlines the necessity of additional observations to confirm the suggested period.

The coordinates of V348 Aql were drawn from the USNO-B1.0 catalog (Monet et al. 2003). The spectral classification is by Halbedel (1984).

References:

Brát, L., Zejda, M., Svoboda, P., 2007, OEJV, 74, 1
Campana, S., 2007, Astronomer's Telegram, 1087
Gehrels, N., Chincarini, G., Giommi, P., et al., 2004, Astrophys. J., 611, 1005
Halbedel, E.M., 1984, Publ. of Astron. Society of Pacific, 96, 98
Hoffmeister, C., 1931, Astron. Nachr., 242, 129
Maitra, D., Reynolds, M., Miller, J.M., Gultekin, K., 2010, Astronomer's Telegram, 2744
Meinunger, L., 1966, Mitt. veraend. Sterne, 3, 137 (the text describing V348 Aql is available electronically here)
Miller-Jones, J.C.A., Sivakoff, G.R., Altamirano, D., et al., 2010, Astrophys. J., 716, 109
Monet, D.G., Levine, S.E., Canzian, B., et al., 2003, Astron. J., 125, 984
Roming, P.W.A., Kennedy, T.E., Mason, K.O., et al., 2005, Space Science Reviews, 120, 95
Sokolovsky, K., Lebedev, A., 2005, in 12th Young Scientists' Conference on Astronomy and Space Physics, Kyiv, Ukraine, April 1923, 2005, eds.: Simon, A.; Golovin, A., p.79
Sokolovsky, K.V., 2009, PZP, 9, 9
Stepan, P., 1995, Contrib. Nicholas Copernicus Obs. Planetarium Brno, 31, 4
Paschke, A., 1988, BBSAG Bulletin, No. 88, 1
Paschke, A., 1996, BBSAG Bulletin, No. 111, 1
Paschke, A., Brat, L., 2006, OEJV, 23, 13
Paschke, A., 2006, OEJV, 48, 1
Paschke, A., 2009, OEJV, 109, 43
Wijnands, R., Maitra, D., Bailyn, C., Linares, M., 2006, Astronomer's Telegram, 871

Light Curve
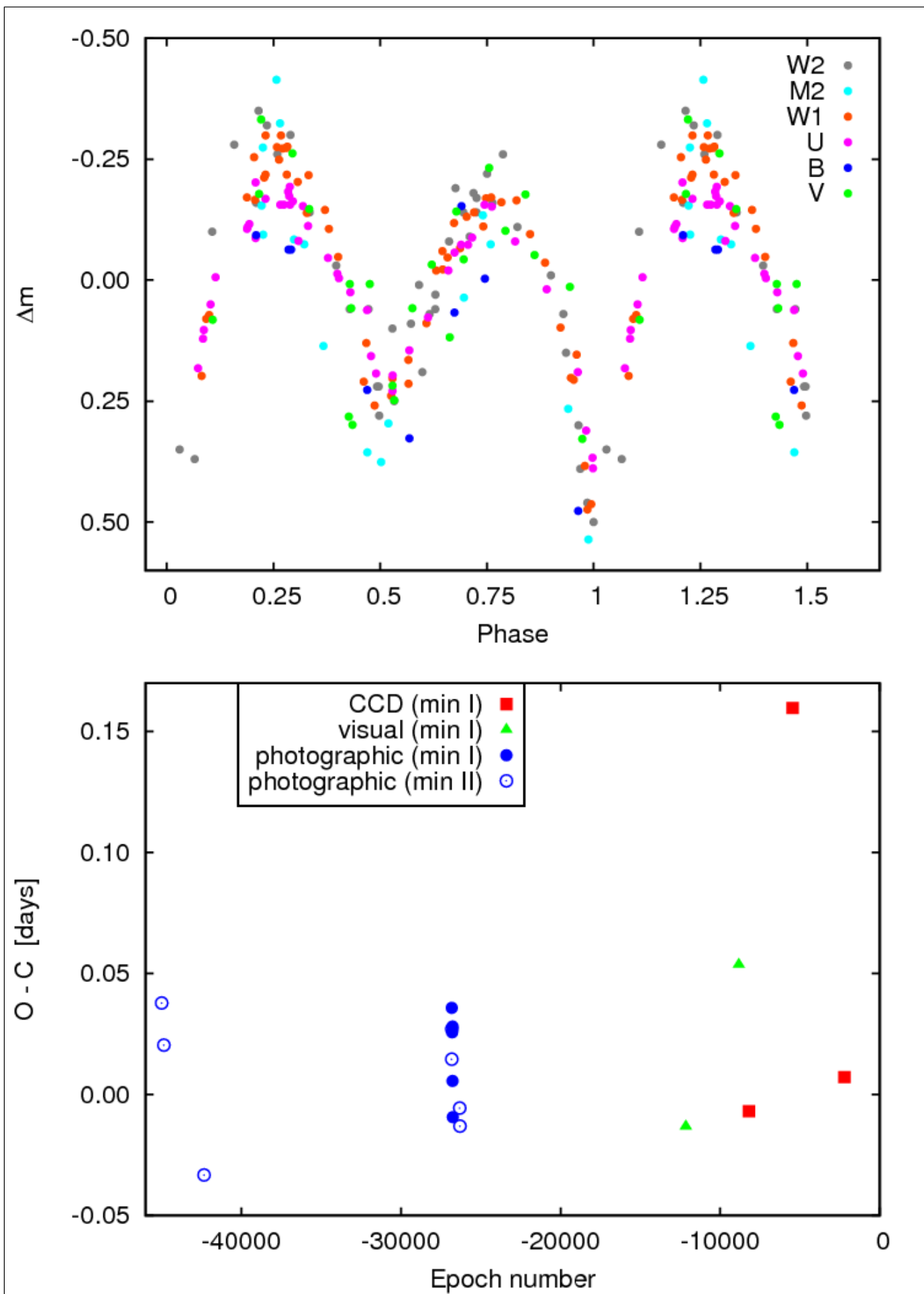
The *Swift*/UVOT optical-ultraviolet phased lightcurve and historical O–C diagram, both computed using the light elements presented in the Table.

Data Source

1. [v348aql.txt](v348aql.txt)