

# A revision of NSV 13538 = NSVS 17231162

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*Abstract: A revision of the variable star NSV 13538 is presented. Light curve elements were improved by using modern data from photometric surveys available online. The following photometric elements of the minimum of the Long Secondary Period were found:  $\text{Min} = \text{HJD } 2454611 + 324 * E$ .*

NSV 13538 was reported to be a variable by H.Shapley & E.M.Hughes (1934). In 1971 the star was added to the Atlas of Finding Charts for Variable Stars (Tsessevich & Kazanasmas, 1971). Doing a search for new variable stars as a part of the VS-COMPAS project, NSVS 17231162 was found to be a variable star in May 2013. Comparing its coordinates with the VSX database records, the star was found to be the same as NSV 13538.

The Northern Sky Variability Survey (Wozniak et al., 2004) data has a moderate resolution, thus cross-identifications were helpful in getting a more precise position, as the NSV position may have not a high accuracy as well. This allowed us to obtain photometric data from other surveys. The corresponding entry in the ASAS-3 database, ASAS J210711-1300.3 has a very good coverage of at least 8 pulsation cycles, which led to a reliable period determination. The data from the APASS complements the ASAS-3 and NSVS measurements.

The light curve of this star shows large-amplitude sharp minima. Small amplitude short term variability

has been lost in the noise in that particular case. The star was initially classified as E: in the NSV catalogue: the LSPs usually show eclipsing-like deep minima profiles.

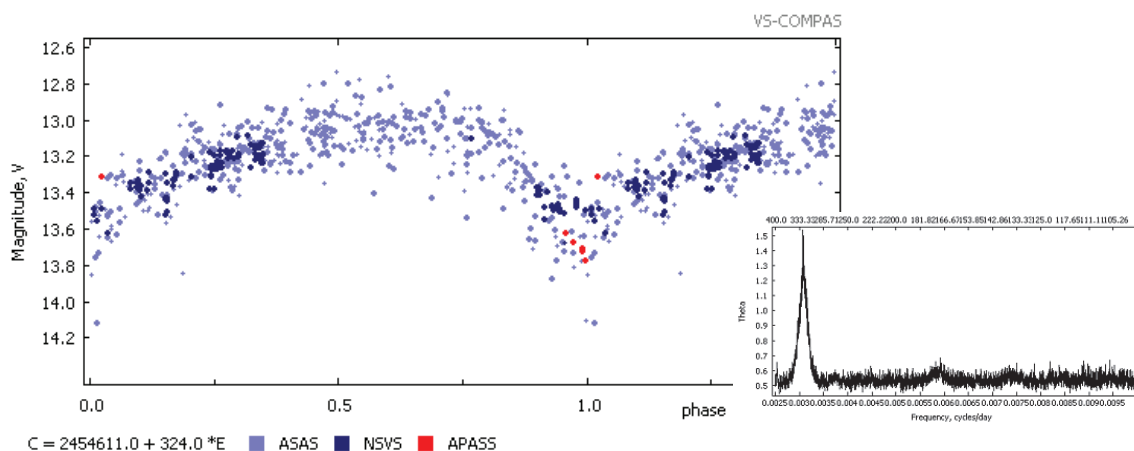
Detailed periodogram analysis of this star's photometry using the method described by Lafler and Kinman (1965) revealed a strong peak corresponding to a period of 324 days. Photometric elements of the LSP minimum are the following:

$$\text{Min} = \text{HJD } 2454611 + 324 * E$$

The ASAS-3 photometric coverage was crucial for the period determination, since NSVS data lacks a major part of the light curve (c.f. Figure 2). The combined light curve folded with a period of 324 days boasts datapoints at all phases.

The magnitude range has been corrected for this object, taking into account the photometric properties of its close neighbor:

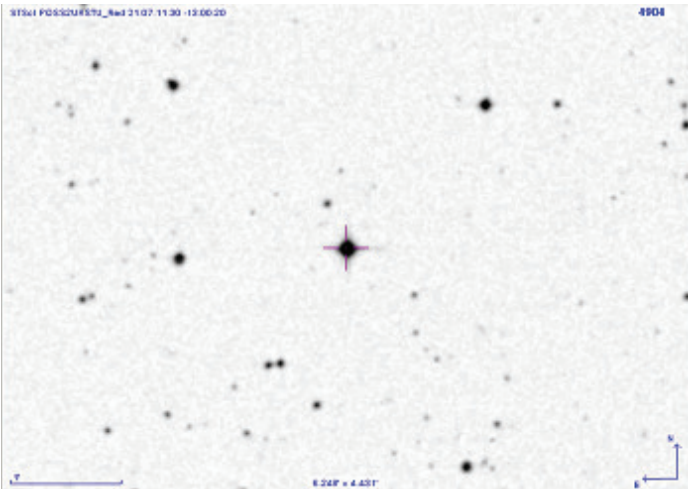
- 2MASS J21071201-1259554 (J-K = 0.93, V = 17.81, sep. 26")



**Figure 1.** - Periodogram analysis shows a strong peak corresponding to a period of 324 days. The APASS data nicely complements the data from the ASAS-3 and NSVS. J-K = 1.11

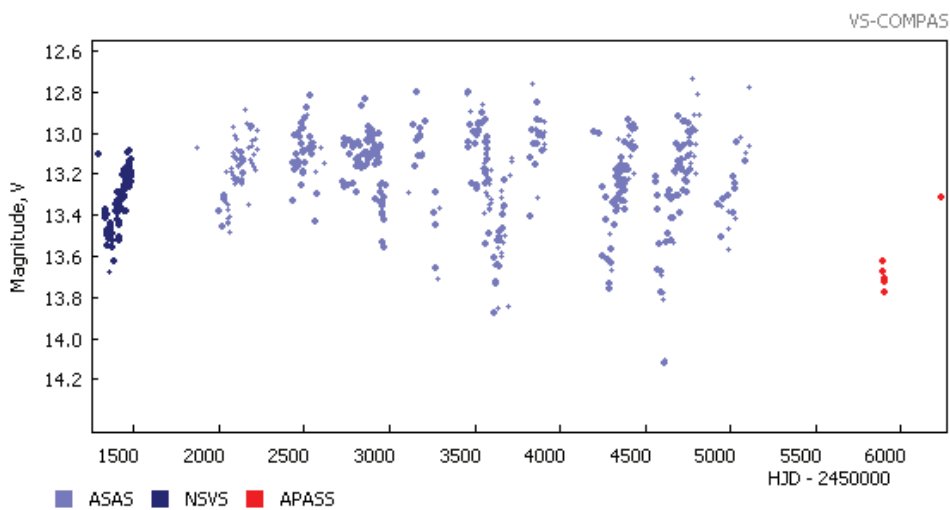
Performing a deblending procedure of the available photometric data for NSV 13538 was necessary to confirm the real magnitude range and fit the minimum between data sets taken from different surveys.

**Table 1.** – A short summary of NSVS 17231162 data with updated elements.



NSV 13538 = NSVS 17231162	
Constellation	Aquarius
Other Names	2MASS J21071127-1300203 ASAS J210711-1300.3 GSC 05779-01662 HV 6236 UCAC4 385-156313
Coordinates	21 07 11.28 -13 00 20.4 (J2000.0)
Mag. range	12.9 - 13.8 V
Epoch	24 May 2008 (HJD 2454611)
Period	324 days
Var. type	SR

*Appendix.* Table 1 provides a summary of the target star. The given epoch corresponds to a minimum of the Long Secondary Period (LSP).



**Figure 2.** - The light curve of NSV 13538, built of the combined photometric data from the ASAS-3, NSVS and the APASS surveys.

## References

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