NSVS 5907410 = MISAO V1119: a Mira variable confirmed

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Abstract: Details of a Mira variable in the constellation of Cygnus are presented. The variability of the NSVS 5907410 source was detected in January of 2012 by Ivan Adamin, based on photometric data from the Northern Sky Variability Survey, as a part of data mining project, the VS-COMPAS. Lately, by the time the star's data was finally analyzed in 2013, the object was identified as the Mis V1119 classified as possible semi-regular. Thus, a revision with actual data was submitted.

Mira variables named after the star Mira (*o* Ceti), belong to a class of pulsating variable stars characterized by very red colors, pulsation periods mostly between 100 and 800 days, and amplitudes greater than one magnitude in infrared and 2.5 magnitude at visual wavelengths by definition.

In this paper a revision of MISAO V1119 variable is presented. Initially, the star discovered by Seiichi Yoshida, MISAO Project; Nobuo Ohkura, Okayama, Japan; and Ken-ichi Kadota, MISAO Project.

During the candidates selection process in the constellation of Cygnus as a part of data mining activity performed by VS-COMPAS Project team in January of 2012, the source identified as NSVS 5907410 was considered a variable. Later, by combining MISAO data with the photometry from the *Northern Sky Variability Survey* the variability class was determined as Mira.
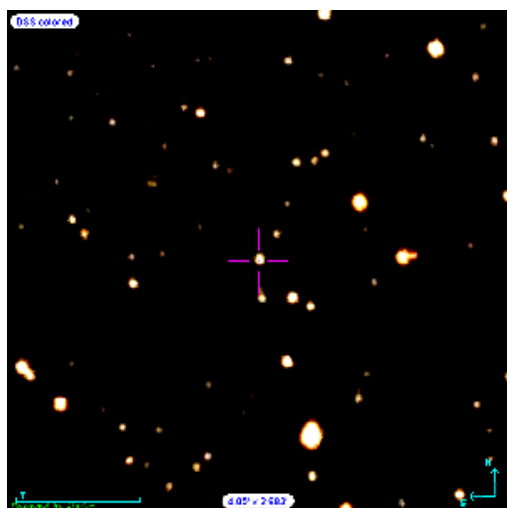

Figure 1. *– NSVS 5907410 and MISAO V1119 references to the same object*

The Northern Sky Variability Survey (Woźniak et al., 2004) has a moderate resolution, so there are cases when the source object for the photometric set is uncertain in the crowded fields. The pictures made by the MISAO clearly demonstrate that the object in the area referencing by NSVS 5907410 is the unique variable source among its neighbors.
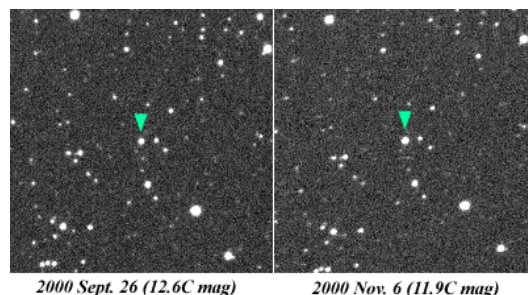

2000 Sept. 26 (12.6C mag)   *2000 Nov. 6 (11.9C mag)*

Figure 1a. *– MISAO comparison images proving the discovery of the variable star.*

Detailed analysis was made by Siarhey Hadon in November of 2013. Periodogram analysis of data for MISAO V1119 revealed a strong peak (cf. Figure 2) around a period value of 450 days. Photometric data points used were gathered by Nobuo Ohkura. This value has a good match with the blended NSVS data, for which a deblending was performed. Otherwise, the NSVS data is not enough to make a reliable decision about the proper period.
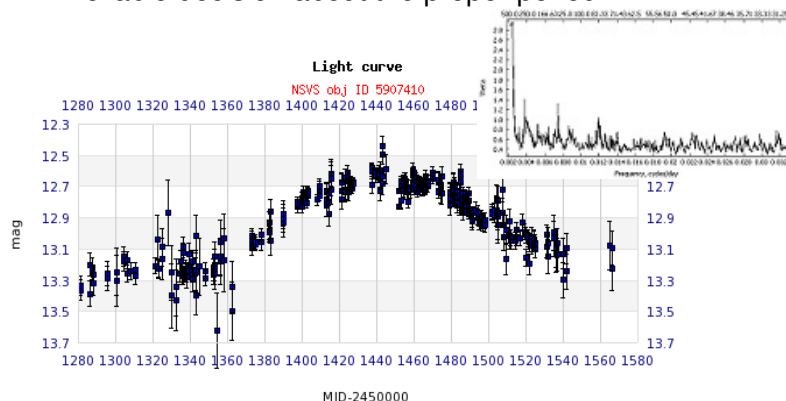

Figure 2. *– Photometry from the NSVS Survey has a good match with the periodogram for Misao V1119, based on data from the Misao Project*

The target star is in a crowded area, so the light curve data from the NSVS database was contaminated by the following non-variable neighbor stars:

2MASS J21255941+4149369 (J-K= 0.81, V= 17.4, sep. 14"),

2MASS J21255855+4150082 (J-K= 0.64, V= 17.3, sep. 19"),

2MASS J21255780+4150086 (J-K= 0.77, V= 17.5, sep. 23"),

2MASS J21260015+4149259 (J-K= 0.56, V= 16.3, sep. 27"),

2MASS J21255733+4150122 (J-K= 0.93, V= 17.3, sep. 29"),

2MASS J21255585+4149505 (J-K= 0.96, V= 14.5, sep. 35"),

2MASS J21255877+4149089 (J-K= 0.61, V= 16.0, sep. 41"),

2MASS J21260005+4149088 (J-K= 0.74, V= 17.2, sep. 43"),

2MASS J21255800+4149051 (J-K= 0.70, V= 16.9, sep. 46").

Performed deblending of the light curve data allowed to find the real magnitude range. Taking in to consideration other properties of the star and its color index, it was classified as a Mira variable. The revision is submitted to the VSX.

Below there is a phased light curve along with a short summary for the NSVS 5907410 is presented. This is a typical light curve for Miras (cf. Figure 3).

This research has made use of the SIMBAD and VizieR databases operated at the Centre de Données Astronomiques (Strasbourg) in France; of the International Variable Star Index (AAVSO), and of the Two Micron All Sky Survey (2MASS). Period search and analysis software is created by Andrey Prokopovich and Ivan Adamin, members of the VS-COMPAS data mining project.

Appendix. Table1 provides a summary data about the target star.
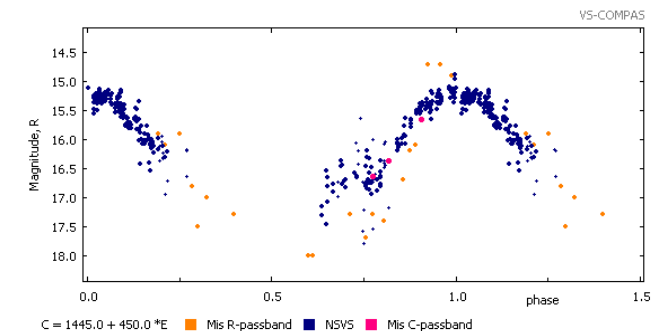

Figure 3. – *Generated phased light curve for NSVS 5907410. The period is 450 days. J-K = 1.98*

Table 1. – A short summary of the NSVS 5907410 object with updated elements.

NSVS 5907410 = MISAO V1119	
AAVSO UID	131755
Constellation	Cygnus
Other Names	2MASS J21255897+4149499 AKARI-IRC-V1 J2125589+414949 GSC2.3 N31P016928 UCAC4 660-096673 IRAS 21240+4136
Coordinates	21 25 58.98 +41 49 50.0 (J2000.0)
Mag. range	14.7 - 18.0 R
Epoch	23 Sep 1999 (HJD 2451445)
Period	450 days
Var. type	M

References

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