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New and confirmed RR Lyrae variables found in the NSVS and ASAS-3 databases

Sebastián A. Otero – CEA – Grupo Wezen 1 88 - varsao@fullzero.com.ar

Abstract:
A search for variable stars in the NSVS and ASAS-3 databases resulted in the discovery or confirmation of fifteen pulsating variables of the RR Lyrae type.

Methodology

The public data release from the Northern Sky Variability Survey (NSVS; Wozniak et al., 2004) was searched for variable stars using the SQL interface available from the Skydot website (http://skydot.lanl.gov/nsvs/nsvs.php). Stars were selected on the basis of a number of statistical criteria. The stars needed to have at least 60 data points, and a significantly larger standard deviation compared to the average value for their magnitude and the skewness calculated from a star's magnitudes had to be smaller than 1 (making it easier to find stars that spend more time at minimum than at maximum). Standard flagged data and data with the APINCOMPL mask set (Wozniak et al., 2004) were not taken into account during these calculations.
Also data for stars in the New Catalogue of Suspected Variable Stars (NSV) (Kukarkin and Kholopov, 1982) and its supplement (Kazarovets et al., 1998) were checked against the ASAS-3 database (Pojmanski, 2002) to confirm their suspected variability. When ASAS observations were available, the original unfiltered NSVS ROTSE1 magnitudes were shifted to match the ASAS-3 V magnitude of the stars. Periods were found with AVE (Barberá, 1996) and then refined using Microsoft Excel. More information about the data analysis can be found in Otero (2006).
The aim of this paper is to present and classify these stars. Further study will help improve these provisional elements.

Results

Table 1 gives positions and cross-identifications for all the variables. The first column gives the star's number in this paper. The following columns give the ASAS or NSVS identifier; the GSC number; a GCVS name if available and the star's position according to the NOMAD catalogue (Zacharias et al., 2005).

Table 1 – Positions and cross-identifications for the fifteen RR Lyrae stars studied.

Star Name				NOMAD position (J2000.0)
#	ASAS/NSVS ID	GSC ID	GCVS ID	
1	NSVS 61797	GSC 4619-1292	New	01 24 30.96 +85 01 07.2
2	ASAS 062340-6129.8	GSC 8894-1675	NSV 02959	06 23 39.52 -61 29 48.3
3	NSVS 710662	GSC 4539-0694	New	07 52 45.11 +81 19 51.7
4	ASAS 081957-2027.3	GSC 6005-4335	NSV 04007	08 19 57.02 -20 27 20.0
5	ASAS 090853-8429.2	GSC 9510-0353	NSV 04438	09 08 49.78 -84 29 12.5
6	ASAS 143930-3351.5	GSC 7304-0119	NSV 06747	14 39 29.75 -33 51 27.2
7	ASAS 191404-8601.4	GSC 9527-0793	NSV 11605	19 14 04.53 -86 01 25.4
8	NSVS 42609	GSC 4656-0461	New	19 40 41.54 +86 21 10.4
9	NSVS 1257504	GSC 4649-2160	New	20 29 32.08 +83 12 17.5
10	ASAS 210236+0634.9	GSC 0538-2553	NSV 13474	21 02 36.07 +06 35 00.6
11	ASAS 210917-7408.9	GSC 9333-1040	NSV 13531	21 09 17.43 -74 08 55.8
12	NSVS 119132	GSC 4603-0197	New	21 45 41.76 +77 56 33.6
13	ASAS 223648-0801.1	GSC 5811-1609	NSV 25929	22 36 48.11 -08 01 07.6
14	ASAS 224916-6630.7	GSC 9124-0981	NSV 14322	22 49 15.81 -66 30 41.2
15	ASAS 233531-6400.9	GSC 9129-1593	NSV 14629	23 35 31.13 -64 00 52.4

Table 2 lists the elements and data for the fifteen RR Lyrae stars found. The first column gives the star's number in this paper. The other columns give the brightness range of the variable; the passband of the observations (V for ASAS-V magnitudes and R1 for ROTSE1 magnitudes); the variability type; the period; the epoch of maximum light derived from the complete dataset; the number of observations used for the analysis; the time span of the observations and the J-K color from the 2MASS catalogue.

Table 2 – Elements and data for the fifteen RR Lyrae stars studied.

#	Magnitude range		Filt	Type	Period (days)	Epoch (HJD)	# Obs.	Time span (days) + years of obs.	J-K
	Max	Min							
1	11.48	11.68	R1	RRC	0.36697(5)	2451414.69(4)	77	138 (1999)	0.20
2	13.45	14.4	V	RRAB	0.474285(5)	2452967.75(2)	140	2007 (2000-2006)	0.11
3	11.88	12.04	R1	RRC	0.39275(1)	2451521.80(3)	643	359 (1999-2000)	0.17
4	13.55	14.4	V	RRAB	0.378807(4)	2452709.653(7)	135	2022 (2000-2006)	0.31
5	13.0	13.75	V	RRAB	0.577418(9)	2452032.49(2)	141	2013 (2000-2006)	0.31
6	13.3	13.8	V	RRC	0.344249(5)	2452498.53(3)	316	2178 (1999-2005)	0.20
7	13.15	13.95	V	RRAB	0.65231(1)	2452918.91(2)	465	1224 (2000-2004)	0.25
8	12.87	13.20	R1	RRC:	0.268250(15)	2451353.766(11)	104	260 (1999)	0.26
9	12.26	12.49	R1	RRC	0.214752(5)	2451322.84(1)	454	268 (1999-2000)	0.41
10	13.35	13.85	V	RRC	0.35610(1)	2453113.91(3)	330	2254 (1999-2005)	0.26
11	13.25	14.3	V	RRAB	0.579162(11)	2452055.835(15)	154	1259 (2000-2004)	0.34
12	13.45	14.0	R1	RRAB	0.56999(4)	2451337.86(1)	225	359 (1999-2000)	0.51
13	11.62	12.10	V	RRC	0.332914(1)	2451456.690(5)	381	1643 (1999-2003)	0.20
14	13.7	14.7	V	RRAB	0.607993(12)	2452088.905(12)	125	1277 (2000-2004)	0.39
15	13.85	14.9	V	RRAB	0.463350(9)	2453005.586(7)	113	1408 (2000-2004)	0.03

Notes and other cross-identifications for individual stars:

#1 – 2MASS J01243087+8501073 = UCAC2 50426777. Spectral type F0: in Skiff (2005).

#2 – BV 0930 = 2MASS J06233952-6129483 = UCAC2 04712511

#3 – NSVS 110128 = NSVS 749322 = 2MASS J07524506+8119516 = UCAC2 50418250

#4 – S 4093 = CSV 1274 = 2MASS J08195701-2027200 = UCAC2 23846265. Classified as S: in the NSV catalogue.

#5 – BV 0936 = 2MASS J09084981-8429123 = UCAC2 00110006

#6 – S 6590 = NSVS 18895527 = NSVS 18973883 = 2MASS J14392974-3351273 = UCAC2 17507759. Classified s E: in the NSV catalogue.

#7 – BV 0968 = 2MASS J19140448-8601253 = UCAC2 00054012

#8 – 2MASS J19404257+8621090 = USNO-B1.0 1763-0033118. NOMAD position comes from USNO-B1.0. 2MASS position is 19 40 42.58 +86 21 09.1 (2000.0). It might be ELL.

#9 – NSVS 34477 = NSVS 1311818 = 2MASS J20293208+8312175

#10 – HV 10656 = NSVS 14397043 = 2MASS J21023606+0635004. Classified as S in the NSV catalogue.

#11 – BV 1138 = 2MASS J21091742-7408556 = UCAC2 00920901

#12 – NSVS 1409529 = NSVS 1280277 = 2MASS J21454172+7756336

#13 – SVS 2667 = NSVS 14561893 = NSVS 17348394 = 2MASS J22364811-0801076 = UCAC2 29024201

#14 – BV 1349 = BPS-CS 22938- 21 = 2MASS J22491581-6630411 = UCAC2 02661698. Noted as an RR variable in Wilhelm et al. (1999).

#15 – BV 1353 = 2MASS J23353112-6400525 = UCAC2 03613706

Figures 1 to 15 show the lightcurves of all the RR Lyrae stars studied in this paper.

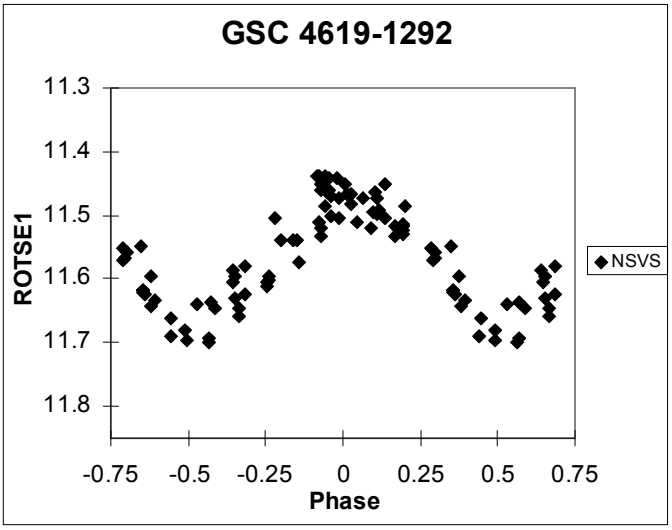

Fig. 1 – Lightcurve of GSC 4619-1292

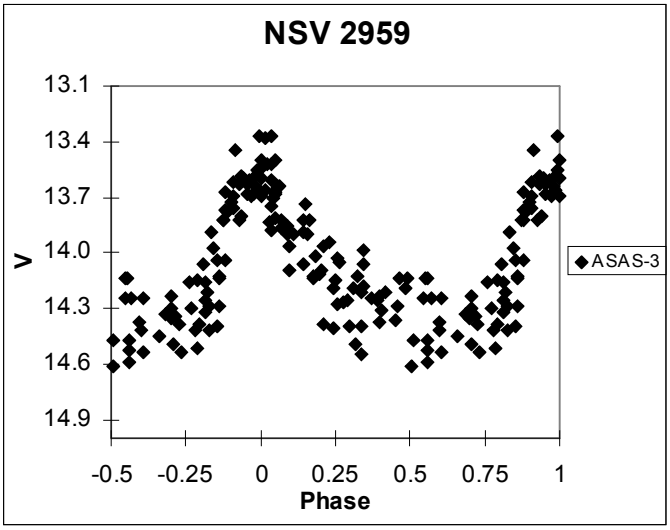

Fig. 2 – Lightcurve of NSV 2959

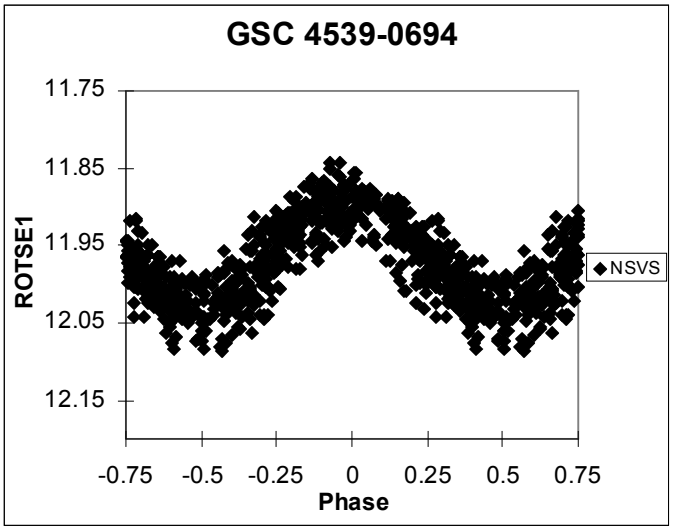

Fig. 3 – Lightcurve of GSC 4539-0694

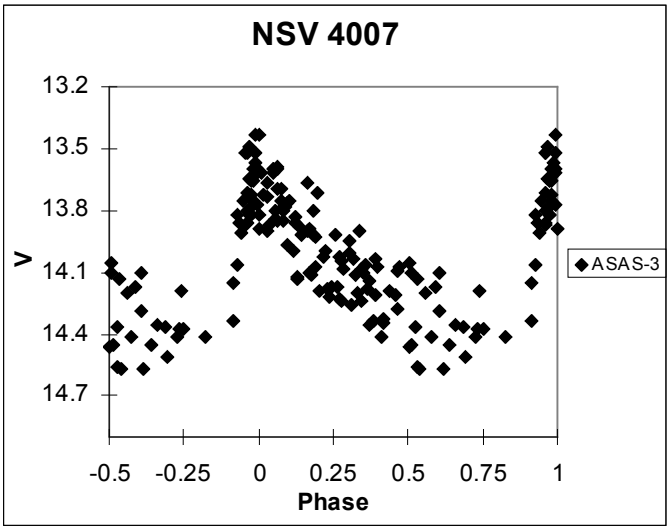

Fig. 4 – Lightcurve of NSV 4007

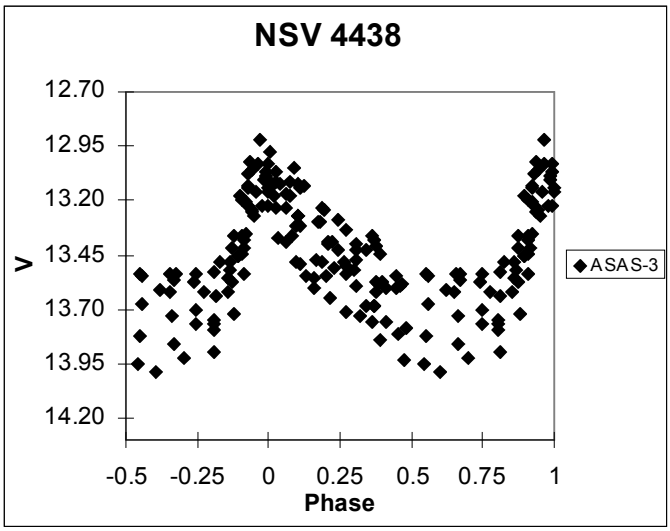

Fig. 5 – Lightcurve of NSV 4438

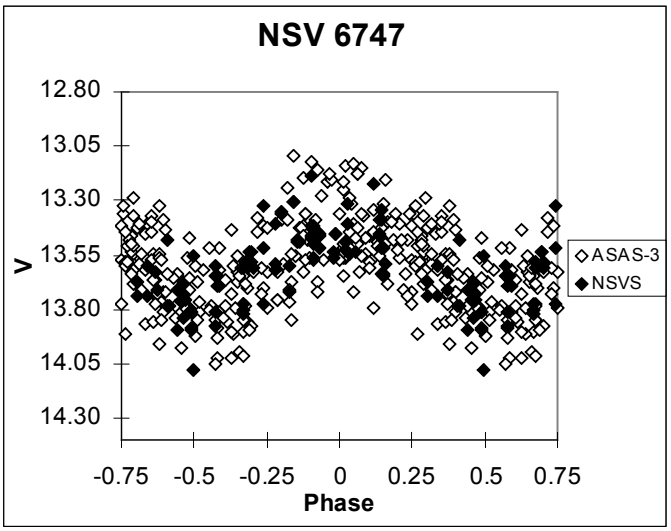

Fig. 6 – Lightcurve of NSV 6747

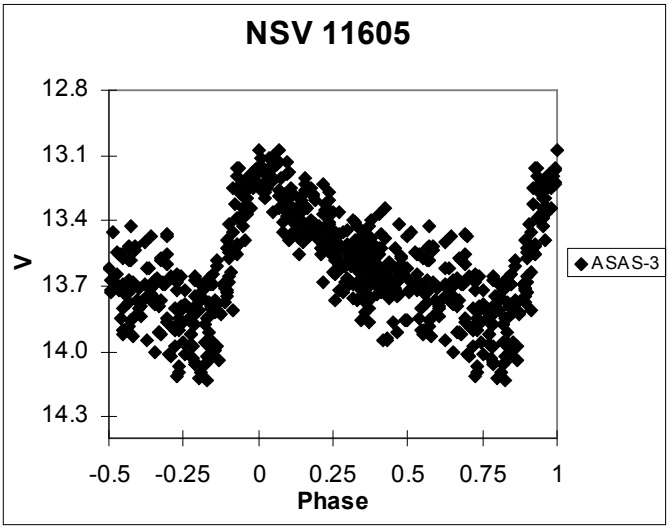

Fig. 7 – Lightcurve of NSV 11605

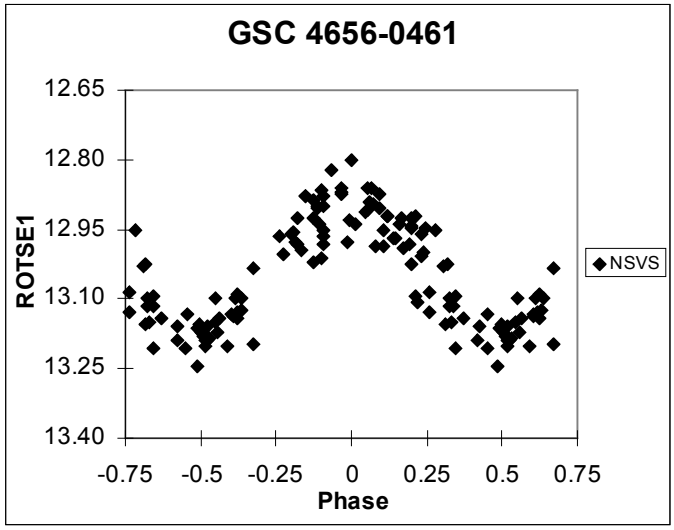

Fig. 8 – Lightcurve of GSC 4656-0461

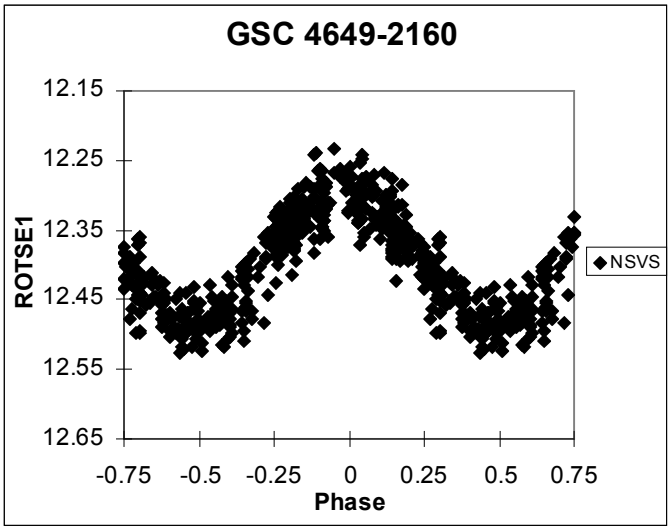

Fig. 9 – Lightcurve of GSC 4649-2160

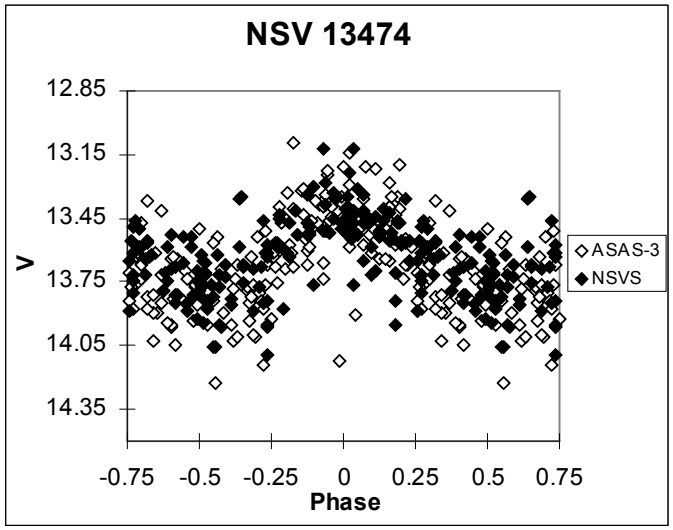

Fig. 10 – Lightcurve of NSV 13474

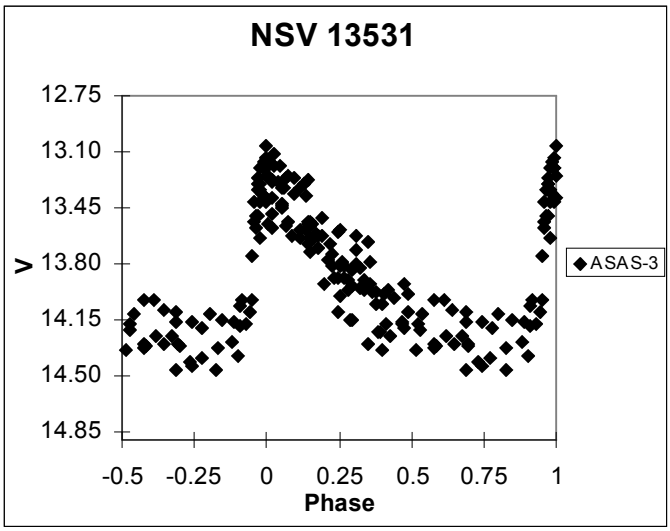

Fig. 11 – Lightcurve of NSV 13531

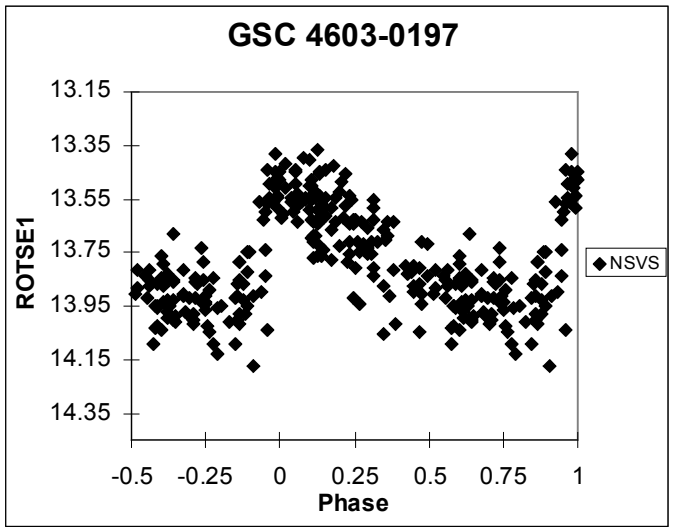

Fig. 12 – Lightcurve of GSC 4603-0197

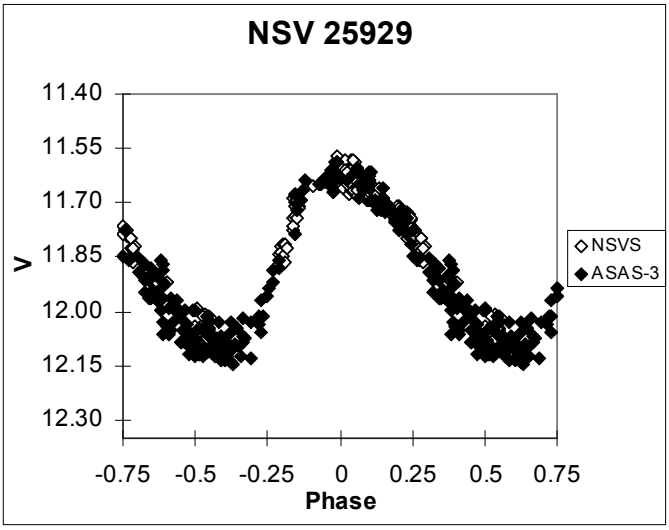

Fig. 13 – Lightcurve of NSV 25929

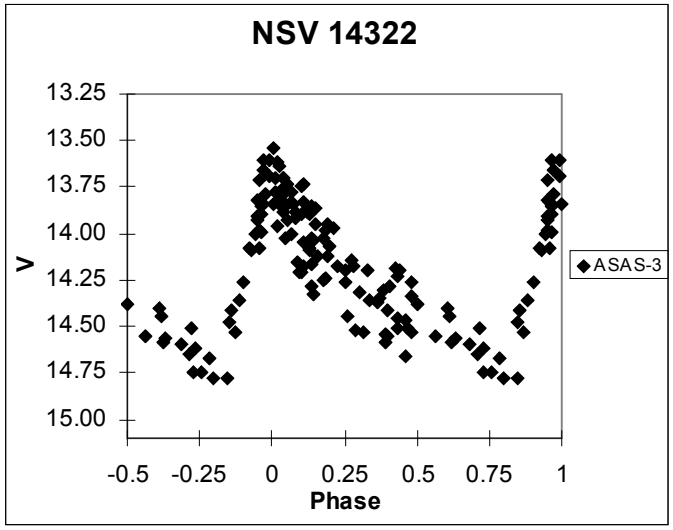

Fig. 14 – Lightcurve of NSV 14322

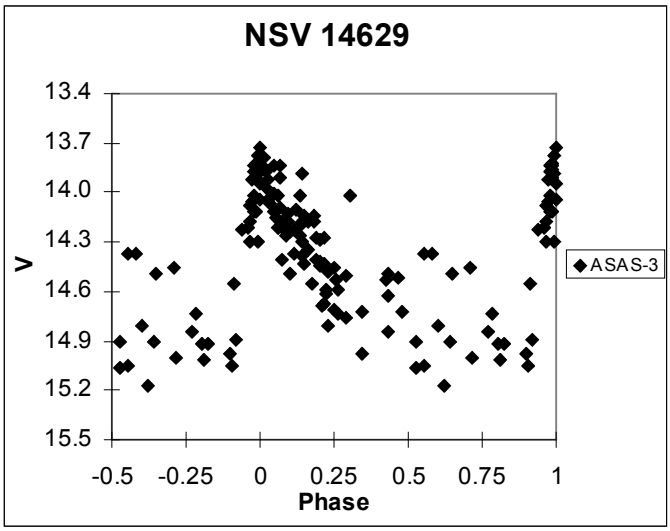

Fig. 15 – Lightcurve of NSV 14629

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