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New and confirmed delta Scuti variables found in the NSVS and ASAS-3 databases

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Abstract:
A search for variable stars in the NSVS and ASAS-3 databases resulted in the discovery or confirmation of five pulsating variables of the DSCT 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 (Pojmanski, 2002) and Hipparcos (Perryman et al., 1997) databases 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. Hipparcos observations have been transformed to V using a table by the author published electronically in IBVS No. 5482 (Otero, 2003). 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 five delta Scuti stars studied.

Star Name				NOMAD position (J2000.0)
#	ASAS/NSVS ID	GSC ID	GCVS ID	
1	NSVS 2121161	GSC 3733-1115	New	04 40 55.19 +53 38 06.6
2	ASAS 060748-4443.7	GSC 7623-1449	NSV 16787	06 07 46.99 -44 43 45.5
3	NSVS 13745	GSC 4638-0455	New	15 35 30.24 +85 37 39.0
4	ASAS 170758-3426.2	GSC 7369-0459	New	17 07 58.00 -34 26 12.3
5	NSVS 3434670	GSC 3986-1266	New	22 13 36.98 +55 44 27.7

Table 2 lists the elements and data for the five delta Scuti 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 five delta Scuti stars studied.

#	Magnitude range		Filt	Type	Period (days)	Epoch (HJD)	# Obs.	Time span (days) + years of obs.	J-K
	Max	Min							
1	10.69	10.90	R1	HADS	0.121596(1)	2451553.70(1)	301	252 (1999-2000)	0.37
2	6.74	6.78	V	DSCT	0.1167053(2)	2447951.300(6)	342	5682 (1992-2005)	0.18
3	12.15	12.53	R1	HADS	0.096605(2)	2451511.600(5)	177	122 (1999)	0.22
4	9.51	9.80	V	HADS	0.0837770(1)	2453096.878(2)	911	1749 (2001-2005)	0.26
5	11.20	11.35	R1	DSCT	0.148585(1)	2452617.476(5)	272	1309 (1999-2002)	0.27

Notes and other cross-identifications for individual stars:

#1 – 2MASS J04405518+5338066 = UCAC2 50142878

#2 – HD 42304 = HIP 29057 = CD-44 2444 = CPD-44 0793 = SAO 217729 = PPM 310432. Koen and Eyer (2002) give a period of 0.1167057 d. No type in the literature. Spectral type F0V (Houk, 1978).

#3 – 2MASS J15353035+8537389 = UCAC2 50428731

#4 – HD 154605 = CPD-34 6730 = PPM 748385. Wrong period of 0.100666 d. in the ASAS catalogue. Spectral type A5 (Kharchenko, 2001).

#5 – 2MASS J22133699+5544277 = UCAC2 50260644. Classified with very insufficient data as EW with a period of 0.22 d. by Lehky and Broz (2006).

Figures 1 to 5 show the lightcurves of all the delta Scuti stars studied in this paper.

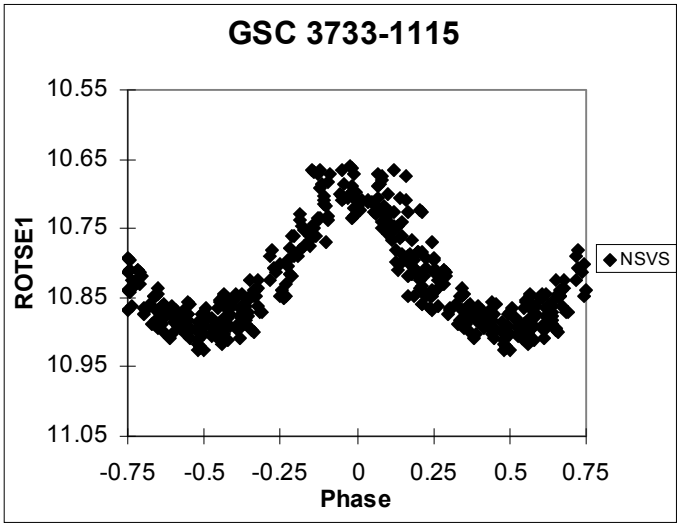

Fig. 1 – Lightcurve of GSC 3733-1115

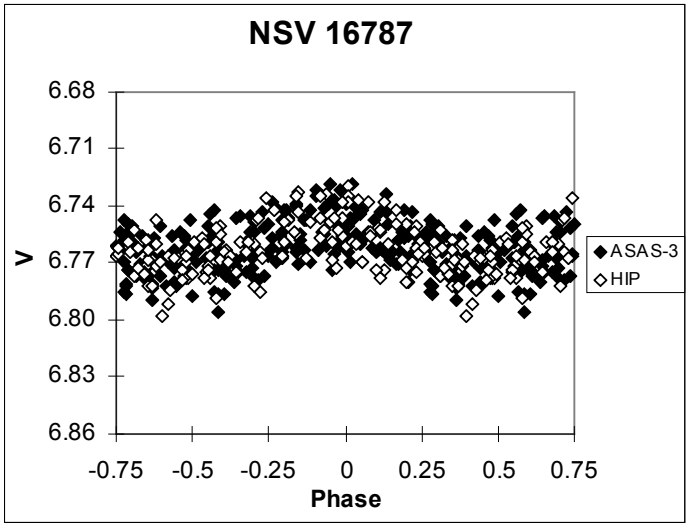

Fig. 2 – Lightcurve of NSV 16787

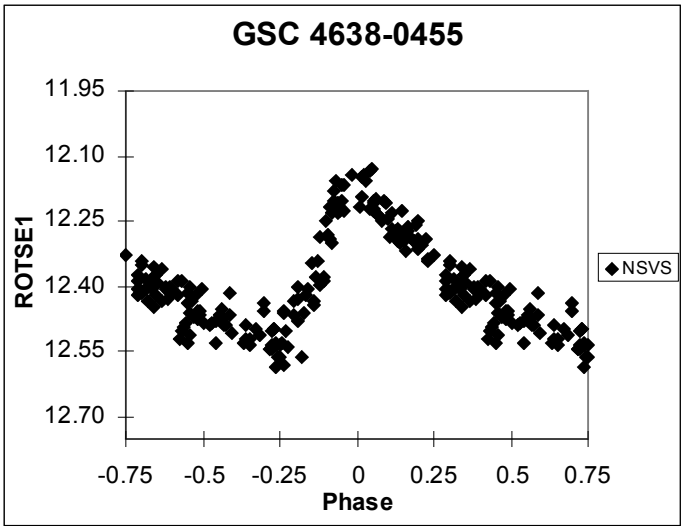

Fig. 3 – Lightcurve of GSC 4638-0455

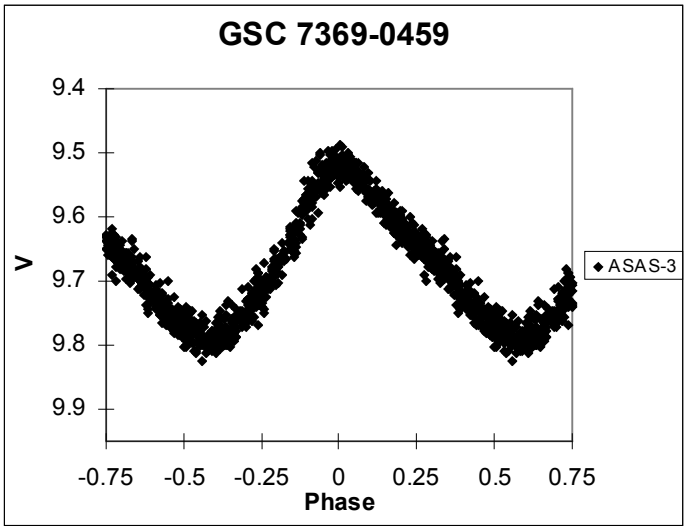

Fig. 4 – Lightcurve of GSC 7369-0459

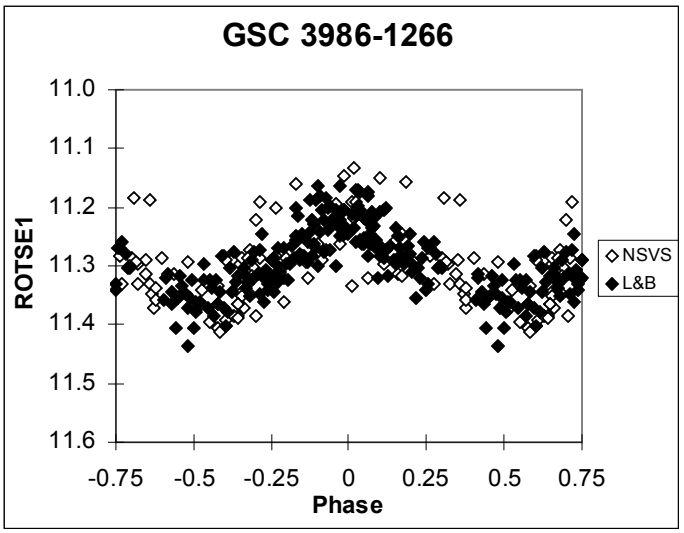

Fig. 5 – Lightcurve of GSC 3986-1266
NSVS and Lehky & Broz (L&B) data are shown.

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