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New GCVS Versions for Three Southern Constellations

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We are currently working on a version of the General Catalogue of Variable Stars (GCVS) revised taking into account the new data accumulated since the 4th GCVS edition. A draft new version will be released for each constellation as soon as the work for the constellation is finished. It will contain all stars of the 4th GCVS edition plus a complete catalogue of the stars added to the GCVS in the Name Lists of Variable Stars Nos. 67–78. Now we are ready for the first release, containing more than 1300 variable stars in the constellations of Antlia, Ara, and Telescopium. When preparing the release, we actively used modern data-mining possibilities to improve variability types and light elements. This paper introduces the first release of the new GCVS version and presents new results (types, light elements), based mainly on data mining, for 213 stars.

1 INTRODUCTION

The first three volumes of the 4th edition of the General Catalogue of Variable Stars (GCVS), containing information on our Galaxy's variable stars in all the 88 constellations, were published about 20 years ago (Kholopov, 1985ab; Kholopov, 1987). They contained more than 28 000 variable stars. Since then, about 12 000 variable stars have been added to the GCVS system via Name Lists of Variable Stars, regularly published in the Information Bulletin on Variable Stars. The electronic GCVS version available at the GCVS site (http://www.sai.msu.su/gcvs/gcvs/) contains all these stars, those of the 4th edition and those of the Name Lists published since (Nos. 67–78), but the data presented for the Name-List stars is incomplete. (It should be reminded that the coordinates of variable stars in the web GCVS version have been considerably improved compared to the original paper version; cf. Samus et al., 2006, and references therein.) For many GCVS stars of the main edition, new publications appeared, demanding changes in the astrophysical information provided by the GCVS.

At the recent General Assembly of the International Astronomical Union (IAU), the IAU Commission 27 "Variable Stars" and the IAU Division V "Variable Stars" discussed the future of variable-star catalogues. The variable-star community is facing serious problems because of the current flow of new automatic discoveries, usually not accompanied with a sufficiently thorough analysis of new results. Commission 27, on behalf of Division V, created an informal working group to discuss these problems and suggest a solution. Meanwhile, it was generally agreed that attempts to prepare a new GCVS version providing up-to-date information were desirable.

It is also obvious that the variable-star classification system used in the 4th GCVS edition should be revised for the new GCVS versions. One of us (N.N.S.) presented a

draft new classification scheme to the IAU Commission 27 (see http://www.sai.msu.su/gcvs/future/classif.htm). It was understood that we would tentatively use this draft scheme in our GCVS work, while the variable-star community would send us suggestions of its improvement.

2 RESULTS

As the first approach to the new GCVS version, we have looked into information available for the GCVS and Name-List stars in three southern constellations, Antlia, Ara, and Telescopium. Earlier, we already approached this task for the constellation of Telescopium and gained some experience in using data available online for improving the GCVS information; we published our results mainly for stars with no light elements in the 4th GCVS edition (Pastukhova et al., 2004). We also used data mining to derive light elements for 100 stars, most of them objects of the NSV catalogue (Kazarovets et al., 2005).

For the constellations of Antlia, Ara, and Telescopium, the most important source of online photometric information is the ASAS-3 survey (Pojmanski, 2002). Many stars in these constellations are contained in the ASAS-3 variable-star catalogue. We are not always satisfied with light curve solutions and period determinations of the ASAS-3 catalogue and sometimes attempted to improve these data. Moreover, for variable stars not in the ASAS-3 catalogue, it is often possible to derive data needed for the GCVS using ASAS-3 raw data. Unfortunately, during 2006, the ASAS-3 data were not completely accessible due to hardware problems in Poland. Additional information for some stars in Antlia could be found in the ROTSE1/NSVS data (Woźniak et al., 2004).

We prepared a complete new GCVS version for 1317 stars in the three constellations, "old" GCVS (4th edition) stars as well as stars named in the Name Lists Nos. 67–78 (the number 1317 does not include non-existing stars; stars having several GCVS names are counted once, in accordance with their main designations). For purposes of evaluation of the new classification system, a subversion using the new draft classification is available at the GCVS Internet site (http://www.sai.msu.su/gcvs/future/). In this subversion, two types are given for each star, according to the old and new classification system. Another subversion, with GCVS information revised but based on the GCVS (4th edition) classification scheme, has been introduced in the main online GCVS version, including data provided by the GCVS search engine.

The Table below contains those stars of the new-classification subversion where information (types, light elements) was significantly revised by us, primarily by means of data mining. The columns are traditional for the GCVS (with the exception that, for eclipsing binaries, the brightness in the secondary minimum is given in the Table rather than in Remarks). Asterisks after GCVS names refer to the short, most important Remarks given after the Table. More detailed remarks, with additional references, can be found at the GCVS site. Like in our earlier catalogues, an asterisk in the "$M-m$ or d" column means "$d = 0$".

Table. Revised Catalogue Data

Name		Type	Magnitude Range				MinII	Epoch, JD 24...	Period	$M-m$ or D
S	Ant	EC	6.27		6.83	V	6.80	52627.7968	0.6483489	
Z	Ant	Lb	8.5		10.5	V				
RS	Ant	M	11.4	<	15.0	V		52105	324	
RT	Ant	RR0	13.2		14.2	V		53870.597	0.552956	25
RX	Ant	M	10.6		14.5	V		52643	234	60
RY	Ant	SR	10.1		11.1	V			72	
RZ	Ant	SR	12.4		14.6	V		53503	232	
SS	Ant	RR0	12.8		14.2	V		53154.540	0.483725	25
SU	Ant	M	12.3	<	14.8	V		53145	335	
SV	Ant	M	11.8	<	14.6	V		53169	298	
TT	Ant	SR	12.7		13.6	V			90	
TY	Ant	SR	11.3		12.0	V			103	
TZ	Ant	SR	10.9		11.7	V		53431	99	
UU	Ant	EA	11.94		12.4	V	12.1	53474.6407	1.36411	14
UV	Ant	L:	12.2		13.1	V				
UW	Ant	SR	12.1		13.6	V			126	
UY	Ant	M	10.4	<	14.5	V		53432	297	
UZ	Ant	RR0	13.1		14.4	p		53965.8348	0.60032	28
VZ	Ant	M	11.1	<	14.4	V		53453	424	
WX	Ant	EA	11.25		12.95	V	11.6	51964.6801	3.8171	16
XZ	Ant	EA	9.65		10.75	V		53036.7096	7.150737	13
YY	Ant	Lb	8.74		9.4	V				
YZ	Ant	EA	10.48		11.54	V	10.56	52988.815	2.152391	14
ZZ	Ant	M	10.3	<	12.0	V		53433	221	
AB	Ant	Lb	6.6		7.1	V				
AD	Ant	M	10.4		14.7	V		53459	316	
AE	Ant	SR	8.8		10.7	V			258	
AH	Ant	SRd	8.40		8.8	V		53492	75	
AN	Ant	EC	8.21		8.34	V	8.26	52974.8389	3.681309	
AT	Ant	SR	8.1		8.6	V		53497	45.3	
AV	Ant	SR	7.5		8.3	V			84	
AW	Ant	SRd:	8.6		9.5	V			700 :	
AY	Ant	SRd	9.64		10.06	V			53.5	
BB	Ant	SR	8.1		9.0	V			122	
BD	Ant	M	11.1	<	15.0	V		53474	283	
BE	Ant	M	11.2		14.6	V		53476	201	
S	Ara *	RR0	9.92		11.24	V		52764.738	0.4518587	12
U	Ara	M	7.7		14.1	V		51981	224.6	44
RR	Ara	M	11.5		15.8	B		52542	204	
RS	Ara	M	10.1	<	12.2	V		52928	204.4	
RT	Ara	RV	10.2		11.3	V		51983.8	76.69	
RU	Ara	M	8.6		13.0	V		52868	256.8	
RW	Ara *	EA	8.85		11.45	V	8.91	52740.796	4.3674535	13
SS	Ara	Cst:	9.28			V				
SW	Ara	EA	12.5		15.9	p		53124.984	6.23796	13
SY	Ara	EA	10.50		12.11	V	10.60	53230.692	1.8566643	13 *
SZ	Ara *	SR	9.0		11.5	V		53097	221.8	
TU	Ara	M	10.4	<	13.7	V		53037	353	
UW	Ara	EA	9.48		10.40	V	9.53	52740.812	3.297015	11 *
UX	Ara	M	9.9	<	12.8	V			250 :	
UY	Ara	RV	10.5		11.4	V		52080.6	57.95	
UZ	Ara	EA	11.4		12.4	p		51955.840	1.5999079	11 *
WY	Ara	M	12.5	<	14.3	V		52889		
AH	Ara	EA	13.0		14.5	p		53191.746	1.00503	15 *
AS	Ara	SR	14.5		16.5	p		52753	257	
BD	Ara	M	12.7	<	15.0	V		52922	269	
BK	Ara	M	11.6		14.6	V		52192	206.1	45
BM	Ara	M	11.7	<	14.1	V		52082	231.2	
BS	Ara	M:	15.0	<	16.5	p		52846	256 :	
CC	Ara	M	12.1	<	15.0	V		52548	312	

Table (Continued)

Name		Type	Magnitude Range				MinII	Epoch, JD 24...	Period	$M-m$ or D
CH	Ara	M	9.7	<	13.4	V		52821	247.5	
CL	Ara	EC:	12.9		13.7	V	13.6	52129.544	0.414584	
DR	Ara	SR	10.8		12.7	V			196	
DU	Ara *	CW	11.73		12.46	V		52105.572	1.6406576	33
DZ	Ara	M	12.5	<	16.5	p		51968	161.8	
EP	Ara	M	13.5	<	16.5	p		52733	251	
ES	Ara	M	12.0	<	15.0	V		53133	289	
EU	Ara	SR	11.1		12.0	V			235	
EV	Ara	M	12.4	<	14.7	V		52713	260	
FO	Ara	RR0	12.7		13.7	V		52725.838	0.600222	16
FR	Ara	EA	11.8		12.6	V	12.0	52071.672	1.66864	16
FT	Ara	RR0	13.5		14.5	V		53144.852	0.78432	15
FZ	Ara	SR	13.1		15.0	V			168	
HH	Ara	M	11.4	<	14.5	V		52164	290	
HX	Ara	RR1	11.85		12.22	V		52699.869	0.219408	39
II	Ara	M	12.1	<	14.5	V		51843	223	
IN	Ara	RR0	12.32		13.6	V		52802.840	0.631489	17
IV	Ara	Lb:	12.9		14.1	V				
KM	Ara	SR	11.9		12.4	V			97 :	
KN	Ara	Lb:	11.4		12.0	V				
KP	Ara	SR	12.4		13.2	V		53129	277	50
KQ	Ara	Lb	13.2		14.1	V				
KR	Ara	SR	11.6		13.6	V		52907	204	
KS	Ara	Lb	12.2		12.8	V				
KT	Ara	M	12.5	<	16.1	p		53220	259	
KX	Ara	Lb	12.5		13.5	V				
LM	Ara	M	13.7		17.7	p		51954	250	
LN	Ara	M	11.8	<	14.6	V		52152	122.5	
LP	Ara	EC	10.0		11.0	V	10.4	51965.813	8.533069	
MM	Ara	EA	11.25		11.89	V	11.85	52102.592	2.556502	
MS	Ara	RR0	11.52		12.48	V		52918.610	0.5249875	25
NN	Ara	SR	11.9		12.8	V		53133	121.2	50
OW	Ara	EA	12.8		14.0	V		53067.894	2.7301	11
PQ	Ara	M	10.9	<	13.5	V		52038	329	
QV	Ara	RR	13.7		14.8	p			0.3180 :	
QY	Ara	M:	10.7	<	12.8	V		51970	261 :	
QZ	Ara	M	11.5	<	14.2	V		51963	390 :	
V341	Ara *	CV:	10.47		11.04	V				
V344	Ara	M	12.0		14.6 :	V		52753	245 :	
V357	Ara	M	14.0	<	16.5	p		52566	277	
V380	Ara	M	15.2	<	19.0	p		53242	228	
V382	Ara	SR:	12.5	<	14.2	V			99 :	
V388	Ara	M	13.0	<	16.3	p		52511	233 :	
V389	Ara	M	14.0	<	16.3	p		52461	455	
V404	Ara	M	12.5	<	16.3	p		53117	320	
V430	Ara	RR0	12.6		14.1	p		52820.551	0.528406	15
V432	Ara	M	12.7	<	15.0	V		53176	253.3	
V447	Ara *	EA	12.7		13.9	V		52027.729	1.35225 :	
V451	Ara	M	12.7		16.0	p		52854	350	
V454	Ara	EC	13.2		13.9	V	13.6	52088.600	0.81082	
V471	Ara	M	11.3	<	16.1	V		52416	279.7	20
V479	Ara	RR0	13.5		14.8	p		52736.761	0.55821	15
V482	Ara	E	12.9		13.9	V	13.2	53032.874	5.0864	
V491	Ara	EC	12.2		13.4	V	12.8	52732.844	0.940097	
V497	Ara	EA	13.3		14.8	V	13.4 :	52094.584	1.14086	12
V498	Ara	M:	13.1	<	14.9	V		53139	215 :	
V509	Ara	M	12.4		16.0	p		52743	500 :	
V511	Ara	M:	15.2	<	16.2	p		53139	290 :	
V514	Ara	SRd	13.5		14.6 :	V		52550	119	
V523	Ara	M	11.9	<	14.3	V		52403	201.2	25

Table (Continued)

Name		Type	Magnitude Range				MinII	Epoch, JD 24...	Period	$M-m$ or D
V524	Ara	SR	13.9		15.1	p			112	
V529	Ara	EA	13.0		13.7	V	13.2	52929.526	0.951954	14
V533	Ara	RR0	13.0		14.1	p		52406.737	0.567861	12
V536	Ara	EA	11.7		13.0	V	11.8	52923.570	2.374084	13
V537	Ara	EA	8.64		8.94	V	8.91	52861.711	1.874351	
V538	Ara	CW	12.3		13.9	V		52177.50	15.8612	28
V544	Ara	EA	13.3		14.0	V	13.8	53141.814	1.81635 :	
V561	Ara	M	12.5	<	15.0	V		52907	300	
V593	Ara	SR	11.6		13.6	V		53110	156.5	50 :
V609	Ara	SR	12.6		13.8	V		53163	162	
V617	Ara *	CW	11.49		11.97	V		52755.74	2.52203	30
V624	Ara *	SR	11.65		12.2	V		53043	294	
V625	Ara	Lb	12.0		12.3	V				
V630	Ara	SR	12.0		13.6	V			98	
V631	Ara	SR	11.4		12.6	V		53224	208	
V633	Ara	M	11.0	<	14.5	V		52907	223.3	
V638	Ara	M:	11.5	<	13.2	V		52097	194	
V639	Ara *	M	12.3		17.6	p		52792	312.5	
V643	Ara	M:	12.5	<	14.1	V		52716	249.3 :	
V644	Ara	Lb	12.8		14.4	V				
V649	Ara	SR	13.2		14.4	V		52157	172 :	
V662	Ara	RV:	11.5		12.5	V		52879.5	92.80	
V675	Ara	M	11.4	<	13.2	V		52795	193.6	
V684	Ara	SR	12.8		14.4	V		52785	132.6	45 :
V686	Ara	RV	12.7		14.1	V		52178.5	36.30	
V689	Ara	Lb	13.0		14.6	V				
V691	Ara	RV	11.3		11.9	V		53081	130.6	
V694	Ara	SR	13.0		14.0	V			164.5	
V696	Ara	SR	13.0		14.3	V		53159	127.8	50
V701	Ara	RR0	12.7		14.0	V		52821.568	0.55585	18
V706	Ara	Lb	13.0		14.0	V				
V708	Ara	SR	13.3		14.3	V			56.7	
V710	Ara *	SR	8.5		10.0	V			94.6	
V712	Ara	SR	12.5		13.3	V		52813	123	
V713	Ara	Lb	7.86		8.82	V				
V719	Ara	SR	12.8		14.0	V			77.0	
V725	Ara	SR	12.7		13.5	V			117	
V728	Ara	EC	13.0		13.6	V	13.5	52719.824	0.73464	
V729	Ara *	SR	10.0		11.5	V		52753	38.0	
V733	Ara	SR	12.3		13.7	V		52441	183	
V734	Ara	M	13.0	<	15.4	V		52758	314	
V738	Ara	Lb:	13.0		13.7	p				
V740	Ara	EC:	12.9		13.7	V	13.5	52751.696	0.37935	
V769	Ara	M	12.3	<	14.7	V		53278	307	
V771	Ara	M	10.8	<	14.2	V		52418	185 :	
V773	Ara	M	11.8	<	14.2	V		52548	275	
V776	Ara	M	12.6	<	15.0	V		52437	206	
V779	Ara	M	11.7	<	14.4	V		53125	188.1	
V786	Ara	RV:	12.6		13.7	V		52129	187	
V798	Ara	M	10.4	<	13.5	V		52415	273	
V810	Ara	SR	11.3	<	13.0	V			120 :	
V813	Ara	SR:	13.2		14.2	V			180 :	
V815	Ara	SR	12.1		12.9	V			55.2	
V836	Ara	E	7.47		7.65	V		53250.579	7.0337 :	
V865	Ara	SR	7.55		7.70	V			27.8	
V867	Ara	EC	7.40		7.60	V	7.57	52764.7376	0.4937123	
V870	Ara	EC	9.00		9.40	Hp	9.40	52031.780	0.399773	
V874	Ara	M	11.0	<	14.2	V		52475	265	
R	Tel	M	7.6		14.8	V		52979	467	43
V	Tel	SR	9.1		10.2	V			373	

Table (Continued)

Name		Type	Magnitude Range				MinII	Epoch, JD 24...	Period	$M-m$ or D
Y	Tel	SR	8.6		9.8	V			258	
RT	Tel	Lb	9.3		9.8	V				
RU	Tel	M	9.5		15.0	V		53866	273.3	
RV	Tel *	EA	10.3		12.0	p		51953.664	8.328119	10
SS	Tel	M	9.1		13.3	V		52566	416.5	45
SW	Tel	M	10.4		14.3	V		48719	228.2	
TY	Tel	M	10.5		16.0	p		52205	397	
UY	Tel	SR	13.3		14.7	V			133	
WZ	Tel	M	14.4	<	17.4	p		52032	394	
XZ	Tel	UG:	15.2		19 :	p				
AA	Tel	SR	12.5		12.9	V			105	
BO	Tel	CW	12.01		13.4	V		52102.6	14.81659	42
CC	Tel	M	11.8	<	15.0	V		53081	425 :	
CU	Tel	SR	12.0		12.5	V			255	
FF	Tel	E:	13.4		14.6	V		52922.570	0.3896	
FY	Tel	RR0	13.1		14.0	V		52751.756	0.67969	30
GQ	Tel	RR0	14.0		14.8	V		52909.648	0.65107 :	30 :
HO	Tel	EA	8.22		8.73	V	8.67	52202.506	1.613101	12
IS	Tel	EA	9.67		10.40	V	9.82	52985.526	1.152800	17
IT	Tel	RR0	13.5		14.6	V		53819.907	0.68769	20
IY	Tel	RR0	13.4		14.3	V		52548.646	0.55592	25 :
KL	Tel	EA	13.4		14.4	V		52884.771	1.6306	15 *
MV	Tel	RR1	13.5		14.3	V		52874.797	0.30330	50 :
MY	Tel	EC	13.2		14.1	V	13.5 :	52057.7643	0.55252	
NO	Tel	RR0	13.6		14.5	V		52053.798	0.61392	10
NV	Tel	EA	9.70		10.35	V	9.83	52179.524	3.544966	07
NX	Tel	SR	11.5		13.7	p		52924	277	
QW	Tel	EC	7.55		7.69	V	7.67	52445.656	0.411930	
QX	Tel	SRd:	8.62		8.78	Hp			28.3	
QZ	Tel *	EC	8.07		8.27	V	8.27	52831.746	1.0309913	
V339	Tel	SR	6.80		7.02	V			24.20	
V346	Tel	Lb	8.96		9.55	V				

Remarks. S Ara. Period varies, the given current elements are valid after JD 2441000. **RW Ara.** Changes of the shape of the light curve due to gaseous streams or to a hot spot are possible. **SZ Ara.** Period varies. **DU Ara.** Period varies. **V341 Ara.** The X-ray source 1RXS J165743.7-631237. Several periods were reported, they satisfy observations only during some time intervals. **V447 Ara.** A different solution of the ASAS-3 data was suggested in the literature. **V617 Ara.** Table 1 gives combined magnitudes with a nearby companion. **V624 Ara.** MaxII 11.9 at the phase 0.4. **V639 Ara.** V1 (NGC 6397). Cluster non-member. **V710 Ara.** Individual cycles have amplitudes from $0\overset{\mathrm{m}}{.}5$ to 1^{m}, the secondary cycle is about 750^{d}. **V729 Ara.** Type RV with a twice longer period is possible. **RV Tel.** $d = 0\overset{\mathrm{p}}{.}02$. **QZ Tel.** A visual double with $9''$ separation. According to Hipparcos data, the variability is probably due to the fainter, north-eastern (B) component. The variability range in Table 1 is for combined light.

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