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Electronic Version of the Third Volume of the General Catalogue of Variable Stars with Improved Coordinates

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Abstract—We present a new electronic version of the third volume of the fourth edition of the General Catalogue of Variable Stars (GCVS) that contains data on 13 855 variables in the constellations Pavo–Vulpecula. The Name Lists of Variable Stars from no. 67 to no. 77 were included in the new version. The main distinctive feature of the new version is that improved J2000.0 equatorial coordinates (including those for 6163 stars corrected for the proper motions) based on the identifications with positional catalogues using finding charts and on our new measurements are presented for 13 812 stars. We searched for a number of stars on original plates from the plate stacks of several observatories and using images from digital sky surveys. Apart from the complete update of the positional information, we made several corrections that were found to be necessary after the publication of the GCVS Volume III (1985) and several corrections of the information about the variability features based on photometry from currently available automatic sky surveys. A number of problem identifications are described in detail. The new version completes our long-term work on the complete revision of the positional information in the GCVS. In the Conclusions, we give a list of references to new Internet resources.

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INTRODUCTION

This paper completes the series of our publications on the new electronic versions of the volumes of the General Catalogue of Variable Stars (GCVS) with improved coordinates (Samus' et al. 2002, 2003; Papers I and II) and presents a similar version of the GCVS Volume III.

The new electronic version is based on the fourth GCVS edition (Kholopov et al. 1985–1988); its Volumes I–III contain data on 28 435 variable stars of our Galaxy (without including the named variable stars that proved to be nonexistent, e.g., minor planets taken for stars, artifacts due to repeated exposures of a plate, etc.). With the succeeding eleven Name Lists of Variable Stars (from no. 67 to no. 77) included, the number of named Galactic variable stars in 2003 exceeded 38 500. The standard accuracy of the variable star coordinates presented in all the printed GCVS editions since 1948 (to 1 s of time in right ascension and to 0.1 arcmin in declination, with a substantial fraction of the GCVS stars having coordinates still less accurate than this standard or just erroneous coordinates) does not meet the current requirements formulated in more detail in Paper I. Therefore, we set the objective of preparing a GCVS version with improved coordinates for all of the catalogued stars, where possible, that would also include their proper motions if they can be found in the existing positional catalogues. This paper completes the implementation of this program. When working on the new electronic version of Volume III, we set out to revise the information about the pattern of variability provided in the GCVS using, in particular, photometric data from currently available automatic sky surveys. A continuation of this revision will be an important objective of our future studies.

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THE CATALOGUE PREPARATION METHODS

The catalogue preparation methods were described in detail in Paper I. In general, they have undergone no changes. The possibilities for effectively identifying variable stars with positional catalogues continue to improve. In compiling the new version of the GCVS Volume III, apart from the sources listed in Papers I and II, we actively used such new catalogues as the Second US Naval Observatory CCD Astrograph Catalog, UCAC2 (Zacharias et al. 2004; more than 48 300 000 stars with significantly improved proper motions compared to the previous version) and the complete version of the all-sky 2.2 μm survey, 2MASS (Cutry et al. 2003, ~471 000 000 point infrared sources).

As previously, the SIMFOV code written and continuously improved by A.A. Volchkov until the last days of his life served as the main tool for visualizing astronomical catalogues and retrieving data from them. During our work on the electronic version of the GCVS Volume III, he made changes to the code that allowed us to perform identifications also with the complete version of the 2MASS catalogue and the UCAC2 catalogue. Recall that the code makes it possible to display a chart of the selected sky field on the required scale containing objects from catalogues of a given list and then to view it zooming in and out and to retrieve information contained in the corresponding catalogue for any image. This code enables automatic identifications of user lists with catalogues based on the coordinates with (or without) allowance for the coincidence of the magnitudes. It is possible to view images, retrieve information, and compare lists for the coordinates referred to any equinox. As before, we used published and unpublished finding charts of variable stars. For the GCVS Volume III, as previously for Volume II, the photographic finding charts of stars sent to the GCVS team in the 1960s by L. Plaut (the Netherlands), the discoverer of their variability, were of particular importance. Such charts are available for some 2000 variable stars in Sagittarius, a constellation in the GCVS Volume III.

As previously, in many cases, we recovered variable stars based on images from the Digitized Sky Survey (DSS; the Hubble Space Telescope Science Institute), the Aladin Sky Atlas (the Center for Astronomical Data, Strasbourg), and the US Naval Observatory Image and Catalog Archive, as well as plates from the plate collection of the Sternberg Astronomical Institute (SAI), the Harvard Observatory plate stacks, and other archives, to take into account the marks left by the discoverers on the plates of the Harvard stacks and the sketches in the discoverers' notebooks from the Harvard archive.

If a variable star was absent in the existing positional catalogues, we measured its coordinates on original plates or available digital sky images. This often had to be done also to determine the coordinates for variable components of visual double stars or for variable stars in clusters. However, the fraction of the stars for which we had to resort to this technique for Volume III was not very large primarily owing to the complete 2MASS catalogue invaluable for crowded star fields. Without this catalogue, the work in crowded fields of, e.g., Sagittarius in Volume III would have inevitably led to numerous mistakes, as was the case, in particular, with many identifications suggested by Kato (1999b).

We experienced certain difficulties when searching for variable stars discovered by Maffei (1975) in Sagitta, Sagittarius, Scutum, and Serpens. The formally accurate coordinates provided by this author are actually rough. The finding charts published much later by Maffei and Tosti (1999) improved the situation. Unfortunately, the latter paper contains quite a few inaccuracies, misprints, wrong charts, and discrepancies between charts and coordinates, which rules out unambiguous identifications in several cases.

We were able to find most flare stars in Pleiades (Taurus), although their discoverers often published overly rough coordinates and ignored the repeated recommendations of IAU Commission 27 urging publication of finding charts. We relied on the results by Stauffer et al. (1991) and Kazarovets (1993), who used the charts from Haro et al. (1982) for their identifications. Note, however, that, in several cases, the identifications based on the charts from Haro et al. (1982) raise doubts that we failed to remove.

As in our work on the first two GCVS volumes, we also made changes to the electronic version of Volume IV when finding omissions in the tables of identifications of variable stars with main catalogues (BD, CoD, CPD, HD, etc.). Having finished the preparation of the electronic version of the catalogue, we performed its automatic (by coordinates) identification with the GSC for checking purposes, as a result of which we revealed and corrected several errors, and its automatic (with subsequent verification) identification with the UCAC2 catalogue, which had not yet been available when we began our work on the new Volume III version.

In the last two years, access to such automatic sky surveys as ASAS-3 (Pojmanski 2002) and ROTSE-I/NSVS (Woźniak et al. 2004) has been provided. These surveys allow access to the original CCD observations that by no means always were used by the survey authors themselves for many relatively bright variables, predominantly of the northern (NSVS) sky and the southern (ASAS-3) sky. Observations from

the automatic surveys often allow one to confirm the variability of the stars suggested as identifications of GCVS objects and to check the GCVS information about the pattern of variability. We suppose that a detailed revision of the astrophysical information contained in the GCVS will be the next stage of our work on the catalogue. We published the first results of this new program obtained during our work on improving the identifications and coordinates for Volume III stars (Pastukhova et al. 2004; Antipin et al. 2005) for 75 variable stars in Telescopium and 49 variables in seven other constellations.

RESULTS

The electronic version of Volume II is accessible at ftp.sai.msu.ru/pub/groups/cluster/gcvs/gcvs/vol3/ or at www.sai.msu.su/groups/cluster/gcvs/gcvs/vol3/.

The main table (vol3.dat) in the new electronic version of the GCVS Volume III contains information about 13 857 objects (not counting the stars erroneously named for the second time or proved nonexistent) in the constellations Pavo–Vulpecula, which are mostly the variable stars of our Galaxy discovered and named by 2003, i.e., it covers the variable stars included in the fourth edition of the GCVS, with Name Lists nos. 67–77 (for the same constellations). Our version presents new equatorial J2000.0 coordinates (vol3_pos.dat) for 13 812 variable stars; for 6163 of these stars, the proper motions were taken into account; so far we have failed to determine accurate coordinates for 43 variable stars due to the absence of finding charts and the lack of information for star identifications. Recall that Papers I and II presented no accurate coordinates for 233 of the 24 068 stars in the GCVS Volumes I and II; since corrections were continuously made to this version, by the end of 2005, the number of GCVS Volume I and II stars without accurate coordinates was reduced to 157. In total, with the new identifications and the latest Name Lists included, our files contain accurate coordinates for 38 310 GCVS stars and also provide the proper motions for 16 046 of them. Among the variables that still remain without identifications, there are particularly many stars discovered in South Africa by R. Innes and H. Wood in the early 20th century. The paper by Gasperoni et al. (1991) occupies a special place: among the 35 variable stars whose discoveries were announced in this paper and that entered into the GCVS via Name Lists no. 71 and later, 25 stars could not be found, and the other ten identifications remain uncertain. All of the coordinates in this paper containing no finding charts are probably grossly in error.

A detailed description of the files can be found in the readme.txt file of the electronic version.

The file vol3.dat. The structure of the main table (vol3.dat) corresponds to that of the combined table in the 4th GCVS edition and the Name Lists (Kholopov et al. 1998; see also www.sai.msu.su/groups/cluster/gcvs/gcvs/iii/iii.dat). The differences between these tables are described in Papers I and II; here, we repeat the corresponding information with recently introduced minor changes for the convenience of users.

(1) In place of the B1950.0 coordinates, we provide new improved equatorial J2000.0 coordinates (right ascensions to within $0^s.1$ and declinations to within $1''$). The coordinates that could not be improved were recalculated from the old rough coordinates to equinox J2000.0 by applying a correction for precession.

(2) The latest Name Lists, up to no. 77, were included.

(3) We corrected all of the serious mistakes found in our GCVS work in other columns of the main table, in the references, and in the notes. For the stars having no published finding charts, but identified by us with the GSC, GSC2.2, 2MASS, the US Naval Observatory (USNO) A1.0/A2.0/B1.0, or UCAC2 catalogues, we now give the symbol of the corresponding catalogue (GSC, GSC2.2, 2MASS, USNO, UCAC2) as a reference to a finding chart.

The main table is presented in a form traditional for the GCVS, i.e., in order of constellations and GCVS variable star names. The table includes the following information: J2000.0 equatorial coordinates, variability types, magnitudes at maximum and minimum light, photometric systems of the magnitudes, epochs of minima or maxima, period of brightness variations, durations of the brightness rise from minimum to maximum or eclipse durations, spectral types, and references. For the stars from Name Lists nos. 67–77 appeared after the publication of the GCVS 4th edition, we provide not all of the columns of the table, but only the coordinates, variability types, magnitudes, and references; the missing data will be added to the 5th edition of the GCVS.

The file vol3_pos.dat. The positional information based on our identifications with main astrometric catalogues, on published data, or on our new measurements (see below) is provided for 13 812 variable stars of the new version of Volume III (including the stars of the Name Lists in the same constellations) in the table vol3_pos.dat. The order of stars in this table is the same as that in the main table. The table consists of the following columns.

(1) Star numbers in the system traditional for the electronic GCVS versions.

(2) GCVS star names.

(3) Improved equatorial J2000.0 coordinates (right ascensions to within $0^s.01$ and declinations to within $0''.1$).

(4) A flag indicating that the coordinates are actually rougher than the new accuracy standard of the catalogue, because we failed to determine or find more accurate coordinates in the source catalogues and journal papers. The flag is a colon (:) in the position following the coordinates.

(5) Proper motions (in arcseconds per year for both coordinates) to within $0''.001\ \mathrm{yr}^{-1}$.

(6) Epochs of the given coordinates.

(7) A flag indicating the uncertainty in identifying the variable star with the source catalogue (the question mark at the corresponding position).

(8) A brief designation of the astrometric data source. In several cases, the designation of a catalogue is followed by the symbol "+pm"; this implies that we took the star position for a certain epoch from this catalogue and reduced it to epoch 2000.0 using information about the proper motion of the star from a different source.

Below, we provide a list of the main catalogues and data sources used, roughly in order of preference in identifying variable stars. We considered the coordinates from several positional catalogues based on plates of Schmidt surveys and catalogues of comparable accuracy as being virtually equivalent. Only the catalogues that were used as the sources of accurate coordinates for the stars contained in the GCVS Volume III are listed.

Hip—The Hipparcos Catalogue (ESA 1997).

Tyc2—The Tycho Catalogue (Hög et al. 2000).

UCAC2—The US Naval Observatory CCD Astrograph Catalog (Zacharias et al. 2004).

PPM—PPM Star Catalogue, Positions and Proper Motions (Röser et al. 1991–1993).

AC—The Four-Million Star Catalogue (see Gulyaev and Nesterov 1992).

ACT—The ACT Reference Catalog (Urban et al. 1997).

FASTT—coordinates of variable stars (in the equatorial region of the sky) measured with the Flagstaff Astrometric Scanning Transit Telescope of the US Naval Observatory (Henden and Stone 1998).

GSC2.2—The Guide Star Catalogue, Version 2.2 (STScI 2001).

GSC—The Guide Star Catalog (Lasker et al. 1990).

A2.0, B1.0—A Catalog of Astrometric Standards (Monet et al. 1998; there are a few cases where the star could be found only in the previous version of the catalogue, they are marked as A1.0); The Whole-Sky USNO-B1.0 Catalog of 1,045,913,669 Sources (Monet et al. 2003).

2MASS—The Two Micron All Sky Survey (Cutri et al. 2003).

For 155 stars, the coordinates were measured by the authors using Digitized Sky Survey images, plates from various plate collections, or other images. The source of the coordinates is specified as "GCVS" in these cases. The coordinates taken from current astronomical periodicals are marked as "Lit."

We present a fragment of the table vol3_pos.dat as a guide to its content (the first 20 stars; Table 1). The table does not contain the star RW Pav, since we failed to identify it. The identification of ST Pav is flagged as uncertain. These two stars were discovered in South Africa in the early 20th century (see above).

The distribution of stars from the new version of the GCVS Volume III in sources of their coordinates is shown in the figure; the GCVS and Lit. sources and some of the catalogues used in a few cases were combined into a sector called "Others."

COMMENTS ON SOME OF THE PROBLEM STARS OF THE ELECTRONIC VERSION

Below, we make comments pertaining to individual stars of the GCVS Volume III. We do not set the goal of listing all of the complex cases that we encountered when working on our catalogue. It seems to us that the examples collected below give an idea of the typical problems that the compilers of the catalogue have to solve. The adopted coordinates and identifications for the stars described in the comments are presented in Table 2.

RR Phe. The identification in Demartino et al. (1996) is erroneous.

SX Pyx. Hoffmeister (1949, 1957) reported the discovery of this Mira star and published a finding chart, which is in agreement with the approximate coordinates provided by this author. There are no red stars in the place indicated by him, and we failed to find any variable objects in digital sky surveys. At our request, S.Yu. Shugarov found Hoffmeister's notes in the archive of the Sonneberg Observatory (Germany); it follows from them that the star was bright on the plate taken on February 3, 1938. However, there is no star at the position marked in the chart both on this plate and on other plates of the Sonneberg collection. We may be dealing with a defect that was subsequently removed from the plate; other explanations are not ruled out either. We did not include this star in the table.

IO Sge. Skiff (1997) correctly pointed out that this Mira star is not identical to G142–11, a neighboring red dwarf with a large proper motion, but his identification of the variable is also erroneous.

KY Sge. Contrary to Skiff (1997), the eastern rather than the western component of the close pair is variable.

Table 1. Fragment of the electronic table vol3_pos.dat

GCVS			J2000.0		p.m. (as yr^{-1})		Epoch	Source
610001	R	Pav	181252.97	−633657.3	−0.026	+0.014	2000.0	Hip
610002	S	Pav	195513.96	−591144.3	+0.017	−0.044	2000.0	Hip
610003	T	Pav	195043.48	−714617.3	+0.000	−0.005	2000.0	Hip
610004	U	Pav	205531.08	−624215.2	+0.002	+0.000	2000.0	Tyc2
610005	V	Pav	174318.94	−574326.3	−0.003	−0.006	2000.0	Hip
610006	W	Pav	175026.94	−622433.0	+0.007	−0.006	2000.0	Tyc2
610007	X	Pav	201145.85	−595612.8	+0.029	−0.010	2000.0	Hip
610008	Y	Pav	212416.74	−694402.0	+0.009	−0.007	2000.0	Hip
610009	Z	Pav	193527.89	−624533.0	+0.016	−0.044	2000.0	Tyc2
610010	RR	Pav	200652.51	−632428.1	–	–	1979.704	GSC
610011	RS	Pav	180722.00	−585742.0	−0.005	+0.001	2000.0	Hip
610012	RT	Pav	183630.53	−695306.1	+0.001	−0.012	2000.0	Tyc2
610013	RU	Pav	180727.34	−591453.6	–	–	1975.449	GSC
610014	RV	Pav	180933.96	−592721.6	–	–	1975.553	GSC
610016	RX	Pav	185824.55	−594625.3	+0.005	−0.011	2000.0	Lit.
610017	RY	Pav	200123.48	−565001.4	−0.013	−0.009	2000.0	Lit.
610018	RZ	Pav	174853.51	−584443.5	−0.002	−0.020	2000.0	Tyc2
610020	ST	Pav	210403.16	−651523.4	–	–	1983.229 ?	A2.0
610021	SU	Pav	201738.99	−600419.0	+0.009	−0.005	2000.0	Tyc2

LP Sge. The identification in Skiff (1997) is erroneous. Skiff's identifications are also erroneous for several other stars (e.g., LU Sge, LY Sge, LZ Sge, MO Sge, MU Sge, NW Sge), which we did not include in the table to save space.

V1340 Sgr and V1341 Sgr. This is a close pair of variable stars. Judging by the coordinates published by Gaposchkin (1956), the red variable Baade 228 = V1340 Sgr is the northern component of the pair, while the charts from Gaposchkin (1956, 1958) indicate that the RR Lyrae star Baade 71 = V1341 Sgr is the northern component. The colors of the candidates in digital sky surveys imply that the identification suggested by the charts is correct.

V1368 Sgr. It is erroneously marked in the photographic chart by Gaposchkin (1956), while the chart drawn by Gaposchkin (1958) is correct. It may well be that the variable's color information in Gaposchkin (1956) refers to the erroneous identification.

V1375 Sgr and V4108 Sgr. Gaposchkin (1956) reported that W. Baade discovered the variable Baade 238 (V1375 Sgr) that proved to be an eclipsing star with a period of $1\overset{d}{.}8681$. In its neighborhood, Blanco (1984) found an RRC star with a period of $0\overset{d}{.}427802$ that was subsequently designated as V4108 Sgr. The star Baade 238 in the photographic chart of Gaposchkin (1956) was probably added by hand; this image is south of V4108 Sgr easily identifiable on Blanco's chart. The detailed hand-drawn chart by Gaposchkin (1958) suffers serious distortions, but, in principle, it does not rule out the identity of the two variables. The original observations published by Gaposchkin (1958) do not satisfy the period suggested by him, but allow a period very close to that found by Blanco to be derived. Gaposchkin probably observed either Blanco's star itself or its neighbor

Table 2. Examples of the coordinates and identifications of problem stars

Star	$\alpha_{2000.0}$	$\delta_{2000.0}$	Epoch	μ_α	μ_δ	Source	Identifications
RR Phe	$23^h58^m44^s.1$	$-39°27'00''$	1977.711			GSC	GSC 8015.01695
IO Sge	19 09 51.6	+17 40 00	1997.531			2MASS	IRAS 19076+1734
KY Sge	19 13 48.2	+17 38 54	1997.531			2MASS	
LP Sge	19 14 43.8	+17 55 35	2000.231			2MASS	IRAS 19124+1750
V1340 Sgr	18 02 19.1	−30 09 28	1998.621			2MASS	
V1341 Sgr	18 02 19.0	−30 09 24	1958.297			GCVS	
V1368 Sgr	18 02 39.1	−29 48 34	1998.213			2MASS	
V1983 Sgr	18 25 57.9	−26 05 40	1998.547			2MASS	NSV 10773, GSC 6861.00198
V2062 Sgr	18 53 57.2	−23 16 21	2000.0	$+0''.024$	$+0''.002$	UCAC2	GSC 6860.01929, IRAS 18509−2320
V3643 Sgr	22 29 03.2	−43 29 01	1987.377			GSC2.2	
V3821 Sgr	18 26 23.3	−22 04 22	1996.697			GSC2.2	
V3841 Sgr	18 30 30.3	−20 02 52	1998.421			2MASS	GSC 6274.01147, IRAS 18275−2004, V3875 Sgr
V3846 Sgr	18 32 11.9	−22 02 54	1999.513			2MASS	IRAS 18292−2205
V3917 Sgr	18 18 47.5	−12 37 12	1999.333			2MASS	Serpens
V4108 Sgr	18 02 44.2	−29 48 44	1958.296			GCVS	V1375 Sgr
V4706 Sgr	18 01 30.2	−27 57 01	1999.508			2MASS	
V487 Tau	03 39 21.6	+23 50 01	1998.752			2MASS	
V501 Tau	03 42 28.0	+25 11 32	2000.0	+0.005	−0.004	UCAC2	
V634 Tau	03 44 44.5	+24 10 30	1999.962			2MASS	V393 Tau
V648 Tau	03 47 10.4	+24 57 19	2000.732			2MASS	
V802 Tau	03 51 51.1	+23 17 41	1997.824			2MASS	
V804 Tau	03 53 25.0	+23 37 51	1973.3			B1.0	Uncertain identification
V853 Tau	03 45 12.4	+22 41 51	1998.859			2MASS	
V859 Tau	03 46 31.3	+22 18 20	1998.881			2MASS	
V881 Tau	03 51 10.3	+24 24 08	1998.763			2MASS	
V1088 Tau	03 49 20.9	+24 33 25	2000.023			2MASS	
XZ Tel	18 28 53.2	−51 48 49	1976.339			GSC2.2	
BB TrA	16 16 43.6	−60 45 21	2000.0	−0.016	+0.002	UCAC2	
LM TrA	16 20 33.6	−68 34 16	2000.0	−0.023	−0.003	UCAC2	GSC 9273.01597, IRAS 16153−6826
XY Vel	11 04 58.9	−55 39 05	2000.0	−0.009	−0.002	Tyc2	Tyc2 8619 2253 1, GSC 8619.02253
CE Vul	19 32 57.8	+23 36 16	2000.0	+0.000	−0.000	UCAC2	
FS Vul	19 36 23.7	+27 10 08	1986.669			GSC2.2	
FT Vul	19 36 24.7	+27 09 39	1997.728			2MASS	GSC 2146.02575, IRAS 19343+2702
GR Vul	19 48 11.3	+27 03 07	2000.0	+0.004	−0.002	UCAC2	GSC 2147.00470
KY Vul	20 26 38.4	+28 45 13	1997.775			2MASS	IRAS 20245+2835
MO Vul	19 42 39.8	+19 52 59	2000.0	+0.002	−0.009	UCAC2	GSC 1610.00875
V339 Vul	19 11 12.3	+24 44 41	2000.337			2MASS	
V354 Vul	19 50 08.6	+22 32 18	2000.285			2MASS	IRAS 19479+2224

using Blanco's star as a comparison star; since the light curve is almost sinusoidal, it is difficult to choose between these two possibilities. In future, V4108 Sgr will be used as the main GCVS name of this star.

V1983 Sgr = NSV 10773. This Mira variable was independently discovered by Luyten (1937) and Hoffleit (1960). Hoffleit's coordinates are erroneous by 18^s in right ascension ($\sim$4 arcmin). The identity is confirmed by the agreement between the light elements for Luyten's star inferred from ASAS-3 observations and the elements published by Hoffleit (1960).

V2062 Sgr. A wrong star is marked in the discoverer's chart (Kooreman 1960). Our identification is confirmed by ASAS-3 observations.

V3643 Sgr. Antipin et al. (1994) could not find this variable discovered by Plaut (1971) using the photographic finding chart provided by the discoverer, on which the stellar field completely disagreed with the coordinates plaut published. Now we have been able to find the variable; its declination in Plaut (1971) was erroneous by almost 4°. Interestingly, roughly the same incomprehensible error was committed by Plaut for V3443 Sgr that was found by Antipin et al. (1994).

V3821 Sgr. The identifications by Predom and DeMartino (1991) and Kato (1999b) are erroneous.

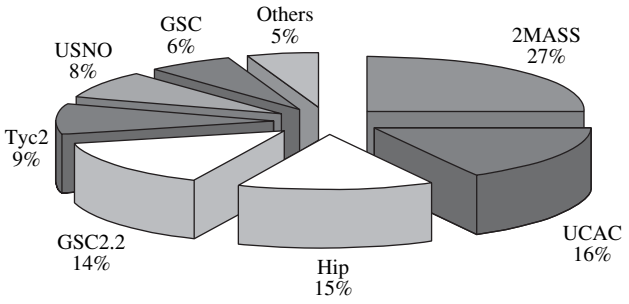
V3841 Sgr = V3875 Sgr. The coordinates given for V3875 Sgr by Hatfield (1972) proved to be erroneous by 8° in declination, and the chart she published is identical to that provided by Hoffleit (1972b) for V3841 Sgr.

V3846 Sgr. Since the discoverer's chart (Hoffleit 1972a) is inaccurate, the identification by Kato (1999b) is erroneous. We identified the variable using archival materials of the Harvard Observatory.

V3917 Sgr. This is an example of the difficulties involved in identifying some stars discovered by Maffei (1975). The declination published by the discoverer for this Mira star is outside the declination range for the remaining variables he discovered in the same field. Using the chart from Maffei and Tosti (1999), we managed to find the star very far from the published position (at 8° in declination and 3^m in right ascension). With the corrected coordinates, the star is in Serpens, it will be given a new name in the GCVS system (see the next section).

V4706 Sgr. The discoverers (S. Yoshida, http://www.aerith.net/misao/) identified it with GSC 6850.02516, but digital sky surveys reveal variability of the red companion $\sim 12''$ west of this star.

V393 Tau and V634 Tau. As the discoverers G.B. Ohanian and E.S. Parsamian explained at our request, we are dealing with the same star and that the erroneous coordinates given previously for V393 Tau in the GCVS resulted from a mistake in Haro (1968). In future, V634 Tau will be used as the main GCVS designation for this star.



Distribution of stars from the new version of the GCVS Volume III in sources of the presented coordinates.

V487 Tau. We adopted the identification based on the chart from Parsamian (1975) that differs from those suggested by Jones (1981) and Stauffer et al. (1991).

V501 Tau. The identification we adopted was suggested by Kazarovets (1993). It agrees with the chart from Haro et al. (1982) and differs from that adopted by Jones (1981) and Stauffer et al. (1991).

V648 Tau. The identification that we adopted following Kazarovets (1993) agrees with the chart from Haro et al. (1982) and differs from that adopted by Jones (1981) and Stauffer et al. (1991). Note that the color indices given for our candidate in star catalogues are not in perfect agreement with those expected for a flare star.

V757 Tau. The star's coordinates in Kazarovets (1993) and Stauffer et al. (1991) agree with the chart from Haro et al. (1982), but there is no star of suitable brightness in this place of the sky. We did not include this star in Table 2.

V802 Tau. We adopted the identification from Stauffer et al. (1991), which agrees with the chart from Haro et al. (1982). Kazarovets (1993) suggested an identification with the other component of the double star; in general, its brightness is in better agreement.

V804 Tau. The star's image was probably inaccurately added by hand to the photographic chart of Haro et al. (1982): there is no star of suitable brightness at the position given by Kazarovets (1993) and Stauffer et al. (1991). Our identification needs confirmation.

V853 Tau and V859 Tau. These two stars were mixed up in Borisova et al. (2003), where their accurate coordinates are given.

V881 Tau. The identification in Kazarovets (1993) seemed preferable to use compared to that suggested by Stauffer et al. (1991).

V956 Tau and NSV 16149. For the variable stars discovered by Hojaev (1984), we had the photographic finding chart sent by this author, without which the identifications of faint stars based on the discoverer's very rough coordinates would be impossible. Unfortunately, not all of the stars discovered by Hojaev (1984) are marked in the chart. The declination of the star GSC 1830.01668 labeled in this chart as the flare variable B27 (V956 Tau) differs by about 25′ from that published by Hojaev. Its precise coordinates ($04^h42^m25\overset{s}{.}3$, $+24°22'04''$, J2000.0) roughly correspond to the approximate coordinates published in the same paper for another flare star, SB27 (NSV 16149). The dates of flares do not coincide for these two variables. We hesitated to attribute the above coordinates to V956 Tau or NSV 16149. V956 Tau was not included in Table 2.

V1088 Tau. We adopted the identification based on the chart from Parsamian (1976), which differs from that suggested by Jones (1981).

XZ Tel. The star's variability was discovered by Shapley et al. (1939). They deemed the star to be a somewhat unusual long-period variable and gave a period of 310^d; as follows from their data, the brightness at maximum is $15\overset{m}{.}2$ pg, while at minimum the star is fainter than $16\overset{m}{.}2$ pg. We reliably identified the star using archival data of the Harvard Observatory. It was bright on six 1934 plates, near JD 2427659, and on five 1935 plates. The object was not recorded in the 2MASS catalogue and is evidently blue. Its brightness at minimum is probably about $20^m B$, although a brightness of $16\overset{m}{.}8$ B was recorded at the epoch of the GSC2.2 catalogue (1976.339). It is highly probable that the star is a dwarf nova.

BB TrA and a new red variable. We identified the Mira variable BB TrA using archival materials of the Harvard Observatory. When searching for it, another red variable star, IRAS 16124−6036 ($16^h16^m45\overset{s}{.}9$, $-60°44'20''$, J2000.0), very bright ($K_S = 6.282$) in the 2MASS catalogue, was found in its immediate neighborhood. Judging by the images in digital sky surveys and the magnitudes in the USNO-B1.0 catalogue, its R-band variability ranges at least from 14.6 to 16.2.

LM TrA. The variability of this Mira star was discovered by Luyten (1933) and, independently, by Goossens and Waelkens (1980). The equinox given for the coordinates in the latter paper is erroneous, and the star is inaccurately marked in the founding chart. This led to an erroneous identification in López and Girard (1990).

XY Vel. The discoverer, Hertzsprung (1924), identified this eclipsing variable with CoD−54°3951 and did not publish a finding chart. In our opinion, the designation CoD−54°3951 refers to a different star (Tyc2 8619 2338 1). Our identification is confirmed by ASAS-3 data, which give an excellent light curve with Hertzsprung's light elements, although, as of October, 2005, the authors of the ASAS-3 survey did not find this variable.

UU Vul. The discovery of the star's variability based on six plates, on only one of which the star was $2.5–3^m$ brighter than on the remaining plates, was reported by Wolf (1924), who published its coordinates with a formal accuracy of 1″. There is no star of suitable brightness at the position given by him. Cannon and Mayall (1949) deemed the variable to be identical to the star HDE 352712 (F0). Tsesevich (1977) pointed out that this identification was groundless, but it had been reproduced in the SIMBAD database until February 2005. We failed to find the bona fide UU Vul and did not include it in Table 2. An error in the coordinates published by Wolf (1924) is probable.

CE Vul. The discoveries of two variable stars in this region of the sky were reported. Ross (1927) found the variable Ross 255 from two photographic plates on which its brightness differed by approximately 1^m. Gengler (1928) reported the discovery of a short-period star, AN 237.1928, almost exactly at the same position and published a finding chart. Although Morgenroth (1936) argued that he managed to rediscover both variables, they are considered identical in the GCVS. We found Gengler's star; its identification is confirmed by ROTSE-I/NSVS observations, which satisfy the light elements given by Tsesevich (1971) for this RR Lyrae variable. It is this star that is presented in the table as CE Vul. Despite the presence of several interesting candidates in this region (the very red star NSV 12138 and the source IRAS 19307+2330 with detected infrared variability), we could not find a second star of clearly variable brightness using images from digital sky surveys or observations from automatic photometric surveys.

FS Vul. Different stars are marked in the charts from Wachmann (1961; comparison star d for FT Vul = HBV 245) and Wachmann (1964; HBV 356). We confirmed the identification suggested by Skiff (1999a) by rediscovering the star's variability using plates from the SAI plate collection.

FT Vul. The star's identification with GSC 2146.01843 (Skiff 1999a) is erroneous.

GR Vul. The coordinates by Wachmann (1963) are correct, while the chart is erroneous, which led to an erroneous identification in Skiff (1999a). Our identification is confirmed by ROTSE-I/NSVS observations.

KY Vul. The identification by Kato (1999a) is erroneous.

Table 3. List of GCVS stars in wrong constellations

GCVS	$\alpha_{2000.0}$	$\delta_{2000.0}$	Constellation
SX Ant	$09^h27^m24\overset{s}{.}6$	$-29°27'19''$	Pyx
V597 Aql	18 58 41.5	−06 42 11	Sct
V1500 Aql	18 58 10.3	−05 44 59	Sct
BG Aur	05 09 38.5	+28 39 27	Tau
SU CVn	12 06 05.1	+44 07 39	UMa
VY Cap	21 09 00.9	−14 27 23	Aqr
V577 Cen	11 56 49.7	−35 40 35	Hya
R Cep	18 11 19.2	+88 59 25	UMi
CY Cep	23 20 09.2	+63 01 23	Cas
V683 Cyg	21 57 32.6	+44 10 20	Lac
V1523 Cyg	20 42 48.8	+55 19 36	Cep
WX Eri	03 24 23.2	−00 42 15	Tau
QV Her	18 15 11.0	+32 29 27	Lyr
IP Hya	14 18 47.4	−30 05 03	Cen
RR Hyi	01 05 19.4	−81 52 35	Oct
T Lac	22 22 23.4	+34 24 51	Peg
T Leo	11 38 26.8	+03 22 07	Vir
HK Lup	16 08 22.5	−39 04 46	Sco
EG Nor	16 22 11.7	−61 15 55	TrA
SW Oct	22 20 55.8	−74 15 12	Ind
V392 Pav	21 32 30.3	−73 53 35	Ind
HI Peg	23 09 20.4	+07 14 53	Psc
CT Per	02 11 34.5	+59 06 05	Cas
VV Pyx	08 27 33.3	−20 50 38	Pup
MX Sge	19 17 56.7	+15 47 17	Aql
V1024 Sgr	18 51 13.2	−15 44 02	Sct
V1049 Sgr	18 58 27.4	−13 52 00	Sct
V1050 Sgr	18 58 33.7	−13 54 58	Sct
V3917 Sgr	18 18 47.5	−12 37 12	Ser
Y Sco	16 29 26.4	−19 20 51	Oph
V384 Sco	18 01 43.3	−35 39 28	Sgr
V1124 Sco	17 23 15.4	−30 07 23	Oph
CZ Sct	18 58 45.8	−05 57 05	Aql
EK Tau	05 49 25.2	+19 49 15	Ori
ER Tau	05 11 11.8	+29 38 21	Aur
ES Tau	05 29 24.9	+28 45 52	Aur
AS TrA	16 13 35.1	−60 13 16	Nor
BM Vul	21 30 40.7	+25 07 59	Peg

MO Vul. Skiff (1999b) gave correct coordinates, but the GSC number he suggested actually refers to V1088 Aql.

V339 Vul, V354 Vul. The identification by Skiff and Williams (1997) is erroneous.

THE VARIABLES TO BE RENAMED

Having improved the coordinates for the stars of the entire catalogue, we can reveal all of the cases where the GCVS identifications do not agree with the constellation in which the star is actually located. Such cases may result from an improvement of the star's coordinates, changes of the constellation boundaries (for the variable stars named before the introduction of the current boundaries by the International Astronomical Union), and previously made mistakes in defining the constellations from tables. Constellation mismatch was found for 38 GCVS stars (Table 3); they will receive their new main GCVS names in one of the next Name Lists of variable stars, while the old names will remain as historical ones, not to be given to other stars to avoid confusion.

CONCLUSIONS

Below, we list the Internet addresses corresponding to the new resources presented in this paper.

The version of the GCVS Volume III with improved coordinates is accessible at

ftp://ftp.sai.msu.ru/pub/groups/cluster/gcvs/gcvs/vol3/

or

http://www.sai.msu.su/groups/cluster/gcvs/gcvs/vol3/.

Copies of all GCVS files are also accessible at

ftp://ftp.sai.msu.su/pub/gcvs/

or

http://www.sai.msu.su/gcvs/.

These addresses will be used as the main ones in future.

The improvements of the GCVS made in the new version of Volume III were incorporated in the catalogue's search system at

http://www.sai.msu.su/groups/cluster/gcvs/cgi-bin/search.html.

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