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Variable Stars

THE GENERAL CATALOGUE OF VARIABLE STARS: FROM P. P. PARENAGO TO THE PRESENT PERIOD

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The GCVS (General Catalogue of Variable Stars) project, initiated, on behalf of the IAU, by P. P. Parenago and B. V. Kukarkin in the fourties, is now facing the necessity of serious changes because of the present scientific and administrative situation. Probably the most important directions of future work are: determination of accurate coordinates for known variables; development of an improved classification of variable stars; development of a data base for known variables with public access.

KEY WORDS Variable stars, catalogs, classification, positions

The first catalogues of variable stars (in fact, very short lists) were compiled and published in the 18th century. By the end of the 19th century, active photographic work, especially at Harvard Observatory, had led to a very rapid increase in the number of known variables. In the twenties of the present century, the variable star commission of the *Astronomische Gesellschaft* initiated publishing, every year, catalogue of variable stars with ephemeris of periodic stars for the coming year. This important project was started by the famous variable star expert R. Prager; after his emigration from Nazi Germany, it was followed by H. Schneller. The last German catalogue of variables, for 1943, contained 9476 stars.

After the second World War, the International Astronomical Union decided to redistribute several projects of general importance for the astronomical community, earlier based upon German scientific groups, among researchers in other countries. Two projects, according to that decision of the IAU Executive Commitee, moved to the Soviet Union. One of them was Ephemeris of Minor Planets, now being regularly compiled by the Institute of theoretical Astronomy in St. Petersburg. The second project was the Variable Star catalogue. Two groups in Moscow, at the Sternberg Institute and at the Academy of Science, were made responsible for it.

The choice of the IAU was well grounded. From the 1930s, P. P. Parenago and B. V. Kukarkin continued compiling a very detailed card catalogue of variable stars containing all information necessary for a really good variable star catalogue.

In 1948, the first *General Catalogue of Variable Stars* (Kukarkin and Parenago, 1948) was published. It contained 10 820 stars. From the very beginning, the Russian GCVS team decided not to publish yearly catalogue, but to prepare a major edition once every few years, with a number of supplements published in between and containing only stars for which important changes in our knowledge had occurred. The GCVS must contain only sufficiently well-studied reliable variables, so it must be accompanied by catalogues of suspected variables, also issued with some regularity. The preparation of such catalogues was also initiated in Moscow (Kukarkin *et al.*, 1951).

Since the 1940s, the GCVS project has been led by P. P. Parenago (1906–1960), B. V. Kukarkin (1909–1977), P. N. Kholopov (1922–1988). These outstanding scientists contributed a great deal to our knowledge of variable stars and organized a good team of researchers, until now active at the Sternberg Institute and at the Institute of Astronomy.

The fourth edition of the GCVS (Kholopov, 1985a, b, 1987; Samus, 1990, 1995), consisting of five volumes and recently finished, has a rather unlucky history. Its preparation was started still under B. V. Kukarkin; two editors died in the process of its preparation. The author team had to change plans and even the sequence of the volumes (the present Volume IV was originally intended to be the final volume). Volumes I–III contain the main cataloge of 28 435 galactic variable stars. Reference tables (the most important among them are cross-identification tables, making it possible to find the GCVS name for any variable from the principal astronomical catalogues, like BD, CoD, CPD, BS, HD, etc.) are presented in Volume IV. Volume V is our first attempt to present a catalogue of extragalactic variable stars; it contains data on 10 979 variable stars in 35 external galaxies, as well as on 984 extragalactic supernovae or suspected supernovae. For reasons of tradition, only variable stars in galactic globular clusters are still outside the GCVS; the last catalogue of such stars appeared almost 25 years ago (Sawyer Hogg, 1973). Variables in globulars are not very numerous, but, for most of them, sufficiently accurate equatorial coordinates are not available. This definitely leads to rather frequent cases of confusion between the GCVS and the catalogue of globular cluster variables, which may be revealed in the process of astrometric work on variable stars in globulars. Presently we are undertaking a serious effort to have equatorial coordinates in a modern system, with an accuracy sufficient for identifications of globular cluster variable stars (see, for instance, Evstigneeva *et al.*, 1994, 1995; Shokin and Samus, 1996).

The fourth edition of the GCVS is available in printed form as well as in electronic form from international data centres or directly from the Sternberg Institute (by ftp).

In 1994, the IAU stopped its financial support of the GCVS project, though IAU Commission 27 (Variable Stars) still considers it to be one of its most important projects. The flow of information on variable stars is steadily increasing; we expect many thousands of new discoveries from searches for gravitational-lensing effects and from space-borne instruments. It is clear that, in the nearest future, we shall not be able to continue our work on variable star catalogues in the traditional manner.

In the following, I shall try to describe our most recent plans and the prospects of further GCVS work considering the changing situation.

(1) We are going to continue regular publication of name lists of variable stars (N. N. Samus, E. V. Kazarovets, M. S. Frolov *et al.*), while we are able to handle the data flow on new discoveries. When preparing a name list, we check whether it is possible to identify a newly discovered object with known variables or suspects, whether the star's variability is really beyond doubt (for instance, in many cases comparison stars turn out to be known variables!), and whether it is already possible to classify the new variable.

(2) This year we are planning to finish the preparation of the supplement (E. V. Kazarovets and N. N. Samus) to the *New Catalogue of Suspected Variable Stars* (Kholopov, 1982).

(3) We shall continue our work on determination of sufficiently accurate equatorial coordinates for variable stars in globular clusters.

(4) The positional accuracy standard of the GCVS, excluding Volume V, is too rough. It is very important to know accurate coordinates for old GCVS variables, especially anticipating many new variable objects. We have recently checked, for possible Guide Star Catalogue identifications and for serious positional mistakes, several thousands of variables discovered by the late L. Plaut who did not publish finding charts but sent them to the GCVS team. This study (Antipin *et al.*, 1994a, b, c) revealed several cases of erroneous coordinates and even of the existence of two or three GCVS names for a single variable. We have recently prepared a list of improved positions for all variables in the constellation of Andromeda; this list will soon be incorporated into the GCVS version available from the Sternberg Institute by ftp (N. N. Samus and O. V. Durlevich). We are going to add more and more constellations to this GCVS version with improved positions.

(5) The system of varable star classification used in the GCVS presently seems rather obsolete. It is important to work out a new classification based upon modern developments of astrophysics of stellar variability. Then, we shall introduce this classification into the electronic version of the 4th GCVS edition, update ephemeris for periodic variables, and present the revised computer version GCVS 4.2.

It seems too early to describe further plans in any more detail. The rapid development of variable star research will certainly change any plans for the relatively remote future.

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