MINISTRY OF EDUCATION AND SCIENCE OF UKRAINE
RESEARCH INSTITUTE “NIKOLAEV ASTRONOMICAL OBSERVATORY”

METHODS AND INSTRUMENTS IN ASTRONOMY: FROM GALILEO TELESCOPES TO SPACE PROJECTS

International Workshop

ABSTRACT BOOK

May 17-20, 2010,
Mykolaiv, Ukraine

1200 DPI. Raw data processing, including image filtration and recovery of bright stars were made using MIDAS software package. Further reduction and results analysis were carried out using our own software and the Tycho-2 reference catalogue.

All three scanners have shown low stability of moving cartridge. It has linear biases up to 20 pixels per 10000 pixels of motion and a periodic counterpart from 2 to 5 pixels. After taking into account the features of scanners and data reduction, the following results were obtained: the standard deviations of stellar positions are from ± 0.04″ to ± 0.12″ in right ascension and from ± 0.06″ to ± 0.13″ in declination, depending on the image quality and stellar magnitude. The error came from repeating measurements (RE) is from ± 0.02″ to ± 0.07″ for both coordinates. The standard deviation of stellar magnitude is from ± 0.2^m to ± 0.5^m for stars of 9^m – 13^m. RE is from ± 0.03^m to ± 0.05^m for stars of 10^m - 13^m.

Using the results of a preliminary research, we have scanned 50 plates in series of 5 scans with Epson Perfection V200 Photo with the same parameters. We have made data reduction and compiled a catalogue of positions and proper motions for 17350 stars in ecliptic zone. The catalogue contains stars in the ICRS system from 7 to 14 magnitude, the majority them have 11^m to 13^m, on the mean epoch of observation 1977.4. Mean standard error of one position measurement is about 0.062″ in RA and 0.067″ in DEC, RMS of (O–C) is about 0.084″ for coordinates and 0.005″/year for proper motions.

Further work in this direction is being successfully continuing.

ASTRONOMICAL DATABASES AND VO-TOOLS OF NIKOLAEV ASTRONOMICAL OBSERVATORY AS A BASIS FOR DEVELOPMENT OF UKRAINIAN VIRTUAL OBSERVATORY

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Results of work in 2006-2009 on creation of astronomical databases aiming at development of Nikolaev Virtual Observatory (NVO) are presented in this abstract. Results of observations and their

reduction, which were obtained during the whole history of Nikolaev Astronomical Observatory (NAO), are included in the databases.

The databases may be considered as a basis for construction of a data centre. Images of different regions of the celestial sphere have been stored in NAO since 1929. About 8000 photo plates were obtained during observations in the 20th century. Observations with CCD have been started since 1996. Annually, telescopes of NAO, using CCD cameras, create data volume of several tens of gigabytes (GB) in the form of CCD images and up to 100 GB of video records. At the end of 2008, the volume of accumulated data in the form of CCD images was about 300 GB. Problems of data volume growth are common in astronomy, nuclear physics and bioinformatics. Therefore, the astronomical community needs to use archives, databases and distributed grid computing to cope with this problem in astronomy.

The International Virtual Observatory Alliance (IVOA) was formed in June 2002 with a mission to "enable the international utilization of astronomical archives..."

The NVO was created at the NAO website in 2008, and consists of three main parts.

The first part contains 27 astrometric stellar catalogues with short descriptions. The files of catalogues were compiled in the standard VOTable format using eXtensible Markup Language (XML), and they are available for downloading. This is an example of the so-called science-ready product. The VOTable format was developed by the International Virtual Observatory Alliance (IVOA) for exchange of tabular data. A user may download these catalogues and open them using any standalone application that supports standards of the IVOA. There are several directions of development for such applications, for example, search of catalogues and images, search and visualisation of spectra, spectral energy distribution (SED) building, search of cross-correlation between objects in different catalogues, statistical data processing of large data volumes etc.

The second part includes database of observations, accumulated in NAO, with access via a browser. The database has a common interface for searching of textual and graphical information concerning photographic and CCD observations. The database contains: textual information about 7437 plates as well as 2700 preview images in JPEG format with resolution of 300 DPI (dots per inch); textual information about 16660 CCD frames as well as 1100 preview images in JPEG format. Absent preview images will be added to the database as soon as they will

be ready after plates scanning and CCD frames processing. The user has to define the equatorial coordinates of search centre, a search radius and a period of observations. Then he or she may also specify additional filters, such as: any combination of objects given separately for plates and CCD frames, output parameters for plates, telescope names for CCD observations. Results of search are generated in the form of two tables for photographic and CCD observations. To obtain access to the source images in FITS format with support of World Coordinate System (WCS), the user has to fill and submit electronic form given after the tables.

The third part includes database of observations with access via a standalone application such as Aladin, which has been developed by Strasbourg Astronomical Data Centre. To obtain access to the database, the user has to perform a series of simple actions, which are described on a corresponding site page. Then he or she may get access to the database via a server selector of Aladin, which has a menu with wide range of image and catalogue servers located world wide, including two menu items for photographic and CCD observations of a NVO image server. The user has to define the equatorial coordinates of search centre and a search radius. The search results are outputted into a main window of Aladin in textual and graphical forms using XML and Simple Object Access Protocol (SOAP). In this way, the NVO image server is integrated with other astronomical servers, using a special configuration file. The user may conveniently request information from many servers using the same server selector of Aladin, although the servers are located in different countries. Aladin has a wide range of special tools for data analysis and handling, including connection with other standalone applications.

As a conclusion, we should note that a research team of a data centre, which provides the infrastructure for data output to the internet, is responsible for creation of corresponding archives. Therefore, each observatory or data centre has to provide an access to its archives in accordance with the IVOA standards and a resolution adopted by the IAU XXV General Assembly #B.1, titled: Public Access to Astronomical Archives. A research team of NAO copes successfully with this task and continues to develop the NVO. Using our databases and VO-tools, we also take part in development of the Ukrainian Virtual Observatory (UkrVO). All three main parts of the NVO are used as prototypes for the UkrVO. Informational resources provided by other astronomical institutions from Ukraine will be included in corresponding databases and VO interfaces.