

Problems of long-term preservation of observation data on the example of SAO RAS archive system

Zhelenkova O.P.^{1,2}, Vitkovskij V.V.^{1,2},
Plyaskina T.A.¹, Shergin V.S.¹, Chernenkov V.N.¹

1-SAO RAS, Nizhnij Arkhyz; 2-ITMO University, Saint-Petersburg





The Special Astrophysical Observatory of RAS has two the largest Russian telescopes – the 6m optical telescope Big Alt-Azimuthal Telescope (BTA) and radio telescope RATAN-600 with 6 hundred meters diameter antenna.

The Observatory became operational in 1966 and this year we are celebrating its 50th anniversary.

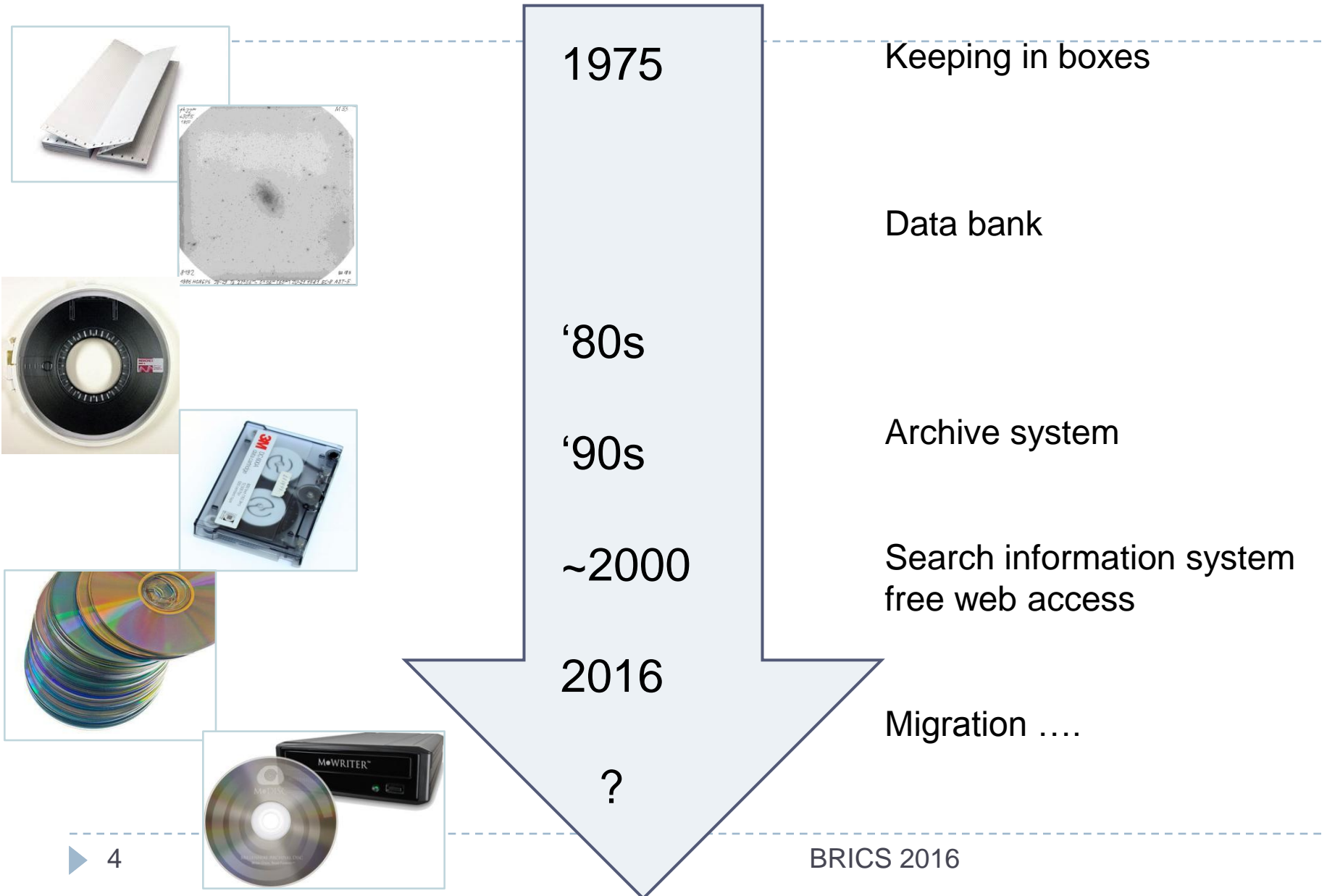
Systematic observations with the radio telescope RAT AN-600 and the 6-m optical telescope BTA started in 1974 – 1975 started and continuously are going on despite the fact that there are already in another state.

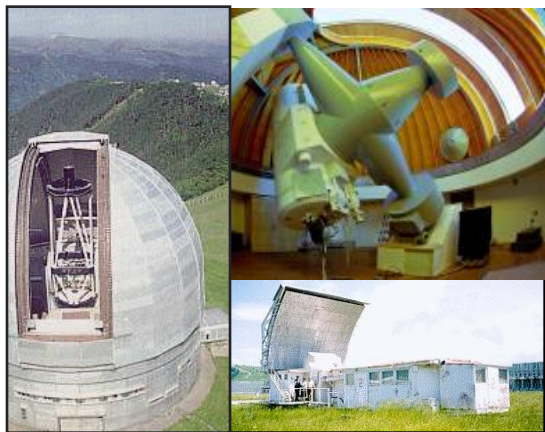


Some facts about the telescopes:

- BTA is the world's first large ground-based telescope with alt-azimuth mount, served as the prototype for similar telescopes, which were enacted later.
- For the first time the computer was used to control the telescope.
- Powerful emitters of one of the landing stages of the Apollo space missions observed on RATAN-600 in the first mapping of the Moon.

Information carriers and technologies for long-term keeping





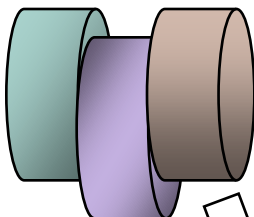
SAO RAS general archive of observational data

Optics: 238 CD/DVD

Radio: 7CD

Total: 245 CD/DVD

Local archives



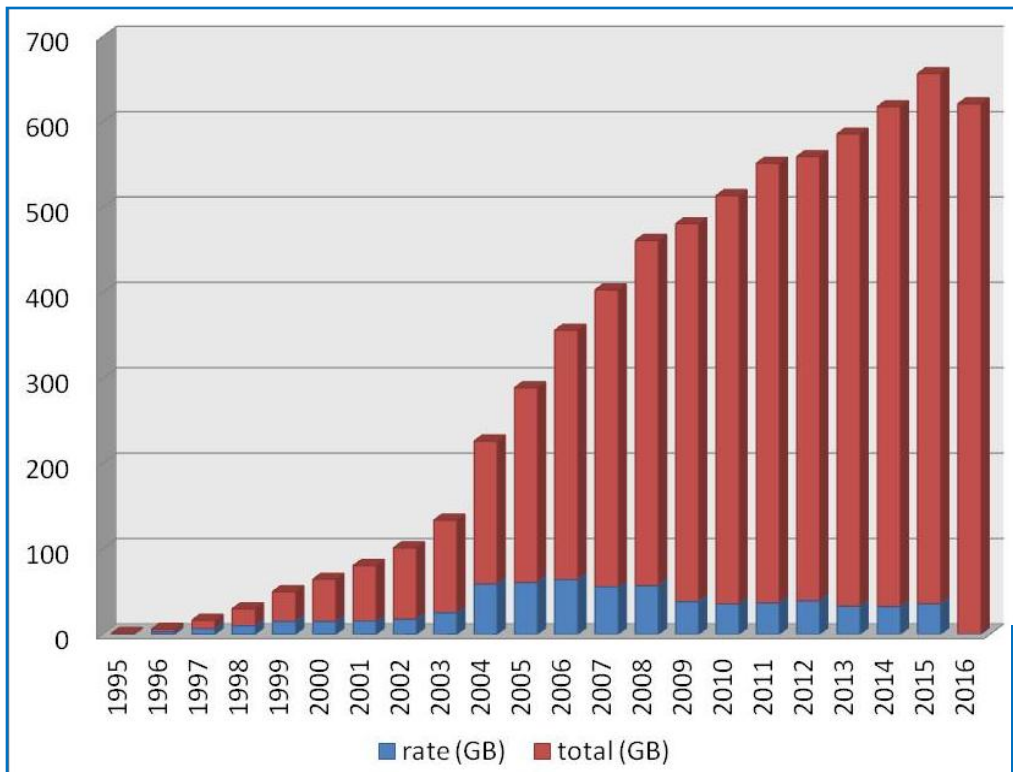
Formats of data: FITS, RFLEX, BINARY

Local archives: 16

Numbers of files	~540000
Volume	0.5TB
Volume of storage area	1.5 TB
Number of records	>1000000

The characteristics of local archives

Archive	N _{CD/DVD}	N _{files}	Volume, MB	Range of date
LYNX	8	2106	1806	1996.02 – 2002.05
NES	50	23225	44995	1998.03 – 2014.04
PFES	6	2296	1993	1996.08 – 2001.01
MPFS	27	17998	31030	1996.08 – 2009.10
IFP	2	4503	1090	1997.05 – 2000.03
MOFS	1	1059	642	1997.03 – 2001.08
SCORPIO	65	193184	210650	2000.09 – 2016.01
UAGS	9	21696	4698	1994.11 – 2005.10
CCD	4	6011	2493	1996.02 – 2000.04
SP124	3	11676	1421	1996.02 – 2000.12
MSS	11	16543	14221	1996.05 – 2014.05
ZMCCD	40	146099	103246	1996.12 – 2015.10
ZMUAGS	15	27211	8247	1998.04 – 2016.02
CEGS	3	611	947	1997.03 – 2010.10
Z600	8	15951	4928	1996.01 – 2001.06
RATAN	7	45921	1735	1996.06 – 1999.01

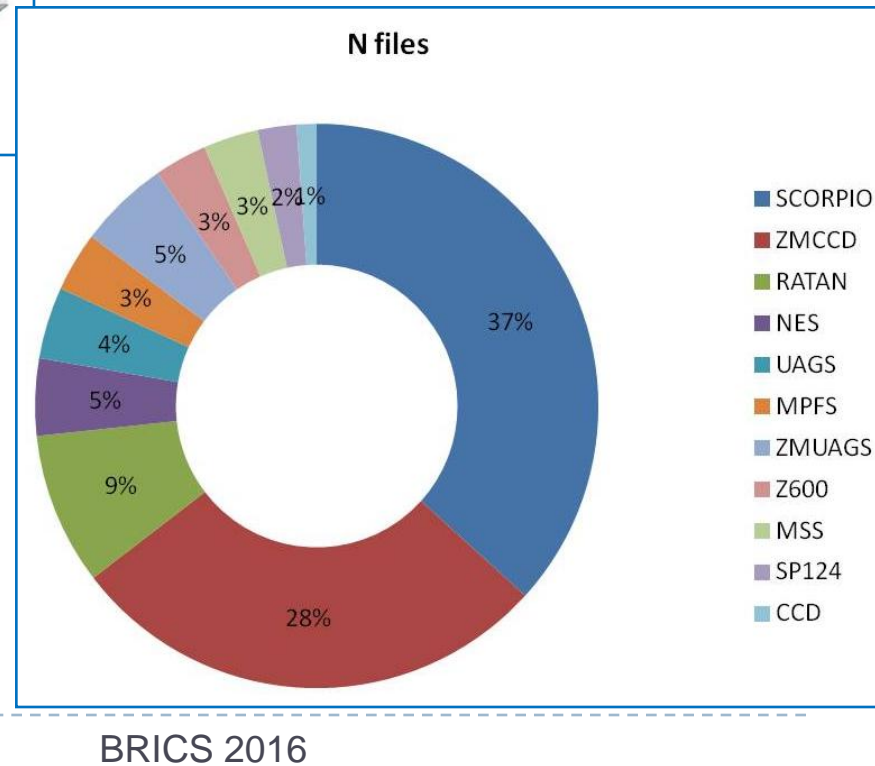
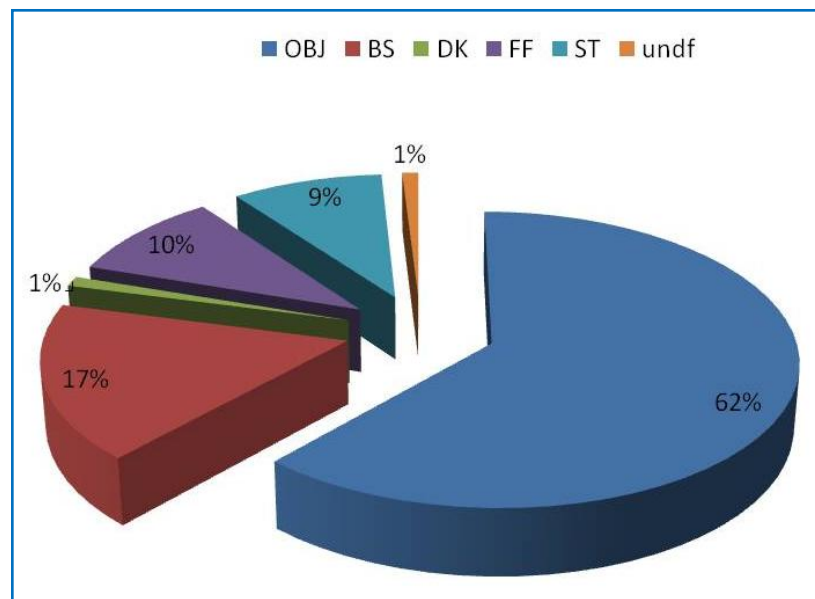


Types of files in the archive:

Observations – 91%

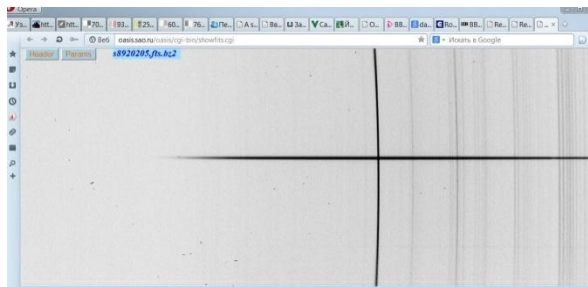
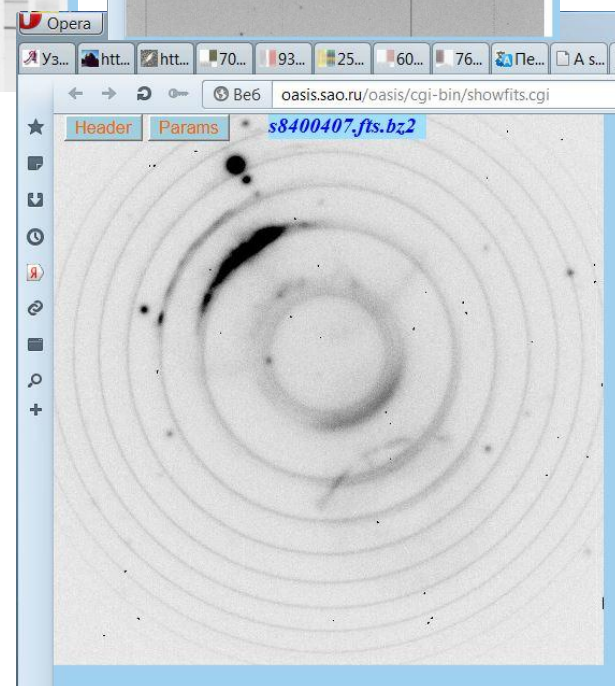
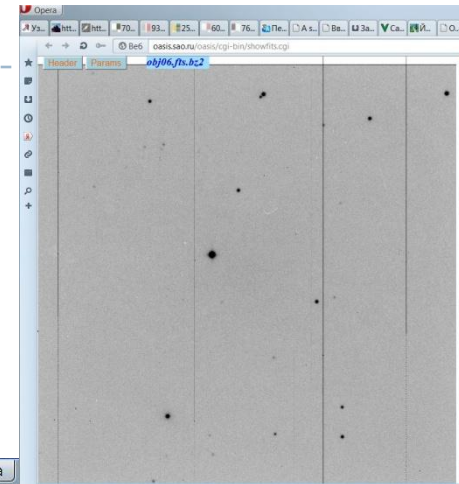
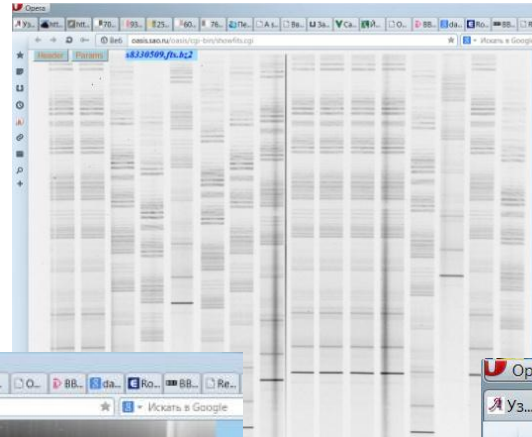
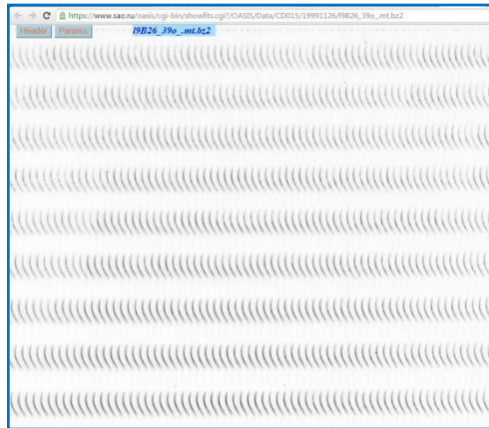
Observation logs - 1%

Auxiliary - 8%



BRICS 2016

Data with heterogeneous structure. Examples of observations



Parameters of an observation file obtained from different telescope systems and requested for the archive system

Observation

- date
- start time
- end time
- frame type

Specification of a file

- identifier
- file location
- inquiry number
- processing level
- file name
- Size
- last modification date

Access level:

- program
- principal investigator
- password
- observer
- origin
- telescope

Detector :

- name
- parameters (readout noise, bitpix)

Observation

target :

- coordinates
- object name

Data format:

- format type
- acquisition system

Weather conditions:

- temperature
- wind
- mirror temperature
- pressure
- seeing

Instrument :

- name
- parameters (filter, slit,..)

FITS-header for direct images

```

BITPIX = 16          / No. of bits per pixel
NAXIS = 2            / No. of axes in matrix
NAXIS1 = 1044        / No. of pixels in X
NAXIS2 = 1046        / No. of pixels in Y
BSCALE = 1.00        / REAL = TAPE*BSCALE + BZERO
BZERO = 32768.0      /
DATAMAX = 9448.0     / MAX PIXEL VALUE
DATAMIN = 78.0       / MIN PIXEL VALUE
DATE = '2011-03-31T21:15:58.673' / UTC date this file was written
CREATOR = 'CCDServ v2.1' / ACQUISITION SYSTEM
DATE-OBS = '2011-03-31T21:15:43.007' / UTC date of Observation start
TELESCOP = 'BTA 6-meter' / TELESCOPE NAME
INSTRUME = 'SCORPIO' / INSTRUMENT
OBSERVER = 'Makarov, Uklein' / OBSERVERS
OBJECT = 'G18.1+2' / NAME OF IMAGE
PROG-ID = 'Groups of dwarf galaxies' / observational program
AUTHOR = 'Makarov' / AUTHOR OF PROGRAM
FILE = 'S8560202.FTS' / original name of input file
IMAGETYP = 'obj' / object, flat, dark, bias, scan, eta, neon, push
ORIGIN = 'SAO RAS' / observatory
START = '01:15:47' / measurement start time (local) (hh:mm:ss)
EXPTIME = 10.0 / actual integration time (sec)
CAMTEMP = 143.251 / camera temperature (K)
DETECTOR = 'EUV CCD42-40' / detector
RATE = 160.0 / readout rate (KPix/sec)
GAIN = 1.946 / gain, electrons per adu
NODE = 'B' / output node (A, B, AB)
BINNING = '2x2' / binning
PXSIZE = '27.0 x 27.0' / pixel size (mkm x mkm)
UTC = 76543.200 / UTC at exposure start (sec) 21:15:43.20
LST = 45424.730 / Local sidereal time (sec) 12:37:04.73
RA = 165.3988782 / Right Ascension (degr.) 11:01:35.73
DEC = 30.5988931 / Declination (degr.) +30:35:56.0
EPOCH = 2000.0 / EPOCH OF RA AND DEC
Z = 22.9 / zenith distance
A = 63.0 / azimuth
PARANGLE = 48.4 / parallactic angle
ROTANGLE = 127.7 / field rotation angle
SEEING = '1.5' / seeing
FILTER = '' / filter
FOCUS = 40.63 / focus of telescope (mm)
IMSCALE = '0.355 x 0.355' / image scale ("/Pix x "/Pix)
SLITWID = 10 / slit width (")

```

```

MIRRTMP = 2.4 / mirror temperature (C)
DOMETEMP = 0.7 / dome temperature @
OUTTEMP = 0.6 / outside temperature (C)
WIND = 5.3 / wind (m/s)
CLOUDS = 0 / clouds (%)
PRESSURE = 596.1 / pressure
MODE = 'Image' / mode of instrument
DISPERSE = '' / disperser, dispersion A/px
SPERANGE = '' / spectral coverage
SLITMASK = / slit mask
SLITPOS = / slit coordinates in 2x2 map
ORDER = / order of dispersion TILTPOS
TILTPOS = '' / tilt position
FILTERS = '' / name of both wheels
FILTPS1 = 0 / position of wheel number 1
FILTPS2 = 0 / position of wheel number 2
POLAMODE = /
CAMFOCUS = 5.59 / focus of reducer (mm)
COLFOCUS = / FOCUS OF COLLIMATOR
QGCONST = / Queensgate constant
LSCAN = / wavelength of IFP scan
CHANNEL = / IFP channel
HISTORY
COMMENT '
MJD-OBS = 55651.8859144 / Modified Julian Date of observation
AIRMASS = 1.08538 / airmass for current zenith distance
WCSAXIS = 2 / Number of WCS axes
CTYPE1 = 'RA--TAN' / RA-Gnomonic projection
CUNIT1 = 'deg' / RA units - degrees
CRPIX1 = 466.3 / X reference pixel
CRVAL1 = 165.3988782 / RA of reference pixel
CTYPE2 = 'DEC--TAN' / Decl-Gnomonic projection
CUNIT2 = 'deg' / Decl units - degrees
CRPIX2 = 551.0 / Y reference pixel
CRVAL2 = 30.5988931 / Decl of reference pixel
EQUINOX = 2000.0 / Equinox of equatorial coordinates
RADECSYS = 'FK5' / using FK5 coordinates system
CD1_1 = -0.0000592925 / rotation matrix coefficient [1,1]
CD1_2 = 0.0000786492 / rotation matrix coefficient [1,2]
CD2_1 = 0.0000786492 / rotation matrix coefficient [2,1]
CD2_2 = 0.0000592925 / rotation matrix coefficient [2,2]
HISTORY scorpio_wcs: dA=0.01dgr Scale=0.3546 dX=-54.7 dY=30.0
END

```

SAO RAS general archive of observations

includes:

- scientific data
- calibration

provides:

- free web access
- long-term keeping and preservation

basic principles:

- the semantic item is a file with observation;
- store in the archive all observations carried out at the observatory telescopes;
- archive does not change the format of stored data;
- exclusive copyright to use data containing information about astrophysical objects, within 2 years after the observations belong to the applicants of the observation program.

Basic requirements for the organization of data in the archive

- Archive disc has a disc label and contains directories with data
- One directory on the disk contains one observation date
- The directory name corresponds to the observation date
- One observation is stored in a single file
- There are no restrictions on file format

- Observation date
- Coordinates
- Source name
- Observation program
- Principal investigator
- Filter
- Type of file
- Mode of observation

STANDARD QUERIES

Standard requests, except for selection by observation date, due to lack of the necessary parameters in the file header are implemented to the part of observation files:

- no coordinate values - 17%
- no object name - 4%
- not defined program name - 30%
- not defined applicant - 29%
- unidentified observers - 29%

OASIS - Observation Archive Search Information System

SIS of the archival system realized in 3-tiers architecture ИИС «client-application server-database server».

The database (OS Fedora 12, DBMS PostgreSQL8.4) includes 17 tables and views.

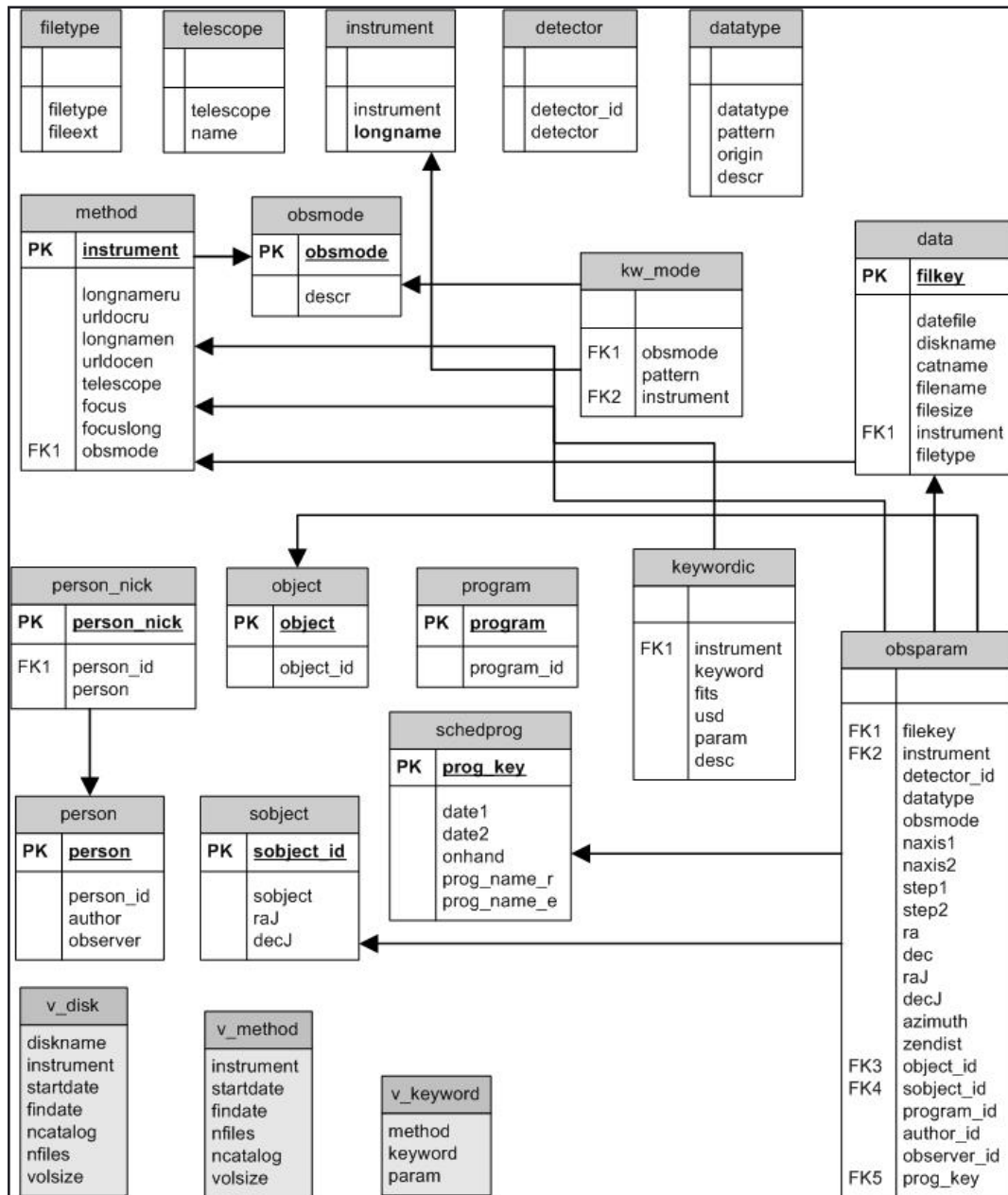
The web interface (Perl, CGI, DBD/DBI) supports the set of standard queries and a http-copying of requested data.

OASIS table schema

Each file is described with about 60 parameters.

They are used for the dynamic formation of the web interface, for mapping parameters FITS-header and attribute of SIS tables, identify files, specify a file type, etc.

Some tables are vocabularies, others contain parameters describing each observation file.



OASIS web interface (I)

Общий архив наблюдательных данных

Положение об архиве Текущее состояние Расписание (БТА/Цейс-1000) Работа поддержка гридами РФФИ 07-07-00415, 10-07-00412, 11-07-00108

Локальный архив	Диапазон дат
NES	1998-03-10 - 2011-09-14
LYNX	1996-02-28 - 2002-05-28
PFES	1996-08-06 - 2001-01-07
MPFS	1996-08-18 - 2009-10-27
MOFS	1997-03-07 - 2001-08-18
UAGS	1994-11-08 - 2005-10-20
CCD	1996-02-13 - 2000-04-30
MSS	1996-05-26 - 2012-02-02
SP124	1996-02-18 - 2000-12-09
ZMCCD	1996-12-31 - 2012-03-25
ZMUAGS	1998-04-30 - 2012-02-27
CEGS	1997-03-24 - 2010-10-26
Z600	1996-01-12 - 2001-06-06
SCORPIO	2000-09-21 - 2012-02-27
RATAN	1996-06-01 - 1999-01-25
IFP	1997-05-14 - 2000-03-02
FITS с WCS-привязкой	
SCORPIO_C	2000-09-21 - 2012-02-27

Вопросы и замечания к zhe@saor.ru

Начальная дата: 1994 01 01 Конечная дата: 1994 01 01

или

выбрать дату по ключу программы наблюдений

R.A.(J2000) Decl.(J2000)
(ra=hh mm ss.s, dec=[-]dd mm ss.s или в градусной мере)

или имя объекта:

Радиус поиска: 5 (arcmin)

Тип данных: obs Режим наблюдений: any Фильтр: any

Автор программы: Справка

Поиск

Локальный архив: SCORPIO (2011-08-02 - 2011-12-03)

Тип данных: obs Режим наблюдений: image Фильтр: R

Просмотр и копирование данных наблюдательной ночи

2011-08-04	2011-08-07	2011-08-08	2011-08-09	2011-08-15	2011-08-17
2011-08-29	2011-08-30	2011-08-31	2011-09-01	2011-09-05	2011-09-06
2011-09-22	2011-09-23	2011-09-27	2011-10-05	2011-10-21	2011-10-22
2011-10-26	2011-10-28	2011-10-29	2011-10-30	2011-10-31	2011-11-01
2011-11-03	2011-11-04	2011-11-25	2011-11-27	2011-11-30	

Примечание: в tag-архив входят данные всей ночи

Всего ночей: 29

Локальный архив: SCORPIO (2011-08-04)

Тип данных: obs Режим наблюдений: image Фильтр: R

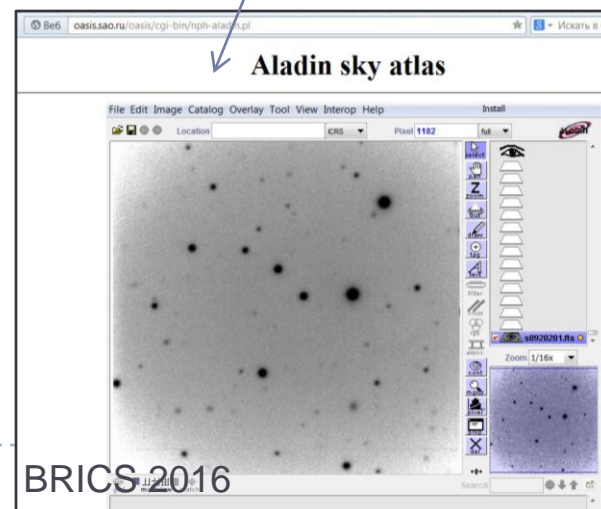
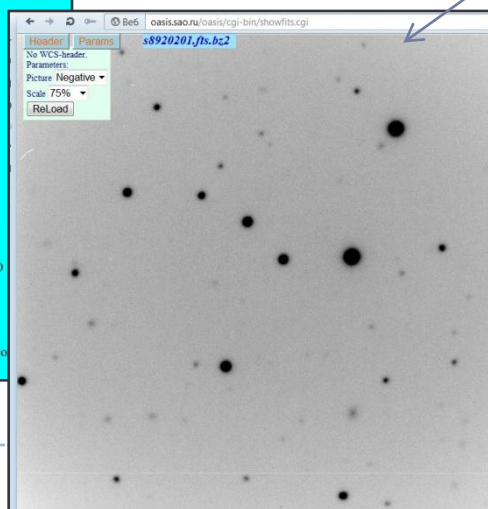
NN	Файл	Заголовок	Просмотр	Тип данных	R.A.2000	Dec.2000	Автор
1	CD199/s20110804/s8930201.fts.bz2			object	8.6814054	27.9072600	Titov
2	CD199/s20110804/s8930202.fts.bz2			object	8.6814054	27.9072600	Titov
3	CD199/s20110804/s8930203.fts.bz2			object	8.6818221	27.9075936	Titov
4	CD199/s20110804/s8930301.fts.bz2			object	26.7451458	21.1735189	Titov
5	CD199/s20110804/s8930302.fts.bz2			object	26.7451458	21.1735189	Titov
6	CD199/s20110804/s8930401.fts.bz2			object	326.8412821	-6.3403136	Titov
7	CD199/s20110804/s8930402.fts.bz2			object	326.8420738	-6.3407586	Titov
8	CD199/s20110804/s8930501.fts.bz2			object	349.9942642	-5.1656775	Titov

Найдено файлов: 8 (общий объем: 89.3 MB)

Параметры файла наблюдений

Копировать файл

BITPIX = 16 / No. of bits per pixel
NAXIS = 2 / No. of axes in matrix
NAXIS1 = 1044 / No. of pixels in X
NAXIS2 = 1046 / No. of pixels in Y
CRVAL1 = 0 / Offset in X
CRVAL2 = 0 / Offset in Y
DATE = '2011-08-05' / Creation data of this file
ORIGIN = 'CCDServer v2.1' / ACQUISITION SYSTEM
DATE-OBS = '2011/05/08' / DATE (YYYY/DD/MM) OF OBS.
TELESCOP = 'BTA 6-meter' / TELESCOPE NAME
INSTRUME = 'SCORPIO' / INSTRUMENT
OBSERVER = 'Makarov, Titov, Melnikov, Jauncey, Khramtsov' / OBSERVERS
OBJECT = '0032+276' / NAME OF IMAGE
PROG-ID = 'Red shifts of the IVS program objects' / observational program
AUTHOR = 'Titov' / AUTHOR OF PROGRAM
BSCALE = 1.00 / REAL = TAPE*BSCALE + BZERO
BZERO = 32768.0 /
DATAMAX = 8114.0 / MAX PIXEL VALUE
DATAMIN = 0.0 / MIN PIXEL VALUE
FILE = 'S8930201.FTS' / original name of input file
IMAGETYP = 'obj' / object, flat, dark, bias, scan, etc.
OBSERVAT = 'SAO RAS' / observatory



OASIS web interface (II)

Общий архив наблюдательных данных

Положение об архиве Текущее состояние Расписания (БТА/Цейсс-1000) Работа поддержана грантами РФФИ 07-07-00415, 10-07-00412, 11-07-00108

Локальный архив	Диапазон дат
NES	1998-03-10 - 2011-09-14
LYNX	1996-02-28 - 2002-05-28
PFES	1996-08-06 - 2001-01-07
MPFS	1996-08-18 - 2009-10-27
MOFS	1997-03-07 - 2001-08-18
UAGS	1994-11-08 - 2005-10-20
CCD	1996-02-13 - 2000-04-30
MSS	1996-05-26 - 2012-02-02
SP124	1996-02-18 - 2000-12-09
ZMCCD	1996-12-31 - 2012-03-25
ZMUAGS	1998-04-30 - 2012-02-27
CEGS	1997-03-24 - 2010-10-26
Z600	1996-01-12 - 2001-06-06
SCORPIO	2000-09-21 - 2012-02-27
RATAN	1996-06-01 - 1999-01-25
IFP	1997-05-14 - 2000-03-02
FITS с WCS-привязкой	
SCORPIO_C	2000-09-21 - 2012-02-27

Вопросы и замечания к zhe@sao.ru

Начальная дата: 1994 ▾ 01 ▾ 01 ▾ Конечная дата: 1994 ▾ 01 ▾ 01 ▾

ИЛИ

выбрать дату по ключу программы наблюдений

R.A.(J2000) Decl.(J2000)
(ra=hh mm ss.s; dec=[-]dd mm ss.s или в градусной мере)

или имя объекта:

Радиус поиска: 5 (arcmin)

Тип данных: obs ▾ Режим наблюдений: any ▾

Автор программы: Справка

Фильтр: any

Поиск

Программы наблюдений из расписания

1994_2	1995_1	1995_2	1996_1	1996_2	1997_1	1997_2	1998_1	1998_2	1999_1
1999_2	2000_1	2000_2	2001_1	2001_2	2002_1	2002_2	2003_1	2003_2	2004_1
2004_2	2005_1	2005_2	2006_1	2006_2	2007_1	2007_2	2008_1	2008_2	2009_1
2009_2	2010_1	2010_2	2011_1	2011_2	2012_1	2012_2	2013_1	2013_2	

Наблюдательные программы 2011_2

Примечание: данные в архиве могут отсутствовать по погодным условиям или другим причинам.

Ключ	Дата (dd.mm-dd.mm)	Программа	Инструмент
2011_2_001	01.07-01.07	Резерв директора	
2011_2_002	02.07-04.07	Красные смещения скоплений галактик	SCORPIO/LS
2011_2_003	05.07-06.07	Поиск квазаров с большим Z	
2011_2_004		Резерв директора	
2011_2_005		Пекулярные красные новые звезды	
2011_2_006	07.07-09.07	Взаимодействие в галактиках	SCORPIO/LS
2011_2_007		Массы белых карликов	
2011_2_008	10.07-10.07	Резерв директора	
2011_2_009		Литий в магнитных CP-звездах	
2011_2_010	11.07-17.07	Микропеременность в OB-звездах	NES
2011_2_011		Спектроскопия гоАр-звезд	

OASIS: Authors oasis.sao.ru

Выберите автора наблюдательной программы:

A B C D E F G H J K L M N P R S T U V W Y Z u

OASIS: Filters

Выберите фильтр:

- IFP-filters
- Comets bands
- SED-filters
- UBVRI-filters
- undefined

Фильтр	CWL (A)
U	3770
B	4400
V	5470
R	6620
I	8380

OASIS: Authors oasis.sao.ru

Выберите автора наблюдательной программы:

A B C D E F G H J K L M N P R S T U V W Y Z u

--- A ---

Abolmasov Afanasiev Akopian Amirkhanian Andrievsky Andronov Arktyukh Ayvazian

OASIS web interface (III)

Общий архив наблюдательных данных

Положение об архиве Текущее состояние Расписание (БТА/Цейс-1000) Работа поддержки программ РФ

Локальный архив	Диапазон дат
NES	1998-03-10 - 2011-09-14
LYNX	1996-02-28 - 2002-05-28
PFES	1996-08-06 - 2001-01-07
MPFS	1996-08-18 - 2009-10-27
MOFS	1997-03-07 - 2001-08-18
UAGS	1994-11-08 - 2005-10-20
CCD	1996-02-13 - 2000-04-30
MSS	1996-05-26 - 2012-02-02
SP124	1996-02-18 - 2000-12-09
ZMCCD	1996-12-31 - 2012-03-25
ZMUAGS	1998-04-30 - 2012-02-27
CEGS	1997-03-24 - 2010-10-26
Z600	1996-01-12 - 2001-06-06
SCORPIO	2000-09-21 - 2012-02-27
RATAN	1996-06-01 - 1999-01-25
IFP	1997-05-14 - 2000-03-02

ELTS с WCS-привязкой

SCORPIO_C

Вопросы и замечания к zhe@ao.ru

Начальная дата: 1994-01-01 Конечная дата: 1994-01-01

или

выбрать дату по ключу программы наблюдений

R.A.(J2000) Decl.(J2000)

(ra=hh mm ss.s, dec=[-]dd mm ss.s или в градусной мере)

или имя объекта:

Радиус поиска: 5 (arcmin)

Тип данных: obs Режим наблюдений: any

Фильтр: any

Автор программы:

Справка

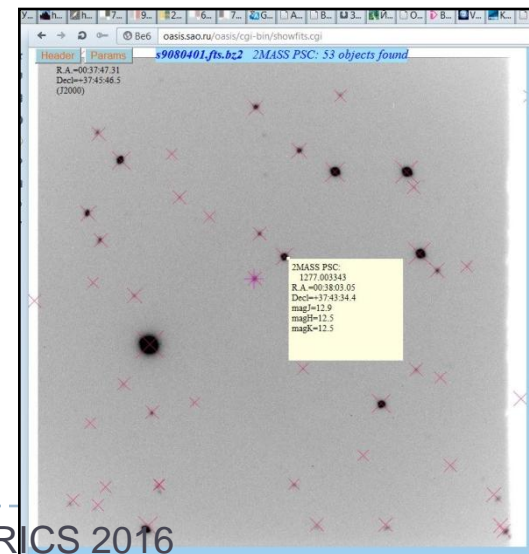
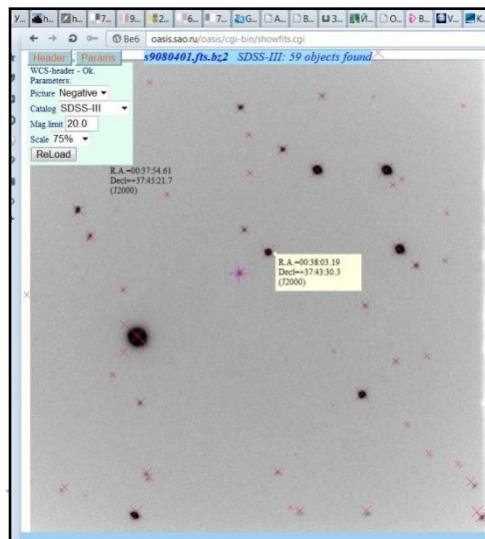
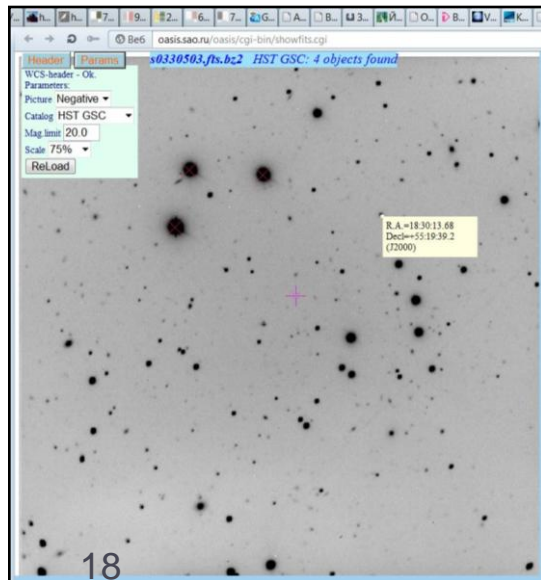
Поиск

Opera

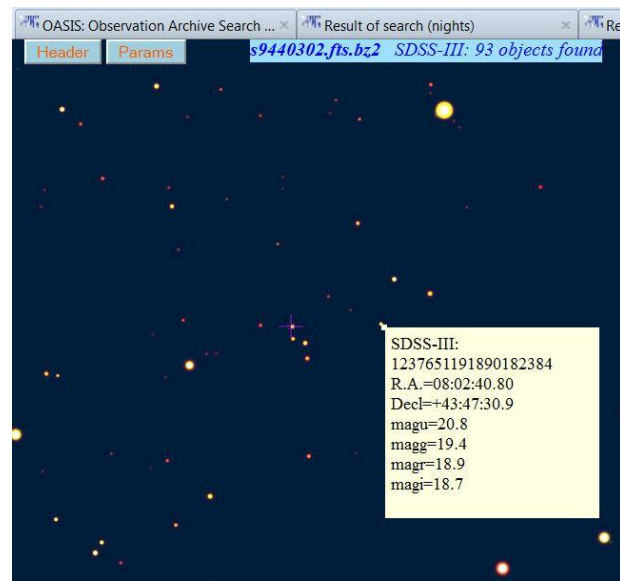
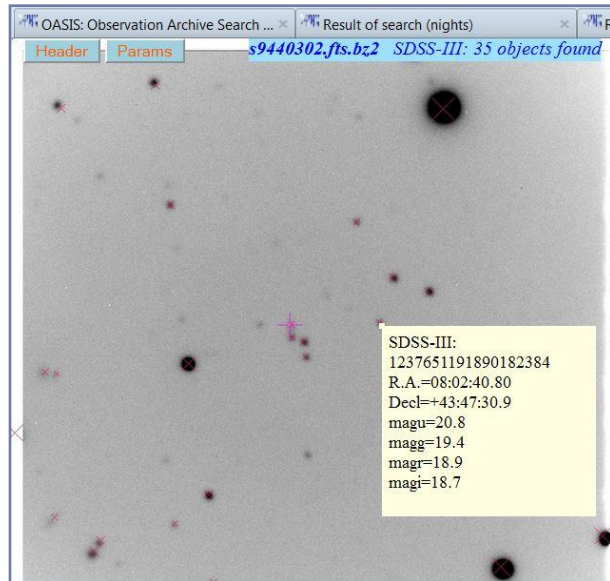
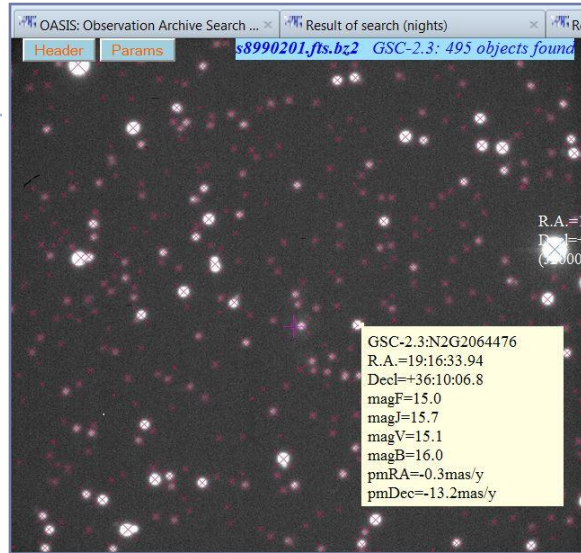
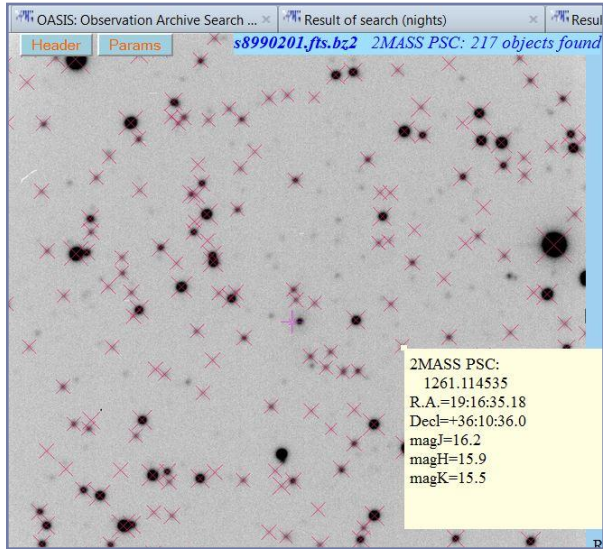
oasis.sao.ru/oasis/cgi-bin/showfits.cgi

EXPTIME = 188.000 / actual integration time (sec)
CAMTEMP = 0 / camera temperature (K)
DETECTOR = 'TK1024' / detector
RATE = 100.0 / readout rate (Kpix/sec)
GAIN = 1.2 / gain, electrons per adu
NODE = 'A' / output node (A, B, AB)
BINNING = '1x1' / binning
PIXSIZE = '24x24' / pixel size
UTC = 72496.000 / UTC at exposure start (sec) 20:08:16.00
LST = 68668.288 / Local sidereal time (sec) 19:04:28.29
RA = 277.5352173 / Right Ascension (deg.) 18:38:08.45
DEC = 55.3147348 / Declination (deg.) +55:18:53.0
EPOCH = 2000.0 / EPOCH OF RA AND DEC
Z = 13 / zenith distance
A = 156 / azimuth
PARAMROLL = 149 / parallactic angle
ROTANGLE = 189 / field rotation angle
SEEING = '1" / seeing
FILTER = 'R' / filter
FOCUS = 38.3 / focus of telescope (mm)
IMSCALE = '0.276 x 0.276' / image scale (" / Pix x " / Pix)
SLITWID = 0.0 / slit width in arcsec
MIRRORTEMP = 0.0 / mirror temperature (C)
DOMETEMP = 0.0 / dome temperature (C)
OUTTEMP = 0.0 / outside temperature (C)
WIND = 0 / wind (m/s)
CLOUDS = 0 / clouds (%)
PRESSURE = 595.1 / pressure
MODE = 'Image' / mode of instrument
DISPERSE = 0.0 / disperser & dispersion A/pix
SPERANGE = 0.0 / spectral coverage
SLITMASK = 0.0 / slit mask
SLITPOS = 0.0 / slit coordinates in 2x2 map
ORDER = 0.0 / order of dispersion
TILTPOS = 0.0 / tilt position
FILTERS = 'R' / filter position
FILTPOS1 = 0.0 / position of wheel number 1
FILTPOS2 = 0.0 / position of wheel number 2
POLARMODE = 0.0 / POLAR MODE
CAMFOCUS = 0.0 / FOCUS OF CAMERA
COLFOCUS = 0.0 / FOCUS OF COLLIMATOR
QSCONST = 0.0 / Queensgate constant
LSCAN = 0.0 / wavelength of IFP scan
CHANNEL = 0.0 / IFP channel
HISTORY
COMMENT Fc= 3.750
MOD-DBS = 52114.8390741 / Modified Julian Date of observation
AIRMASS = 1.82625 / airmass for current zenith distance
WCASIS = 2 / Number of WCS axes
CTYPE1 = 'RA---TAN' / RA-Gnomonic projection
CUNIT1 = 'deg' / RA units - degrees
CRPIX1 = 553.8 / X reference pixel
CRVAL1 = 277.5352173 / RA of reference pixel
CTYPE2 = 'DEC--TAN' / Decl-Gnomonic projection
CUNIT2 = 'deg' / Decl units - degrees
CRPIX2 = 553.4 / Y reference pixel
CRVAL2 = 55.3147348 / Decl of reference pixel
EQUINOX = 2000.0 / Equinox of equatorial coordinates
RADECSYS = 'FK5' / using FK5 coordinates system
CD1_1 = 0.0000000011 / rotation matrix coefficient [1,1]
CD1_2 = 0.0000767631 / rotation matrix coefficient [1,2]
CD2_1 = 0.0000767631 / rotation matrix coefficient [2,1]
CD2_2 = -0.0000000011 / rotation matrix coefficient [2,2]
HISTORY scorio_wcs: dx=0.10dgr. Scale=0.2764 dx=41.8 dy=41.4
END

RA=18:38:08.45
Dec=+55:18:53.0
(J2000)



OASIS web interface (IV) – on-fly visualization



OASIS web interface (IV)

Общий архив наблюдательных данных

Положение об архиве Текущее состояние Расписание (БГА/Пейс-1000) Работа поддержка программами РФФИ

Локальный архив	Диапазон дат
NES	1998-03-10 - 2011-09-14
LYNX	1996-02-28 - 2002-05-28
PFES	1996-08-06 - 2001-01-07
MPFS	1996-08-18 - 2009-10-27
MOFS	1997-03-07 - 2001-08-18
UAGS	1994-11-08 - 2005-10-20
CCD	1996-02-13 - 2000-04-30
MSS	1996-05-26 - 2012-02-02
SP124	1996-02-18 - 2000-12-09
ZMCCD	1996-12-31 - 2012-03-25
ZMUAGS	1998-04-30 - 2012-02-27
CEGS	1997-03-24 - 2010-10-26
Z600	1996-01-12 - 2001-06-06
SCORPIO	2000-09-21 - 2012-02-27
RATAN	1996-06-01 - 1999-01-25
IFP	1997-05-14 - 2000-03-02
FITS с WCS-привязкой	
SCORPIO_C	2000-09-21 - 2012-02-27

Вопросы и замечания к zhe@zhe.ru

Начальная дата: 1994 01 01 или Конечная дата: 1994 01 01

или

выбрать дату по ключу программы наблюдений

R.A.(J2000) Decl.(J2000)
(ra=hh mm ss.s, dec=[-]dd mm ss.s или в градусной мере)

или имя объекта:

Радиус поиска: 5 (arcmin)

Тип данных: obs Режим наблюдений: any

Автор программы: Справка

Поиск

Локальный архив: SCORPIO_C (2011-09-01 - 2012-09-01)

Тип данных: obs

Просмотр и копирование данных наблюдательной ночи

2011-09-01	2011-09-05	2011-09-06	2011-09-19	2011-09-20	2011-09-21
2011-09-22	2011-09-23	2011-09-26	2011-09-27	2011-09-28	2011-10-03
2011-10-05	2011-10-21	2011-10-22	2011-10-25	2011-10-26	2011-10-27
2011-10-28	2011-10-29	2011-10-30	2011-10-31	2011-11-01	2011-11-02
2011-11-03	2011-11-04	2011-11-17	2011-11-18	2011-11-19	2011-11-20
2011-11-21	2011-11-22	2011-11-24	2011-11-25	2011-11-27	2011-11-30
2011-12-02	2011-12-03	2011-12-22	2011-12-23	2011-12-26	2012-01-23
2012-01-24	2012-01-25	2012-01-26	2012-01-27	2012-01-28	2012-01-29
2012-01-30	2012-01-31	2012-02-01	2012-02-13	2012-02-19	2012-02-20
2012-02-21	2012-02-23	2012-02-27			

Примечание: в tar-архив входят данные всей ночи

Всего ночей: 57

Локальный архив: SCORPIO_C (2011-09-01 - 2012-09-01)

Тип данных: obs

Просмотр и копирование данных наблюдательной ночи

2011-09-01	2011-09-05	2011-09-06	2011-09-19	2011-09-20	2011-09-21
2011-09-22	2011-09-23	2011-09-26	2011-09-27	2011-09-28	2011-10-03
2011-10-05	2011-10-21	2011-10-22	2011-10-25	2011-10-26	2011-10-27
2011-10-28	2011-10-29	2011-10-30	2011-10-31	2011-11-01	2011-11-02
2011-11-03	2011-11-04	2011-11-17	2011-11-18		
2011-11-21	2011-11-22	2011-11-24	2011-11-25		
2011-12-02	2011-12-03	2011-12-22	2011-12-23		
2012-01-24	2012-01-25	2012-01-26	2012-01-27		
2012-01-30	2012-01-31	2012-02-01	2012-02-13		
2012-02-21	2012-02-23	2012-02-27			

Примечание: в tar-архив входят данные всей ночи

Всего ночей: 57

ОASIS authorization

Полный доступ к этим данным предоставляется авторам программ наблюдений (см. справку).

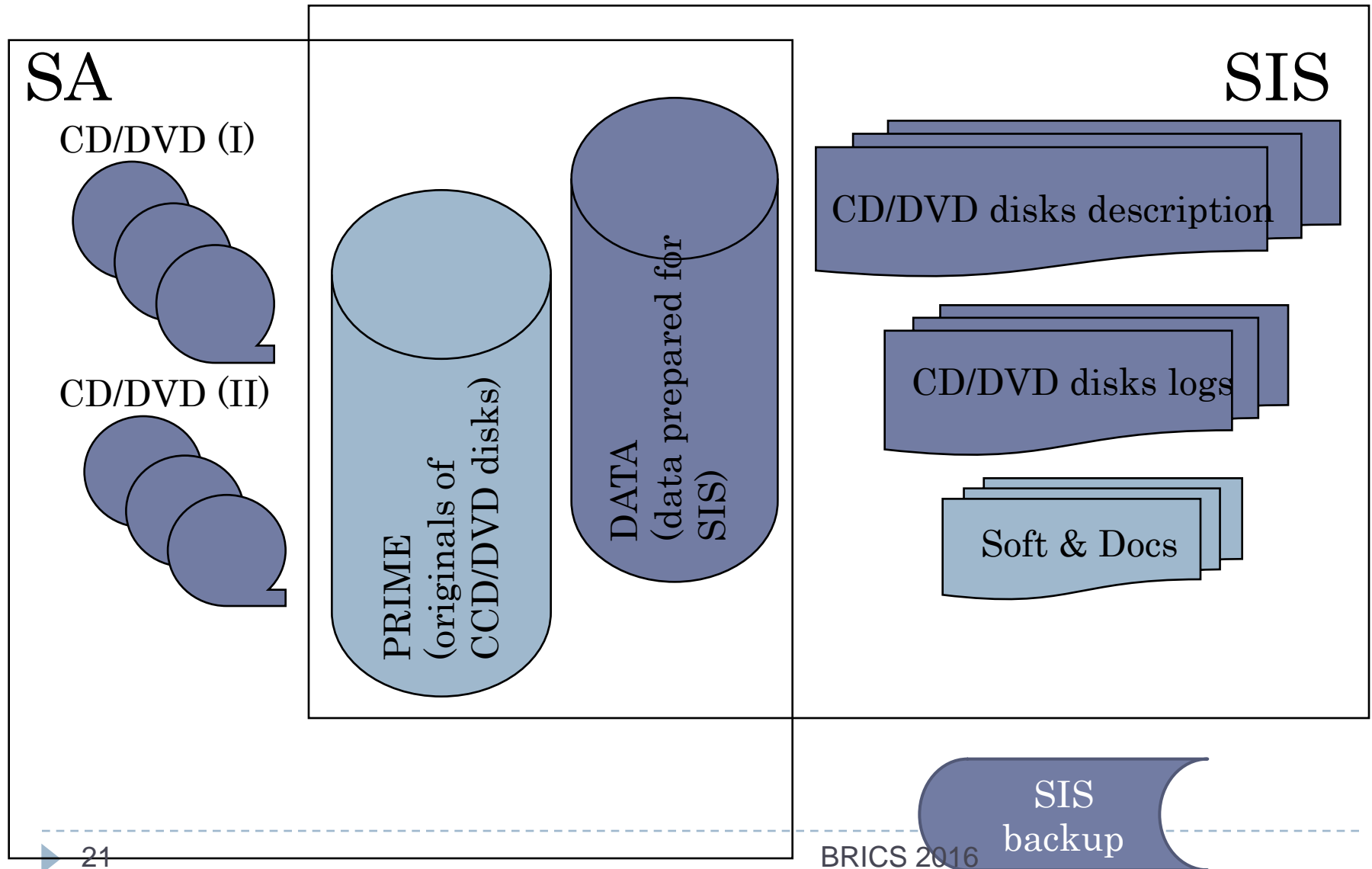
логическое имя: toisav

пароль:

Вход

Вход без авторизации является гостевым

The archival system includes a storage area (SA) and search information system (SIS)



Storage area of the archival system

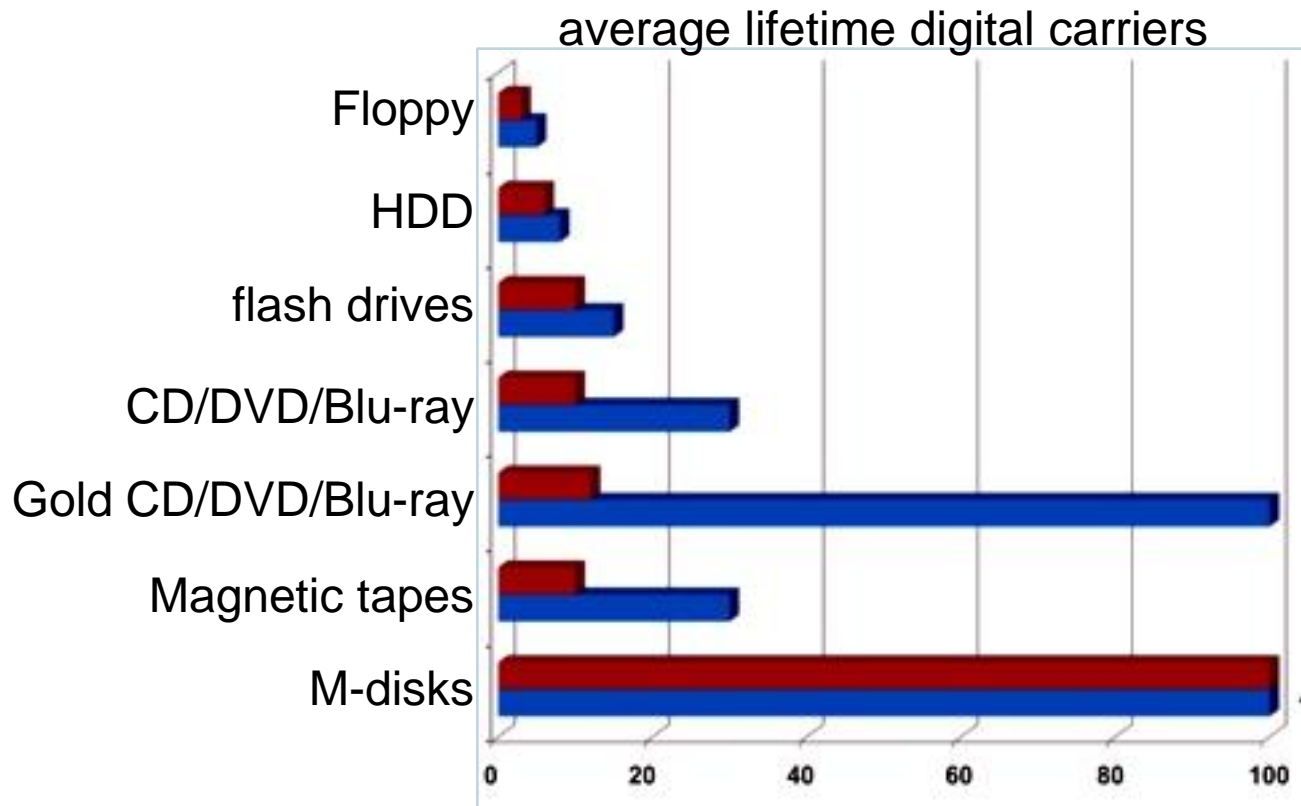
- 2 copies of the archived data on CD/DVD: MASTER (I) и COPY (II);
- on a dedicated server for the working version of SIS: PRIME and DATA (~1.5TB);
- on the file server for the test case of SIS: PRIME and DATA (~1.5TB);
- full SIS backup, including two copies of the data, service files and software.

Migration of radio observations

- ▶ 6 local archives for each type of radiometric complex and secondary reflector
- ▶ ref1: 1982-01 – 2016 (more 30 years)
- ▶ ref2: 2011-11 – 2016
- ▶ ref3: 2013-02 – 2016
- ▶ ref4: 2011-07 – 2013-01
- ▶ ref5: 2008-09 – 2008-10
- ▶ ref6: 1988-02 – 1988-04

volume: ~74GB compressed data, ~540000 files

reliability of digital carriers



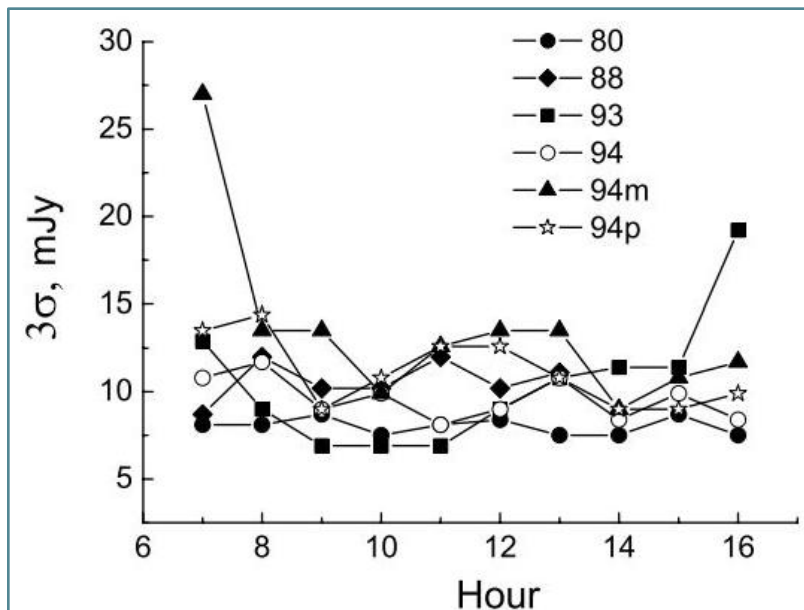
expected frequency of migration



RATAN-600 «Cold» blind surveys 1980-1994

survey	H	date	t, days	N	σ , mK	$F_{3.94\text{GHz}}^{\text{lim}}$, mJy
1980	51°08'	15.03.1980-06.06.1980	84	25-50	0.7	8.0±0.5
1988	51°09'	16.12.1987-12.01.1988	28	25	1.1	10.6±1.3
1993	51°10'	17.09.1993-01.11.1993	46	46	1.6	10.4±1.2
1993	51°22'	01.04.1994-25.05.1994	55	40	1.2	11.1±2.0

(Soboleva+, 2010AstBu..65...44)

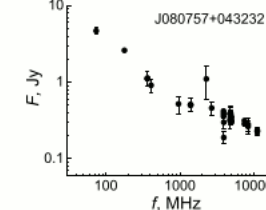
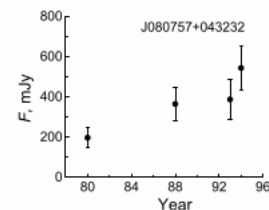
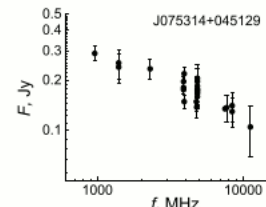
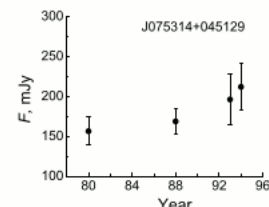
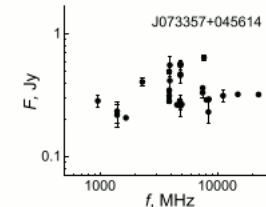
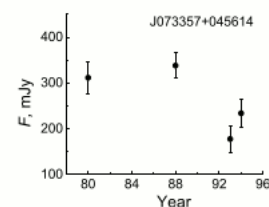
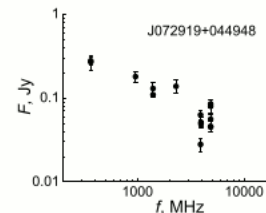
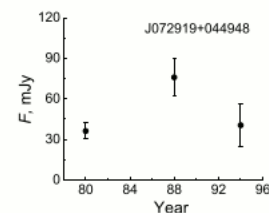


- 1) The ability to detect variable sources based on blind RATAN-600 surveys (Majorova&Zhelenkova, 2012AstBu..67..318);
- 2) Search candidates of variables sources in the range $7\text{h} < \text{RA} < 17\text{h}$ (Majorova&Zhelenkova, 2013AstBu..68..371) and in $2\text{h} < \text{RA} < 7\text{h}$ (Majorova+, 2015AstBu..70...34);
- 3) Search sources which were observed only in one survey, including the transient events (Zhelenkova&Majorova, 2016);

Кандидаты в переменные источники

RCR		V	V_R	V_F	\bar{F} ,	σ^{set} ,	RMS^{set}	\overline{dH} ,	α	Notes
RA ₂₀₀₀	Dec ₂₀₀₀				mJy	mJy		arcmin		
(1)		(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
J 072919.57+044948.7		0.189	2.09	2.61	51	22	0.428	5.5	-0.67	
J 073357.46+045614.1		0.199	1.90	3.99	265	73	0.276	0.6	0.11	*
J 075314.02+045129.4		0.025	1.35	1.64	183	25	0.138	4.2	-0.34	*
J 080757.60+043234.6		0.275	2.68	3.12	374	142	0.380	-23.0	-0.30	
J 081218.14+050755.5		0.097	1.92	1.91	118	32	0.266	11.5	-0.75	
J 081626.62+045852.8		0.106	1.67	2.42	53	14	0.272	3.5	-0.88	
J 083148.89+042938.5		0.130	1.89	2.32	949	247	0.261	-25.5	0.04	*

RCR		p_{df}	p_{df-1}	\bar{p} ,	$\langle F \rangle$,	ΔF ,	V_x	$\langle \sigma \rangle$,	$\langle \sigma \rangle^{\text{otn}}$	χ^2	df
RA ₂₀₀₀	Dec ₂₀₀₀				mJy	mJy		mJy			
(1)		(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
J 072919.57+044948.7		0.966		0.966	42	16	0.385	5	0.124	6.82	2
J 073357.46+045614.1		1	0.999	0.999	266	103	0.388	15	0.056	18.80	3
J 075314.02+045129.4		0.653	0.796	0.725	173	10	0.057	10	0.059	3.31	3
J 080757.60+043234.6		0.991	0.995	0.993	302	179	0.594	37	0.124	10.67	3
J 081218.14+050755.5		0.738	0.906	0.823	110	21	0.194	12	0.112	4.01	3
J 081626.62+045852.8		0.974	0.990	0.983	51	17	0.337	4	0.078	9.25	3
J 083148.89+042938.5		0.960	0.984	0.972	859	316	0.367	79	0.092	8.31	3

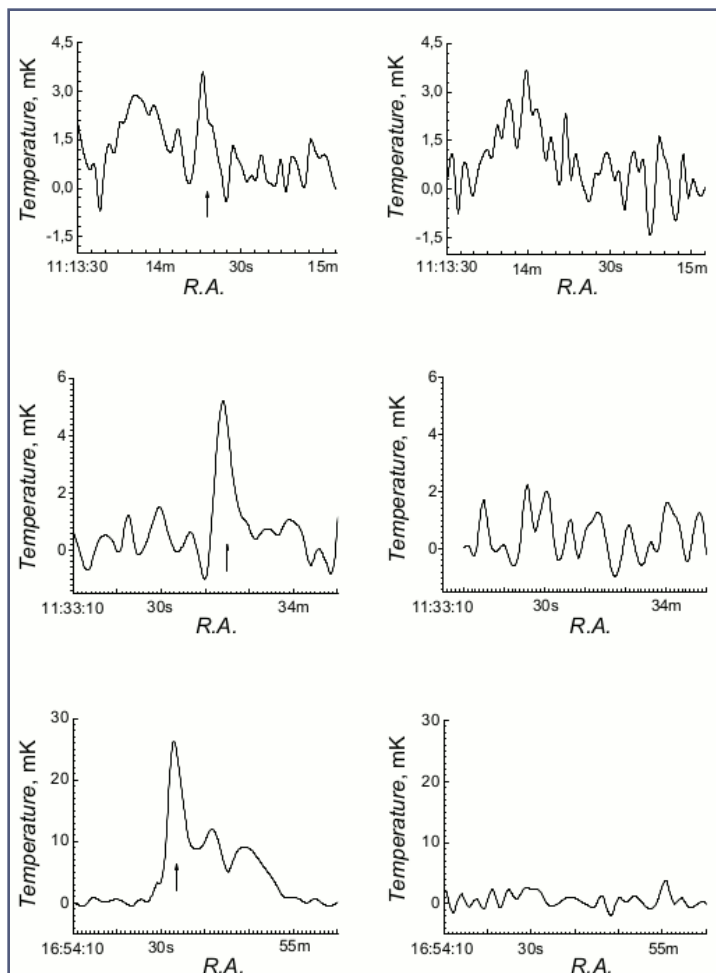


Sources detected only in one survey, including transient events

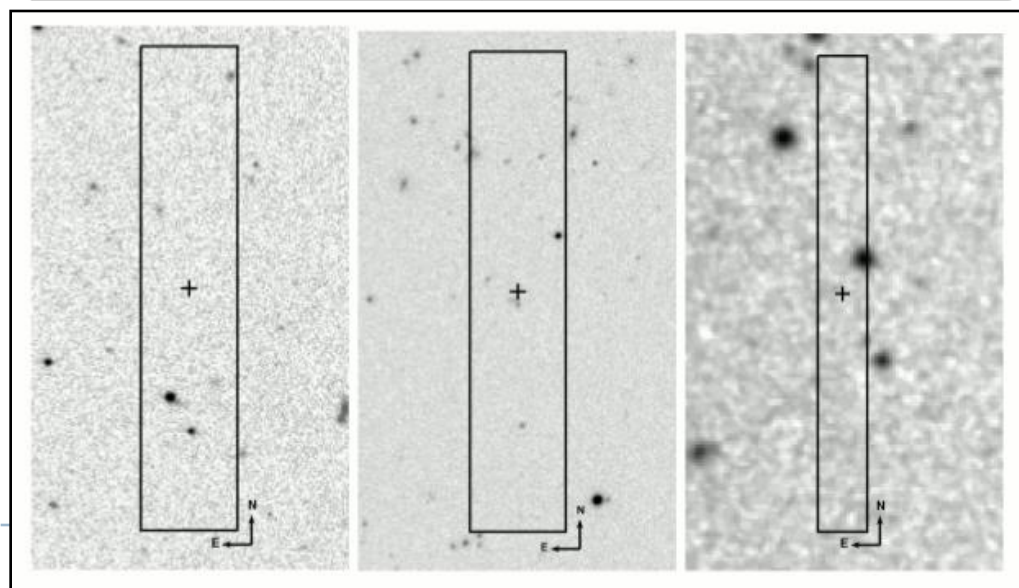
A criterion of the transient nature of the source:

absence it in NVSS and other catalogs,

detection on only one of the surveys despite the fact that the sensitivity of at least a further survey, it was enough to detect it.



Имя (1)	$R.A.$ hhmmss.s (2)	$Dec.$ sddmmss (3)	$F_{3.94\text{ГГц}}$ мЯн (4)	T_a/σ 1988–1994 гг. (5)
J111417+045530	111416.7 ± 0.6	$+045530 \pm 45$	21.0 ± 2.0	$5.2 \div 7.5$
J113344+045030	113344.1 ± 0.6	$+045030 \pm 45$	24.3 ± 2.5	$3.4 \div 4.0$
J165433+045457	165433.1 ± 0.3	$+045457 \pm 45$	88.2 ± 8.5	$11.1 \div 16.6$



► Thanks for attention!

► The works supported by RFBR grants:
07-07-00415, 10-07-00412, 11-07-00108, 14-07-00361