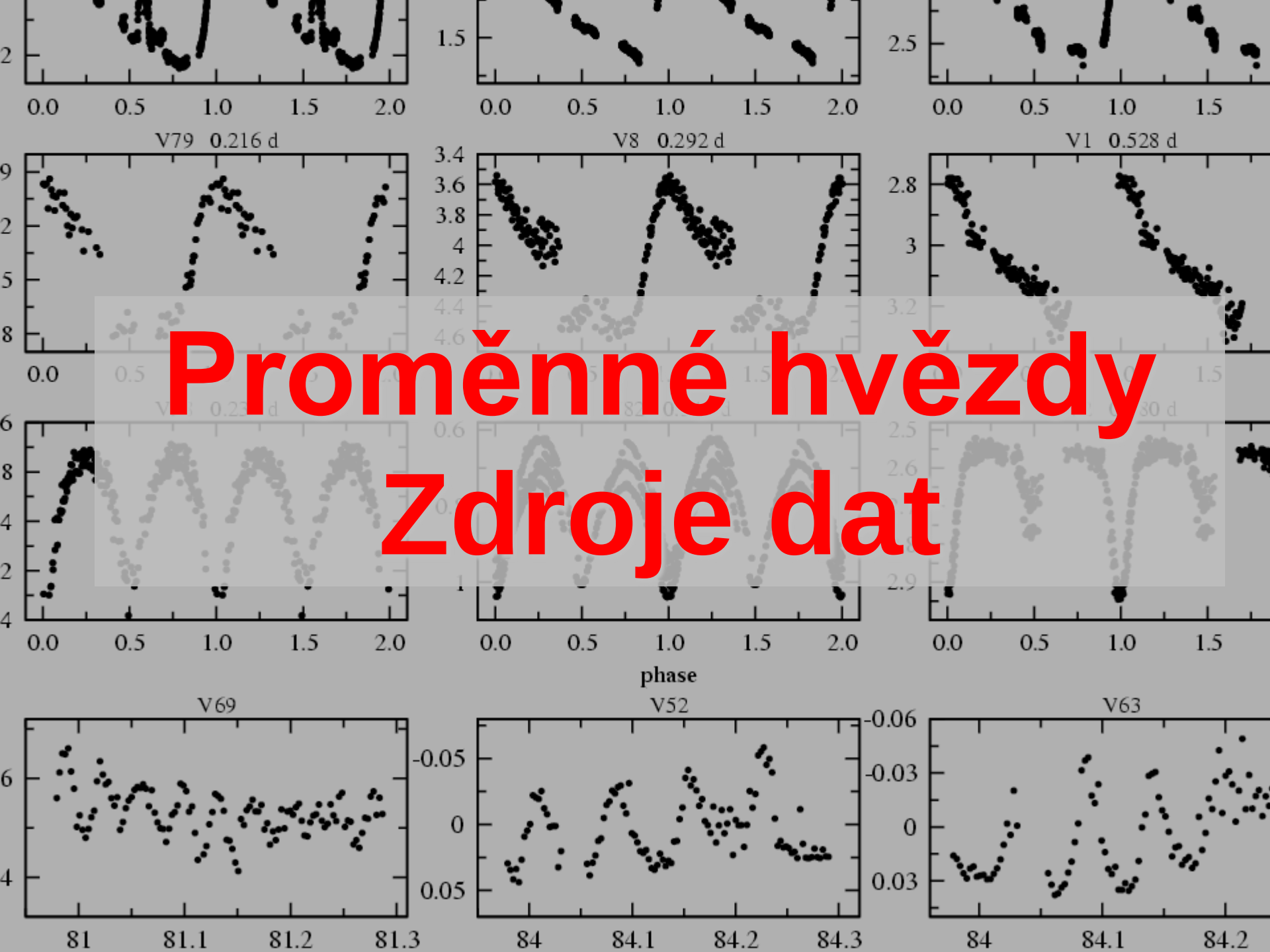



# Proměnné hvězdy
# Zdroje dat

# Astronomie – věda založená na datech a jejich analýze

Zdroje dat:

- vlastní pozorování (fotometrická, spektroskopická, interferometrická, polarimetrická aj.) – pozorovatelů (alespoň těch profesionálních) ubývá

  důvody – pohodlnost, robotické dalekohledy, přehlídky

- data z publikací, literatury
- archívy přehlídkových projektů – minulých i aktivních

= > astronom musí umět:

1. hledat data v literatuře a archívech
2. získaná data korektně zpracovat!

Předmět našeho studia – změny jasnosti proměnných hvězd (světelné křivky)

u periodicky proměnných – světelnou křivku nahrazuje fázová křivka

# Data z literatury, publikací

zdroje:

- ADS

  https://ui.adsabs.harvard.edu/

- SIMBAD

  http://simbad.u-strasbg.fr/simbad/

- WoS

  http://apps.webofknowledge.com/

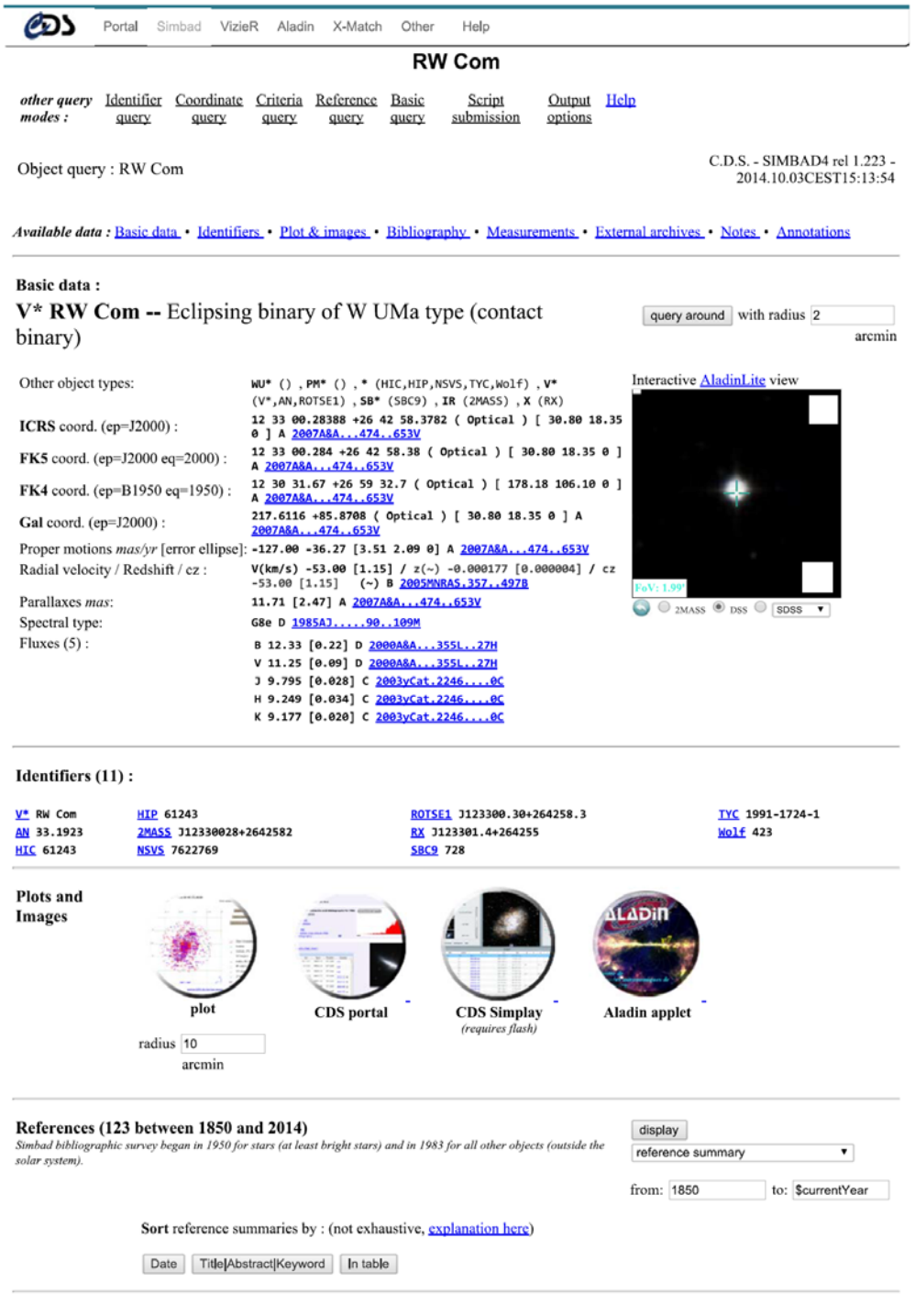
- CDS

  https://cds.u-strasbg.fr/

aj.

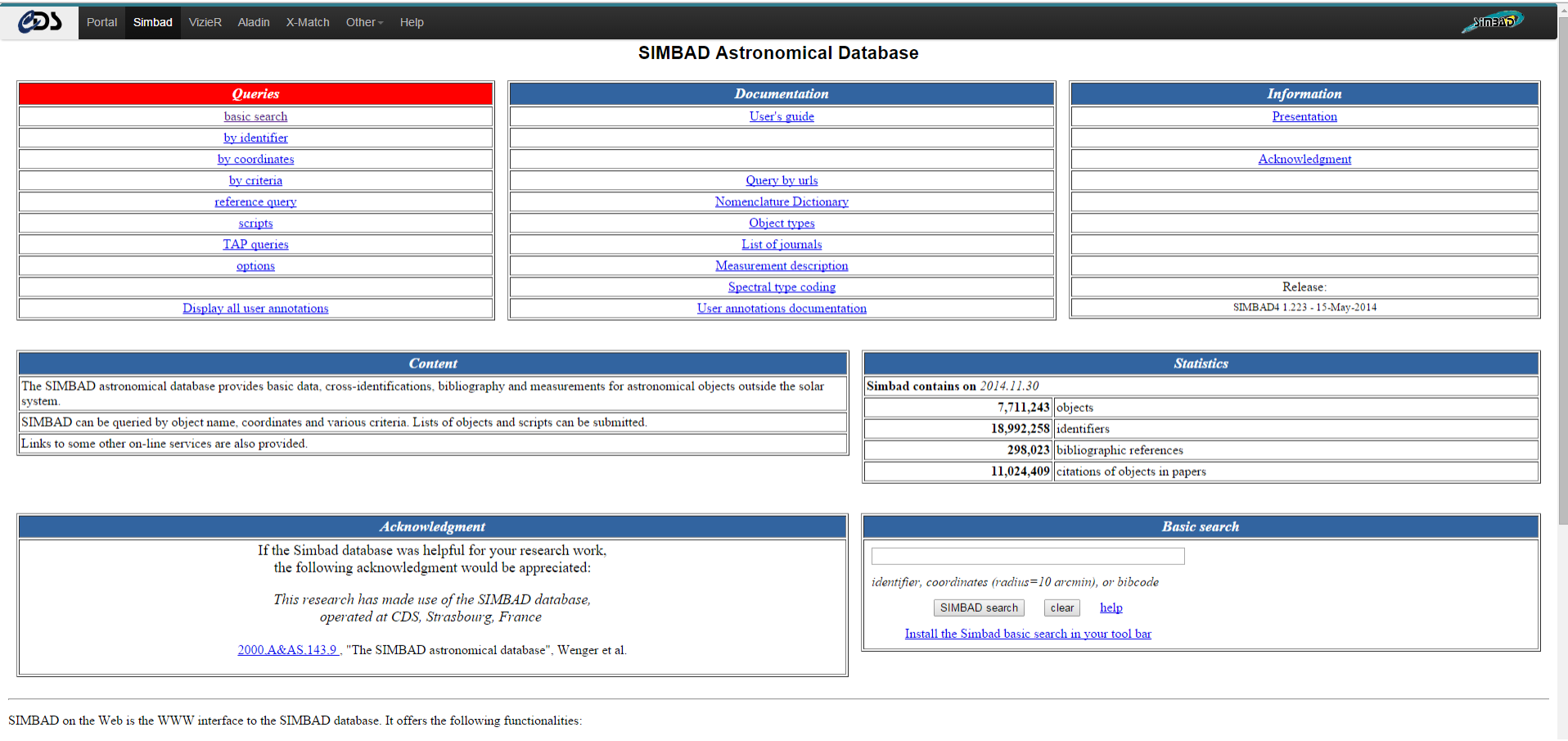
poznámky:

1. starší a azbukou psané články nemusí být dostupné v elektronické podobě!
2. čtěte pozorně - zvyklosti, jak uvádět časy, hvězdné velikosti, chyby, fotometrické filtry aj. se s časem mění!



# SIMBAD

http://simbad.u-strasbg.fr/simbad/




SIMBAD on the Web is the WWW interface to the SIMBAD database. It offers the following functionalities:

# Aladin

http://aladin.u-strasbg.fr/

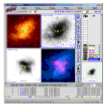
Portal | Simbad | VizieR | Aladin | X-Match | Other | Help

## Aladin Sky Atlas

**New: Aladin version 8** - March 2014 - *The new release of Aladin (more) ...*

***Description*** *(en français)*

**Aladin is an interactive software sky atlas allowing the user to visualize digitized astronomical images, superimpose entries from astronomical catalogues or databases**, and interactively access related data and information from the *Simbad database*, the *VizieR service* and other archives for all known sources in the field (see available data).
Created in 1999, Aladin has become a widely-used *VO tool* capable of addressing challenges such as locating data of interest, accessing and exploring distributed datasets, visualizing multi-wavelength data. Compliance with existing or emerging VO standards, interconnection with other visualisation or analysis tools, ability to easily compare heterogeneous data are key topics allowing Aladin to be a powerful data exploration and integration tool as well as a science enabler.
The *Aladin sky atlas* is available in four modes: a Java Standalone application, a Java applet, a Aladin Lite javascript and a simple previewer.


**Download Aladin on your machine**


Launch **Aladin applet** (*FI, CS, Jp, In, UK, Ca*)*


Use **Aladin Lite**


Jump to simple previewer

***Documentation***

**The Aladin FAQ**
**The Aladin user manual** (En - Fr - It - *corresponds to version 6*)
Available Hierarchical Progressive Surveys (HiPS doc)
Provide my data in Aladin (help form)
The Aladin science case tutorial
The Aladin filter manual
The script reference manual

***Demonstration***

What's new? - *a Flash video (40MB)*
Become a beta tester - *exercices for discovering/testing Aladin*
Object gallery - *2 million Simbad object thumbnails created by Aladin in batch mode*
Amateur's corner- *movie for starting (48MB)*

***Mailing list***

**Subscribe:** just send this e-mail to sympa@unistra.fr
Archive access

***Plugins***

Aladin can be extended by your own java plugins.
See the Aladin plugin repository.

***Copyright***

UDS/CNRS - distributed under GPL v3 licence
- Portions of the code (outreach developements) have been developed in the framework of the EuroVO AIDA project (2008-2010).
- Portions of the code (FoV advanced integration, Fits cubes, Xmatcher by ellipses, Plastic integration) have been developed in the framework of the EuroVO VOTech project (2005-2008).
- Portions of the code (contours, filters, metadataTree) have been developed in the framework of the Astrophysical Virtual Observatory (AVO), an EC RTD project 2002-2004
- The RGB feature has been developed in the framework of the IDHA project (ACI GRID of the French Ministere de la Recherche).

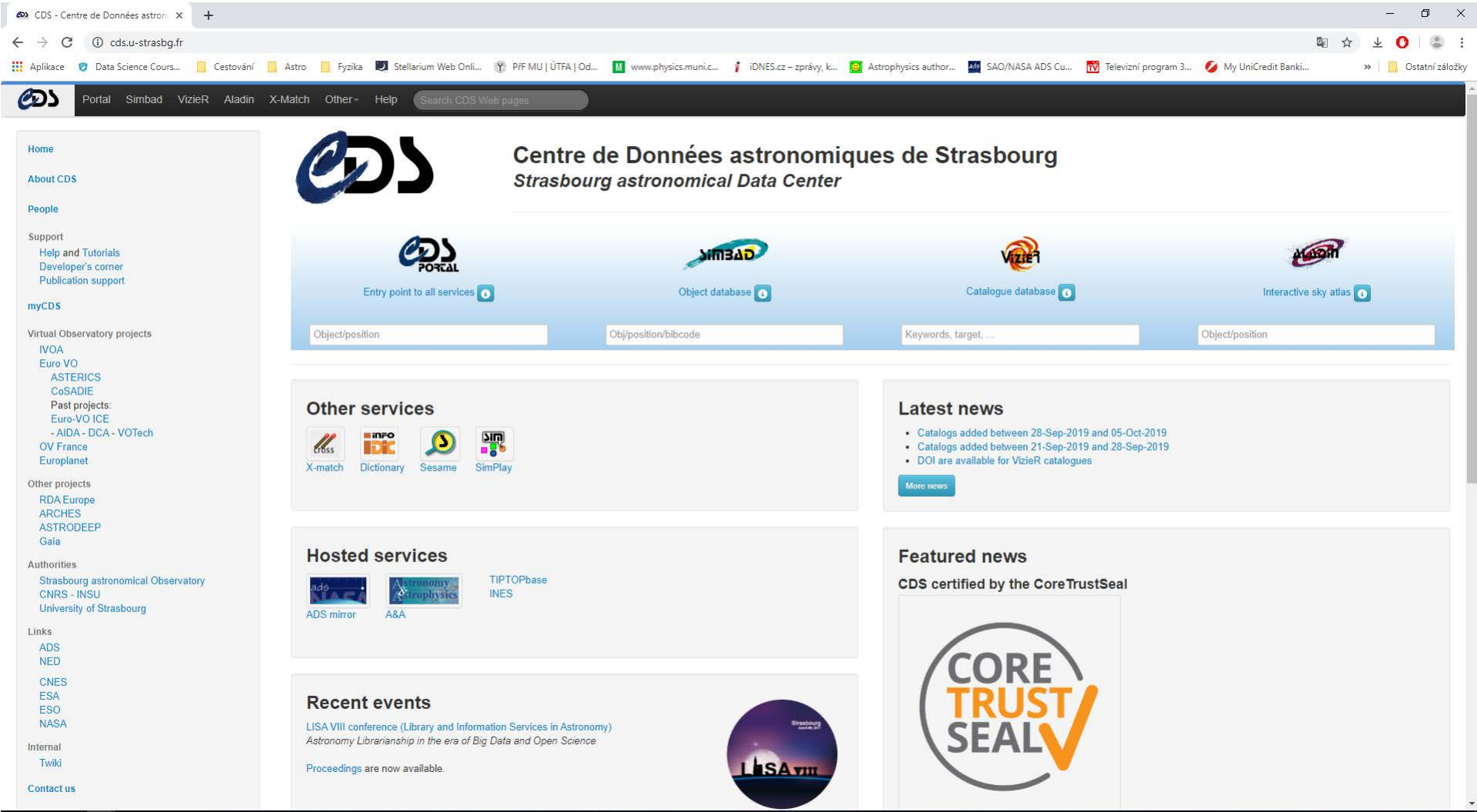
***Acknowledgment***

If the Aladin sky atlas was helpful for your research work, the following citation would be appreciated: 2000A&AS..143...33B.

*(*) The Aladin Java applet can be started from the CDS (Strasbourg - France), from the CFA (Harvard - USA), from the ADAC (Tokyo - Japan), from the IUCAA (Pune - India), from the UKADC (Cambridge - UK), or from the CADC (Victoria - Canada).*

# CDS portal

http://cdsportal.u-strasbg.fr/



# IRSA (Infrared Processing and Analysis Center)

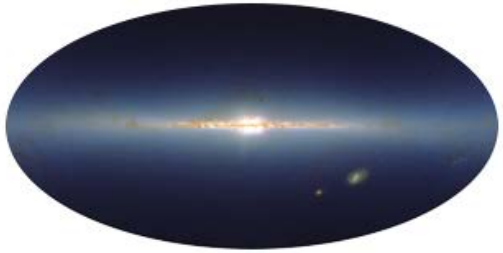
data z projektů NASA (IR a submm), družic a několik souborů dat

all-sky projekty v 20 oborech,
přes 20 miliard řádek dat v katalogu,
přes 18 milionů snímků,
přes 100 000 spekter

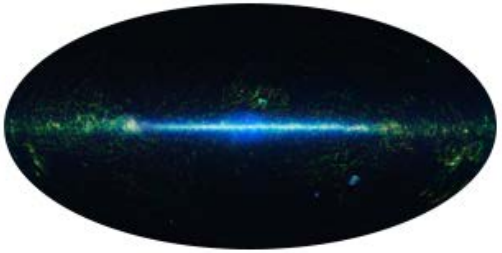
http://irsa.ipac.caltech.edu/frontpage/

http://www.ipac.caltech.edu/

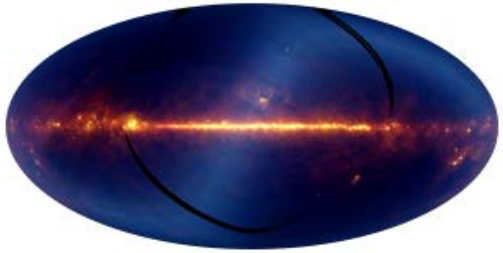
**Spitzer**: 3.6, 4.5, 5.8, 8, 24, 70, 160 microns



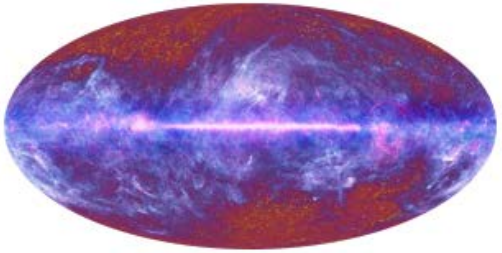
**2MASS**: J, H, K



**WISE**: 3.4, 4.6, 12, 22 microns



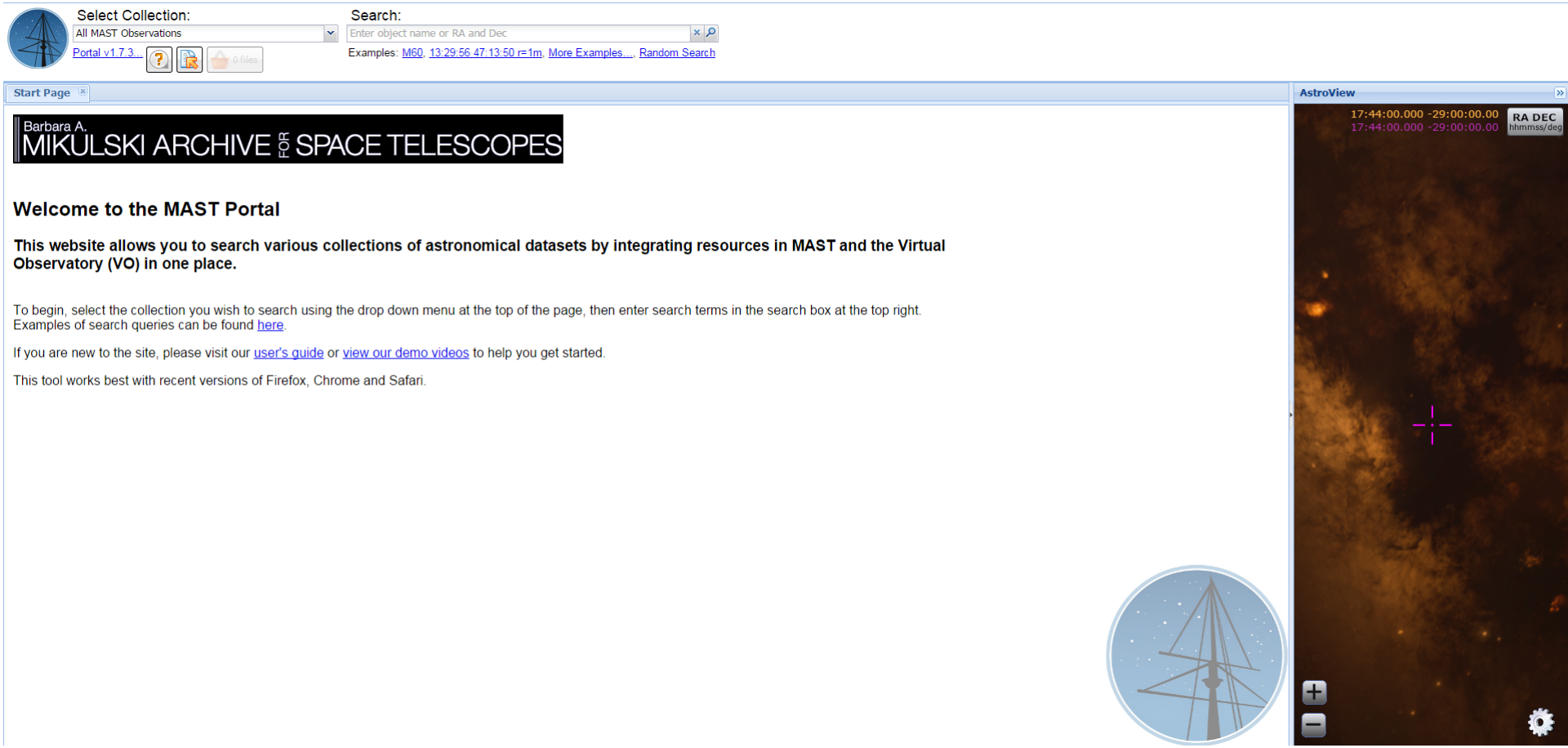
**IRAS**: 12, 25, 60, 100 microns



**Planck**: 30-857 GHz

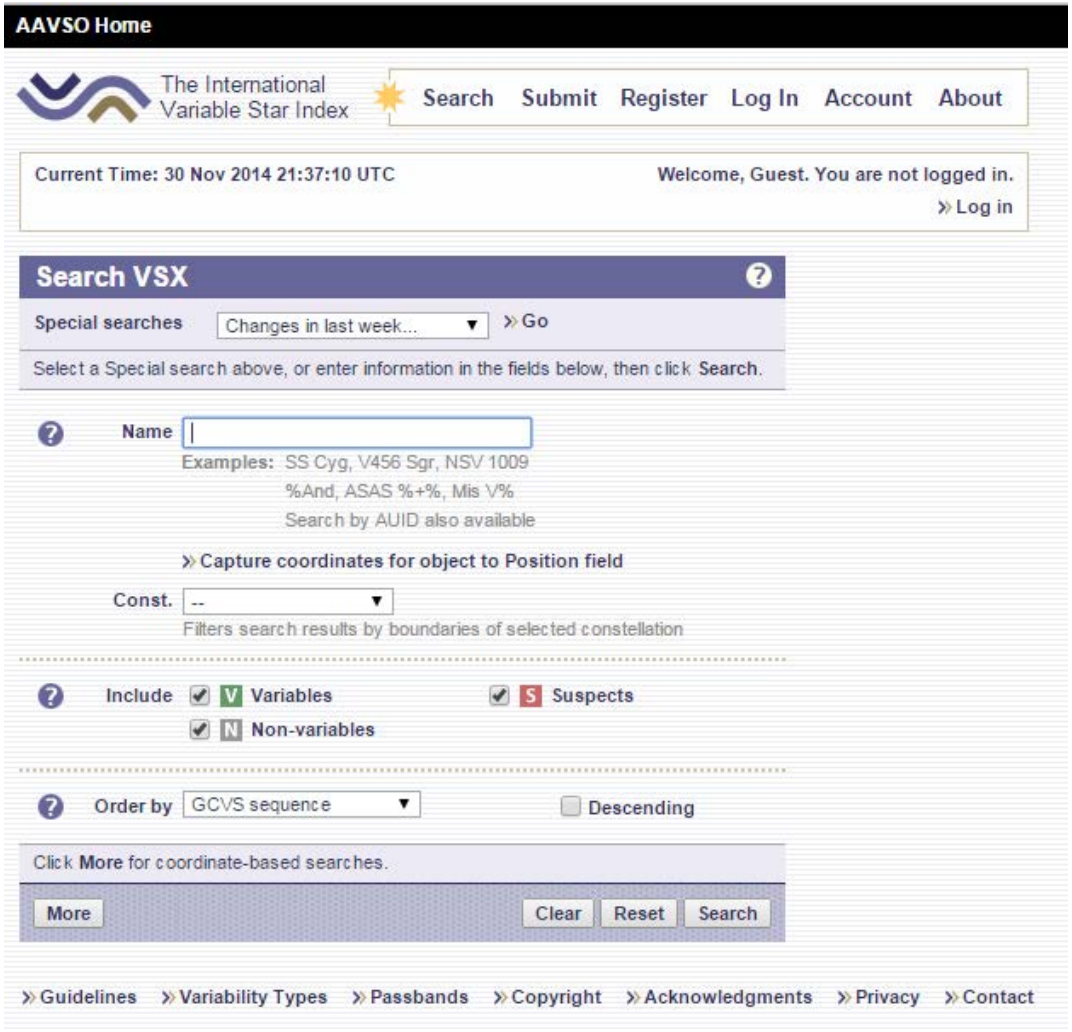
# MAST

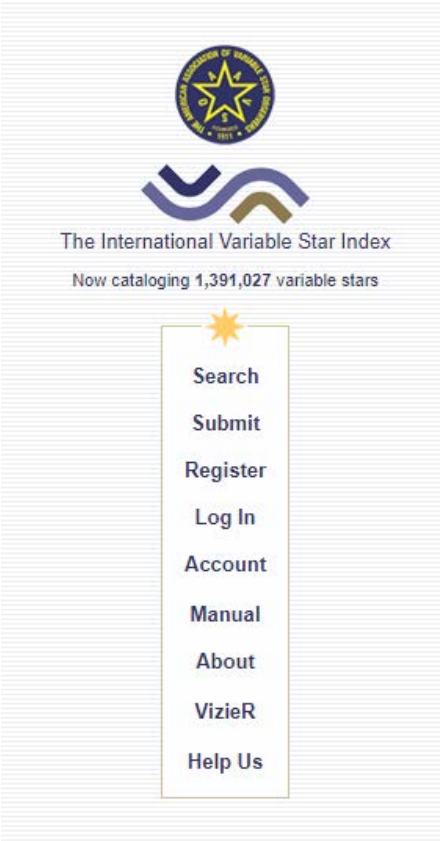
http://mast.stsci.edu/portal/Mashup/Clients/Mast/Portal.html



# AAVSO

http://www.aavso.org/vsx/



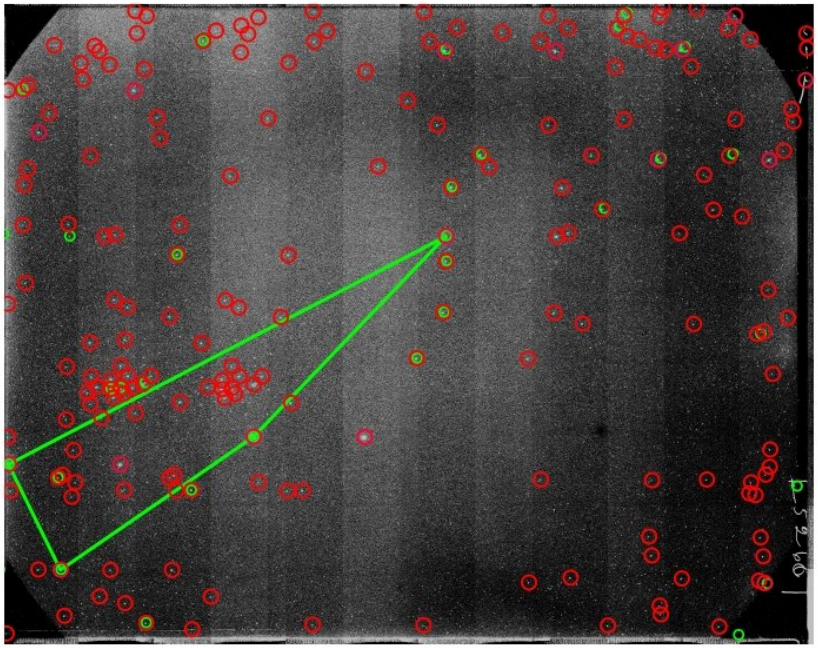



# Přehlídkové projekty:

historické – fotografické

- National Geographic Society
  – Palomar Observatory Sky Survey (NGS-POSS)
- Harvard Plate collection
- Moskva
- Pulkovo
- Sonneberg
- Asiago

dnes – proces převodu do digitální podoby, např. project DASCH



*DASCH*

Digital Access to a Sky Century @ Harvard

*A New Look at the Temporal Universe*

Data Release Description | Search Magnitudes and Lightcurves | Search Images | Project Page

## DASCH Lightcurve Access

Enter the J2000 object position or a Simbad-searchable reference in the box below and press "Search" to obtain the lightcurve query results in a separate window. The search center is currently restricted to released regions, a maximum of ten entries, and a maximum search radius is 60 arcsec. Note that the positions returned by Simbad may not necessarily match the DASCH positions because of discrepancies between catalogs. DASCH positions are corrected by UCAC4 proper motions.

HV 982

N >= 1 d <= 5 arcsec

Source: APASS Input Catalog (B-band)

Use frame format  Use separate tabs

Name and address (Optional)

Search

We are currently using the AAVSO Photometry All-Sky Survey (APASS) DR6 Catalog, the Kepler Input Catalog (KIC), and the GSC2.3.2 Catalog for photometry calibration. The APASS calibration gives the best photometric accuracy over the entire sky. The KIC calibration gives comparable accuracy for the field of the Kepler satellite. Finally, the GSC2.3.2 catalog provides magnitudes for objects outside the 9 to 15 magnitude range of APASS. An overview of DASCH calibration appears in Laycock, S. et. al. "Digital Access to a Sky Century at Harvard. II: Initial Photometry and Astrometry" and in Sumin Tang et al., "Improved Photometry for the DASCH pipeline". An overview of the DASCH pipeline appears in the project photometry page.

Objects in the Kepler field calibrated with the Kepler Catalog (KIC) have g-band magnitudes; objects calibrated with APASS have B-band magnitudes; and objects calibrated with GSC2.3.2 have JpgMag (IIIaJ) magnitudes.

To access photometric data enter object ID's (one per line) in the window above. Valid identifications are: **J2000 RA DEC** (5 45 -81.5 or 5:26:50 -81:35:12 or 8 41 43.8 +19 43 33.5 where a "+"declination sign is mandatory in the third case only), **GSC2.3.2 ID** (for the gsc2.3.2 dataset only; e.g. N2312220195 or N120013341), **Kepler Input Catalog ID** (for the KIC dataset only; e.g. K3433237), **APASS Catalog ID** (for the APASS dataset only; e.g. APASS_J115140.7+020334), **Simbad-searchable object name** (XX Dor), or **DASCH object** (DASCH_J123349.2-113822), i.e. an object which does not have a matching catalog entry. All stars within **d** arcsecs from center, having more than **N** measurements will be listed. Because of astrometry issues inherent in the processing of old photographic plates, measurements of interest may appear in adjacent lightcurves. To obtain object's light curve, click on its listed ID in the query results window. Data tables for all points returned by the query may be obtained by selecting the "Download all points in table form." link at the bottom of the query results window.

### Acknowledgements

**The DASCH project at Harvard is grateful for partial support from NSF grants AST-0407380, AST-0909073, and AST-1313370; which should be acknowledged in all papers making use of DASCH data.**

We acknowledge the one-time gift of the Cornel and Cynthia K. Sarosdy Fund for DASCH, and thank Grzegorz Pojmanski of the ASAS project for providing some of the source code on which the DASCH web-interface is based.

The ongoing AAVSO Photometric All-Sky Survey (APASS) has improved DASCH photometric calibration and is funded by the Robert Martin Ayers Sciences Fund.

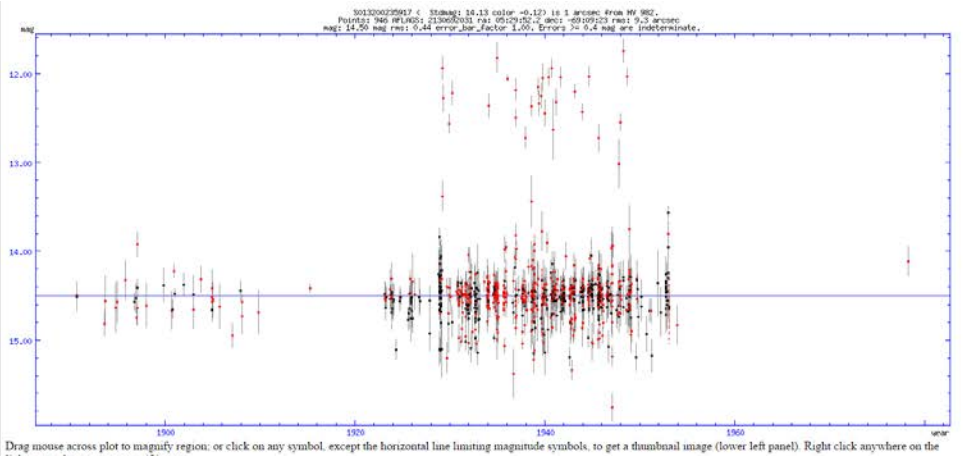
**DASCH (apass) Catalog Query Results (5")**

'HV 982' ra: 05:29:52.3 dec: -69:09:22 approx. plates: 2834

| arcsec | Nobs | Nplot | mag | id | (nearbyObjects [(mag)] [object type] @ arcsec |
|---|---|---|---|---|---|
| 1 | 1267 | 946 | 14.53 | S013200235917 | |

Display this table as a text file
Display this table as a VOTable
Download all points in table form.

Click on a point in the plot in the upper right panel and the object image will appear here.




Drag mouse across plot to magnify region; or click on any symbol, except the horizontal line limiting magnitude symbols, to get a thumbnail image (lower left panel). Right click anywhere on the lightcurve plot to save as a .gif image.

Show Lightcurve Summary Data (Plotted points only)
Download Data in tab-delimited or VOtable format
Get Tarball of Extracted FITS images
Reset plot to original size

Black points have no quality flags set, but note that these flags have varying probabilities of false positive and false negatives. Red points have one or more issues. Error bars greater than +/- 0.4 mag are truncated to this magnitude and shown as dashed. Stars too bright are shown as blue up arrows and limiting magnitudes are shown as horizontal bars. Undetected images are shown as down arrows at the average limiting magnitude of a square degree region. Buttons below control the display of red points: a button with bold type means that the point is plotted. A 'Show' button click may need to be followed by the above 'Reset plot to original size' to display all of the affected points.

Show: Unflagged points | Show: All points | Show: Default points

Show: Limiting Magnitudes | Show: Undetected | **Hide: High astrometric error** | **Hide: Plate Defect**

Show: High BACKGROUND | **Hide: Uncertain date for extinction calculation** | Show: Maximum isophotonic rms exceeded | Show: Maximum locally smoothed rms exceeded

Show: Within 0.5 magnitude of the limiting magnitude | **Hide: In spatial bin 9** | **Hide: Bin has high or unknown astrometric error** | **Hide: Blend of multiple catalog stars**

**Hide: Multiple images for one catalog star** | **Hide: Complex blend** | Show: Pickering Wedge Image | **Hide: SExtractor blend** | **Hide: Excessive smoothing correction** | **Hide: Within 23.5 degrees of horizon**

**Hide: Multiple Exposure Plates** | **Hide: Grating Plates** | **Hide: Yellow or Red Plates** | **Hide: Non-Blue Colorterm Spatial Bin** | **Hide: Pickering Wedge Plates** | **Hide: Saturated Images**

**Hide: Not Magnitude-dependent Corrected** | **Hide: Wide-Field Patrol Telescopes** | **Hide: Narrow-Field Telescopes** | **Hide: Trailed** | **Hide: a series** | **Hide: am series** | **Hide: b series** | **Hide: dsb series**

**Hide: dsr series** | **Hide: dsy series** | **Hide: mf series** | **Hide: rb series** | **Hide: ay series**

http://dasch.rc.fas.harvard.edu/

# WIDE-FIELD PLATE DATABASE

Institute of Astronomy
Bulgarian Academy of Sciences
72 Tsarigradsko Shosse Blvd.
BG-1784 SOFIA, Bulgaria
Telephone: +359 (0)2 9795935
GSM: +359 (0)879603463 FAX: +359 (0)2 9753201
E-mail: wfpdb at skyarchive.org

January 15th, 2014





**ASTROWEB-WFPDB**

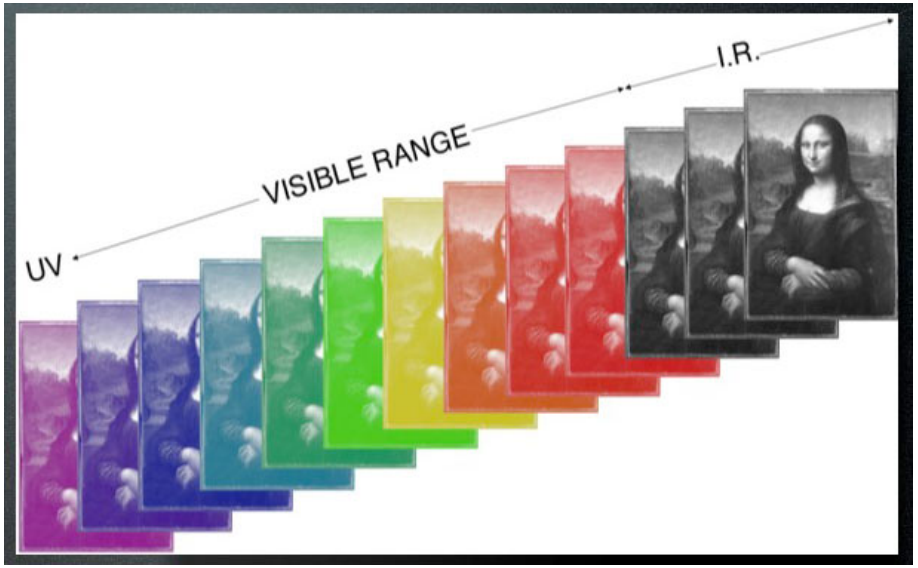
**Web based generator for sky maps drawing.**

MORE: DOCUMENTS & LINKS

# Současné přehlídkové projekty

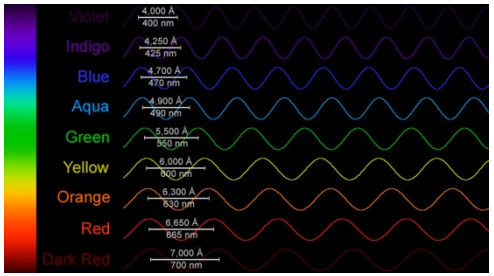
Rozdělení podle sledované části spektra

- Optické
- Infračervené
- Rádiové
- Gama
- Multispektrální




Rozdělení podle umístění přístrojů

- Pozemské
- Družicové




**Náš zájem – zejména fotometrická data z dostupných zdrojů!**

# Družicové fotometrické přehlídky

- Hipparcos – celá hvězdná obloha, obor $H_p$, + podpora Tycho katalog ($B,V$)
  https://www.cosmos.esa.int/web/hipparcos
- OMC Integral – celá hv. obloha, obor $V$ https://sdc.cab.inta-csic.es/omc/index.jsp
- MOST -dlouhodobé sledování pečlivě vybraných objektů (hvězdy slunečního typu, podtrpaslíci, roAp, WR hvězdy, soustavy s exoplanetami)
  http://most.astro.ubc.ca/
- COROT - FOV 2.7° by 3.05°, 2 pole (Ser, Mon) http://idoc-corot.ias.u-psud.fr/
- KEPLER – pole Cyg-Lyr, mise K2 http://kepler.nasa.gov, http://keplerscience.arc.nasa.gov
- Chandra - rtg. satelit, 827 prom. hvězd http://cxc.harvard.edu/vguide/index.php
- GAIA - http://sci.esa.int/science-e/www/area/index.cfm?fareaid=26
- BRITE – Kanada, Polsko, Rakousko – sada nanosatelitů
  http://www.brite-constellation.at/
- WISE (Wide-field Infrared Survey Explorer) - http://wise.ssl.berkeley.edu/
- TESS (Transiting Exoplanet Survey Satellite) - https://tess.gsfc.nasa.gov/
- HST – Hubble Catalogue of Variables https://arxiv.org/abs/1909.10757

a další


**Object ID:** Odeslat Reset

Examples: IOMC 2677000065, IOMC 26770000%, V1011 Cyg

**Object list:**

**Object type:**
[Blue object] Blue object
[Composite object] Association of Stars
[Composite object] Cataclysmic Var. AM Her type
[Composite object] Cataclysmic Var. DQ Her type
[Composite object] Cataclysmic Variable Star
[Composite object] Cluster of Galaxies

File: Vybrat soubor **Soubor nevybrán**

Magnitude range: < V <

**Position:** R.A.: Dec: Radius (arcmin):

**Date:** From: To:

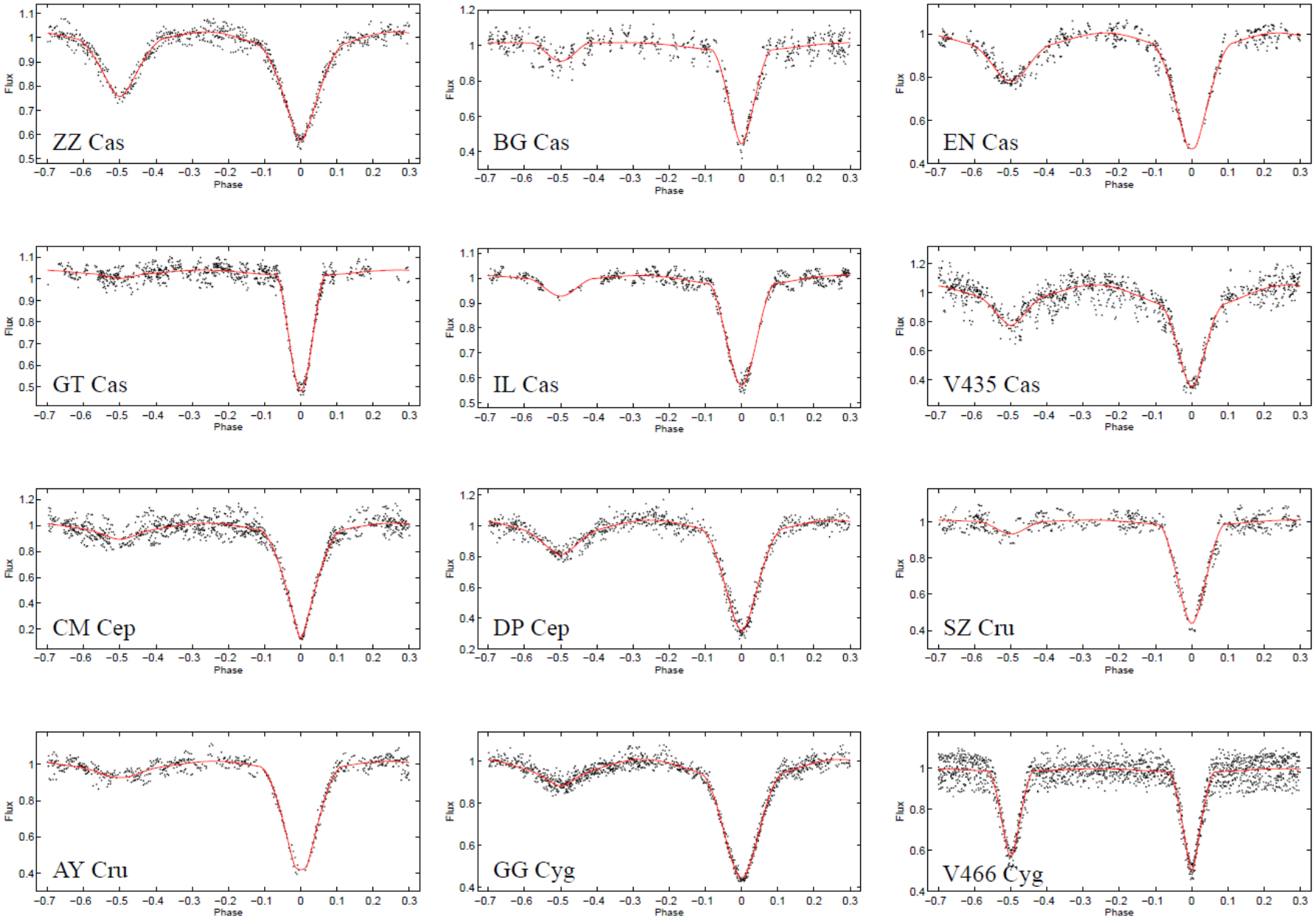
**Time binning:** 10 minutes **Centroid method:** Brightest pixel Source coordinates

**Target type:** Scientific **Num. points:** Only light curves with 1 points or more.

**Avoid scientific targets with NULL priority:**

expoziční časy jsou řádově minuty, každý snímek má jiný; uvádí se jen začátek expozice

| Output format | Sort output by | Number of results per page | Page to show |
|---|---|---|---|
| HTML | | 50 | 1 |

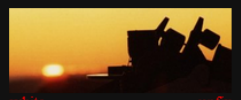

ZZ Cas
BG Cas
EN Cas
GT Cas
IL Cas
V435 Cas
CM Cep
DP Cep
SZ Cru
AY Cru
GG Cyg
V466 Cyg
Flux
Phase

# Pozemské fotometrické přehlídky

- ASAS - http://www.astrouw.edu.pl/asas/
- OGLE - http://ogle.astrouw.edu.pl/
- MACHO - http://wwwmacho.anu.edu.au/Data/MachoData.html
- EROS - http://eros.in2p3.fr/
- ROTSE (NSVS) - http://www.rotse.net/, http://skydot.lanl.gov/nsvs/nsvs.php
- SuperWASP - http://wasp.cerit-sc.cz/form
- APASS - http://www.aavso.org/apass
- SDSS - http://www.sdss3.org
- Catalina (CRTS) - http://crts.caltech.edu/
- 2MASS - http://www.ipac.caltech.edu/2mass/
- LINEAR – (https://astroweb.lanl.gov/lineardb/), https://ll.mit.edu/mission/space/linear/
- Stardial - http://stardial.astro.illinois.edu/
- HATNet - http://www.hatnet.org/
- Pi of the sky - http://grb.fuw.edu.pl/
- MASCARA - http://mascara1.strw.leidenuniv.nl/
- Pan-STARRS – http://pan-starrs.ifa.hawaii.edu/
- ASAS-SN - http://www.astronomy.ohio-state.edu/~assassin/index.shtml
- Evryscope - http://evryscope.astro.unc.edu/

a další

budované - čipy přes řádově Gpx! – LSST - http://www.lsst.org/



white unfix


Main
News
Highlights

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AASC / photometry
Sky Atlas
Kepler FOV
Download Data
View Alerts
Star of the Month

Information:
Credit
Status
Papers
History

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Links
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# ASAS All Star Catalogue

**HJD-2450000**

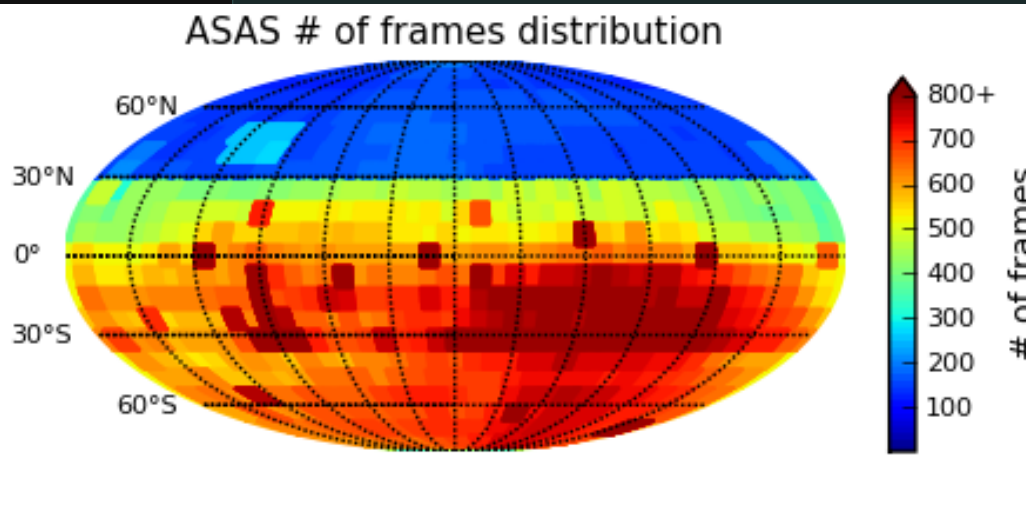
**Source:**
- **V-band (ASAS-3)**
- **I-band (ASAS-2)**

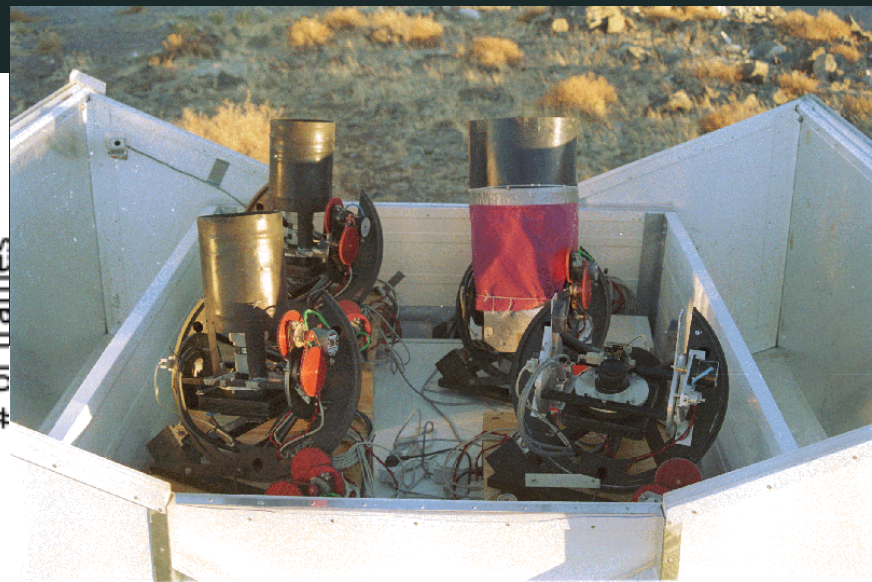
**Eqnx** 2000
**N >** 4
**r <** 15 **arcsec**
Search

To access photometric data enter object ID's (one per line) in the area above. Valid identifications are:
*RA[h] DEC[deg]*
for example: *5.45 -81.5* or *5:26:50,-81:35:12*
*ASAS ID*
for example: *052650-8135.2*
*GCVS ID*
for example: *XX Dor*

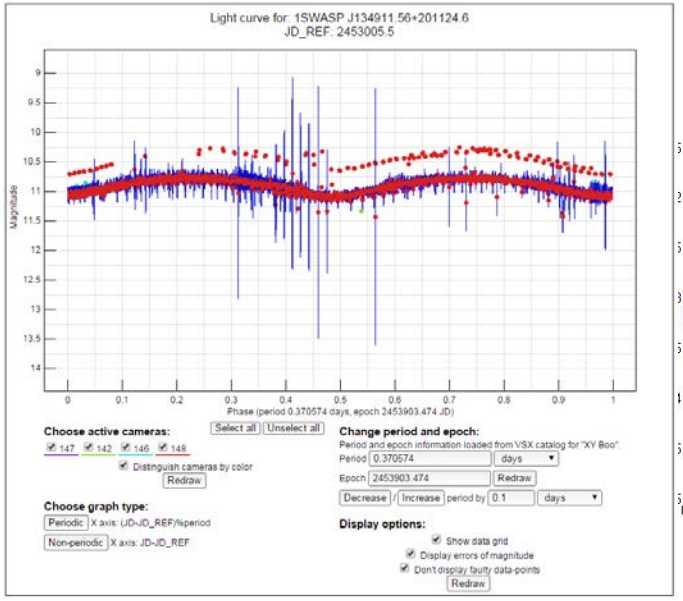
All stars within *r* arcsecs from center, having more than *N* measurements will be listed. To obtain object's light curve, click on its listed ID.

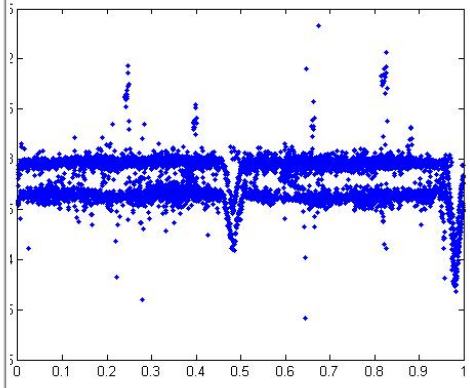
For more information on the catalogues go to the Catalogues section.

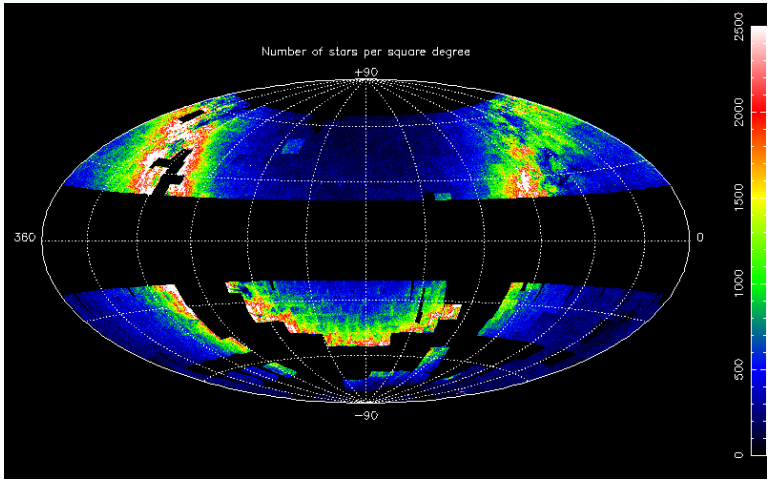



http://wasp.cerit-sc.cz/form






TMID *(s)* – střed expozice v sekundách od JD_REF
TMID=((HJD-JD_REF)*86400)

# Northern Sky Variability Survey

**Before you start:**
Cone search radius is limited to 120 arc minutes.
Output is always trimmed to 5000 rows.
Queries other than `select` are ignored
Selected flags reject measurements with certain known problems
(relevant only for light curve viewing)

**Cone Search**
Radius is in arc minutes. Format for coordinates is sexagesimal hours or decimal degrees: ([+|-]00:00:00.0 | 0.0)

| | |
|---|---|
| RA | 1:30:0.0 |
| DEC | 85:00:00.0 |
| Radius | 10 |

**Sextractor flags:**

- [ ] NEIGHBORS
- [ ] BLENDED
- [x] SATURATED
- [ ] ATEDGE
- [ ] APINCOMPL
- [ ] ISINCOMPL
- [ ] DBMEMOVR
- [ ] EXMEMOVR

**Photometric correction flags:**

- [x] NOCORR
- [ ] PATCH
- [x] LONPTS
- [x] HISCAT
- [x] HICORR
- [x] HISIGCORR
- [x] RADECFLIP

Reload the page to restore standard flags

Submit Query | Reset

**Put your select query here:**

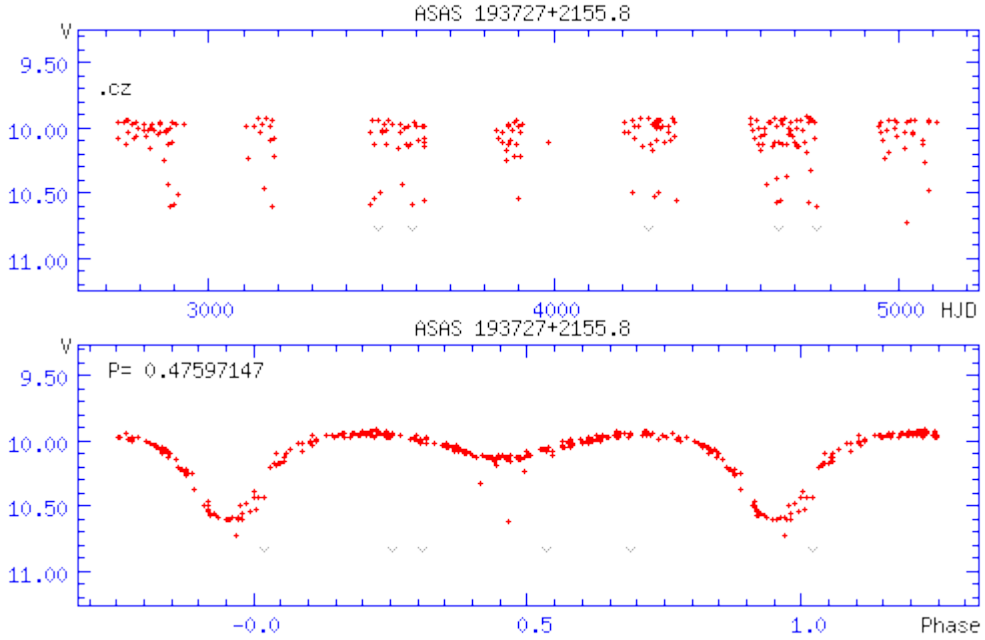
```
select * from object limit 10
```

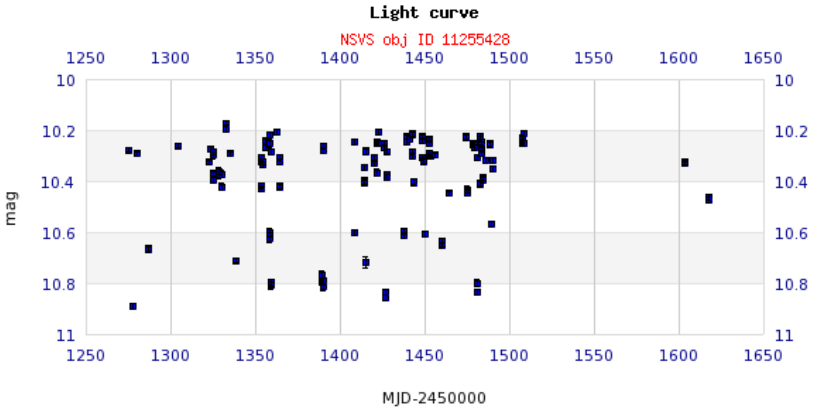
Submit Query

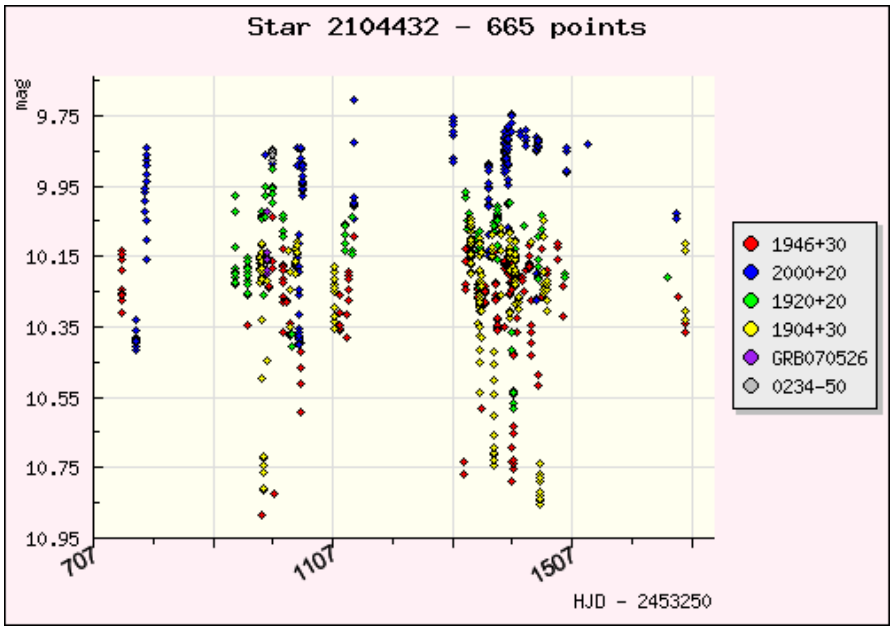
**MJD-50000**

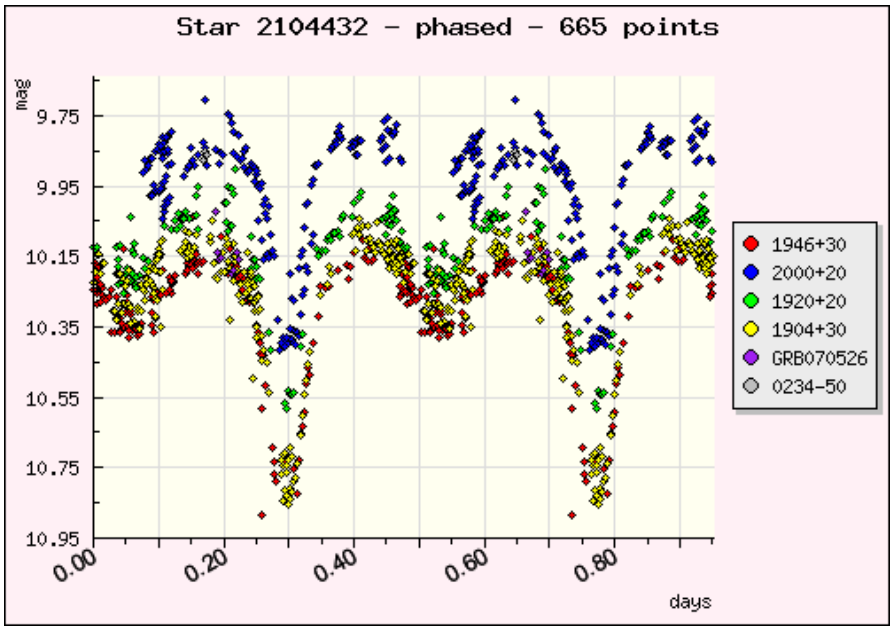
**1282.418683 => 2451282.9186**


**čas měření - 2453250**


ASAS 193727+2155.8
V
.cz
9.50
10.00
10.50
11.00
3000
4000
5000
HJD
ASAS 193727+2155.8
V
P= 0.47597147
9.50
10.00
10.50
11.00
-0.0
0.5
1.0
Phase

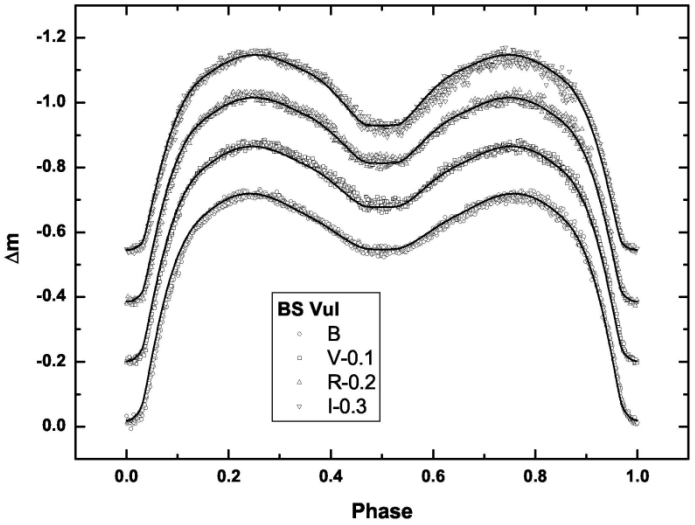

Light curve
NSVS obj ID 11255428
1250
1300
1350
1400
1450
1500
1550
1600
1650
mag
10
10.2
10.4
10.6
10.8
11
MJD-2450000

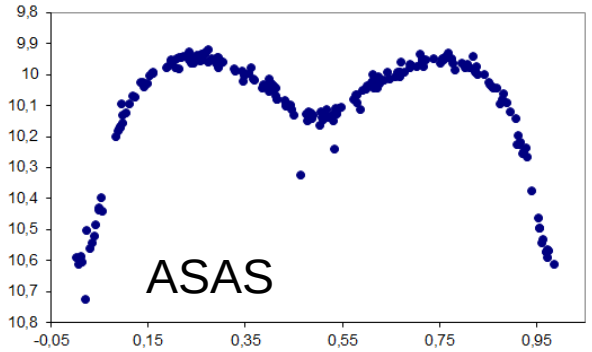

Star 2104432 - 665 points
mag
9.75
9.95
10.15
10.35
10.55
10.75
10.95
707
1107
1507
HJD - 2453250
1946+30
2000+20
1920+20
1904+30
GRB070526
0234-50

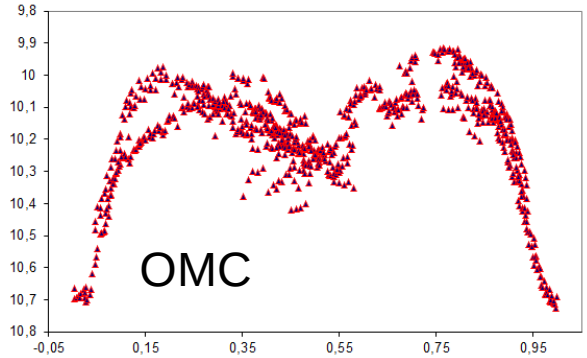

Star 2104432 - phased - 665 points
mag
9.75
9.95
10.15
10.35
10.55
10.75
10.95
0.00
0.20
0.40
0.60
0.80
days
1946+30
2000+20
1920+20
1904+30
GRB070526
0234-50

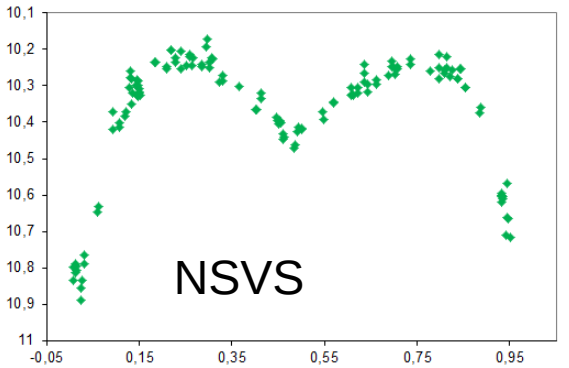
# BS Vul

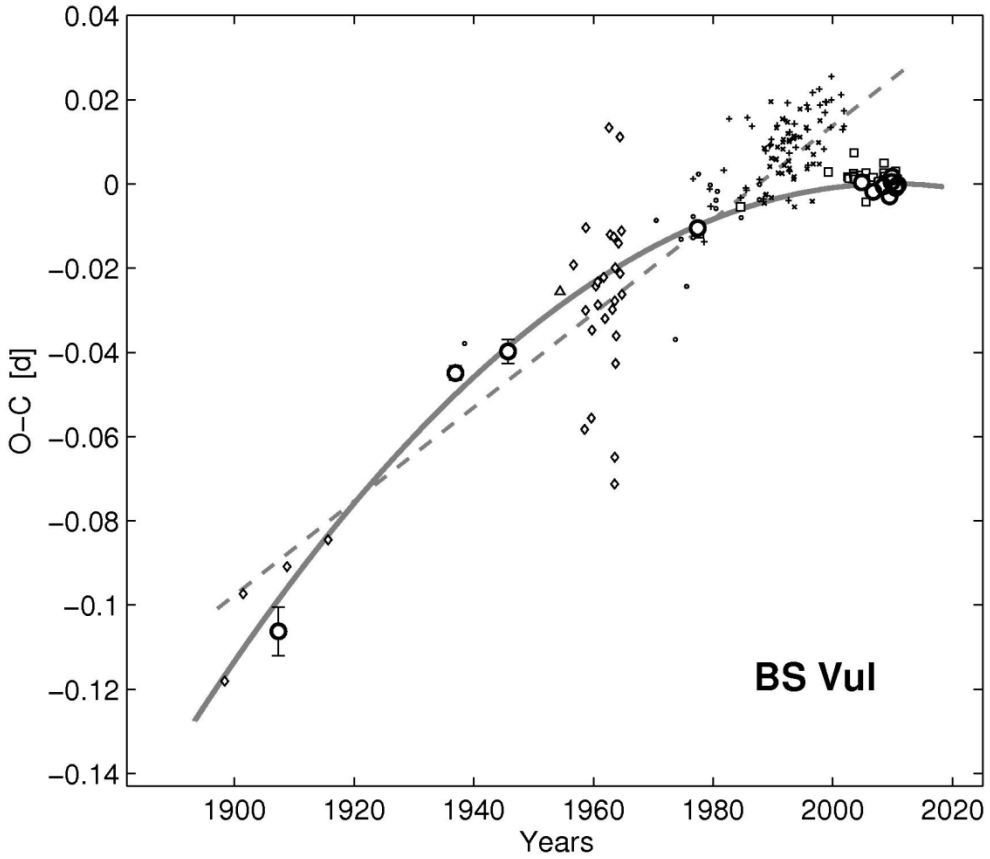
Astronomical Journal 144, 37 (2012)



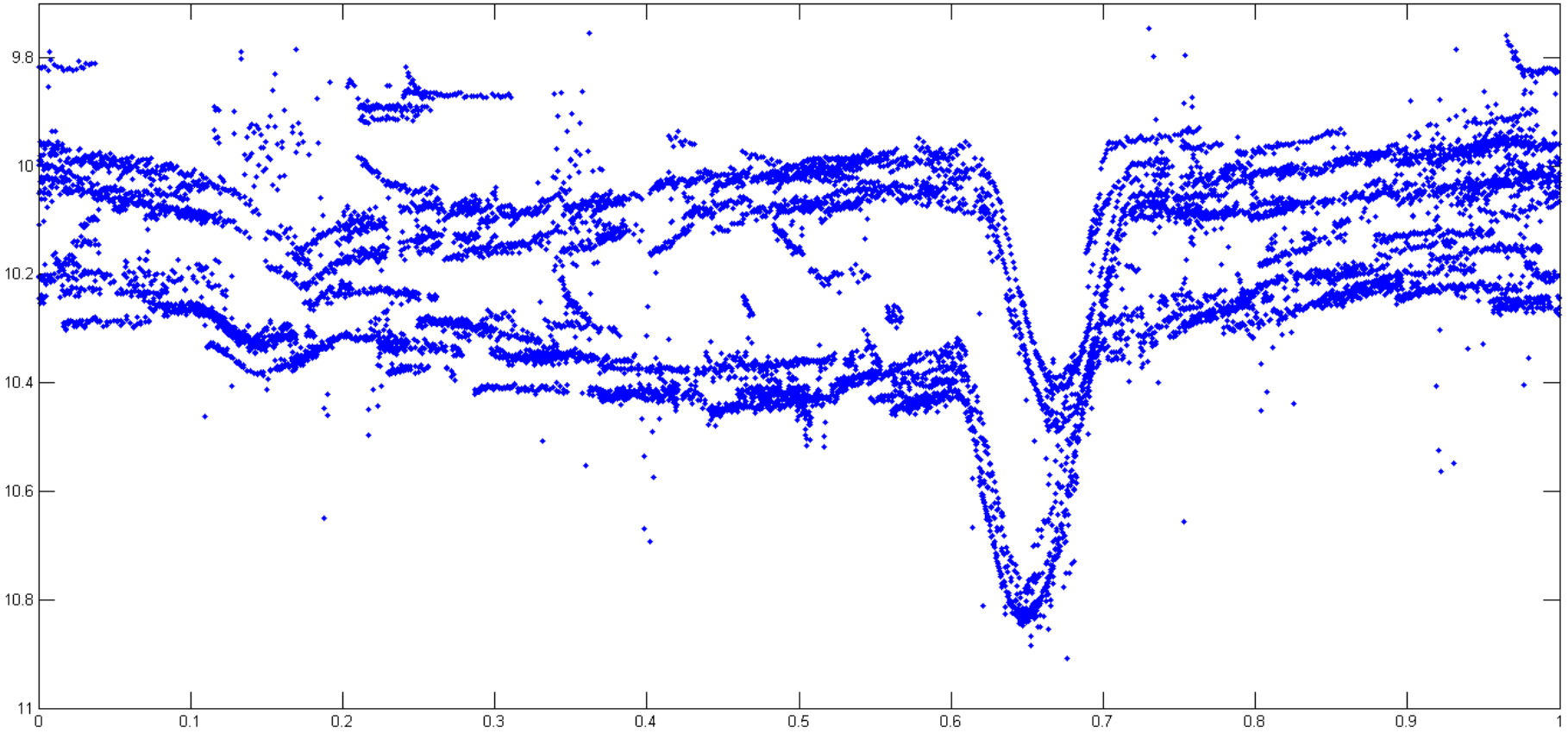



# UX Com (data z SWASP)

proměnná perioda,
změna tvaru světelné křivky,
na rozhraní snímků => několik měření v témže okamžiku, ale různé kalibrace



# Vize do budoucna

Virtuální (astronomická) observatoř – VO, příp. VAO – souhrn astronomických dat, nástrojů a služeb, která jsou přístupná všem; částečně funkční

Zásady:

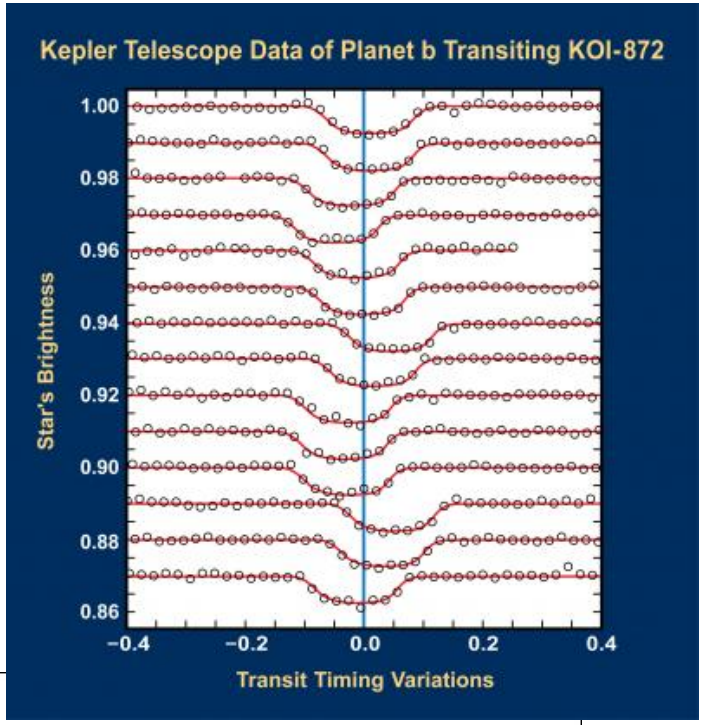
- vlastní formát dat s jasnou strukturou
- společné protokoly práce s daty
- společné nástroje na zpracování dat

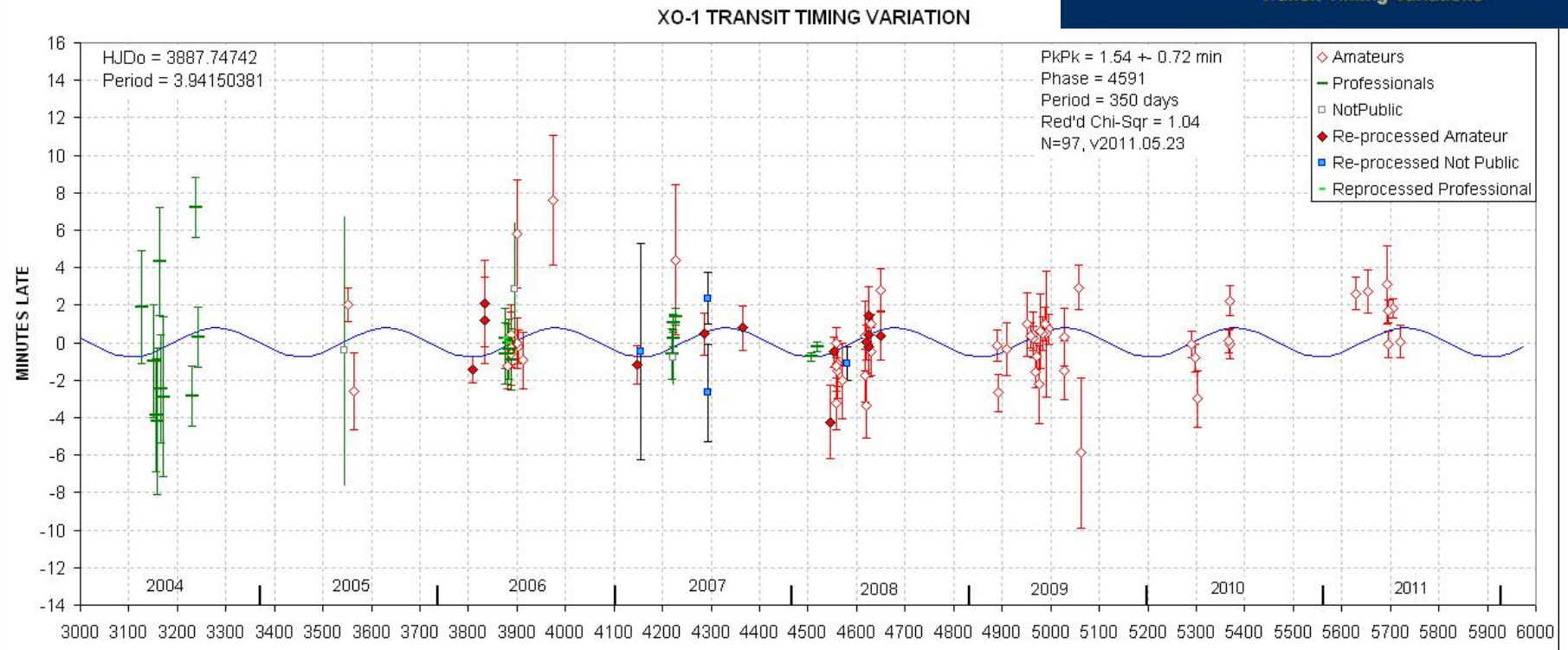
Národní VO – např. britský AstroGrid http://www.astrogrid.org/, evropská VO http://www.euro-vo.org/, americká http://www.usvao.org/, česká http://stelweb.asu.cas.cz/czvo/ ...

# proč to všechno?

- dlouhodobé studie

např. změny periody, TTV, O-C – dnes změny menší než 1 min! => nutnost větší pozornosti k přesnosti časových značek!

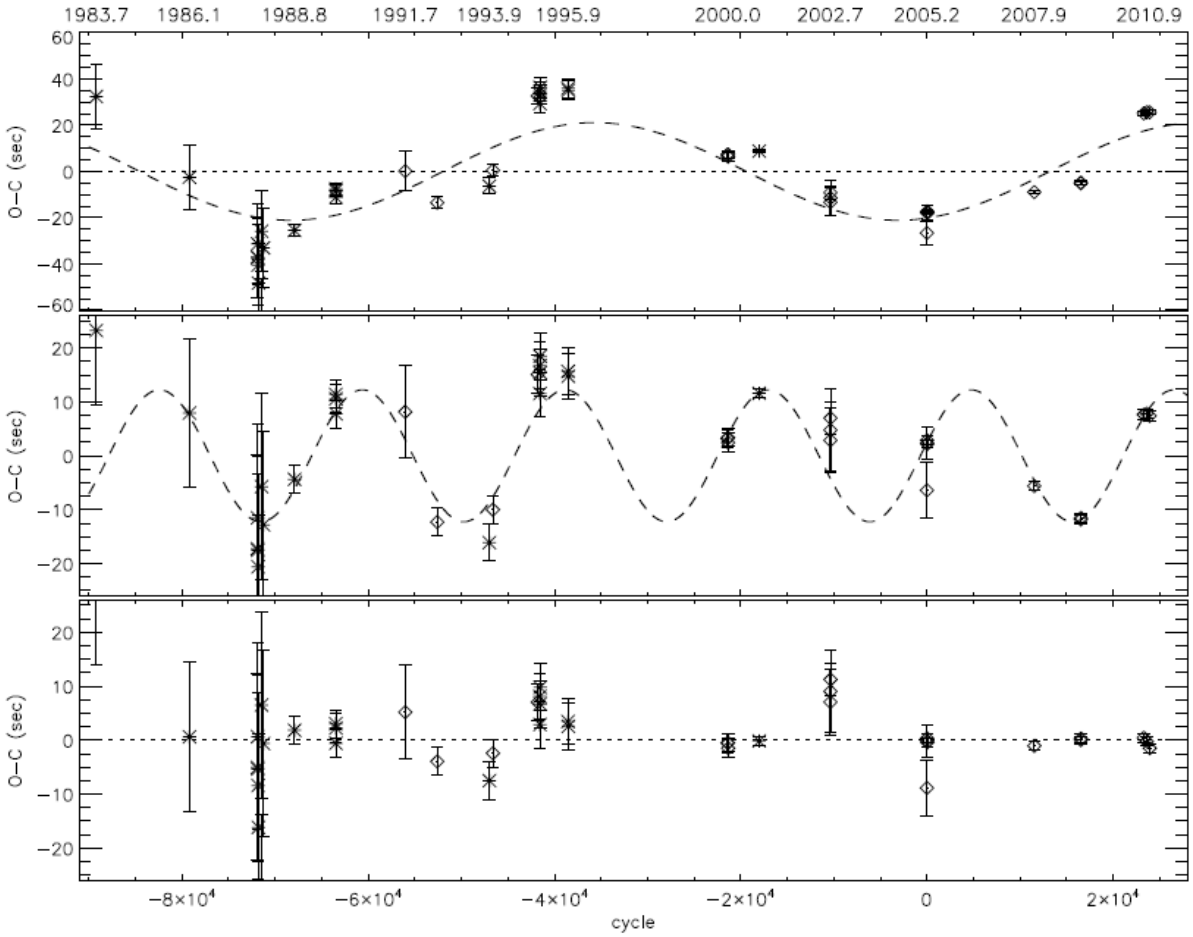


kladný příklad:

Potter, S. B. et al.: Possible detection of two giant extrasolar planets orbiting the eclipsing polar UZ Fornacis

http://adsabs.harvard.edu/abs/2011MNRAS.416.2202P



Praktické cvičení:

- vyhledat fotometrická data k zadané hvězdě alespoň ze dvou zdrojů,
- uspořádat data, vytvořit z nalezených dat datový soubor ve formátu – HJD, mag, filtr, zdroj
- vykreslit fázovou světelnou křivku
- výsledný soubor a graf zaslat na zejda@physics.muni.cz do 21. 12. 2019

| | |
|---|---|
| **Batková, Dominika** | HS2231+2441 |
| **Grigerová, Adriana** | AO Vel |
| **Husáriková, Nikola** | AV Tri |
| **Chobola, Martin** | BP Del |
| **Jadlovský, Daniel** | NSVS 4863977 |
| **Labaj, Matúš** | BB Per |
| **Neumannová, Kateřina** | NSV 12284 |
| **Slavíková, Vendula** | OGLE LMC-ECL-12030 |
| **Stoklásek, David** | OGLE SMC-ECL 3500 |

http://www.physics.muni.cz/~zejda/zdroje_dat2019.pdf