

THE THIRD INTERNATIONAL SCHOOL IN ASTRONOMY:
ASTROINFORMATICS - VIRTUAL OBSERVATORY
Belgrade, 29.06. - 01.07.2010

Wide-Field Plate Database: Plate Index Catalogue

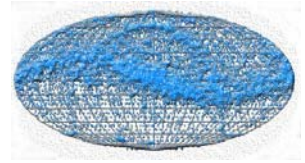


Milcho Tsvetkov
Sofia Sky Archive DataCenter
Bulgarian Academy of Sciences



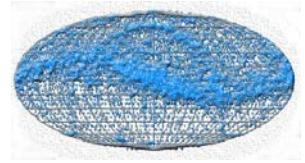
Belgrade, 30.06.2010

Abstract



The development for last 15 years of the Wide-Field Plate Database (WFPDB, <http://www.skyarchive.org>) as an initiative of the IAU Working Group on Sky Surveys, hosted by Commission 9, is discussed. This database contains descriptive information for more than 2300000 total numbers of observations from the archives of 125 professional observatories operated in the period 1872-2005 all over the world. De facto the database is an instrument for searching the long term brightness variations of existing (registered) sky objects mainly to the 14(B) magnitude. The WFPDB base has a mirror in the AIP, Potsdam (<http://vodata.aip.de/WFPDBsearch/>) and its first version works under VizieR . <http://webviz.u-strasbg.fr/viz-bin/VizieR?-source=VI/90>. Currently the WFPDB provides access to the information for more than 30% of the estimated archives total number. Following the requirements of the Centre de Données Astronomiques de Strasbourg (CDS) and International Virtual Observatory Alliance (IVOA) the WFPDB contains the digitized plate preview images, as well as digitized plate raw data using the new generation of the flatbed scanners. The WFPDB team continues to enlarge the database with submitted or retrieved information from the photographic plates which enable the astronomical community to complement their investigations going more than 100 years back in time. The newly created Bulgarian Virtual Observatory (BGVO, <http://www.bgvo.org/>) is closely related with the WFPDB development and its participation in the EC initiatives in the frame of the EURO VO Data Center Alliance.

WFPDB Project Goals



WHAT IS WIDE- FIELD PLATE DATABASE?

An VIRTUAL Photographic World Wide Telescope handling the Information of 120 years old photographic wide-field astronomical observations

WFPDB

HollywoodLostAndFound.net



WFPDB LINX and mirrors

WFPDB:

<http://www.skyarchive.org>

<http://trillian.magrathea.bg:8080/>

<http://trillian.magrathea.bg:2500/home/published/>

WFPDB-SEARCH:

<http://vodata.aip.de/WFPDBsearch/>

<http://vizier.u-strasbg.fr/viz-bin/VizieR?-source=VI/90>

<http://trillian.magrathea.bg:8080/search/>

CdC:

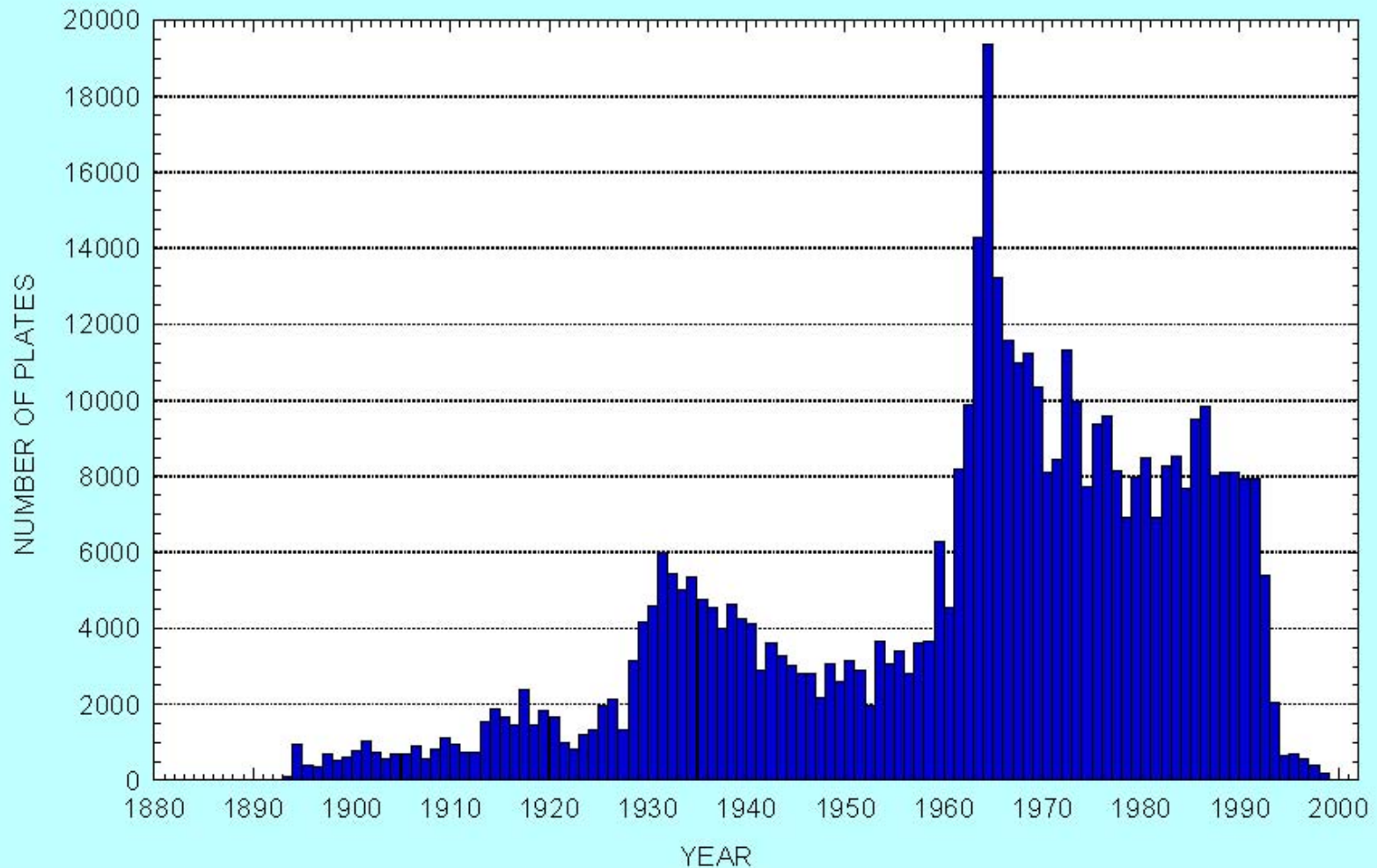
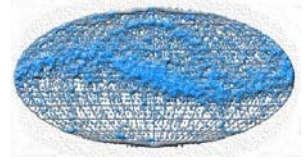
<http://vo.aip.de/plates/picindex.html>

<http://docs.astro.bas.bg/~pi/Data/www/picindex.html>

StarGazer:

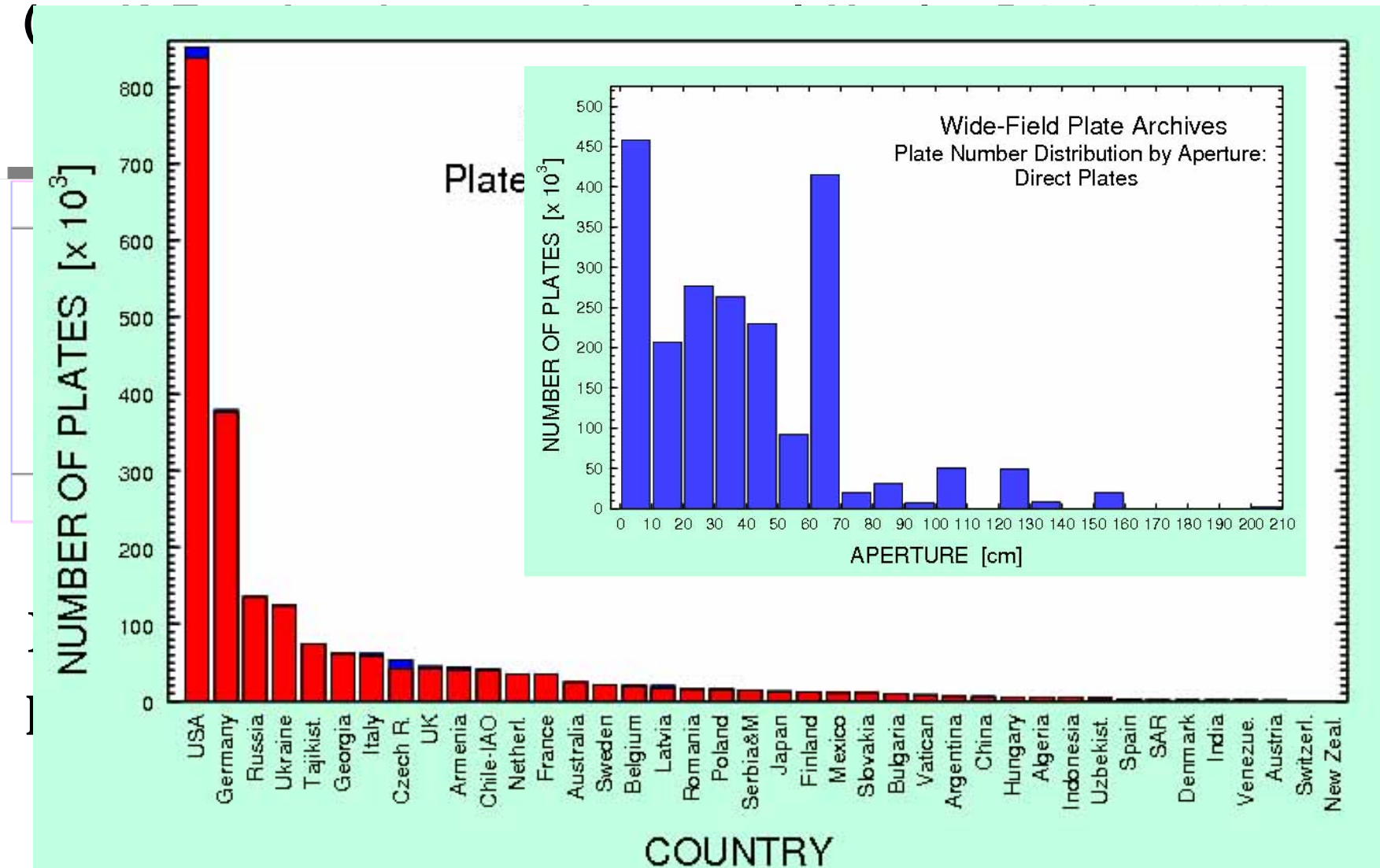
<http://trillian.magrathea.bg:8080/stargazer/>

WFPDB time series



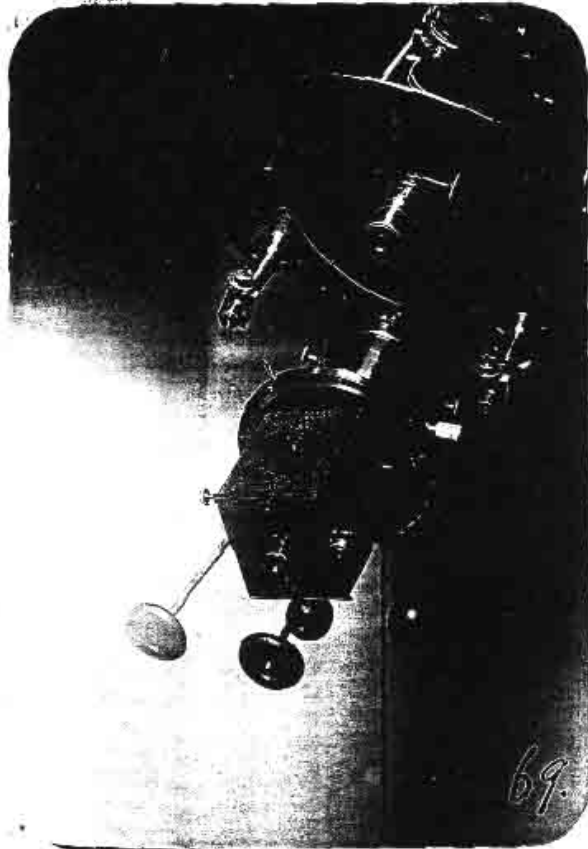
The WFPA-WFPDB

<http://www.skyarchive.org/catalogue.html#Cat50>

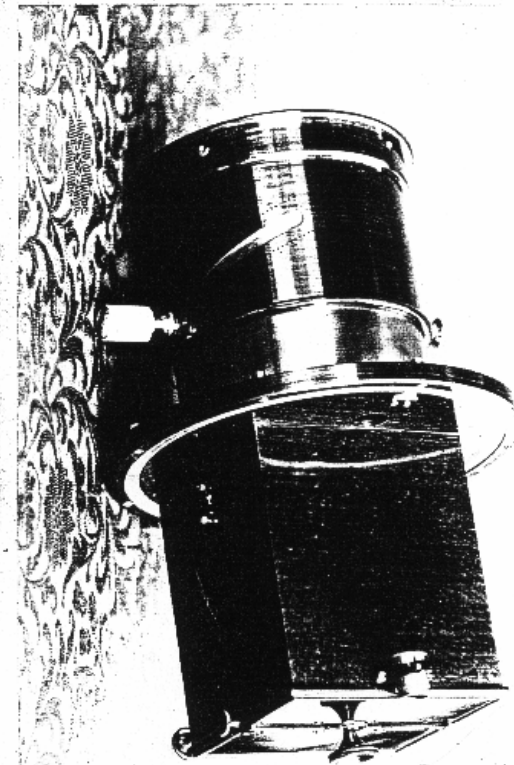


WFPDB

The Lohse Photographic camera

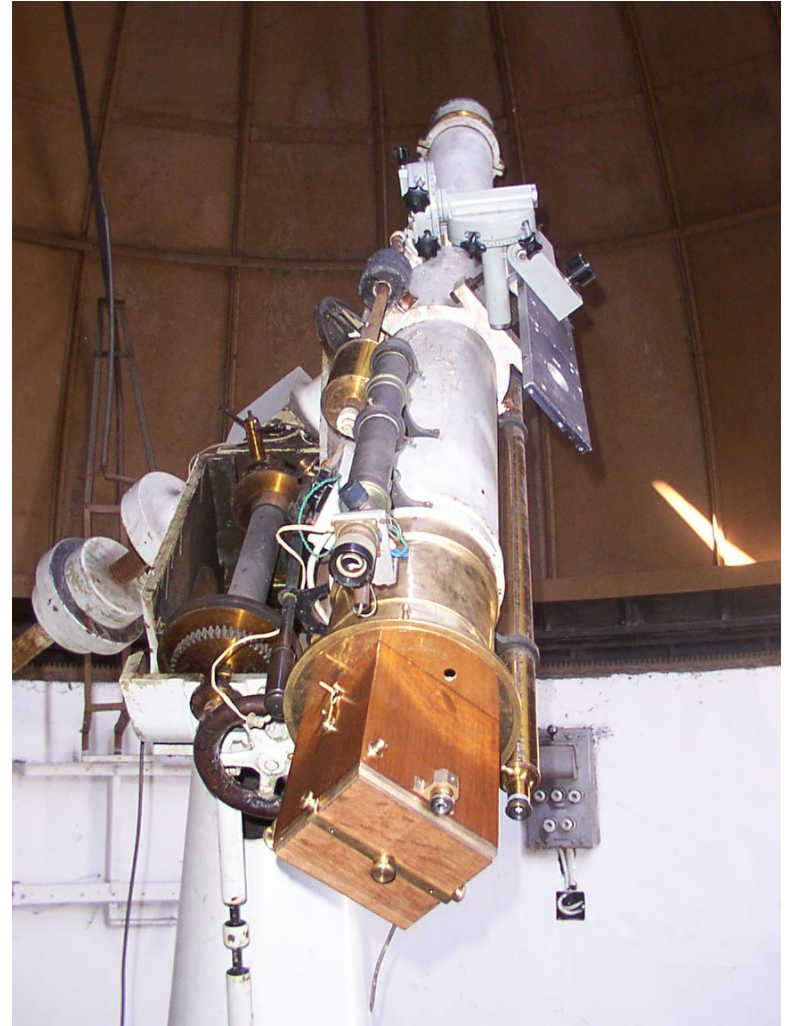


*Photogr. Apparat nach Lohse (1885)
für den Repsold - Schrödersehen Refraktor
in Potsdam.*



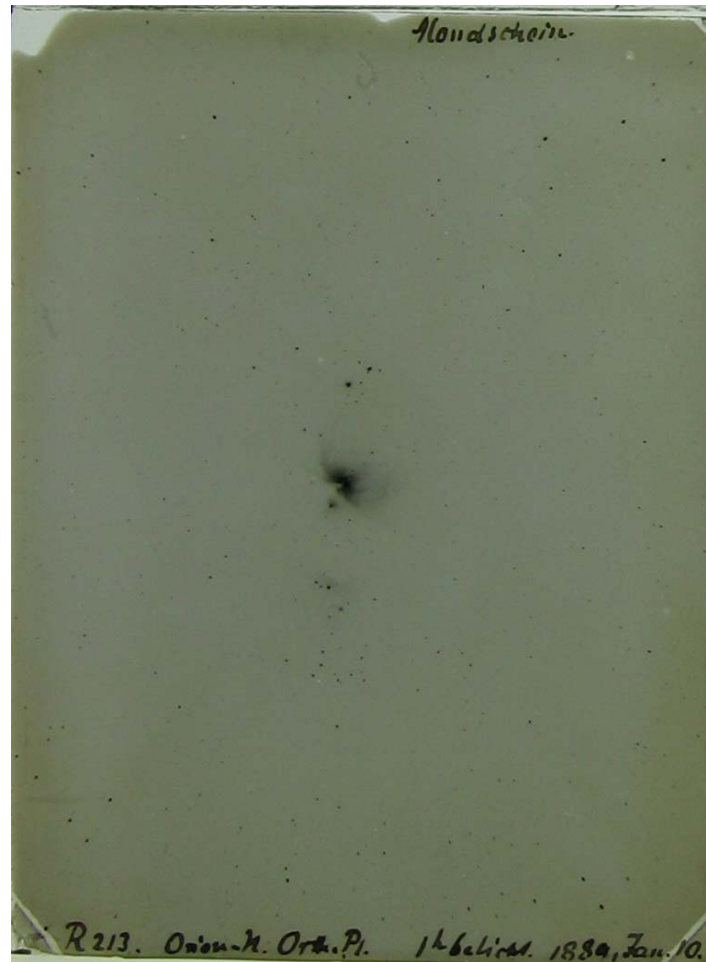
*Photographischer Apparat
für Himmelaufnahmen am unter gleich-
zeitigen Auslasten der Optik.
Hof. Ausgabe für Herrn Dr. Lohse.*

WFPDB



O. Lohse Historical Plate Achieve, Potsdam 1879-1896

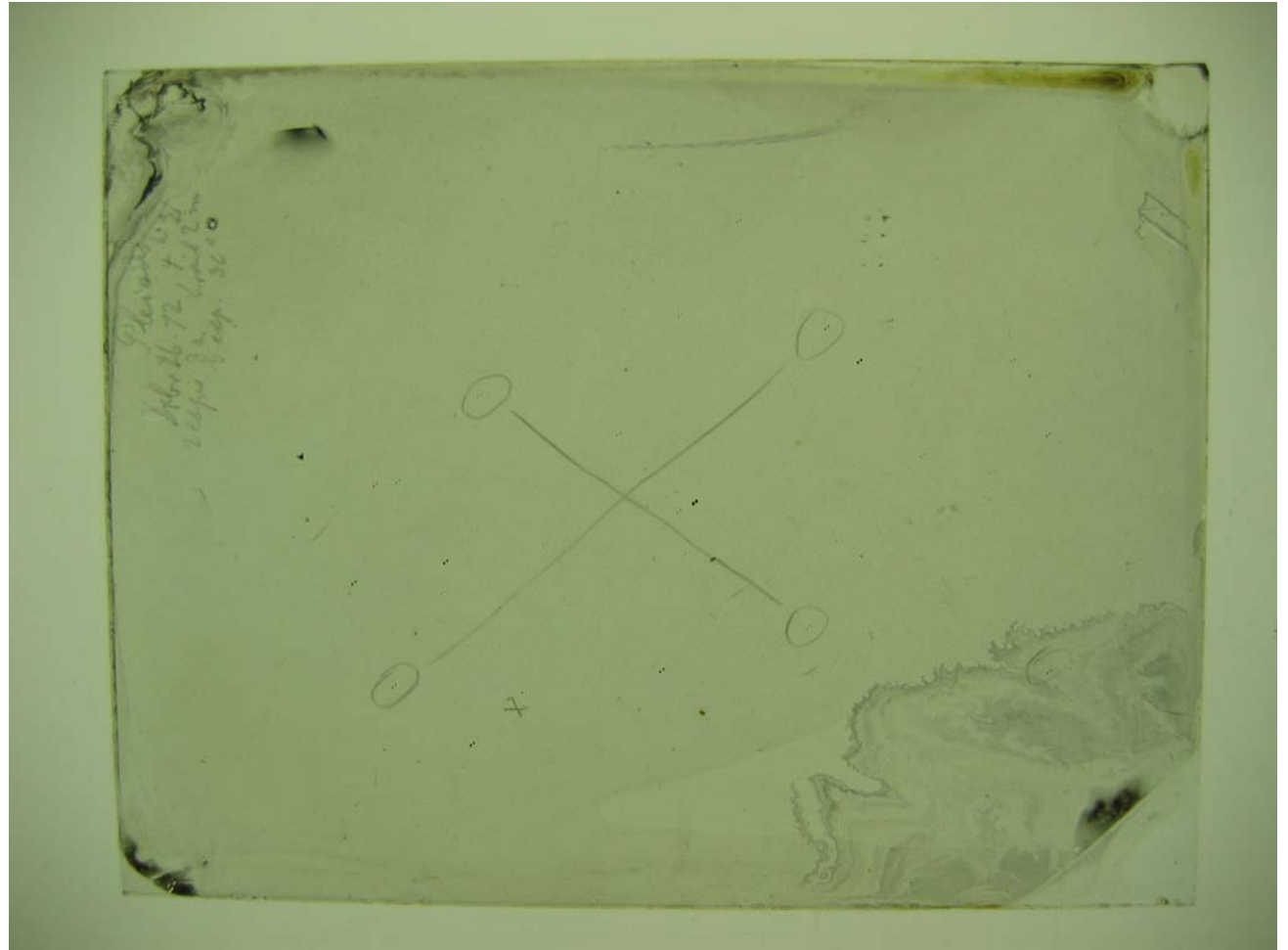
60 plates survive two WW from 214 in AIP

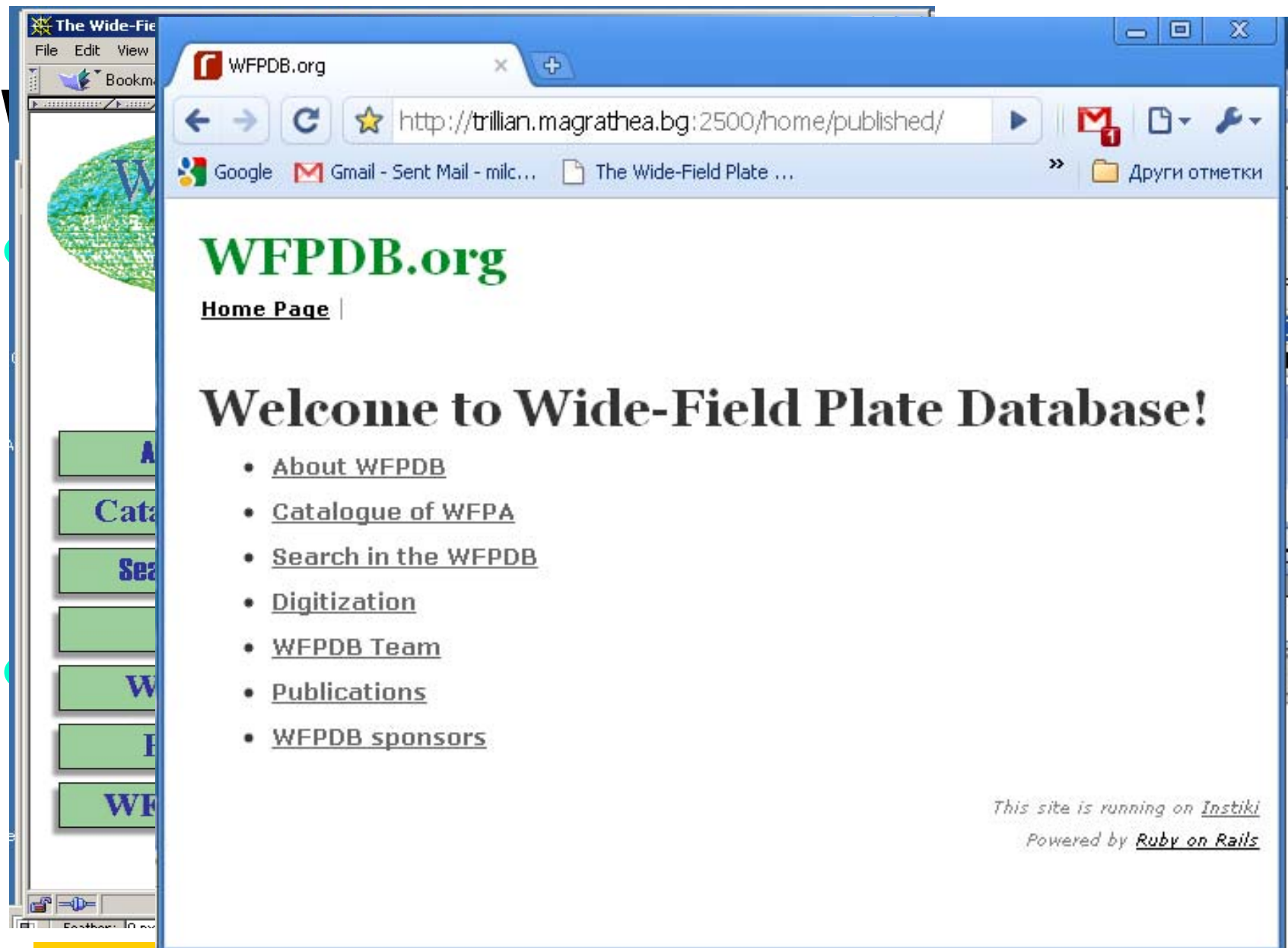


Harvard College Observatory Historical Gould Survey

**Pleiades Gould Plate, Cordoba, 1872, Dec. 26,
04:30h**

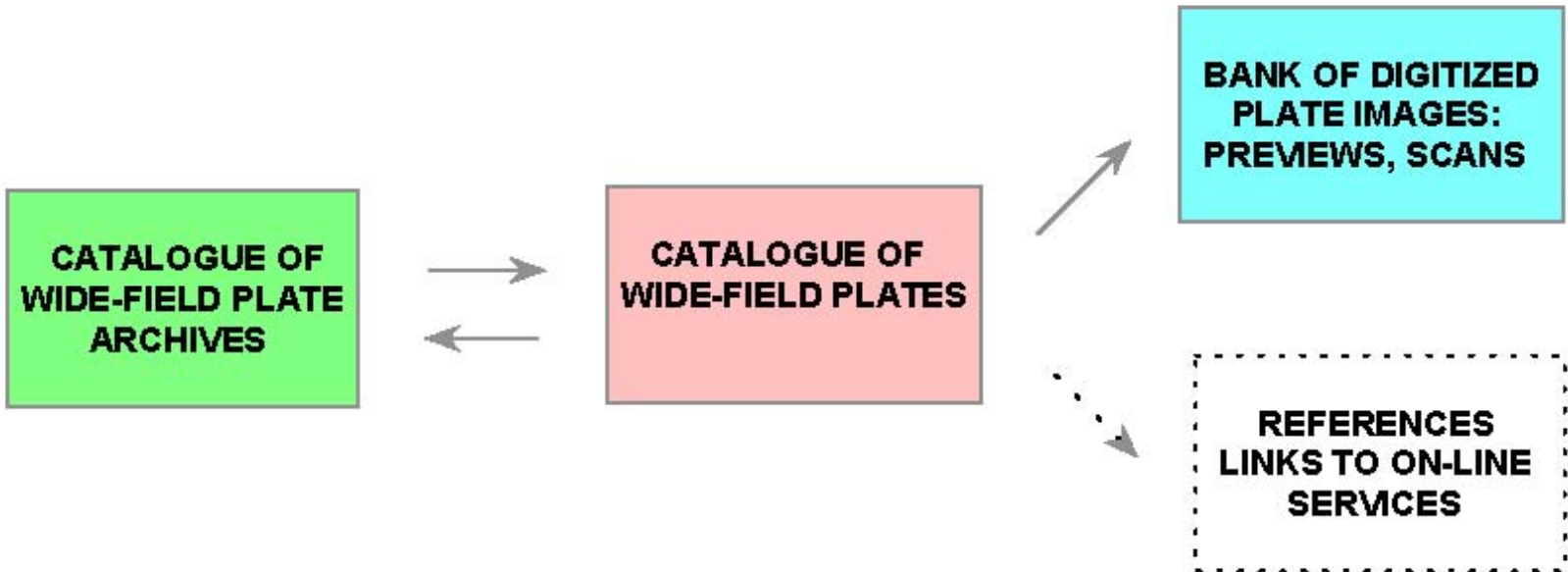
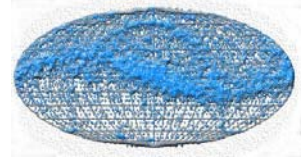
**1000 plates
In the period
1872 - 1890**



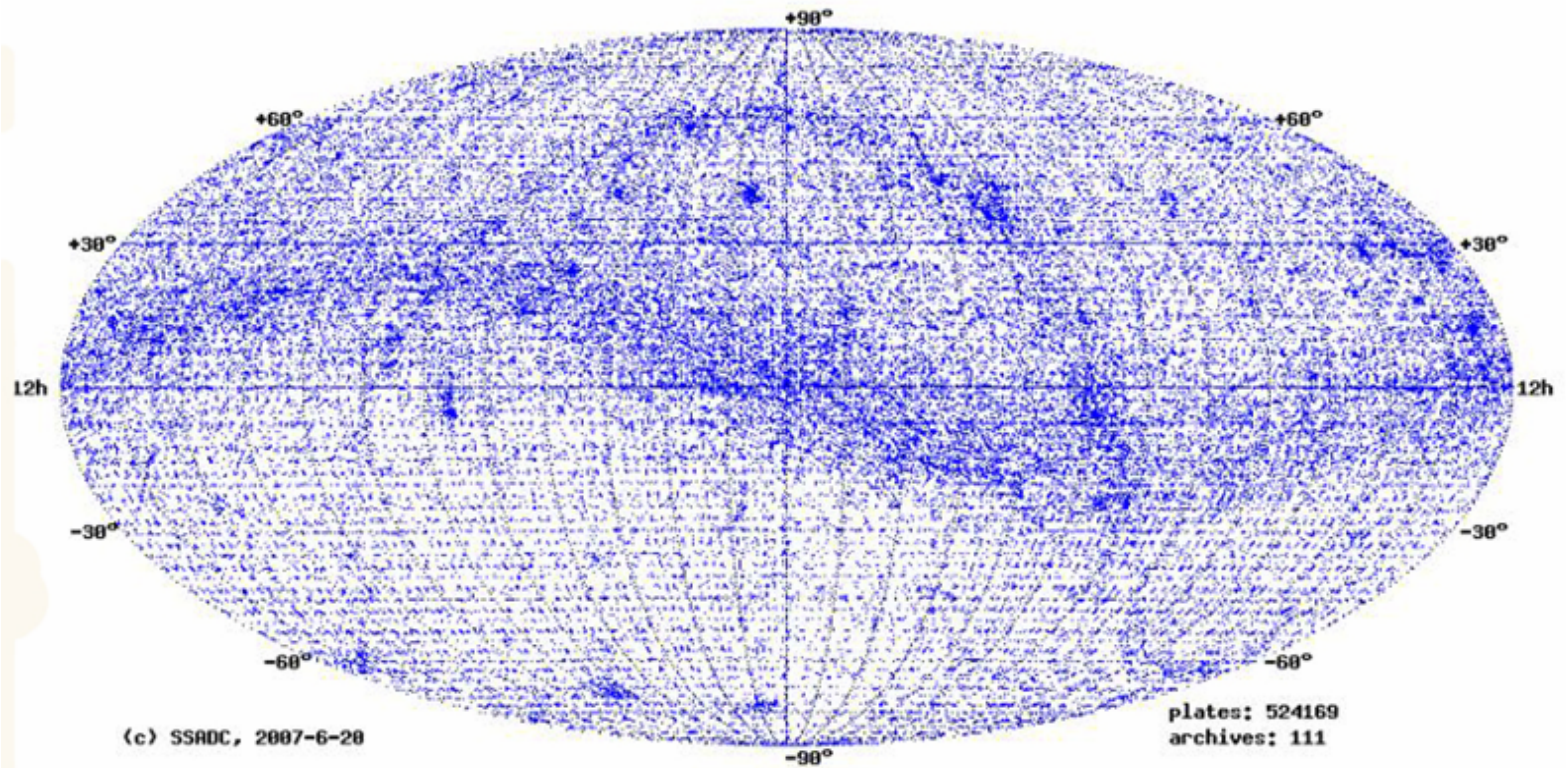


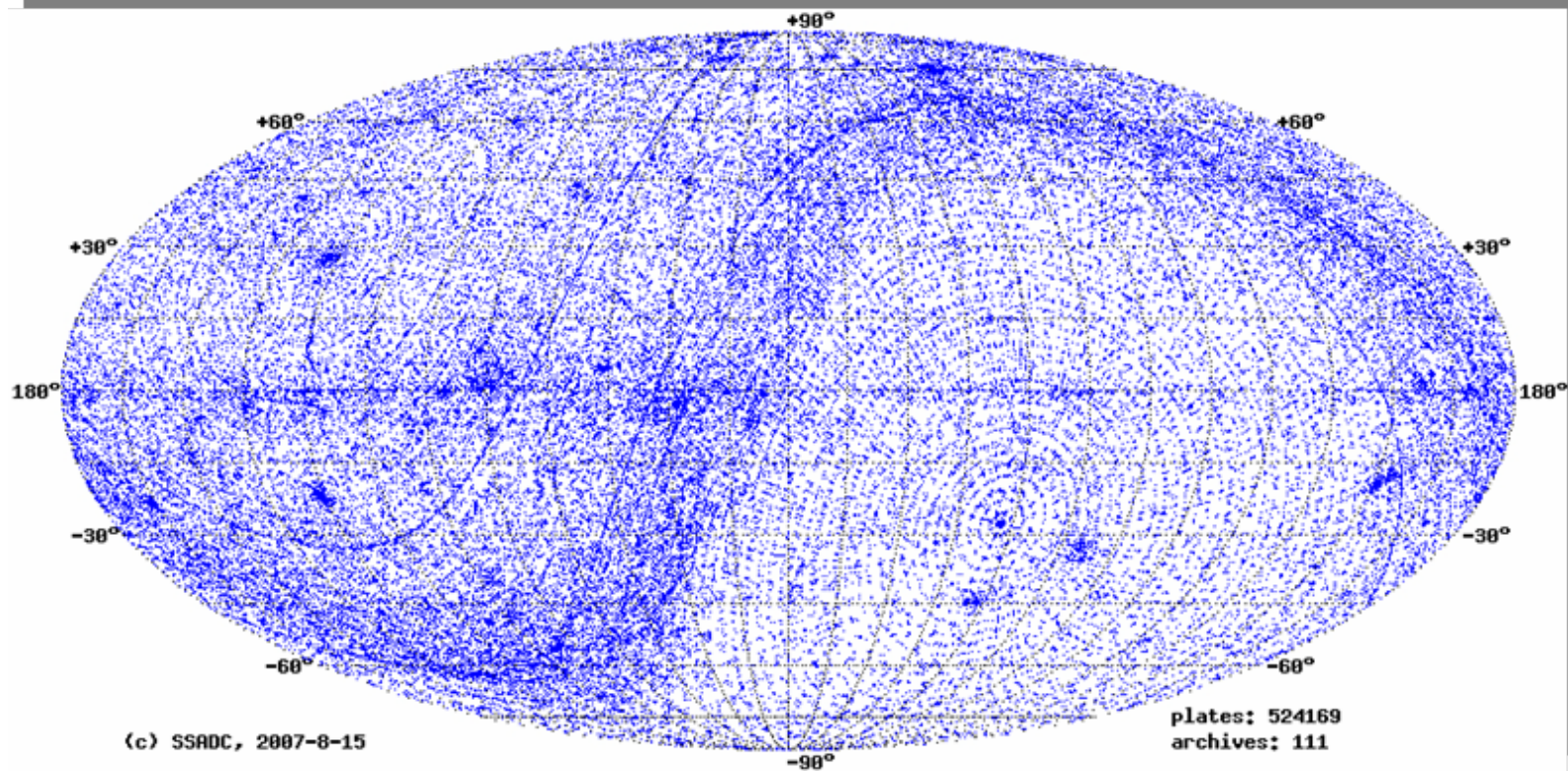
Web Site: <http://www.skyarchive.org>

WFPDB structure



WFPDB Sky Distribution







Database SEARCH engines

NetScape: Catalogue Selection Page

File Edit View Go Communicator

Back Forward Reload Home Search Netscape Print Security Stop

Members WebMail Connections BizJournal Smartupdate Mtplace

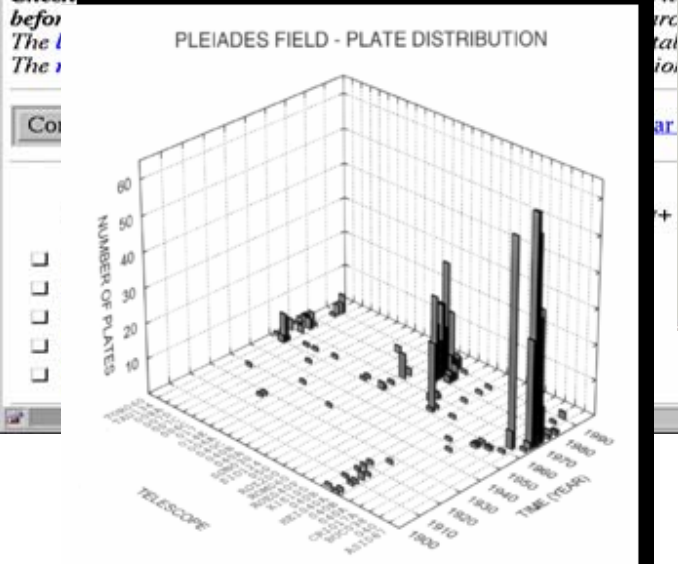
Location: <http://vizier.u-strasbg.fr/viz-bin/VizieR?source=V1/90>

CDS Catalogue Selection Page

CDS · Simbad · VizieR · Aladin · All Catalogues · Nomenclature

- VizieR is also accessible from [NASA ADC, USA](#) and from [other sources](#)
- Very Large Catalogues ([GSC](#) and [USNO-A2.0](#)) can also be targets

This page presents a list of catalogue table(s) matching your selection. Check the results before using them.



WFPDB search page - Netscape

File Edit View Go Communicator Help

Location: <http://draco.skyarchive.org/search/>

Additional display

Angular Distance from Field Centre ☒ Has preview ☒

Select All Submit Clear

Search by Constraints applied on Columns

Show	Sort	Column	Constraints	Units	Explain
<input checked="" type="checkbox"/>	<input type="radio"/>	IDobs	<input type="text"/>	(char)	WFPDB observatory identifier
<input checked="" type="checkbox"/>	<input type="radio"/>	IDins	<input type="text"/>	cm	Instrument aperture
<input checked="" type="checkbox"/>	<input type="radio"/>	IDsuf1	<input type="text"/>	(char)	Instrument aperture suffix
<input checked="" type="checkbox"/>	<input type="radio"/>	IDno	<input type="text"/>		Original plate number
<input checked="" type="checkbox"/>	<input type="radio"/>	OBJNAM	<input type="text"/>	(char)	Object or field designation
<input checked="" type="checkbox"/>	<input type="radio"/>	OBJTYP	<input type="text"/>	(char)	Object type code
<input checked="" type="checkbox"/>	<input type="radio"/>	METHOD	<input type="text"/>		Method of observation code
<input checked="" type="checkbox"/>	<input type="radio"/>	MULTEX	<input type="text"/>		Multiplicity of exposure
<input checked="" type="checkbox"/>	<input type="radio"/>	EXP	<input type="text"/>	min	Exposure time
<input checked="" type="checkbox"/>	<input type="radio"/>	EMULS	<input type="text"/>	(char)	Emulsion type
<input checked="" type="checkbox"/>	<input type="radio"/>	FILT	<input type="text"/>	(char)	Filter type
<input checked="" type="checkbox"/>	<input type="radio"/>	SPEC	<input type="text"/>	(char)	Spectral band
<input checked="" type="checkbox"/>	<input type="radio"/>	DIMx	<input type="text"/>		X dimension of plate
<input checked="" type="checkbox"/>	<input type="radio"/>	DIMy	<input type="text"/>		Y dimension of plate
<input checked="" type="checkbox"/>	<input type="radio"/>	All	-		

Submit Reset All

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Document: Done



1997-02-12 00

DRACO 16

<http://draco.skyarchive.org/search/search.cgi?service=preview&mainID=59770&full=1> - Microsoft Internet Explor...

File Edit View Favorites Tools Help

Address <http://draco.skyarchive.org/search/search.cgi?service=preview&mainID=59770&full=1> Go Links >>

Search X

Ne >>

Choose a category for your search

- ☒ Files
- ☐ Folders
- ☐ Links
- ☐ Images
- ☐ Audio
- ☐ Video
- ☐ Other

Find Web content

Bring to you by MSN Search

Search for other items:
[Files](#)
or
[Folder](#)
[Computer](#)
[People](#)

PREVIEW:

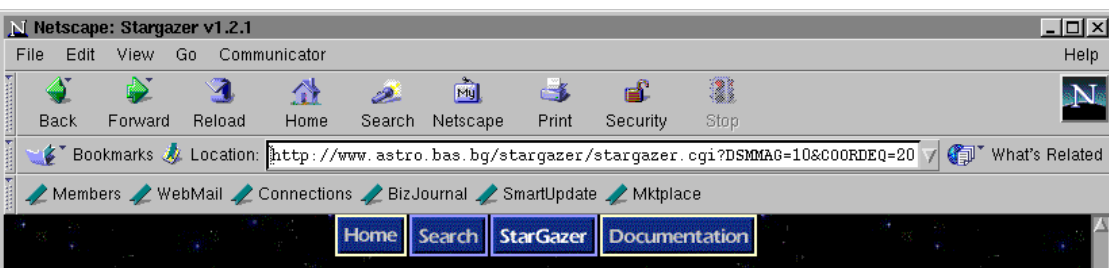
[Close this page](#)



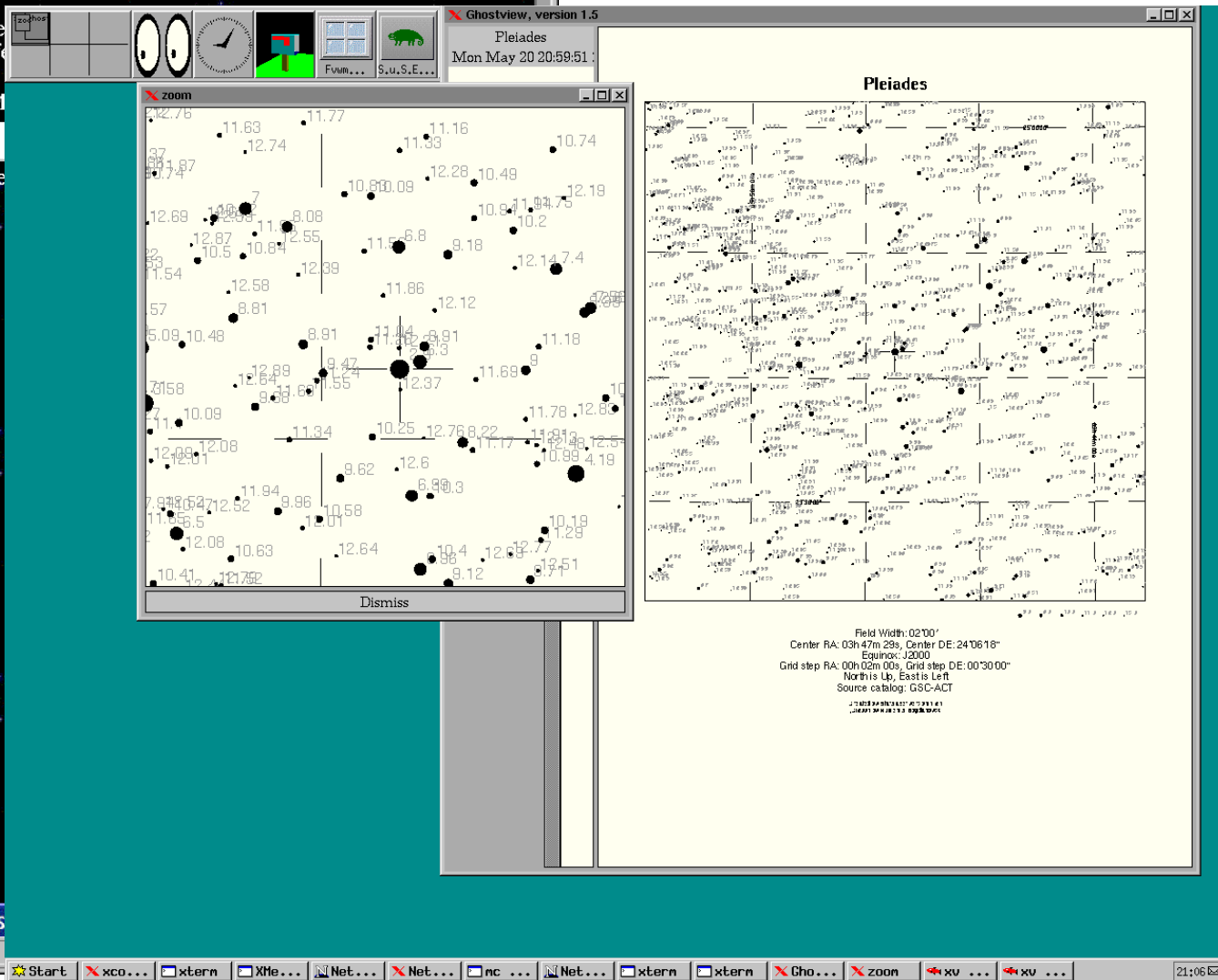
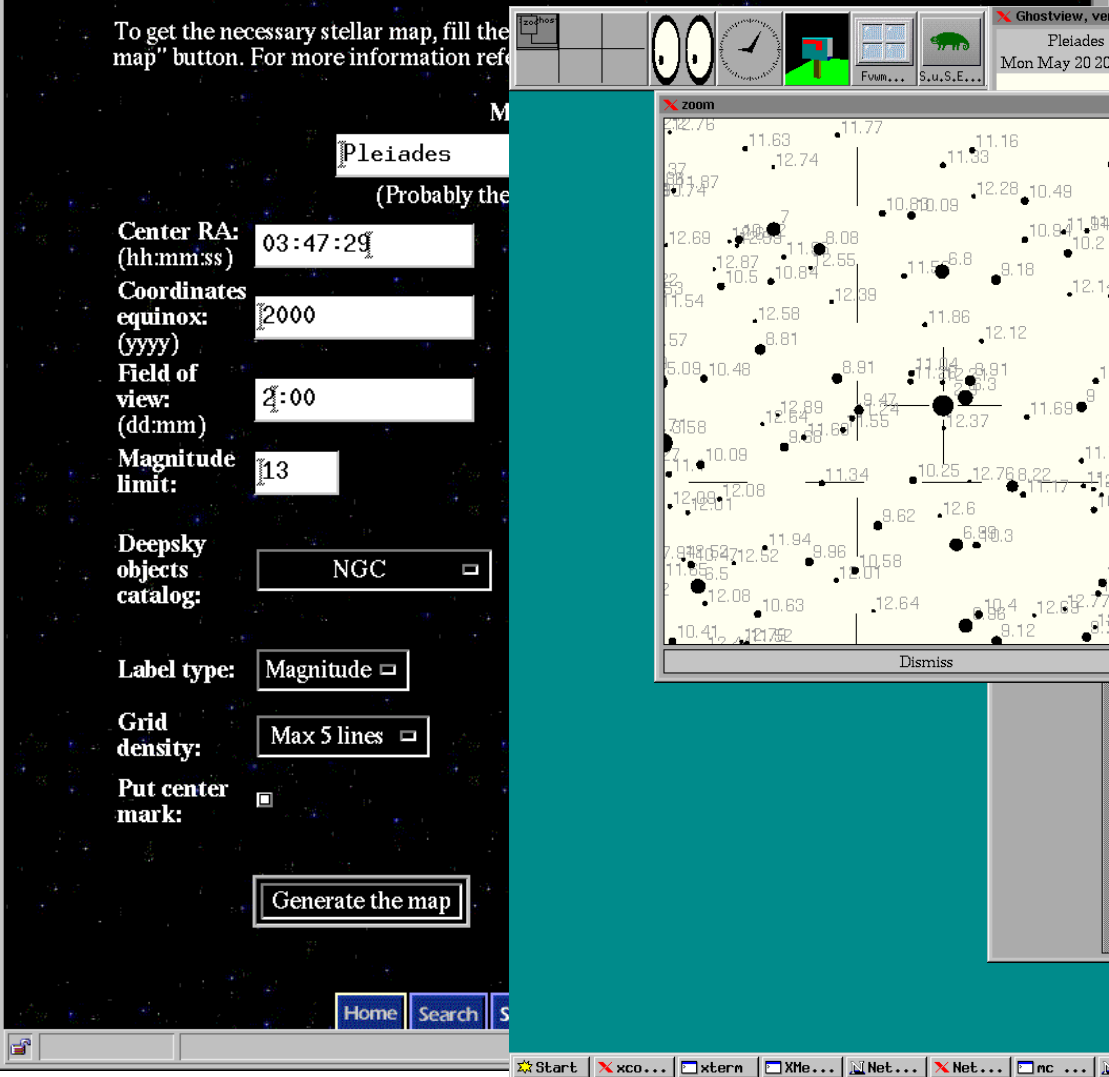
Done

Done

Internet



Visualization!



Web Site:<http://www.skyarchive.org>

Wide-Field Plate Database
Plate Number Distribution by Continents
Total Number of Plates: 2185501.

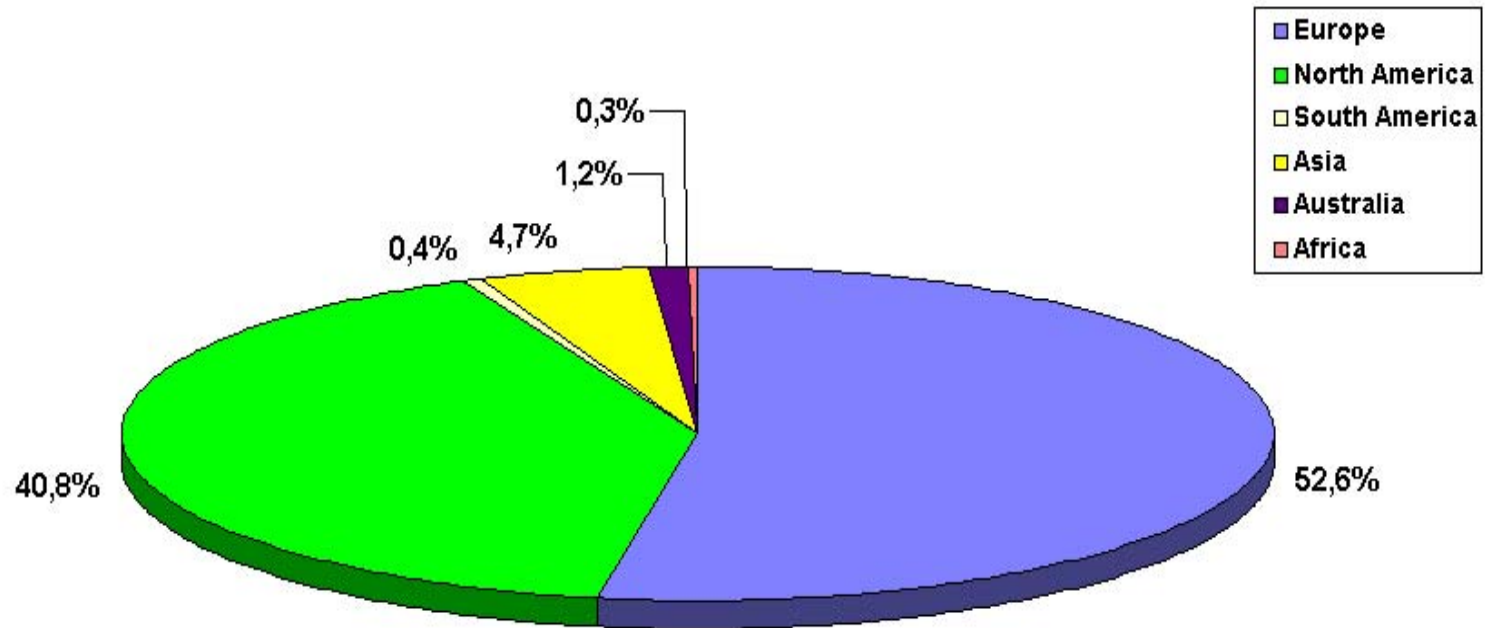


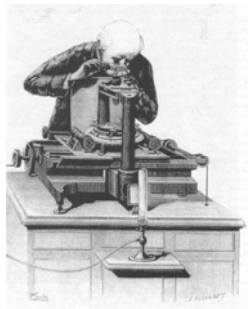
Plate Digitization -

Different approaches

- **Plate scanning using:**
 - **PDSs, Super Cosmos, USNO Monet scanner, LAMA's STScI MAMA, APM etc.**
 - **NEW: Flatbed Scanners: EPSON 1640XL, UMAX Etc.**
 - **CCD Previews (new)**



Automating the Measurements

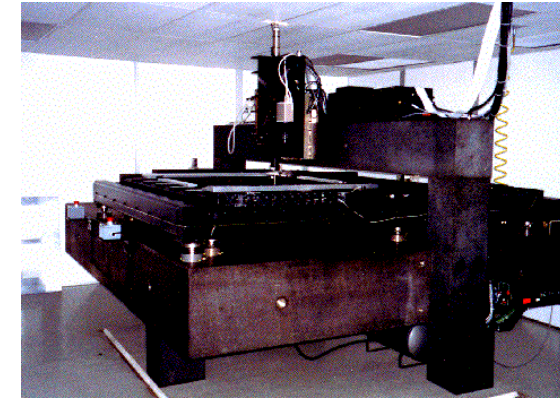


1886

*The Grant 2
Measuring
Engine-1967

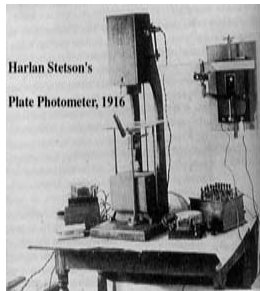


*Gaertner single screw
engine 1916

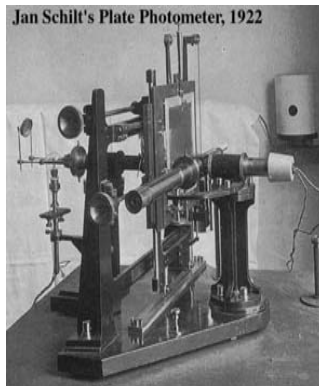


**PMM (NRO ~1988)

Astrometric Photometric



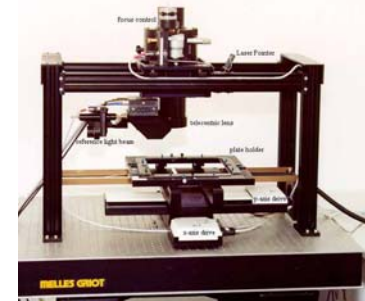
*1916



Jan Schilt
Photometer -
1922



*Perkin-Elmer
PDS ~1980



Tautenburg~1995

*<http://www.astro.virginia.edu/~rjp0i/museum.html>
**http://www.nofs.navy.mil/projects/pmm/pmm_capti.html

Slide after Bob Simcoe

WFPDB: SCANNERS



STATUS OF PLATE ARCHIVING AND DIGITIZATION

EUROPEAN PLATE ARCHIVES

Total EU WF-plates

- European direct plate archives: 1129367 plates
- European spectral (objective prism) plate archives: 46276 plates

**Totally: 306 (70%) plate archives: 1,175,643 (52%)
plates**

EU Plate Digitization - current status

EUROPEAN digitized plates last 5-7 years:

Sonneberg: 300000 FB 4xHP **150 000** (20 μ /pix)

Pulkovo: 50000 FB 1x UMAX **30 000** (20 μ /pix)

Tautenburg: 9000 TLSW_Scanner: **4058**(10 μ /pix)

Asiago: 20000 2xEPSON1640XL **3000** (16 μ /pix)

Byurakan: 20000 EPSON1680 ~1874 (16 μ /pix) FBSS

Bamberg: 25000 EPSON 1640: **1000** (16 μ /pix) ~ **2000**

preview (40 μ c)

Heidelberg(ARI):ARI 400 EPSON10000XL **344** POSSS

plates (10 μ /pix)

Heidelberg(LSW): 20000: MPI/LSW 200 scanner:

Heidelberg NEXSCAN F4100

More:

EU Plate Digitization - current status (more...)

Konkoly: 13000 UMAX PL3000 **500** 8 (mic/pix), **500** (20 mic/pix)

Potsdam: 20000 AIP EPSON10000XL **300** (10mic/pix) (1000 CdC GAVO)

Brussels: 20000 ROB Agfa DUOSCAN HiD ~**600** (250) mic/pix (preview)
A4 Precise scanner (in development)

Sofia: 10000 EPSON 1640XL **300** (16mic/pix)

Moscow: 20000 GAISH CREO ~**200** (10 mic/pix)

Moscow: INASAN 4000 : 2xEPSON 1640XL (?) 16 (mic/pix)

Kiev: 24000: Microtek ScanMaker 9800XL (digitization just started)

Bucharest: 12000 Umax AlfaVista II. **100** (10 mic/pix) CCD-preview

Cluj: 5000, HP **200** preview,

Belgrade: 12000 EPSONV700 test scans

Vatican: 10000: EPSON 1640XL (16mic/pix)

Jena: 1000 EPSONV700 test scans

Tatranska Lomnoca: 12000 EPSONV700 test scans

Totally: more than 220 000 !!! scanned for last 5-7 years.

Sonneberg Plate Archive



1953. [coll. green 20] ~~15~~ 15



Tautenburg Plate Archive

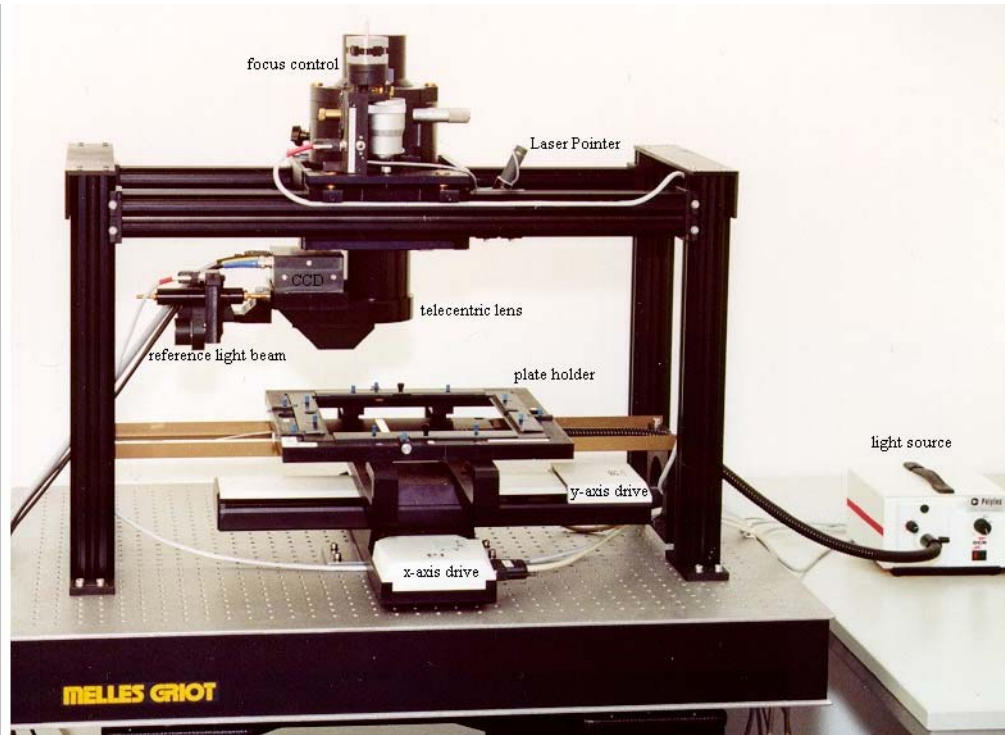


Plate archive contains about 9000 plates, TL SW_Scanner

Digitized **4058** plates (10mic/pix) - about 50% (local database)

<http://www.tblsw.de>

Asiago Plate Archive

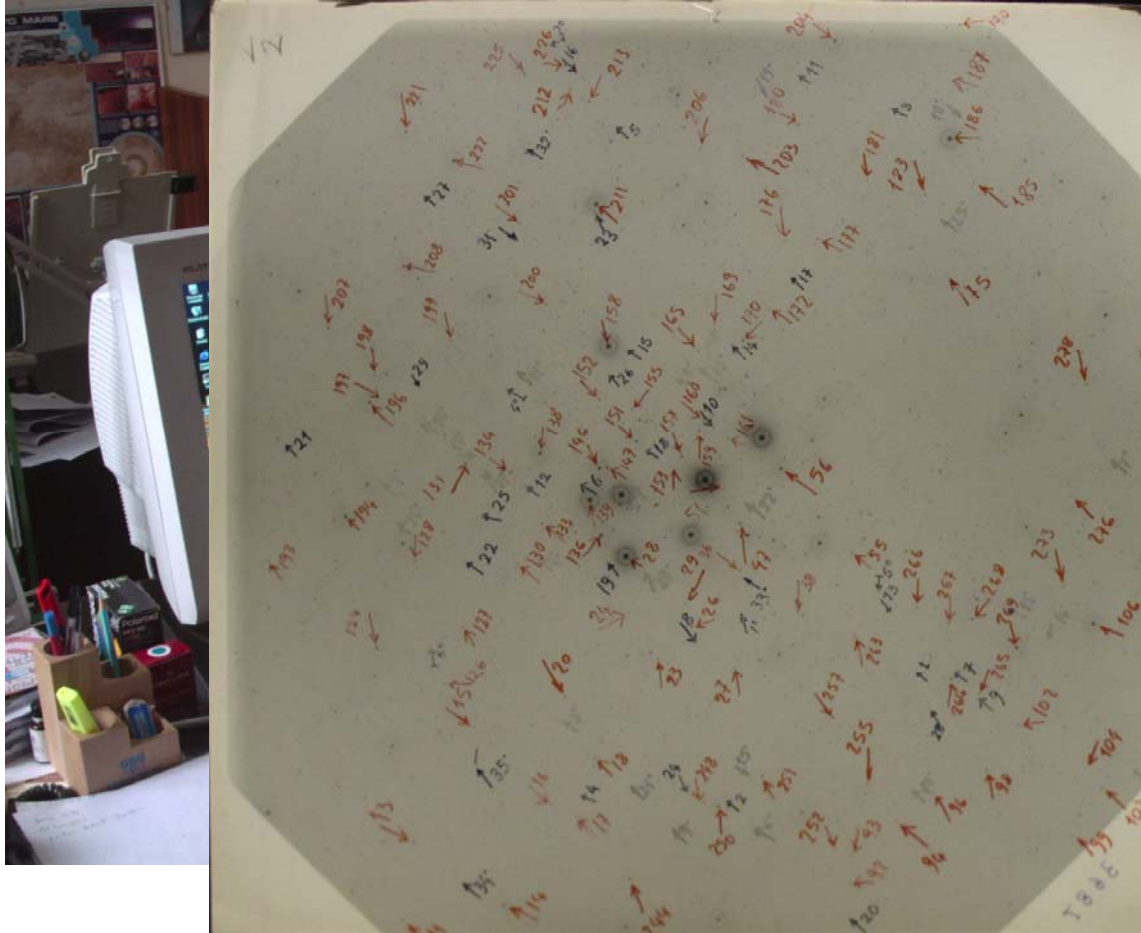


Plate archive contains about 20000 plates, 2xEPSON1640 scanners

Digitized 700 plates (16mic/pix) - National level project (Local database)

<http://www.astropd.it>

Bamberg Plate Archive

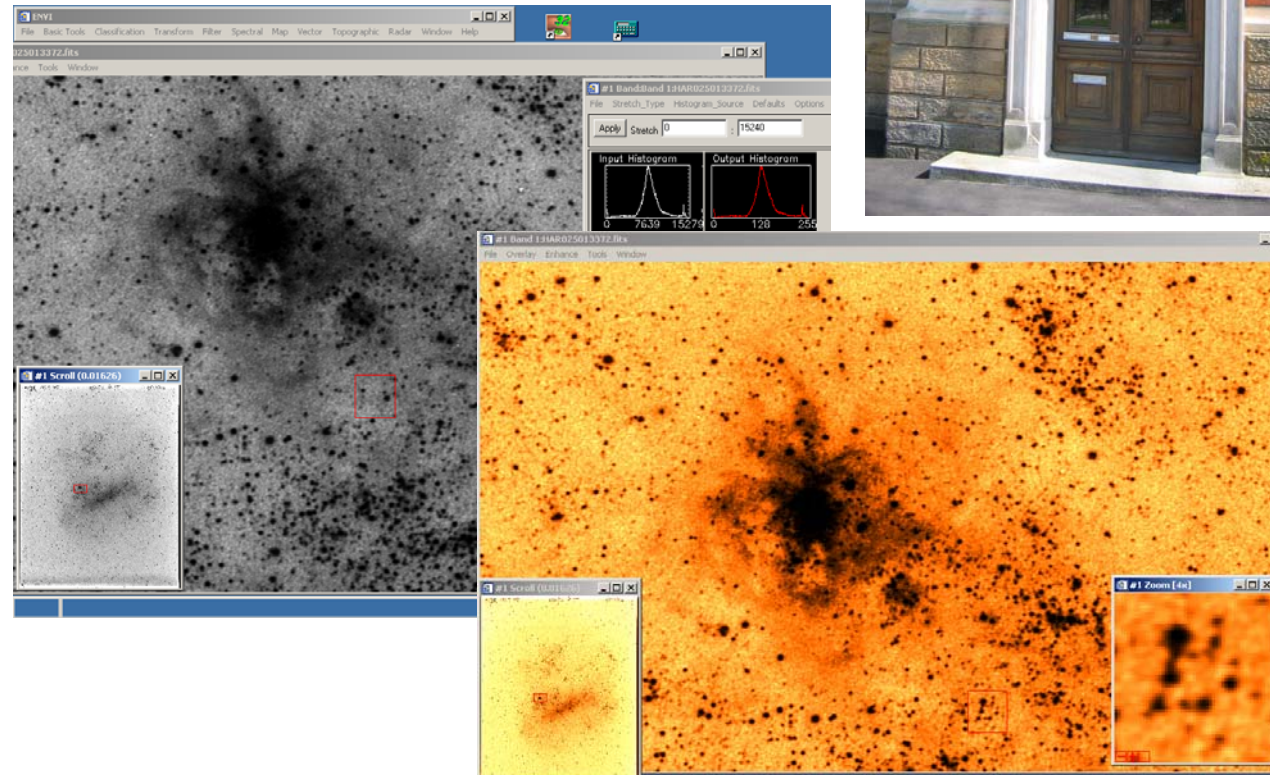


Plate archive contains about 29000 plates, EPSON1640 XL

Digitized 1000 plates (16mic/pix) - DFG/AvH project (WFPDB link)

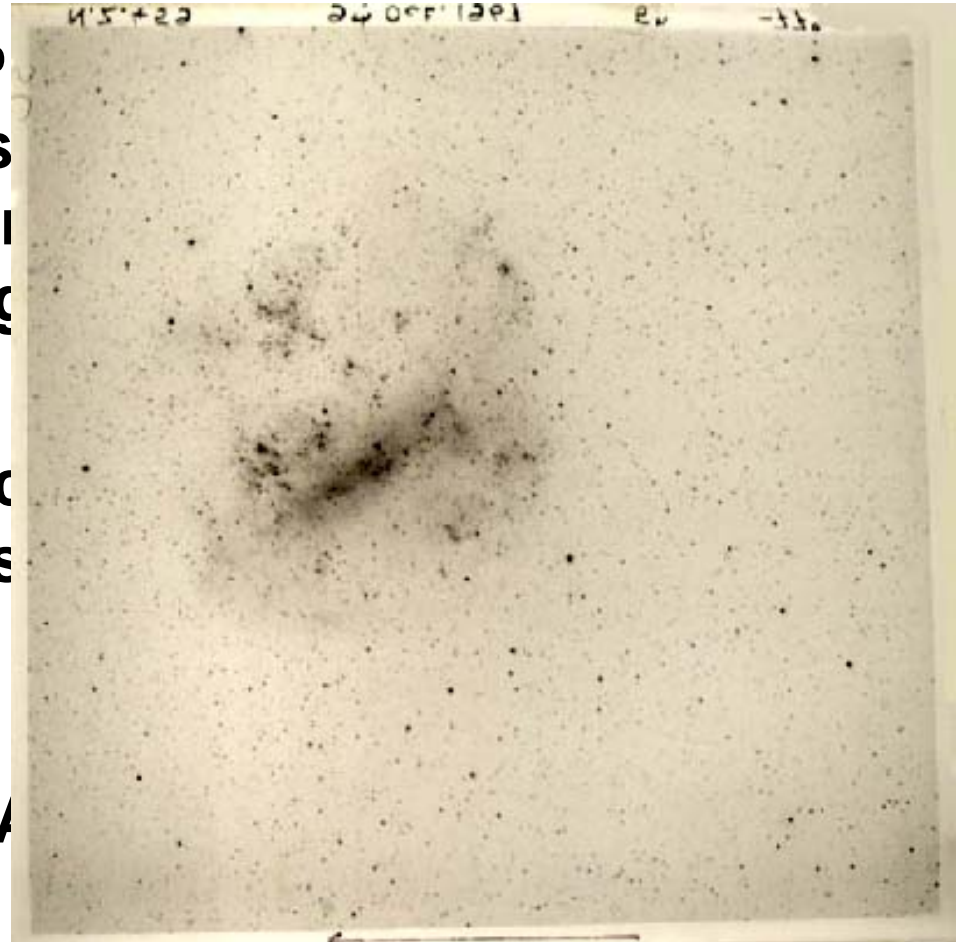


Southern Bamberg PPSS: 22000 plates taken in SA 1963-73



archive importance.

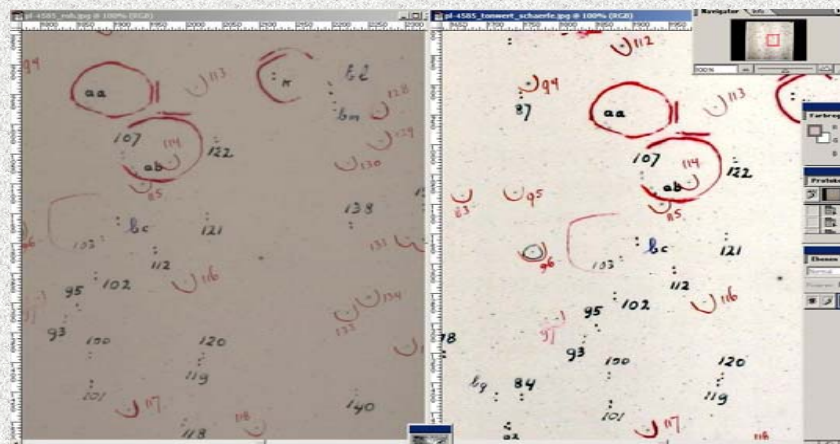
- Project supported by A



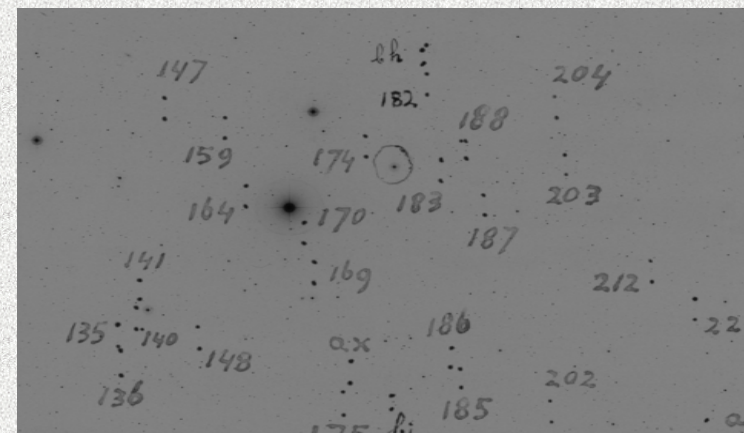
Heidelberg Plate Archive (ARI)



G. Burkhardt



Documentation: image processing



P-L plate detail as seen from the glass side

Heidelberg Plate Archive (LSW-MPI)

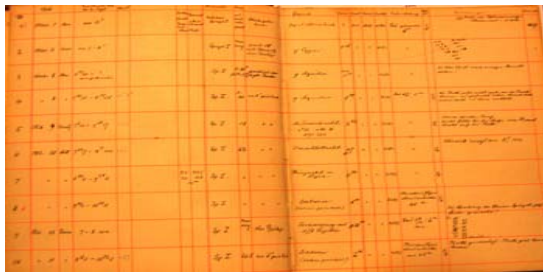
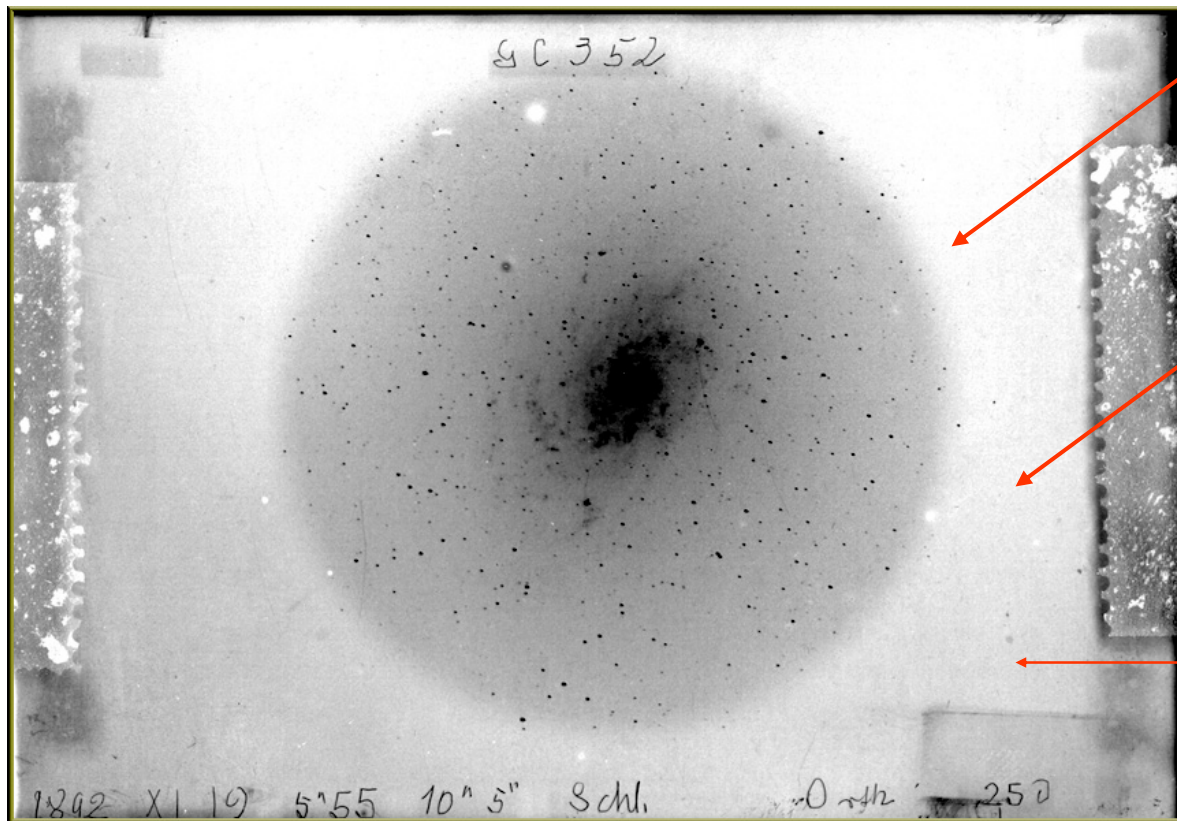


Plate archive contains about 20000 plates, HEIDEBERG Nexscan_F4100

Digitization started (10mic/pix) - LSW and MPI plates will be digitized

More Historical Surveys



Szombathely(H)
M33(1892)
Vincze & Jankovics

Brussels (ROB)
CdC(1914)
Lampen's et al.

Carte de Ciel
Alain Fresneau
100y old plates
IAU WG



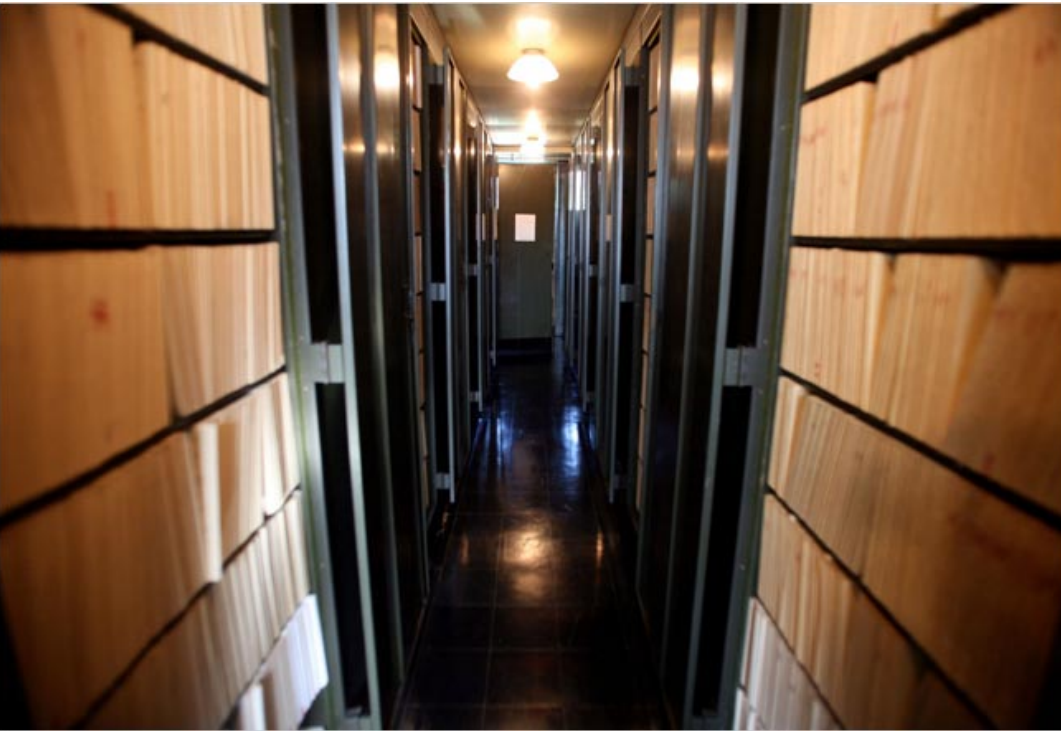
STATUS OF THE PLATE ARCHIVING AND DIGITIZATION

US PLATE ARCHIVES

HARVARD WF-plates 500 000 Plates
DASS Project

PARI INICIATIVE (LAMA1/2- SScTI)

TOTALLY about 1 000 000 plates



Harvard Plate Stacks

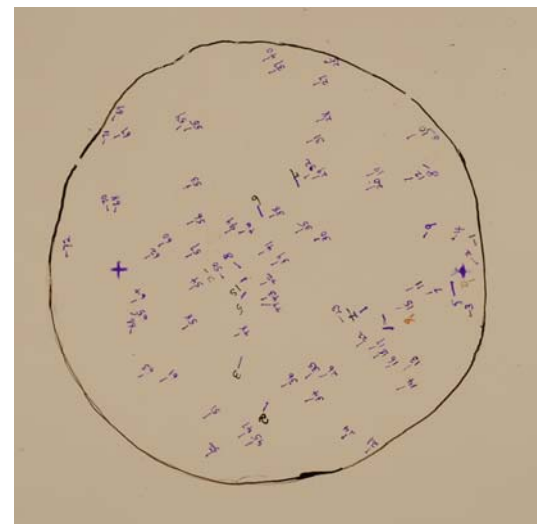
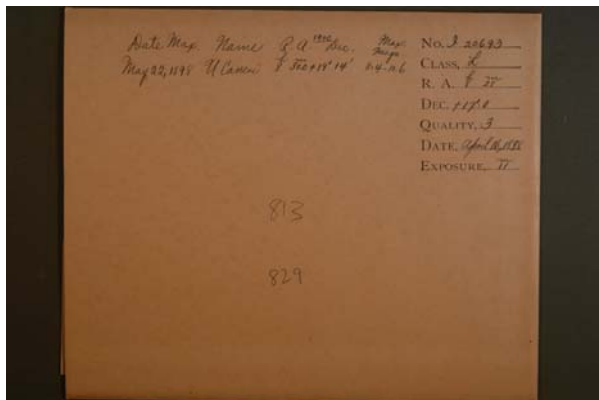
500 000, 3 floors

~ 160 Tons

**Nikon D200
Station**

Slide after Bob Simcoe





Slide after Bob Simcoe

Using technology common to semiconductor wafer and flat panel display inspection stations, a machine was built that does ultra-fast, ultra-precise digitizing.

HARVARD DASS SCANNER

of Bob Simcoe

~0.5M\$ (5y)

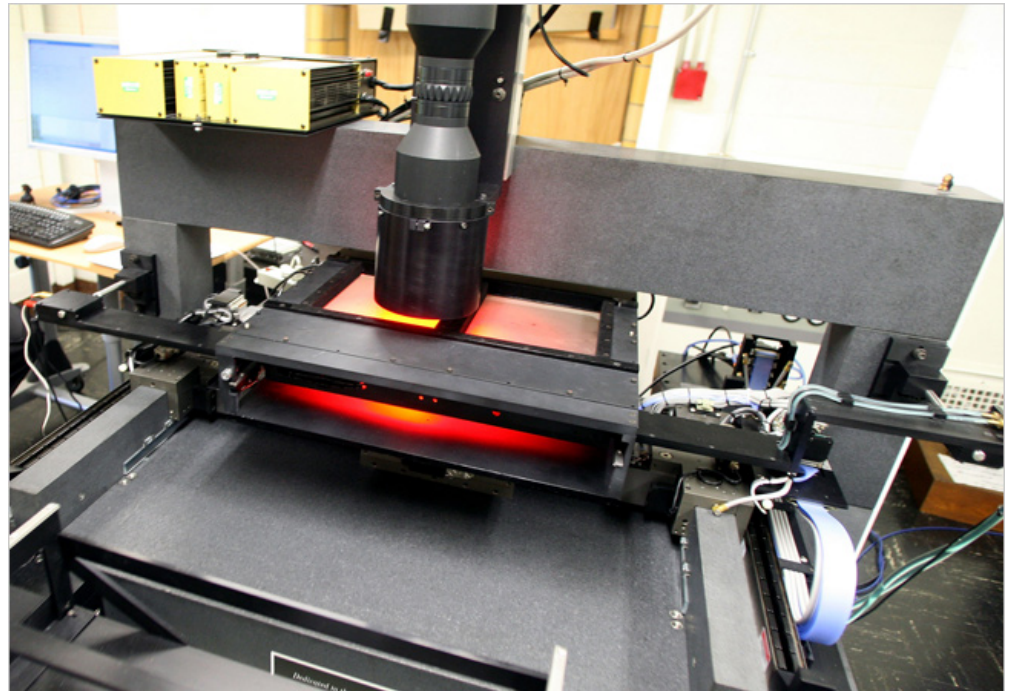
It will digitize two 8 x 10 inch plates or an 14 x 17 inch plate in about 90 seconds of machine time, generating enough data in that time to fill a DVD (2.8 Gigabytes-2 scans 14 x 17 plate).



Slide after Bob Simcoe

Digitizer Subsystems

- CCD Camera
- Lens
- X-Y (Z) table
- Isolation stand
- Illumination
- Fixture to hold plates
- Computer/storage system



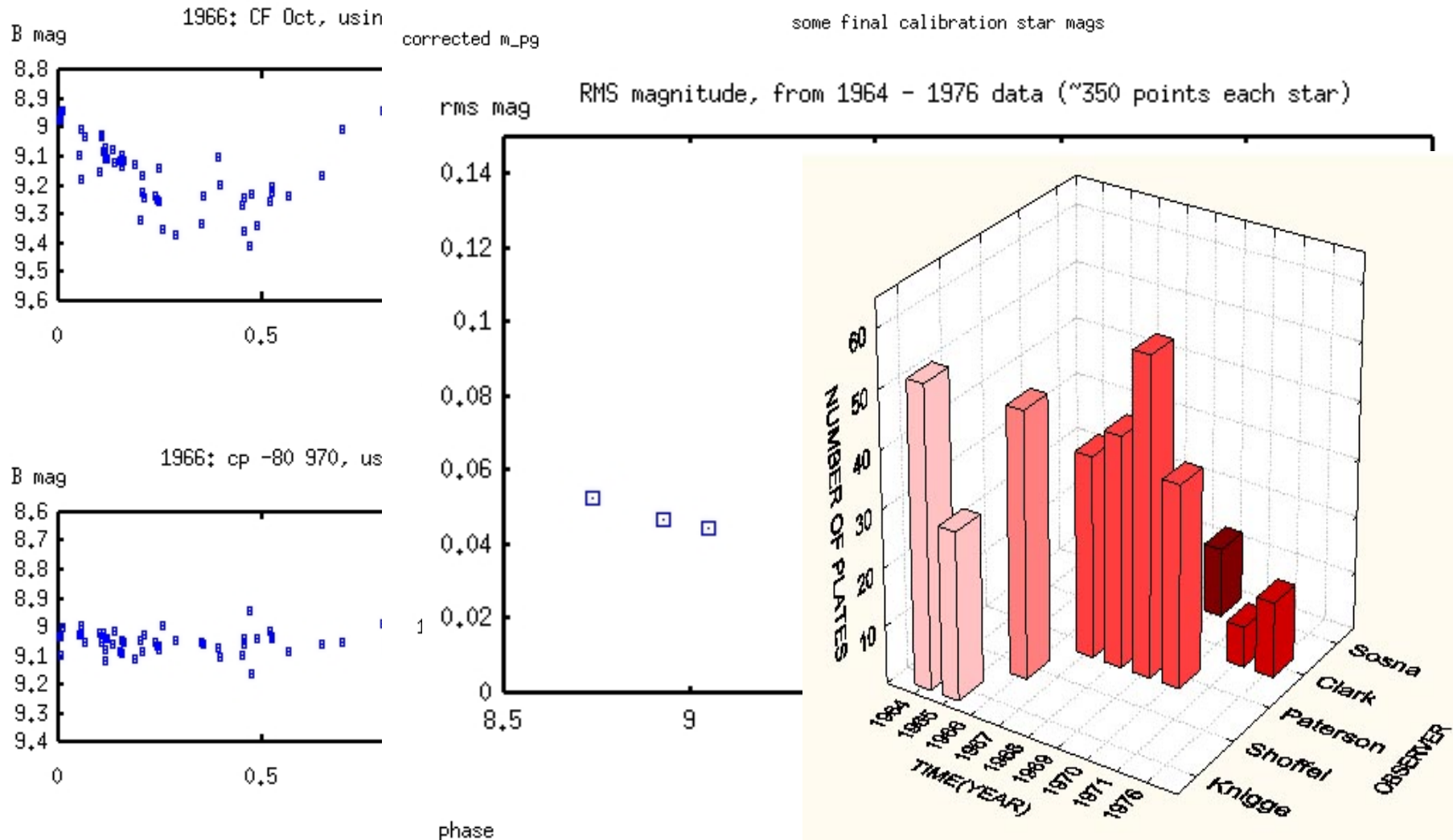
Slide after Bob Simcoe

Wide-filed plate database applications

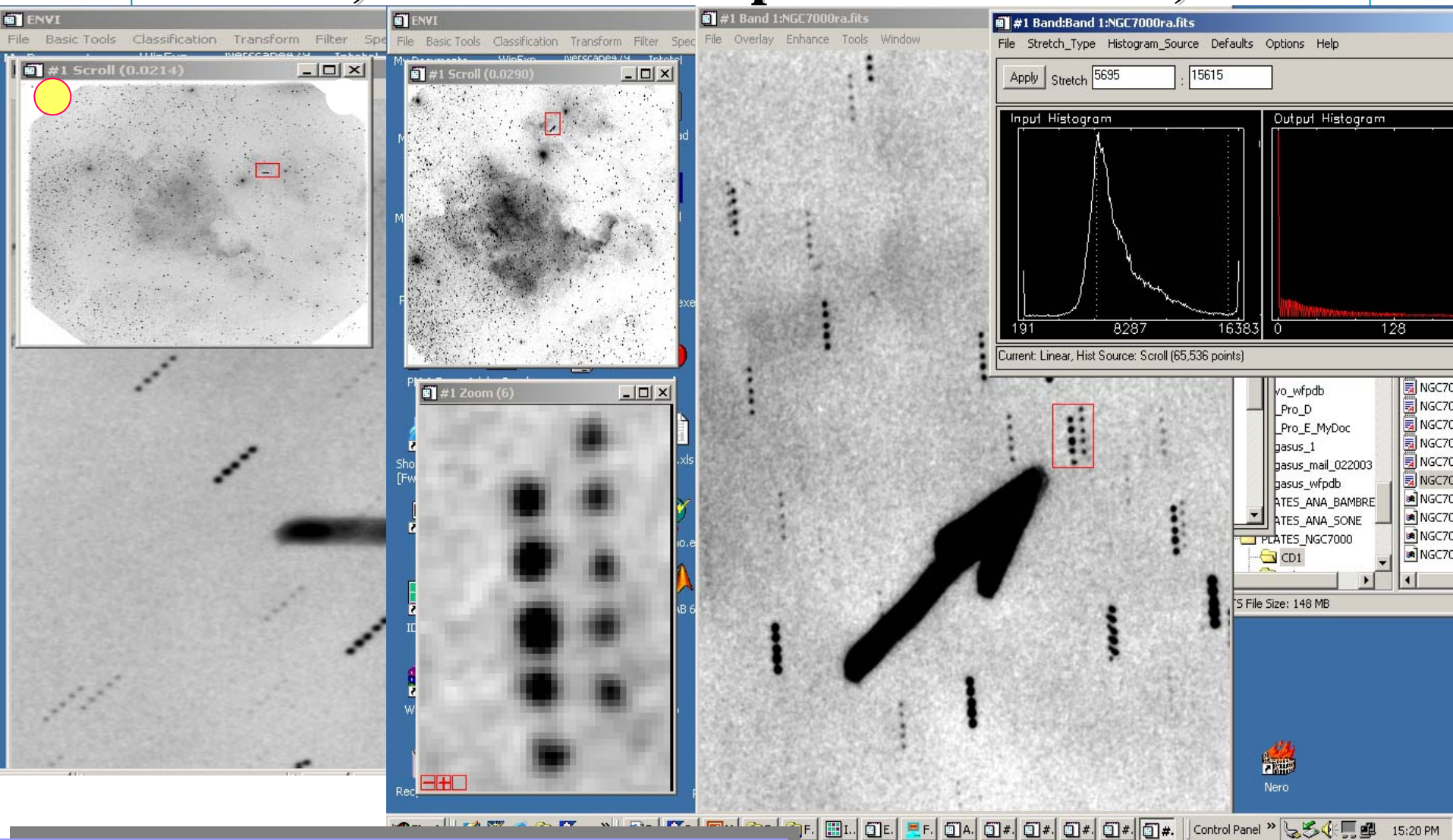
Study (long term) brightness variations

- Study the small planet orbits: Discovery and rediscovery NEA, (**DETERMINATION OF THE ORBIT OF THE LARGEST ASTEROID 2001 KX76 (d=1200 km) using the AVO** (Berlin, DLR, Gerhard Hahn et al., IAU Information Bulletin, 90 p.3, 2002)
- study the some known phenomenon as GRB rapid events in the Galaxy etc.
- Link to the references Databases (IBVS, ADS)

CF Oct search on the Bamberg plates: J. Innis et al., 2004 (MNRAS in press)



Flare Star Search in NGC7000, Asiago, 60/70 cm Schmidt; scanned with Epson 1640XL Pro, 2003.



Rosino, Tsvetkov & Tsvetkova, IBVS, 2000
Beriberi et al., Experimental Astr., 2004 (in press)

THE MAIN TASKS TO BE SOLVED ARE:

- Preservation, compression and access to wide-field astronomical observations**
- Virtual Observatory ICT standards compatibility, specially for platform independent operability**
- WEB-based search tools for stars in digitized observations**
- Adaptation of methods for image analysis, compression, web-access and data-mining**
- Dissemination among the ICT and astronomical community of the team experience**



ASTROINFO team participants

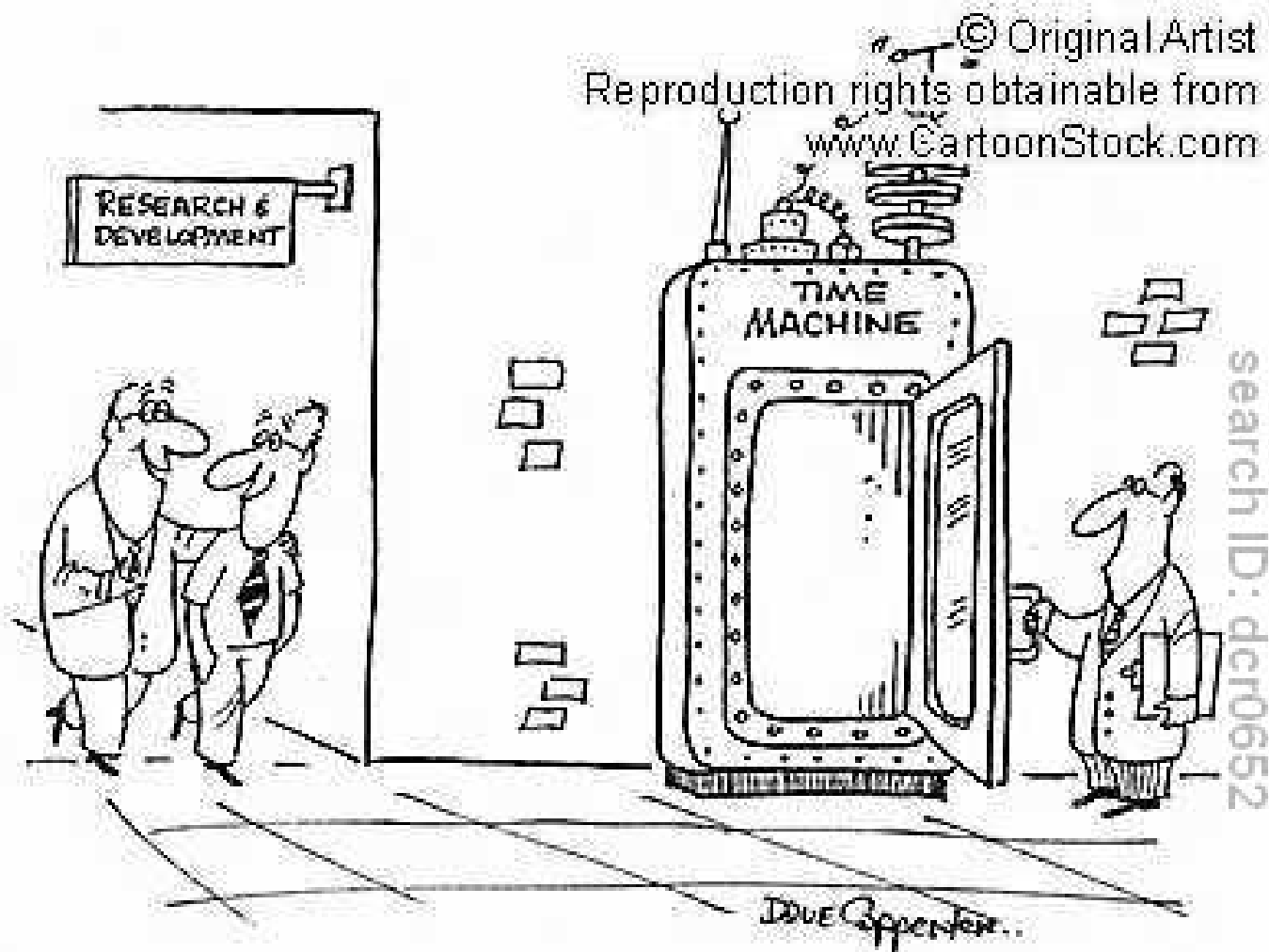
**Ognyan Kounchev¹, Milcho Tsvetkov², Dimo Dimov³, Yavor Chapanov⁴,
Nikolay Kirov^{1,8}, Katya Tsvetkova², Damyan Kalaglarski⁵, Svetoslav Christov⁵,
Emil Kelevedjiev¹, Ana Borisova², Juliana Goranova^{1,2}, Galin Borisov²,
Rumen Bogdanovski¹, Alexander Kolev⁶, Orlin Stanchev⁷, Alexander Marinov³,
Nadezhda Zlateva³, Lasko Laskov^{3,8}, Georgi Marinov⁴**

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- 2) Institute of Astronomy, Bulgarian Academy of Sciences*
- 3) Institute of Information Technologies, Bulgarian Academy of Sciences*
- 4) Central Laboratory for Geodesy, Bulgarian Academy of Sciences*
- 5) Institute of Meteorology and Hydrology, Bulgarian Academy of Sciences*
- 6) Defense Advanced Research Institute, Military and Staff College*
- 7) Department of Astronomy, Sofia University*
- 8) Department of Informatics, New Bulgarian University*

This work is supported by the Bulgarian NSF grants DO-02-273 and DO-02-275



WFPDB: Time Machine



"LONG TERM INVESTMENT SUCCESS REQUIRES A CLEAR PICTURE OF THE FUTURE, AND THAT'S GOING TO BE YOUR JOB, TED..."

Thanks!