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

Wide-Field Plate Database: Plate Index Catalogue

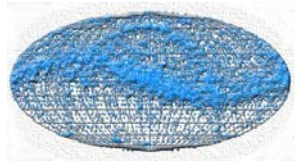
Milcho Tsvetkov

Sofia Sky Archive DataCenter

Bulgarian Academy of Sciences

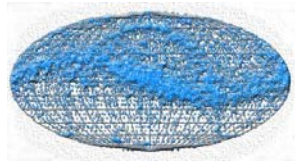
Belgrade, 30.06.2010

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 fist version works under VizeiR . 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 Donnes Astronomiques de Strasbourg (CDS) and International Virtual Observatory Alliance (IVOA) the WFPDB contains the digitized plate preview images, as well as digitized plate row 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

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/

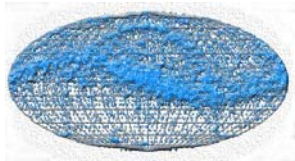
CdC:

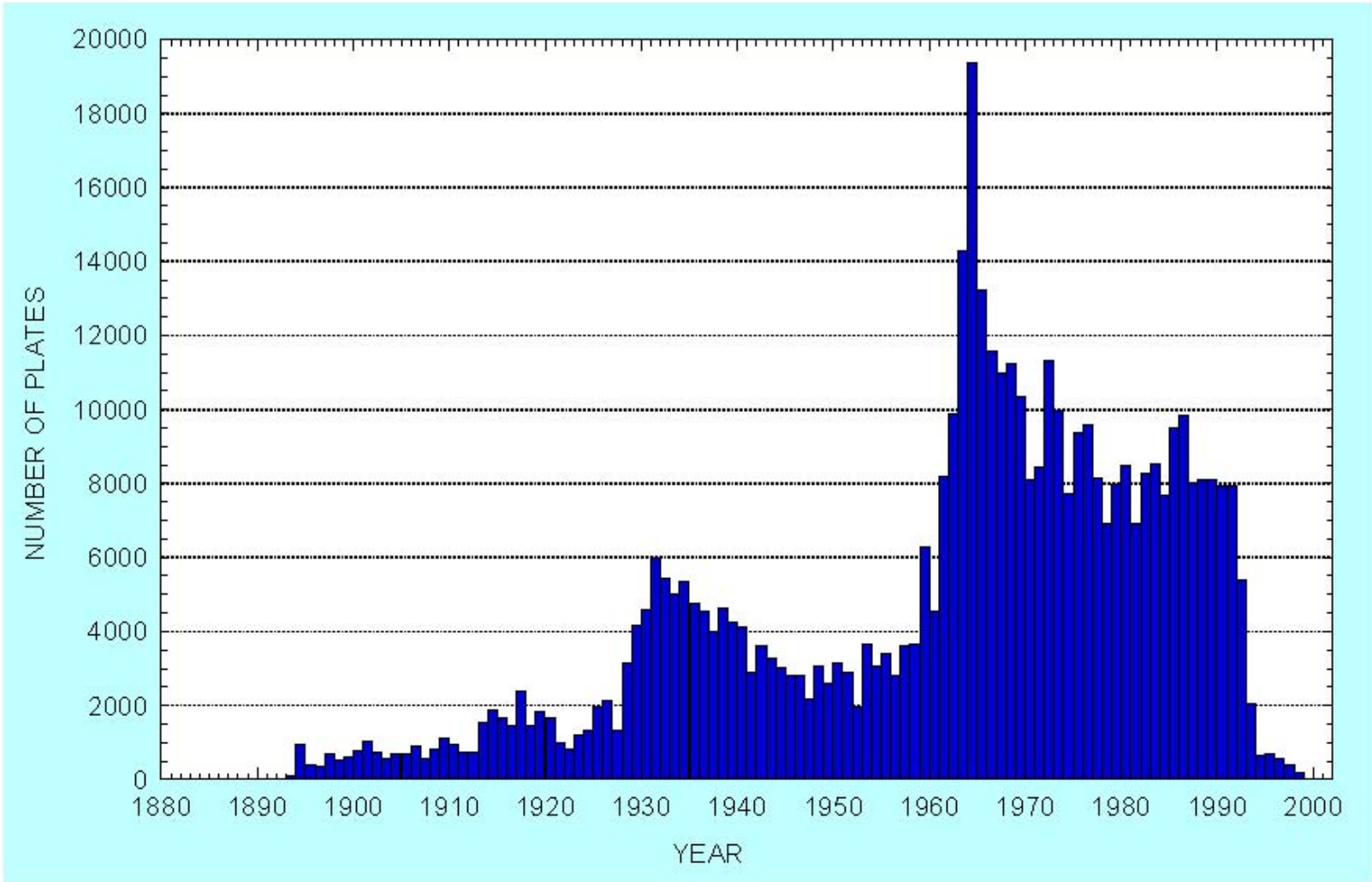
http://vo.aip.de/plates/picindex.html
http://docs.astro.bas.bg/~pi/Data/www/picindex.html

StarGazer:

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

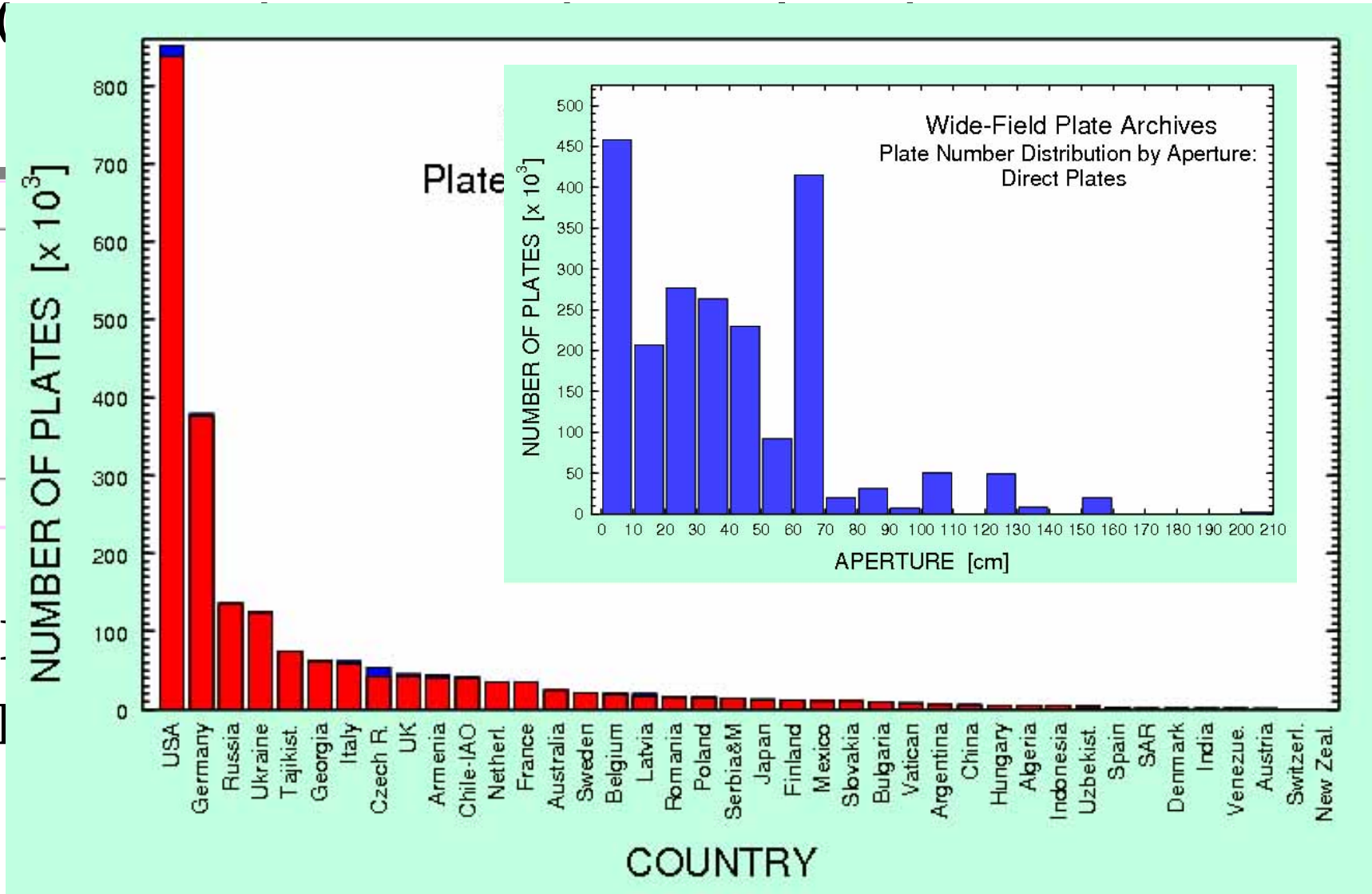
WFPDB time series





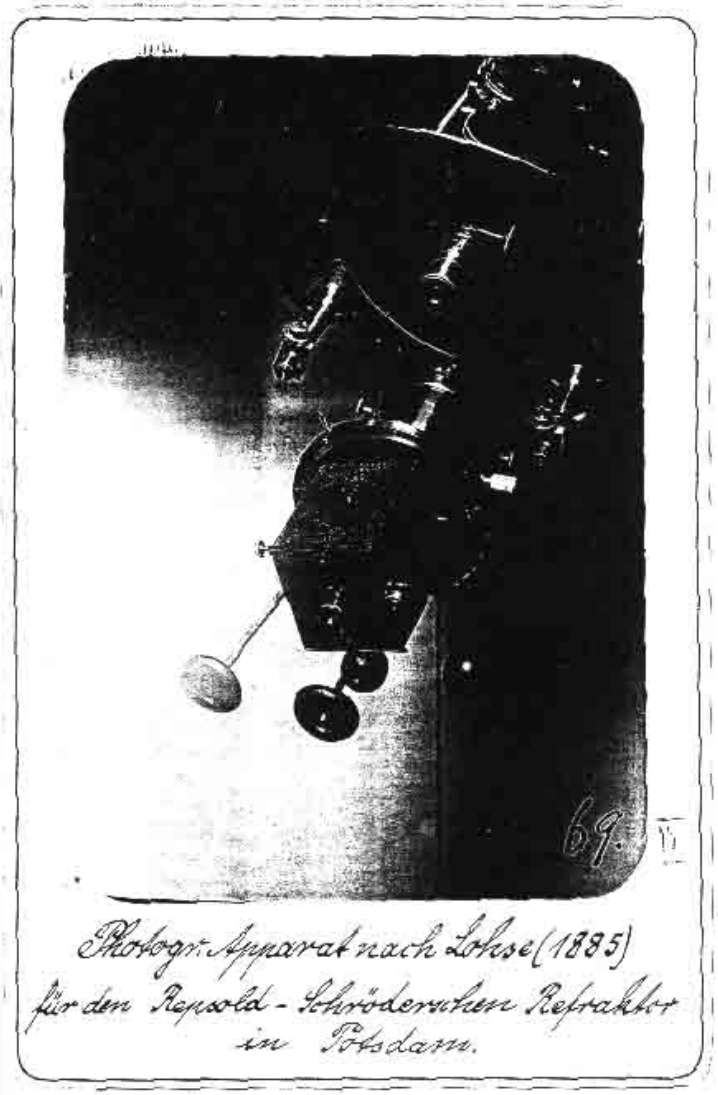
The WFPA-WFPDB

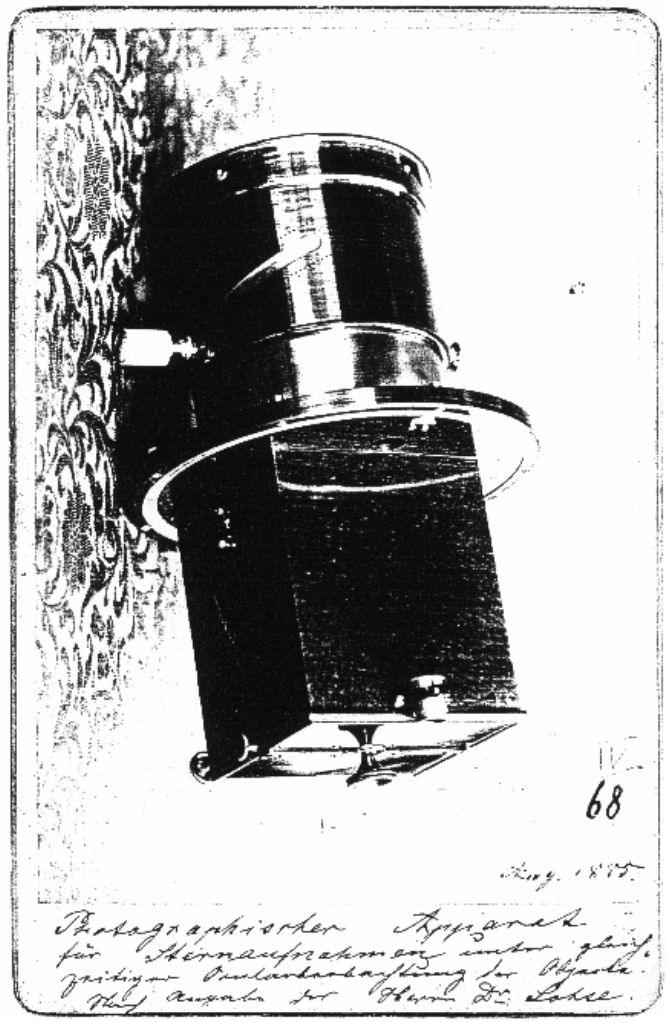
http://www.skyarchive.org/catalogue.html#Cat50



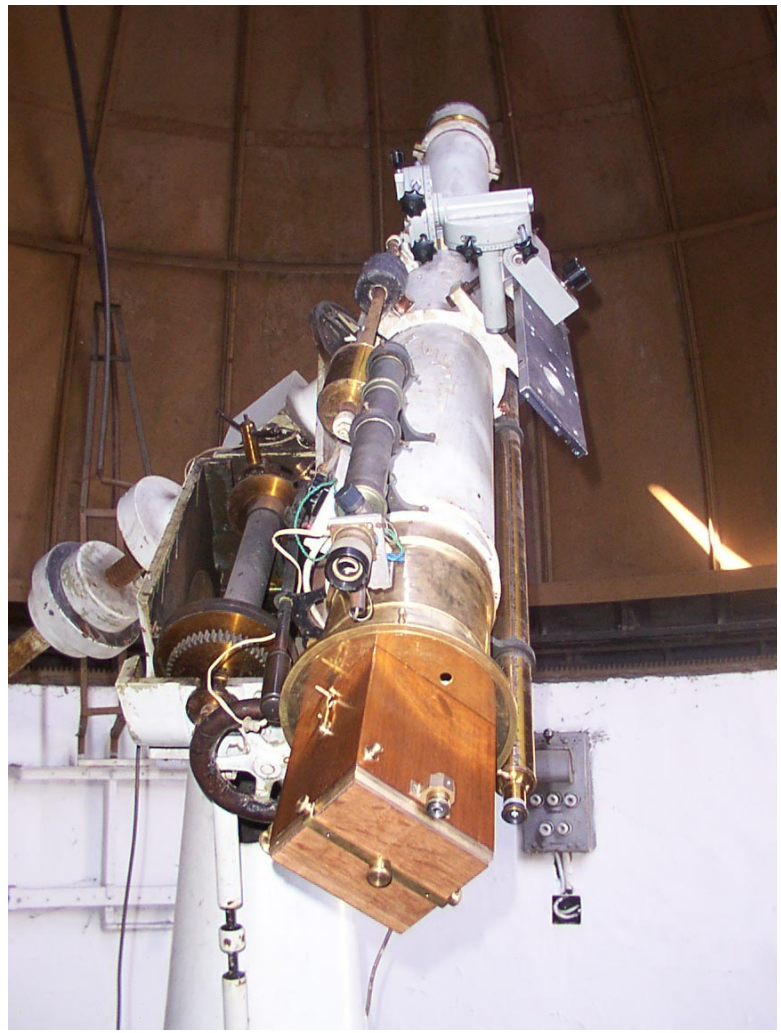
WFPDB

The Lohse Photographic camera



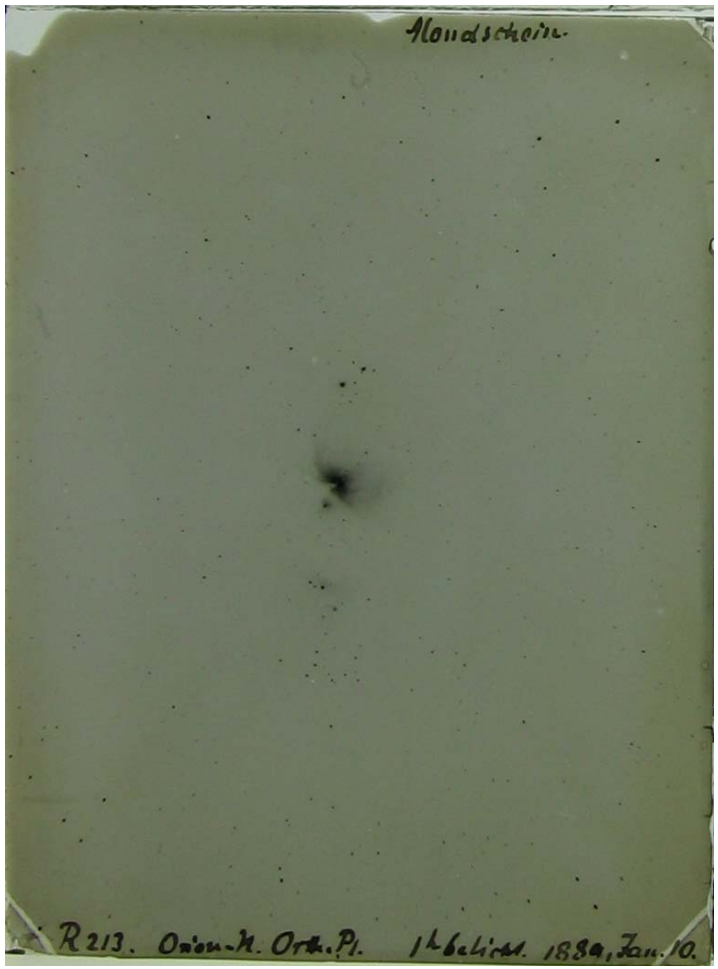


WFPDB



O. Lohse Historical Plate Achieve, Potsdam 1879-1896

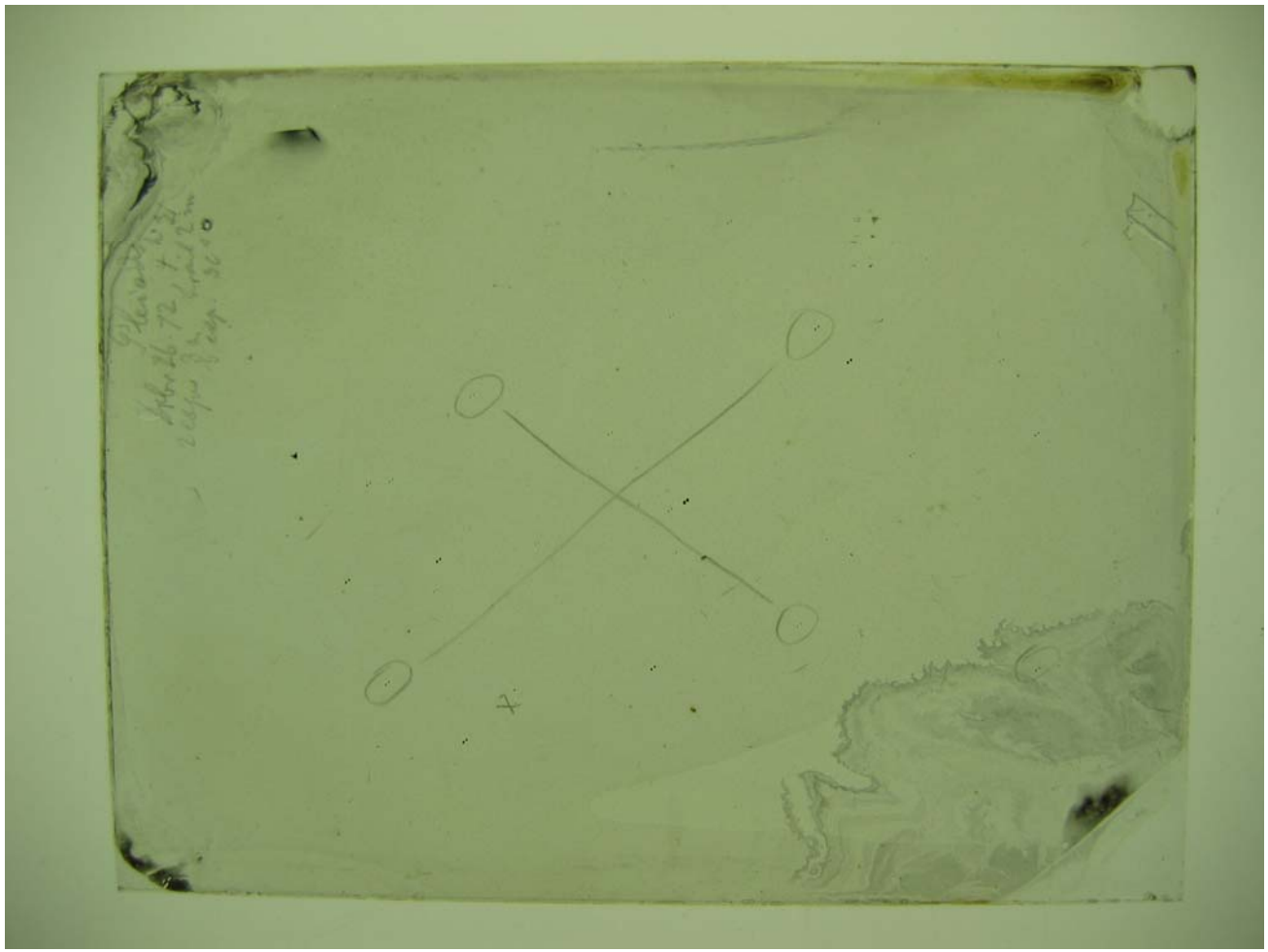
60 plates survive two WW from 214 in AIP

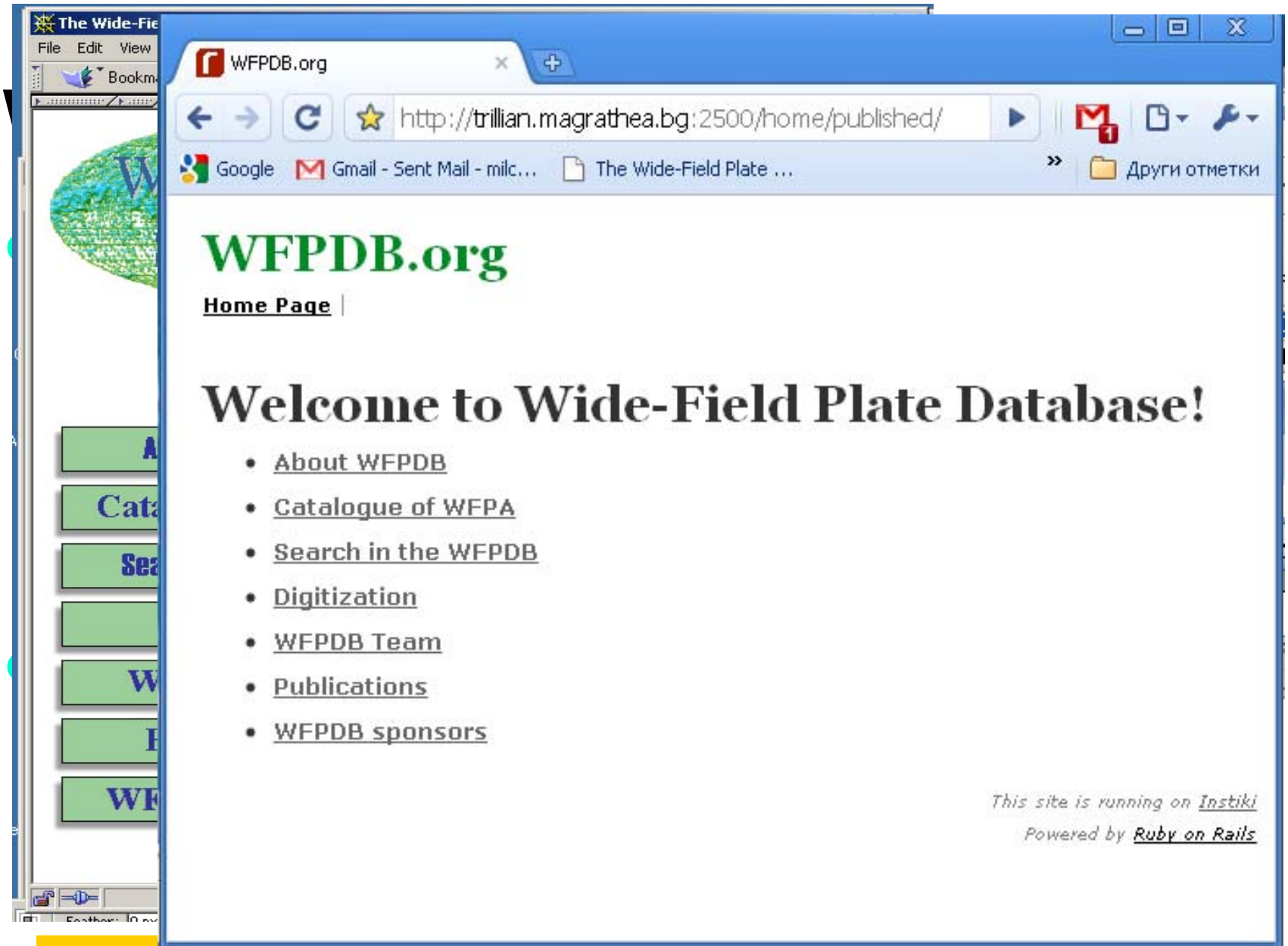


Harvard College Observatory Historical Gould Survey

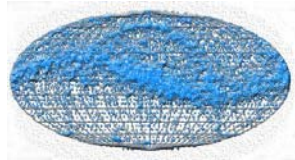
Pleiades Gould Plate, Cordoba, 1872, Dec. 26, 04:30h

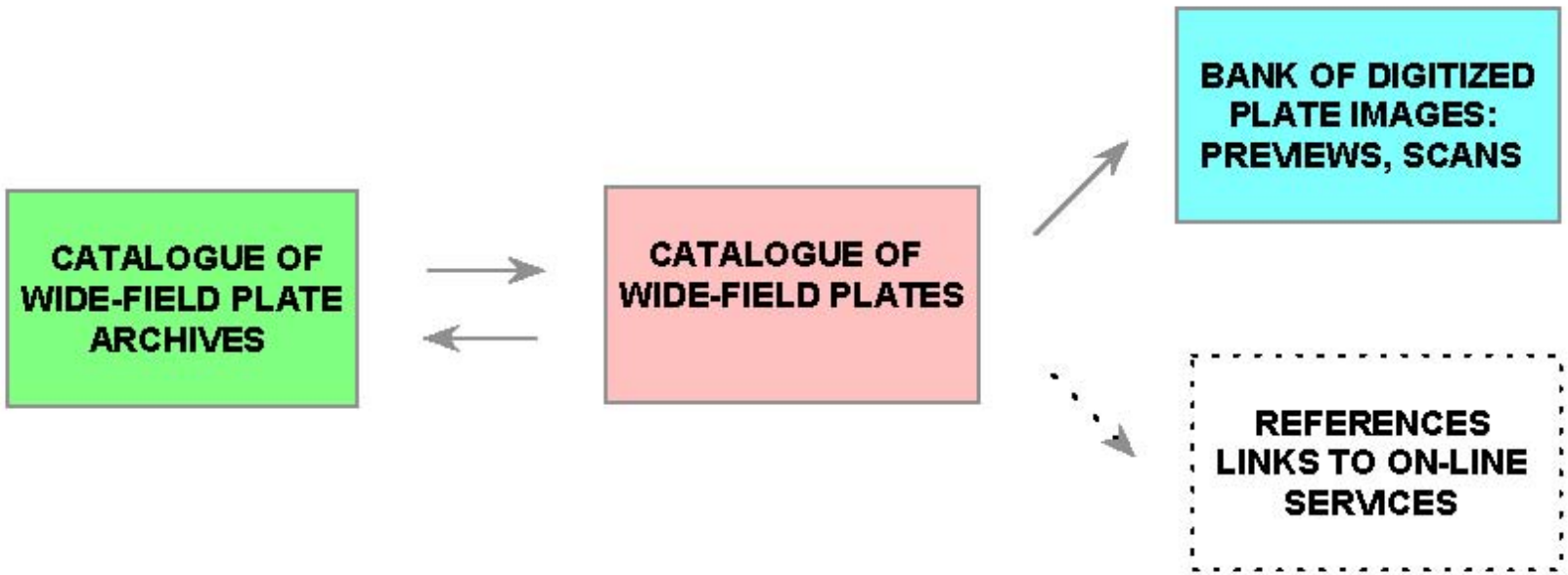
1000 plates
In the period
1872 - 1890



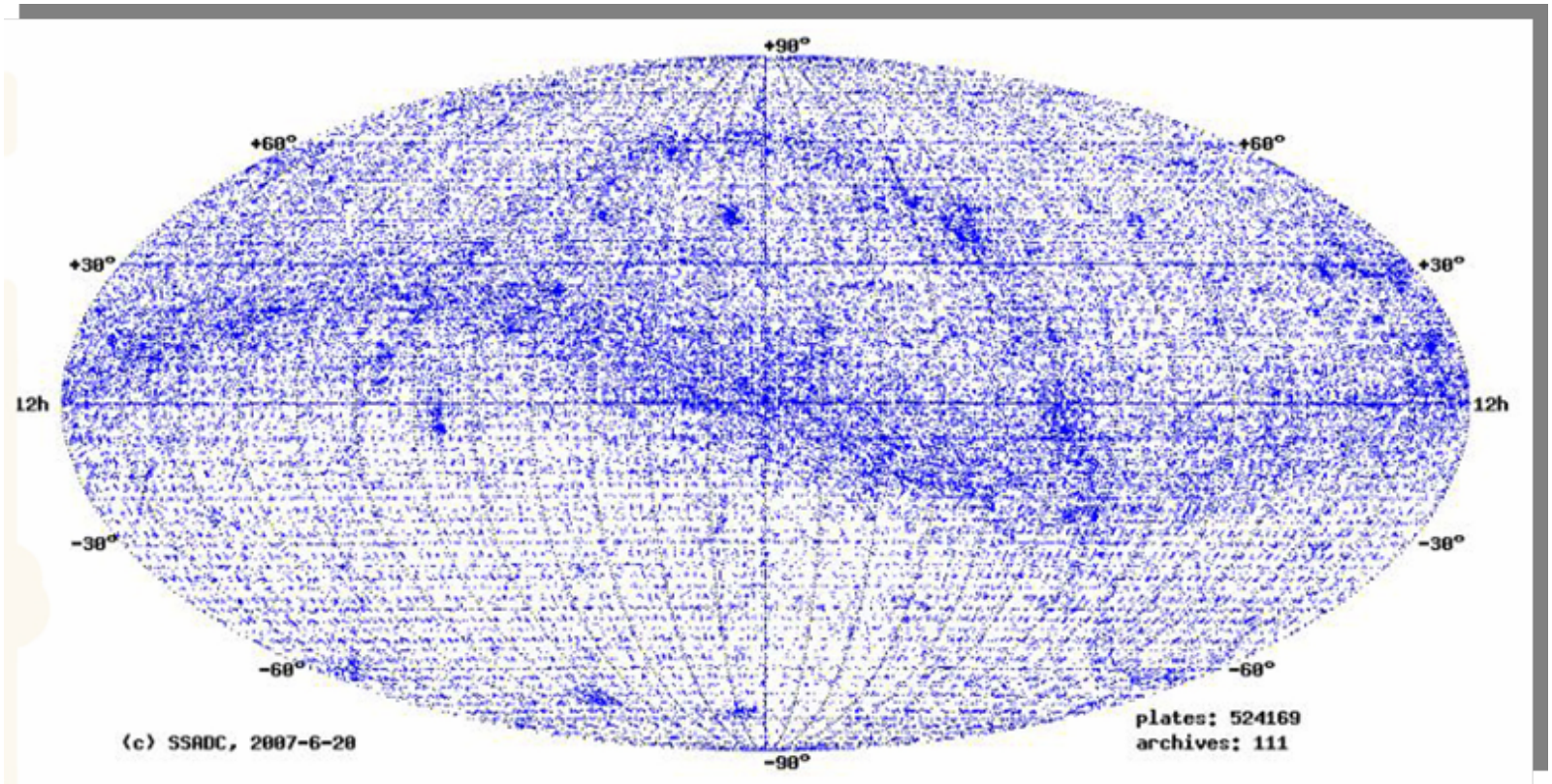


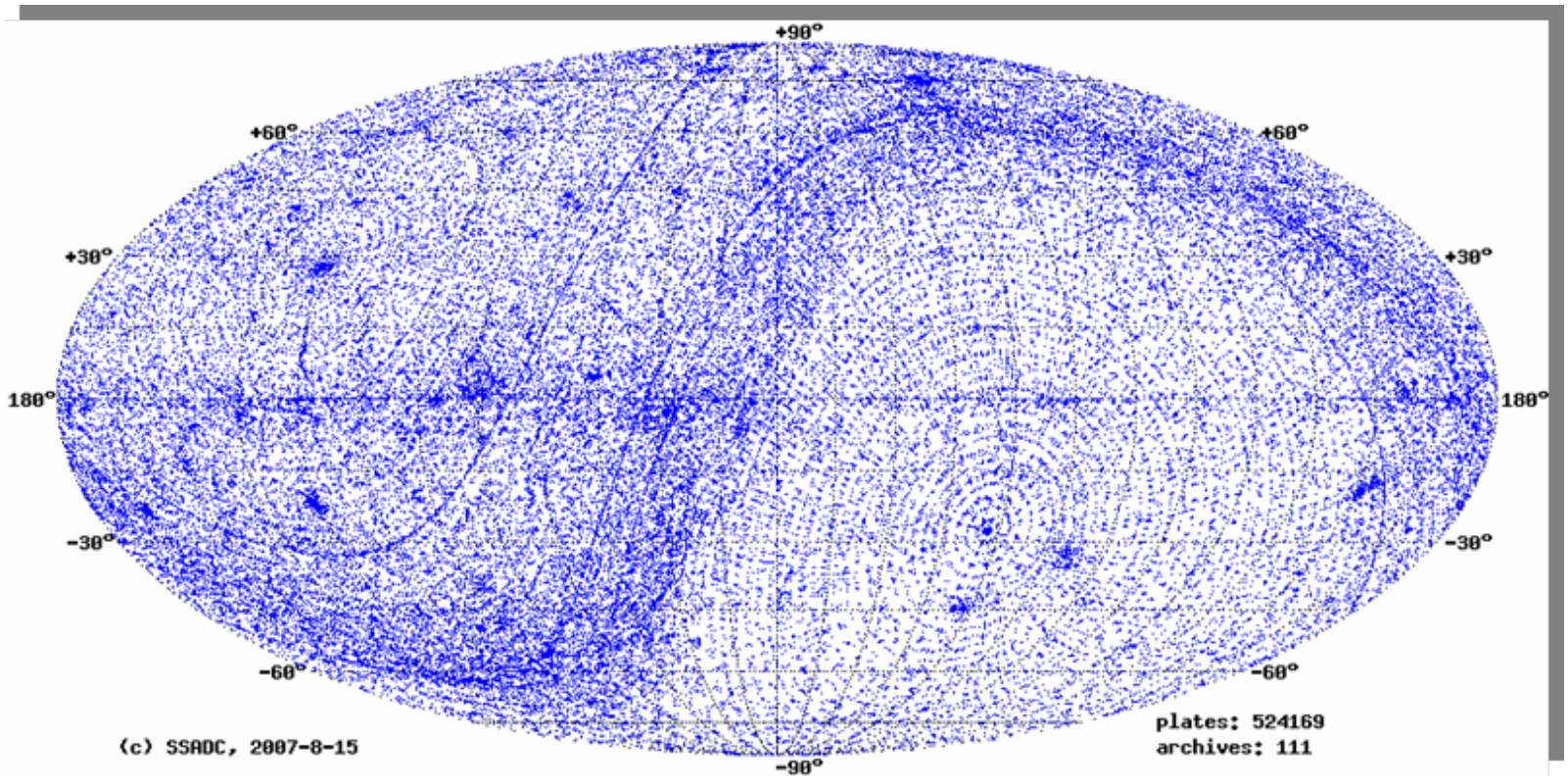
WFPDB structure



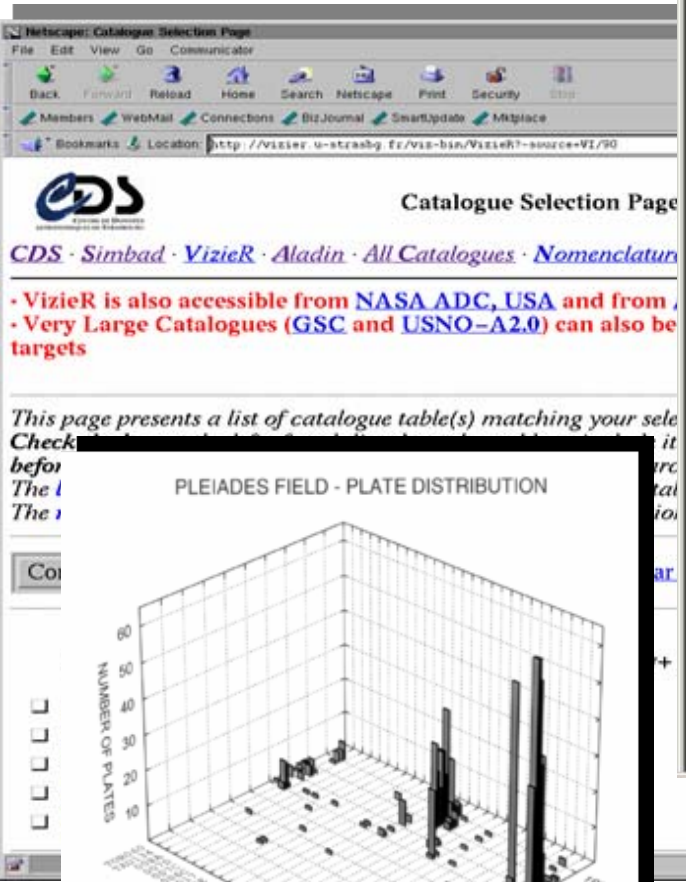


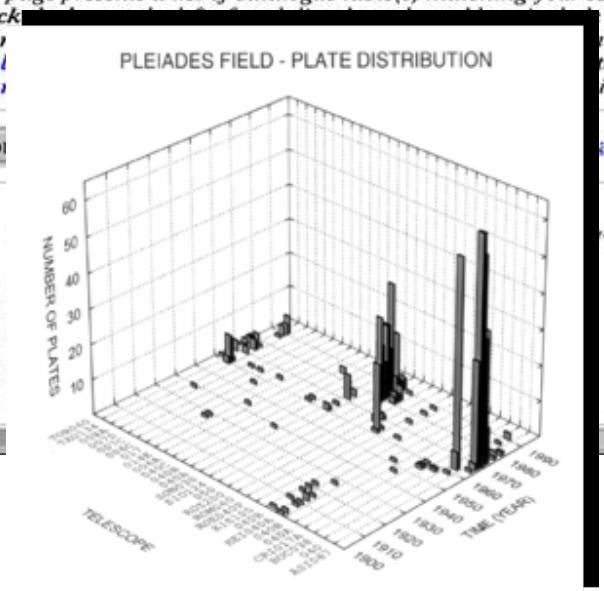
WFPDB Sky Distribution

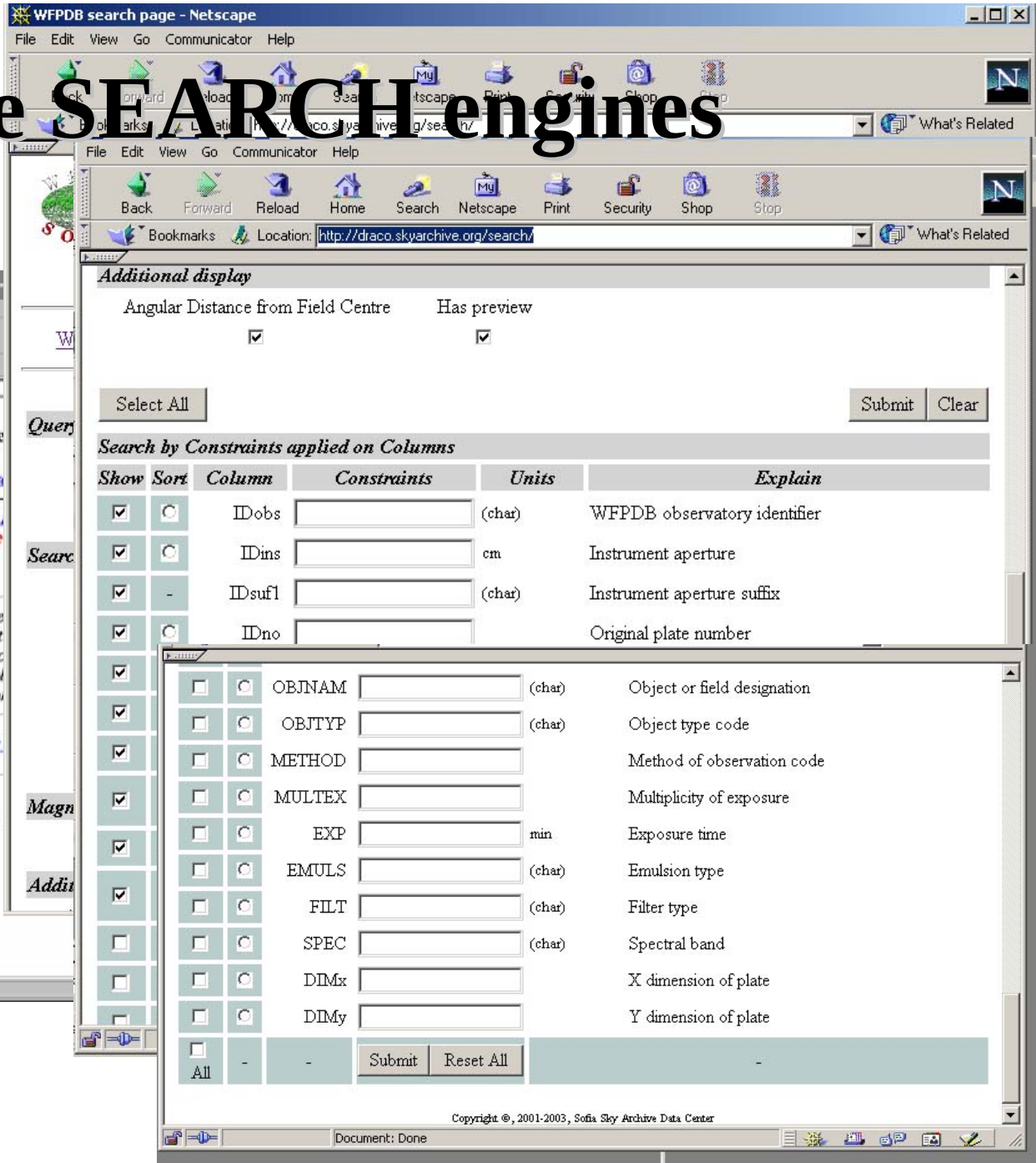


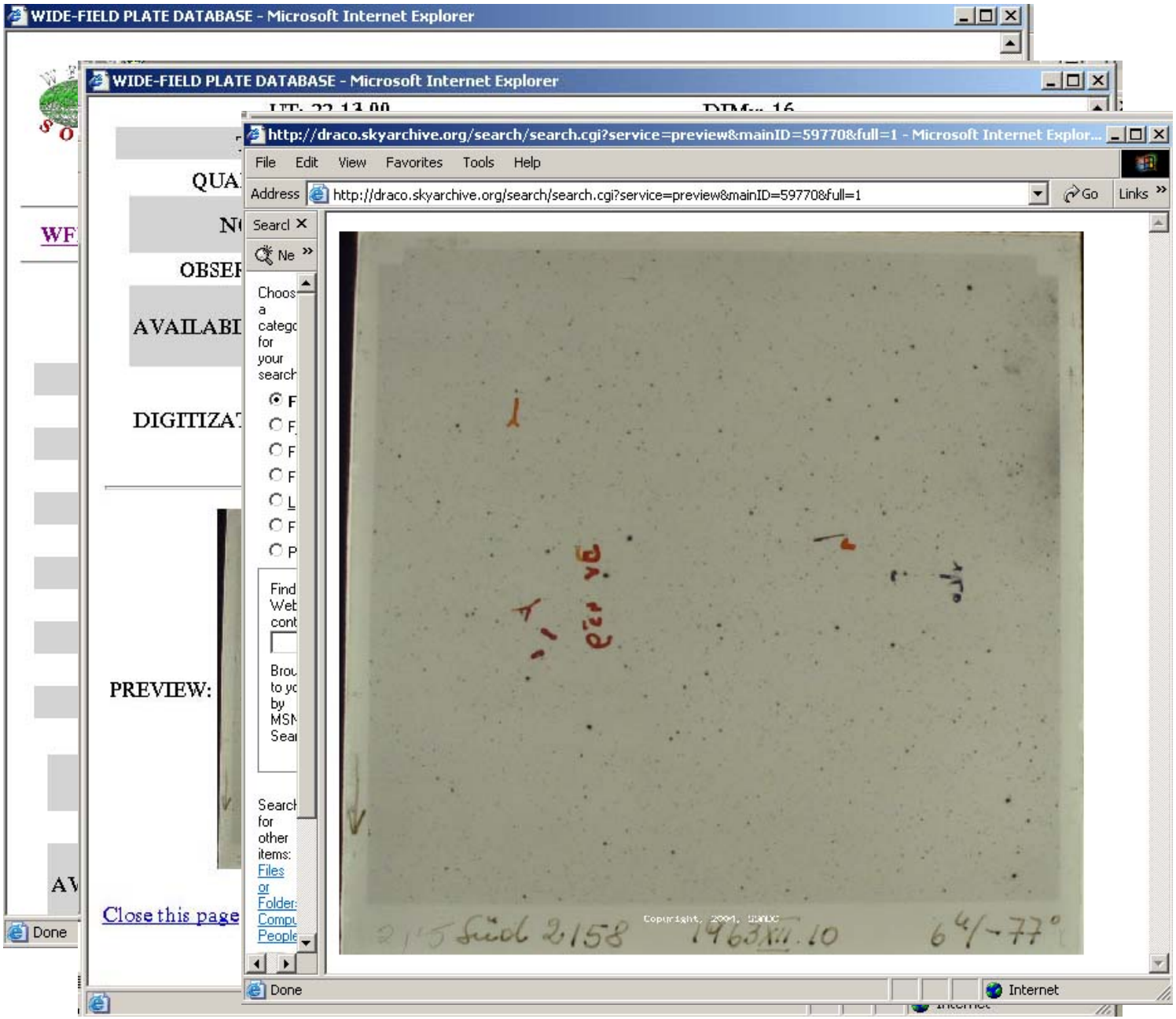

+90°
+60°
+60°
+30°
+30°
180°
180°
-30°
-30°
-60°
-60°
-90°
(c) SSADC, 2007-8-15
plates: 524169
archives: 111

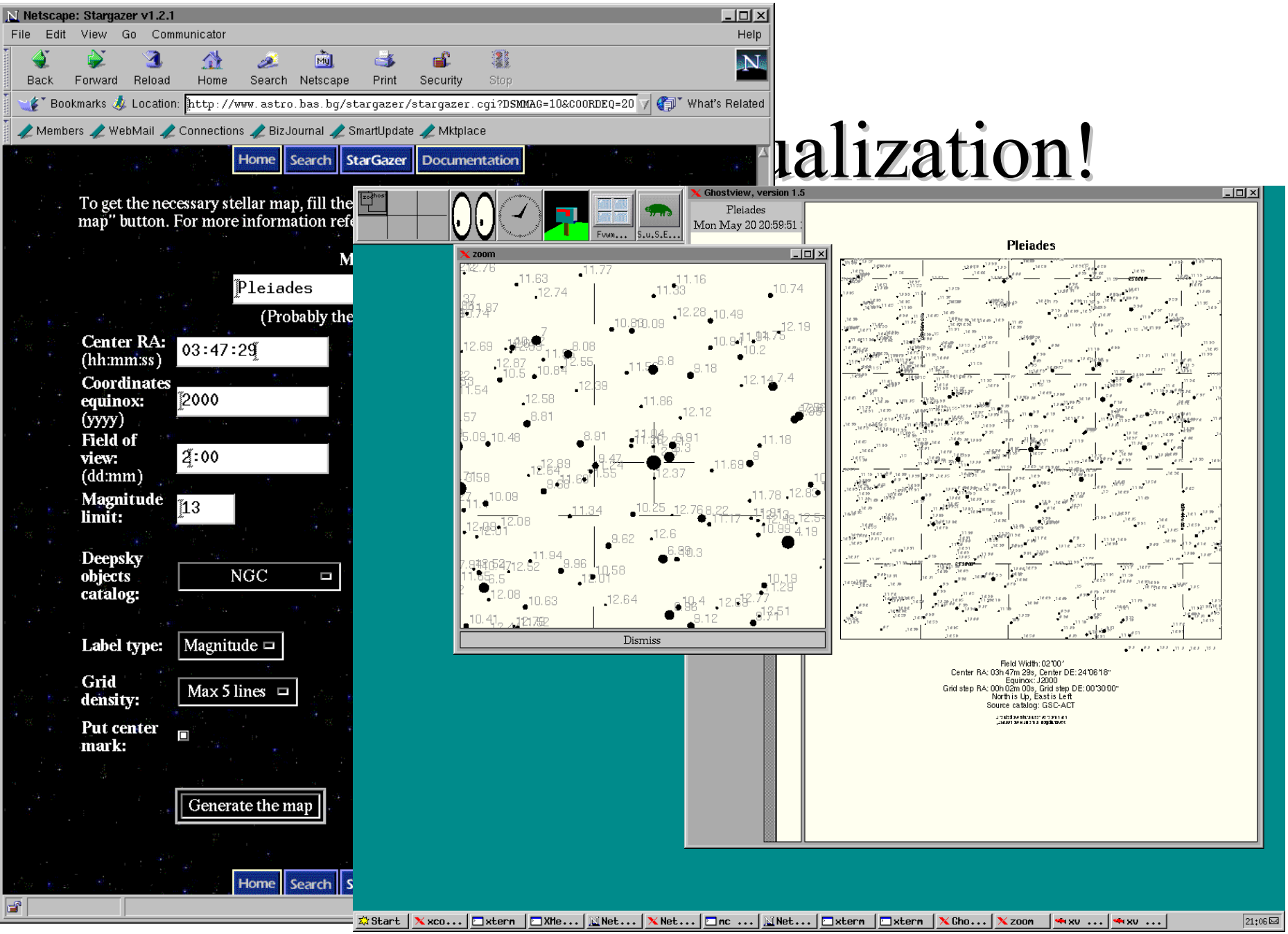
Database SEARCH engines








WIDE-FIELD PLATE DATABASE - Microsoft Internet Explorer
WIDE-FIELD PLATE DATABASE - Microsoft Internet Explorer
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
PREVIEW:
Close this page
Done
Internet


Netscape: Stargazer v1.2.1
File Edit View Go Communicator Help
Back Forward Reload Home Search Netscape Print Security Stop
Bookmarks Location: http://www.astro.bas.bg/stargazer/stargazer.cgi?DSMMAG=10&COORDEQ=20
What's Related
Members WebMail Connections BizJournal SmartUpdate Mktplace
Home Search StarGazer Documentation
To get the necessary stellar map, fill the
map" button. For more information ref
Pleiades
(Probably the
Center RA: (hh:mm:ss) 03:47:29
Coordinates equinox: (yyyy) 2000
Field of view: (dd:mm) 2:00
Magnitude limit: 13
Deepsky objects catalog: NGC
Label type: Magnitude
Grid density: Max 5 lines
Put center mark:
Generate the map
Home Search
Ghostview, version 1.5
Pleiades
Mon May 20 20:59:51
zoom
Dismiss
Pleiades
Field Width: 02°00'
Center RA: 03h 47m 29s, Center DE: 24°06'18"
Equinox: J2000
Grid step RA: 00h 02m 00s, Grid step DE: 00°30'00"
North is Up, East is Left
Source catalog: GSC-ACT
Start
21:06

ualization!

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

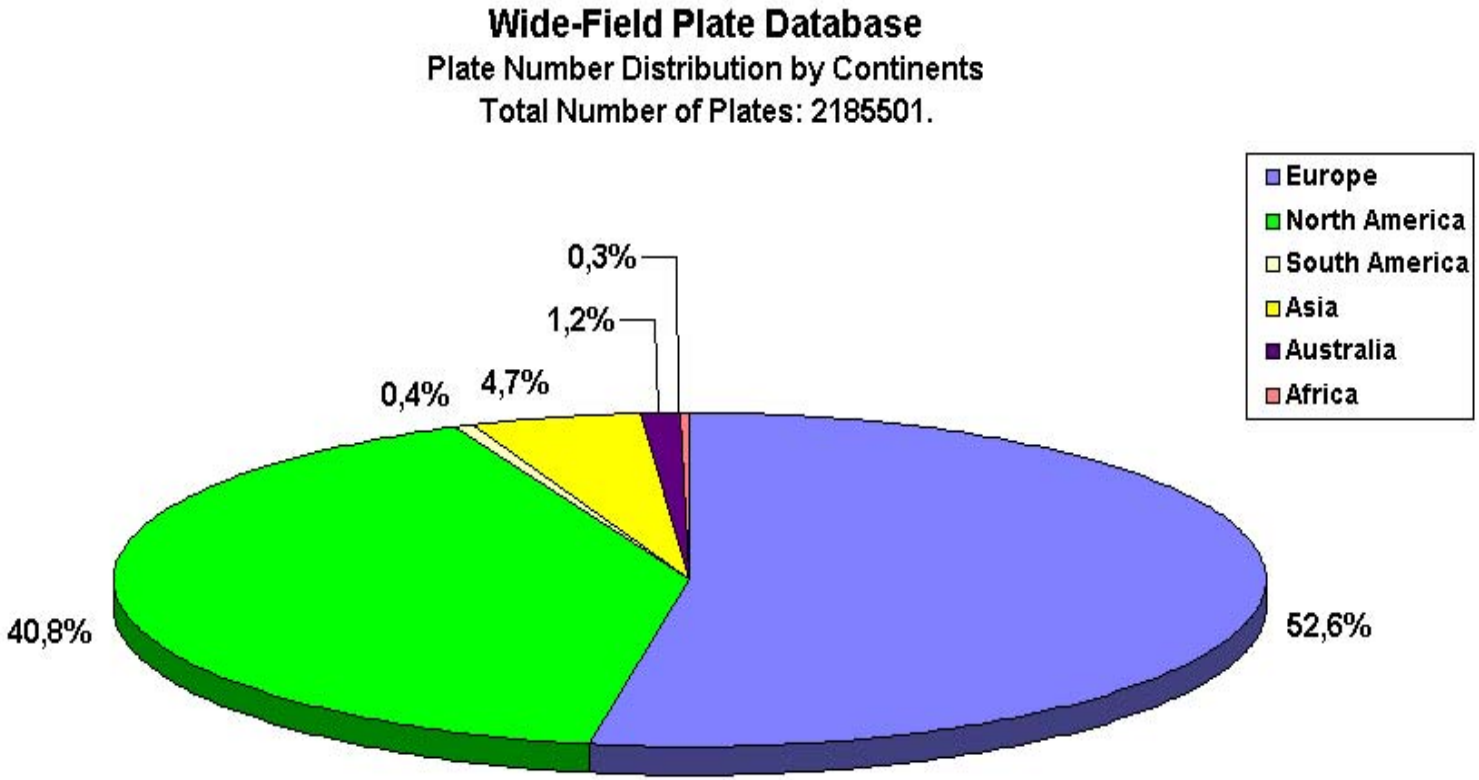


Plate Digitization -

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)

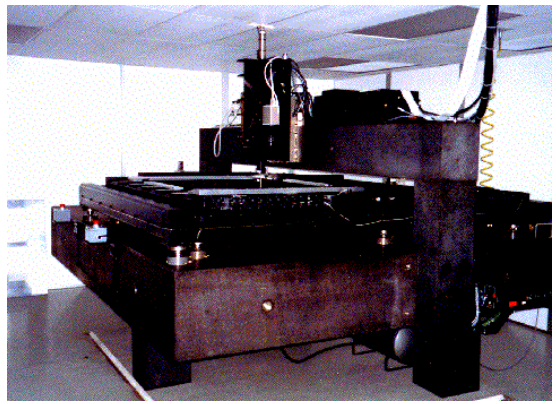
Automating the Measurements

1886

*The Grant 2 Measuring Engine-1967

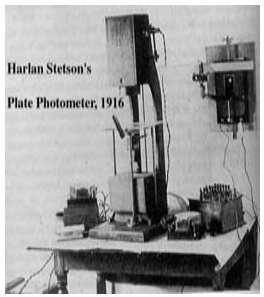
*Gaertner single screw engine 1916

**PMM (NRO ~1988)

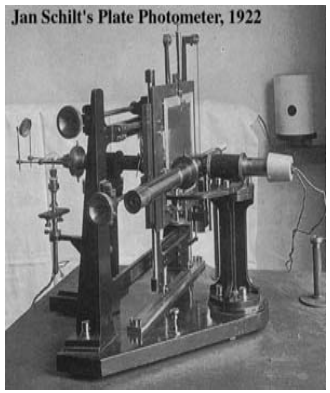


Astrometric

Photometric



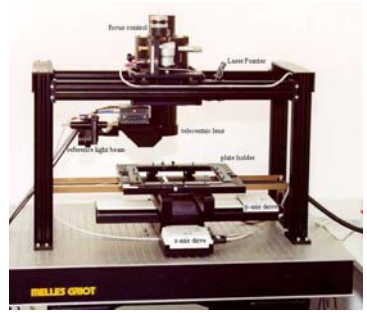
*1916



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_caption.html

Slide after Bob Simcoe

WFPDB: SCANNERS

STSTUS OF PLATE ARCHIVENG AND DIGITIZATION

EUROPEN PLATE ARCHUVES

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** (20μ/pix)
Pulkovo: 50000 FB 1x UMAX **30 000** (20μ/pix)
Tautenburg: 9000 TLSW_Scanner: **4058**(10μ/pix)
Asiago: 20000 2xEPSON1640XL **3000** (16μ/pix)
Byurakan: 20000 EPSON1680 ~1874 (16 μ/pix) FBSS
Bamberg: 25000 EPSON 1640: **1000** (16μ/pix) ~ **2000** preview (40 μc)
Heidelberg(ARI):ARI 400 EPSON10000XL **344** POSSS plates (10 μ/pix)
Heidelberg(LSW): 20000: MPI/LSW 200 scanner: Heidelberg NEXSCAN F4100

More: ……

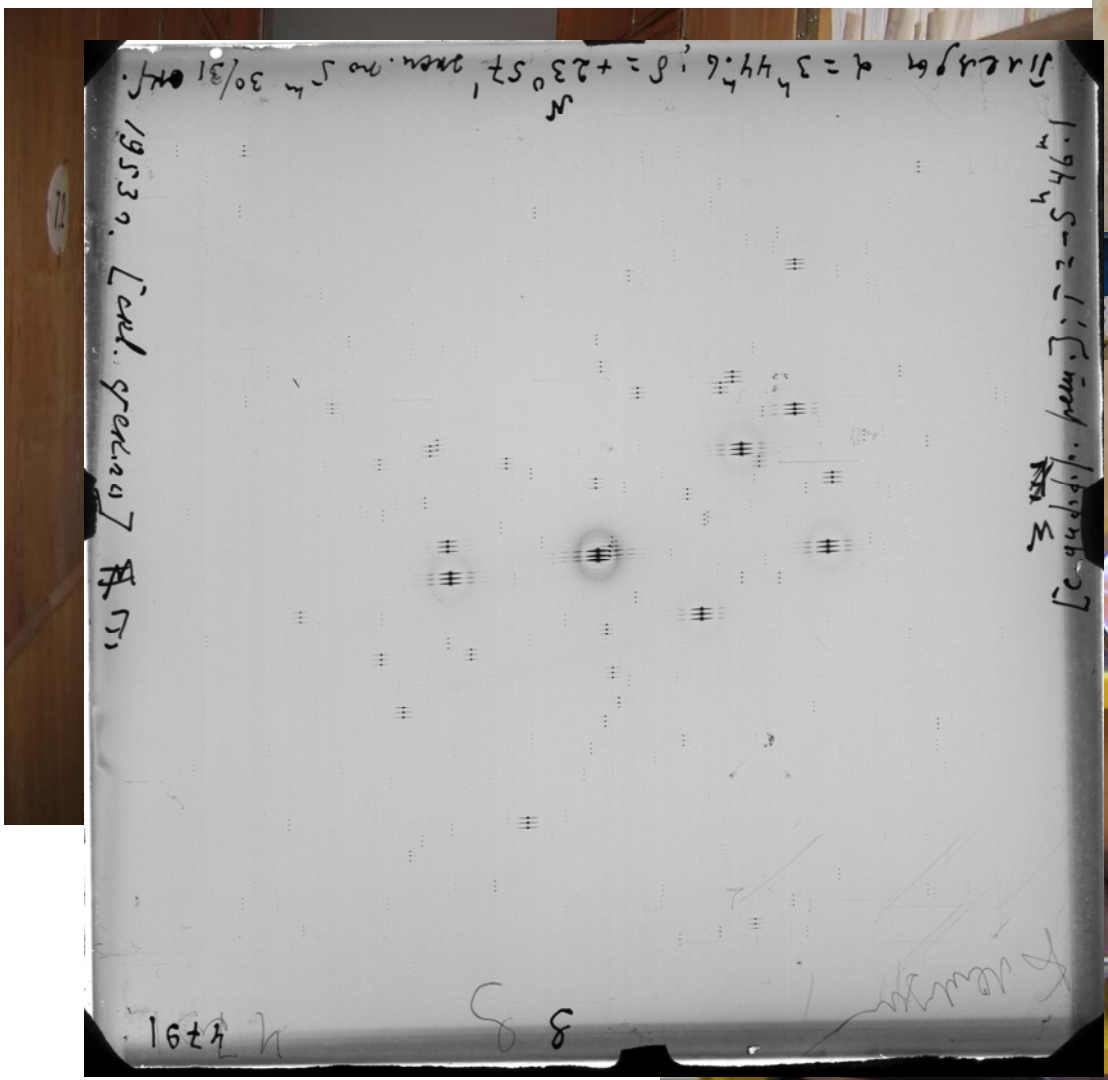
EU Plate Digitization - current status (more…)

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

Pulkovo Plate Archive



Tautenburg Plate Archive

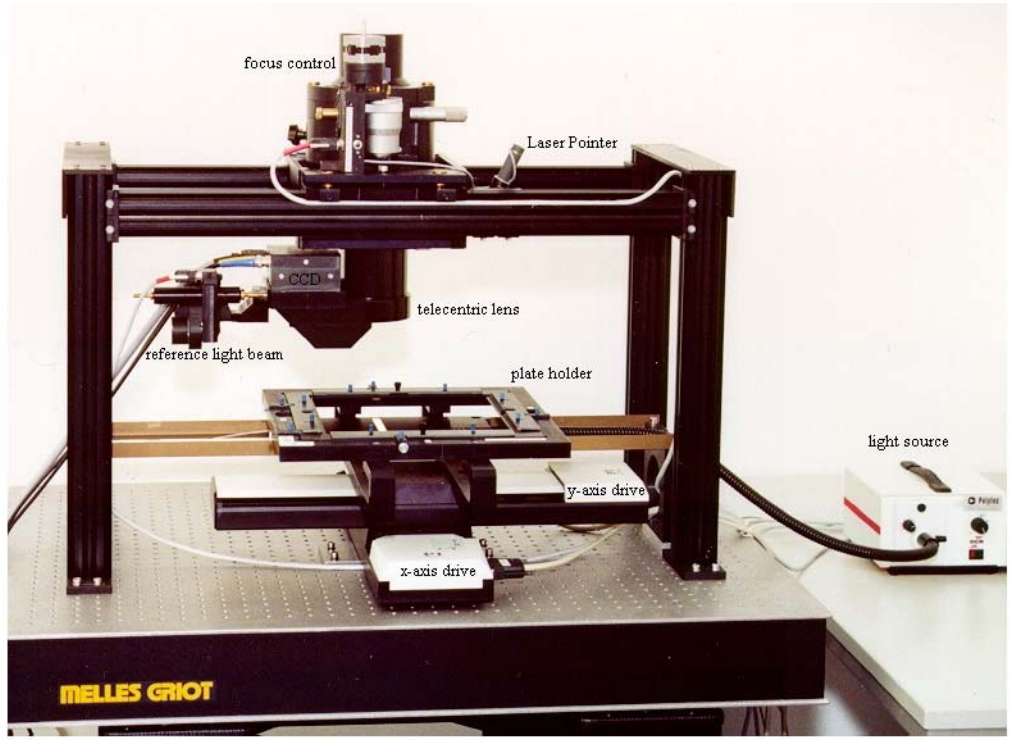
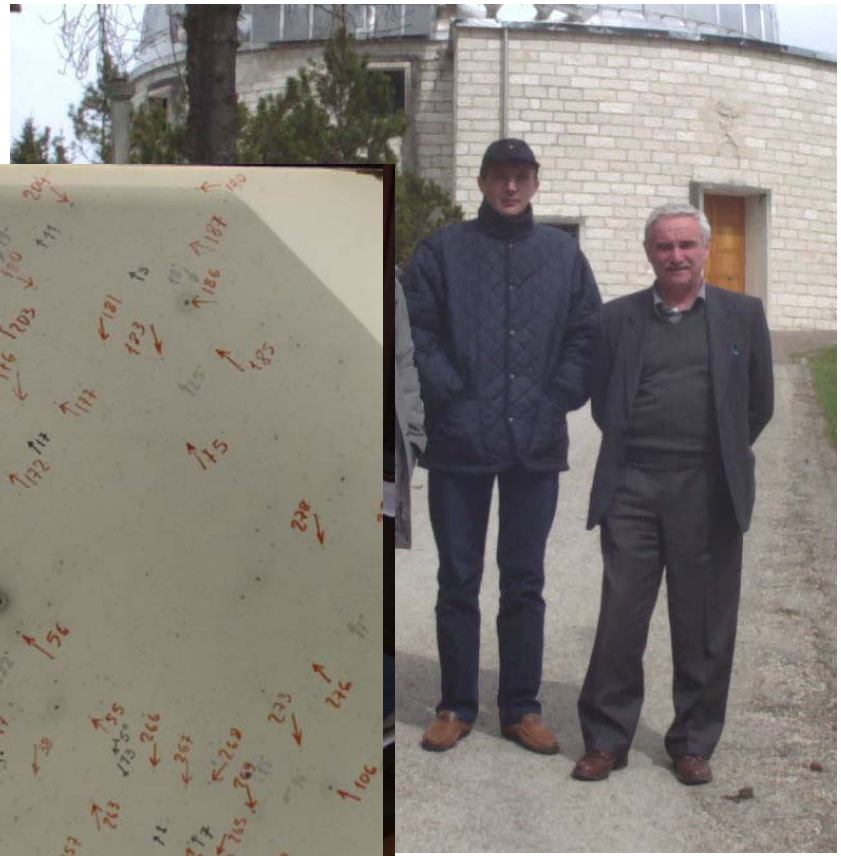


Plate archive contains about 9000 plates, TLSW_Scanner

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

http://www.tblsw.de

Asiago Plate Archive



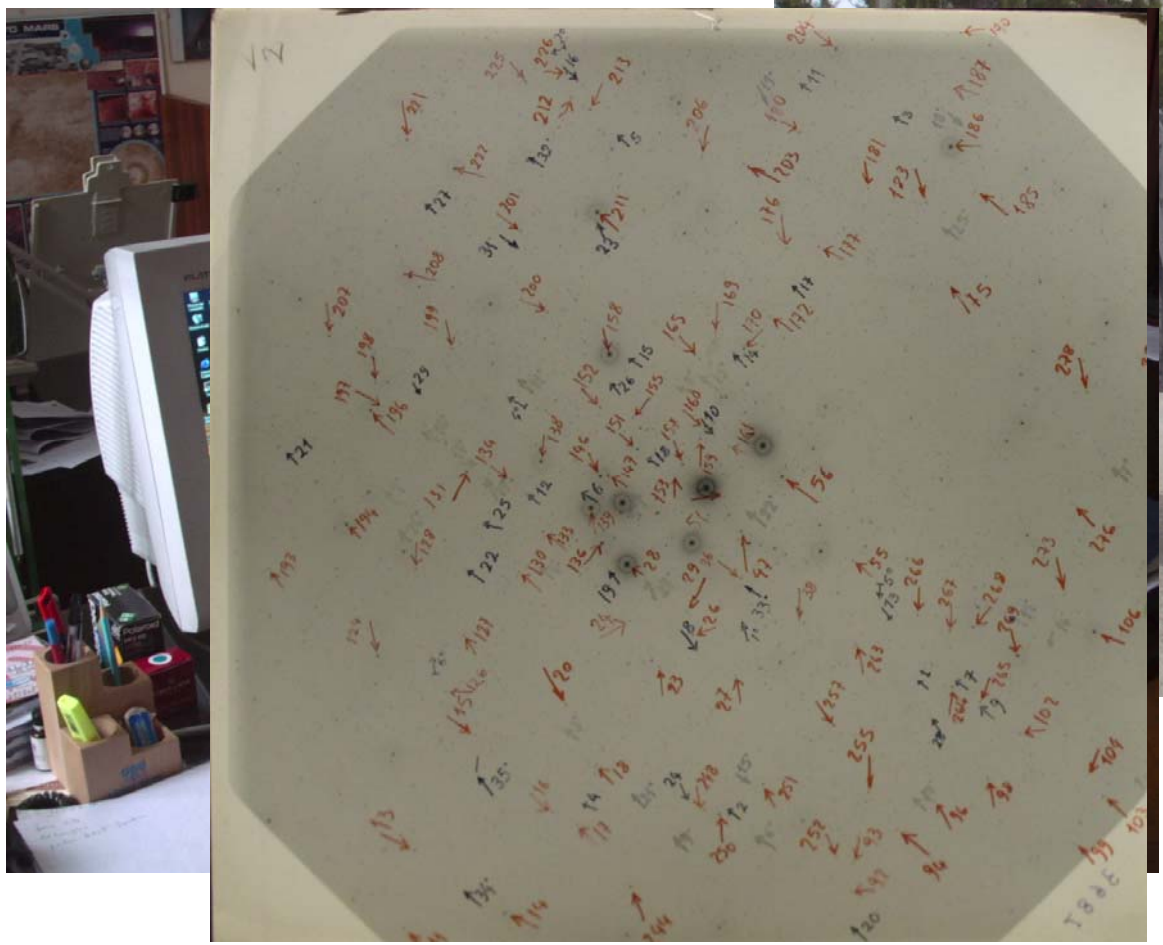


Plate archive contains about 20000 plates, 2xEPSON1640 scanners

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

http://www.astropd.it

Bamberg Plate Archive

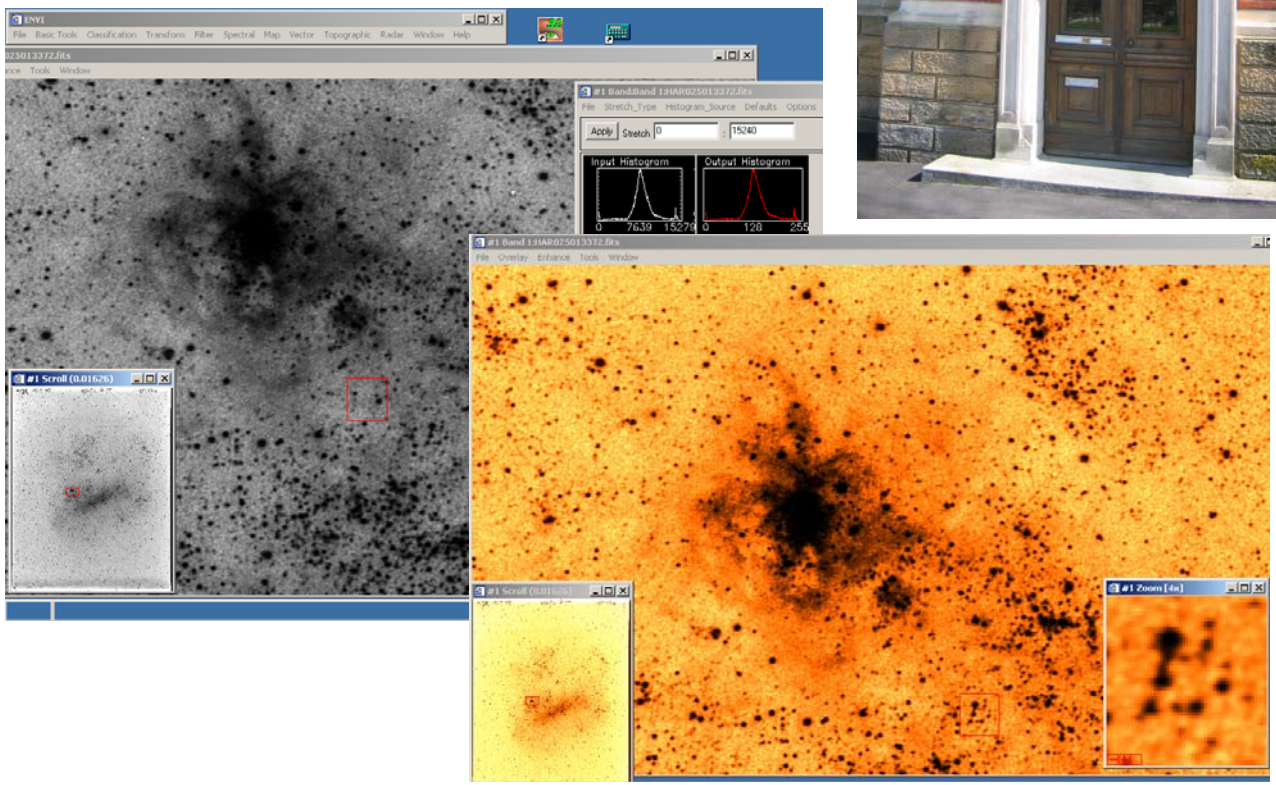
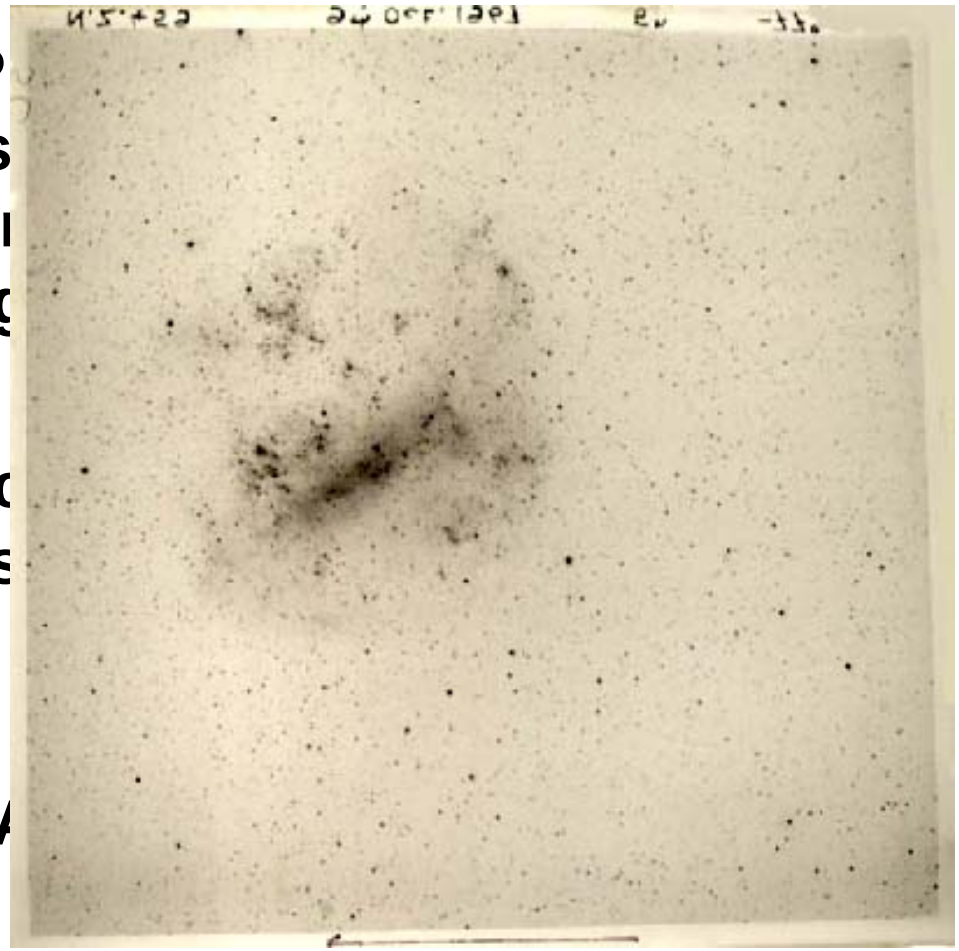


Plate archive contains about 29000 plates, EPSON1640 XL

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

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

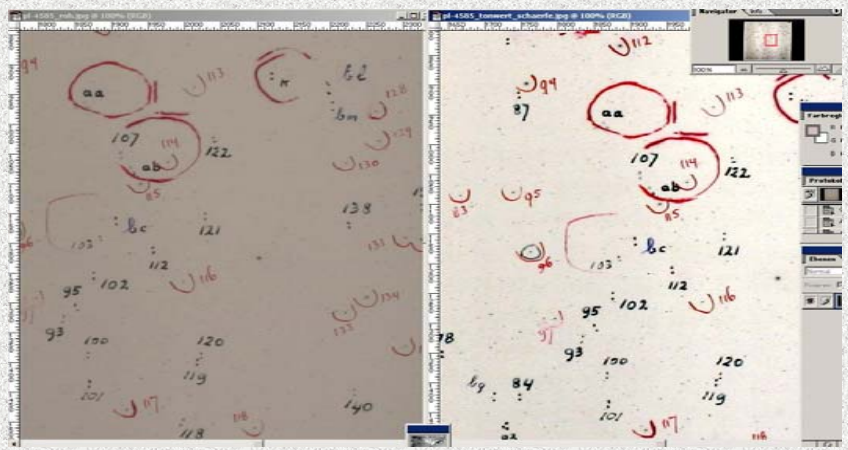


archive importance.

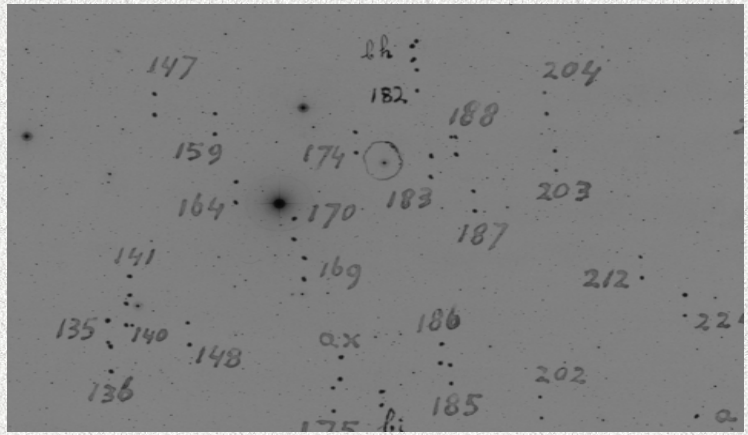
- Project supported by A

Heidelberg Plate Archive (ARI)

G. Burkhardt



Documentation: image processing



P-L plate detail as seen from the glass side

Heidelberg Plate Archive (LSW-MPI)

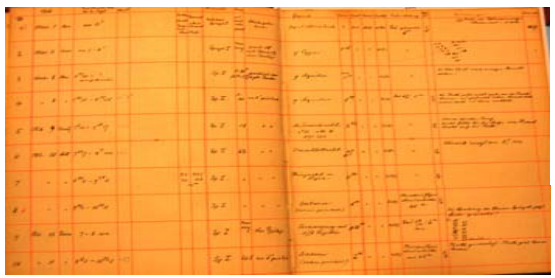
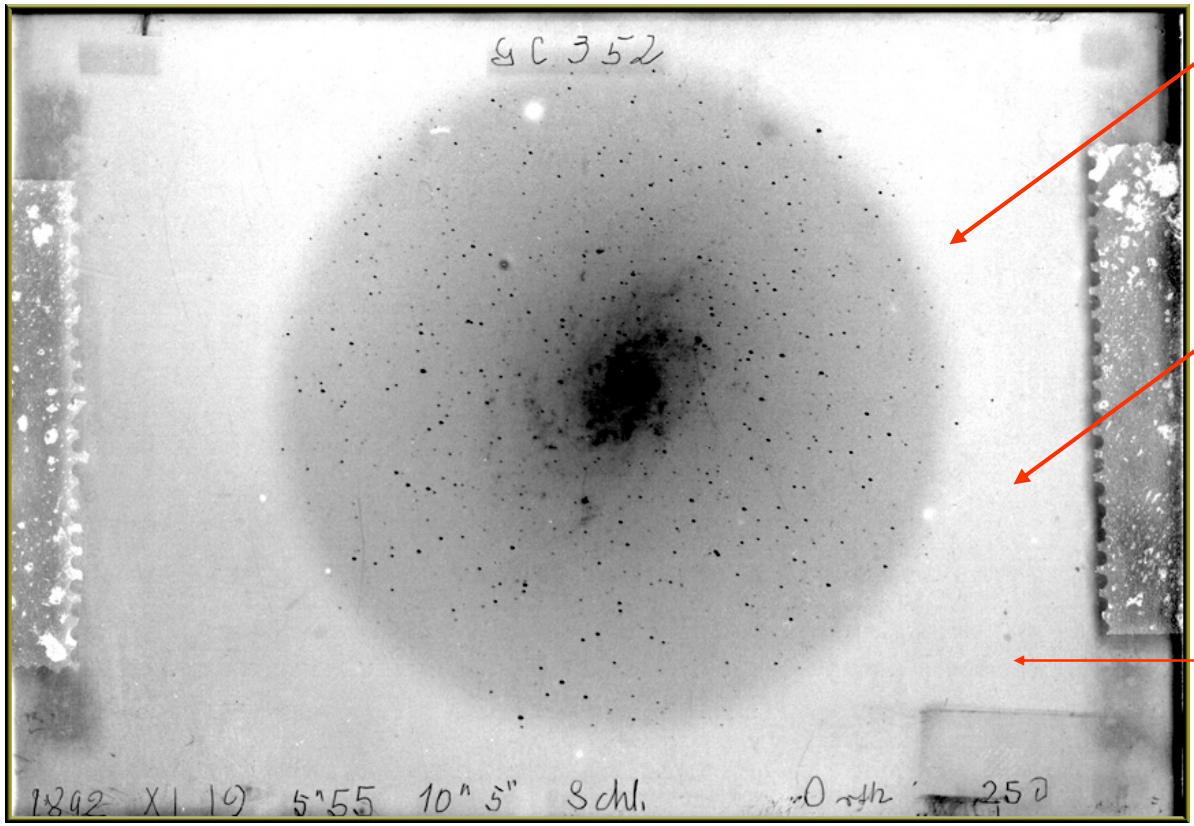


Plate archive contains about 20000 plates, HEIDEBERG Nexscan_F4100

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

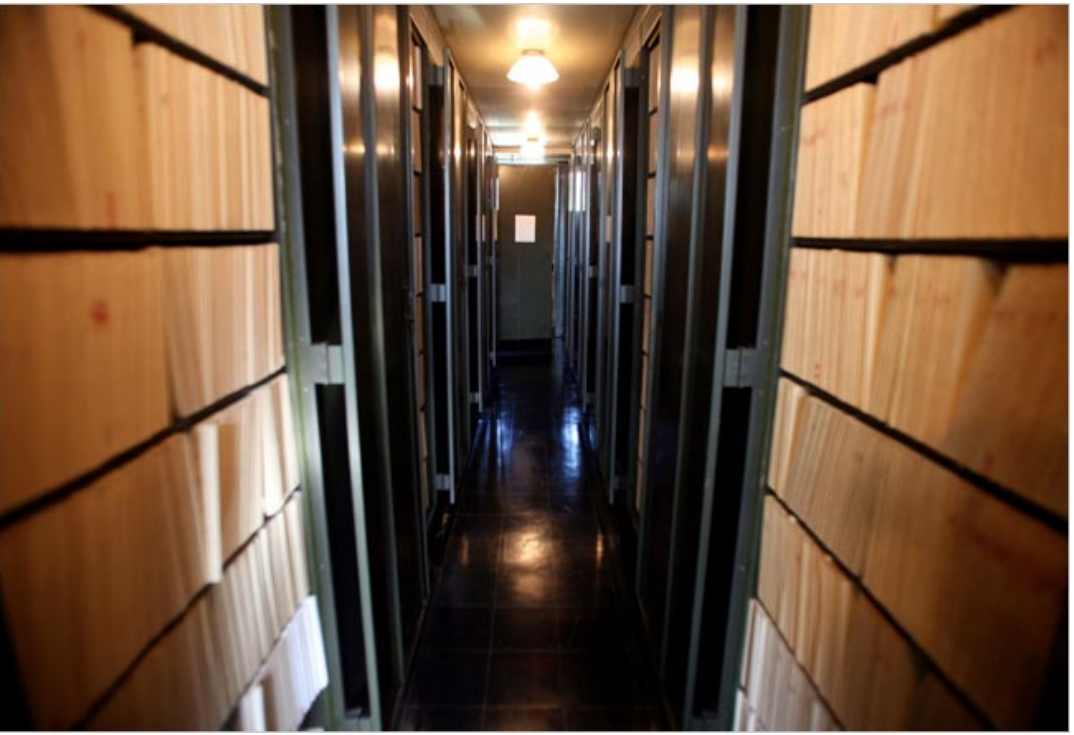
STSTUS OF THE PLATE ARCHIVING AND DIGITIZATION

US PLATE ARCHIVES

HARVARD WF-plates 500 000 Plates
DASS Project

PARI INICIATIVE (LAMA1/2- SScTI)

TOTALLY about 1 000 000 plates



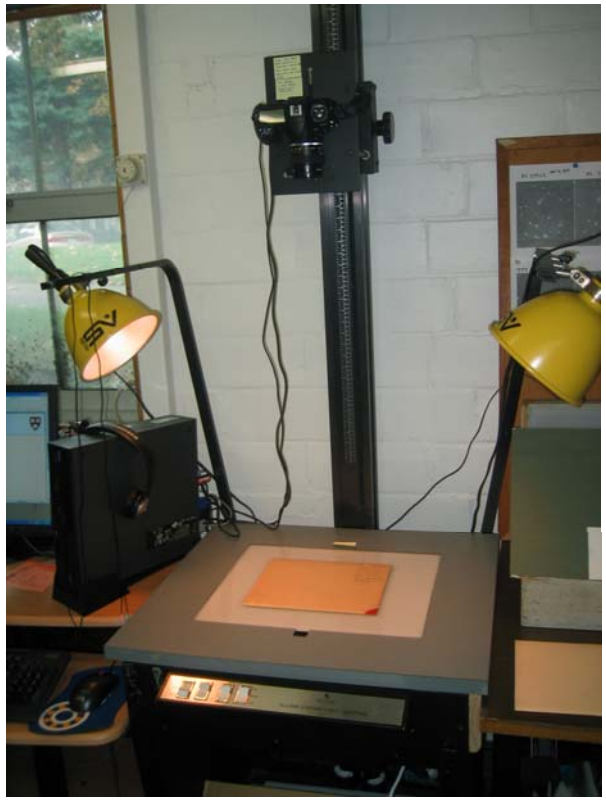
Harvard Plate Stacks

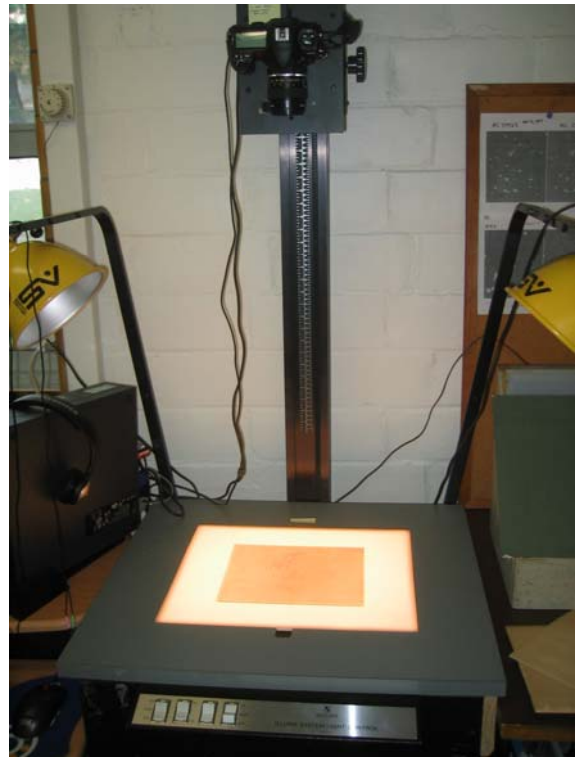
500 000, 3 floors

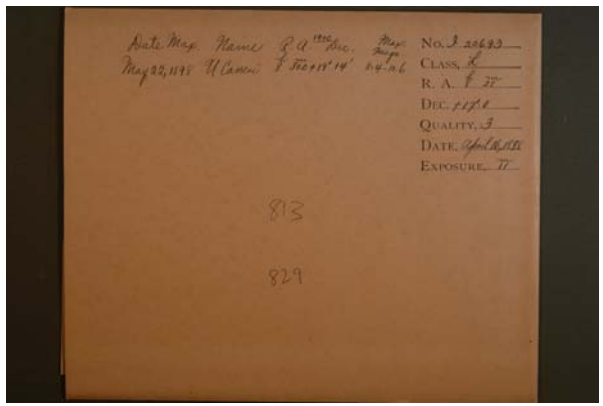
~ 160 Tons

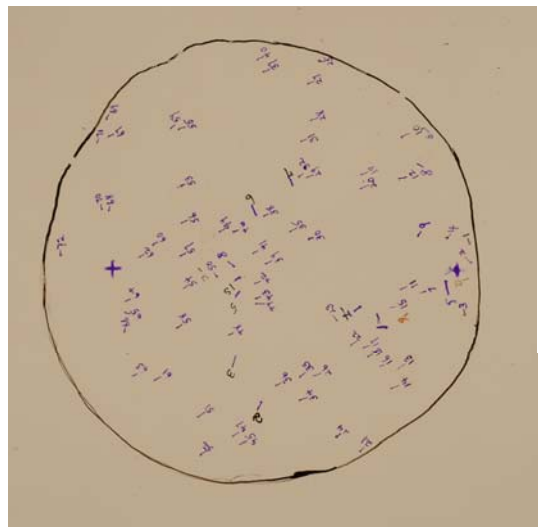
Nikon D200 Station

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

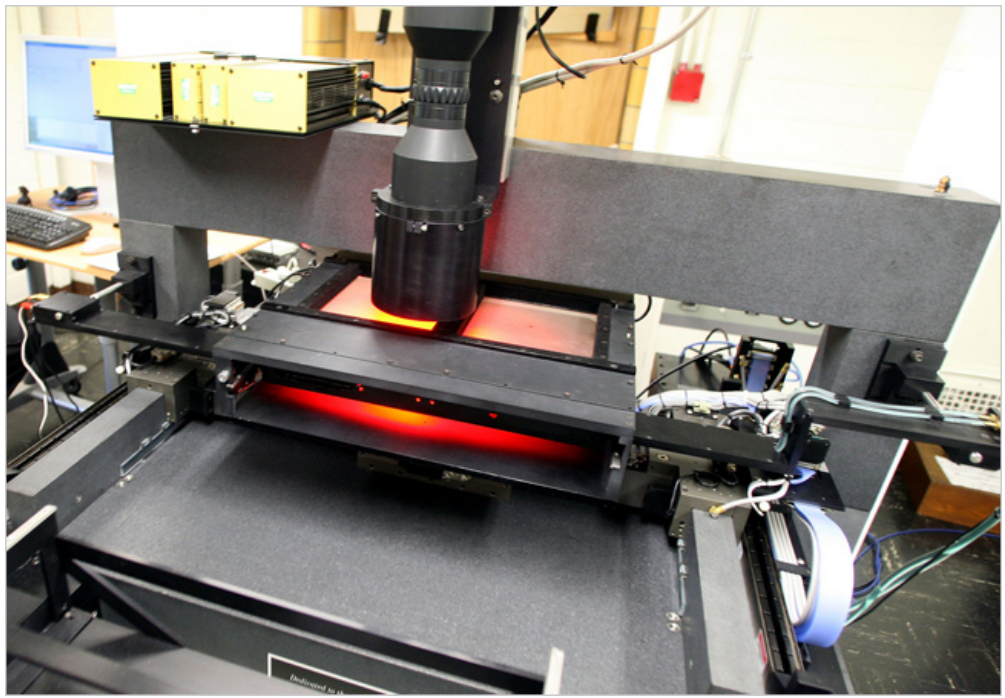
~0.5M$ (5y)

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

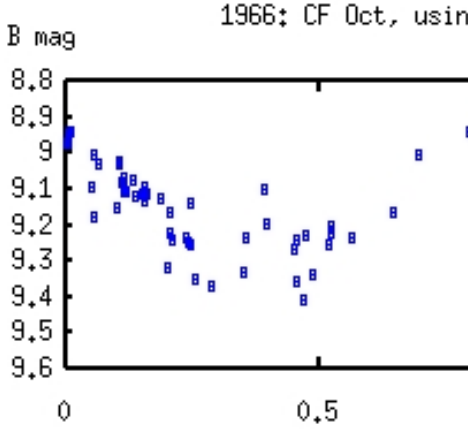
Wide-filed plate database applications

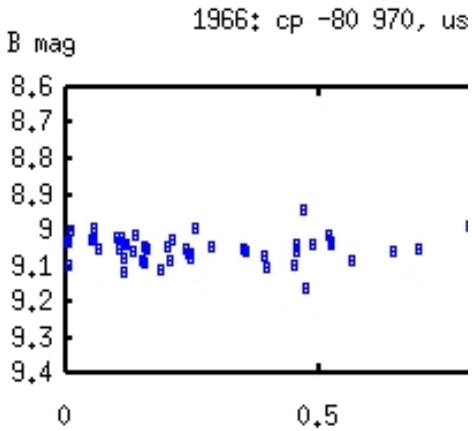
Study (long term) brightness variations

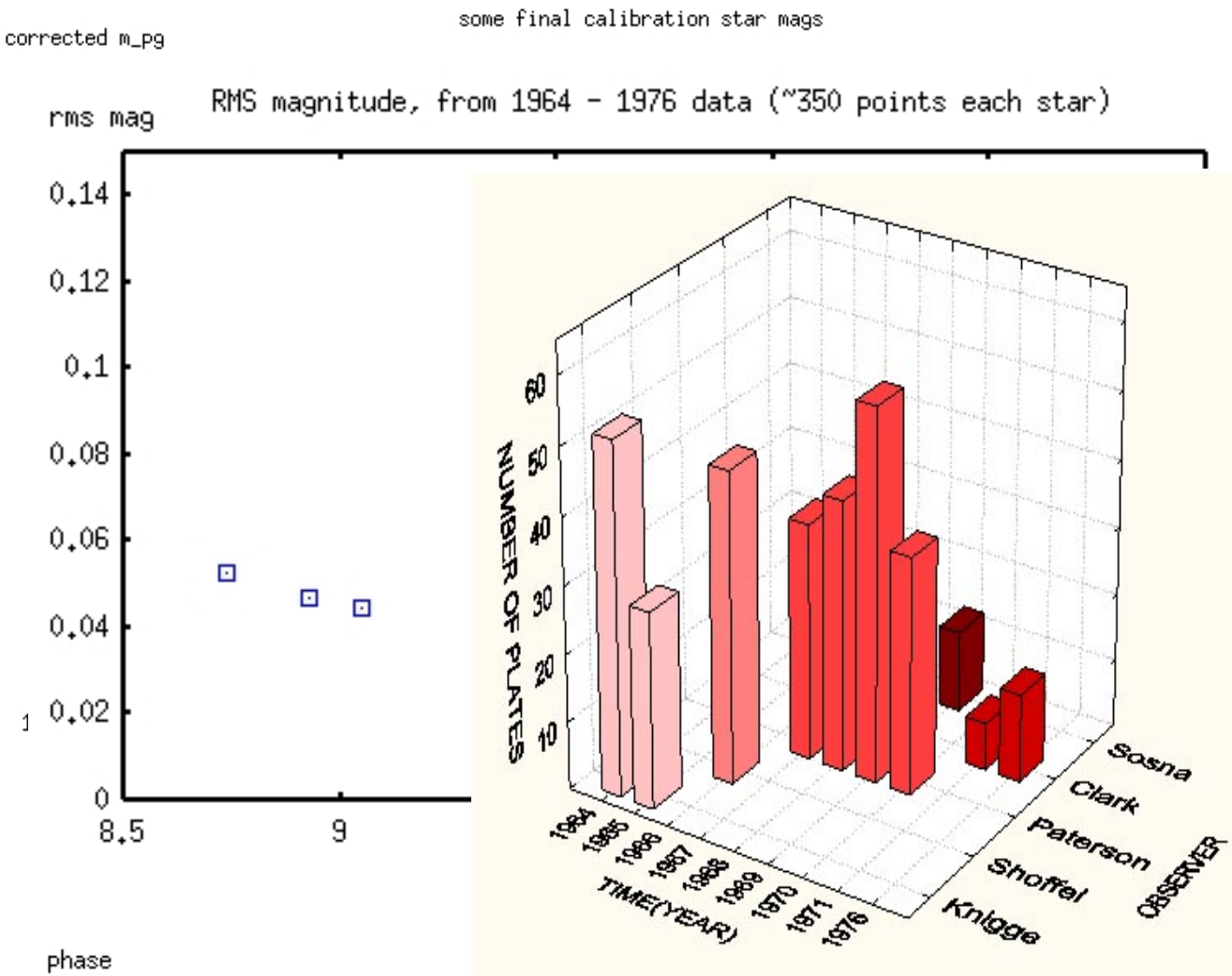
- Study the small planet orbits: Discovery and rediscovery NEA, (**DETERMINATION OF THE ORBIT OF THE LARGEST ASTEROID 2001 KX76 (d=1200 km) using the AVO (Berlin, DLR, Gerhard Hahn et al., IAU Information Bulletin, 90 p.3, 2002)**
- **study the some known phenomenon as GRB rapid events in the Galaxy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

- **Link to the references Databases (IBVS, ADS**

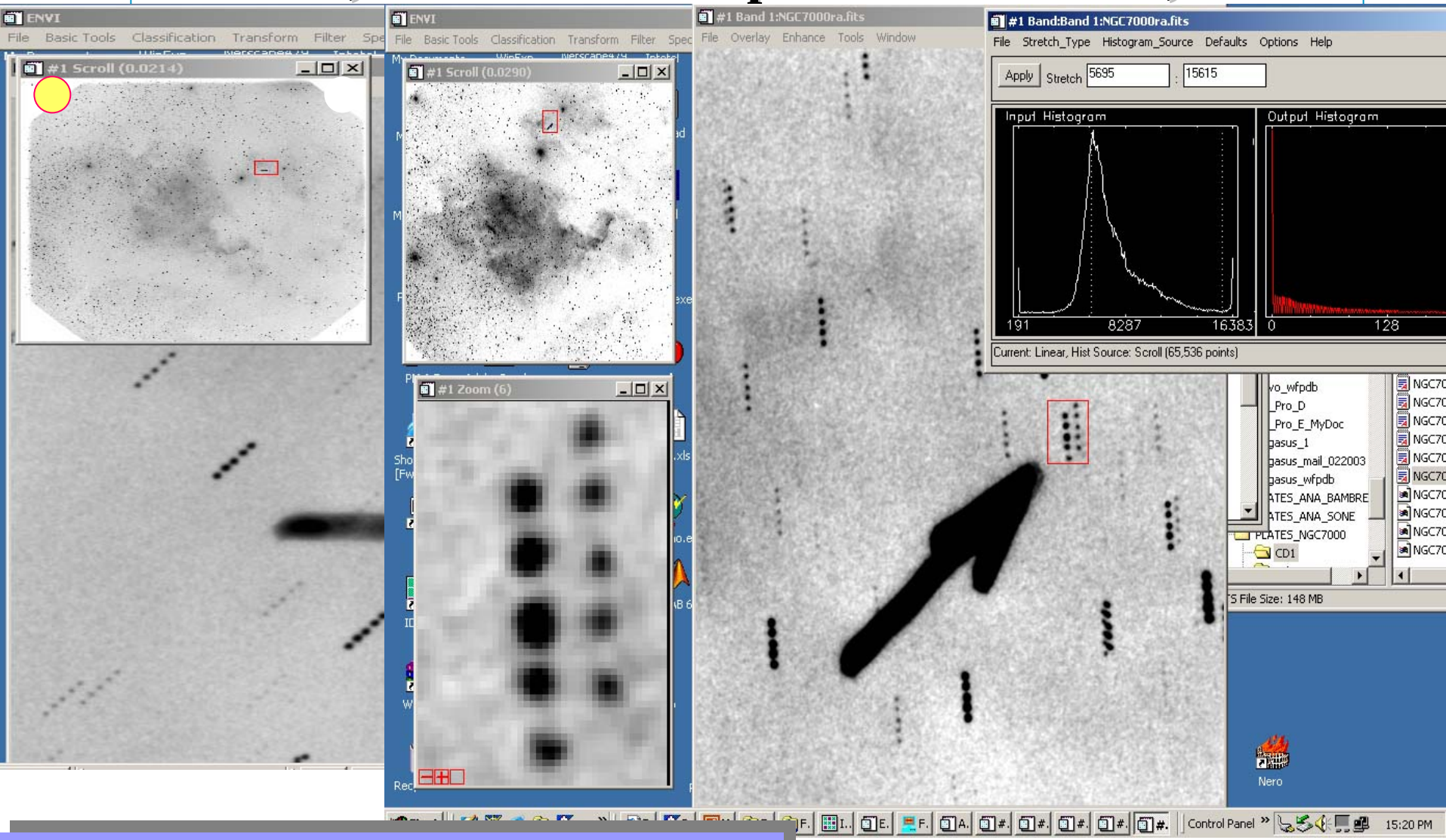
CF Oct search on the Bamberg plates: J. Innis et al., 2004 (MNRAS in press)







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



Rosino, Tsvetkov &Tsvetkova, IBVS,2000

Beriberi et all., 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

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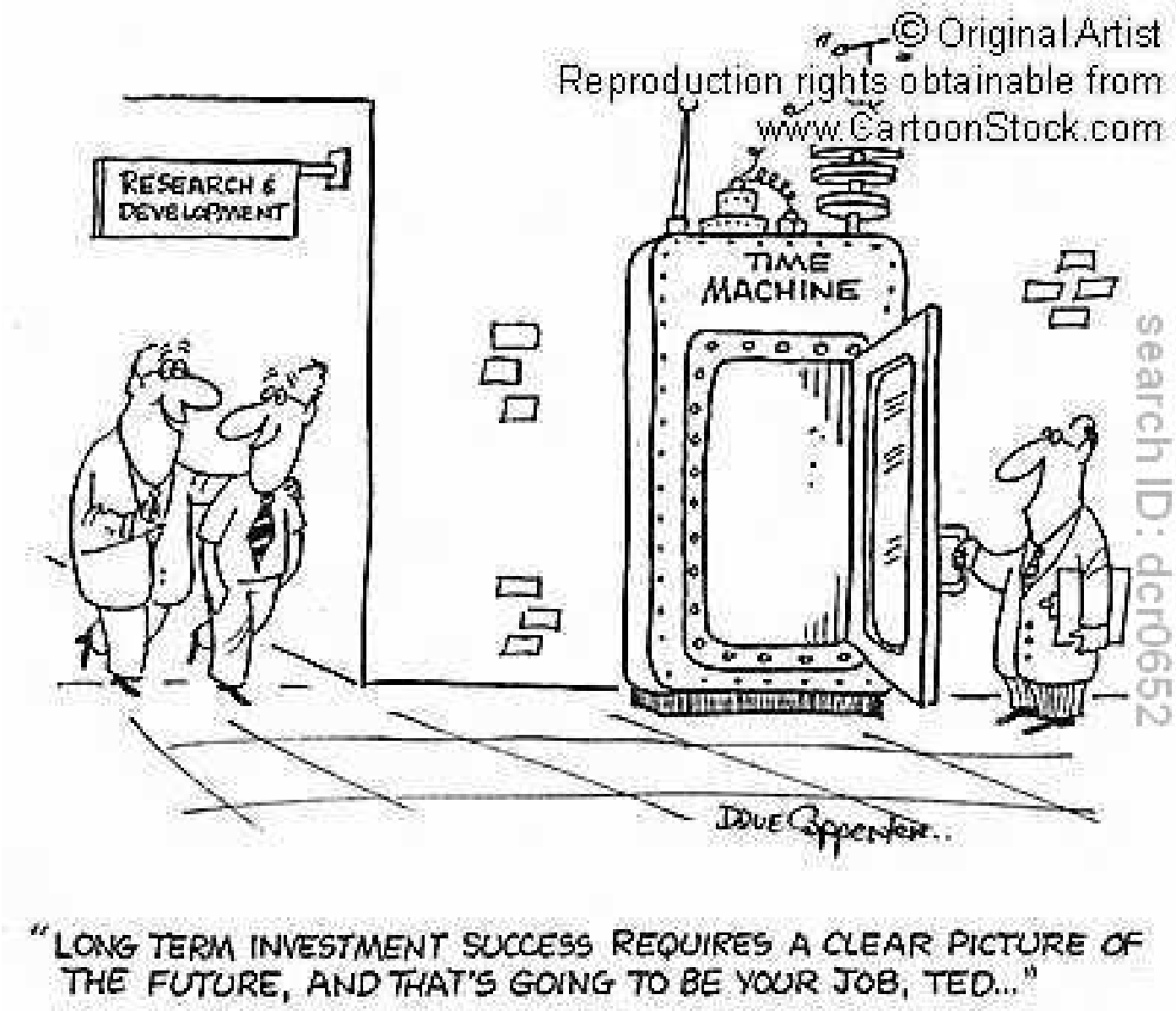
Wide-Field Plate Database - Sofia

WFPDB: Time Machine



Thanks!