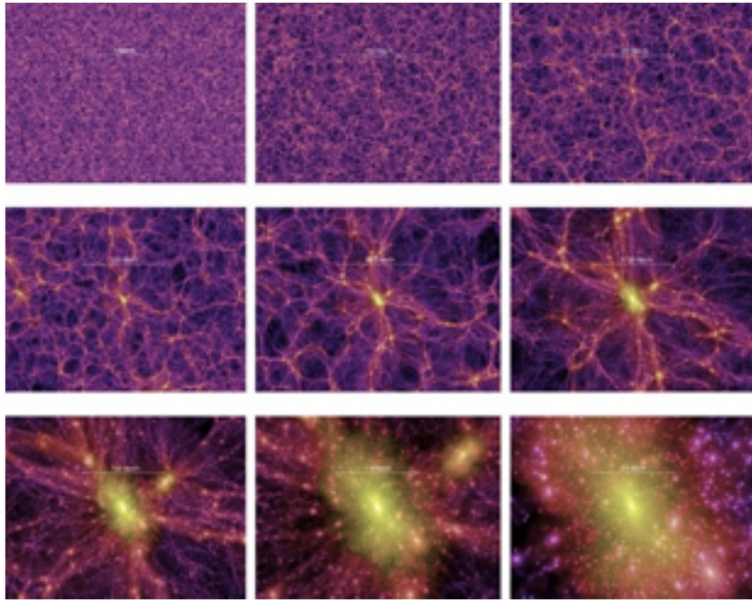




# DATA, DATA, AND MORE DATA!



# ASTRONOMICAL ARCHIVES



- ESDC » Home
- Home
- About ESDC
- Archival Research Visitor Programme
- Newsletter
- Science Archives
- Archive Image Browser
- ESASky
- DOIs
- User Survey Results
- Videos
- Scientific Tutorials
- Publications
- VOSpec
- Euro-VO Registry
- Archives User Groups
- Contact Us

## ESAC SCIENCE DATA CENTRE

ESDC Statistics

Monthly Users (*)  16 879	Monthly Downloaded (*)  101. TB	Archive Total Size  662.2 TB
---------------------------------	---------------------------------------	------------------------------------

\* Monthly averages in 2021

### Astronomy Science Archives

- cheops
- esasky
- exosat

## ESO — Reaching New Heights in Astronomy

European Southern Observatory

Public Science User Portal Intranet Contact Site Map Search Go!

Science Users Information > Science Archive Facility 02 Sep 2021

### Science Archive Facility

- Data Portal
- ESO Data
- Hubble Space Telescope Data
- Virtual Observatory Tools
- Catalogues, Plates and DSS
- Tools and Documentation
- Related External Services
- ESO & HST Image Galleries

### Welcome to the ESO Science Archive Facility

The ESO Science Archive Facility contains data from ESO telescopes at La Silla Paranal Observatory, including the APEX submillimeter telescope on Liano de Chajnantor. In addition, the raw UKIDSS/WFCAM data obtained at the UK Infrared Telescope facility in Hawaii are available.

The Principal Investigators of successful proposals for time on ESO telescopes have exclusive access to their scientific data for the duration of a proprietary period, normally of one year, after which the data becomes available to the community at large. Please read the [ESO Data Access Policy](#) statement for more information, along with the [relevant FAQs](#).

Browsing the archive does not require authentication. Please [acknowledge the use of archive data](#) in any publication.

There are three main ways to access the archive, varying for content and presentation/interface: the usual Raw Data query form, the innovative Science Portal to browse and access both raw and processed data, and to the ambient condition measurements, [see this page](#).

## Mikulski Archive for Space Telescopes

The Mikulski Archive for Space Telescopes is an astronomical data archive focused on the optical, ultraviolet, and near-infrared. MAST hosts data from over a dozen missions like Hubble, Kepler, TESS, and soon JWST.

SEARCH MENU

### On This Page

- Missions
- High Level Science Products
- Search Tools
- Catalogs
- APIs
- Publishing Resources
- Latest MAST News

## Missions



Hubble



Webb



TESS



See All of MAST's Missions and Data

Portal  
Data

Catalogue  
Facility  
Catalogue Data

Community Forum  
Share ideas, ask questions, and feedback



### Search by Target:

Object List:

Examples (coordinates in J2000):

64.99061 52.98401  
4 19 57.75 +52 59 02.436  
4:19:57.75 +52:59:02.436  
ULAS J135058.86+081506.8

Browse...

No file selected.

Search radius:

5

arcmin

### Search by Date:

Between:

16

March



2009

And:

7

October



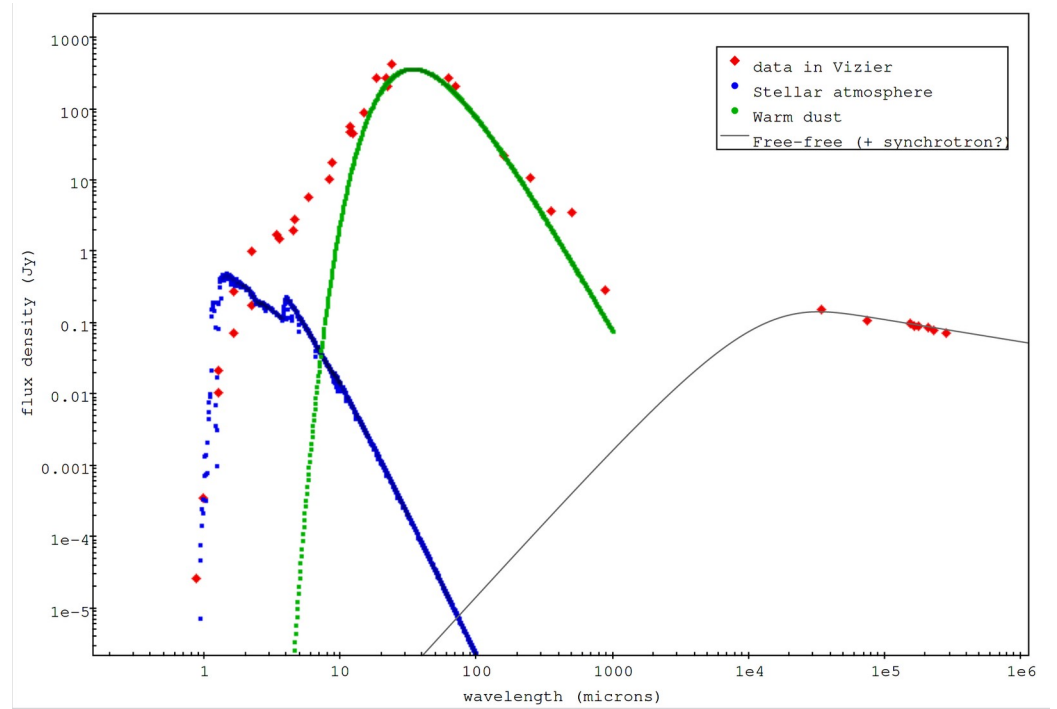
2022

### Search by Instrumentation:

Only reduced data:

- Spectroscopy:
- OSIRIS Long Slit
- OSIRIS Multi-Object Spectroscopy
- CANARICAM Spectroscopy

# MULTI-WAVELENGTH ASTRONOMY



# MULTI-WAVELENGTH ASTRONOMY

THE ASTROPHYSICAL JOURNAL, 644: L75–L78, 2006 June 10  
© 2006. The American Astronomical Society. All rights reserved. Printed in U.S.A.

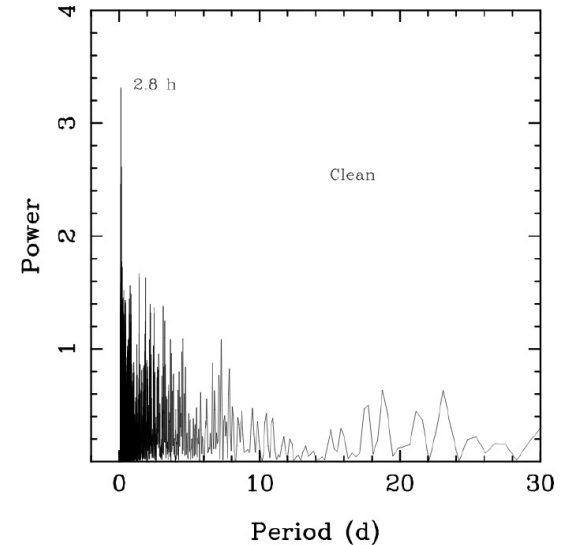
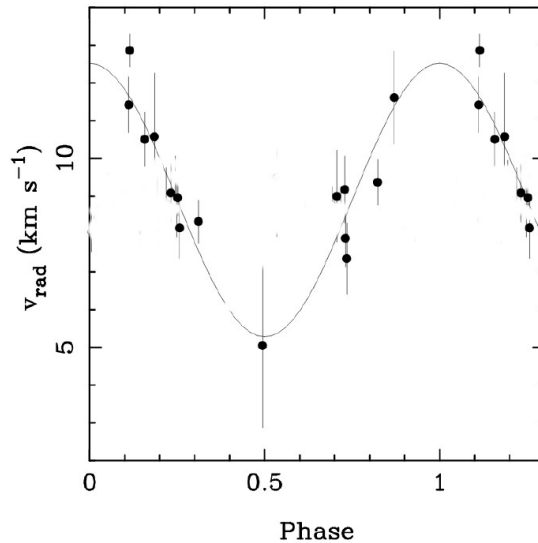
A MULTIWAVELENGTH RADIAL VELOCITY SEARCH FOR PLANETS AROUND THE BROWN DWARF LP 944-20

E. L. MARTÍN,<sup>1,2</sup> E. GUENTHER,<sup>3</sup> M. R. ZAPATERO OSORIO,<sup>4</sup> H. BOUY,<sup>1</sup> AND R. WAINSCOAT<sup>5</sup>

*Received 2006 April 10; accepted 2006 April 25; published 2006 May 26*

Optical range (UVES/VLT):

- 14 nights /841 days
- Period 2.5 - 3.7h



# MULTI-WAVELENGTH ASTRONOMY

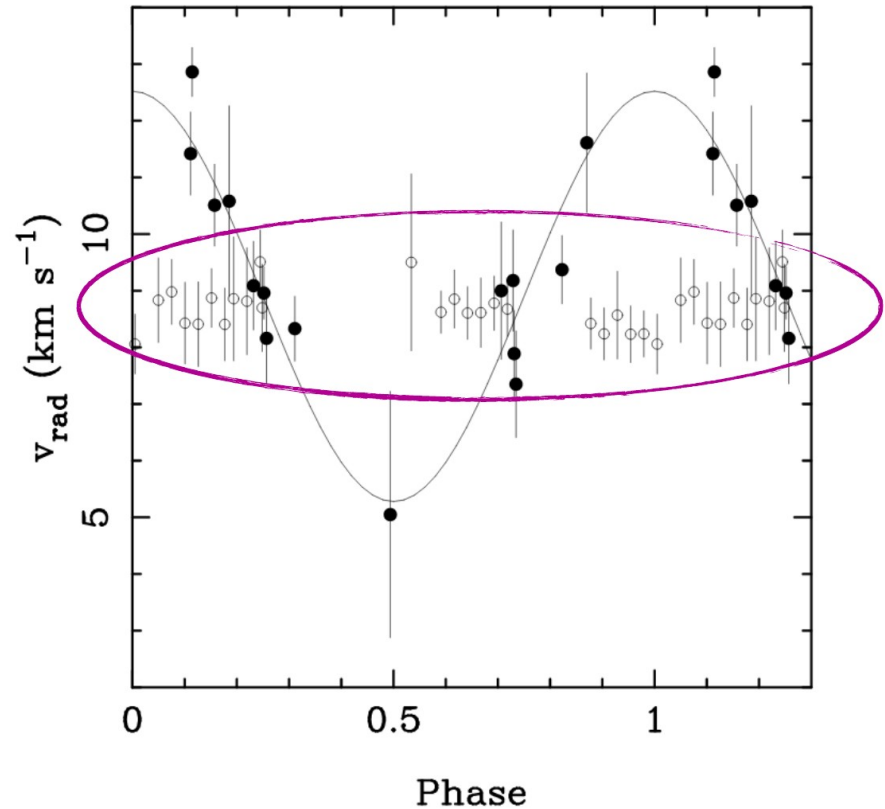
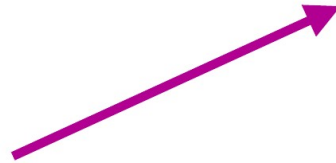
THE ASTROPHYSICAL JOURNAL, 644: L75–L78, 2006 June 10  
© 2006. The American Astronomical Society. All rights reserved. Printed in U.S.A.

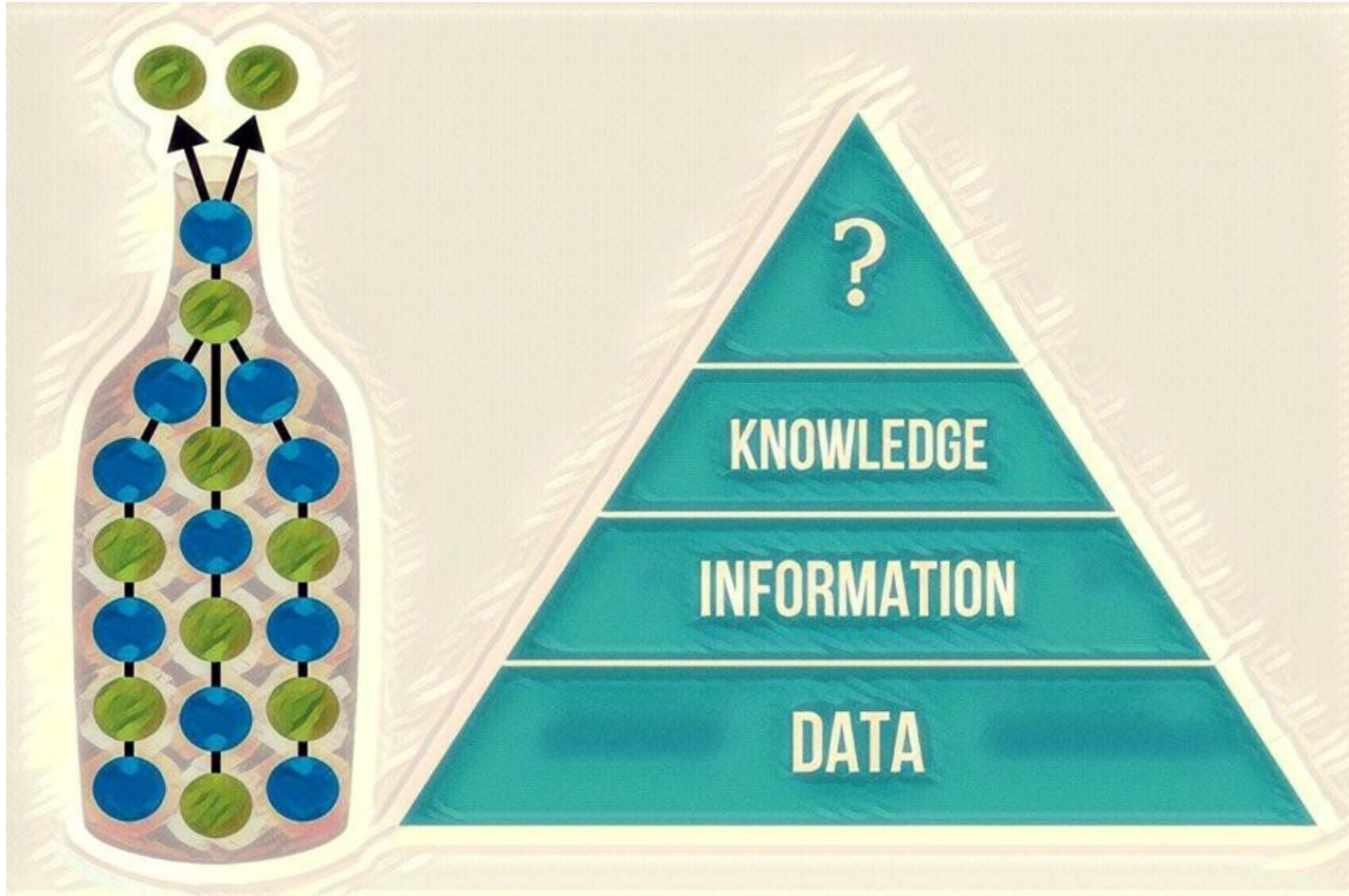
A MULTIWAVELENGTH RADIAL VELOCITY SEARCH FOR PLAN

E. L. MARTÍN,<sup>1,2</sup> E. GUENTHER,<sup>3</sup> M. R. ZAPATERO OSOR

*Received 2006 April 10; accepted 2006 April 25;*

Infrared range







# THE GOAL: MAKING DATA **F.A.I.R**

# F A I R



Findable



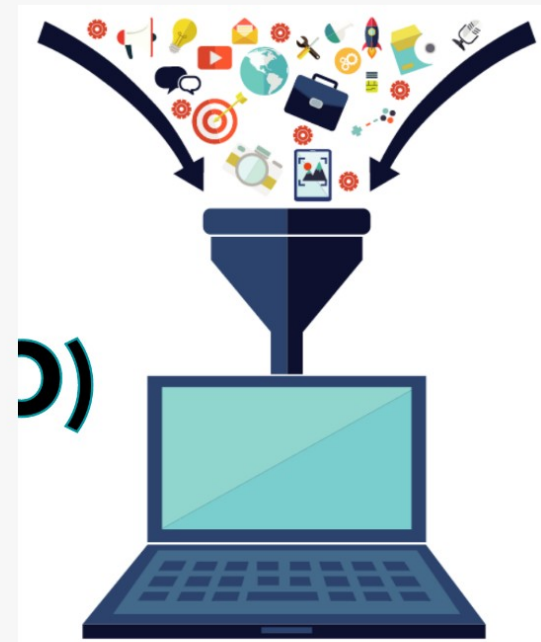
Accessible



Interoperable



Reusable



*“Dame todo lo que exista en los archivos astronómicos sobre un determinado objeto. Y dámelo listo para hacer ciencia”*



# THE INTERNATIONAL VIRTUAL OBSERVATORY ALLIANCE

## Virtual Observatories of the Future

Caltech campus, Pasadena, Calif., USA

June 13 - 16, 2000

<http://astro.caltech.edu/nvoconf>

Email inquiries: [nvoconf@astro.caltech.edu](mailto:nvoconf@astro.caltech.edu)

## MPA/ ESO/ MPE Joint Astronomy Conference

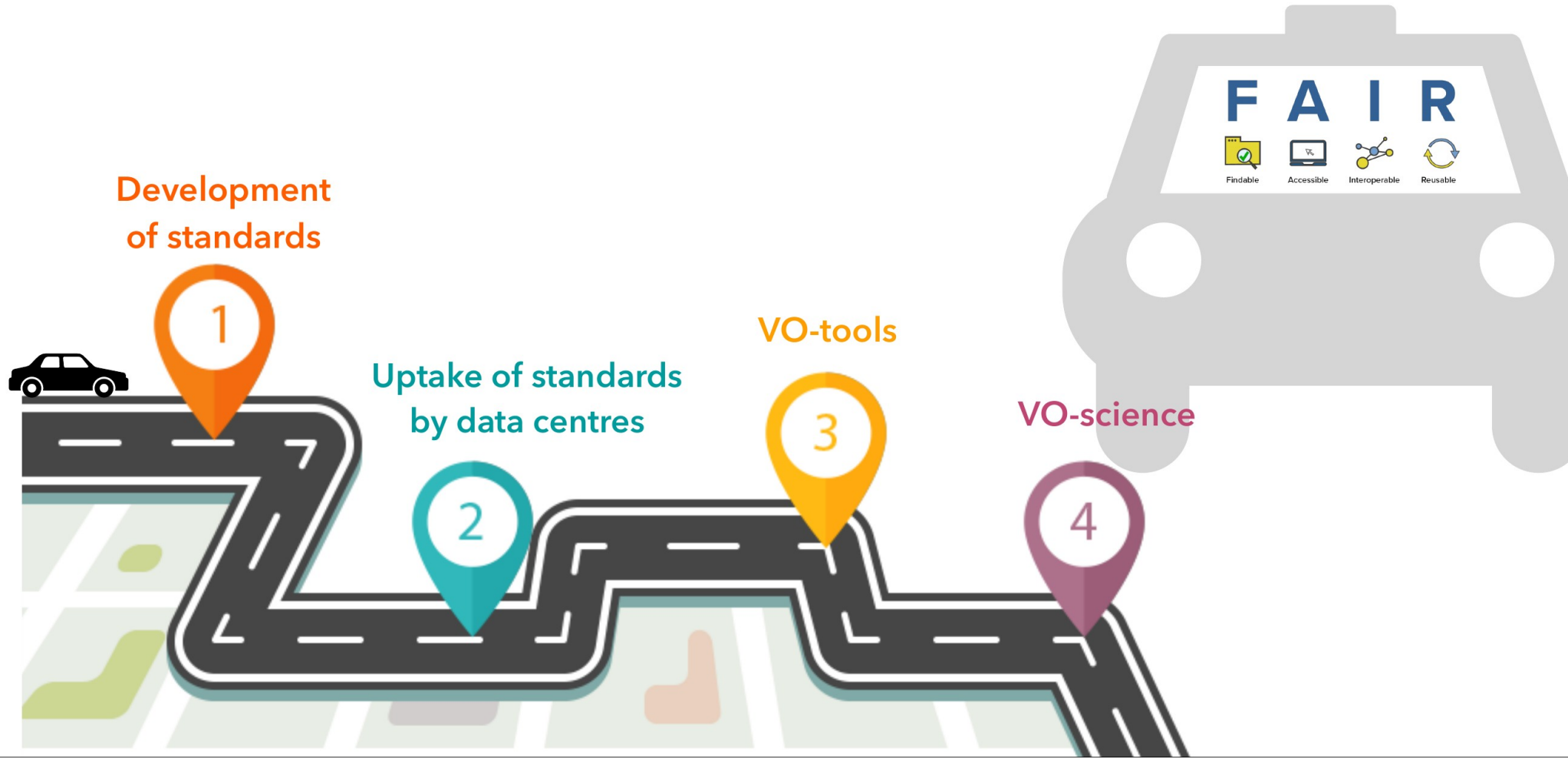
# MINING THE SKY

July 31 - August 4, 2000

Garching, Germany



# THE VIRTUAL OBSERVATORY ROADMAP



# THE POWER OF VO: **ALADIN**



The screenshot displays the ALADIN v10.0 software interface. The main window is divided into four panels showing different color channels of the Barnard 33 galaxy cluster: DSS2 color (top-left), 2MASS color (top-right), XMM-EPIC color (bottom-left), and AKARI FIS color (bottom-right). A central crosshair marks the cluster's position. The interface includes a menu bar (File, Edit, Image, Catalog, Overlay, Coverage, Tool, View, Interop, Help), a Command line, and a left sidebar with a tree view of available data collections. A right sidebar contains a 'Data discovery tree' and various tool icons. The bottom status bar shows the current view is 'Barnard 33' with coordinates 05:40:59.69 -02:16:12.0 and a zoom level of 1,306x x 53.07.

Available data → 24028 / 24029  
in view out view

Command: DSS2 color

Frame: ICRS Projection: Spheric

Available data collections (left panel):

- Gamma-ray → 23
- X → 23
- UV → 27
- Optical → 96
- Infrared → 179
- Radio → 67
- Sat-lines → 45
- X-ray → 1
- X-ray → 16
- Data base → 59
- Catalog → 22530
- VizieR → 21095
- I-Astrometric Data → 267
- II-Photometric Data → 346
- AllWISE Data Release (Cut+)
- The Pan-STARRS release 1 (PS)
- 2MASS All-Sky Catalog of Point Sources
- The ISO GAL Point Source Catalog
- Revised catalog of GALEX UV sources
- KIDS-ESO-DR3 multi-band sources
- AAVSO Photometric All-Sky Survey
- WISE All-Sky Data Release (Cut+)
- GALEX-DR5 (GR5) sources from
- 2MASS 6X Point Source Work
- UKIDSS-DR9 LAS, GCS and DXS
- AKARI/IRC mid-IR all-sky Survey
- AKARI/FIS All-Sky Survey Point Sources
- SkyMapper Southern Sky Survey
- The VISTA Hemisphere Survey
- IRAS catalogue of Point Sources
- JMMC Stellar Diameters Catalog
- IRAS PSC/FSC Combined Catalog
- IRAS Faint Source Catalog (I + II)
- GLIMPSE Source Catalog (I + II)
- The SDSS Photometric Catalog
- TASS Mark IV patches photometric
- Catalog of Infrared Observations
- IRAS Point Source Relect Catalog
- XMM-OM Serendipitous Source Catalog
- General Catalogue of Photometric
- VPHAS+ DR2 survey (Drew+)
- XMM-OM Serendipitous Source Catalog
- VLT Survey Telescope ATLAS (I + II)
- UBV Photometric Catalog data
- UBV Photometry of O & B Stars
- Palomar Transient Factory (PTF)
- Homogeneous Means in the UB

Data discovery tree of available collections (left panel):

- ◆ In green: the collections visible in the current view, in orange the outside collections
- ◆ Type in key word, a mission name, etc in the select field to keep only relevant collections
- ◆ Use the predefined filters to select more specifically the collections
- ◆ Create and store your own filters thanks to the right button

Activate the view mode to hide temporary the collections outside the view.

Tools: select, pan, zoom, phot, draw, Tag, misc, aspect, fit, cross, crop, cont, pixel, prop, del

View: CDS/P/DSS2/color

Epoch: [slider] Size: [slider] Dens.: [slider] Zoom: [slider]

Barnard 33 +30  
05:40:59.69 -02:16:12.0  
1,306x x 53.07

© 2017 Université de Strasbourg/CNRS - by CDS - Distributed under GNU GPL v3

# THE POWER OF VO: **TOPCAT**

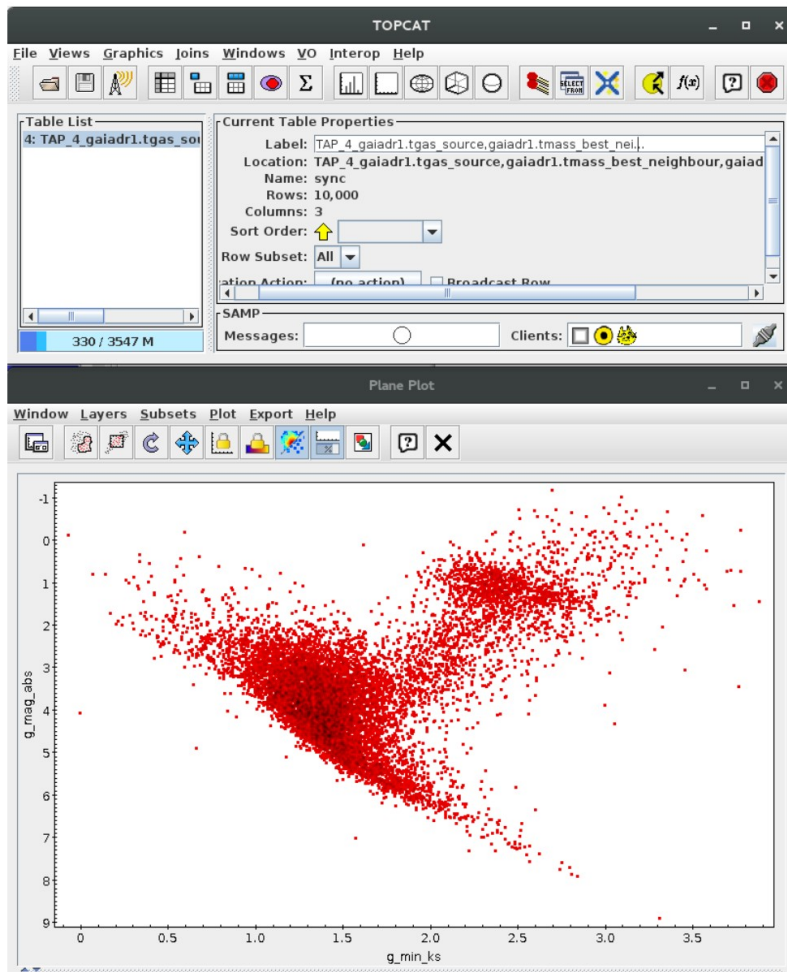
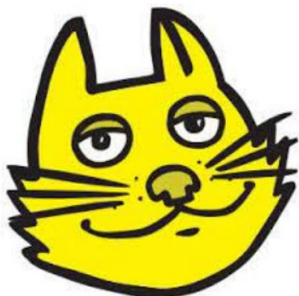


Table Access Protocol (TAP) Query

Window TAP Registry Edit Interop Help

Select Service Use Service Resume Job Running Jobs

Metadata

Name	Service	Schema	Table	Columns	FKeys	Hints
solution_id				BIGINT	✓	
designation				VARCHAR	✓	
source_id				BIGINT	✓	
random_index				BIGINT	✓	
ref_epoch				DOUBLE	✓	yr
ra				DOUBLE	✓	deg
ra_error				DOUBLE	✓	mas
dec				DOUBLE	✓	deg
dec_error				DOUBLE	✓	mas
parallax				DOUBLE	✓	mas
parallax_error				DOUBLE	✓	mas
parallax_over_error				REAL	✓	
pmra				DOUBLE	✓	mas.yr**1
pmra_error				DOUBLE	✓	mas.yr**1
pmdec				DOUBLE	✓	mas.yr**1
pmdec_error				DOUBLE	✓	mas.yr**1
ra_dec_corr				REAL	✓	
ra_parallax_corr				REAL	✓	
ra_pmra_corr				REAL	✓	

Service Capabilities

Query Language: ADQL-2.0 Max Rows: 3000000 (default) Uploads: 100Mb

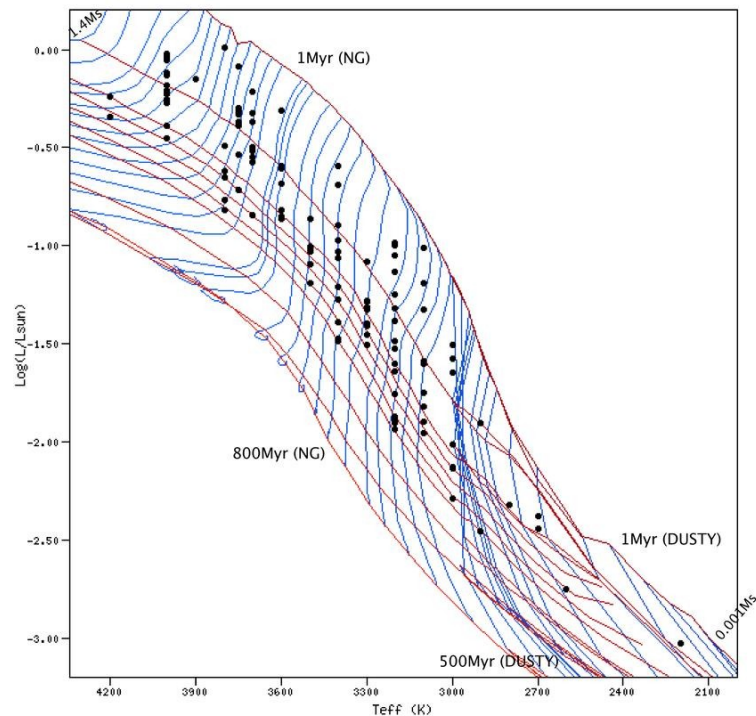
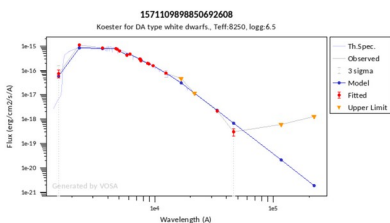
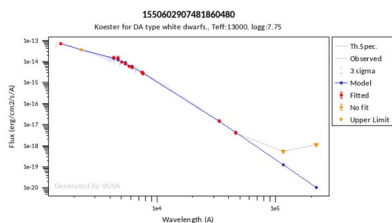
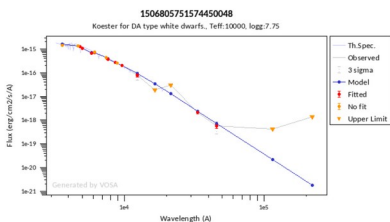
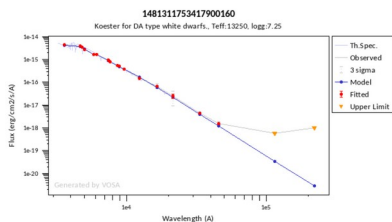
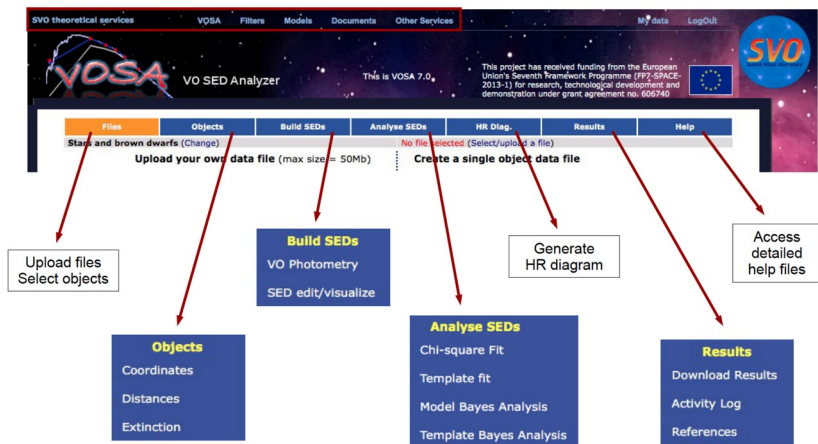
ADQL Text

Mode: Synchronous

```
SELECT TOP 10000 gaia.source_id,  
gaia.phot_g_mean_mag + 5 * log10(gaia.parallax) - 10 AS g_mag_abs ,  
gaia.phot_g_mean_mag - tmass.ks_m AS g_min_ks  
FROM gaiadr1.tgas_source AS gaia  
INNER JOIN gaiadr1.tmass_best_neighbour AS xmatch  
ON gaia.source_id = xmatch.source_id  
INNER JOIN gaiadr1.tmass_original_valid AS tmass  
ON tmass.tmass_oid = xmatch.tmass_oid  
WHERE gaia.parallax/gaia.parallax_error >= 5 AND  
ph_qual = 'AAA' AND  
sqrt(power(2.5 / log(10) * gaia.phot_g_mean_flux_error  
/ gaia.phot_g_mean_flux, 2)) <= 0.05 AND  
sqrt(power(2.5/log(10)*gaia.phot_g_mean_flux_error  
/ gaia.phot_g_mean_flux, 2)  
+ power(tmass.ks_msigcom, 2)) <= 0.05
```

Run Query

# THE POWER OF VO: **VOSA**

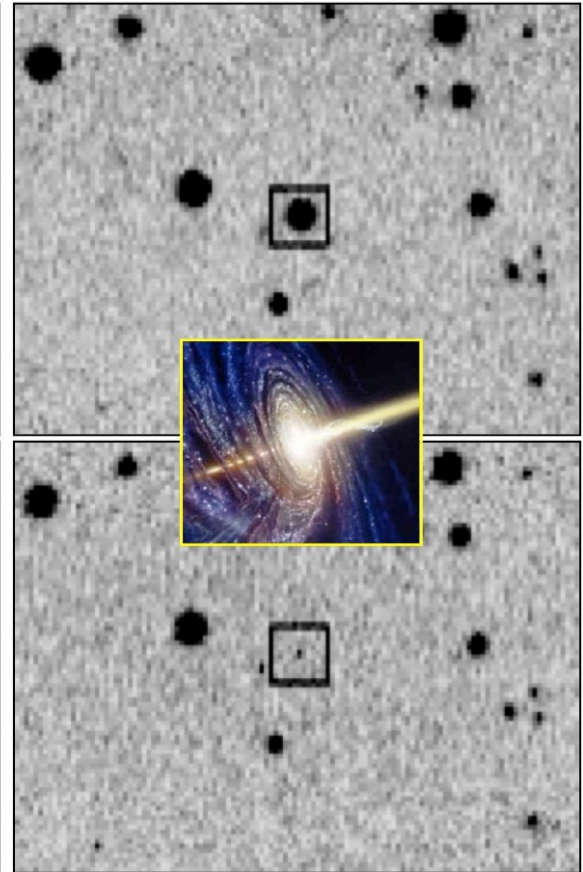
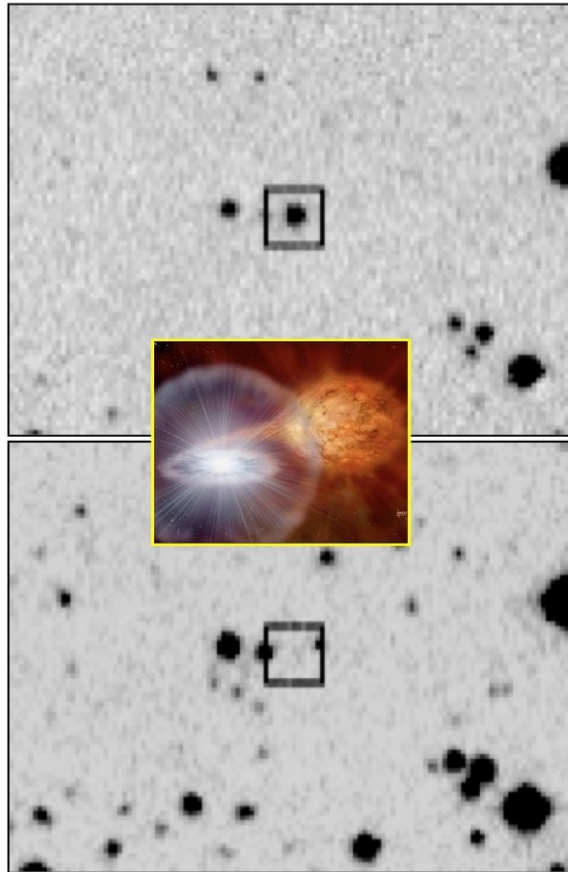
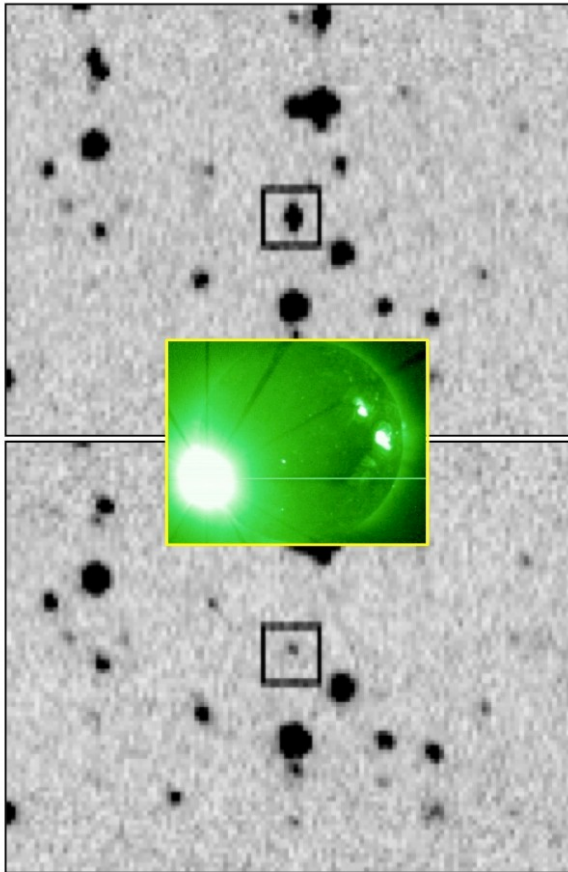


# THE POWER OF VO: **TRANSIENTS**

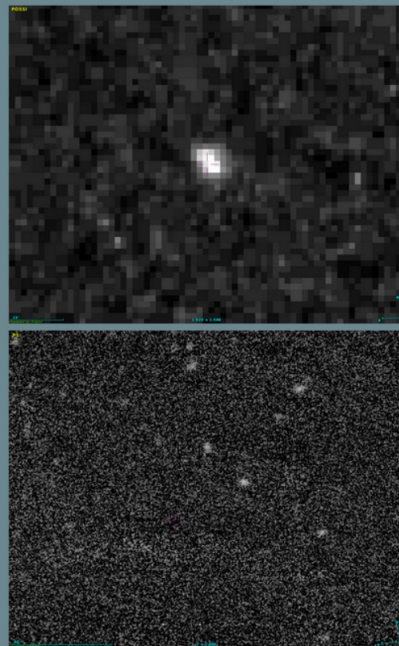
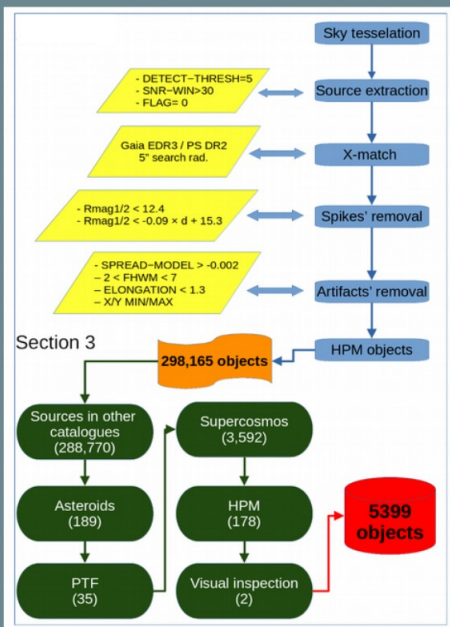
Flare star

Dwarf Nova

Blazar



# Discovering vanishing objects in POSS I red images using the Virtual Observatory



We report a search for vanishing sources in POSS I (Palomar Observatory Sky Survey) red images using virtual observatory archives, tools and services. The search aims at finding POSS I sources not present in recent catalogues like PAN-STARRS DR2 (limiting magnitude  $r=21.4$ ) or Gaia EDR3 (limiting magnitude  $G=21$ ).

We found 298 165 sources visible only in POSS I plates, out of which 288 770 had a crossmatch within 5 arcsec in other archives (mainly in the infrared), 189 were classified as asteroids, 35 as variable objects, 3592 as artefacts from the comparison to a second digitization (Supercosmos) and 180 as high proper motion objects without information on proper motion in Gaia EDR3.

The remaining unidentified transients (5399 sources) as well as the 172 163 sources not detected in the optical but identified in the infrared regime are available from a virtual observatory compliant archive and can be of interest in searches for strong M-dwarf flares, high-redshift supernovae, asteroids, or other categories of unidentified red transients.

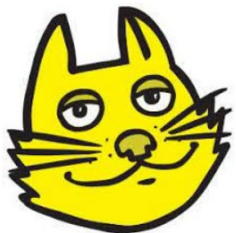
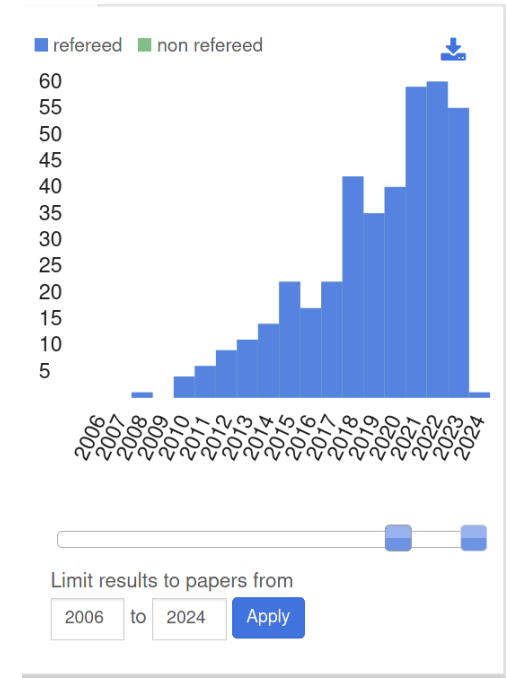
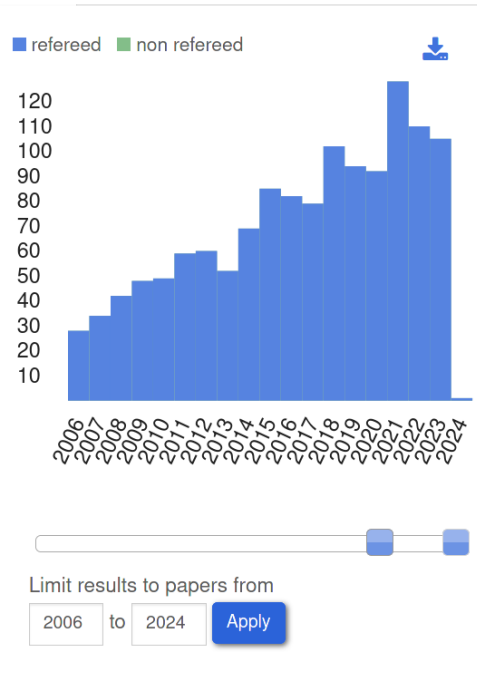
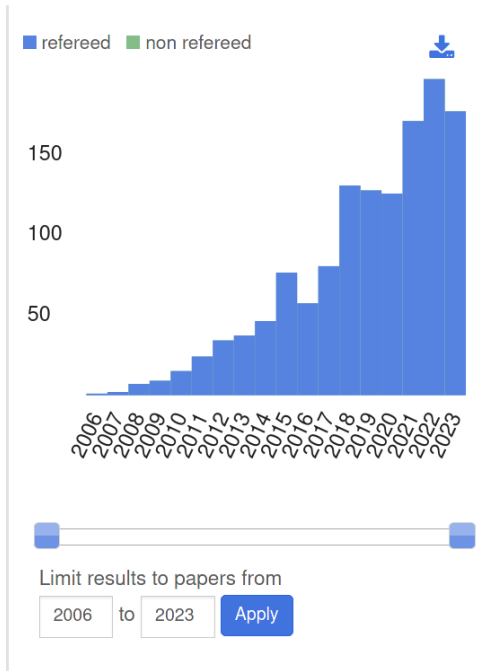
CREDIT: CAB, CSIC-INTA

Left: Flowchart of the process.

Right: POSS-I source not detected in more recent surveys.



# HOW USED ARE VO-TOOLS?



# F.A.I.R. PRINCIPLES BEYOND ASTROPHYSICS



European Commission

## MANIFESTO FOR EU COVID-19 RESEARCH

July 2020

### MAXIMISING THE ACCESSIBILITY OF RESEARCH RESULTS IN THE FIGHT AGAINST COVID-19

We agree and endorse the principles below when dealing with research results stemming from EU funded research grants related to COVID-19 on prevention (including vaccines), testing and treatment:

- 1** Make the generated results, whether tangible or intangible, **public and accessible** without delay, for instance on the Horizon Results Platform, on an existing IP sharing platform, or through an existing patent pool.
- 2** Make scientific papers and research data available in **open access** without delay and following the **FAIR principles** via preprint servers or public repositories, with rights for others to build upon the publications and data and with access to the tools needed for their validation. In particular, make COVID-19 research data available through the European COVID-19 Data Platform.
- 3** Where possible, grant for a limited time<sup>3</sup>, **non-exclusive royalty free licences** on the intellectual property resulting from EU-funded research. These non-exclusive royalty free licenses shall be given in exchange for the licensees' commitment to rapidly and broadly distribute the resulting products and services under fair and reasonable conditions to prevent, diagnose, treat and contain COVID-19.

# The FAIR principles are fulfilled in Astronomy thanks to the Virtual Observatory making reality what in other disciplines is just a dream

HILL: I felt a little bit like I stepped into the future when I went to a meeting of the [virtual observatories](#) in astronomy. They've already done a lot of the things that we're aiming to do in the sense that they've got observatories from all around the world that are sharing, through a common infrastructure, the data that they're measuring. And they're integrating it into a unified picture of the sky and our universe. These same data contribute to building large-scale simulations of the universe. I think that's extremely inspiring. If we can have a common infrastructure that allows us to have a globally integrated view of the data being produced, and the tools to run large-scale simulations from the data, we will really have made progress in neuroscience.



Human Brain Project

Science ▾

Platforms ▾

Collaborate ▾

Follow HBP ▾

About ▾

Education & Training ▾

## Welcome to the Human Brain Project

The Human Brain Project aims to put in place a cutting-edge research infrastructure that will allow scientific and industrial researchers to advance our knowledge in the fields of neuroscience, computing, and brain-related medicine

[Learn more about the project](#)



# FINAL REMARKS

**VIRTUAL OBSERVATORY  
MAKES YOUR LIFE  
EASIER!! 😎**

If you have any question please, let us know: [svo-support@cab.inta-csic.es](mailto:svo-support@cab.inta-csic.es)