State of the IVOA

Virtual IVOA Interop Meeting, May. 2021

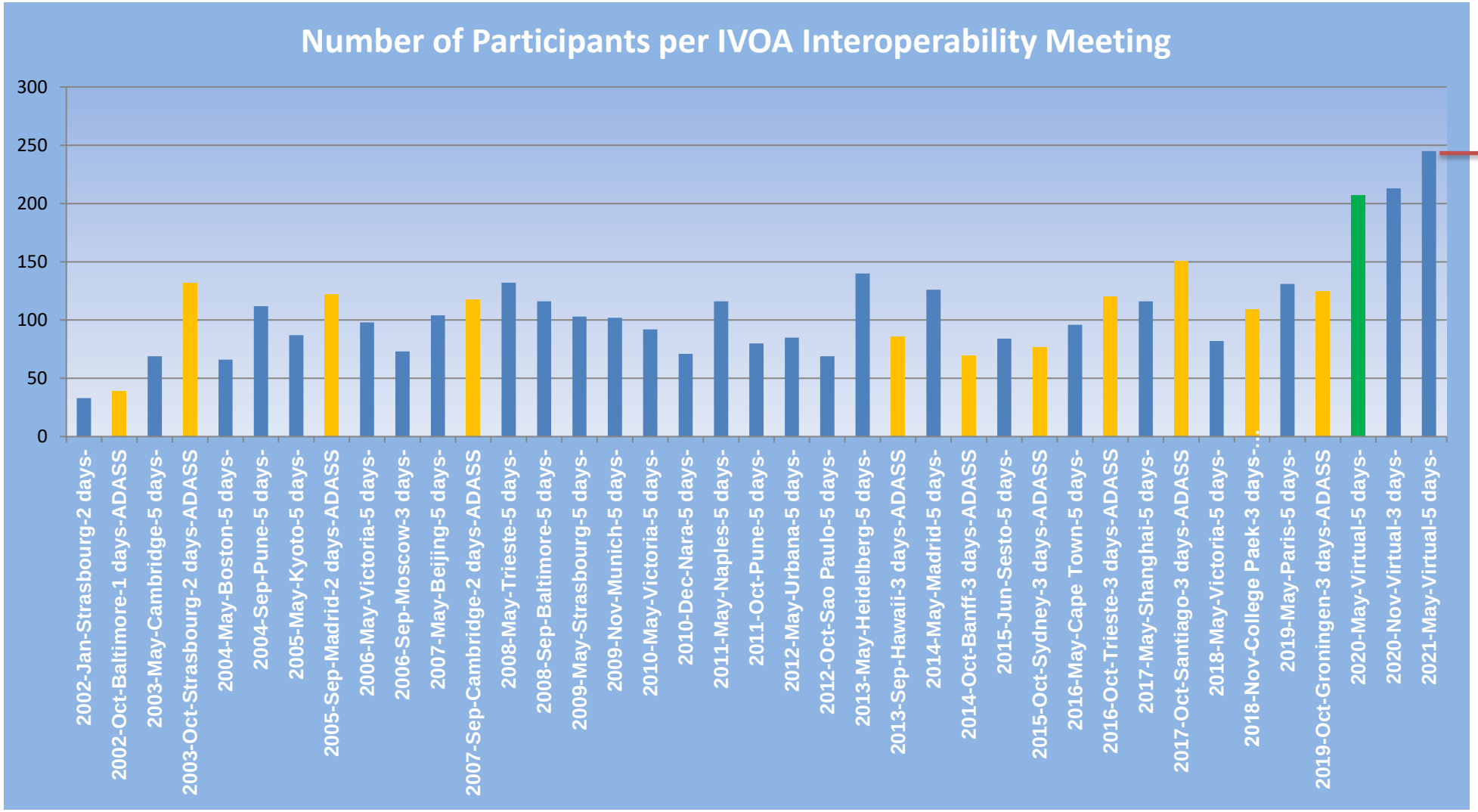
Chenzhou Cui

Chair of the IVOA Executive Committee

Chinese Virtual Observatory

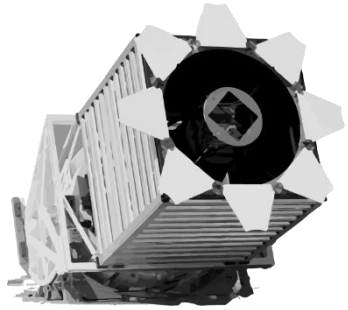
NAOC, CAS

Participation



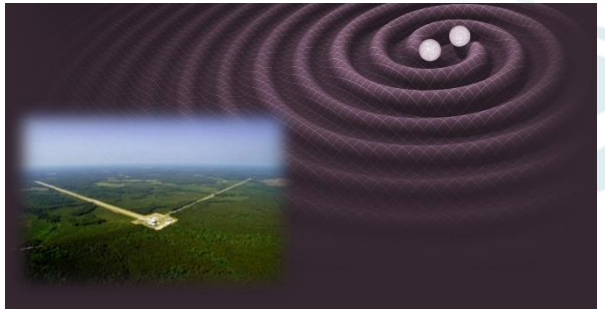
Astronomy: a Data-driven Science

- TBs era
  - 2dFGRS
  - SDSS
  - LAMOST
  - Gaia
- PBs to EBs era
  - FAST/FASTA
  - SKA
  - Vera Rubin Observatory LSST
  - Euclid
  - …
- Astronomy is entering a new era of big data where the data sets are too large to download and analyze using users' own facilities.









euclid

The Idea of Virtual Observatory

Vision of the VO:

- The Web is transparent. The goal of the Virtual Observatory is to achieve the same transparency for astronomical data.
- Astronomical datasets, tools, services should work seamlessly together.
- The VO allows astronomers to interrogate multiple data centers in a seamless and transparent way, provides new powerful analysis and visualization tools within that system, and gives data centers a standard framework for publishing and delivering services using their data.
- Like the World Wide Web, the VO is not a fixed system, but rather a *way of doing things.*

Virtual Observatory (VO) is a data-intensively online astronomical research and education environment, taking advantages of advanced information technologies to achieve seamless, global access to astronomical information.

-- my words

International Virtual Observatory Alliance

- An organisation that debates and agrees the technical standards that are needed to make the VO possible, A focal point for VO aspirations, a framework for discussing and sharing VO ideas and technology.

- Created in 2002
- 21 member VO projects
- 6 Working Groups, 8 Interest Groups
- 2 Interoperability meetings per year
  - May
  - Oct/Nov with ADASS
- *~ 46 interoperability standards*

Welcome Netherlands Virtual Observatory

- An organisation that debates and agrees the technical standards that are needed to make the VO possible, A focal point for VO aspirations, a framework for discussing and sharing VO ideas and technology.

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- 2 Interoperability meetings per year
  - May
  - Oct/Nov with ADASS
- *~ 46 interoperability standards*

Collaboration between IVOA and IAU OAD

MEMORANDUM OF UNDERSTANDING

BETWEEN

THE INTERNATIONAL VIRTUAL OBSERVATORY ALLIANCE (IVOA)

AND

THE OFFICE OF ASTRONOMY FOR DEVELOPMENT (OAD)

1. Background

1.1 The International Virtual Observatory Allia
The International Virtual Observatory Alliance

Approved and agreed:

International Virtual Observatory Alliance

Chenzhou Cui
Exec Chair

Date: March 03, 2021

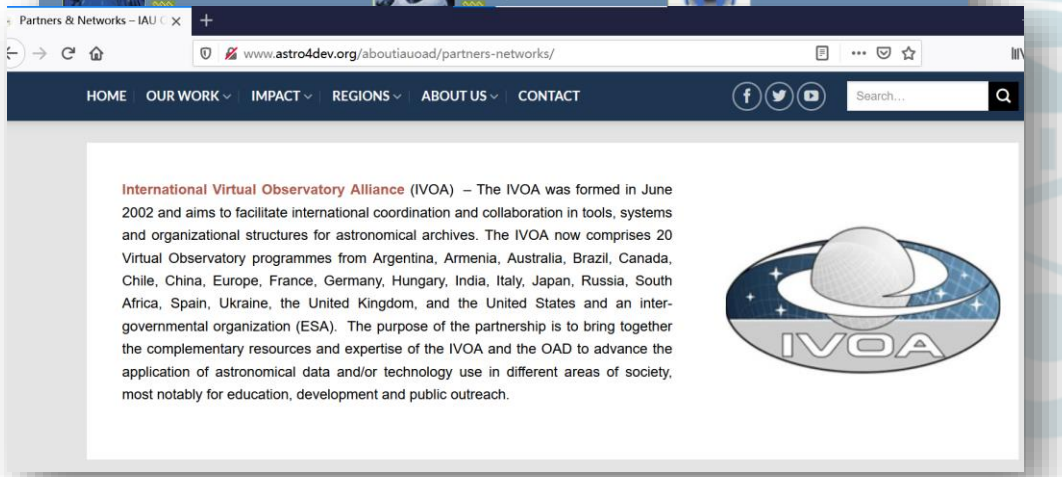
Office of Astronomy for Development

Kevin Govender
Director

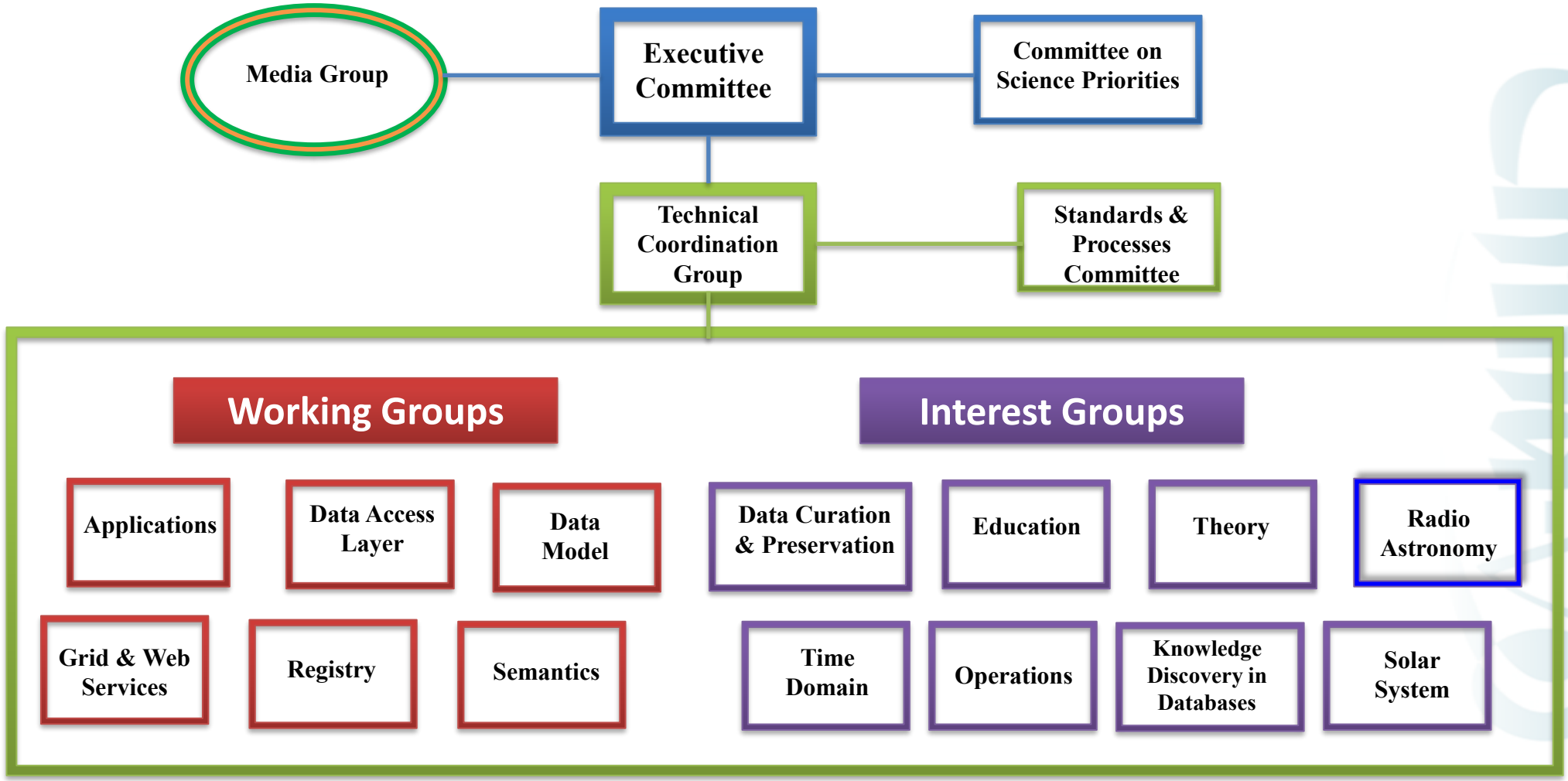
Date: March 03, 2021

Page 3 of 3

The first official partner for the IVOA



IVOA Organization Chart



We are working hard

in the very challenging year

2020

Date	Event	Host	Location	Further Info
Feb 11	TCG Telecon	Telecon	20:00 UTC	
Feb 18	Exec Telecon	Telecon	10 am Eastern	
Mar 24	Exec Telecon	Telecon	15:00 UTC	
Apr 07	TCG Telecon	Telecon	15:00 UTC	
Apr 16	TCG Telecon	Telecon	20:00 UTC	
Apr 21	Exec Telecon	Telecon	15:00 UTC	
3 May-8 May	Interoperability Meeting		Sydney (Australia)	Meeting Page *Replaced by the following*
4 May - 8 May	Virtual Interoperability Meeting		Online	Meeting Page, Program Pa
May 14	TCG telecon	Telecon	15:00 UTC	
Jun 11	TCG telecon	Telecon	20:00 UTC	
Jun 23	Exec Telecon	Telecon	15:00 UTC	
Aug 27	TCG Telecon	Telecon	15:00 UTC	
Sep 15	Exec Telecon (TM93)	Telecon	14:30 UTC	
Sep 22	TCG Telecon	Telecon	20:00 UTC	
Oct 08	TCG Telecon	Telecon	15:00 UTC	
Oct 27	Exec Telecon (TM94)	Telecon	14:00 UTC	
Oct 29	TCG Telecon	Telecon	20:00 UTC	
17 Nov - 19 Nov	Interoperability Meeting		Granada (Spain)	Meeting Page *Replaced by the following virtual meeting d*
17 Nov - 19 Nov	Virtual Interoperability Meeting		Online	Meeting Page, Program Page
Dec 15	Exec Telecon (TM95)	Telecon	14:00 UTC	

- Exec, TCG, WGs/IGs, dozens of VMs
  - + Special workshops
- ADASS meeting, and many others

2021

Date	Event	Host	Location	Further Info
Mar 02	Exec Telecon	Telecon	14:00 UTC	
Mar 09	TCG Telecon	Telecon	15:00 UTC	
Apr 20	TCG Telecon	Telecon	20:00 UTC	
May 04	Exec Telecon	Telecon	14:00 UTC	
May 11	TCG Telecon	Telecon	15:00 UTC	
May 18	TCG Telecon	Telecon	20:00 UTC	
May 19	Exec Telecon	Telecon	14:00 UTC	
24 May-28 May	Virtual Interoperability Meeting		Online	

RDA RESEARCH DATA ALLIANCE

O&A Members 61

Active Organisational & Affiliate members

MEMBERSHIP Members: 11823

Becoming a member of RDA is simple and open to both individuals and organizations

RDA Groups WG & IGs: 96

Discover what RDA Working and Interest Groups and all other Groups are up to and find

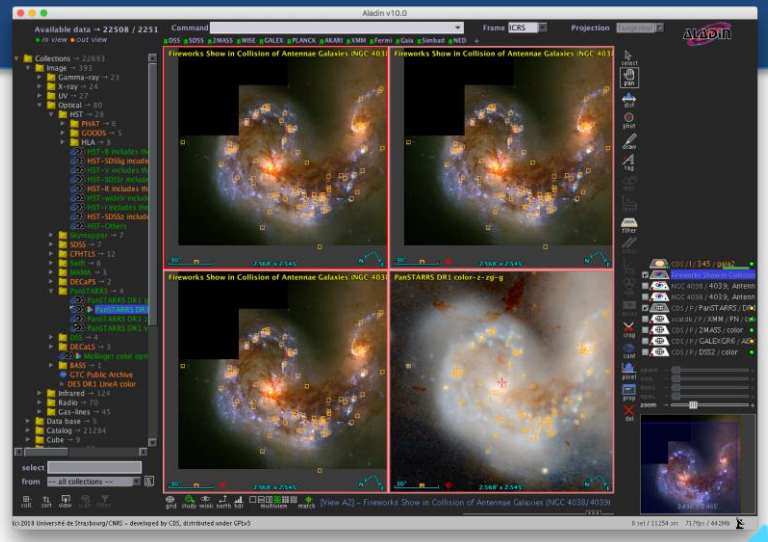
ABOUT RDA | GET INVOLVED | GROUPS | RECOMMENDATIONS & OUTPUTS

A typology of the components of Global Open Research Commons

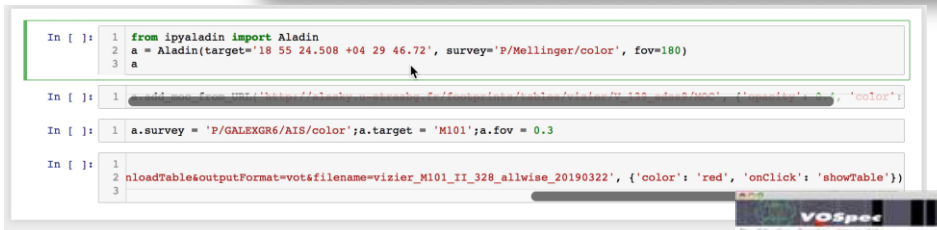
Home » *Plenaries* » A typology of the components of Global Open Research Commons

IVOA, Interoperability commons for astronomical data

Interoperable applications and services



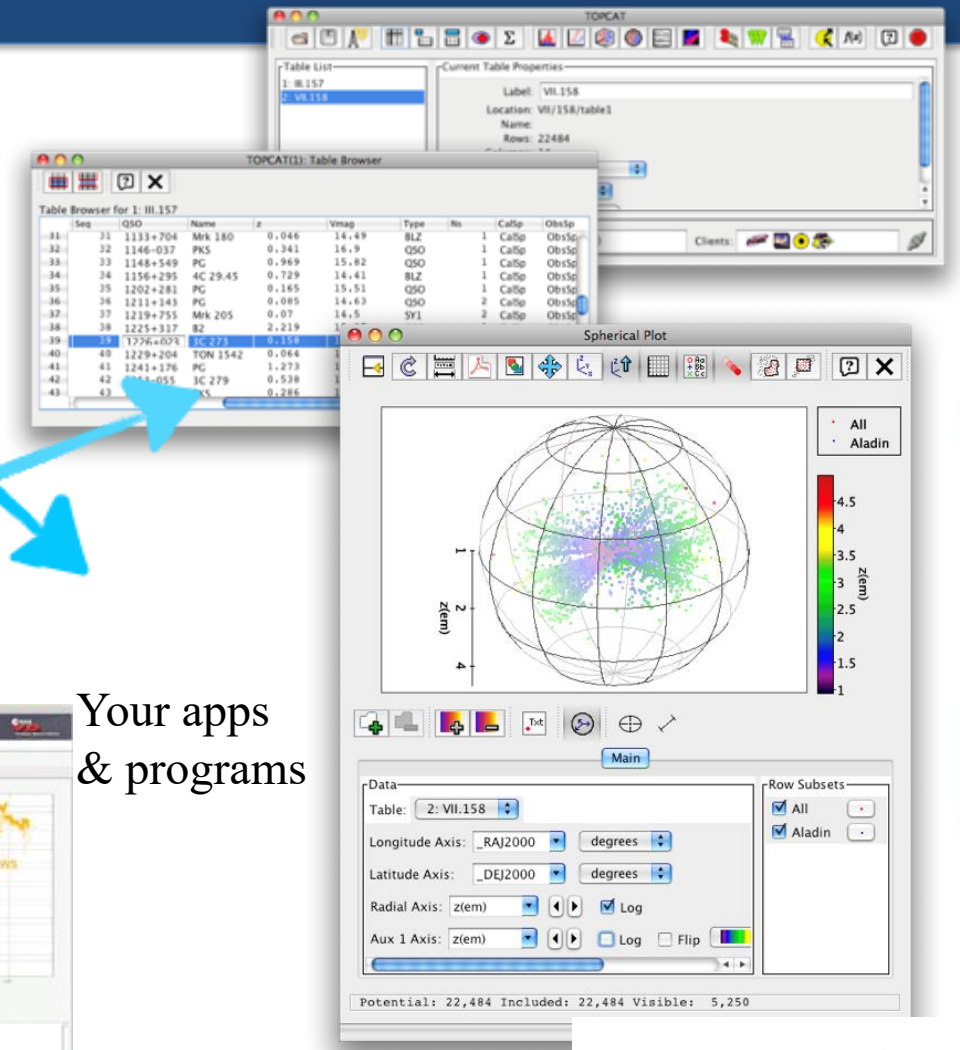
Aladin



Notebooks

Spectral tools

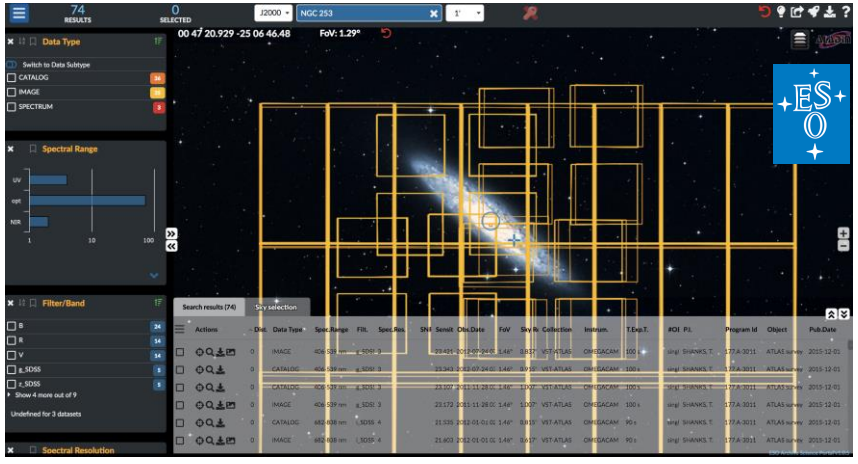
Your apps & programs



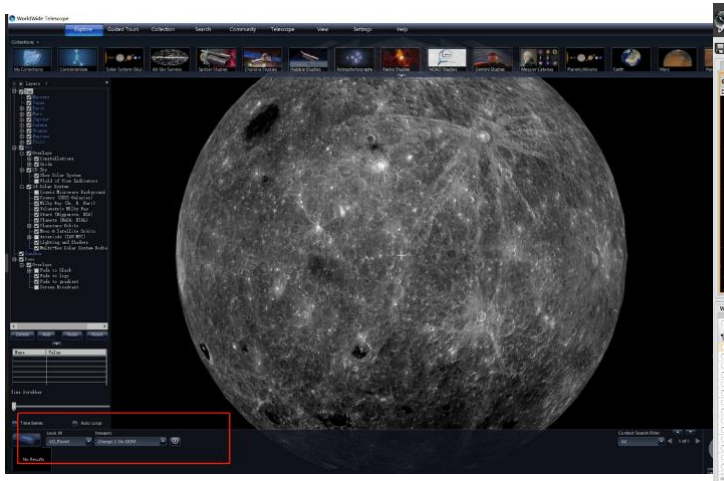
TOPCAT

Broadcast

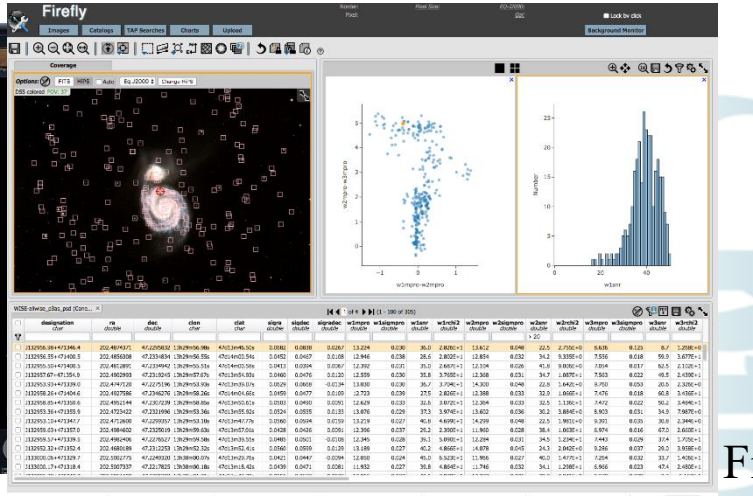
VO embedded in astronomy services



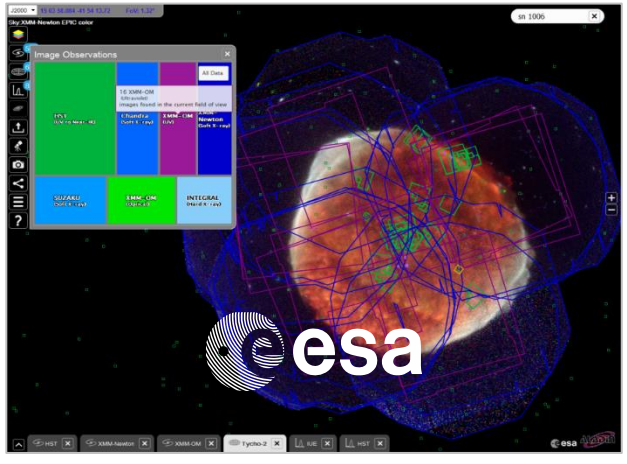
ESO Science Portal



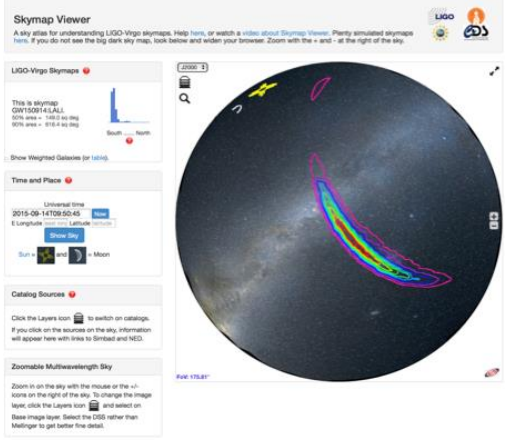
WWT



Firefly
Caltech-IPAC

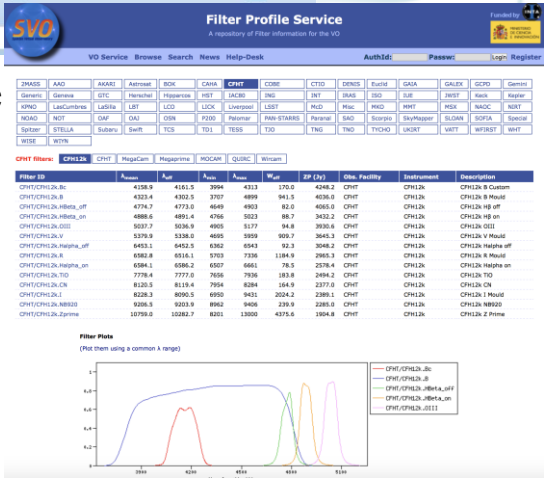


ESA Sky



Grav. waves

CDS reference data service

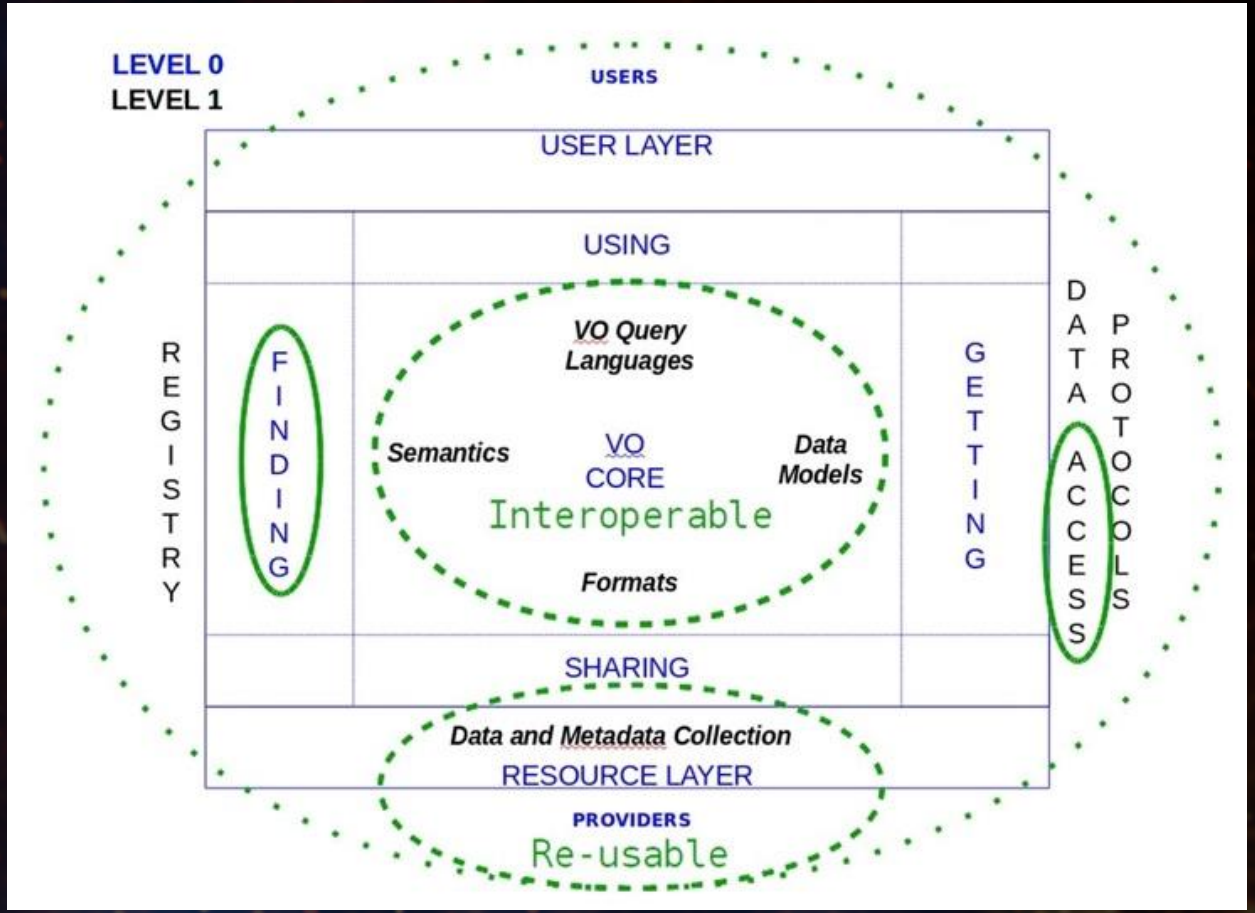


SVO Filter Profile service

VO is FAIR

Making data:

***F**indable*
***A**ccessible*
***I**nteroperable*
***R**eusable*



These online VO data services and tools laid a solid groundwork for the science platform idea.

IVOA, Interoperability commons for astronomical data

VO-Driven Science Platforms

- The amount of astronomy data will increase greatly in the near future. Science platforms are being developed to allow researchers to efficiently analyze big data sets. These science platforms enable analysis close to the data, support online data mining and machine learning.
- Most science platforms in astronomy employ a similar architecture and technologies to provide an interactive data analysis environment. Based on Cloud computing platforms, JupyterHub with JupyterLab are used as an interface for exploratory data mining and analysis. The interactive environment is generally deployed using container techniques (e.g., docker).

Open Science Cloud Platforms

- European Open Science Cloud
  - It is a trusted system providing seamless access to data and interoperable services. It supports the whole research data cycle, from discovery and mining to storage, management, analysis and re-use across borders and disciplines.
- African Open Science Platform
  - The *African Open Science Platform* initiative (AOSP), funded by the South African Department of Science and Technology (DST) through the National Research Foundation (NRF), and implemented and managed by the Academy of Science of South Africa (ASSAf), is a pan-African project for Africa by Africa. Direction is provided by CODATA (ISC).
- GÉANT
  - GÉANT is a fundamental element of Europe's e-infrastructure, delivering the pan-European GÉANT network for scientific excellence, research, education and innovation.
- Australian Research Data Commons (ARDC)
  - The **ARDC** is a transformational, sector-wide initiative, working with sector, government, and industry partners to build a coherent national and collaborative research data commons. This will deliver a world-leading data advantage, facilitate innovation, foster collaboration and enhance research translation.
- Global Open Science Cloud
  - The mission of GOSC is to connect different international, national and regional open science clouds and platforms to create a global digital environment for borderless research and innovation.
- Pangeo, …

EUROPEAN OPEN SCIENCE CLOUD

GÉANT

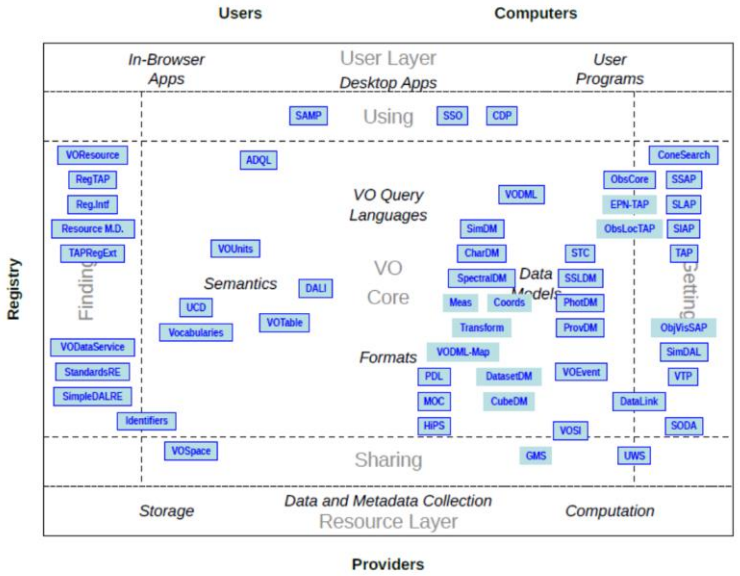
ARDC
Australian Research Data Commons

PANGEO

Evolving with new requirements

- the changing landscape
  - Time-domain astronomy, multi-messenger astronomy, new radio astronomy
  - Machine learning, deep learning, Satellite constellation (i.e. Starlink)
  - AstroPy, RDA, CODATA

IVOA Architecture
Version 2.0
IVOA Note 2021-05-21
Working group
Technical Coordination G



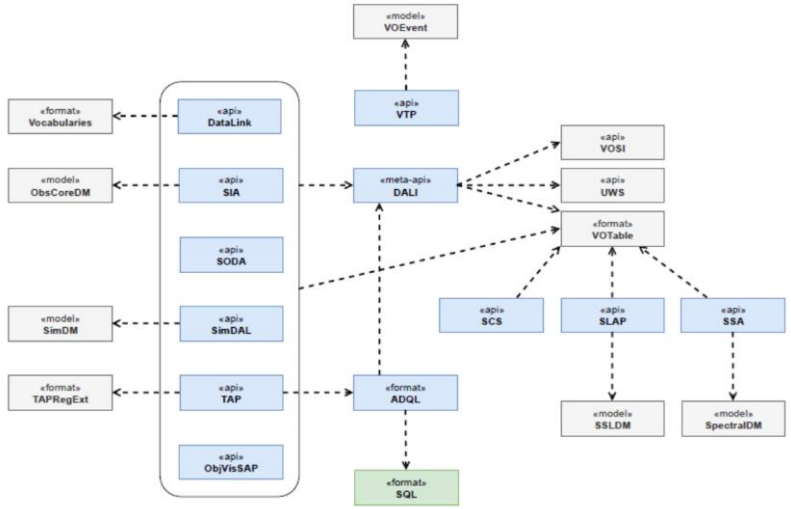


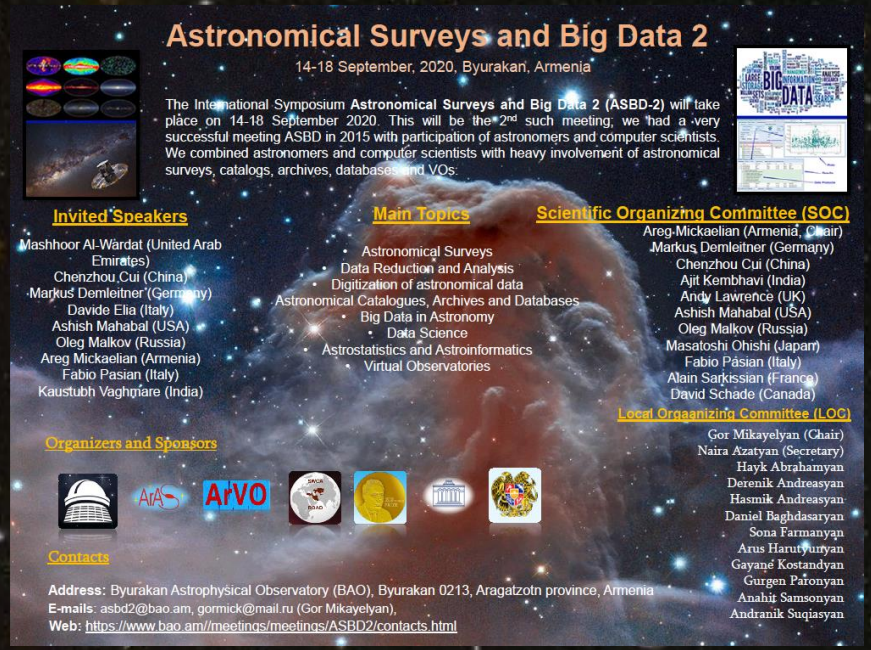
Figure 9: Data Access Standards and Dependencies

Highlights from IVOA Members

ArVO – Armenian Virtual Observatory

Meetings and Events:

- 7th Byurakan International Summer School (7BISS), *07-11.09.2020, Byurakan, Armenia*
- Astronomical Surveys and Big Data 2 (ASBD-2), *14-18.09.2020, Byurakan, Armenia*



Recent publications:

Demleitner, M.; Mickaelian, A.; Mikayelyan, G.; Knyazyan, A.; Baghdasaryan, D. *Outlier Analysis in Low-Resolution Spectra: DFBS and Beyond*, GAVO, 2019

Mickaelian, A. M.; Sarkissian, A.; Berthier, J.; Meftah, M.; Thuillot, W.; Vachier, F. *Search and study of asteroids from the digitized first Byurakan survey using virtual observatory tools*. Icarus 330, p. 5, 2019

Gevorgyan, Gh.; Knyazyan, A. V.; Astsatryan, H. V.; Mickaelian, A. M.; Mikayelyan, G. A. *Astronomical objects classification based on the Digitized First Byurakan Survey low-dispersion spectra*. A&C, 2020, in press

All-Sky Virtual Observatory News

Data Central and SkyMapper

- Data Central SSA service released (see DAL/DM talk by Brent Miszalski)
- Large number of VO examples published at Data Central, using SIA, SSA, HiPS and MOC
- SAMI Data Release 3 and WiggleZ Final Data Release now available on Data Central
- SkyMapper Data Release 3 mosaic service under construction
- SkyMapper preparing for Data Release 4

Theoretical Astrophysical Observatory

- New Genesis premade catalogues available: SHARK, Meraxes, SAGE & DarkSAGE
- New visualization tool nearing stable release (Vis3D)
- UI/UX review, need to reassess how new components fit into the rest of TAO

All-Sky Virtual Observatory News

MWA

- Updated TAP service to align with new MWA Data Life Cycle policy
- New MWA correlator coming online soon means a lot of metadata updates will be required
- Evaluating tools to improve service maintenance and maintainability

CASDA

- ASKAP data for Phase 1 surveys ingested and released (RACS, EMU, WALLABY)
- $65million AUD announced for Australian SKA Regional Centre
- CASDA will be moving to Ceph filesystem store, so a lot of development work will be required

China-VO: FAST Call for Proposal

- The Five-hundred-meter Aperture Spherical radio Telescope (FAST) located in a karst depression in Guizhou, is the world's largest single-dish radio telescope, with a receiving area equivalent to 30 football fields.
- Call for Proposals were open between 30th March and 15th May 2021. 216 proposals from 15 countries were collected.
- China-VO provided the portal and back-end platform.


荣誉证书

HONORARY CREDENTIAL

中国科学院国家天文台：

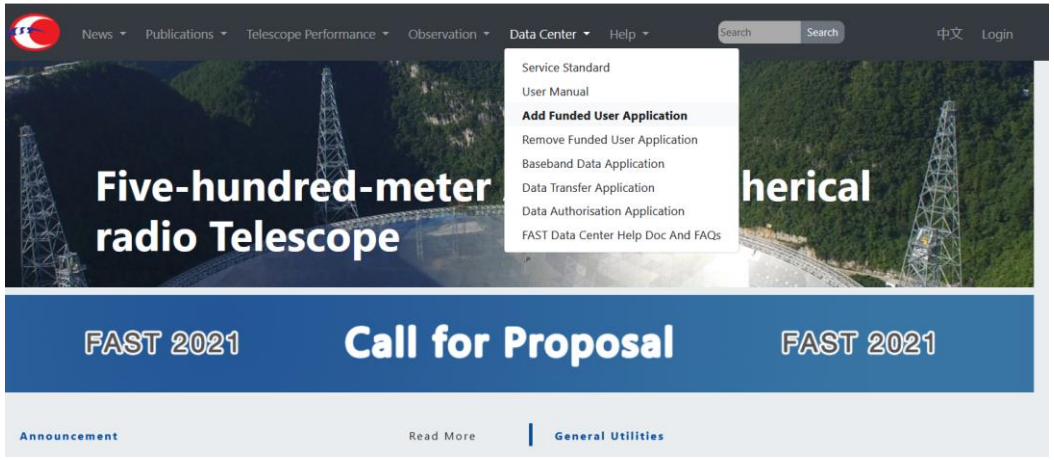
你单位选送的"500 米口径球面射电望远镜观测项目管理系统"案例，被评为"2020 年度中国科学院信息化应用优秀案例"。特发此证，以兹鼓励。

中国科学院网络安全和信息化领导小组办公室

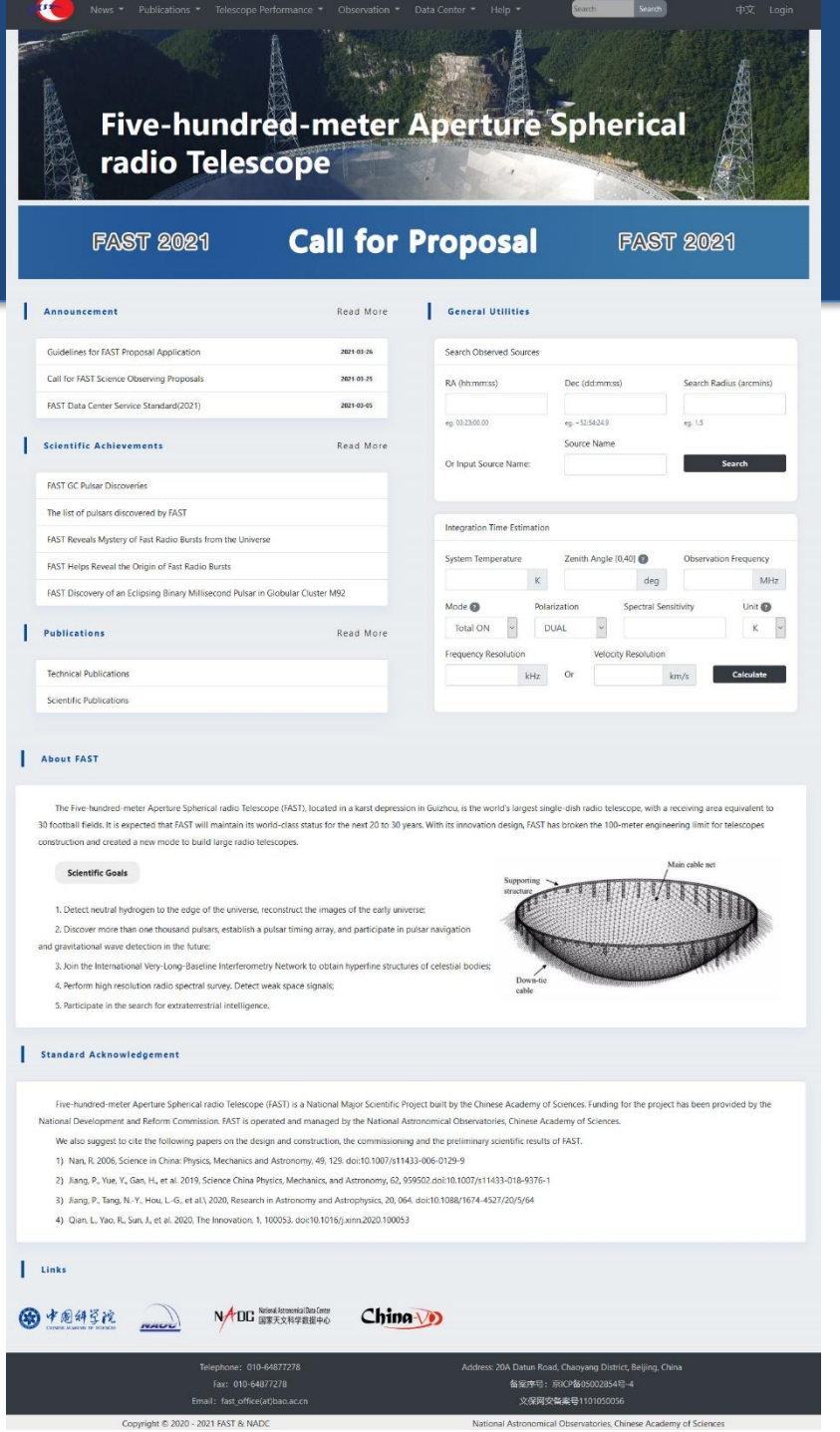
（代章）

二〇二一年三月

Best practice award on e-Science CAS, 2020

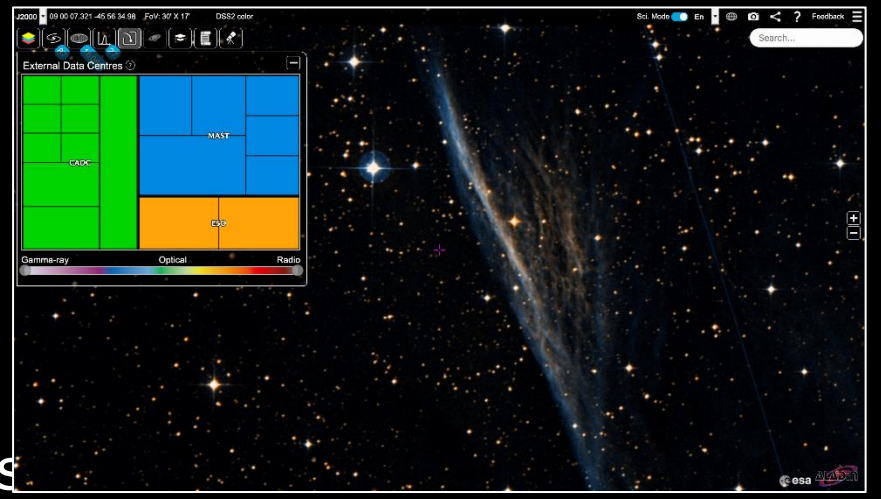


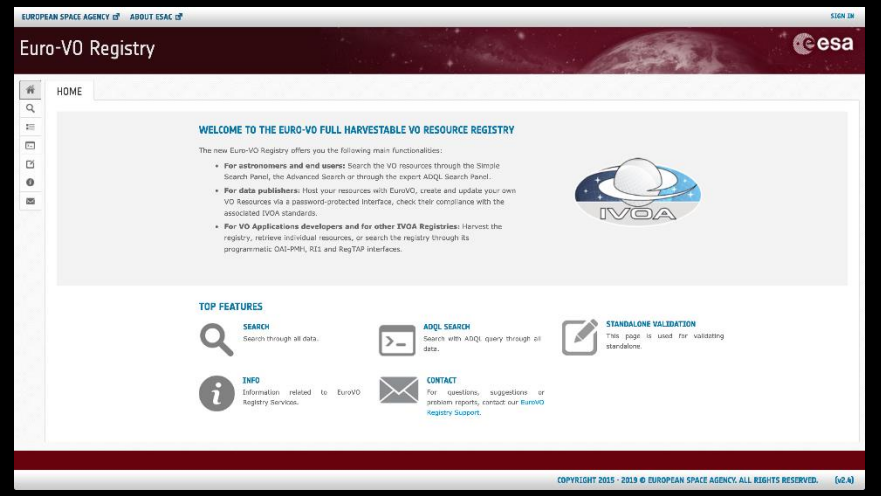
https://fast.bao.ac.cn/



ESA – VO Activities

- TAP 1.1 implementation ready: archives currently being updated
- Gaia : New Datalink contents being prepared for DR3 (Mcmc, RVS spectra, Xp mean spectra & Xp sampled mean spectra)
- ESASky : External TAP extension to other data centres ongoing
- ObsLocTAP : Proposed recommendation March 2021
- Euro-VO Registry 2.4 release mid May 2021:
  - Validator updates to cover SIAP 2.0 resources
  - Updates related to updated IVOA Rec (ie VODataService 1.2, VOTable 1.4)
  - Various bug fixes and improvements to increase robustness





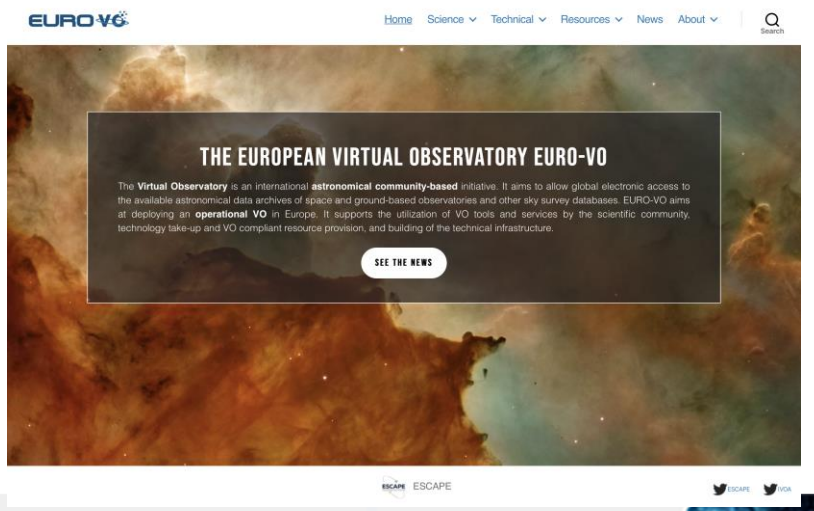
Euro-VO Activities

* Activities are being pursued within the EC funded **ESCAPE** Project
  * In the work package: **CEVO "C**onnecting ESFRI to the **E**OSC via **VO"**
* Euro-VO partners working with large Astronomy, Astroparticle Physics and Solar Physics partners
* ESCAPE is bringing VO into the European Open Science Cloud (EOSC)

Funded by the European Union's Horizon 2020 - Grant N° 824064

Euro-VO Status and Highlights

* **ESCAPE project Feb 2019- Jan 2023**
  * Successful mid-term review in Nov 2020
  * VO is integrated part of ESCAPE in coordination with:
    * Software Repository / Science Platform / Data Infrastructure -- being developed in context of EOSC
  * Deliverable reports etc. - **https://projectescape.eu**
* **Recent Activities:**
  * **IVOA Newcomers Introduction sessions – H. Heinl, D. Morris**
  * **Virtual Observatory School – February 2021 (Link)**
  * **Technology Forum – April 2021 (Link)**
  * **Astronomy input to FAIRsFAIR project**
  * **Renewed web pages: https://euro-vo.org**
* **Upcoming:**
  * **Hands-on workshop for Data Providers** *(~Nov/Dec 2021)*

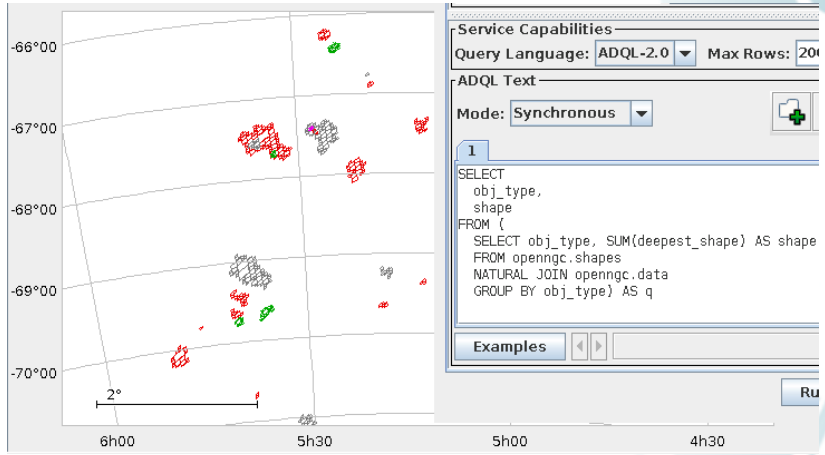


Funded by the European Union's Horizon 2020 - Grant N° 824064

GAVO

- Software
  - Our publishing package DaCHS will be part of Debian's next stable release, bullseye, for extra-easy installation ("apt install gavodachs2-server").
  - Several new ADQL user defined functions (TAP operators: adopt them?):
    * gavo_specconv to convert between spectral units,
    * gavo_mocintersect and gavo_mocunion for MOC manipulation,
    * gavo_vocmatch to work with Vocabularies within TAP queries.

Check out our blog (https://blog.g-vo.org) -- and perhaps blog yourself so we can perhaps have Planet VO one day.



- Standards
  - Vocabularies in the VO 2: Check out the Semantics session
  - Advanced Column metadata: Another step to blind discovery. A Note on that is out since April 29.

VO-France

Renewal of VO-France in 2020

2021 : meeting of the French OV community
Teams from most French astrophysics laboratories participated

Some actions of VO-France
- support to develop interoperability for **heliophysics**
- promote usage of **Provenance DM**
- works on **a future SLAP 2**
- french **theory meeting** planned to promote **SimDM and SimDAL**
- **Hackathon** - projects / collaborations / etc.
- etc.

The CDS All-Sky-Data system (2 x 1.6 PB)
- Hosts the main CDS HiPS node (~380 TB).
- Was recently installed in its intended configuration over 2 sites.
- Responds to ~600k tile-queries per day – **HiPSreally being used heavily** !

The **Vizier** catalogue service now hosts more than **20000 catalogues**:
- CDS publishing registry migration to be reported at this interop.
- Time metadata is being curated routinely.

VObs.it

the Italian initiative to support the VO

- **Working on tightening the connection among national research data infrastructures**

- Recently proposed to INAF as a multi-institution "programme" (long-term project), aimed at supporting Italian participation in IVOA and Euro-VO

VObs.it

Funding for development of standards and provision of services for IVOA is granted by INAF: fairly constant over time (lower in 2020-21 due to lack of travel)

- Activity in IVOA within WGs and IGs
- Chairing the DAL+GWS WGs
- IVOA documents coordination

Person-power: ~ 3 FTE/year
(half for development + half for service)

Additional efforts to develop data access/ retrieval and applications compliant to IVOA standards at the two main Italian centers:

- IA2, the INAF center for Astronomical Archives
- SSDC, the ASI Space Science Data Center (evolution of ASDC)

Each data centre has its own budget

VObs.it

VObs.it supports (on INAF-provided servers and resources) the following IVOA services:

- web pages (www.ivoa.net)
- wiki (wiki.ivoa.net)
- mail and lists (mail.ivoa.net)
- documents repository (www.ivoa.net/documents)
- vocabulary maintenance (www.ivoa.net/rdf)

It also manages the

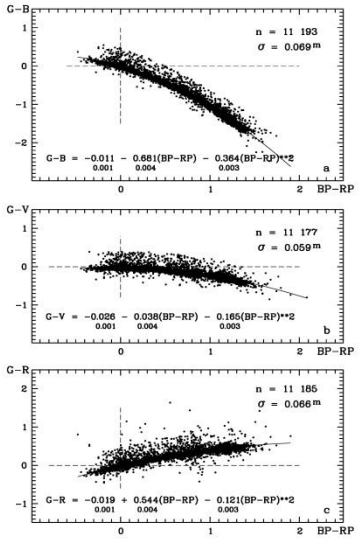
- registration of IVOA domains (ivoa.net and ivoa.info)
- the related DNS service
- resolving the other IVOA community provided services:
  - rofr.ivoa.net (currently hosted at CADC)
  - mail.ivoa.net/search (provided by CNRS/CDS)

Current efforts/activities include:

- actively participation in the EU-funded ESCAPE project (on integration of VO services with the European Open Science Cloud)
- a national webinar and a workshop in 2021 (wide interest)
- rebuild IVOA servers after May Interop
- updates to the document repository
- smooth out historical heritage services
- planning for a docs DNS resolved subdomain
- also to link a documents search engine (CDS)

Ukrainian VO: Main projects in 2020-2021 years

Science with archive Astroplates:



Software developed for Relationship between the B, V, R Johnson photoelectric stellar magnitudes (archive astroplates) and the GAIA DR2 BP, G, RP stellar magnitudes

Catalogs of coordinates and magnitudes of asteroids, including those that have no other data (MPC) earlier 1981-1996

Survey	FON-Kyiv (1981-1994)	FON-Kitab (1981-1989)	Baldone (1967-1996)
Number of plates	2260	2282/10	10
Number of identified asteroids/ comets	2000	4589/2	~280
Number of identified asteroids that have no other data (MPC)	152	87/2	12

Big galaxy surveys and Machine learning

New method for distance moduli (m-M) to the galaxies

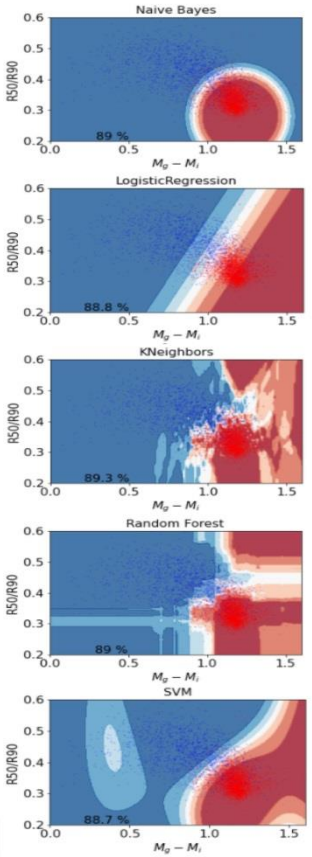
Method	N	error, mag
Primary methods		
TRGB	475	0.05
Cepheids	87	0.08
PNLF	72	0.12
GC radius	107	0.13
HII region diameter	44	0.13
SNIa	3179	0.14
SNIa SDSS	1771	0.16
SNII optical	184	0.17
SBF	539	0.18
AGN time lag	20	0.18
GCLF	213	0.18
Masers	10	0.22
BCG	239	0.35
Secondary methods		
Sosies	344	0.20
Tertiary	283	0.30
D-Sigma	566	0.33
ANN regr. (all attributes)	393359	0.35
TF	12244	0.38
Conv. V_{LG} to $m-M$	1209871	0.40
FP	129038	0.42
ANN regr. (without V_{LG})	436140	0.44

Parameters for training: magnitudes in U, B, I, and K bands; colour indices, surface brightness, angular size, radial velocity, and coordinates. Test set: 91 760 galaxies at z < 0.2 from the NED.

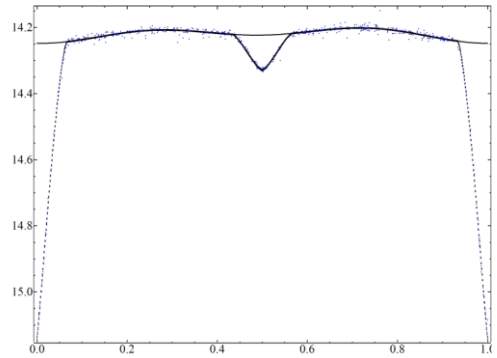
Results: The most effective is the neural network regression model with two hidden layers. The obtained rms of 0.35 mag (relative error of 16%) does not depend on the distance to galaxy and is comparable with the Tully-Fisher and Fundamental Plane relations.

Photometry-based approach for galaxy morphological classification

The support-vector machine (96.4%) and random forest (95.5%) provide the highest accuracy. Test sample of 316 031 galaxies, SDSS DR9, at z<0.1

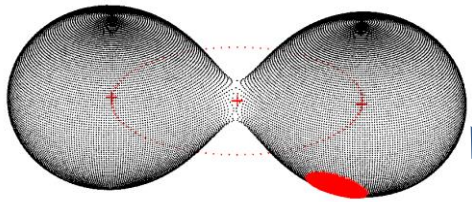


Statistically optimal modelling of Variability (methods and software)

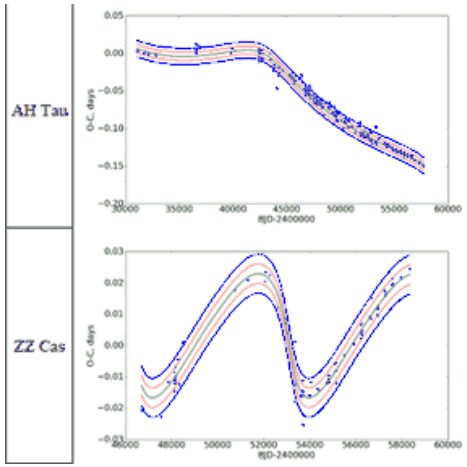


Transits of exoplanets

Catalogue of Phenomenological Characteristics of Eclipsing Binaries

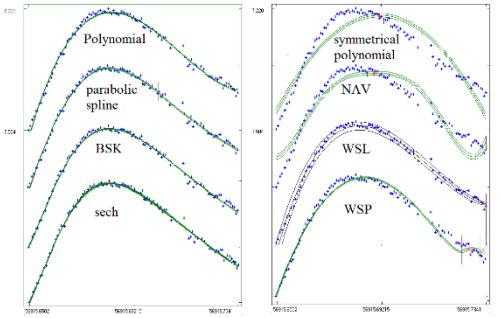


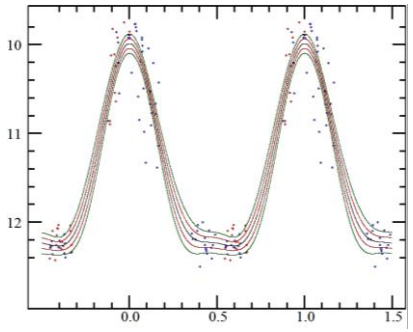
Physical Modelling of newly discovered variables

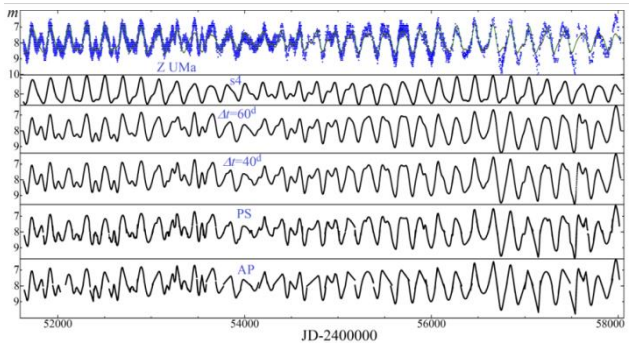


Third bodies at circumbinary elliptical orbits

Software: MCV MAVKA. NAV, FDCN, FVSE



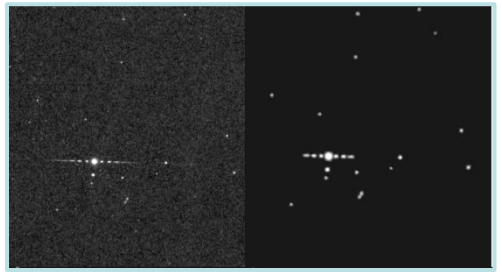




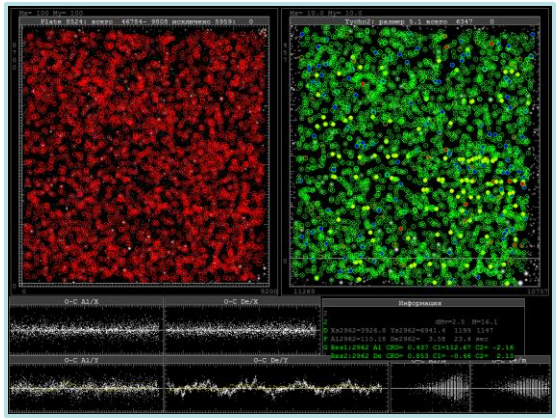
Pulsating stars with different degree of stability

Creation of catalogs of coordinate and proper motions in fields with open clusters with common reduction of CCD observation and plate archive images

Use scanner Epson V750 Pro for receiving images of photo plate



Reduction and obtained coordinates of about 30 mln. objects.



Use telescope Mobitel KT-50 for receiving 36 ths. CCD frames and software for downloading 340 ths. images from IVOA archives.

Reduction of 36000 CCD images; obtained coordinates of 152 mln objects.

Reduction of 340000 VO images, obtained coordinates of 1050 mln objects.

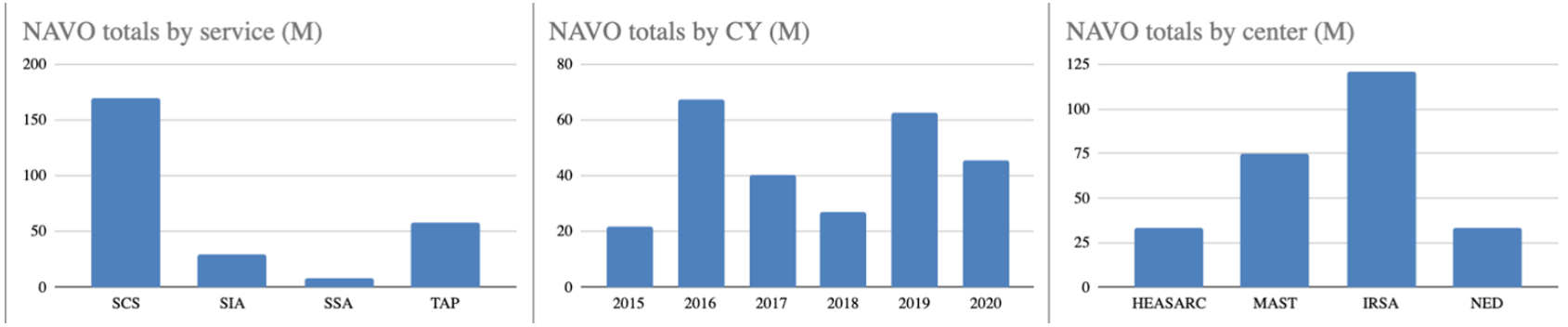
Obtained catalogs:

Photographic catalog for epoch 1982.7:
2.6 mln stars (7-16)^{m}, middle precision : **RA 0."06 DEC 0. "09**
CCD catalog for epoch 2013.6:
4.2 mln stars (8-17)^{m}, middle precision : **RA 0."06 DEC 0. "07**
CCD catalog for epoch 2017.3:
3.4 mln stars (8-17.5)^{m}, middle precision : **RA 0."05 DEC 0. "06**
6 catalogs for different epoch from IVOA images:
87.3 mln stars (7-19)^{m}, middle precision : **0."03 - 0. "09**
Catalog of coordinates and proper motions from 8 catalogs with 83.4 mln stars: 5.8 mln stars (8-19)^{m}, middle precision :
RA 0."035 DEC 0. "042 , PM 0.004"/year

USVOA-NAVO Highlights. May 2021

- Archive services operational on average 99.5% of 2020
- AAS workshops (40+ attendees) and webinars (60+) at Winter AAS, **summer AAS 2021 workshop (June 7-9)**
- Data releases:
  - IRSA: NEOWISE Reactivation 2021 Release; LSST Data Challenge 2 mock catalog (~2 billion rows); Spitzer Deep Drill; IRAC imaging of Rubin Deep Drilling Fields.
  - HEASARC: TESS SIA service
- Services and APIs under development:
  - MOCs for data discovery at IRSA (in final testing)
  - IRSA Viewer has new TAP GUI interface to NAVO archives
  - DataLink - allows in depth browsing of holdings down a tree of links
    - Implemented at HEASARC and IRSA.
- Science platforms:
  - HEASARC@SciServer science platform launched, a test-bed for NAVO discussions of standards and APIs.
  - Time-series (TIKE) platform developed by MAST, test-bed for Jupyter stack
- CAOM - allow all archive databases to be compatible
  - Implemented at IRSA and MAST.

NAVO Usage, CY15-20 (millions of requests per category)



On average NAVO services respond to more than one data request each second

Query Type		Year		Center	
Cone	170 M	2017:	40.3 M	HEASARC	33.3 M
SIA	29.6 M	2018:	27.2 M	MAST	74.8 M
SSA	8.11 M	2019:	62.7 M	IRSA	121 M
TAP	57.4 M	2020:	45.5 M	NED	33.6 M

And now – to work !!

25-28 May 2021
Online
UTC timezone

- Overview
- Programme
- Registration
- Call for Contributions
- Participant List

Meeting help-desk
interop_helpdesk@ivoa....

The IVOA May 2021 Interoperability meeting organization will be similar to the last (Nov 2020) Interoperability Meeting. We will use Zoom as our shared remote service, and Etherpad for live notes and questions. We are planning to keep presentations to a single thread (no parallel sessions) and save a good amount of the time for your input and discussion. Sessions will be recorded and posted so that if you miss a session you can go back and view it. We will work to schedule sessions with reasonable times during the day for 2 of the 3 sessions a day in your time zone.

The meeting schedule will be made up of sessions of the IVOA Working Groups and Interest Groups. In addition, we envision asking the community for topics/presentations as we did last time. We plan to make a slight adjustment in that we will welcome smaller prop... well as longer proposals that take the hour.

Starts 25 May 2021, 04:30
Ends 28 May 2021, 23:00
UTC

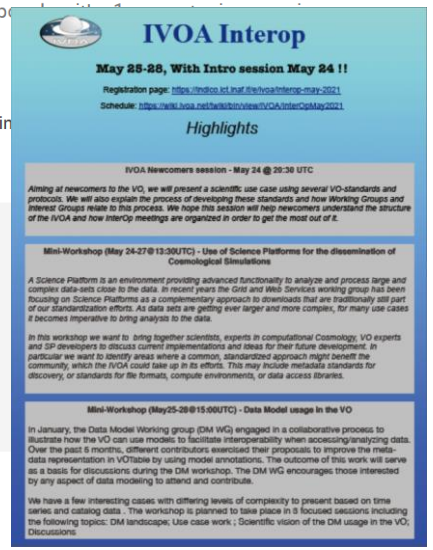
Onlin...

POC/TCG coordination:

- Patrick Dowler [CADC] (email)
- Janet Evans [CfA | Harvard & Smithsonian] (email)

VLoc:

- Marco Molinaro [INAF & VObs.it](email)
- Giulia Iafrate [INAF & VObs.it](email)
- Giuliano Taffoni [INAF & VObs.it](email)



TWiki > IVOA Web > IvoaTCG > ProgramPrepVirtualMay2021 > InterOpMay2021 (2021-05-21, MarcoMolinaro)

Edit Attach

May 2021 IVOA Virtual Interop Meeting Schedule

All times are UTC -- check your local times https://www.worldtimebuddy.com/

Meeting registration, participant list, call for contributions etc are at https://indico.ict.inaf.it/event/1441/.

Feedback

We welcome feedback about the meeting, please leave your comments here.

Recorded Sessions

Recordings for the sessions will be uploaded to the CANFAR VOSpace service after each day of the meeting.

Programme

Session	Time (UTC)	Elapse time	Session	Notes
Monday May 24, 2021				
ZOOM LINK for Monday: TBA				
Intro1	20:30 UTC	60 min	Newcomers Intro - IVOA Basics	Henrik Heinl/Dave Morris
	21:30	*Break - 30 min*		
Intro2	22:00	60 min	Newcomers Intro - IVOA Examples	Henrik Heinl/Dave Morris
	23:00	*End of Session*		
Tuesday May 25, 2021				
ZOOM LINK for Tuesday: TBA				
1	05:00 UTC	10 min	Welcome & Logistics	Janet Evans
	05:10	20 min	State of the IVOA	Chenzhou Cui
	05:30	10 min	State of the CSP	Bruno Merín
	05:40	20 min	State of the TCG	Patrick Dowler