



State of the IVOA

Virtual IVOA Interop Meeting, May. 2021

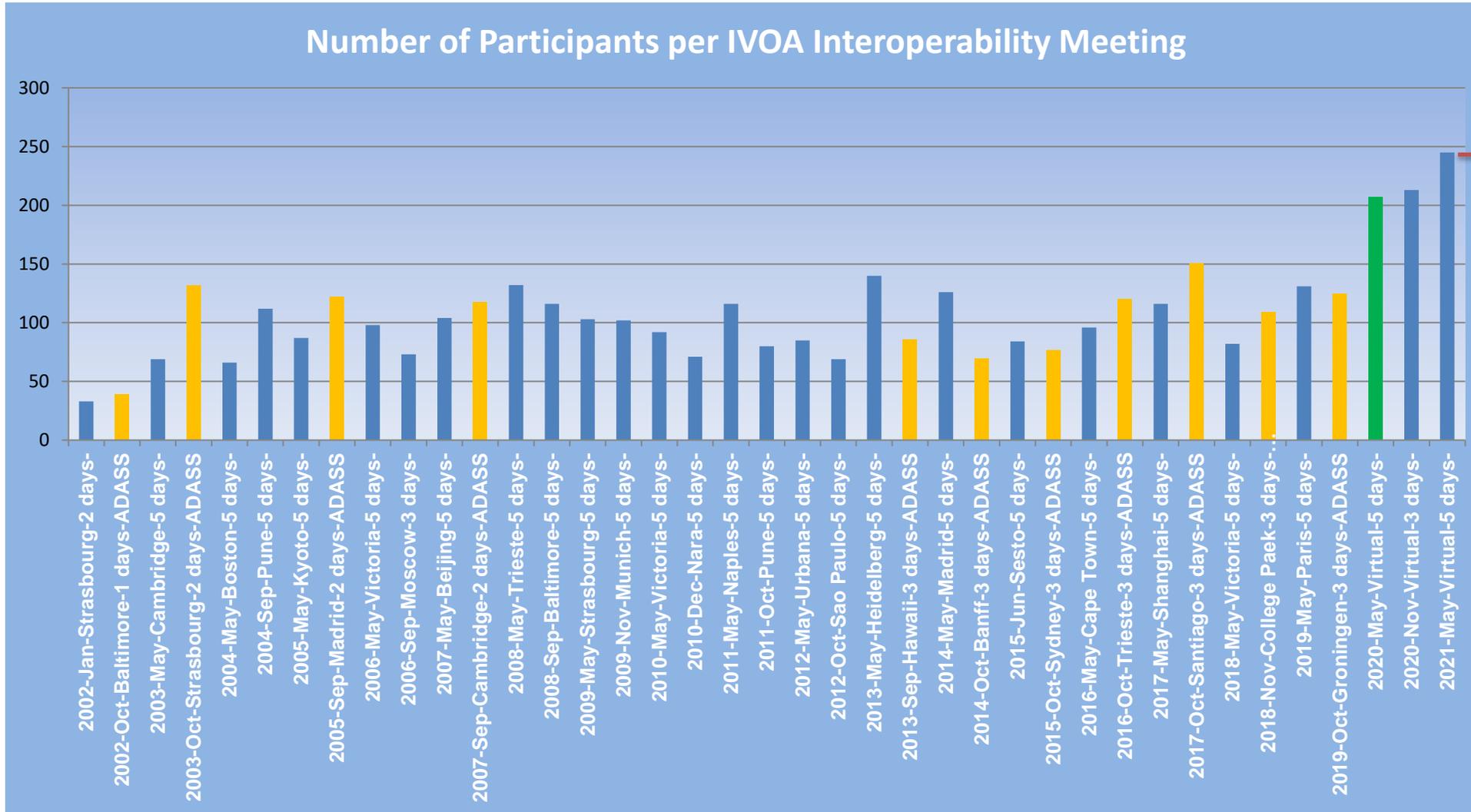
Chenzhou Cui

Chair of the IVOA Executive Committee

Chinese Virtual Observatory

NAOC, CAS

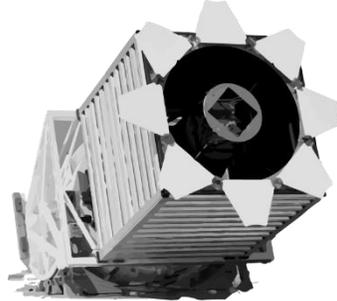
Participation



Astronomy: a Data-driven Science

- TBs era

- 2dFGRS
- SDSS
- LAMOST
- Gaia

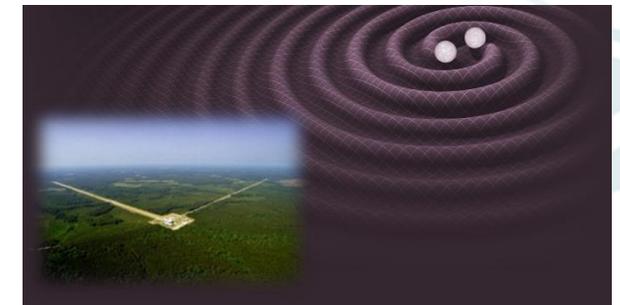


- PBs to EBs era

- 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.



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.
- Created in 2002
- **22** member VO projects
- 6 Working Groups, 8 Interest Groups
- 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 Alliance The International Virtual Observatory Alliance

Approved and agreed:

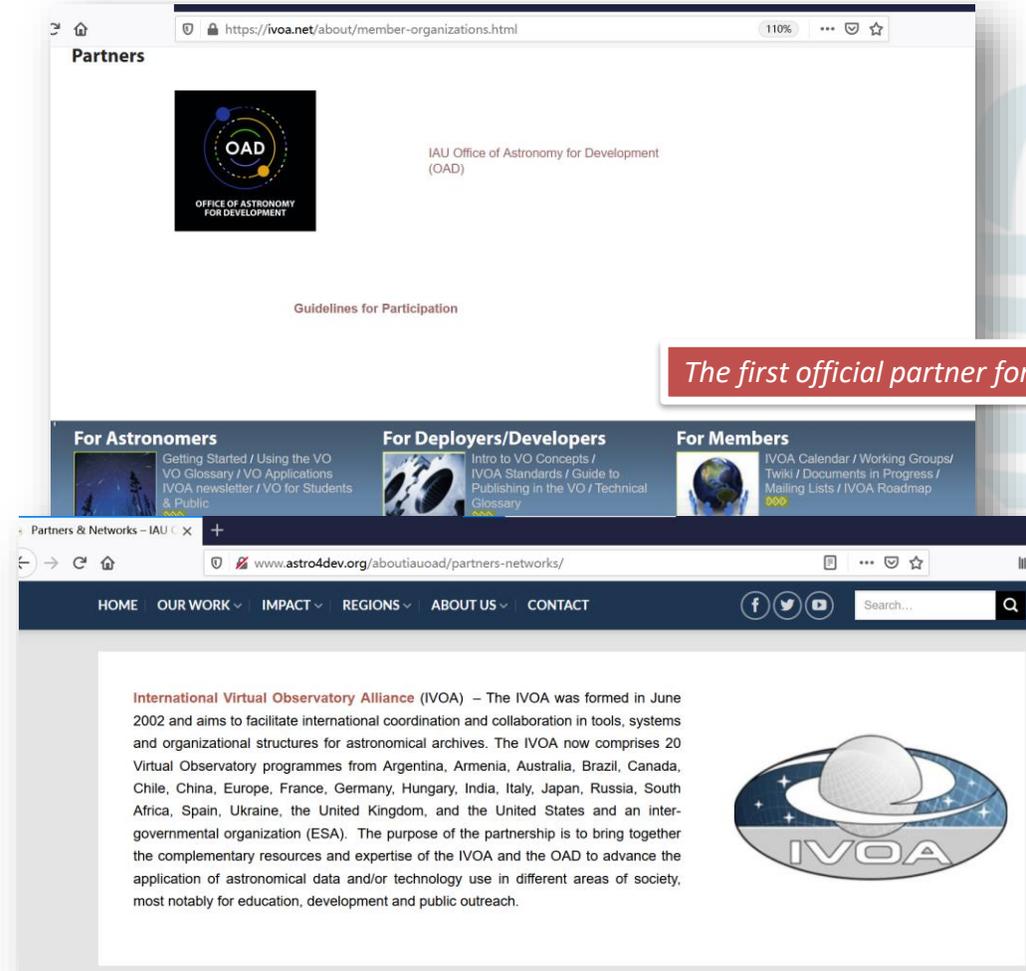
International Virtual Observatory Alliance

Chenzhou Cui
Exec Chair
Date: March 03, 2021

Office of Astronomy for Development

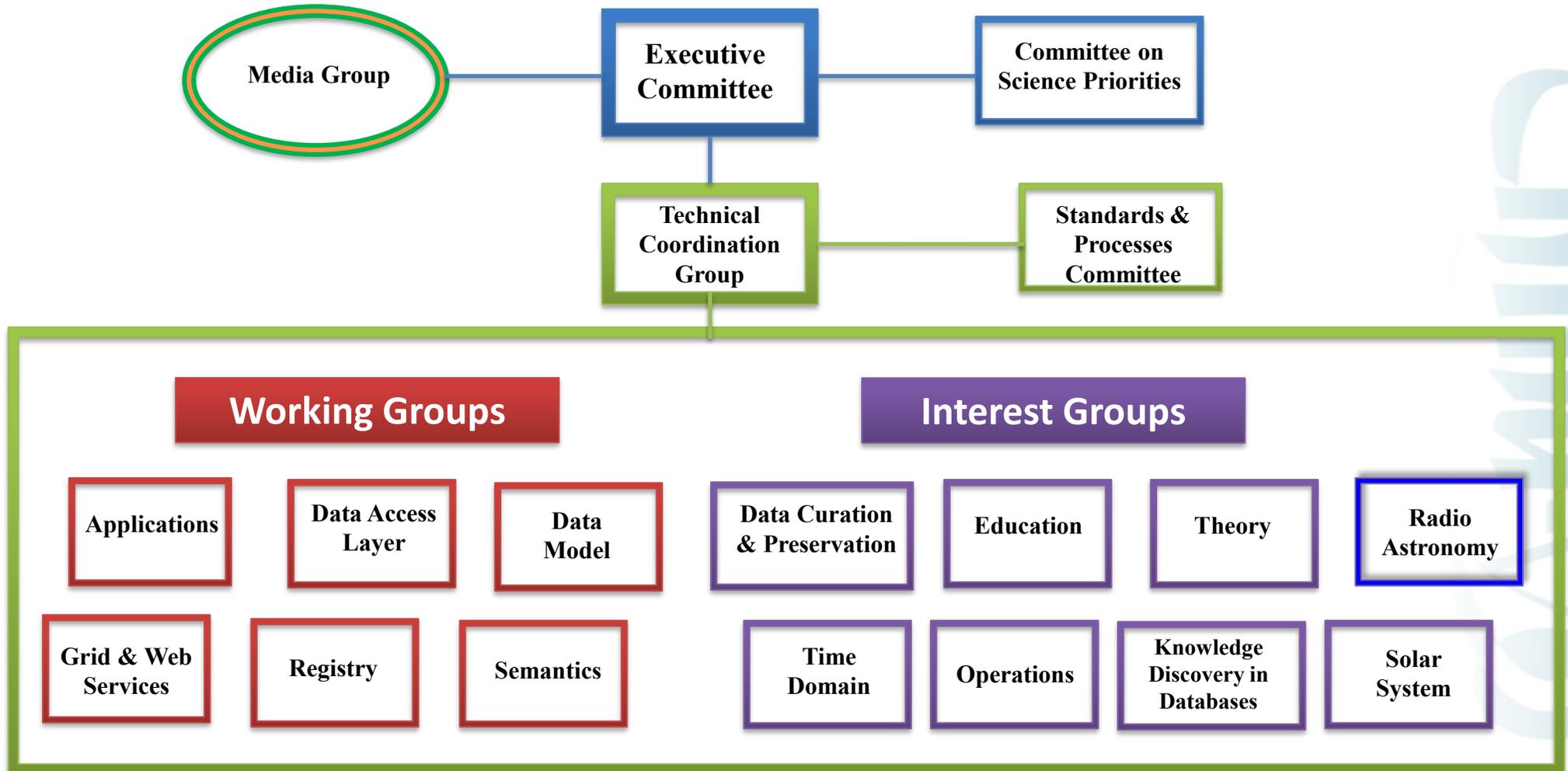
Kevin Govender
Director
Date: March 03, 2021

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The screenshot shows the IVOA website's 'Partners' page. At the top, there is a logo for the Office of Astronomy for Development (OAD) and the text 'IAU Office of Astronomy for Development (OAD)'. Below this, there is a link for 'Guidelines for Participation'. A red callout box with white text says 'The first official partner for the IVOA'. The page also features three columns of links: 'For Astronomers' (Getting Started / Using the VO, VO Glossary / VO Applications, IVOA newsletter / VO for Students & Public), 'For Deployers/Developers' (Intro to VO Concepts / IVOA Standards / Guide to Publishing in the VO / Technical Glossary), and 'For Members' (IVOA Calendar / Working Groups / Twiki / Documents in Progress / Mailing Lists / IVOA Roadmap). Below the screenshot, there is another browser window showing the 'Partners & Networks' page on the astro4dev.org website. This page has a navigation bar with 'HOME', 'OUR WORK', 'IMPACT', 'REGIONS', 'ABOUT US', and 'CONTACT'. The main content area features a paragraph about the IVOA and its partnership with the OAD, along with the IVOA logo.

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
				<i>Replaced by the following</i>
4 May - 8 May	Virtual Interoperability Meeting		Online	Meeting Page, Program Page
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
				<i>Replaced by the following virtual meeting d</i>
17 Nov - 19 Nov	Virtual Interoperability Meeting		Online	Meeting Page, Program Page
Dec 15	Exec Telecon (TM95)	Telecon	14:00 UTC	

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	Meeting Page, Includes O&A, CIM & DM mini-workshop

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

RDA
RESEARCH DATA ALLIANCE

O&A Members **61**

MEMBERSHIP **Members: 11823**

RDA Groups **WG & IGs: 96**

Active Organisational & Affiliate members

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

Discover what RDA Working and Interest Groups and all other Groups are up to and find out how to join them. [Explore Groups](#)

Register now

ABOUT RDA ▾ GET INVOLVED ▾ GROUPS ▾ RECOMMENDATIONS & OUTPUTS ▾

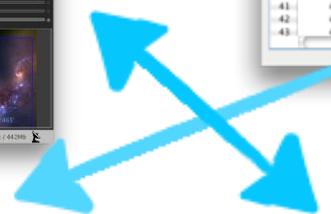
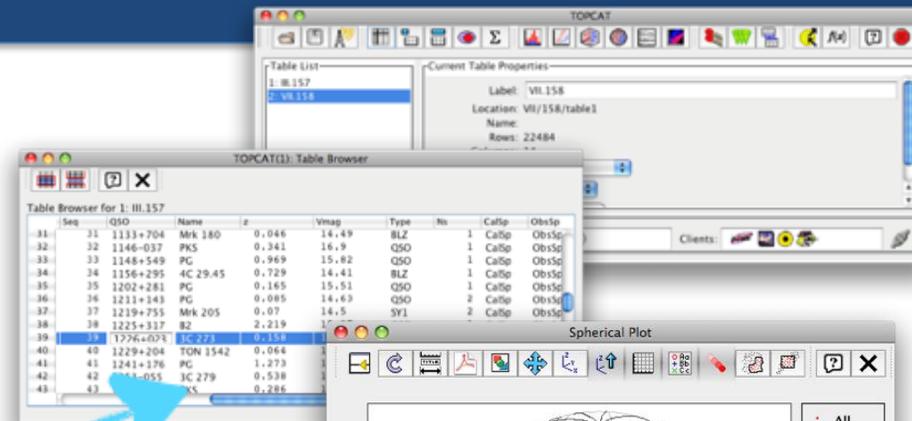
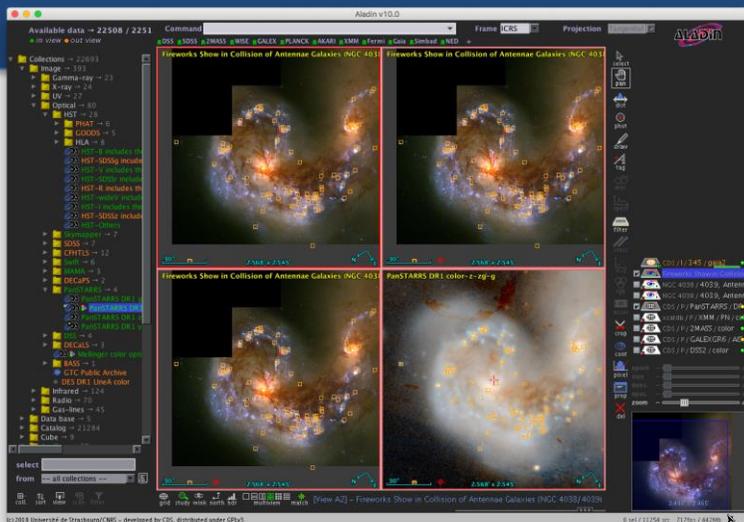
IVOA, Interoperability commons for astronomical data

A typology of the components of Global Open Research Commons

[Home](#) » [Plenaries](#) » A typology of the components of Global Open Research Commons

Interoperable applications and services

Aladin



Your apps & programs

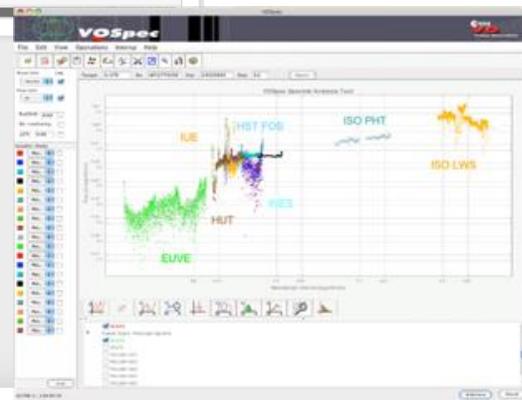
```
In [ ]: 1 from ipyaladin import Aladin
2 a = Aladin(target='18 55 24.508 +04 29 46.72', survey='P/Mellinger/color', fov=180)
3 a

In [ ]: 1 a.color = 'P/GALEXGR6/AIS/color'; a.target = 'M101'; a.fov = 0.3

In [ ]: 1 a.survey = 'P/GALEXGR6/AIS/color'; a.target = 'M101'; a.fov = 0.3
2 nloadTablesOutputFormat=vot&filename=vizier_M101_I1_328_allwise_20190322, {'color': 'red', 'onClick': 'showTable'})
3
```

Notebooks

Spectral tools



TOPCAT

Broadcast

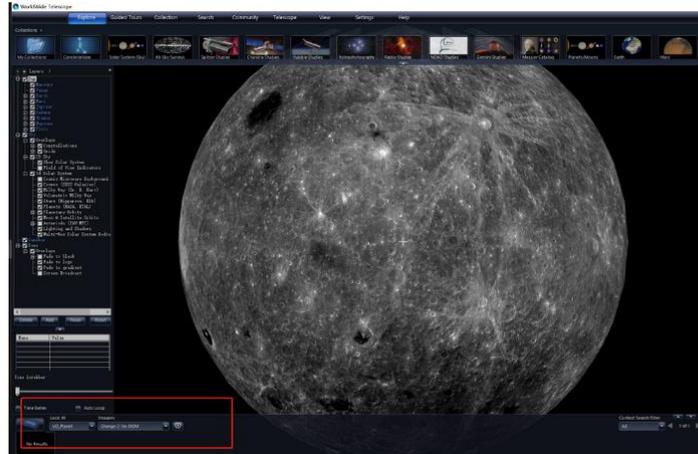


China-VO

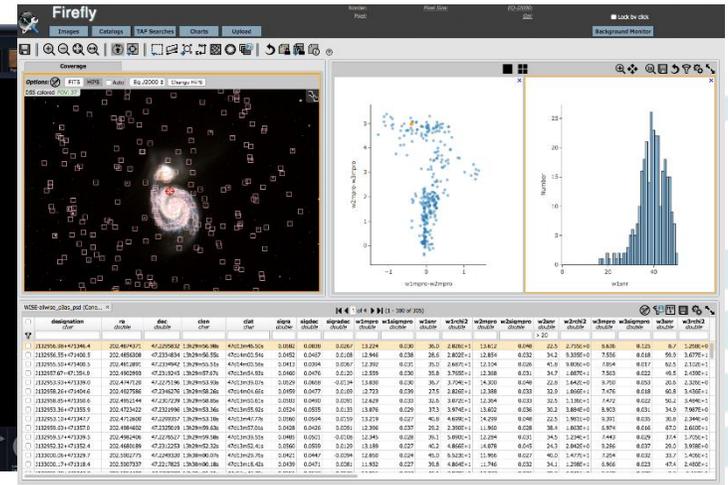
VO embedded in astronomy services



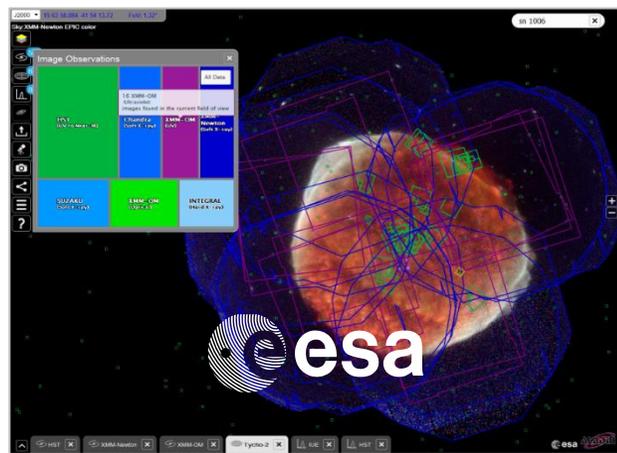
ESO Science Portal



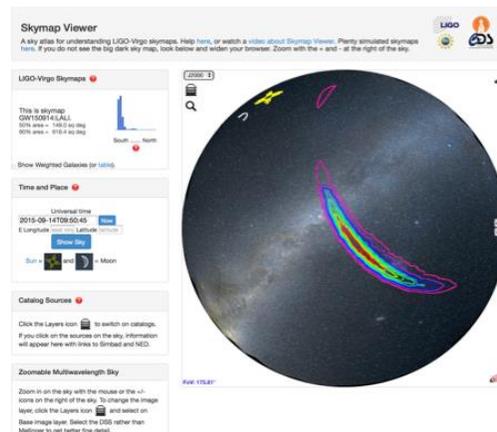
WWT



Firefly
Caltech-IPAC



ESA Sky

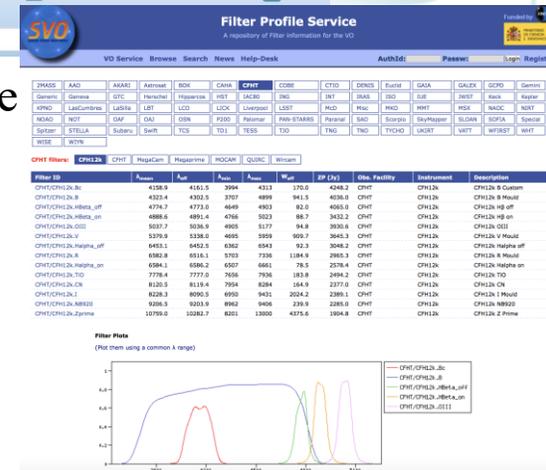


Grav. waves

The screenshot shows the CDS reference data service interface. It features a search bar at the top with the text 'Object/position' and 'Obj/position/bibcode'. Below the search bar are several service icons: 'EDS PORTAL', 'SIMBAD', 'VizieR', and 'Aladin'. The interface also includes a 'Filter Profile Service' section with a table of filter profiles.

CDS reference data service

SVO Filter Profile service



VO is FAIR

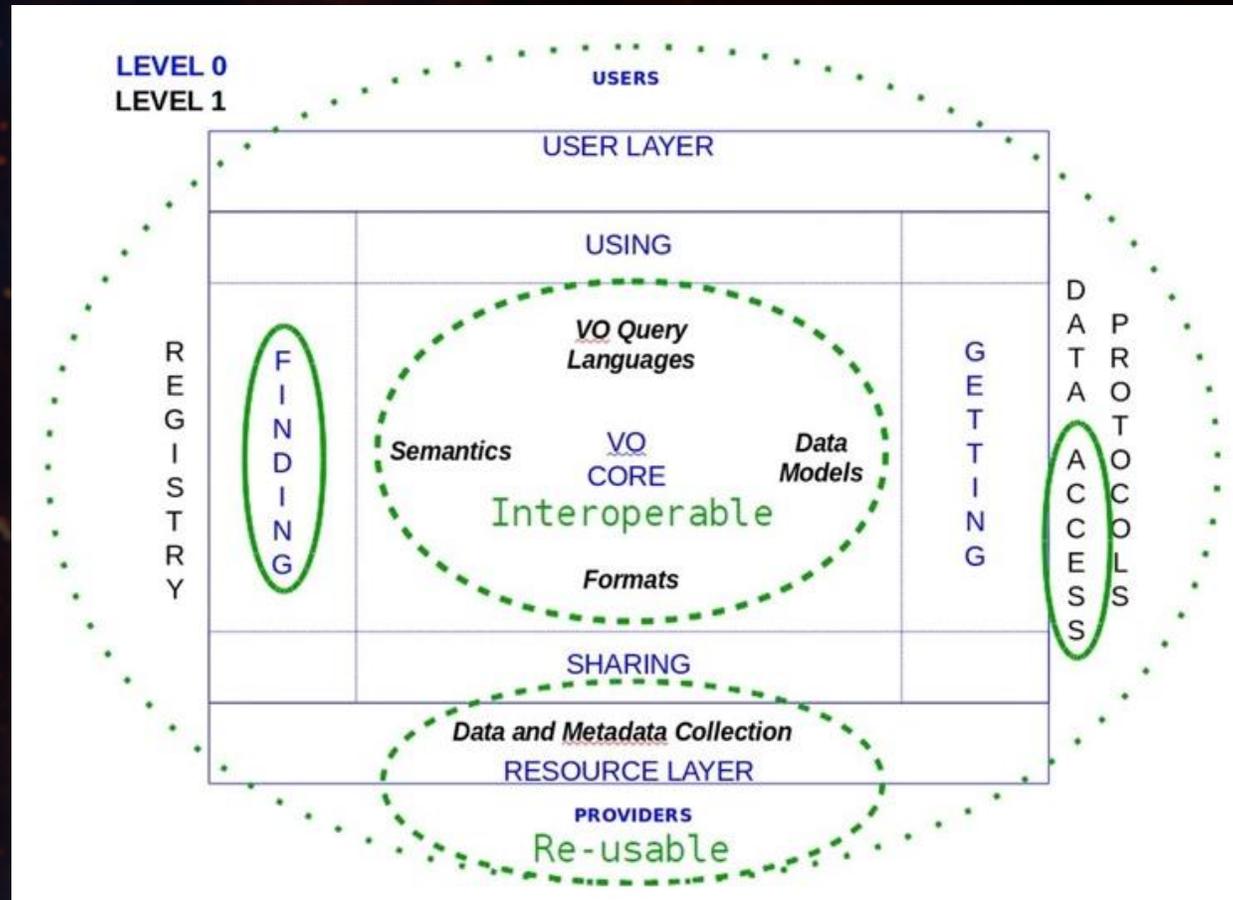
Making data:

Findable

Accessible

Interoperable

Reusable



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

IVOA, Interoperability commons for astronomical data



International Virtual Observatory Alliance

May 2021 IVOA virtual Interop Meeting

Credit: X-ray: NASA/CXC/CfA/R. Tullmann et al.; Optical: NASA/AURA/STScI

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, ...



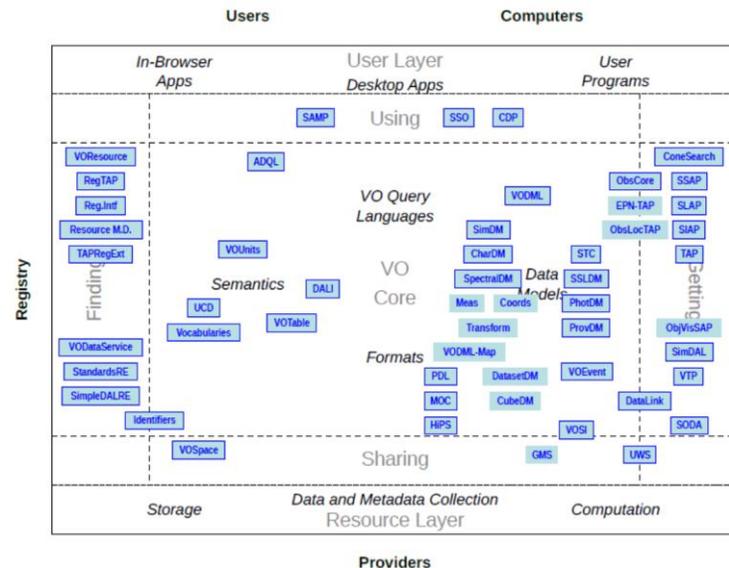
Evolving with new requirements

- 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



4 Authentication and Authorization

- 4.1 SSO
- 4.2 CDP
- 4.3 GMS

5 Application and Format Standards

- 5.1 HiPS
- 5.2 MOC
- 5.3 VOTable
- 5.4 SAMP

6 Semantics Standards

- 6.1 Vocabularies
- 6.2 VOUnits
- 6.3 UCD

7 Registry Standards

- 7.1 Identifier
- 7.2 VOResource
- 7.3 VODataService
- 7.4 Registry Interface
- 7.5 Resource Metadata

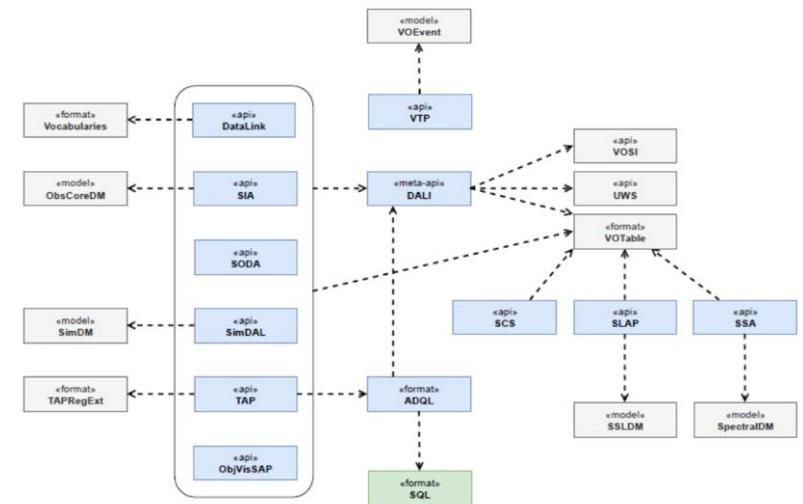


Figure 9: Data Access Standards and Dependencies

Highlights from IVOA Members



China-VO

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 2020

Astronomical Surveys and Big Data 2
14-18 September, 2020, Byurakan, Armenia

The International Symposium Astronomical Surveys and Big Data 2 (ASBD-2) will take place on 14-18 September 2020. This will be the 2nd such meeting; we had a very successful meeting ASBD in 2015 with participation of astronomers and computer scientists. We combined astronomers and computer scientists with heavy involvement of astronomical surveys, catalogs, archives, databases and VOs.

Invited Speakers

- Mashhoor Al-Wardat (United Arab Emirates)
- Chenzhou Cui (China)
- Markus Demleitner (Germany)
- Davide Elia (Italy)
- Ashish Mahabal (USA)
- Oleg Malkov (Russia)
- Areg Mickaelian (Armenia)
- Fabio Pasian (Italy)
- Kaustubh Vaghmare (India)

Main Topics

- Astronomical Surveys
- Data Reduction and Analysis
- Digitization of astronomical data
- Astronomical Catalogues, Archives and Databases
- Big Data in Astronomy
- Data Science
- Astrostatistics and Astroinformatics
- Virtual Observatories

Scientific Organizing Committee (SOC)

- Areg Mickaelian (Armenia, Chair)
- Markus Demleitner (Germany)
- Chenzhou Cui (China)
- Ajit Kembhavi (India)
- Andy Lawrence (UK)
- Ashish Mahabal (USA)
- Oleg Malkov (Russia)
- Masatoshi Ohishi (Japan)
- Fabio Pasian (Italy)
- Alain Sarkissian (France)
- David Schade (Canada)

Local Organizing Committee (LOC)

- Gor Mikayelyan (Chair)
- Naira Azatyan (Secretary)
- Hayk Abrahamyan
- Derenik Andreevyan
- Hasmik Andreevyan
- Daniel Baghdasaryan
- Sona Farmanyan
- Arus Harutyunyan
- Gayane Kostandyan
- Gurgen Paronyan
- Anahit Samsonyan
- Andranik Suqiasyan

Organizers and Sponsors

Contacts

Address: Byurakan Astrophysical Observatory (BAO), Byurakan 0213, Aragatzotn province, Armenia
E-mails: asbd2@bao.am, gormick@mail.ru (Gor Mikayelyan)
Web: <https://www.bao.am/meetings/meetings/ASBD2/contacts.html>

ArVO



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

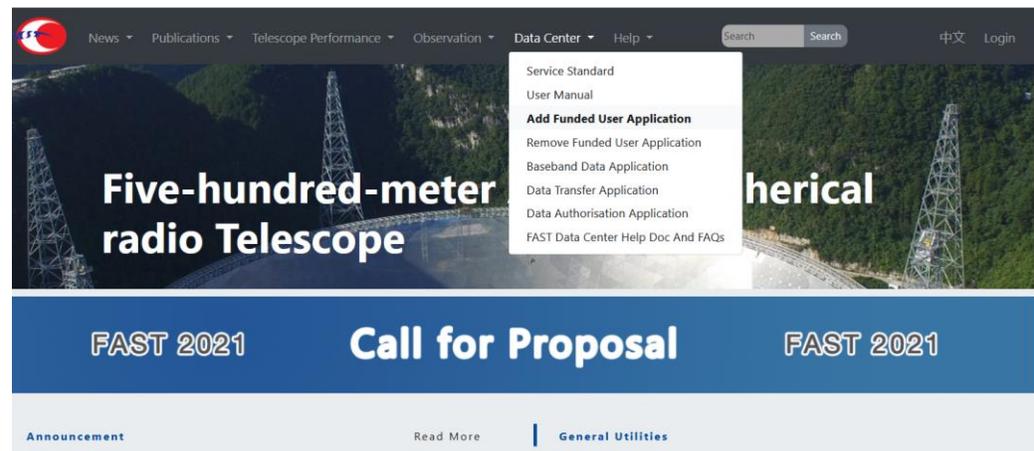
- ASKAP data for Phase 1 surveys ingested and released (RACS, EMU, WALLABY)
- \$65million AUD announced for Australian SKA Regional Centre
- CASDA will be moving to Ceph filesystem store, so a lot of development work will be required

China-VO: FAST Call for Proposal

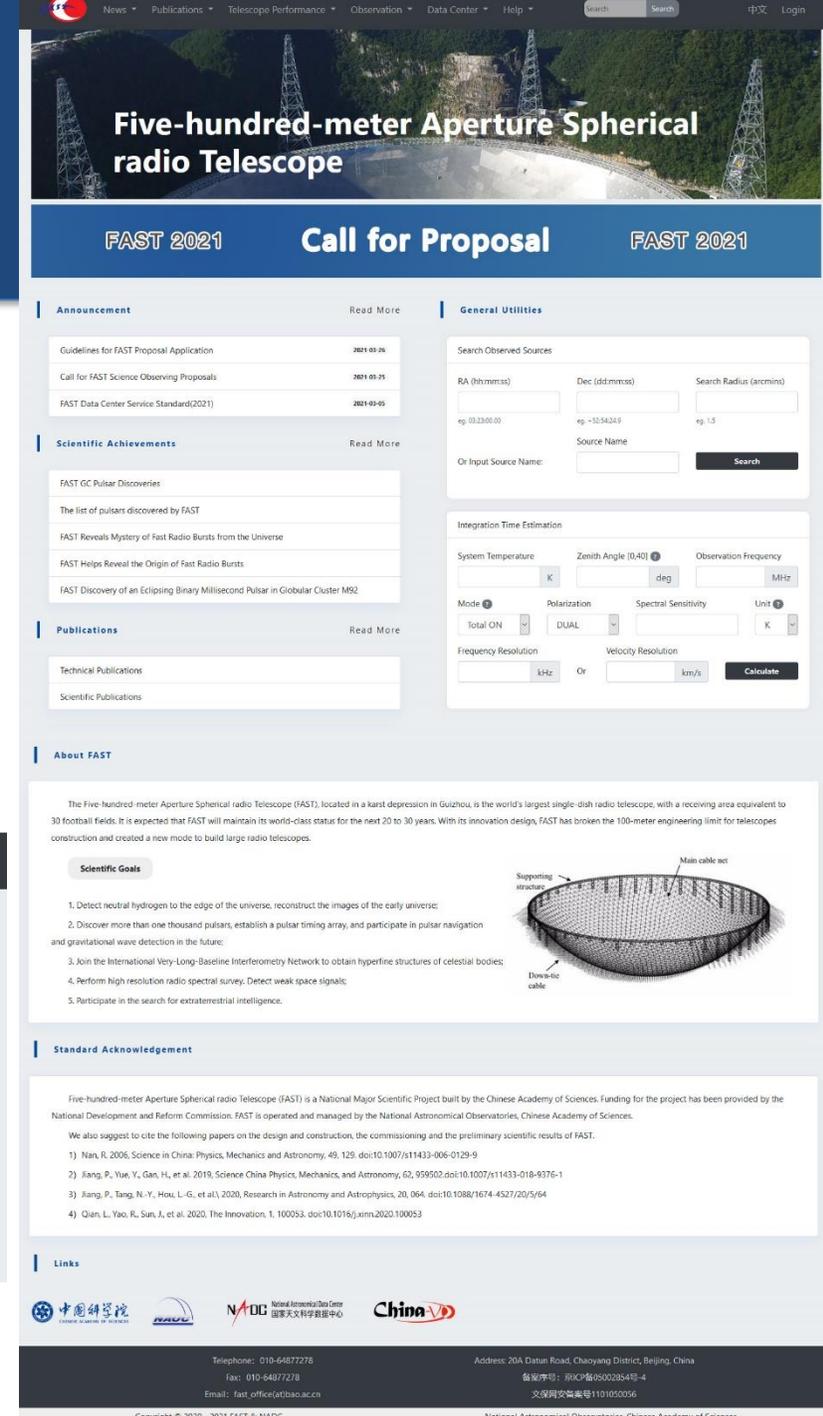
- The Five-hundred-meter Aperture Spherical radio Telescope (FAST) located in a karst depression in Guizhou, is the world's largest single-dish radio telescope, with a receiving area equivalent to 30 football fields.
- Call for Proposals were open between 30th March and 15th May 2021. **216 proposals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



Best practice award on e-Science
CAS, 2020



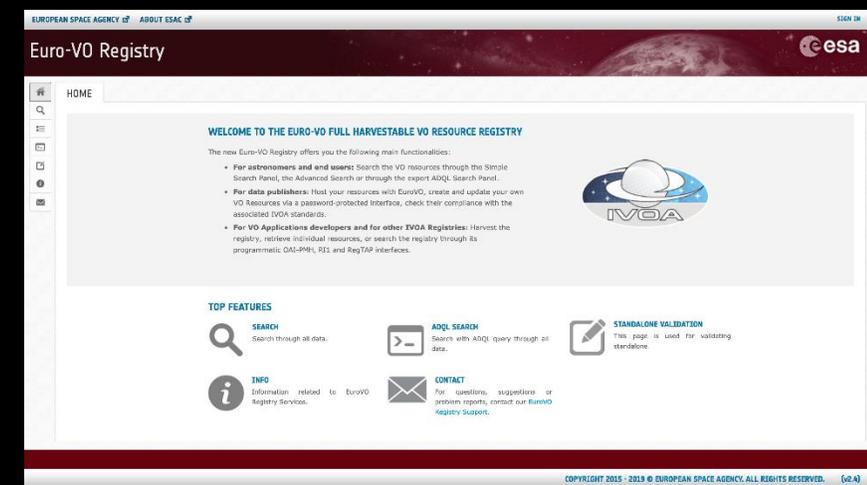
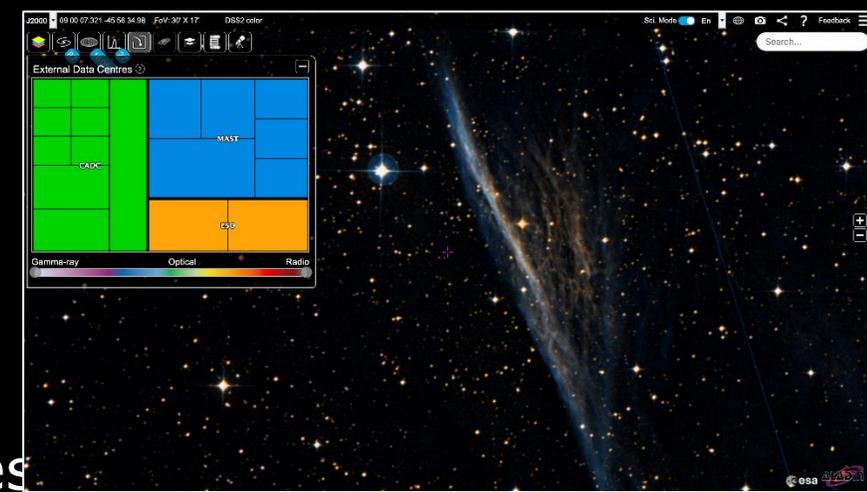
<https://fast.bao.ac.cn/>



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



- * Activities are being pursued within the EC funded **ESCAPE** Project
 - * In the work package: **CEVO "Connecting ESFRI to the EOSC 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)



Euro-VO Status and Highlights

* ESCAPE project Feb 2019- Jan 2023

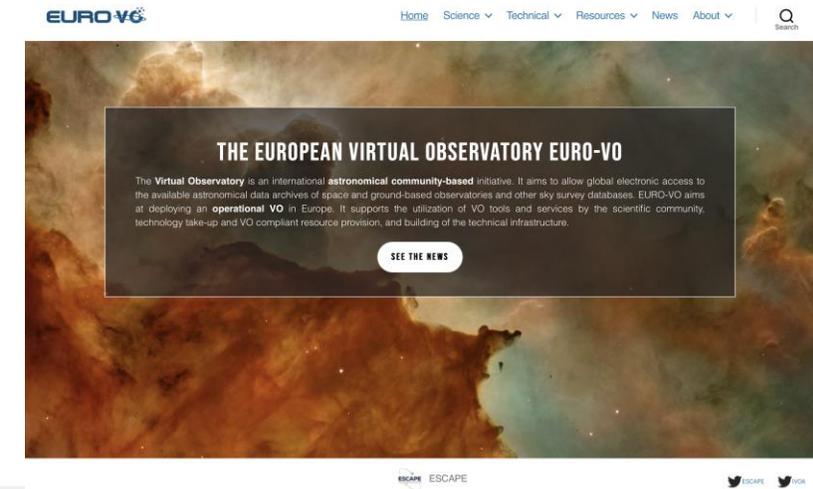
- * Successful mid-term review in Nov 2020
- * VO is integrated part of ESCAPE in coordination with:
 - * Software Repository / Science Platform / Data Infrastructure -- being developed in context of EOSC
- * Deliverable reports etc. - <https://projectescape.eu>

* Recent Activities:

- * IVOA Newcomers Introduction sessions – H. Heintl, 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*)



GAVO

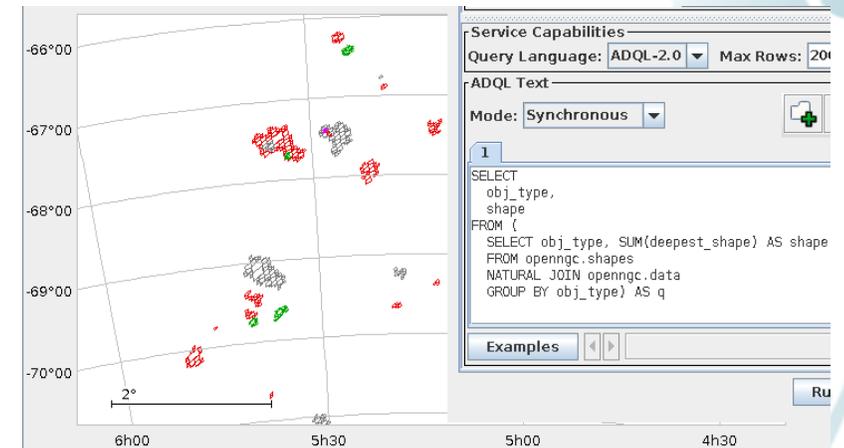
- Software

- 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_speconv 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.gvo.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)

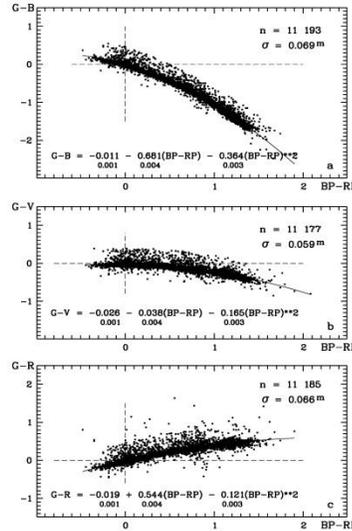
Current efforts/activities include:

- **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

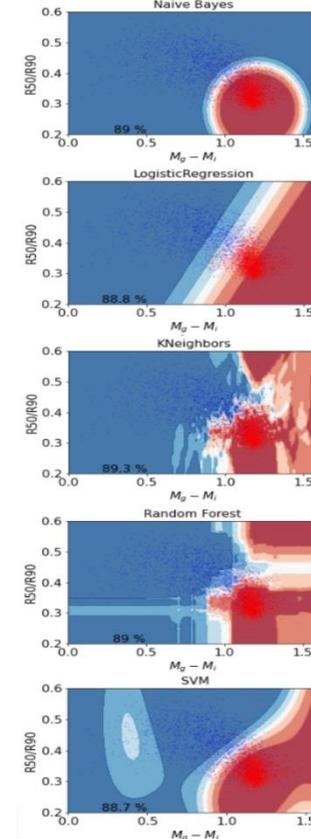
Big galaxy surveys and Machine learning

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

Photometry-based approach for galaxy morphological classification

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

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

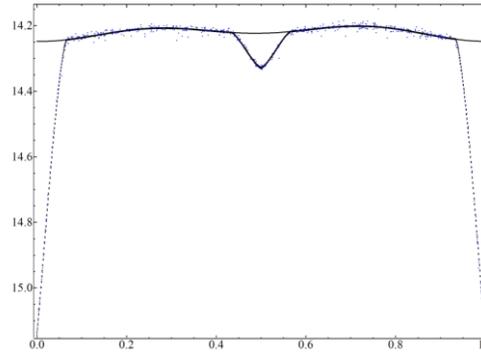


Parameters for training: magnitudes in U, B, I, and K bands; colour indices, surface brightness, angular size, radial velocity, and coordinates. Test set: 91 760 galaxies at $z < 0.2$ from the NED.

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.

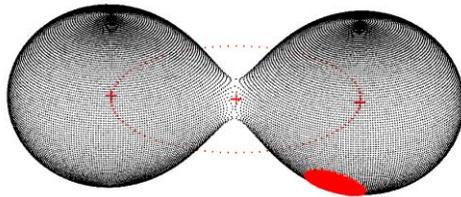
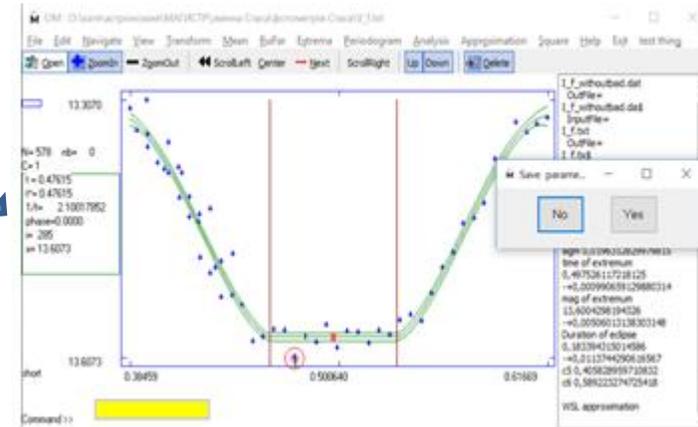


Statistically optimal modelling of Variability (methods and software)

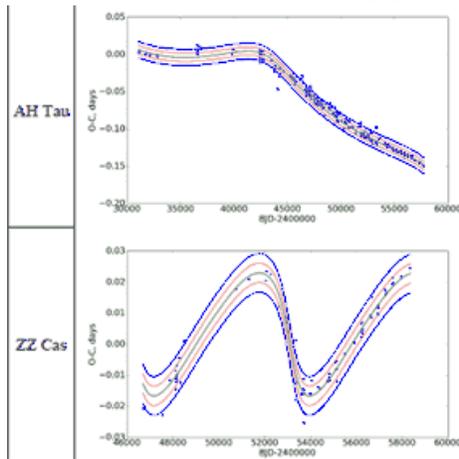


Transits of exoplanets

Catalogue of Phenomenological Characteristics of Eclipsing Binaries

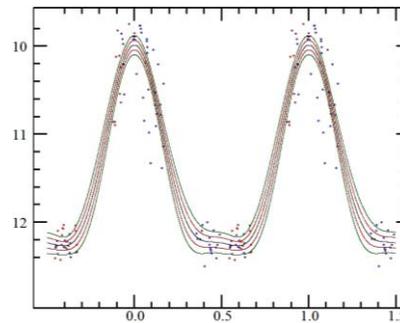


Physical Modelling of newly discovered variables

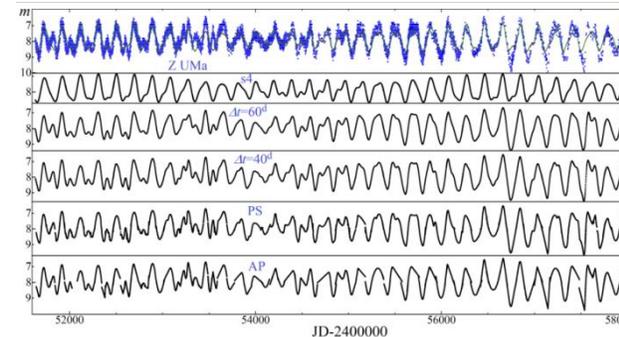
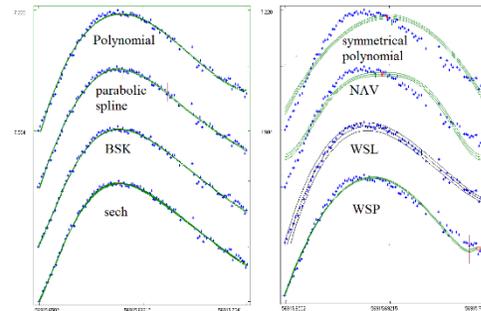


Third bodies at circumbinary elliptical orbits

Software: MCV
MAVKA, NAV,
FDCN, FVSE



Pulsating stars with different degree of stability

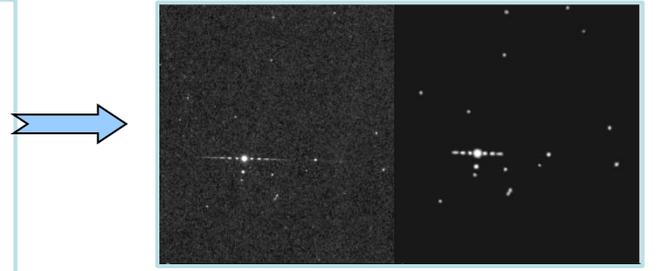




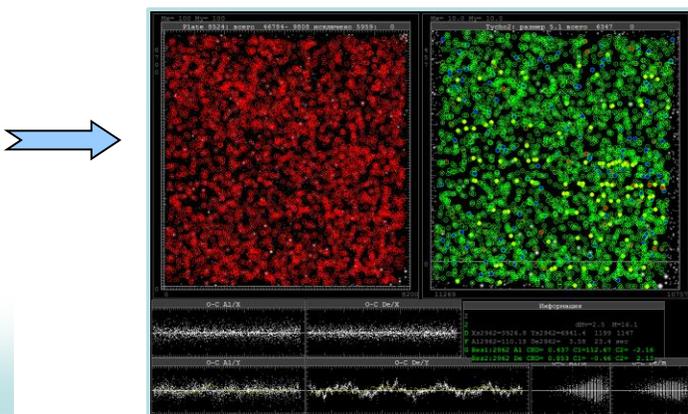
Creation of catalogs of coordinate and proper motions in fields with open clusters with common reduction of CCD observation and plate archive images



Use scanner Epson V750 Pro for receiving images of photo plate



Reduction and obtained coordinates of about 30 mln. objects.



Obtained catalogs:



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.

- 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**

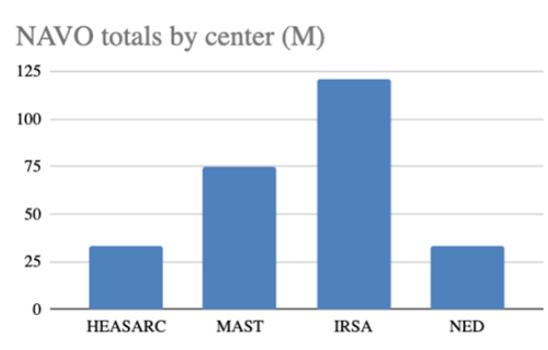
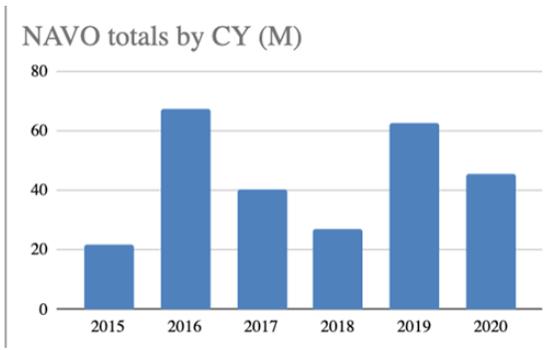
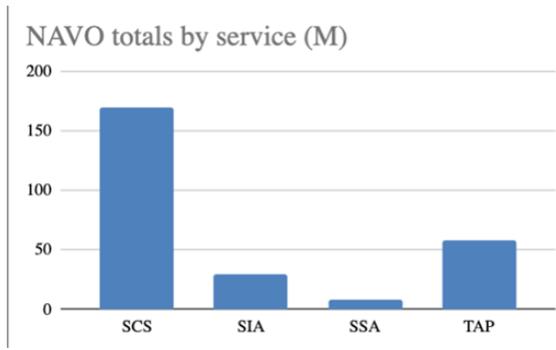


USVOA-NAVO Highlights. May 2021

- 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	2017: 40.3 M	HEASARC 33.3 M
SIA	2018: 27.2 M	MAST 74.8 M
SSA	2019: 62.7 M	IRSA 121 M
TAP	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 proposals as well as longer proposals that take the hour.

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



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](#))

IVOA Interop
May 25-28, With Intro session May 24 !!
Registration page: <https://indico.icat.inaf.it/ivoa/interop-may-2021>
Schedule: <https://www.ivoa.net/en/ivoa/interop/ivoa/interop-may-2021>

Highlights

IVOA Newcomers session - May 24 @ 20:30 UTC

Aiming at newcomers to the VO, we will present a scientific use case using several VO-standards and protocols. We will also explain the process of developing these standards and how Working Groups and Interest Groups relate to this process. We hope this session will help newcomers understand the structure of the IVOA and how InterOp meetings are organized in order to get the most out of it.

Mini-Workshop (May 24-27 @ 13:00UTC) - Use of Science Platforms for the dissemination of Cosmological Simulations

A Science Platform is an environment providing advanced functionality to analyze and process large and complex data-sets close to the data. In recent years the Grid and Web Services working group has been focusing on Science Platforms as a complementary approach to downloads that are traditionally still part of our standardization efforts. As data sets are getting ever larger and more complex, for many use cases it becomes imperative to bring analysis to the data.

In this workshop we want to bring together scientists, experts in computational Cosmology, VO experts and SP developers to discuss current implementations and ideas for their future development. In particular we want to identify areas where a common, standardized approach might benefit the community, which the IVOA could take up in its efforts. This may include metadata standards for discovery, or standards for the formats, compute environments, or data access libraries.

Mini-Workshop (May 25-28 @ 15:00UTC) - Data Model Usage in the VO

In January, the Data Model Working group (DM WG) engaged in a collaborative process to illustrate how the VO can use models to facilitate interoperability when accessing/analyzing data. Over the past 6 months, different contributors exercised their proposals to improve the metadata representation in VOTable by using model annotations. The outcome of this work will serve as a basis for discussions during the DM workshop. The DM WG encourages those interested by any aspect of data modeling to attend and contribute.

We have a few interesting cases with differing levels of complexity to present based on time series and catalog data. The workshop is planned to take place in 8 focused sessions including the following topics: DM landscape; Use case work; Scientific vision of the DM usage in the VO; Discussions.

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.icat.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 Merin
	05:40	20 min	State of the TCG	Patrick Dowler