IVOA Newsletter - July 2021

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IVOA Newsletter Editors: Stefania Amodeo, Deborah Baines, Giulia Iafrate.

The International Virtual Observatory Alliance (IVOA) was formed in June 2002 with a mission to facilitate the international coordination and collaboration necessary for the development and deployment of the tools, systems and organizational structures necessary to enable the international utilization of astronomical archives as an integrated and interoperating virtual observatory. The IVOA now comprises 20 VO programs from Argentina, Armenia, Australia, Brazil, Canada, Chile, China, Europe, France, Germany, Hungary, India, Italy, Japan, Russia, South Africa, Spain, Ukraine, the United Kingdom, and the United States and an inter-governmental organization (ESA). Membership is open to other national and international programs according to the IVOA Guidelines for Participation. You can read more about the IVOA and what we do at http://ivoa.net/about/.

What is the VO?
The Virtual Observatory (VO) aims to provide a research environment that will open up new possibilities for scientific research based on data discovery, efficient data access, and interoperability. The vision is of global astronomy archives connected via the VO to form a multiwavelength digital sky that can be searched, visualized, and analyzed in new and innovative ways. VO projects worldwide working toward this vision are already providing science capabilities with new tools and services. This newsletter, aimed at astronomers, highlights VO tools and technologies for doing astronomy research, recent papers, and upcoming events.

IVOA NEWS

Northern Fall Interoperability Meeting Overview
Janet Evans, Marco Molinaro and Patrick Dowler

The Northern Spring Interop meeting was held May 25-28, 2021 via Zoom with 256 registered participants. New this year was a Newcomers session, and 2 Mini-Workshops. The Newcomers session was sponsored by the Education Interest Group and held on May 24 – the day before the opening of the Interop. Several scientific use cases were demoed using VO-standards and protocols. The aim was to help newcomers understand the structure of the IVOA and how Interop meetings are organized in order to get the most out of the upcoming meeting.

The first Mini-Workshop was on the use of Science Platforms for the dissemination of Cosmological Simulations. The workshop brought together scientists, experts in computational Cosmology, VO experts and SP developers who presented and discussed current implementations and ideas for their future development. The sessions were well attended with many contributions.

The second Mini-Workshop was on Data Model Usage in the VO. In January, a collaborative process was initiated to illustrate how the VO can use models to facilitate interoperability when accessing and analyzing data. The outcome of this work served as a basis for presentations and discussions during the Data Model workshop with a focus on time series and catalog data. Follow-on discussions have been ongoing since the workshop with efforts toward a final mapping syntax and development of a roadmap planned for conclusion this summer.

A community session was held on IVOA/Astropy/Astroquery/PyVO Collaborations where members of the IVOA, Astropy, and User community discussed topics and priorities for further joined priorities and efforts. Other sessions led by the IVOA Working and Interest Groups focused on core topics related to current Technical Coordination Group (TCG) efforts. Community led presentations provided a balance between contributed and core presentations. All sessions were recorded and available here.

The TCG thanks all outgoing members and particularly Pat Dowler who completed his term as TCG chair. We welcome all new committee members and we thank all who participated in the May Virtual Interop meeting. We also welcome you to participate in the efforts of the IVOA through the working group and interest group email & slack discussions and by engaging with the IVOA.

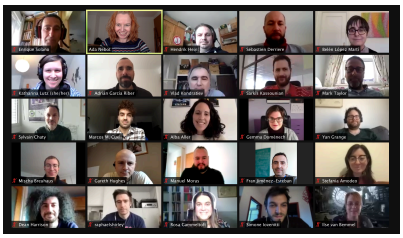
Here are several links to get involved:

IVOA Website	https://www.ivoa.net/	Place to start
IVOA Wiki pages	https://wiki.ivoa.net/	Collaboration area
Main Mailing List	interop 'at' ivoa.net	IVOA community list
All Mailing Lists	https://www.ivoa.net/members/	Identifies email lists for all WG/IG, CSP & Exec.
Slack	https://ivoa.slack.com/	Collaboration slack channel
Github	https://github.com/ivoa	Collaboration development/new ideas
Github	https://github.com/ivoa-std	Standard document development

SCHOOLS AND WORKSHOPS

"Python in Astronomy" training workshop
Boliang He
From 25 to 28 May, 2021, the Chinese Virtual Observatory (China-VO) hosted the "Python in Astronomy" training workshop for young astronomers. 30 graduate students from all over the country participated in the event. The

training topics included fundamental of python, astronomical data, Virtual Observatory and AstroPy. Hands-on tutorials on photometric and spectral data processing were very welcomed by the participants.



First "ESCAPE Science with interoperable data" school
Enrique Solano, Miriam Cortés
Following the long tradition of VO schools organised by the Euro-VO initiative in the framework of different European projects (AIDA, 2008-2010; ICE, 2010-2012; CoSADIE, 2012-2015; and ASTERICS, 2015-2019) the ESCAPE project held its first VO school on 8-12, 19 February 2021. As in previous schools, the goal was twofold: to expose participants to the variety of VO tools and services so that they can use them efficiently for their own research, and to gather requirements and feedback from them. Participants were also introduced to the vision of the ESCAPE project, in particular to the new context of data sharing where the Virtual Observatory framework is being integrated into the European Open Science Cloud (EOSC).

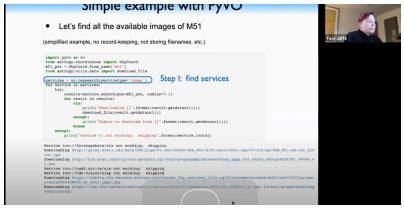
The school was planned to be held in Madrid in May 2020. However, due to the COVID-19 pandemic, it was postponed and held on-line on February 2021 using Zoom and Slack as platforms.

During the school, VO experts gave hands-on sessions on the usage of VO tools and services using real life examples of scientific applications. These hands-on tutorials provided the starting point for participants to use the tools and services for their own science projects with the benefit of the expertise of the tutors.The hands-on tutorials and the more advanced presentations were aimed at addressing the needs of the participants based on the information they provided during the registration. The last day was dedicated to the participants own science cases, applying what they had learnt earlier in the week.

The school was the first experience for many of the partners to run a high-level-interactive event in an on-line setting. Nevertheless, this challenging situation did not prevent the school from running very smoothly and in a perfect “virtual” atmosphere. The meeting was a success, with a great atmosphere favouring a lot of exchanges and discussions. 93% of the participants rated the school as “very good” or “excellent” while 100% of the participants foresee using VO-tools in their future research.

More information on the school can be found here.

NAVO Workshop "Accessing NASA’s Astrophysics Archives using Python"
Bruce Berriman
During the summer meeting of the American Astronomical Society, held June 7-11 2021, the NASA Astronomical Virtual Observatories (NAVO) hosted a workshop titled "Accessing NASA’s Astrophysics Archives using Python”. The workshop described several use cases that involved discovery and access of data across NASA VO-compliant images.

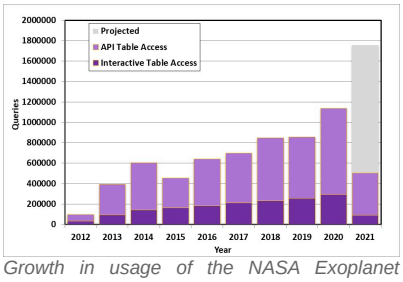


The Python notebooks developed for the workshop are available here and a webinar recording of the session is here.

Access more scientific usage tutorials here

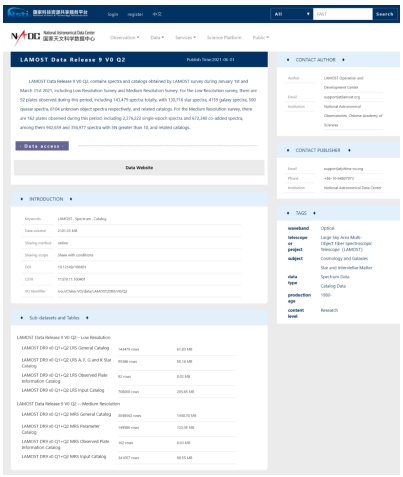
VO APPLICATIONS AND IMPLEMENTATION HIGHLIGHTS

TAP Service at the NASA Exoplanet Archive
Bruce Berriman
The NASA Exoplanet Archive, operated by the NASA Exoplanet Science Institute at IPAC, has over the past 18 months redesigned its infrastructure to make the data more standardized, easier to access, more complete, and better reflect the scientific progress of the field of exoplanetary astrophysics. As part of this effort, the Exoplanet Archive released new and more comprehensive tables that were underpinned by Python-based nexsciTAP server (https://github.com/Caltech-IPAC/nexsciTAP). With the release of the new tables atop the new TAP services in 2020, the NASA Exoplanet Archive saw a noticeable increase in access of the tables by the community. The NASA Exoplanet Archive is now in the process of making all its tables TAP compliant.



Growth in usage of the NASA Exoplanet Archive over time. The TAP services were released in 2020.

VO standards-based Metadata Management and Data Submission System of NADC
Yihan Tao
The National Astronomical Data Center (NADC) of China has developed a metadata management and data submission system. Data preservation for research project is one of the major responsibilities for NADC.The



system is aimed at supporting the data submission process of astronomical projects, including the submission and review of metadata and data. With the system, data administrators can also curate a published data catalogue and manage the metadata. The metadata standard employed in the system is consistent with and extended from the VO standards-Resource Metadata for the Virtual Observatory Version 1.12 and IVOA Observation Data Model Core Components and its Implementation in the Table Access Protocol. In order to describe and filter the dataset by types, a multifaceted taxonomy of waveband, telescope/project, subject, data product type, production age, process level, content type and content level is adopted in the system and displayed as tags.

SOME RECENT PAPERS ABOUT VO-ENABLED SCIENCE

Featured Science Publication

Gaia Early Data Release 3. Summary of the contents and survey properties
Gaia Collaboration
A&A (2021) Volume 649, A120
Context. We present the early installment of the third Gaia data release, Gaia EDR3, consisting of astrometry and photometry for 1.8 billion sources brighter than magnitude 21, complemented with the list of radial velocities from Gaia DR2.
Aims. A summary of the contents of Gaia EDR3 is presented, accompanied by a discussion on the differences with respect to Gaia DR2 and an overview of the main limitations which are present in the survey. Recommendations are made on the responsible use of Gaia EDR3 results.
Methods. The raw data collected with the Gaia instruments during the first 34 months of the mission have been processed by the Gaia Data Processing and Analysis Consortium and turned into this early third data release, which represents a major advance with respect to Gaia DR2 in terms of astrometric and photometric precision, accuracy, and homogeneity.
Results. Gaia EDR3 contains celestial positions and the apparent brightness in G for approximately 1.8 billion sources. For 1.5 billion of those sources, parallaxes, proper motions, and the (GBP − GRP) colour are also available. The passbands for G, GBP, and GRP are provided as part of the release. For ease of use, the 7 million radial velocities from Gaia DR2 are included in this release, after the removal of a small number of spurious values. New radial velocities will appear as part of Gaia DR3. Finally, Gaia EDR3 represents an updated materialisation of the celestial reference frame (CRF) in the optical, the Gaia-CRF3, which is based solely on extragalactic sources. The creation of the source list for Gaia EDR3 includes enhancements that make it more robust with respect to high proper motion stars, and the disturbing effects of spurious and partially resolved sources. The source list is largely the same as that for Gaia DR2, but it does feature new sources and there are some notable changes. The source list will not change for Gaia DR3. Conclusions: Gaia EDR3 represents a significant advance over Gaia DR2, with parallax precisions increased by 30 per cent, proper motion precisions increased by a factor of 2, and the systematic errors in the astrometry suppressed by 30-40% for the parallaxes and by a factor ~2.5 for the proper motions. The photometry also features increased precision, but above all much better homogeneity across colour, magnitude, and celestial position. A single passband for G, GBP, and GRP is valid over the entire magnitude and colour range, with no systematics above the 1% level.
DOI: 10.1051/0004-6361/202039657

Refereed Publications

The full list of refereed publications from March 2021 to July 2021 can be found at the following list, curated by the Spanish Virtual Observatory.

More Ways to Find VO-related Publications

All ADS links mentioning the "virtual observatory" in the abstract.

All refereed publications mentioning the "virtual observatory" in the abstract.

VO CALENDAR

24 - 28 October 2021 - ADASS XXXI
Hybrid meeting
The XXXI ADASS conference will be held in Cape Town (South Africa). This annual Astronomical Data Analysis Software and Systems (ADASS) conference, held in a different location each year, is a forum for astronomers, computer scientists, software engineers, faculty members and students working in areas related to algorithms, software and systems for the acquisition, reduction, analysis, and dissemination of astronomical data. The ADASS XXXI program will include invited talks, contributed papers, display sessions, tutorials, computer demonstrations, and special interest (“Birds of a Feather” or BoF) meetings.

2 - 4 November 2021 - IVOA Interoperability Meeting
Online
The International Virtual Observatory Alliance (IVOA) semi-annual Interoperability meetings provide an opportunity for discussion and development of virtual observatory standards and VO-based applications, and are open to those with an interest in utilizing the VO infrastructure and tools in support of observatory operations and/or astronomical research. The Northern Fall 2021 IVOA Interoperability meeting will be a Virtual Conference.

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

For Members

IVOA Calendar / Working Groups/
Twiki / Documents in Progress /
Mailing Lists / IVOA Roadmap