IVOA Newsletter - September 2019

Subscribe | Newsletter archives | Write to the editors

IVOA Newsletter Editors: Deborah Baines, Bruce Berriman, Jamie Anne Budynkiewicz, Theresa Dower, Giulia Iafrate, Shanshan Li, Simon O'Toole, Yihan Tao.

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

IVOA Interoperability meeting in Paris, France
The Northern Spring meeting of the IVOA took place in Paris, France at the Paris Observatory between 12-17 May 2019. The meeting was hosted by the Paris Astronomical Data Centre and Observatoire Virtuel France (OV-France), and gathered 131 participants from around the world for a full schedule of events covering many aspects of the development and use of the Virtual Observatory.

The Interop was centred around the sessions of the IVOA Working- and Interest-Groups which are the essential face-to-face working meetings of these groups for the development of IVOA standards, and also for reporting of feedback from implementations.

The IVOA Committee for Science Priorities organized a Focus Session on Big Data Challenges where representatives from LSST, SKA, MAST and the ESA Gaia and Euclid missions outlined their data exploitation plans. The presentations and discussions showed that VO compliance is well integrated into their plans, and that the development of science analysis platforms is a strong common theme.

A special 'experimental' event at this Interop was the Astropy-VO Sprint/Hackathon which gathered participants from the Astropy project and VO projects to work together on specific improvements to the interoperability of the VO within Astropy, and as a way to build stronger connections between VO and Astropy.

A plenary session of the Solar System Interest Group welcomed the participation of representatives from the IPDA (International Planetary Data Alliance) and also new participation from Solar Physics projects. The International Planetarium Society made a plenary presentation, and other new participants included a representative from EUDAT.

Many thanks are due to the local organisers (lead by Baptise Cecconi and Pierre Le Sidaner), and to sponsors Europlanet, the French Space Agency (CNES) and CNRS-INSU/ASOV. Furthermore the effort by the organisers to minimise the environmental impact via use of reusable/recyclable materials and a local sustainable procurement was highly appreciated.

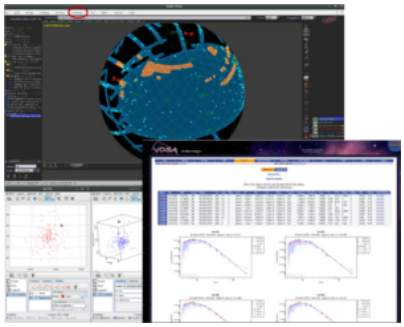
More information: May 2019 Interop Meeting Page

SCHOOLS AND WORKSHOPS

XIII Spanish Virtual Observatory School
The Spanish Virtual Observatory held their 13th VO School at the Complutense University of Madrid in Madrid on 4-5 March 2019. The goal of the school was twofold: (1) to expose participants to the variety of VO tools and services available today so that they can use them efficiently for their own research, and (2) to gather requirements and feedback from participants.

To achieve these goals, VO experts lectured and tutored the participants on the usage of VO tools and services. Real life examples of scientific applications were given. A large fraction of the time was dedicated to hands-on

exercises, which allowed participants to become fully familiar with the VO capabilities on their own laptops.

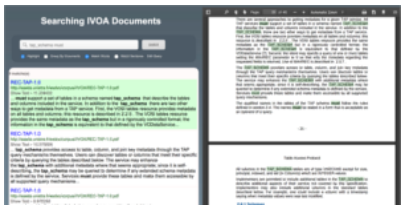


More information: XIII SVO School

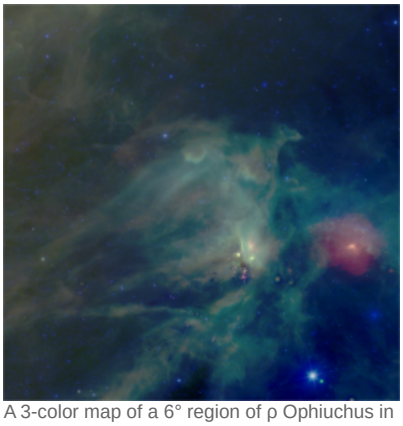
Access more scientific usage tutorials here

VO APPLICATIONS AND IMPLEMENTATION HIGHLIGHTS

A search engine for the IVOA documentation.
We provide a web application for textual search within both IVOA recommendations and notes. The objective is to guide users toward the documents answering their questions. Documents are all downloaded from the IVOA documents page. They are then split into small parts that are indexed by Elastic Search. Users can then retrieve the text sections matching the searched words.



More information:http://saada.unistra.fr/esdoc/interfacePDF.html?index=ivoa#

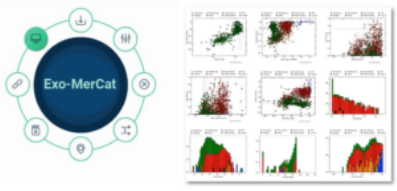

A 3-color map of a 6° region of ρ Ophiuchus in WISE bands W1, W3 and W4 (3.4, 12 and 22 μm) at ~10 arcsecond resolution (HiPS level 5).

Creating High Quality HiPS Visualizations With Montage
Version 5 of the Montage image mosaic engine provided support for the HEALPix sky tesselation scheme. Extending this capability to support HiPS, which is based on HEALPix, is an obvious development for Montage. We provide here a status report on a collaboration with IRSA to use Montage to create HiPS maps of all four bands of the WISE all-sky survey, down to HiPS level 9 tiles, level 18 pixels. The maps are scheduled for completion and release in late-Summer 2019.

There are two characteristics of Montage that bring value to HiPS maps: it rectifies backgrounds by modeling differences between images; and includes an adaptive stretch for creating visualizations. Creating a HiPS map of the WISE images involves using existing tools to computing HEALPix mosaics of the WISE images in FITS format, background rectified to create the highest quality mosaics, and then creating from the mosaics HiPS tiles in PNG format, with display values created with an adaptive stretch; the process used new tools that will be released in Summer 2019. Thus far we have begin created HiPS tiles for 18% of the sky, and we have begun processing the rest of the WISE images.

More information: http://montage.ipac.caltech.edu; code repository is at https://github.com/Caltech-IPAC/Montage. If you would like to evaluate this functionality, please send an e-mail to: *gbb 'at' ipac.caltech.edu*.

Exo-MerCat, a VO-aware exoplanet catalog

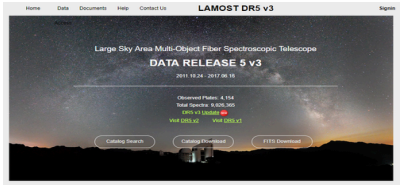


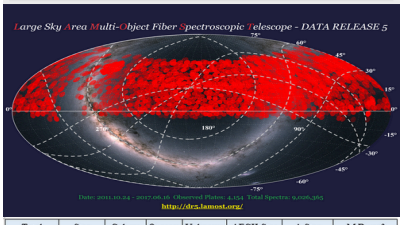
After attending the fourth VO school at the Centre de Données astronomiques de Strasbourg (CDS) in Strasbourg on 20-22 November 2018, the construction of an exoplanet catalog was finalized that collects all available data from the currently available online databases, called Exo-MerCat. Exo-MerCat is a Python code that collects and selects the most precise measurement for all interesting planetary and orbital parameters, taking into account the presence of multiple aliases for the same target. It performs comparisons and checks as well, to find coordinate errors or alias mismatches. By means of VO TAP and ConeSearch queries to SIMBAD and VizieR, it retrieves the main identifier for each target, allowing any user to easily download stellar information at a later stage by querying their favorite catalog in a standardized VO-aware way. For each interesting planetary parameter, Exo-MerCat stores the corresponding reference paper link.

A Graphic User Interface is provided, which allows the selection of all sorts of parameter ranges. It can also generate automatic plots that are commonly used in the exoplanetary community, and the user can retrieve and manipulate data at will. Exo-MerCat is ingested into a database with a TAP service and can be queried by all the VO-aware TAP-enabled applications.

The software was presented at the Paris InterOp Meeting (https://wiki.ivoa.net/internal/IVOA/InterOpMay2019SSIG/ExoMerCat.pdf). All further information will be published soon in a peer-reviewed paper (Alei et al. – submitted).

LAMOST Releases the Fifth Data Release (DR5) Internationally
LAMOST published its fifth Data Release (DR5) to astronomers worldwide on June 26, 2019, according to the international astronomical practice and "the LAMOST Spectral Survey Data Policy". It includes all spectra obtained during the pilot survey and the first five years' regular survey. Scientific users can log on to the website powered by the China-VO at http://dr5.lamost.org for data query and download. The data release complies with





Total Spectra	Star	Galaxy	Quasars	Unknown	AFGK Star Catalog	A Star Catalog	M Dwarf Catalog
9,026,365	8,183,160	152,863	52,453	637,889	5,348,712	439,920	534,393

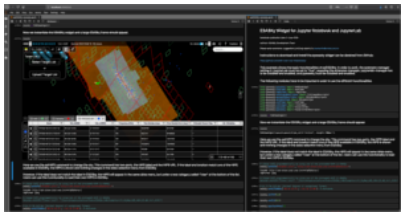
The website of LAMOST DR5 (top); footprints of the LAMOST pilot survey and the first five years' regular survey (middle); statistics of LAMOST DR5 (bottom).

multiple IVOA standards and protocols, including Simple Cone Search, Simple Spectral Access (SSA), Simple Application Messaging Protocol (SAMP), etc.

Through LAMOST DR5, a total number of 9.02 million spectra were released to the international community. Additionally, a catalog which provides stellar parameters of 5.34 million stars was also released internationally in this data set. The catalog will also be included in CDS VizieR. LAMOST DR5 has thus resulted in the largest public spectral data set and stellar parameter catalog in the world at present!

More information: http://dr5.lamost.org

pyESASky: An ESASky widget for Jupyter



ESASky allows scientists to explore large collections of astronomical data with the click of a button. At the same time, Jupyter Notebook and, more recently, JupyterLab provide the framework for quick and effective manipulation, visualisation and analysis of datasets. To take advantage of both tools, at the ESAC Science Data Centre (ESDC) we have developed pyESASky, a Jupyter Widget for ESASky. This is a library that allows scientists to interact with ESASky within Jupyter, and to overlay their own data on ESASky, from catalogues to footprints and HiPS.

The library, still a beta version, can be obtained from GitHub. Installation instructions and some sample notebooks are also included in this distribution. Interested users are invited to test the widget and provide us feedback via the ESASky UserEcho forum.

More information: pyESASky

SOME RECENT PAPERS ABOUT VO-ENABLED SCIENCE

Featured Science Publication

The CARMENES search for exoplanets around M dwarfs. Different roads to radii and masses of the target stars
Schweitzer, A.; Passegger, V. M.; Cifuentes, C.; Béjar, V. J. S.; Cortés-Contreras, M.; Caballero, J. A.; del Burgo, C.; Czesla, S.; Kürster, M.; Montes, D.; Zapatero Osorio, M. R.; Ribas, I.; Reiners, A.; Quirrenbach, A.; Amado, P. J.; Aceituno, J.; Anglada-Escudé, G.; Bauer, F. F.; Dreizler, S.; Jeffers, S. V. Guenther, E. W.; Henning, T.; Kaminski, A.; Lafarga, M.; Marfil, E.; Morales, J. C.; Schmitt, J. H. M. M.; Seifert, W.; Solano, E.; Tabernero, H. M.; Zechmeister, M.
A&A (2019) Volume 625, 68
Aims: We determine the radii and masses of 293 nearby, bright M dwarfs of the CARMENES survey. This is the first time that such a large and homogeneous high-resolution (R > 80 000) spectroscopic survey has been used to derive these fundamental stellar parameters.
Methods: We derived the radii using Stefan-Boltzmann's law. We obtained the required effective temperatures T_{eff} from a spectral analysis and we obtained the required luminosities L from integrated broadband photometry together with the Gaia DR2 parallaxes. The mass was then determined using a mass-radius relation that we derived from eclipsing binaries known in the literature. We compared this method with three other methods: (1) We calculated the mass from the radius and the surface gravity log g, which was obtained from the same spectral analysis as T_{eff}. (2) We used a widely used infrared mass-magnitude relation. (3) We used a Bayesian approach to infer stellar parameters from the comparison of the absolute magnitudes and colors of our targets with evolutionary models.
Results: Between spectral types M0 V and M7 V our radii cover the range 0.1 $R_\odot$ < R < 0.6 $R_\odot$ with an error of 2-3% and our masses cover 0.09 $\mathcal{M}_\odot$ < $\mathcal{M}$ < 0.6 $\mathcal{M}_\odot$ with an error of 3-5%. We find good agreement between the masses determined with these different methods for most of our targets. Only the masses of very young objects show discrepancies. This can be well explained with the assumptions that we used for our methods.
DOI: 10.1051/0004-6361/201834965

Refereed Publications

The full list of refereed publications from February to September 2019 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

6-10 October 2019 - ADASS XXIX
Groningen, The Netherlands
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 XXIX program will include invited talks, contributed papers, display sessions, tutorials, computer demonstrations, and special interest ("Birds of a Feather" or BoF) meetings.

11-13 October 2019 - IVOA Interoperability Meeting
Groningen, The Netherlands
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 2019 IVOA Interoperability meeting will be held in Groningen, The Netherlands and will be hosted by ASTRON.

22-25 October 2019 - .Astronomy 11
Toronto, Canada
The .Astronomy conference series aims to build a dynamic and creative community of scientists and educators to exploit the potential offered by modern computing and the internet in the era of data-driven astronomy. Rather than scientific questions, the focus is on innovative use of the web to develop new research tools, and to communicate with a broad audience through online platforms and innovative engagement resources. .Astronomy provides scientists, developers and science communicators an opportunity to showcase their ideas and skills outside their institutes or research areas, and help them get credit for their work.

4-8 January 2020 - 235th AAS Meeting
Honolulu, Hawaii, USA
The American Astronomical Society (AAS) meetings serve as a venue for the general astronomical community to gather and discuss the latest science, tools, and technologies in astronomy. At the 235th AAS Meeting, there will be a couple of VO-related sessions and exhibits, including presentations from international VO partners, open to all astronomers. IVOA affiliated institutions will have booths in the exhibition hall throughout the week, demonstrating tools and services such as the NASA Astrophysics Data System, SciServer, VizieR, and other VO data access interfaces. Attendees may learn more about the data and services provided by those institutions, and have face-to-face discussions with developers.

29 June - 3 July 2020 - EAS Annual Meeting 2020
Leiden, The Netherlands
The European Astronomical Society (EAS) Annual Meeting (formerly known as EWASS, and earlier JENAM) has more than 25 years of tradition and it has imposed itself as the largest conference for European astronomy. In addition to plenary sessions and the award of prestigious prizes, the conference hosts many symposia held in parallel, as well as special sessions and meetings. IVOA affiliated institutions will have booths in the exhibition hall throughout the week, demonstrating tools and services such as VizieR, Aladin, ESO tools and services, ESA archives, and other VO data access interfaces. Attendees may learn more about the data and services provided by those institutions, and have face-to-face discussions with scientists and developers.