

IVOA Newsletter - June 2017

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IVOA Newsletter Editors: Deborah Baines, Jamie Anne Budynkiewicz, Theresa Dower, Giulia Iafrate, Simon O'Toole, Maria Patterson, Li Shanshan, 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](http://ivoa.net/about/). 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



IAU Working Group on Data Driven Astronomy Education and Public Outreach (DAEPO)

The new approved IAU Inter-Commission B2-C1-C2 WG on Data Driven Astronomy Education and Public Outreach (DAEPO) was launched officially in April 2017. The WG consists of 16 founding members, including the IVOA Education Interest Group, with Chenzhou Cui as Chair.

With the development of many mega-science astronomical projects, for example CTA, DESI, EUCLID, FAST, GAIA, JWST, LAMOST, LSST, SDSS, SKA, and large scale simulations, astronomy has become a Big Data science. Astronomical data are not only a necessary resource for scientific research, but also a very valuable resource for education and public outreach (EPO), especially in the era of the Internet and Cloud Computing. Maximizing the values of astronomical data in education and public outreach is the mission of the WG. The WG has the major objectives to:

- Act as a forum to discuss the value of astronomy data in EPO, the advantages and benefits of data driven EPO, and the challenges facing to data driven EPO
- Provide guidelines, curriculums, data resources, tools, and e-infrastructure for data driven EPO
- Provide best practices of data driven EPO

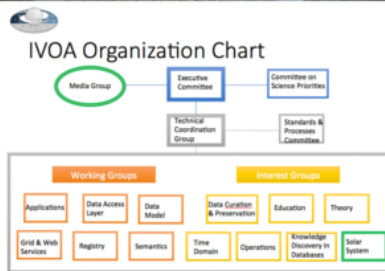
More info: <http://daepo.china-vo.org>

Shanghai IVOA Interoperability Meeting

The Northern Spring meeting of the IVOA was held on May 14-19 2017, in Shanghai, China, under the auspices of the China-VO. This meeting also celebrated the 15th anniversary of the IVOA, was among the best attended by the IVOA community (116 registered participants) and led to productive discussions at all levels of participation.



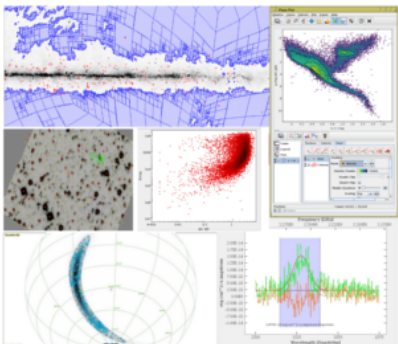
Since the last Interoperability meeting (in Trieste, Italy, October 2016,) a record 10 new standards were finalized by the Working Groups, discussed and approved within the Technical Coordination Group of Working and Interest Group Chairs, and approved by the IVOA Executive Committee. The IVOA has reached an important milestone for simple cube data extraction, and is now preparing the standards for a more complete and sophisticated manipulation of data cubes. Also of note is the approval of the HiPS 1.0 standard, to allow large area hierarchical mapping and display of astronomical data.



The IVOA has now two new groups: the Media Group and the Solar System Interest Group. The Media Group is taking over the public face of the IVOA, including the publishing of newsletters and looking at different media presences. The Solar System Interest group will work with all IVOA working groups to review, assess and propose IVOA standard adjustments for Solar System sciences.

The IVOA Committee on Science Priorities (CSP) tried a new approach at this meeting: in addition to key invited presentations on major science topics and projects, we had a series of short talks highlighting recent science/VO developments. This format will also be used in future meetings, to facilitate active participation by a wider scientific audience. The CSP is also looking at widening its membership at large in the astronomical community. The IVOA Education Interest Group is also looking at a new format, to both present a strong IVOA representation with external bodies (including the IAU), and to strengthen world-wide representation by including regional coordinators.

More info: <http://ivoa2017shanghai.csp.escience.cn>



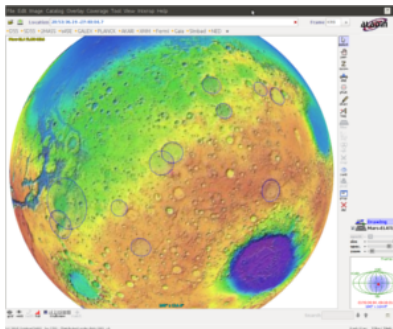
Scientific Tutorials

A comprehensive list of scientific usage tutorials is maintained and updated by the Euro-VO at the following page. Each tutorial takes the user step-by-step through an example scientific use case using one or a number of virtual observatory tools (e.g. TOPCAT, Aladin, the CDS Portal, VOSA, CASSIS, ...). Scientific use cases range from general data mining of objects, exploring Gaia data, determining stellar physical parameters, discovering brown dwarfs, to handling gravitational-wave sky maps for follow-up observations, and accessing and handling big datasets with the Astronomical Data Query Language (ADQL). Many of the tutorials have recently been updated in preparation for the ASTERICS schools.

More info: <http://www.euro-vo.org/?q=science/scientific-tutorials>

Solar System in the VO

Solar System sciences are now officially part of the VO. During the last Interop Meeting in Shanghai (China), the IVOA (International Virtual Observation Alliance) Exec committee approved the creation of a Solar System Interest Group within the IVOA. Some IVOA standards, protocols and tools are already used for solar and planetary sciences for data description, sharing and publishing. With this interest group, we will review and assess IVOA standards and propose adjustments when necessary. We will also work with large astronomical data centers to help them sharing solar and planetary (including exoplanets) data products more efficiently. This action is supported by the IPDA (International Planetary Data Alliance). The Europlanet/VESPA (Virtual European Solar and Planetary Access) project will also participate to the activities of this group.



More info: <http://wiki.ivoa.net/twiki/bin/view/IVOA/IvoaSS>
IPDA: <https://planetarydata.org>
VESPA: <http://europlanet-vespa.eu>

Sherpa and Iris at the 229th AAS

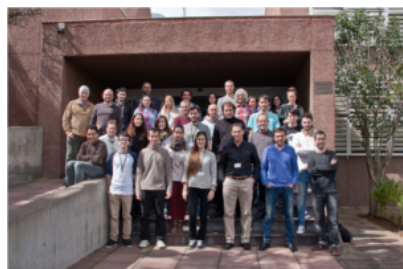
The Chandra X-Ray Observatory held a session on Flexible Multi-dimensional Modeling of Complex Data in Astronomy at the 229th meeting of the American Astronomical Society. The session used Sherpa, a Python based general modeling and fitting library for modeling multi-dimensional data, and Iris, a VO-enabled spectral energy distribution analysis application built on top of Sherpa, as possible tools for accessing multi-wavelength data and interpreting the results.



The workshop was broken into two parts: demonstrations, and "free time" for attendants to follow worksheets that guided using the tools in various science tasks. The Sherpa tutorial demonstrated basic-to-complex modeling scripts in Jupyter notebooks, and also highlighted SABA, a Python package that bridges Sherpa's modeling library to Astropy. The Iris demonstration focused on aggregating datasets from online data archives, from disk, and SAMP-enabled applications (via under-the-hood VO protocols), and data visualization and manipulation capabilities.

Approximately 30 people attended the session, and a handful came to the Chandra booth after the meeting to learn more about using Sherpa and Iris for their science projects.

Presentations, worksheets, and meeting information can be found here



Tenth Spanish Virtual Observatory School

The Spanish Virtual Observatory project held its tenth VO school at the Instituto de Astrofísica de Canarias, Spain, on 6-8 March 2017. The goal of the school was twofold: 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 to gather requirements and feedback from them.

Real life examples of scientific applications of VO tools and services 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.

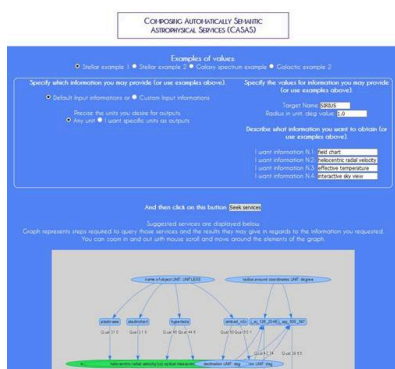
More information (including the hands-on tutorials) can be found at: http://svo.cab.inta-csic.es/meetings/escuela_svo10/

Access more scientific usage tutorials [here](#)

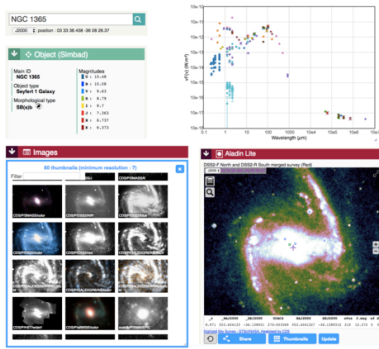
VO APPLICATIONS AND IMPLEMENTATION HIGHLIGHTS

Automatic composition of astrophysical services

The semantic Web (Berneers-Lee et al. 2001) is an ongoing evolution of the current Web, based on algorithms and knowledge formalization allowing automatic reasoning about Web documents and services. CASAS (Composing Automatically and Semantically Astrophysical Services) is a tool that aims to bring the semantic web capabilities to astrophysical services, including VO and non-VO services, data providers and data processing alike. The Web interface of CASAS allows requesting a set of information to be retrieved from the services registered in the ontology underlying the system. The workflow leading to the requested information is then automatically composed, presented and may be run with the results automatically displayed. A more in-depth view of CASAS will be available in the next issue of the journal "Astronomy and computing" (DOI: <http://dx.doi.org/10.1016/j.ascom.2017.05.002>). Response time for this first version may be long and the input parameters are restricted, which will be improved in future releases.



More Information: <http://cta1.bagn.obs-mip.fr/>



New version of CDS Portal

CDS has released a new version of the [CDS Portal](#). It can be queried for an astronomical source or position, and aggregates in a single page a summary of results from various services, such as measurements and bibliography from SIMBAD, catalogues, tabular data and photometry from Vizier, images from Aladin and more.

On the technical side, the new portal is built upon Javascript widgets querying the [MocServer](#) to quickly retrieve available datasets for the requested target. Aladin Lite is used to display data of interest (HiPS (Hierarchical Progressive Surveys) images, catalogues, etc).

The underlying technologies were presented at the May 2016 IVOA meeting.

More Information: [New CDS Portal](#)

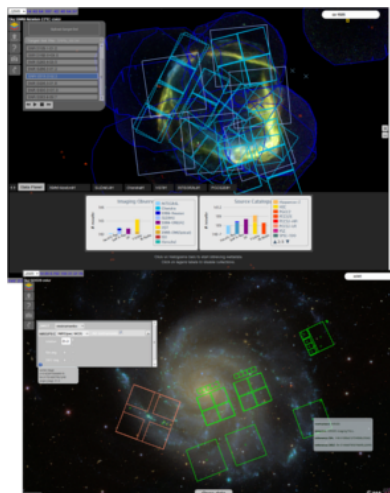
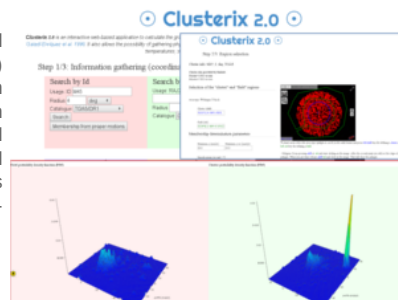
[Launch portal for target NGC 3628](#)

[Take the interactive tour to discover the portal features](#)

Clusterix

Clusterix is a new tool jointly developed by the Spanish Virtual Observatory and the University of Barcelona (ICCUB-IEEC) whose goal is the determination of membership probabilities in stellar clusters from proper motion data. Using VO search protocols, the system also gathers parallaxes and radial velocities from different services and estimate physical parameters like effective temperatures and surface gravities using VO tools like VOSA. This information can be used to fine-tune the proper motion-based membership probabilities.

More information: <http://clusterix.cab.inta-csic.es/clusterix/>



ESASky: A science-driven discovery portal for space astronomy data

ESASky is the multi-mission archive interface developed at the ESAC Science Data Centre (ESDC) for exploration and discovery of the data kept in the ESA astronomical archives and archives from other data providers. Users can explore the sky in multiple wavelengths, quickly see the data available for their targets and retrieve the relevant science-ready products, with just a few clicks. The tool is completely web-based and it requires no prior knowledge of the specific details of each mission.

ESASky features a sky exploration interface that uses AladinLite to visualise the HiPS of the different missions, as well as a single/multiple target interface. It is VO-compliant, allowing users to directly send their selected products via SAMP to an open VO application. The first version was released in May 2016, and it provided access to imaging and catalogue data. Later incremental releases added new functionalities and data. Future releases will enable retrieval of spectroscopic data and will incorporate features to allow the study of Solar System objects (SSO) and time-domain exploration. A beta version incorporating a prototype of the SSO search functionality with a limited number of 1000 asteroids is available at <http://sky.esa.int/beta>.

More Information: <http://sky.esa.int> and <http://sky.esa.int/beta>

SOME RECENT PAPERS ABOUT VO-ENABLED SCIENCE

Featured Science Publication

RCSed—A Value-added Reference Catalog of Spectral Energy Distributions of 800,299 Galaxies in 11 Ultraviolet, Optical, and Near-infrared Bands: Morphologies, Colors, Ionized Gas, and Stellar Population Properties

Chilingarian, Igor V.; Zolotukhin, Ivan Yu.; Katkov, Ivan Yu.; Melchior, Anne-Laure; Rubtsov, Evgeniy V.; Grishin, Kirill A.

The Astrophysical Journal Supplement Series (2017) Vol. 228, Issue 2, 14, 25 pp.

We present RCSed, the value-added Reference Catalog of Spectral Energy Distributions of galaxies, which contains homogenized spectrophotometric data for 800,299 low- and intermediate-redshift galaxies ($0.007 < z < 0.6$) selected from the Sloan Digital Sky Survey spectroscopic sample. Accessible from the Virtual Observatory (VO) and complemented with detailed information on galaxy properties obtained with state-of-the-art data analysis, RCSed enables direct studies of galaxy formation and evolution over the last 5 Gyr. We provide tabulated color transformations for galaxies of different morphologies and luminosities, and analytic expressions for the red sequence shape in different colors. RCSed comprises integrated k-corrected photometry in up to 11 ultraviolet, optical, and near-infrared bands published by the GALEX, SDSS, and UKIDSS wide-field imaging surveys; results of the stellar population fitting of SDSS spectra including best-fitting templates, velocity

dispersions, parameterized star formation histories, and stellar metallicities computed for instantaneous starburst and exponentially declining star formation models; parametric and non-parametric emission line fluxes and profiles; and gas phase metallicities. We link RCSED to the Galaxy Zoo morphological classification and galaxy bulge+disk decomposition results of Simard et al. We construct the color-magnitude, Faber-Jackson, and mass-metallicity relations; compare them with the literature; and discuss systematic errors of the galaxy properties presented in our catalog. RCSED is accessible from the project web site and via VO simple spectrum access and table access services using VO-compliant applications. We describe several examples of SQL queries to the database. Finally, we briefly discuss existing and future scientific applications of RCSED and prospective catalog extensions to higher redshifts and different wavelengths.

Refereed Publications

The full list of refereed publications from November 2016 to June 2017 can be found at the following list (over 120 publications), 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

29-30 June 2017 - Astroinformatics: From Big Data to Understanding the Universe at Large

EWASS 2017, Prague, Czech Republic

Analysis and accurate interpretation of large and high dimensional data-sets is becoming increasingly important throughout all scientific branches covering scales ranging from the microscopic world of particle physics, to mega-scales of cosmology. Astronomy has experienced a data deluge growing from Terabytes to Petabytes. Besides the volume it is the complexity, and diversity, of the data that bring interesting challenges that border the fields of mathematics, statistics, computer science in general, and machine learning in particular. This two day symposium at the European Week of Astronomy and Space Science (EWASS), Prague, aims to cover aspects of Supervised, Semi-supervised, and Unsupervised learning, Convolutional Networks, visualization, and updates on various surveys through review talks, invited talks, contributed talks, panel discussions and posters with 1-minute lightning talks.

22-26 October 2017 - ADASS XXVII

Santiago, Chile

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 XXVII program will include invited talks, contributed papers, display sessions, tutorials, computer demonstrations, and special interest ("Birds of a Feather" or BoF) meetings.

27-29 October 2017 - IVOA Interoperability Meeting

Santiago, Chile

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 Autumn 2017 IVOA Interoperability meeting will be held in Santiago, Chile, and will be hosted by the Chilean VO (ChIVO).

7-10 November 2017 - Astroinformatics 2017

Cape Town, South Africa

Astroinformatics 2017 builds on the successful series of meetings devoted to the growing challenge of scientific exploitation of massive and complex data sets from major observational projects at radio, optical and infrared wavelength, and from associated large-scale simulations. The meeting will continue the tradition to bring together astronomers, data scientists, statisticians, computer scientists, companies and policy makers to stimulate a cross-disciplinary exchange in this rapidly advancing field of research.

14-17 November 2017 - Astronomy 9

Cape Town, South Africa

Astronomy is driven forward by new technology, and today, software is developing more rapidly than it ever has. How can new technologies help astronomical research, education, and outreach? How can new developments in machine learning, web interfaces, and software impact our work? The Astronomy conference brings together people in astronomy, technology, and education to build on our strengths for a better community. The rapid growth in astronomy in South Africa with projects like SKA, SALT, and Office of Astronomy for Development makes it an exciting time to look at advances in new technologies along with a vibrant, growing community.

28-30 November 2017 - 2017 Conference on Big Data from Space (BiDS'17)

Toulouse, France

Big Data from Space refers to the massive spatio-temporal Earth and Space observation data collected by space-borne and ground based sensors, and to synergetic use of data coming from other sources and communities. This domain is currently facing sharp development with numerous new initiatives and breakthroughs ranging from intelligent sensors to data science. This is the third edition of the BiDS conference cycle and it will be hosted by the Centre National d'Études Spatiales (CNES) in Toulouse, one of the key European cities with activities focused on space and aerospace developments and applications.

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 /
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