

# OAJ web portals: from observations scheduling to data access and visualization

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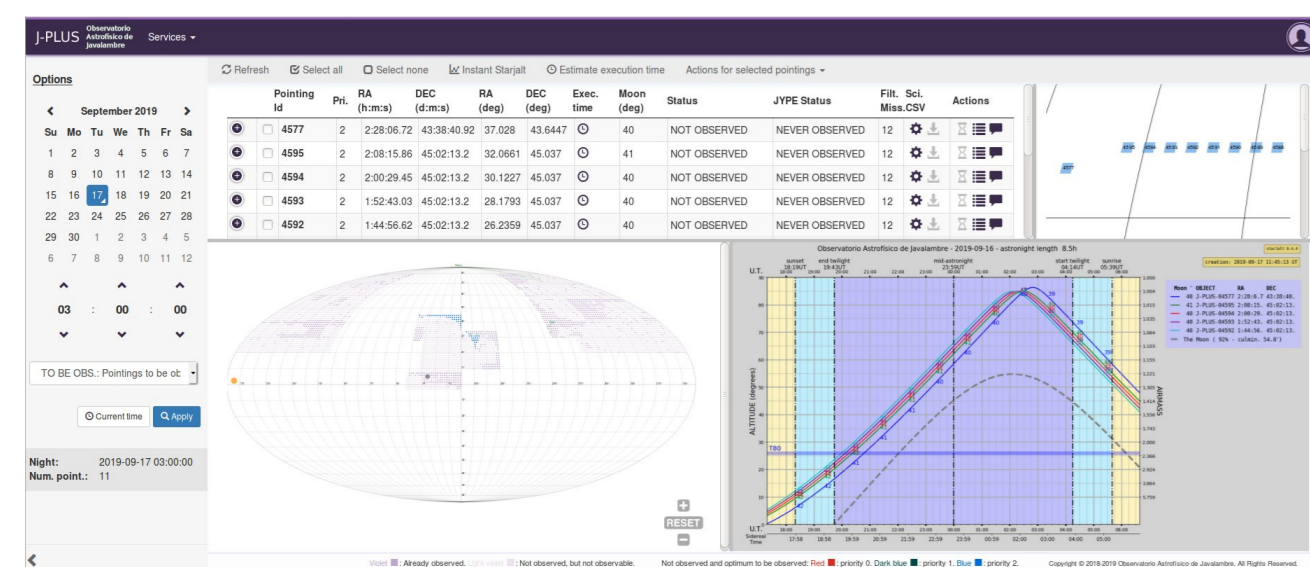
## The Observatorio Astrofísico de Javalambre (OAJ)



The OAJ has been particularly conceived for carrying out large sky surveys with two large field telescopes: JST/T250, a 2.5m 3deg FoV and JAST/T80 with 2deg FoV. The most immediate objective of the two telescopes for the next years is carrying out two unique multiband photometric sky surveys of 8500 square degrees: Javalambre Physics of the Accelerating Universe Astrophysical Survey (J-PAS) (using 54 narrow plus 5 broad band filters) and Javalambre Photometric Local Universe Survey (J-PLUS) (using 12 filters). The OAJ as Spanish ICTS also offers 20% of observing time to the astronomical community through periodical calls.

## Scheduling and tracking the observations: Tracking portals

OAJ has to deal with the complexity of carrying out two large area surveys with thousands of pointings in different filters, and several open time projects with different requirements and types of observations (queue and ToO).

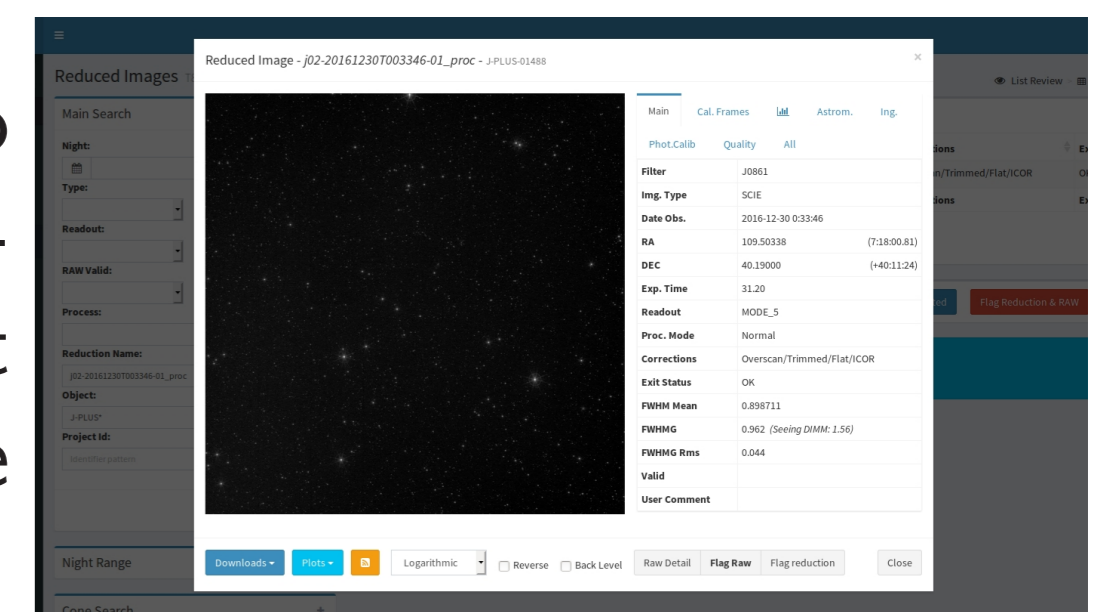


J-PLUS and TAC Tracking portals include tools to plan the best observations during the night; to track the observations; to know the status of the survey; and to create the command files for the telescope.

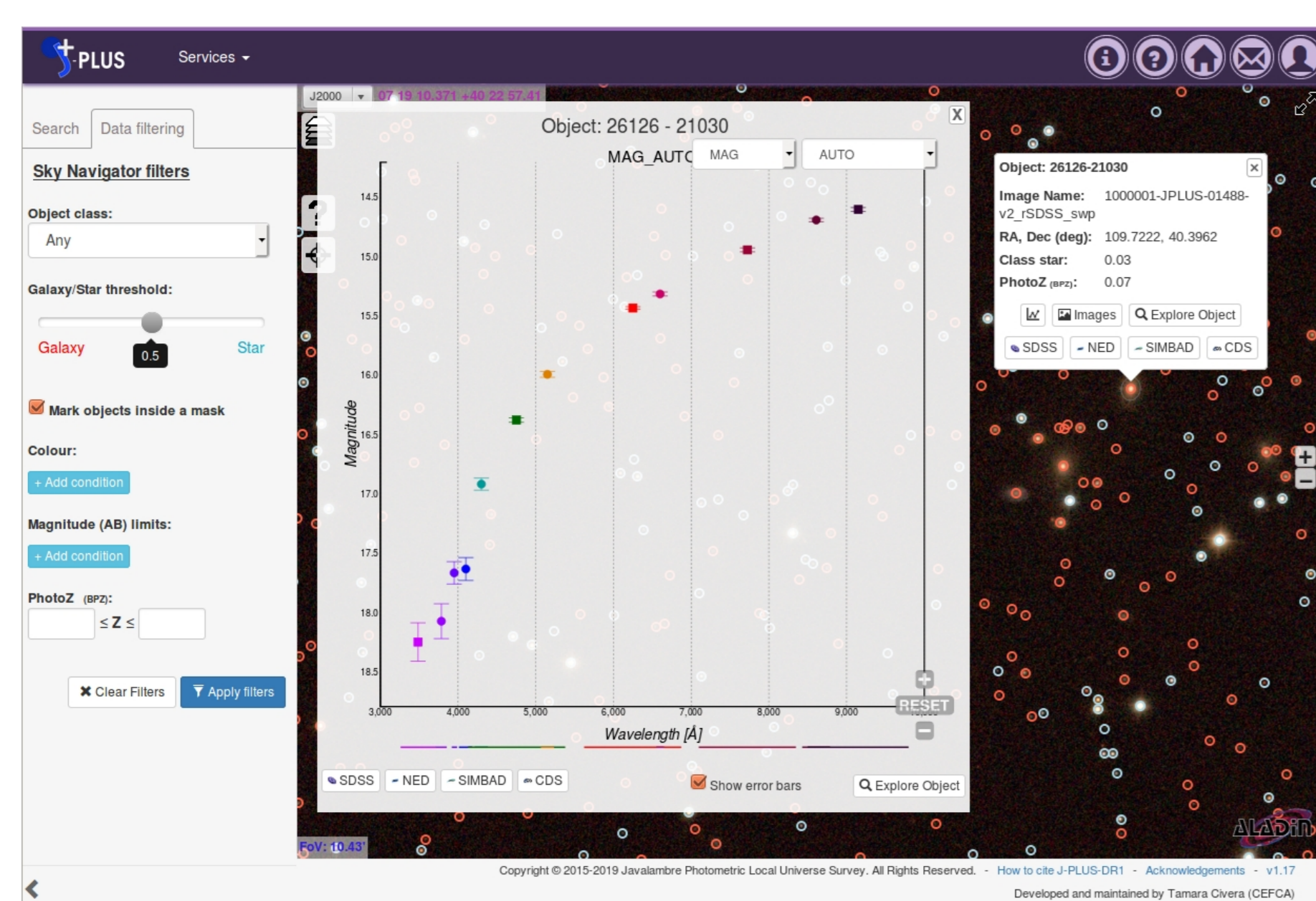
## Reduction pipelines management and review: The reduction portal

After data acquisition, images are archived in the Unit for Processing and Data Archiving (UPAD) and they are pipeline processed. During this pipeline processing different data, images and products are generated.

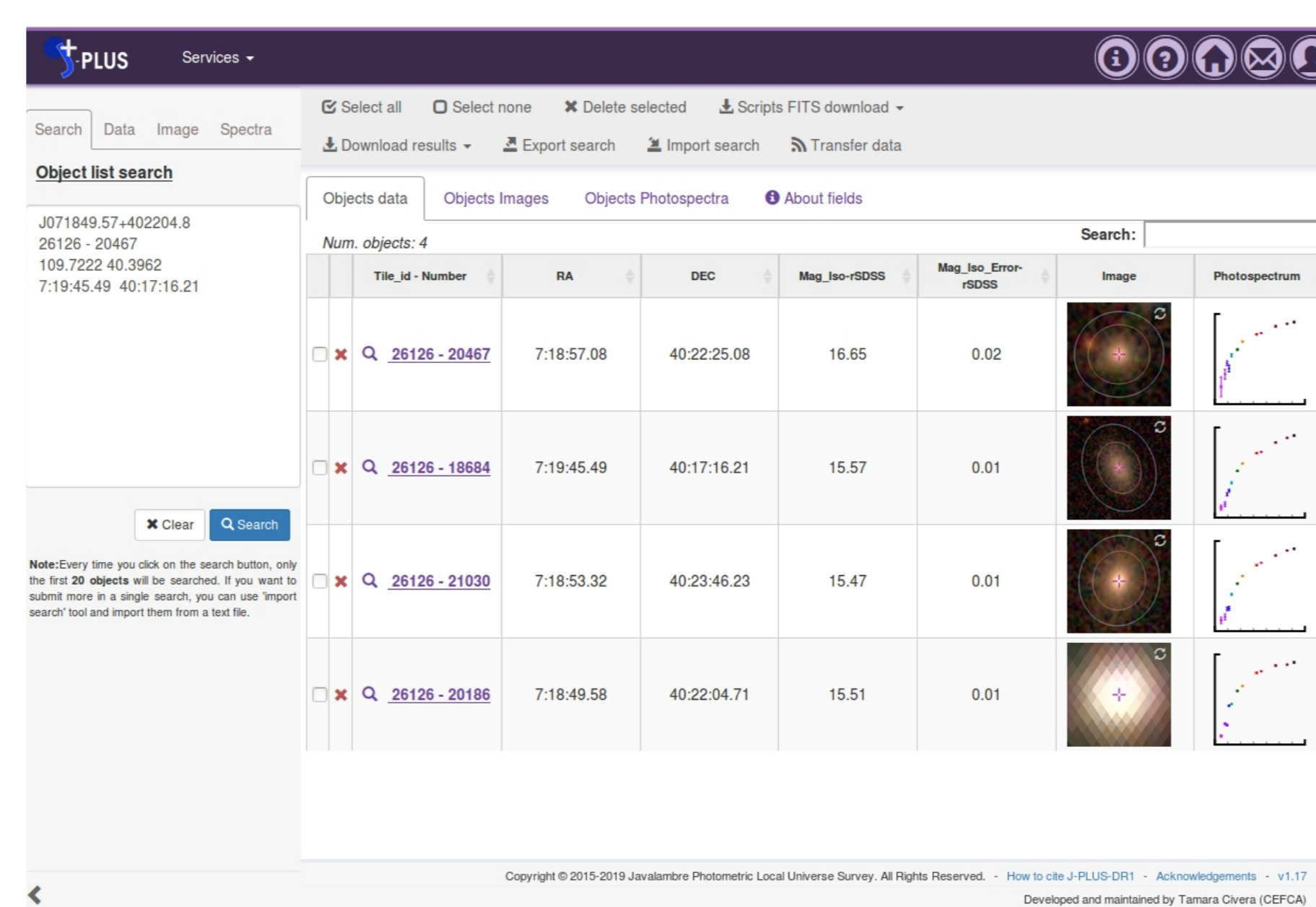
The reduction portal provides an agile access to the status, processing history, metadata, measurements and statistics of the images and plots that allows the validation of the image quality and the data treatment.



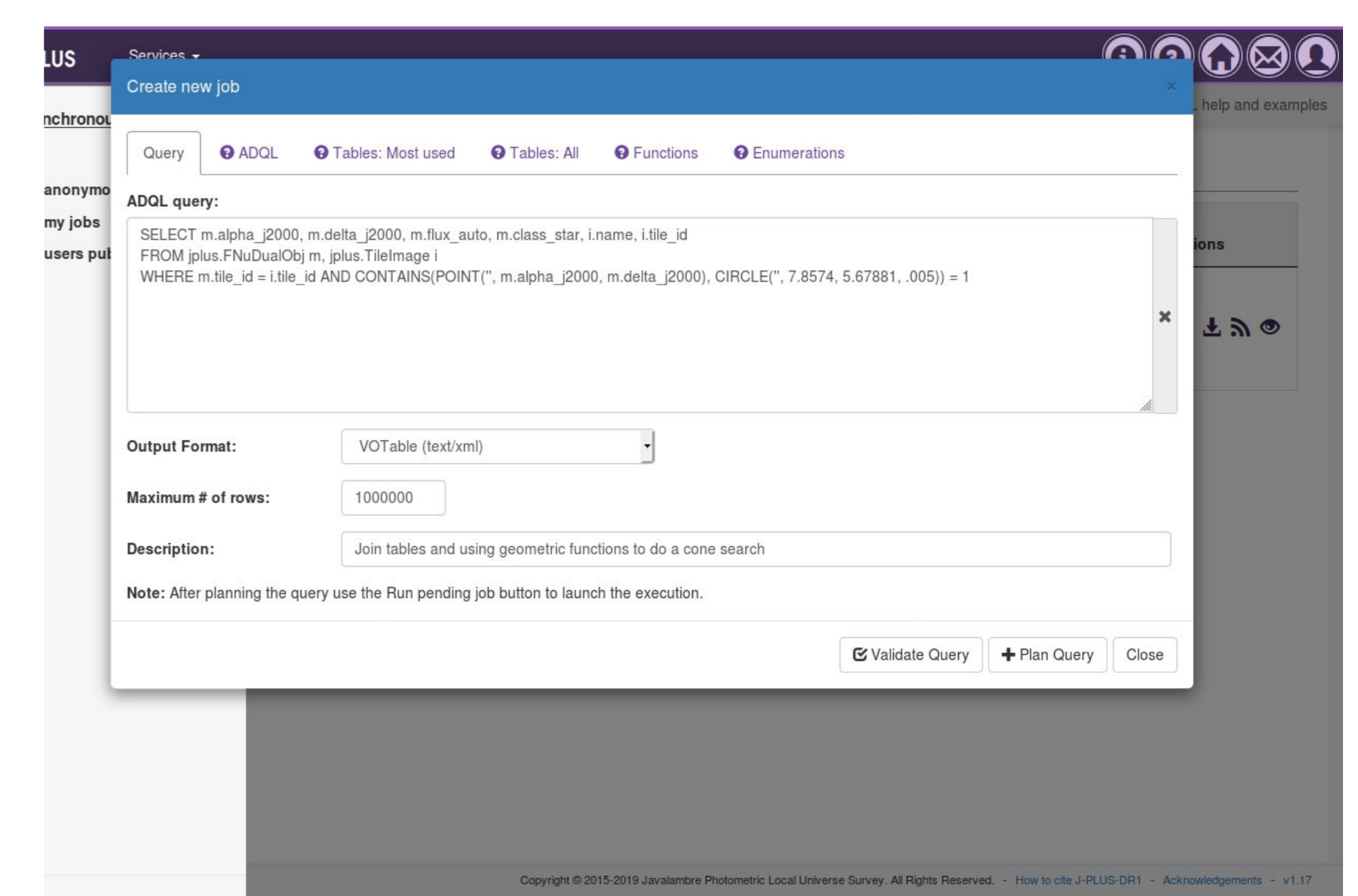
## Data publication: The catalogues portal



Sky navigator service



Object list service



ADQL asynchronous queries interface

J-PAS and J-PLUS include images, dual and single catalogue data which include parameters measured from images and photo-redshift computations. A powerful web portal, the catalogues portal ([archive.cefca.es](http://archive.cefca.es)), has been implemented to publish all this survey data offering advanced tools, each suited to a particular need, for data search, visualization and download. This portal includes services such as sky navigator, object visualization, object list search, ADQL asynchronous queries interface, cone search, image search and download and Multi-Order Coverage Map (MOC) download service.

All of these services support Simple Application Messaging Protocol (SAMP) that enables the catalogues portal interoperate and communicate with Virtual Observatory (VO) compatible applications. Catalogues data are also accessible through VO protocols as SIAP, SCS, SSAP or TAP.

## Data publication: The TACData portal

External access to the data collected as part of an Open Time proposal is provided to its PIs and Cols once the observations are concluded and validated. The data provided include raw scientific data, calibration frames and scientific data reduced and calibrated with the specific OAJ pipelines. After a proprietary time of one year, the data are made public for all the astronomical community.

To offer all this data, the TACData portal ([tacdata.cefca.es](http://tacdata.cefca.es)) has been implemented. It deals with the complexity of offering private (only accessible for the proposal PIs and Cols) and public data and allows users to perform searches and download the data and files. To make downloading easier, the portal also includes functionality to create scripts to download a set of files using command line tools.

## Technical aspects

PostgreSQL has been chosen as the database for the different web portals because it is well known to manage terabyte sized databases and supports array datatypes necessary to store the fluxes and errors measured in 16 different apertures in the different filters. Adequate indexing is a key point to achieve to provide 'web response time' as many of portal services query sky areas. To achieve it Healpix pixelization schema is used.

For implementing the web portals, the Python programming language and the framework Pyramid have been chosen. Moreover, for developing the sky navigator, the Aladin lite library is used and RGB images have been generated following the Hierarchical Progressive Survey (HiPS) system.

## References

Cenarro, A. J., et al. 2019, A&A, 622, A176. 1804.02667; Cristóbal-Hornillos, D., et al. 2014, in SPIE, vol. 9152 of SPIE Conf. Ser., 915200; Dupke, R. A., et al. 2019, in BAAS Meeting 233, vol. 233 of BAAS Meeting, 383.01.

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