
ViaLactea Web

Release 1.0

NEANIAS Space Team

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The [ViaLactea project](#) is an ecosystem that offers the Astrophysics and Planetary communities highly interactive visual analytic interfaces enabling effective exploitation of multi-wavelength observations of the Milky Way Galactic Plane, ranging from the near infrared to the radio spectrum. ViaLactea strongly promotes FAIR data and Open Science practices and is integrated within the European Open Science Cloud (EOSC).

As a part of this research, the ViaLactea Web (VLW) solution is developed as a collaborative web solutions for multi-user support underpinned by efficient remote server CPU and GPU rendering, and support of mobile and desktop devices. All underlying data is managed by a dedicated data service, namely the ViaLactea Knowledge Base, that provides object catalogs and Spectral Energy Distribution model outputs to carry out correlation analysis workflows for studying the star formation process in our Galaxy. The overall performance experiences is defined by remote GPU and CPU visualisation server performance.

INTRODUCTION

The NEANIAS ViaLactea Web is currently available at <https://visivo-server.oact.inaf.it/>.

The main requirements to access the service are:

- Internet Access and Firefox Web browser
- Microsoft or Google account for authentication
- Access to the VLKB service through the NEANIAS Service Management System (SMS) (see *[Access to the VLKB service](#)*).

The service demo video is available [here](#).

ACCESS TO THE VLKB SERVICE

To receive an access to VLKB service, follow the steps below:

- 1) Open the NEANIAS SMS page using this [link](#).
- 2) Login with NEANIAS SSO using a Microsoft or Google account.
- 3) Fill and submit the access request form. You will access all public surveys by default. If you want to ask for access to private surveys you can select the surveys by selecting the checkboxes in the ViaLactea surveys field. There are four private surveys currently available. The “AllPrivate” option includes all of them.
- 4) You will receive email notifications by the NEANIAS SMS about the processing of your access request. When the request is taken care of, the status will change to “Under development”. Once the status is set to “Resolved”, you can access the service.

USER INTERFACE

After successful login the user is redirected to VLW web page with application main interface. The Web UI is designed as similar as possible to the UI of [ViaLactea desktop version](#). The UI components are inspired by the desktop version of ViaLactea but adapted for use within browser and different versions of screen Desktop/Tablet/Mobile.

ViaLactea Web 2.0 provides tools for analysis of 2D and 3D results of VLKB queries. The 2D and 3D data analysis functionality is provided in separate tabs of a web browser. For testing purposes, the visualisation of local 3D FITS files is also supported. The current interface layout that covers a visualisation of 2D data is presented in [Fig. 3.1](#).

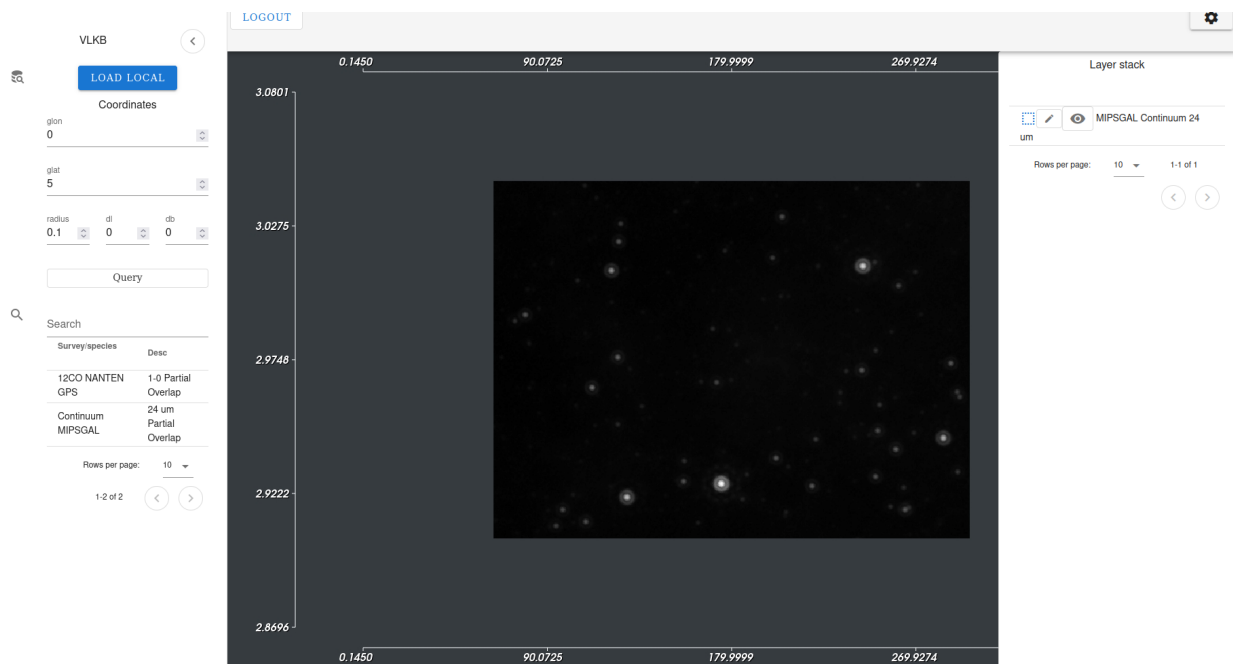


Fig. 3.1: The ViaLactea Web 2D image analysis UI

The current interface layout that covers a 3D DataCube visualisation aspects is presented in [Fig. 3.2](#).

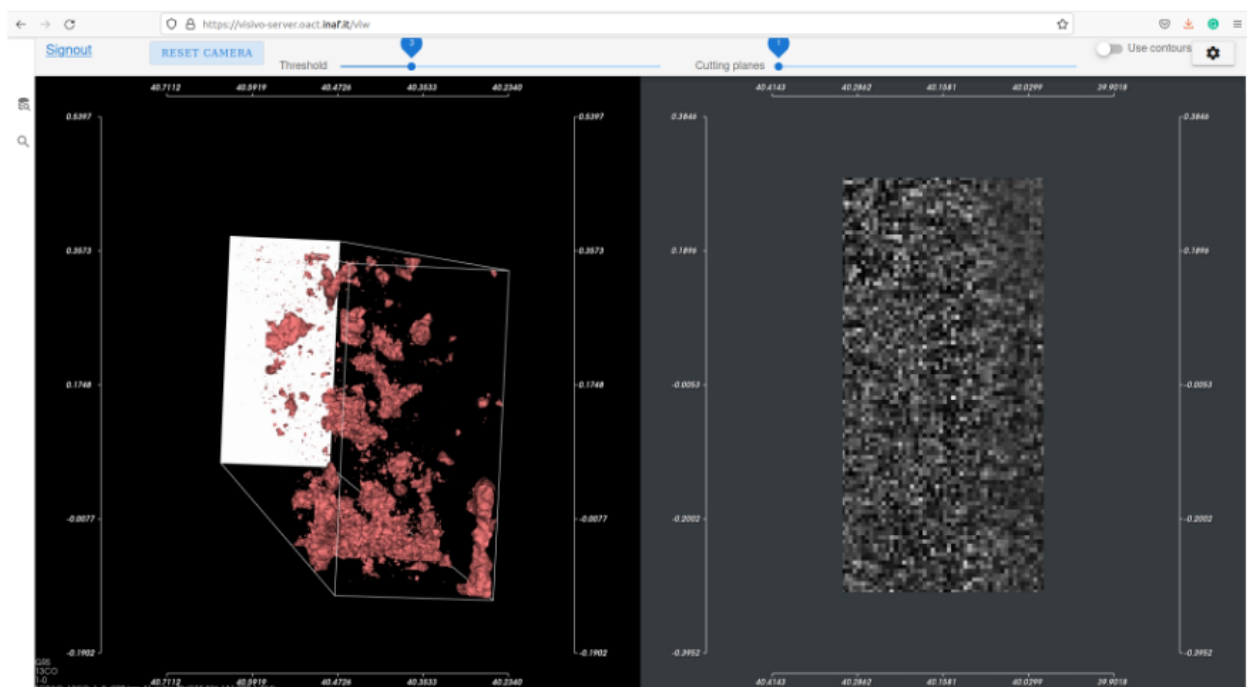


Fig. 3.2: The ViaLactea Web 3D image analysis UI

LOADING DATACUBE SURVEYS


To access both 2D and 3D DataCube surveys data, open a left panel by clicking on a Search icon and enter galactic coordinates (see Fig. 4.1), for example glon:20,glat:0,rad:0.2.

The image shows a web interface for VLKB. At the top, the text 'VLKB' is displayed next to a circular back arrow icon. Below this is a blue button labeled 'LOAD LOCAL'. Underneath the button is the heading 'Coordinates'. There are five input fields with labels and values: 'glon' with value '0', 'glat' with value '0', 'radius' with value '0.1', 'dl' with value '0', and 'db' with value '0'. Each input field has a small up/down arrow icon to its right. At the bottom of the form is a button labeled 'Query'.

Fig. 4.1: Right panel

Confirm a VLKB query by clicking on the Query button (see Fig. 4.1). Wait till query will be executed and the first available 2D data is loaded.

In the query results the 2D data is marked as “Continuum” surveys (see Fig. 4.2). The total number of all available surveys from the query is displayed at the bottom. The user can navigate through pages to preview all surveys and adjust the number of surveys displayed per page, that is 10 by default



Search

Survey/species	Desc
HI SGPS	21 cm Partial Overlap
Continuum CORNISH	5 GHz Partial Overlap
Continuum CORNISH	5 GHz Partial Overlap
Continuum CORNISH	5 GHz Partial Overlap
Continuum CORNISH	5 GHz Partial Overlap
Continuum Hi- GAL Mosaic	160 um Partial Overlap
Continuum Hi- GAL Mosaic	160 um Partial Overlap
Continuum Hi- GAL Mosaic	250 um Partial Overlap
Continuum Hi- GAL Mosaic	250 um Partial Overlap
Continuum Hi- GAL Mosaic	350 um Partial Overlap

Rows per page:

10

11-20 of 35

Fig. 4.2: The list of available surveys

MULTI-TAB INTERFACE FOR VISUALISATION OF 2D AND 3D DATA

Similarly to 2D data, the datacubes for current VLKB query is available for selection from right panel. To visualise the 3D DataCube data, the user should click on selected survey in the query results. The DataCube data would be loaded in a separate web browser tab with available interaction in 2D and 3D views (see Fig. 5.1).

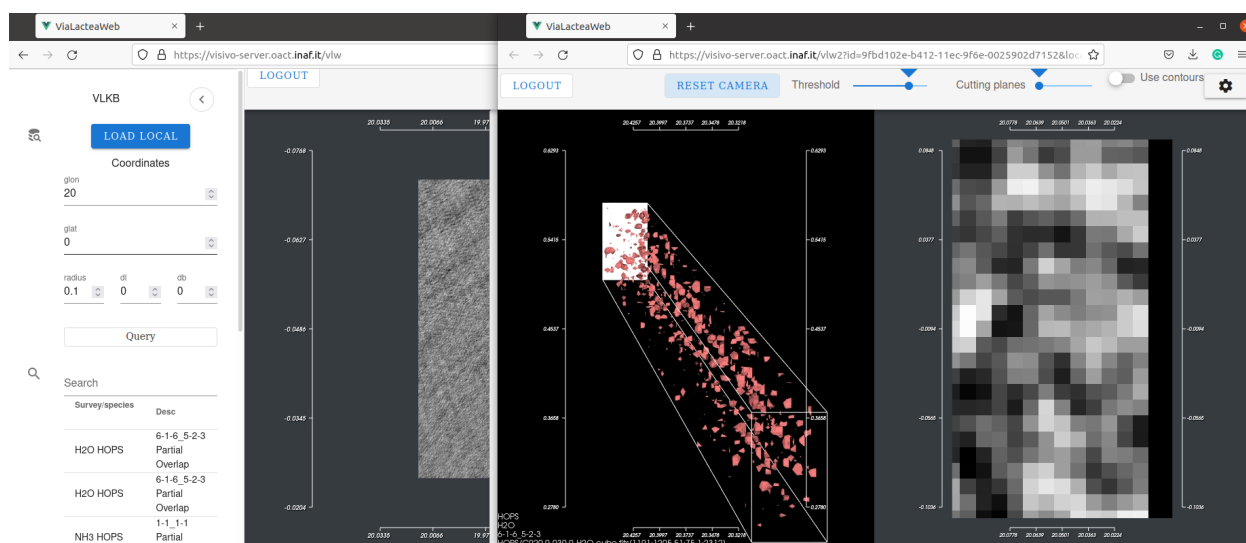


Fig. 5.1: The selected 2D image and DataCube survey available in different tabs

BROWSING AND VISUALISING 3D DATACUBE FILES (FITS) FROM THE REMOTE SERVER

VLW also allows browsing and visualising FITS files stored on remote server. To access local DataCubes, open a left panel by clicking on a Search icon and click on “Load Local” . The Datacube FITS file browser will appear [Fig. 6.1](#) .

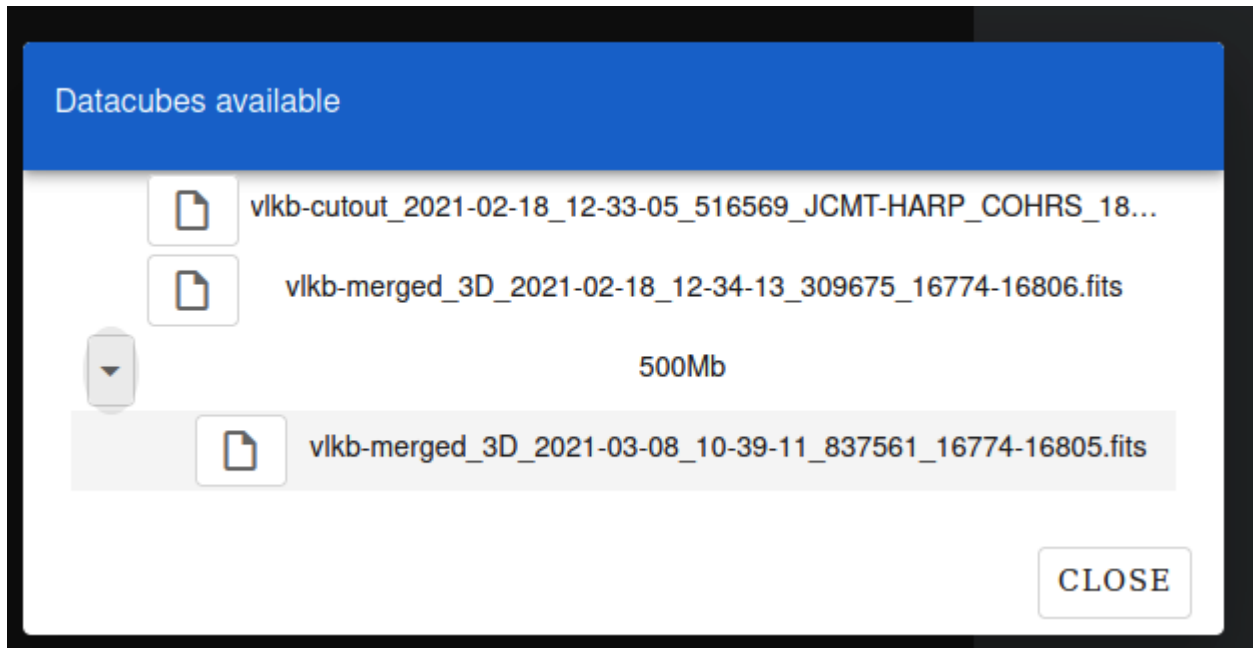


Fig. 6.1: Local FITS file browser

2D IMAGE INTERACTIVE VISUALIZATION

7.1 Adding new 2D images and changing order

By clicking on 2D surveys in query results in the right panel, the user add additional images for current visual analysis. The list of all currently visualised images is available at LayerStack (Fig. 7.1). The user can change the order of images by dragging them into chosen position in Layer Stack list.

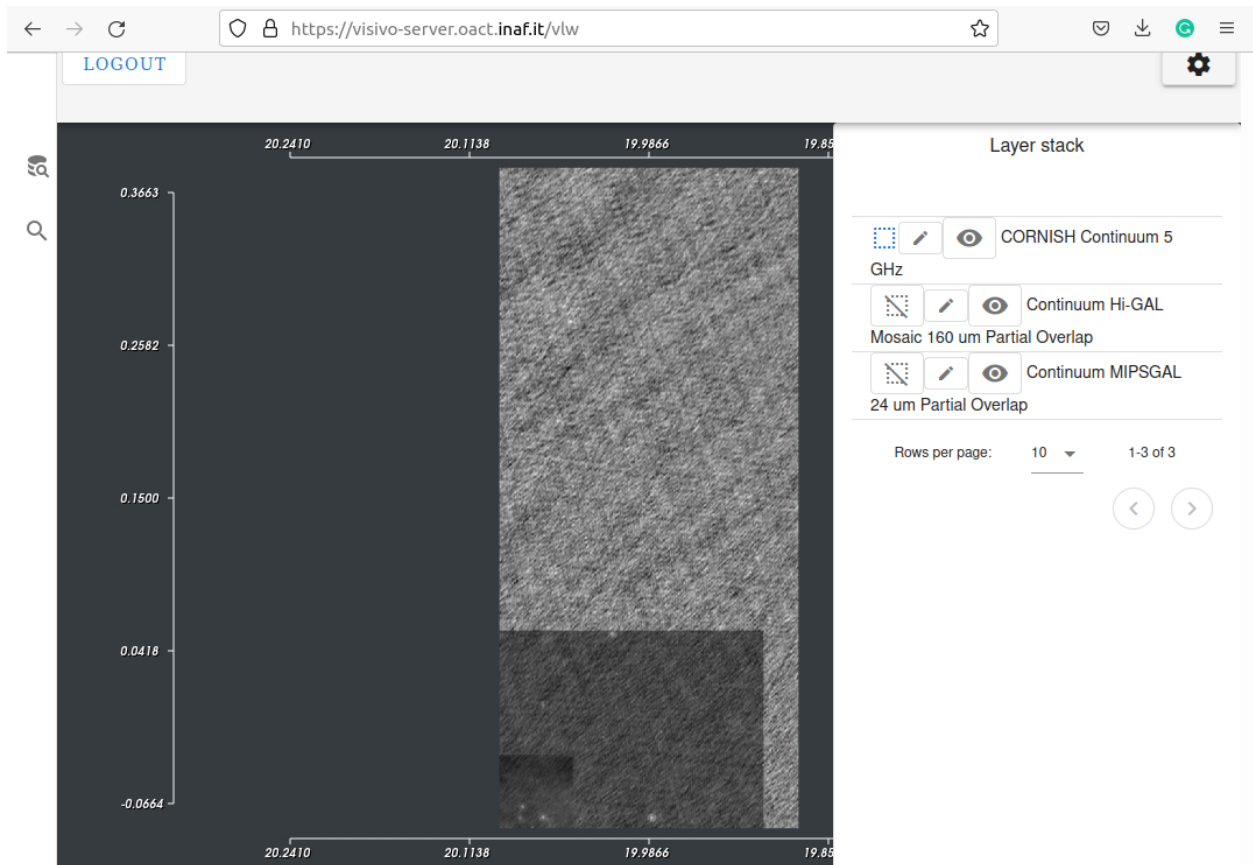


Fig. 7.1: 2D images and Layer stack

7.2 Activating and Hiding/Showing images.

The user can interactively explore the 2D images. To adjust the image grayscale with the mouse, the layer should be active. The currently active image (available for mouse interaction) is highlighted with blue square icon in Layer Stack. To activate the 2D image layer, the user should click on its activation icon to turn its picture into blue square.

To hide/show images the user should click on open/closed eye icon next to image layer.

7.3 Adjusting opacity and palette of image layer

The user can also adjust the optical parameters of each image in Layers Stack. To adjust opacity and change palette the user should click on “edit” icon next to image layer. This will open a dialog where the user can adjust the opacity and change palette for selected image layer (Fig. 7.2).

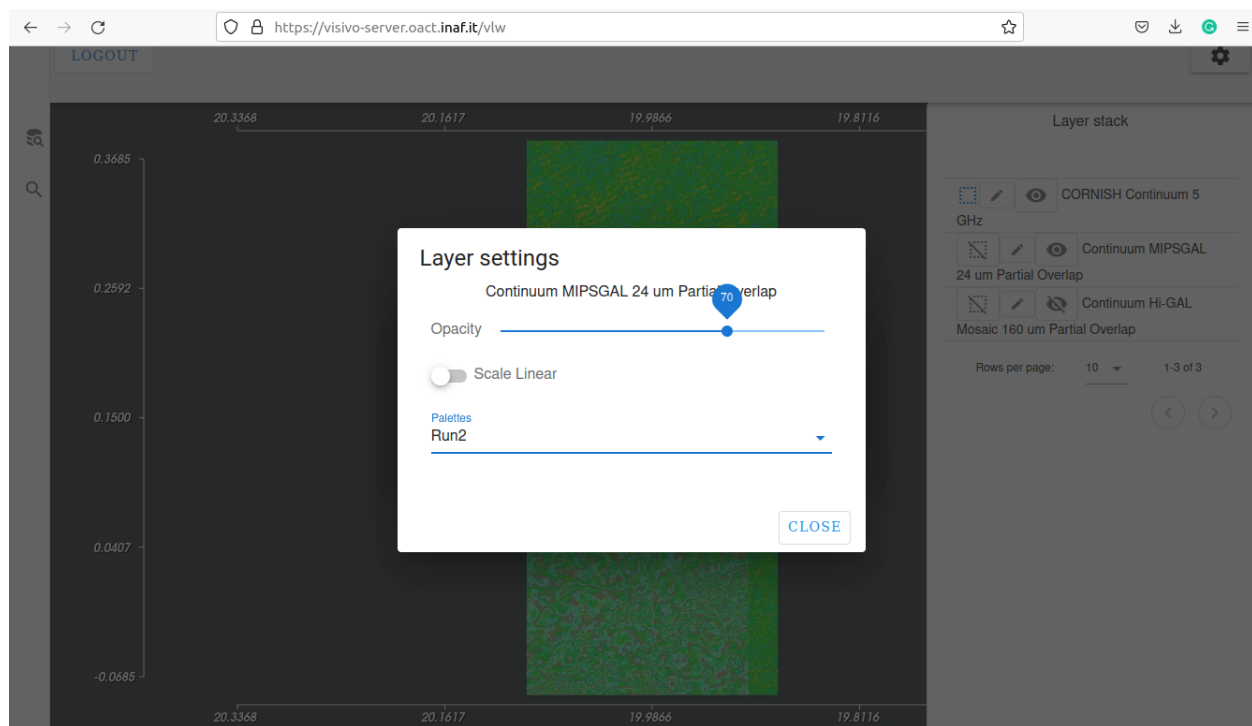


Fig. 7.2: Dialog for changing opacity and palette of the selected image layer

3D DATACUBE INTERACTIVE VISUALIZATION

8.1 Top bar

As DataCube is loaded, the user can interactively explore data in 2D and 3D projections and via set of available operations in tools bar on top (Fig. 8.1) .

The following operations are available in navigation bar on top:

- The slider on the Cutting plane panel to select various 2D projections
- The checkbox on the Contours panel to display contours in 2D projections
- The slider on the Threshold panel to adjust the 3D isocontour value for DataCube.

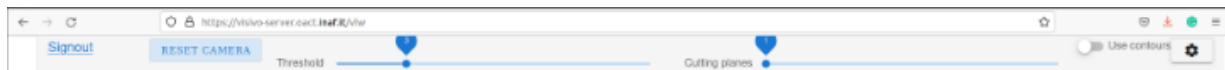


Fig. 8.1: Tools bar to interact with DataCube data

8.2 2D and 3D mouse interaction

The following types of user interaction are available:

- Adjust the 2D the image scale with mouse while holding down a right button.
- Rotate in 3D with mouse while holding down a right button.
- Zoom in/out in 3D with mouse wheel
- Panning in 3D with mouse while holding down a right button and pressing “Shift” key.