CARTA 3: Cube Analysis and Rendering Tool for Astronomy

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CARTA

Cube Analysis and Rendering Tool for Astronomy

Project: ASIAA, IDIA, NRAO, U Alberta

Webpage: https://cartavis.org

Github: https://github.com/CARTAvis

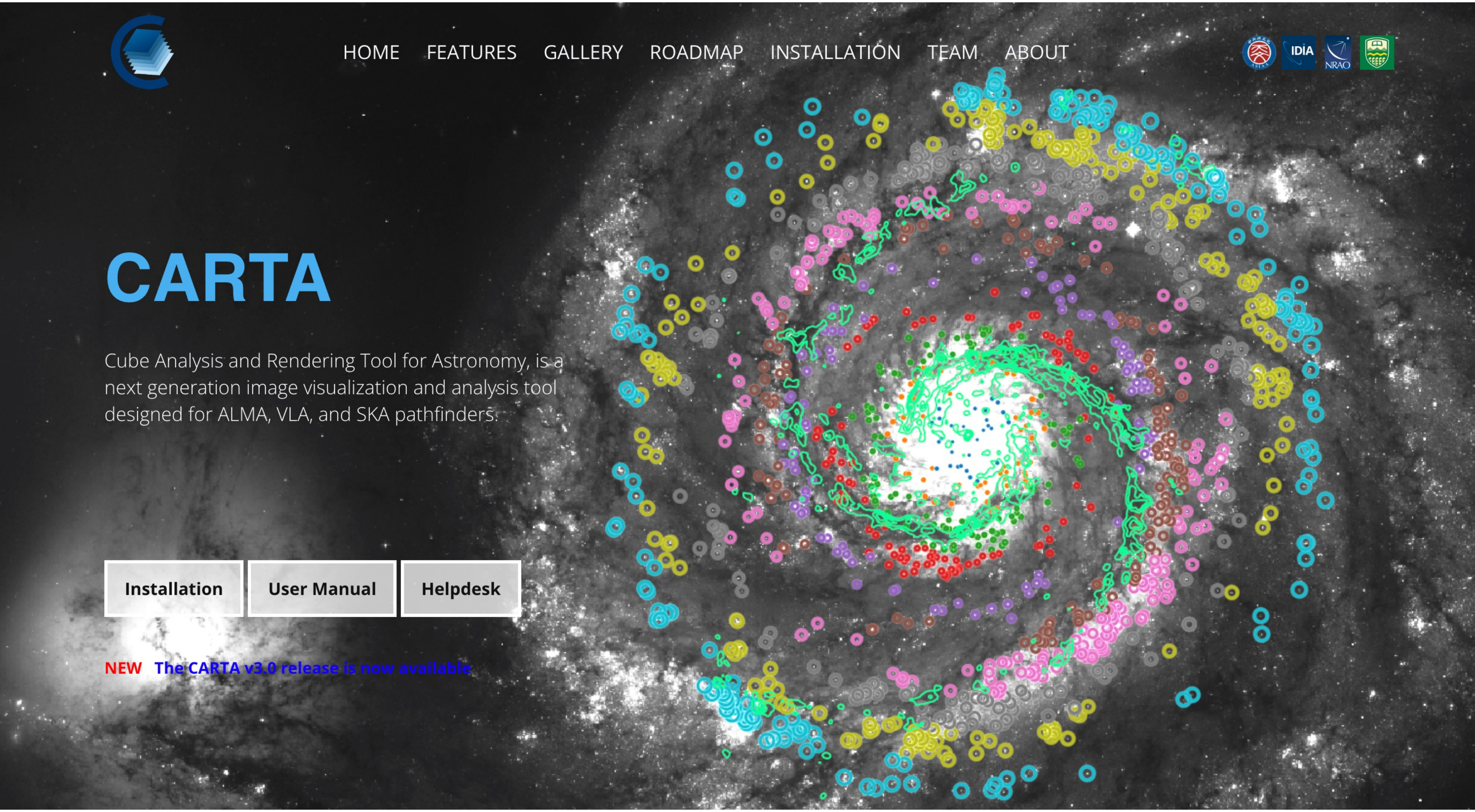
Goal: To build a high performance, versatile image for large data cubes and image in astronomy

Use cases:

- CASA viewer replacement (excluding interactive clean and visibility display)
- Archive interface for images from SKA precursors, ALMA, NRAO SRDP
- Stand alone analysis tool
- Scriptable interface (publication ready images, interaction for analysis)
- Collaborative tool

Current release version 3.0 (release date Aug 23, 2022)

CARTA on cartavis.org

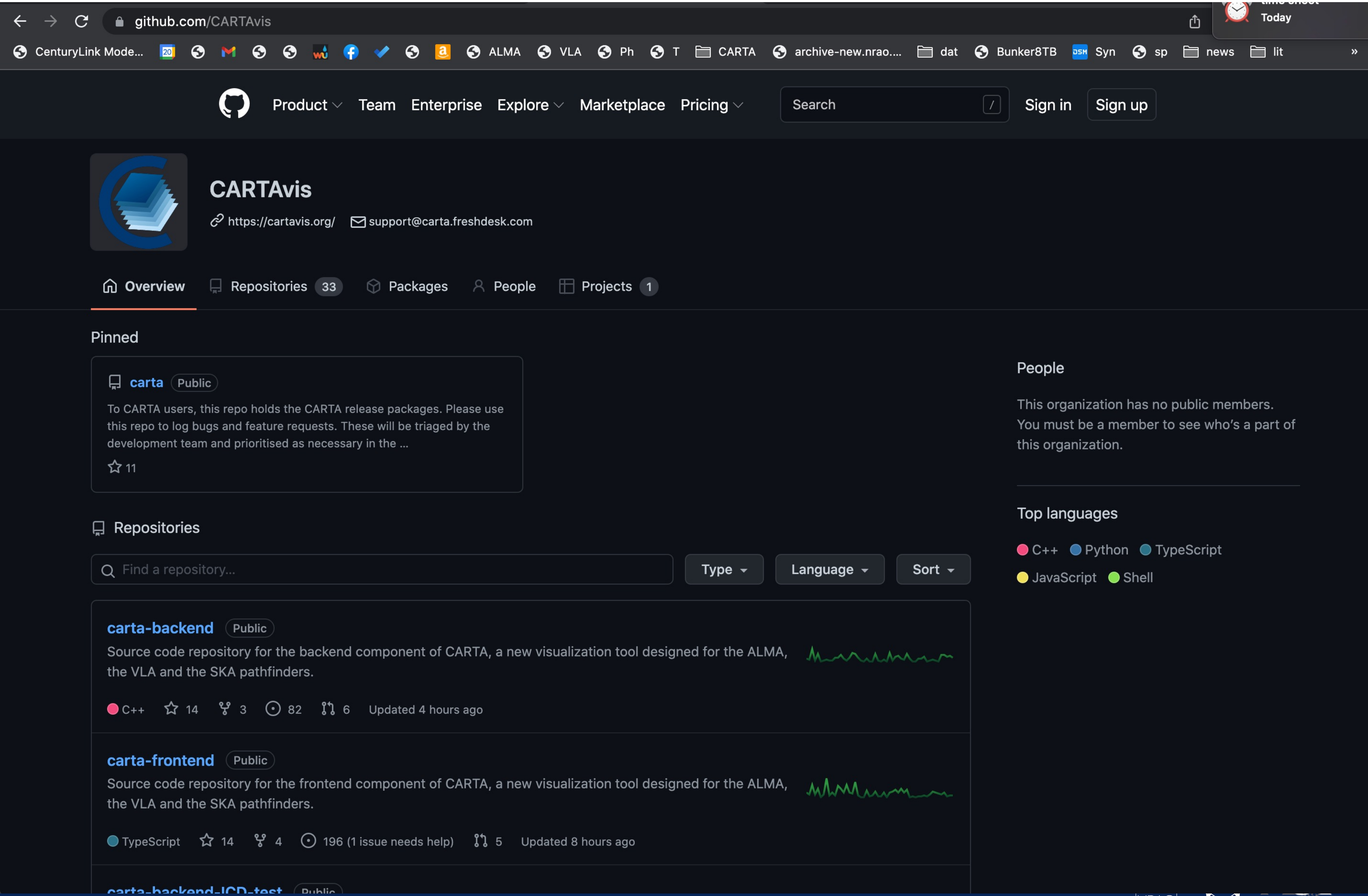

HOME
FEATURES
GALLERY
ROADMAP
INSTALLATION
TEAM
ABOUT
IDIA
NRAO
Installation
User Manual
Helpdesk

CARTA

Cube Analysis and Rendering Tool for Astronomy, is a next generation image visualization and analysis tool designed for ALMA, VLA, and SKA pathfinders.

NEW **The CARTA v3.0 release is now available**

CARTA on github.com/CARTAvis


github.com/CARTAvis
Today
CenturyLink Mode...
ALMA
VLA
Ph
T
CARTA
archive-new.nrao....
dat
Bunker8TB
Syn
sp
news
lit
Product
Team
Enterprise
Explore
Marketplace
Pricing
Search
Sign in
Sign up

CARTAvis

https://cartavis.org/ support@carta.freshdesk.com

Overview
Repositories 33
Packages
People
Projects 1

Pinned

carta Public

To CARTA users, this repo holds the CARTA release packages. Please use this repo to log bugs and feature requests. These will be triaged by the development team and prioritised as necessary in the ...

☆ 11

Repositories

Find a repository...
Type
Language
Sort

carta-backend Public

Source code repository for the backend component of CARTA, a new visualization tool designed for the ALMA, the VLA and the SKA pathfinders.

● C++ ☆ 14 3 82 6 Updated 4 hours ago

carta-frontend Public

Source code repository for the frontend component of CARTA, a new visualization tool designed for the ALMA, the VLA and the SKA pathfinders.

● TypeScript ☆ 14 4 196 (1 issue needs help) 5 Updated 8 hours ago

carta-backend-ICD-test Public

People

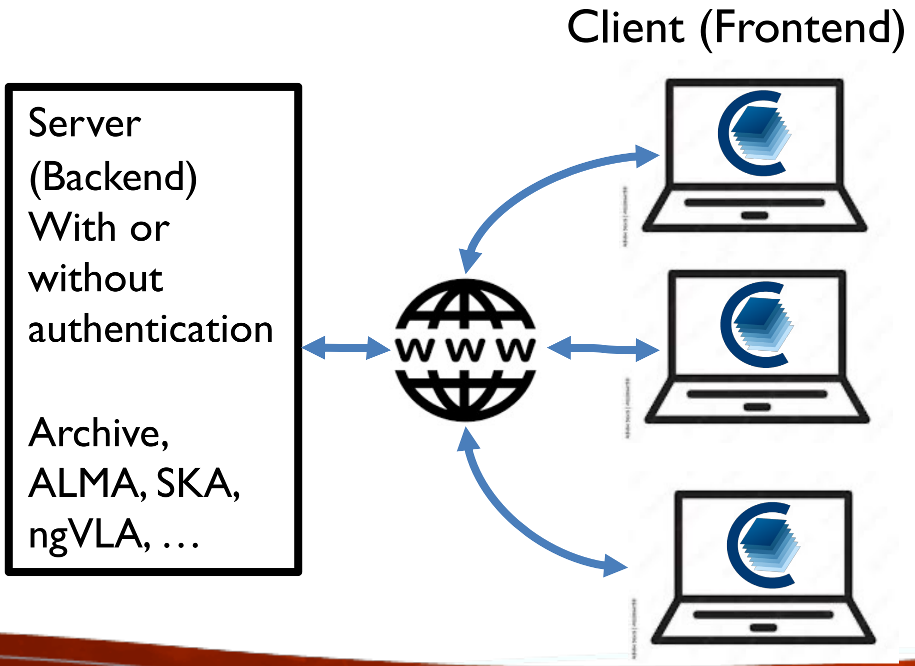
This organization has no public members. You must be a member to see who's a part of this organization.

Top languages

● C++ ● Python ● TypeScript ● JavaScript ● Shell

CARTA architecture

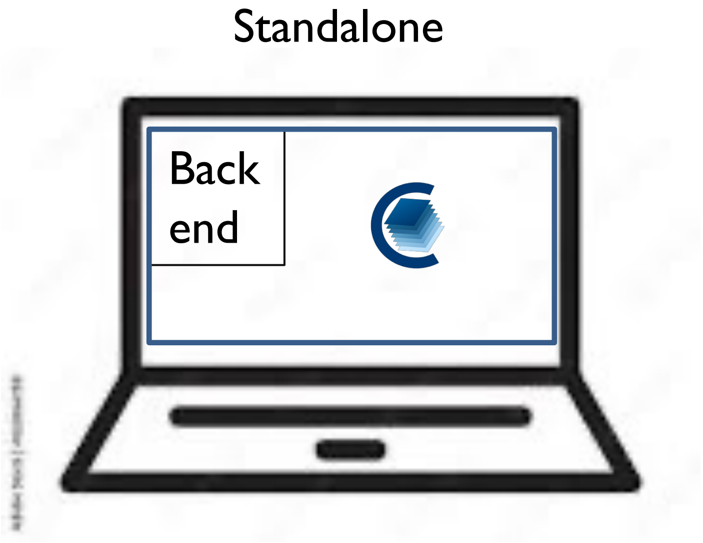
- A focus is on the performance for large datasets (1 TB loads in seconds)
  - Memory efficient image loading
  - Parallelization and GPU-accelerated rendering
  - Progressive and responsive update of spectral profile
  - Tiled image rendering
- Image formats: CASA, fits, gzipped fits, MIRIAD, HDF5 image (cube)
- OS: MacOS, Ubuntu, RHEL
- CARTA is built as a server-client infrastructure, launched separately or in a stand-alone version in a single instance



Client (Frontend)

Server (Backend)
With or without authentication

Archive,
ALMA, SKA,
ngVLA, …

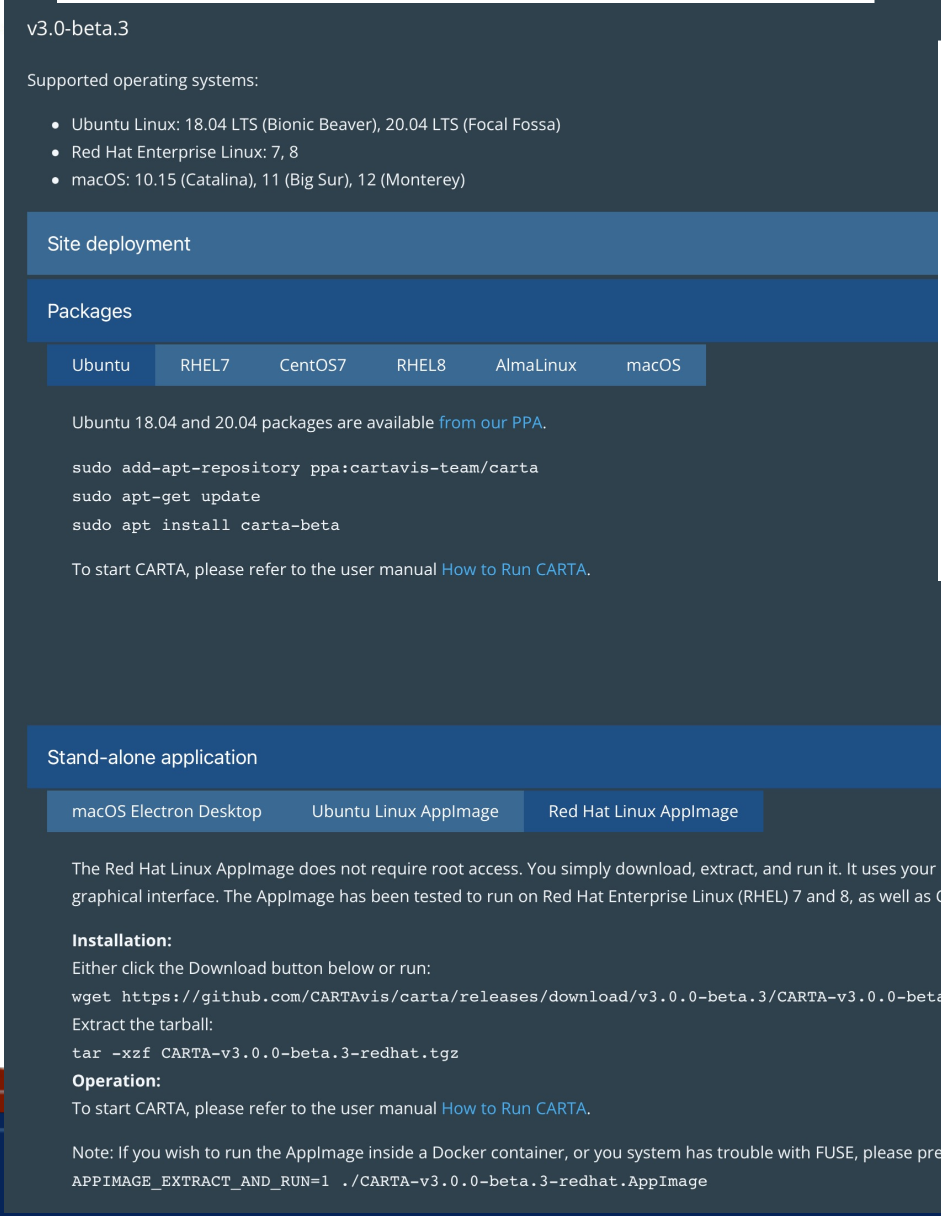


Standalone

Back end

System Requirements

From catravis.org "Obtaining CARTA":



v3.0-beta.3

Supported operating systems:

- Ubuntu Linux: 18.04 LTS (Bionic Beaver), 20.04 LTS (Focal Fossa)
- Red Hat Enterprise Linux: 7, 8
- macOS: 10.15 (Catalina), 11 (Big Sur), 12 (Monterey)

Site deployment

Packages

Ubuntu 18.04 and 20.04 packages are available from our PPA.

```
sudo add-apt-repository ppa:cartavis-team/carta
sudo apt-get update
sudo apt install carta-beta
```

To start CARTA, please refer to the user manual How to Run CARTA.

Stand-alone application

The Red Hat Linux AppImage does not require root access. You simply download, extract, and run it. It uses your default web browser to display the CARTA graphical interface. The AppImage has been tested to run on Red Hat Enterprise Linux (RHEL) 7 and 8, as well as CentOS 7 and AlmaLinux 8.

Installation:
Either click the Download button below or run:

```
wget https://github.com/CARTAvis/carta/releases/download/v3.0.0-beta.3/CARTA-v3.0.0-beta.3-redhat.tgz
```

Extract the tarball:

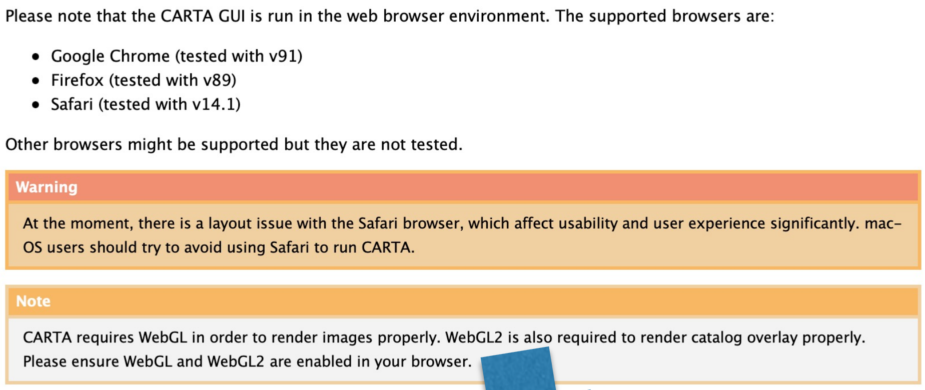
```
tar -xzf CARTA-v3.0.0-beta.3-redhat.tgz
```

Operation:
To start CARTA, please refer to the user manual How to Run CARTA.

Note: If you wish to run the AppImage inside a Docker container, or you system has trouble with FUSE, please prefix with the following environment variable:

```
APPIMAGE_EXTRACT_AND_RUN=1 ./CARTA-v3.0.0-beta.3-redhat.AppImage
```

Browsers: from carta.readthedocs.io "How to run CARTA?":



Please note that the CARTA GUI is run in the web browser environment. The supported browsers are:

- Google Chrome (tested with v91)
- Firefox (tested with v89)
- Safari (tested with v14.1)

Other browsers might be supported but they are not tested.

Warning

At the moment, there is a layout issue with the Safari browser, which affect usability and user experience significantly. mac-OS users should try to avoid using Safari to run CARTA.

Note

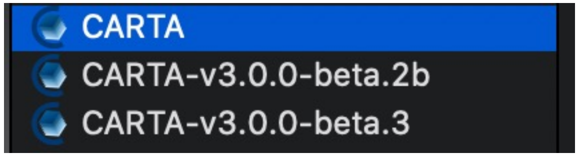
CARTA requires WebGL in order to render images properly. WebGL2 is also required to render catalog overlay properly. Please ensure WebGL and WebGL2 are enabled in your browser.

Note: system/browser must be support webGL 2.0
If not, then CARTA widget will pop up, but image display will be single color
Test URL:
https://get.webgl.org/webgl2/
May require upgrade or downgrade of video card driver

CARTA – Startup Standalone

MacOX installed stand-alone:

`carta` (or click the icon in the Applications folder)



CARTA
CARTA-v3.0.0-beta.2b
CARTA-v3.0.0-beta.3

Linux at NRAO (beta version needs to be downloaded from cartavis.org first):

```
jott@nmpost045 ~> carta --no_browser
CARTA will use the default ephemerides and geodetic data.
[2022-10-11 17:02:20.154] [CARTA] [info] Writing to the log file: /users/jott/.carta/log/carta.log
[2022-10-11 17:02:20.154] [CARTA] [info] /tmp/.mount_cartaKMLmpa/bin/carta_backend: Version 3.0.0
[2022-10-11 17:02:20.161] [CARTA] [info] Serving CARTA frontend from /tmp/.mount_cartaKMLmpa/share/carta/frontend
[2022-10-11 17:02:20.161] [CARTA] [info] Listening on port 3002 with top level folder /, starting folder /users/jott. The number of OpenMP worker threads will be handled automatically.
[2022-10-11 17:02:20.161] [CARTA] [info] CARTA is accessible at http://10.64.10.145:3002/?token=51cb73f4-05e1-4423-92eb-9d530b8d8f69
[2022-10-11 17:02:43.453] [CARTA] [info] 0x15825b0 ::Session (1050442889:1)
[2022-10-11 17:02:43.453] [CARTA] [info] Session 1050442889 [10.64.128.247] Connected. Num sessions: 1
```

→ Copy and paste this URL in your local browser and CARTA will show up

If you launch from your own Linux computer, run the app image directly:

```
> ./CARTA-v3.0.0-redhat7.AppImage -- no_browser
```

CARTA – Startup Remote

VNC session will not work! CARTA is developed for high performance and VNC disables this option through the unavailability of webgl. You will see a blank or monochrome image

Instead:
- Start a VPN session to your remote server or set up a SSH tunnel (NRAO instructions on https://casadocs.readthedocs.io/en/latest/notebooks/carta.html)

On the remote Linux

```
jott@nmpost045 ~> carta --no_browser   (or ./CARTA-v3.0.0-redhat7.AppImage -- no_browser )
CARTA will use the default ephemerides and geodetic data.
[2022-10-11 17:02:20.154] [CARTA] [info] Writing to the log file: /users/jott/.carta/log/carta.log
[2022-10-11 17:02:20.154] [CARTA] [info] /tmp/.mount_cartaKMLmpa/bin/carta_backend: Version 3.0.0
[2022-10-11 17:02:20.161] [CARTA] [info] Serving CARTA frontend from /tmp/.mount_cartaKMLmpa/share/carta/frontend
[2022-10-11 17:02:20.161] [CARTA] [info] Listening on port 3002 with top level folder /, starting folder /users/jott. The number of OpenMP worker threads will be handled automatically.
[2022-10-11 17:02:20.161] [CARTA] [info] CARTA is accessible at http://10.64.10.145:3002/?token=51cb73f4-05e1-4423-92eb-9d530b8d8f69
[2022-10-11 17:02:43.453] [CARTA] [info] 0x15825b0 ::Session (1050442889:1)
[2022-10-11 17:02:43.453] [CARTA] [info] Session 1050442889 [10.64.128.247] Connected. Num sessions: 1
```

→ Copy and paste this URL in your local browser

- However, only staff has access to VPN at NRAO. To remedy this, NRAO server versions for everyone are considered for the future

CARTA for this workshop

The set up of your little workstation boxes are similar to a VNC environment which does not allow webgl for firefox.

So please do the following, it will work for many sessions after setting it up once:

1) run on your workstation:

```
$ carta --no_browser
```

2) Get the following line:

```
[info] CARTA is accessible at http://10.64.10.143:3002/?token=052680c2-b602-4d8d-9ac4-e4cb1120f56b
```

If you have your own laptop, follow the instructions on https://casadocs.readthedocs.io/en/stable/notebooks/carta.html for ssh tunneling:

3) Pick the port number from the URL above (here: 3002) then, in a new terminal on your laptop:

```
$ ssh -N username@ssh.aoc.nrao.edu -L 3002:nraosiw123.aoc.nrao.edu:3002
```

(example workstation name: nraosiw123)

4.) Then, in a local browser on your laptop, replace the URL but not port to 'localhost':

```
$ http://localhost:3002/?token=052680c2-b602-4d8d-9ac4-e4cb1120f56b
```

If you don't have your own laptop

3) If you sit in the auditorium the section near the door, run

```
$ ssh apricity microsoft-edge
```

if you sit in the section away from the door, run

```
$ ssh petrichor microsoft-edge
```

(we want to distribute users to two servers) This will launch the MS Edge browser, that supports webgl.

4) You can now paste the URL from CARTA into the Edge browser

CARTA Features

Viewing:

- Image rendering with (global) min/max clipping, scaling functions and color maps
- Image panning, zooming, etc.
- Multi-panel
- Hardcopy
- Image/region saving
- Image blinking
- Image WCS matching spatially and spectrally
- Contours with different generators, colors, color maps
- Catalog overlays
- Setting of rest frequency
- Vector overlays
- Complex image display
- LEL image arithmetic before display
- Generating computed polarization quantities (eg. linear polarization intensity) of a Stokes cube on the fly
- Setting a new rest frequency when saving a subimage

CARTA Features

Tools/Analysis:

- Regions: rotating box, ellipses, polygons, line, point, polyline
- Spatial (X,Y) and spectral (Z) profiles
- Spectral profiles can convert spectral axis labels (velocity, frequency, wavelength)
- Histogram
- Image/Region Statistics
- Stokes analysis widget
- Moment generator
- pV diagram
- Spectral line labelling
- Spectral smoothing
- Distance measuring tool
- Intensity conversion
- 2D Gaussian fitting of sources in image
- Line and polyline region spectral profiler

CARTA Features

Other:

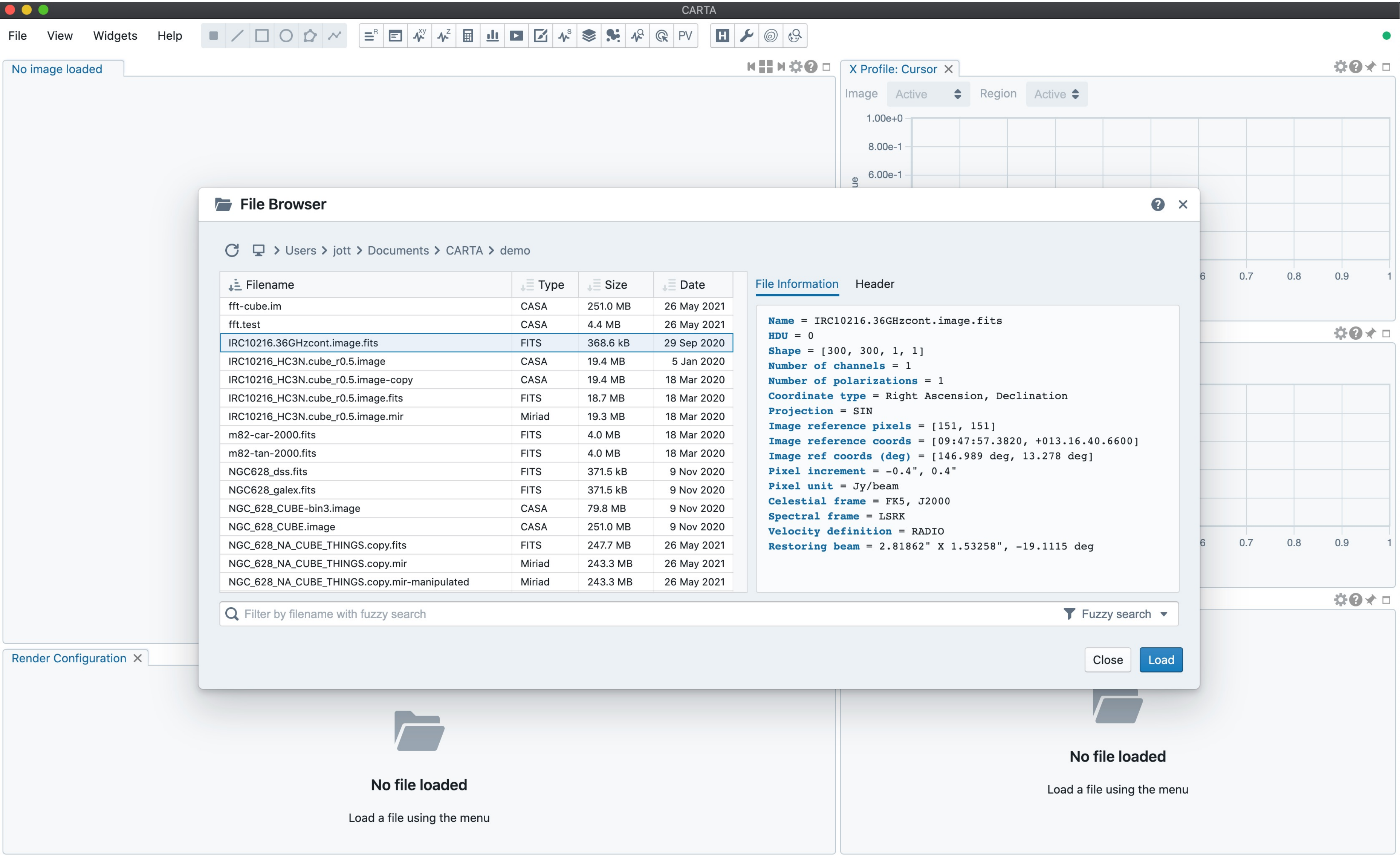
- Server-client infrastructure for remote image access
- Server authentication
- Tiled rendering for performance
- Docking and Preferred layouts and layout saving
- Scripting is under active development

CASAviewer vs CARTA

Gaps relative to CASAviewer (green: CARTA development underway; black: future CARTA development; red: likely not implemented in CARTA)

- Complete set of fitting tools → spectral: multiple Gaussians and Lorenzians already available with continuum polynomial; spatial: 2D Gaussian fit
- Source finder tool
- Spectral profile error bar plotting (MUSE/optical feature in CASA)
- Image annotation → v4
- Profile annotation
- Rotated cube view (input as ra-dec-channel, view as ra-channel vs dec)
- Scalable output (SVG or PDF)
- Creation of multi-channel plots → v4
- Regions that extend across spectral and stokes planes
- Histogram fitting
- Markers → they have not been widely used in the CASAviewer
- Interactive clean → CASA is developing a visualization tool independent of CARTA
- Full support of CRTF → was not even supported by the CASAviewer
- Save/reload states → v4
- Share states → v4

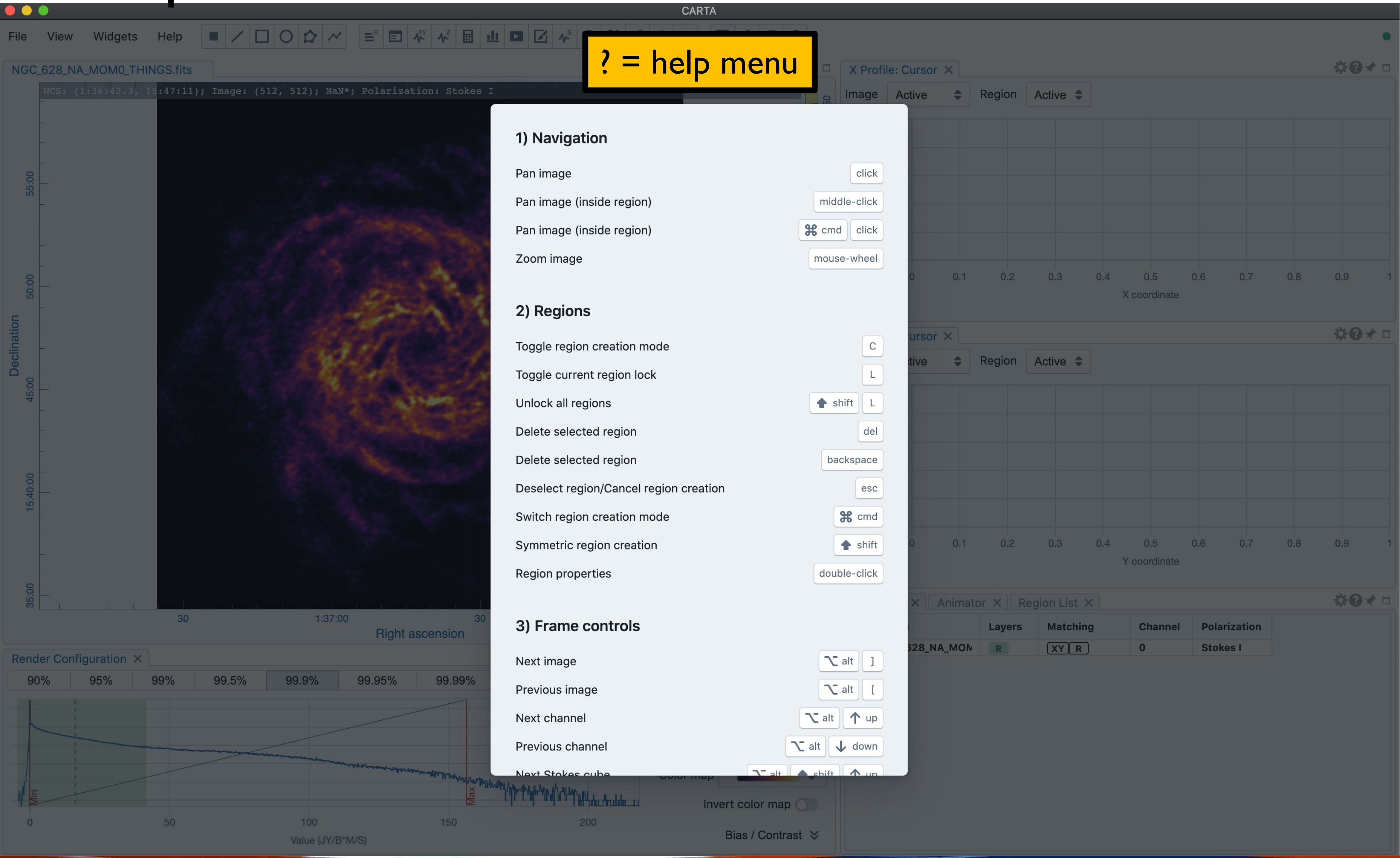
File loading


CARTA
File
View
Widgets
Help
PV
No image loaded
X Profile: Cursor
Image
Active
Region
Active
1.00e+0
8.00e-1
6.00e-1
0.7
0.8
0.9
1
File Browser
Users > jott > Documents > CARTA > demo
File Information
Header
Filter by filename with fuzzy search
Fuzzy search
Close
Load
Render Configuration
No file loaded
Load a file using the menu
No file loaded
Load a file using the menu

Filename	Type	Size	Date
fft-cube.im	CASA	251.0 MB	26 May 2021
fft.test	CASA	4.4 MB	26 May 2021
IRC10216.36GHzcont.image.fits	FITS	368.6 kB	29 Sep 2020
IRC10216_HC3N.cube_r0.5.image	CASA	19.4 MB	5 Jan 2020
IRC10216_HC3N.cube_r0.5.image-copy	CASA	19.4 MB	18 Mar 2020
IRC10216_HC3N.cube_r0.5.image.fits	FITS	18.7 MB	18 Mar 2020
IRC10216_HC3N.cube_r0.5.image.mir	Miriad	19.3 MB	18 Mar 2020
m82-car-2000.fits	FITS	4.0 MB	18 Mar 2020
m82-tan-2000.fits	FITS	4.0 MB	18 Mar 2020
NGC628_dss.fits	FITS	371.5 kB	9 Nov 2020
NGC628_galex.fits	FITS	371.5 kB	9 Nov 2020
NGC_628_CUBE-bin3.image	CASA	79.8 MB	9 Nov 2020
NGC_628_CUBE.image	CASA	251.0 MB	9 Nov 2020
NGC_628_NA_CUBE_THINGS.copy.fits	FITS	247.7 MB	26 May 2021
NGC_628_NA_CUBE_THINGS.copy.mir	Miriad	243.3 MB	26 May 2021
NGC_628_NA_CUBE_THINGS.copy.mir-manipulated	Miriad	243.3 MB	26 May 2021

```
Name = IRC10216.36GHzcont.image.fits
HDU = 0
Shape = [300, 300, 1, 1]
Number of channels = 1
Number of polarizations = 1
Coordinate type = Right Ascension, Declination
Projection = SIN
Image reference pixels = [151, 151]
Image reference coords = [09:47:57.3820, +013.16.40.6600]
Image ref coords (deg) = [146.989 deg, 13.278 deg]
Pixel increment = -0.4", 0.4"
Pixel unit = Jy/beam
Celestial frame = FK5, J2000
Spectral frame = LSRK
Velocity definition = RADIO
Restoring beam = 2.81862" X 1.53258", -19.1115 deg
```

Help


CARTA
File
View
Widgets
Help
NGC_628_NA_MOM0_THINGS.fits
WCS: (1:36:42.3, 15:47:11); Image: (512, 512); NaN*; Polarization: Stokes I
Declination
Right ascension
X Profile: Cursor
Image
Active
Region
Active
X coordinate
Y coordinate
Animator
Region List
Layers
Matching
Channel
Polarization
Stokes I
Render Configuration
90%
95%
99%
99.5%
99.9%
99.95%
99.99%
Value (JY/B*M/S)
Invert color map
Bias / Contrast

? = help menu

1) Navigation

Pan image	click
Pan image (inside region)	middle-click
Pan image (inside region)	⌘ cmd + click
Zoom image	mouse-wheel

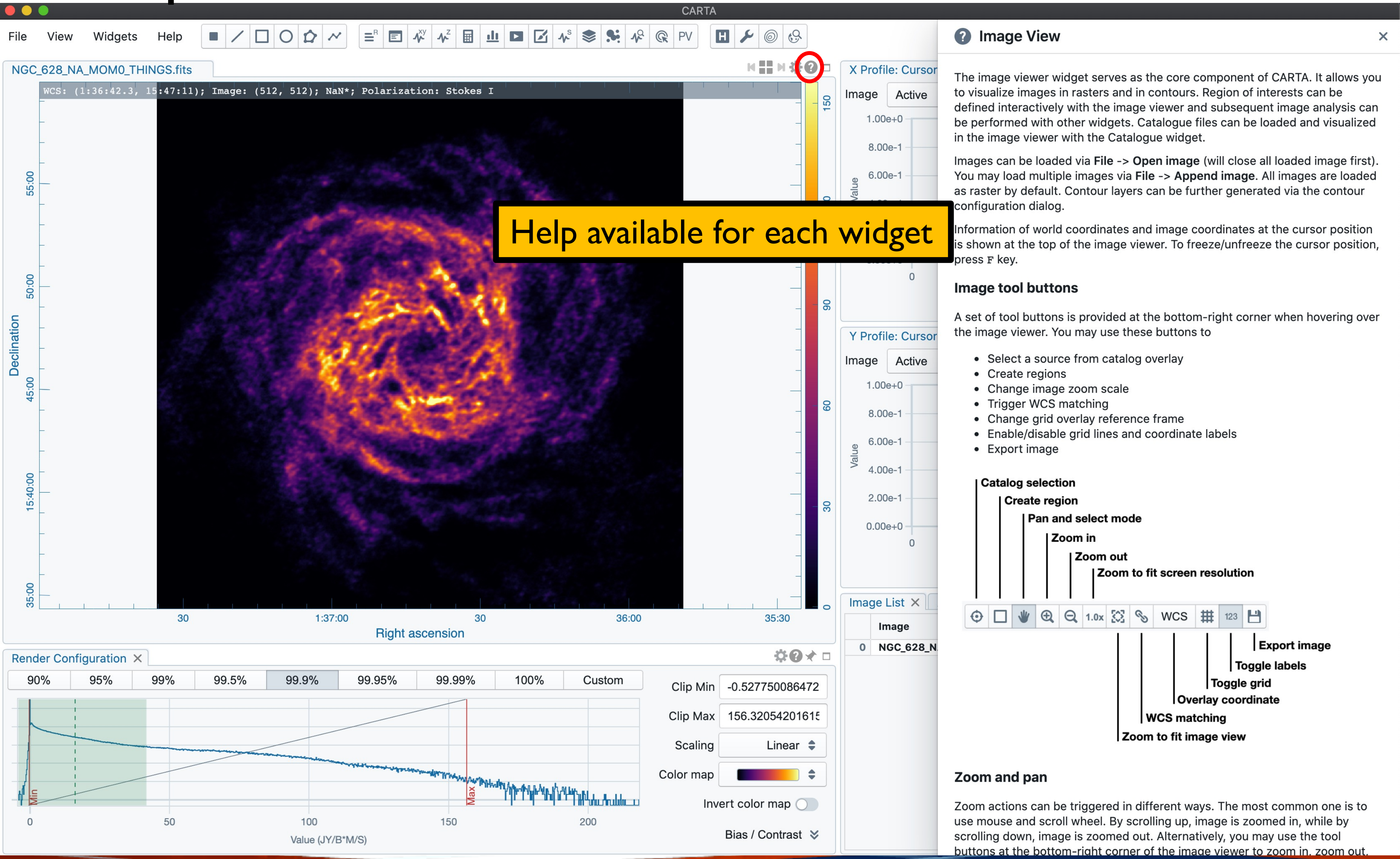
2) Regions

Toggle region creation mode	C
Toggle current region lock	L
Unlock all regions	⇧ shift + L
Delete selected region	del
Delete selected region	backspace
Deselect region/Cancel region creation	esc
Switch region creation mode	⌘ cmd
Symmetric region creation	⇧ shift
Region properties	double-click

3) Frame controls

Next image	⌥ alt +]
Previous image	⌥ alt + [
Next channel	⌥ alt + ↑ up
Previous channel	⌥ alt + ↓ down
Next Stokes cube	⌥ alt + ⇧ shift + ↑ up

Help


CARTA
File
View
Widgets
Help
NGC_628_NA_MOM0_THINGS.fits
Declination
Right ascension
55:00
50:00
45:00
15:40:00
35:00
30
1:37:00
30
36:00
35:30
150
90
60
30
0
X Profile: Cursor
Y Profile: Cursor
Image
Active
Value
Image List
Render Configuration
90%
95%
99%
99.5%
99.9%
99.95%
99.99%
100%
Custom
Min
Max
0
50
100
150
200
Value (JY/B*M/S)
Color map
Invert color map
Bias / Contrast

`WCS: (1:36:42.3, 15:47:11); Image: (512, 512); NaN*; Polarization: Stokes I`

Image
0 NGC_628_N

Clip Min: -0.527750086472

Clip Max: 156.32054201615

Scaling: Linear

Help available for each widget

Image View

The image viewer widget serves as the core component of CARTA. It allows you to visualize images in rasters and in contours. Region of interests can be defined interactively with the image viewer and subsequent image analysis can be performed with other widgets. Catalogue files can be loaded and visualized in the image viewer with the Catalogue widget.

Images can be loaded via **File** -> **Open image** (will close all loaded image first). You may load multiple images via **File** -> **Append image**. All images are loaded as raster by default. Contour layers can be further generated via the contour configuration dialog.

Information of world coordinates and image coordinates at the cursor position is shown at the top of the image viewer. To freeze/unfreeze the cursor position, press `F` key.

Image tool buttons

A set of tool buttons is provided at the bottom-right corner when hovering over the image viewer. You may use these buttons to

- Select a source from catalog overlay
- Create regions
- Change image zoom scale
- Trigger WCS matching
- Change grid overlay reference frame
- Enable/disable grid lines and coordinate labels
- Export image

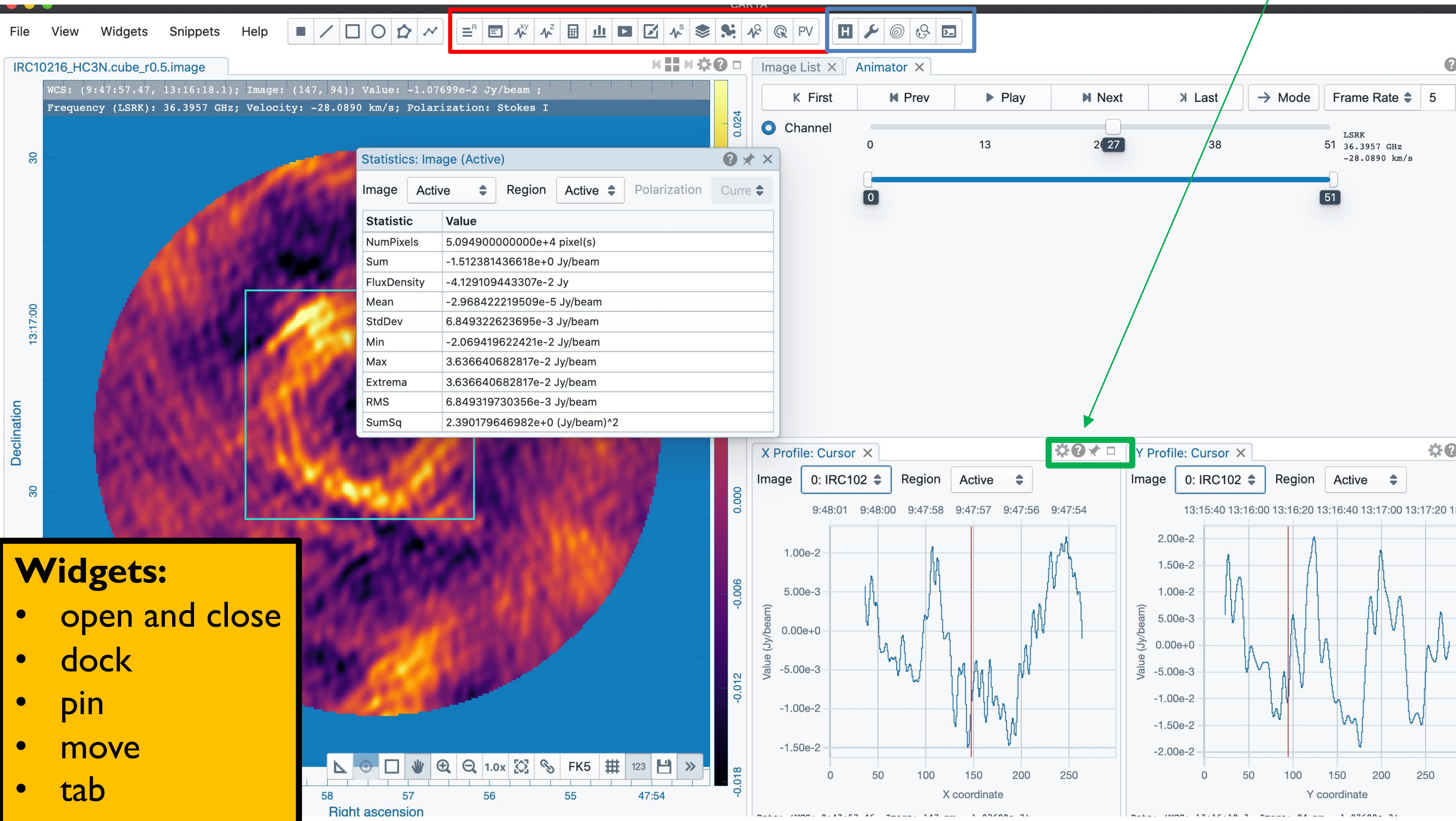
Catalog selection
Create region
Pan and select mode
Zoom in
Zoom out
Zoom to fit screen resolution
1.0x
WCS
123
Export image
Toggle labels
Toggle grid
Overlay coordinate
WCS matching
Zoom to fit image view

Zoom and pan

Zoom actions can be triggered in different ways. The most common one is to use mouse and scroll wheel. By scrolling up, image is zoomed in, while by scrolling down, image is zoomed out. Alternatively, you may use the tool buttons at the bottom-right corner of the image viewer to zoom in, zoom out,

Widgets

Settings, help, pin, full screen


File
View
Widgets
Snippets
Help
PV
IRC10216_HC3N.cube_r0.5.image
Image List
Animator
First
Prev
Play
Next
Last
Mode
Frame Rate
5
Channel
0
13
26
27
38
51
LSRK
36.3957 GHz
-28.0890 km/s
0
51
X Profile: Cursor
Y Profile: Cursor
Image
0: IRC102
Region
Active
Value (Jy/beam)
X coordinate
Y coordinate
Declination
Right ascension
FK5
1.0x

```
WCS: (9:47:57.47, 13:16:18.1); Image: (147, 94); Value: -1.07699e-2 Jy/beam ;
Frequency (LSRK): 36.3957 GHz; Velocity: -28.0890 km/s; Polarization: Stokes I
```

Statistics: Image (Active)

Image: Active · Region: Active · Polarization: Curre

Statistic	Value
NumPixels	5.094900000000e+4 pixel(s)
Sum	-1.512381436618e+0 Jy/beam
FluxDensity	-4.129109443307e-2 Jy
Mean	-2.968422219509e-5 Jy/beam
StdDev	6.849322623695e-3 Jy/beam
Min	-2.069419622421e-2 Jy/beam
Max	3.636640682817e-2 Jy/beam
Extrema	3.636640682817e-2 Jy/beam
RMS	6.849319730356e-3 Jy/beam
SumSq	2.390179646982e+0 (Jy/beam)^2

Widgets:

- open and close
- dock
- pin
- move
- tab
- rearrange
- resize
- float

Widgets

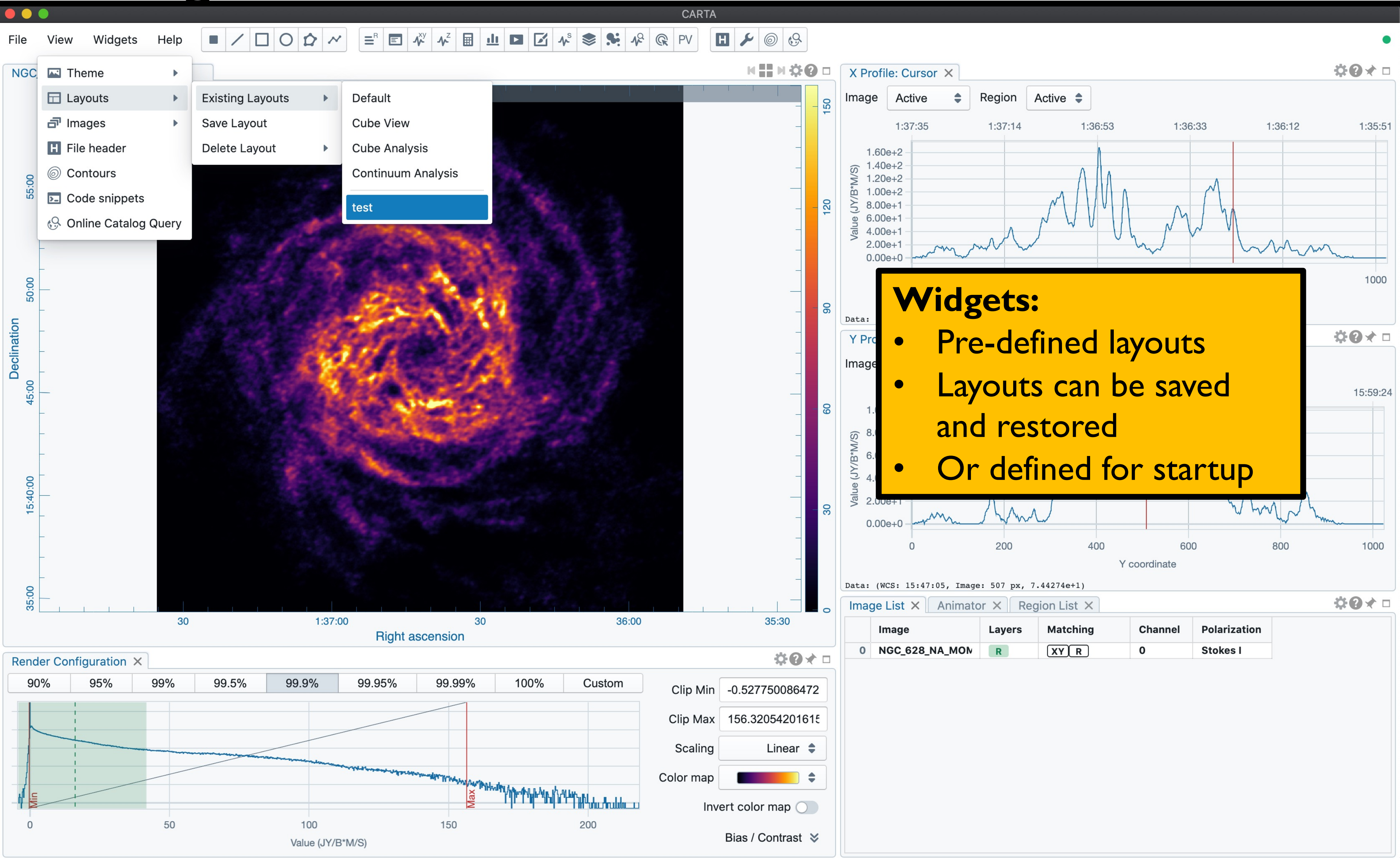

CARTA
File
View
Widgets
Help
Theme
Layouts
Images
File header
Contours
Code snippets
Online Catalog Query
Existing Layouts
Save Layout
Delete Layout
Default
Cube View
Cube Analysis
Continuum Analysis
test
X Profile: Cursor
Y Profile
Image List
Animator
Region List
Render Configuration
Right ascension
Declination
Y coordinate
Value (JY/B*M/S)
90%
95%
99%
99.5%
99.9%
99.95%
99.99%
100%
Custom
Invert color map
Bias / Contrast

Image: Active
Region: Active

Data: (WCS: 15:47:05, Image: 507 px, 7.44274e+1)

	Image	Layers	Matching	Channel	Polarization
0	NGC_628_NA_MON	R	XY R	0	Stokes I

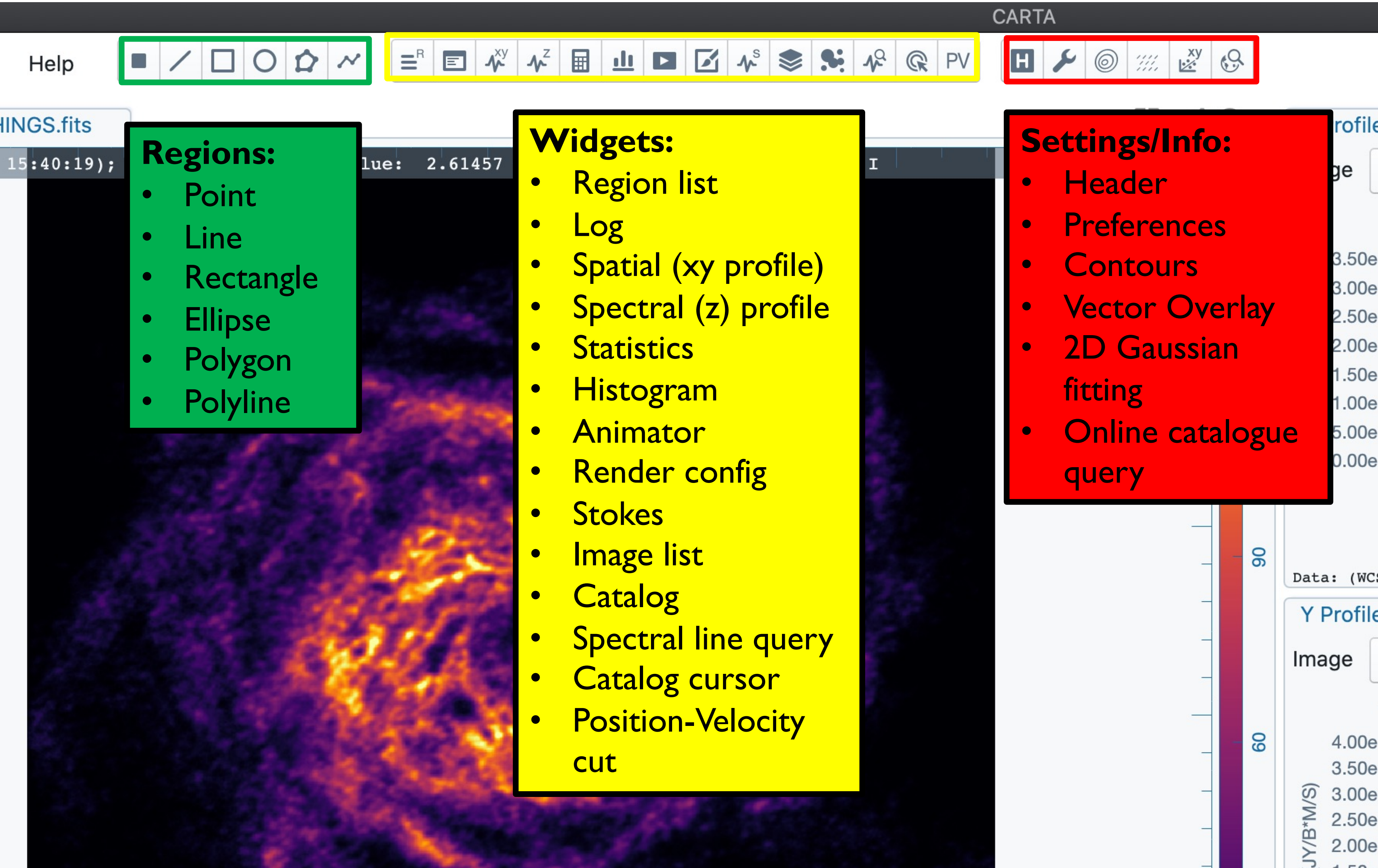
Clip Min: -0.527750086472
Clip Max: 156.32054201615
Scaling: Linear
Color map

Widgets:

- Pre-defined layouts
- Layouts can be saved and restored
- Or defined for startup

CARTA v3 (2022)

Widgets


CARTA
Help
PV
HINGS.fits
15:40:19);
lue: 2.61457
rofile
Data: (WC
Y Profile
Image
90
60

Regions:

- Point
- Line
- Rectangle
- Ellipse
- Polygon
- Polyline

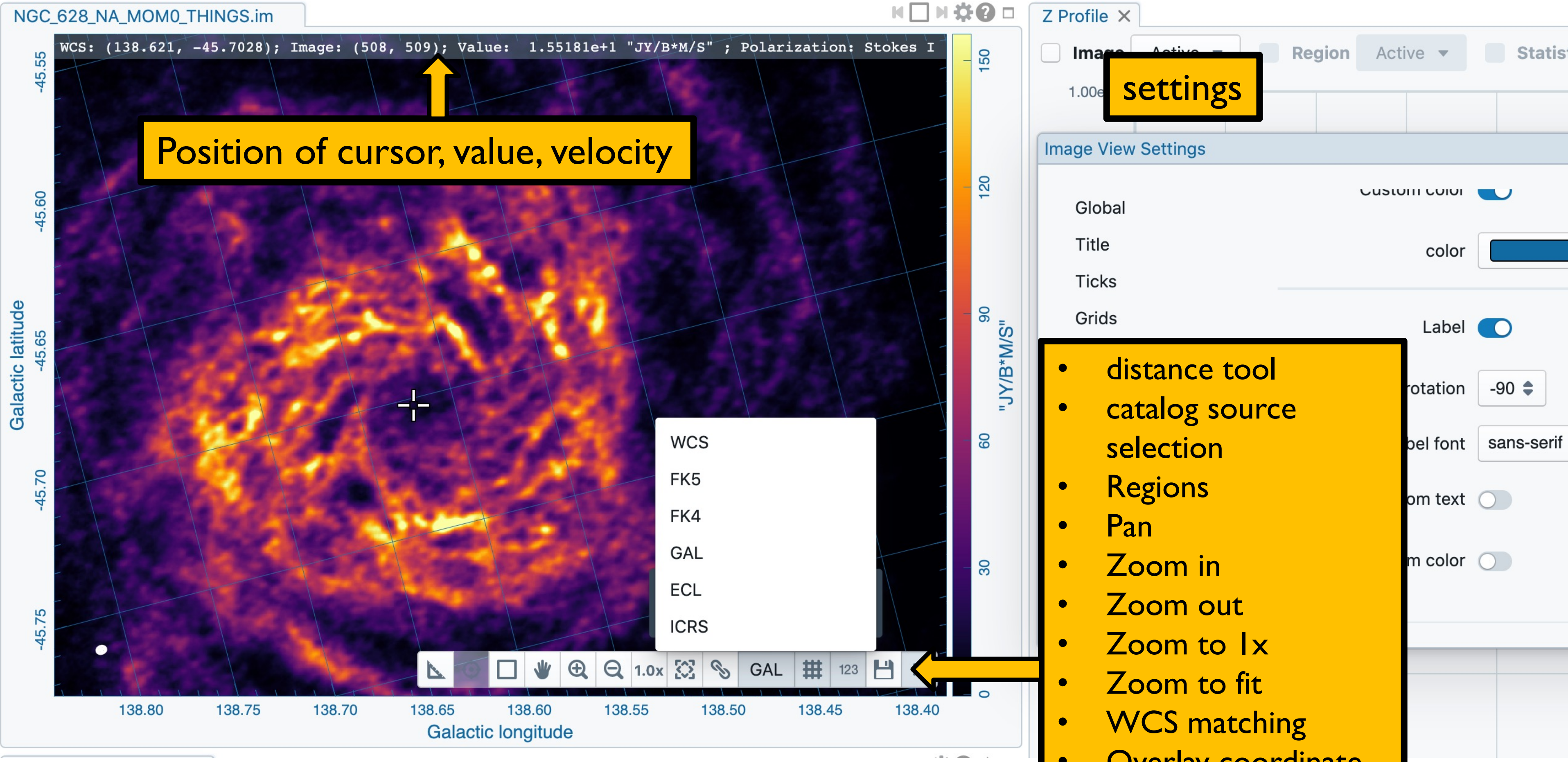
Widgets:

- Region list
- Log
- Spatial (xy profile)
- Spectral (z) profile
- Statistics
- Histogram
- Animator
- Render config
- Stokes
- Image list
- Catalog
- Spectral line query
- Catalog cursor
- Position-Velocity cut

Settings/Info:

- Header
- Preferences
- Contours
- Vector Overlay
- 2D Gaussian fitting
- Online catalogue query

Image display widget



```
WCS: (138.621, -45.7028); Image: (508, 509); Value:  1.55181e+1 "JY/B*M/S" ; Polarization: Stokes I
```

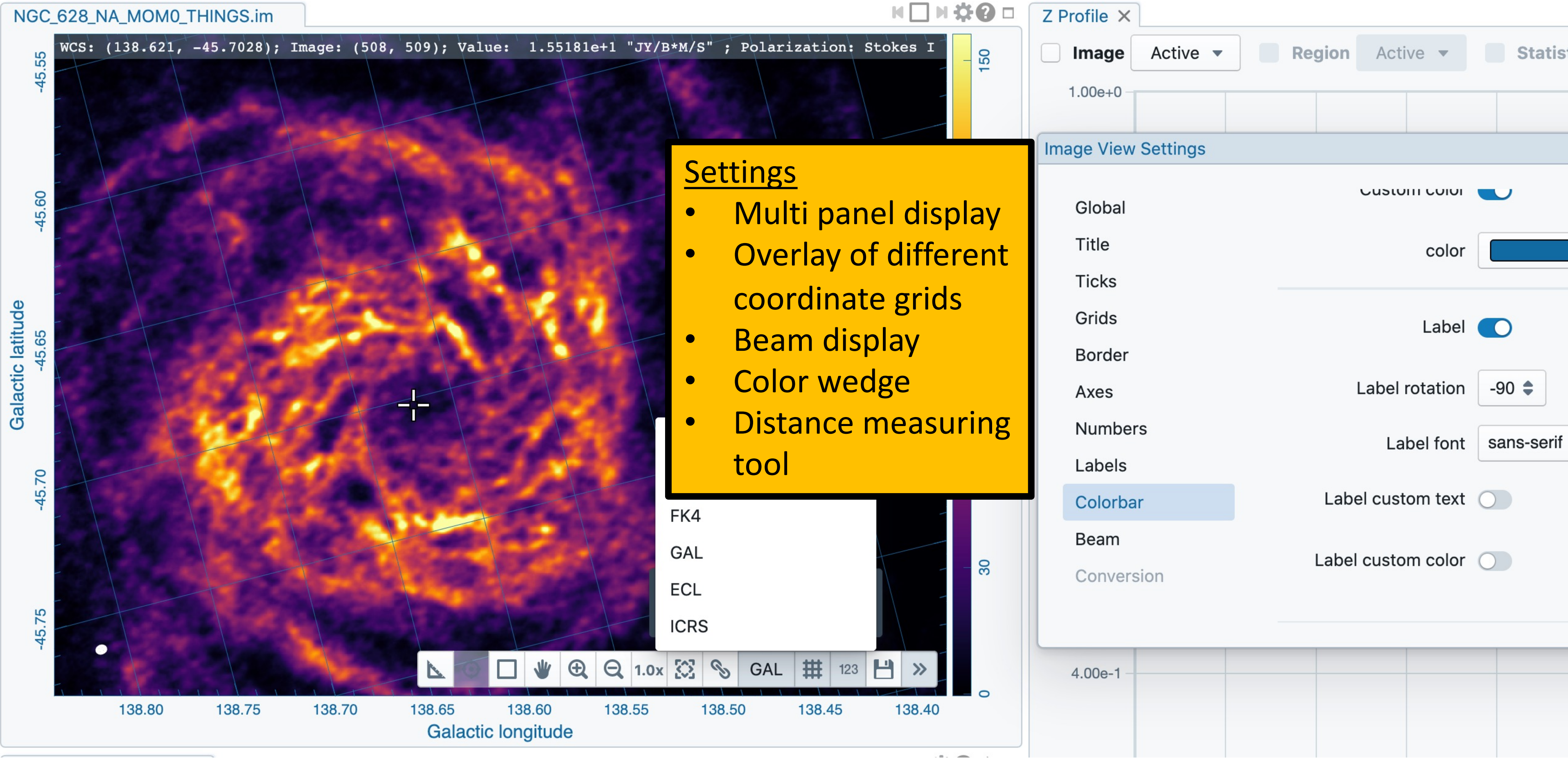
NGC_628_NA_MOM0_THINGS.im
Galactic latitude
-45.55
-45.60
-45.65
-45.70
-45.75
Galactic longitude
138.80
138.75
138.70
138.65
138.60
138.55
138.50
138.45
138.40
"JY/B*M/S"
150
120
90
60
30
0
WCS
FK5
FK4
GAL
ECL
ICRS
1.0x
GAL
123
Z Profile
Image
Active
Region
Active
Statis
1.00e
Image View Settings
Global
Title
Ticks
Grids
Custom color
color
Label
rotation
-90
bel font
sans-serif
om text
m color

Position of cursor, value, velocity

settings

- distance tool
- catalog source selection
- Regions
- Pan
- Zoom in
- Zoom out
- Zoom to 1x
- Zoom to fit
- WCS matching
- Overlay coordinate
- Grid
- Labels
- Export

Image display widget



NGC_628_NA_MOM0_THINGS.im

```
WCS: (138.621, -45.7028); Image: (508, 509); Value:  1.55181e+1 "JY/B*M/S" ; Polarization: Stokes I
```

Image View Settings

Label ●

Label rotation -90

Label font sans-serif

Label custom text ○

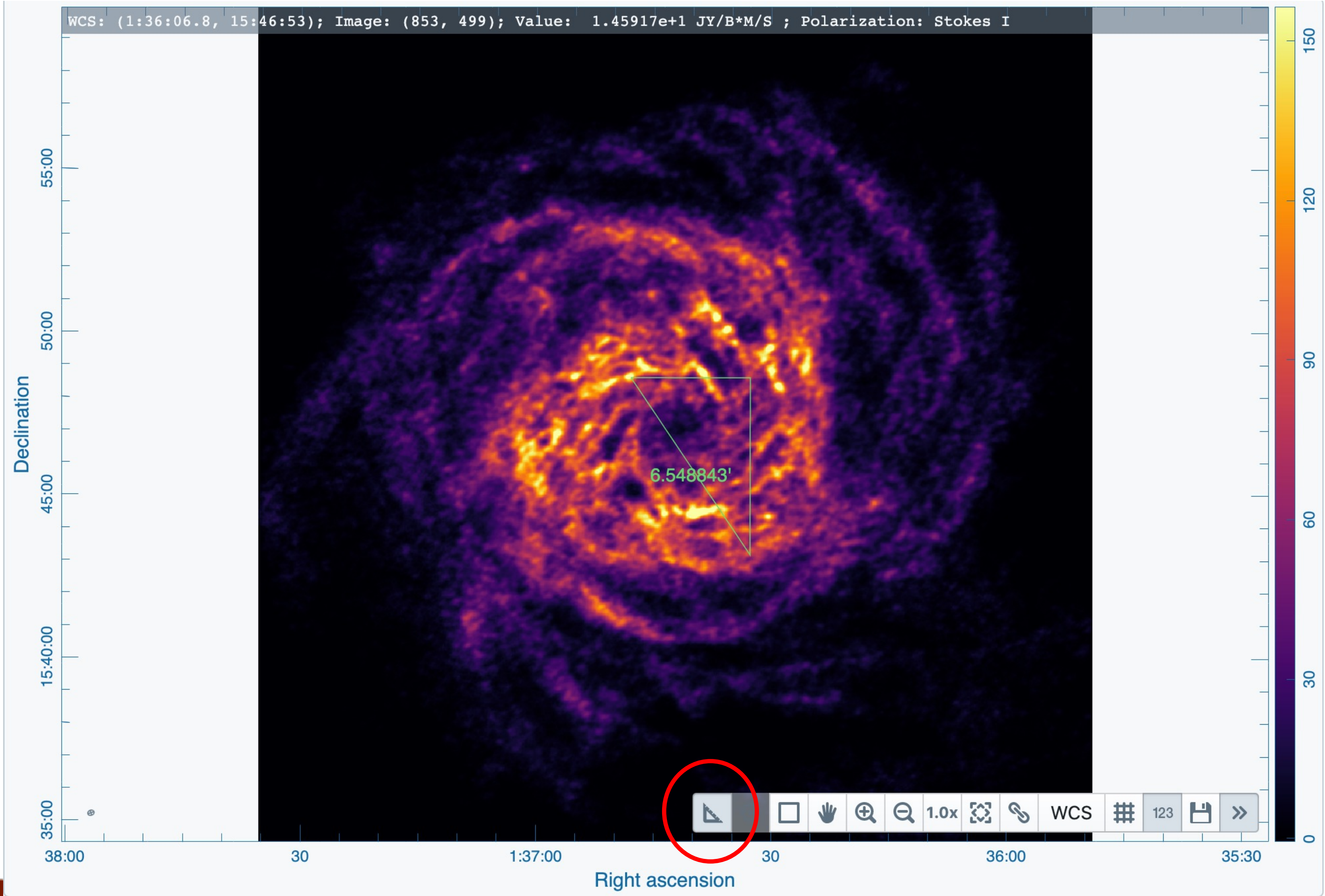
Label custom color ○

Galactic latitude
-45.55
-45.60
-45.65
-45.70
-45.75
138.80
138.75
138.70
138.65
138.60
138.55
138.50
138.45
138.40
Galactic longitude
150
30
0
FK4
GAL
ECL
ICRS
1.0x
GAL
123
Z Profile
Image
Active
Region
Active
Statis
1.00e+0
4.00e-1
Global
Title
Ticks
Grids
Border
Axes
Numbers
Labels
Colorbar
Beam
Conversion
Custom color
color

Settings

- Multi panel display
- Overlay of different coordinate grids
- Beam display
- Color wedge
- Distance measuring tool

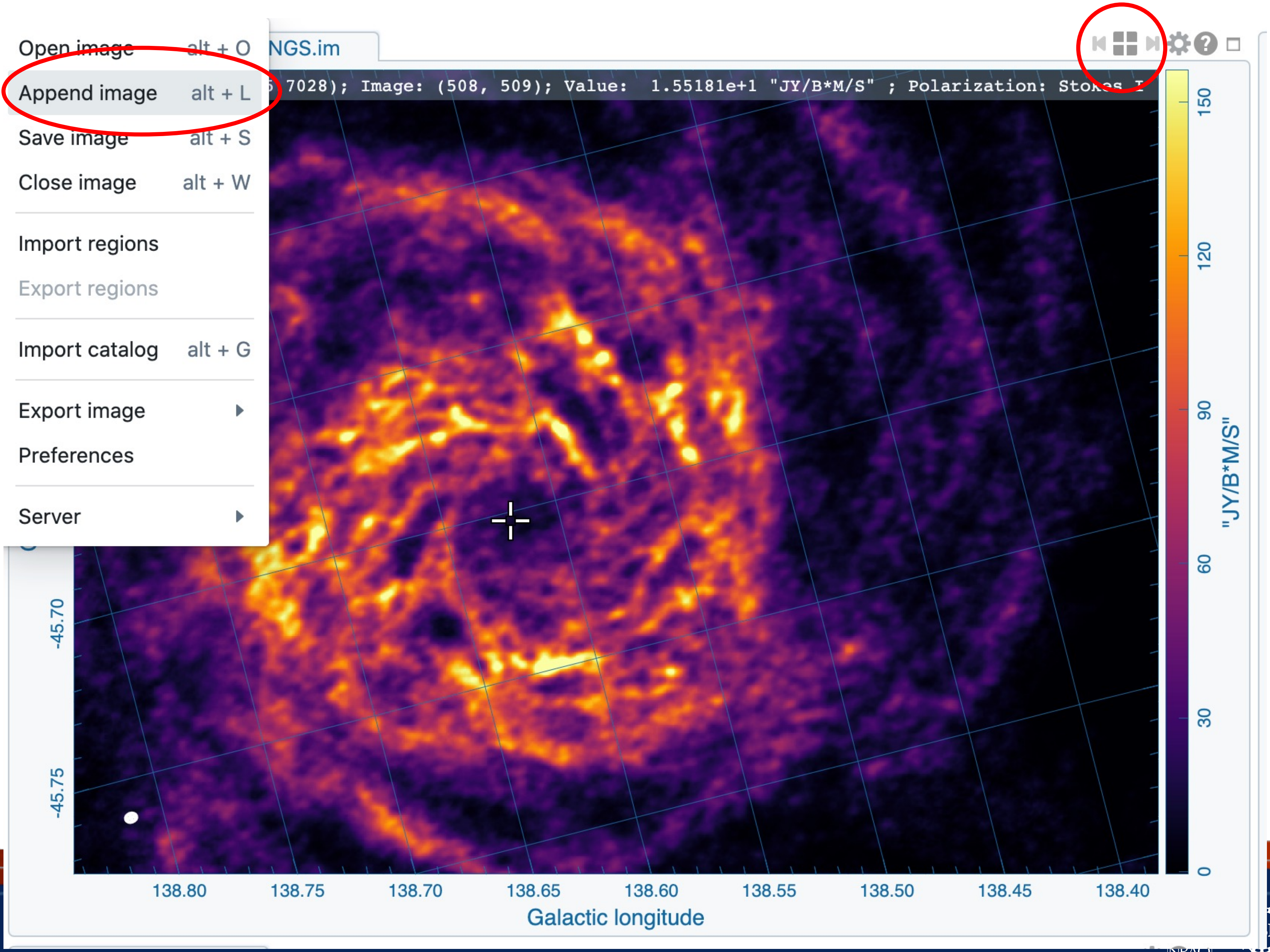
Distance Measurement



```
WCS: (1:36:06.8, 15:46:53); Image: (853, 499); Value:  1.45917e+1 JY/B*M/S ; Polarization: Stokes I
```

6.548843'
Declination
55:00
50:00
45:00
15:40:00
35:00
Right ascension
38:00
30
1:37:00
30
36:00
35:30
150
120
90
60
30
0
1.0x
WCS
123

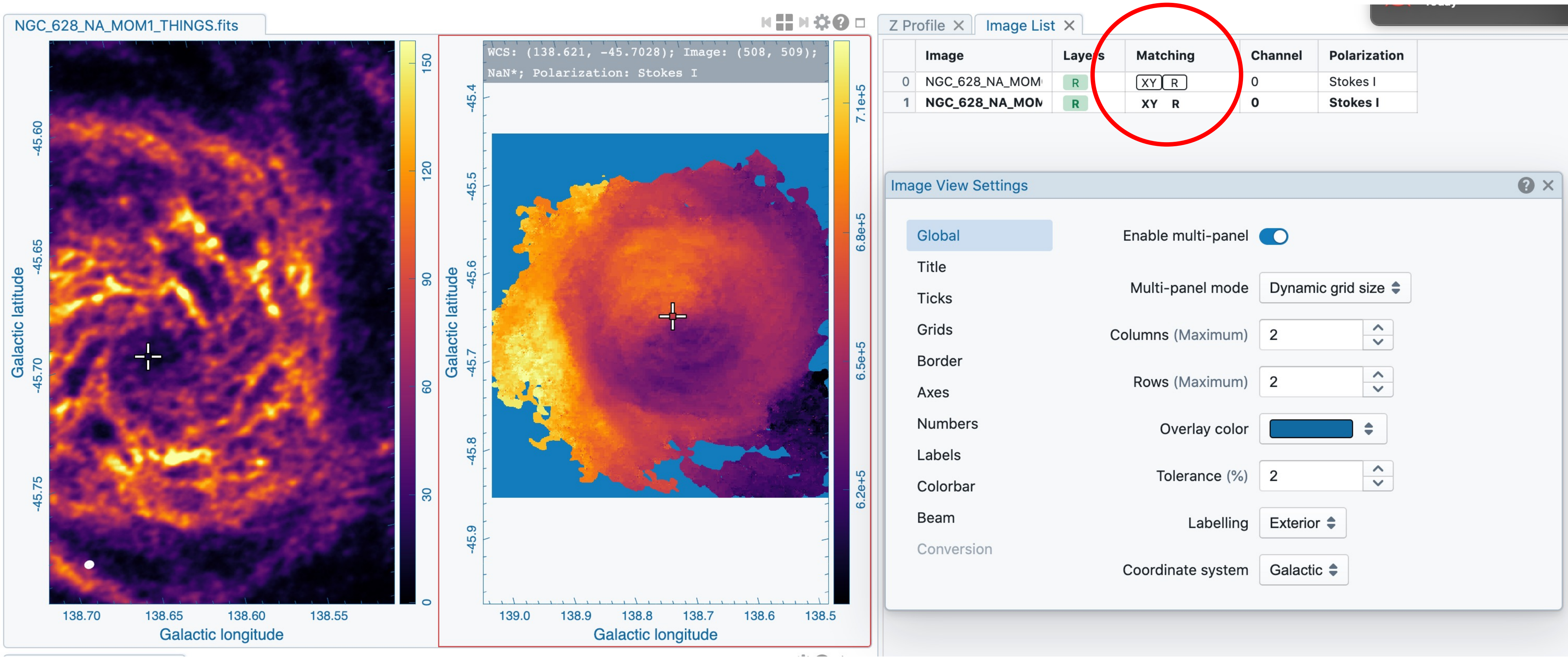
Image display widget - multipanel



```
5 7028); Image: (508, 509); Value:  1.55181e+1 "JY/B*M/S" ; Polarization: Stokes I
```

Open image alt + O
Append image alt + L
Save image alt + S
Close image alt + W
Import regions
Export regions
Import catalog alt + G
Export image
Preferences
Server
NGS.im
-45.70
-45.75
138.80
138.75
138.70
138.65
138.60
138.55
138.50
138.45
138.40
Galactic longitude
150
120
90
60
30
0
"JY/B*M/S"

Image display widget - multipanel



NGC_628_NA_MOM1_THINGS.fits

WCS: (138.621, -45.7028); Image: (508, 509); NaN*; Polarization: Stokes I

Galactic latitude
-45.60
-45.65
-45.70
-45.75
138.70
138.65
138.60
138.55
Galactic longitude
150
120
90
60
30
0
-45.4
-45.5
-45.6
-45.7
-45.8
-45.9
139.0
138.9
138.8
138.7
138.6
138.5
7.1e+5
6.8e+5
6.5e+5
6.2e+5
Z Profile
Image List

	Image	Layers	Matching	Channel	Polarization
0	NGC_628_NA_MOM	R	XY R	0	Stokes I
1	**NGC_628_NA_MON**	R	**XY R**	**0**	**Stokes I**

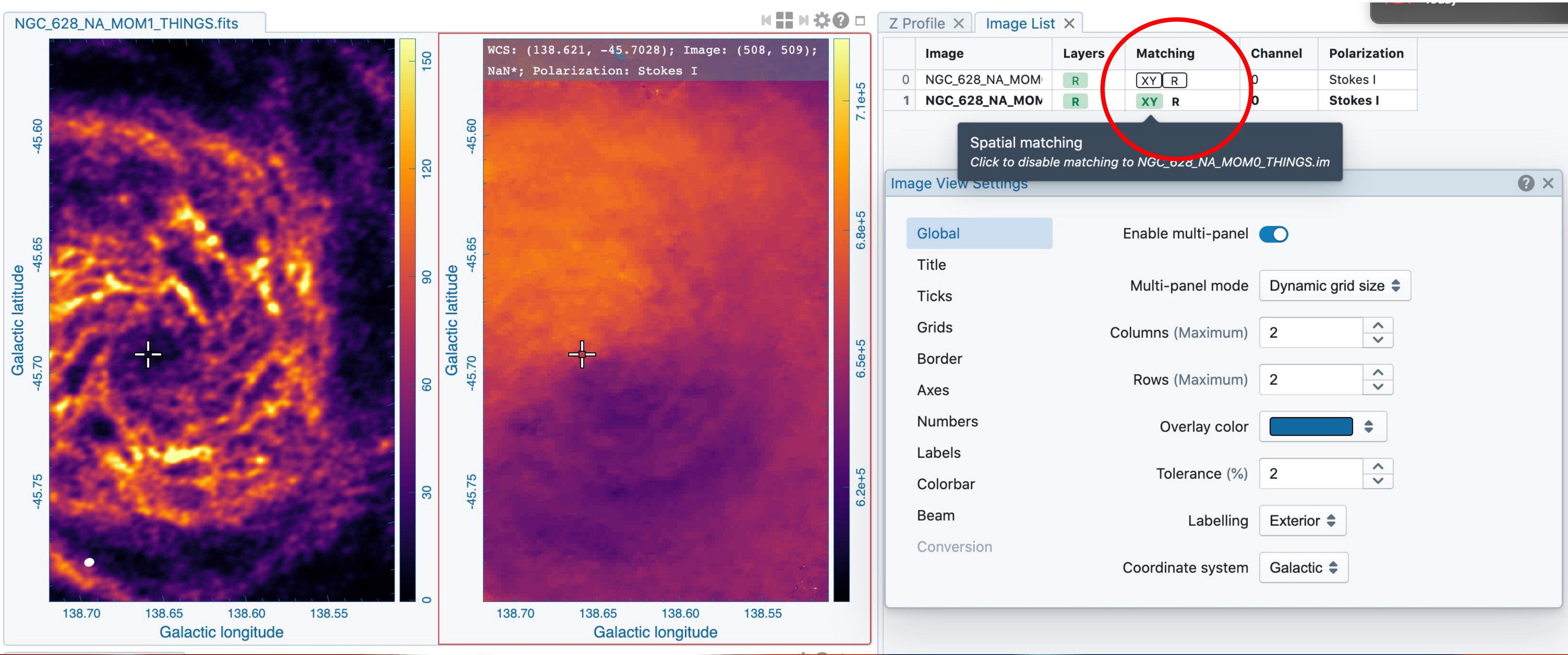
Image View Settings

Global
Title
Ticks
Grids
Border
Axes
Numbers
Labels
Colorbar
Beam
Conversion

Enable multi-panel	●
Multi-panel mode	Dynamic grid size
Columns (Maximum)	2
Rows (Maximum)	2
Overlay color	🟦
Tolerance (%)	2
Labelling	Exterior
Coordinate system	Galactic

Image display widget - multipanel

WCS image registration will align coordinates of different images
Master is outlined; aligned images in green
Alignment in XY (spatial) and/or Z (spectral), and or R (color scale)



NGC_628_NA_MOM1_THINGS.fits

WCS: (138.621, -45.7028); Image: (508, 509);
NaN*; Polarization: Stokes I

	Image	Layers	Matching	Channel	Polarization
0	NGC_628_NA_MOM	R	XY R	0	Stokes I
1	**NGC_628_NA_MOM**	R	XY R	0	**Stokes I**

Spatial matching
Click to disable matching to NGC_628_NA_MOM0_THINGS.im

Image View Settings

Enable multi-panel: on
Multi-panel mode: Dynamic grid size
Columns (Maximum): 2
Rows (Maximum): 2
Overlay color
Tolerance (%): 2
Labelling: Exterior
Coordinate system: Galactic

Z Profile
Image List
Global
Title
Ticks
Grids
Border
Axes
Numbers
Labels
Colorbar
Beam
Conversion
Galactic latitude
Galactic longitude
-45.60
-45.65
-45.70
-45.75
138.70
138.65
138.60
138.55
150
120
90
60
30
0
7.1e+5
6.8e+5
6.5e+5
6.2e+5

Cursor Widget

Align WCS first to see multiple image values

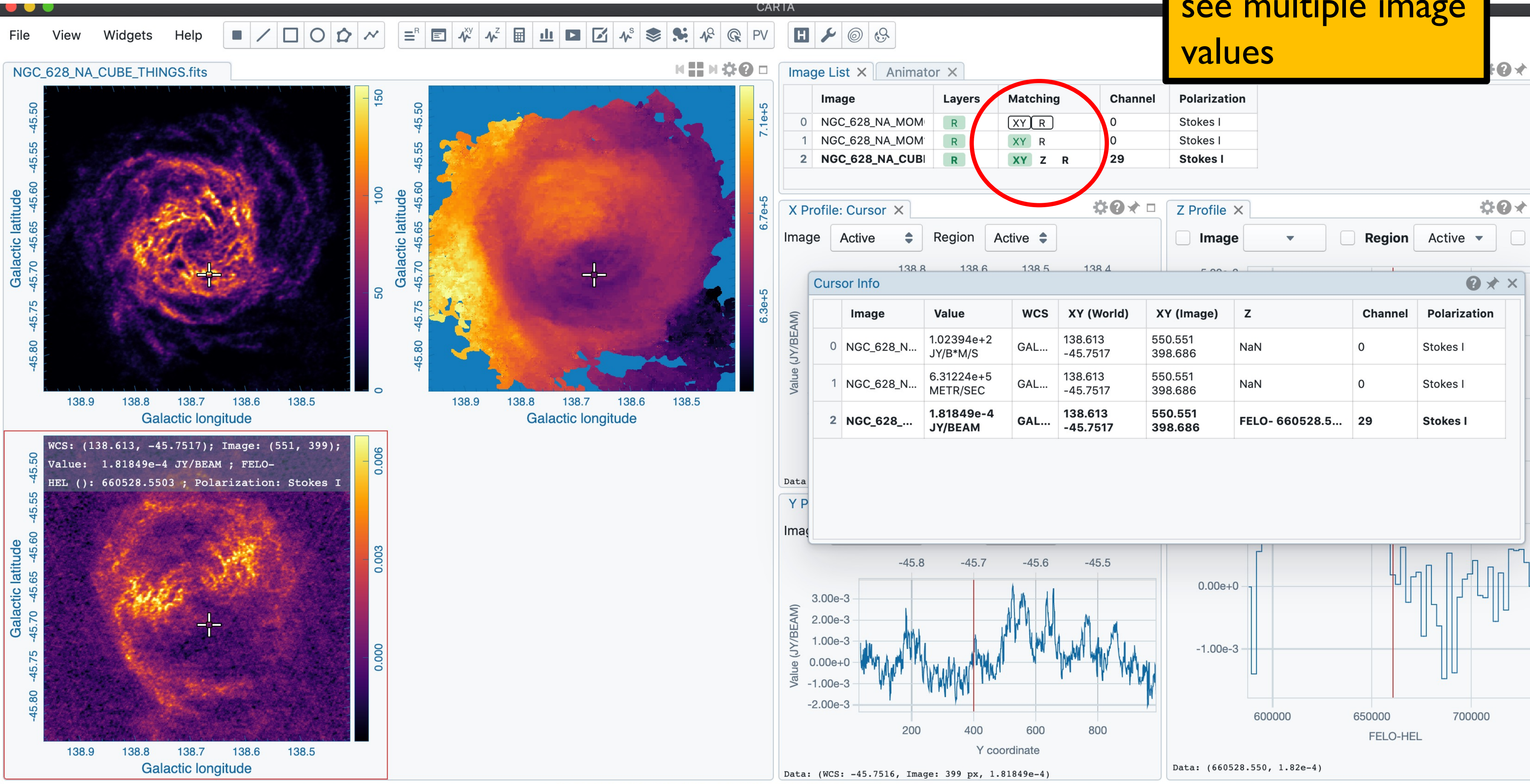

CARTA
File
View
Widgets
Help
NGC_628_NA_CUBE_THINGS.fits
Galactic latitude
Galactic longitude
Image List
Animator
X Profile: Cursor
Z Profile
Image
Active
Region
Active
Cursor Info
Value (JY/BEAM)
Y coordinate
FELO-HEL

	Image	Layers	Matching	Channel	Polarization
0	NGC_628_NA_MOM	R	XY R	0	Stokes I
1	NGC_628_NA_MOM	R	XY R	0	Stokes I
2	**NGC_628_NA_CUBI**	R	XY Z R	**29**	**Stokes I**

Cursor Info

	Image	Value	WCS	XY (World)	XY (Image)	Z	Channel	Polarization
0	NGC_628_N...	1.02394e+2 JY/B*M/S	GAL...	138.613 -45.7517	550.551 398.686	NaN	0	Stokes I
1	NGC_628_N...	6.31224e+5 METR/SEC	GAL...	138.613 -45.7517	550.551 398.686	NaN	0	Stokes I
2	**NGC_628_...**	**1.81849e-4 JY/BEAM**	**GAL...**	**138.613 -45.7517**	**550.551 398.686**	**FELO- 660528.5...**	**29**	**Stokes I**

```
WCS: (138.613, -45.7517); Image: (551, 399);
Value: 1.81849e-4 JY/BEAM ; FELO-
HEL (): 660528.5503 ; Polarization: Stokes I
```

```
Data: (WCS: -45.7516, Image: 399 px, 1.81849e-4)
```

```
Data: (660528.550, 1.82e-4)
```

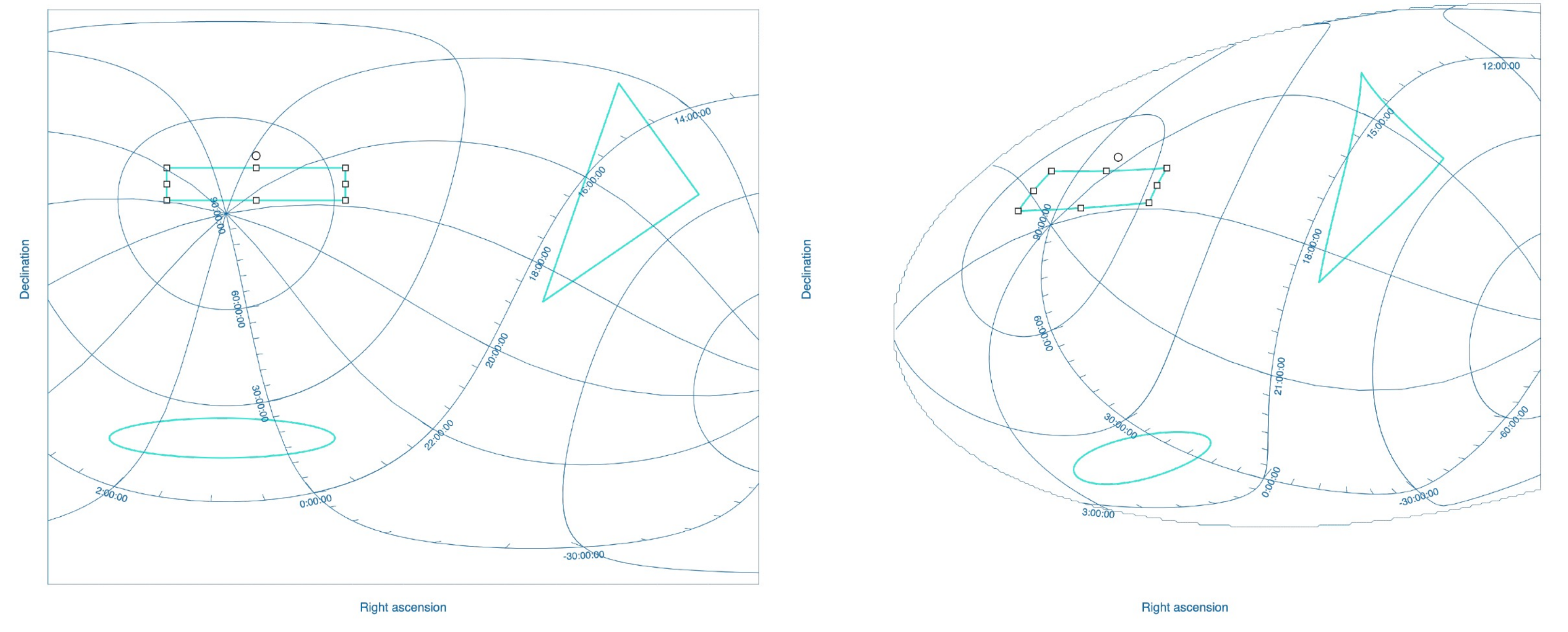
CARTA

Projection handling:

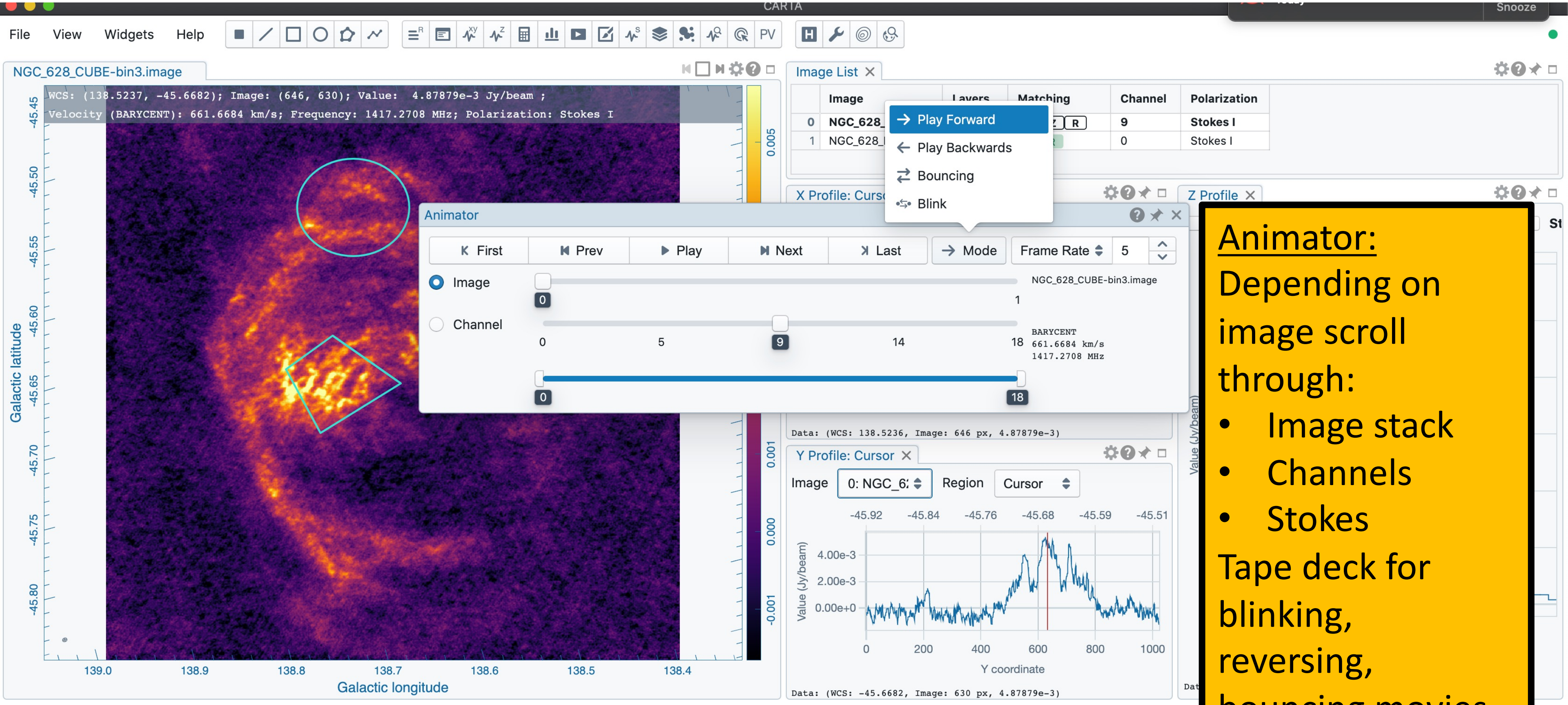
To avoid regridding, WCS matching shifts and rotates the image to the master image
This produces a small error for large fields, only visible in blinking
But images are projected correctly when overlaid as contours

Spectral matching: Nearest interpolation

Regions: They project correctly when moving across the sky in different coordinate systems



Animator


CARTA
File
View
Widgets
Help
NGC_628_CUBE-bin3.image
Image List
Image
Layers
Matching
Channel
Polarization
0
NGC_628_
9
Stokes I
1
NGC_628_
0
Stokes I
Play Forward
Play Backwards
Bouncing
Blink
X Profile: Curs
Z Profile
Animator
First
Prev
Play
Next
Last
Mode
Frame Rate
5
Image
Channel
NGC_628_CUBE-bin3.image
0
1
0
5
9
14
18
BARYCENT
661.6684 km/s
1417.2708 MHz
0
18
Y Profile: Cursor
Image
0: NGC_6
Region
Cursor
-45.92
-45.84
-45.76
-45.68
-45.59
-45.51
4.00e-3
2.00e-3
0.00e+0
Value (Jy/beam)
0
200
400
600
800
1000
Y coordinate
-45.45
-45.50
-45.55
-45.60
-45.65
-45.70
-45.75
-45.80
Galactic latitude
139.0
138.9
138.8
138.7
138.6
138.5
138.4
Galactic longitude
0.005
0.001
0.000
-0.001

```
WCS: (138.5237, -45.6682); Image: (646, 630); Value:  4.87879e-3 Jy/beam ;
Velocity (BARYCENT): 661.6684 km/s; Frequency: 1417.2708 MHz; Polarization: Stokes I
```

```
Data: (WCS: 138.5236, Image: 646 px, 4.87879e-3)
```

```
Data: (WCS: -45.6682, Image: 630 px, 4.87879e-3)
```

<u>Animator:</u>
Depending on image scroll through:

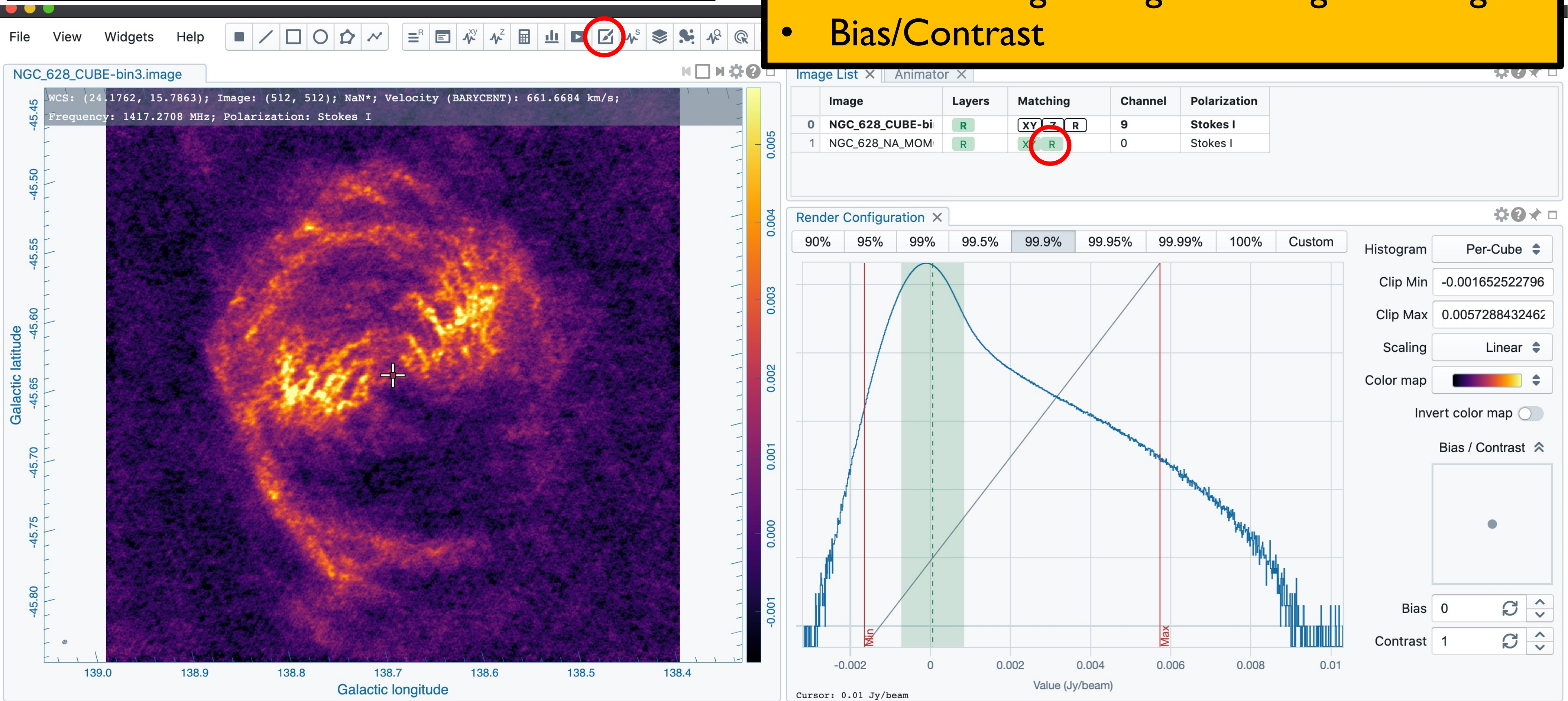
- Image stack
- Channels
- Stokes

Tape deck for blinking, reversing, bouncing movies

Rendering

Image widget: "R" controls rendering determined by a template (framed)

Selection of
- Color maps
- Scaling/transfer function (shown as overlay)
- Per plane or per cube scaling
- Global scaling through the image list widget
- Bias/Contrast


File
View
Widgets
Help
NGC_628_CUBE-bin3.image
Galactic latitude
Galactic longitude
-45.45
-45.50
-45.55
-45.60
-45.65
-45.70
-45.75
-45.80
139.0
138.9
138.8
138.7
138.6
138.5
138.4
0.005
0.004
0.003
0.002
0.001
0.000
-0.001
Image List
Animator
Render Configuration
90%
95%
99%
99.5%
99.9%
99.95%
99.99%
100%
Custom
Min
Max
-0.002
0
0.002
0.004
0.006
0.008
0.01
Value (Jy/beam)
Invert color map
Bias / Contrast

`WCS: (24.1762, 15.7863); Image: (512, 512); NaN*; Velocity (BARYCENT): 661.6684 km/s; Frequency: 1417.2708 MHz; Polarization: Stokes I`

	Image	Layers	Matching	Channel	Polarization
0	NGC_628_CUBE-bi	R	XY Z R	9	Stokes I
1	NGC_628_NA_MOM	R	XY R	0	Stokes I

Histogram: Per-Cube
Clip Min: -0.001652522796
Clip Max: 0.0057288432462
Scaling: Linear
Bias: 0
Contrast: 1

`Cursor: 0.01 Jy/beam`

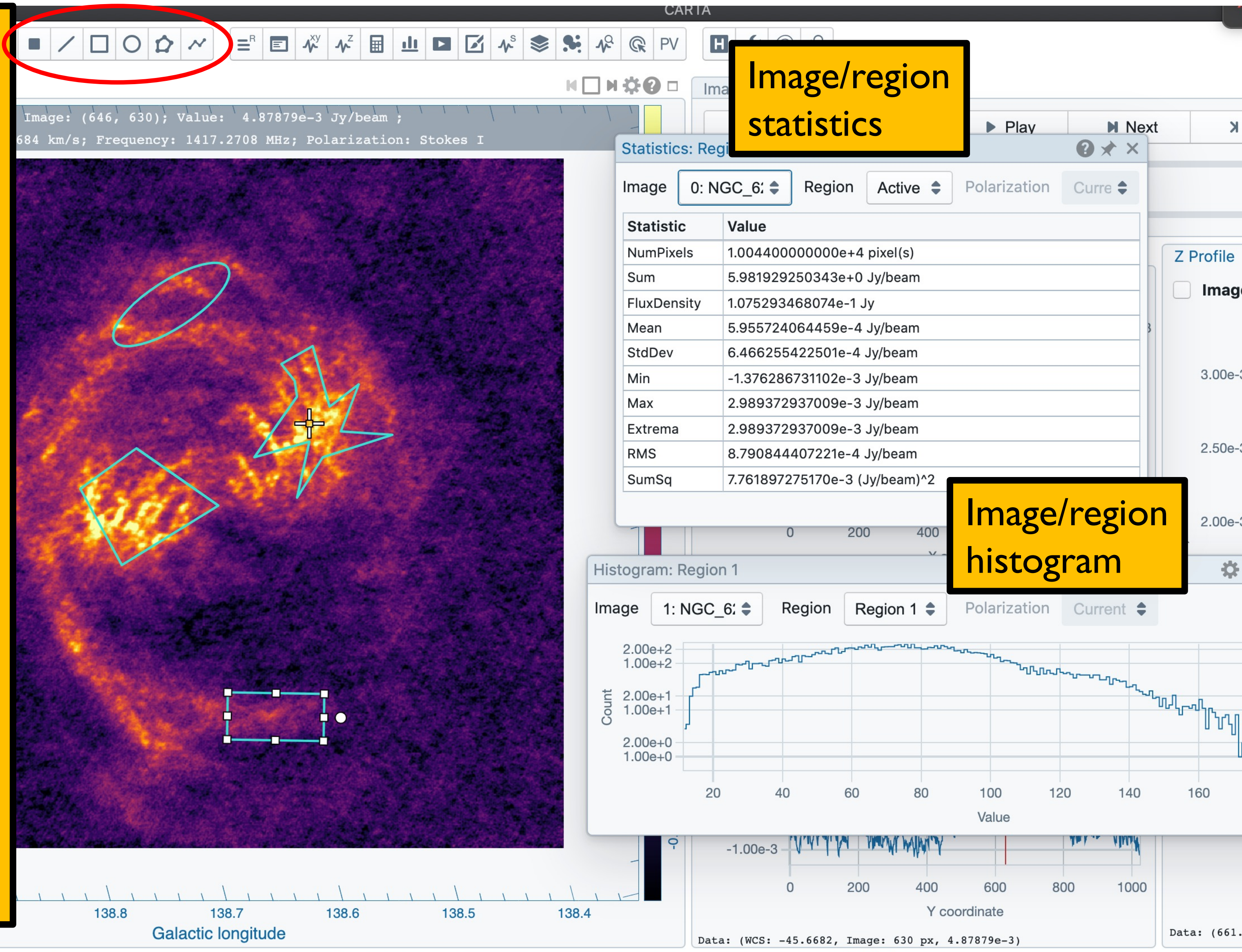
Image statistics, setting the cuts manually or by percentage or by values

Regions

Regions can be created (point, line, rectangle, ellipse, polygon, polyline), deleted, rotated, moved, resized. They are properly projected when moved

Save/load in CASA CRTF or DS9 format

Analysis can be done on selected regions (line and polyline for profiles, pV)



Image/region statistics

Image/region histogram

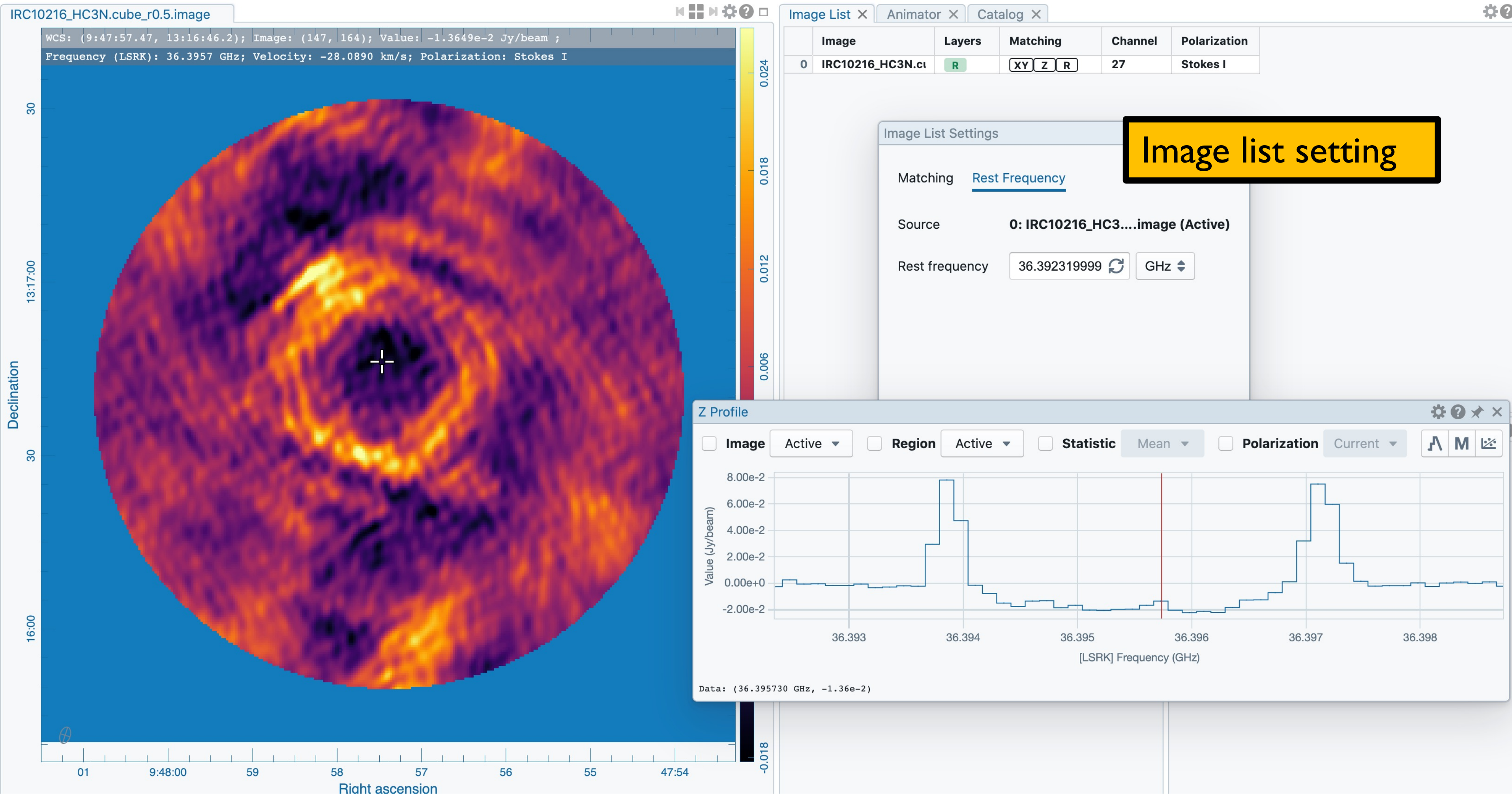
CARTA
PV
Image: (646, 630); Value: 4.87879e-3 Jy/beam ;
684 km/s; Frequency: 1417.2708 MHz; Polarization: Stokes I
Play
Next
Statistics: Regi
Image
0: NGC_6:
Region
Active
Polarization
Curre
Z Profile
Histogram: Region 1
Image
1: NGC_6:
Region
Region 1
Polarization
Current
2.00e+2
1.00e+2
2.00e+1
1.00e+1
2.00e+0
1.00e+0
Count
20
40
60
80
100
120
140
160
Value
3.00e-
2.50e-
2.00e-
-1.00e-3
0
200
400
600
800
1000
Y coordinate
138.8
138.7
138.6
138.5
138.4
Galactic longitude

Statistic	Value
NumPixels	1.004400000000e+4 pixel(s)
Sum	5.981929250343e+0 Jy/beam
FluxDensity	1.075293468074e-1 Jy
Mean	5.955724064459e-4 Jy/beam
StdDev	6.466255422501e-4 Jy/beam
Min	-1.376286731102e-3 Jy/beam
Max	2.989372937009e-3 Jy/beam
Extrema	2.989372937009e-3 Jy/beam
RMS	8.790844407221e-4 Jy/beam
SumSq	7.761897275170e-3 (Jy/beam)^2

Data: (WCS: -45.6682, Image: 630 px, 4.87879e-3)

Data: (661.

Set new rest frequency


IRC10216_HC3N.cube_r0.5.image
Image List
Animator
Catalog
Declination
Right ascension
30
13:17:00
30
16:00
01
9:48:00
59
58
57
56
55
47:54
0.024
0.018
0.012
0.006
-0.018
Image List Settings
Matching
Rest Frequency
Z Profile
Image
Active
Region
Active
Statistic
Mean
Polarization
Current
8.00e-2
6.00e-2
4.00e-2
2.00e-2
0.00e+0
-2.00e-2
Value (Jy/beam)
36.393
36.394
36.395
36.396
36.397
36.398
[LSRK] Frequency (GHz)

```
WCS: (9:47:57.47, 13:16:46.2); Image: (147, 164); Value: -1.3649e-2 Jy/beam ;
Frequency (LSRK): 36.3957 GHz; Velocity: -28.0890 km/s; Polarization: Stokes I
```

	Image	Layers	Matching	Channel	Polarization
0	IRC10216_HC3N.cı	R	XY Z R	27	Stokes I

Source: 0: IRC10216_HC3....image (Active)

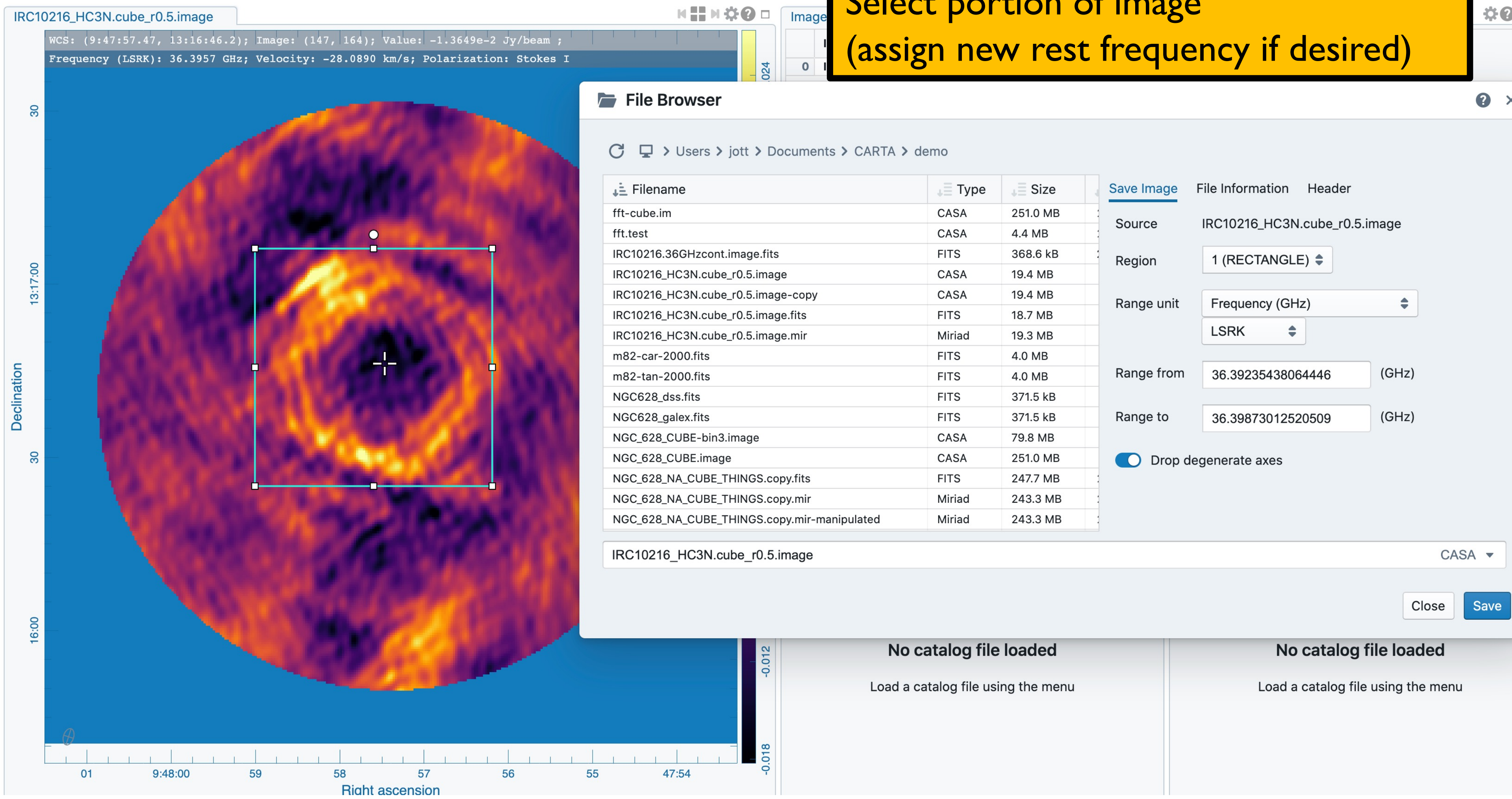
Rest frequency: 36.392319999 GHz

```
Data: (36.395730 GHz, -1.36e-2)
```

Image list setting

Saving subimages

Select portion of image
(assign new rest frequency if desired)



IRC10216_HC3N.cube_r0.5.image

```
WCS: (9:47:57.47, 13:16:46.2); Image: (147, 164); Value: -1.3649e-2 Jy/beam ;
Frequency (LSRK): 36.3957 GHz; Velocity: -28.0890 km/s; Polarization: Stokes I
```

Image
Declination
30
13:17:00
30
16:00
01
9:48:00
59
58
57
56
55
47:54
Right ascension
024
-0.012
-0.018
No catalog file loaded
Load a catalog file using the menu
No catalog file loaded
Load a catalog file using the menu

File Browser

Users > jott > Documents > CARTA > demo

Filename	Type	Size
fft-cube.im	CASA	251.0 MB
fft.test	CASA	4.4 MB
IRC10216.36GHzcont.image.fits	FITS	368.6 kB
IRC10216_HC3N.cube_r0.5.image	CASA	19.4 MB
IRC10216_HC3N.cube_r0.5.image-copy	CASA	19.4 MB
IRC10216_HC3N.cube_r0.5.image.fits	FITS	18.7 MB
IRC10216_HC3N.cube_r0.5.image.mir	Miriad	19.3 MB
m82-car-2000.fits	FITS	4.0 MB
m82-tan-2000.fits	FITS	4.0 MB
NGC628_dss.fits	FITS	371.5 kB
NGC628_galex.fits	FITS	371.5 kB
NGC_628_CUBE-bin3.image	CASA	79.8 MB
NGC_628_CUBE.image	CASA	251.0 MB
NGC_628_NA_CUBE_THINGS.copy.fits	FITS	247.7 MB
NGC_628_NA_CUBE_THINGS.copy.mir	Miriad	243.3 MB
NGC_628_NA_CUBE_THINGS.copy.mir-manipulated	Miriad	243.3 MB

Save Image
File Information
Header

Source: IRC10216_HC3N.cube_r0.5.image

Region: 1 (RECTANGLE)

Range unit: Frequency (GHz), LSRK

Range from: 36.39235438064446 (GHz)

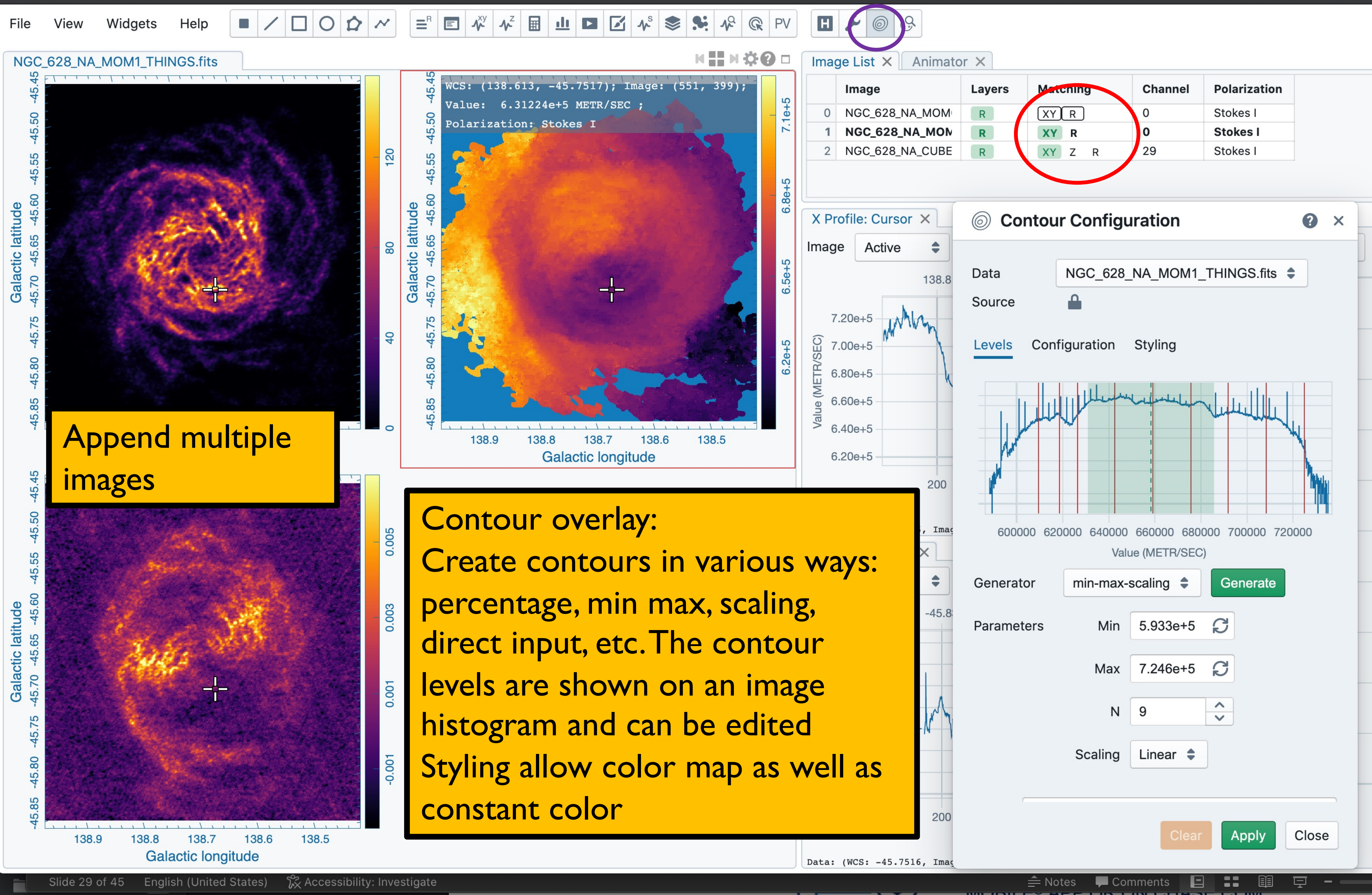
Range to: 36.39873012520509 (GHz)

Drop degenerate axes: on

IRC10216_HC3N.cube_r0.5.image — CASA

Contours

- Match the coordinates for multiple images


File
View
Widgets
Help
NGC_628_NA_MOM1_THINGS.fits
Galactic latitude
Galactic longitude
Image List
Animator
X Profile: Cursor
Image
Active
Value (METR/SEC)
Levels
Configuration
Styling
Generate
Clear
Apply
Close
Slide 29 of 45
English (United States)
Accessibility: Investigate
Notes
Comments

WCS: (138.613, -45.7517); Image: (551, 399);
Value: 6.31224e+5 METR/SEC ;
Polarization: Stokes I

	Image	Layers	Matching	Channel	Polarization
0	NGC_628_NA_MOM	R	XY R	0	Stokes I
1	NGC_628_NA_MOM	R	XY R	0	Stokes I
2	NGC_628_NA_CUBE	R	XY Z R	29	Stokes I

Contour Configuration

Data: NGC_628_NA_MOM1_THINGS.fits

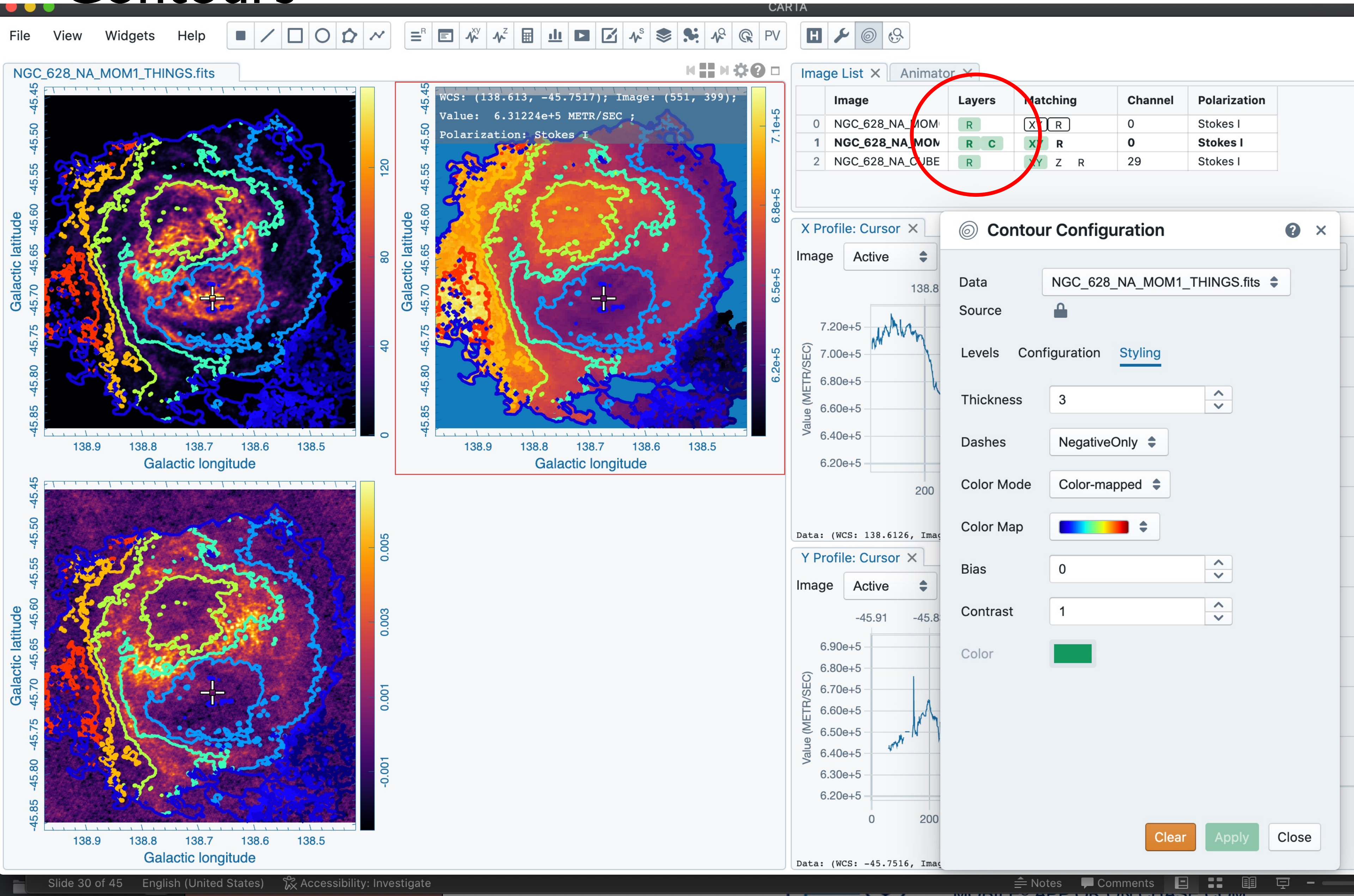
Generator: min-max-scaling

Parameters: Min 5.933e+5; Max 7.246e+5; N 9; Scaling Linear

Append multiple images

Contour overlay:
Create contours in various ways: percentage, min max, scaling, direct input, etc. The contour levels are shown on an image histogram and can be edited
Styling allow color map as well as constant color

Contours


CARTA
File
View
Widgets
Help
PV
NGC_628_NA_MOM1_THINGS.fits
Galactic latitude
Galactic longitude
138.9
138.8
138.7
138.6
138.5
-45.45
-45.50
-45.55
-45.60
-45.65
-45.70
-45.75
-45.80
-45.85
120
80
40
0
7.1e+5
6.8e+5
6.5e+5
6.2e+5
0.005
0.003
0.001
-0.001
Image List
Animator
X Profile: Cursor
Y Profile: Cursor
Value (METR/SEC)
7.20e+5
7.00e+5
6.80e+5
6.60e+5
6.40e+5
6.20e+5
200
-45.91
-45.8
6.90e+5
6.70e+5
6.50e+5
6.30e+5
0
Slide 30 of 45
English (United States)
Accessibility: Investigate
Notes
Comments

```
WCS: (138.613, -45.7517); Image: (551, 399);
Value:  6.31224e+5 METR/SEC ;
Polarization: Stokes I
```

	Image	Layers	Matching	Channel	Polarization
0	NGC_628_NA_MOM	R	XY R	0	Stokes I
1	**NGC_628_NA_MOM**	**R C**	**XY R**	**0**	**Stokes I**
2	NGC_628_NA_CUBE	R	XY Z R	29	Stokes I

X Profile: Cursor — Image: Active

```
Data: (WCS: 138.6126, Imag
```

Y Profile: Cursor — Image: Active

```
Data: (WCS: -45.7516, Imag
```

Contour Configuration

Data: NGC_628_NA_MOM1_THINGS.fits

Source: 🔒

Levels | Configuration | Styling

Thickness: 3

Dashes: NegativeOnly

Color Mode: Color-mapped

Color Map

Bias: 0

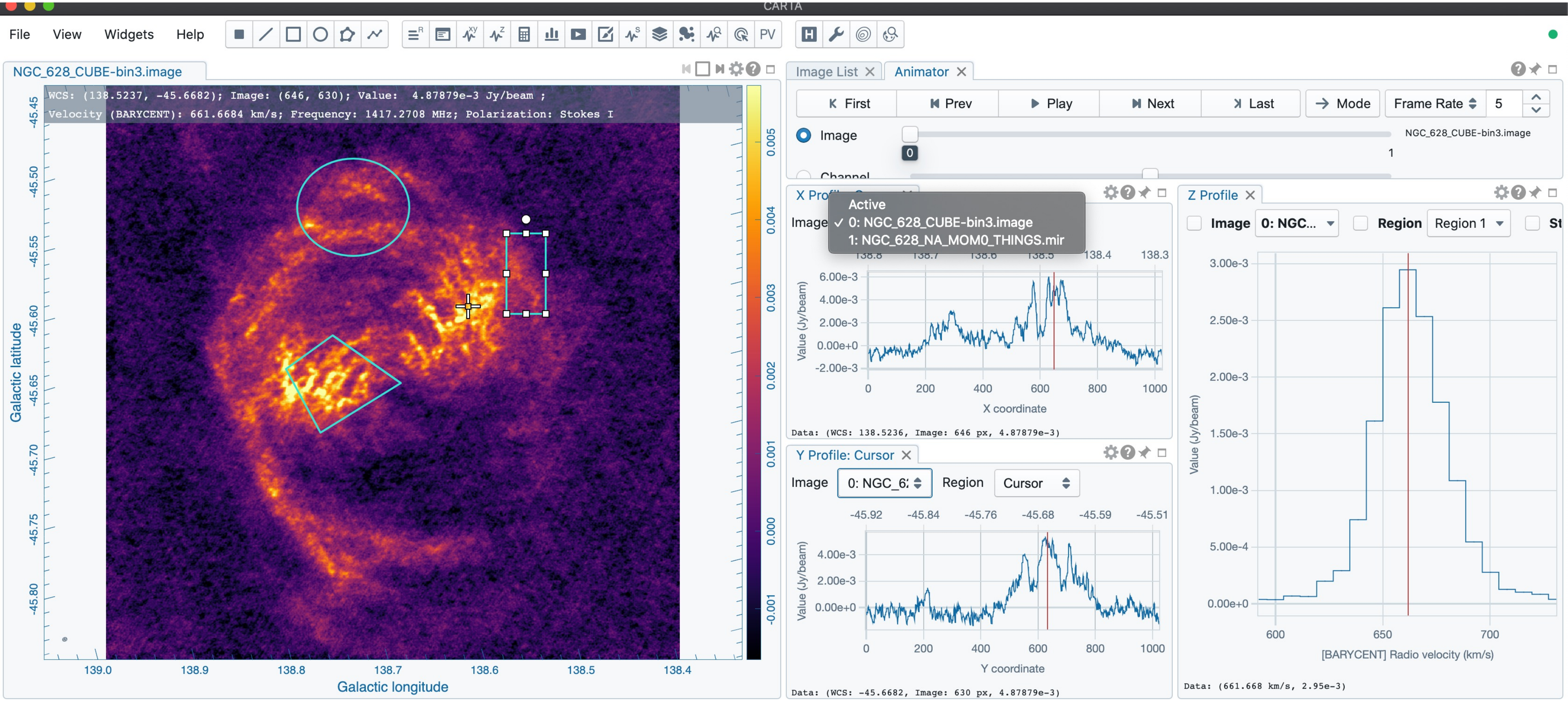
Contrast: 1

Color: 🟩

Clear | Apply | Close

Profiles

- Spatial/Spectral profile: Line shape can be changed (color, steps/connect/points), spectral smoothing; data can be saved as ascii
- Marker is the position of the cursor/animator (freeze with ‘f’)
- Selection of region and image in each widget
- For spectral profile, regions can be selected, as well as statistics, axis labels (velocity, frequency, channel, wavelength, ..)
- 3D Position is marked by a red vertical line


CARTA
File
View
Widgets
Help
PV
NGC_628_CUBE-bin3.image
Galactic latitude
Galactic longitude
139.0
138.9
138.8
138.7
138.6
138.5
138.4
-45.45
-45.50
-45.55
-45.60
-45.65
-45.70
-45.75
-45.80
0.005
0.004
0.003
0.002
0.001
0.000
-0.001
Image List
Animator
First
Prev
Play
Next
Last
Mode
Frame Rate
5
Image
Channel
0
1
NGC_628_CUBE-bin3.image
X Profile
Active
✓ 0: NGC_628_CUBE-bin3.image
1: NGC_628_NA_MOM0_THINGS.mir
138.4
138.3
Value (Jy/beam)
6.00e-3
4.00e-3
2.00e-3
0.00e+0
-2.00e-3
0
200
400
600
800
1000
X coordinate
Y Profile: Cursor
Image
0: NGC_6
Region
Cursor
-45.92
-45.84
-45.76
-45.68
-45.59
-45.51
Value (Jy/beam)
4.00e-3
2.00e-3
0.00e+0
0
200
400
600
800
1000
Y coordinate
Z Profile
☐ Image
0: NGC...
☐ Region
Region 1
☐ St
3.00e-3
2.50e-3
2.00e-3
1.50e-3
1.00e-3
5.00e-4
0.00e+0
Value (Jy/beam)
600
650
700
[BARYCENT] Radio velocity (km/s)

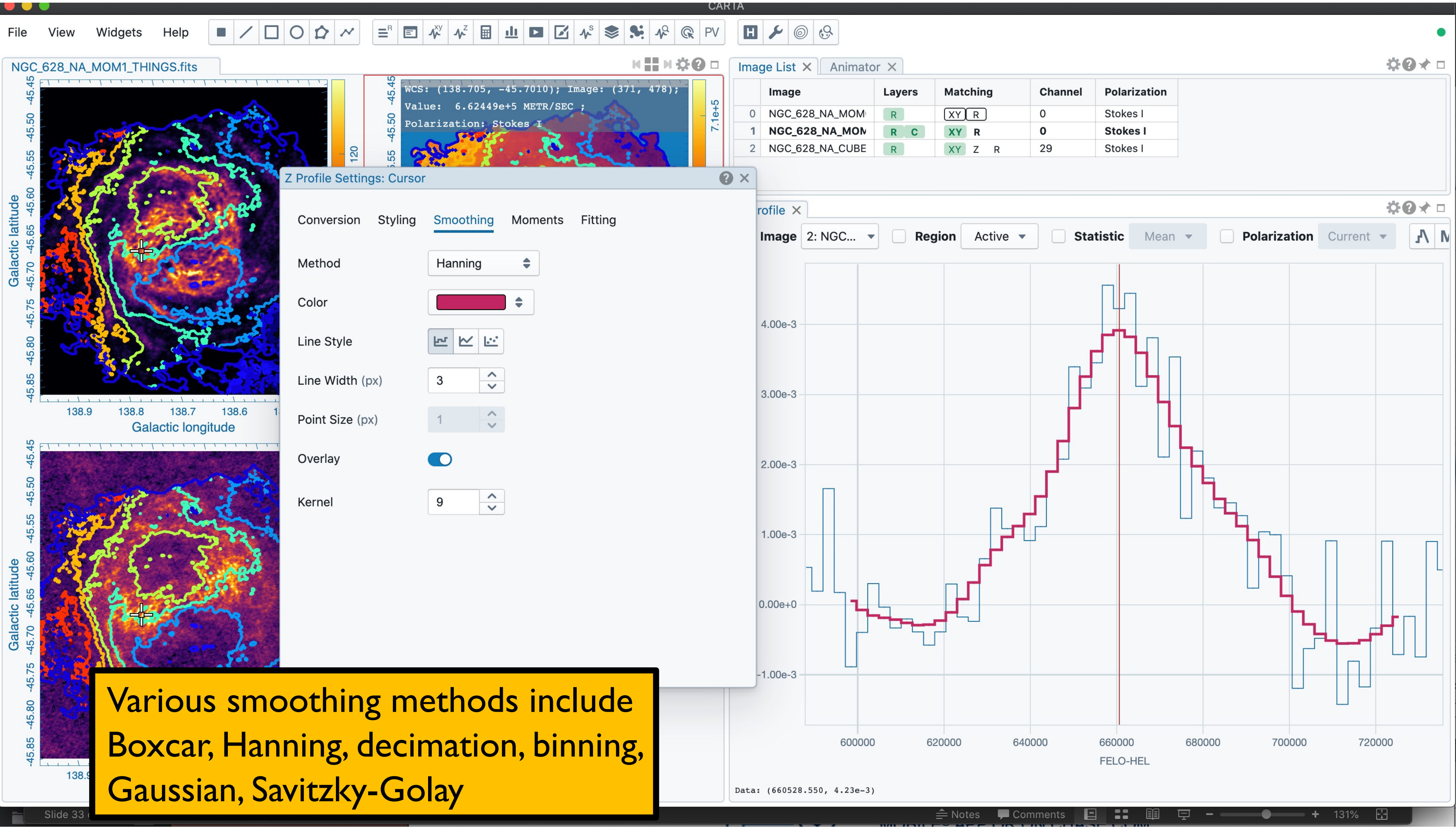
```
WCS: (138.5237, -45.6682); Image: (646, 630); Value:  4.87879e-3 Jy/beam ;
Velocity (BARYCENT): 661.6684 km/s; Frequency: 1417.2708 MHz; Polarization: Stokes I
```

```
Data: (WCS: 138.5236, Image: 646 px, 4.87879e-3)
```

```
Data: (WCS: -45.6682, Image: 630 px, 4.87879e-3)
```

```
Data: (661.668 km/s, 2.95e-3)
```

Spectral smoothing


CARTA
File
View
Widgets
Help
PV
NGC_628_NA_MOM1_THINGS.fits
Galactic latitude
Galactic longitude
138.9
138.8
138.7
138.6
-45.45
-45.50
-45.55
-45.60
-45.65
-45.70
-45.75
-45.80
-45.85
120
7.1e+5
Image List
Animator
Profile
Image
2: NGC...
Region
Active
Statistic
Mean
Polarization
Current
4.00e-3
3.00e-3
2.00e-3
1.00e-3
0.00e+0
-1.00e-3
600000
620000
640000
660000
680000
700000
720000
FELO-HEL
Slide 33
Notes
Comments
131%

```
WCS: (138.705, -45.7010); Image: (371, 478);
Value:  6.62449e+5 METR/SEC ;
Polarization: Stokes I
```

	Image	Layers	Matching	Channel	Polarization
0	NGC_628_NA_MOM	R	XY R	0	Stokes I
1	**NGC_628_NA_MOM**	R C	XY R	**0**	**Stokes I**
2	NGC_628_NA_CUBE	R	XY Z R	29	Stokes I

Z Profile Settings: Cursor

Conversion | Styling | Smoothing | Moments | Fitting

Method: Hanning

Color: 🟥

Line Style

Line Width (px): 3

Point Size (px): 1

Overlay: ●

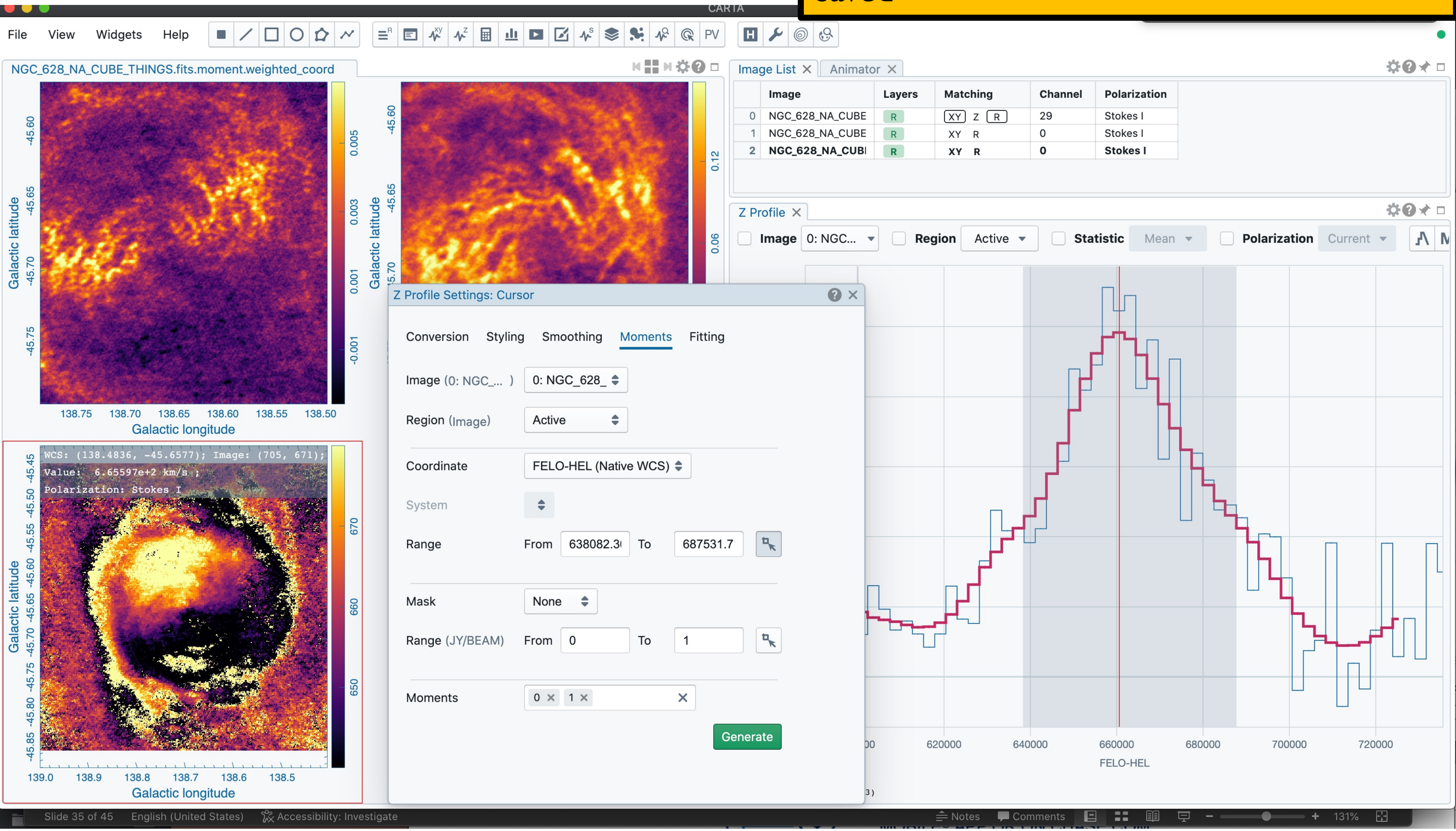
Kernel: 9

```
Data: (660528.550, 4.23e-3)
```

Various smoothing methods include Boxcar, Hanning, decimation, binning, Gaussian, Savitzky-Golay

Moment maps

Spectral selection can be done interactively, including clip. Images can be saved


CARTA
File
View
Widgets
Help
PV
NGC_628_NA_CUBE_THINGS.fits.moment.weighted_coord
Galactic latitude
Galactic longitude
-45.60
-45.65
-45.70
-45.75
138.75
138.70
138.65
138.60
138.55
138.50
0.005
0.003
0.001
-0.001
0.12
0.06
-45.45
-45.50
-45.55
-45.80
-45.85
139.0
138.9
138.8
138.7
138.6
138.5
670
660
650
Image List
Animator
Z Profile
Image
0: NGC...
Region
Active
Statistic
Mean
Polarization
Current
620000
640000
660000
680000
700000
720000
FELO-HEL
Slide 35 of 45
English (United States)
Accessibility: Investigate
Notes
Comments
131%

WCS: (138.4836, -45.6577); Image: (705, 671);
Value: 6.65597e+2 km/s ;
Polarization: Stokes I

	Image	Layers	Matching	Channel	Polarization
0	NGC_628_NA_CUBE	R	XY Z R	29	Stokes I
1	NGC_628_NA_CUBE	R	XY R	0	Stokes I
2	**NGC_628_NA_CUBI**	R	**XY R**	**0**	**Stokes I**

Z Profile Settings: Cursor

Conversion · Styling · Smoothing · **Moments** · Fitting

Image (0: NGC_...) 0: NGC_628_

Region (Image) Active

Coordinate FELO-HEL (Native WCS)

System

Range From 638082.3 To 687531.7

Mask None

Range (JY/BEAM) From 0 To 1

Moments 0 × 1 ×

Generate

Spectral line labeling

Based on splatalogue, select line strength, frequency range and redshift

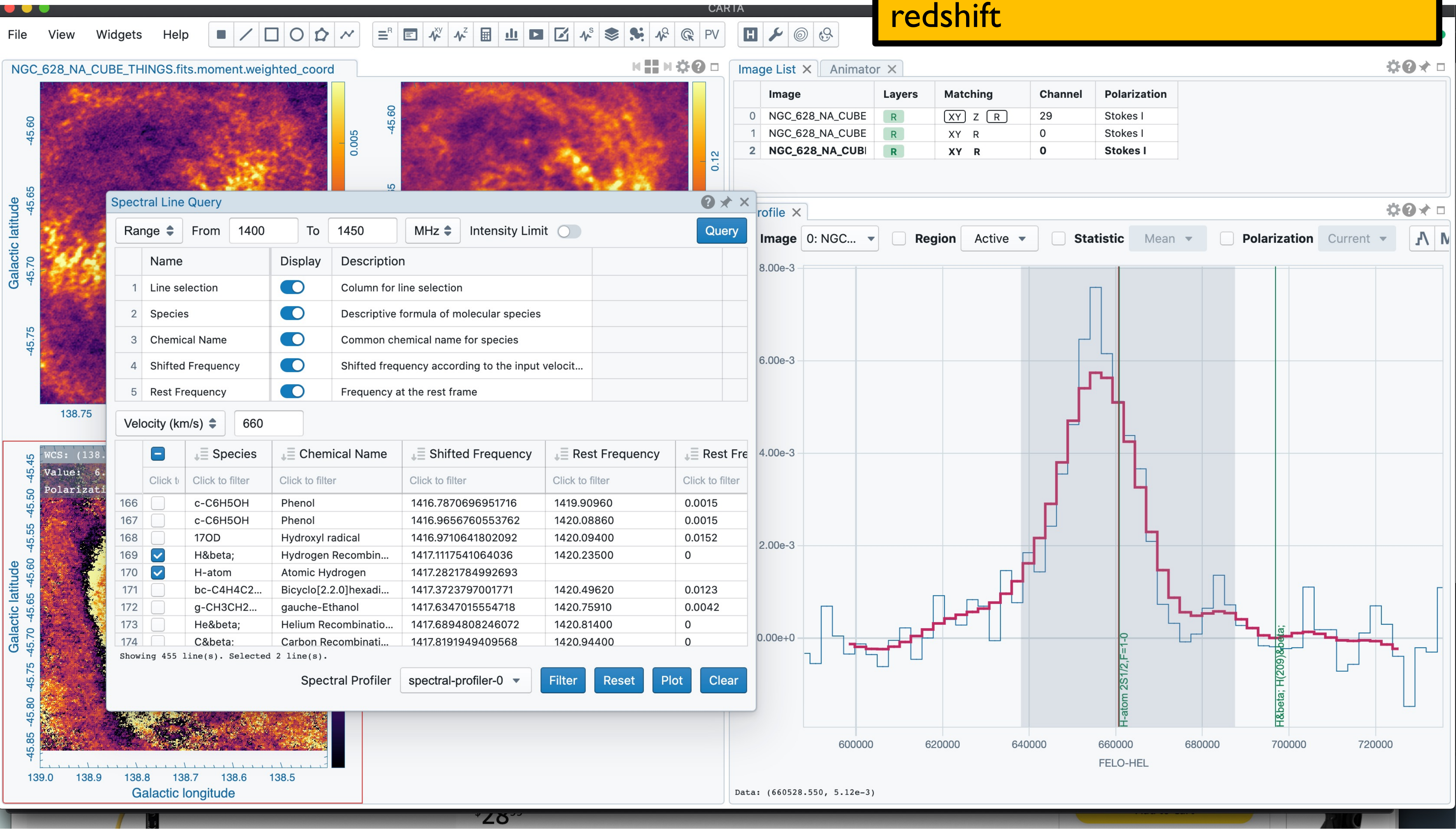

CARTA
File
View
Widgets
Help
PV
NGC_628_NA_CUBE_THINGS.fits.moment.weighted_coord
Galactic latitude
-45.60
-45.65
-45.70
-45.75
138.75
0.005
0.12
Image List
Animator
rofile
Image
0: NGC...
Region
Active
Statistic
Mean
Polarization
Current
8.00e-3
6.00e-3
4.00e-3
2.00e-3
0.00e+0
600000
620000
640000
660000
680000
700000
720000
FELO-HEL
H-atom 2S1/2,F=1-0
H&beta; H(209)&beta;
WCS: (138.
Value: 6.
Polarizati
-45.45
-45.50
-45.55
-45.60
-45.65
-45.70
-45.75
-45.80
-45.85
139.0
138.9
138.8
138.7
138.6
138.5
Galactic longitude

	Image	Layers	Matching	Channel	Polarization
0	NGC_628_NA_CUBE	R	XY Z R	29	Stokes I
1	NGC_628_NA_CUBE	R	XY R	0	Stokes I
2	**NGC_628_NA_CUBI**	**R**	**XY R**	**0**	**Stokes I**

Spectral Line Query

Range From 1400 To 1450 MHz Intensity Limit ○ **Query**

	Name	Display	Description
1	Line selection	●	Column for line selection
2	Species	●	Descriptive formula of molecular species
3	Chemical Name	●	Common chemical name for species
4	Shifted Frequency	●	Shifted frequency according to the input velocit...
5	Rest Frequency	●	Frequency at the rest frame

Velocity (km/s) 660

	⊟	Species	Chemical Name	Shifted Frequency	Rest Frequency	Rest Fre
	Click t	Click to filter	Click to filter	Click to filter	Click to filter	Click to filter
166	☐	c-C6H5OH	Phenol	1416.7870696951716	1419.90960	0.0015
167	☐	c-C6H5OH	Phenol	1416.9656760553762	1420.08860	0.0015
168	☐	17OD	Hydroxyl radical	1416.9710641802092	1420.09400	0.0152
169	☑	H&beta;	Hydrogen Recombin...	1417.1117541064036	1420.23500	0
170	☑	H-atom	Atomic Hydrogen	1417.2821784992693		
171	☐	bc-C4H4C2...	Bicyclo[2.2.0]hexadi...	1417.3723797001771	1420.49620	0.0123
172	☐	g-CH3CH2...	gauche-Ethanol	1417.6347015554718	1420.75910	0.0042
173	☐	He&beta;	Helium Recombinatio...	1417.6894808246072	1420.81400	0
174	☐	C&beta;	Carbon Recombinati...	1417.8191949409568	1420.94400	0

```
Showing 455 line(s). Selected 2 line(s).
```

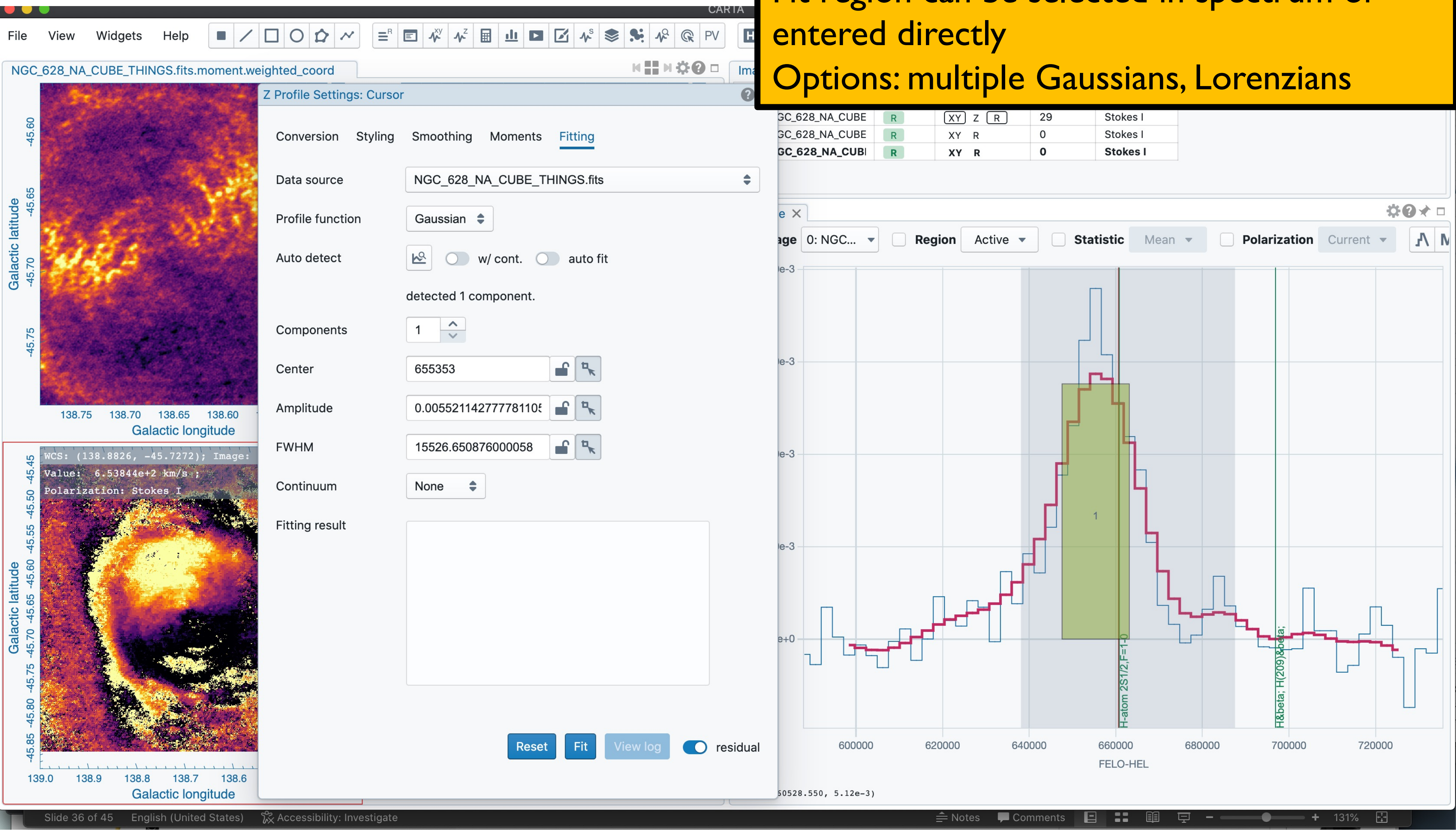
Spectral Profiler: spectral-profiler-0

Filter **Reset** **Plot** **Clear**

```
Data: (660528.550, 5.12e-3)
```

Spectral Line Fitting

Autodetection of line for initial fitting parameters (can also be set manually).
Fit region can be selected in spectrum or entered directly
Options: multiple Gaussians, Lorenzians



Z Profile Settings: Cursor

Data source: NGC_628_NA_CUBE_THINGS.fits

Profile function: Gaussian

Auto detect: w/ cont. auto fit

detected 1 component.

Components: 1

Center: 655353

Amplitude: 0.00552114277778110

FWHM: 15526.650876000058

Continuum: None

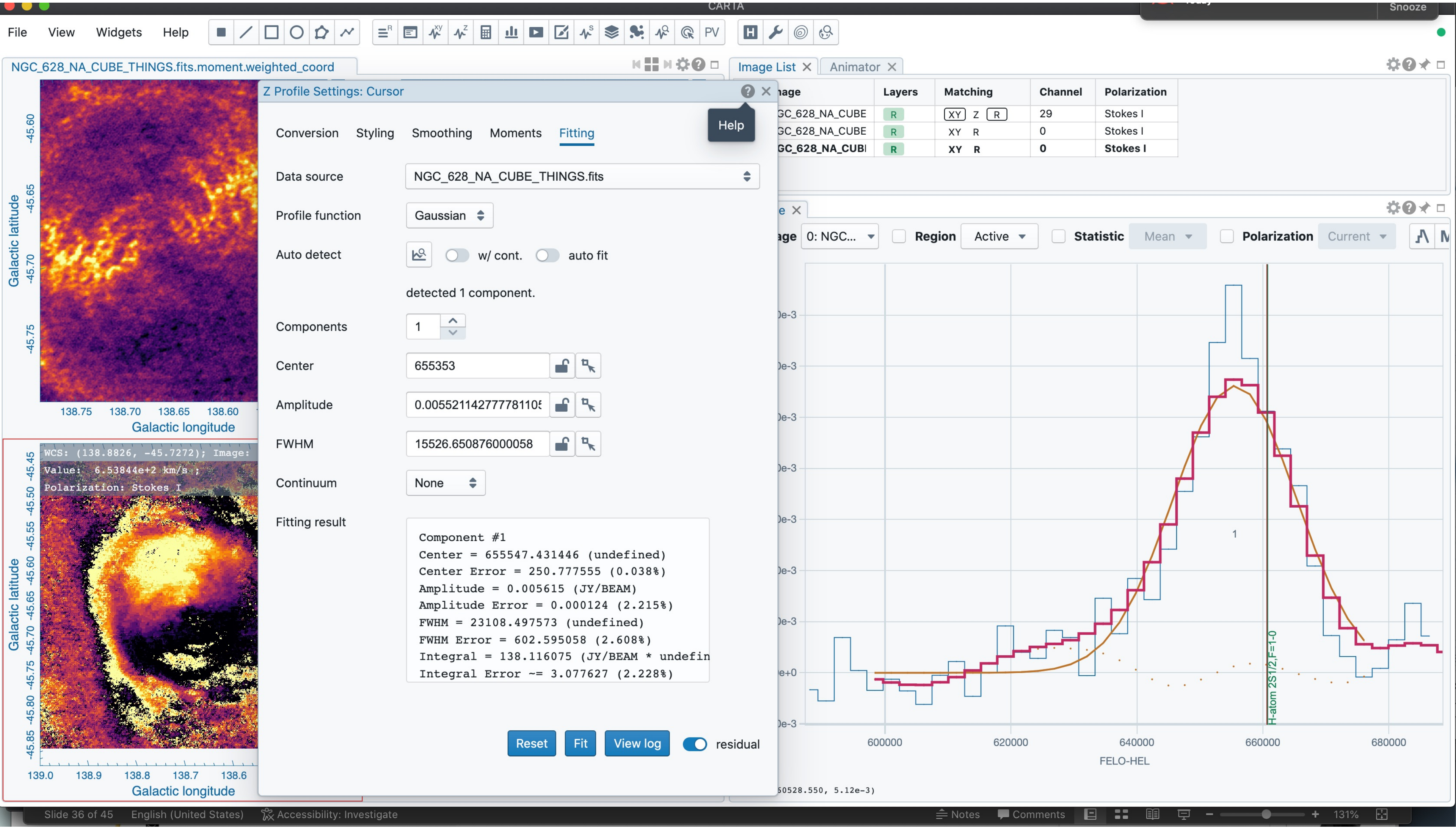
Fitting result

WCS: (138.8826, -45.7272); Image:
Value: 6.53844e+2 km/s ;
Polarization: Stokes I

CARTA
File
View
Widgets
Help
PV
NGC_628_NA_CUBE_THINGS.fits.moment.weighted_coord
Conversion
Styling
Smoothing
Moments
Fitting
Reset
Fit
View log
residual
Galactic latitude
Galactic longitude
-45.60
-45.65
-45.70
-45.75
138.75
138.70
138.65
138.60
-45.45
-45.50
-45.55
-45.80
-45.85
139.0
138.9
138.8
138.7
138.6
GC_628_NA_CUBE
R
XY
Z
29
0
Stokes I
Region
Active
Statistic
Mean
Polarization
Current
1
H-atom 2S1/2,F=1-0
H&beta; H(209)&beta;
600000
620000
640000
660000
680000
700000
720000
FELO-HEL
50528.550, 5.12e-3)
Slide 36 of 45
English (United States)
Accessibility: Investigate
Notes
Comments
131%

Spectral Line Fitting

Fit results can be copied/pasted


CARTA
File
View
Widgets
Help
PV
NGC_628_NA_CUBE_THINGS.fits.moment.weighted_coord
Galactic latitude
Galactic longitude
-45.60
-45.65
-45.70
-45.75
138.75
138.70
138.65
138.60
WCS: (138.8826, -45.7272); Image:
Value: 6.53844e+2 km/s ;
Polarization: Stokes I
-45.45
-45.50
-45.55
-45.60
-45.65
-45.70
-45.75
-45.80
-45.85
139.0
138.9
138.8
138.7
138.6
Z Profile Settings: Cursor
Help
Conversion
Styling
Smoothing
Moments
Fitting
Reset
Fit
View log
Image List
Animator
Layers
Matching
Channel
Polarization
GC_628_NA_CUBE
GC_628_NA_CUBE
GC_628_NA_CUBI
R
XY Z R
XY R
29
0
Stokes I
Region
Active
Statistic
Mean
Polarization
Current
0: NGC...
600000
620000
640000
660000
680000
FELO-HEL
H-atom 2S1/2,F=1-0
1
50528.550, 5.12e-3)
Slide 36 of 45
English (United States)
Accessibility: Investigate
Notes
Comments
131%
Snooze

Data source: NGC_628_NA_CUBE_THINGS.fits

Profile function: Gaussian

Auto detect: ○ w/ cont. ○ auto fit

detected 1 component.

Components: 1

Center: 655353

Amplitude: 0.00552114277778110

FWHM: 15526.650876000058

Continuum: None

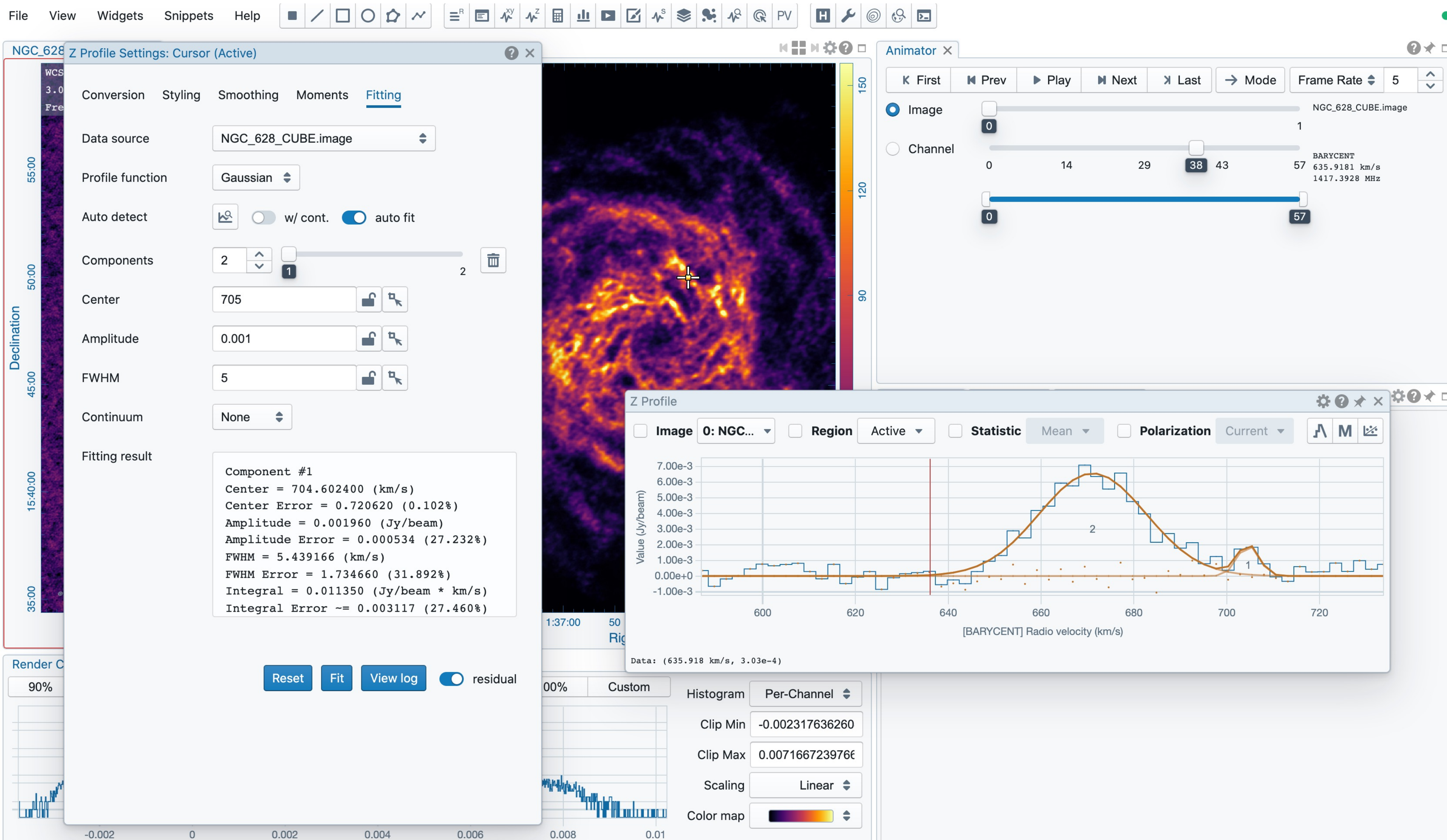
Fitting result

```
Component #1
Center = 655547.431446 (undefined)
Center Error = 250.777555 (0.038%)
Amplitude = 0.005615 (JY/BEAM)
Amplitude Error = 0.000124 (2.215%)
FWHM = 23108.497573 (undefined)
FWHM Error = 602.595058 (2.608%)
Integral = 138.116075 (JY/BEAM * undefin
Integral Error ~= 3.077627 (2.228%)
```

● residual

Spectral Line Fitting

Multiple Gaussians


File
View
Widgets
Snippets
Help
Z Profile Settings: Cursor (Active)
Conversion
Styling
Smoothing
Moments
Fitting
Auto detect
w/ cont.
auto fit
Reset
Fit
View log
residual
Animator
First
Prev
Play
Next
Last
Mode
Frame Rate
5
Image
Channel
NGC_628_CUBE.image
BARYCENT 635.9181 km/s 1417.3928 MHz
Z Profile
Image
0: NGC...
Region
Active
Statistic
Mean
Polarization
Current
Value (Jy/beam)
[BARYCENT] Radio velocity (km/s)
600
620
640
660
680
700
720
7.00e-3
6.00e-3
5.00e-3
4.00e-3
3.00e-3
2.00e-3
1.00e-3
0.00e+0
-1.00e-3
Declination
Render C
Histogram
Per-Channel
Scaling
Linear
Color map
Custom

Data source: NGC_628_CUBE.image

Profile function: Gaussian

Components: 2

Center: 705

Amplitude: 0.001

FWHM: 5

Continuum: None

Clip Min: -0.002317636260

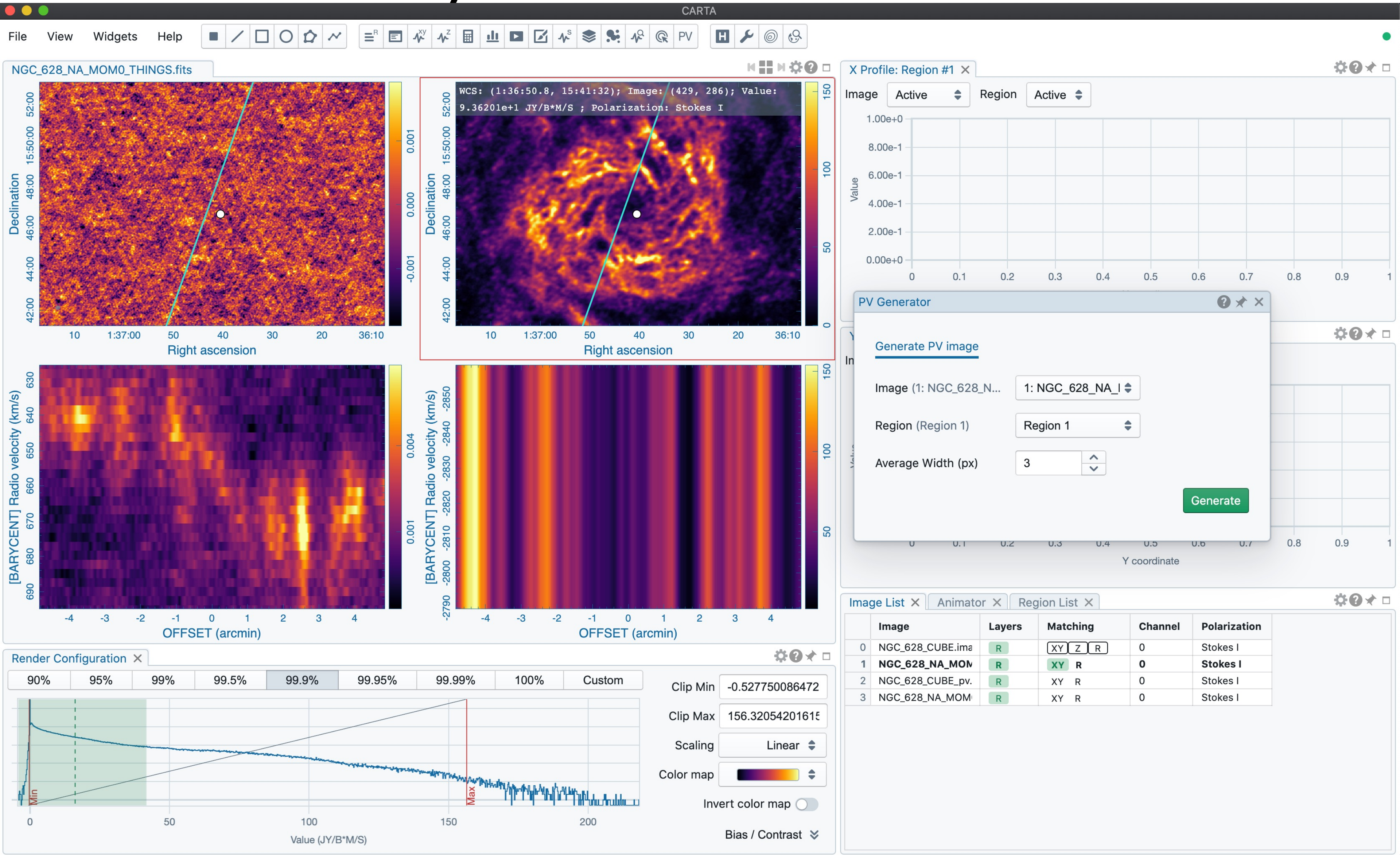
Clip Max: 0.007166723976

Fitting result

```
Component #1
Center = 704.602400 (km/s)
Center Error = 0.720620 (0.102%)
Amplitude = 0.001960 (Jy/beam)
Amplitude Error = 0.000534 (27.232%)
FWHM = 5.439166 (km/s)
FWHM Error = 1.734660 (31.892%)
Integral = 0.011350 (Jy/beam * km/s)
Integral Error ~= 0.003117 (27.460%)
```

```
Data: (635.918 km/s, 3.03e-4)
```

Position-Velocity


CARTA
File
View
Widgets
Help
PV
NGC_628_NA_MOM0_THINGS.fits
Declination
Right ascension
[BARYCENTRIC] Radio velocity (km/s)
OFFSET (arcmin)
X Profile: Region #1
Value
Y coordinate
Image List
Animator
Region List
Render Configuration
Value (JY/B*M/S)
Min
Max
Generate

WCS: (1:36:50.8, 15:41:32); Image: (429, 286); Value: 9.36201e+1 JY/B*M/S ; Polarization: Stokes I

X Profile: Region #1 — Image: Active; Region: Active

PV Generator

Generate PV image

Image (1: NGC_628_N... : 1: NGC_628_NA_I

Region (Region 1): Region 1

Average Width (px): 3

Render Configuration: 90% | 95% | 99% | 99.5% | 99.9% | 99.95% | 99.99% | 100% | Custom

Clip Min: -0.527750086472

Clip Max: 156.32054201615

Scaling: Linear

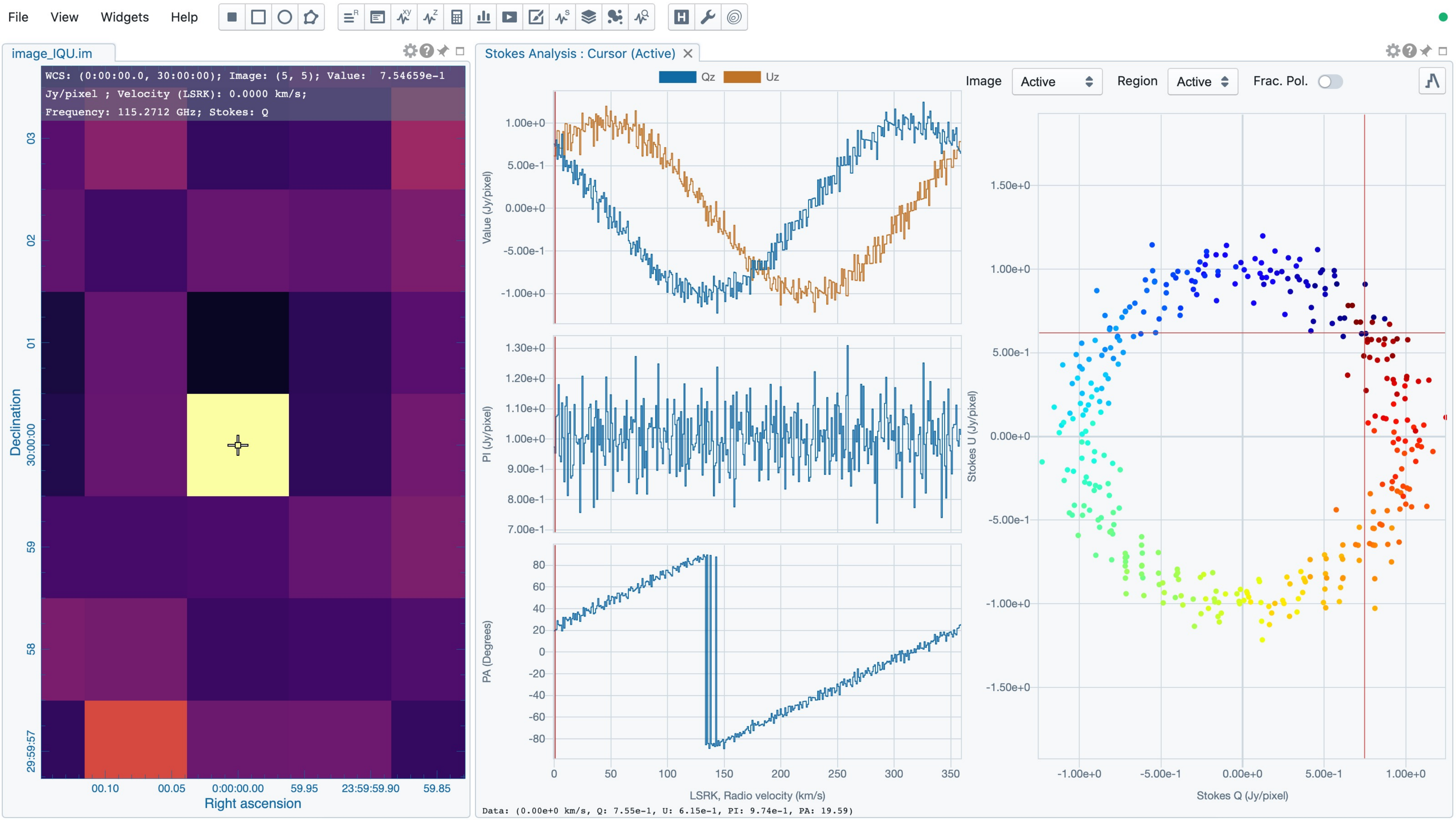
Invert color map ○

Bias / Contrast

	Image	Layers	Matching	Channel	Polarization
0	NGC_628_CUBE.ima	R	XY Z R	0	Stokes I
1	**NGC_628_NA_MON**	R	**XY** R	**0**	**Stokes I**
2	NGC_628_CUBE_pv.	R	XY R	0	Stokes I
3	NGC_628_NA_MOM	R	XY R	0	Stokes I

CARTA v3 (2022)

CARTA – Stokes Analysis Widget


File
View
Widgets
Help
image_IQU.im
Stokes Analysis : Cursor (Active)
Qz
Uz
Declination
03
02
01
30:00:00
59
58
29:59:57
00.10
00.05
0:00:00.00
59.95
23:59:59.90
59.85
Right ascension
Value (Jy/pixel)
1.00e+0
5.00e-1
0.00e+0
-5.00e-1
-1.00e+0
PI (Jy/pixel)
1.30e+0
1.20e+0
1.10e+0
1.00e+0
9.00e-1
8.00e-1
7.00e-1
PA (Degrees)
80
60
40
20
0
-20
-40
-60
-80
0
50
100
150
200
250
300
350
LSRK, Radio velocity (km/s)
Stokes U (Jy/pixel)
1.50e+0
1.00e+0
5.00e-1
0.00e+0
-5.00e-1
-1.00e+0
-1.50e+0
-1.00e+0
-5.00e-1
0.00e+0
5.00e-1
1.00e+0
Stokes Q (Jy/pixel)

```
WCS: (0:00:00.0, 30:00:00); Image: (5, 5); Value:  7.54659e-1
Jy/pixel ; Velocity (LSRK): 0.0000 km/s;
Frequency: 115.2712 GHz; Stokes: Q
```

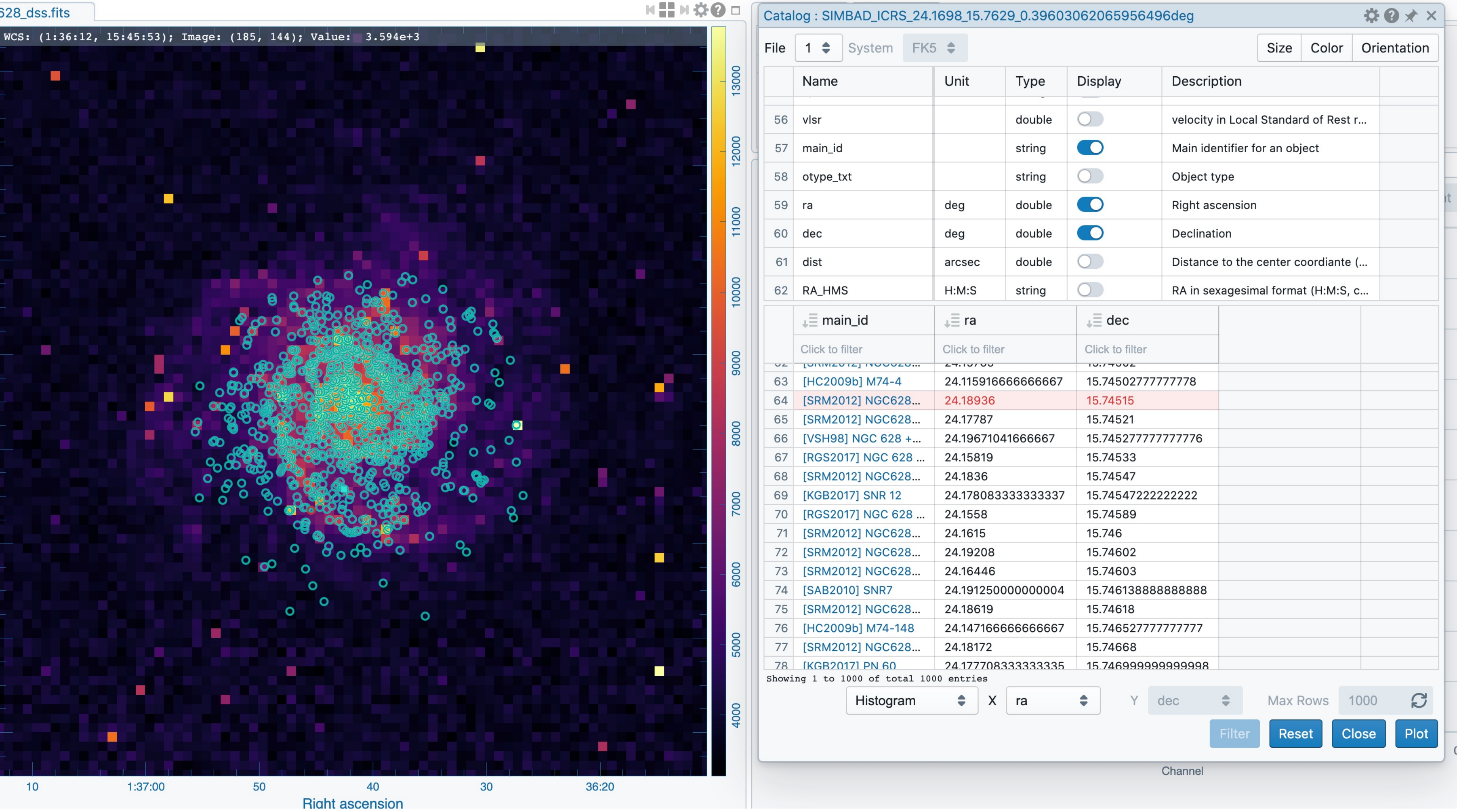
Image: Active

Region: Active

Frac. Pol. ○

```
Data: (0.00e+0 km/s, Q: 7.55e-1, U: 6.15e-1, PI: 9.74e-1, PA: 19.59)
```

CARTA – Catalog tool


628_dss.fits
13000
12000
11000
10000
9000
8000
7000
6000
5000
4000
10
1:37:00
50
40
30
36:20
Right ascension
Channel
File
1
System
FK5
Size
Color
Orientation
Histogram
X
ra
Y
dec
Max Rows
1000
Filter
Reset
Close
Plot

WCS: (1:36:12, 15:45:53); Image: (185, 144); Value: 3.594e+3

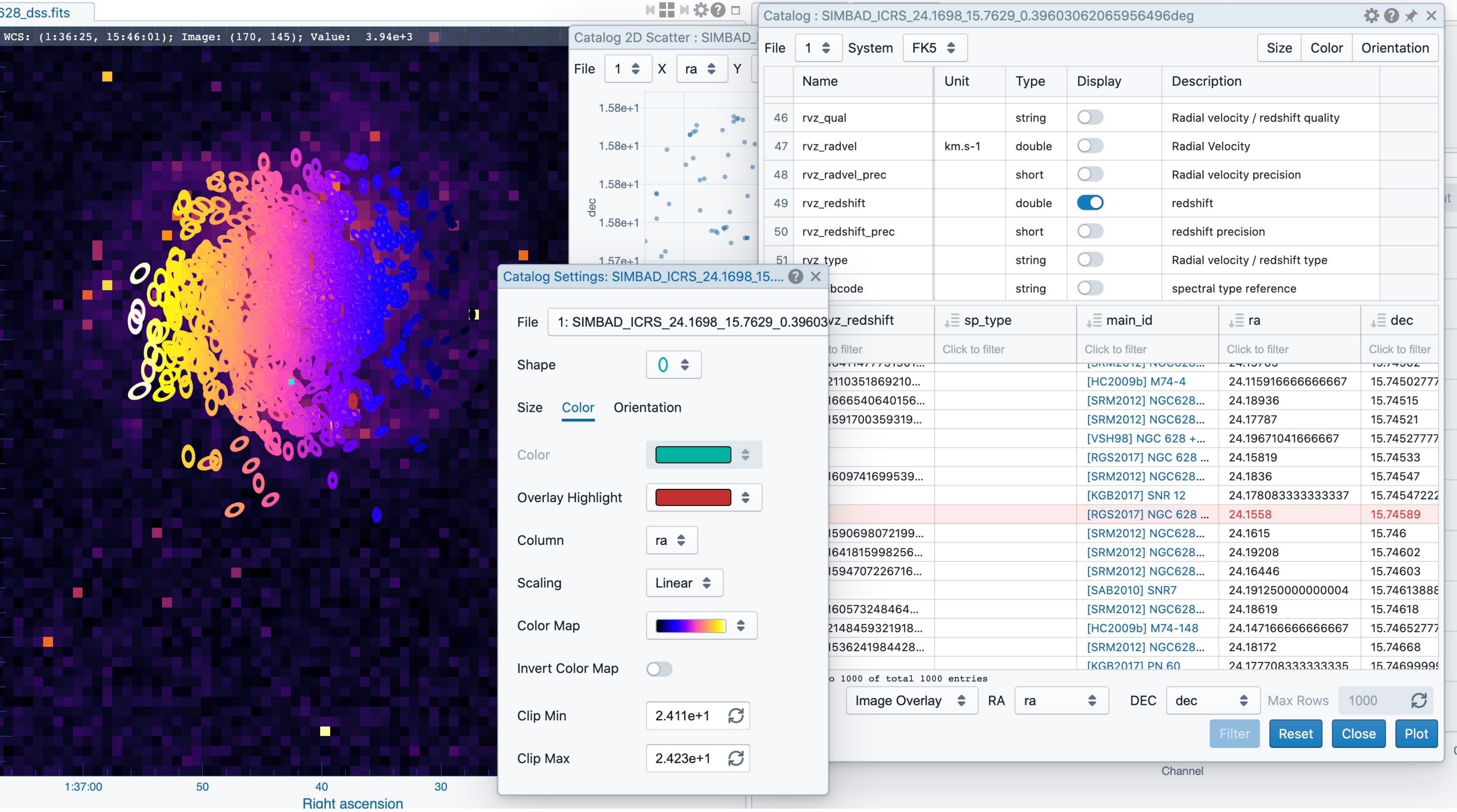
Catalog : SIMBAD_ICRS_24.1698_15.7629_0.39603062065956496deg

	Name	Unit	Type	Display	Description
56	vlsr		double	○	velocity in Local Standard of Rest r...
57	main_id		string	●	Main identifier for an object
58	otype_txt		string	○	Object type
59	ra	deg	double	●	Right ascension
60	dec	deg	double	●	Declination
61	dist	arcsec	double	○	Distance to the center coordiante (...
62	RA_HMS	H:M:S	string	○	RA in sexagesimal format (H:M:S, c...

	main_id	ra	dec
	Click to filter	Click to filter	Click to filter
63	[HC2009b] M74-4	24.115916666666667	15.745027777777778
64	[SRM2012] NGC628...	24.18936	15.74515
65	[SRM2012] NGC628...	24.17787	15.74521
66	[VSH98] NGC 628 +...	24.19671041666667	15.745277777777776
67	[RGS2017] NGC 628 ...	24.15819	15.74533
68	[SRM2012] NGC628...	24.1836	15.74547
69	[KGB2017] SNR 12	24.178083333333337	15.745472222222222
70	[RGS2017] NGC 628 ...	24.1558	15.74589
71	[SRM2012] NGC628...	24.1615	15.746
72	[SRM2012] NGC628...	24.19208	15.74602
73	[SRM2012] NGC628...	24.16446	15.74603
74	[SAB2010] SNR7	24.191250000000004	15.746138888888888
75	[SRM2012] NGC628...	24.18619	15.74618
76	[HC2009b] M74-148	24.147166666666667	15.746527777777777
77	[SRM2012] NGC628...	24.18172	15.74668
78	[KGB2017] PN 60	24.177708333333335	15.746999999999998

Showing 1 to 1000 of total 1000 entries

CARTA – Catalog tool



628_dss.fits

WCS: (1:36:25, 15:46:01); Image: (170, 145); Value: 3.94e+3

1:37:00
50
40
30
Right ascension
Catalog 2D Scatter : SIMBAD_
File
1
X
ra
Y
dec
1.58e+1
1.58e+1
1.58e+1
1.58e+1
1.57e+1
Channel

Catalog : SIMBAD_ICRS_24.1698_15.7629_0.39603062065956496deg

File: 1 System: FK5

Size
Color
Orientation

	Name	Unit	Type	Display	Description
46	rvz_qual		string	○	Radial velocity / redshift quality
47	rvz_radvel	km.s-1	double	○	Radial Velocity
48	rvz_radvel_prec		short	○	Radial velocity precision
49	rvz_redshift		double	●	redshift
50	rvz_redshift_prec		short	○	redshift precision
51	rvz_type		string	○	Radial velocity / redshift type
	bcode		string	○	spectral type reference

Catalog Settings: SIMBAD_ICRS_24.1698_15....

File: 1: SIMBAD_ICRS_24.1698_15.7629_0.39603

Shape: O

Size
Color
Orientation

Color: 🟩

Overlay Highlight: 🟥

Column: ra

Scaling: Linear

Color Map:

Invert Color Map: ○

Clip Min: 2.411e+1

Clip Max: 2.423e+1

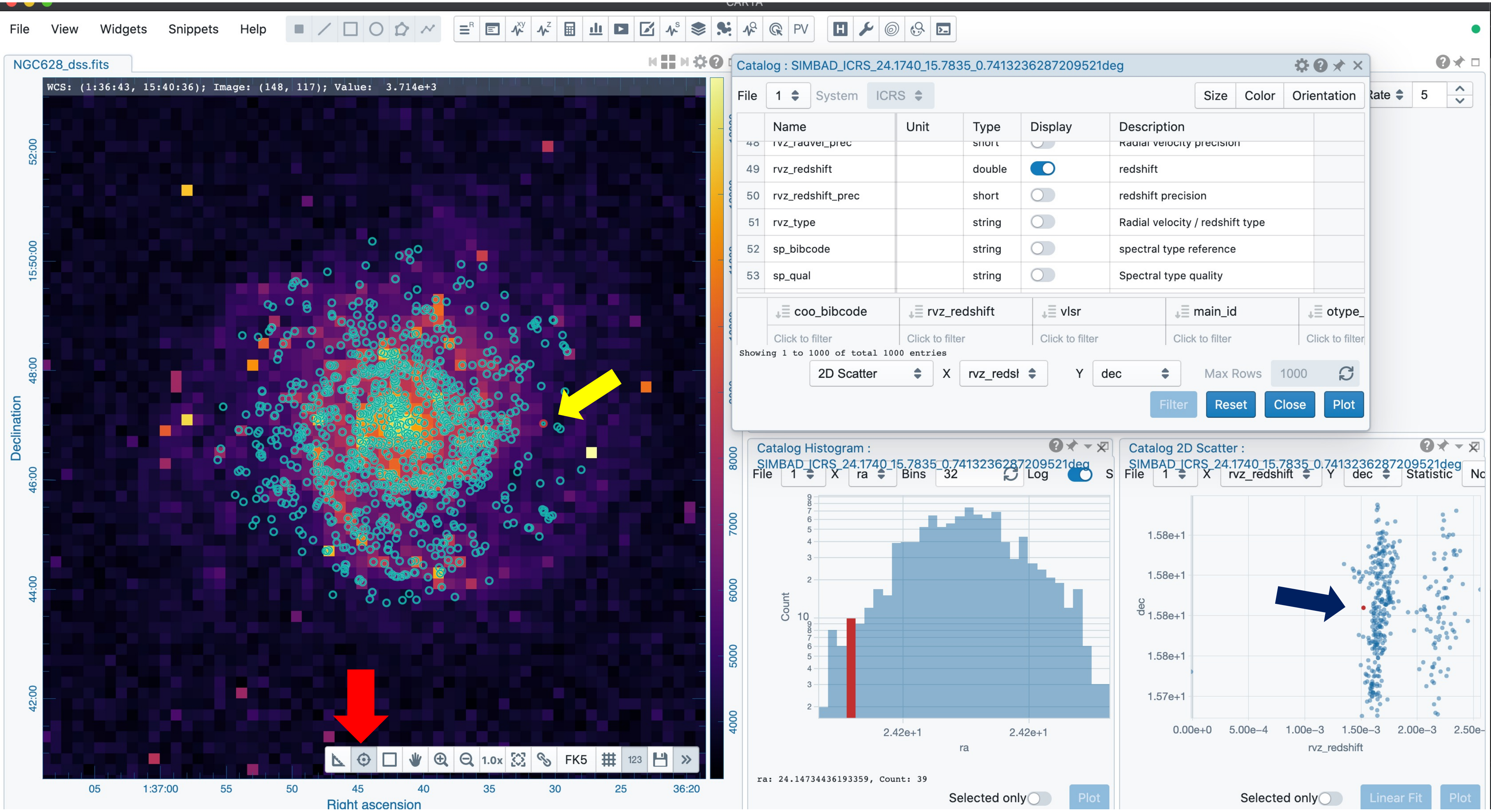
vz_redshift	sp_type	main_id	ra	dec
to filter	Click to filter	Click to filter	Click to filter	Click to filter
2110351869210...		[HC2009b] M74-4	24.115916666666667	15.74502777
1666540640156...		[SRM2012] NGC628...	24.18936	15.74515
1591700359319...		[SRM2012] NGC628...	24.17787	15.74521
		[VSH98] NGC 628 +...	24.19671041666667	15.74527777
		[RGS2017] NGC 628 ...	24.15819	15.74533
1609741699539...		[SRM2012] NGC628...	24.1836	15.74547
		[KGB2017] SNR 12	24.178083333333337	15.74547222
		[RGS2017] NGC 628 ...	24.1558	15.74589
1590698072199...		[SRM2012] NGC628...	24.1615	15.746
1641815998256...		[SRM2012] NGC628...	24.19208	15.74602
1594707226716...		[SRM2012] NGC628...	24.16446	15.74603
		[SAB2010] SNR7	24.191250000000004	15.74613888
160573248464...		[SRM2012] NGC628...	24.18619	15.74618
2148459321918...		[HC2009b] M74-148	24.147166666666667	15.74652777
1536241984428...		[SRM2012] NGC628...	24.18172	15.74668
		[KGB2017] PN 60	24.177708333333335	15.7469999

o 1000 of total 1000 entries

Image Overlay RA: ra DEC: dec Max Rows: 1000

Filter
Reset
Close
Plot

CARTA – Catalog tool



File
View
Widgets
Snippets
Help
PV
NGC628_dss.fits
Declination
52:00
15:50:00
48:00
46:00
44:00
42:00
05
1:37:00
55
50
45
40
35
30
25
36:20
Right ascension
1.0x
FK5
123
8000
7000
6000
5000
4000
Catalog : SIMBAD_ICRS_24.1740_15.7835_0.7413236287209521deg
File
1
System
ICRS
Size
Color
Orientation
Rate
5
coo_bibcode
rvz_redshift
vlsr
main_id
otype_
Click to filter
Filter
Reset
Close
Plot
Catalog Histogram : SIMBAD_ICRS_24.1740_15.7835_0.7413236287209521deg
File
1
X
ra
Bins
32
Log
Count
10
2.42e+1
ra
Selected only
Plot
Catalog 2D Scatter : SIMBAD_ICRS_24.1740_15.7835_0.7413236287209521deg
File
1
X
rvz_redshift
Y
dec
Statistic
dec
1.58e+1
1.58e+1
1.58e+1
1.58e+1
1.57e+1
0.00e+0
5.00e−4
1.00e−3
1.50e−3
2.00e−3
2.50e−
rvz_redshift
Selected only
Linear Fit
Plot

```
WCS: (1:36:43, 15:40:36); Image: (148, 117); Value:  3.714e+3
```

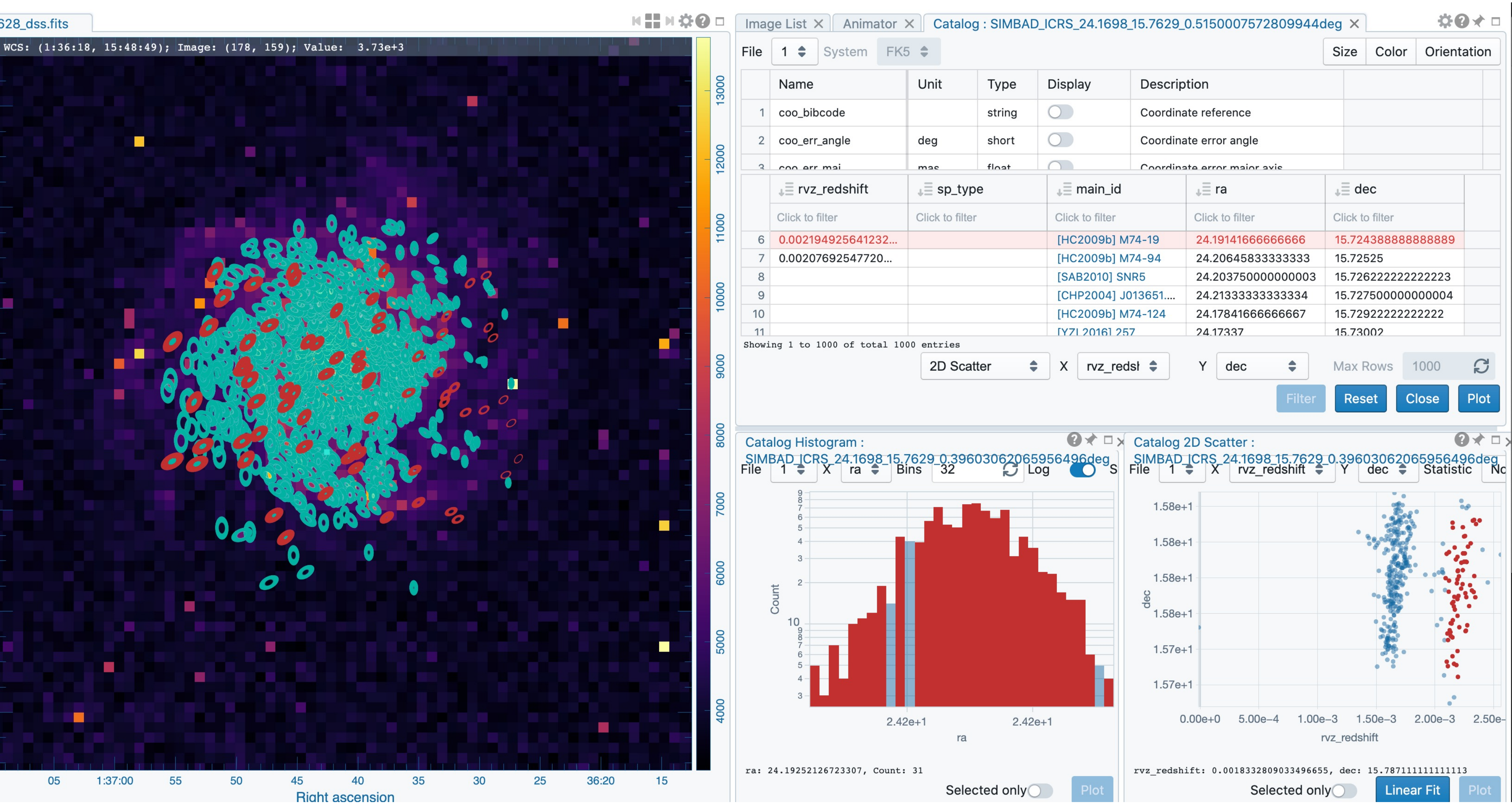
	Name	Unit	Type	Display	Description
48	rvz_radvel_prec		short	○	Radial velocity precision
49	rvz_redshift		double	●	redshift
50	rvz_redshift_prec		short	○	redshift precision
51	rvz_type		string	○	Radial velocity / redshift type
52	sp_bibcode		string	○	spectral type reference
53	sp_qual		string	○	Spectral type quality

```
Showing 1 to 1000 of total 1000 entries
```

2D Scatter X rvz_redsh Y dec Max Rows 1000

```
ra: 24.14734436193359, Count: 39
```

CARTA – Catalog tool



628_dss.fits
Image List
Animator
Catalog : SIMBAD_ICRS_24.1698_15.7629_0.5150007572809944deg
File
1
System
FK5
Size
Color
Orientation
2D Scatter
X
rvz_redsl
Y
dec
Max Rows
1000
Filter
Reset
Close
Plot
Catalog Histogram :
SIMBAD_ICRS_24.1698_15.7629_0.39603062065956496deg
File
1
X
ra
Bins
32
Log
Count
2.42e+1
2.42e+1
ra
Selected only
Plot
Catalog 2D Scatter :
SIMBAD_ICRS_24.1698_15.7629_0.39603062065956496deg
File
1
X
rvz_redshift
Y
dec
Statistic
dec
1.58e+1
1.58e+1
1.58e+1
1.58e+1
1.57e+1
1.57e+1
0.00e+0
5.00e−4
1.00e−3
1.50e−3
2.00e−3
2.50e-
rvz_redshift
Selected only
Linear Fit
Plot
13000
12000
11000
10000
9000
8000
7000
6000
5000
4000
05
1:37:00
55
50
45
40
35
30
25
36:20
15
Right ascension

```
WCS: (1:36:18, 15:48:49); Image: (178, 159); Value:  3.73e+3
```

	Name	Unit	Type	Display	Description
1	coo_bibcode		string	○	Coordinate reference
2	coo_err_angle	deg	short	○	Coordinate error angle
3	coo_err_maj	mas	float	○	Coordinate error major axis

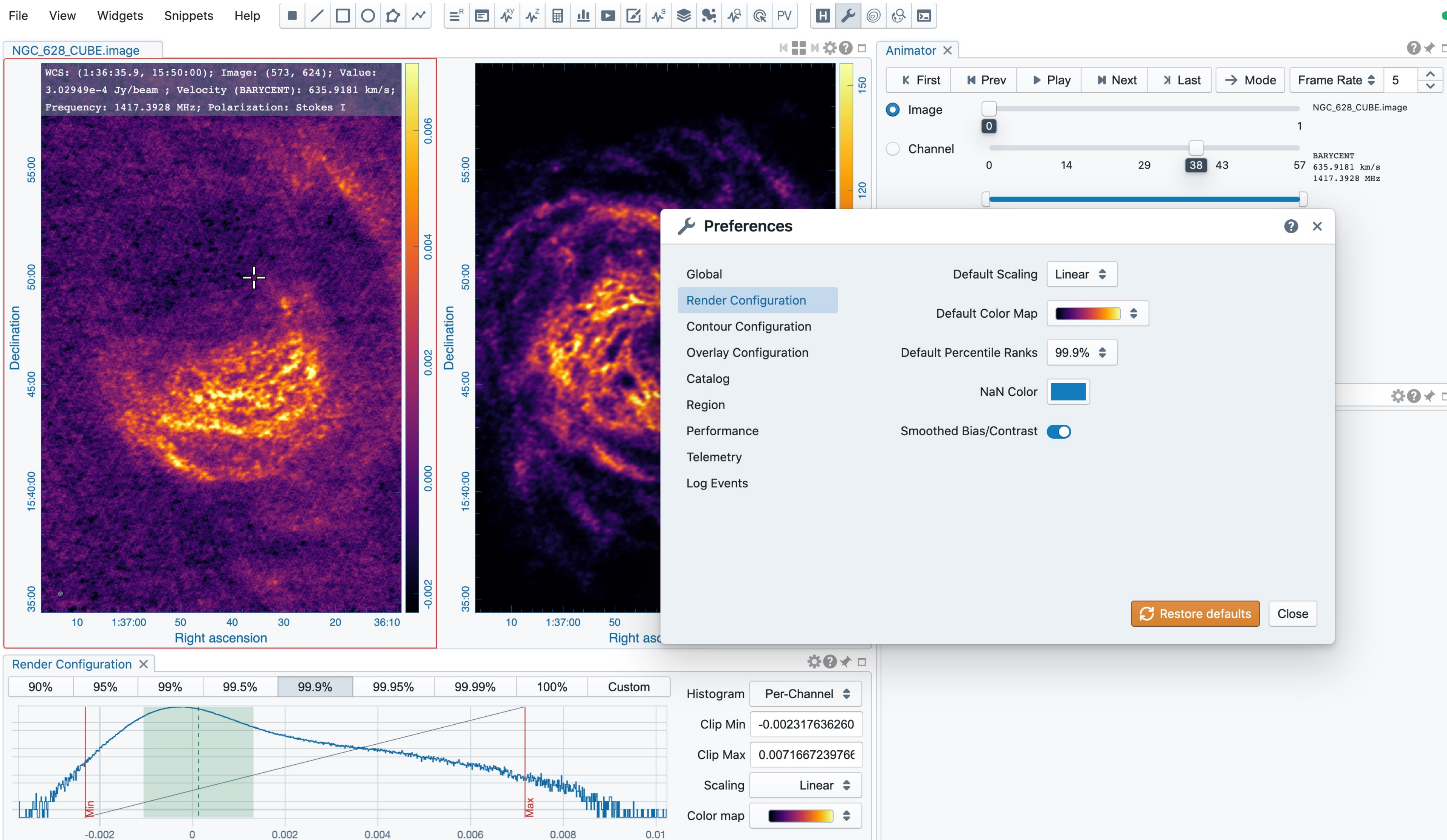
	rvz_redshift	sp_type	main_id	ra	dec
	Click to filter	Click to filter	Click to filter	Click to filter	Click to filter
6	0.002194925641232...		[HC2009b] M74-19	24.19141666666666	15.72438888888889
7	0.00207692547720...		[HC2009b] M74-94	24.20645833333333	15.72525
8			[SAB2010] SNR5	24.20375000000003	15.72622222222223
9			[CHP2004] J013651....	24.21333333333334	15.72750000000004
10			[HC2009b] M74-124	24.17841666666667	15.72922222222222
11			[YZL2016] 257	24.17337	15.73002

```
Showing 1 to 1000 of total 1000 entries
```

```
ra: 24.19252126723307, Count: 31
```

```
rvz_redshift: 0.0018332809033496655, dec: 15.787111111111113
```

Preferences



WCS: (1:36:35.9, 15:50:00); Image: (573, 624); Value: 3.02949e-4 Jy/beam ; Velocity (BARYCENT): 635.9181 km/s; Frequency: 1417.3928 MHz; Polarization: Stokes I

Preferences

Default Scaling: Linear

Default Color Map

Default Percentile Ranks: 99.9%

NaN Color

Smoothed Bias/Contrast

Render Configuration

Histogram: Per-Channel

Clip Min: -0.002317636260

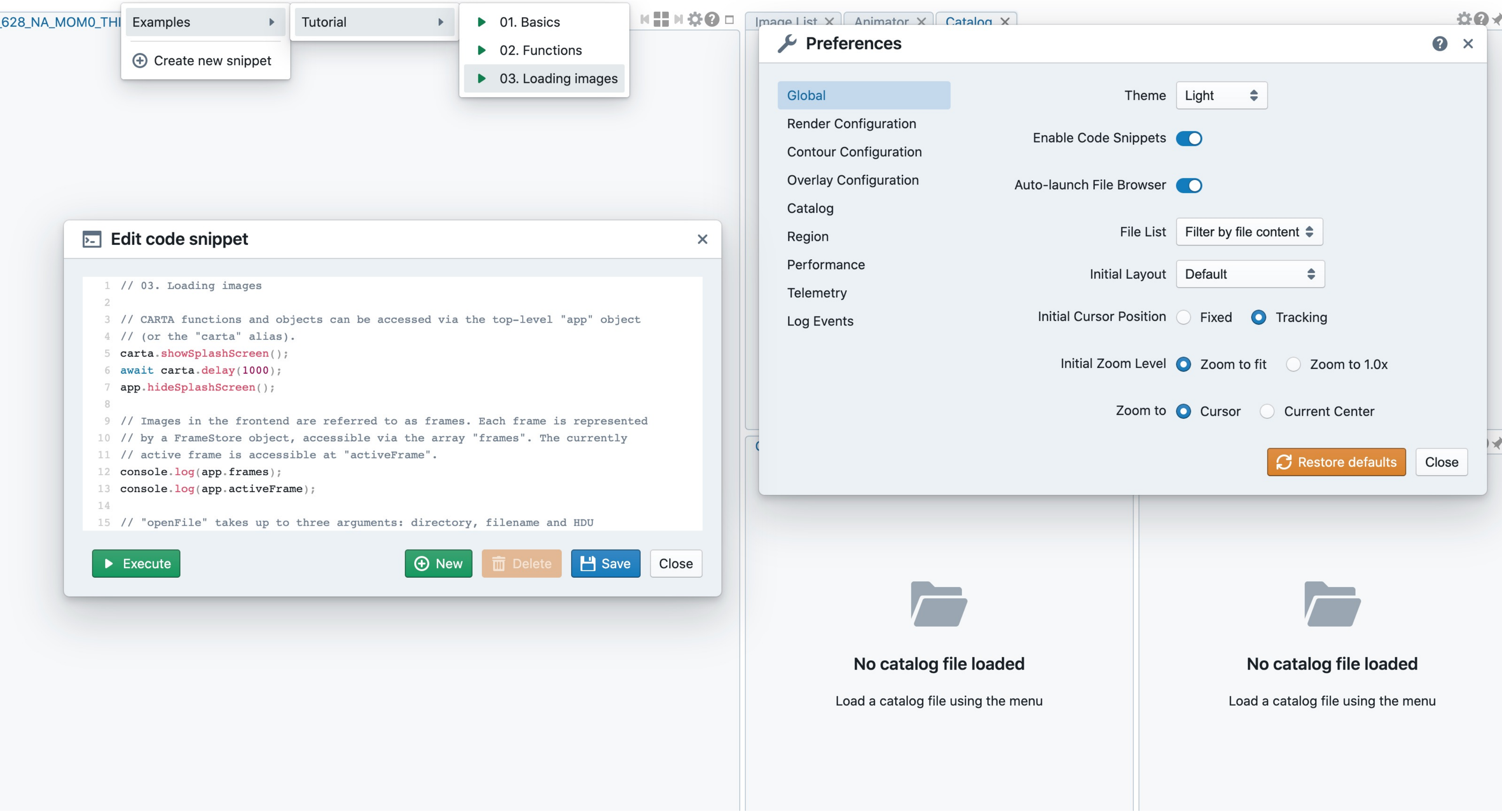
Clip Max: 0.007166723976

Scaling: Linear

Color map

File
View
Widgets
Snippets
Help
PV
NGC_628_CUBE.image
Declination
Right ascension
55:00
50:00
45:00
15:40:00
35:00
10
1:37:00
50
40
30
20
36:10
0.006
0.004
0.002
0.000
-0.002
150
120
Animator
First
Prev
Play
Next
Last
Mode
Frame Rate
5
Image
Channel
0
1
14
29
38
43
57
NGC_628_CUBE.image
BARYCENT
635.9181 km/s
1417.3928 MHz
Global
Render Configuration
Contour Configuration
Overlay Configuration
Catalog
Region
Performance
Telemetry
Log Events
Restore defaults
Close
90%
95%
99%
99.5%
99.9%
99.95%
99.99%
100%
Custom
Min
Max
-0.002
0
0.002
0.004
0.006
0.008
0.01

Python scripting in progress/Code snippet


628_NA_MOM0_THI
Examples
Create new snippet
Tutorial
01. Basics
02. Functions
03. Loading images
Image List
Animator
Catalog
Edit code snippet
Execute
New
Delete
Save
Close
Preferences
Global
Render Configuration
Contour Configuration
Overlay Configuration
Catalog
Region
Performance
Telemetry
Log Events
Restore defaults
Close
No catalog file loaded
Load a catalog file using the menu
No catalog file loaded
Load a catalog file using the menu

```
// 03. Loading images

// CARTA functions and objects can be accessed via the top-level "app" object
// (or the "carta" alias).
carta.showSplashScreen();
await carta.delay(1000);
app.hideSplashScreen();

// Images in the frontend are referred to as frames. Each frame is represented
// by a FrameStore object, accessible via the array "frames". The currently
// active frame is accessible at "activeFrame".
console.log(app.frames);
console.log(app.activeFrame);

// "openFile" takes up to three arguments: directory, filename and HDU
```

Theme: Light

Enable Code Snippets: ●

Auto-launch File Browser: ●

File List: Filter by file content

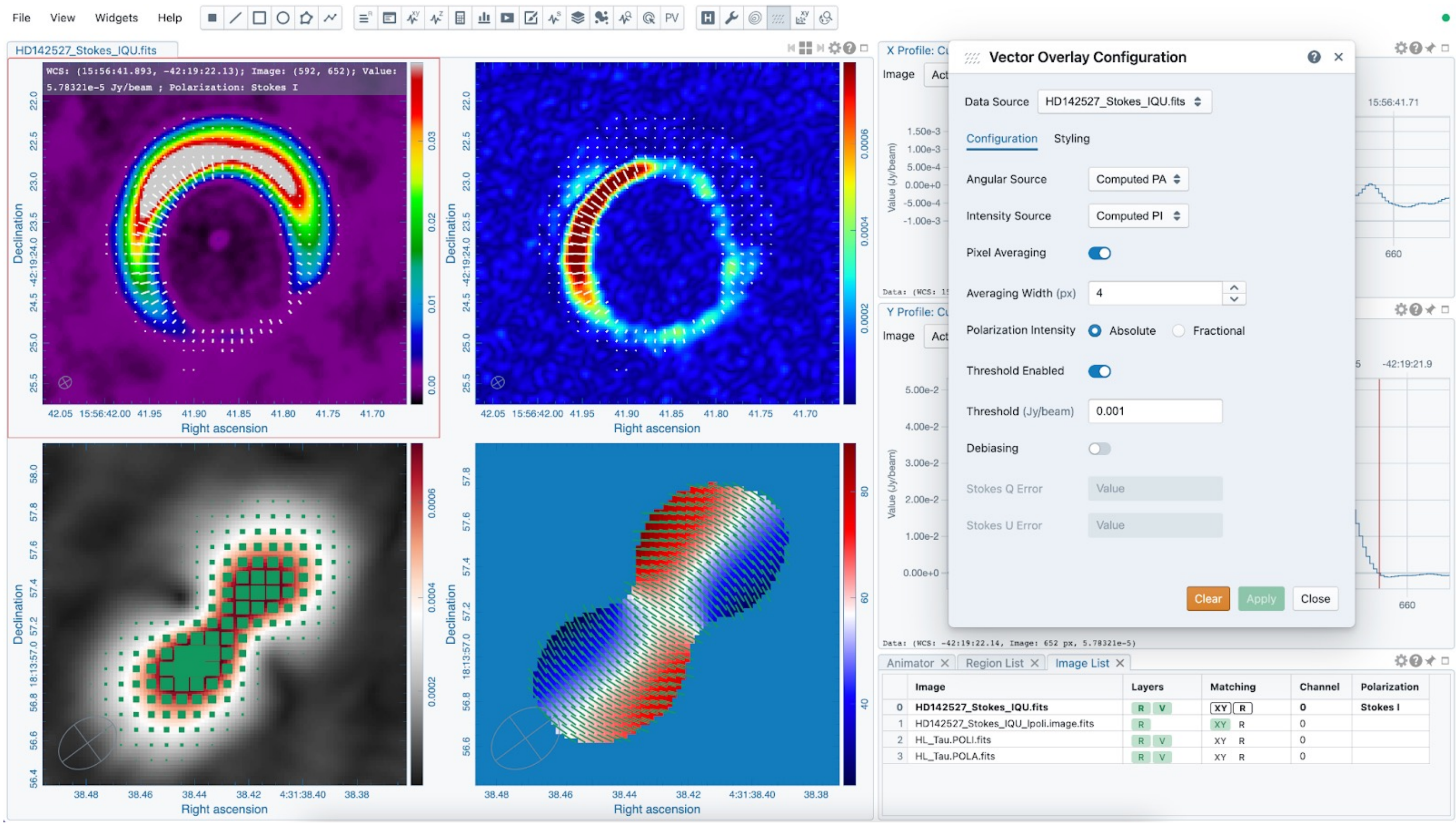
Initial Layout: Default

Initial Cursor Position: ○ Fixed ● Tracking

Initial Zoom Level: ● Zoom to fit ○ Zoom to 1.0x

Zoom to: ● Cursor ○ Current Center

Vector field rendering



File
View
Widgets
Help
HD142527_Stokes_IQU.fits
X Profile: Cu
Y Profile: Cu
Image
Act
Declination
Right ascension

WCS: (15:56:41.893, -42:19:22.13); Image: (592, 652); Value: 5.78321e-5 Jy/beam ; Polarization: Stokes I

Vector Overlay Configuration

Data Source: HD142527_Stokes_IQU.fits

Configuration | Styling

Angular Source: Computed PA
Intensity Source: Computed PI
Pixel Averaging: on
Averaging Width (px): 4
Polarization Intensity: ● Absolute ○ Fractional
Threshold Enabled: on
Threshold (Jy/beam): 0.001
Debiasing: off
Stokes Q Error: Value
Stokes U Error: Value

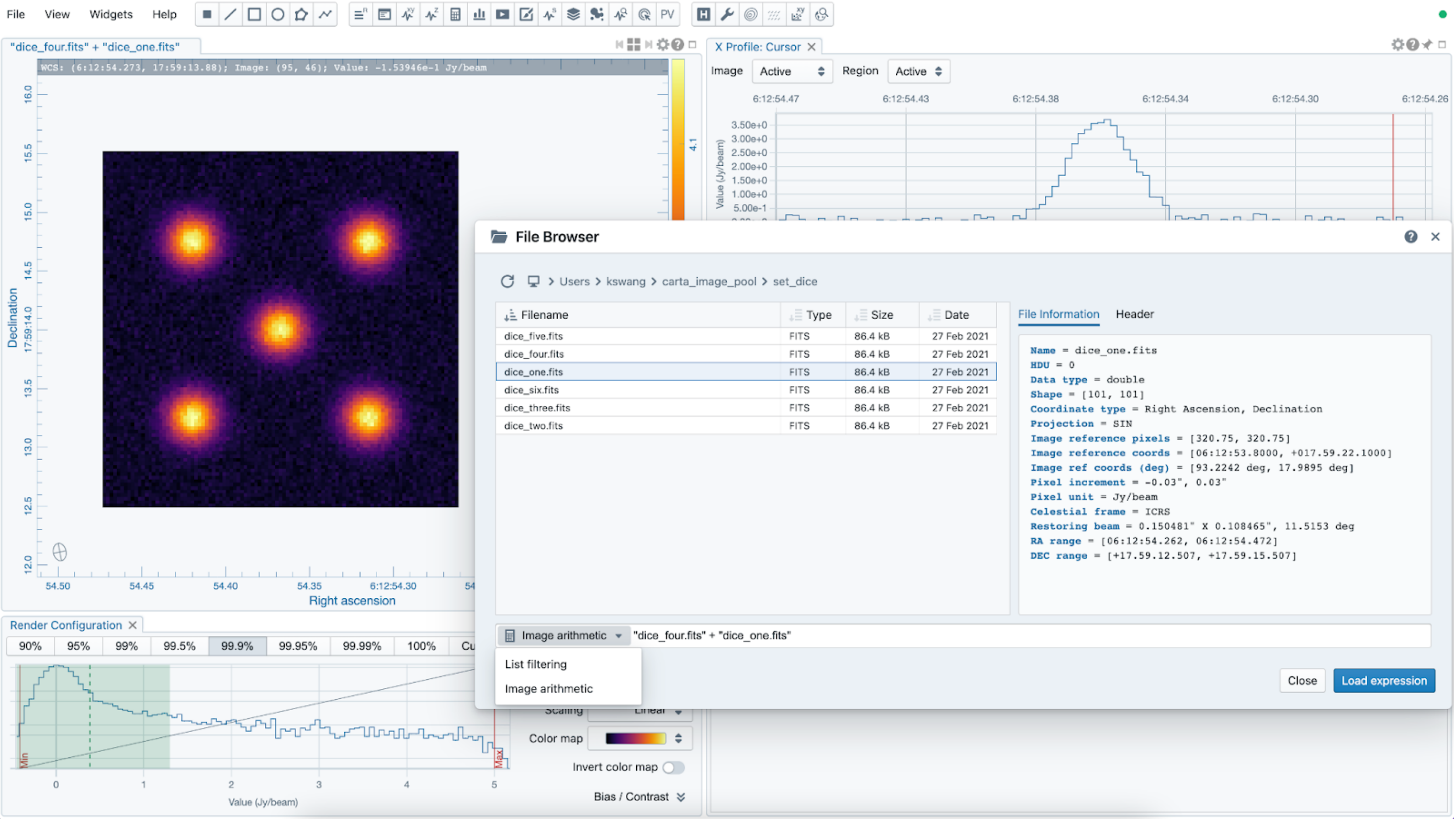
Clear
Apply
Close

Data: (WCS: -42:19:22.14, Image: 652 px, 5.78321e-5)

Animator
Region List
Image List

	Image	Layers	Matching	Channel	Polarization
0	**HD142527_Stokes_IQU.fits**	R V	XY R	0	Stokes I
1	HD142527_Stokes_IQU_Ipoli.image.fits	R	XY R	0	
2	HL_Tau.POLI.fits	R V	XY R	0	
3	HL_Tau.POLA.fits	R V	XY R	0	

LEL image loading (mathematical expressions)


File
View
Widgets
Help
PV
"dice_four.fits" + "dice_one.fits"
Declination
17:59:14.0
16.0
15.5
15.0
14.5
13.5
13.0
12.5
12.0
54.50
54.45
54.40
54.35
6:12:54.30
Right ascension
X Profile: Cursor
Value (Jy/beam)
6:12:54.47
6:12:54.43
6:12:54.38
6:12:54.34
6:12:54.30
6:12:54.26
3.50e+0
3.00e+0
2.50e+0
2.00e+0
1.50e+0
1.00e+0
5.00e-1
Render Configuration
90%
95%
99%
99.5%
99.9%
99.95%
99.99%
100%
Min
Max
0
1
2
3
4
5
Value (Jy/beam)
Scaling
Linear
Color map
Invert color map
Bias / Contrast
File Browser
Users > kswang > carta_image_pool > set_dice
File Information
Header
List filtering
Image arithmetic
Close
Load expression

WCS: (6:12:54.273, 17:59:13.88); Image: (95, 46); Value: -1.53946e-1 Jy/beam

Image: Active

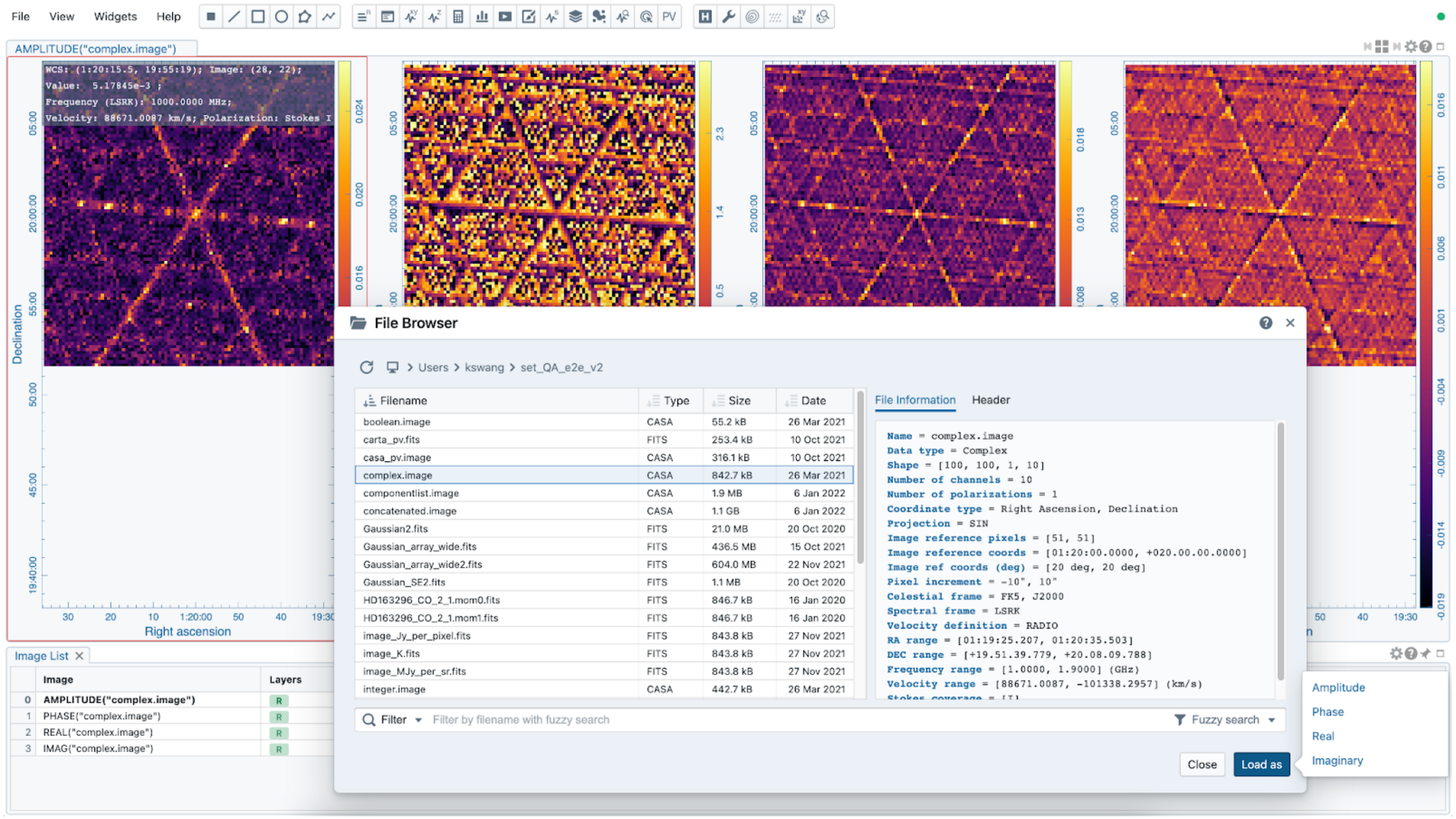
Region: Active

Filename	Type	Size	Date
dice_five.fits	FITS	86.4 kB	27 Feb 2021
dice_four.fits	FITS	86.4 kB	27 Feb 2021
dice_one.fits	FITS	86.4 kB	27 Feb 2021
dice_six.fits	FITS	86.4 kB	27 Feb 2021
dice_three.fits	FITS	86.4 kB	27 Feb 2021
dice_two.fits	FITS	86.4 kB	27 Feb 2021

```
Name = dice_one.fits
HDU = 0
Data type = double
Shape = [101, 101]
Coordinate type = Right Ascension, Declination
Projection = SIN
Image reference pixels = [320.75, 320.75]
Image reference coords = [06:12:53.8000, +017.59.22.1000]
Image ref coords (deg) = [93.2242 deg, 17.9895 deg]
Pixel increment = -0.03", 0.03"
Pixel unit = Jy/beam
Celestial frame = ICRS
Restoring beam = 0.150481" X 0.108465", 11.5153 deg
RA range = [06:12:54.262, 06:12:54.472]
DEC range = [+17.59.12.507, +17.59.15.507]
```

Image arithmetic: "dice_four.fits" + "dice_one.fits"

Complex-valued images


File
View
Widgets
Help
PV
AMPLITUDE("complex.image")
Declination
Right ascension
File Browser
Users > kswang > set_QA_e2e_v2
File Information
Header
Filter
Filter by filename with fuzzy search
Fuzzy search
Close
Load as
Amplitude
Phase
Real
Imaginary
Image List

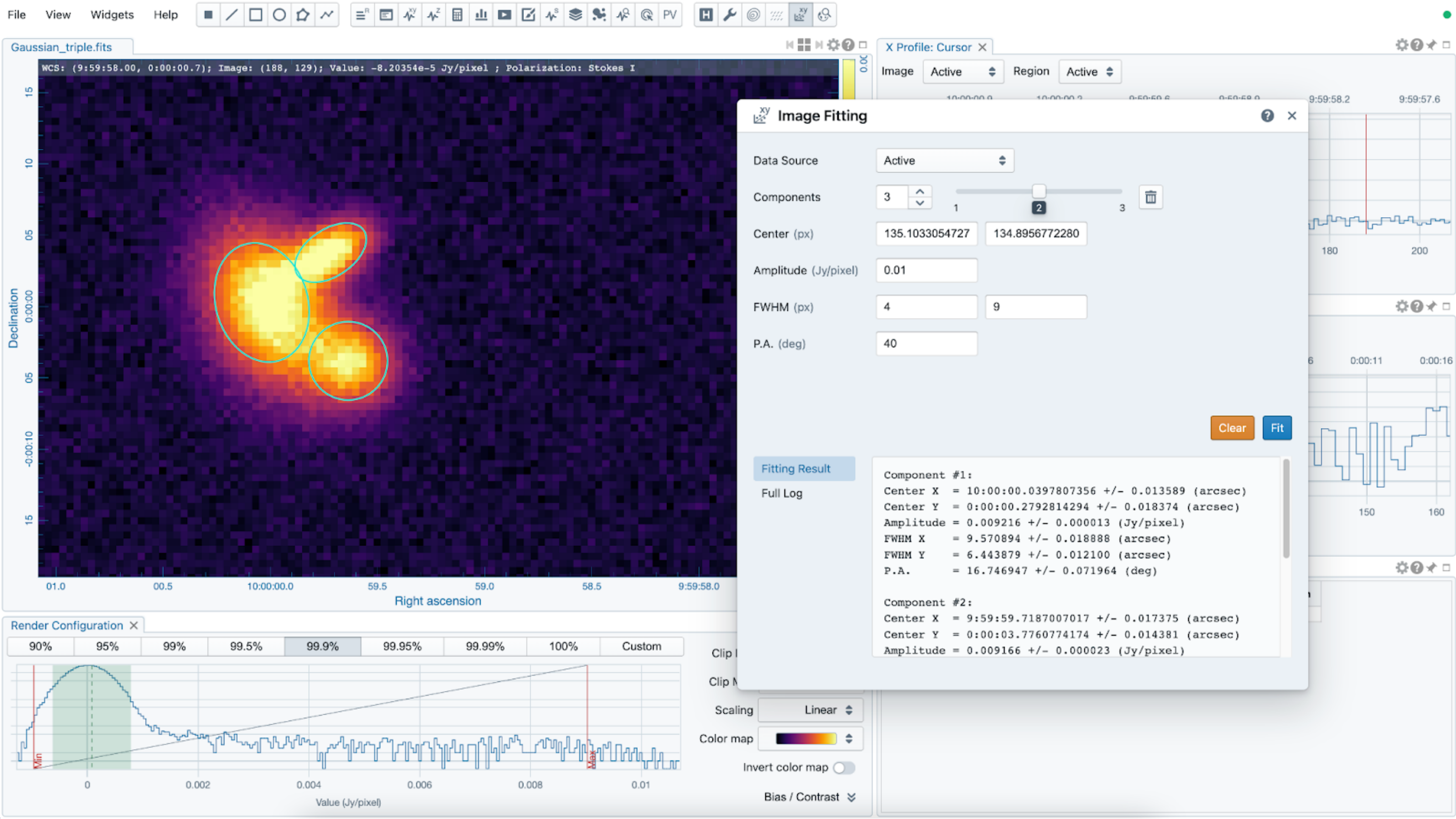
```
WCS: (1:20:15.5, 19:55:19); Image: (28, 22);
Value:  5.17845e-3 ;
Frequency (LSRK): 1000.0000 MHz;
Velocity: 88671.0087 km/s; Polarization: Stokes I
```

Filename	Type	Size	Date
boolean.image	CASA	55.2 kB	26 Mar 2021
carta_pv.fits	FITS	253.4 kB	10 Oct 2021
casa_pv.image	CASA	316.1 kB	10 Oct 2021
complex.image	CASA	842.7 kB	26 Mar 2021
componentlist.image	CASA	1.9 MB	6 Jan 2022
concatenated.image	CASA	1.1 GB	6 Jan 2022
Gaussian2.fits	FITS	21.0 MB	20 Oct 2020
Gaussian_array_wide.fits	FITS	436.5 MB	15 Oct 2021
Gaussian_array_wide2.fits	FITS	604.0 MB	22 Nov 2021
Gaussian_SE2.fits	FITS	1.1 MB	20 Oct 2020
HD163296_CO_2_1.mom0.fits	FITS	846.7 kB	16 Jan 2020
HD163296_CO_2_1.mom1.fits	FITS	846.7 kB	16 Jan 2020
image_Jy_per_pixel.fits	FITS	843.8 kB	27 Nov 2021
image_K.fits	FITS	843.8 kB	27 Nov 2021
image_MJy_per_sr.fits	FITS	843.8 kB	27 Nov 2021
integer.image	CASA	442.7 kB	26 Mar 2021

```
Name = complex.image
Data type = Complex
Shape = [100, 100, 1, 10]
Number of channels = 10
Number of polarizations = 1
Coordinate type = Right Ascension, Declination
Projection = SIN
Image reference pixels = [51, 51]
Image reference coords = [01:20:00.0000, +020.00.00.0000]
Image ref coords (deg) = [20 deg, 20 deg]
Pixel increment = -10", 10"
Celestial frame = FK5, J2000
Spectral frame = LSRK
Velocity definition = RADIO
RA range = [01:19:25.207, 01:20:35.503]
DEC range = [+19.51.39.779, +20.08.09.788]
Frequency range = [1.0000, 1.9000] (GHz)
Velocity range = [88671.0087, -101338.2957] (km/s)
```

	Image	Layers
0	AMPLITUDE("complex.image")	R
1	PHASE("complex.image")	R
2	REAL("complex.image")	R
3	IMAG("complex.image")	R

2D Gaussian Fitting


File
View
Widgets
Help
PV
Gaussian_triple.fits
Declination
Right ascension
01.0
00.5
10:00:00.0
59.5
59.0
58.5
9:59:58.0
X Profile: Cursor
Render Configuration
90%
95%
99%
99.5%
99.9%
99.95%
99.99%
100%
Custom
Value (Jy/pixel)
Scaling
Linear
Color map
Invert color map
Bias / Contrast
Image Fitting
Clear
Fit
Fitting Result
Full Log

WCS: (9:59:58.00, 0:00:00.7); Image: (188, 129); Value: -8.20354e-5 Jy/pixel ; Polarization: Stokes I

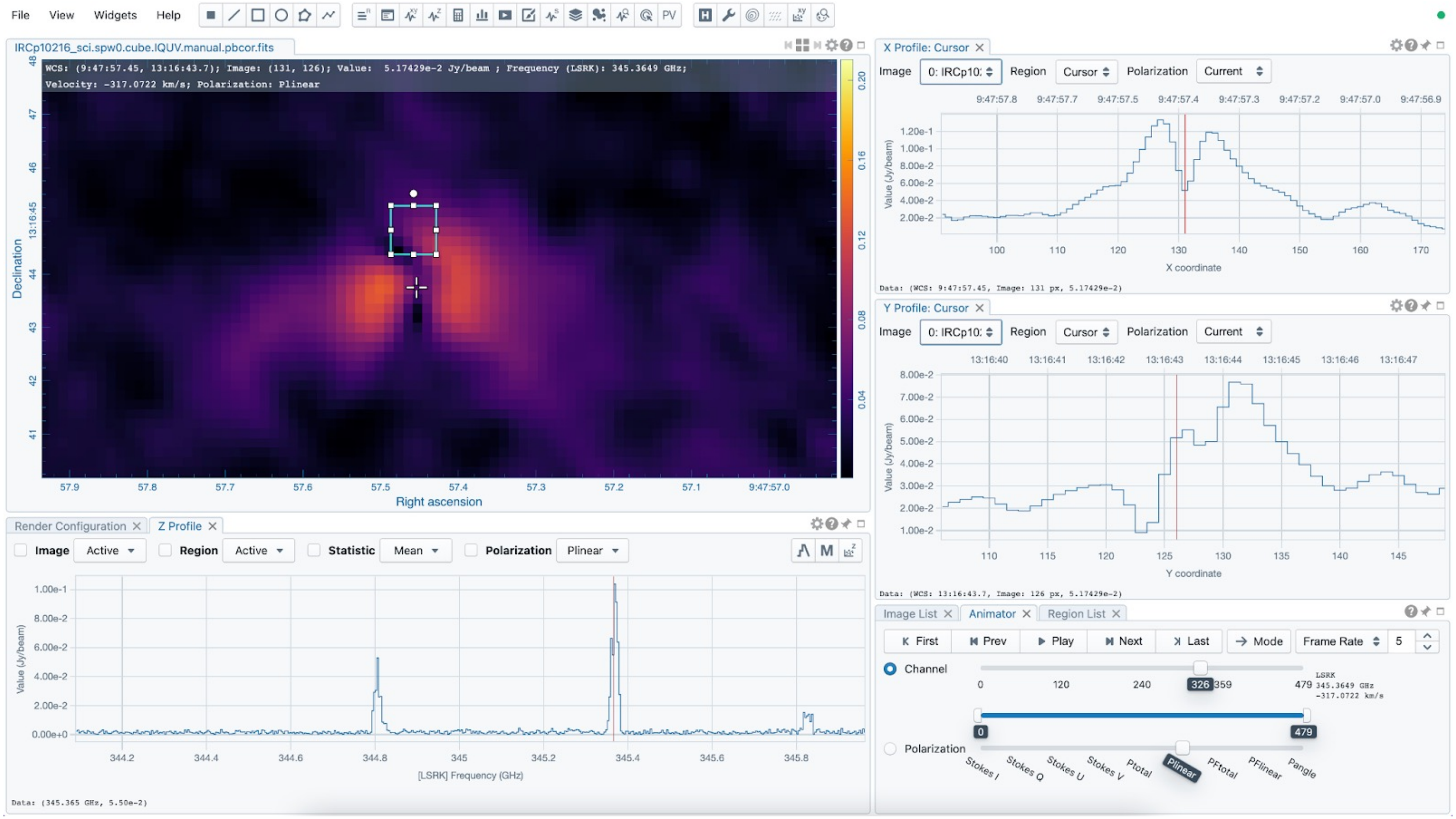
Image: Active
Region: Active

Data Source: Active
Components: 3
Center (px): 135.1033054727 134.8956772280
Amplitude (Jy/pixel): 0.01
FWHM (px): 4 9
P.A. (deg): 40

```
Component #1:
Center X  = 10:00:00.0397807356 +/- 0.013589 (arcsec)
Center Y  = 0:00:00.2792814294 +/- 0.018374 (arcsec)
Amplitude = 0.009216 +/- 0.000013 (Jy/pixel)
FWHM X    = 9.570894 +/- 0.018888 (arcsec)
FWHM Y    = 6.443879 +/- 0.012100 (arcsec)
P.A.      = 16.746947 +/- 0.071964 (deg)

Component #2:
Center X  = 9:59:59.7187007017 +/- 0.017375 (arcsec)
Center Y  = 0:00:03.7760774174 +/- 0.014381 (arcsec)
Amplitude = 0.009166 +/- 0.000023 (Jy/pixel)
```

Calculation of polarization quantities (like linear polarization intensity, polarization angle) from Stokes IQUV cube



IRCp10216_sci.spw0.cube.IQUV.manual.pbcor.fits

```
WCS: (9:47:57.45, 13:16:43.7); Image: (131, 126); Value:  5.17429e-2 Jy/beam ; Frequency (LSRK): 345.3649 GHz;
Velocity: -317.0722 km/s; Polarization: Plinear
```

X Profile: Cursor — Image: 0: IRCp10: ; Region: Cursor ; Polarization: Current

```
Data: (WCS: 9:47:57.45, Image: 131 px, 5.17429e-2)
```

Y Profile: Cursor — Image: 0: IRCp10: ; Region: Cursor ; Polarization: Current

```
Data: (WCS: 13:16:43.7, Image: 126 px, 5.17429e-2)
```

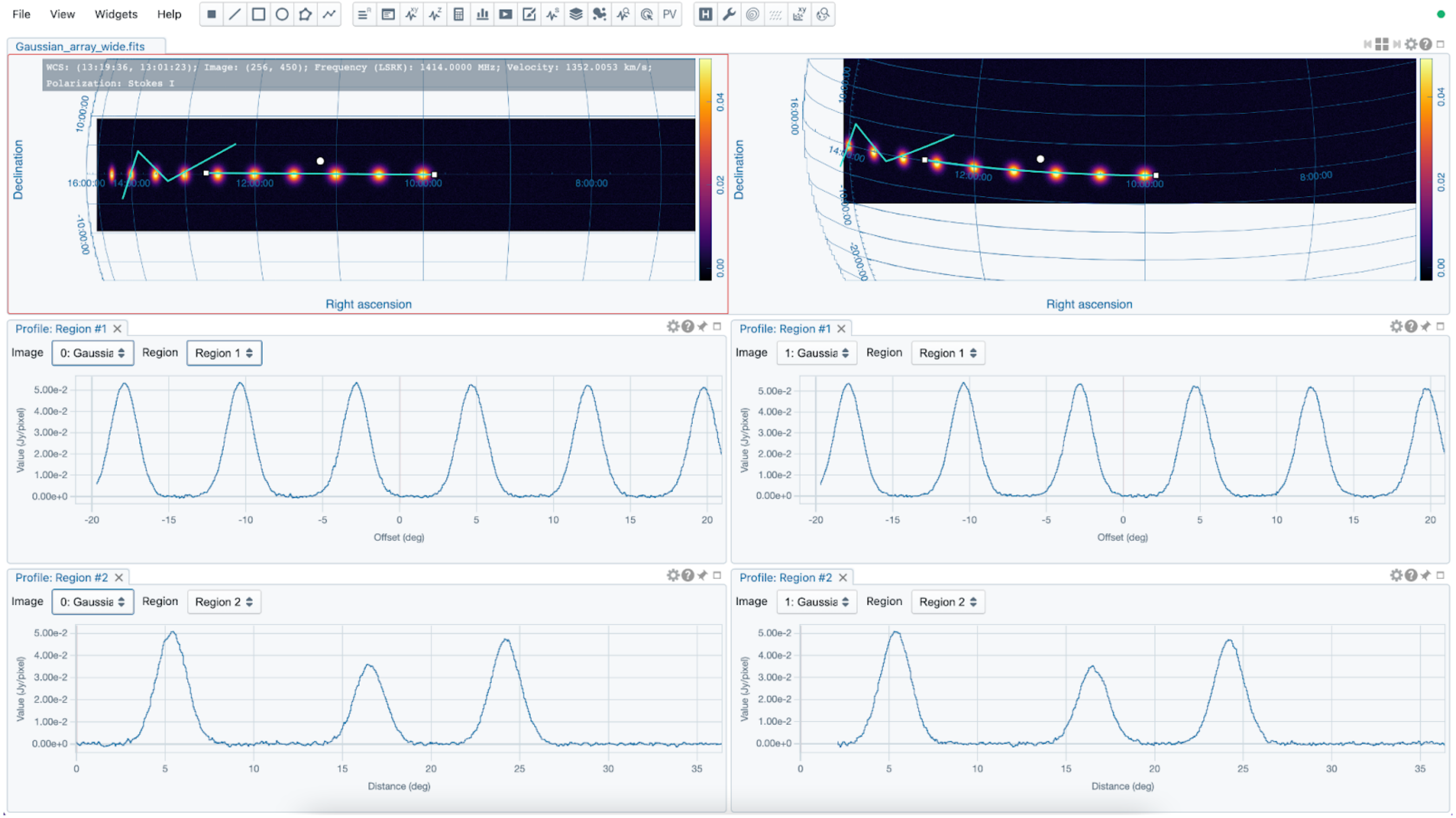
Z Profile — Image: Active ; Region: Active ; Statistic: Mean ; Polarization: Plinear

```
Data: (345.365 GHz, 5.50e-2)
```

Animator — Channel: 326 ; LSRK 345.3649 GHz -317.0722 km/s ; Polarization: Plinear ; Frame Rate: 5

File
View
Widgets
Help
PV
Declination
48
47
46
13:16:45
44
43
42
41
Right ascension
57.9
57.8
57.7
57.6
57.5
57.4
57.3
57.2
57.1
9:47:57.0
0.20
0.16
0.12
0.08
0.04
9:47:57.8
9:47:57.7
9:47:57.5
9:47:57.4
9:47:57.3
9:47:57.2
9:47:57.0
9:47:56.9
1.20e-1
1.00e-1
8.00e-2
6.00e-2
4.00e-2
2.00e-2
Value (Jy/beam)
100
110
120
130
140
150
160
170
X coordinate
13:16:40
13:16:41
13:16:42
13:16:43
13:16:44
13:16:45
13:16:46
13:16:47
8.00e-2
7.00e-2
6.00e-2
5.00e-2
4.00e-2
3.00e-2
2.00e-2
1.00e-2
110
115
120
125
130
135
140
145
Y coordinate
Render Configuration
Z Profile
1.00e-1
8.00e-2
6.00e-2
4.00e-2
2.00e-2
0.00e+0
344.2
344.4
344.6
344.8
345
345.2
345.4
345.6
345.8
[LSRK] Frequency (GHz)
Image List
Animator
Region List
First
Prev
Play
Next
Last
Mode
Channel
0
120
240
326
359
479
0
479
Polarization
Stokes I
Stokes Q
Stokes U
Stokes V
Ptotal
Plinear
PFtotal
PFlinear
Pangle

Line and Polyline spatial profiles


File
View
Widgets
Help
PV
Gaussian_array_wide.fits
Declination
Right ascension
10:00:00
16:00:00
14:00:00
12:00:00
10:00:00
8:00:00
-10:00:00
0.04
0.02
0.00
Profile: Region #1
Profile: Region #2
Value (Jy/pixel)
5.00e-2
4.00e-2
3.00e-2
2.00e-2
1.00e-2
0.00e+0
-20
-15
-10
-5
0
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20
Offset (deg)
0
5
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20
25
30
35
Distance (deg)

```
WCS: (13:19:36, 13:01:23); Image: (256, 450); Frequency (LSRK): 1414.0000 MHz; Velocity: 1352.0053 km/s;
Polarization: Stokes I
```

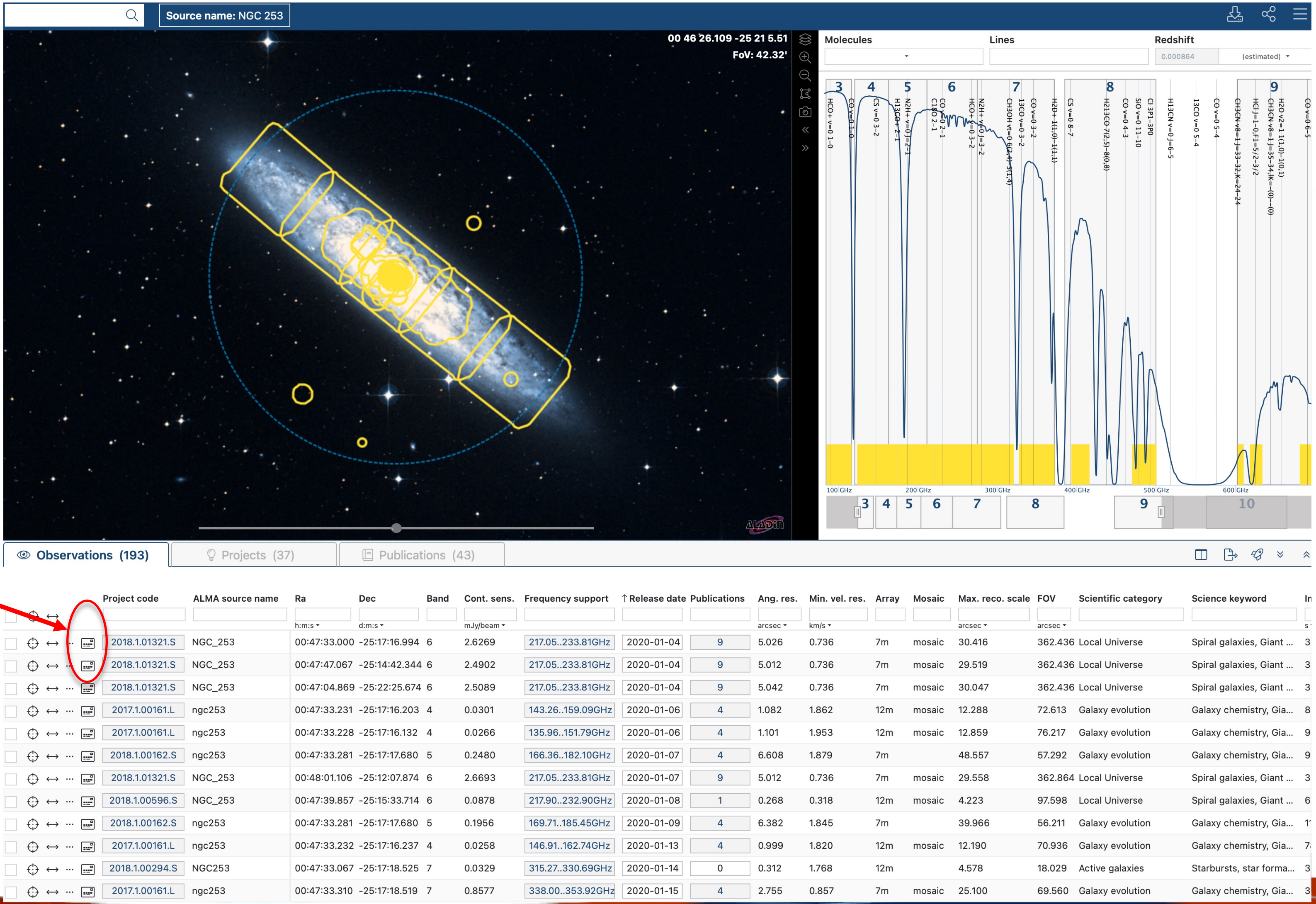
Profile: Region #1 — Image: 0: Gaussia; Region: Region 1

Profile: Region #1 — Image: 1: Gaussia; Region: Region 1

Profile: Region #2 — Image: 0: Gaussia; Region: Region 2

Profile: Region #2 — Image: 1: Gaussia; Region: Region 2

Remote Visualization of products in the ALMA Science Archive using CARTA

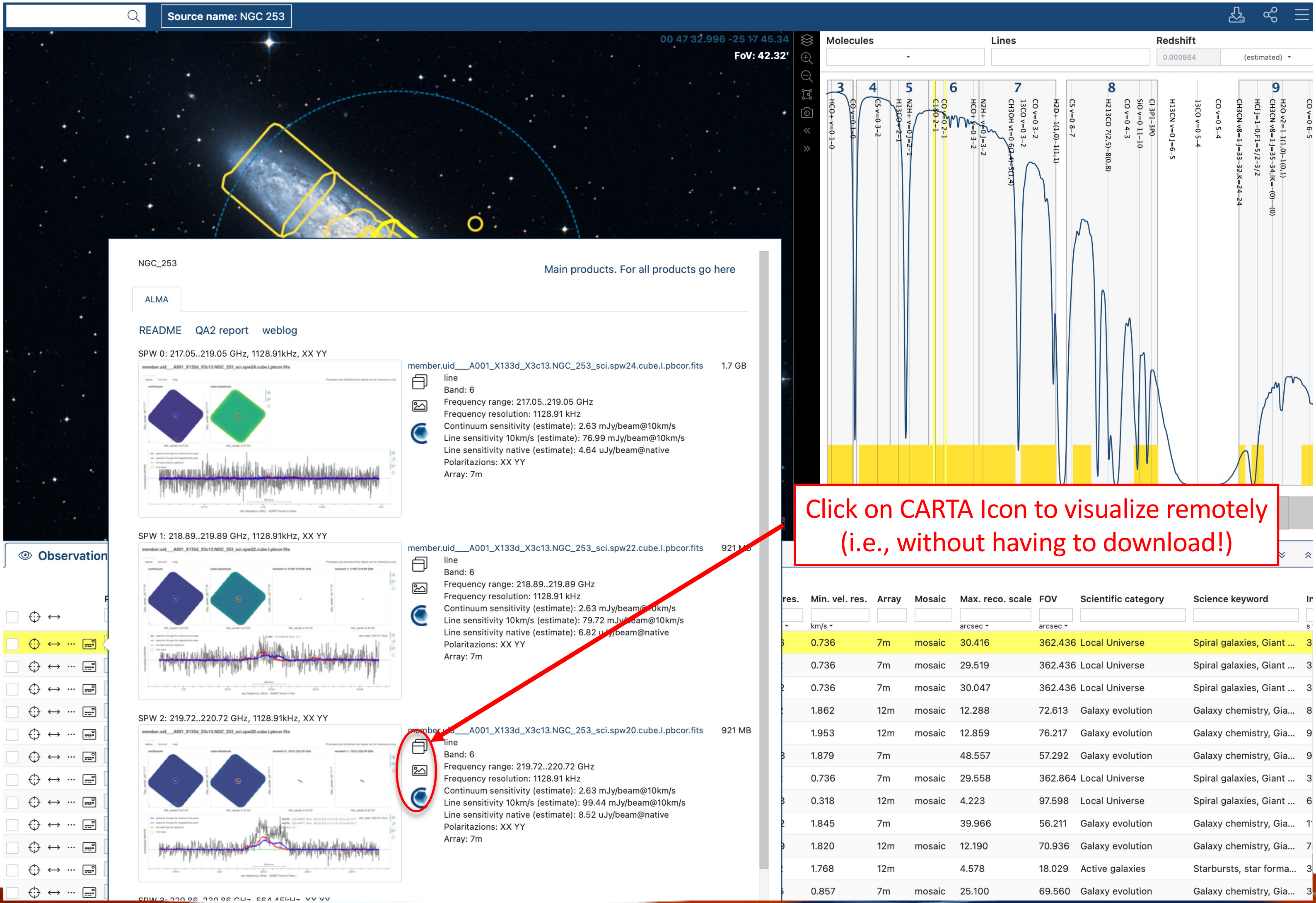


Project code	ALMA source name	Ra	Dec	Band	Cont. sens.	Frequency support	↑ Release date	Publications	Ang. res.	Min. vel. res.	Array	Mosaic	Max. reco. scale	FOV	Scientific category	Science keyword
		h:m:s	d:m:s		mJy/beam				arcsec	km/s			arcsec	arcsec		
2018.1.01321.S	NGC_253	00:47:33.000	-25:17:16.994	6	2.6269	217.05..233.81GHz	2020-01-04	9	5.026	0.736	7m	mosaic	30.416	362.436	Local Universe	Spiral galaxies, Giant ...
2018.1.01321.S	NGC_253	00:47:47.067	-25:14:42.344	6	2.4902	217.05..233.81GHz	2020-01-04	9	5.012	0.736	7m	mosaic	29.519	362.436	Local Universe	Spiral galaxies, Giant ...
2018.1.01321.S	NGC_253	00:47:04.869	-25:22:25.674	6	2.5089	217.05..233.81GHz	2020-01-04	9	5.042	0.736	7m	mosaic	30.047	362.436	Local Universe	Spiral galaxies, Giant ...
2017.1.00161.L	ngc253	00:47:33.231	-25:17:16.203	4	0.0301	143.26..159.09GHz	2020-01-06	4	1.082	1.862	12m	mosaic	12.288	72.613	Galaxy evolution	Galaxy chemistry, Gia...
2017.1.00161.L	ngc253	00:47:33.228	-25:17:16.132	4	0.0266	135.96..151.79GHz	2020-01-06	4	1.101	1.953	12m	mosaic	12.859	76.217	Galaxy evolution	Galaxy chemistry, Gia...
2018.1.00162.S	ngc253	00:47:33.281	-25:17:17.680	5	0.2480	166.36..182.10GHz	2020-01-07	4	6.608	1.879	7m		48.557	57.292	Galaxy evolution	Galaxy chemistry, Gia...
2018.1.01321.S	NGC_253	00:48:01.106	-25:12:07.874	6	2.6693	217.05..233.81GHz	2020-01-07	9	5.012	0.736	7m	mosaic	29.558	362.864	Local Universe	Spiral galaxies, Giant ...
2018.1.00596.S	NGC_253	00:47:39.857	-25:15:33.714	6	0.0878	217.90..232.90GHz	2020-01-08	1	0.268	0.318	12m	mosaic	4.223	97.598	Local Universe	Spiral galaxies, Giant ...
2018.1.00162.S	ngc253	00:47:33.281	-25:17:17.680	5	0.1956	169.71..185.45GHz	2020-01-09	4	6.382	1.845	7m		39.966	56.211	Galaxy evolution	Galaxy chemistry, Gia...
2017.1.00161.L	ngc253	00:47:33.232	-25:17:16.237	4	0.0258	146.91..162.74GHz	2020-01-13	4	0.999	1.820	12m	mosaic	12.190	70.936	Galaxy evolution	Galaxy chemistry, Gia...
2018.1.00294.S	NGC253	00:47:33.067	-25:17:18.525	7	0.0329	315.27..330.69GHz	2020-01-14	0	0.312	1.768	12m		4.578	18.029	Active galaxies	Starbursts, star forma...
2017.1.00161.L	ngc253	00:47:33.310	-25:17:18.519	7	0.8577	338.00..353.92GHz	2020-01-15	4	2.755	0.857	7m	mosaic	25.100	69.560	Galaxy evolution	Galaxy chemistry, Gia...

Click on "preview" icon

CARTA v3 (2022)

Remote Visualization of products in the ALMA Science Archive using CARTA



NGC_253

Main products. For all products go here

ALMA

README QA2 report weblog

SPW 0: 217.05..219.05 GHz, 1128.91kHz, XX YY

member.uid___A001_X133d_X3c13.NGC_253_sci.spw24.cube.I.pbcor.fits 1.7 GB
line
Band: 6
Frequency range: 217.05..219.05 GHz
Frequency resolution: 1128.91 kHz
Continuum sensitivity (estimate): 2.63 mJy/beam@10km/s
Line sensitivity 10km/s (estimate): 76.99 mJy/beam@10km/s
Line sensitivity native (estimate): 4.64 uJy/beam@native
Polaritazions: XX YY
Array: 7m

SPW 1: 218.89..219.89 GHz, 1128.91kHz, XX YY

member.uid___A001_X133d_X3c13.NGC_253_sci.spw22.cube.I.pbcor.fits 921 MB
line
Band: 6
Frequency range: 218.89..219.89 GHz
Frequency resolution: 1128.91 kHz
Continuum sensitivity (estimate): 2.63 mJy/beam@10km/s
Line sensitivity 10km/s (estimate): 79.72 mJy/beam@10km/s
Line sensitivity native (estimate): 6.82 uJy/beam@native
Polaritazions: XX YY
Array: 7m

SPW 2: 219.72..220.72 GHz, 1128.91kHz, XX YY

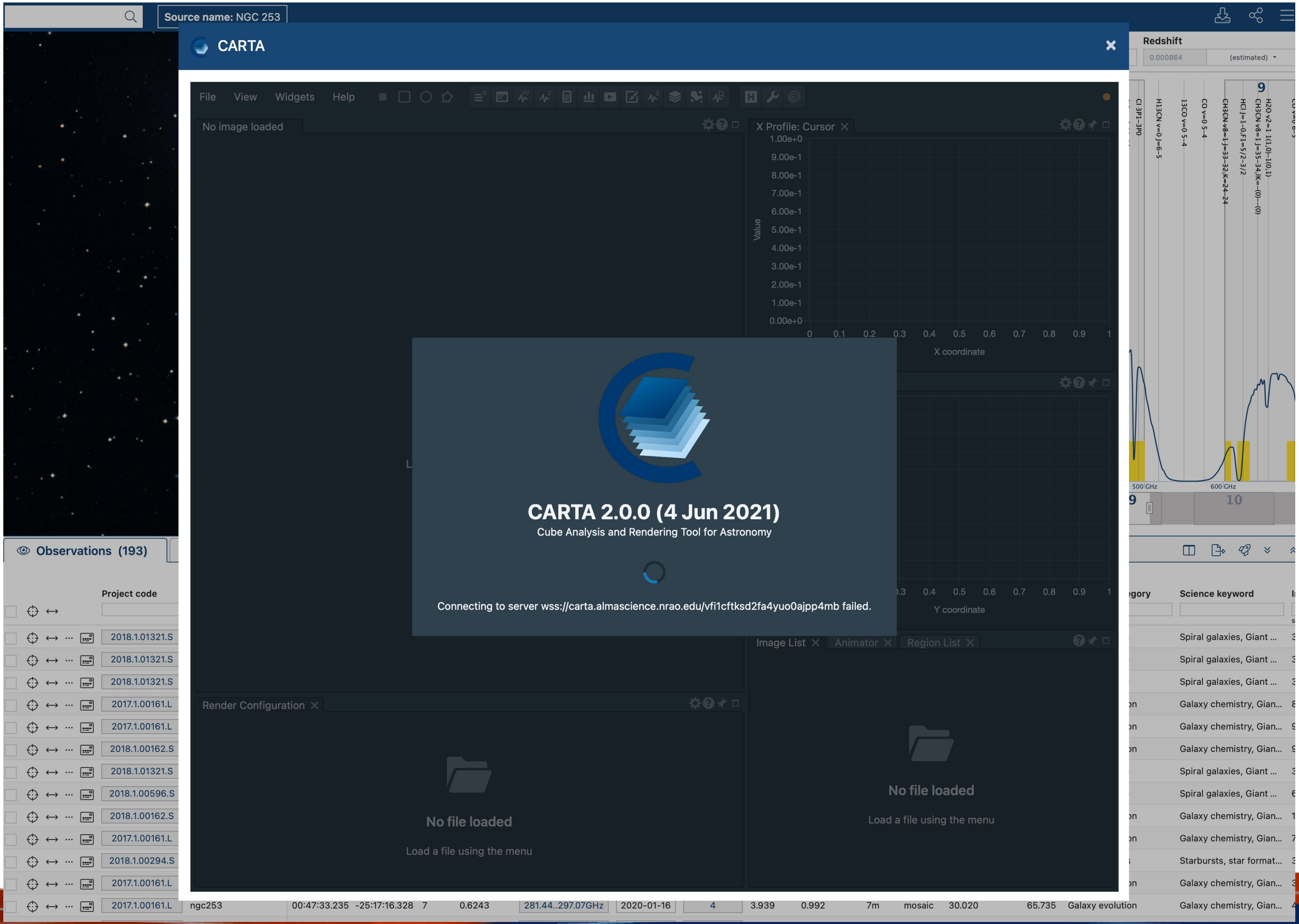
member.uid___A001_X133d_X3c13.NGC_253_sci.spw20.cube.I.pbcor.fits 921 MB
line
Band: 6
Frequency range: 219.72..220.72 GHz
Frequency resolution: 1128.91 kHz
Continuum sensitivity (estimate): 2.63 mJy/beam@10km/s
Line sensitivity 10km/s (estimate): 99.44 mJy/beam@10km/s
Line sensitivity native (estimate): 8.52 uJy/beam@native
Polaritazions: XX YY
Array: 7m

Min. vel. res.	Array	Mosaic	Max. reco. scale	FOV	Scientific category	Science keyword
km/s			arcsec	arcsec		
0.736	7m	mosaic	30.416	362.436	Local Universe	Spiral galaxies, Giant ...
0.736	7m	mosaic	29.519	362.436	Local Universe	Spiral galaxies, Giant ...
0.736	7m	mosaic	30.047	362.436	Local Universe	Spiral galaxies, Giant ...
1.862	12m	mosaic	12.288	72.613	Galaxy evolution	Galaxy chemistry, Gia...
1.953	12m	mosaic	12.859	76.217	Galaxy evolution	Galaxy chemistry, Gia...
1.879	7m		48.557	57.292	Galaxy evolution	Galaxy chemistry, Gia...
0.736	7m	mosaic	29.558	362.864	Local Universe	Spiral galaxies, Giant ...
0.318	12m	mosaic	4.223	97.598	Local Universe	Spiral galaxies, Giant ...
1.845	7m		39.966	56.211	Galaxy evolution	Galaxy chemistry, Gia...
1.820	12m	mosaic	12.190	70.936	Galaxy evolution	Galaxy chemistry, Gia...
1.768	12m		4.578	18.029	Active galaxies	Starbursts, star forma...
0.857	7m	mosaic	25.100	69.560	Galaxy evolution	Galaxy chemistry, Gia...

Click on CARTA Icon to visualize remotely (i.e., without having to download!)

CARTA v3 (2022)

Remote Visualization of products in the ALMA Science Archive using CARTA


CARTA
File
View
Widgets
Help
X Profile: Cursor
Value
X coordinate
Y coordinate
Image List
Animator
Region List
Render Configuration
Redshift
(estimated)
500 GHz
600 GHz
Observations (193)
Project code
Science keyword

Source name: NGC 253

Redshift: 0.000864 (estimated)

No image loaded

CARTA 2.0.0 (4 Jun 2021)

Cube Analysis and Rendering Tool for Astronomy

Connecting to server wss://carta.almascience.nrao.edu/vfi1cftksd2fa4yuo0ajpp4mb failed.

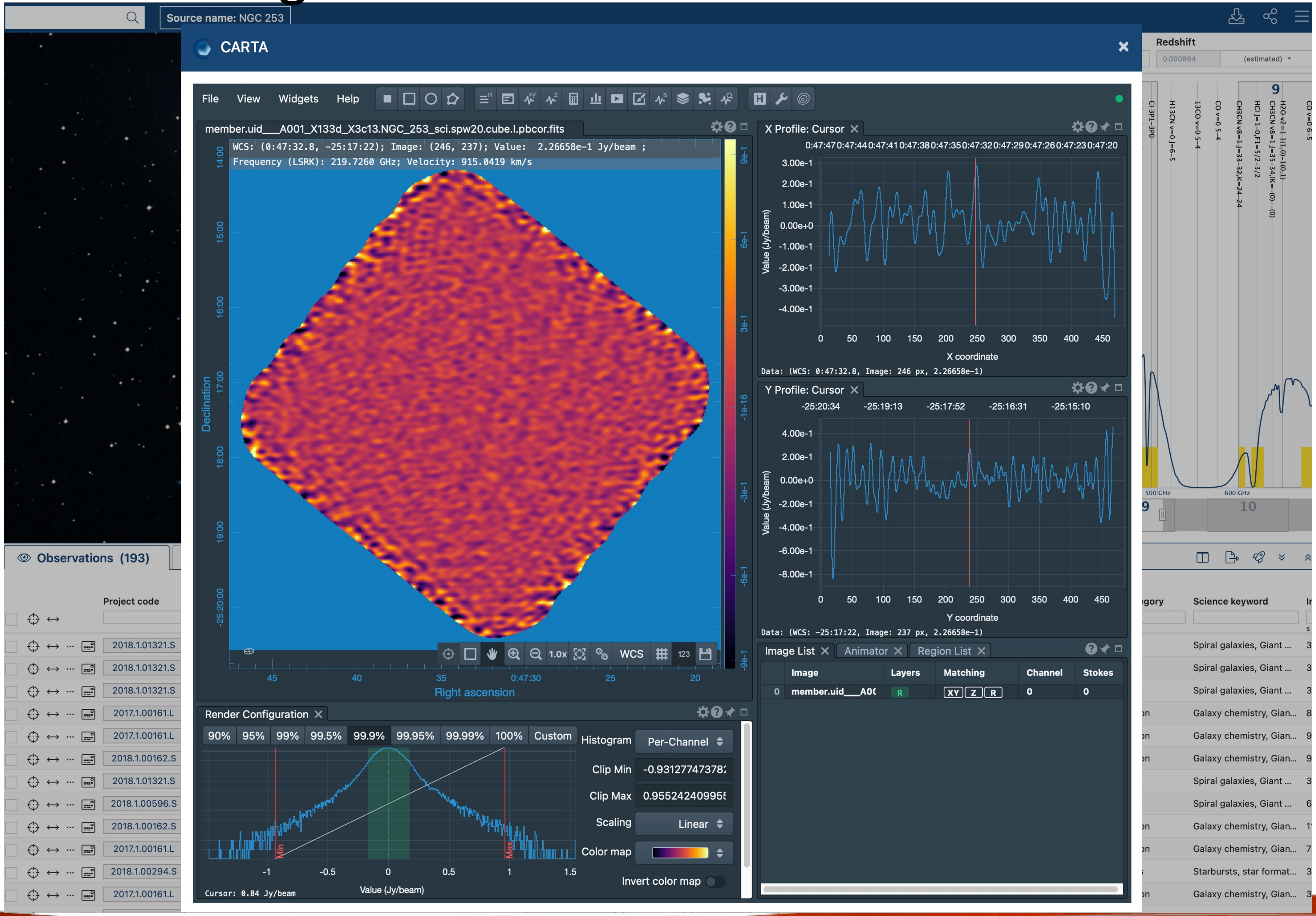
No file loaded

Load a file using the menu

Project code		Science keyword
2018.1.01321.S		Spiral galaxies, Giant ...
2018.1.01321.S		Spiral galaxies, Giant ...
2018.1.01321.S		Spiral galaxies, Giant ...
2017.1.00161.L		Galaxy chemistry, Gian...
2017.1.00161.L		Galaxy chemistry, Gian...
2018.1.00162.S		Galaxy chemistry, Gian...
2018.1.01321.S		Spiral galaxies, Giant ...
2018.1.00596.S		Spiral galaxies, Giant ...
2018.1.00162.S		Galaxy chemistry, Gian...
2017.1.00161.L		Galaxy chemistry, Gian...
2018.1.00294.S		Starbursts, star format...
2017.1.00161.L		Galaxy chemistry, Gian...
2017.1.00161.L	ngc253 00:47:33.235 -25:17:16.328 7 0.6243 281.44..297.07GHz 2020-01-16 4 3.939 0.992 7m mosaic 30.020 65.735 Galaxy evolution	Galaxy chemistry, Gian...

CARTA v3 (2022)

Remote Visualization of products in the ALMA Science Archive using CARTA


Source name: NGC 253
CARTA
File
View
Widgets
Help
Redshift
0.000864
(estimated)
Observations (193)
Project code
2018.1.01321.S
2018.1.01321.S
2018.1.01321.S
2017.1.00161.L
2017.1.00161.L
2018.1.00162.S
2018.1.01321.S
2018.1.00596.S
2018.1.00162.S
2017.1.00161.L
2018.1.00294.S
2017.1.00161.L
Science keyword
Spiral galaxies, Giant ...
Galaxy chemistry, Gian...
Starbursts, star format...
X Profile: Cursor
X coordinate
Value (Jy/beam)
Y Profile: Cursor
Y coordinate
Declination
Right ascension
WCS
Render Configuration
90%
95%
99%
99.5%
99.9%
99.95%
99.99%
100%
Custom
Value (Jy/beam)
Min
Max
Image List
Animator
Region List

member.uid___A001_X133d_X3c13.NGC_253_sci.spw20.cube.I.pbcor.fits

```
WCS: (0:47:32.8, -25:17:22); Image: (246, 237); Value:  2.26658e-1 Jy/beam ;
Frequency (LSRK): 219.7260 GHz; Velocity: 915.0419 km/s
```

```
Data: (WCS: 0:47:32.8, Image: 246 px, 2.26658e-1)
```

```
Data: (WCS: -25:17:22, Image: 237 px, 2.26658e-1)
```

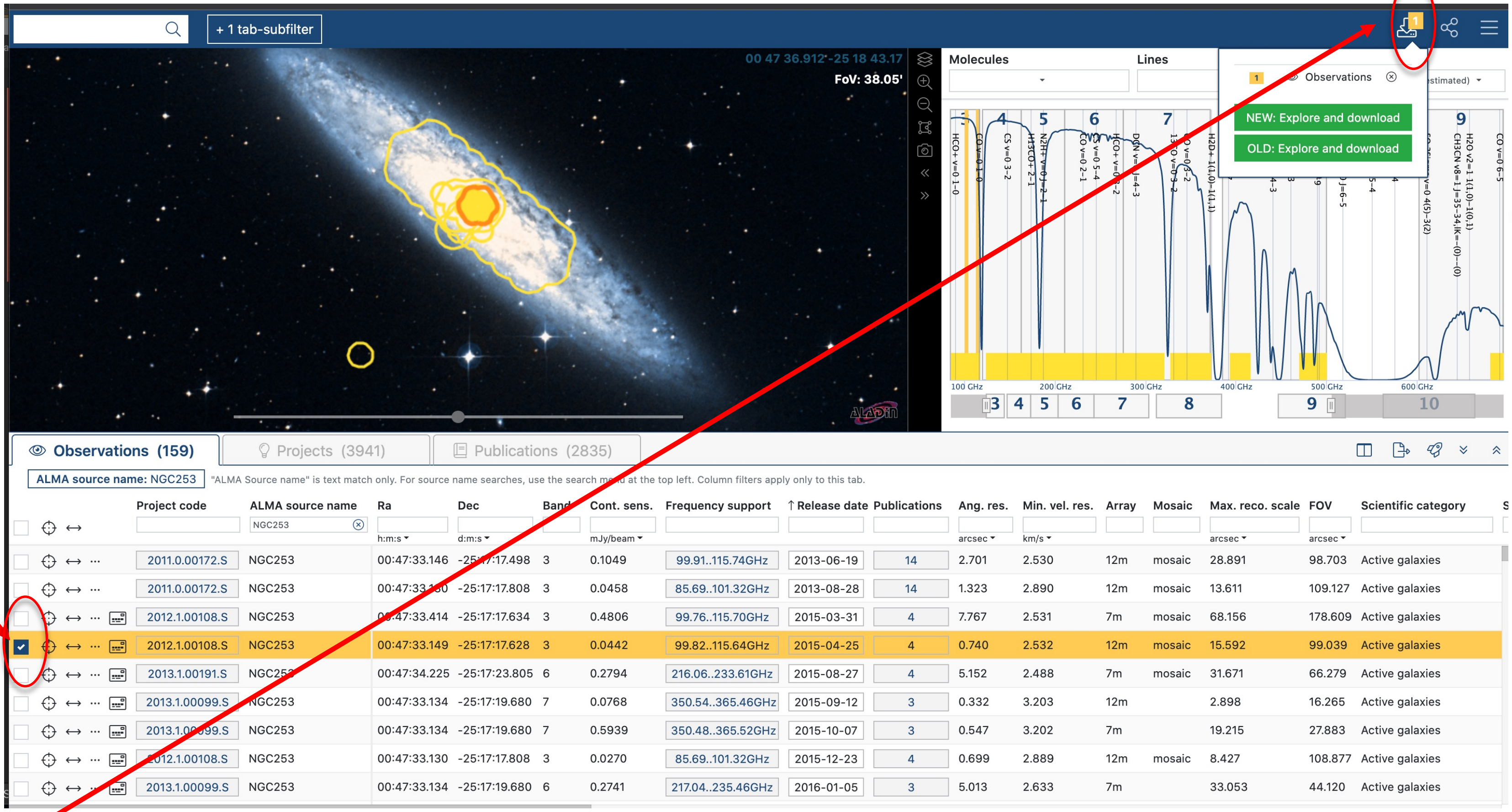
```
Cursor: 0.84 Jy/beam
```

Histogram: Per-Channel
Clip Min: -0.93127747378:
Clip Max: 0.95524240995!
Scaling: Linear
Color map
Invert color map

	Image	Layers	Matching	Channel	Stokes
0	member.uid___A0(	R	XY Z R	0	0

CARTA v3 (2022)

Remote Visualization of products in the ALMA Science Archive using CARTA



+ 1 tab-subfilter
00 47 36.912 -25 18 43.17
FoV: 38.05'
Molecules
Lines
1
Observations
NEW: Explore and download
OLD: Explore and download
100 GHz
200 GHz
300 GHz
400 GHz
500 GHz
600 GHz
3 4 5 6 7 8 9 10
Observations (159)
Projects (3941)
Publications (2835)

ALMA source name: NGC253 "ALMA Source name" is text match only. For source name searches, use the search menu at the top left. Column filters apply only to this tab.

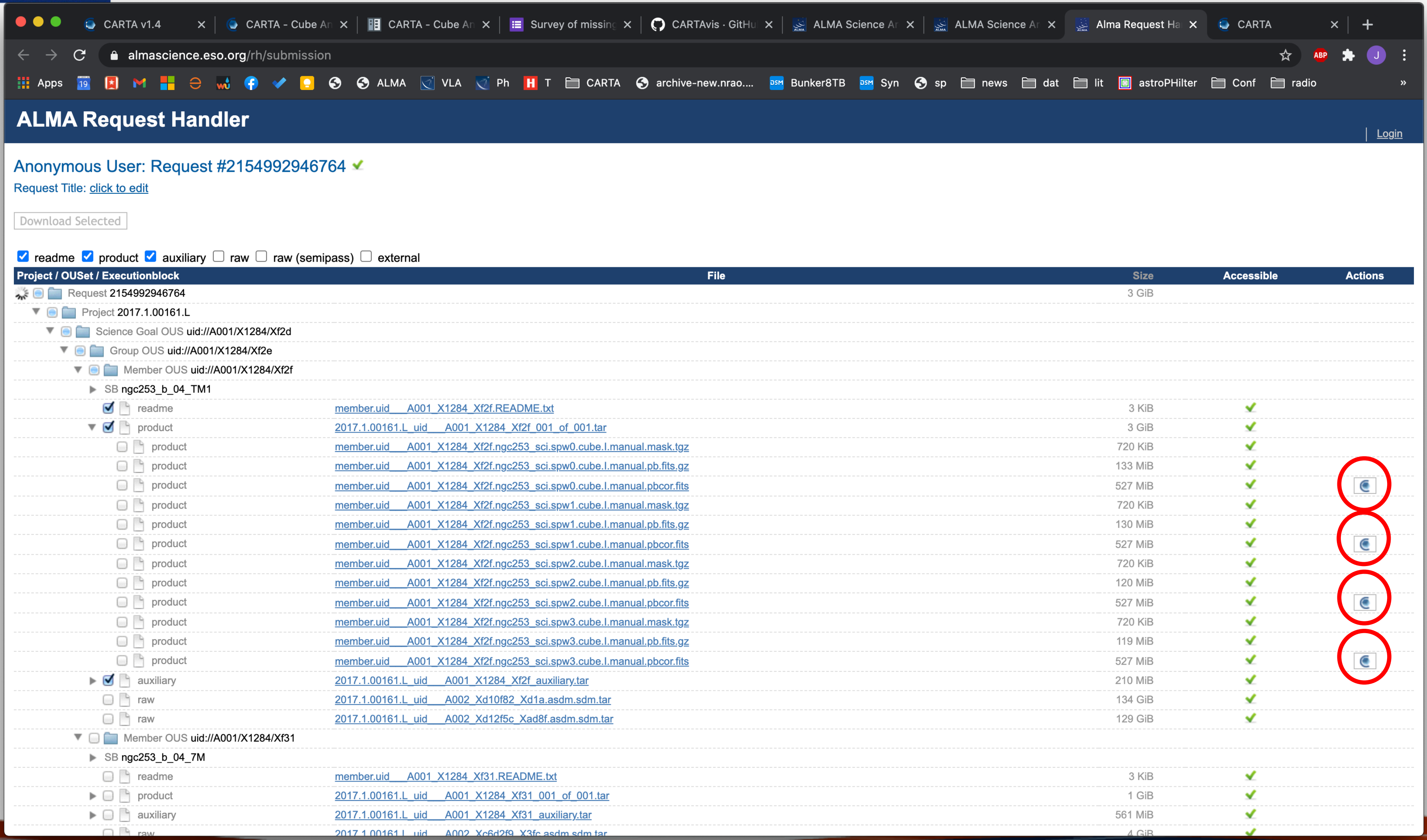
	Project code	ALMA source name	Ra (h:m:s)	Dec (d:m:s)	Band	Cont. sens. (mJy/beam)	Frequency support	↑ Release date	Publications	Ang. res. (arcsec)	Min. vel. res. (km/s)	Array	Mosaic	Max. reco. scale (arcsec)	FOV (arcsec)	Scientific category
☐	2011.0.00172.S	NGC253	00:47:33.146	-25:17:17.498	3	0.1049	99.91..115.74GHz	2013-06-19	14	2.701	2.530	12m	mosaic	28.891	98.703	Active galaxies
☐	2011.0.00172.S	NGC253	00:47:33.130	-25:17:17.808	3	0.0458	85.69..101.32GHz	2013-08-28	14	1.323	2.890	12m	mosaic	13.611	109.127	Active galaxies
☐	2012.1.00108.S	NGC253	00:47:33.414	-25:17:17.634	3	0.4806	99.76..115.70GHz	2015-03-31	4	7.767	2.531	7m	mosaic	68.156	178.609	Active galaxies
☑	2012.1.00108.S	NGC253	00:47:33.149	-25:17:17.628	3	0.0442	99.82..115.64GHz	2015-04-25	4	0.740	2.532	12m	mosaic	15.592	99.039	Active galaxies
☐	2013.1.00191.S	NGC253	00:47:34.225	-25:17:23.805	6	0.2794	216.06..233.61GHz	2015-08-27	4	5.152	2.488	7m	mosaic	31.671	66.279	Active galaxies
☐	2013.1.00099.S	NGC253	00:47:33.134	-25:17:19.680	7	0.0768	350.54..365.46GHz	2015-09-12	3	0.332	3.203	12m		2.898	16.265	Active galaxies
☐	2013.1.00099.S	NGC253	00:47:33.134	-25:17:19.680	7	0.5939	350.48..365.52GHz	2015-10-07	3	0.547	3.202	7m		19.215	27.883	Active galaxies
☐	2012.1.00108.S	NGC253	00:47:33.130	-25:17:17.808	3	0.0270	85.69..101.32GHz	2015-12-23	4	0.699	2.889	12m	mosaic	8.427	108.877	Active galaxies
☐	2013.1.00099.S	NGC253	00:47:33.134	-25:17:19.680	6	0.2741	217.04..235.46GHz	2016-01-05	3	5.013	2.633	7m		33.053	44.120	Active galaxies

Select dataset

Then go on "Explore and download"

CARTA v3 (2022)

Remote Visualization of products in the ALMA Science Archive using CARTA


CARTA v1.4
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CARTA - Cube An
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Conf
radio
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ALMA Request Handler

Anonymous User: Request #2154992946764 ✓

Request Title: click to edit

Download Selected

☑ readme ☑ product ☑ auxiliary ☐ raw ☐ raw (semipass) ☐ external

Project / OUSet / Executionblock	File	Size	Accessible	Actions
Request 2154992946764		3 GiB		
▼ Project 2017.1.00161.L				
▼ Science Goal OUS uid://A001/X1284/Xf2d				
▼ Group OUS uid://A001/X1284/Xf2e				
▼ Member OUS uid://A001/X1284/Xf2f				
▶ SB ngc253_b_04_TM1				
☑ readme	member.uid___A001_X1284_Xf2f.README.txt	3 KiB	✓	
▼ ☑ product	2017.1.00161.L_uid___A001_X1284_Xf2f_001_of_001.tar	3 GiB	✓	
☐ product	member.uid___A001_X1284_Xf2f.ngc253_sci.spw0.cube.I.manual.mask.tgz	720 KiB	✓	
☐ product	member.uid___A001_X1284_Xf2f.ngc253_sci.spw0.cube.I.manual.pb.fits.gz	133 MiB	✓	
☐ product	member.uid___A001_X1284_Xf2f.ngc253_sci.spw0.cube.I.manual.pbcor.fits	527 MiB	✓	
☐ product	member.uid___A001_X1284_Xf2f.ngc253_sci.spw1.cube.I.manual.mask.tgz	720 KiB	✓	
☐ product	member.uid___A001_X1284_Xf2f.ngc253_sci.spw1.cube.I.manual.pb.fits.gz	130 MiB	✓	
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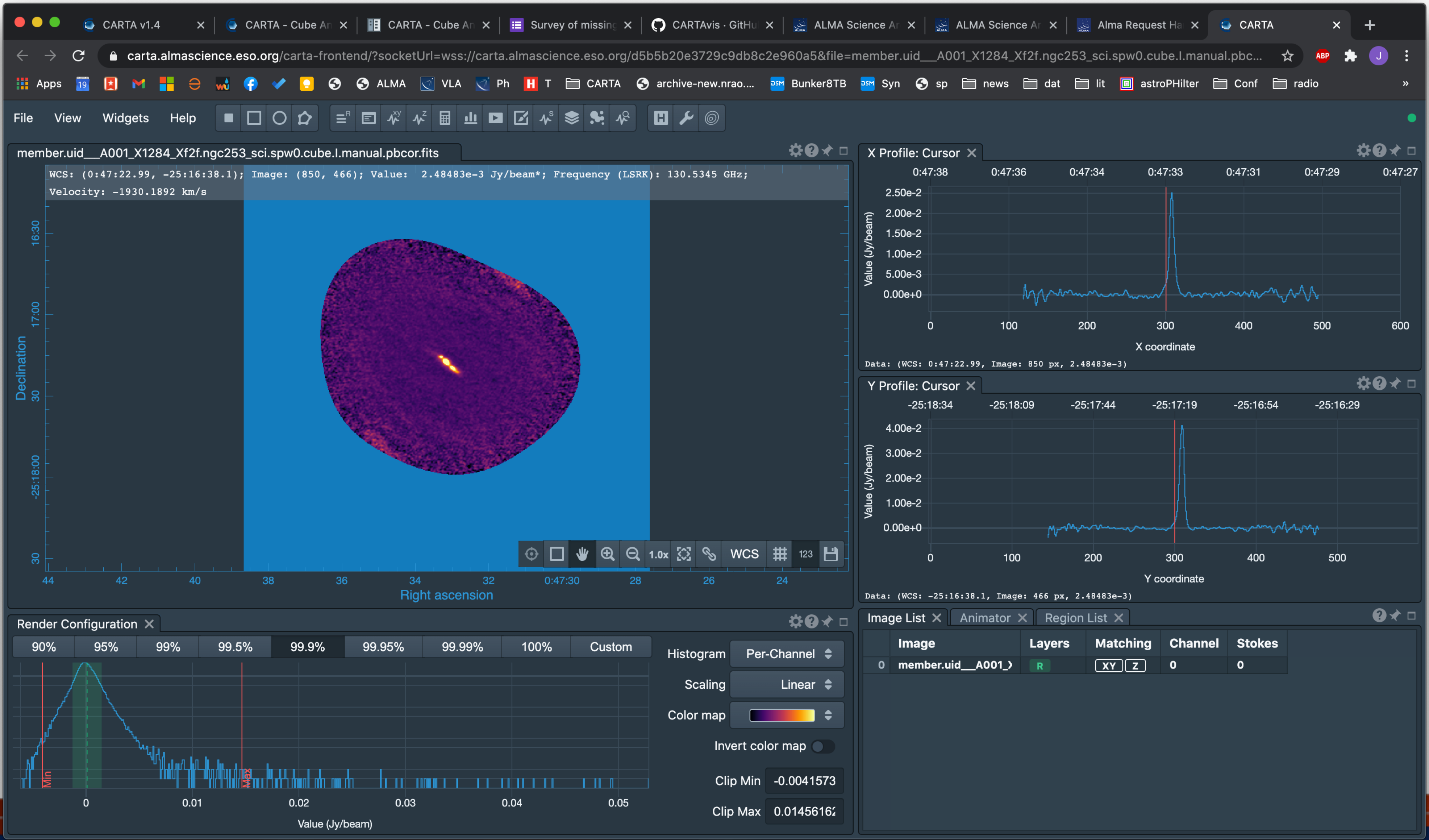
☐ product	member.uid___A001_X1284_Xf2f.ngc253_sci.spw2.cube.I.manual.mask.tgz	720 KiB	✓	
☐ product	member.uid___A001_X1284_Xf2f.ngc253_sci.spw2.cube.I.manual.pb.fits.gz	120 MiB	✓	
☐ product	member.uid___A001_X1284_Xf2f.ngc253_sci.spw2.cube.I.manual.pbcor.fits	527 MiB	✓	
☐ product	member.uid___A001_X1284_Xf2f.ngc253_sci.spw3.cube.I.manual.mask.tgz	720 KiB	✓	
☐ product	member.uid___A001_X1284_Xf2f.ngc253_sci.spw3.cube.I.manual.pb.fits.gz	119 MiB	✓	
☐ product	member.uid___A001_X1284_Xf2f.ngc253_sci.spw3.cube.I.manual.pbcor.fits	527 MiB	✓	
▶ ☑ auxiliary	2017.1.00161.L_uid___A001_X1284_Xf2f_auxiliary.tar	210 MiB	✓	
☐ raw	2017.1.00161.L_uid___A002_Xd10f82_Xd1a.asdm.sdm.tar	134 GiB	✓	
☐ raw	2017.1.00161.L_uid___A002_Xd12f5c_Xad8f.asdm.sdm.tar	129 GiB	✓	
▼ ☐ Member OUS uid://A001/X1284/Xf31				
▶ SB ngc253_b_04_7M				
☐ readme	member.uid___A001_X1284_Xf31.README.txt	3 KiB	✓	
▶ ☐ product	2017.1.00161.L_uid___A001_X1284_Xf31_001_of_001.tar	1 GiB	✓	
▶ ☐ auxiliary	2017.1.00161.L_uid___A001_X1284_Xf31_auxiliary.tar	561 MiB	✓	
☐ raw	2017.1.00161.L_uid___A002_Xc6d2f9_X3fc.asdm.sdm.tar	4 GiB	✓	

Remote Visualization of products in the ALMA Science Archive using CARTA



carta.almascience.eso.org/carta-frontend/?socketUrl=wss://carta.almascience.eso.org/d5b5b20e3729c9db8c2e960a5&file=member.uid___A001_X1284_Xf2f.ngc253_sci.spw0.cube.I.manual.pbc...

member.uid___A001_X1284_Xf2f.ngc253_sci.spw0.cube.I.manual.pbcor.fits

```
WCS: (0:47:22.99, -25:16:38.1); Image: (850, 466); Value:  2.48483e-3 Jy/beam*; Frequency (LSRK): 130.5345 GHz;
Velocity: -1930.1892 km/s
```

```
Data: (WCS: 0:47:22.99, Image: 850 px, 2.48483e-3)
```

```
Data: (WCS: -25:16:38.1, Image: 466 px, 2.48483e-3)
```

Histogram: Per-Channel

Scaling: Linear

Invert color map

Clip Min: -0.0041573

Clip Max: 0.01456162

	Image	Layers	Matching	Channel	Stokes
0	member.uid__A001_X	R	XY Z	0	0

CARTA v1.4
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-25:18:09
-25:17:44
-25:17:19
-25:16:54
-25:16:29
4.00e-2
3.00e-2
2.00e-2
1.00e-2
0.00e+0
Value (Jy/beam)
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100
200
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400
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Y coordinate
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95%
99%
99.5%
99.9%
99.95%
99.99%
100%
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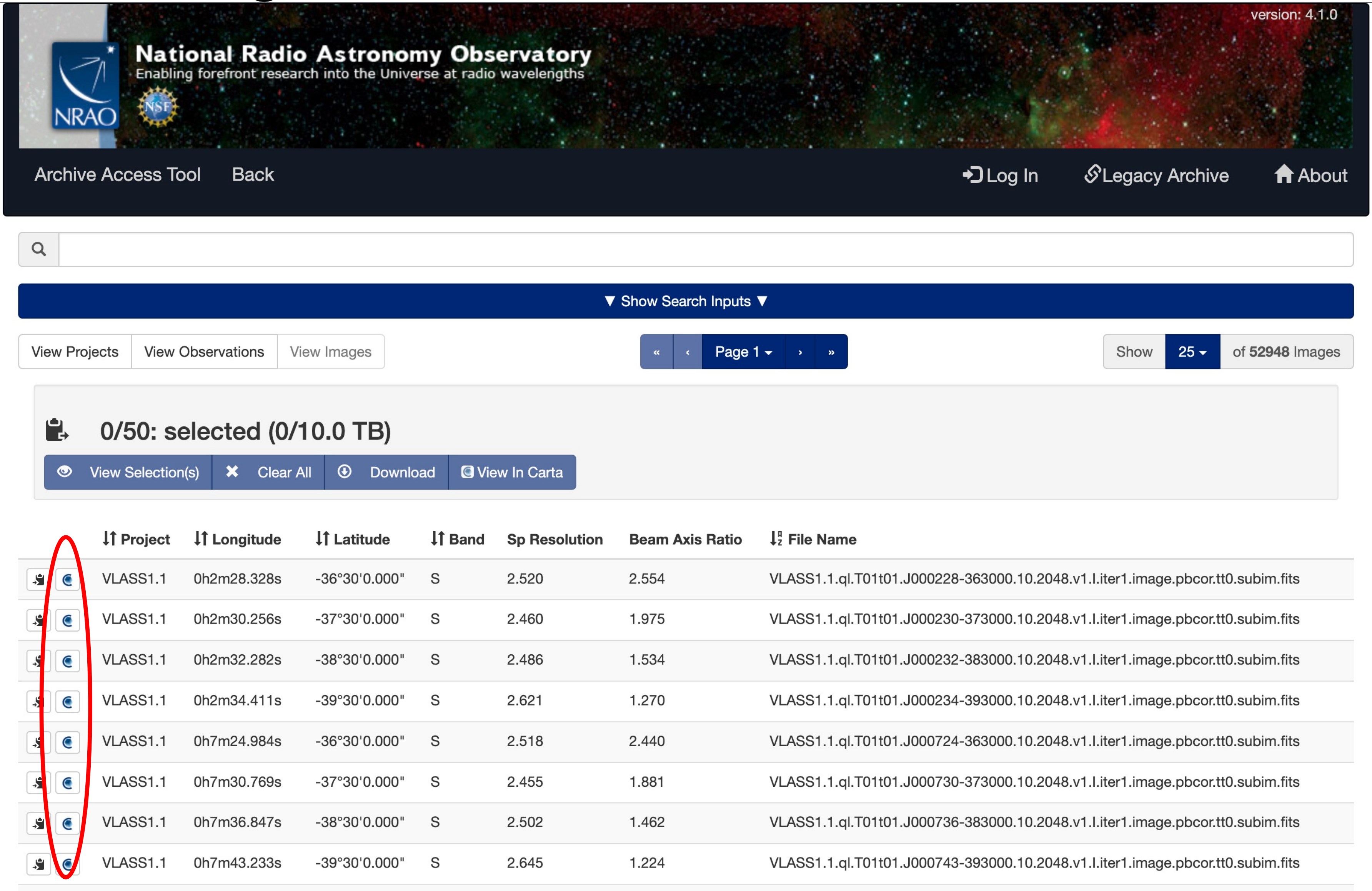
0.03
0.04
0.05
Value (Jy/beam)
Color map
Image List
Animator
Region List

CARTA v3 (2022)

SRDP image archive


version: 4.1.0
National Radio Astronomy Observatory
Enabling forefront research into the Universe at radio wavelengths
NRAO
NSF
Archive Access Tool
Back
Log In
Legacy Archive
About
▼ Show Search Inputs ▼
View Projects
View Observations
View Images
«
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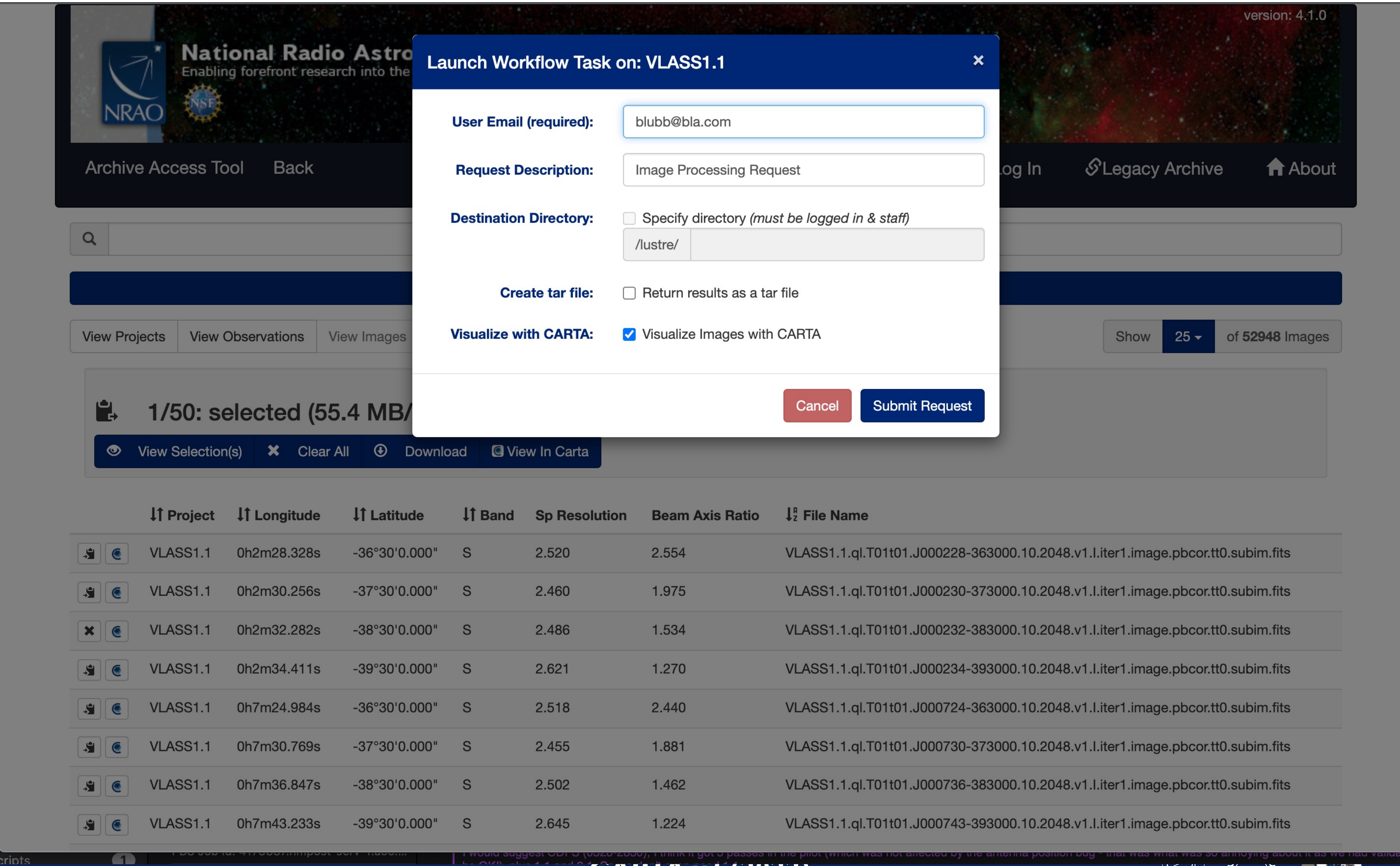
Page 1
›
»
Show
25
View Selection(s)
✖ Clear All
Download
View In Carta

of **52948** Images

0/50: selected (0/10.0 TB)

	Project	Longitude	Latitude	Band	Sp Resolution	Beam Axis Ratio	File Name
	VLASS1.1	0h2m28.328s	-36°30'0.000"	S	2.520	2.554	VLASS1.1.ql.T01t01.J000228-363000.10.2048.v1.I.iter1.image.pbcor.tt0.subim.fits
	VLASS1.1	0h2m30.256s	-37°30'0.000"	S	2.460	1.975	VLASS1.1.ql.T01t01.J000230-373000.10.2048.v1.I.iter1.image.pbcor.tt0.subim.fits
	VLASS1.1	0h2m32.282s	-38°30'0.000"	S	2.486	1.534	VLASS1.1.ql.T01t01.J000232-383000.10.2048.v1.I.iter1.image.pbcor.tt0.subim.fits
	VLASS1.1	0h2m34.411s	-39°30'0.000"	S	2.621	1.270	VLASS1.1.ql.T01t01.J000234-393000.10.2048.v1.I.iter1.image.pbcor.tt0.subim.fits
	VLASS1.1	0h7m24.984s	-36°30'0.000"	S	2.518	2.440	VLASS1.1.ql.T01t01.J000724-363000.10.2048.v1.I.iter1.image.pbcor.tt0.subim.fits
	VLASS1.1	0h7m30.769s	-37°30'0.000"	S	2.455	1.881	VLASS1.1.ql.T01t01.J000730-373000.10.2048.v1.I.iter1.image.pbcor.tt0.subim.fits
	VLASS1.1	0h7m36.847s	-38°30'0.000"	S	2.502	1.462	VLASS1.1.ql.T01t01.J000736-383000.10.2048.v1.I.iter1.image.pbcor.tt0.subim.fits
	VLASS1.1	0h7m43.233s	-39°30'0.000"	S	2.645	1.224	VLASS1.1.ql.T01t01.J000743-393000.10.2048.v1.I.iter1.image.pbcor.tt0.subim.fits

SRDP image archive



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Destination Directory: ☐ Specify directory *(must be logged in & staff)*
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Create tar file: ☐ Return results as a tar file

Visualize with CARTA: ☑ Visualize Images with CARTA

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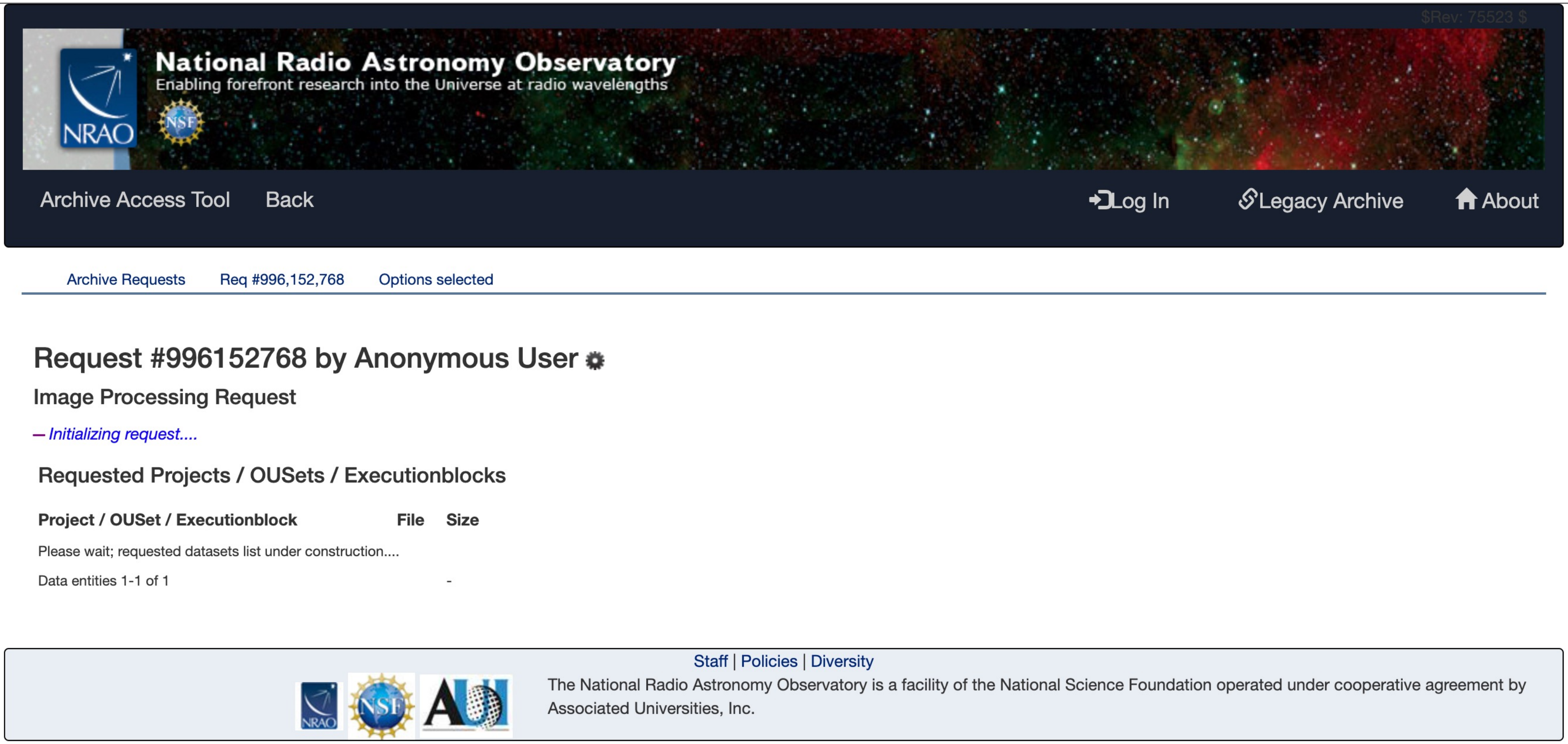
	Project	Longitude	Latitude	Band	Sp Resolution	Beam Axis Ratio	File Name
	VLASS1.1	0h2m28.328s	-36°30'0.000"	S	2.520	2.554	VLASS1.1.ql.T01t01.J000228-363000.10.2048.v1.I.iter1.image.pbcor.tt0.subim.fits
	VLASS1.1	0h2m30.256s	-37°30'0.000"	S	2.460	1.975	VLASS1.1.ql.T01t01.J000230-373000.10.2048.v1.I.iter1.image.pbcor.tt0.subim.fits
✖	VLASS1.1	0h2m32.282s	-38°30'0.000"	S	2.486	1.534	VLASS1.1.ql.T01t01.J000232-383000.10.2048.v1.I.iter1.image.pbcor.tt0.subim.fits
	VLASS1.1	0h2m34.411s	-39°30'0.000"	S	2.621	1.270	VLASS1.1.ql.T01t01.J000234-393000.10.2048.v1.I.iter1.image.pbcor.tt0.subim.fits
	VLASS1.1	0h7m24.984s	-36°30'0.000"	S	2.518	2.440	VLASS1.1.ql.T01t01.J000724-363000.10.2048.v1.I.iter1.image.pbcor.tt0.subim.fits
	VLASS1.1	0h7m30.769s	-37°30'0.000"	S	2.455	1.881	VLASS1.1.ql.T01t01.J000730-373000.10.2048.v1.I.iter1.image.pbcor.tt0.subim.fits
	VLASS1.1	0h7m36.847s	-38°30'0.000"	S	2.502	1.462	VLASS1.1.ql.T01t01.J000736-383000.10.2048.v1.I.iter1.image.pbcor.tt0.subim.fits
	VLASS1.1	0h7m43.233s	-39°30'0.000"	S	2.645	1.224	VLASS1.1.ql.T01t01.J000743-393000.10.2048.v1.I.iter1.image.pbcor.tt0.subim.fits

SRDP archive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Request #996152768 by Anonymous User

Image Processing Request

– *Initializing request....*

Requested Projects / OUSets / Executionblocks

Project / OUSet / Executionblock	File	Size
Please wait; requested datasets list under construction....		
Data entities 1-1 of 1		-

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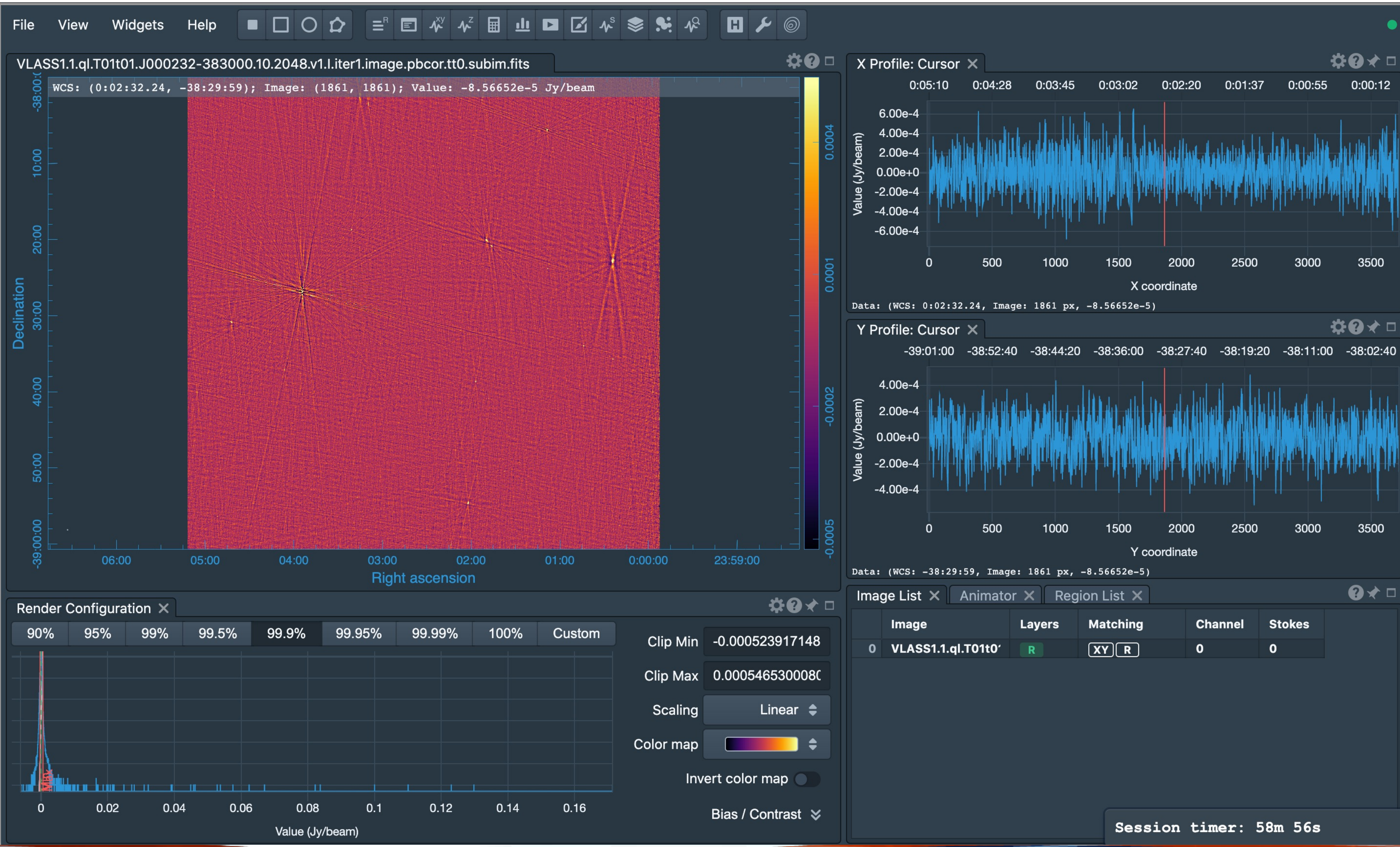

VLASS1.1.ql.T01t01.J000232-383000.10.2048.v1.I.iter1.image.pbcor.tt0.subim.fits

```
WCS: (0:02:32.24, -38:29:59); Image: (1861, 1861); Value: -8.56652e-5 Jy/beam
```

```
Data: (WCS: 0:02:32.24, Image: 1861 px, -8.56652e-5)
```

```
Data: (WCS: -38:29:59, Image: 1861 px, -8.56652e-5)
```

Clip Min: -0.000523917148

Clip Max: 0.000546530008(

Scaling: Linear

Invert color map

	Image	Layers	Matching	Channel	Stokes
0	VLASS1.1.ql.T01t0'	R	XY R	0	0

Session timer: 58m 56s

File
View
Widgets
Help
Declination
-38:00:00
10:00
20:00
30:00
40:00
50:00
-39:00:00
06:00
05:00
04:00
03:00
02:00
01:00
0:00:00
23:59:00
Right ascension
0.0004
0.0001
-0.0002
-0.0005
X Profile: Cursor
0:05:10
0:04:28
0:03:45
0:03:02
0:02:20
0:01:37
0:00:55
0:00:12
Value (Jy/beam)
6.00e-4
4.00e-4
2.00e-4
0.00e+0
-2.00e-4
-4.00e-4
-6.00e-4
0
500
1000
1500
2000
2500
3000
3500
X coordinate
Y Profile: Cursor
-39:01:00
-38:52:40
-38:44:20
-38:36:00
-38:27:40
-38:19:20
-38:11:00
-38:02:40
Y coordinate
Render Configuration
90%
95%
99%
99.5%
99.9%
99.95%
99.99%
100%
Custom
0
0.02
0.04
0.06
0.08
0.1
0.12
0.14
0.16
Value (Jy/beam)
Color map
Bias / Contrast
Image List
Animator
Region List

CARTA v3 (2022)

CARTA

Development for v4 (release in 2023, but beta versions with subset of features will be available sooner):

- Save, restore state
- Share states
- Interactive position-velocity plots
- 2D image fitting
- RGB image blender
- Spatial profile fitting
- Histogram improvements with custom parameters
- Image annotation
- Channel maps
- Scripting interface

Later:

- Volume (3D) rendering
- Improved Profile, histogram, and image fitting tools
- Source finder
- Transposed cubes
- Image smoothing
- VR integration (IDaVie)

CARTA

- CARTA is the new visualization tool, actively developed for radio image formats (but can be used for any fits image [cube]). It replaces the CASAviewer that is not supported anymore.
- Performance and architecture of CARTA are ideal for displaying large images hosted locally (VLA, ALMA, …) or remotely (SKA, ngVLA, VLASS, …)
- Almost all CASAviewer functionality is now available in CARTA v3, it is now a good time to switch over
- CARTA is integrated in the ALMA and NRAO/SRDP archives
- Python scripting is under active development

- For questions, comments, suggestions, please contact the CARTA helpdesk support@carta.freshdesk.com
- CARTA homepage: cartavis.org

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