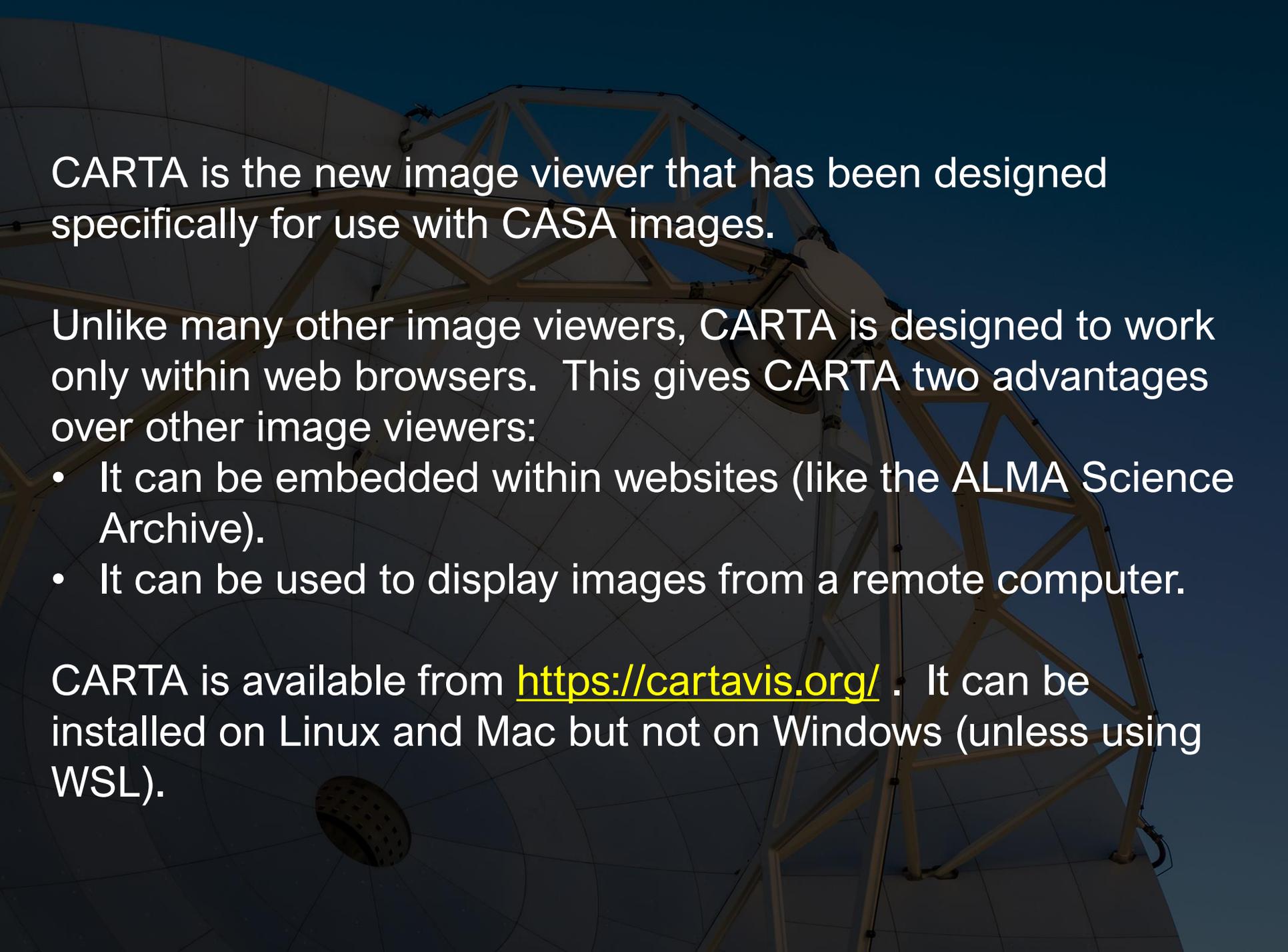


# ***CARTA***

**George Bendo**

UK ALMA Regional Centre Node  
Jodrell Bank Centre for Astrophysics  
The University of Manchester



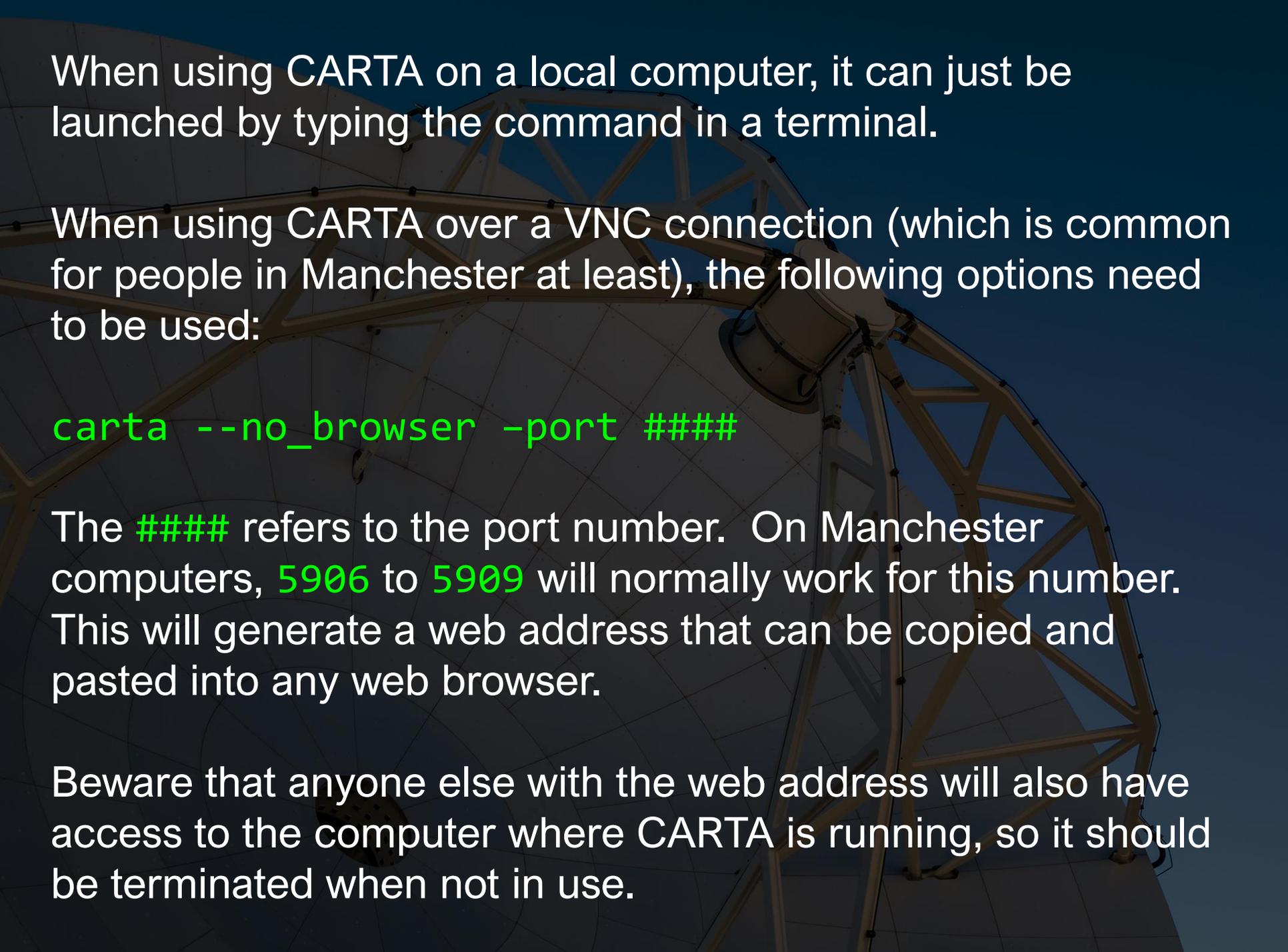


CARTA is the new image viewer that has been designed specifically for use with CASA images.

Unlike many other image viewers, CARTA is designed to work only within web browsers. This gives CARTA two advantages over other image viewers:

- It can be embedded within websites (like the ALMA Science Archive).
- It can be used to display images from a remote computer.

CARTA is available from <https://cartavis.org/> . It can be installed on Linux and Mac but not on Windows (unless using WSL).



When using CARTA on a local computer, it can just be launched by typing the command in a terminal.

When using CARTA over a VNC connection (which is common for people in Manchester at least), the following options need to be used:

```
carta --no_browser -port #####
```

The ##### refers to the port number. On Manchester computers, 5906 to 5909 will normally work for this number. This will generate a web address that can be copied and pasted into any web browser.

Beware that anyone else with the web address will also have access to the computer where CARTA is running, so it should be terminated when not in use.

When CARTA is started, it will display a file browser window. When a file is selected in this interface, CARTA will display useful information about the image.

The screenshot shows the CARTA web interface in a browser window. The browser's address bar shows the URL `172.21.80.169:3002/?token=6744a761-41ac-4614-a9da-c5b6c6dbc78`. The main interface area displays "No image loaded" with a folder icon and the instruction "Load a file using the menu". A "File Browser" window is open, showing a file list for the directory `mnt > d > product`. The file list has columns for "Filename", "Type", "Size", and "Date".

Filename	Type	Size	Date
member.uid__A001_X158f_X7a1_PJ113921.7_sci.spw17.cube.l	FITS	714.2 kB	17:54
member.uid__A001_X158f_X7a1_PJ113921.7_sci.spw17.cube.l	FITS	198.8 MB	17:54
member.uid__A001_X158f_X7a1_PJ113921.7_sci.spw17.cube.l	FITS	731.3 MB	17:54
member.uid__A001_X158f_X7a1_PJ113921.7_sci.spw17.mfs.l.r	FITS	9.7 kB	17:54
member.uid__A001_X158f_X7a1_PJ113921.7_sci.spw17.mfs.l.f	FITS	1.7 MB	17:54
member.uid__A001_X158f_X7a1_PJ113921.7_sci.spw17.mfs.l.f	FITS	6.3 MB	17:54
member.uid__A001_X158f_X7a1_PJ113921.7_sci.spw17_21_23_	FITS	6.3 MB	17:54
member.uid__A001_X158f_X7a1_PJ113921.7_sci.spw17_21_23_	FITS	6.3 MB	17:54
member.uid__A001_X158f_X7a1_PJ113921.7_sci.spw17_21_23_	FITS	9.9 kB	17:54
member.uid__A001_X158f_X7a1_PJ113921.7_sci.spw17_21_23_	FITS	6.3 MB	17:54
member.uid__A001_X158f_X7a1_PJ113921.7_sci.spw17_21_23_	FITS	6.3 MB	17:54
member.uid__A001_X158f_X7a1_PJ113921.7_sci.spw17_21_23_	FITS	6.3 MB	17:54
member.uid__A001_X158f_X7a1_PJ113921.7_sci.spw21.cube.l	FITS	165.3 MB	17:54
member.uid__A001_X158f_X7a1_PJ113921.7_sci.spw21.cube.l	FITS	731.3 MB	17:54
member.uid__A001_X158f_X7a1_PJ113921.7_sci.spw21.mfs.l.r	FITS	9.6 kB	17:54
member.uid__A001_X158f_X7a1_PJ113921.7_sci.spw21.mfs.l.f	FITS	1.4 MB	17:54

The "File Browser" window also includes a search bar with the text "Filter by filename with fuzzy search" and a "Fuzzy search" dropdown menu. At the bottom of the window, there are "Close" and "Load" buttons. The background interface shows a "No image loaded" message and a "Render Configuration" panel.

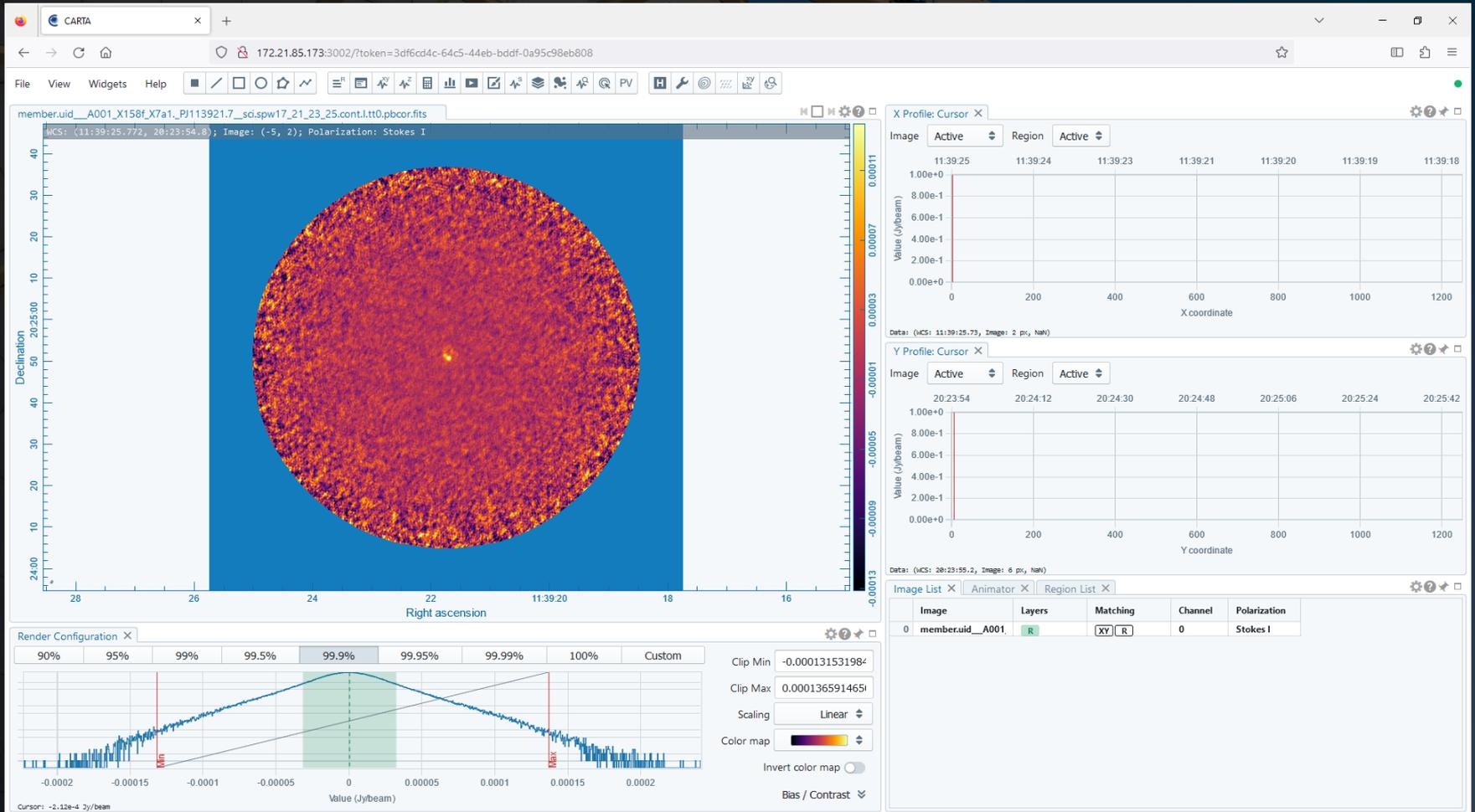
When CARTA is started, it will display a file browser window. When a file is selected in this interface, CARTA will display useful information about the image.

The screenshot shows the CARTA software interface. A file browser window is open, displaying a list of files in the directory `mnt > d > product`. A yellow arrow points to the file `member.uid__A001_X158f_X7a1_P1113921.7_sci.spw17_21_23.fits`, which is highlighted in blue. To the right of the file list, a 'File Information' panel is visible, showing details for the selected file. The file information includes:

- Name = member.uid\_\_A001\_X158f\_X7a1\_P1113921.7\_sci.spw17\_21\_23\_25.corr
- HDU = 0
- Data type = float
- Shape = [1250, 1250, 1, 1]
- Number of channels = 1
- Number of polarizations = 1
- Coordinate type = Right Ascension, Declination
- Projection = SIN
- Image reference pixels = [626, 626]
- Image reference coords = [11:39:21.7420, +020.24.50.9005]
- Image ref coords (deg) = [174.841 deg, 20.4141 deg]
- Pixel increment = -0.09", 0.09"
- Pixel unit = Jy/beam
- Celestial frame = ICRS
- Spectral frame = LSRK
- Velocity definition = RADIO
- Restoring beam = 0.792553" X 0.495623", -28.4605 deg
- RA range = [11:39:17.747, 11:39:25.744]
- DEC range = [20:23:54.648, 20:25:47.058]

The main CARTA window shows 'No image loaded' and a 'Render Configuration' panel. The bottom of the window displays 'No file loaded' and the instruction 'Load a file using the menu'.

Once a file is selected, It will be possible to see CARTA's main display.

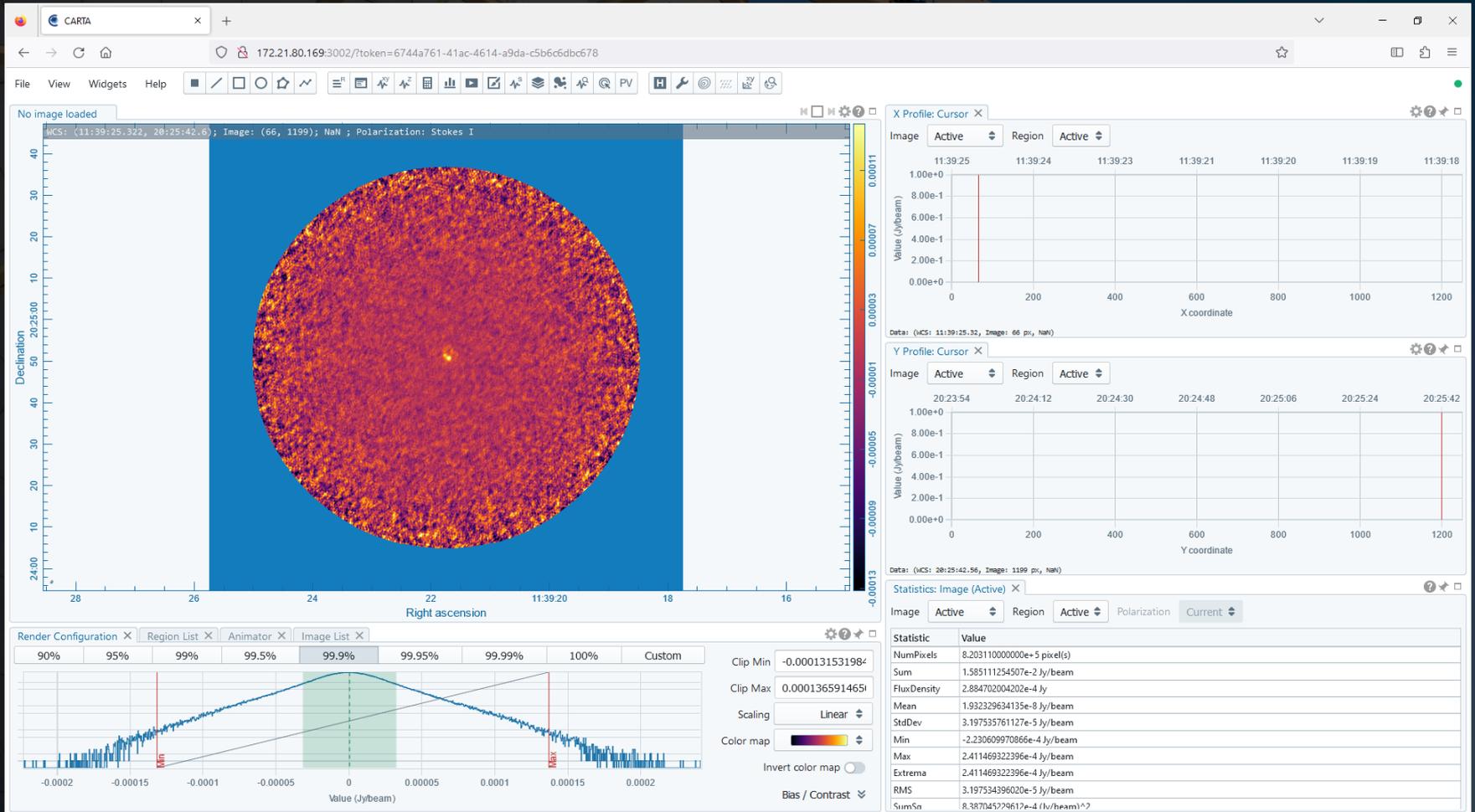


The default display features the image panel and six widgets. It is possible to select alternate panel arrangements by going to View and then Layouts in the menu bar at the top.

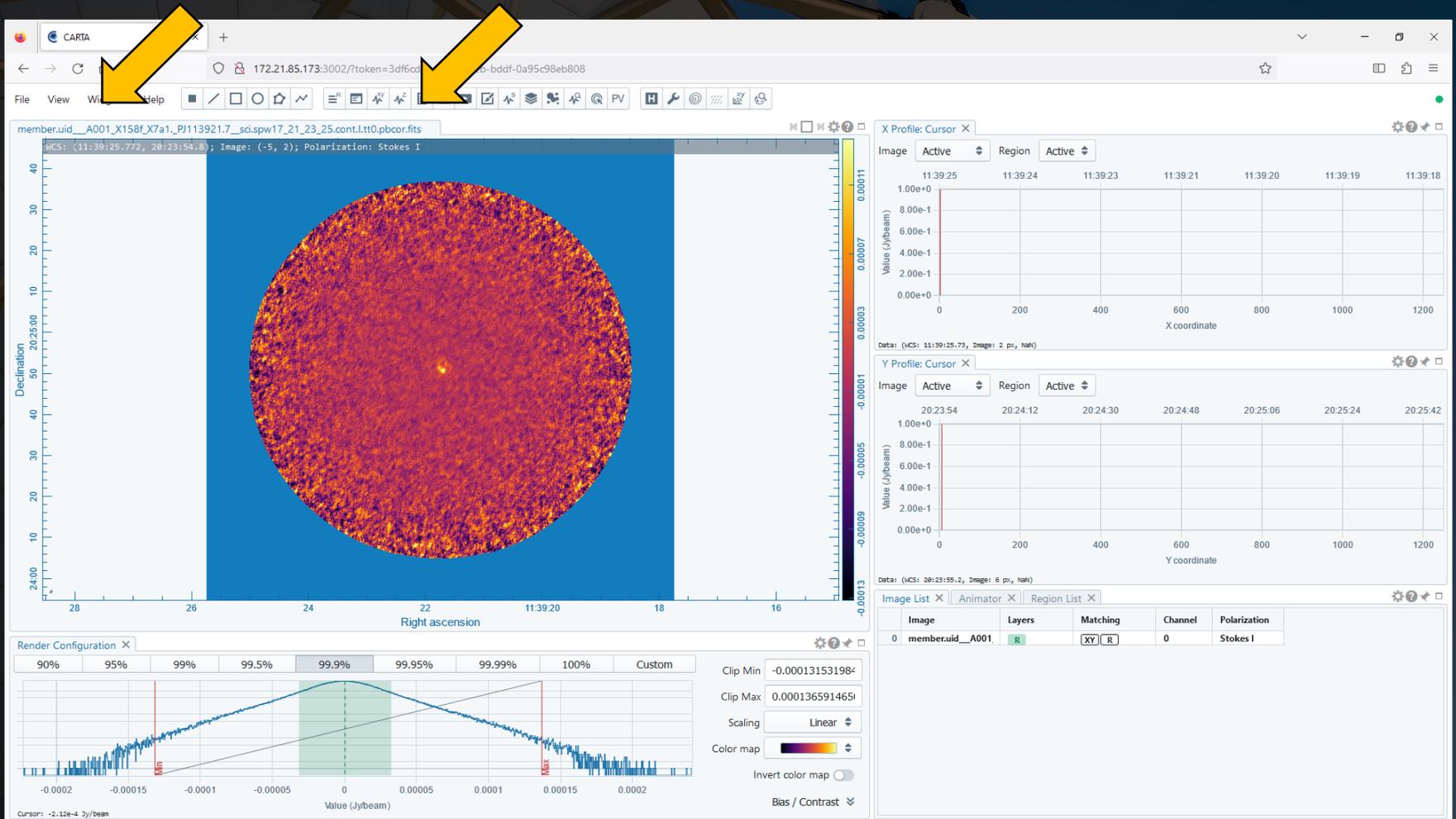
The screenshot displays the CARTA software interface. A yellow arrow points to the 'View' menu, which is open, showing options like 'Layouts', 'Images', 'File header', 'Contours', 'Vector overlay', 'Image fitting', and 'Online Catalog Query'. The main panel shows a circular radio telescope image with a color scale on the right ranging from -0.0013 to 0.0011. Below the image is a histogram and a 'Render Configuration' panel with a 'Value (Jy/beam)' axis and a 'Bias / Contrast' control. To the right, there are two 'X Profile' and 'Y Profile' plots, each with a 'Value (Jy/beam)' axis and an 'X coordinate' or 'Y coordinate' axis. At the bottom right, there is an 'Image List' table.

Image	Layers	Matching	Channel	Polarization	
0	memberuid__A001	R	XY [R]	0	Stokes I

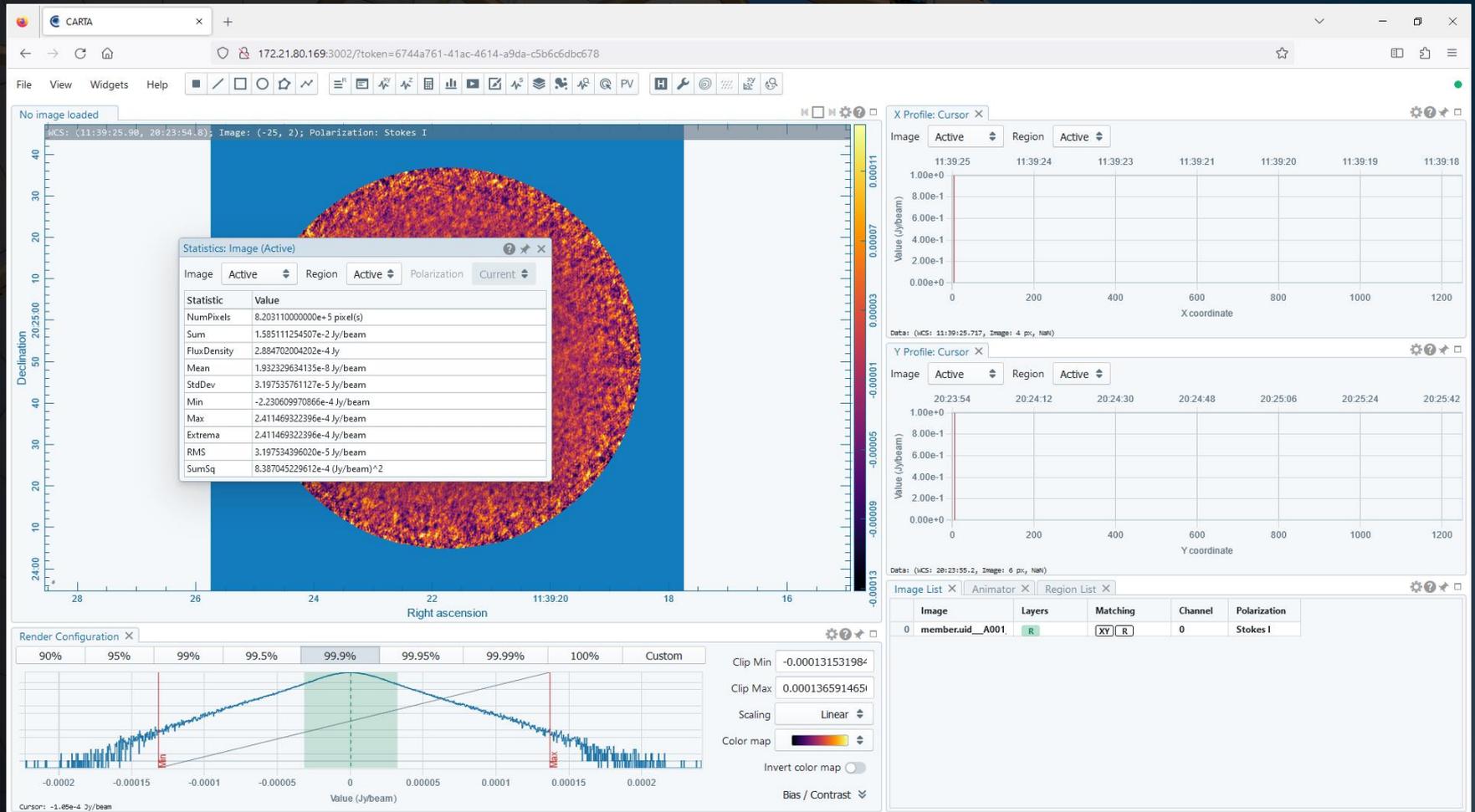
The default display features the image panel and six widgets. It is possible to select alternate panel arrangements by going to View and then Layouts in the menu bar at the top.



It is also possible to open new widgets by clicking on the various corresponding buttons in the button bar or by clicking on one of the options under Widgets in the menu bar.



It is also possible to open new widgets by clicking on the various corresponding buttons in the button bar or by clicking on one of the options under Widgets in the menu bar.



Widgets can be dragged around the screen by moving the cursor over the menu bar and holding down the left mouse button.

The screenshot displays the CARTA software interface. The main window shows a radio telescope image with a color scale on the right. A yellow arrow points to the 'Statistics: Image (Active)' window, which is currently open. The statistics window displays the following data:

Statistic	Value
NumPixels	8.203110000000e+5 pixel(s)
Sum	1.585111254507e-2 Jy/beam
FluxDensity	2.884702004202e-4 Jy
Mean	1.932329634135e-8 Jy/beam
StdDev	3.197535761127e-5 Jy/beam
Min	-2.230609970866e-4 Jy/beam
Max	2.411469322396e-4 Jy/beam
Extrema	2.411469322396e-4 Jy/beam
RMS	3.197534396020e-5 Jy/beam
SumSq	8.387045229612e-4 (Jy/beam)^2

Below the main image, there is a 'Render Configuration' window showing a histogram of the image values. The histogram has a green shaded region around the mean and red vertical lines for the minimum and maximum values. The 'Render Configuration' window also includes a 'Clip Min' field set to -0.000131531984, a 'Clip Max' field set to 0.0001365914651, and a 'Scaling' dropdown set to 'Linear'. The 'Color map' is set to a rainbow color map, and the 'Invert color map' checkbox is unchecked. The 'Bias / Contrast' field is also visible.

On the right side of the interface, there are two profile windows: 'X Profile: Cursor X' and 'Y Profile: Cursor X'. Both windows show a plot of 'Value (Jy/beam)' versus 'X coordinate' or 'Y coordinate'. The 'X Profile' window has a data table with columns for 'Image', 'Region', and 'Polarization', and a grid for plotting. The 'Y Profile' window has a similar data table and grid.

At the bottom right, there is an 'Image List' window with a table showing the following data:

Image	Layers	Matching	Channel	Polarization
0	memberuid__A001	R	XY	R
			0	Stokes I

Widgets can be dragged around the screen by moving the cursor over the menu bar and holding down the left mouse button.

The screenshot displays the CARTA software interface. The main window shows a circular radio telescope image with a color scale on the right ranging from -0.0013 to 0.0011. The axes are labeled 'Right ascension' and 'Declination'. A 'Render Configuration' panel at the bottom left shows a histogram of the image data with a green shaded region around the peak. A 'Statistics: Image (Active)' window is open, displaying various statistical values for the image. A yellow arrow points to the 'Statistics: Image (Active)' window. The 'X Profile: Cursor' window is also visible, showing a line plot of the image data along the X-axis.

**Statistics: Image (Active)**

Statistic	Value
NumPixels	8.203110000000e+5 pixel(s)
Sum	1.585111254507e-2 Jy/beam
FluxDensity	2.884702004202e-4 Jy
Mean	1.932329634135e-8 Jy/beam
StdDev	3.197535761127e-5 Jy/beam
Min	-2.230609970866e-4 Jy/beam
Max	2.411469322396e-4 Jy/beam
Extrema	2.411469322396e-4 Jy/beam
RMS	3.197534396020e-5 Jy/beam
SumSq	8.387045229612e-4 (Jy/beam) <sup>2</sup>

**Image List**

Image	Layers	Matching	Channel	Polarization		
0	memberuid__A001	R	XY	R	0	Stokes I

Widgets can be fixed into place by moving the cursor over the pin icon, holding down the left mouse button, and then dragging the outline around CARTA. Widgets can be placed either in between other widgets or in the same place as others (with the widget selected using the tabs).

The screenshot displays the CARTA software interface. The main window shows a radio telescope image with a color scale on the right. A yellow arrow points to a pin icon on the 'Statistics: Image (Active)' window. The interface includes a menu bar (File, View, Widgets, Help), a toolbar, and several panels:

- Statistics: Image (Active)**: A window showing statistical data for the active image. A yellow arrow points to a pin icon in its top right corner.
- X Profile: Cursor X**: A plot showing the value (Jy/beam) versus X coordinate for the active image.
- Y Profile: Cursor X**: A plot showing the value (Jy/beam) versus Y coordinate for the active image.
- Render Configuration**: A window showing the histogram of the image values and various rendering options like Clip Min, Clip Max, Scaling, and Color map.
- Image List**: A table listing the images loaded in the software.

Statistic	Value
NumPixels	8.203110000000e+5 pixel(s)
Sum	1.585111254507e-2 Jy/beam
FluxDensity	2.884702004202e-4 Jy
Mean	1.932329634135e-8 Jy/beam
StdDev	3.197535761127e-5 Jy/beam
Min	-2.230609970866e-4 Jy/beam
Max	2.411469322396e-4 Jy/beam
Extrema	2.411469322396e-4 Jy/beam
RMS	3.197534396020e-5 Jy/beam
SumSq	8.387045229612e-4 (Jy/beam)^2

Image	Layers	Matching	Channel	Polarization		
0	memberuid_A001	R	XY	R	0	Stokes I

Widgets can be fixed into place by moving the cursor over the pin icon, holding down the left mouse button, and then dragging the outline around CARTA. Widgets can be placed either in between other widgets or in the same place as others (with the widget selected using the tabs).

The screenshot displays the CARTA software interface. The main window shows a circular radio telescope image with a color scale on the right ranging from -0.0013 to 0.0011. The axes are labeled 'Right ascension' and 'Declination'. Below the image is a 'Render Configuration' panel with a histogram and a 'Value (Jy/beam)' axis. To the right of the image are two 'X Profile' and 'Y Profile' plots, each with a 'Value (Jy/beam)' axis and an 'X coordinate' axis. A yellow arrow points to a pin icon in the bottom right corner of the interface. The bottom right corner also contains a 'Statistics: Image (Active)' panel with a table of statistics and a 'Region List' panel with a table of regions.

Statistic	Value
NumPixels	8.203110000000e+5 pixels(s)
Sum	1.585111254507e-2 Jy/beam
FluxDensity	2.884702004202e-4 Jy
Mean	1.932329634135e-8 Jy/beam
StdDev	3.197535761127e-5 Jy/beam
Min	-2.230609970866e-4 Jy/beam
Max	2.411469322396e-4 Jy/beam
Extrema	2.411469322396e-4 Jy/beam
RMS	3.197534396020e-5 Jy/beam
SumSn	8.387045729617e-4 (Jy/beam)^2

Name	Type	Center
Cursor	Point	11:39:25.836 20:23:54.8

Widgets can be fixed into place by moving the cursor over the pin icon, holding down the left mouse button, and then dragging the outline around CARTA. Widgets can be placed either in between other widgets or in the same place as others (with the widget selected using the tabs).

The screenshot displays the CARTA software interface. The main window shows a circular radio telescope image with a color scale on the right ranging from -0.0013 to 0.0011. The axes are labeled 'Right ascension' and 'Declination'. Below the image is a 'Render Configuration' panel with a histogram and various settings like 'Clip Min', 'Clip Max', 'Scaling', and 'Color map'. To the right, there are two 'X Profile' and 'Y Profile' plots showing 'Value (Jy/beam)' vs 'X coordinate' and 'Y coordinate' respectively. A yellow arrow points to a pin icon in the bottom right corner of the interface. At the bottom right, there is a 'Statistics: Image (Active)' table.

Statistic	Value
NumPixels	8.203110000000e+5 pixel(s)
Sum	1.585111254507e-2 Jy/beam
FluxDensity	2.884702004202e-4 Jy
Mean	1.932329634135e-8 Jy/beam
StdDev	3.197535761127e-5 Jy/beam
Min	-2.230609970866e-4 Jy/beam
Max	2.411469322396e-4 Jy/beam
Extrema	2.411469322396e-4 Jy/beam
RMS	3.197534396020e-5 Jy/beam
SumSn	8.387045729617e-4 (Jy/beam) <sup>2</sup>

# Left clicking on a question mark will bring up a help screen.

The screenshot shows the CARTA web interface with a help screen for the 'Image List' widget. The help text is as follows:

The image list widget displays all loaded images as a list, which includes the image name, rendering layers (R for raster, C for contours, V for vector field), layer visibility state, spatial matching state, spectral matching state, color range matching state, channel index, and polarization type. The channel index and polarization type are synchronized with the animator.

You may click R to hide/show a raster layer, C to hide/show a contour layer, and V to hide/show a vector field layer.

Per image, you can click the XY button to enable/disable spatial matching and click the Z button to enable/disable spectral matching. To match the color range to the reference image, click the R button.

To change a reference image, right-click on a row to bring up the context menu. The spatial reference image, the spectral reference image, and the raster scaling reference image can be defined independently. By default, spectral matching is performed with respect to radio velocity convention. If other spectral conventions (e.g., frequency, channel, etc) are desired, use the Matching tab of the image list settings dialog (the cog at the top-right corner of the image list widget).

When images are matched spectrally in the velocity domain, the rest frequency for the frequency-to-velocity conversion per image can be re-defined. This allows you to compare different spectral features efficiently without changing the RESTFRQ header iteratively and permanently. You can right-click on a row to bring up the context menu or use the Rest Frequency tab of the image list settings dialog.

To close an image (or images), right-click on a row to bring up the context menu.

The list order reflects the order of the image slider in the animator. When the image viewer is in the multi-panel mode, the list order also determines the image order in the grid layout following the left-right then top-down rule. To change the order, drag-and-drop an image in the list to the desired new position.

The interface also shows a central image viewer with a color scale from -0.0013 to 0.0011, and two profile plots (X and Y) showing value vs. coordinate. A yellow arrow points to the settings gear icon in the bottom right corner of the image list widget.

Image	Layers	Matching	Channel	Polarization		
0	member.aid__A001	R	XY	R	0	Stokes I

Left clicking on a gear icon will display settings for that window.

The screenshot shows the CARTA software interface. The main window displays a circular image of a star field with a color scale on the right. A settings dialog box for "X Spatial Profile Settings: Cursor" is open, showing options for styling, smoothing, and computation. A yellow arrow points to a gear icon in the top right corner of the main window. Below the main window, there are two profile plots (X and Y) and a render configuration panel with a histogram and various settings like clip min/max, scaling, and color map.

**X Spatial Profile Settings: Cursor**

Styling Smoothing Computation

Coordinate X

Line Color (Primary) [Blue]

Line Width (px) 1

Point Size (px) 1.5

Show WCS Axis

Show Mean/RMS

Only visible in single profile

Line Style [Solid] [Dashed] [Dotted]

**X Profile: Cursor X**

Image Active Region Active

11:39:25	11:39:24	11:39:23	11:39:21	11:39:20	11:39:19	11:39:18
1.00e+0						
8.00e-1						
6.00e-1						
4.00e-1						
2.00e-1						
0.00e+0						

Value (Jy/beam)

X coordinate

Data: (WCS: 11:39:25.564, Image: 28 pri, NaN)

**Y Profile: Cursor X**

Image Active Region Active

20:23:54	20:24:12	20:24:30	20:24:48	20:25:06	20:25:24	20:25:42
1.00e+0						
8.00e-1						
6.00e-1						
4.00e-1						
2.00e-1						
0.00e+0						

Value (Jy/beam)

Y coordinate

Data: (WCS: 20:23:55.2, Image: 6 pri, NaN)

**Render Configuration X**

90%	95%	99%	99.5%	99.9%	99.95%	99.99%	100%	Custom

Clip Min -0.000131531984

Clip Max 0.0001365914651

Scaling Linear

Color map [Rainbow]

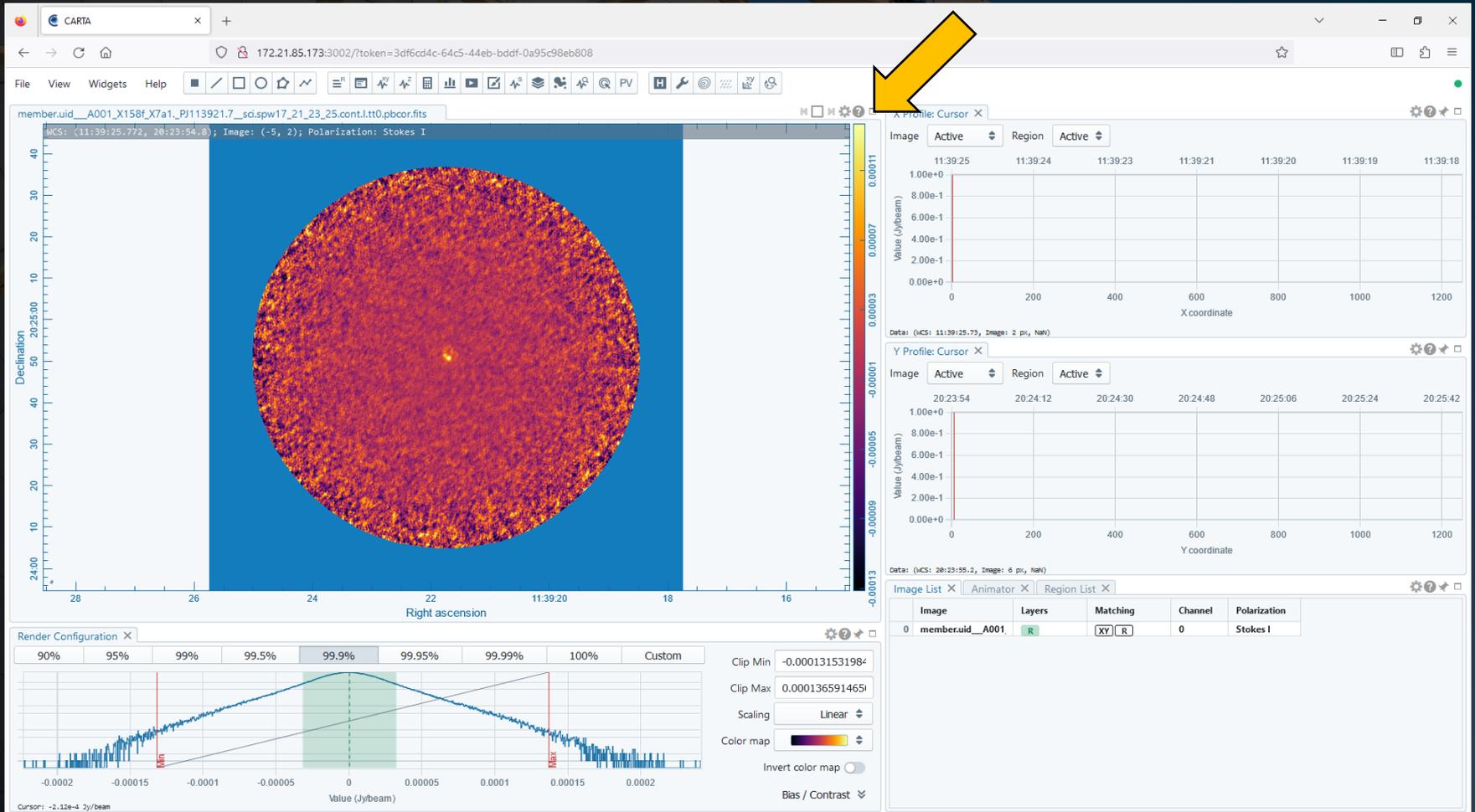
Invert color map

Bias / Contrast

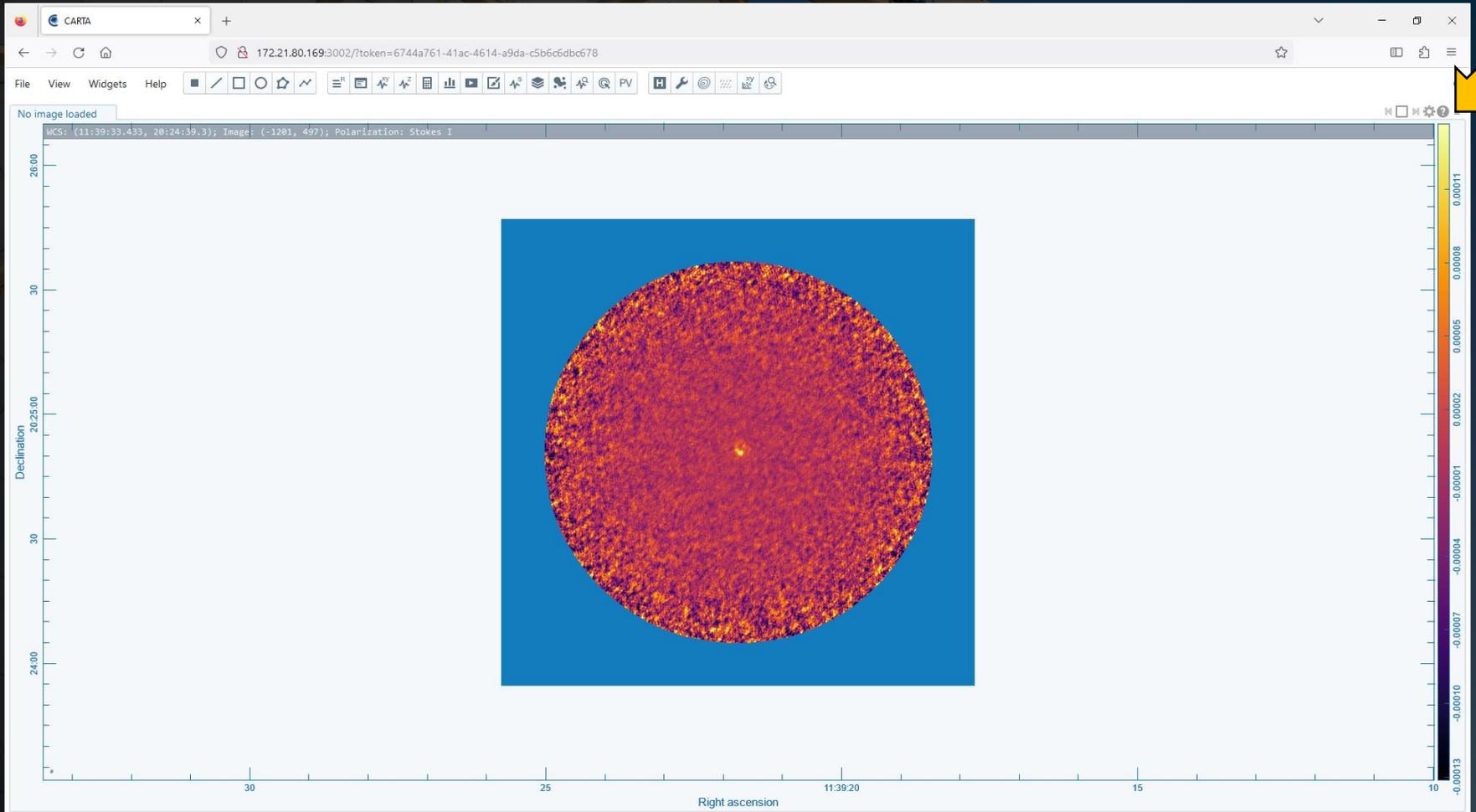
**Image List X**

Image	Layers	Matching	Channel	Polarization
0 memberuid__A001	R	XY [R]	0	Stokes I

Left clicking on the rectangle icon will maximize the widget. When a widget is maximized, left clicking on the single bar will restore the widget to its original size.



Left clicking on the rectangle icon will maximize the widget. When a widget is maximized, left clicking on the single bar will restore the widget to its original size.

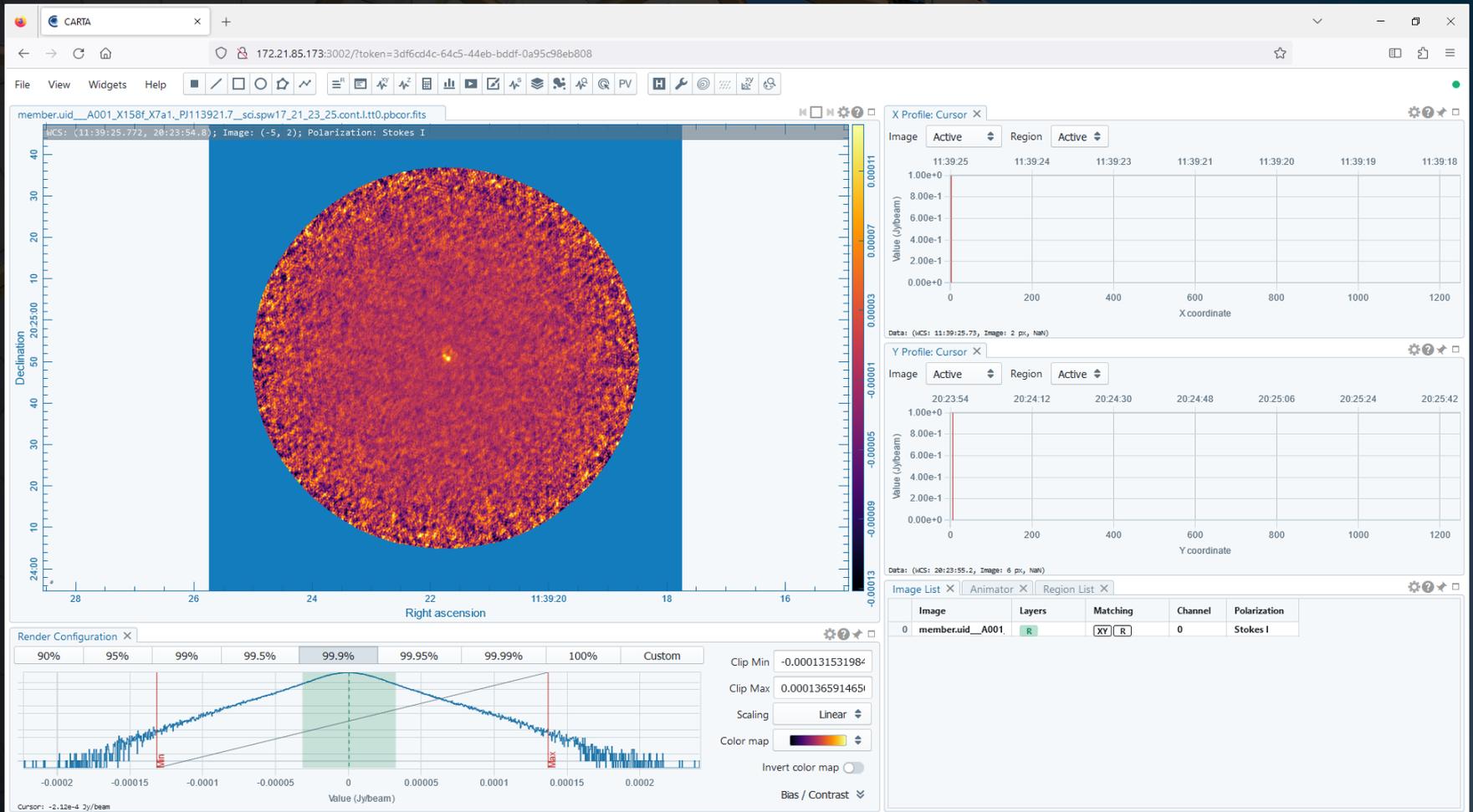


Various widget configurations can be saved by going to View, then Layouts, and then Save Layout.

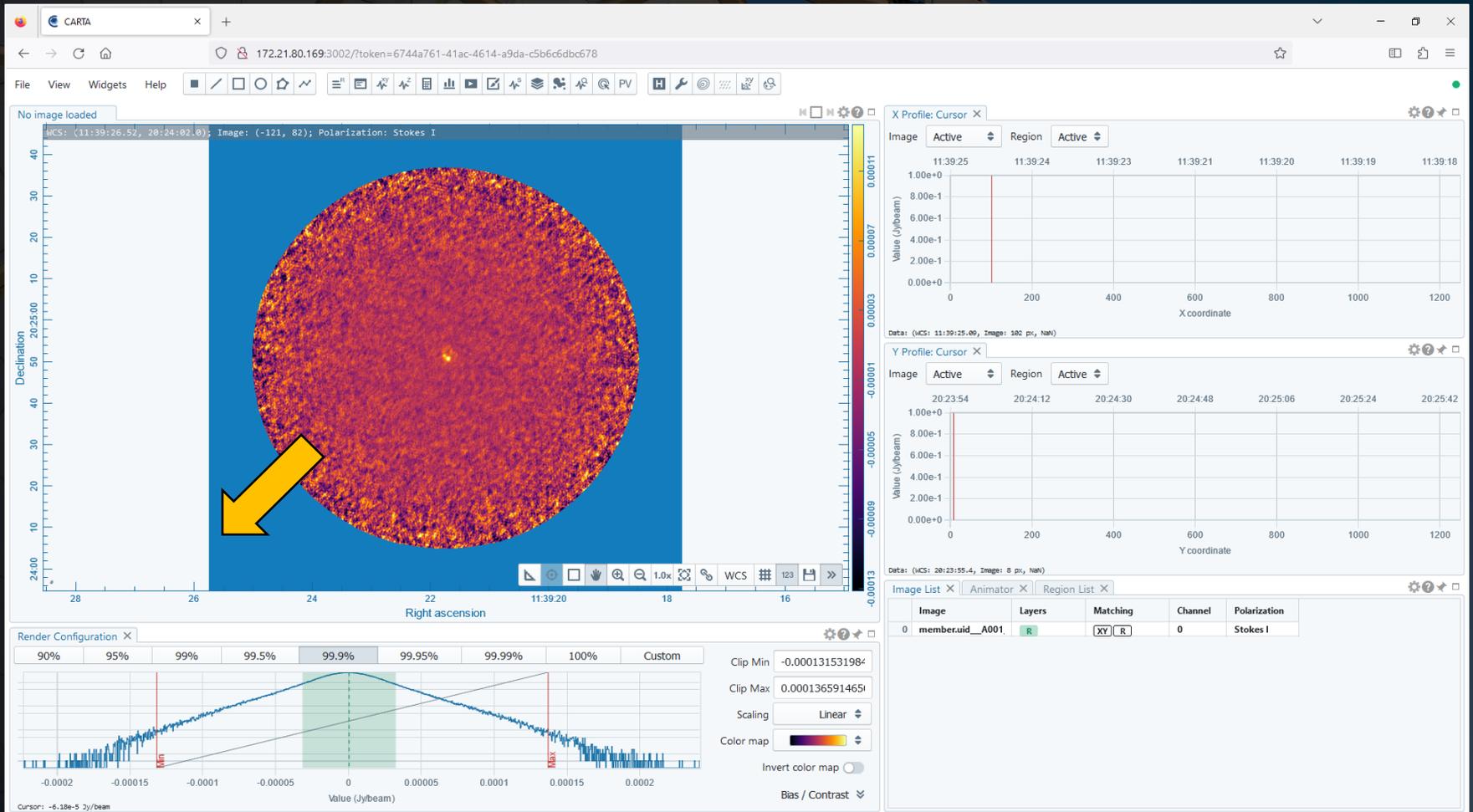
The screenshot displays the CARTA software interface. A yellow arrow points to the 'View' menu, which is open, showing options like 'Layouts' and 'Save Layout'. The main window shows a circular radio telescope beam with a color scale ranging from -0.0013 to 0.0011. The 'Render Configuration' panel shows a histogram and a Gaussian fit. The 'Image List' panel shows a table of images.

Image	Layers	Matching	Channel	Polarization		
0	memberuid_A001	R	XY	R	0	Stokes I

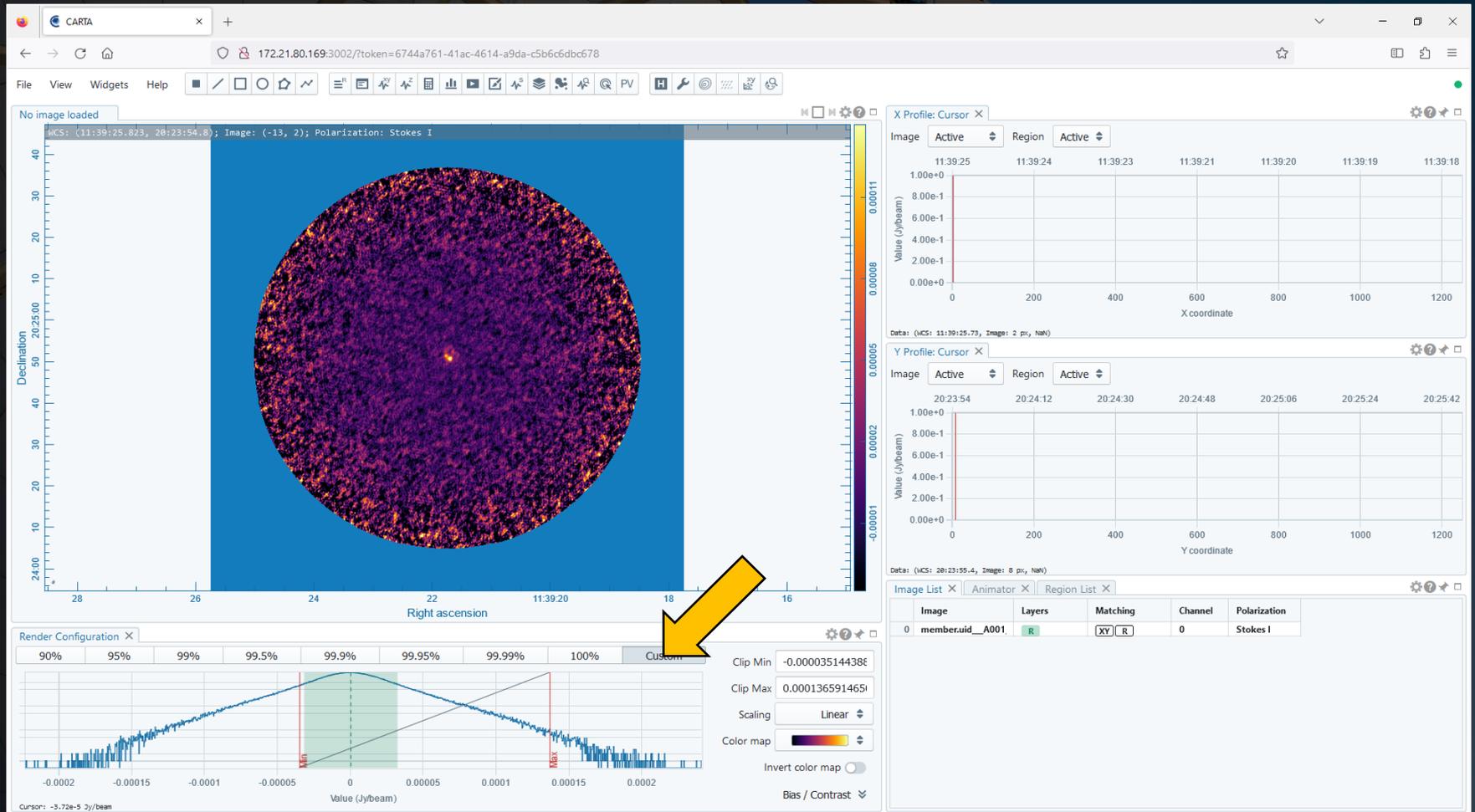
In the image panel, text at the top shows the coordinates and pixel value at the location of the cursor. The beam is visible by default in the lower left corner. The colour bar is shown on the right. Additional display tools will appear on the lower right when hovering the cursor over the window.



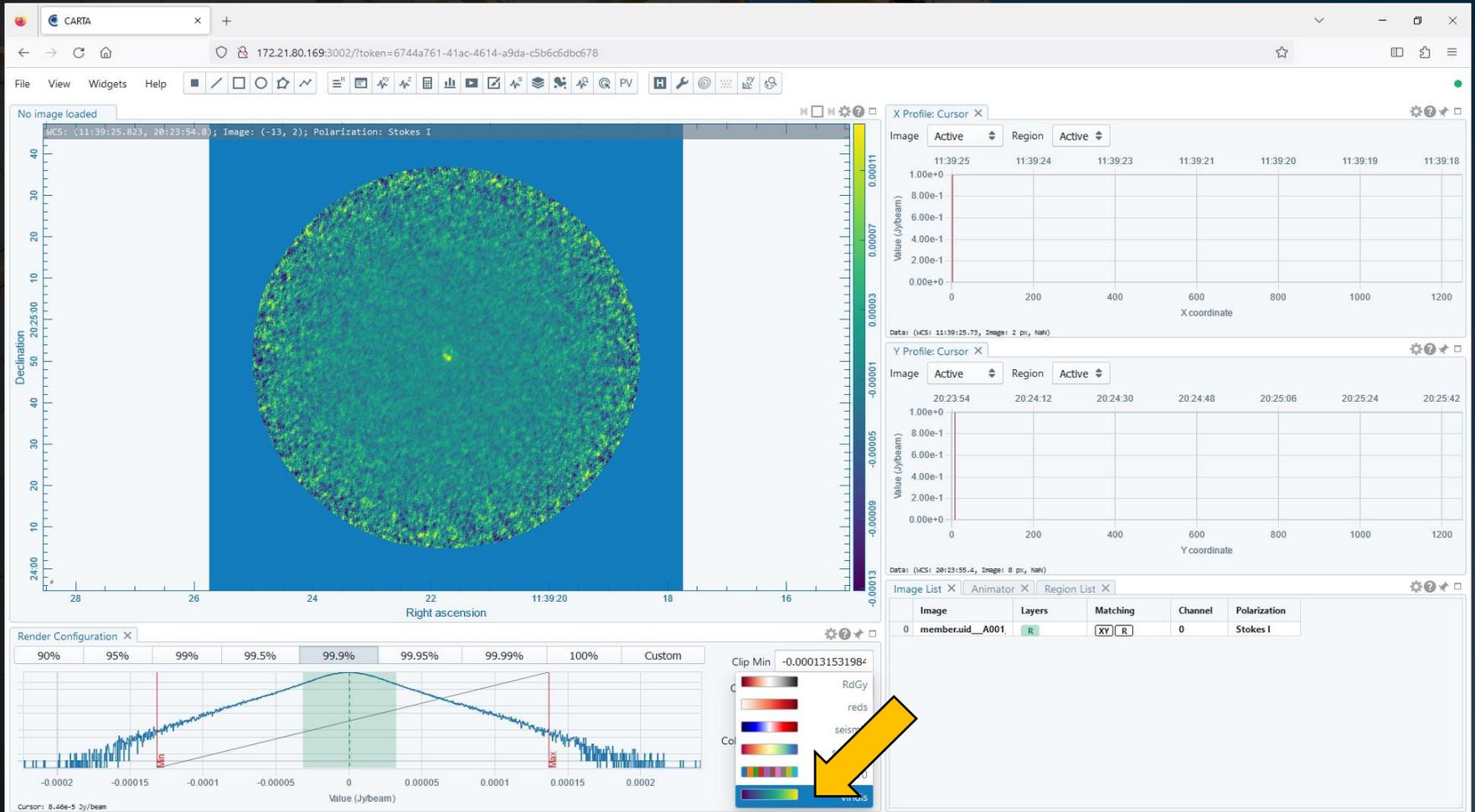
In the image panel, text at the top shows the coordinates and pixel value at the location of the cursor. The beam is visible by default in the lower left corner. The colour bar is shown on the right. Additional display tools will appear on the lower right when hovering the cursor over the window.



The Render Configuration widget at the bottom of the display shows how the pixel values are converted into colours. This can be used to change the minimum and maximum ranges used in the conversion, the scaling function, and the color map.



The Render Configuration widget at the bottom of the display shows how the pixel values are converted into colours. This can be used to change the minimum and maximum ranges used in the conversion, the scaling function, and the color map.



Also note that clicking on the arrows next to Bias/Contrast in the Render Configuration widget will display a box with a dot that can be moved around to change the bias and contrast as well as boxes where these values can be typed in.

The screenshot displays the CARTA software interface. The main window shows a circular radio astronomy image with a color scale on the right ranging from -0.00013 to 0.00011. The image is centered on a bright source. The axes are labeled 'Right ascension' and 'Declination'. Below the image is the 'Render Configuration' widget, which includes a histogram of the image data and various controls for image rendering. A yellow arrow points to the 'Bias / Contrast' control in the Render Configuration widget.

Render Configuration X

90% 95% 99% 99.5% 99.9% 99.95% 99.99% 100% Custom

Clip Min -0.000131531984

Clip Max 0.0001365914651

Scaling Linear

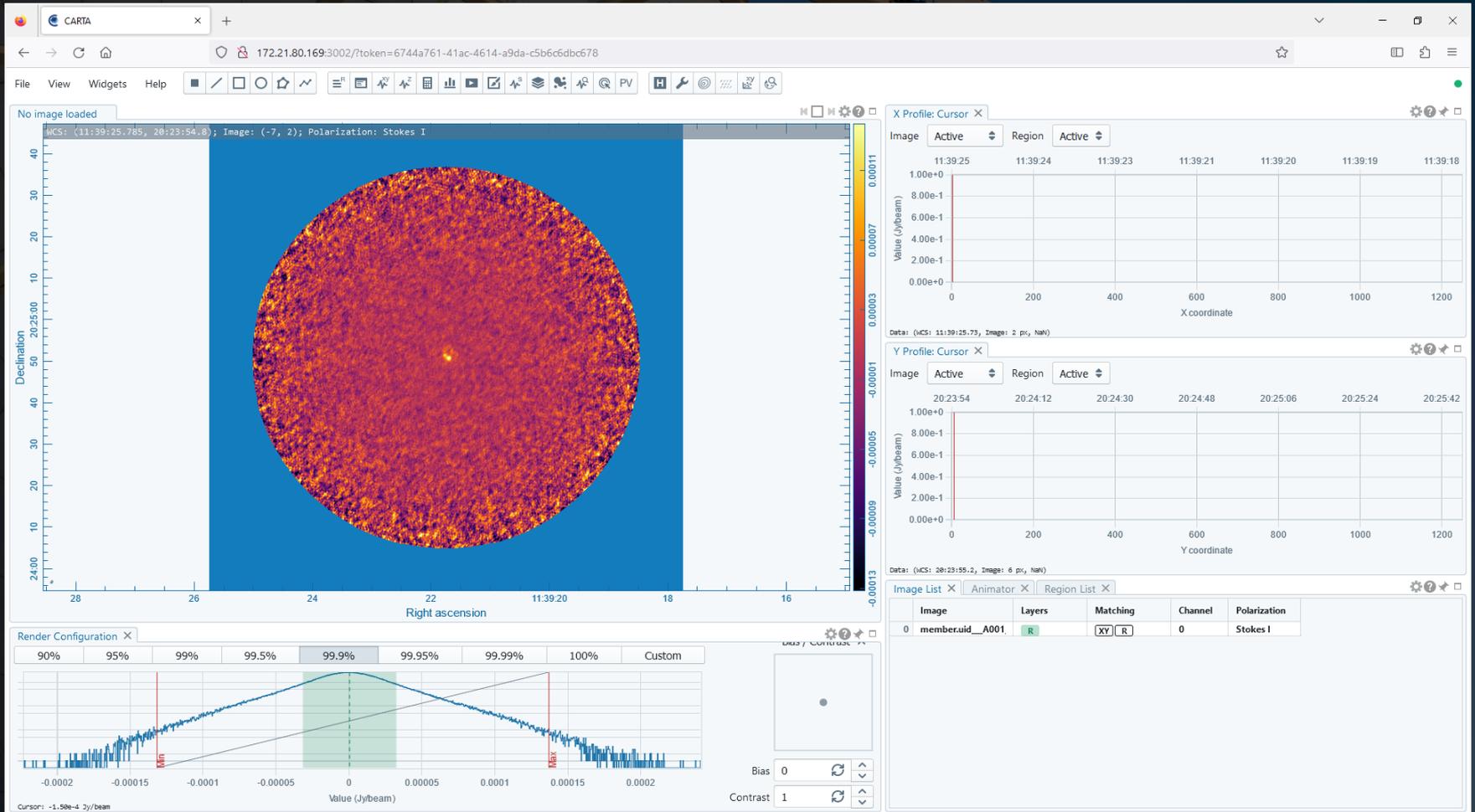
Color map

Invert color map

Bias / Contrast

Image	Layers	Matching	Channel	Polarization		
0	member.uid__A001	R	XY	R	0	Stokes I

Also note that clicking on the arrows next to Bias/Contrast in the Render Configuration widget will display a box with a dot that can be moved around to change the bias and contrast as well as boxes where these values can be typed in.



Also note that clicking on the arrows next to Bias/Contrast in the Render Configuration widget will display a box with a dot that can be moved around to change the bias and contrast as well as boxes where these values can be typed in.

The screenshot displays the CARTA software interface. The main window shows a circular radio telescope image with a color scale on the right ranging from -0.00013 to 0.00011. The axes are labeled 'Right ascension' and 'Declination'. Below the image is a histogram showing the distribution of values, with a green shaded region around the peak and red vertical lines for 'Min' and 'Max'. The 'Render Configuration' panel at the bottom shows a 'Bias' of 0.36923 and a 'Contrast' of 1.81538. A yellow arrow points to the 'Bias' and 'Contrast' labels. To the right, there are two 'X Profile' and 'Y Profile' plots showing 'Value (Jy/beam)' versus 'X coordinate' and 'Y coordinate' respectively. A table at the bottom right shows the current image configuration:

Image	Layers	Matching	Channel	Polarization
0 member_uid_A001	R	XY [R]	0	Stokes I

More than one image can be loaded into CARTA by clicking on File and then Append Image and then selecting a file in the File Browser.

The screenshot displays the CARTA web interface. A yellow arrow points to the 'Append Image' option in the 'File' menu. The main window shows a circular image of a star field with a color scale on the right. Below the image is a histogram and a 'Render Configuration' panel. To the right, there are 'X Profile' and 'Y Profile' plots, and an 'Image List' table.

Image	Layers	Matching	Channel	Polarization		
0	memberuid_A001	R	XY	R	0	Stokes I

More than one image can be loaded into CARTA by clicking on File and then Append Image and then selecting a file in the File Browser.

The screenshot displays the CARTA software interface. A File Browser window is open, showing a list of files in the directory `mnt > d > product`. The files are listed in a table with columns for Filename, Type, Size, and Date. The background shows a FITS image of a radio galaxy with a color scale from 0.00011 to 1.00e+0. The interface includes a menu bar (File, View, Widgets, Help), a toolbar, and a plot area with axes for Declination and Value (Jy/beam).

Filename	Type	Size	Date
member.uid__A001_X158f_X7a1_PJ113921.7_sci.spw17_21_23.cont.ltt0.pbcor.fits	FITS	714.2 kB	17:54
member.uid__A001_X158f_X7a1_PJ113921.7_sci.spw17.cube.l	FITS	198.8 MB	17:54
member.uid__A001_X158f_X7a1_PJ113921.7_sci.spw17.cube.l	FITS	731.3 MB	17:54
member.uid__A001_X158f_X7a1_PJ113921.7_sci.spw17.mfs.l.r	FITS	9.7 kB	17:54
member.uid__A001_X158f_X7a1_PJ113921.7_sci.spw17.mfs.l.f	FITS	1.7 MB	17:54
member.uid__A001_X158f_X7a1_PJ113921.7_sci.spw17.mfs.l.f	FITS	6.3 MB	17:54
member.uid__A001_X158f_X7a1_PJ113921.7_sci.spw17_21_23	FITS	6.3 MB	17:54
member.uid__A001_X158f_X7a1_PJ113921.7_sci.spw17_21_23	FITS	9.9 kB	17:54
member.uid__A001_X158f_X7a1_PJ113921.7_sci.spw17_21_23	FITS	6.3 MB	17:54
member.uid__A001_X158f_X7a1_PJ113921.7_sci.spw17_21_23	FITS	6.3 MB	17:54
member.uid__A001_X158f_X7a1_PJ113921.7_sci.spw17_21_23	FITS	6.3 MB	17:54
member.uid__A001_X158f_X7a1_PJ113921.7_sci.spw21.cube.l	FITS	165.3 MB	17:54
member.uid__A001_X158f_X7a1_PJ113921.7_sci.spw21.cube.l	FITS	731.3 MB	17:54
member.uid__A001_X158f_X7a1_PJ113921.7_sci.spw21.mfs.l.r	FITS	9.6 kB	17:54
member.uid__A001_X158f_X7a1_PJ113921.7_sci.spw21.mfs.l.f	FITS	1.4 MB	17:54

More than one image can be loaded into CARTA by clicking on File and then Append Image and then selecting a file in the File Browser.

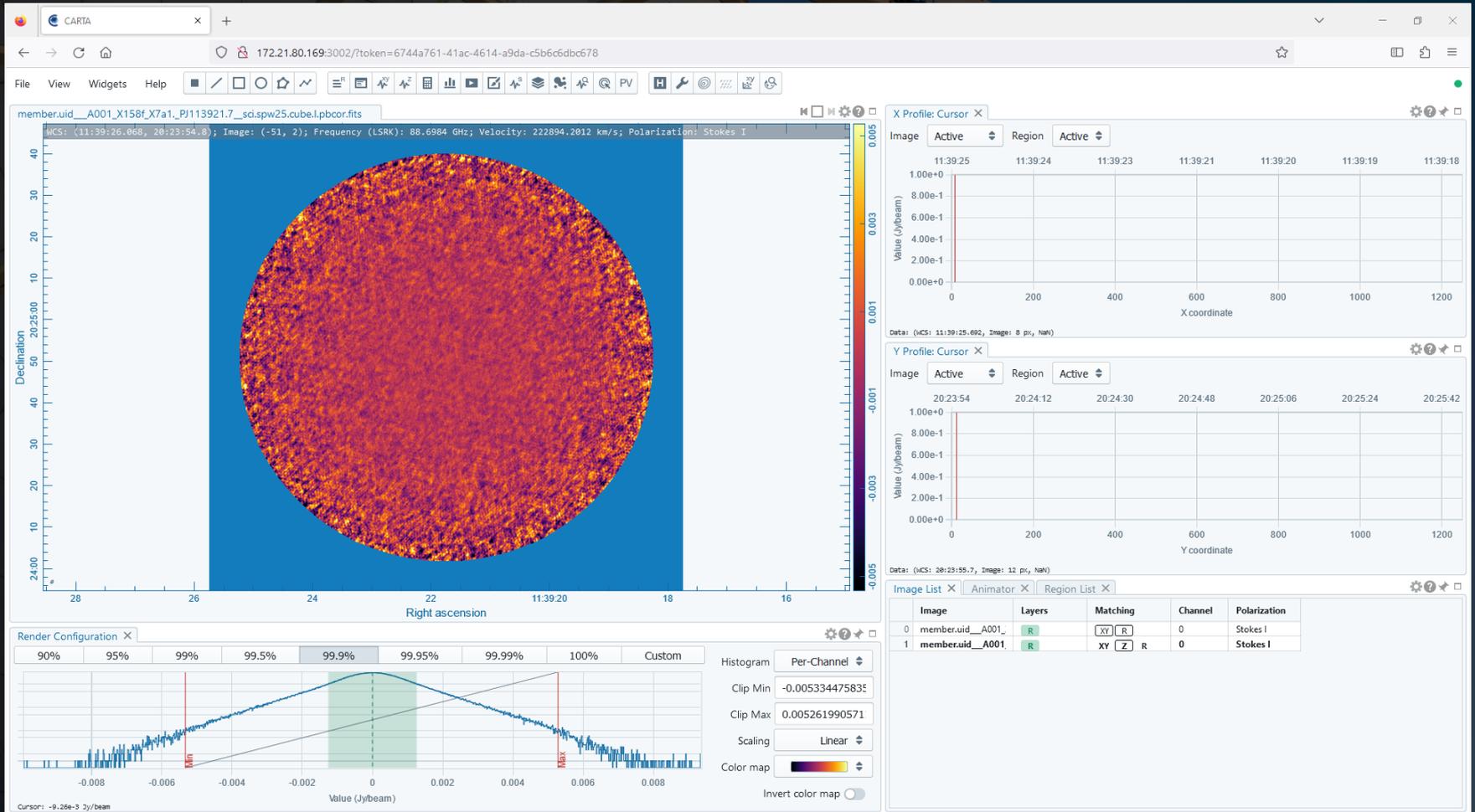
The screenshot displays the CARTA software interface. A File Browser window is open, showing a list of files in the directory `mnt > d > product`. A yellow arrow points to the file `member.uid__A001_X158f_X7a1_P1113921.7_sci.spw25.cube.l`, which is 3.0 GB in size. The File Information panel on the right shows details for the selected file, including its name, HDU count, data type, shape, number of channels, and coordinate system.

Filename	Type	Size	Date
member.uid__A001_X158f_X7a1_P1113921.7_sci.spw1.mfs.l	FITS	1.4 MB	17:54
member.uid__A001_X158f_X7a1_P1113921.7_sci.spw21.mfs.l	FITS	6.3 MB	17:54
member.uid__A001_X158f_X7a1_P1113921.7_sci.spw23.cube.l	FITS	161.4 MB	17:54
member.uid__A001_X158f_X7a1_P1113921.7_sci.spw23.cube.l	FITS	731.3 MB	17:55
member.uid__A001_X158f_X7a1_P1113921.7_sci.spw23.cube.l	FITS	9.6 kB	17:55
member.uid__A001_X158f_X7a1_P1113921.7_sci.spw23.cube.l	FITS	1.4 MB	17:55
member.uid__A001_X158f_X7a1_P1113921.7_sci.spw23.cube.l	FITS	6.3 MB	17:55
member.uid__A001_X158f_X7a1_P1113921.7_sci.spw23.cube.l	FITS	2.9 MB	17:55
member.uid__A001_X158f_X7a1_P1113921.7_sci.spw25.cube.l	FITS	790.5 MB	17:55
member.uid__A001_X158f_X7a1_P1113921.7_sci.spw25.cube.l	FITS	3.0 GB	17:56
member.uid__A001_X158f_X7a1_P1113921.7_sci.spw25.mfs.l	FITS	9.7 kB	17:56
member.uid__A001_X158f_X7a1_P1113921.7_sci.spw25.mfs.l	FITS	1.7 MB	17:56
member.uid__A001_X158f_X7a1_P1113921.7_sci.spw25.mfs.l	FITS	6.3 MB	17:56
member.uid__A001_X158f_X7a1_P1113921.7_sci.spw25.mfs.l	FITS	2.2 kB	17:54
member.uid__A001_X158f_X7a1_P1113921.7_sci.spw25.mfs.l	FITS	106.5 kB	17:54
member.uid__A001_X158f_X7a1_P1113921.7_sci.spw25.mfs.l	FITS	371.5 kB	17:54

File Information:

- Name = member.uid\_\_A001\_X158f\_X7a1\_P1113921.7\_sci.spw25.cube.l.pbcor
- HDU = 0
- Data type = float
- Shape = [1250, 1250, 477, 1]
- Number of channels = 477
- Number of polarizations = 1
- Coordinate type = Right Ascension, Declination
- Projection = SIN
- Image reference pixels = [626, 626]
- Image reference coords = [11:39:21.7420, +020.24.50.9000]
- Image ref coords (deg) = [174.841 deg, 20.4141 deg]
- Pixel increment = -0.09", 0.09"
- Pixel unit = Jy/beam
- Celestial frame = ICRS
- Spectral frame = LSRK
- Velocity definition = RADIO
- Restoring beam = 0.906603" X 0.608119", -33.8059 deg
- RA range = [11:39:17.747, 11:39:25.744]
- DEC range = [+20.23.54.647, +20.25.47.057]

More than one image can be loaded into CARTA by clicking on File and then Append Image and then selecting a file in the File Browser.

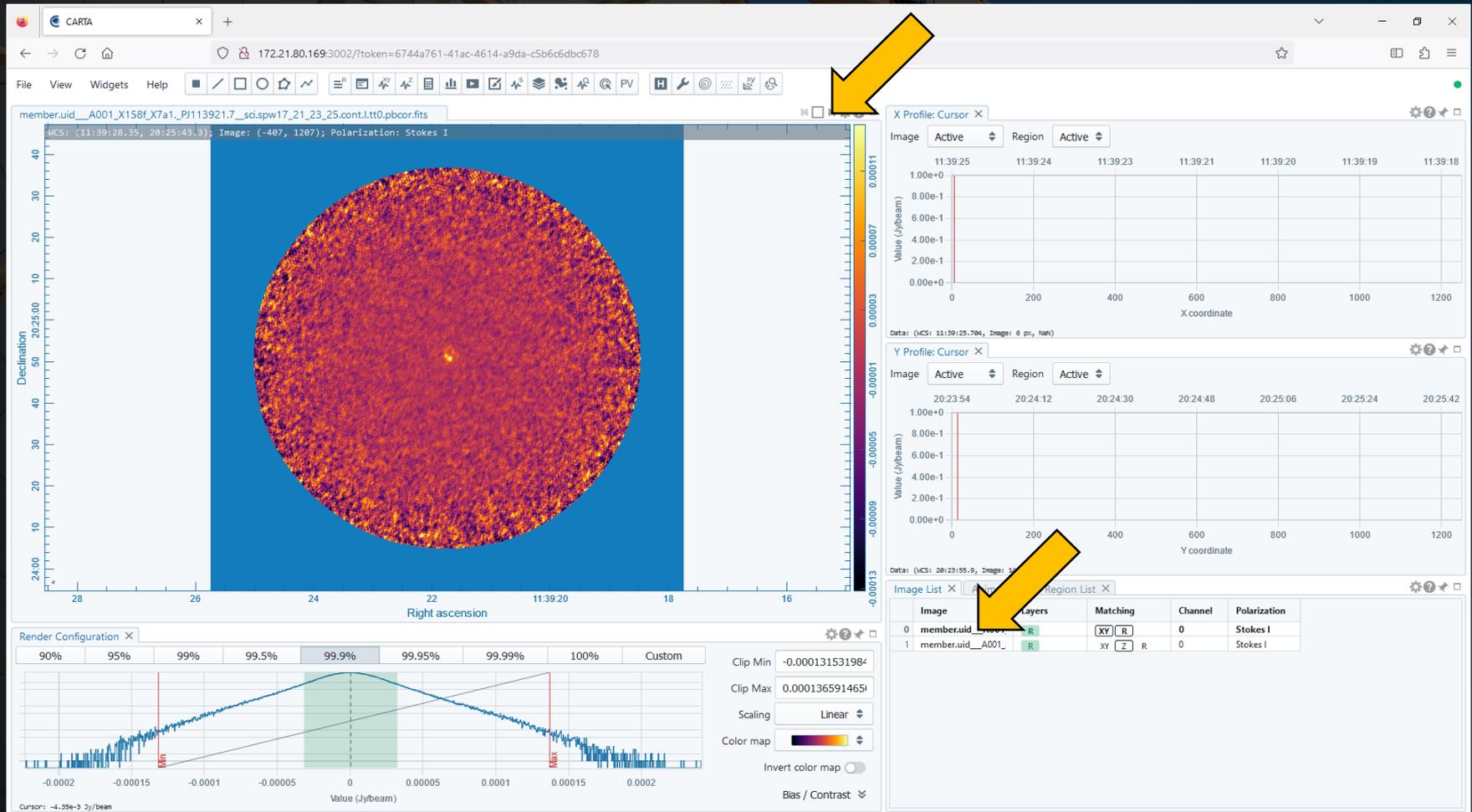


Images can be displayed either individually or in a grid by clicking on an icon above the image panel.

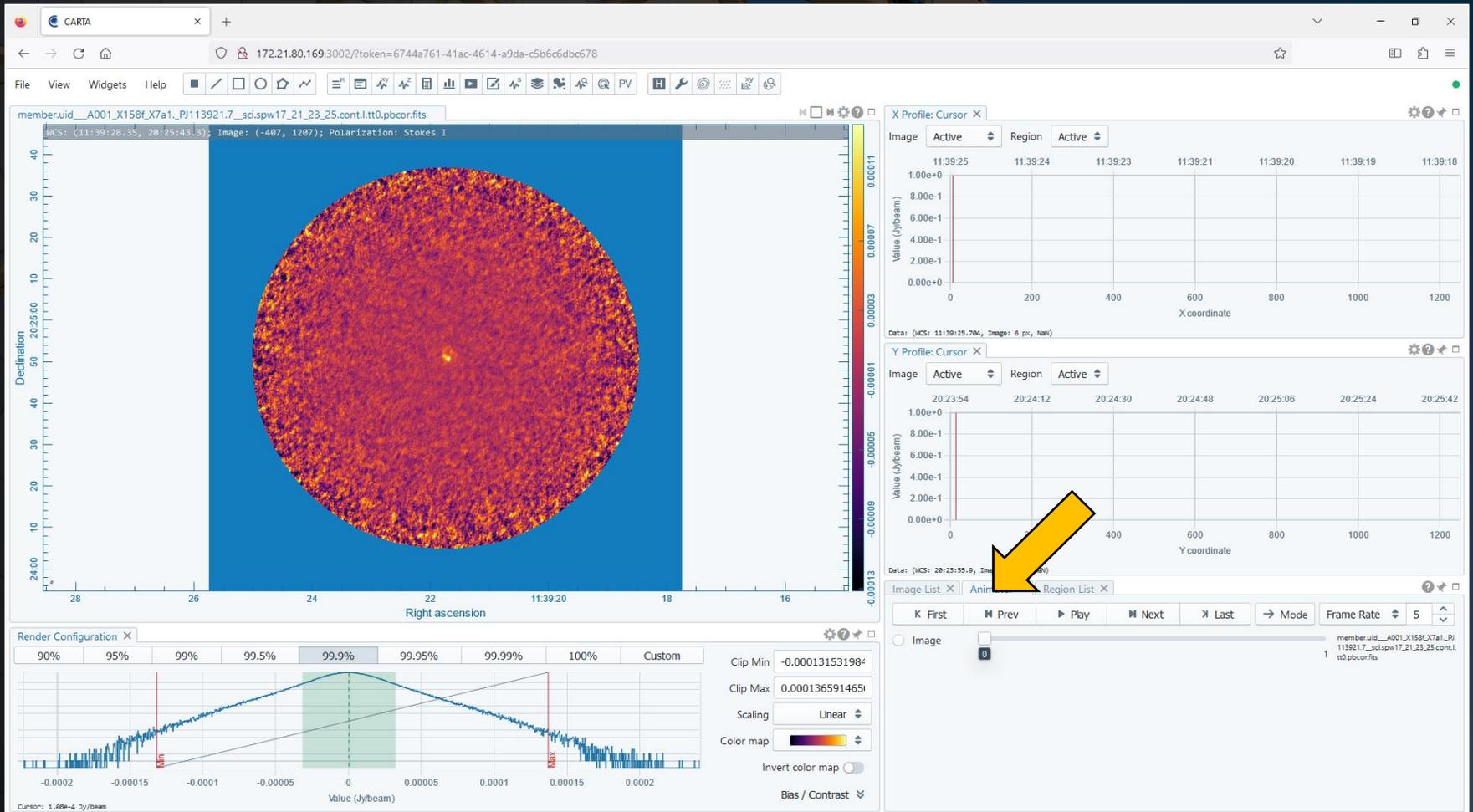
The screenshot displays the CARTA software interface. At the top, a browser window shows the URL `172.21.80.169:3002/?token=6744a761-41ac-4614-a9da-c5b6c6dbc678`. The main panel features two circular radio astronomy images side-by-side, both showing a similar noisy pattern with a central bright spot. The left image has a color scale from -0.0013 to 0.0011, and the right image has a scale from -0.005 to 0.005. Both axes are labeled with Right ascension and Declination. A yellow arrow points to a small icon above the right image, which is used to toggle between single and grid views. Below the images is a 'Render Configuration' panel with a histogram showing the distribution of values (Jy/beam) from -0.008 to 0.008. The histogram includes a 'Clip Min' of -0.00533447583 and a 'Clip Max' of 0.005261990571. To the right of the images are two 'X Profile' and 'Y Profile' plots, both currently empty. At the bottom right is an 'Image List' table:

Image	Layers	Matching	Channel	Polarization
0 member.uid__A001_	R	XY R	0	Stokes I
1 member.uid__A001_	R	XY Z R	0	Stokes I

When images are displayed individually, it is possible to switch between images by clicking on the arrows above the image, by clicking on the name of an image in the Image List, or by paging between images in the Animator widget.



When images are displayed individually, it is possible to switch between images by clicking on the arrows above the image, by clicking on the name of an image in the Image List, or by paging between images in the Animator widget.



The Animator widget can also be used to move between channels in an image cube and change the Stokes parameter displayed in images from full polarization observations.

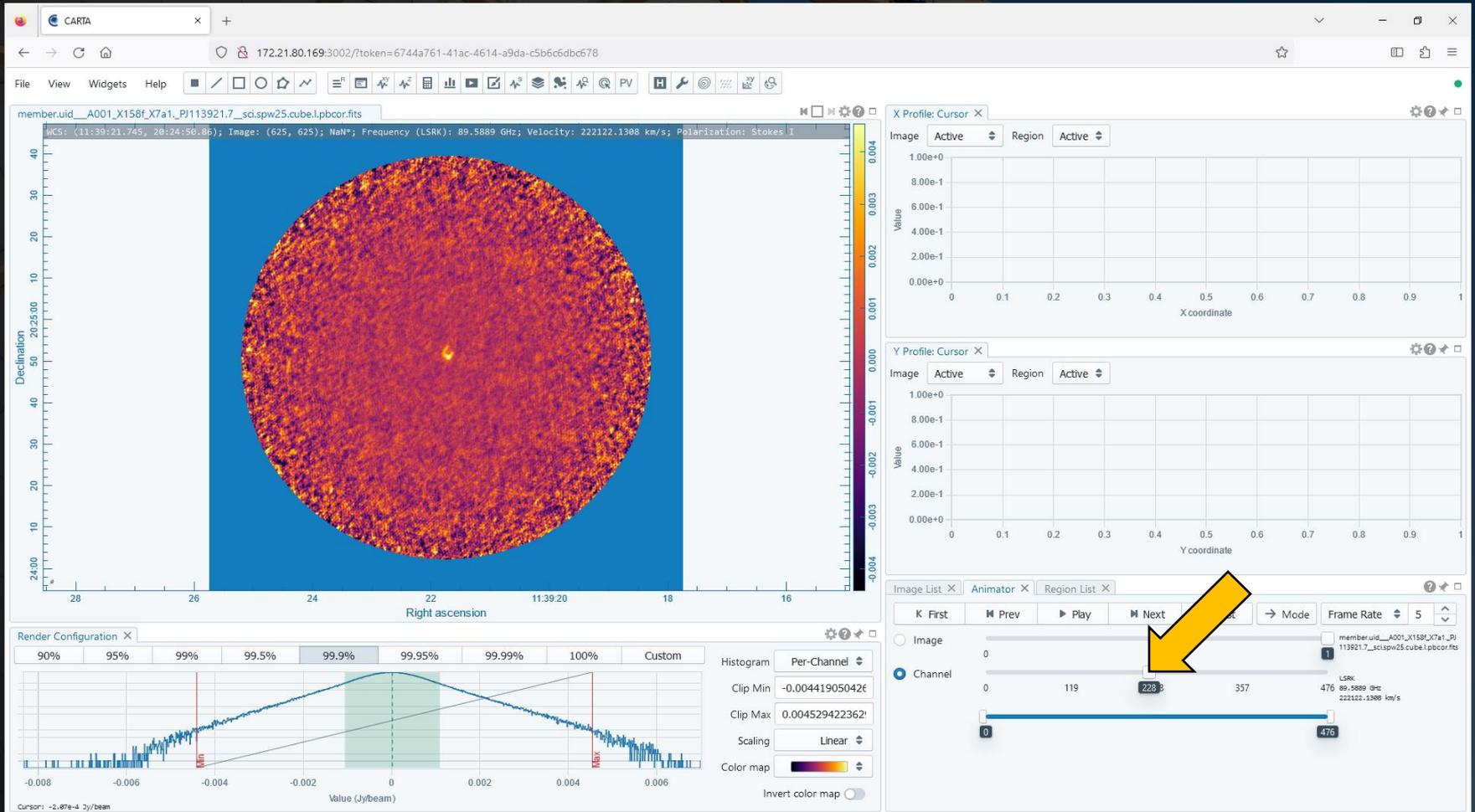


Image coordinate systems can be aligned by clicking on the XY option in the Matching column in the Image List widget.

The screenshot displays the CARTA software interface. The main window shows a circular radio astronomy image with a color scale on the right ranging from -0.005 to 0.005. The axes are labeled 'Right ascension' and 'Declination'. Below the image is a 'Render Configuration' panel with a histogram and various settings like 'Clip Min', 'Clip Max', and 'Scaling'. On the right side, there are two profile plots: 'X Profile: Cursor X' and 'Y Profile: Cursor X', both showing 'Value' vs 'Coordinate'. At the bottom right, the 'Image List' widget is visible, containing a table with columns for 'Image', 'Layers', 'Matching', 'Channel', and 'Polarization'. A yellow arrow points to the 'XY' option in the 'Matching' column of the first row.

Image	Layers	Matching	Channel	Polarization
0 member.uid__A001_	R	XY	0	Stokes I
1 member.uid__A001_	R	XY	0	Stokes I

Image headers can be displayed by clicking on the icon with the H in the button bar.

The screenshot shows the CARTA web interface. A yellow arrow points to the 'H' icon in the toolbar, which is used to display the file header. The 'File Header' dialog box is open, showing the following information:

```
File Information Header
SIMPLE = T / Standard FITS
BITPIX = -32 / Floating point (32 bit)
NAXIS = 4
NAXIS1 = 1250
NAXIS2 = 1250
NAXIS3 = 477
NAXIS4 = 1
EXTEND = T
BSCALE = 1.000000000000E+00 / PHYSICAL = PIXEL*BSCALE + BZERO
BZERO = 0.000000000000E+00
BMAJ = 2.518340625389E-04
BMIN = 1.689219347791E-04
BPA = -3.389586726234E+01
BTYPE = Intensity
OBJECT = PJ113921.7
BUNIT = Jy/beam / Brightness (pixel) unit
RADESYS = ICRS
LONPOLE = 1.800000000000E+02
LATPOLE = 2.041413888889E+01
PC1_1 = 1.000000000000E+00
PC2_1 = 0.000000000000E+00
PC3_1 = 0.000000000000E+00
PC4_1 = 0.000000000000E+00
PC1_2 = 0.000000000000E+00
PC2_2 = 1.000000000000E+00
PC3_2 = 0.000000000000E+00
PC4_2 = 0.000000000000E+00
```

The main window displays a radio astronomy image with a color scale from -0.005 to 0.005. The image is centered on a region of interest, with axes labeled 'Declination' and 'Right Ascension'. The 'Render Configuration' panel at the bottom shows a histogram of the image data, with a cursor at -1.89e-3 Jy/beam. The 'Region List' panel at the bottom right shows a table of regions:

Matching	Channel	Polarization
XY R	0	Stokes I
XY Z R	0	Stokes I

Clicking on the contour icon in the button bar will open a window that can be used to generate contours. This is good when overlaying one form of emission over another.

The screenshot shows the CARTA software interface. A yellow arrow points to the contour icon in the toolbar. The main window displays a radio astronomy image of a circular source with a histogram of its values. The Contour Configuration dialog is open, showing a histogram of the data and a bell-shaped curve representing the distribution. The dialog includes fields for Data, Source, Levels, Configuration, and Styling. The Parameters section shows Start: 1.599e-4, Step: 1.279e-4, N: 5, and Multiplier: 1. The Levels section is empty. The Styling section shows Scaling: Linear, Color map: a color bar, and Invert color map: off. The Bias/Contrast section is also visible.

Layers	Matching	Channel	Polarization
4_A001	XY   R	0	Stokes I
2_A001	XY   Z R	0	Stokes I

Clicking on the contour icon in the button bar will open a window that can be used to generate contours. This is good when overlaying one form of emission over another.

The screenshot shows the CARTA software interface. The main window displays a radio astronomy image of a circular source. A 'Contour Configuration' dialog box is open in the center, showing a histogram of the image data. A yellow arrow points to the 'Generate' button in the dialog. The dialog box has the following fields and controls:

- Data: member.uid\_\_A001\_X158f\_X7a1\_PJ113921.7\_\_sci.spw17\_21\_23\_25.cont.Ltt0.pbcor.fits
- Source: [lock icon]
- Levels: Configuration Styling
- Generator: start-step-multiplier [Generate]
- Parameters: Start 5.000e-5 Step 5.000e-5 N 5 Multiplier 1
- Levels: 5.00e-5 × 1.00e-4 × 1.50e-4 × 2.00e-4 × 2.50e-4 ×
- Buttons: Clear Apply Close

The background image shows a circular source with a color map ranging from blue to red. The axes are labeled 'Right ascension' and 'Declination'. The 'Render Configuration' window at the bottom shows a histogram of the image data with a 'Min' and 'Max' value.

Layers	Matching	Channel	Polarization
d__A001	XY   R	0	Stokes I
f__A001	XY   Z R	0	Stokes I

Clicking on the contour icon in the button bar will open a window that can be used to generate contours. This is good when overlaying one form of emission over another.

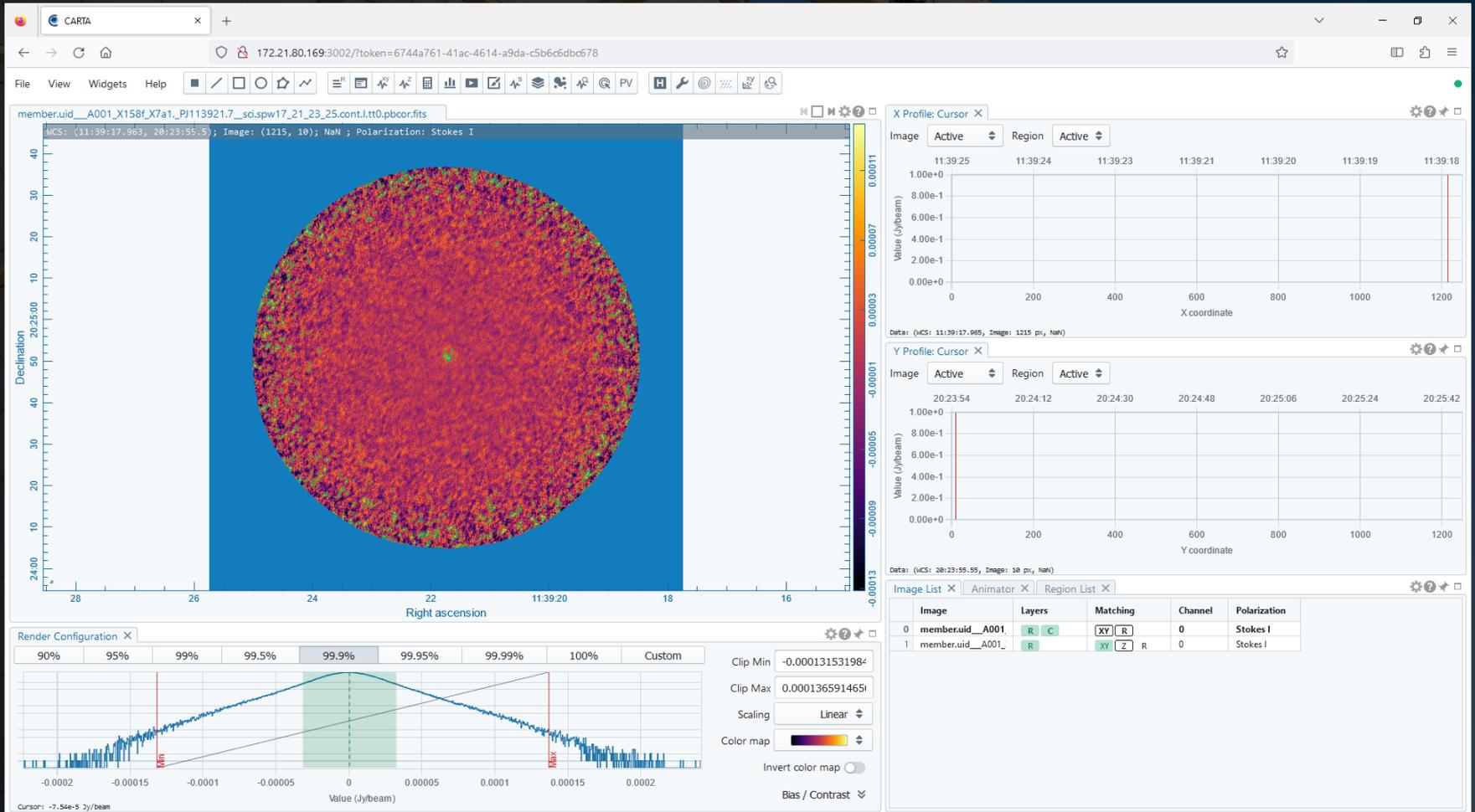
The screenshot shows the CARTA software interface. The main window displays a radio astronomy image with a circular field of view. The axes are labeled 'Right ascension' (28 to 22) and 'Declination' (24.00 to 40). A 'Contour Configuration' dialog box is open in the center, showing a histogram of the data. The dialog box has the following fields and controls:

- Data: member.uid\_\_A001\_X158f\_X7a1\_PJ113921.7\_\_sci.spw17\_21\_23\_25.cont.Ltt0.pbcor.fits
- Source: [lock icon]
- Levels: Configuration Styling
- Generator: start-step-multiplier [Generate]
- Parameters: Start 5.000e-5 Step 5.000e-5 N 5 Multiplier 1
- Levels: 5.00e-5 x 1.00e-4 x 1.50e-4 x 2.00e-4 x 2.50e-4 x
- Buttons: Clear Apply Close
- Scaling: Linear
- Color map: [color bar]
- Invert color map: [off]
- Bias / Contrast: [dropdown]

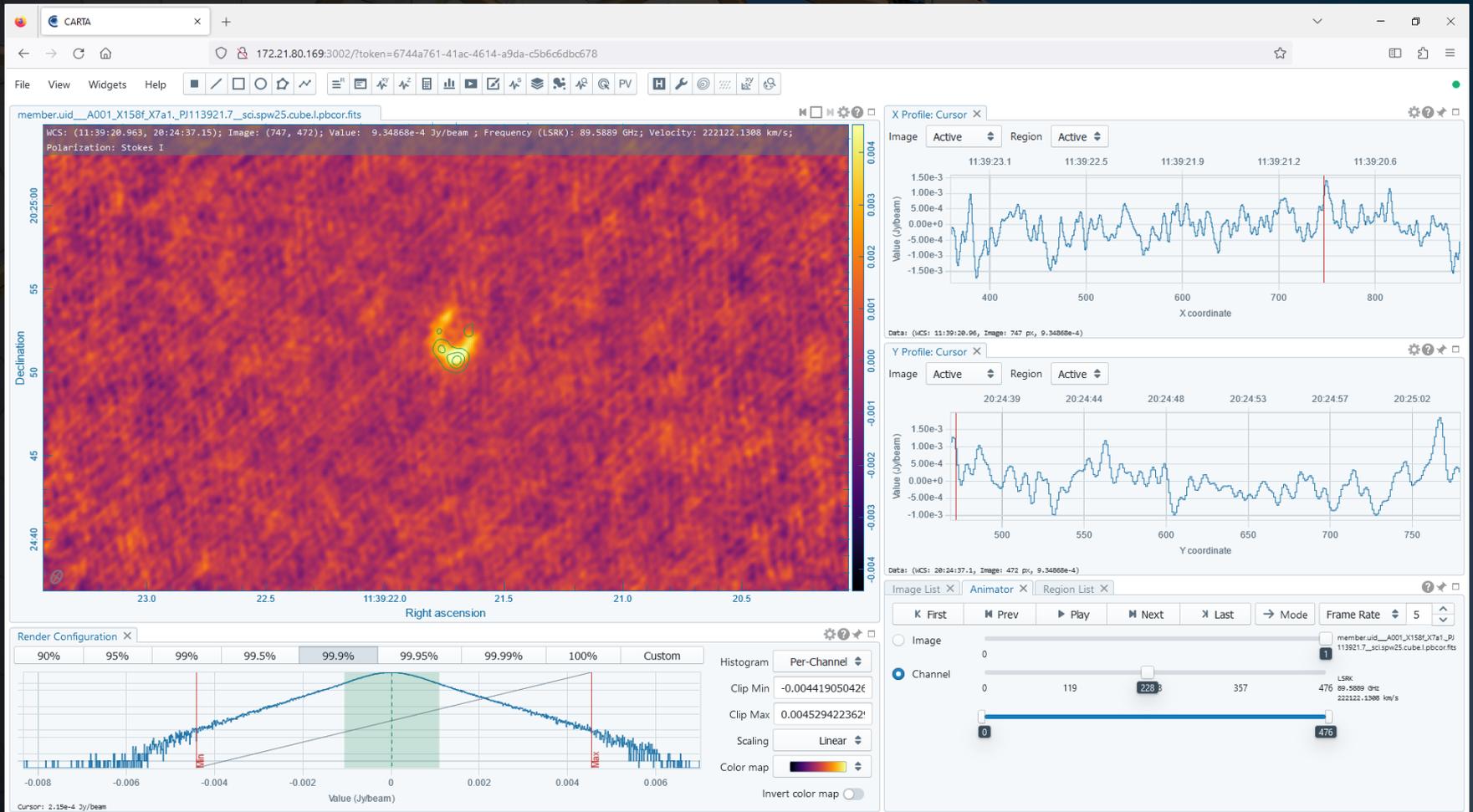
A yellow arrow points to the 'Apply' button in the dialog box. The background shows a histogram of the data with a green shaded region around the peak. The main window also shows a 'Render Configuration' dialog box with a histogram and a 'Region List' table.

Layers	Matching	Channel	Polarization
d__A001	R XY   R	0	Stokes I
d__A001	R XY   Z R	0	Stokes I

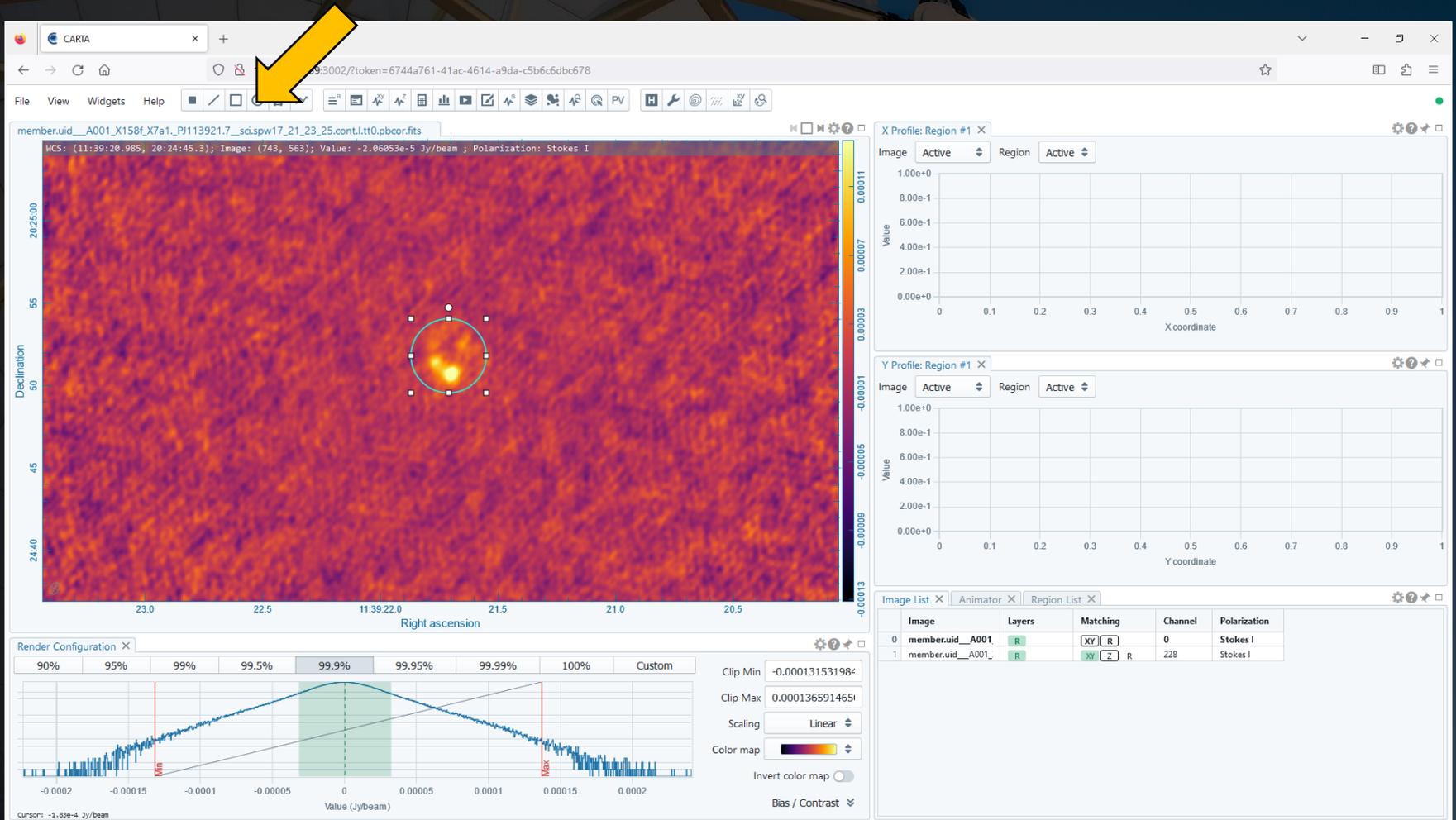
Clicking on the contour icon in the button bar will open a window that can be used to generate contours. This is good when overlaying one form of emission over another.



Clicking on the contour icon in the button bar will open a window that can be used to generate contours. This is good when overlaying one form of emission over another.



Regions can be drawn on the image by clicking on one of the shapes in the menu bar and then drawing that shape in the image panel. These regions can be used by several other widgets.



Double clicking on a region in an image or in the Region List widget will display information about that region.

The screenshot displays the CARTA software interface. The main window shows a radio telescope image with a region of interest (ROI) highlighted by a yellow circle and a yellow arrow. The ROI is centered on a bright source. The image axes are labeled 'Right ascension' (23.0 to 20.5) and 'Declination' (24.40 to 20.25.00). The color scale ranges from -0.00013 to 0.00011 Jy/beam.

The Region List widget at the bottom right contains the following table:

Name	Type	Center	Size	P.A. (deg)
Cursor	Point	11:39:20.985 20:24:45.3		0.0
Region 1	Ellipse	11:39:21.7099796862 20:24:51.8005009413	2.2500000000" 2.2500000000"	0.0

The X Profile and Y Profile widgets show the intensity profiles across the ROI. The X Profile shows a peak at X coordinate 0.5, and the Y Profile shows a peak at Y coordinate 0.5. The Region List widget also has a yellow arrow pointing to the 'Region 1' entry.

Double clicking on a region in an image or in the Region List widget will display information about that region.

The screenshot displays the CARTA software interface. The main window shows a radio telescope image with a color scale from 0.00007 to 0.00011. A dialog box titled "Editing Region 1" is open, showing the following details:

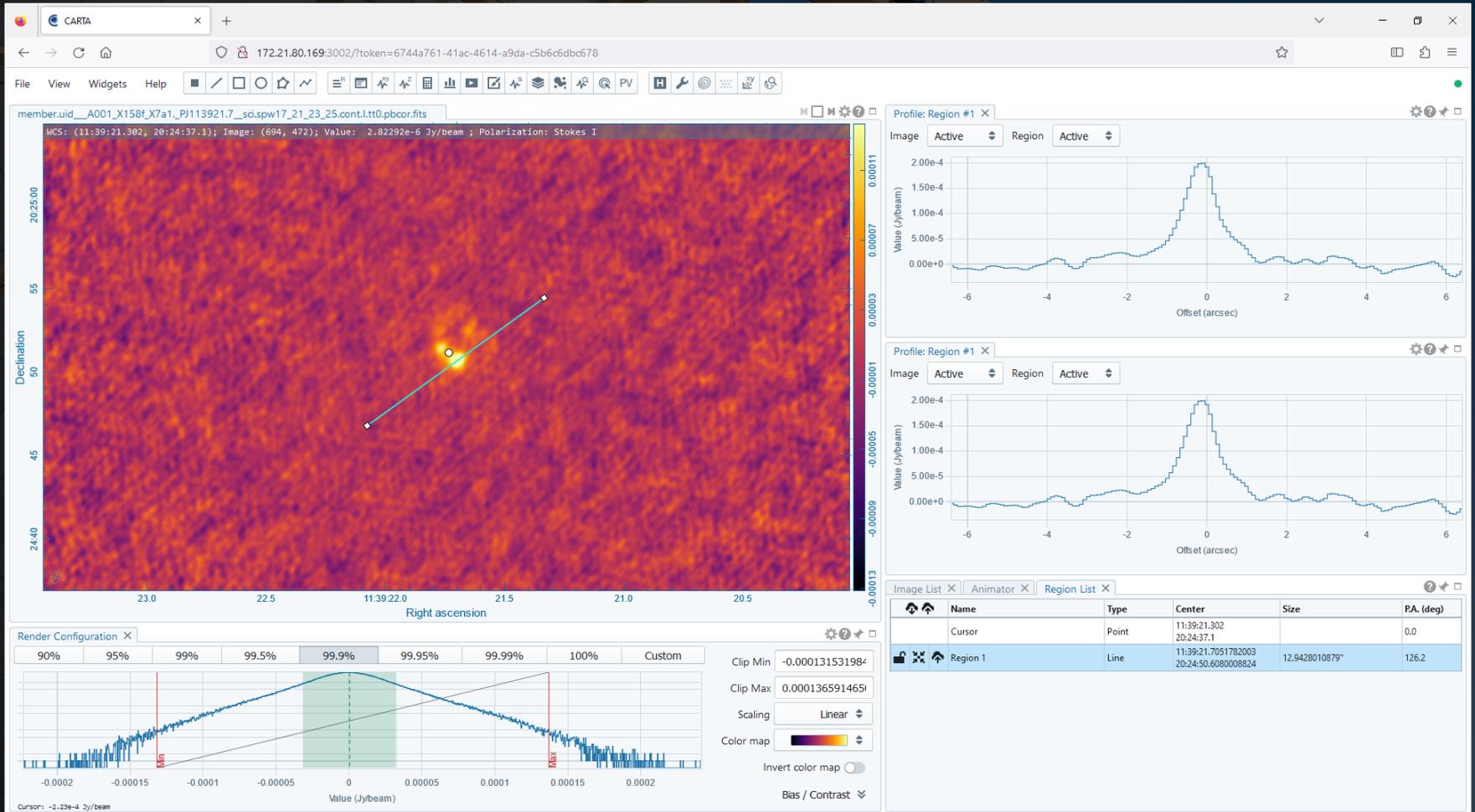
- Appearance:** Color (red), Line Width (px) 2, Dash Length (px) 0.
- Properties:** Region Name (Enter a region name), Coordinate (World), Center (11:39:21.70997, 20:24:51.80050), Semi-axes (2.2500000000", 2.2500000000"), P.A. (deg) 0.

The Region List widget at the bottom right shows the following table:

	Type	Center	Size	P.A. (deg)
Cursor	Point	11:39:20.985 20:24:45.3		0.0
Region 1	Ellipse	11:39:21.7099796862 20:24:51.8005009413	2.2500000000" 2.2500000000"	0.0

At the bottom, the Render Configuration widget shows a histogram of the image data with a cursor at -2.23e-4 Jy/beam. The histogram has a peak at 99.9% and a range from -0.0002 to 0.0002. The Clip Min is -0.000131531984 and the Clip Max is 0.0001365914651. The scaling is set to Linear and the color map is a red-to-blue gradient.

X Profile and Y Profile windows will, by default, show the x and y profiles at the position of the cursor. If a line region is drawn on the image, these widgets can be used to show the x and y profiles of the line.



The Statistics widget will display statistical information either for the pixels within an individual region (such as a circle) or for the entire image.

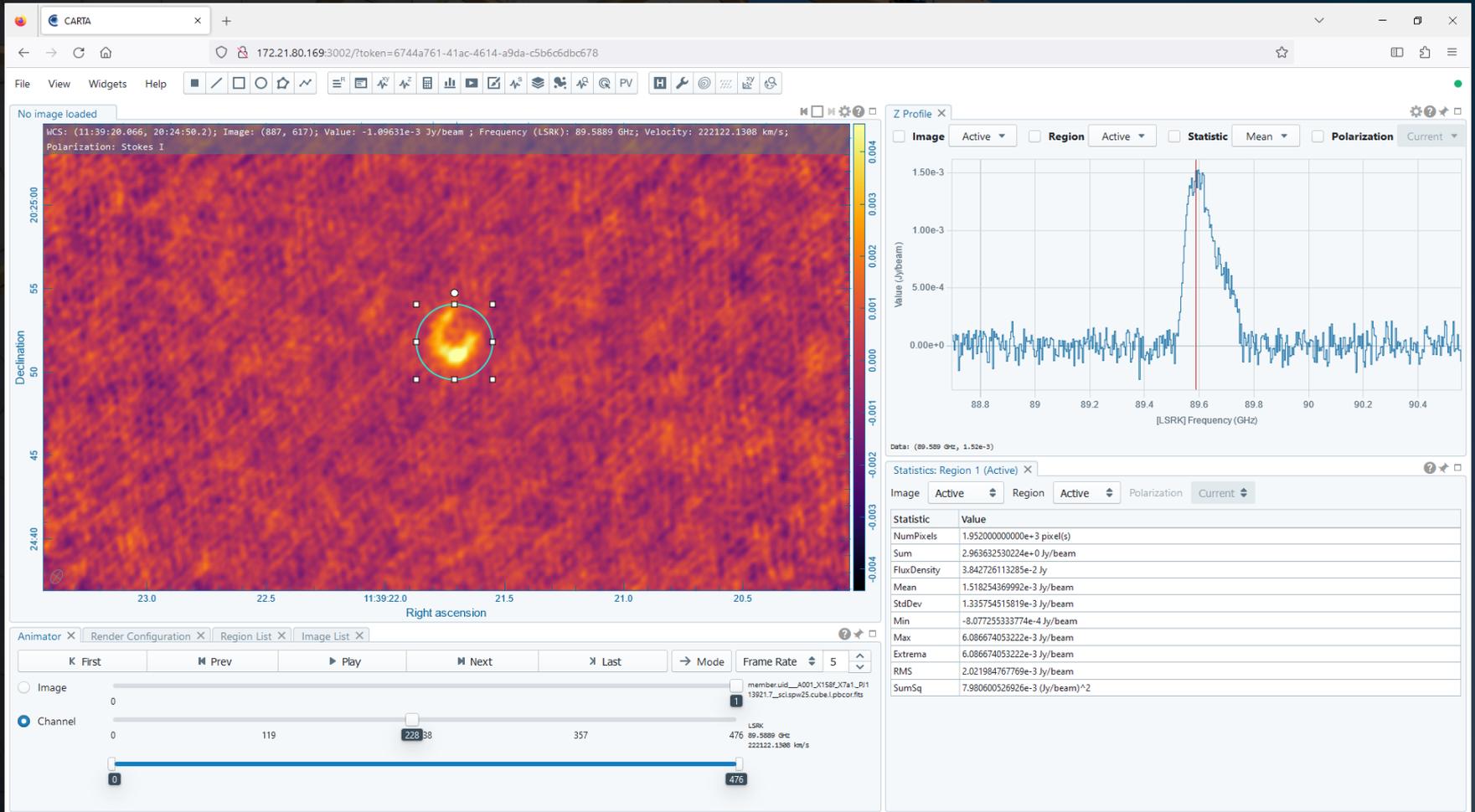
The screenshot displays the CARTA software interface. A yellow arrow points to the 'Statistics' widget in the top toolbar. The main window shows a radio astronomy image with a color scale from -0.00013 to 0.00011. A region of interest (ROI) is defined by a red circle and a blue ellipse. The 'Statistics: Region 1 (Active)' window is open, showing the following data:

Statistic	Value
NumPixels	1.961000000000e+3 pixel(s)
Sum	7.068734640706e-2 Jy/beam
FluxDensity	1.286420301871e-3 Jy
Mean	3.604658154363e-5 Jy/beam
StdDev	3.473249264475e-5 Jy/beam
Min	-2.632030373206e-5 Jy/beam
Max	2.10575702360e-4 Jy/beam
Extrema	2.10575702360e-4 Jy/beam
RMS	5.005084332441e-5 Jy/beam
SumSq	4.912475445187e-6 (Jy/beam) <sup>2</sup>

The 'Render Configuration' window at the bottom left shows a histogram of the image values, with a green shaded region indicating the current clip range from -0.000131531984 to 0.0001365914651. The 'Image List' window at the bottom right shows the following table:

Name	Type	Center	Size	P.A. (deg)
Cursor	Point	11:39:22.105 20:24:54.34		0.0
Region 1	Ellipse	11:39:21.7099796862 20:24:51.8005009413	2.2500000000" 2.2500000000"	0.0

The Z Profile will show the spectrum measured within an image cube at the position of the cursor or within a region. (Because spectra can be slow to load and because the spectrum updates when the cursor is moved across an image, displaying the spectrum within a region works better.)



Left clicking on a specific location in the spectrum will display the image cube at that specific frequency.

HCs: (11:39:20.162, 20:24:58.2); Image: (872, 706); Value: 3.82817e-4 Jy/beam ; Frequency (LSRK): 89.6944 GHz; Velocity: 222030.7014 km/s;  
Polarization: Stokes I

Right ascension

Declination

Z Profile X

Image Active Region Active Statistic Mean Polarization Current

Value (Jy/beam)

LSRJK Frequency (GHz)

Data: (89.694 GHz, 4.856e-4)

Statistics: Region 1 (Active) X

Image Active Region Active Polarization Current

Statistic	Value
NumPixels	1.952000000000e+3 pixel(s)
Sum	9.533261039725e-1 Jy/beam
FluxDensity	1.236108416564e-2 Jy
Mean	4.883842745761e-4 Jy/beam
StdDev	8.028643198581e-4 Jy/beam
Min	-9.380040573888e-4 Jy/beam
Max	3.970680758357e-3 Jy/beam
Extrema	3.970680758357e-3 Jy/beam
RMS	9.395637790463e-4 Jy/beam
SumSq	1.723186745237e-3 (Jy/beam) <sup>2</sup>

Animator X Render Configuration X Region List X Image List X

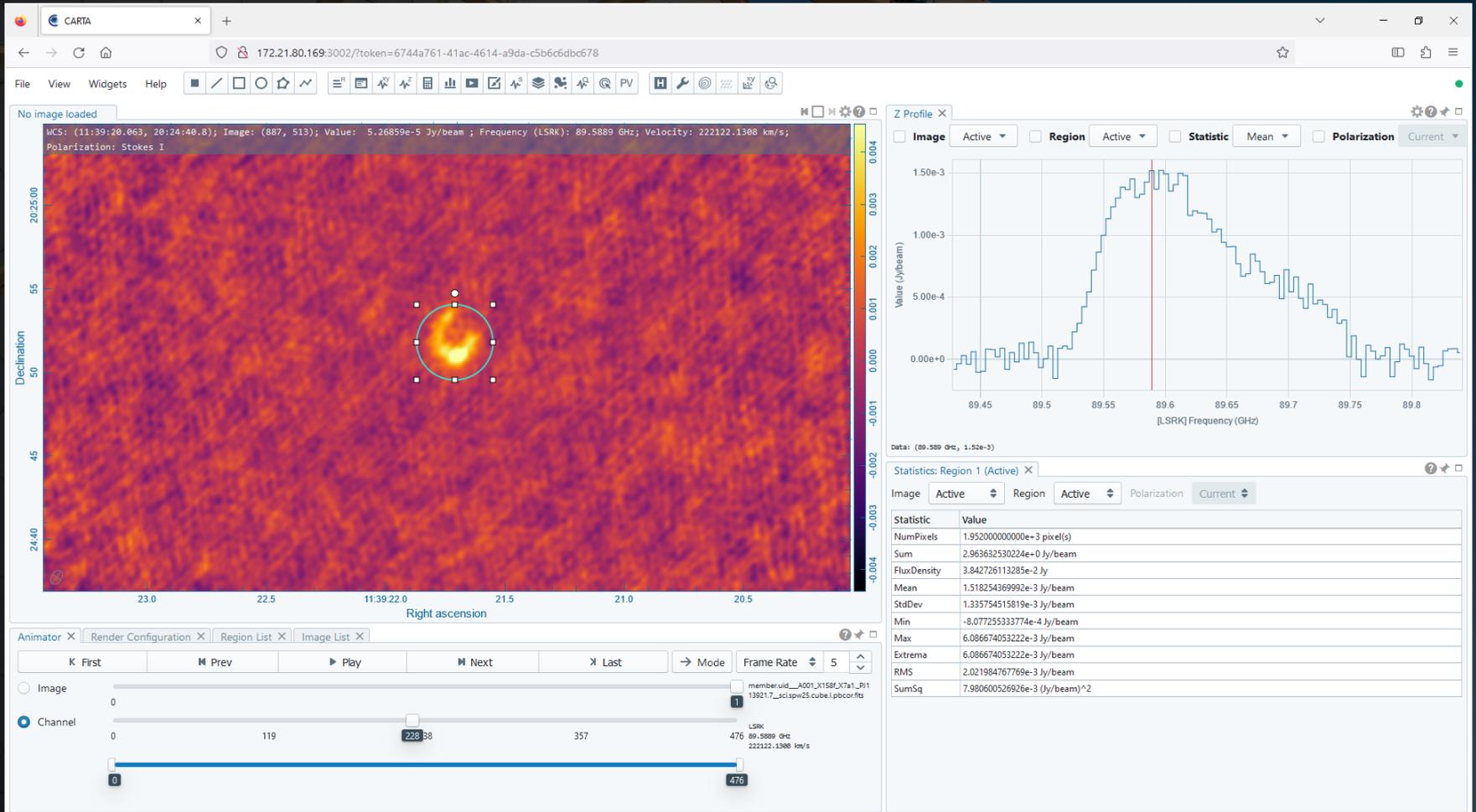
K First Prev Play Next Last Mode Frame Rate 5

Image 0

Channel 0 119 238 255 357

LSRK 476 89.6944 GHz 222030.7014 km/s

Holding down the left mouse button and dragging within the plot of the spectrum will zoom in on that location. (Double-clicking will zoom out again.)



The smoothing option in the Z Profile window (accessible through settings if the button is not visible) provides options for smoothing the spectrum.

The screenshot displays the CARTA software interface. The main window shows a spectral image with a color scale from -0.003 to 0.003. The Z Profile window is open, showing a plot of Value (Jy/beam) versus [LSRK] Frequency (GHz). The plot shows a peak at approximately 89.6 GHz. The Z Profile window has tabs for Image, Region, and Statistic. The Statistic tab is active, showing a table of statistics for Region 1 (Active).

**Z Profile Settings: Region #1 (Active)**

- Conversion: [None]
- Styling: [None]
- Smoothing: [None]
- Moments: [None]
- Fitting: [None]

Method: Boxcar  
Color: [Red]  
Line Style: [None]  
Line Width (px): 1  
Point Size (px): 1  
Overlay: [Off]  
Kernel: 8

**Z Profile X**

Image: Active | Region: Active | Statistic: Mean | Polarization: Current

Value (Jy/beam) vs [LSRK] Frequency (GHz)

Data: (89.702 GHz, 5.45e-4)

**Statistics: Region 1 (Active) X**

Statistic	Value
NumPixels	1.952000000000e+3 pixel(s)
Sum	1.063091441329e+0 Jy/beam
FluxDensity	1.378433122441e-2 Jy
Mean	5.446165170741e-4 Jy/beam
StdDev	8.443887216754e-4 Jy/beam
Min	-9.777159430087e-4 Jy/beam
Max	4.016421269625e-3 Jy/beam
Extrema	4.016421269625e-3 Jy/beam
RMS	1.004606490874e-3 Jy/beam
SumSq	1.970025161342e-3 (Jy/beam) <sup>2</sup>

Animator: [None] | Render Configuration: [None] | Region List: [None] | Image List: [None]

Channel: 0 to 476 (LSRK: 476 89.7022 GHz, 222023.9288 km/s)

The moment option in the Z Profile window (accessible through settings if the button is not visible) provides an option for creating moment images. These will appear as separate images in the Image List, and it is possible to switch to and from these moment images using the Animator.

The screenshot displays the CARTA software interface. The main window shows a spectral cube with a color scale from -0.003 to 0.003. The Z Profile window is open, showing the 'Moments' tab. A yellow arrow points to the 'Generate' button. Another yellow arrow points to the 'Moment' button in the 'Moments' section. The Animator window at the bottom shows the 'Channel' selected, with a slider indicating the current channel is 257 out of 476.

**Z Profile Settings: Region #1 (Active)**

- Conversion: Styling Smoothing **Moments**
- Image (1: membe...): Active
- Region (Region 1): Active
- Coordinate: Frequency (GHz)
- System: LSRK
- Range (GHz): From 89.5 To 89.75
- Mask: None
- Range (Jy/beam): From 0 To 1
- Moments: 0 ×

**Z Profile X**

Image Active Region Active Statistic Mean Polarization Current

Value (J/beam)

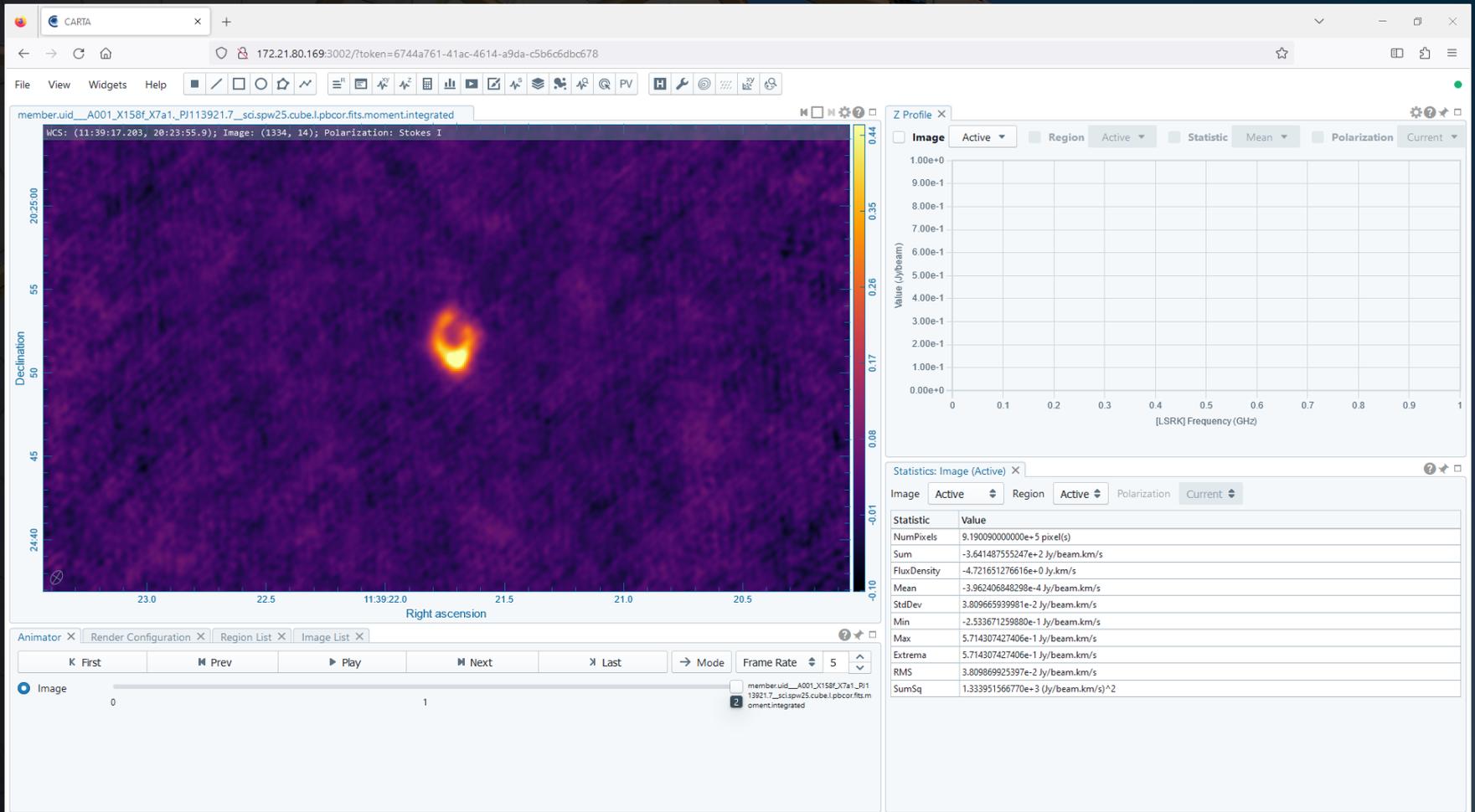
LSRKJ Frequency (GHz)

Data: (89.702 GHz, 5.45e-4)

**Statistics: Region 1 (Active) X**

Statistic	Value
NumPixels	1.952000000000e+3 pixel(s)
Sum	1.063091441329e+0 Jy/beam
FluxDensity	1.378433122441e-2 Jy
Mean	5.446165170741e-4 Jy/beam
StdDev	8.443887216754e-4 Jy/beam
Min	-9.777159430087e-4 Jy/beam
Max	4.016421269625e-3 Jy/beam
Extrema	4.016421269625e-3 Jy/beam
RMS	1.004606490874e-3 Jy/beam
SumSq	1.970025161342e-3 (Jy/beam) <sup>2</sup>

The moment option in the Z Profile window (accessible through settings if the button is not visible) provides an option for creating moment images. These will appear as separate images in the Image List, and it is possible to switch to and from these moment images using the Animator.



The fitting option in the Z Profile window (accessible through settings if the button is not visible) can be used to fit a spectral line, although a priori values need to be set first (or estimated using the auto detect button).

The screenshot displays the CARTA software interface. The main window shows a spectral line plot with a Gaussian fit overlaid. The plot's x-axis is labeled 'LSRJQ Frequency (GHz)' and ranges from 88.8 to 90.4. The y-axis is labeled 'Value (J/beam)' and ranges from 0.00e+0 to 1.50e-3. A red vertical line marks the peak of the fit at approximately 89.6 GHz. The plot is titled 'Z Profile X' and has tabs for 'Image', 'Region', 'Statistic', 'Mean', and 'Polarization'. The 'Image' tab is active.

A 'Z Profile Settings: Region #1 (Active)' window is open, showing various configuration options. A yellow arrow points to the 'Fitting' tab in this window. The 'Fitting' tab is currently selected, and the 'Profile function' is set to 'Gaussian'. Other options include 'Auto detect', 'Components', 'Center', 'Amplitude', 'FWHM', 'Continuum', and 'Fitting result'.

At the bottom of the interface, there is an 'Animator' section with playback controls (First, Prev, Play, Next, Last) and a 'Frame Rate' set to 5. Below this are sliders for 'Image' and 'Channel' selection, with the 'Image' slider currently at 228 and the 'Channel' slider at 476.

On the right side, a 'Statistics: Region 1 (Active)' window is open, displaying a table of statistical values for the active region.

Statistic	Value
NumPixels	1.952000000000e+3 pixel(s)
Sum	2.963632530224e+0 Jy/beam
FluxDensity	3.842726113285e-2 Jy
Mean	1.518254369992e-3 Jy/beam
StdDev	1.335754515819e-3 Jy/beam
Min	-8.077255333774e-4 Jy/beam
Max	6.086674053222e-3 Jy/beam
Extrema	6.086674053222e-3 Jy/beam
RMS	2.021984767769e-3 Jy/beam
SumSq	7.980600526926e-3 (Jy/beam)^2



The fitting option in the Z Profile window (accessible through settings if the button is not visible) can be used to fit a spectral line, although a priori values need to be set first (or estimated using the auto detect button).

The screenshot displays the CARTA software interface. The main window shows a spectral line plot with a green shaded region indicating a fit. A yellow arrow points to the 'Fit' button in the 'Z Profile Settings: Region #1 (Active)' dialog box. The dialog box contains the following information:

**Z Profile Settings: Region #1 (Active)**  
detected 1 component.

Components: 1

Center: 89.59479605729794

Amplitude: 0.001412333081501176

FWHM: 0.11717704799973205

Continuum: None

Fitting result: [Empty box]

Buttons: Reset, Fit, Log, Residual

The main window also displays the following information:

member\_uid\_\_A001\_X158f\_X7a1\_PJ113921.7\_sq.spw25.cube.lpbcor.fits

HCS: (11:39:23.197, 20:24:39.1); Image: (398, 494); Value: 2.87048e-4 Jy/beam; Frequency (LSRK): 89.5889 GHz; Velocity: 222122.1388 km/s; Polarization: Stokes I

Z Profile X: Image Active, Region Active, Statistic Mean, Polarization Current

Value (J/beam) vs [LSRK] Frequency (GHz)

Data: (89.5889 GHz, 1.52e-5)

Statistics: Region 1 (Active) X

Statistic	Value
NumPixels	1.952000000000e+3 pixel(s)
Sum	2.963632530224e+0 Jy/beam
FluxDensity	3.842726113285e-2 Jy
Mean	1.518254369992e-3 Jy/beam
StdDev	1.335754515819e-3 Jy/beam
Min	-8.077255333774e-4 Jy/beam
Max	6.086674053222e-3 Jy/beam
Extrema	6.086674053222e-3 Jy/beam
RMS	2.021984767769e-3 Jy/beam
SumSq	7.980600526926e-3 (Jy/beam)^2

The fitting option in the Z Profile window (accessible through settings if the button is not visible) can be used to fit a spectral line, although a priori values need to be set first (or estimated using the auto detect button).

The screenshot displays the CARTA software interface. The main window shows a spectral plot with a fitted line. A 'Z Profile Settings: Region #1 (Active)' dialog box is open, showing the following parameters:

- Components: 1
- Center: 89.59479605729794
- Amplitude: 0.001412333081501176
- FWHM: 0.11717704799973205
- Continuum: None

The 'Fitting result' section shows:

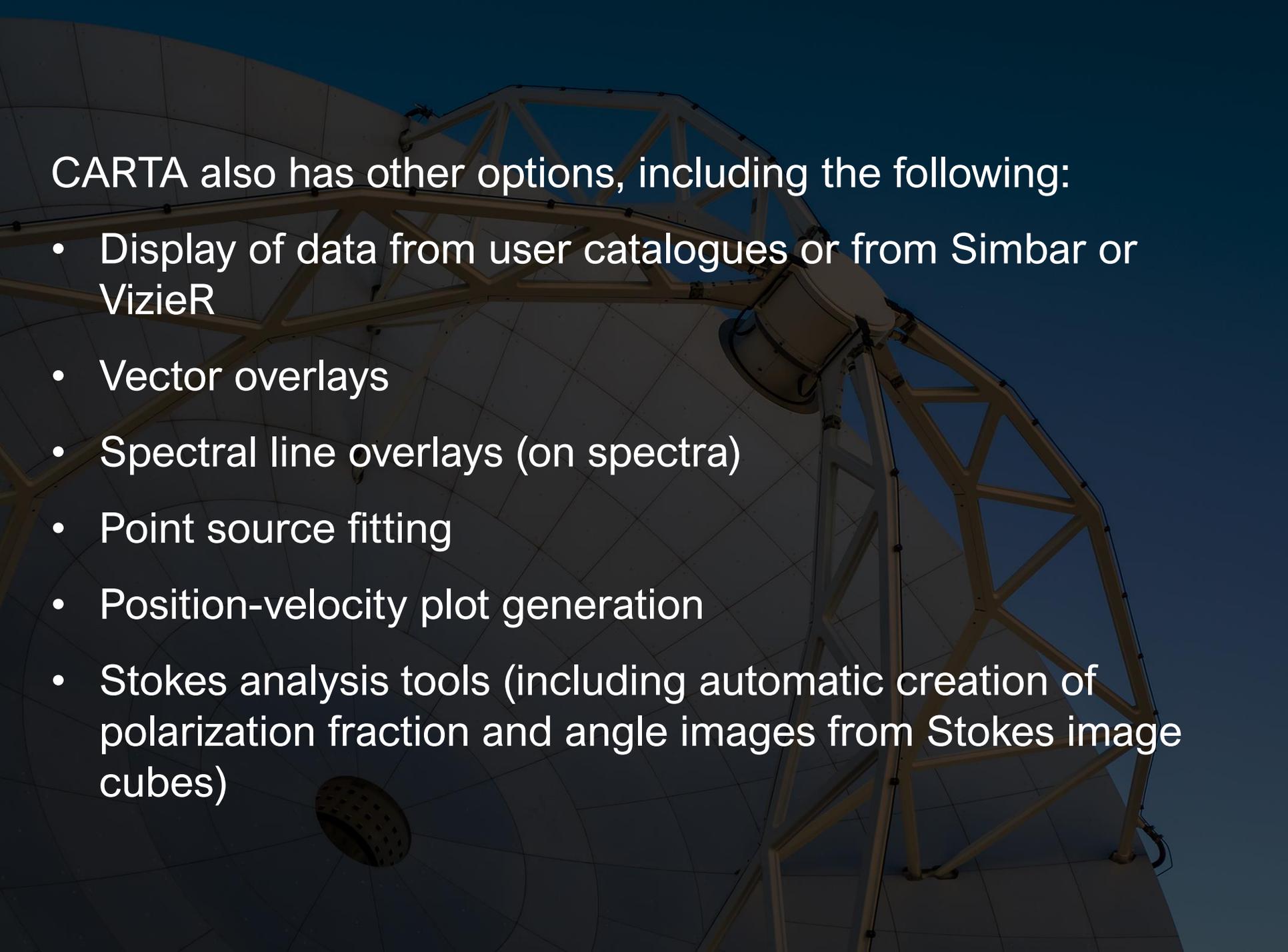
- Component #1
- Center = 89.609853 (GHz)
- Center Error = 0.001268 (0.001%)
- Amplitude = 0.001419 (Jy/beam)
- Amplitude Error = 0.000027 (1.915%)
- FWHM = 0.135017 (GHz)
- FWHM Error = 0.002985 (2.211%)
- Integral = 0.000204 (Jy/beam \* GHz)
- Integral Error ~ 0.000004 (1.915%)

The 'Z Profile' window shows a plot of Value (J/beam) vs [LSRK] Frequency (GHz). The plot displays a peak at approximately 89.6 GHz, with a fitted curve overlaid. The data is labeled as (89.5889 GHz, 1.52e-3).

The 'Statistics: Region 1 (Active)' window shows the following statistics:

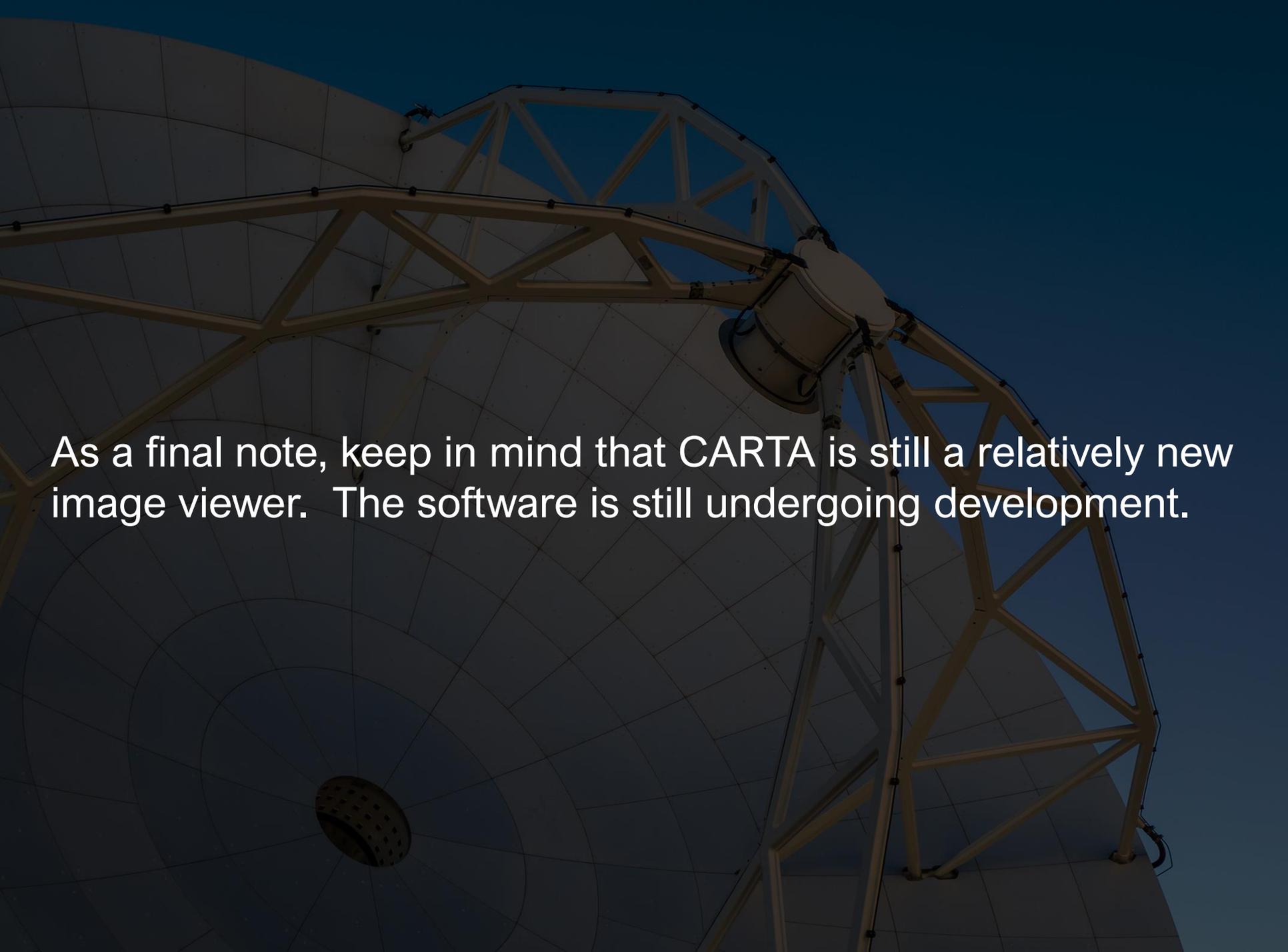
Statistic	Value
NumPixels	1.952000000000e+3 pixel(s)
Sum	2.963632530224e+0 Jy/beam
FluxDensity	3.842726113285e-2 Jy
Mean	1.518254369992e-3 Jy/beam
StdDev	1.335754515819e-3 Jy/beam
Min	-8.077255333774e-4 Jy/beam
Max	6.086674053222e-3 Jy/beam
Extrema	6.086674053222e-3 Jy/beam
RMS	2.021984767769e-3 Jy/beam
SumSq	7.980600526926e-3 (Jy/beam)^2

The bottom of the interface shows an 'Animator' window with playback controls and a timeline. The timeline is set to 'Image' mode, showing a range from 0 to 476, with a current position at 228.88. The LSRK velocity is displayed as 476 89.5889 GHz 222122.1388 km/s.



CARTA also has other options, including the following:

- Display of data from user catalogues or from Simbar or Vizier
- Vector overlays
- Spectral line overlays (on spectra)
- Point source fitting
- Position-velocity plot generation
- Stokes analysis tools (including automatic creation of polarization fraction and angle images from Stokes image cubes)

A large satellite dish antenna structure is shown against a dark blue sky. The dish is composed of a complex metal lattice of beams and supports. A large, circular, perforated horn antenna is mounted on the right side of the structure. The overall scene is dimly lit, suggesting dusk or dawn.

As a final note, keep in mind that CARTA is still a relatively new image viewer. The software is still undergoing development.