Looking at your data in CARTA

(and doing some analysis in CARTA):

A demo

ACE Talk: Alex Green, Oct. 24, 2024

Resources

- User manual (carta.readthedocs.io)
- Helpdesk (support@carta.freshdesk.com)
- Github Issues page (github.com/CARTAvis/carta/issues)
- Juergen Ott's demo at the 20th NRAO Synthesis Imaging Summer School (slides, video)

What is it?

A Good, Well-constructed acronym:

Cube **A**nalysis and **R**endering **T**ool for **A**stronomy

What is it (actually)?

A visualization tool for astronomical data, built for personal & server deployment

It allows you to quickly load in large (GB, TB) files located on a remote

server and view them on your personal laptop

Works with FITS (+gzip) images, CASA images, HDF5

You can also load in catalogs: VOTable, FITS, online (SIMBAD)

Why not just use DS9?

If you are able to get what you need done quickly and efficiently in DS9, I encourage you to stick with it!

I was first exposed to DS9 in Fall 2016 (intro astronomy class my first year of college) and even now (October 2024) I do not feel like I can accomplish the tasks[1] I would like to do in DS9 efficiently

On the other hand, in a matter of weeks, I was able to get to a level of comfort with CARTA where I could perform these tasks without difficulty

CARTA also has the full gamut of matplotlib colormaps, which I view as a dealbreaker by itself.

[1]Tweaking colorbar limits, matching and locking WCS and spectral axes of multiple frames, looking at spectra of regions

Why make the effort to download/learn/use CARTA?

v4.1 (January 2024 release) is stable/functional/well-performing v4.1, and new versions are in active development (cartavis.org/#roadmap)

Next release

The next release will be v5.0 (Q3 2024) with the planned main new features (details TBD):

- Full support of workspace
- Full support of workspace sharing (carta-controller only)
- RGB image blender
- Channel-map view
- Image source finder
- Spectral line query enhancement
- Catalog visualization enhancement
- Python scripting interface (long-term effort)

Future releases

This is a non-exclusive list of features we would like to add in subsequent releases, but they are not 100% decided upon yet and depend on feedback from users, resourcing etc.:

- Collaborative tools
- Volume (pseudo 3D) rendering
- Profile, histogram, and image fitting tools
- VO service (image and catalog)
- Smart layout
- New moment image generator
- Python scripting interface (long-term effort)

I love the functionality that CARTA offers, but as a principle, I hate having to use my mouse to interface with my computer. I am outrageously excited for the Python scripting interface

What is the intent of this demo?

This demo is a simulation of a workflow I might go through while inspecting some new radio astronomy data product I'm working with. The data used are (modified) position-position-velocity cubes from my 2023 ALMA program.

The ymmv-factor here might seem high if you don't work with radio data or IFU cubes, but many of the things I'll show broadly work the same way on photometry. If you save them as FITS images, you can probably do all of this with simulation results as well!

On to the demo!