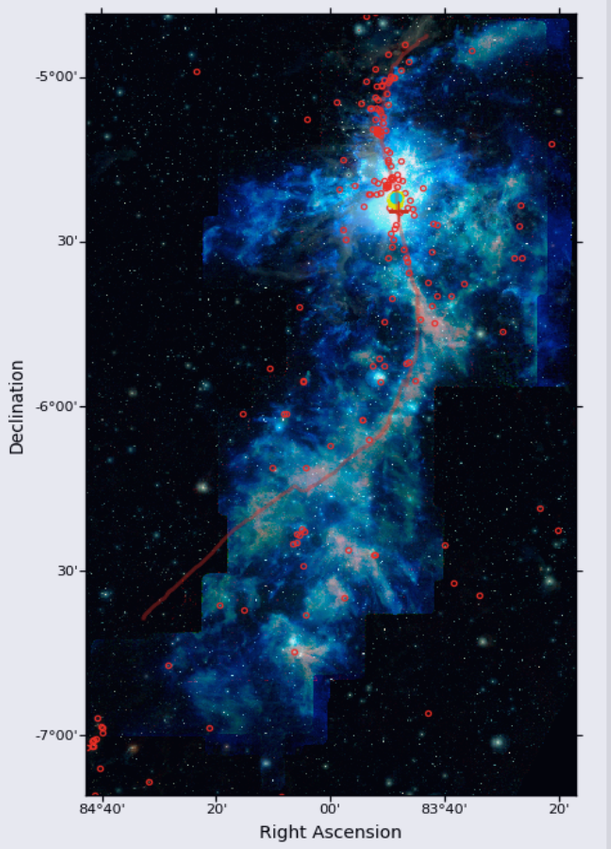
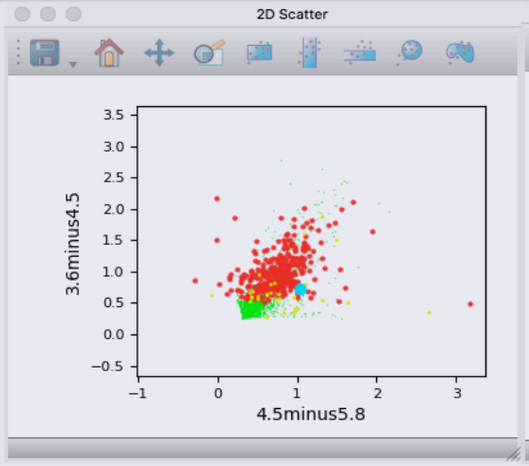
Alyssa A. Goodman
Harvard-Smithsonian Center for Astrophysics +Radcliffe Insitute for Advanced Study
@AlyssaAGoodman

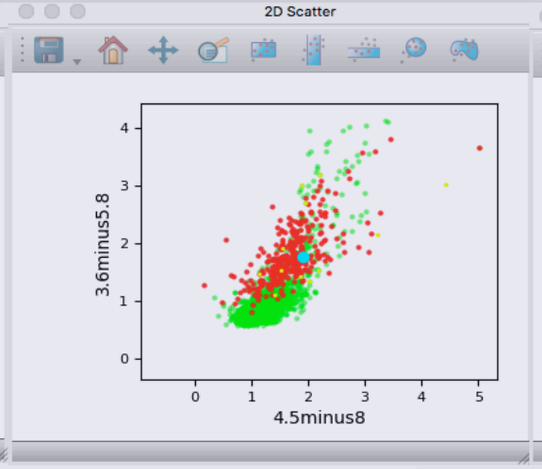
Export Session | Add/edit arithmetic attributes | Selection Mode: | Preferences | View Error Con

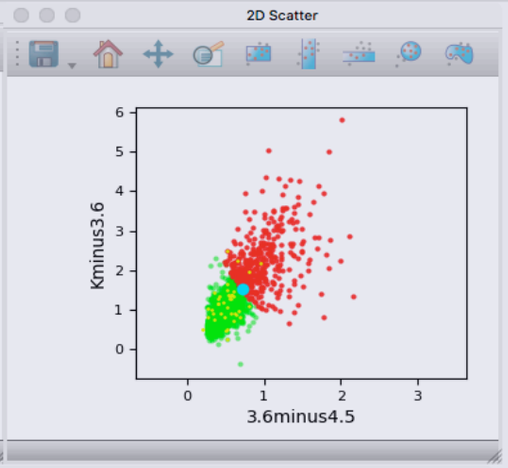
Tab 1 | Tab 3

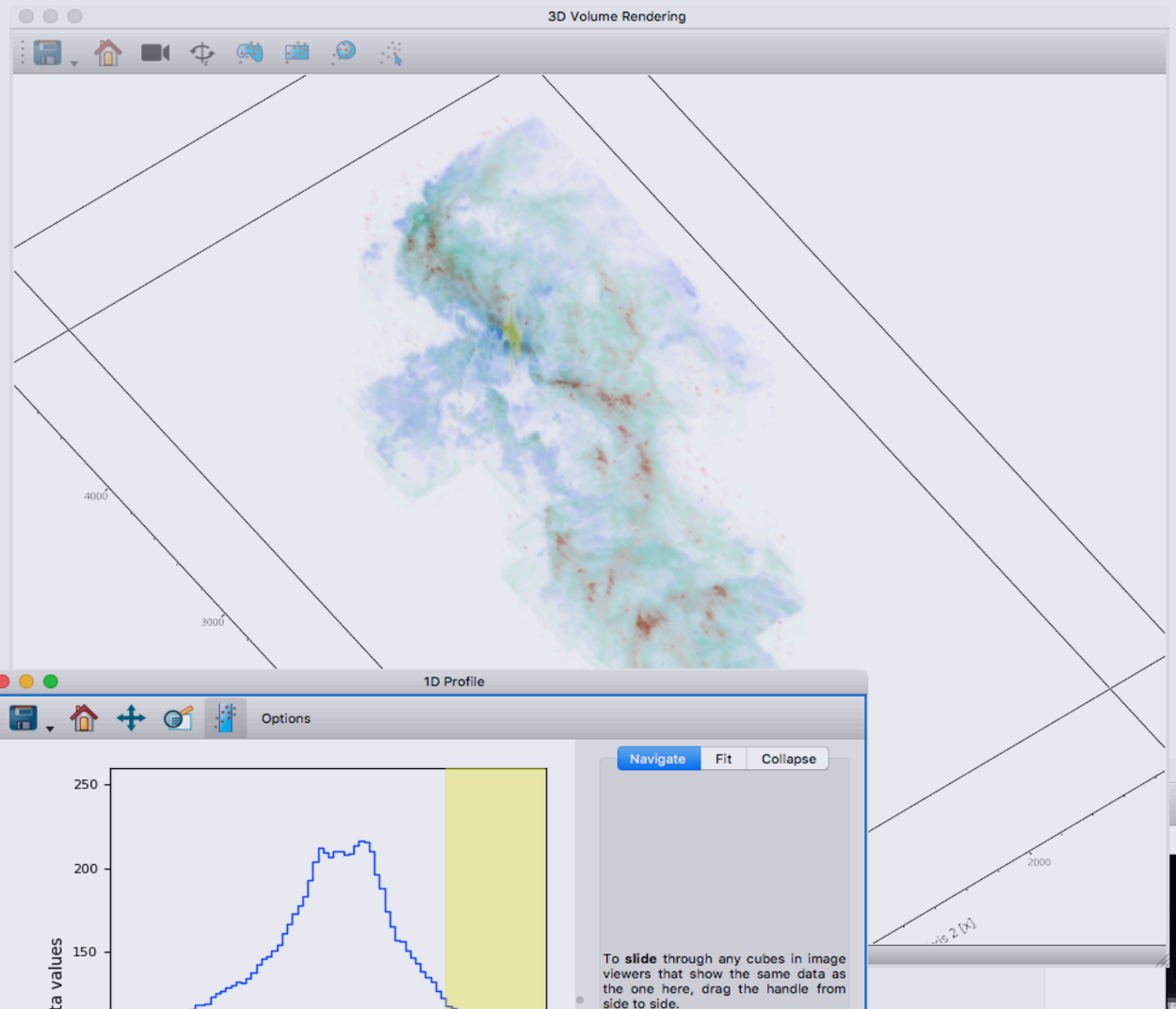


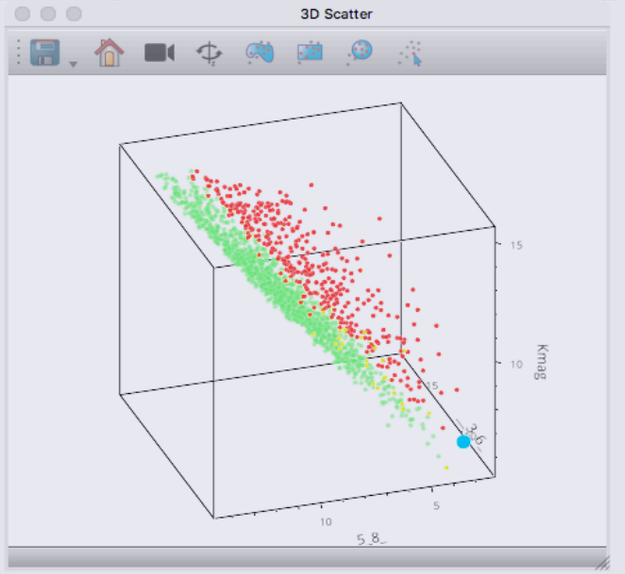
glue



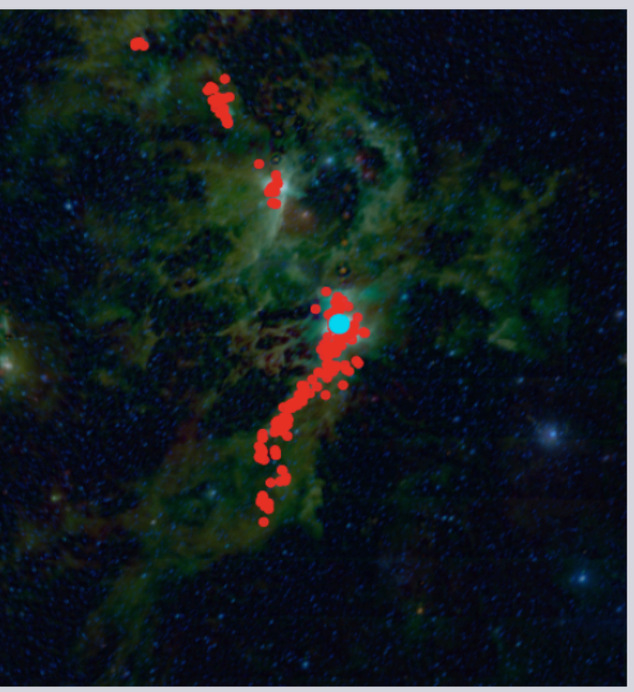


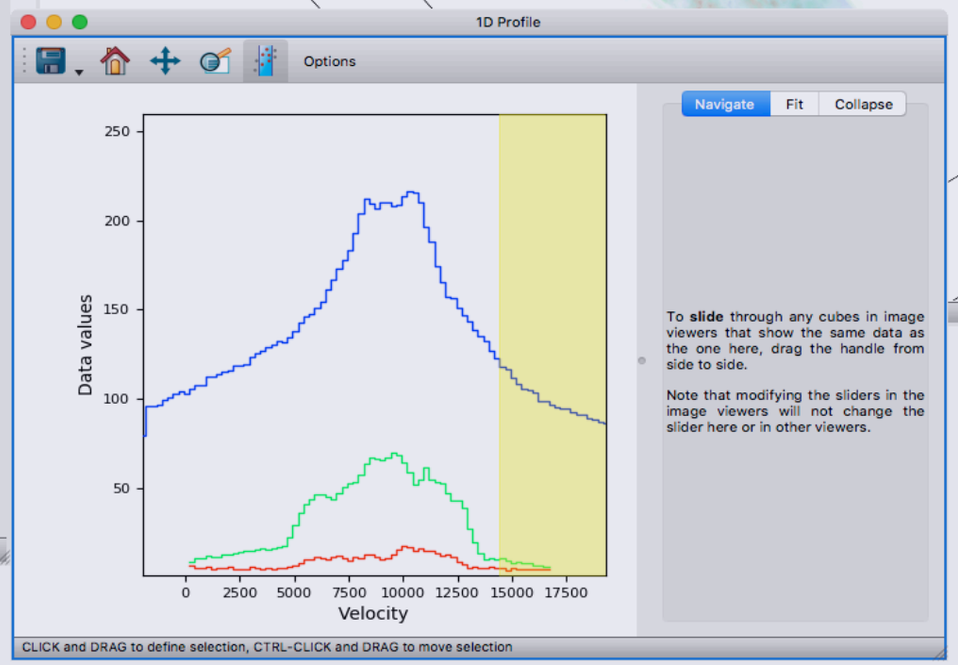




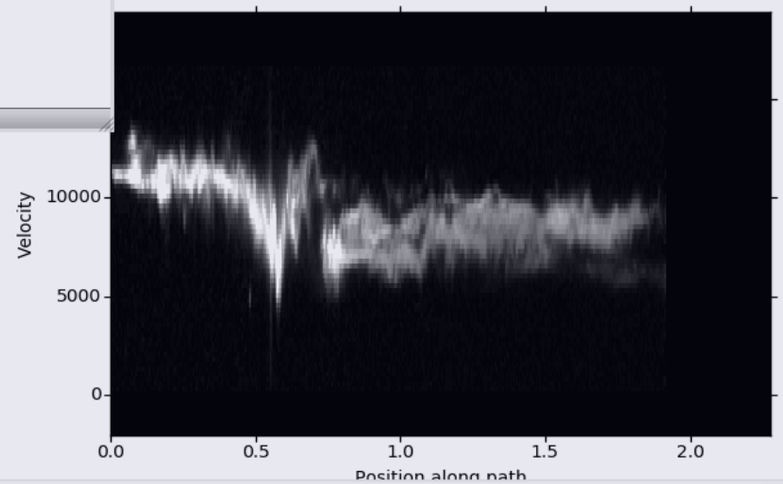


WorldWideTelescope (WWT)





Custom Slice



glue: a new instrument for discovery

multidimensional data exploration

built-in

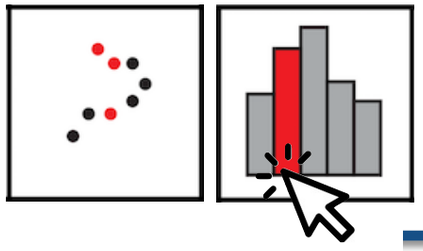
standard data loaders

Data File 1

Data File 2

Data File N

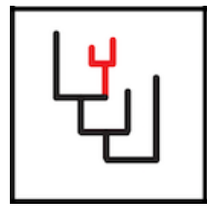
define new variables, import/export insights, interactive plots for the web, save state, all from GUI



standard 1D, 2D & 3D plots

link data files' attributes

highlight live or algorithmic selections with Boolean logic

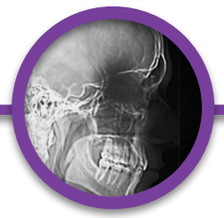


plug-in

custom data loaders

custom buttons, features

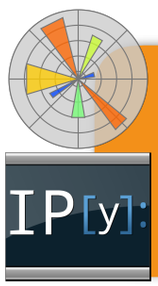
custom plots



?

+options

user config.py file (loaders, colors, plot types, +)

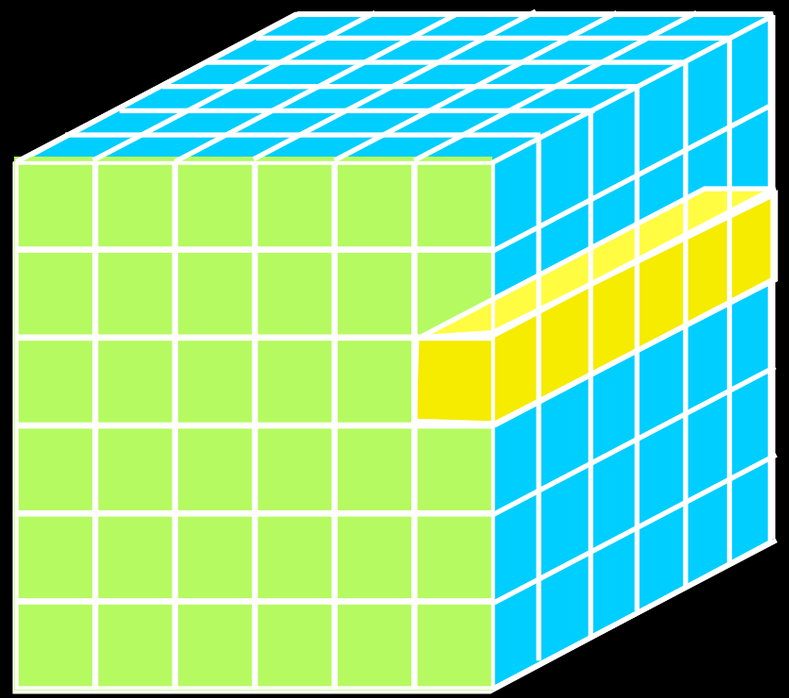


access to all matplotlib functions through built-in IPython terminal

jupyter

run & interact with glue from Jupyter notebook & other tools

glueviz.org

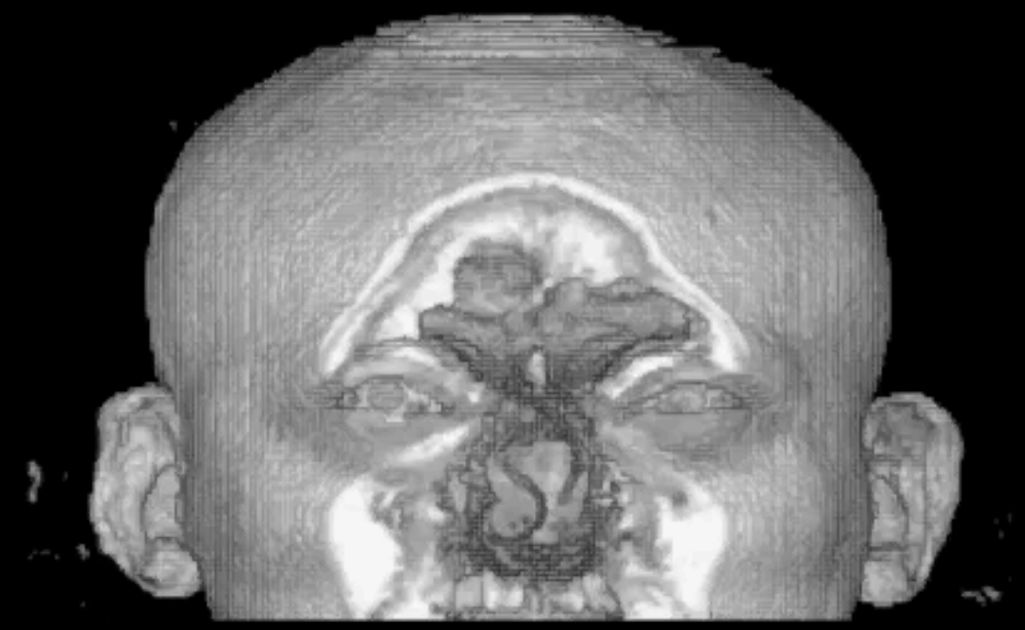


DATA-DIMENSIONS-DISPLAY

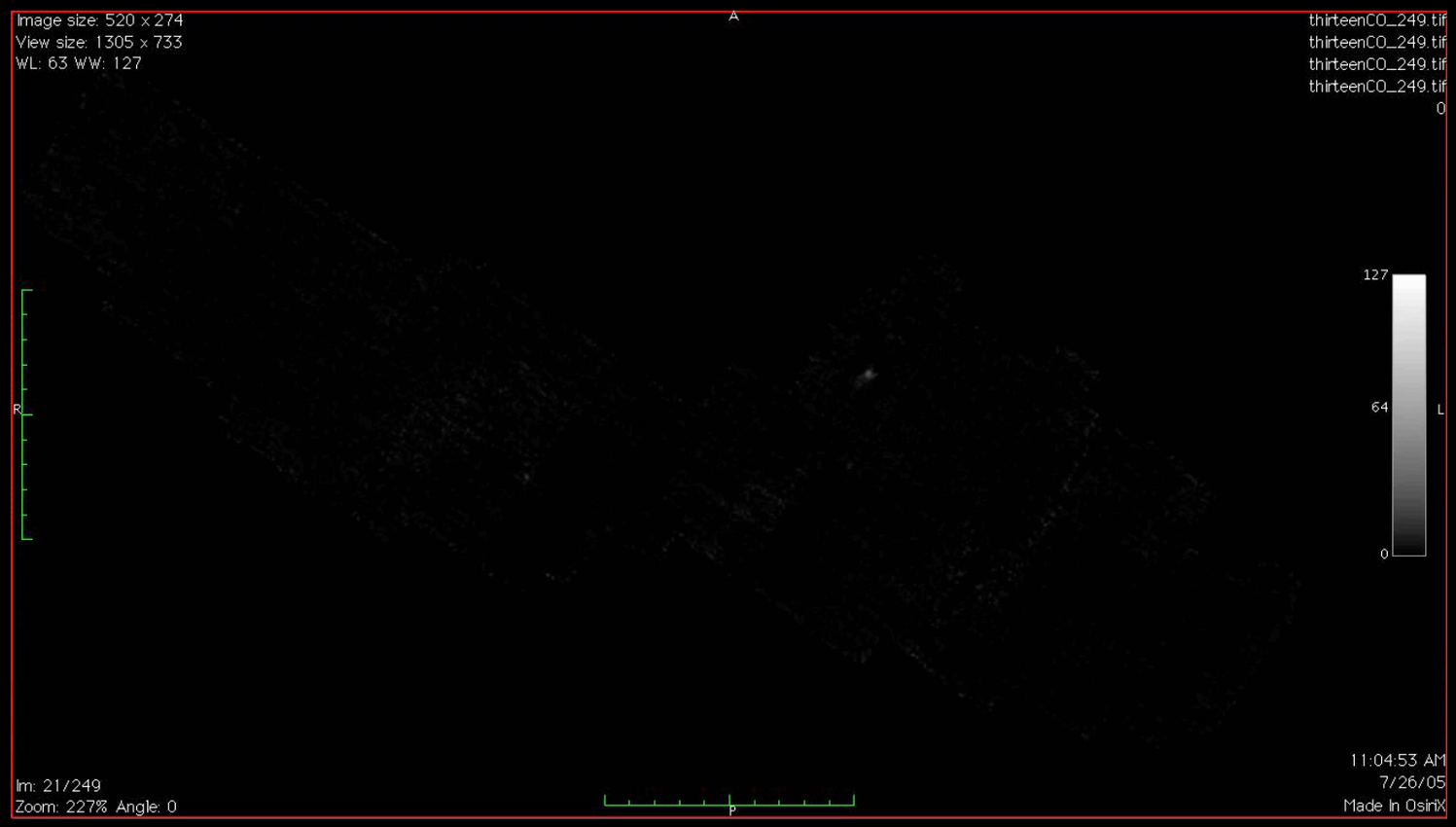
1D: Columns = “Spectra”, “SEDs” or “Time Series” (x-y Graphs)
2D: Faces or Slices = “Images”
3D: Volumes = “3D Renderings”, “2D Movies”
4D: Time Series of Volumes = “3D Movies”

ASTRONOMICAL MEDICINE

"Keith"



"Perseus"



"z" is depth into head

"z" is line-of-sight velocity

ASTRONOMICAL MEDICINE

mage size: 520 x 274
iew size: 1305 x 733
L: 63 WW: 127

mm peak (Enoch et al. 2006)

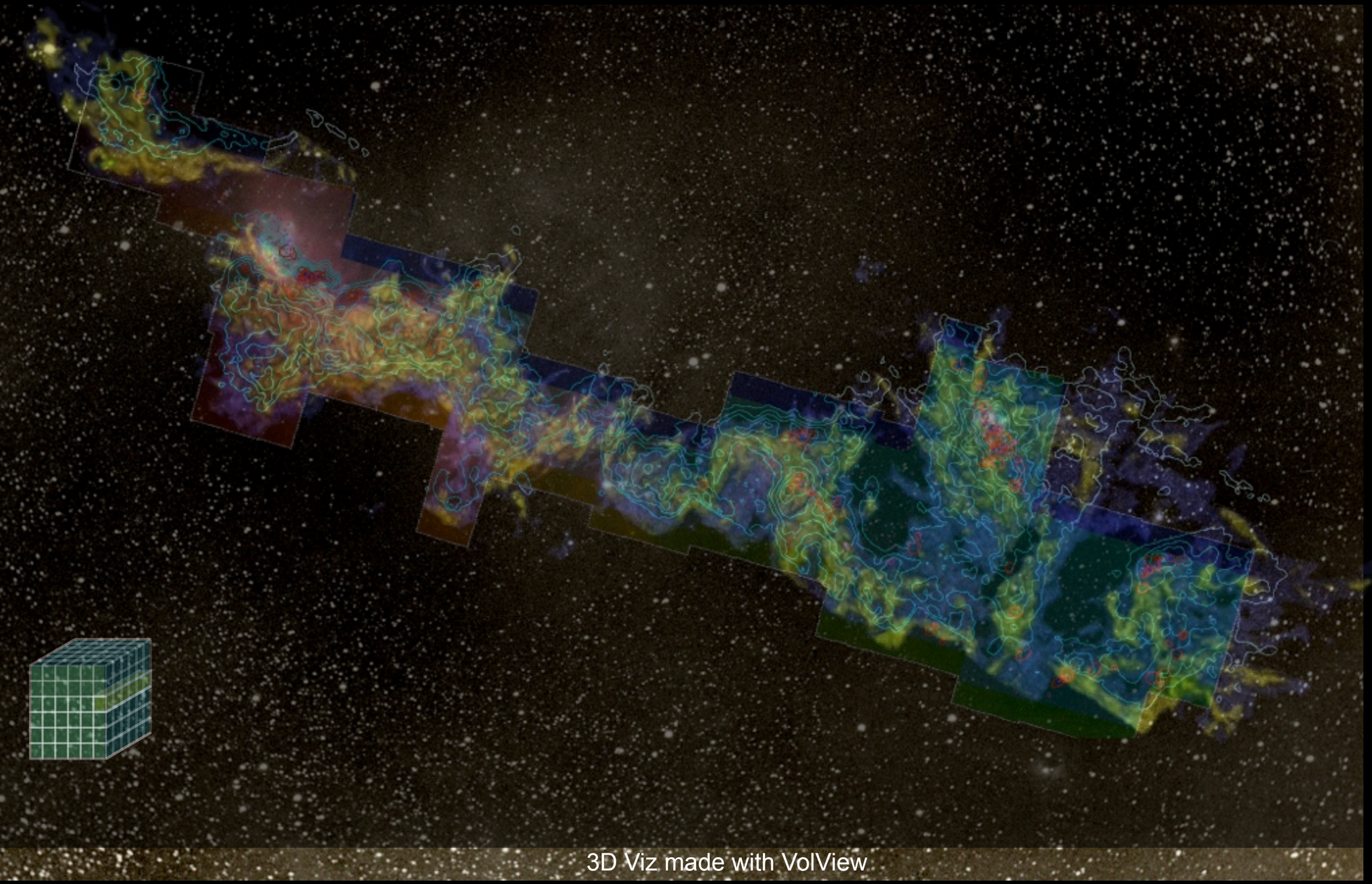
sub-mm peak (Hatchell et al. 2005, Kirk et al. 2006)

^{13}CO (Ridge et al. 2006)

mid-IR IRAC composite from c2d data (Foster, Laakso, Ridge, et al.)

Optical image (Barnard 1927)

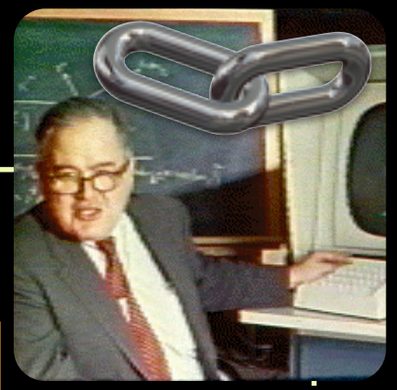
n: 1/249
oom: 227% Angle: 0



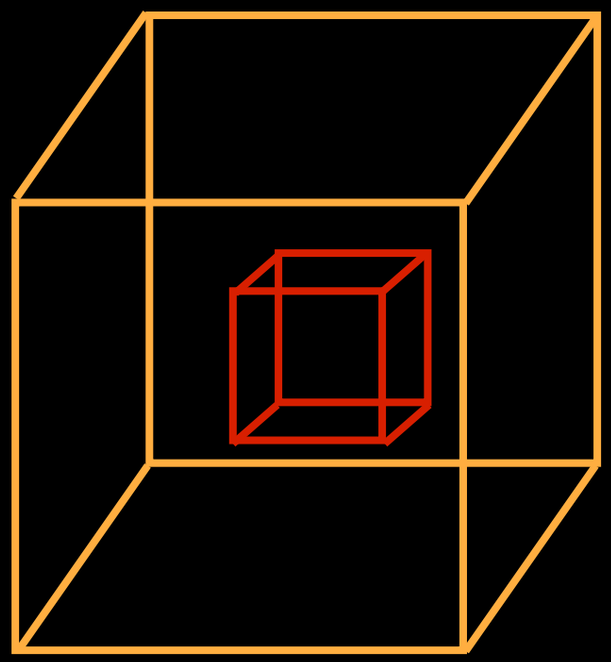
3D Viz made with VolView

COMPLETE

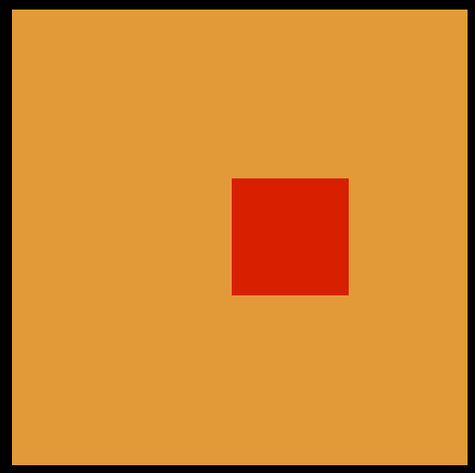
LINKED VIEWS OF HIGH-DIMENSIONAL DATA



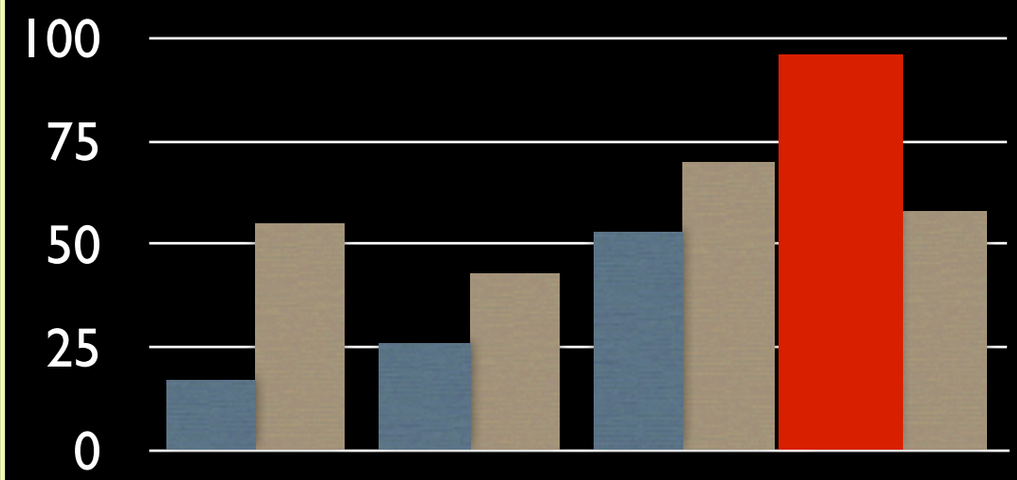
John Tukey



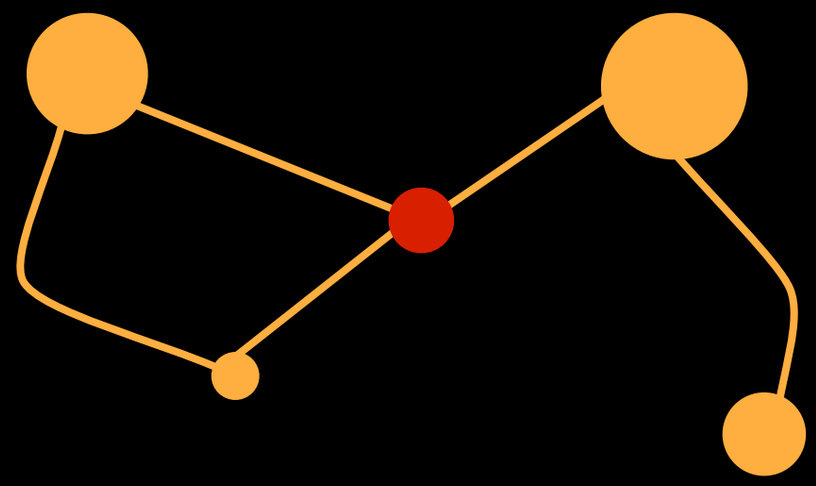
3D



2D



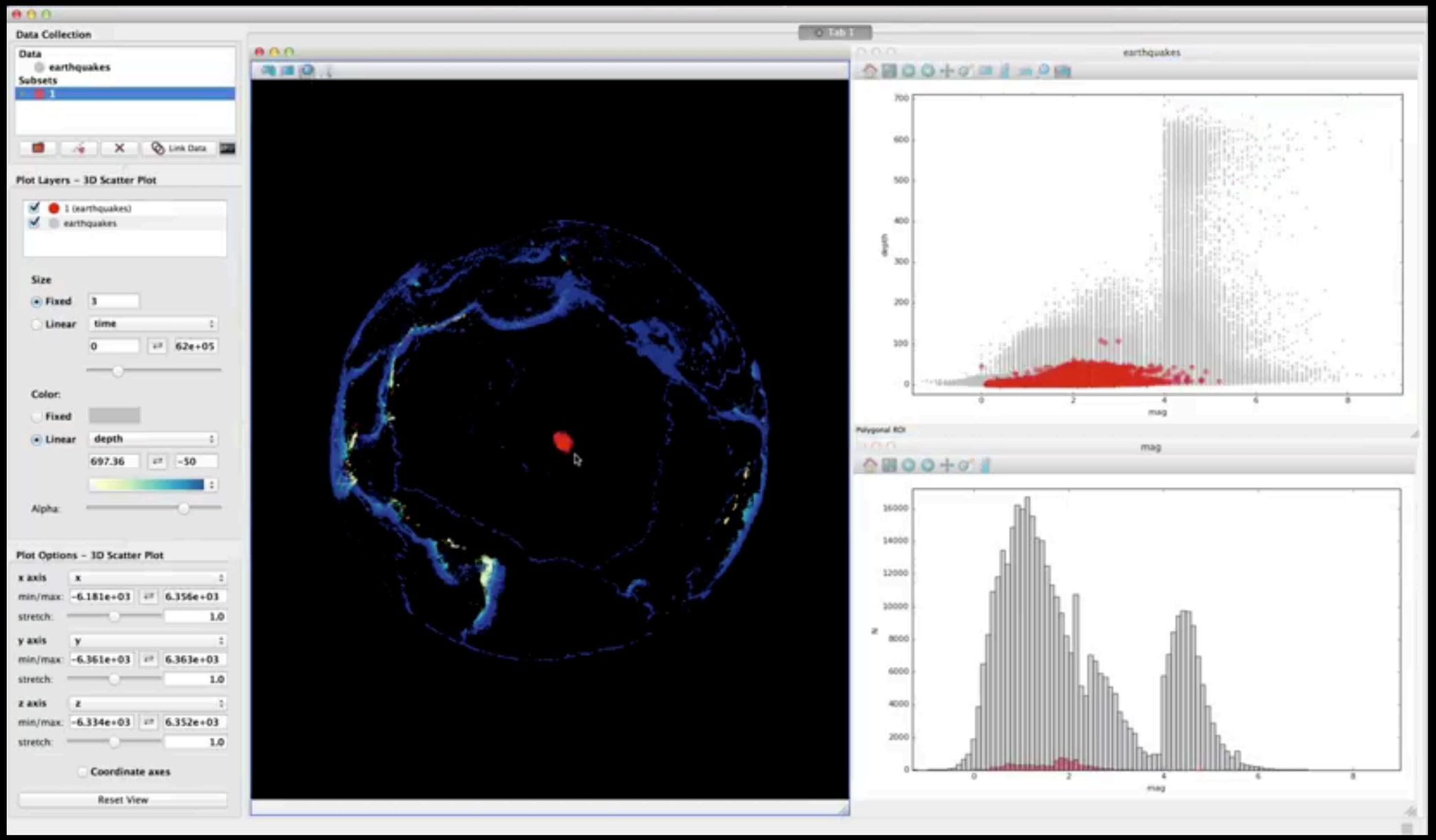
Data Abstraction



figure, by M. Borkin, reproduced from Goodman 2012, "Principles of High-Dimensional Data Visualization in Astronomy"

LINKED VIEWS OF HIGH-DIMENSIONAL DATA (IN PYTHON)

GLUE



video by Tom Robitaille, lead glue developer

glue created by: C. Beaumont, M. Borkin, P. Qian, T. Robitaille, M. Breddels, and A. Goodman, PI

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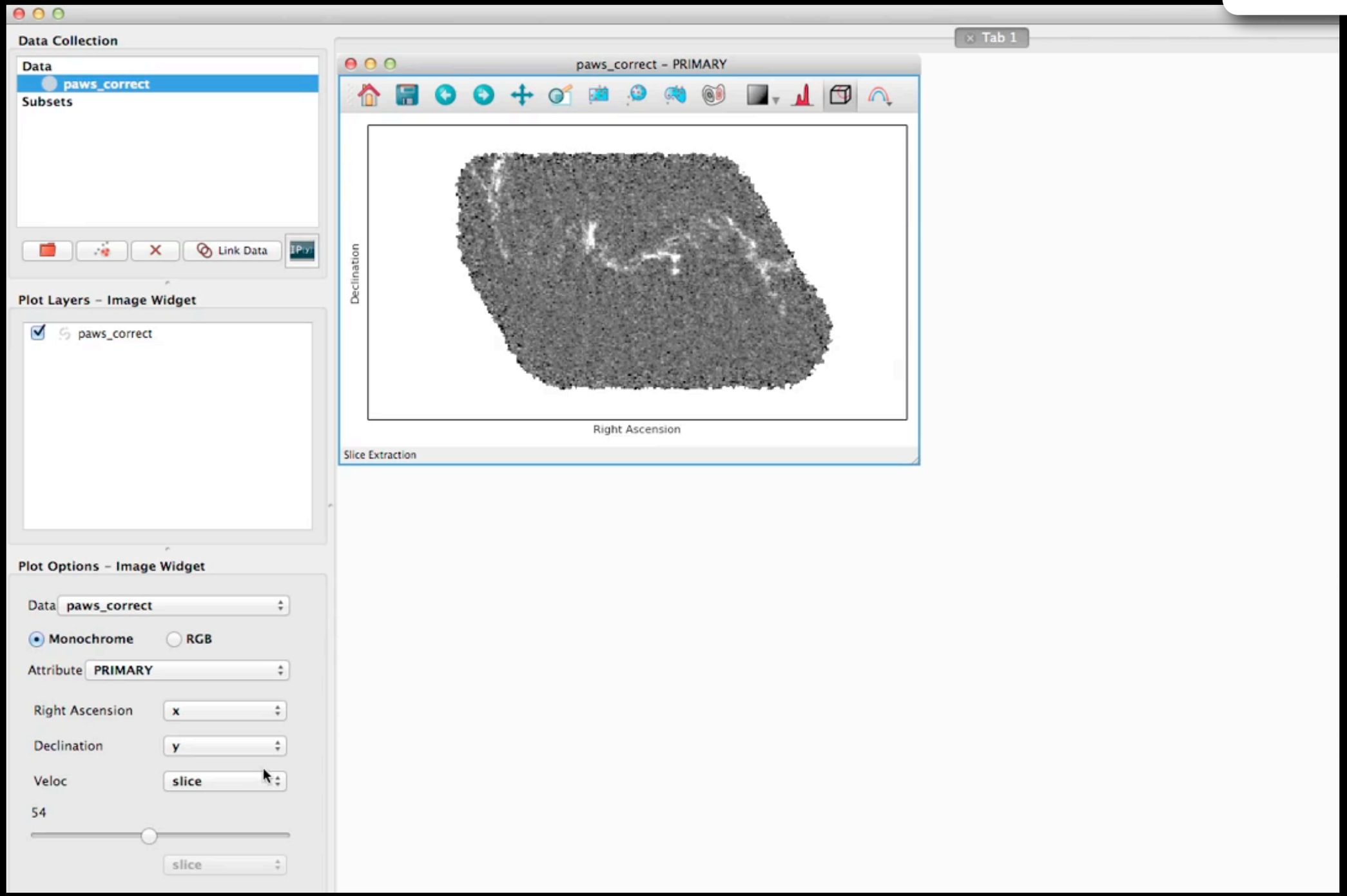

video by Tom Robitaille, lead glue developer

glue created by: C. Beaumont, M. Borkin, P. Qian, T. Robitaille, M. Breddels, and A. Goodman, PI

SNEAK PREVIEW: GLUE IN THE BROWSER ("GLUPYTER")

and scholarly papers with/in "Jupyter" notebooks

glue in the browser

Video courtesy of Maarten Breddels, consulting developer

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multidimensional data exploration

built-in

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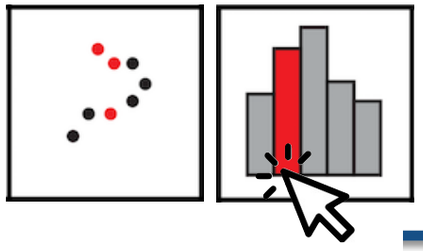

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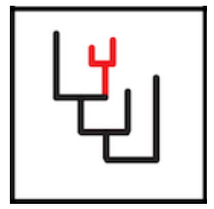

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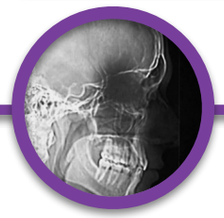

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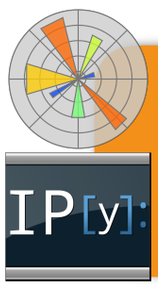
user config.py file (loaders, colors, plot types, +)



access to all matplotlib functions through built-in IPython terminal

jupyter

run & interact with glue from Jupyter notebook & other tools

glueviz.org

No merging of data sets—just glue them.

python File Edit View Canvas Data Manager Plugins Help 79% Tue May 29 10:39 PM Alyssa

Glue

Open Data | Export Data/Subsets | Link Data | IPython Terminal | Open Session | Export Session | Add/edit arithmetic attributes | Selection Mode: | Preferences

Data Collection

Data
- meth_cube_hdrfixed
- onh2d_cube_hdrfixed

Subsets

Plot Layers

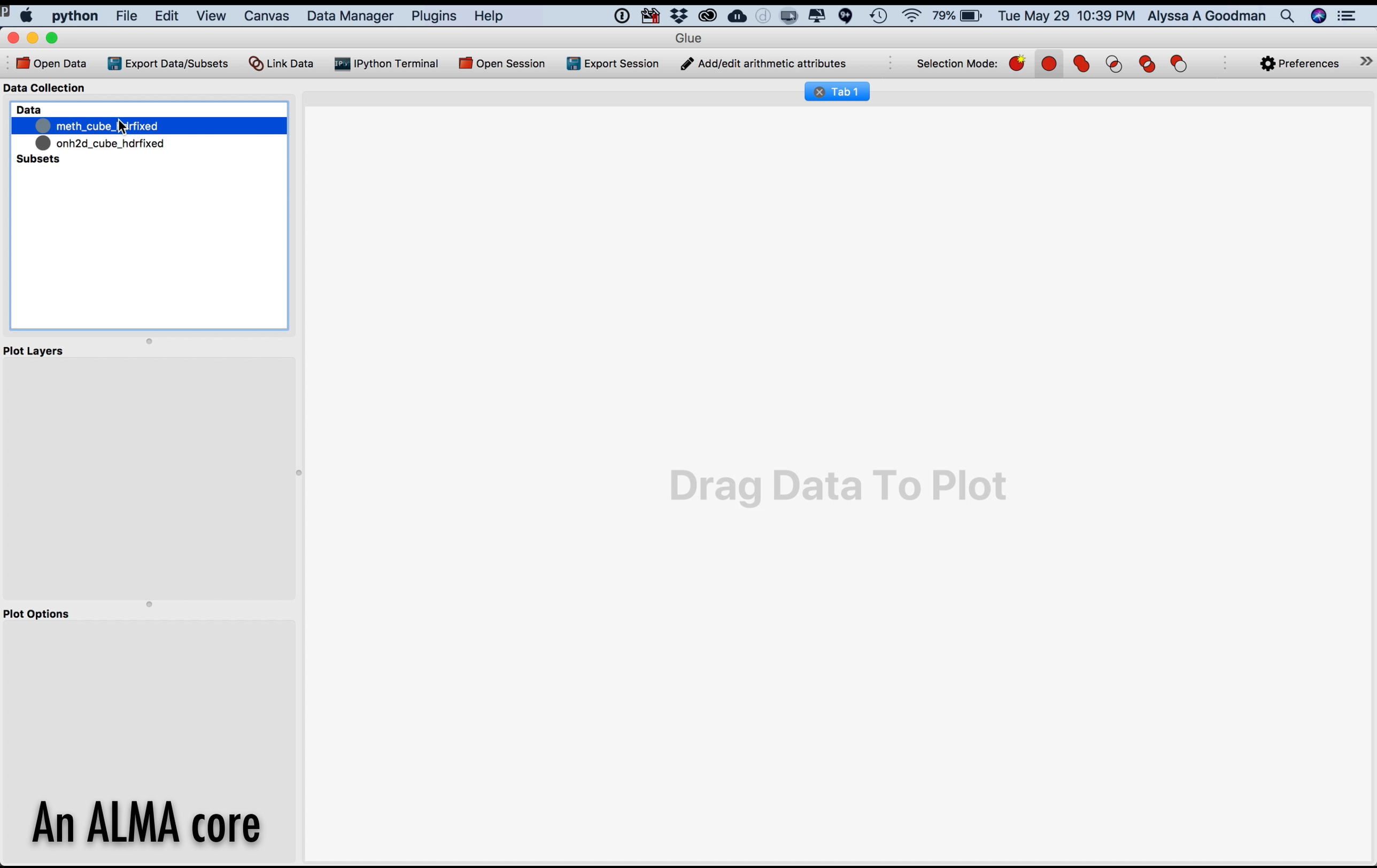
Plot Options

Tab 1

Drag Data To Plot

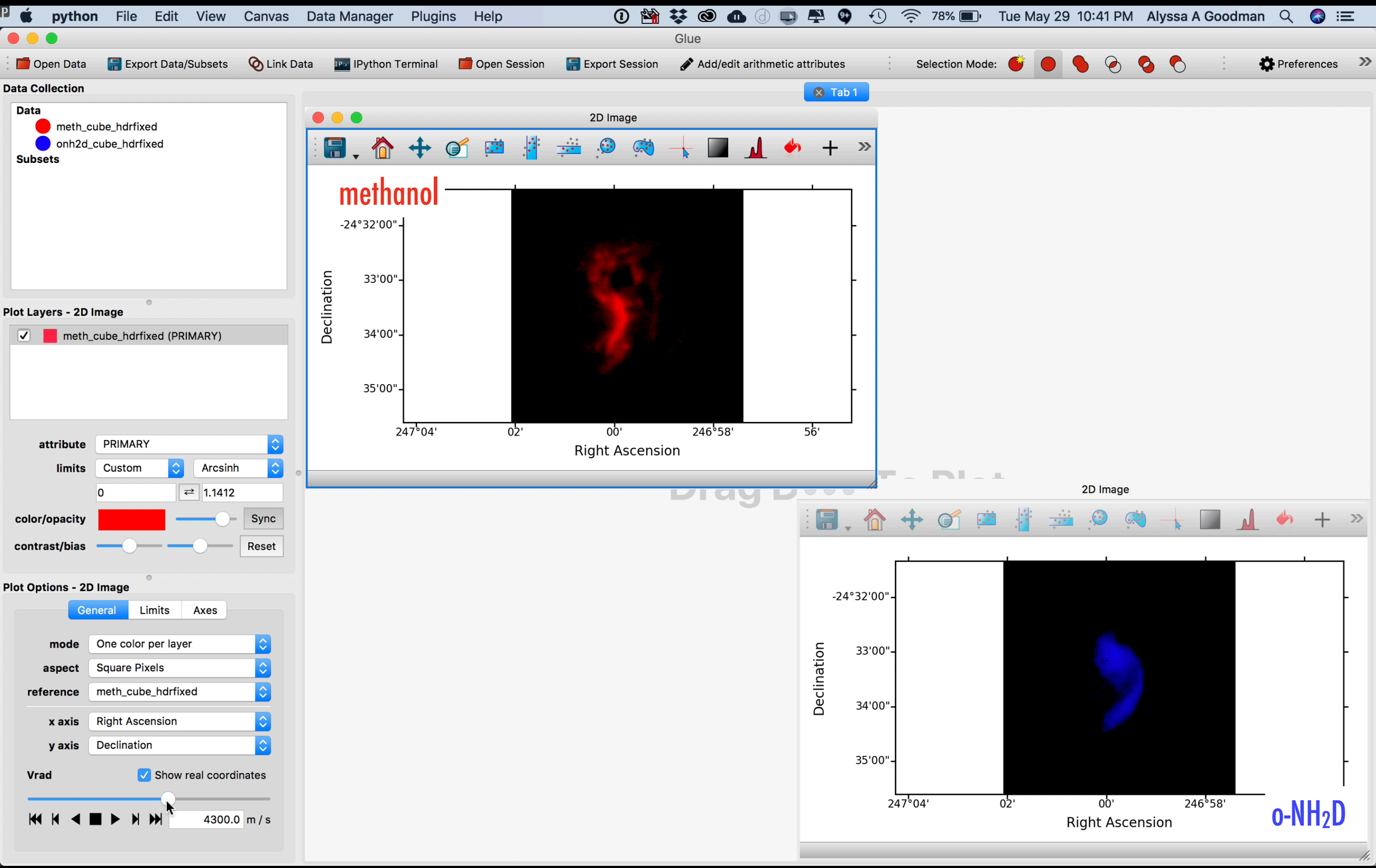
An ALMA core

Just drag to visualize, e.g. series of 2D "channel maps."

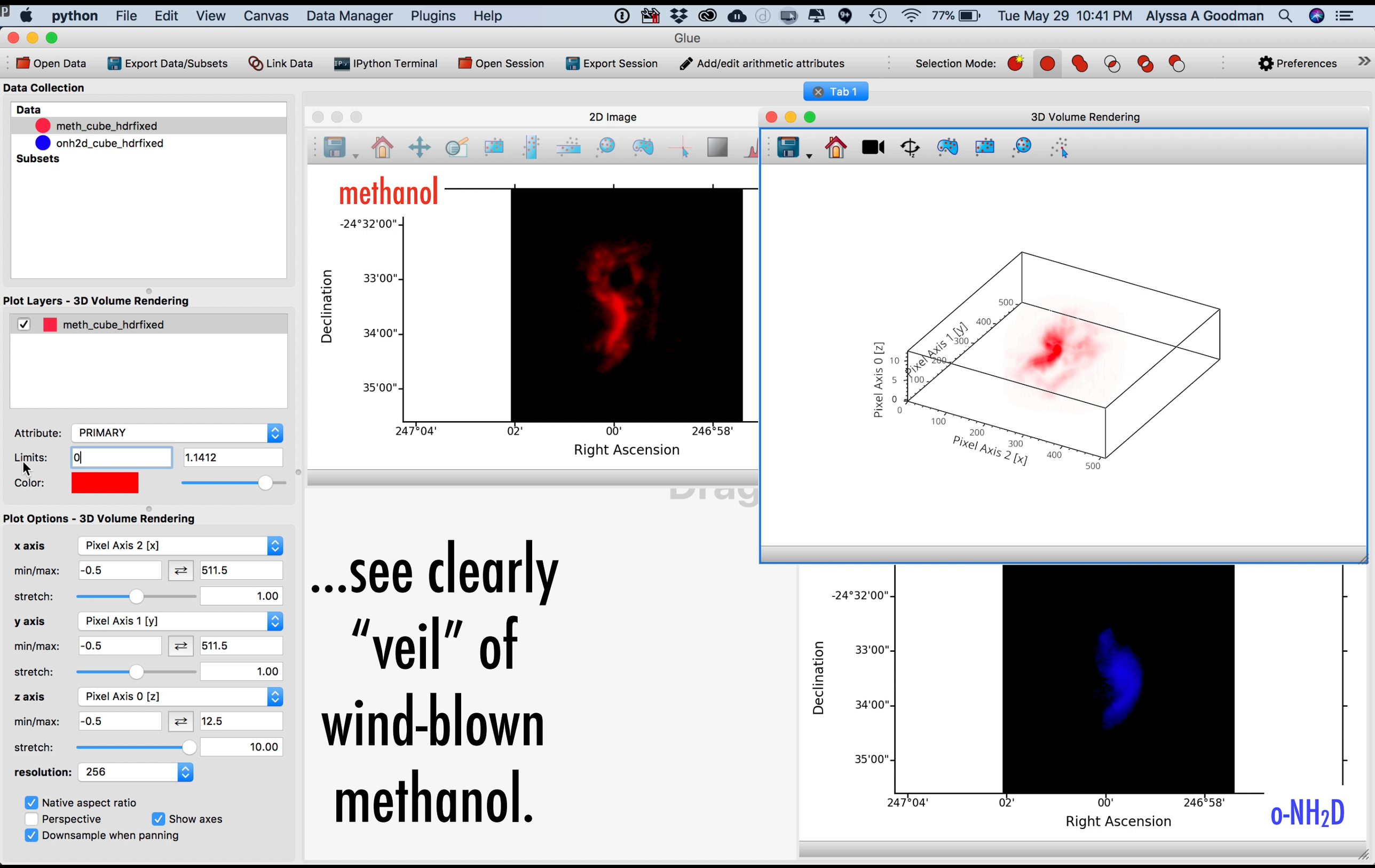


An ALMA core

Adjust so each tracer is a different color.

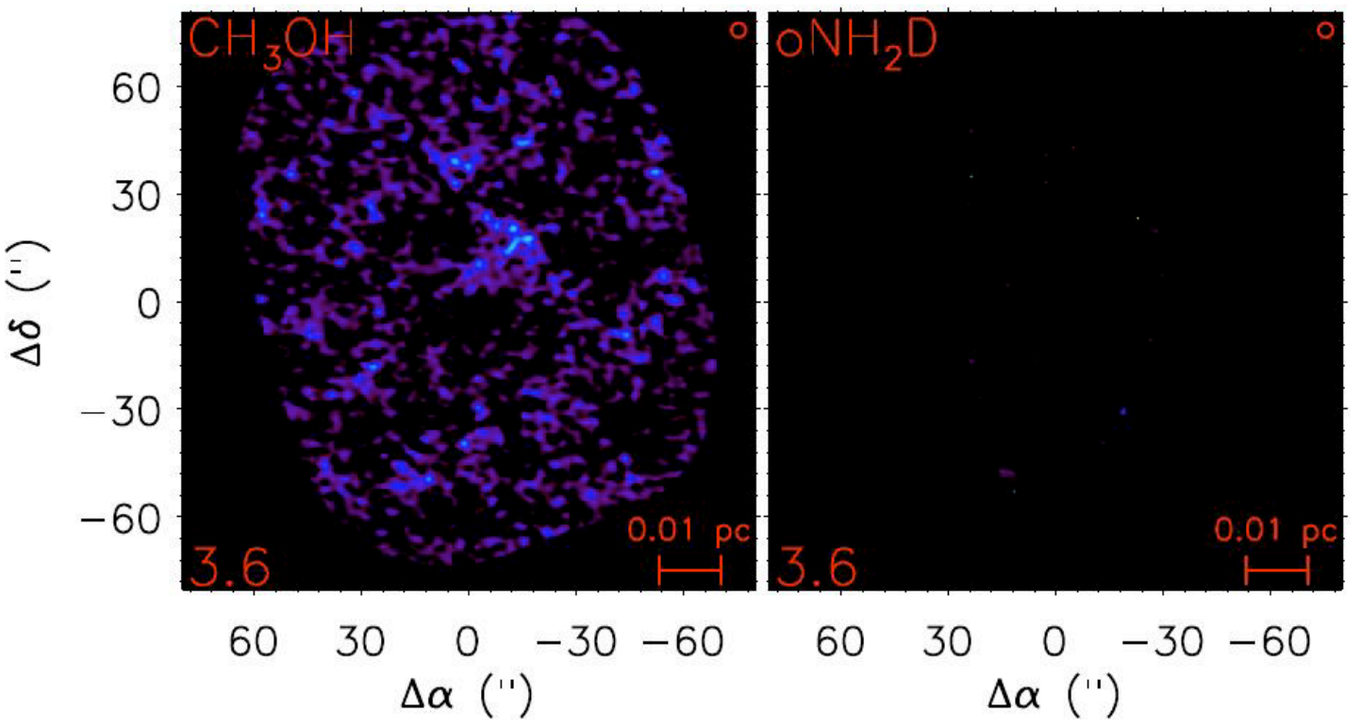


Create 3D views...

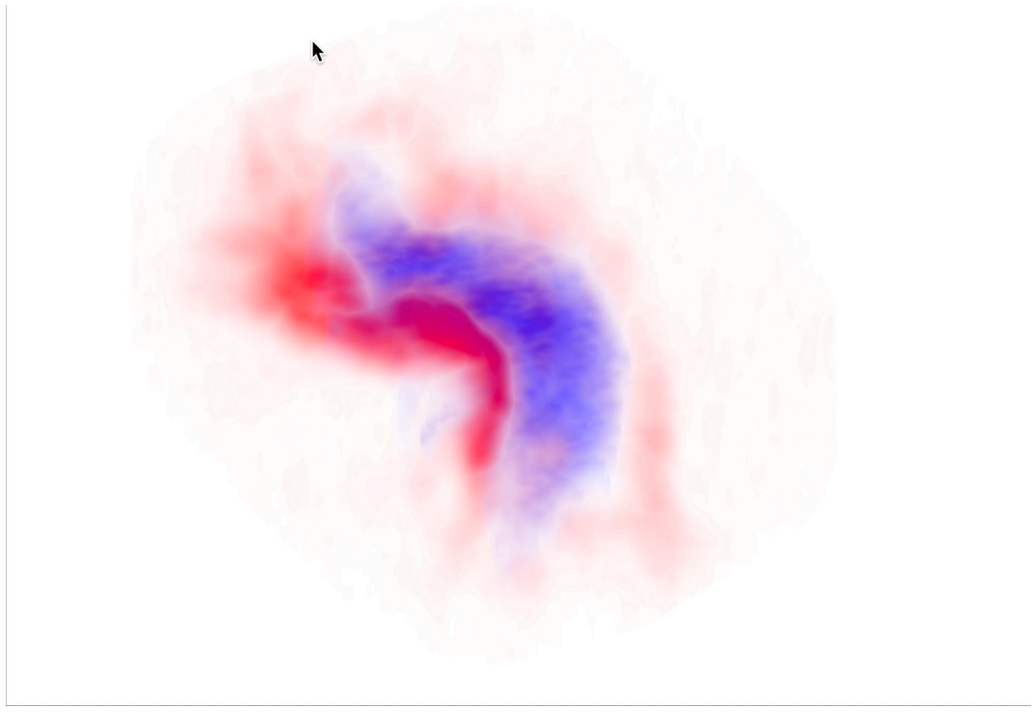


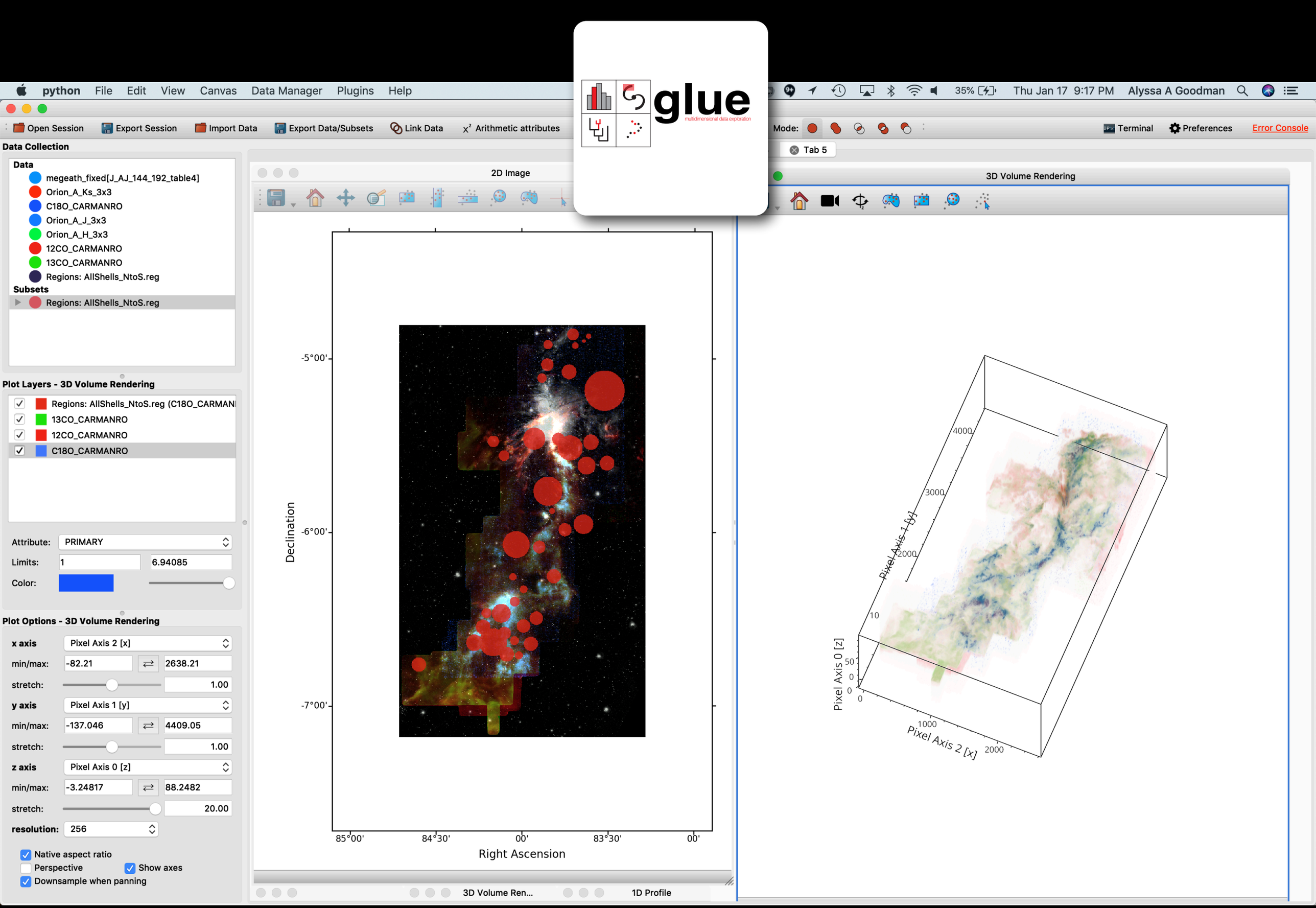
...see clearly "veil" of wind-blown methanol.

Traditional Rainbow Channel maps



glue





(red circles from Feddersen ds9 region file)

Glue

Open Session | Export Session | Import Data | Export Data/Subsets | Link Data | x^2 Arithmetic attributes | Active Subset: None (the next selection will create a subset) | Terminal | Preferences | Error Console

Data Collection

Data
- megeath_fixed[J_AJ_144_192_table4]
- Orion_A_Ks_3x3
- C18O_CARMANRO
- Orion_A_J_3x3
- Orion_A_H_3x3
- 12CO_CARMANRO
- 13CO_CARMANRO

Subsets
- Orion Peak

Plot Layers - WorldWideTelescope (WWT)

- Orion Peak (megeath_fixed[J_AJ_144_192_tal
- megeath_fixed[J_AJ_144_192_table4]

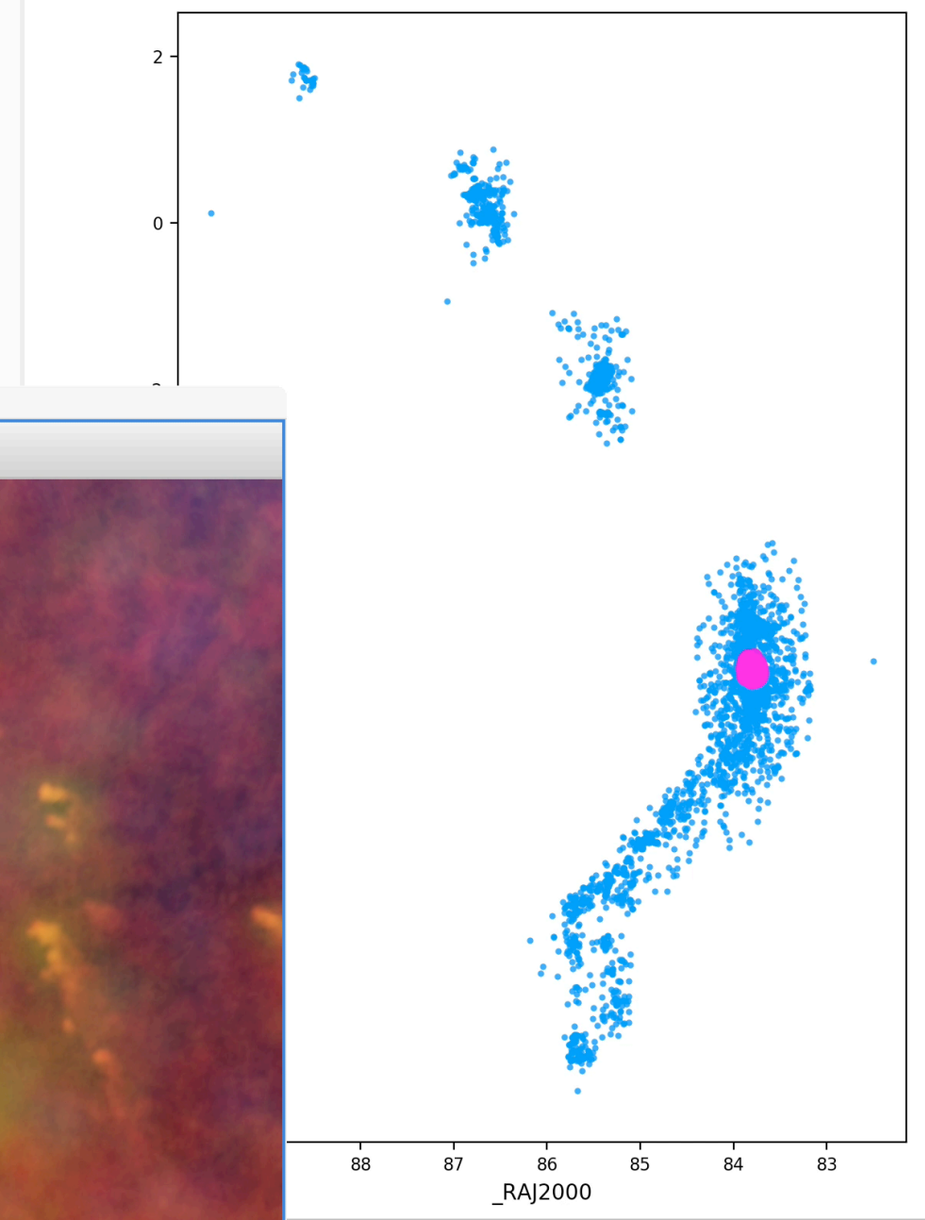
Color:
Size: 3
Opacity:
RA: _RAJ2000
Dec: _DEJ2000
Center view on layer

Plot Options - WorldWideTelescope (WWT)

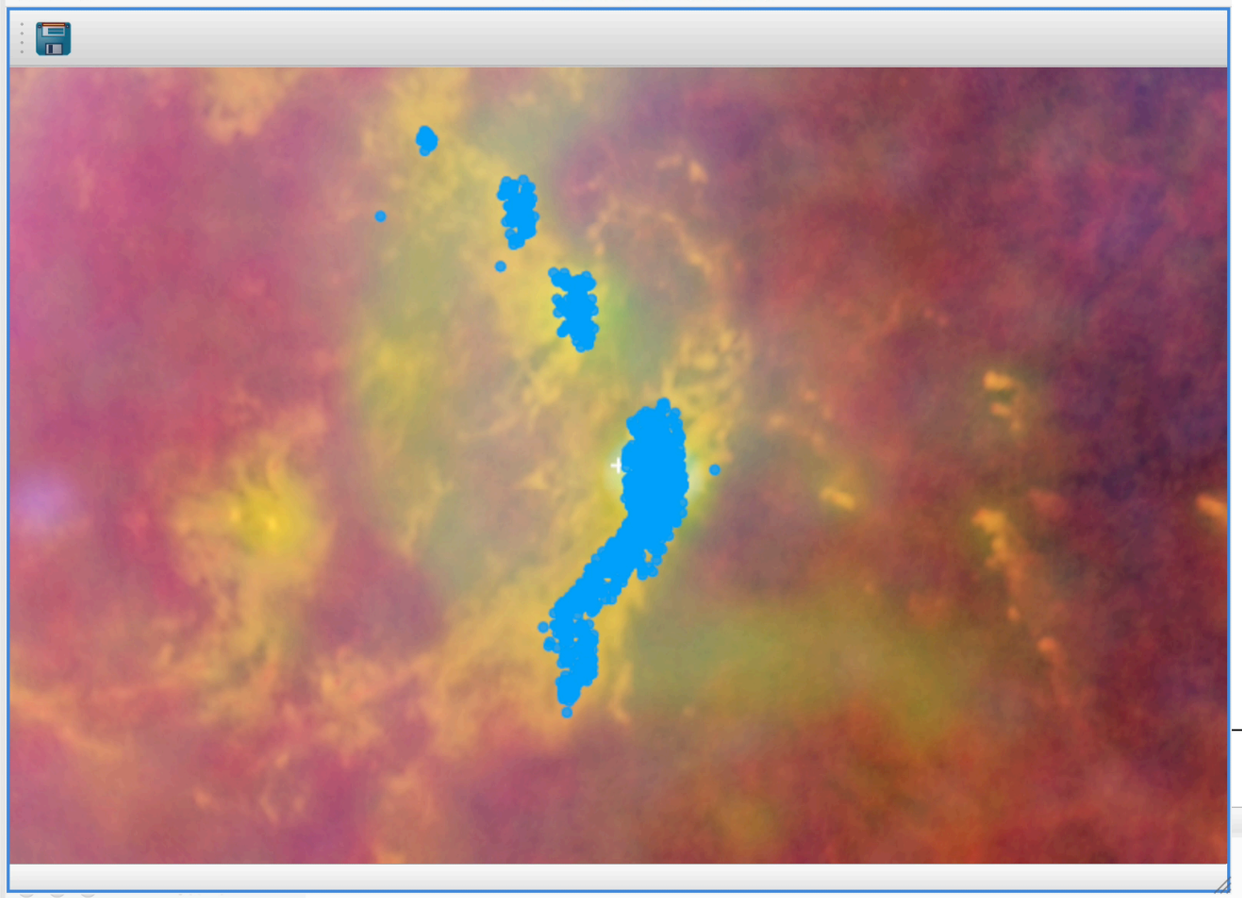
Foreground: Planck Dust & Gas
Opacity:
Background: Hydrogen Alpha Full Sky Map
Galactic Plane mode

Color-Optimized | Tab 6

2D Scatter



WorldWideTelescope (WWT)

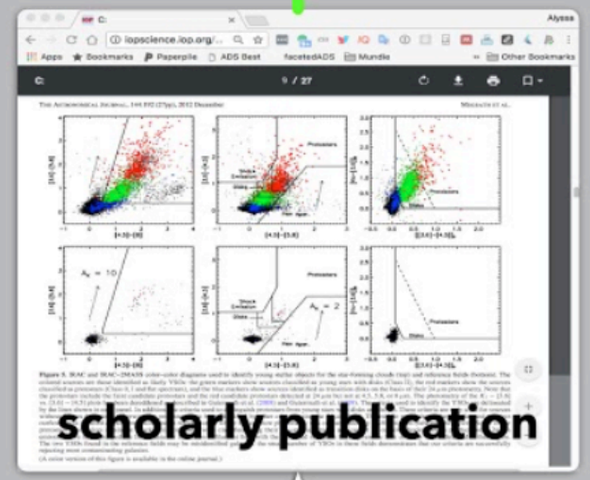


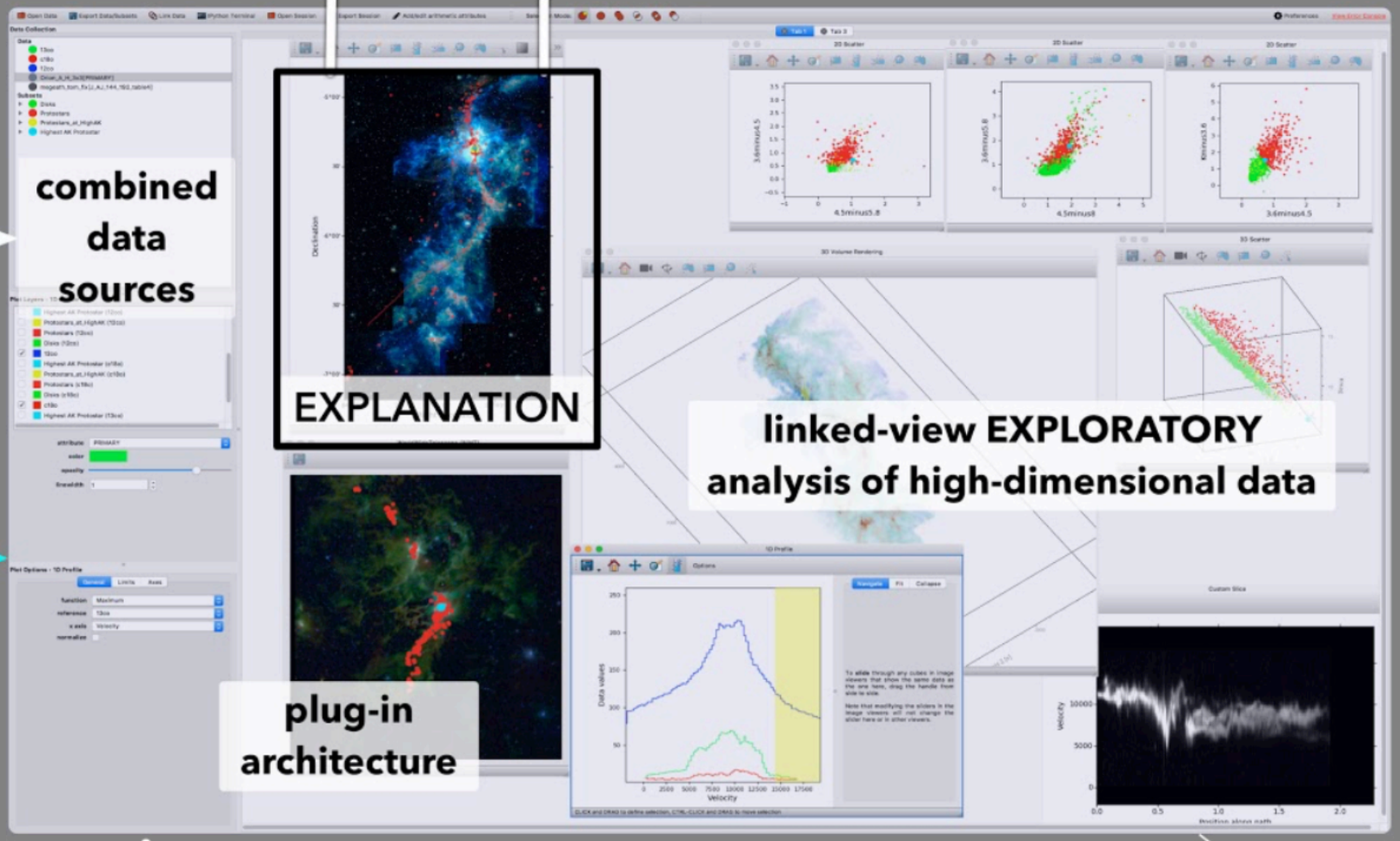
Putting it all together, new arithmetic attributes (components)

glue
multidimensional data exploration

DATA,
CODE,
COLLABORATION

DATA-DRIVEN STORYTELLING





EXPLORATORATION ⇄ EXPLANATION