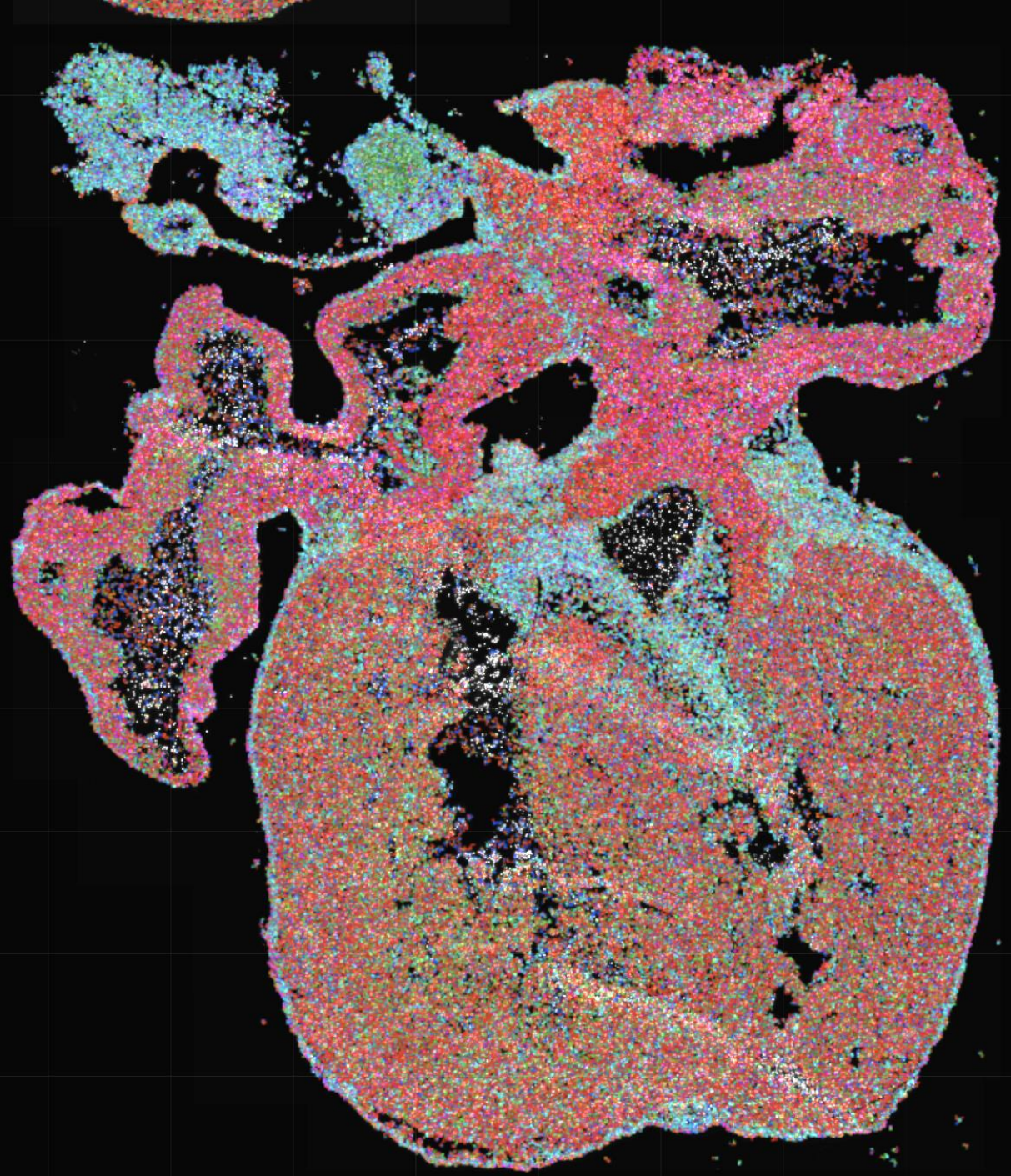


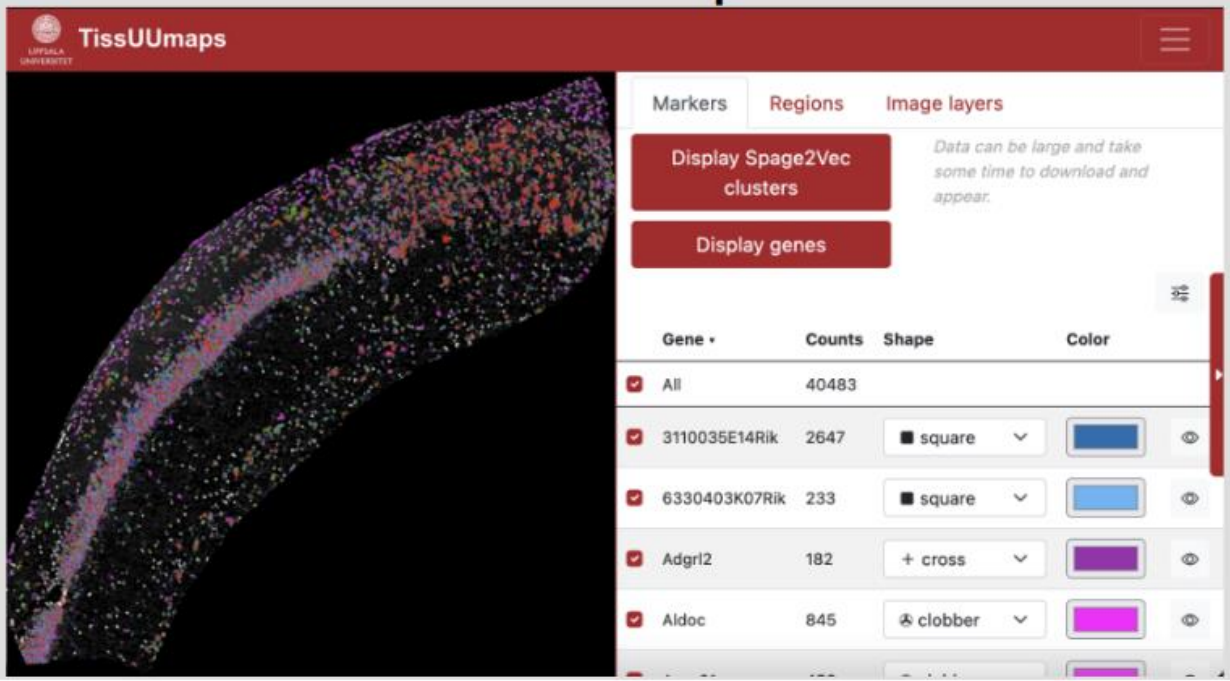
TissUUmaps 3: Interactive visualization and quality assessment of large-scale spatial omics

Christophe Avenel

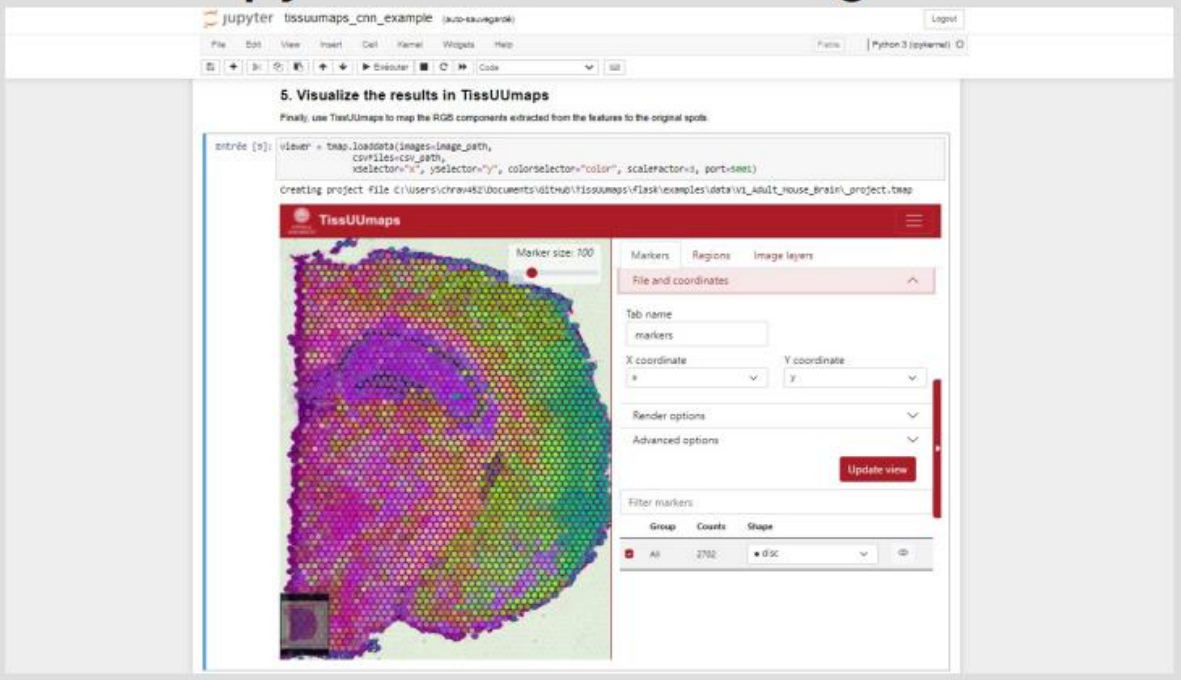
Dept. of Information Technology, Uppsala University, and NBIS / BioImage Informatics Facility

Interactive viewer

Web & Desktop viewer



Jupyter Notebook integration

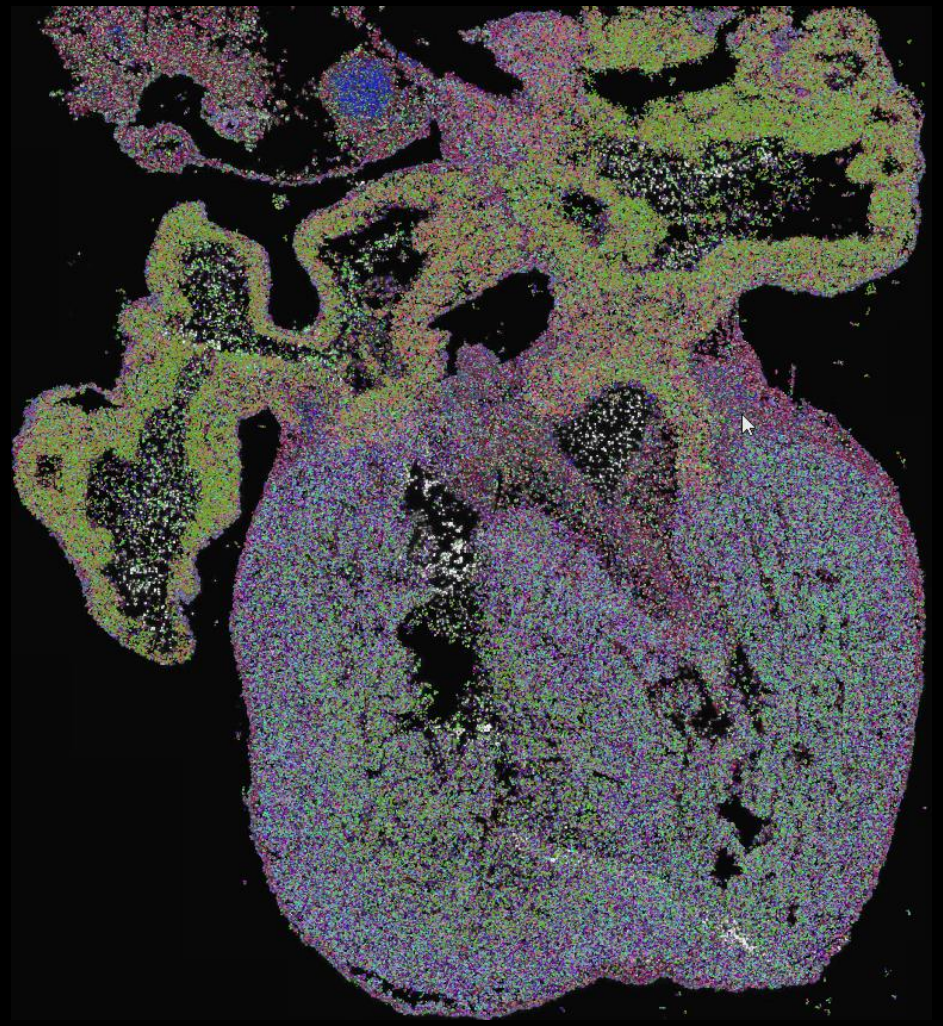


- Install locally with ***pip*** / ***Windows installer*** / ***Docker***

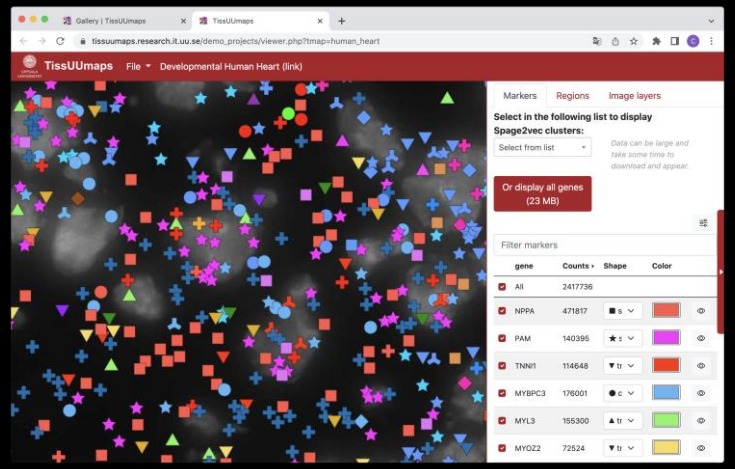
Challenge:

Viewing and sharing large spatial omics datasets without having to download large files or install software.

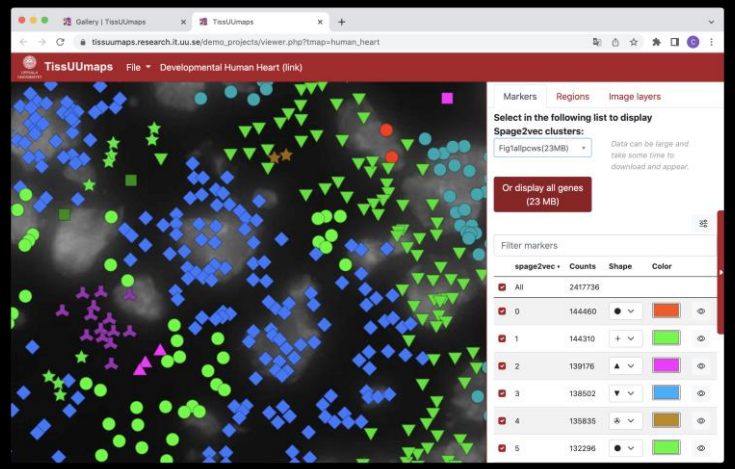
…and interact with the data, do spatial statistics, define ROIs, play with clustering alternatives, and check decoding quality…



Organ resolution (human heart at 6 pcws)



Sub-cellular resolution in situ sequencing data

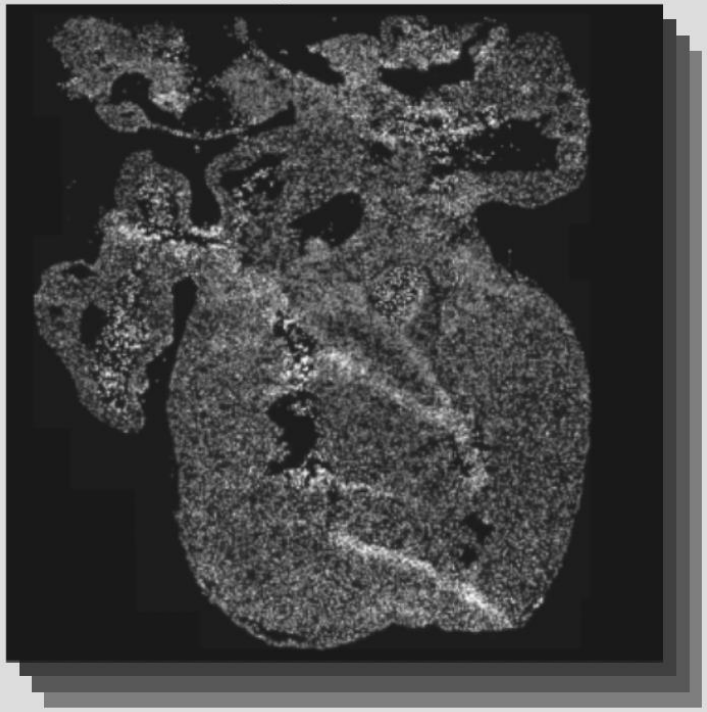


Cell-typing by spatial statistics

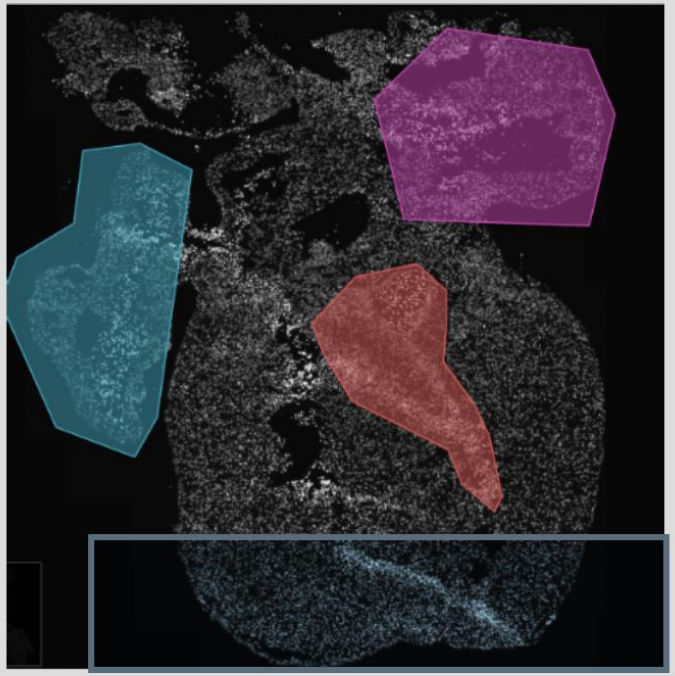
Types of input data

- 2D images, 8-bit, (of tissue), any modality, multiple layers
- Regions, drawn manually or defined using tools such as QuPath, Cellpose etc (GeoJSON)
- Markers, with x- and y coordinates, type and value, or even advanced info such as pie-charts (input as .csv file, could be generated from AnnData)
- Coming soon: *AnnData* objects directly

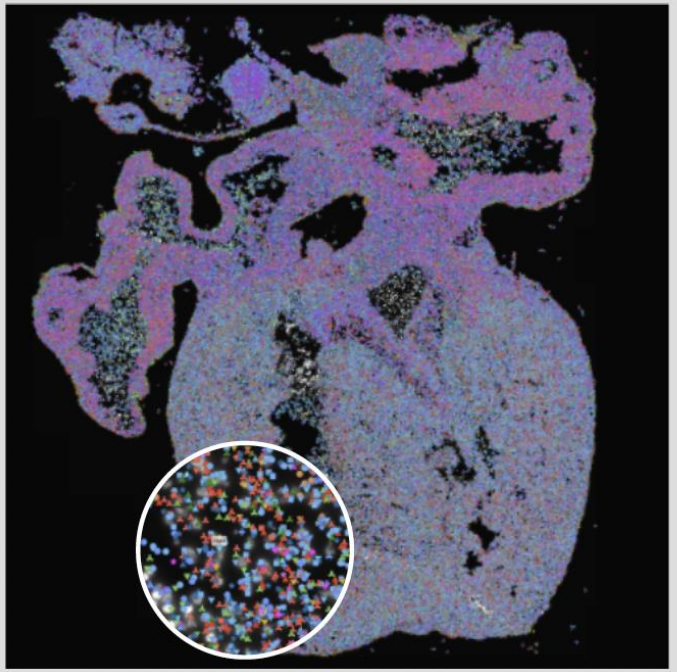
Image stack



Regions

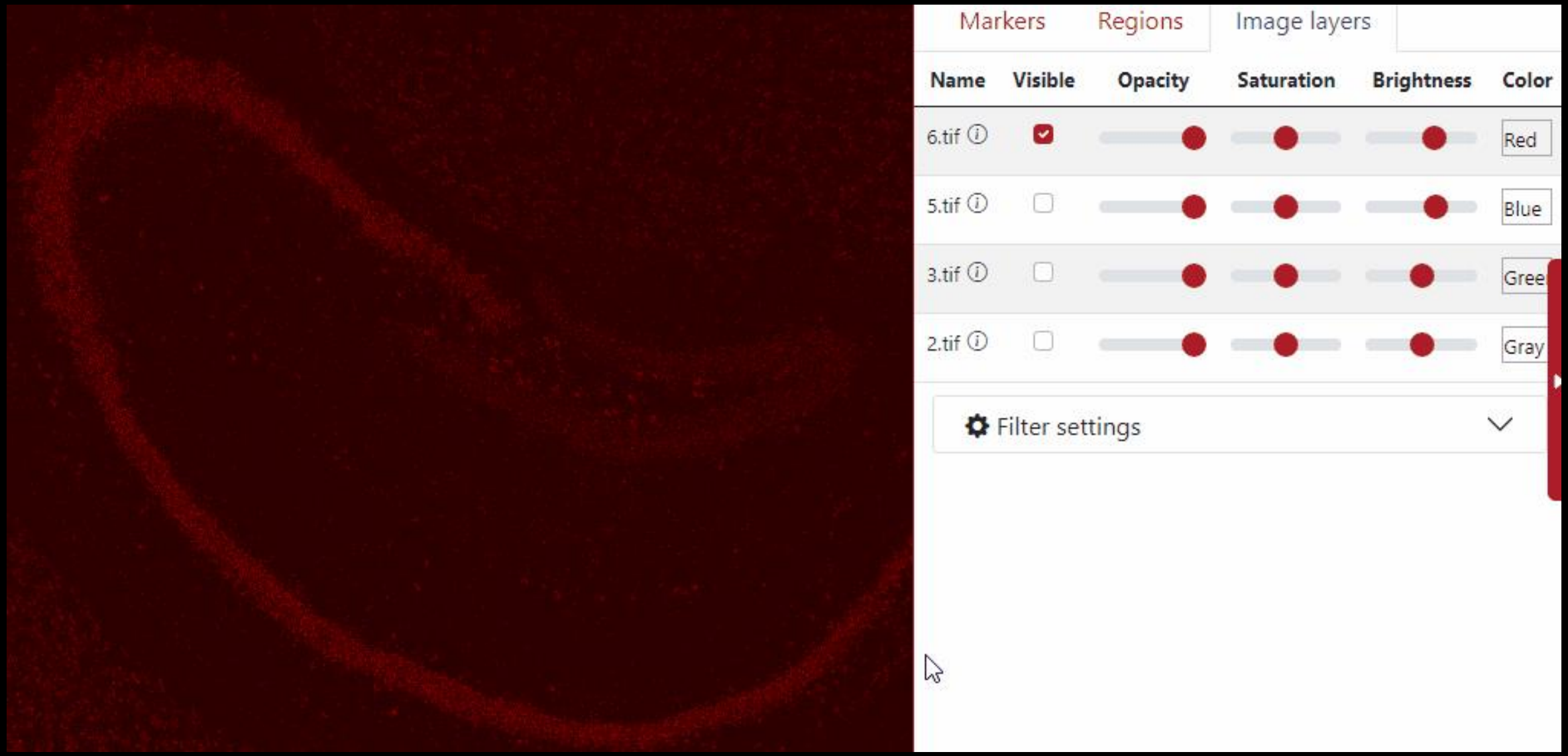


Markers



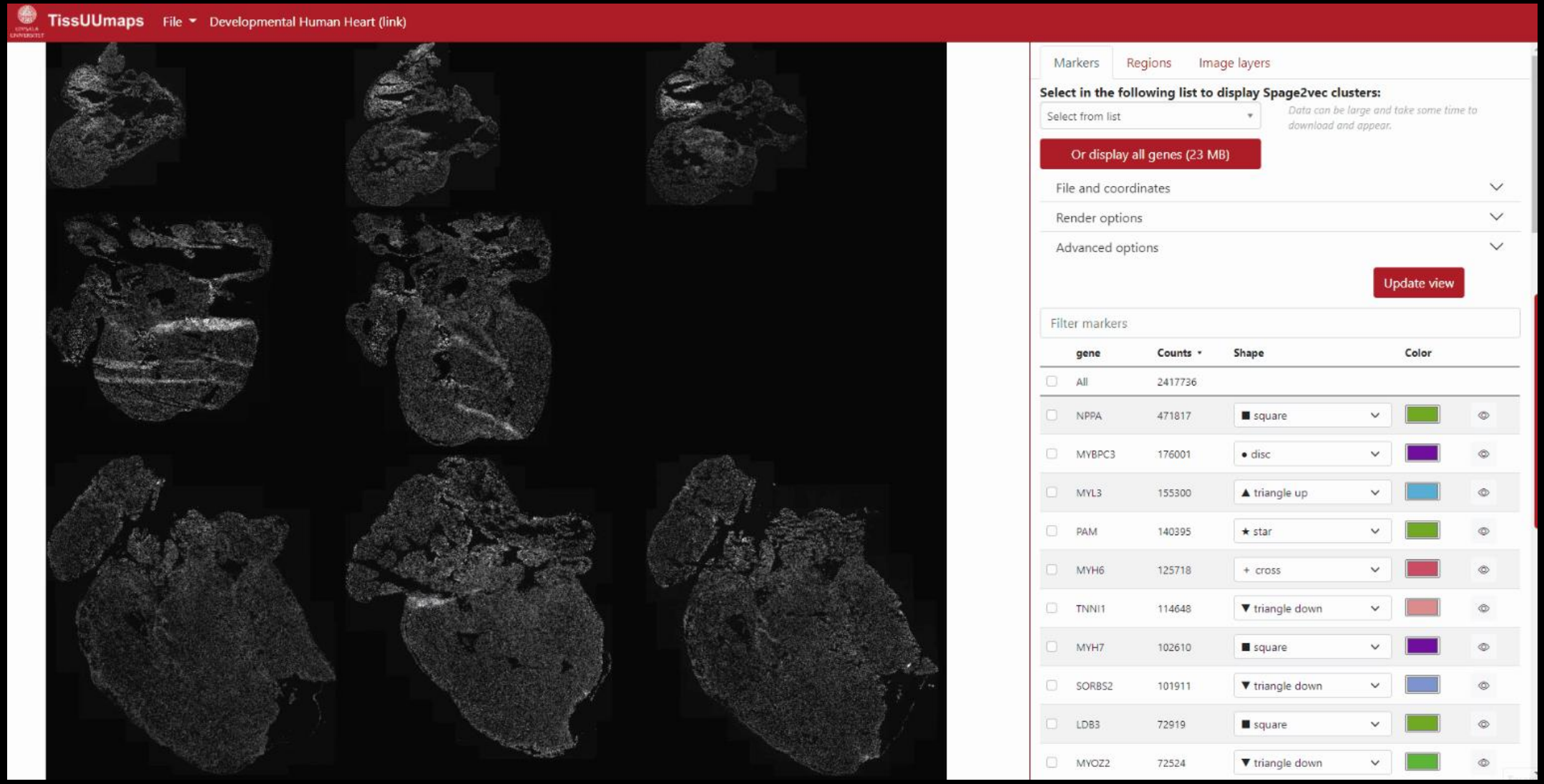
2D images

8-bit, (of tissue), any modality, multiple layers



Markers

Markers, with x- and y coordinates, type and value, or even advanced info such as pie-charts (input as .csv file, could be generated from AnnData)



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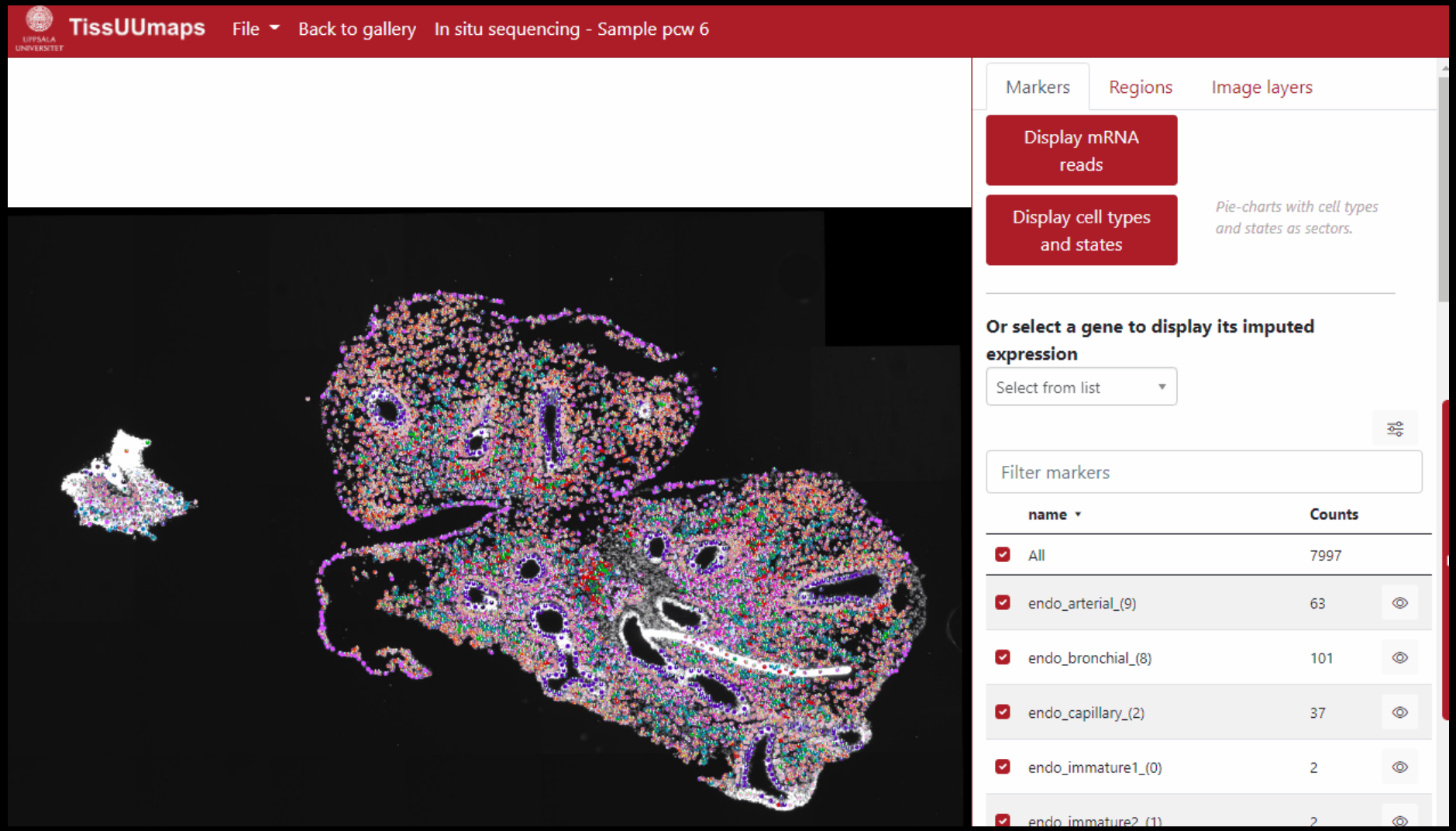

Regions

Regions, drawn manually or defined using tools such as QuPath, Cellpose etc or defined using a TissUUmaps plugin (GeoJSON)

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Compatibilities

We aim for compatibility with other open source initiatives rather than building all functionality into TissUUmaps.

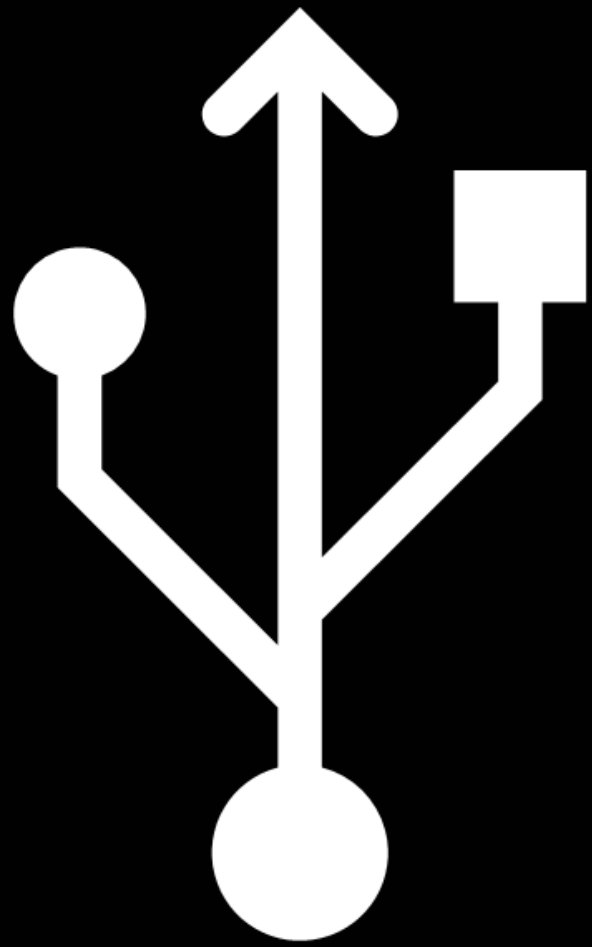
TissUUmaps can be incorporated into Jupyter Notebooks to create modular data flows – see tutorials at tissuumaps.github.io

DEMO

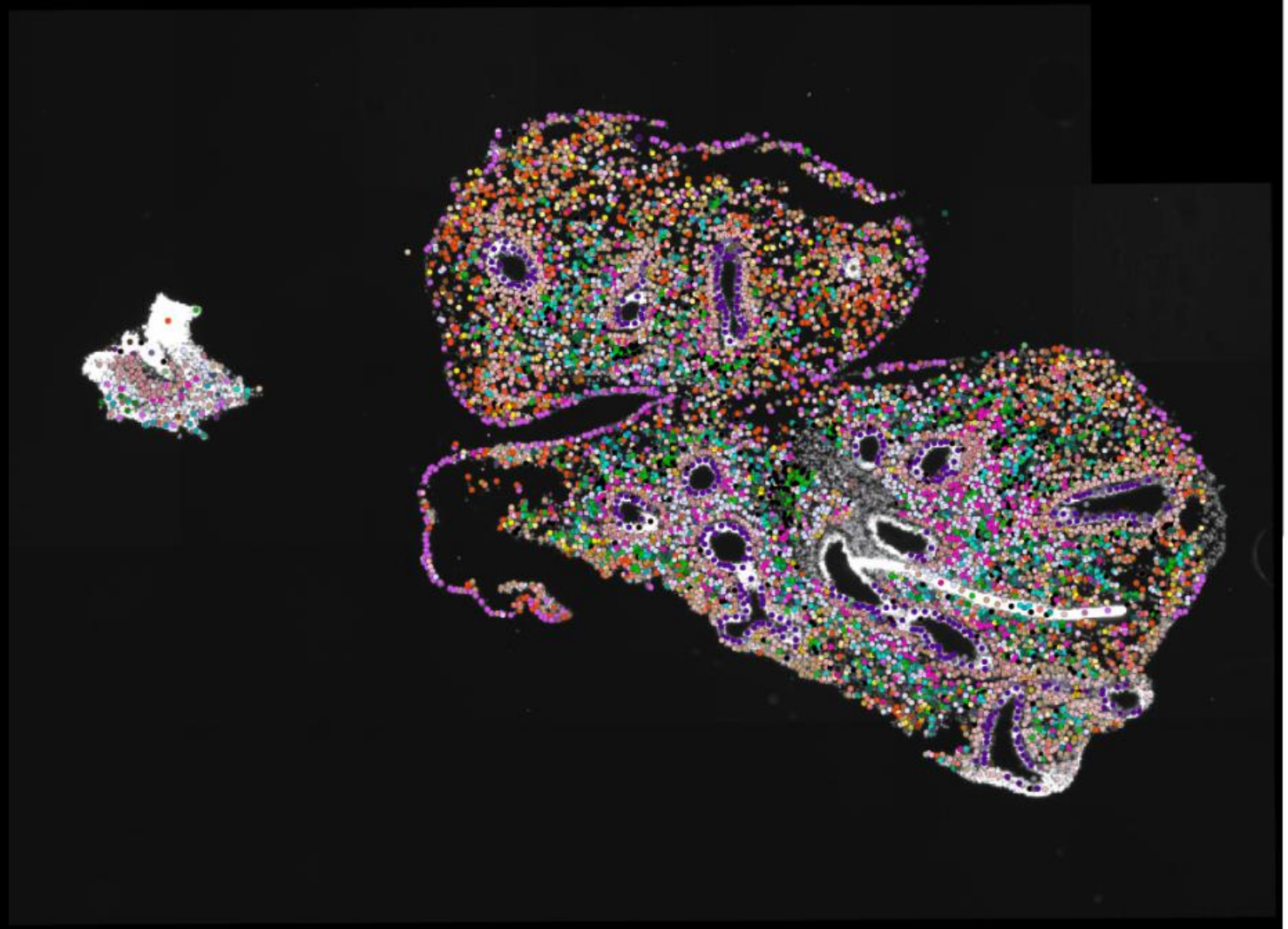
- https://tissuumaps.github.io

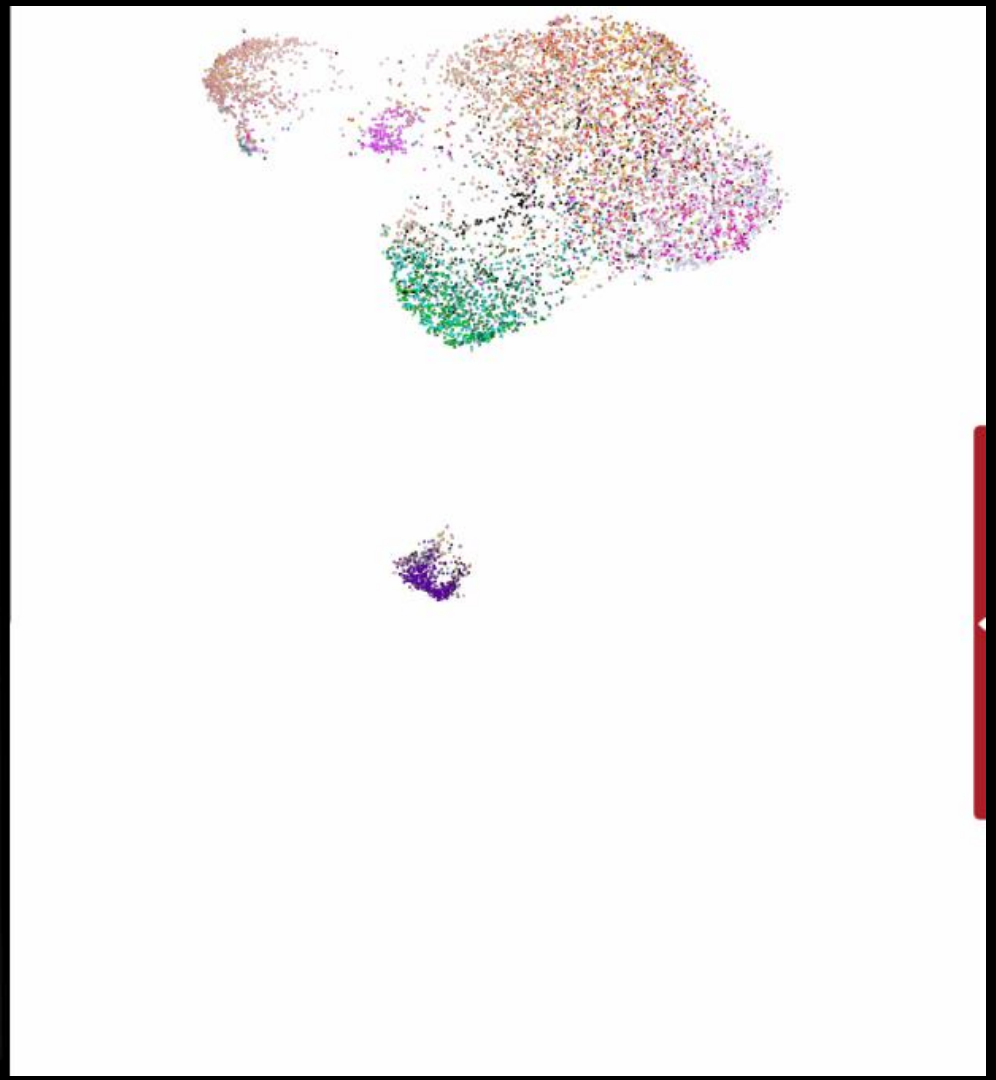
TissUUmaps plugins

- Feature Space 2D
- Feature Space 3D
- Points2Regions
- Spot Inspector

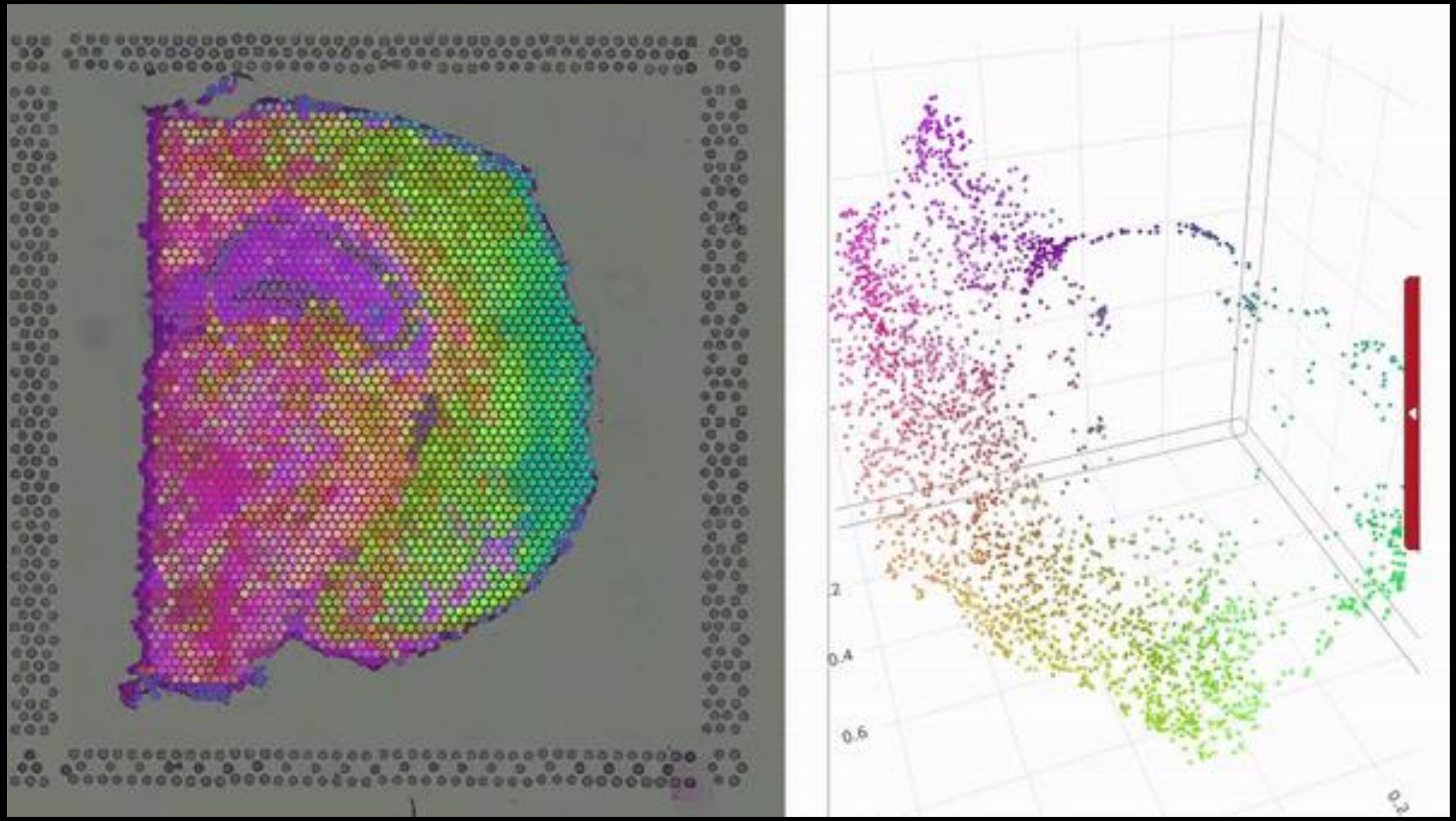


Feature Space 2D

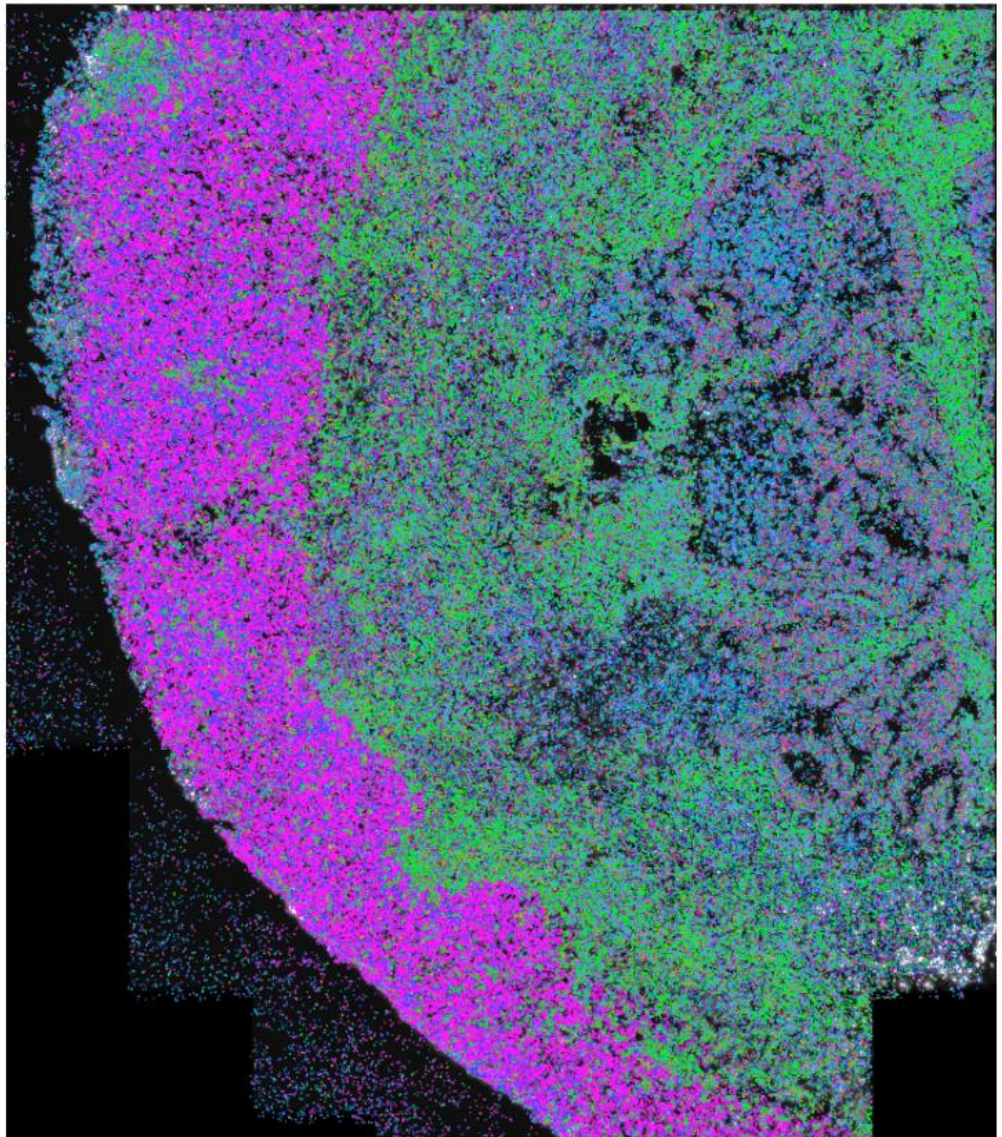




Feature Space 3D



Points2Regions



Markers | Regions | Image layers | Plugins

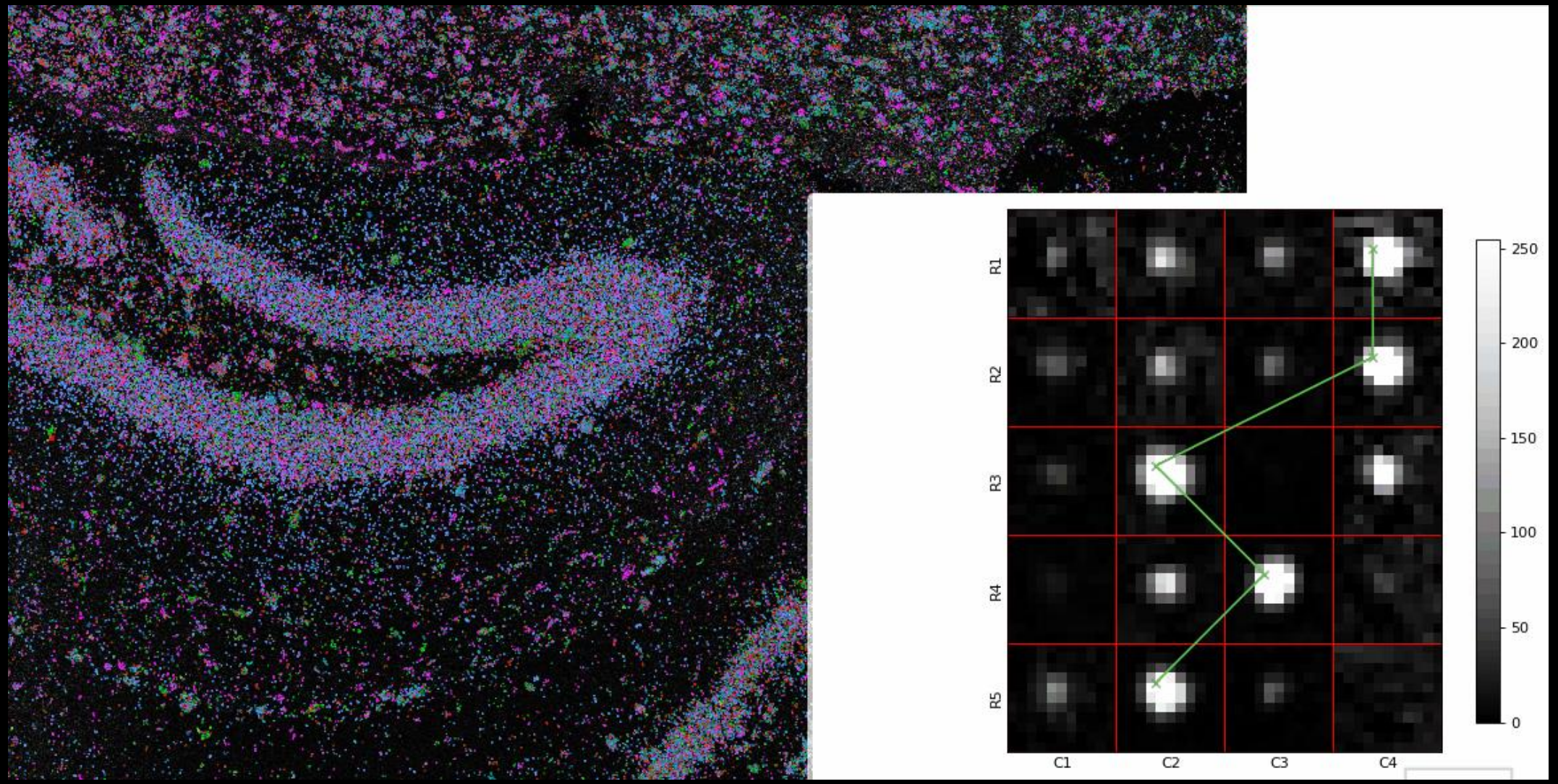
Download data

New markers × +

Filter markers

	name	Counts	Shape	Color
☑	All	561485		
☑	ADAMDEC1	477	● disc	
☑	ALBUMIN	178367	+ cross	
☑	APC	804	■ square	
☑	ARPC2	60	◆ diamond	
☑	ARPC3	3184	▲ triangle up	
☑	AXIN1	716	★ star	
☑	AXIN2	1143	▼ triangle down	
☑	BMP3B	134	☮ clobber	
☑	CALD1	49	● disc	
☑	CALM3	1058	+ cross	
☑	CAMK2A	1034	■ square	
☑	CAMK2G	1852	◆ diamond	
☑	CAV1	126	▲ triangle up	

Spot Inspector



Conclusion

- TissUUmaps is primarily a web-based interactive viewer for large-scale 2D images, regions, and markers.
- We collaborate with other open source initiatives for cell and tissue segmentation and spatial statistics, and aim for compatibility rather than building all functionality into TissUUmaps
- Please reach out to us if you have ideas for how your tools can be combined with TissUUmaps.

Examples and video tutorials on compatibilities with…

… can be found at website https://tissuumaps.github.io