Integrating GRASS GIS and Jupyter Notebooks to Facilitate Advanced Geospatial Modeling Education

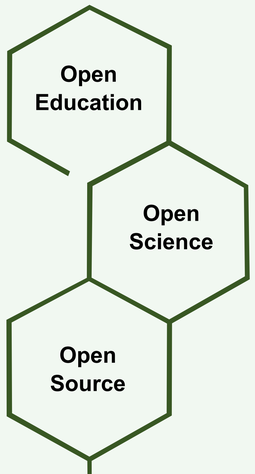
Caitlin Haedrich, Vaclav Petras, Anna Petrasova, Helena Mitasova
GeoForAll Lab

Center for Geospatial Analytics

NC STATE UNIVERSITY College of Natural Resources

Why Integrate GRASS GIS & Jupyter?

+ Rising popularity of computation notebooks in education and sciences
+ Increasing demand for programming proficiency in GIScience
+ Increase accessibility of open source software and advanced geospatial analysis



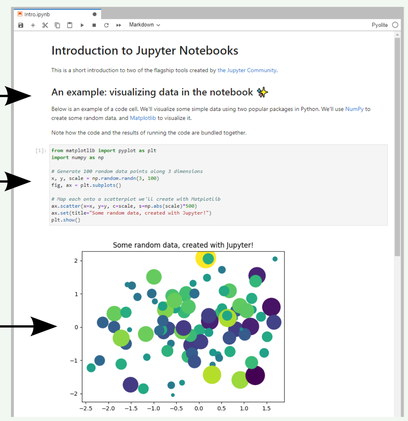
What is GRASS GIS?

+ Open Source GIS software
+ Extensive geospatial libraries include support for multitemporal analysis and dynamic simulations
+ Built and maintained by international team of scientists and developers

What are Jupyter Notebooks?

+ Sharable documents with live code (including Python, R, Java, and Matlab), in-line visualizations & Markdown narrative text
+ Can be run locally or hosted online through Binder, Jupyter Hub, Google Colab & others

Markdown Text →
Live Code →
Code Output →



Developing *grass.jupyter*

To faciliate advanced geospatial modeling education, we developed a new GRASS GIS package called **grass.jupyter.**

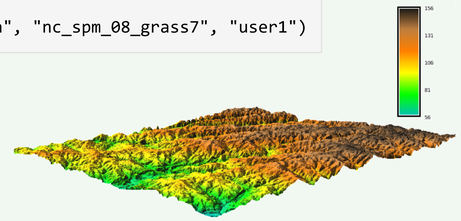
grass.jupyter *enhances existing GRASS Python API to allow Jupyter Notebook users to easily* **manage** *and* **visualize** *GRASS data*

Session Handling

```
import grass.jupyter as gj
session = gj.init("./grassdata", "nc_spm_08_grass7", "user1")
```

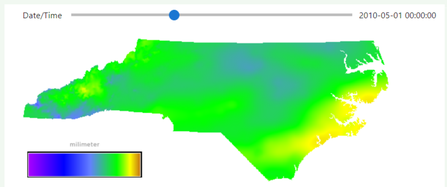
2D and 3D Rendering

```
img = gj.GrassRenderer()
img.d_rast(map="elevation")
img.show()
```



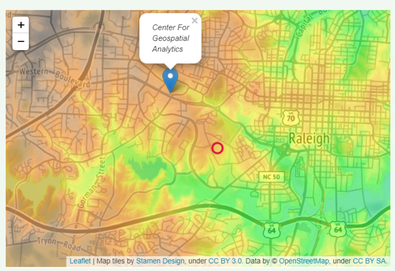
Animations & Interactive Time Slider for Space Time Datasets

```
img = gj.TimeSeries(
    "precip_sum_2010")
img.time_slider()
img.animate()
```



Interactive Maps with Folium (a Leaflet library for Python)

```
import folium
m = folium.Map()
gj.Raster("elevation").add_to(m)
gj.Vector("roadsmajor").add_to(m)
```

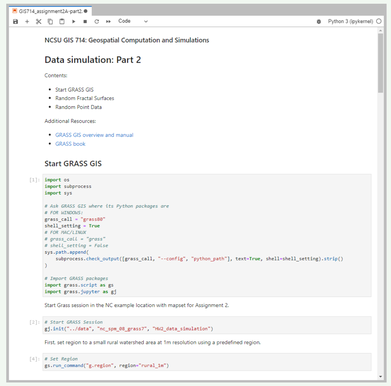


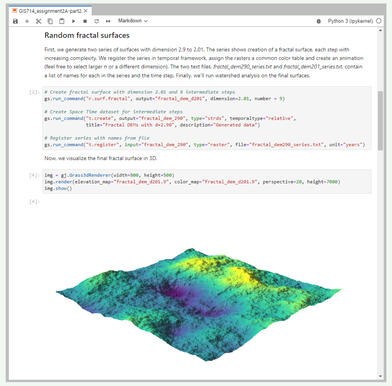
Try grass.jupyter in Binder

Visit grass.jupyter project tracking page

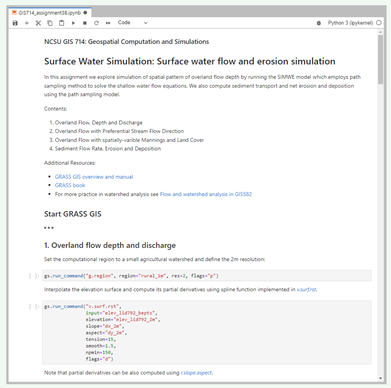
Teaching with *grass.jupyter*

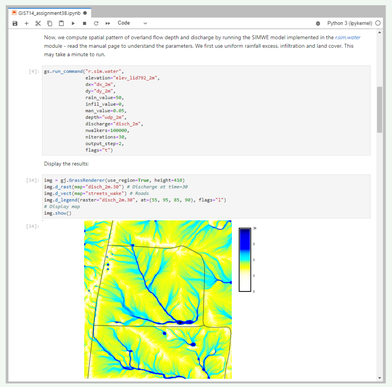
+ Notebook assignments for GIS714: Geospatial Computation and Simulation
+ 6 Notebooks that cover data simulation, surface water processes, uncertainty propagation and noise simulation





+ Notebooks stored on GitHub and hosted on Binder
+ Students choose to run notebooks locally or on Binder





Check out the GIS714 Notebooks on GitHub

Visit GIS714 Course Webpage

Acknowledgements

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