

State of GRASS GIS

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& Verónica Andreo, Vaclav Petras, Anna Petrasova



GRASS GIS

FOSS4G 2022 - Florence, Italy

neteler.github.io/grass-gis-talks-markus/

- Co-founder and senior consultant at mundialis, Bonn (DE)
- PhD in Geography, Univ. of Hannover
- Years of researcher's life in Trento, Italy
- Since 2016 in Bonn, Germany @ mundialis
- Since 1997 active in the **GRASS GIS** project
- Co-founder of **OSGeo**



<https://www.mundialis.de/neteler/>

- Which GRASS?
- Exciting new features in GRASS GIS 8.2
- Code quality and automated releases
- Community contributions
- Get involved

- **GRASS GIS** (Geographic Resources Analysis Support System), a FOSS suite used for geospatial data management and analysis, image processing, spatial modeling, and visualization.
- Originally developed by the U.S. Army CERL for land management and environmental planning (1982-1995).
- Founding member of OSGeo (2006)
- **39 years of continuous geospatial development**

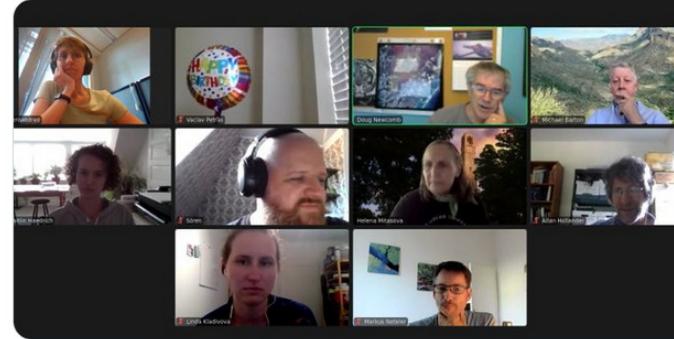


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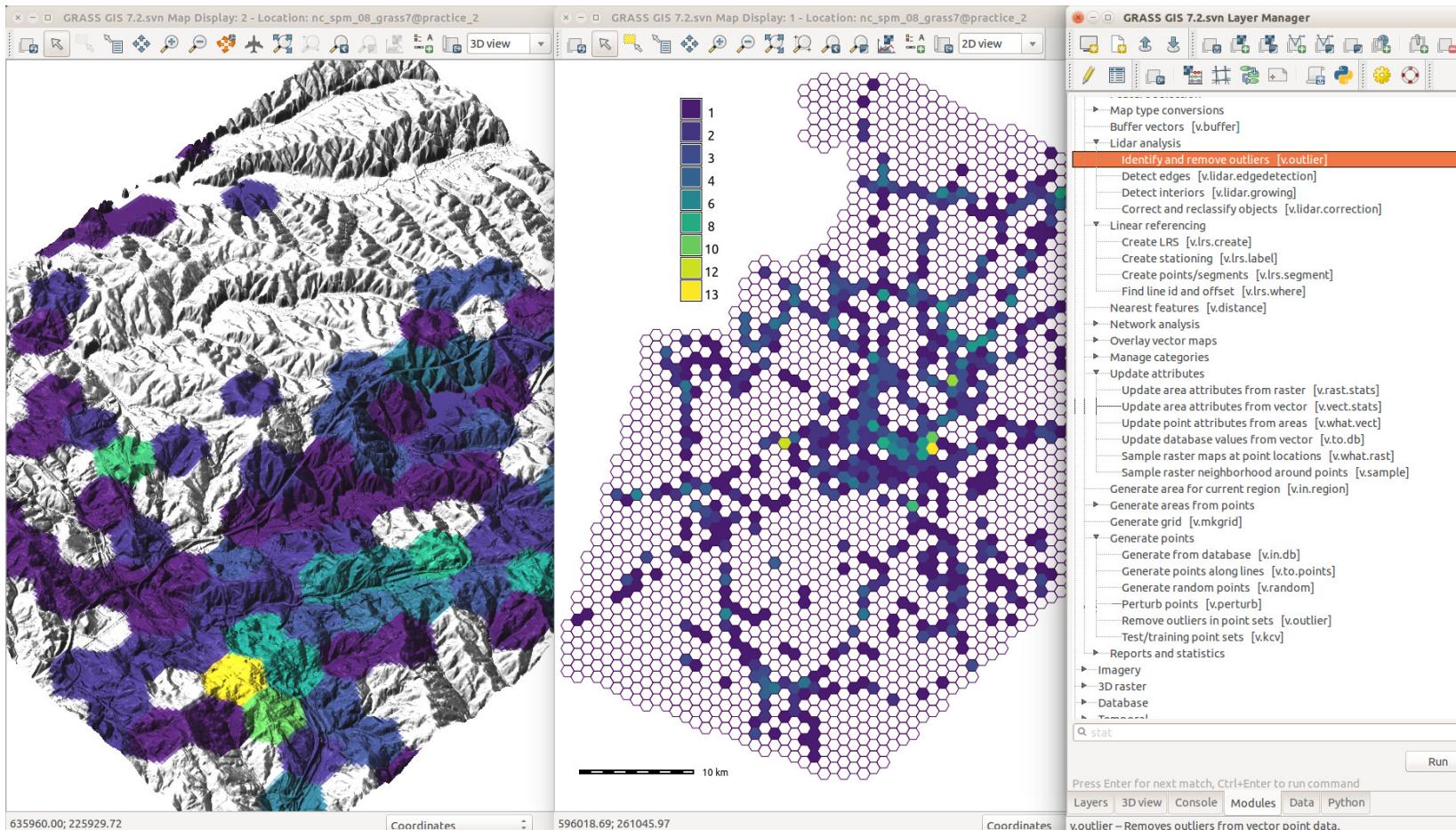
The 1st user manual for (what would become) GRASS GIS was published by J. Westervelt and M. O'Shea on 29 July 1983...

This is why the GRASS GIS **#community** celebrates today 39 years of continuous **#opensource** development & geospatial coolness!! 😁

Happy birthday **#GRASSGIS!!** 🎉🎂🍺



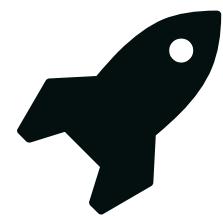
- All matured tools available right away
 - Download of experimental tools possible
 - Network analysis, hydrology, remote sensing, OBIA, time series,
- ...



- 7.8.7, Feb 2022 Stability and fixes.
- 8.0.0, Feb 2022 New startup, data management.
- 8.0.2, May 2022 Stability and fixes.
- 8.2.0, June 2022 Jupyter, parallel r.neighbors, ...
 - major.minor.micro – semantic versioning:
 - major (x) brings **features and possibly backward incompatible changes**
 - minor (x.y) brings **features and fixes**,
 - micro (x.y.z) brings **fixes**,

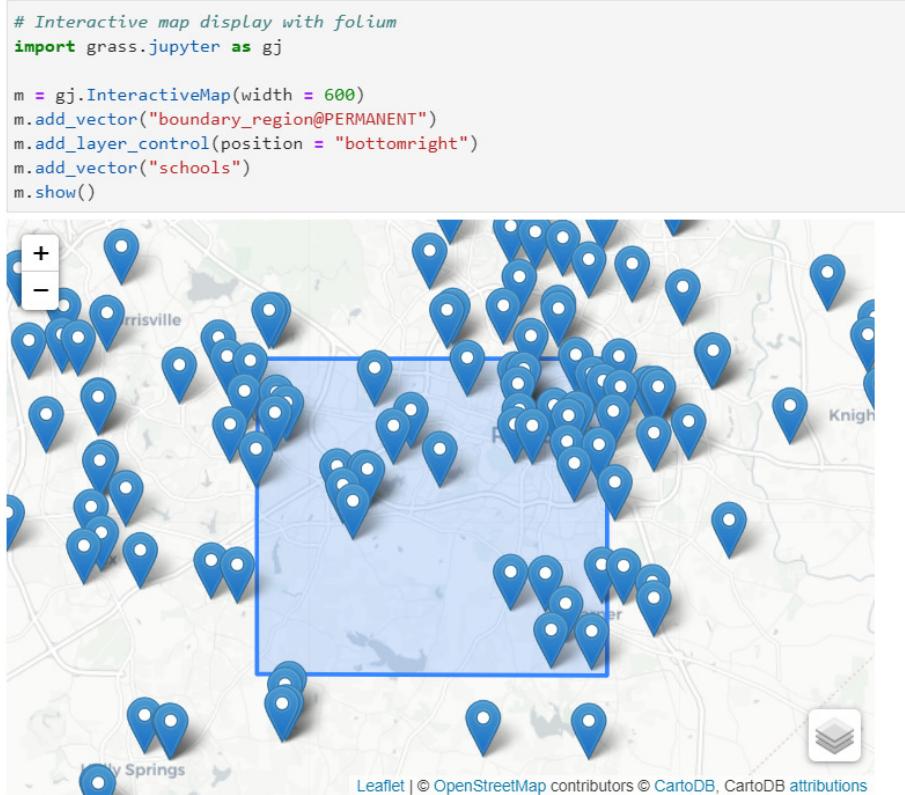


8.2+



Notebooks

Integration of results from Google Summer of Code
2021

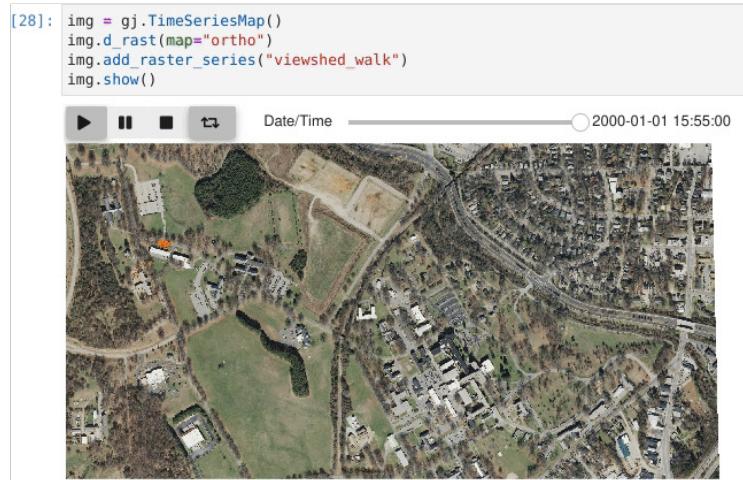
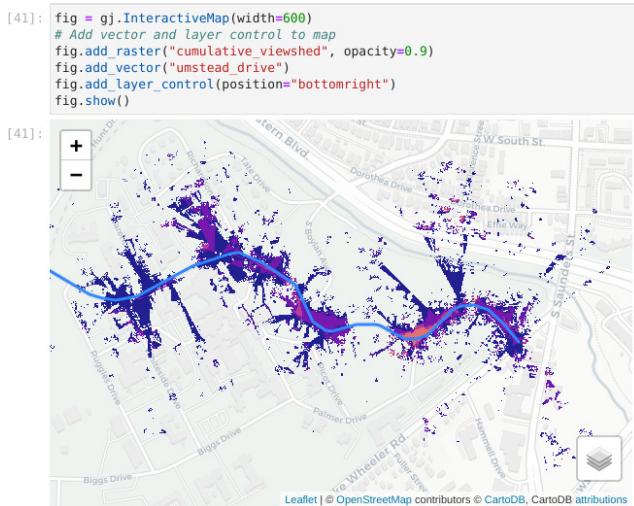


New Python library that simplifies the launch of GRASS GIS in Jupyter
and the interactive display of raster/vector data

by Caitlin Haedrich

Notebooks

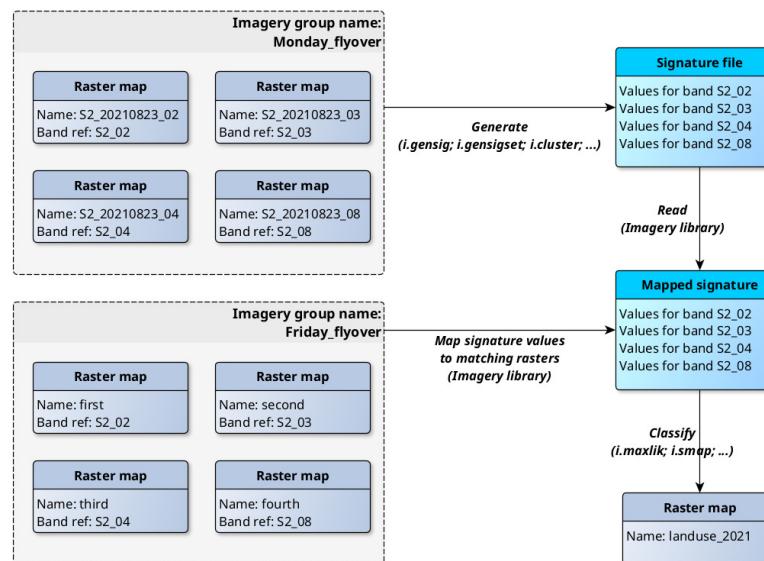
- Notebooks: Mix of text, code, results, images, ...
- Usage: Prototyping, reproducibility, tutorials, ...
- Now in GRASS GIS: Python functions for easy integration



tinyurl.com/grass-rc2 (run in Binder)

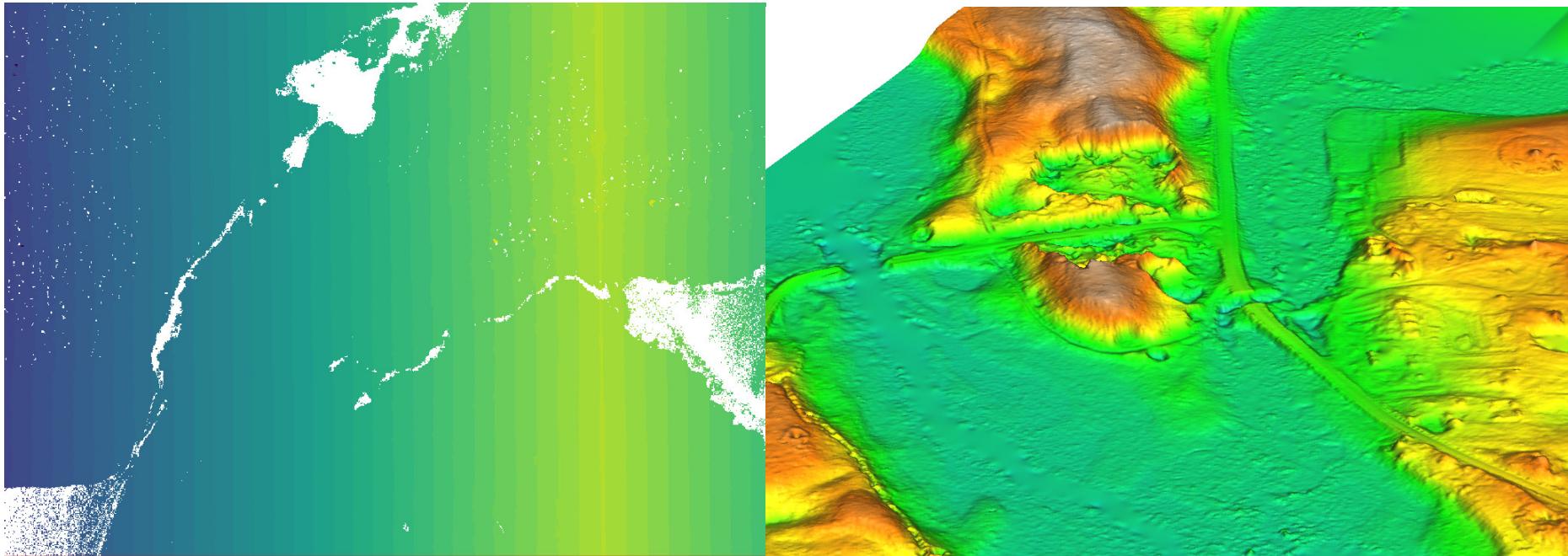
by Vaclav Petras, Anna Petrasova, Caitlin Haedrich

- assigning meaningful labels to raster maps (e.g., S2_1 or red)
 - image classification can use semantic labels to identify bands
 - different scenes can then be classified if semantic labels are the same
- organize bands within one spatio-temporal dataset
- signature files can be used for classification if band references match (raster values are semantically equal)

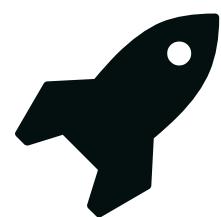


by Maris Nartiss, Martin Landa, Markus Metz

- import of any point dimension (including user defined ones e.g. from PDAL filters)
- support of 19 binning methods (including eigenvalues)
- point filtering by values in any dimension

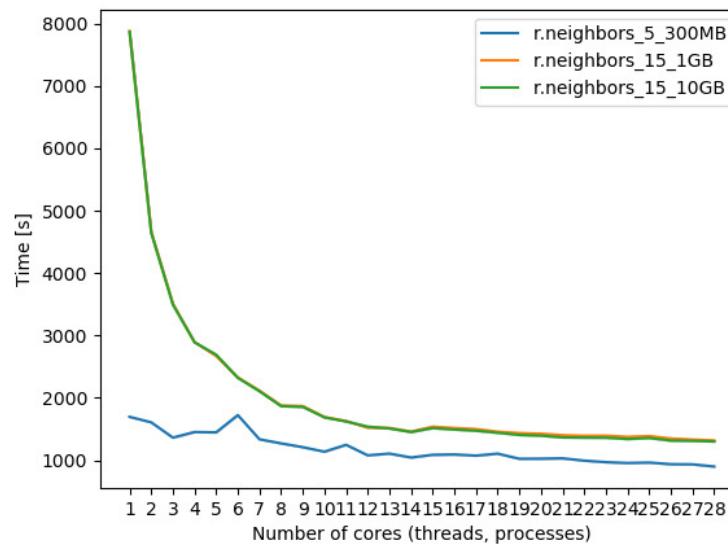


by Vaclav Petras and Māris Nartīšs



Integration of results from Google Summer of Code 2021

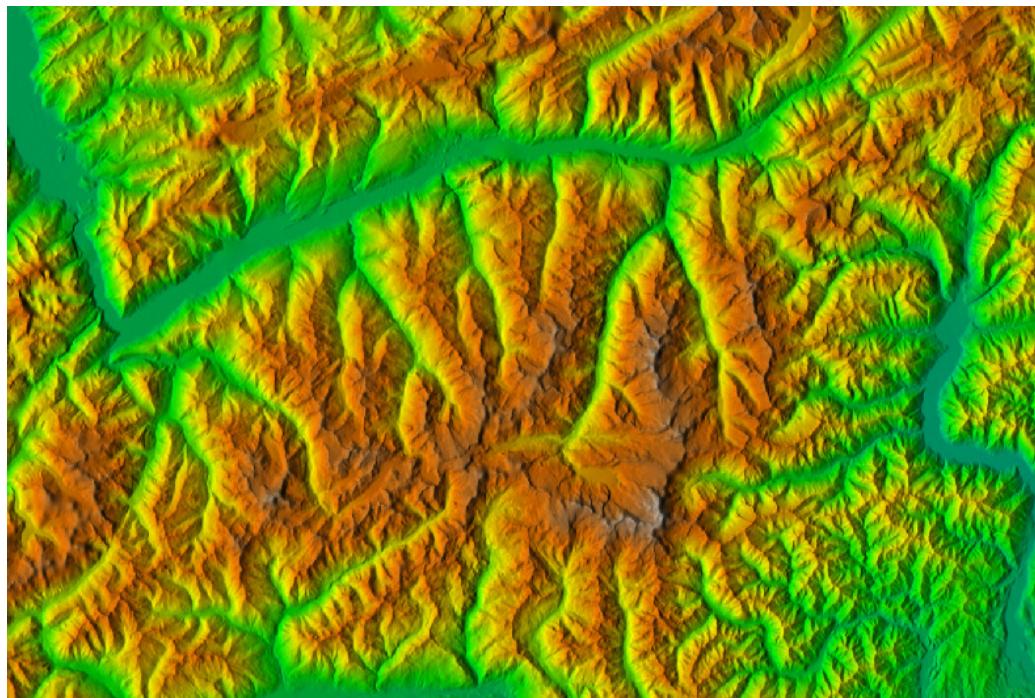
- r.series
 - r.univar
 - r.neighbors
 - r.patch
 - r.resamp.interp
 - r.resamp.filter
 - r.mfilter
 - r.slope.aspect
- + benchmarking library



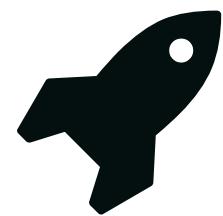
by Aaron Saw Min Sern and Anna Petrasova

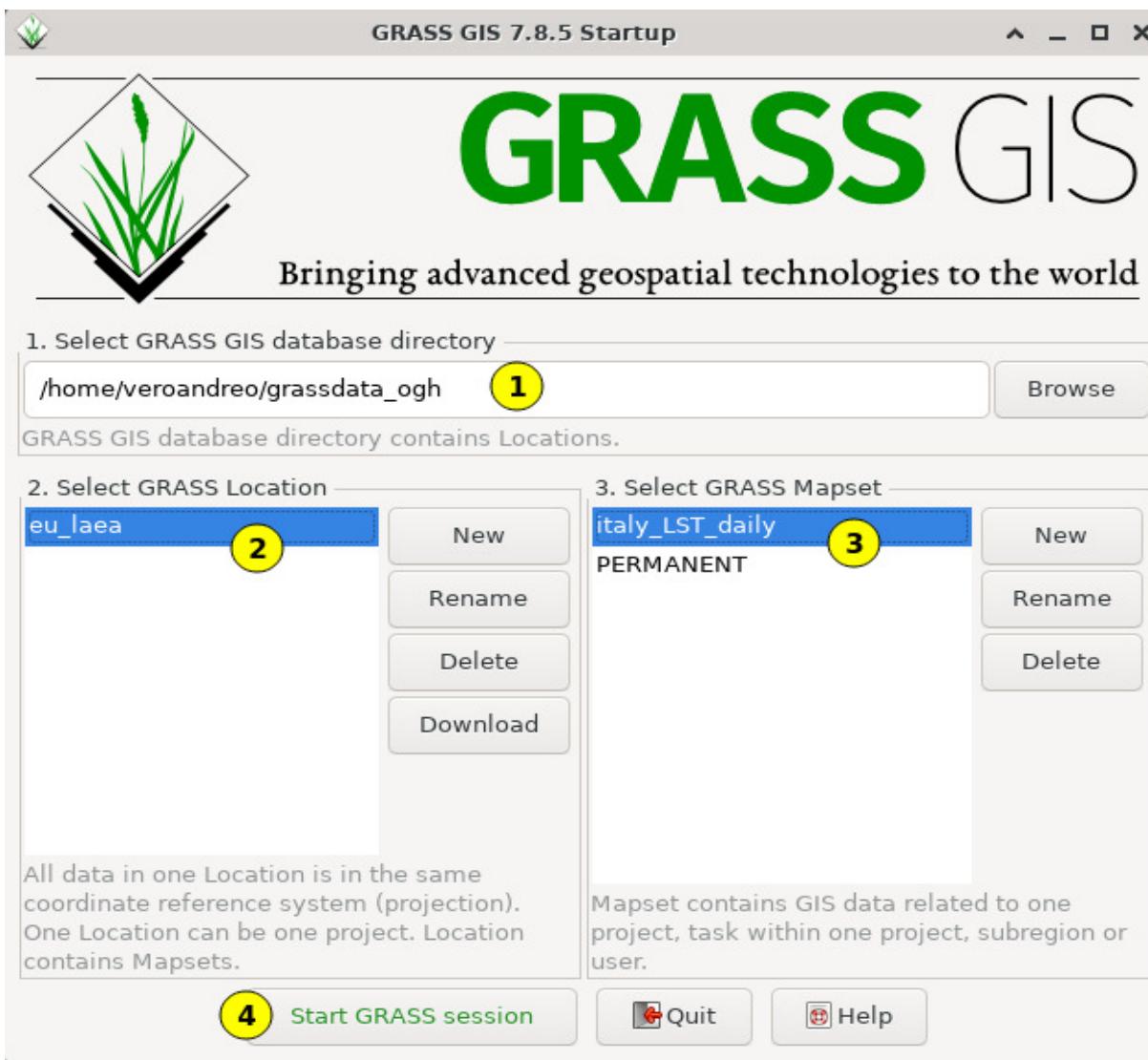
Available in 8.2+

- Core tools: r.sun, v.surf.rst, r.sim.sediment, r.sim.water
- Addons tools:
r.sun.daily, r.in.usgs, r.mapcalc.tiled, t.rast.what.aggr, r.connectivity.corridors, r.viewshed.exposure, and **14** more
- Parallelizing custom Python scripts:
 - GridModule (by tile)
 - multiprocessing, ParallelModuleQueue (by task)



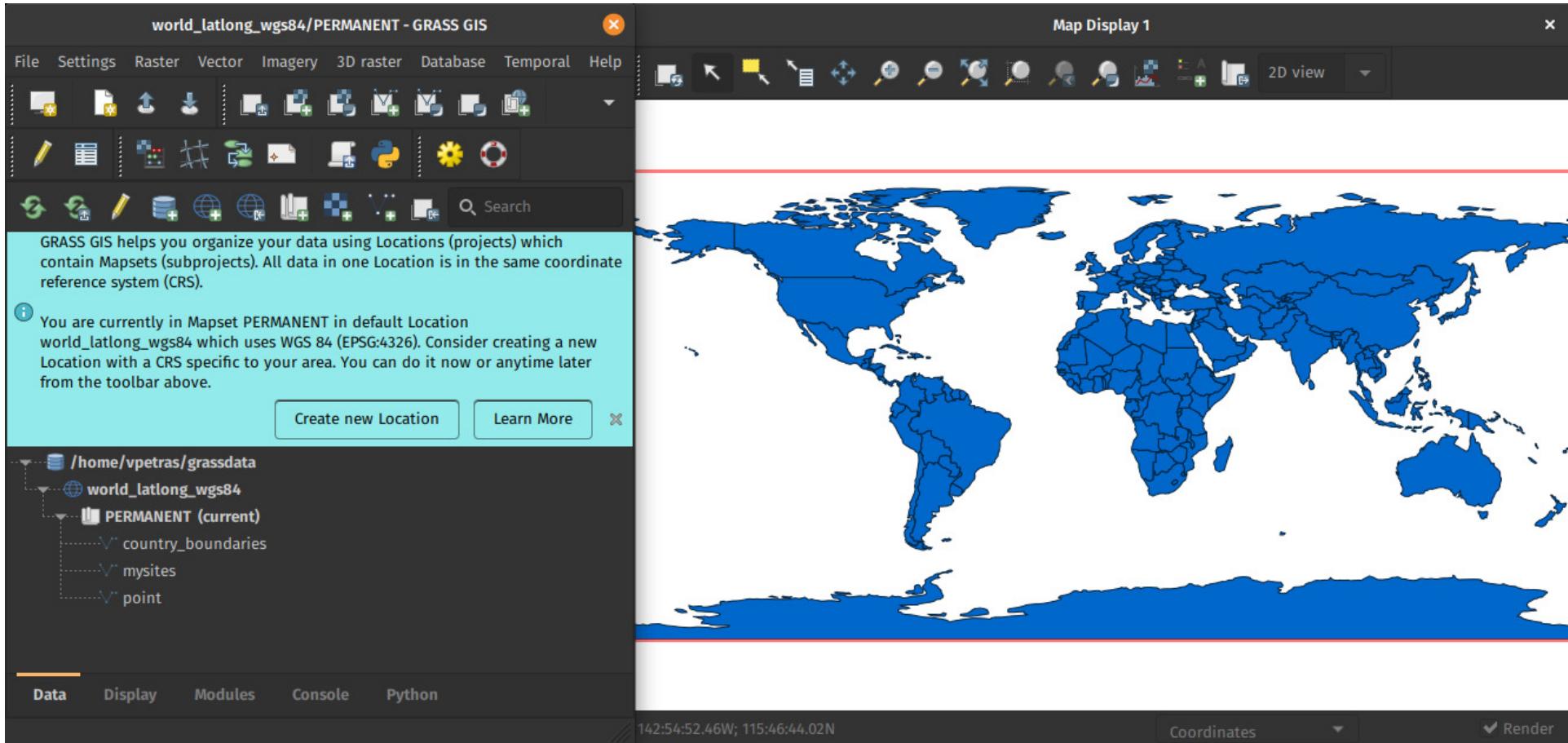
8.2+





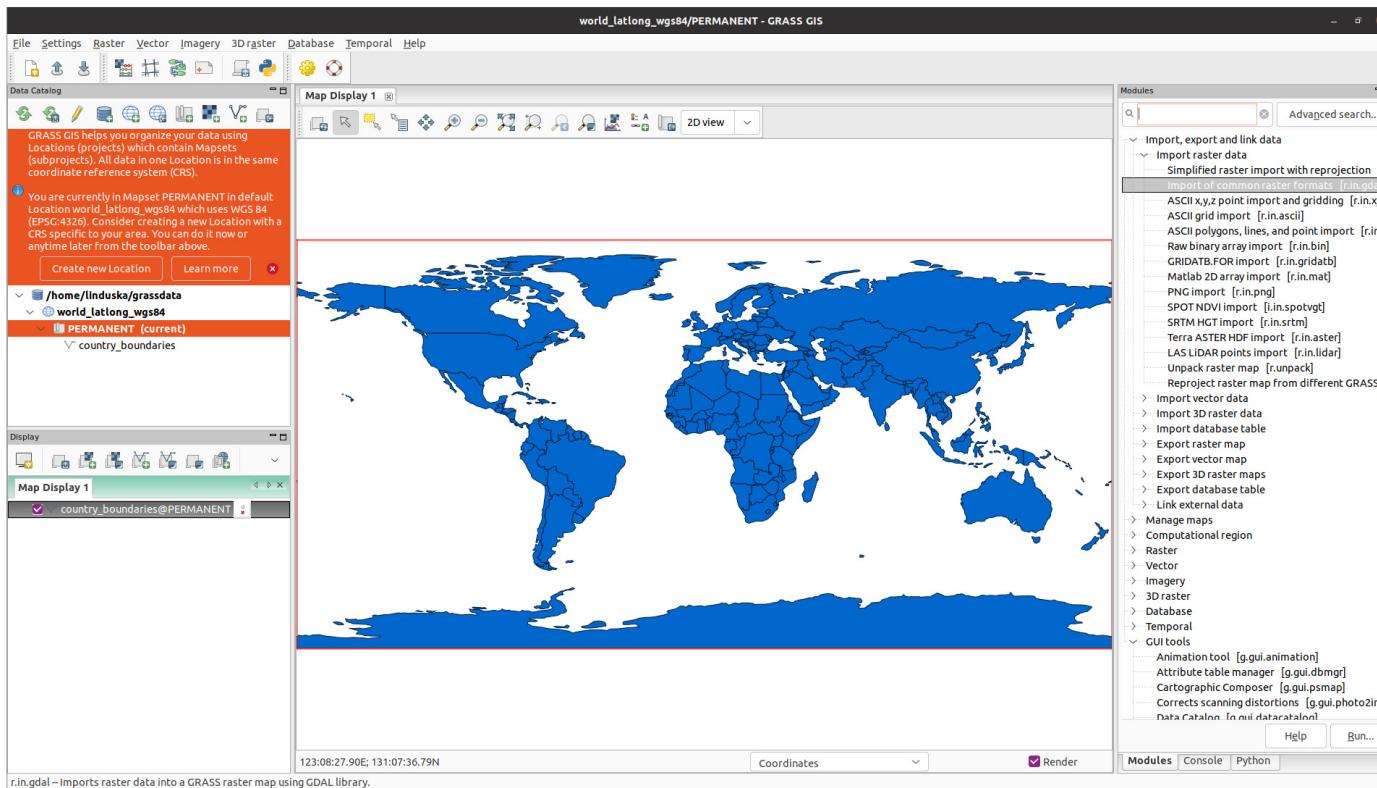


Initial project sets up automatically. Guidance provided for next steps.



by Linda Kladivova & rest of the community (many reviews, calls, user surveys, ...)

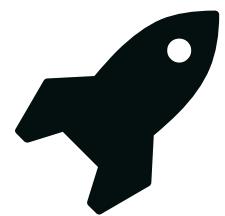
Integration of results from Google Summer of Code 2021



One GUI window with optimized layout with dockable widgets.
by Linda Kladivova

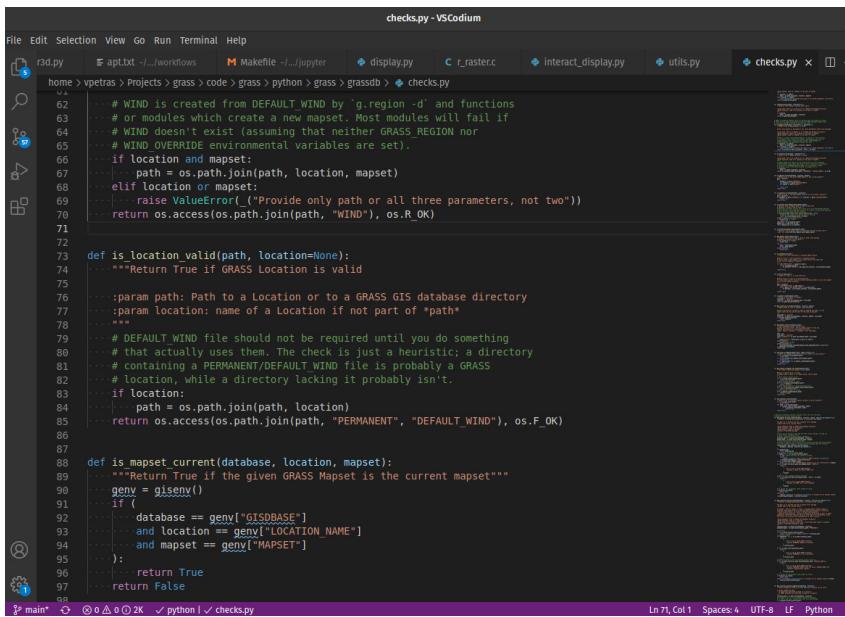
Available in 8.2+: *Settings > Preferences > General*

releases



GitHub Actions

- Python code formatted by Black.
- Python code checked against Flake8.
- Most of warnings in C code removed and now checked.
- Code tested with CodeQL.
- Flake8 and Black checks also for Addons.



```
checks.py - VSCode

File Edit Selection View Go Run Terminal Help
home > vpetras > Projects > grass > Code > python > grass > grassdb > checks.py

62:     # WIND is created from DEFAULT_WIND by 'g.region -d' and functions
63:     # or modules which create a new mapset. Most modules will fail if
64:     # WIND doesn't exist (assuming that neither GRASS_REGION nor
65:     # WIND_OVERRIDE environmental variables are set).
66:     if location and mapset:
67:         path = os.path.join(path, location, mapset)
68:     elif location or mapset:
69:         raise ValueError("Provide only path or all three parameters, not two")
70:     return os.access(os.path.join(path, "WIND"), os.R_OK)
71:
72:
73: def is_location_valid(path, location=None):
74:     """Return True if GRASS Location is valid
75:
76:     :param path: Path to a Location or to a GRASS GIS database directory
77:     :param location: name of a Location if not part of *path*
78:     """
79:     # DEFAULT_WIND file should not be required until you do something
80:     # that actually uses them. The check is just a heuristic: a directory
81:     # containing a PERMANENT/DEFAULT_WIND file is probably a GRASS
82:     # location, while a directory lacking it probably isn't.
83:     if location:
84:         path = os.path.join(path, location)
85:     return os.access(os.path.join(path, "PERMANENT", "DEFAULT_WIND"), os.F_OK)
86:
87:
88: def is_mapset_current(database, location, mapset):
89:     """Return True if the given GRASS Mapset is the current mapset"""
90:     geny = gisenv()
91:     if (
92:         database == geny["GISDBASE"]
93:         and location == geny["LOCATION_NAME"]
94:         and mapset == geny["MAPSET"]
95:     ):
96:         return True
97:     return False
98:
```

by Nicklas Larsson, Vaclav Petras, Anna Petrasova, Carmen Tawalika, ...

Turning git commit entries into a release page

- log message parsing, categorization for the subsection
- publishing of source code and auto-generated **release notes**

Releases / 8.2.0

GRASS GIS 8.2.0 Latest

 **github-actions** released this Jun 03, 2022  8.2.0  cafd69c

The GRASS GIS 8.2.0 release provides more than 225 improvements and fixes with respect to the release 8.0.0.

What's Changed

Highlights

- Parallel processing in *r.series*, *r.patch*, *r.mfilter*, and *r.slope.aspect* by [@aaronsms](#)
- Single window graphical user interface from Settings > Preferences > General by [@lindakladivova](#)
- A new map display settings dialog and status bar context menu by [@lindakladivova](#)
- A new *grass.jupyter* package for interacting with Jupyter notebooks by [@chaedri](#)  [launch](#) [binder](#)
- *GridModule* from *grass.pygrass* is easier and safer to use by [@petrasovaa](#) and [@wenzeslaus](#)
- *init* from *grass.script.setup* now returns a context manager by [@albertoparadisIlop](#) and [@wenzeslaus](#)
- A JSON file with latest commit info is available for packaging and reproducibility purposes by [@tmszi](#)

Modules

Raster

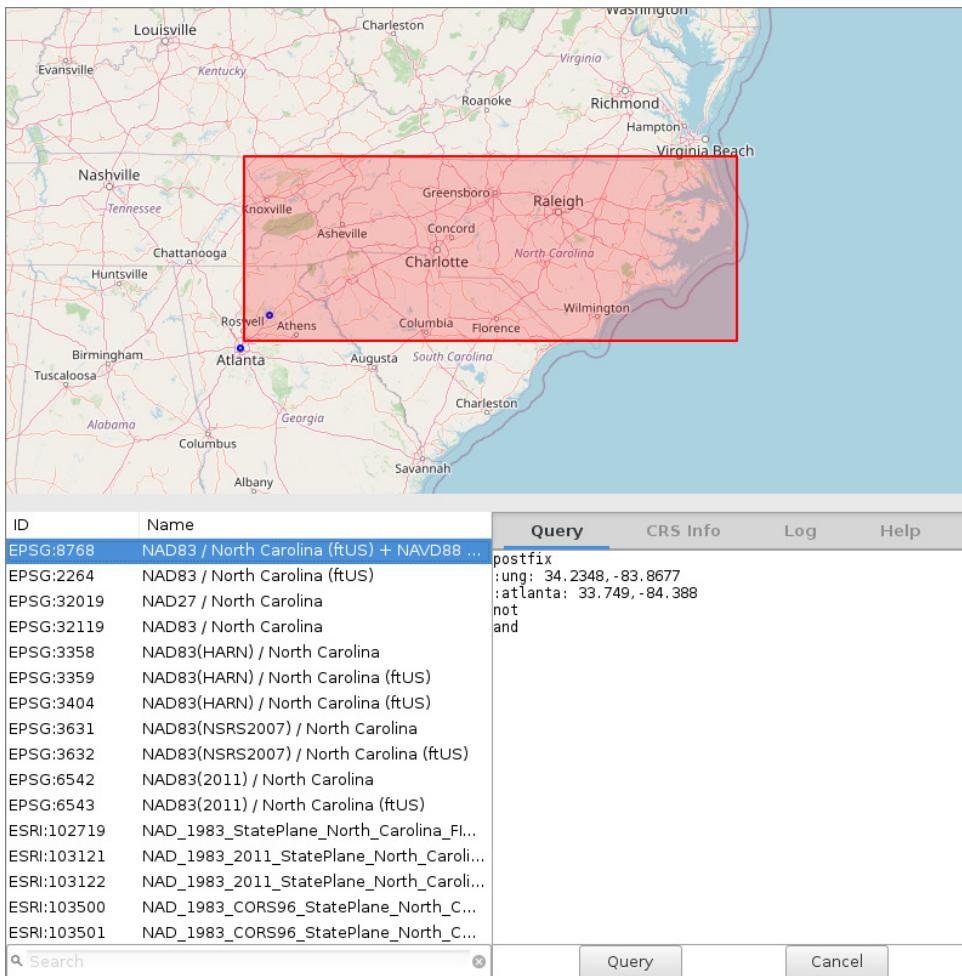
- *r.buildvrt*: check if all input maps are NULL-only by [@neteler](#) in [#2220](#)

by Vaclav Petras (procedure support by Markus Neteler)

the community

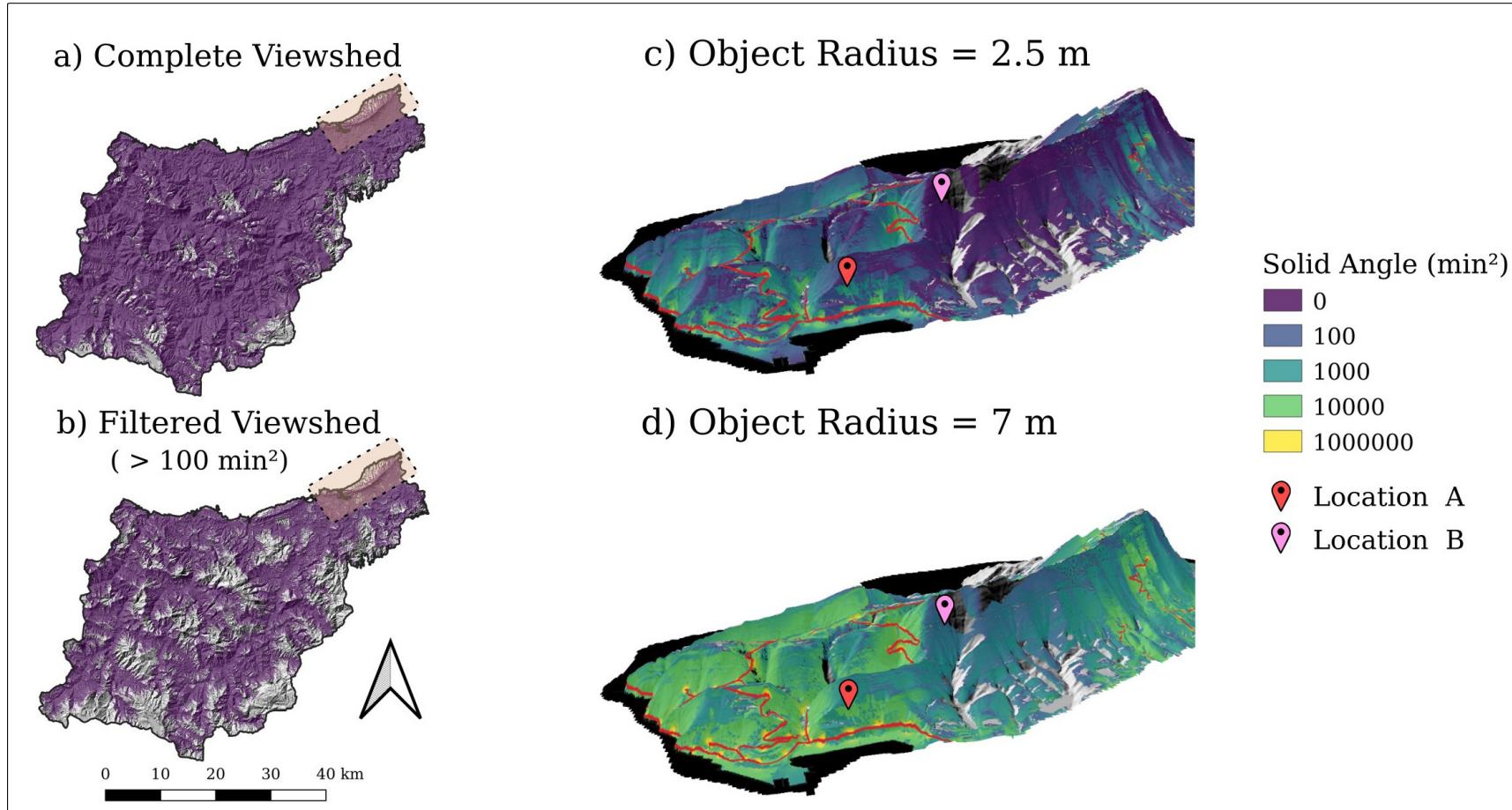


g.projpicker queries projections spatially using user-drawn geometries and set-theoretic logical operators. It requires [ProjPicker](#).



addon by Huidae Cho

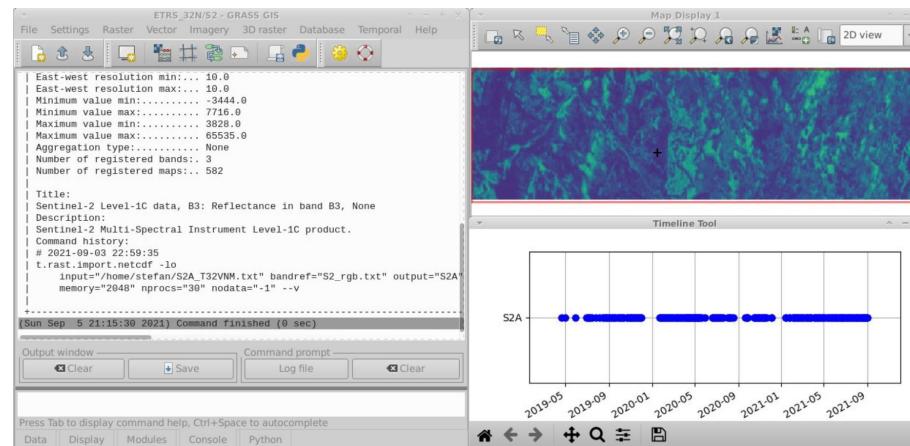
r.survey allows to assess whether objects of certain size could be detected by an observer moving along roads or sitting on a flying object



addon by Ivan Marchesini

GRASS GIS understands netCDF data that follows the CF-convention

- **m.crawl.thredds**: Lists URLs for netCDF datasets on Thredds servers
- **t.rast.import.netcdf**: Makes Spatio-temporal data in netCDF format directly available for analysis in GRASS STRDS (also without downloading)



Enjoy data delivered right into your GRASS GIS database from e.g.:

thredds.ucar.edu/thredds/catalog.html

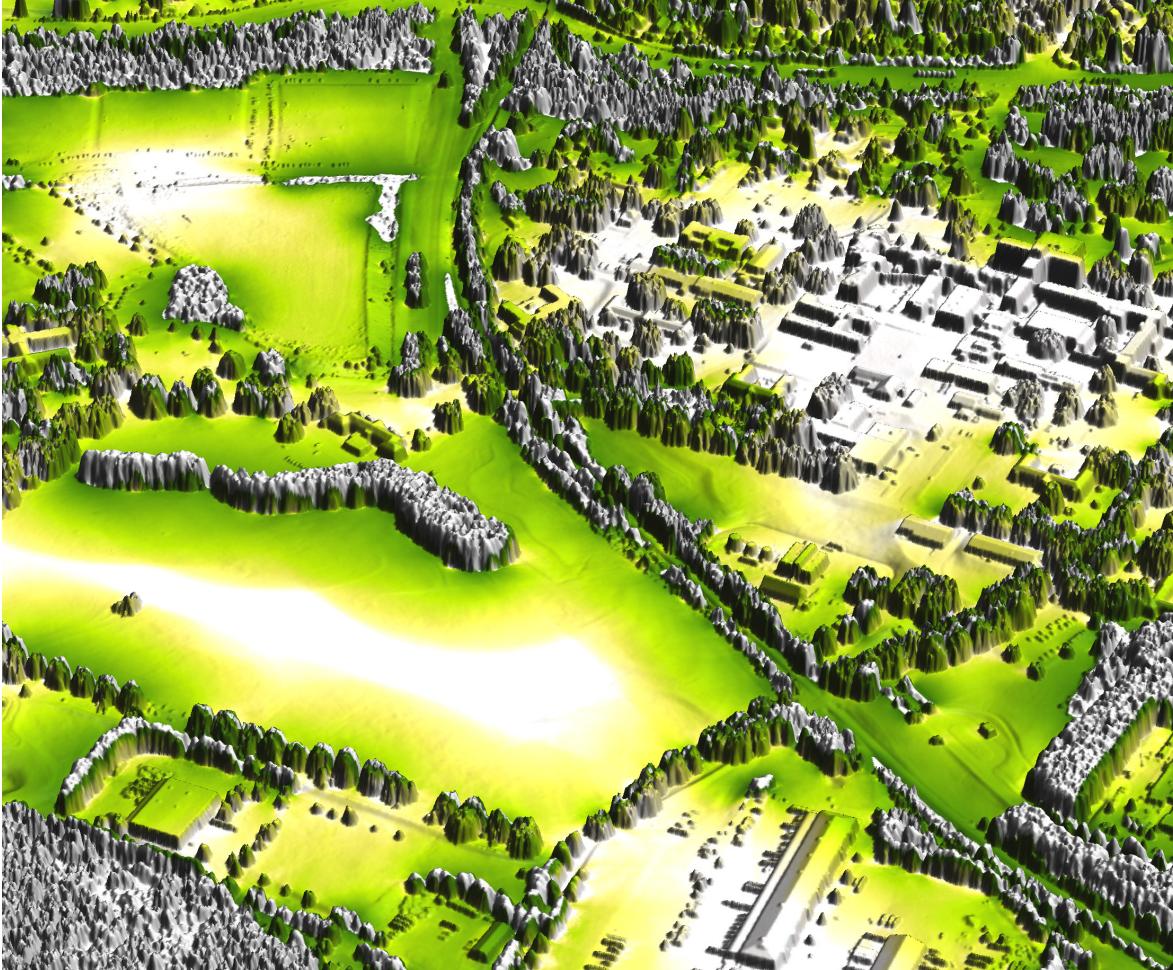


Norwegian National Ground Segment for Satellite Data



by Stefan Blumentrath (Norwegian Institute for Nature Research - NINA)

r.viewshed.exposure - Weighted cumulative viewshed analysis
defining visual exposure to a source



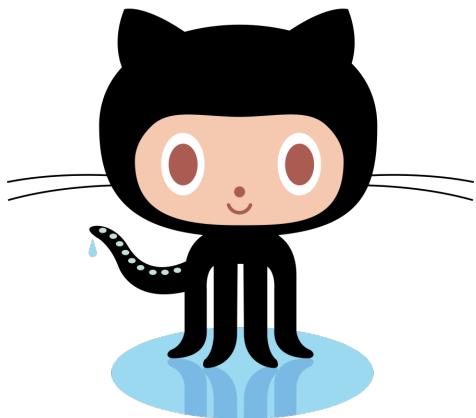
addon by Zofie Cimburova and Stefan Blumentrath

welcome!



GRASS GIS development is GitHub-centered: core, addons, website

- File bug reports or feature requests
- All issues and PR's are publicly visible
- Ask, comment, suggest also in Github [Discussions](#)
- *"Fork me on [GitHub](#)"* and suggest changes or fix bugs via pull requests
- Create your own addon! See this nice workshop for a guideline:
[How to write a Python tool for GRASS](#)

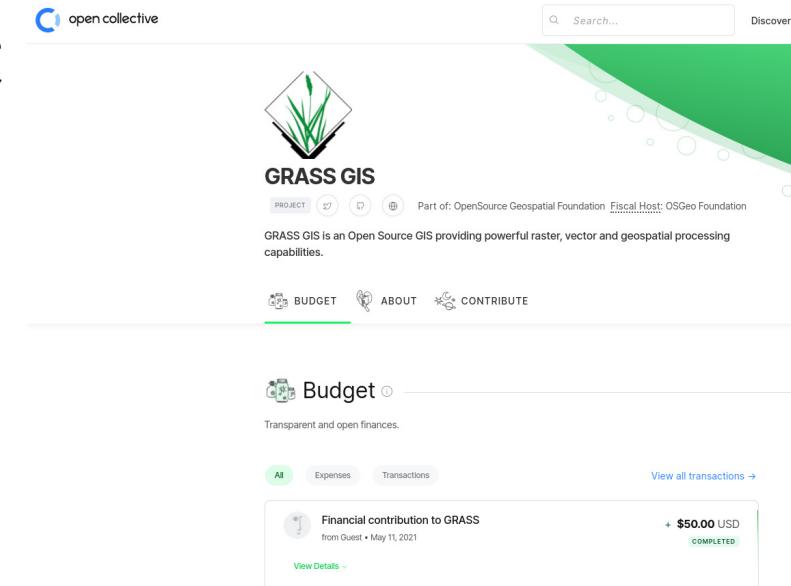


- Translations: we use OSGeo Weblate
- Documentation: start by fixing typos in manual pages, add examples where missing, create cool screenshots, write tutorials in the wiki, etc.
- Contribute material for our social media   
- Write a blog post for our website
- Bring your own ideas!

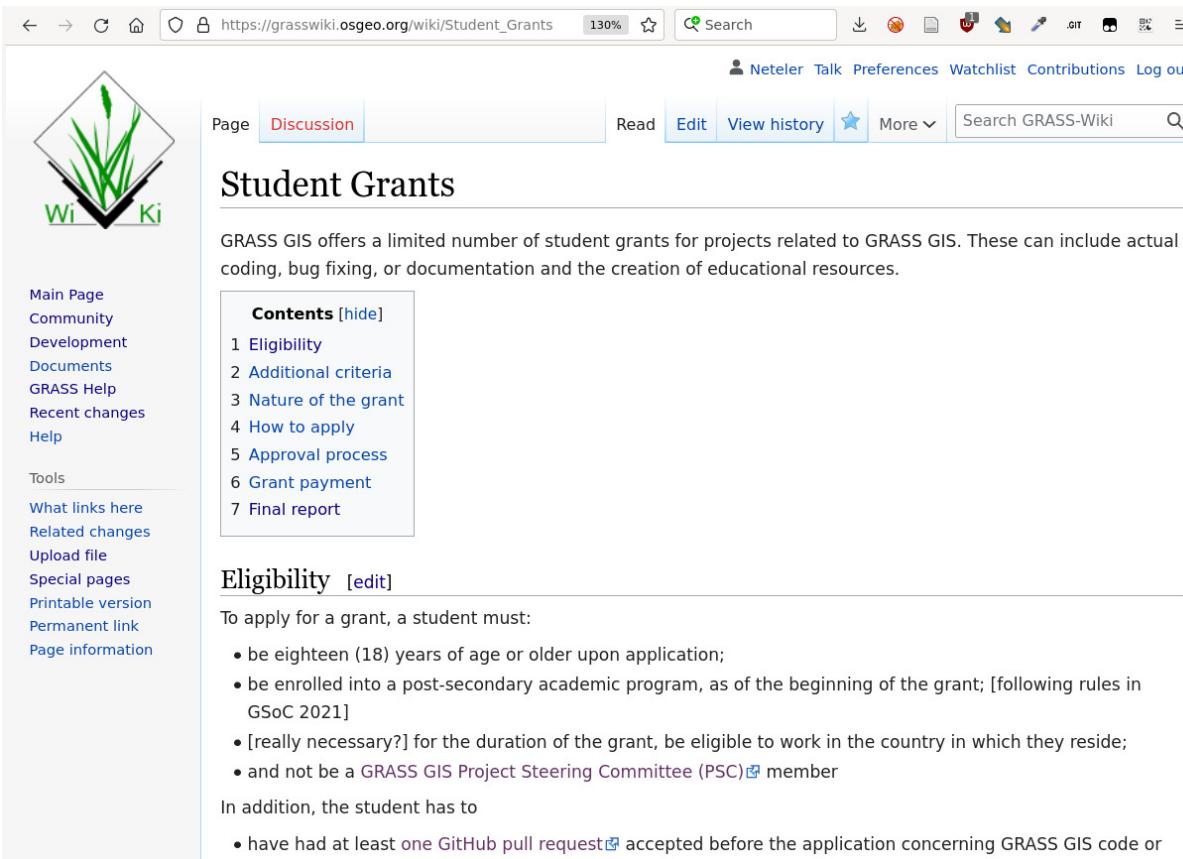
- Individuals:
 - Time: organize virtual community event, fix typos, ...
 - Money: opencollective.com/grass (new!)
- Organizations:
 - Time: employee time
 - Money: pay developers (companies) to add features or fix bugs

"One of the greatest benefits of GRASS GIS is that its environments gives us a plethora of options for manipulating data and testing/designing our automation/workflow processes."

<https://opencollective.com/grass>



- GRASS GIS offers a limited number of student grants.
- These can include actual coding, bug fixing, or documentation and the creation of educational resources.



The screenshot shows a web browser displaying the GRASS-Wiki page for Student Grants. The URL in the address bar is https://grasswiki.osgeo.org/wiki/Student_Grants. The page title is "Student Grants". The content area includes a brief introduction, a "Contents" sidebar with 7 numbered sections, and two main sections: "Eligibility" and "In addition, the student has to".

Page Discussion Read Edit View history More Search GRASS-Wiki

Student Grants

GRASS GIS offers a limited number of student grants for projects related to GRASS GIS. These can include actual coding, bug fixing, or documentation and the creation of educational resources.

Contents [hide]

- 1 Eligibility
- 2 Additional criteria
- 3 Nature of the grant
- 4 How to apply
- 5 Approval process
- 6 Grant payment
- 7 Final report

Eligibility [edit]

To apply for a grant, a student must:

- be eighteen (18) years of age or older upon application;
- be enrolled into a post-secondary academic program, as of the beginning of the grant; [following rules in GSoC 2021]
- [really necessary?] for the duration of the grant, be eligible to work in the country in which they reside;
- and not be a GRASS GIS Project Steering Committee (PSC) member

In addition, the student has to

- have had at least one GitHub pull request accepted before the application concerning GRASS GIS code or

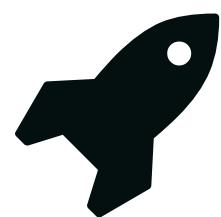
https://grasswiki.osgeo.org/wiki/Student_Grants



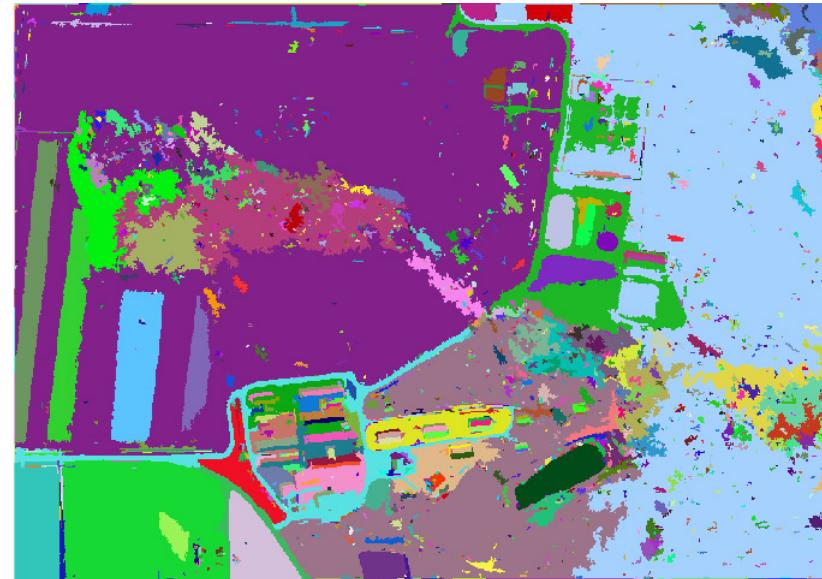
grass.osgeo.org

neteler.github.io/grass-gis-talks-markus/foss4g2022.html

 [MarkusNeteler](#)



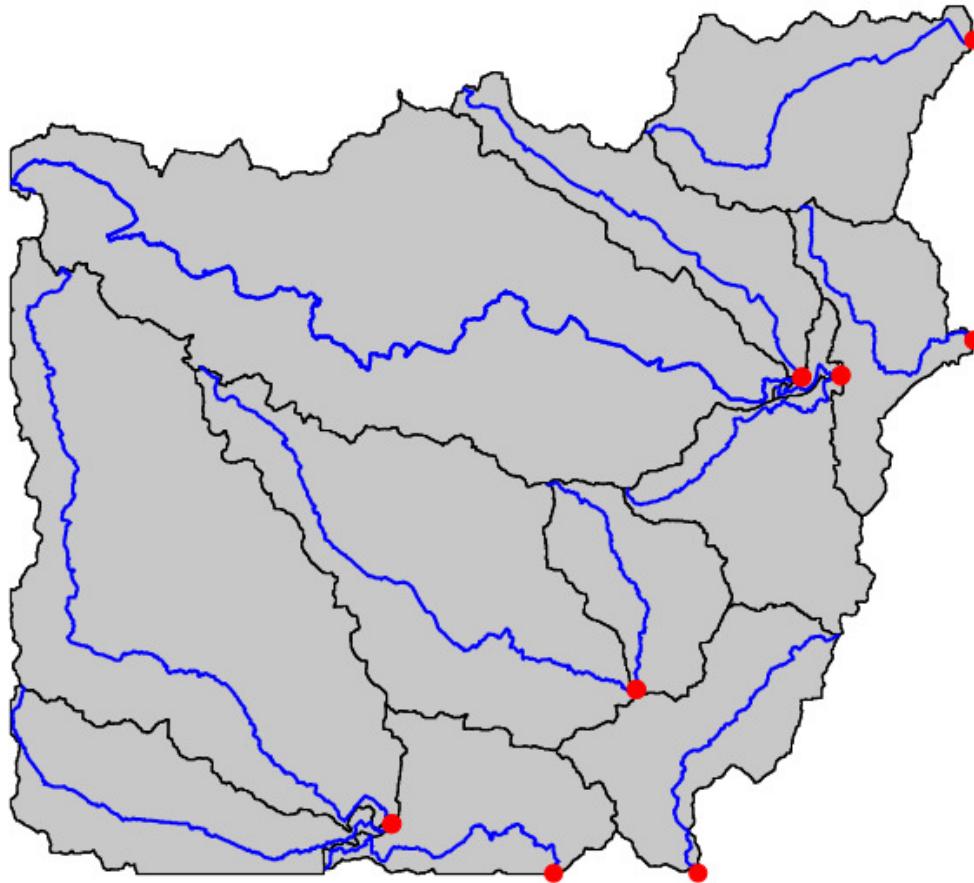
i.gabor creates directional filters for image segmentation using *i.segment*. It requires NumPy and SciPy.



addon by Owen Smith

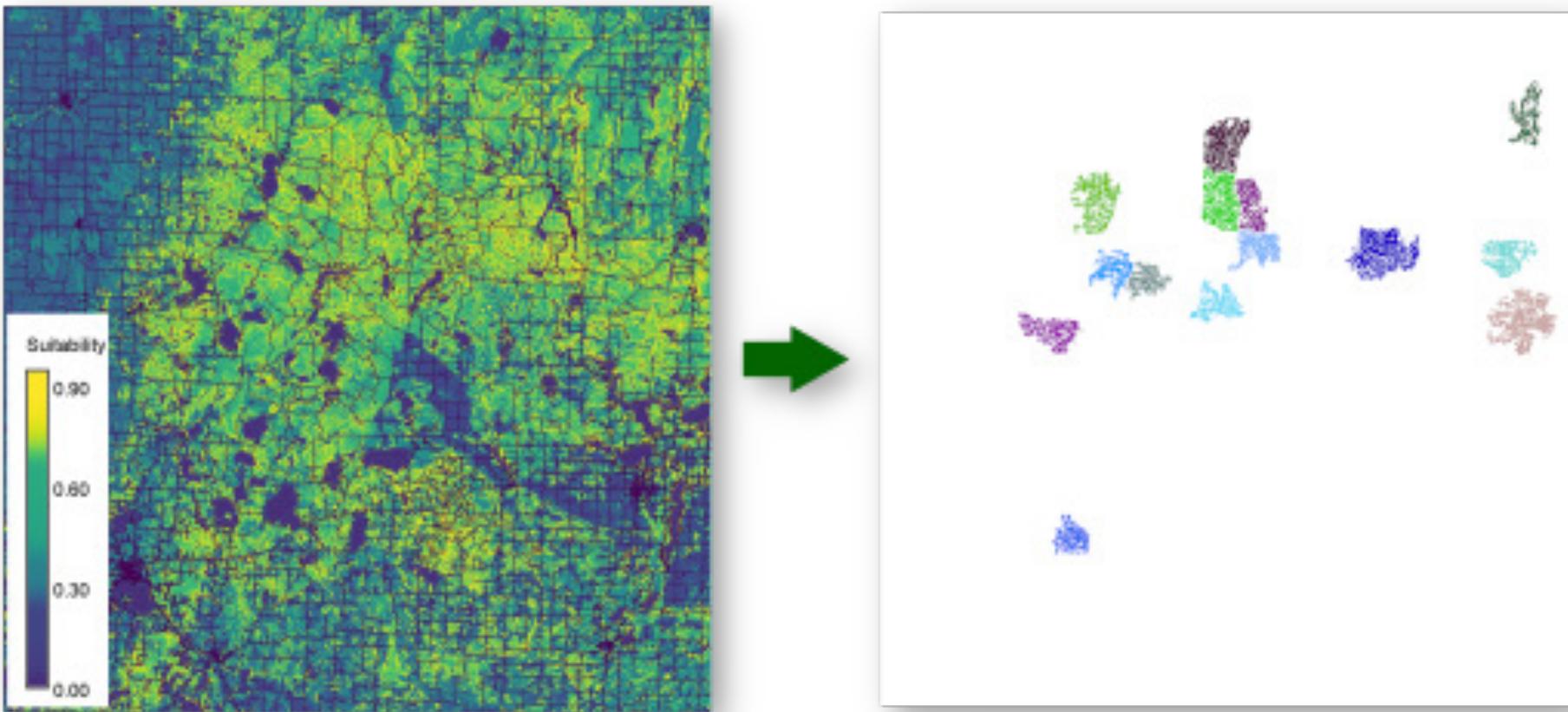
Direction Raster

r.accumulate calculates weighted flow accumulation, subwatersheds, stream networks, and longest flow paths using a flow direction map.



by Huidae Cho

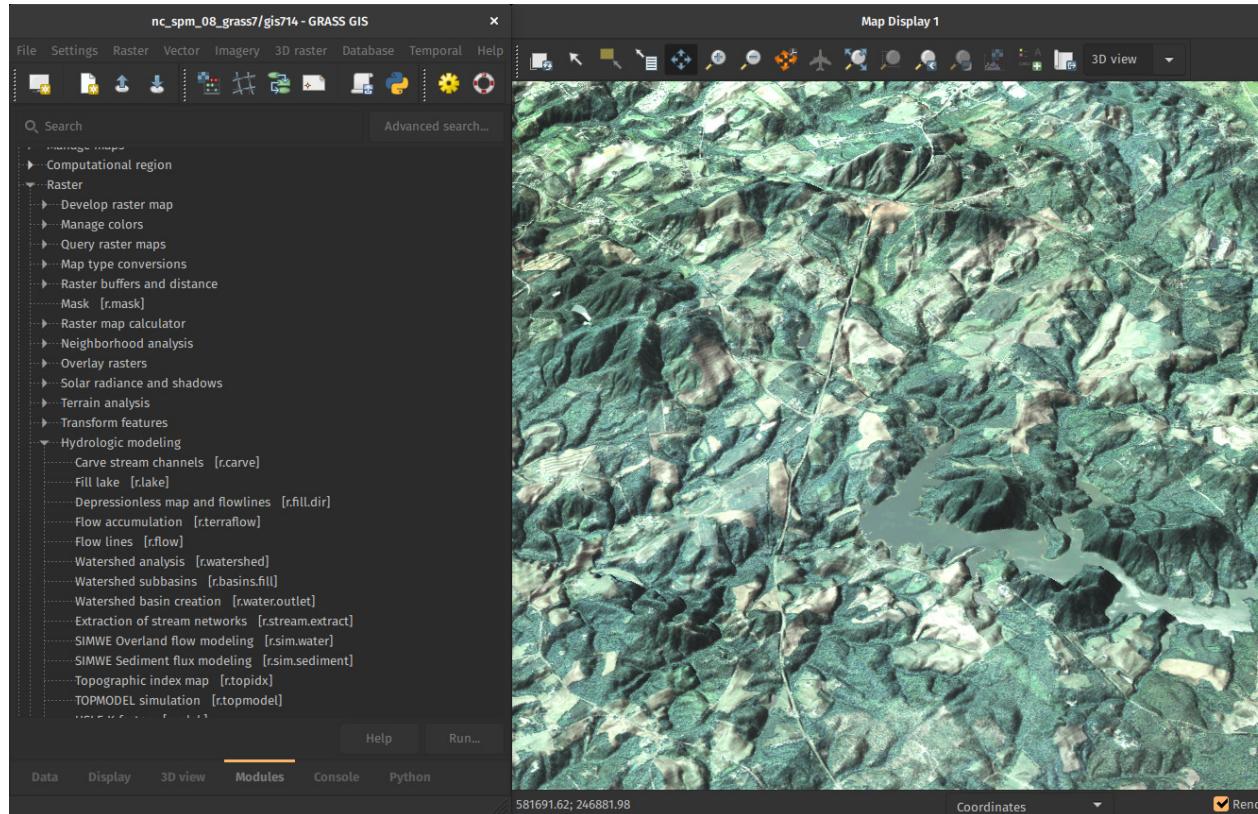
r.suitability.regions allows to identify suitable regions, e.g., for endangered species, starting from suitability maps.



addon by Paulo van Breugel

Automated download and import of common datasets

i.sentinel, i.modis, i.landsat, r.in.usgs, r.in.nasadem, m.crawl.thredds,
t.rast.import.netcdf, ...



by Fondazione Edmund Mach, OpenGeoLabs, mundialis, GSoC, NC State University, CONICET, Norwegian Institute for Nature Research, ...