



State of GRASS GIS Project: 35 years is nothing!

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grass.osgeo.org

FOSS4G 2019 – Bucharest, Romania



35+ years of GRASS GIS: from mainframe to desktop and cloud

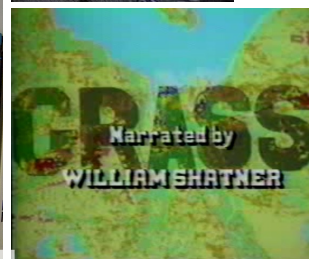


GRASS GIS 101

- GRASS = Geographic Resources Analysis Support System
- **modular and flexible** GIS and image processing software
- freedom: GNU General Public License 2+
 - 2D raster and 3D raster voxel processing
 - topological vector data functionality
 - image processing, time series analysis
 - visualization options
- **portable** software ("all" operating systems)
- graphical user interface and command line
- **cloud** ready: docker images available



1982: Vax 11/780
minicomputer



OSGeo
community sprint



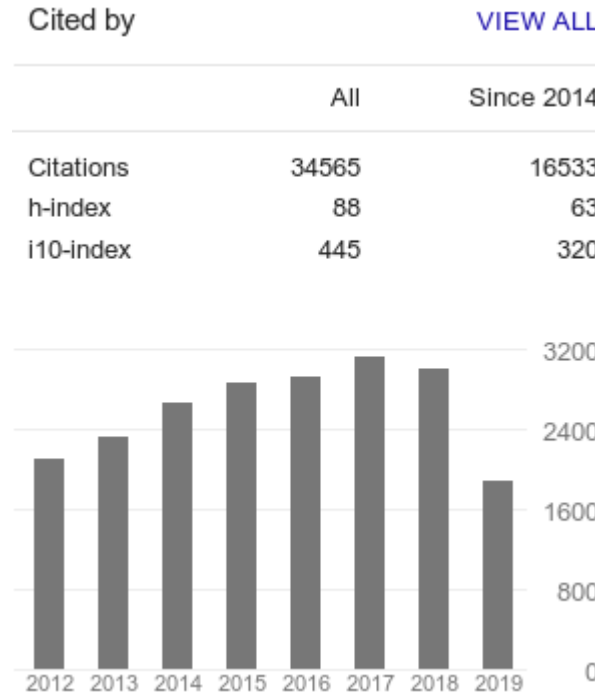
Data center
(Source: [Wikipedia](#))

GRASS GIS and the scientific community



GRASS GIS scientific reputation:

- 34528 citations
- H-index: 88
- i10-index: 444



<https://scholar.google.com/citations?user=gJ0ZB0cAAAAAJ>

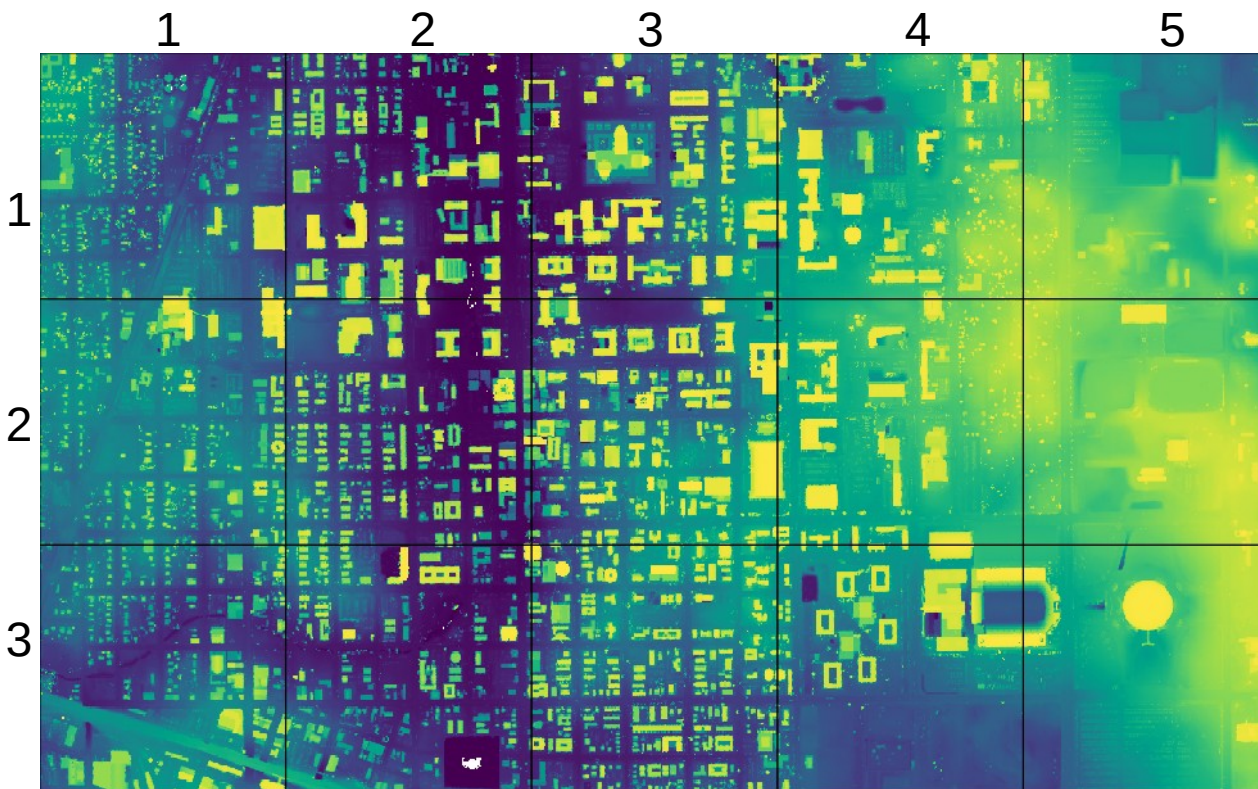
GRASS GIS is Big Data ready



Virtual raster tiles (VRT)

r.buildvrt - creates
VRT layer from a list
of input raster maps

Useful for tile based
(cloud) computing or
better management
of mosaics



Screenshot source:

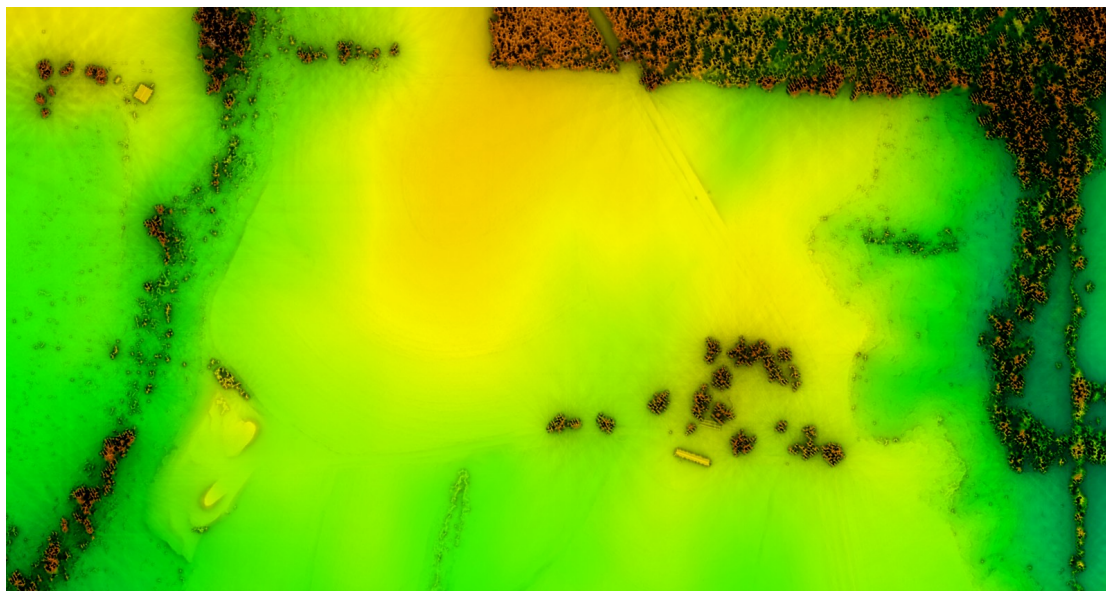
https://wenzeslaus.github.io/grass-gis-talks/ncgis2019_whats_new.html#/26



GRASS GIS is Big Data ready

New raster compression

ZSTD - an improvement over ZLIB (Deflate) method, providing both faster and higher rate of compression



Screenshot source:

https://wenzeslaus.github.io/grass-gis-talks/ncgis2019_whats_new.html#/27

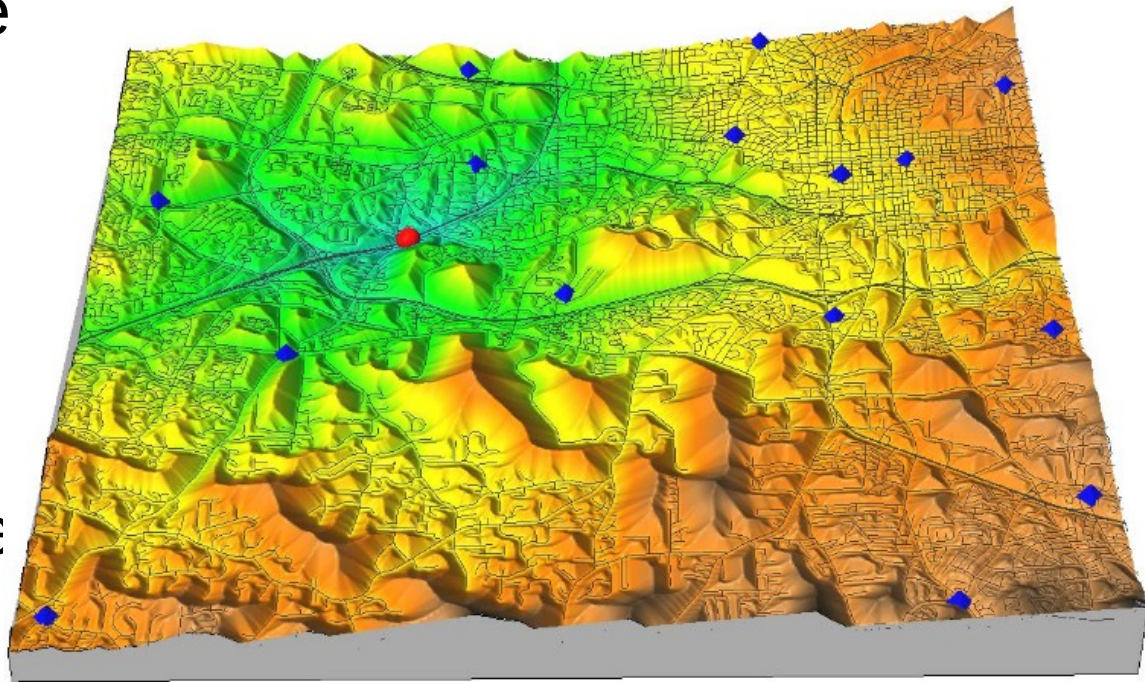


GRASS GIS is Big Data ready

Flexible memory handling:

- **all-in-memory** mode
- **disk cache** mode

The new all-in-memory cache offers faster cost path, point cloud binning, stream and flow computation, image segmentation, b-spline interpolation



Screenshot source:

https://wenzeslaus.github.io/grass-gis-talks/ncgis2019_whats_new.html#/28

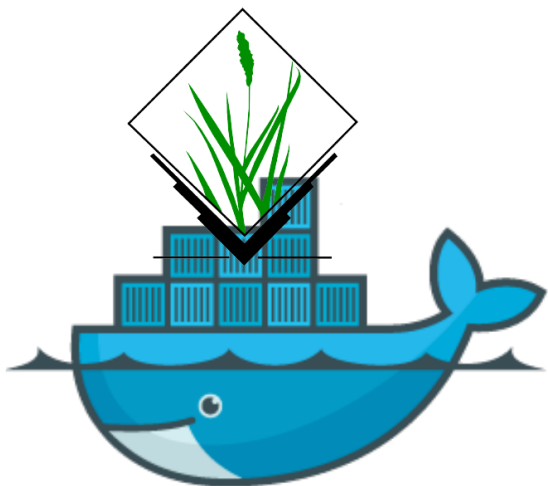





GRASS GIS is Big Data ready

Up-to-date docker images are available from

<https://grass.osgeo.org/download/software/docker-images/>

→ <https://hub.docker.com/>



	mundialis/grass-py3-pdal By mundialis • Updated 8 days ago GRASS GIS 7.8 (release branch, grass78) with python3 and PDAL Container Linux x86-64	8.3K Downloads	2 Stars
	mundialis/grass-gis-stable By mundialis • Updated 6 days ago GRASS GIS 7.6 release branch (grass76) Container Linux x86-64	306 Downloads	2 Stars
	neteler/grassgis7 By neteler • Updated 15 hours ago GRASS GIS 7.9 is a free and open source Geographic Information System (GIS) software suite (grass79) Container Linux x86-64	213 Downloads	

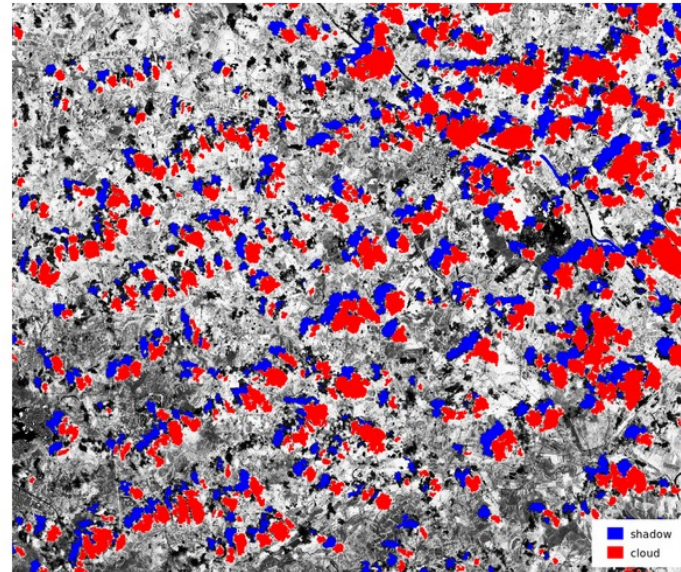
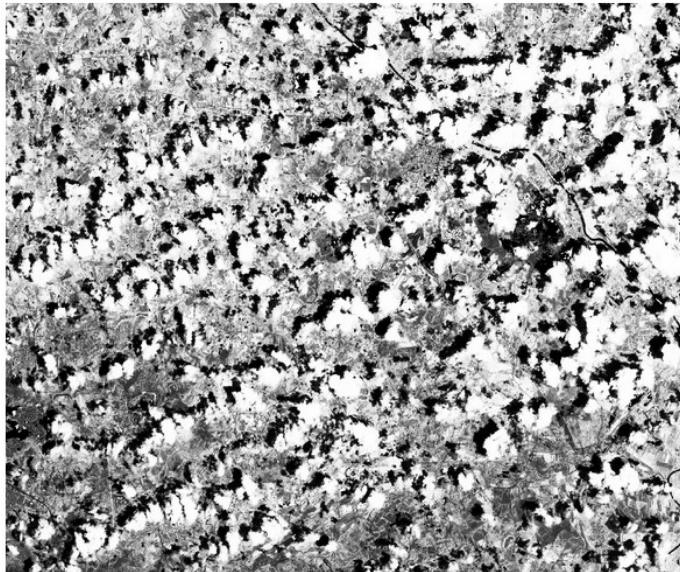


GRASS GIS is Copernicus-ready

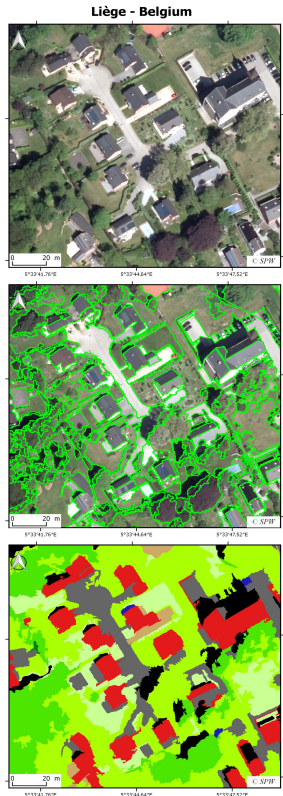
New toolset for processing Sentinel-2 data

<https://grass.osgeo.org/grass7/manuals/addons/i.sentinel.html>

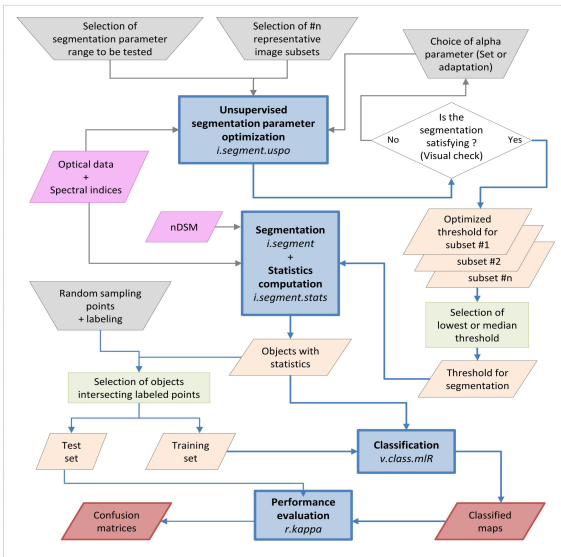
S-2 download, import, atmospheric and topographic correction, cloud detection, and masking



Remote sensing in GRASS GIS: object-based image analysis (OBIA)



AN OPEN-SOURCE
SEMI-AUTOMATED PROCESSING CHAIN
FOR URBAN OBJECT-BASED CLASSIFICATION



- Complete toolchain from segmentation to classification
- including
 - SLIC superpixel creation
 - image segmentation and parameter optimization
 - Machine Learning (r.learn.ml, v.class.mlR)
 - Deep learning (i.ann.*)

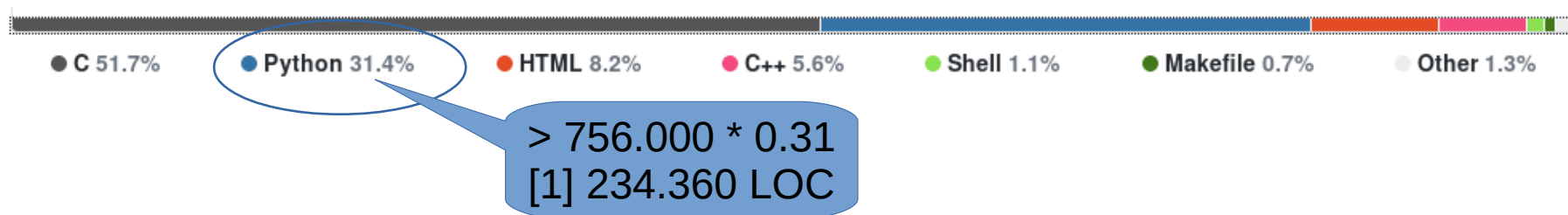
Source : <http://dx.doi.org/10.3390/rs9040358>

GRASS GIS and Python: a long-lasting love story



Python 3 support is available!

- started in 2018 as a Google Summer of Code project
- a notable amount of code needed to be revisited:



First release candidate (7.8.0 RC1) in August 2019

<https://github.com/OSGeo/grass/releases/tag/7.8.0RC1>

Try GRASS GIS online!



Try GRASS GIS in Jupyter Notebook with Python



<https://github.com/wenzeslaus/try-grass-in-jupyter>

Jupyter Notebook for trying GRASS GIS in *Binder*.

Try GRASS GIS in Jupyter Notebook with Bash



<https://github.com/wenzeslaus/try-grass-in-jupyter-with-bash>

Jupyter Notebook for trying GRASS GIS in *Binder*.

Try GRASS GIS online!



Browser address bar: <https://hub.gke.mybinder.org/user/wenzeslaus-grass-zonal-of-solar-jteqp543/>

JupyterLab interface: zonal-of-watersheds (autosaved)

File Edit View Insert Cell Kernel Widgets Help | Not Trusted | Python 2

Watersheds

Set computational region and create...

```
In [4]: gs.parse_command('g.region', raster="elevation", flags='pg')
gs.parse_command('r.relift', input="elevation", output='shade')

gs.run_command('d.erase')
gs.run_command('d.rast', map="elevation")
#gs.run_command('d.legend', raster="lakes_buff", range=(2, 5), at=(80, 100, 2, 10))
Image(filename="map.png")

gs.run_command("r.watershed", elevation="elevation", basin="watersheds", threshold=80000)

#gs.run_command("r.colors", map="watersheds", color="haxby")

gs.run_command('d.erase')
gs.run_command('d.shade', color="watersheds", shade="shade")
Image(filename="map.png")
```

Out[4]:

actinia: GRASS GIS with REST API



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actinia

Actinia is an open source REST API for scalable, distributed, high performance processing of geographical data that uses GRASS GIS for computational tasks. Users can process satellite images, time series of satellite images, and also arbitrary raster and vector data with geographical relations.



https://github.com/mundialis/actinia_core/

Actinia is a REST service to process geographical data that can be managed by the GRASS GIS software system. The software is designed to expose a GRASS GIS database and many GRASS GIS [\[1\]](#) processing tool as REST service [\[2\]](#). This REST interface allows to access, manage and manipulate the GRASS GIS database via HTTP GET, PUT, POST and DELETE requests and to process raster rasters and time series data located in

actinia: GRASS GIS with REST API



```
GRASS 7.8.dev (nc_spm_08):~ >
v.buffer input=mypoint output=mybuffer distance=42 --json
{
  "module": "v.buffer",
  "id": "v.buffer_1804289383",
  "inputs": [
    {"param": "input", "value": "mypoint"},
    {"param": "layer", "value": "-1"},
    {"param": "type", "value": "point,line,area"},
    {"param": "distance", "value": "42"},
    {"param": "angle", "value": "0"},
    {"param": "scale", "value": "1.0"}
  ],
  "outputs": [
    {"param": "output", "value": "mybuffer"}
  ]
}
```

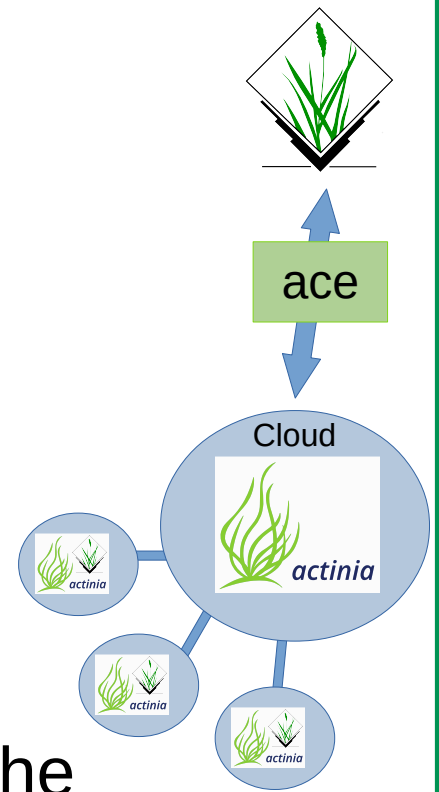
https://github.com/mundialis/actinia_core/

actinia: GRASS GIS with REST API

“ace” tool – actinia command execution

ace allows to work with actinia REST services:

- execution of **single** or **lists** of GRASS GIS commands (i.e., process chains)
- ... the actinia job management will distribute the requests to multiple compute nodes in the cloud




Tutorial incl. download of “ace” tool:



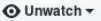


https://github.com/mundialis/actinia_core/tree/master/scripts




SVN to git migration: GRASS GIS 7.x














<https://github.com/OSGeo/grass>


 Search or jump to... Pull requests Issues Marketplace Explore






 **OSGeo** / **grass**   26  56  38



 Pull requests 16  Insights 












GRASS GIS - free and open source Geographic Information System (GIS) <https://grass.osgeo.org> 

20,156 commits 6 branches 51 releases 36 contributors 

Branch: master     

 **wenzeslaus** v.in.ascii: include values into error messages (#104)  Latest commit #86bec8 2 days ago

 github	added .github/FUNDING.yml	3 months ago
 .travis	Travis-CI: enable ccache for faster builds	3 months ago
 db	svn refs changed to git (#93)	13 days ago
 demolocation	GRASS_DB_ENCODING is environmental variable	5 years ago
 display	change Python shebang to python3 (#82)	19 days ago
 doc	Cleanup .swp files too (#97)	11 days ago
 docker	remove now unneeded Python 3 shebang trick (#90)	14 days ago
 general	change Python shebang to python3 (#82)	19 days ago
 gui	svn refs changed to git (#93)	13 days ago
 imagery	svn refs changed to git (#93)	13 days ago
 include	svn refs changed to git (#93)	13 days ago

SVN to git migration: 1987 – 2016

v3.2 ... v6.x



<https://github.com/OSGeo/grass-legacy>

OSGeo / **grass-legacy** Unwatch 8 Unstar 3 Fork 0

Code Pull requests 0 Security Insights Settings

Legacy code repository of GRASS GIS versions 3.2, 4.x, 5.x, 6.x (1987-2016) <https://grass.osgeo.org> Edit

legacy-code grass-gis Manage topics

24,035 commits 14 branches 84 releases 30 contributors View license

Branch: develbranch_6 New pull request Create new file Upload files Find File Clone or download

neteler progman: point to http://grass.osgeo.org/programming7/	Latest commit 2734c86 on Sep 19, 2015
db	sync devbr6 to relbr6 6 years ago
debian	git-core pkg renamed to just 'git' 6 years ago
demolocation/PERMANENT	removed legacy files; updated to current vector format (trac https://... 12 years ago
display	d.vect.chart: backport bugfixes 5 years ago
doc	updated supporting docs 5 years ago
gem	compress png images with 'optipng -o5'; svn props 5 years ago
general	user message harmonization update (partial backport of https://trac.o... 5 years ago
gui	wxGUI: added v.vect.stats to menu (fixes https://trac.osgeo.org/grass... 5 years ago
imagery	i.landsat.toar: minor file cosmetics 5 years ago
include	fix makefile (rfc directory has been removed) 5 years ago
lib	Vlib: sync 64, 65 5 years ago

GRASS GIS Addons were also moved to GH:

<https://github.com/OSGeo/grass-addons/>

A true software archive: back to GRASS GIS v 3.2 from 1987



<https://github.com/OSGeo/grass-legacy>

OSGeo / **grass-legacy** Unwatch 8 Unstar 3 Fork 0

[Code](#) [Pull requests 0](#) [Security](#) [Insights](#) [Settings](#)

Legacy code repository of GRASS GIS versions 3.2, 4.x, 5.x, 6.x (1987-2016) <https://grass.osgeo.org> [Edit](#)

[legacy-code](#) [grass-gis](#) [Manage topics](#)

7,978 commits 14 branches 84 releases 30 contributors [View license](#)

Branch: **releasebranch_...** [New pull request](#) [Create new file](#) [Upload files](#) [Find File](#) [Clone or download](#)

This branch is 7978 commits ahead, 24035 commits behind develbranch_6. [Pull request](#) [Compare](#)

grass-svn2git and **Markus Neteler** added ... i.e. the old v6.5! Latest commit a3c282d on Jan 28, 1991

Community activities: Code Sprint 2019 in Berlin



- Focus on SVN to GitHub migration
- Discussions on “image collections” (now available as pull request for discussion)
- WIP: support for PROJ 6

May 2019

New Web site upcoming!



 GRASS GIS

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Geographic Resources Analysis Support System



Download

Get your free, libre and open source copy
of the GRASS GIS software



Learn

Get to know the GRASS GIS ecosystem
with manuals, tutorials and more



Contribute

Contribute to Open Source Geospatial
through GRASS GIS development

Thanks for your attention – and join us!



GRASSGIS

grass.osgeo.org

<https://github.com/OSGeo/grass>