Intro to GRASS and Python Scripting

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Introduction to GRASS

- Background
- Project Setup
- User Interface
  - Short Demo
- Python Scripting in GRASS
  - Short Demo
- Put it all together

GRASS GIS

Bringing advanced geospatial technologies to the world.

- Geographical Resource Analysis Support System
- Developed by USACE Construction Engineering Research Lab
- Free and open source GIS software
- Available for Mac OSX, Windows, Linux
- Global network of developers and users
- https://grass.osgeo.org

Introduction to GRASS

- Setup
  - Create a ‘grass data’ folder
    - Single location to house grass projects
  - Assign to the project…
    - Location
    - Initial mapset
    - Projection
    - Spatial operating region

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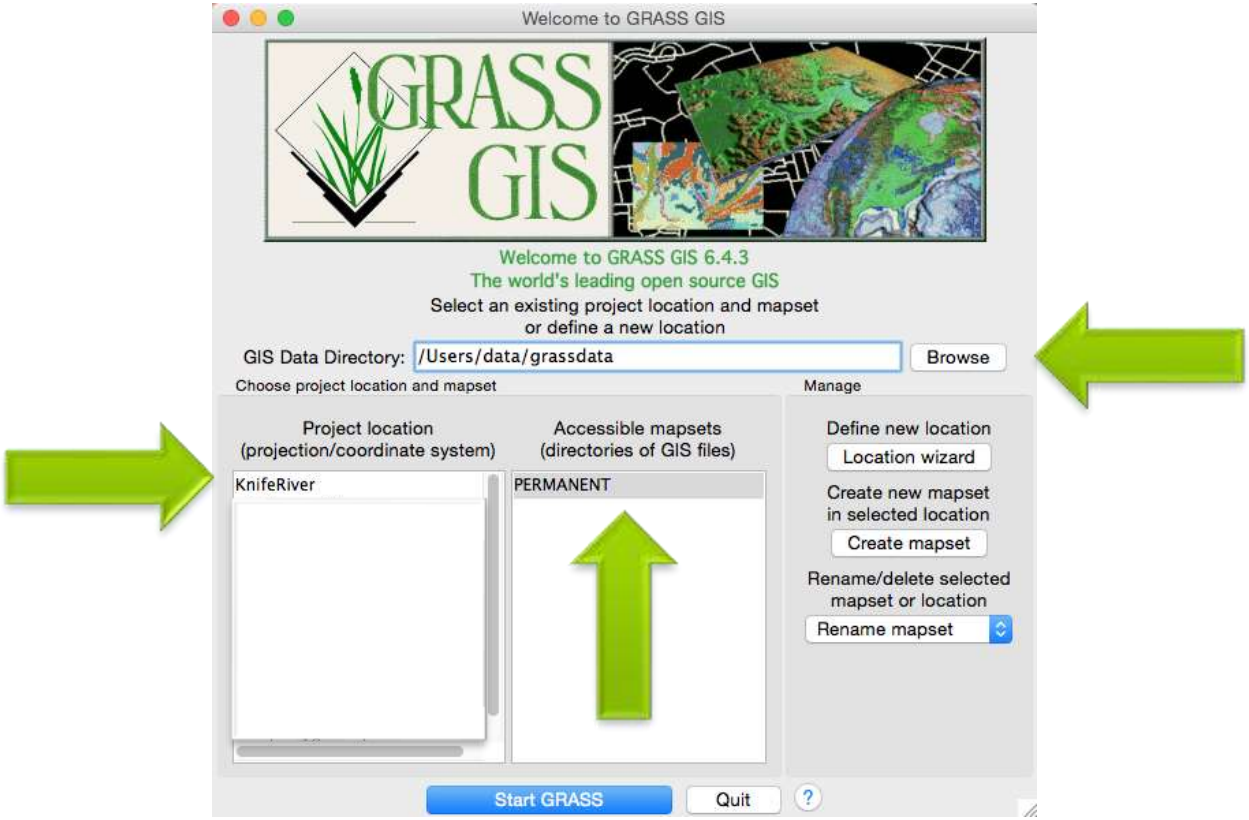

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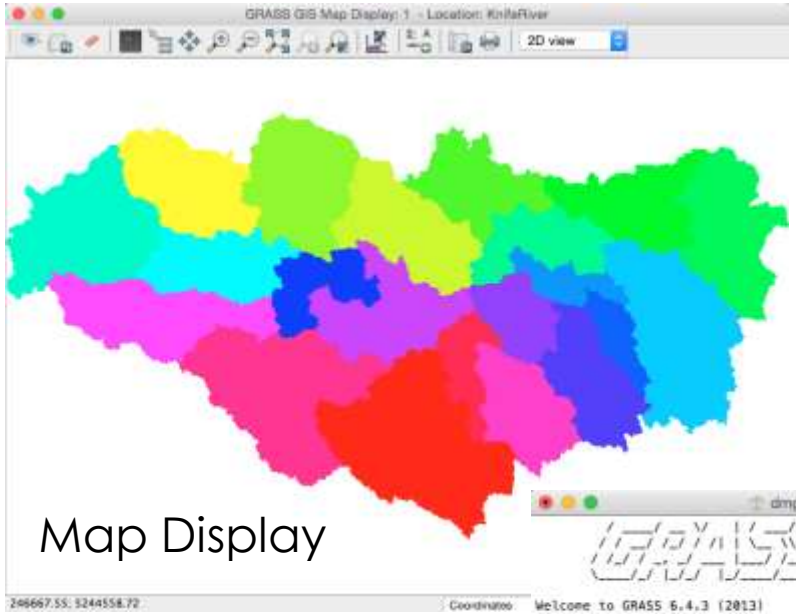
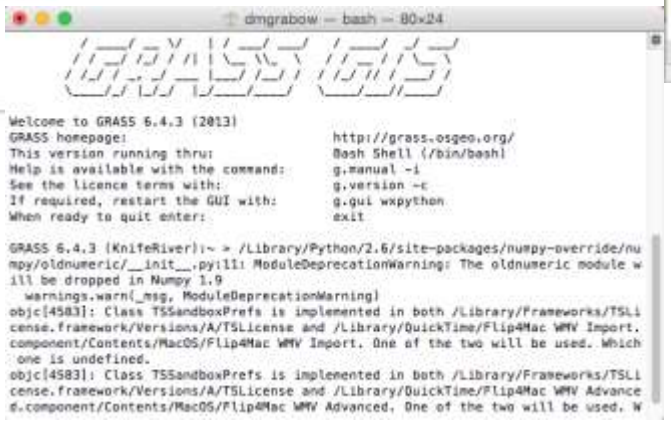
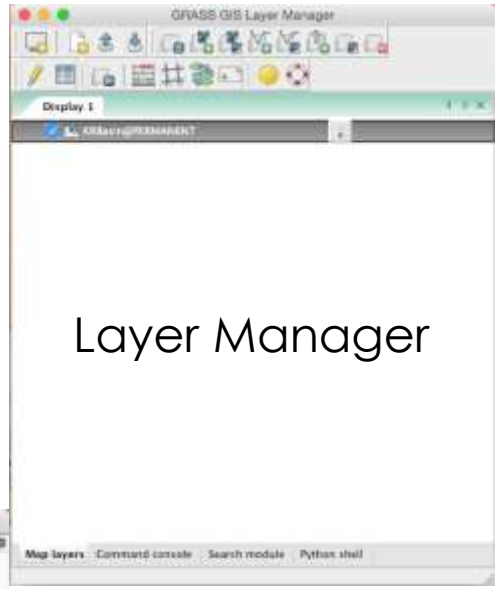


Map Display



Terminal



Layer Manager

Introduction to GRASS

- Short Demo
- Knife River basin
  - ~2500 sq mi.
  - 10 m DEM (NED)
  - ~500 MB file size

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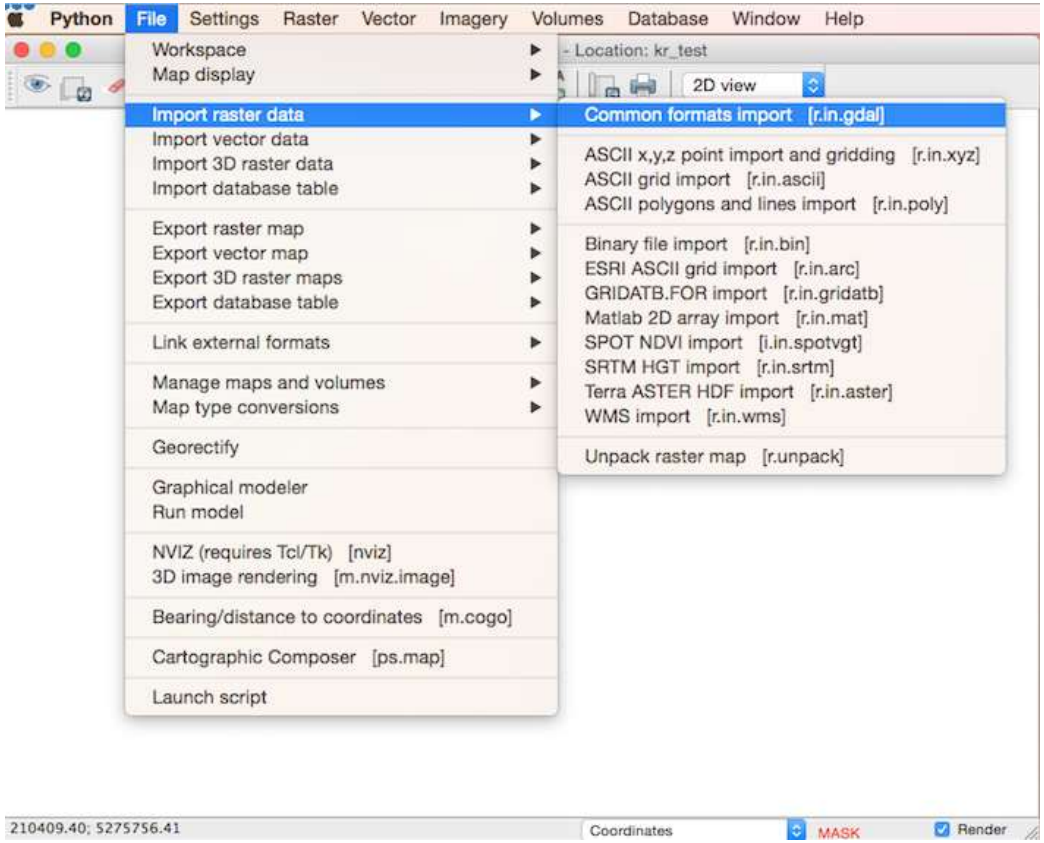

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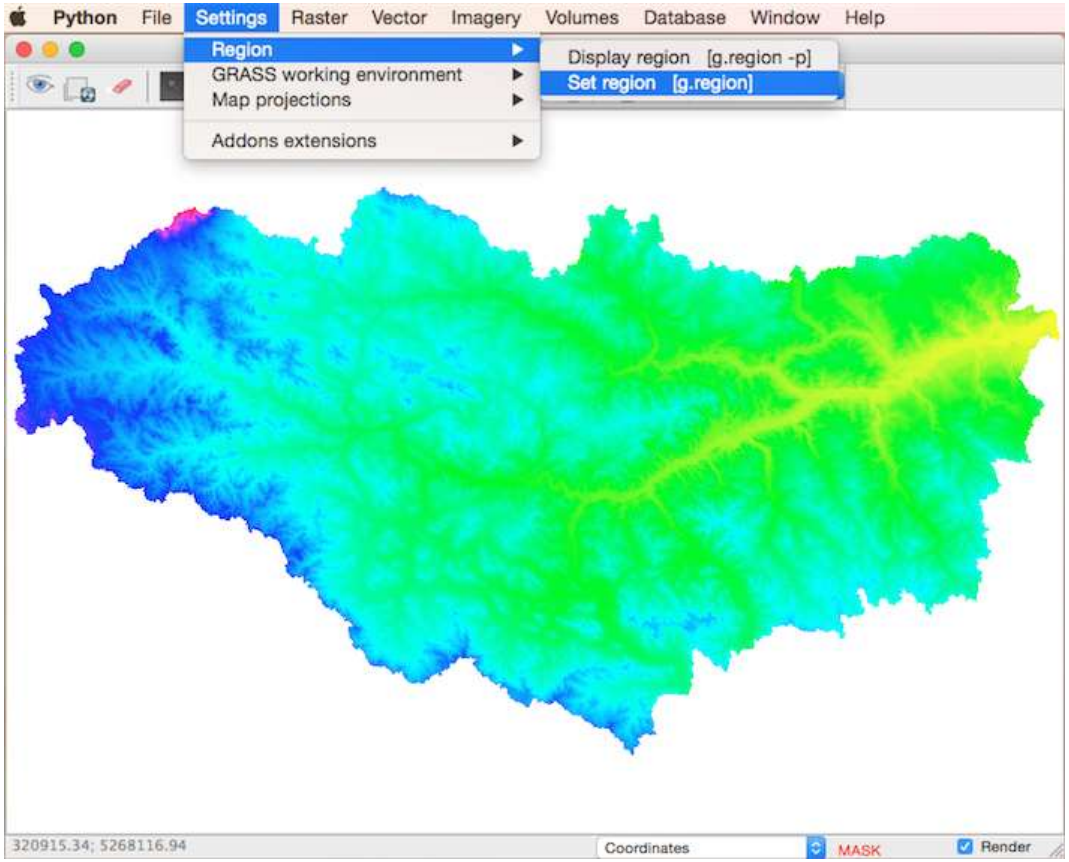

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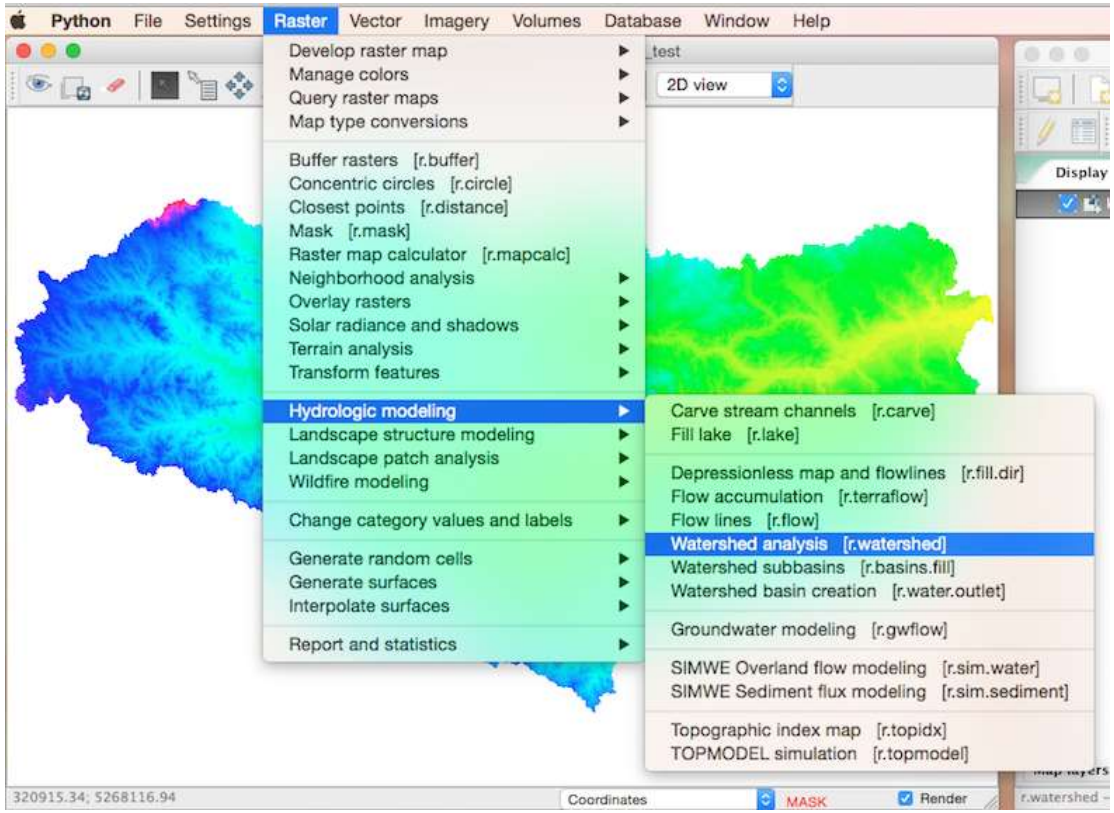

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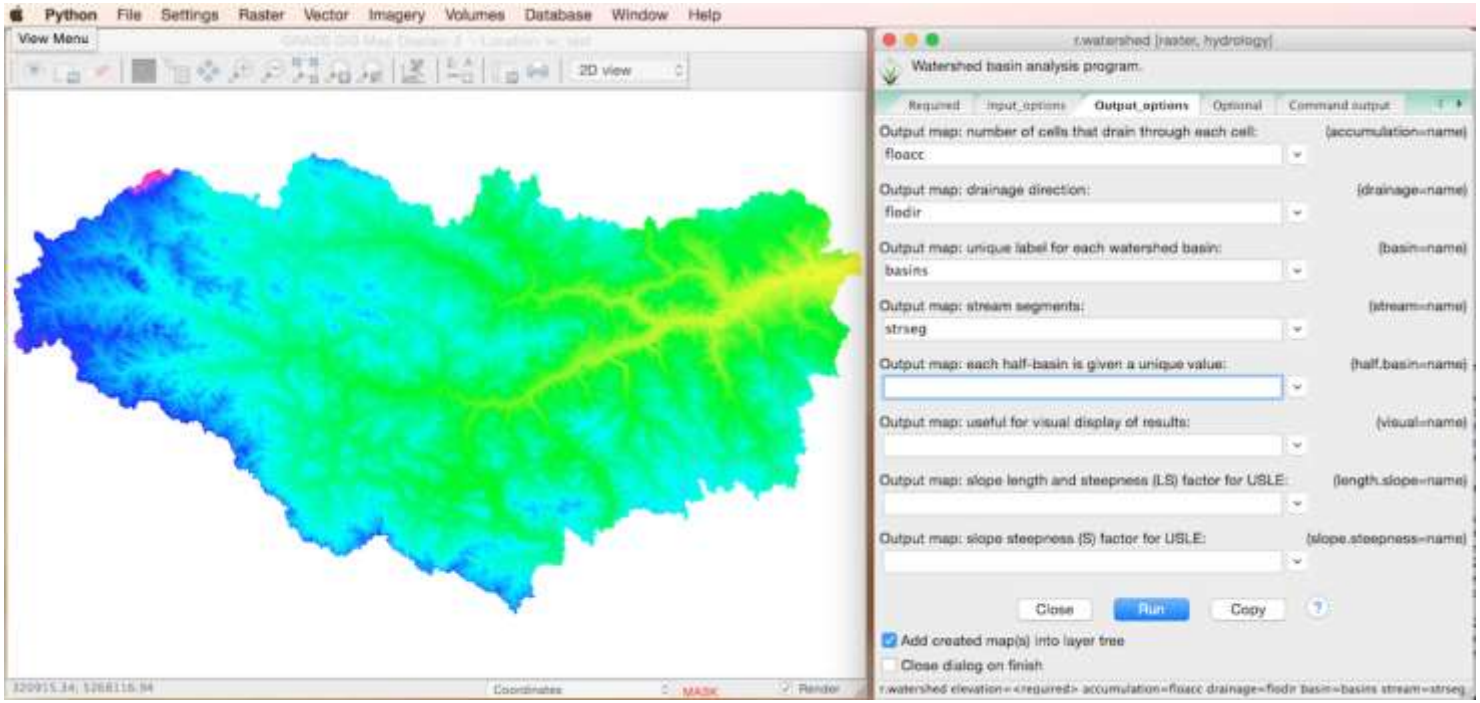

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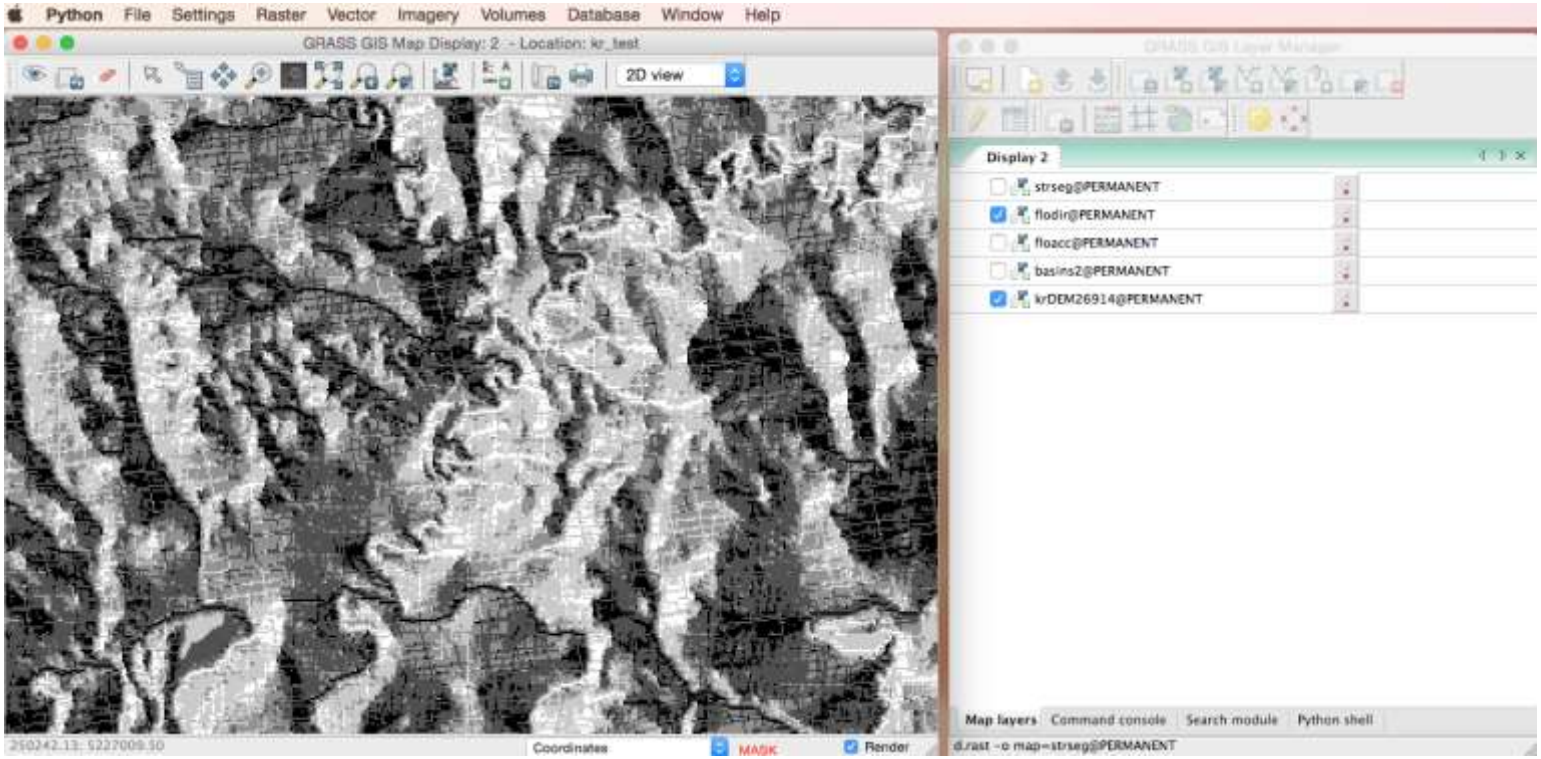

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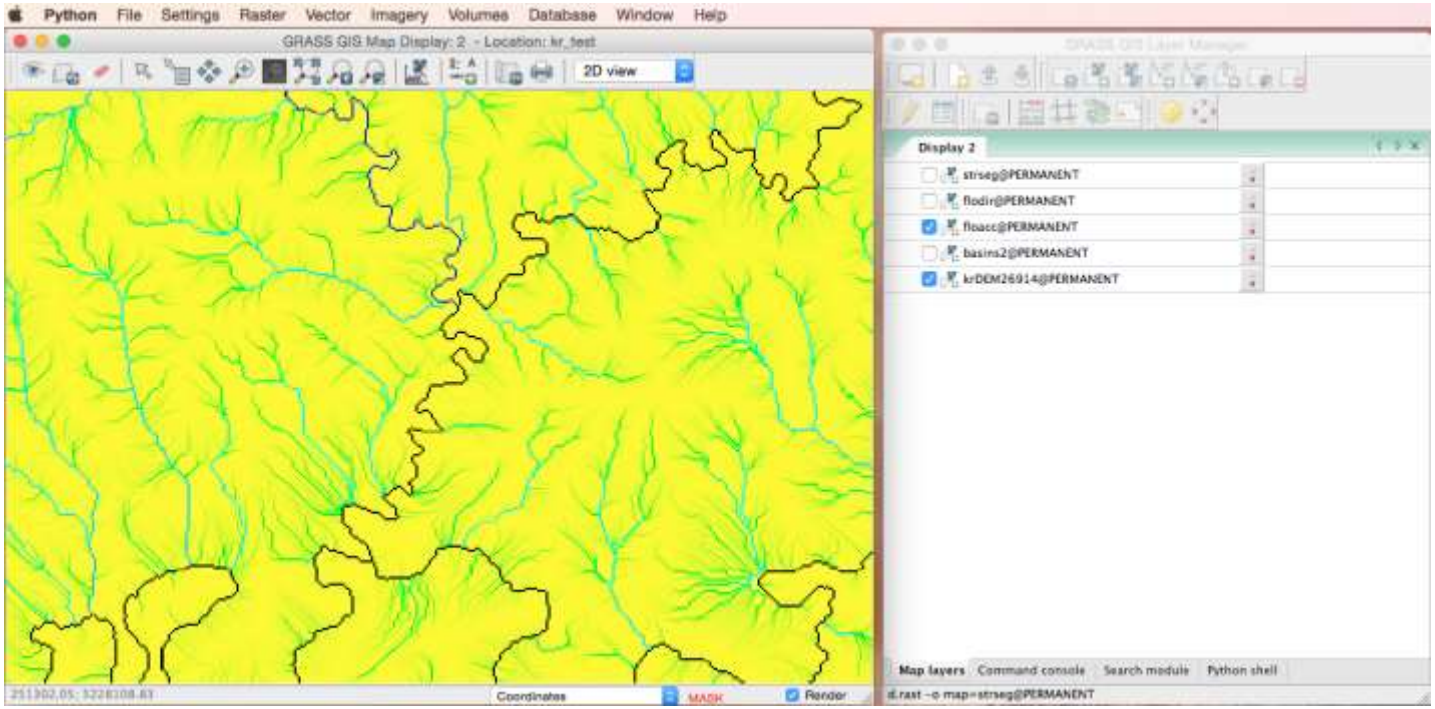

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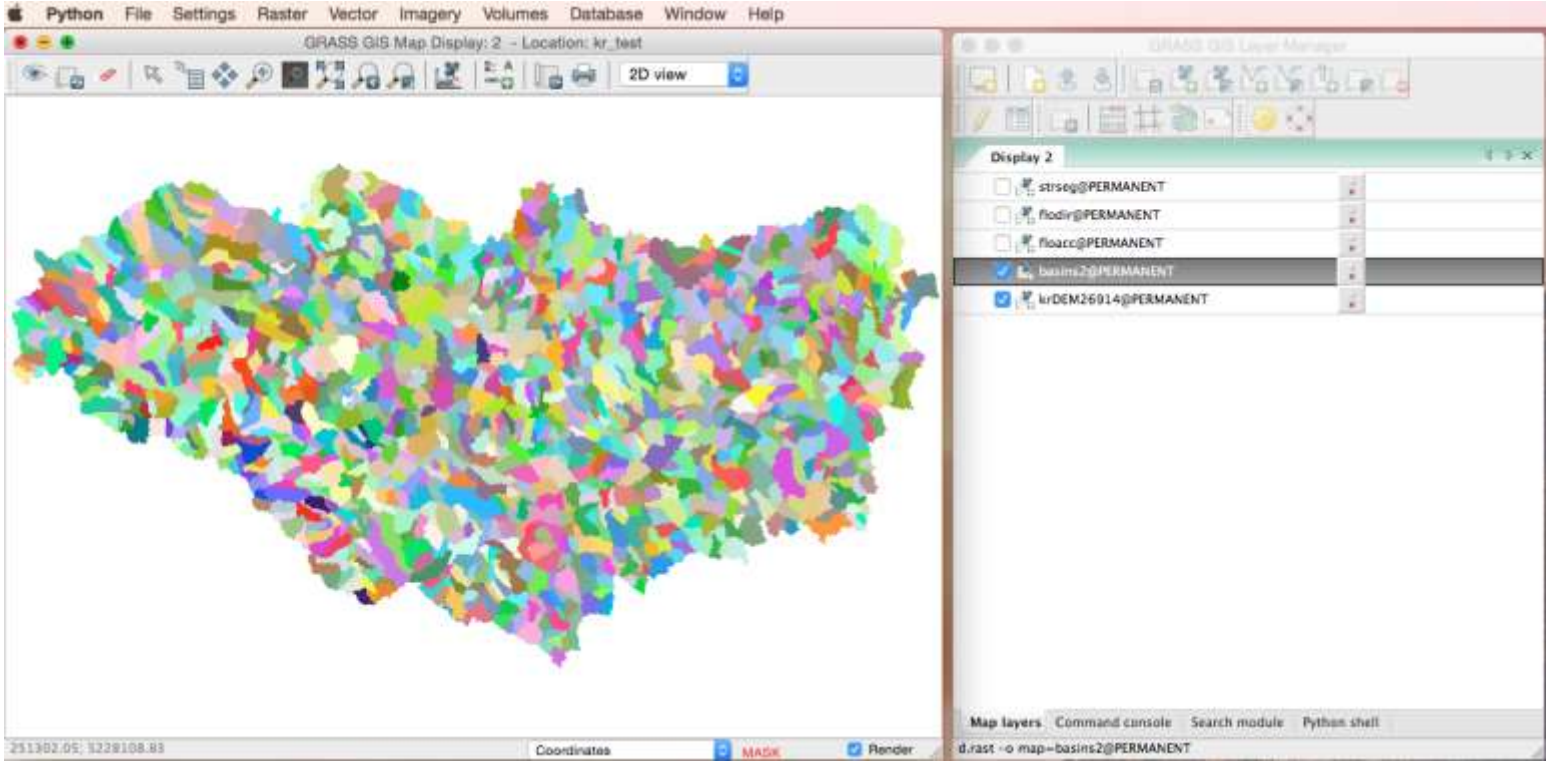

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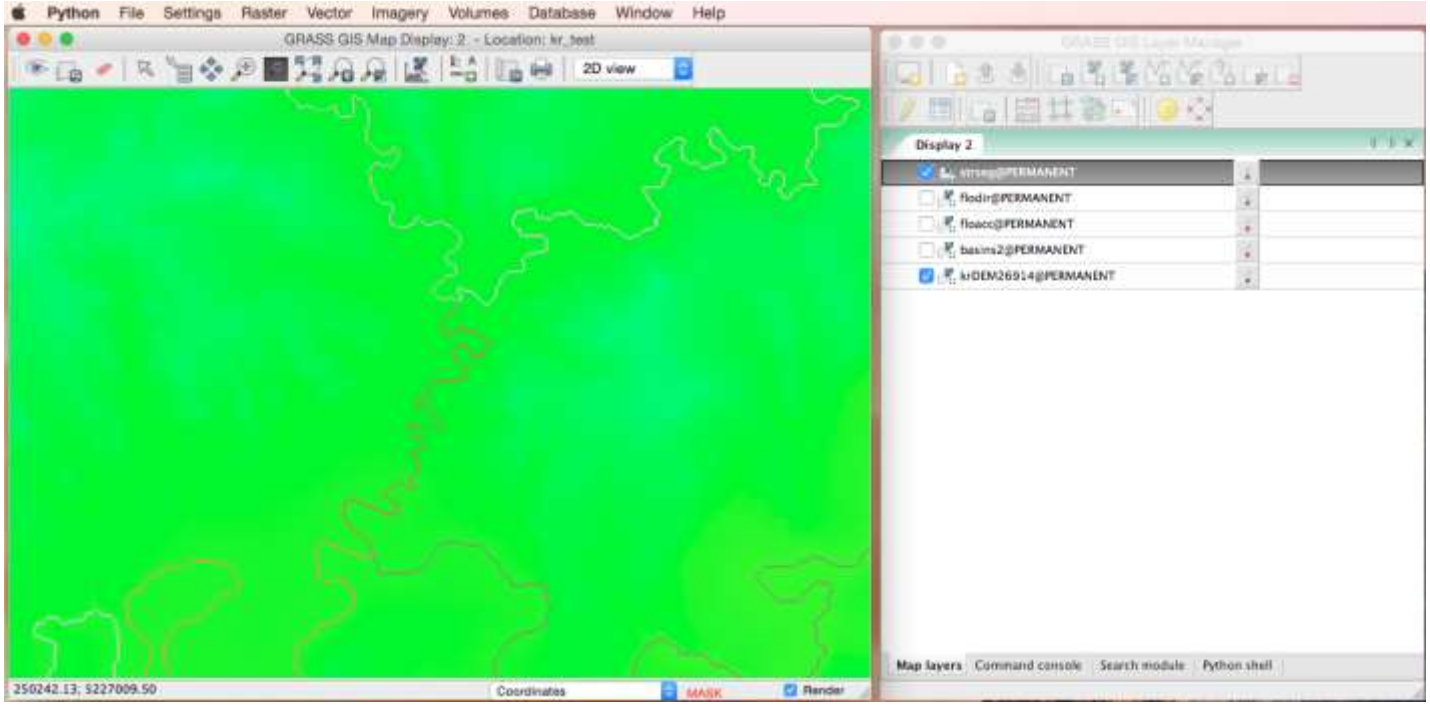

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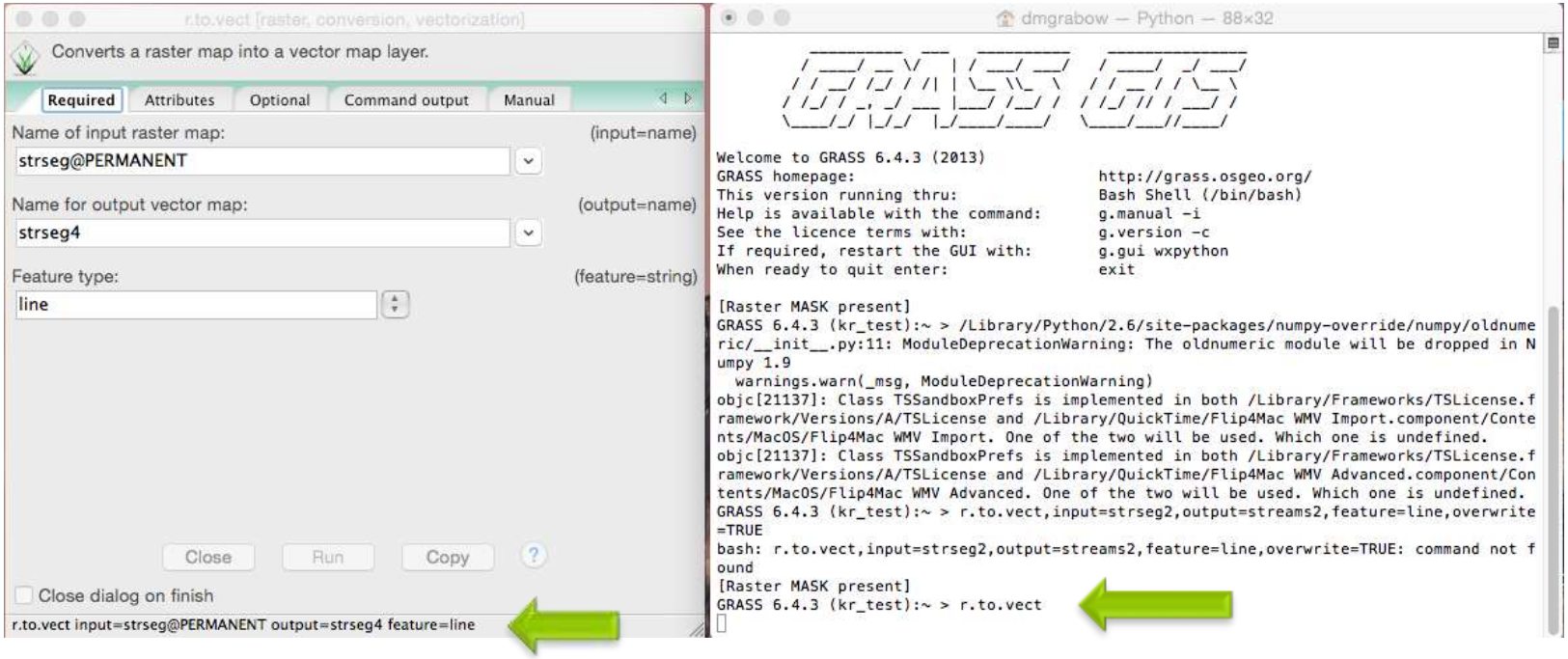


Introduction to GRASS

- User made scripts
  - Python
    - Numerous Python modules within GRASS
      - GRASS 6 in shell, 7 as python scripts
      - User can easily view python code
  - Excellent online help
    - https://grasswiki.osgeo.org/wiki/GRASS-Wiki
  - Tips
    - Save scripts in ‘bin’ under GRASS library
    - Utilize the user interface when building scripts

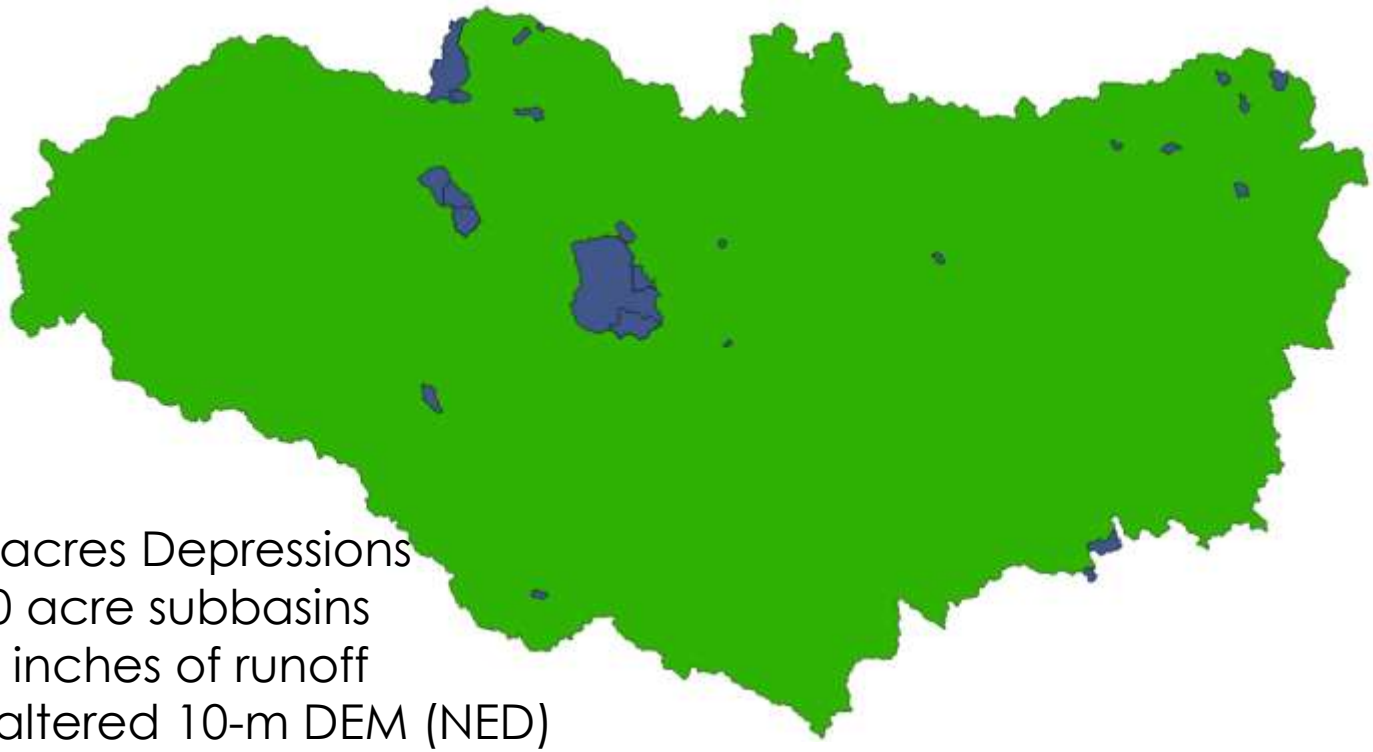
Introduction to GRASS

```
#!/usr/bin/env python

import grass.script as grass
import time

t0=time.time()

mapset = input("Enter MAPSET name (ie. 'PERMANENT'): ")

dem = input("Enter DEM name (ie. 'DEM_name_here'): ")
dem = dem+'@'+mapset

celnum = 32000

##use r.watershed to determine streams and subbasins
grass.run_command('r.watershed', overwrite='TRUE',quiet='TRUE', elevation=dem, threshold=celnum,accumulation=
                'floacc2@'+mapset,drainage='flodir2@'+mapset,stream='strseg2@'+mapset,basin='basins2@'+mapset)
grass.run_command('r.to.vect',input='strseg2@'+mapset,output='streams2',feature='line',overwrite='TRUE')
grass.run_command('r.to.vect',input='basins2@'+mapset,output='subbasins2',feature='area',overwrite='TRUE')
grass.run_command('v.db.addcol',map='subbasins2@'+mapset,columns='area DOUBLE PRECISION')
grass.run_command('v.to.db',map='subbasins2@'+mapset,option='area', units='acres',columns='area')

t1=time.time()
tdelta = (t1-t0)/60
print '\nFinished - Runtime was %.2f minutes\n' % (tdelta)

print 'Done processing'
```

Introduction to GRASS

- Put it all together…
  - Noncontributing analysis
    - Estimate areas that do not contribute to stream flow during specific event
    - Python, GRASS, SQLite, QGIS
      - QGIS plugin for GRASS

Introduction to GRASS



- 40 acres Depressions
- 640 acre subbasins
- 1.5 inches of runoff
- Unaltered 10-m DEM (NED)