



Bringing advanced geospatial technologies to the world

A satellite in the top left corner with lines connecting it to a globe. The globe shows the Americas. The word 'GDAL' is written in large, bold, blue letters across the globe.

AN INTRODUCTION TO GDAL AND GRASS GIS



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Bringing advanced geospatial technologies to the world by Brian Pondi and Da Vince

Speakers:

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your host

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BBackground: *Geospatial and remote sensing.*

fformerly: *Market and reasearch associate with
ffocus on predictive modelling, location &*

BBusiness intelligence and forecasting products.

currently: *Consulting, VGI and student*

Generally: *A tinkerer and a virtuoso*

Affiliation: *None, Free agent*

GRASS GIS

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Introduction.

WHAT IS GRASS GIS AND GDAL ANYWAY? WHY CARE ABOUT THEM?

- > Let's get the abbreviations out of the way.

- >> *GDAL: Geospatial Data Abstraction Library [released in 1998]*

- >> *GRASS GIS: Geographic Resource Analysis Support System [released in 1984]*

- >> *OGR: OGR Simple Feature Library, comes with GDAL (OpenGIS Simple Feature Reference Implementation)*

- > Both GDAL and GRASS GIS are member/projects under the Open Source Geospatial Foundation (OSGeo)

- > Free and open source cross-platform and runs on major operating systems written in C, C++ with great python api bindings and wrappers

- > Not as popular as QGIS and ArcGIS is with desktop users. Maybe cause they are more CLI oriented? Although grass offers a GUI through WxWidgets python api

- > Provide tools for both raster and vector data reading, manipulation and processing

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> You probably have been using them.

>> Fast, free, open, flexible and extensible software

>> Support and Interoperable with other OSGeo member projects such as QGIS, PostGIS among others.

>> Supported by some GIS service providers and incorporated in their solution stack.

>> Feature rich scriptable using CLI utilities

>> Run batch and bulk processes, a plus if familiar with any cli scripting language. Bash, Python, tcl, perl,

php

> What the talk is not about.

>> A comparison between the two software

>> Promoting their use compared to others stack

> Who is without a flaw(s)?

>> Not really many articles/docs on the direct usage. The most common ones are using bindings or wrappers using other languages python, R, java, javascript

>> The CLI/text based interfaces can be daunting to beginners

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> Expected outcome.

- >> To be comfortable with some of the common cmd
- >> Perform some of basic spatial operations using both tool
- >> Understanding of the various workflow.
- >> Be dangerous enough to make your colleague think you're a hacker
- >> Desirable: start chaining your analysis and processing into reproducible programs or scripts

> What the talk is not about.

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> What to bring or consider:

- >> Be aware of others
- >> Be friendly and patient
- >> Be welcoming and respectful
- >> Be open to all questions and viewpoints
- >> Be understanding of differences
- >> Be Kind and considerate to others
- >> Have Gdal, grass, grass gui and grass-gdal-plugin already installed to try some examples

> Outline GDAL:

- >> Introduction and installation gotchas

- >> ``Hello World`` in Gdal

- >> Common Gdal commands and operations with examples

- >> Common ogr & osr commands

- >> Extras and api in other language {osgeo, rgdal, rasterio etc}

- >> Further resources

> Outline Grass GIS.

- >> introduction and installation

- >> Start your first grass session from Grass dataset ``Location and mapset`` using GUI

- >> Creating your own Mapsets using GUI and through CLI

- >> Loading datasets to your new mapset

- >> Nice to have: an actual modelling case study



- > A translator library for raster and vector data formats released under X/MIT style Open Source License by the Open Source Geospatial Foundation.
- > As a library, it presents a single raster abstract data model and single vector abstract data model to the calling application for all supported formats. It also comes with a variety of useful command line utilities for data translation and processing(<https://gdal.org/>) latest release GDAL/OGR 3.2.1
- > the capabilities are also accessible programmatically using the api.
- > support for a variety of raster formats(147 drivers) and vector formats(90 drivers) at the time of writing

Installation:

Methods vary based on your operating system.

Conda: `conda install -c conda-forge gdal=[version]` should work across

OSX: you know better than I do. (<https://medium.com/planet-stories/a-gentle-introduction-to-gdal-part-1-a3253eb96082>)

Windows: through OSGeo4W graphical installer or follow (<https://sandbox.idre.ucla.edu/sandbox/tutorials/installing-gdal-for-windows>) rem to use the right versions.

Linux distro: `pacman -S gdal` `sudo apt install gdal-bin libgdal-dev` "better try googling the solution that'll work

Common commands:

- > `ogrinfo` Get information about a vector dataset
- > `gdalinfo` Get information about a raster dataset
- > `ogr2ogr` Convert vector data between file formats
- > `gdal_translate`
- > `gdal_merge`

Vector Data:

- > `ogrinfo --formats` To see full list of supported vector formats
- > `ogrinfo [yourData]` To get basic information about your data
- > `ogrinfo -so [yourData] [yourLayer]` To get more info about your date
- > `ogrinfo -al [yourData]` To list out all feature
- > `ogr2ogr --formats` To get full list of output formats
- > `ogr2ogr -f [outputFormat] [Destination fileName] [source fileName]` To convert between vector data formats
- > query data using ogr: supports sqlite and OGR SQL dialect
- > `ogr2ogr -where"query" [output filename] [input filename]` or `ogr2ogr -sql "Sql query"`
- > `ogr2ogr -t_srs [epsg:code] [output filename] [input filename]`
- > `ogr2ogr -append -update [source file] [file to append] -nln [new file]`

Raster data:

> `gdalinfo --formats` To get full list of supported raster formats

> `gdal_translate --formats` valid list of output formats

> `gdalbuildvrt`

> `gdal_rasterize, gdal_calc`

Ref:

Go through the resources below to explore further:

Geogirl's ogr tutorial series.

<https://developers.planet.com/planetschool/getting-started-with-gdal/>

https://www.youtube.com/watch?v=2Q1T96NJmuc&ab_channel=MakingSenseRemotely

<https://courses.spatialthoughts.com/gdal-tools.html>

<https://ocw.un-ihe.org/mod/book/view.php?id=6228>



Grass GIS:

Installation:

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

Windows: The easiest way is through OSGeo4W installer or winGrass stand alone installer

OSX: probably mac users know better. Check above link for the official *.dmg package

Linux distro: Debian based -> if you installed qgis using the official docs you probably have grass else: `sudo apt install grass libgrass-dev grass-gui grass-doc`

grass learn:

<https://grass.osgeo.org/learn/>

<https://ncsu-geoforall-lab.github.io/grass-intro-workshop/intro.html>

<https://baharmon.github.io/watersheds-in-grass>

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Q&A



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