QGIS Notes

**Table of Contents**

[1.0 Introduction to QGIS 1](#_Toc515285363)

[1.1 Basics 1](#_Toc515285364)

[1.2 Version 1](#_Toc515285365)

[1.3 Learning 4](#_Toc515285366)

[2.0 Examples 5](#_Toc515285367)

[2.1 Timeline elements 5](#_Toc515285368)

[3.0 Data Sources 5](#_Toc515285369)

[4.0 Sustainability and GIS 5](#_Toc515285370)

# **1.0 Introduction to QGIS**

The purpose of geographic information systems is to show physical area, with both natural and man-made features4. A deeper understanding between land and environment/populations are gained from simple stylized interpretations. There are many different types of geographic information systems: Arc GIS, GRASS GIS (geographic resources analysis support system), ArcMap, GeoJSON, HGIS (historical GIS), and TimeMap5. QGIS (Quantum QGIS) is the software used in this research project; it has two interfaces, QGIS Browser and QGIS Server, with the same code rendering, but different front-end interfaces.

When creating your map, it’s important to focus on specific themes, while different features can create a spatial reference.

## **Basics**

There are points, lines, and polygons. Points are the position on the plane of a feature, lines are connected points, and polygons are connected lines to form at loop.

## **Version**

QGIS’s latest version 3.0 is Girona. The next is 3.2 Bonn, which will be released June 29th, 2018. The third update, 3.4, will be on October 26th, 2018, which will be the Long Term Release (LTR). All updates can be found [here](https://qgis.org/en/site/forusers/visualchangelog30/index.html) 6.

In the previous version (QGIS 2.18), the API in needed to be broken, because it made QGIS dependent on functions that were no longer needed. Application Programming Interface (API) is the basis for building application software. It was a software library that helps it communicate between different software components. This allows higher level refactoring, new features, infrastructure tasks, and miscellaneous. All the services (where data is collected) like WMS GetMap, WFS, GetFeature, GetLegendGraphics, WCS, GetPrint, etc…) were recoded14.

The changes outlined are the most commonly used functions.

Version 3.0 7,8

Changes 9

* Background tasks:

Previously, when a task would be completed there would be a lot of waiting for the task to process. Now 3.0 tries to do that processing in the background. So, you can continue working, while processing is happening in QGIS.

* OTF (On the Fly) Project Changes:

Project > Project Properties > CRS

Version 3.0 is more flexible. Changes maps in terms of area and distance calculations and whether or not ellipsoid calculations are needed. The previous version, QGIS 2.18, applied to only interface of map. If people want no projection associated with their maps (examples local coordinate system, a different planet, made-up map), then they would uncheck button and treats every coordinate as a number. Every measurement is planar (a Cartesian measurement). When box is checked a program will connect all the coordinate systems added by data and might change units and other adjustments. Everything will line up with different data sets.

* Removal of “Core” Plugins

Plugins > Manage and install Plugins

In any QGIS there are many plugins installed by default, but not enabled. So, each user’s QGIS could interact differently when interacting with shared projects. In 3.0, QGIS incorporated those plugins into the project automatically into processing. It merged and removed many unused plugins.

* Unified add layers window

The interface is now easier to interact with. By moving the menu options into a consistent pattern as “properties tab”, QGIS is more user friendly.

* Exe Load and crash handler

Each feature has an issue tracker. When QGIS crashes, the program will locate where the bug was, making it easier to fix the issue.

* Setting Migration

This will force a migration of all settings (colors, symbols, data, etc).

* User profiles
  + Settings > Profile
  + Will have isolated plugins and individual set ups.
  + Now can change between profiles
* Node Tool/Move Features Tool

Work flow change, not as many plugins required for edits.

* Enhanced node tools

Now lines can extend, modes move, and new nodes are easily added.

* Project Compatibility

Version 3.X is not compatible with many of the previous versions. Previous code had duplicates and little parts that did small parts of a process. Now everything is more condensed. But, developers couldn’t say definitively which processes went where (so projects are not compatible). Some functions might be transferable. Because the new version broke the script and pieced it back together to be more efficient, so projects in 1.X won’t work and work in 2.X will have varying levels of success.

There are so many features. Highlighted below are only a few to get an idea of what changes are happening. For the continuous [updates/commits](https://github.com/qgis/QGIS-Documentation/issues?q=is%3Aopen+is%3Aissue+milestone%3A%22QGIS+3.0%22) go to the Git QGIS documentation page. To understand the documentation read [this explanation](https://docs.qgis.org/2.18/en/docs/documentation_guidelines/writing.html#introduction). Version 3.x will continue to update and the changelog can be seen [here](http://changelog.qgis.org/en/qgis/) 13.

NEW FEATURES (examples) 10,11,12

* Multi canvas support (View > new map > map view) 🡪 look at a layer in a larger project
  + Sink the windows that pop up to move together.
  + Multiple map views (and dock)
* Search Bar
  + Control/command K
  + Search actions, layers
* CAD digitizing tools built right into version (rectangle, circle, ellipse, shapes+)
* Autocompleted field values (scroll down menu with what you start to type)
* Edit labels (more interactive) - 8 icons on bar
* Style raster layers (unique values and colors / more interactive)
* Unified interface (properties, layer, data source manager pages look and interact the same now)
* Add symbols, text tacked to map
* Many processing algorithms (C++ algorithms / algorithms were optimized and made flexible/stable)
* Multiple Interactive map canvases (snap into/out of window)
* Preview the valid bounds of map projections (validate CRS choices)
* Support for QLR files, print templates, processing models and python scripts in BROWSER
* Locator Search bar (quick access to layers, features, actions, algorithms, plugins)
* Automatic projection of layers in processing algorithms (previously create temporary layers to clip layers in a different CRS)
* 3D map views!
  + Buildings, trees, terrain
  + View > 3D view 🡪 to have window
* Auto update field values whenever a feature is modified
* Symbol clipping: create buffers and clip them around labels/symbols (not just geographic data)
* Topological coloring
* Ctrl+TAB to toggle visibility of opened panels.

QGIS Version 3.0: Conclusion

Pros: Parallel updating of Qt5/PyQt5/Phython3 until they work together. Two efforts have been run: the version update and about every 4 months updates. Has many new updates. Seems to make interface and interactions more user friendly and consistent throughout QGIS operations15. As the research project progresses, we want to change and adapt with the program. This will stay compatible throughout the research.

Cons: Not compatible with previous work. Features from 2.18 update won’t be compatible to version 3.0 version update. So, they will have to dual commit. Large changes in basic code (combining, adding, deleting plugins)15. Broke the API, which makes it incompatible14. Not as “reliable as 2.18” yet6. Version 2.18 is the LTR (long term release) right now, and is more stable then QGIS version 3.0.

Side Note: the language I was reading was very similar to the language around GIT (commit, master branches, new features, etc.). It does use GIT!

## **1.3 Learning**

Training manual for historians and historical social scientists.23

<http://www2.isu.edu/departments/history/gismanual.shtml>

Geospatial Historian has humanitarian GIS training24.

<https://geospatialhistorian.wordpress.com>

Refer [here](https://docs.qgis.org/2.18/en/docs/user_manual/) for QGIS user guide 1

Refer [here](https://sophia.smith.edu/gis-modules/) for modules2 \*\* Good

Refer [here](https://docs.qgis.org/2.18/en/docs/training_manual/) for training manual3

Places to look for GIS information

* Digital Geography
* Flickr Map showcase/photos
* QGIS.org blog20
* Northroad
* Cadline Community
* Stack Exchange21

# **2.0 Examples**

QGIS allows for many projections of land and features layered on top of each other through a geometric network. Some modeling examples are topological, hydrological, and cartographic modeling. Other system features are map overlay, geostatistics, geocoding, and graphic display techniques. I collects characteristics from maps and projects that might be helpful in the visualization of this research project.

## **2.1 Timeline elements**

Creating Timeline Gif (in QGIS) 16

Great example17, but done with ArcGIS. TimeMap is a web mapping application5. HGIS is a process of layering old maps over new maps18.

The Heartbeat of a region (in ArcGIS)17

Analysis the traffic patterns in a city and shows intensity in a Gif.

African American and Latino migration is the United States22

# **3.0 Data Sources**

Locations: OpenStreetMap (crowdsourcing, Open Layers (custom applications), Ordnance Survey, NASA, USGS, Natural Resources of Canada, Esri.

Make road routs ([here](https://maps.openrouteservice.org/directions?n1=49.409445&n2=8.692953&n3=13&b=0&k1=en-US&k2=km))19

# **4.0 Sustainability and GIS**

QUESTION

* GIS active domain
  + Sync up server? (move around computers)
* How do I get QGIS desktop (what’s the difference between desktop and server)

# **Resources**

1. QGIS User Guide. Available at: https://docs.qgis.org/2.18/en/docs/user\_manual/. (Accessed: 28th May 2018)

2. GIS Modules – Smith College Project.

3. QGIS Training Manual. Available at: https://docs.qgis.org/2.18/en/docs/training\_manual/. (Accessed: 28th May 2018)

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5. ECAI - Electronic Cultural Atlas Initiative. Available at: http://ecai.org/tech/timemap07.html. (Accessed: 28th May 2018)

6. Changelog for QGIS 3.0. Available at: https://qgis.org/en/site/forusers/visualchangelog30/index.html. (Accessed: 28th May 2018)

7. Sutton, T. Help us to plan for QGIS 3.0. *QGIS.org blog* (2016).

8. Evers, K. *proj.4: PROJ.4 - Cartographic Projections Library*. (2018).

9. North Road. *QGIS Australia User Meetup 2017: QGIS 3.0 What End Users Need to Know*.

10. Short Announcement: QGIS 3.0 is on its way. *Digital Geography* (2017).

11. 24 Days of QGIS 3.0 Features – North Road.

12. Sutton, T. Let’s make a big funding push for QGIS 3.0! *QGIS.org blog* (2016).

13. Projecta: QGIS. Available at: http://changelog.qgis.org/en/qgis/. (Accessed: 28th May 2018)

14. underdark. QGIS Server refactoring is done! *QGIS.org blog* (2017).

15. Sutton, T. QGIS 3.0 plans. *QGIS.org blog* (2016).

16. QGIS Archives. *Digital Geography*

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18. Historical GIS Research Network. Available at: http://www.hgis.org.uk/what\_is.htm. (Accessed: 28th May 2018)

19. Openrouteservice Maps. Available at: https://maps.openrouteservice.org/directions?n1=49.409445&n2=8.692953&n3=13&b=0&k1=en-US&k2=km. (Accessed: 28th May 2018)

20. QGIS.org blog. *QGIS.org blog* Available at: http://blog.qgis.org/. (Accessed: 28th May 2018)

21. Distinction between Difference and Clip tools in QGIS? *Geographic Information Systems Stack Exchange* Available at: https://gis.stackexchange.com/questions/76839/distinction-between-difference-and-clip-tools-in-qgis. (Accessed: 28th May 2018)

22. American Migrations. Available at: http://ammig.gisforhistory.org/. (Accessed: 28th May 2018)

23. Scribd. *Scribd* Available at: https://www.scribd.com/embeds/225789617/content?start\_page=1&view\_mode=scroll&access\_key=key-L1U5Xy7SjCkcwwgndKLN&show\_recommendations=true. (Accessed: 28th May 2018)

24. Geospatial Historian. *Geospatial Historian* Available at: https://geospatialhistorian.wordpress.com/. (Accessed: 28th May 2018)

Go into further

<https://nyalldawson.net/2017/02/new-map-coloring-algorithms-in-qgis-3-0/>

<http://www.hgis.org.uk/what_is.htm>