



How to use OSM data in QGIS ?



Vector, raster, database, docker, Overpass, tiles and so on ...

Which one can I use ?

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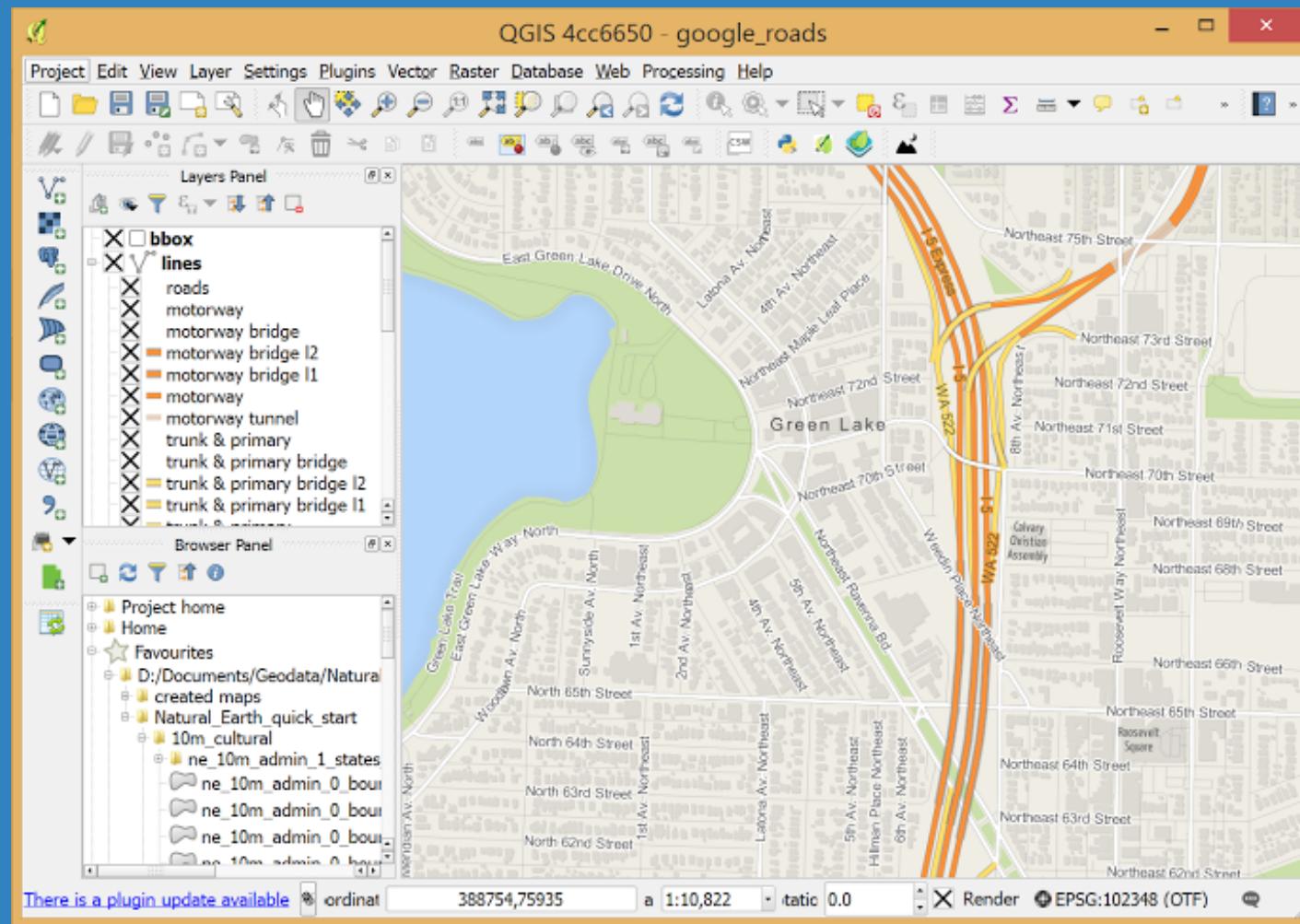
3Liz

- **Open Source** forever, check our [GitHub](#)
- Contributors in QGIS, server side mainly, plugins
- ❤️ QGIS Desktop ❤️ QGIS Server ❤️ PostGIS ❤️
- Opensource solution for publishing QGIS Project on the web,
[**Lizmap Web Client**](#) 🌐





QGIS, the powerful desktop app

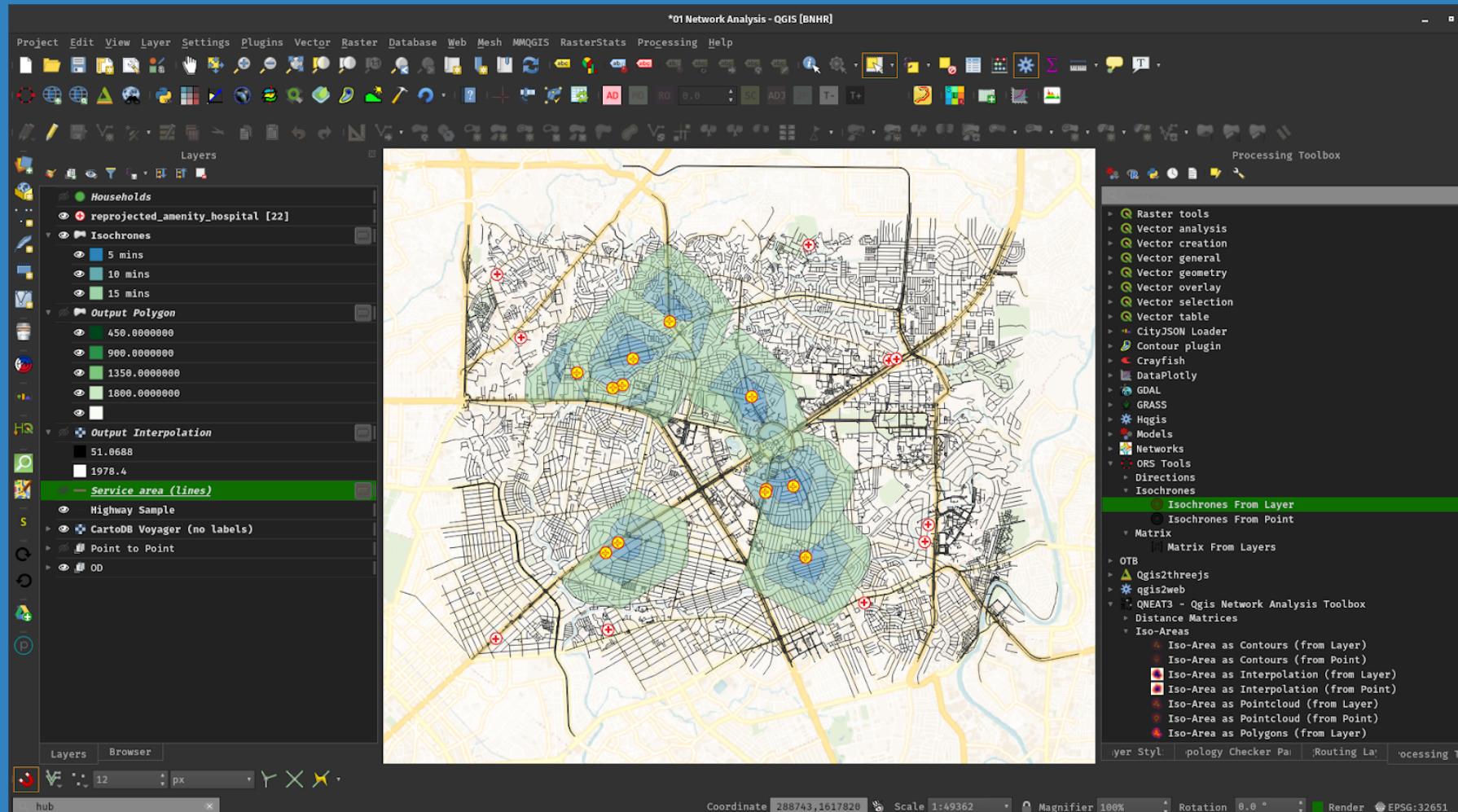


OSM vector data with different symbologies





QGIS, the powerful desktop app

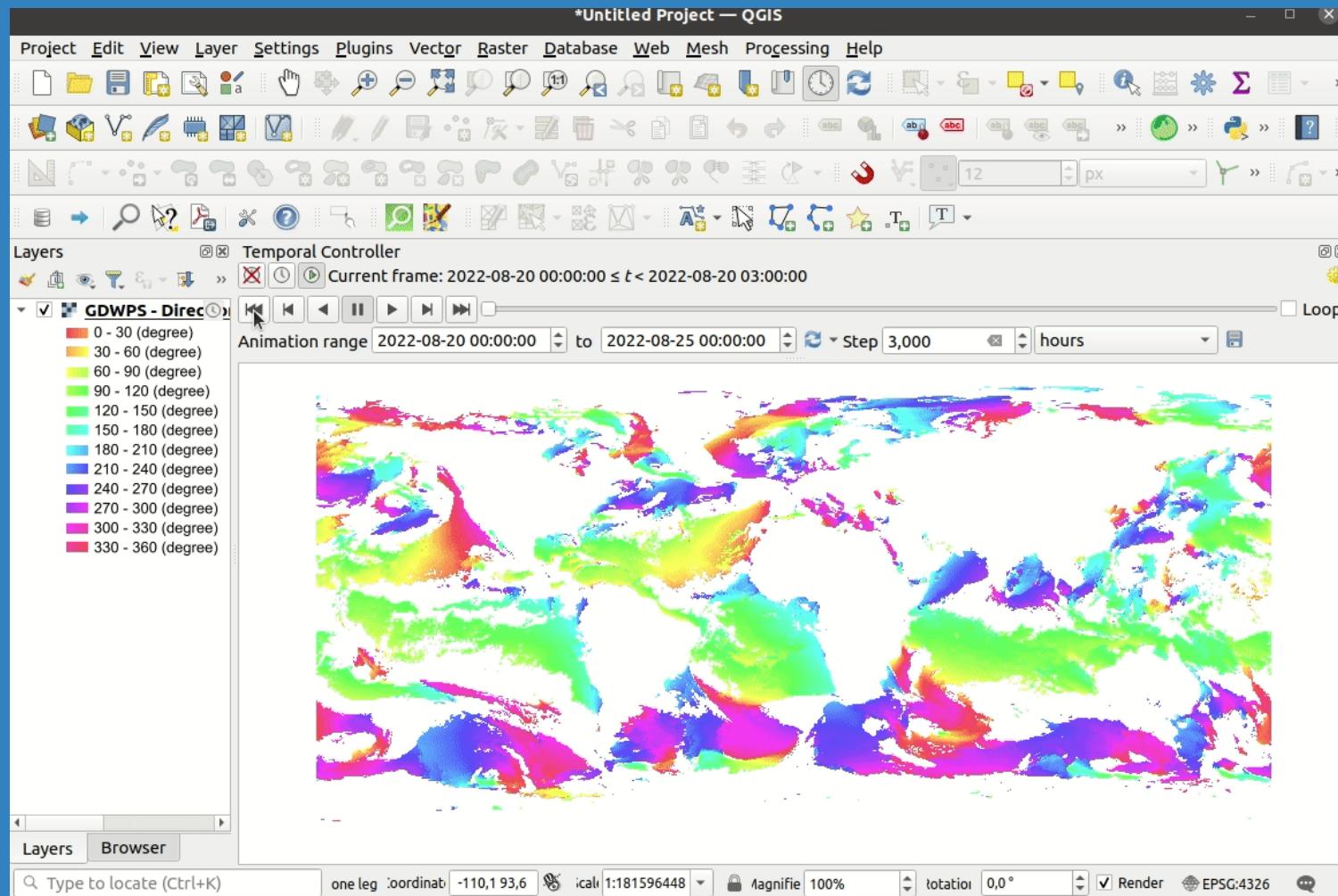


Isochrone analysis





QGIS, the powerful desktop app

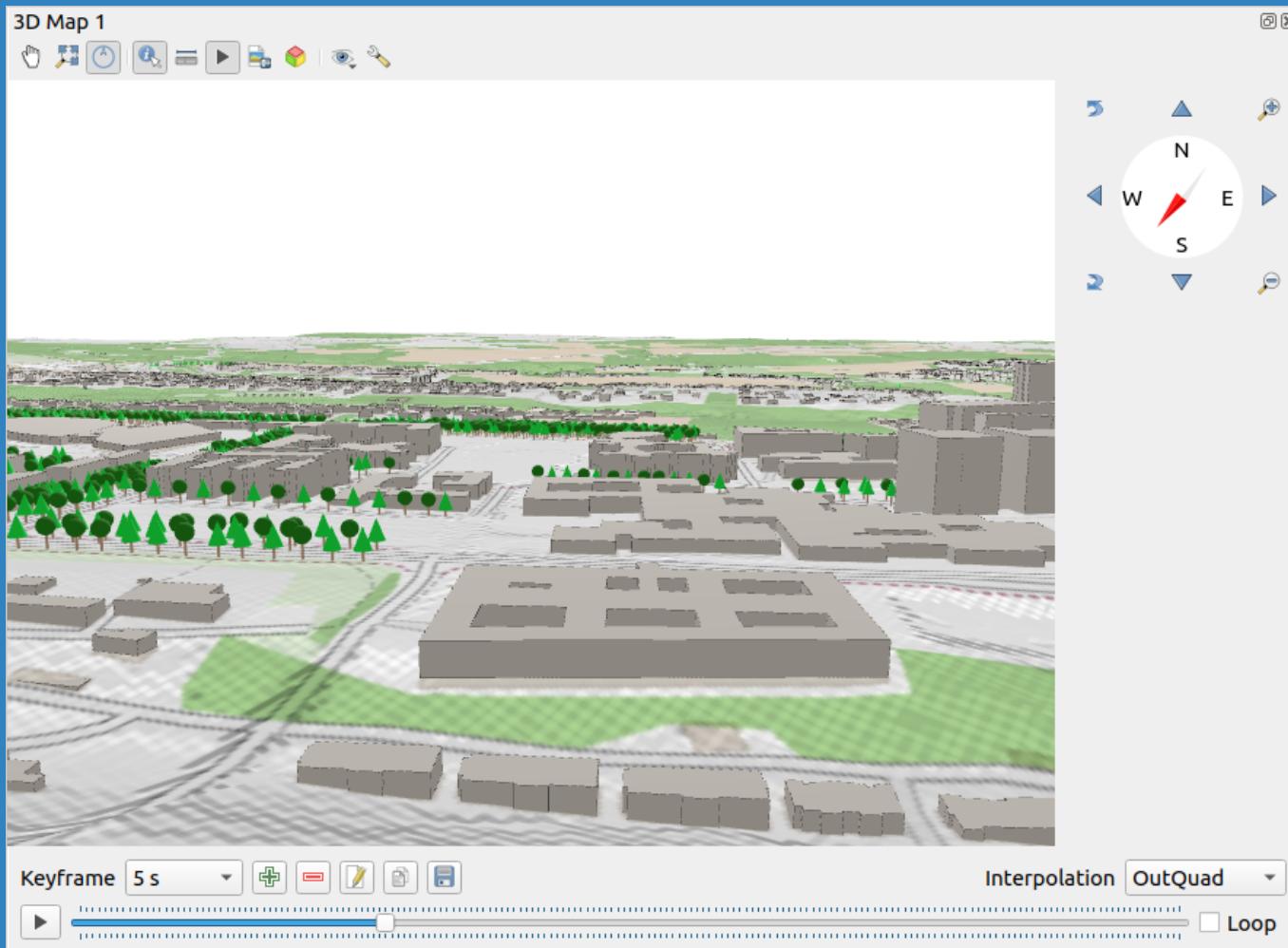


Remote data with temporal controller





QGIS, the powerful desktop app



3D



FOSS4G - Firenze 2022

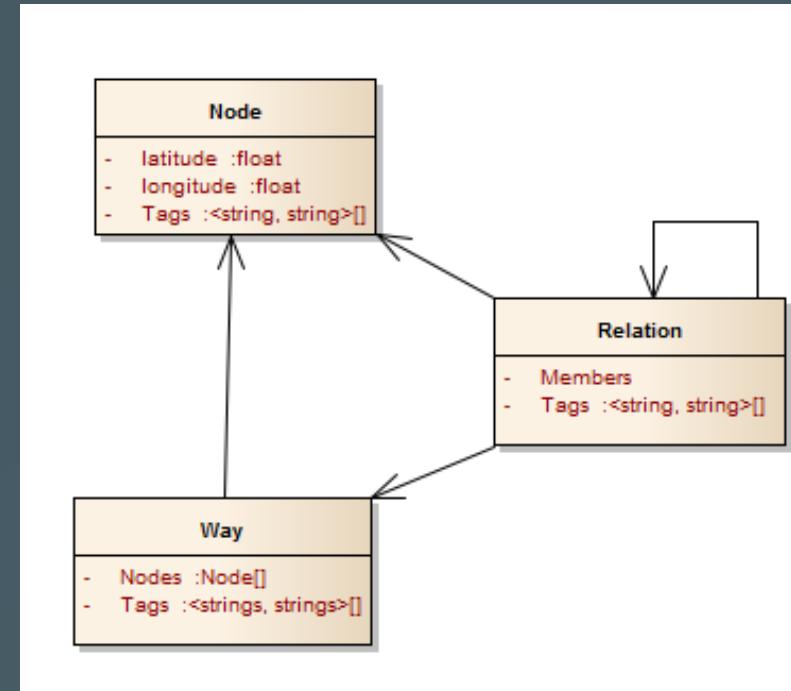


OSM data model

- Different primitive objects

OSM	GIS
Node	Point
Way	Line
Relation	Polygon

- A OSM way can either be a GIS line or GIS polygon according to its OSM tags (key/values)
- A OSM relation can be point, line, multilinestrings, multipolygons, mixed geometry...





OSM data model

Another difference → **attributes**

- In GIS, the **layer** has one or many **fields**, defining all features in this specific layer
- In OSM, the **layer** does **not** exist. Each feature is individual and has its own fields.





Therefore

OSM data in QGIS will be different from raw OSM data





Moreover, there are a few questions





Do you need ...

- to have up to date OSM data ?
- to work with small extent or a big extent ?
 - By the way, what is a small and big extent ? (for online API)
 - Density of data in different part of the worlds
- to have OSM metadata such as contributor, changeset, timestamp ?
- data designed for display or analysis or routing or geocoding or ... ?
- all OSM keys and values or just the "most common ones" ?





There isn't a single answer





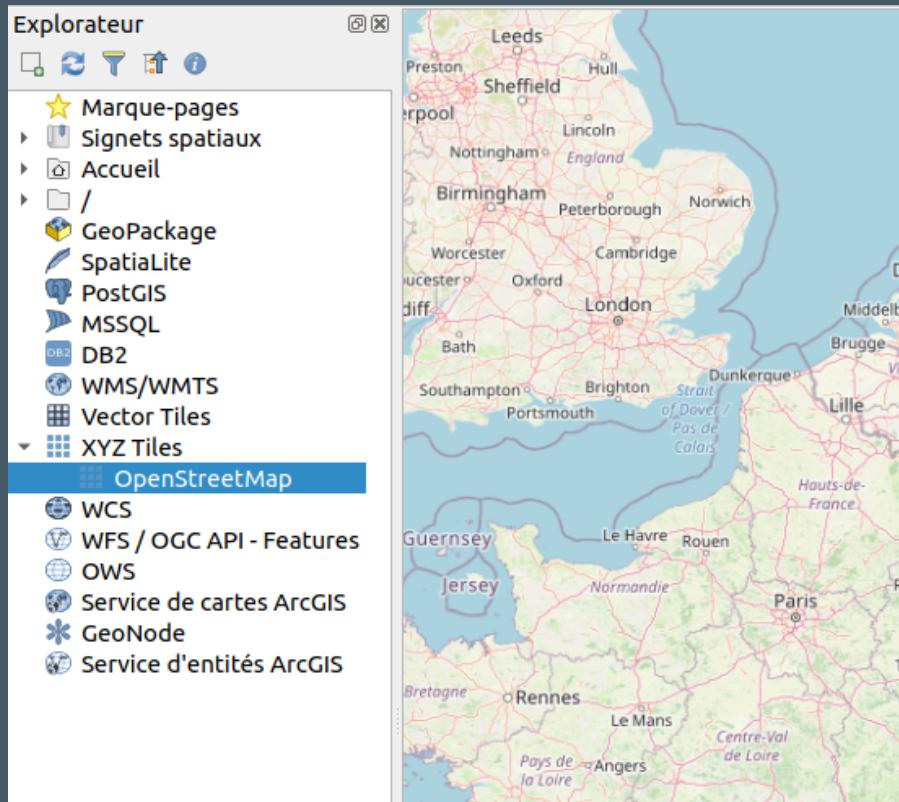
Let's see what is possible





With QGIS only

- Add the default mapnik style as a raster, from the *QGIS Browser*





With QGIS only

- Some online tools are already transforming the data into GIS formats (SHP, Geopackage...)
- <https://download.geofabrik.de>
↳
- <https://www.data.data-wax.com/> France and other countries, QGIS style, GitHub (➡ this screenshot)
- Opendata portals (such as the French one <https://www.data.gouv.fr>). Look in your country 😊
- ...





With QGIS only

- Load OSM XML or PBF files
 - Thanks to OGR in the background
- Different websites to download these files with worldwide coverage:
 - [https://download.geofabrik.d
e/](https://download.geofabrik.de/)
 - [http://download.openstreetm
ap.fr/extracts/](http://download.openstreetm
ap.fr/extracts/)
 - ...

The screenshot shows the QGIS 'Browser' panel. At the top, there are several icons: a square with a green dot, a blue arrow, a yellow arrow, an orange arrow, and a blue info icon. Below these are sections for 'Favorites' (with a yellow star icon), 'Spatial Bookmarks' (with a blue folder icon), and 'Home' (with a blue house icon). Under 'Home', there are several folders: '3d', 'anne', 'Desktop', 'dev' (which contains 'ansible', 'app', and 'data'), 'osm' (which contains 'mayotte-latest.osm.pbf' and its subtypes: 'lines', 'multilinestrings', 'multipolygons', 'other_relations', and 'points'), 'qgis-mercicor-data', 'workshop', 'lzm_demo' (with a yellow Python icon), 'screenshot.png' (with a blue square icon), and 'docker'. The 'osm' folder and its subtypes are highlighted with a blue selection bar.





With QGIS only

- It starts to be an issue if you want some **specific** fields
- This is called an **HStore** field

points — Features Total: 99, Filtered: 99, Selected: 0

The screenshot shows the QGIS attribute table for a layer named 'points'. The table has 99 features. A red box highlights the 'other_tags' column, which contains HStore data. A red arrow points from the text 'This is called an HStore field' in the slide to this column. The 'other_tags' column for feature 8 contains the following value:

```
"denotation"=>"landmark","genus"=>"Adansonia","leaf_cycle"=>"deciduous","leaf_type"=>"broadleaved","natural"=>"tree","species"=>"A. digitata","genus"=>"..."
```

	osm_id	name	barrier	highway	ref	address	is_in	place	man_made	other_tags
1	9110804195	NULL	NULL	NULL	NULL	NULL	NULL	NULL	communication	"material"=>"metal", "tower:type"=>"co...
2	9110874825	Baobab	NULL	NULL	NULL	NULL	NULL	NULL	NULL	"denotation"=>"landmark", "genus"=>"...
3	9110887917	NULL	gate	NULL	NULL	NULL	NULL	NULL	NULL	"material"=>"metal"
4	9110917251	Baobab	NULL	NULL	NULL	NULL	NULL	NULL	NULL	"denotation"=>"landmark", "genus"=>"...
5	9110917252	Baobab	NULL	NULL	NULL	NULL	NULL	NULL	NULL	"denotation"=>"landmark", "genus"=>"...
6	9110917253	Baobab	NULL	NULL	NULL	NULL	NULL	NULL	NULL	"denotation"=>"landmark", "genus"=>"...
7	9110917254	Baobab	NULL	NULL	NULL	NULL	NULL	NULL	NULL	"denotation"=>"landmark", "genus"=>"...
8	9110917255									"denotation"=>"landmark", "genus"=>"Adansonia", "leaf_cycle"=>"deciduous", "leaf_type"=>"broadleaved", "natural"=>"tree", "species"=>"A. digitata", "genus"=>"..."



Use Processing Explode HStore

Explode HStore Field

Parameters Log

Input layer: points [EPSG:4326]

Selected features only

HStore field: osm_id

Expected list of fields separated by a comma [optional]:

Exploded: Create temporary layer

Open output file after running algorithm

0%

Help Run as Batch Process... Close Run

This algorithm creates a copy of the input layer and adds a new field for every unique key in the HStore field.
The expected field list is an optional comma separated list. By default, all unique keys are added. If this list is specified, only these fields are added and the HStore field is updated.





Or use QGIS Expression

points — Select by Expression

Expression Function Editor

hstore_to_map("other_tags")['description']

= + - / * ^ || () '\n'

Feature

Preview: 'DEMBENI C'

Zoom to Features Select Features Close

function **hstore_to_map**

Creates a map from a hstore-formatted string.

Syntax

hstore_to_map(string)

Arguments

string the input string

Examples

- **hstore_to_map('qgis=>rocks')**
→ { 'qgis': 'rocks' }

for selection, labelling ...





Using QGIS Plugins

A few plugins in the QGIS plugin manager among the 914 plugins available 😊 (August 2022)

The screenshot shows the QGIS Plugin Manager interface. On the left, there's a sidebar with buttons for All, Installed, Not installed, Upgradeable, Install from ZIP, and Settings. A search bar at the top right contains the text "openstreetmap". The main pane displays a list of plugins, with "QuickOSM" highlighted by a blue selection bar at the bottom. The right side shows detailed information for the "QuickOSM" plugin:

QuickOSM

Download OSM data thanks to the Overpass API. You can also open local OSM or PBF files. A special parser, on top of OGR, is used to let you see all OSM keys available.

Execute customs Overpass queries in QGIS to get OSM data.

★★★★★ 227 rating vote(s), 775413 downloads

Tags osm, openstreetmap, overpass, download, osmdownload, josm, remote, pbf, processing, modeler

More info homepage bug tracker code repository

Author Etienne Trimaille

Installed version MASTER

Available version (stable) 2.0.0 updated at jeu. juin 24 00:00:00 2021

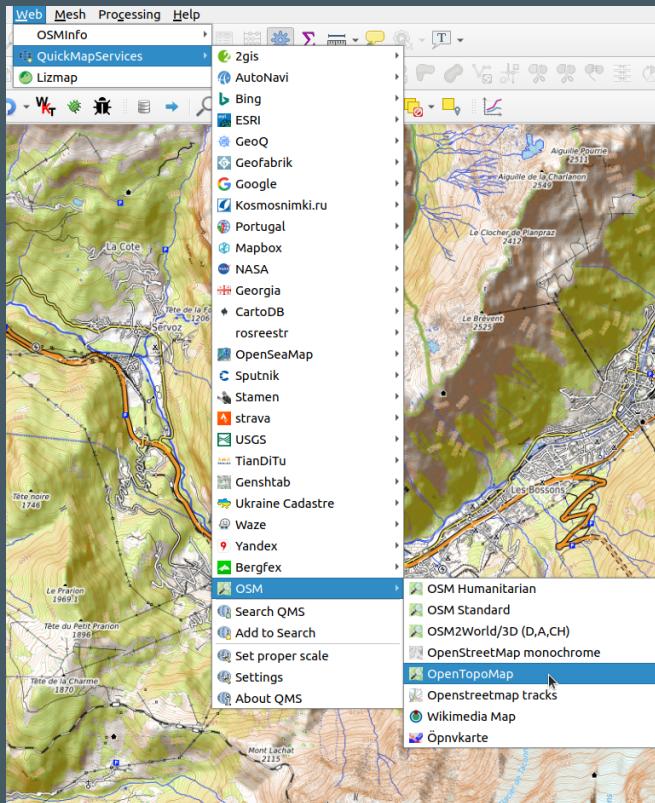
Changelog changelog

At the bottom of the right panel are buttons for "Upgrade All", "Uninstall Plugin", "Downgrade Plugin", and "Close".





QuickMapServices plugin

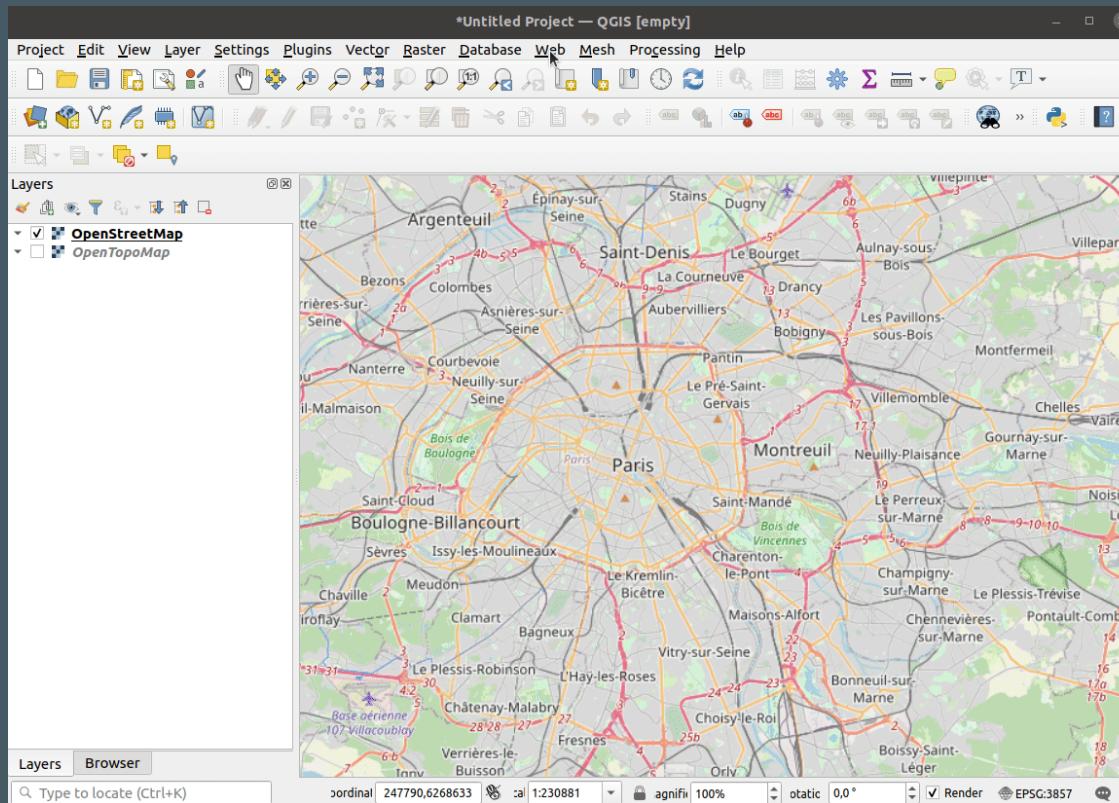


OpenTopoMap in the background, based on OSM, designed for
hiking ⛰





QuickMapServices plugin



In *QuickMapServices*, go in *Settings* → *More services* → *Get contributed pack* to enable a **lot** of basemaps 🚀.





QuickOSM plugin

- Download the data on the fly
- Making requests to the Overpass API, similar to Overpass-Turbo
 - Server API to retrieve raw OSM data based on queries (OQL)
- QuickOSM **2.2.1** was released this weekend, during the SOTM & QGIS Contributor meeting
- Targeting both
 - **non OSM contributors**
 - and OSM OverpassAPI **experts**
- It's removing the HStore field `other_tags` by exploding it
- As it's using an API, limited amount of data
- Let's make an overview of this new version





Quick Query

- Search in your native language
 - Bakery
 - Panetteria
 - Boulangerie
 - shop=bakery in OSM
- Multi key/value support with AND / OR operator

Aide sur les clés/valeurs Réinitialiser

Pré-réglage Boulangerie

	Clé	Valeur	Ajouter	Supprimer
1	shop	bakery		

- *Thanks to the JOSM and Vespucci community to share these presets on GitHub*





Quick Query

French people love and

QuickOSM

Aide sur les clés/valeurs

Pré-réglage Non obligatoire. Ex: boulangerie

	Clé	Valeur	Ajouter	Supprimer
1	Requête sur toutes les clés	Requête sur toutes les valeurs		

Dans

Lieu nommé requis quand la requête est "Dans".

▼ Historique des requêtes

shop_bakery_baume les dames

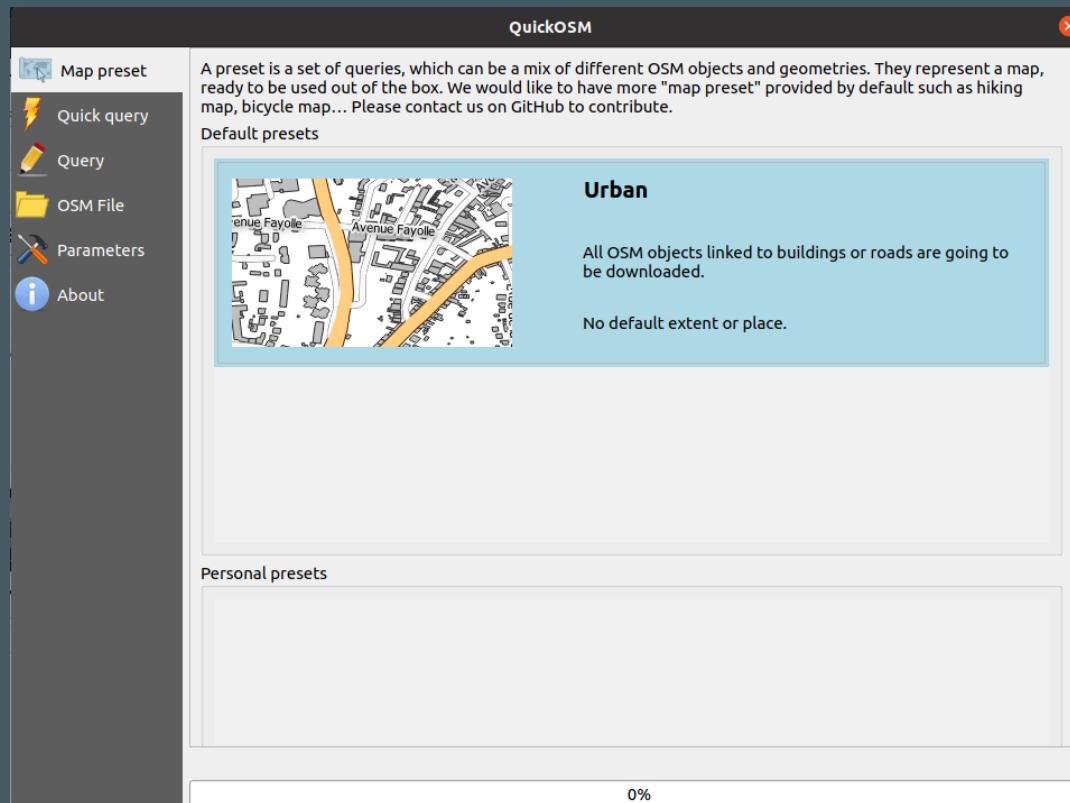
All OSM objects with the key 'shop'='bakery' in baume les dames are going to be downloaded.





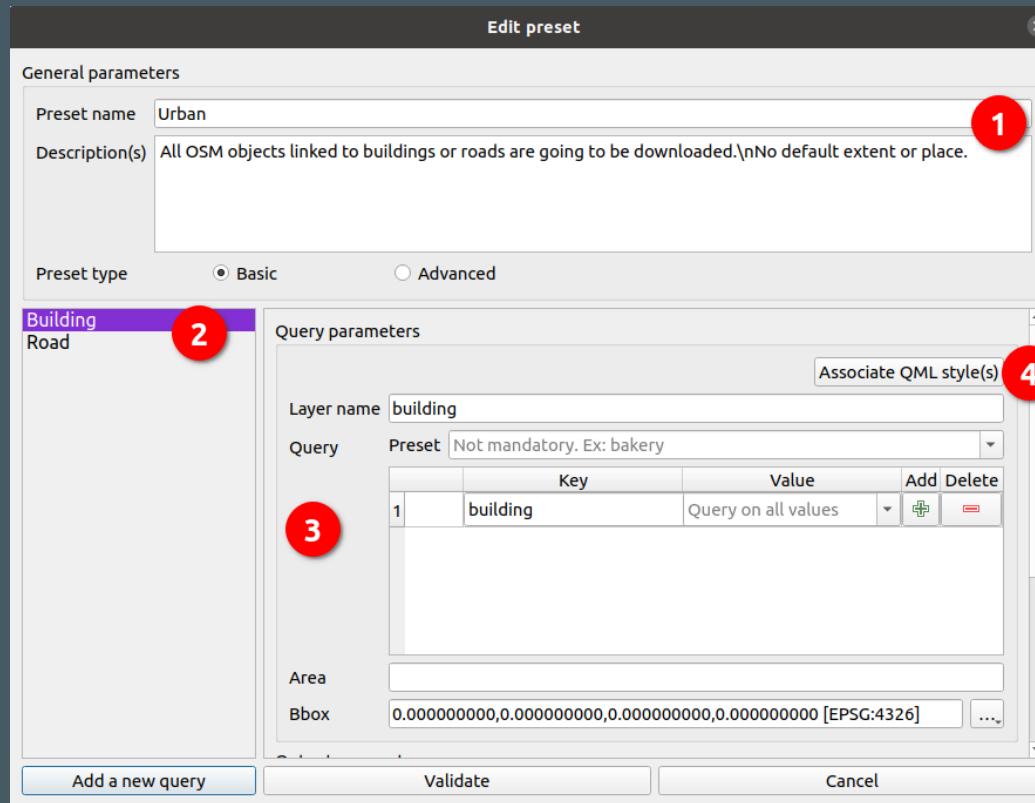
Map presets

- Download many layers, many OSM objects, with a QGIS symbology at the **same** time with 2 clicks





Map presets



A few steps to make new presets, with a QGIS style





Map presets



Bicycle map, landuse... map presets

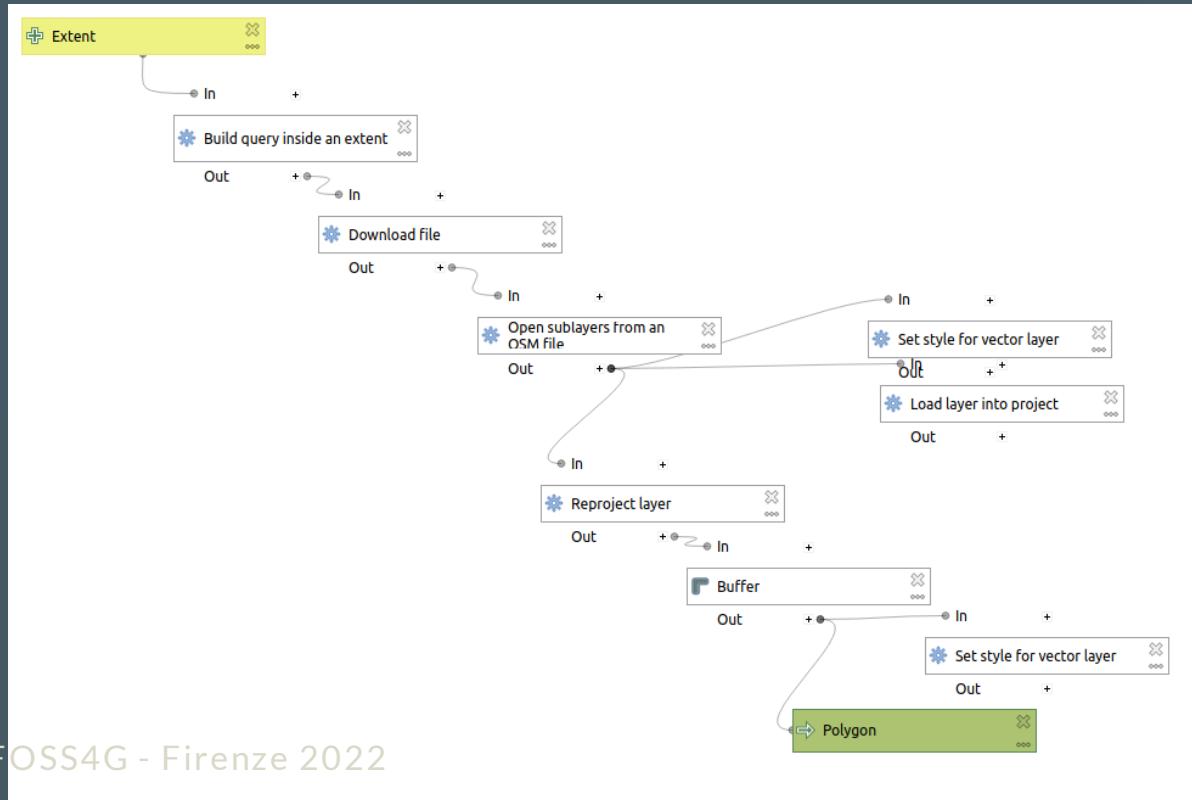
<https://docs.3liz.org/QuickOSM/user-guide/map-preset/>





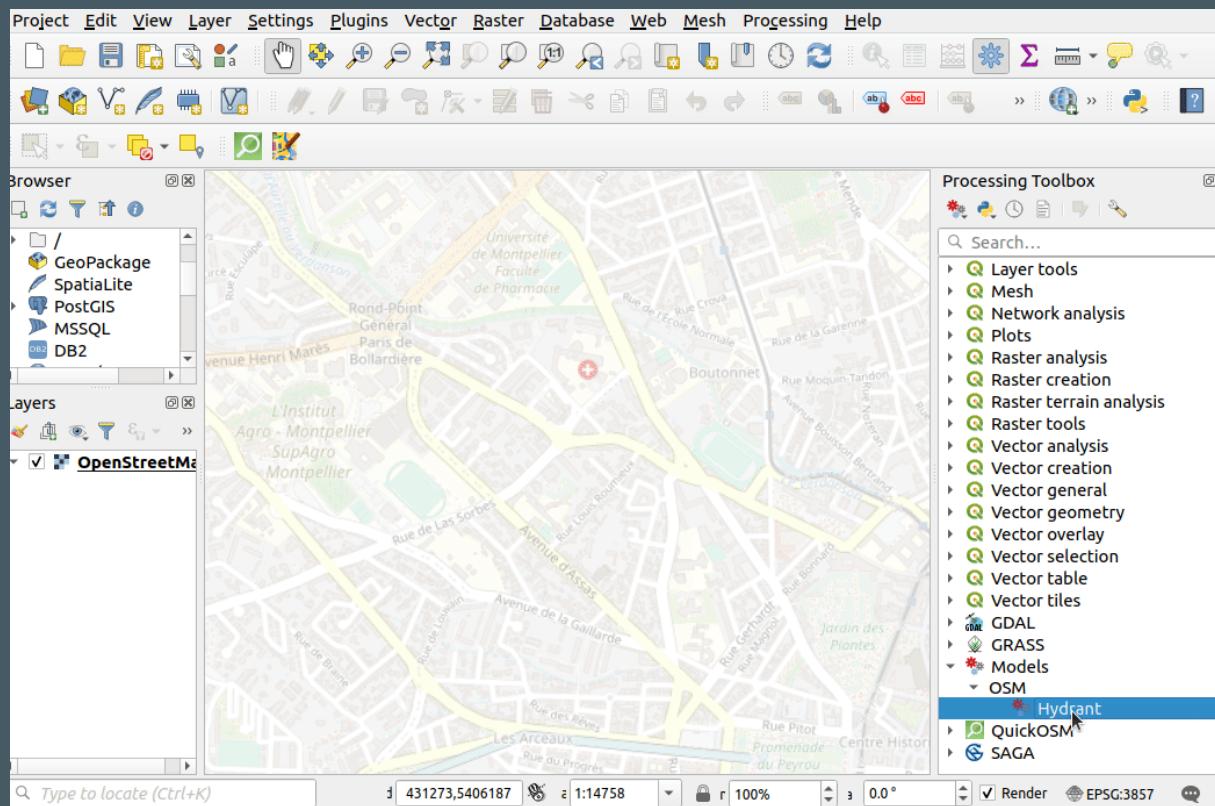
QuickOSM in Processing

- Available in Processing *Toolbox* and *Modeler*
- Batch processing
- Example : downloading fire hydrants, reprojecting in meters projection, buffering and QGIS Style





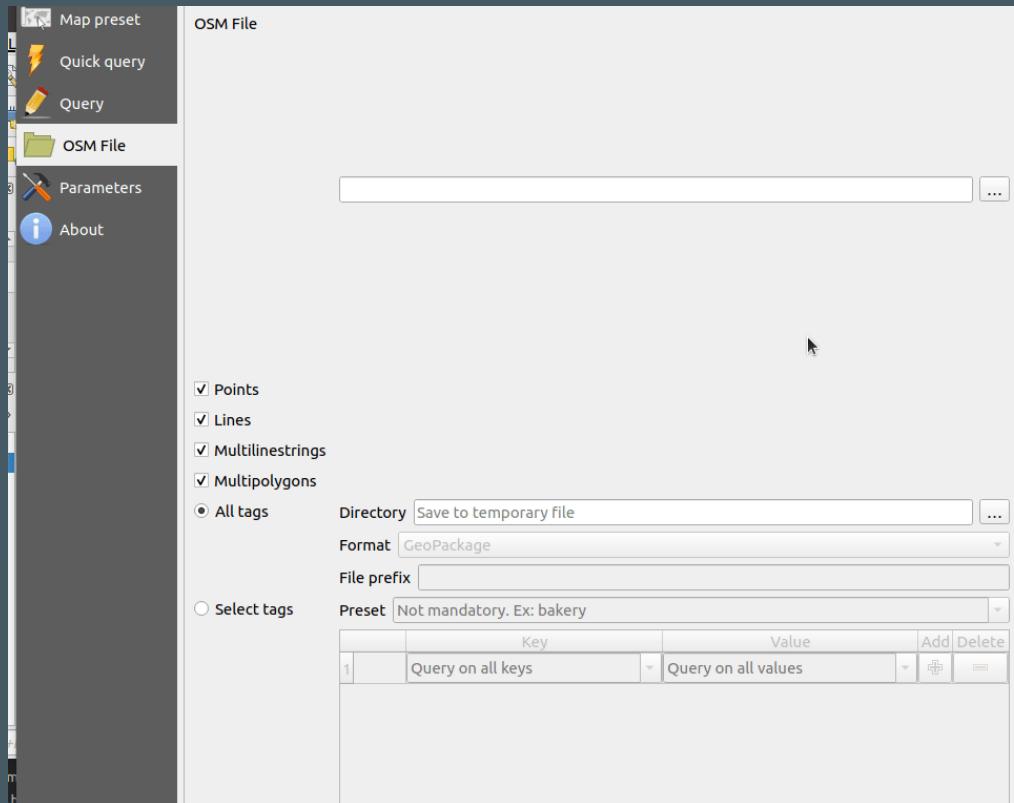
QuickOSM in Processing





Local OSM file

- Having a PBF/OSM file on your computer ?
- You can still filter it



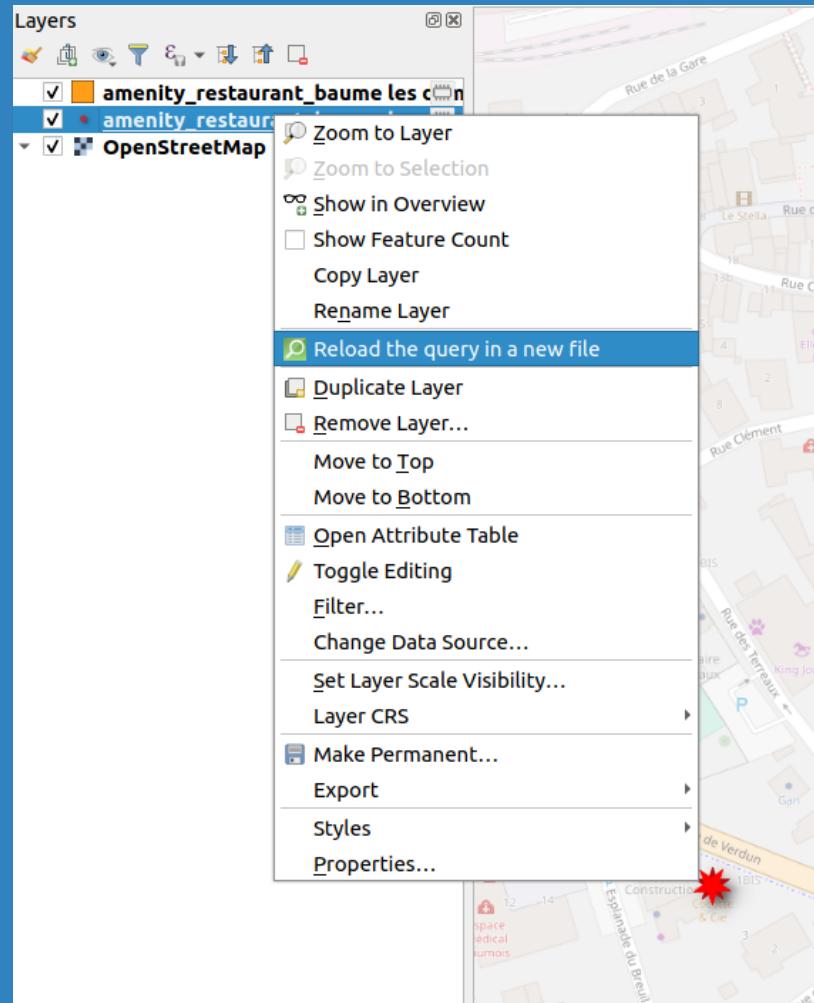


Some quick tips in QuickSOM





Reload the query to get latest update from OSM





Query many named places with ;

In montpellier ; paris

All OSM objects with the key 'amenity'='restaurant' in montpellier and paris are going to be downloaded.





Default QGIS Actions available

mapillary_guadeloupe — Features Total: 75, Filtered:

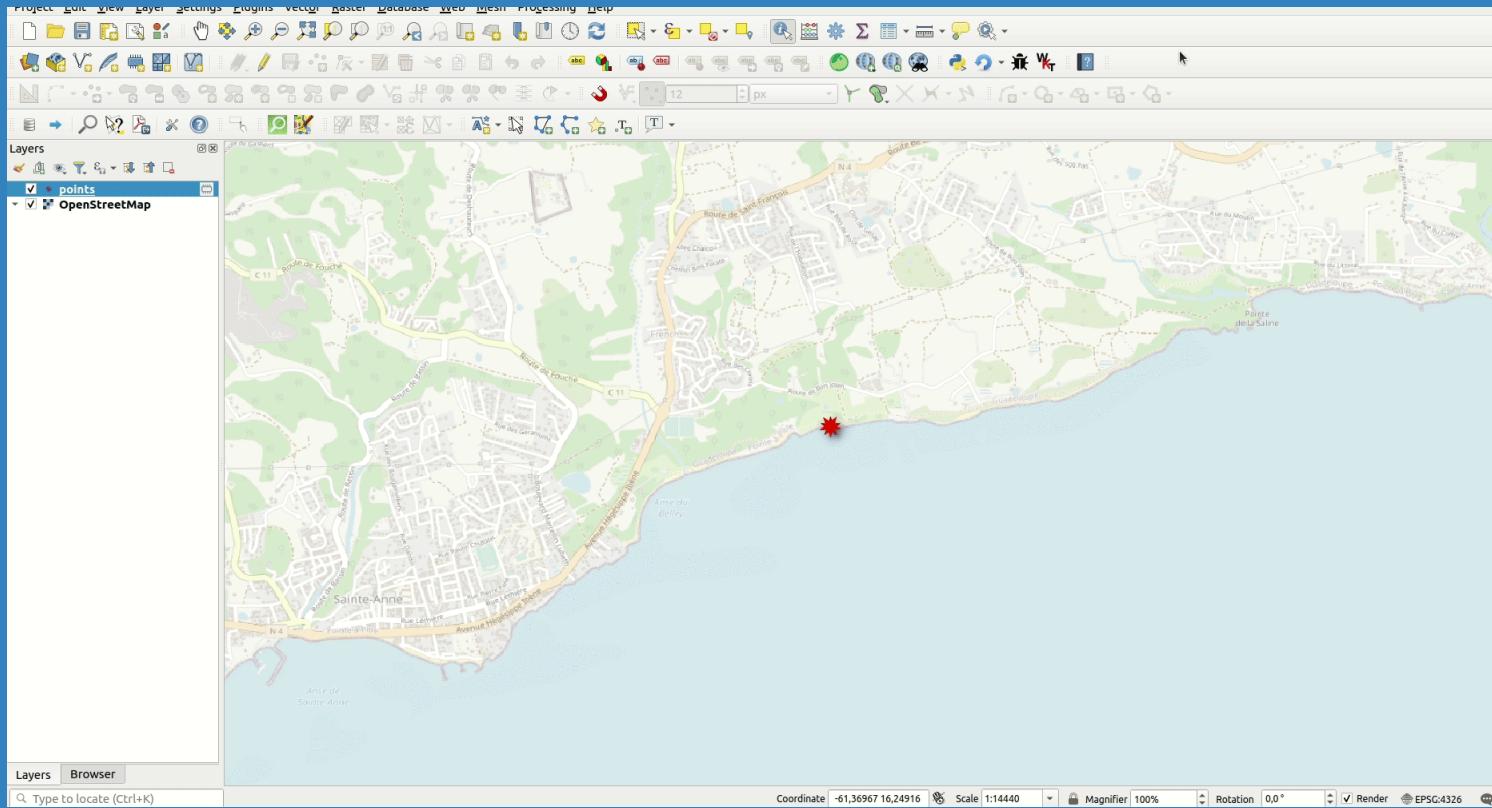
	full_id	osm_id	osm_type	map			
1	n28894627...	2889462701	node	c5O6C			
2	n29517567...	2951756716	node	qJEaMHve...	NULL	NULL	NULL
3	n29517567...	2951756717	node	Zj2geSuCL...	NULL	NULL	NULL

JOSM, Wikipedia, URL, Mapillary





Default QGIS Actions available



JOSM, Wikipedia, URL, Mapillary





Translations

- Web interface : <https://www.transifex.com/quickosm/gui/dashboard/>
- Statistics : <https://docs.3liz.org/QuickOSM/translation-stats/>





OSM relations

Issues with OSM relations

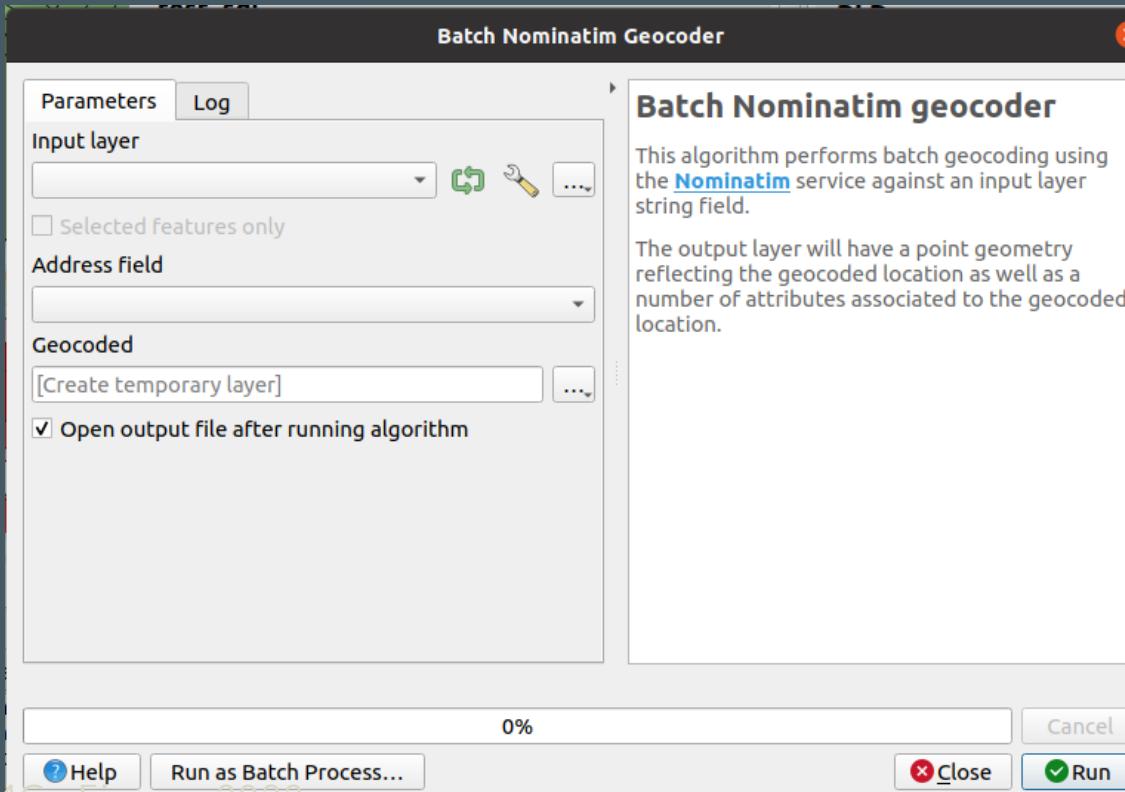
- The underlying library (OGR) can **only display** `relations = route`,
`multilinestrings`, `multipolygons` or `boundary`.
- Other relations need some post-processing to manage geometries for a GIS software





Geocoding

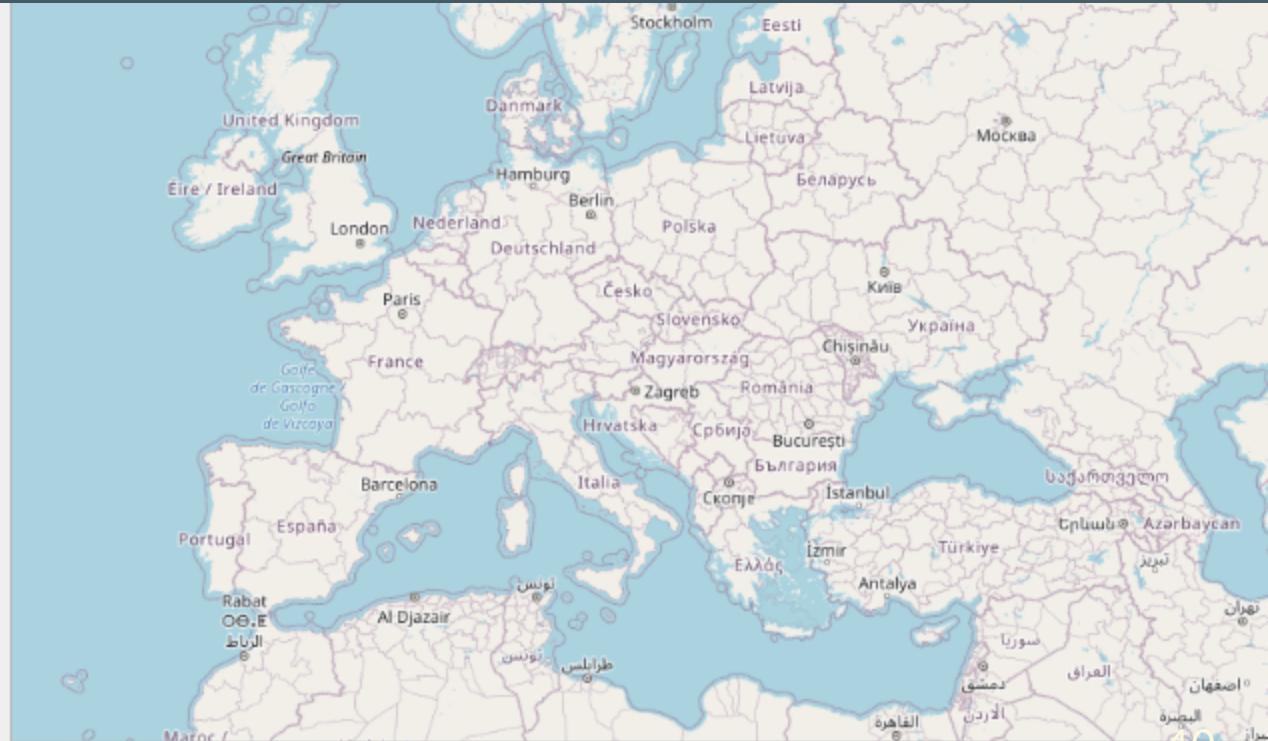
- New in QGIS 3.20 
- No more plugin required
- <https://nominatim.qgis.org>
- Processing algorithm for batch geocoding





Geocoding

- New in QGIS 3.20 
- No more plugin required
- <https://nominatim.qgis.org>
- Integrated in the locator bar (without plugin)



The screenshot shows a QGIS interface with a map of Europe and the Mediterranean region. The map displays country boundaries and place names in several languages. Labels include:

- United Kingdom, Great Britain, Eire / Ireland, London
- Danmark, Hamburg, Berlin, Nederland, Deutschland, Paris, France, Golfe de Gascogne, Golfo de Vizcaya
- Stockholm, Eesti, Lätvija, Lietuva, Minsk, Moskva, Kiev, Ukraine, Chișinău, Moldova
- Cesko, Slovensko, Magyarország, Zagreb, Hrvatska, Italia, Romania, Serbia, Skopje, Istanbul, Bulgaria, Izmir, Turkey, Antalya
- Portugal, Espana, Barcelona, Rabat, Al Djazair, Libya, Tunisia, Morocco, Algeria, Egypt, Cairo, Alexandria, Jordan, Syria, Iraq, Iran, Azerbaijan, Armenia, Georgia, Turkey, Cyprus, Lebanon, Israel

At the bottom left, the QGIS toolbar shows "Browser" and "Layers" buttons, and the status bar displays "FOSS4G - Firenze 2022" and "Type to locate (Ctrl+K)".



Routing

- ORS Tools
- API based on OpenStreetMap data
- isochrones and matrix calculations

The screenshot shows the ORS Tools interface. On the left is a map of Europe with a red line representing a route. The route starts in Denmark, goes through Germany, and ends in the Czech Republic. Several cities are labeled along the route, including Copenhagen, Hamburg, Berlin, Prague, and Vienna. On the right is a dialog box titled "ORS Tools". It has tabs for "Resources", "Sign Up", "Dashboard", and "Forum". The "Provider" dropdown is set to "openrouteservice". Below it are tabs for "Advanced Directions" and "Batch Jobs", with "Advanced Directions" selected. Under "Go with", the mode is set to "driving-car" and the optimization is "fastest". A list of points is shown, starting with Point 0 at 13.389705, 52.537907. Points 1 through 9 are listed with their coordinates. Below this is a section for "Traveling Salesman" with a checked checkbox. Under "Other Options", there are radio buttons for "None", "Optimize Start", and "Optimize End", with "None" selected. There are also checkboxes for "Avoid tags" and "Avoid countries", both of which are unchecked. At the bottom of the dialog are buttons for "Help", "About", "Close", and "Apply".





Importing OSM in a database ?

[https://wiki.openstreetmap.org/wiki/Databases and data access APIs#Database Schemas](https://wiki.openstreetmap.org/wiki/Databases_and_data_access_APIs#Database_Schemas)

Schema name	Created with	Used by	Primary use case	Updatable	Geometries (PostGIS)	Lossless	hstore columns	Database
osm2pgsql	osm2pgsql	Mapnik, Kothic JS	Rendering	yes	yes	no	optional	PostgreSQL
apidb	osmosis	API	Mirroring	yes	no	yes	no	PostgreSQL, MySQL
pgsnapshot	osmosis	jXAPI	Analysis	yes	optional	yes	yes	PostgreSQL
imposm	Imposm		Rendering	no	yes	no	Imposm2: no, Imposm3: yes	PostgreSQL
nominatim	osm2pgsql	Nominatim	Search, Geocoding	yes	yes	yes	?	PostgreSQL
ogr2ogr	ogr2ogr		Analysis	no	yes	no	optional	various
osmsharp	OsmSharp		Routing	yes	no	?	?	Oracle
overpass	Overpass API		Analysis	yes	?	yes	?	custom
mongosm	MongOSM		Analysis	maybe	?	?	?	MongoDB
node-mongosm	Mongoosejs		Analysis	yes	yes	yes	NA	MongoDB
osmium	Osmium		Analysis	no	yes	no	yes	PostgreSQL

- Mainly **osm2pgsql**, used for rendering, very old project and used
- Imposm, version **3** is updatable. Each layer has a **mapping** configuration





Database with docker

- 🐘 and 🐳
- <https://github.com/kartoza/docker-osm>
- Docker-compose project :
 - PostgreSQL container
 - Imposm container
 - OSMUpdate container : to download OSM diff files
- Workflow
 - Drop a PBF file in the folder
 - Drop the area of interest for clipping (recommended) in the folder
 - Copy `.example.env` to `.env` for local settings
 - `make run`





et voila !

Possible to customize the configuration :

- Different **mapping**
- Generalization for different scales
- Updated every two minutes by default
- SQL Triggers, views
- Styles included in the QGIS `layer_styles` table

▼	Tables (25)
>	layer_styles
>	osm_admin
>	osm_aeroways
>	osm_amenities
>	osm_barrierpoints
>	osm_barrierways
>	osm_buildings
>	osm_housenumbers
>	osm_housenumbers_interpolated
>	osm_landusages
>	osm_landusages_gen0
>	osm_landusages_gen1
>	osm_places
>	osm_roads
>	osm_roads_gen0
>	osm_roads_gen1
>	osm_transport_areas
>	osm_transport_points
>	osm_waterareas
>	osm_waterareas_gen0
>	osm_waterareas_gen1
>	osm_waterways
>	osm_waterways_gen0
>	osm_waterways_gen1
>	spatial_ref_sys
>	Trigger Functions
>	Types
>	Views





Vector tiles

- Vector tile support, new in QGIS 3.14 ⭐
- MapTiler / OpenMapTiles <https://openmaptiles.org/>
- Talk at the **State Of The Map** by Jiri Komarek and Wladimir Szczerban
- Talk at the **FOSS4G** by Adam Laza yesterday, QGIS MapTiler plugin





Questions

This was just a *subset* of capabilities.
There are still other plugins, other ways etc.

Come to see me if you have any links or other tools

Etienne

 @etrimaille or @3LIZ_news

