



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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 [@etrimaille](https://twitter.com/etrimaille)





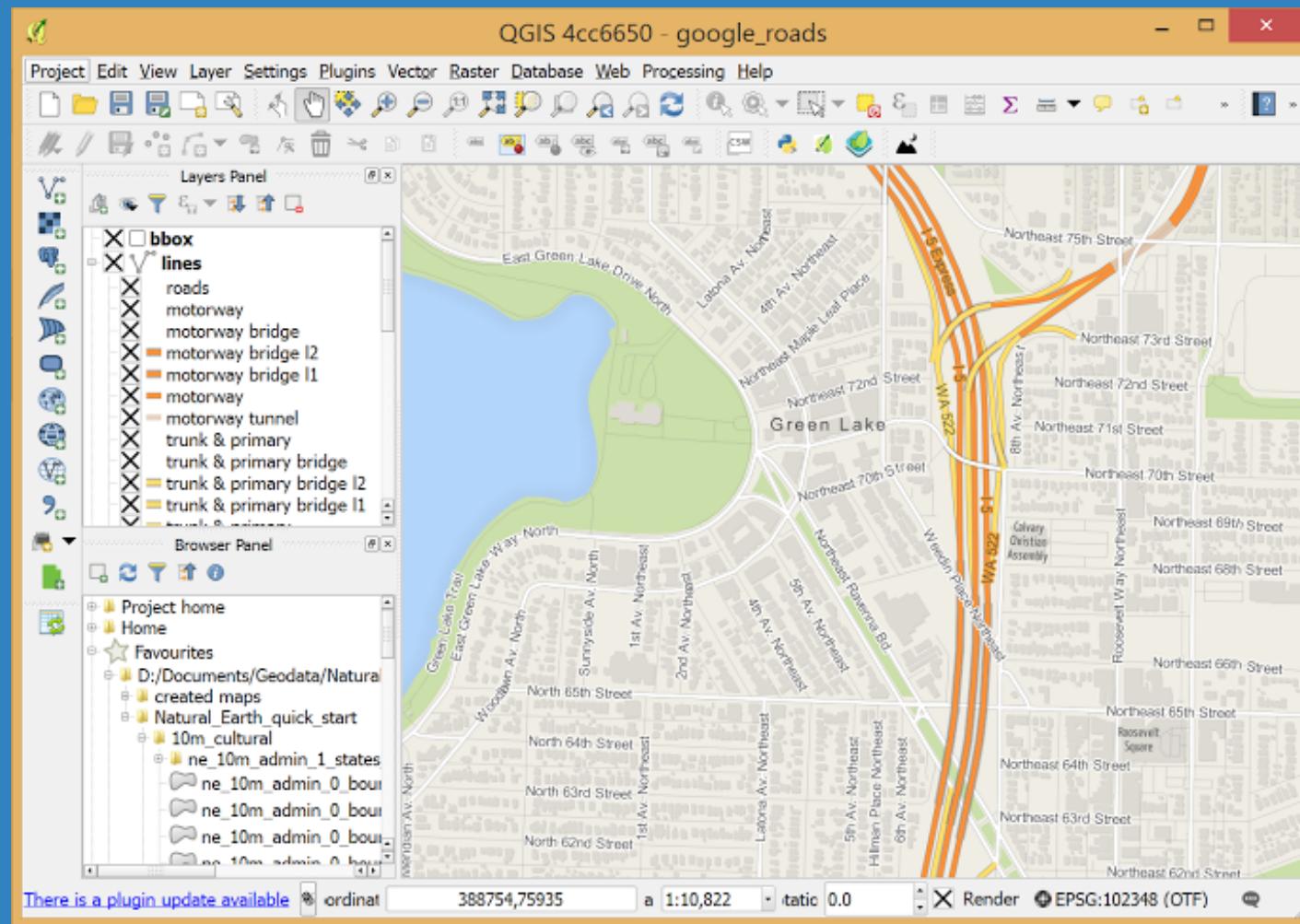
3Liz

- **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

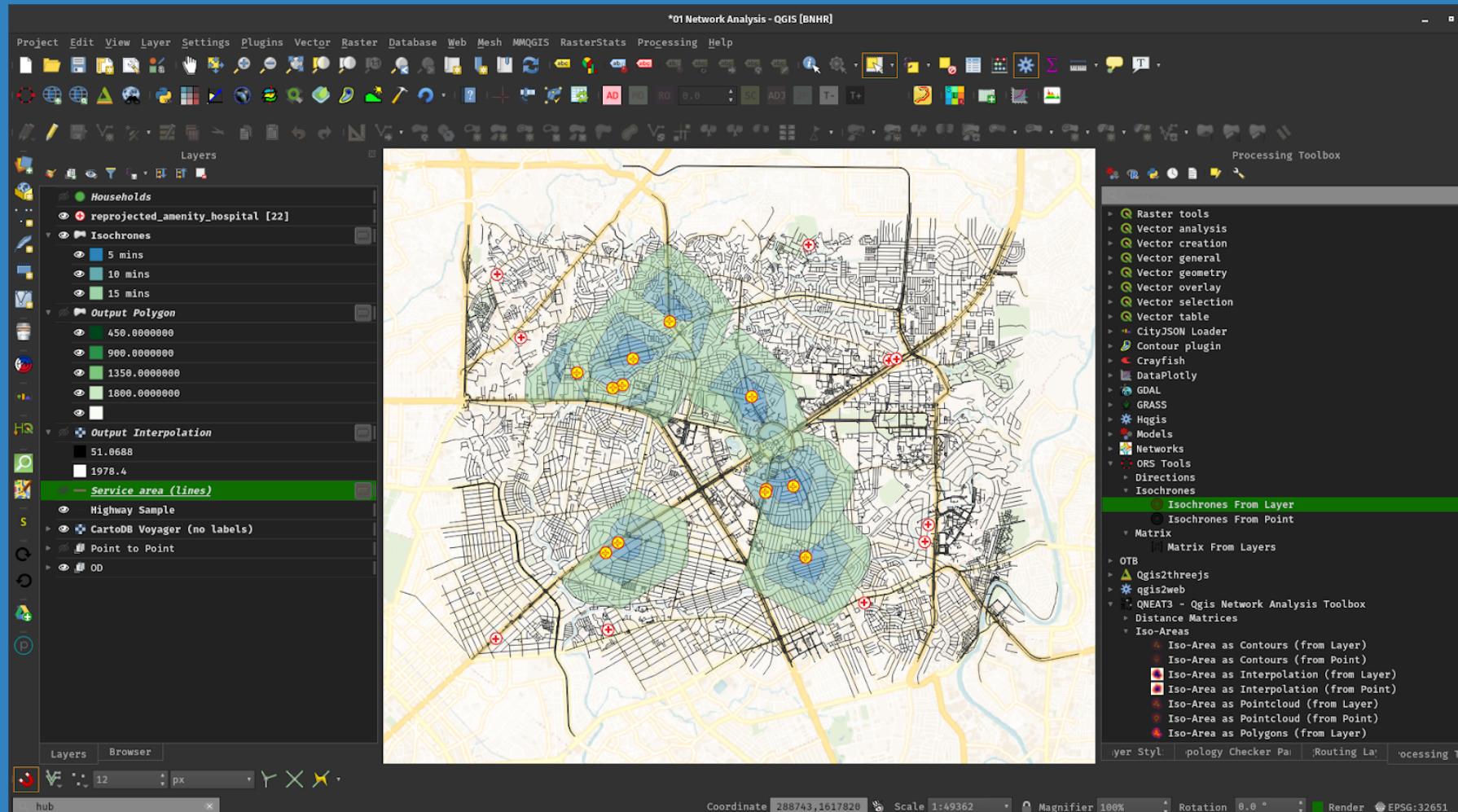


OSM vector data with different symbologies



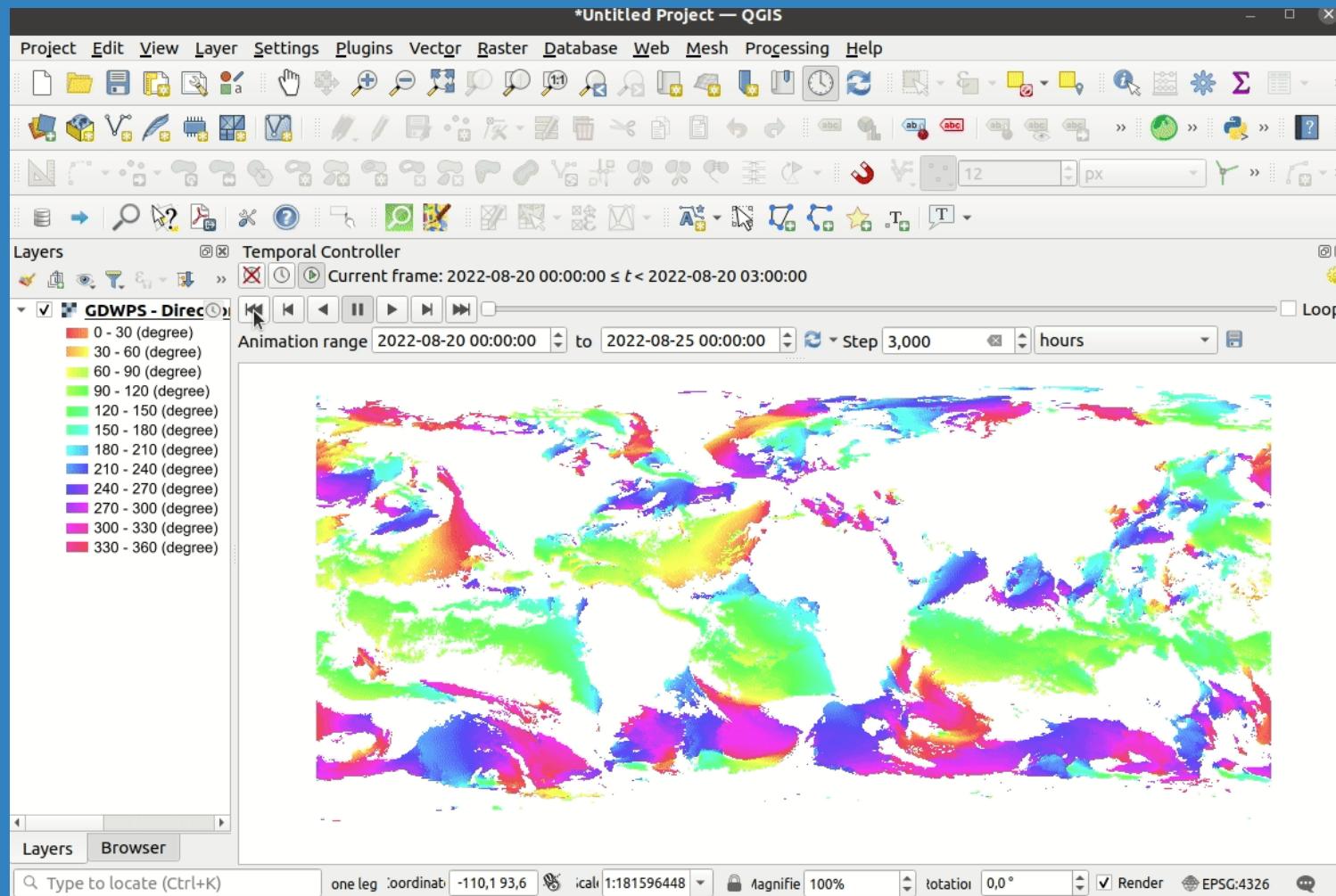


QGIS, the powerful desktop app



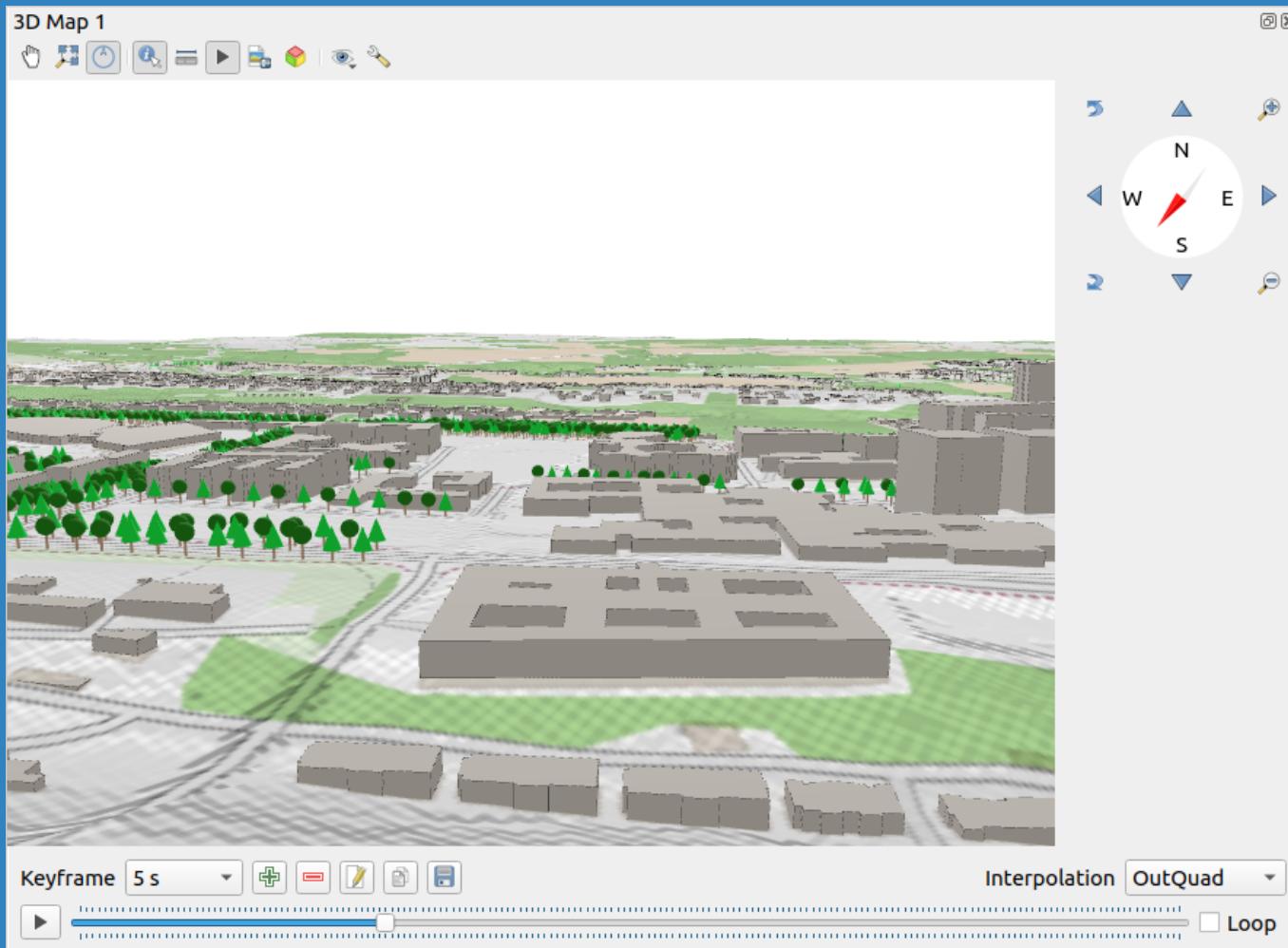


QGIS, the powerful desktop app





QGIS, the powerful desktop app



3D



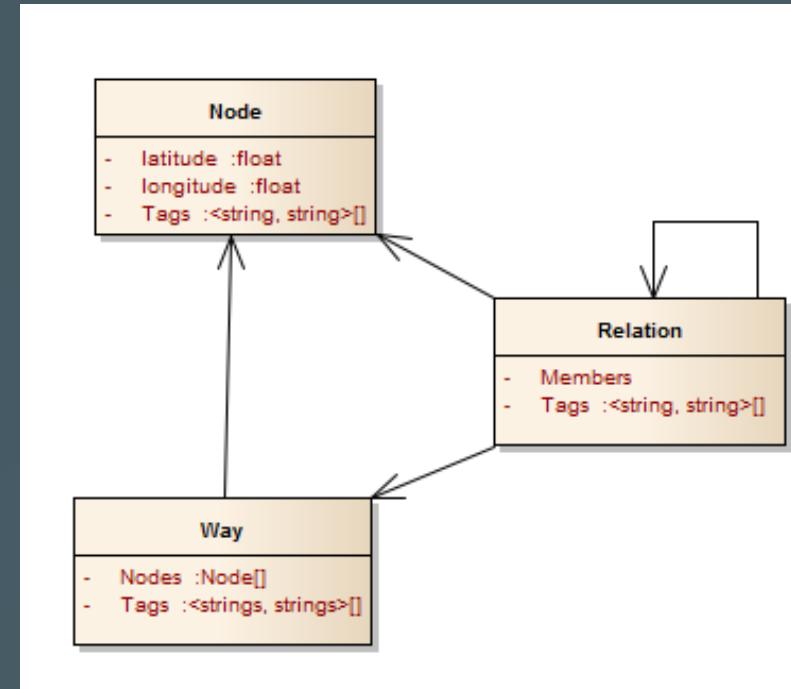


OSM data model

- 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





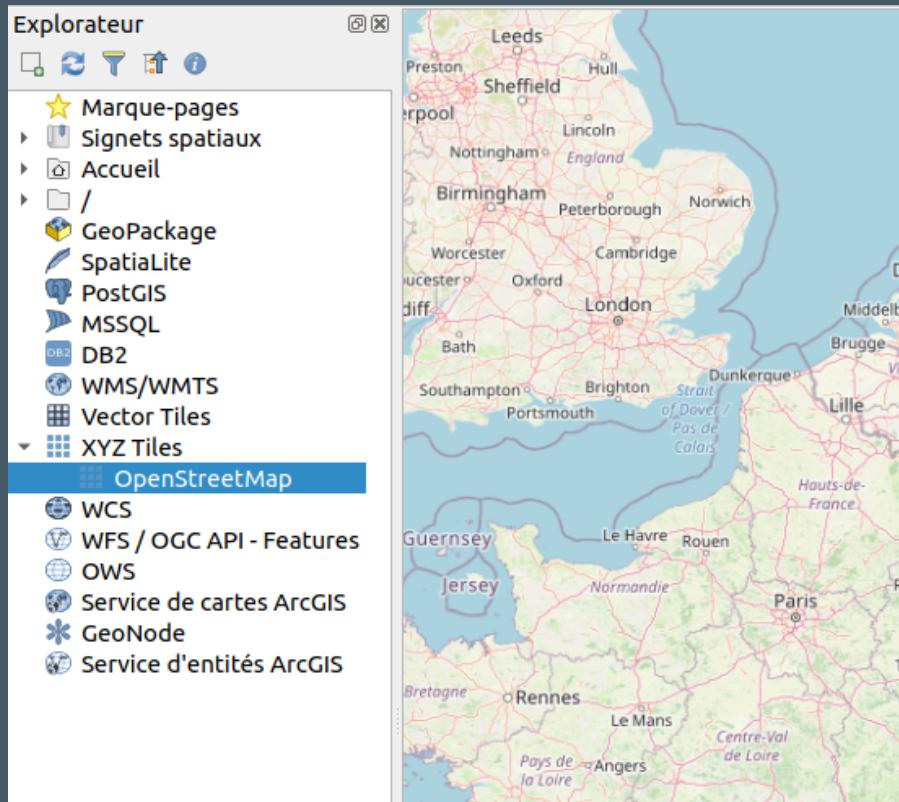
Let's see what is possible





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/)
 - ...

Browser

The screenshot shows the QGIS Browser window with a hierarchical file structure. The root folder is 'Home'. Inside 'Home' are '3d', 'anne', 'Desktop', 'dev', and 'osm'. 'dev' contains 'ansible', 'app', and 'data'. 'data' contains 'ifremer', 'miscellaneous', and 'osm'. 'osm' contains 'mayotte-latest.osm.pbf' which is expanded to show 'lines', 'multilinestrings', 'multipolygons', 'other_relations', and 'points'. Other items in 'osm' include 'qgis-mercicor-data', 'workshop', 'lzm_demo', 'screenshot.png', and 'docker'. The 'osm' folder and its contents are highlighted with a blue selection bar.

- ★ Favorites
- ▶ Spatial Bookmarks
- ▼ Home
 - ▶ 3d
 - ▶ anne
 - ▶ Desktop
 - ▼ dev
 - ▶ ansible
 - ▶ app
 - ▼ data
 - ▶ ifremer
 - ▶ miscellaneous
 - ▼ osm
 - ▼ mayotte-latest.osm.pbf
 - ✓ lines
 - ✓ multilinestrings
 - ✗ multipolygons
 - ✗ other_relations
 - ⋮ points
 - ▶ qgis-mercicor-data
 - ▶ workshop
 - ▶ lzm_demo
 - ▶ screenshot.png
 - ▶ docker





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. The columns are: osm_id, name, barrier, highway, ref, address, is_in, place, man_made, and other_tags. The 'other_tags' column contains HStore data. A red box highlights the 'other_tags' column header, and a red arrow points from the text 'This is called an HStore field' to the 'other_tags' column.

	osm_id	name	barrier	highway	ref	address	is_in	place	man_made	other_tags
1	9110804195	NULL	NULL	NULL	NULL	NULL	NULL	NULL	communicati...	"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... Cancel 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)

Plugins | All (973)

All

Installed

Not installed

Upgradeable

Install from ZIP

Settings

openstreetmap

- 3D City Builder
- Animate OSM
- Catchment
- FlexiGIS
- Go2NextFeaturePlus
- HCMGIS
- Lat Lon Tools
- MapTiler
- Open Aerial Map (OAM) for QGIS3, Express Edition
- OpenLayers Plugin
- ORS Tools
- OSM Data Sync
- OSMDownloader
- OSMInfo
- osmpoly_export
- Pelias Geocoding
- QuickMapServices
- QuickOSM
- SPARQLing Unicorn QGIS Plugin
- Valhalla

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

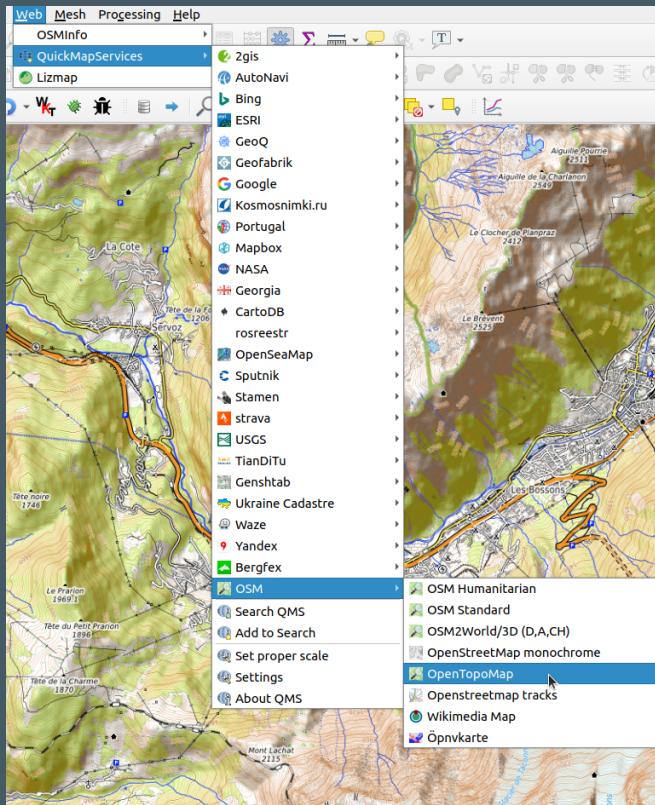
Changelog changelog

Upgrade All Uninstall Plugin Downgrade Plugin Close





QuickMapServices plugin

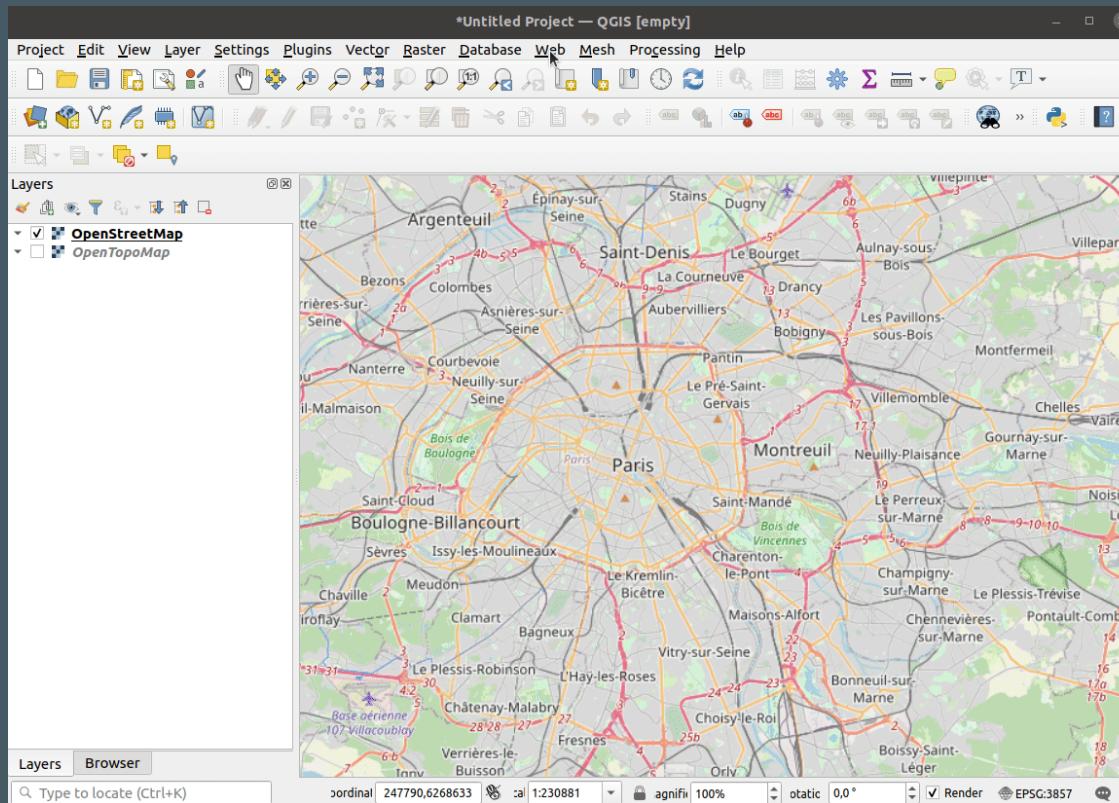


OpenTopoMap in the background, based on OSM, designed for
hiking ⛰





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** is **on its way**
- 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

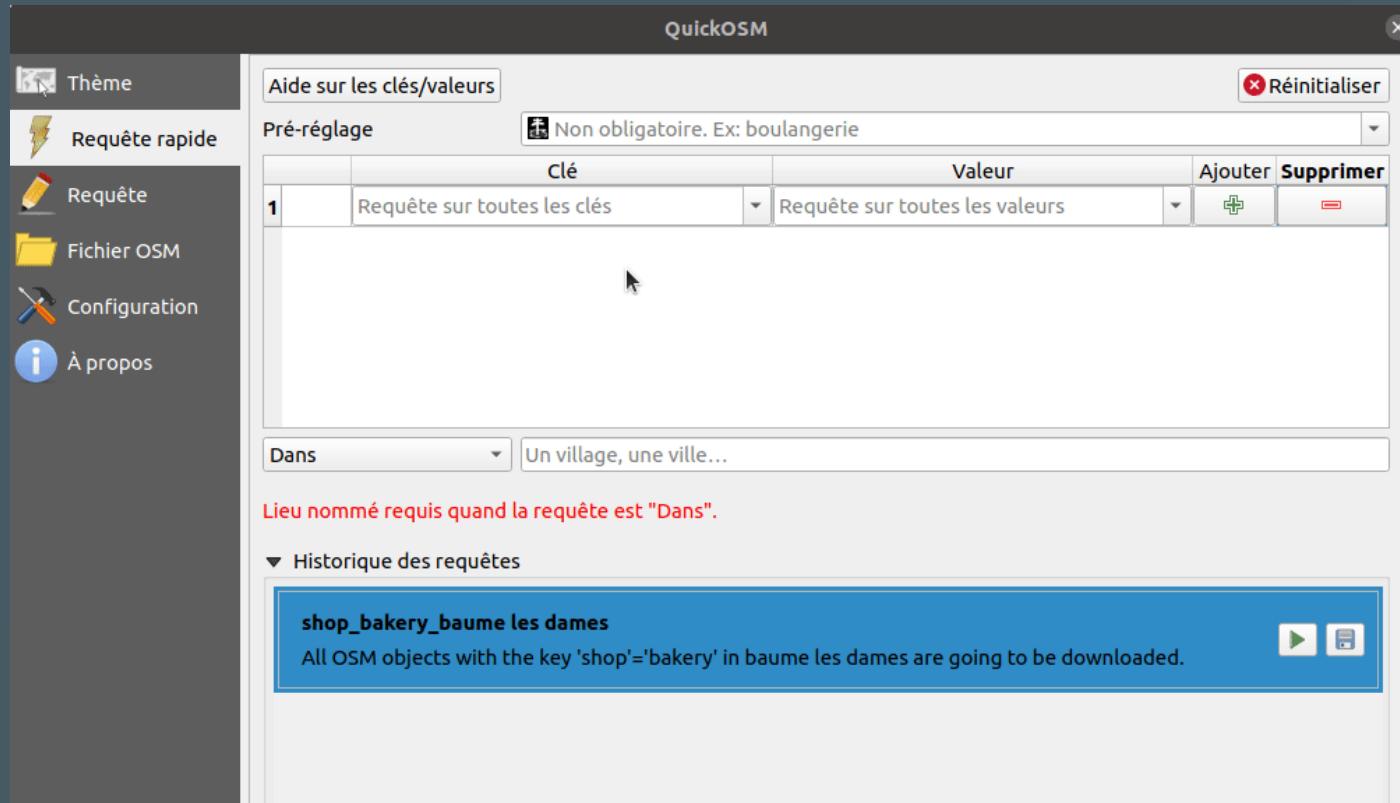
	Clé	Valeur	Ajouter	Supprimer
1	Requête sur toutes les clés	Requête sur toutes les valeurs		

Dans

Lieu nommé requis quand la requête est "Dans".

▼ Historique des requêtes

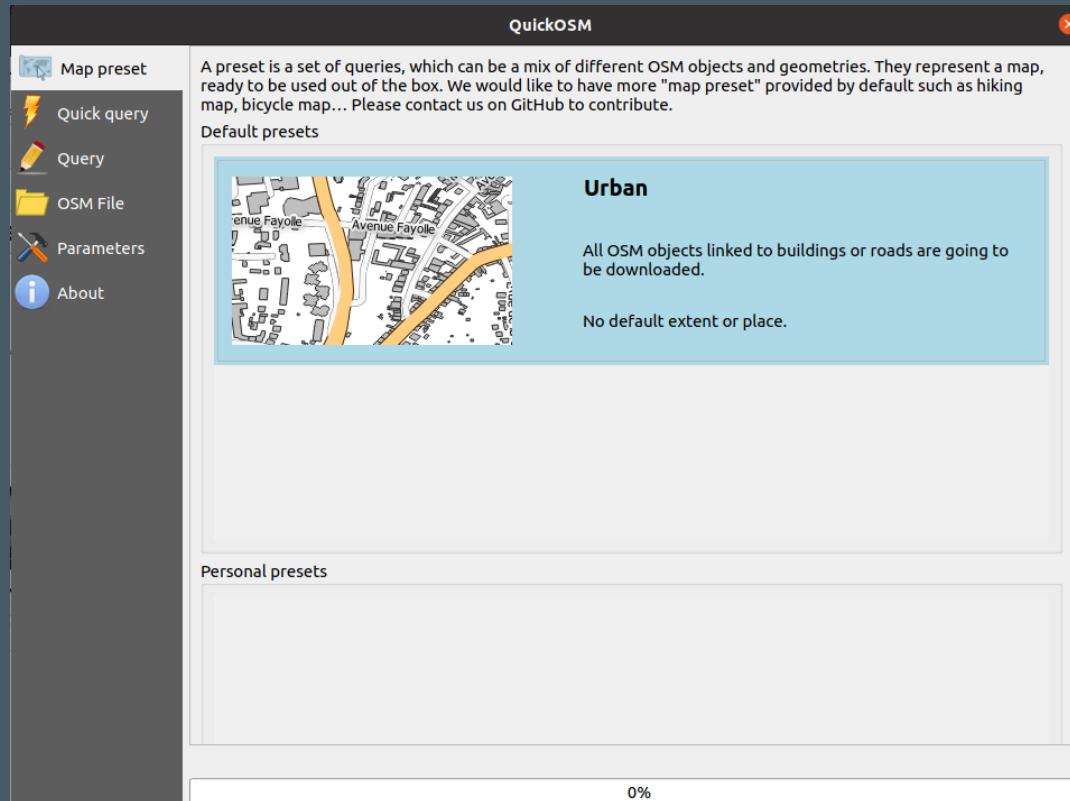
shop_bakery_baume les dames
All OSM objects with the key 'shop'='bakery' in baume les dames are going to be downloaded.





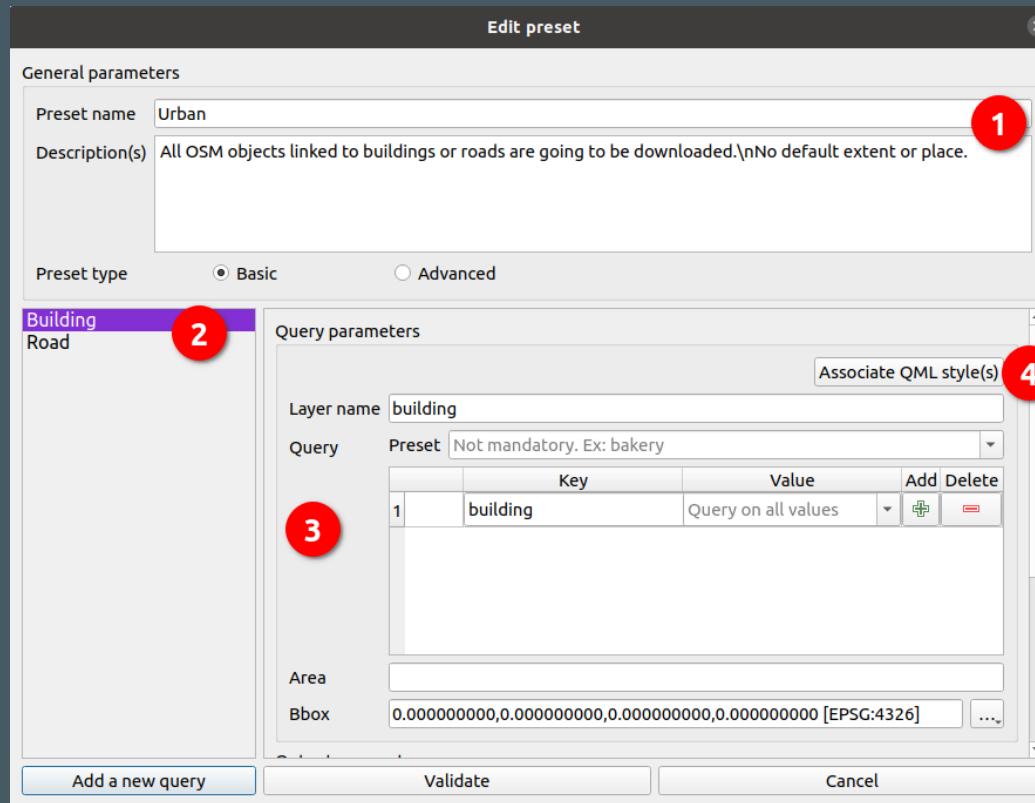
Map presets

- 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

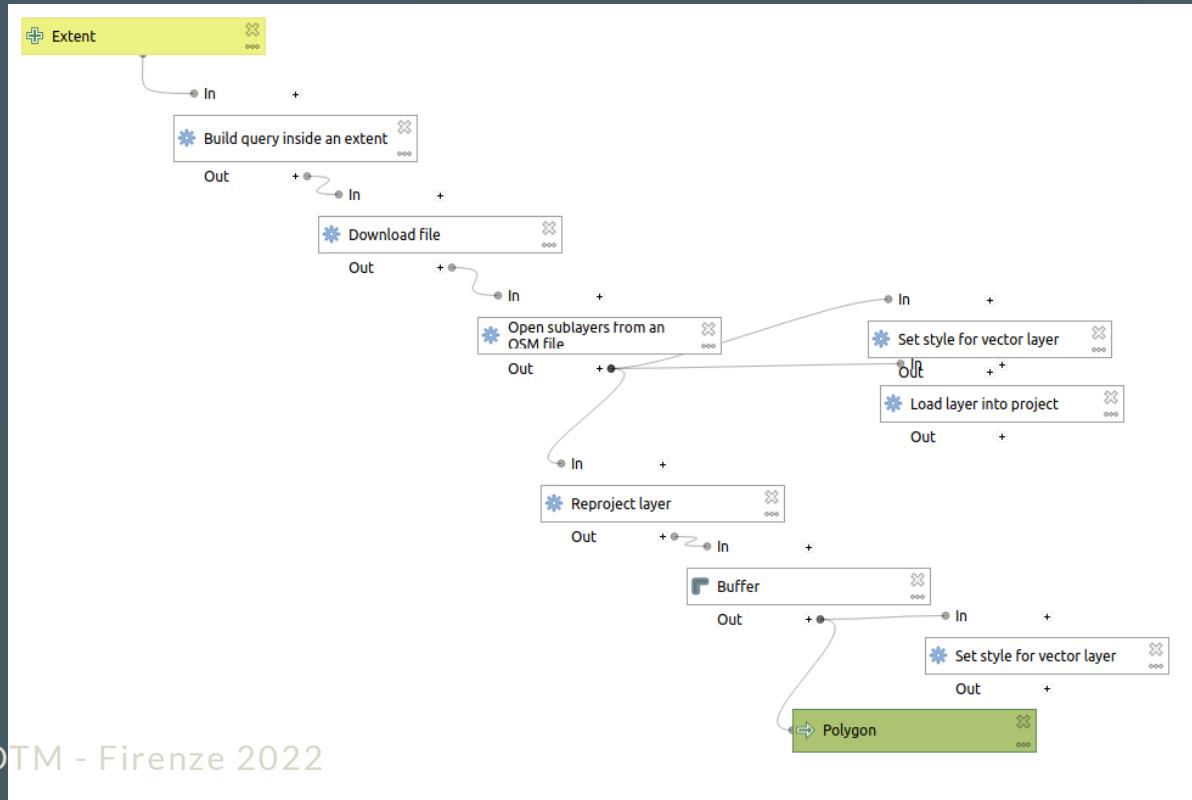
<https://docs.3liz.org/QuickOSM/user-guide/map-preset/>





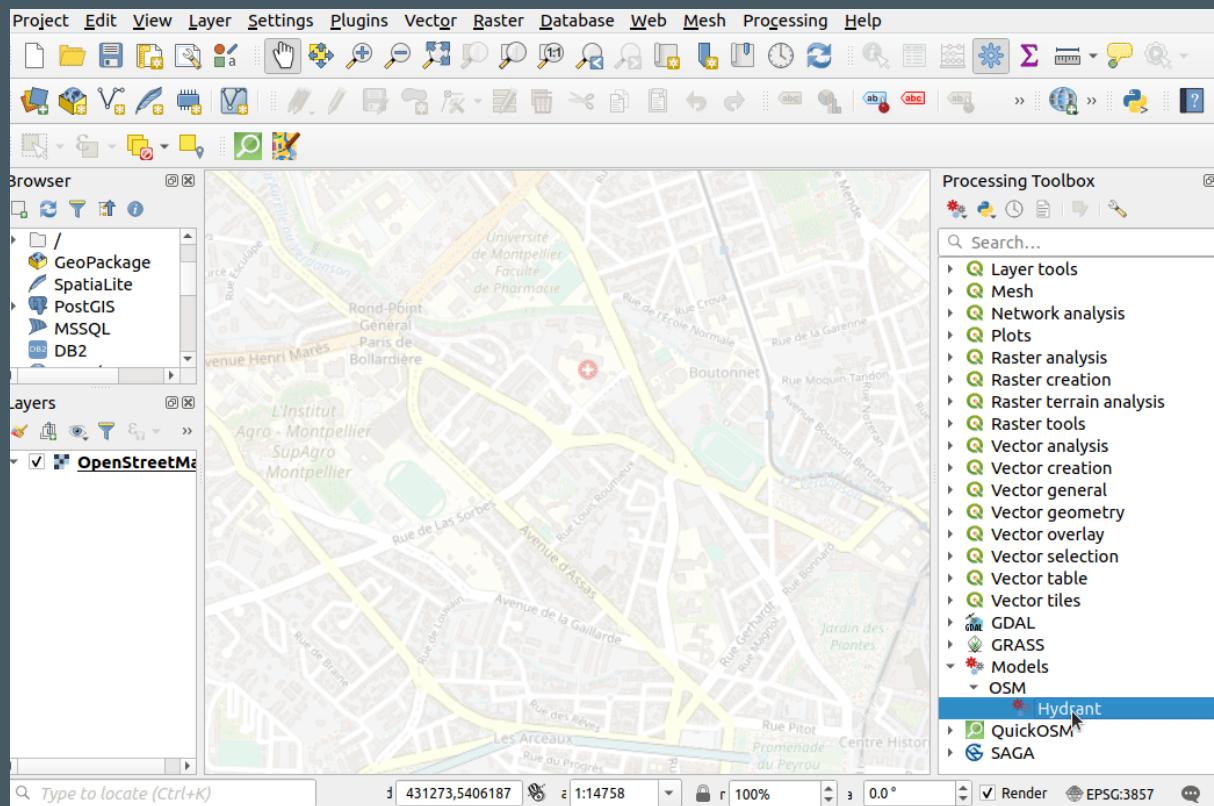
QuickOSM in Processing

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





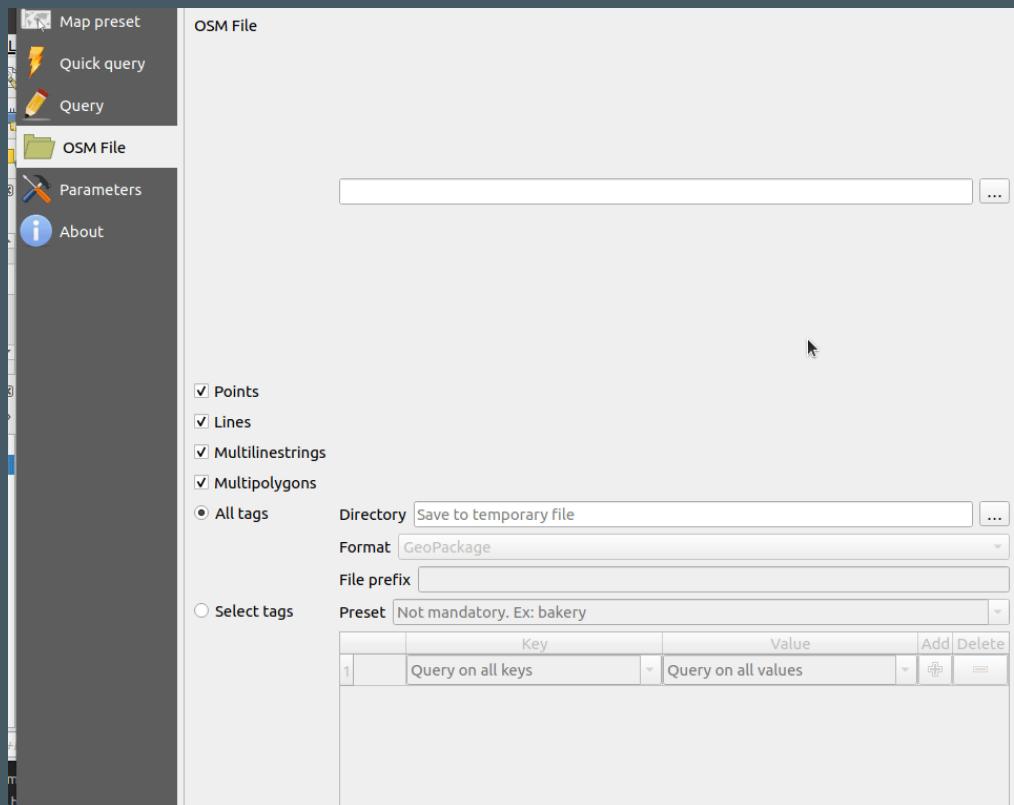
QuickOSM in Processing





Local OSM file

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

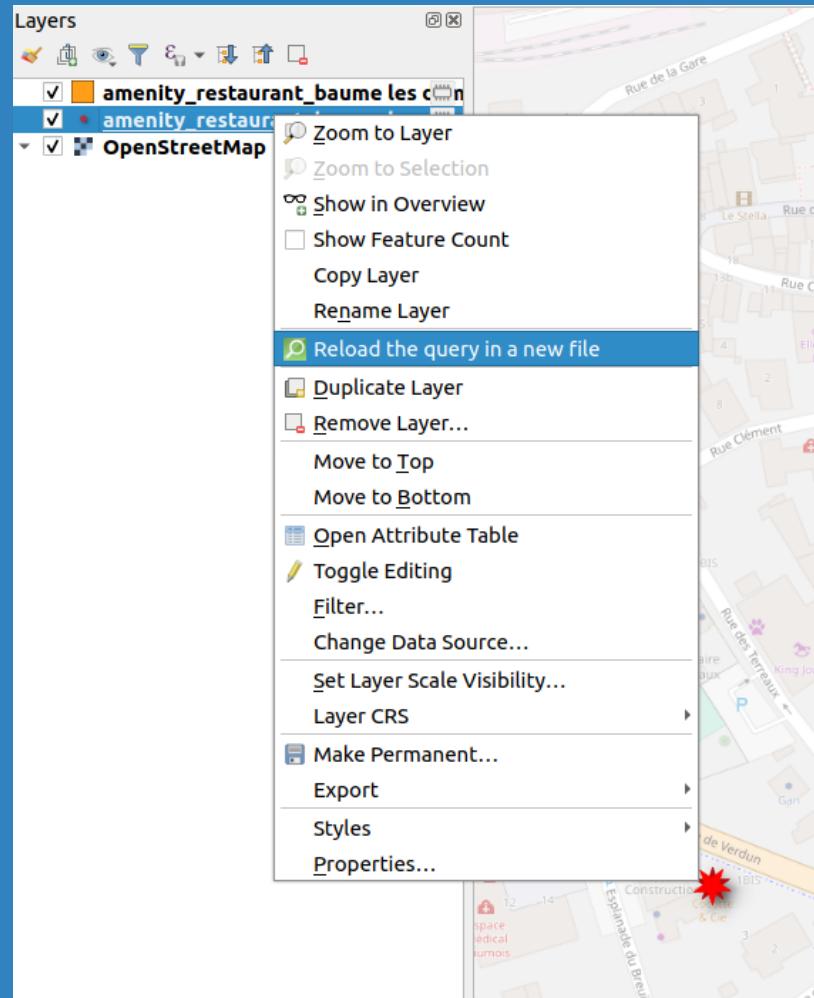




Some quick tips in QuickSOM



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

The screenshot shows a QGIS interface with a map of Guadeloupe. A context menu is open over a selected feature, listing actions such as 'Select All', 'Copy Cell Content', 'Zoom to Feature', 'Pan to Feature', 'Flash Feature', 'Run Layer Action', 'OpenStreetMap Browser', 'JOSM', 'User default editor', 'mapillary', 'website' (which is highlighted in blue), 'wikidata', and 'Open Form...'. Below the map is a table titled 'mapillary_guadeloupe — Features Total: 75, Filtered:' containing three rows of data.

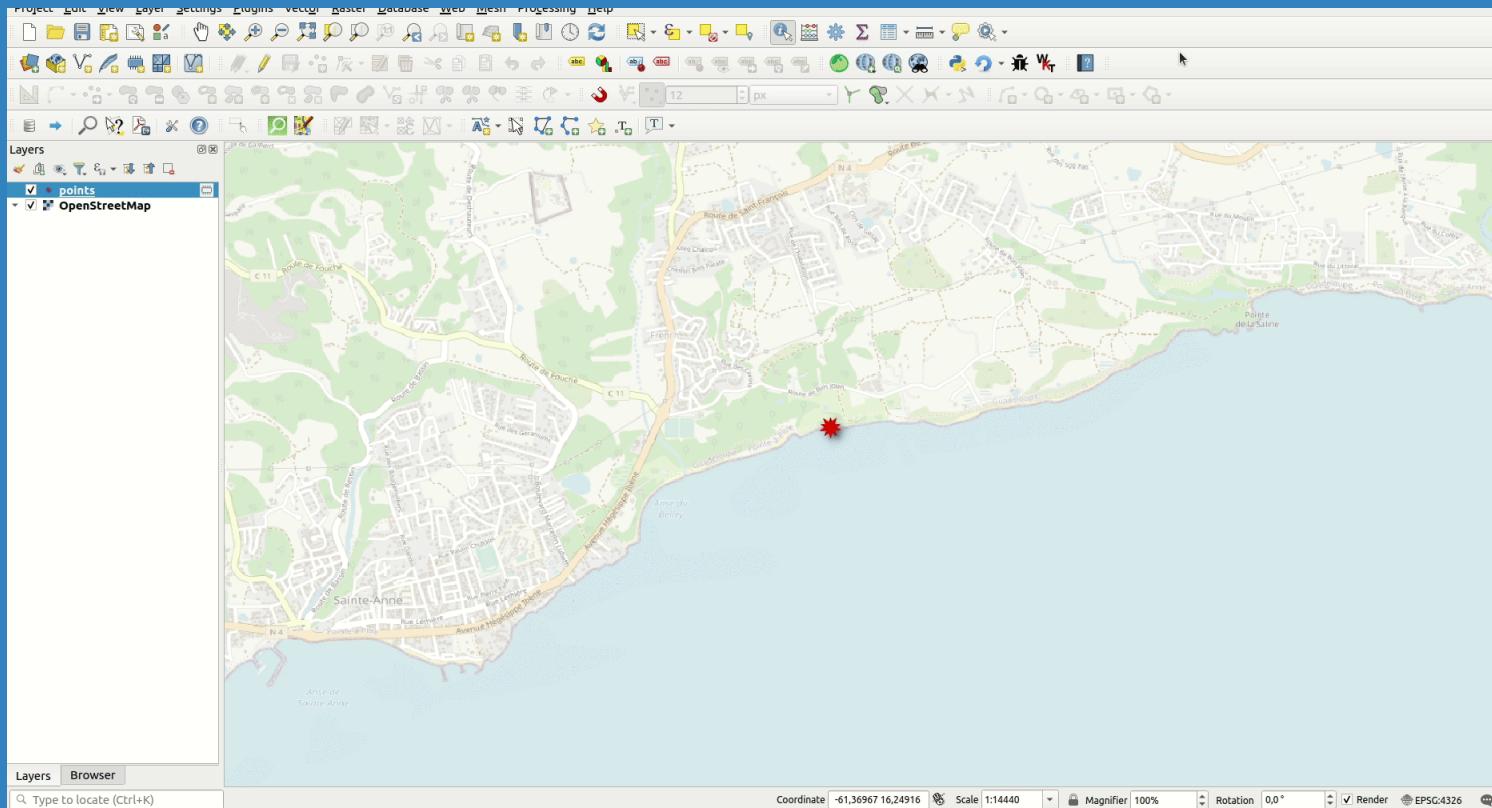
	full_id	osm_id	osm_type	map			
1	n28894627...	2889462701	node	c5O6C			
2	n29517567...	2951756716	node	qJEaMHve...	NULL	NULL	NULL
3	n29517567...	2951756717	node	Zj2geSuCL...	NULL	NULL	NULL

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

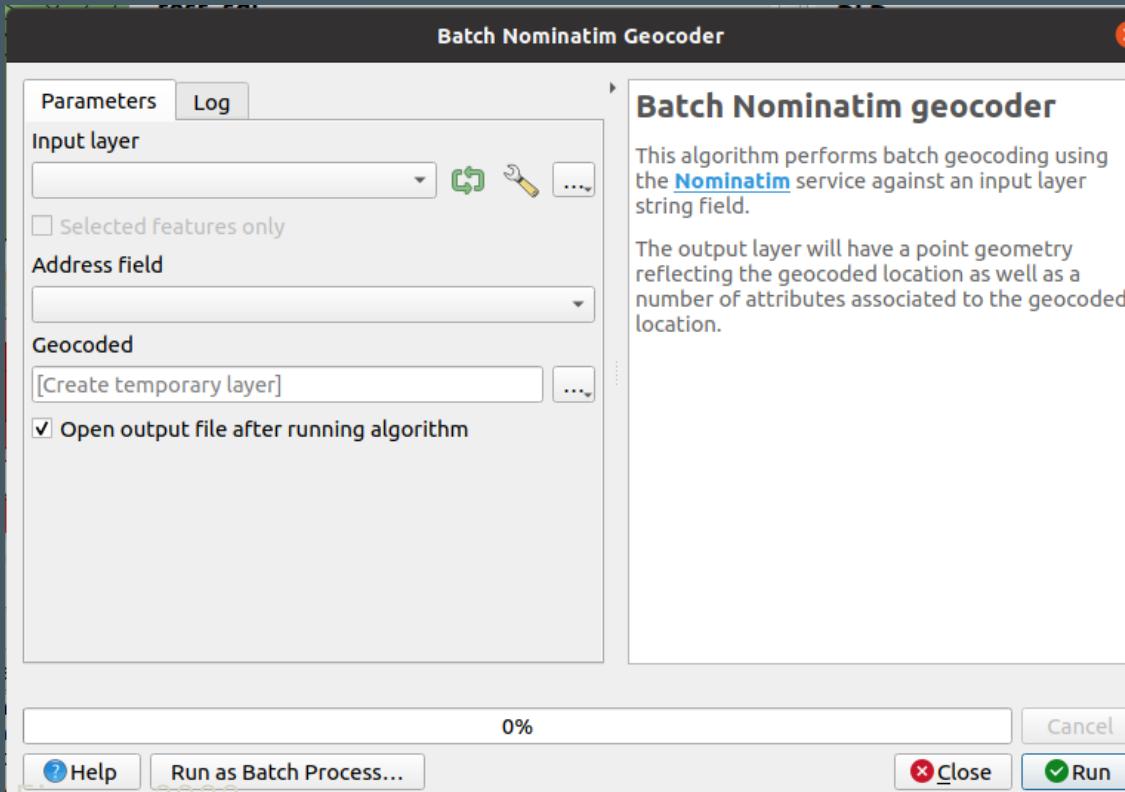
- The underlying library (OGR) can **only display** `relations = route`,
`multilinestrings`, `multipolygons` or `boundary`.
- Other relations need some post-processing to manage geometries for a GIS software





Geocoding

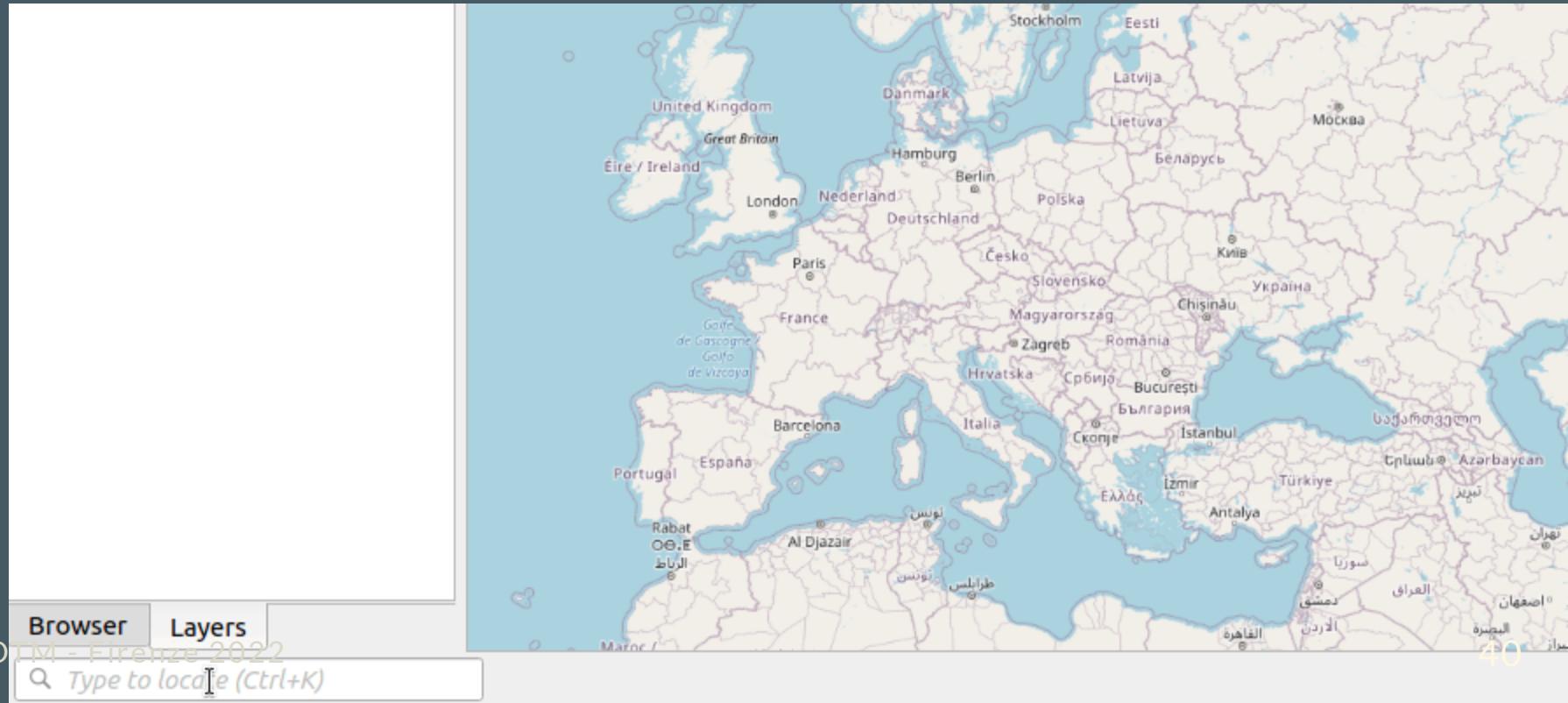
- New in QGIS 3.20 
- No more plugin required
- <https://nominatim.qgis.org>
- Processing algorithm for batch geocoding





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 parts of Africa and the Middle East. The map features place names in various languages, including English, German, French, Spanish, Italian, and Russian. A search bar at the bottom left contains the text "Type to locate (Ctrl+K)". The QGIS toolbar at the top includes icons for Browser, Layers, and a magnifying glass. The bottom left corner displays the "STATE OF THE MAP" logo and the text "SOTM - Firenze 2022".



Routing

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

The screenshot shows the ORS Tools application 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. Major cities like Copenhagen, Hamburg, Berlin, Prague, and Vienna are labeled. On the right is a window titled "ORS Tools". It has tabs for "Resources", "Sign Up", "Dashboard", and "Forum". The "Resources" tab is active. A dropdown menu "Provider" is set to "openrouteservice". Below it are buttons for "Advanced Directions" and "Batch Jobs". Under "Advanced Directions", there are dropdown menus for "Go with" (set to "driving-car") and "fastest". A list of points is shown in a table:

Point	Coordinates
0	13.389705, 52.537907
1	11.585935, 50.909092
2	10.018172, 53.551318
3	14.451738, 50.083400
4	8.669559, 50.105029
5	12.159096, 49.022635
6	11.602793, 48.130398
7	6.983792, 50.930347
8	16.322939, 48.209098
9	8.838136, 53.077982

Below this is a section titled "Advanced Configuration" with a checked checkbox for "Traveling Salesman". Under "Traveling Salesman", there is a note: "All other configuration will be omitted". There are three radio buttons: "None" (selected), "Optimize Start", and "Optimize End". There are also two checkboxes: "Avoid tags" and "Avoid countries". At the bottom of the window 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/>
- Presentation from Jiri Komarek and Wladimir Szczerban **yesterday at the SOTM** or at the FOSS4G next week





Questions

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

Etienne

🐦 @etrimaille or @3LIZ_news

