



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)





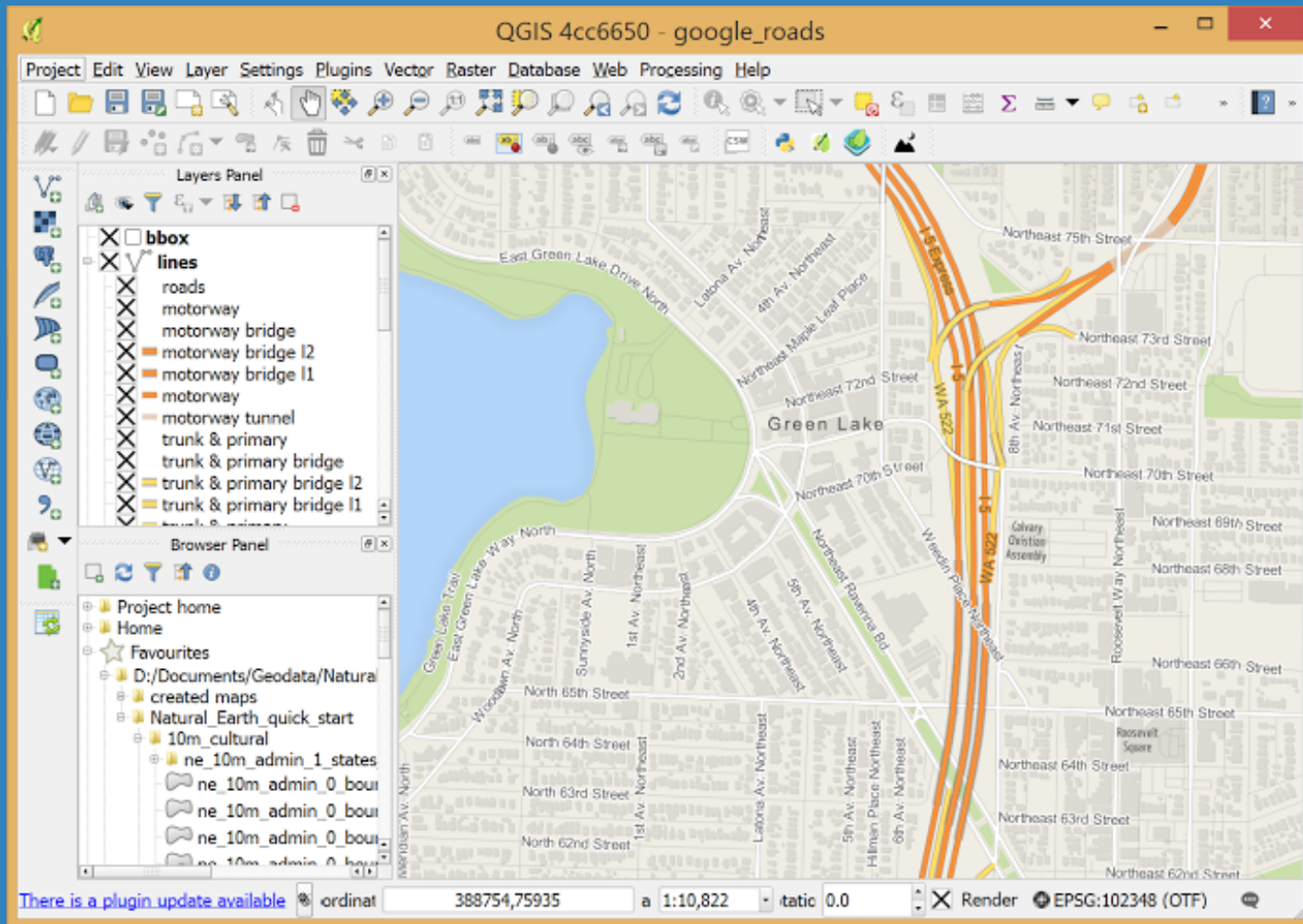
3Liz

- **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 🦎





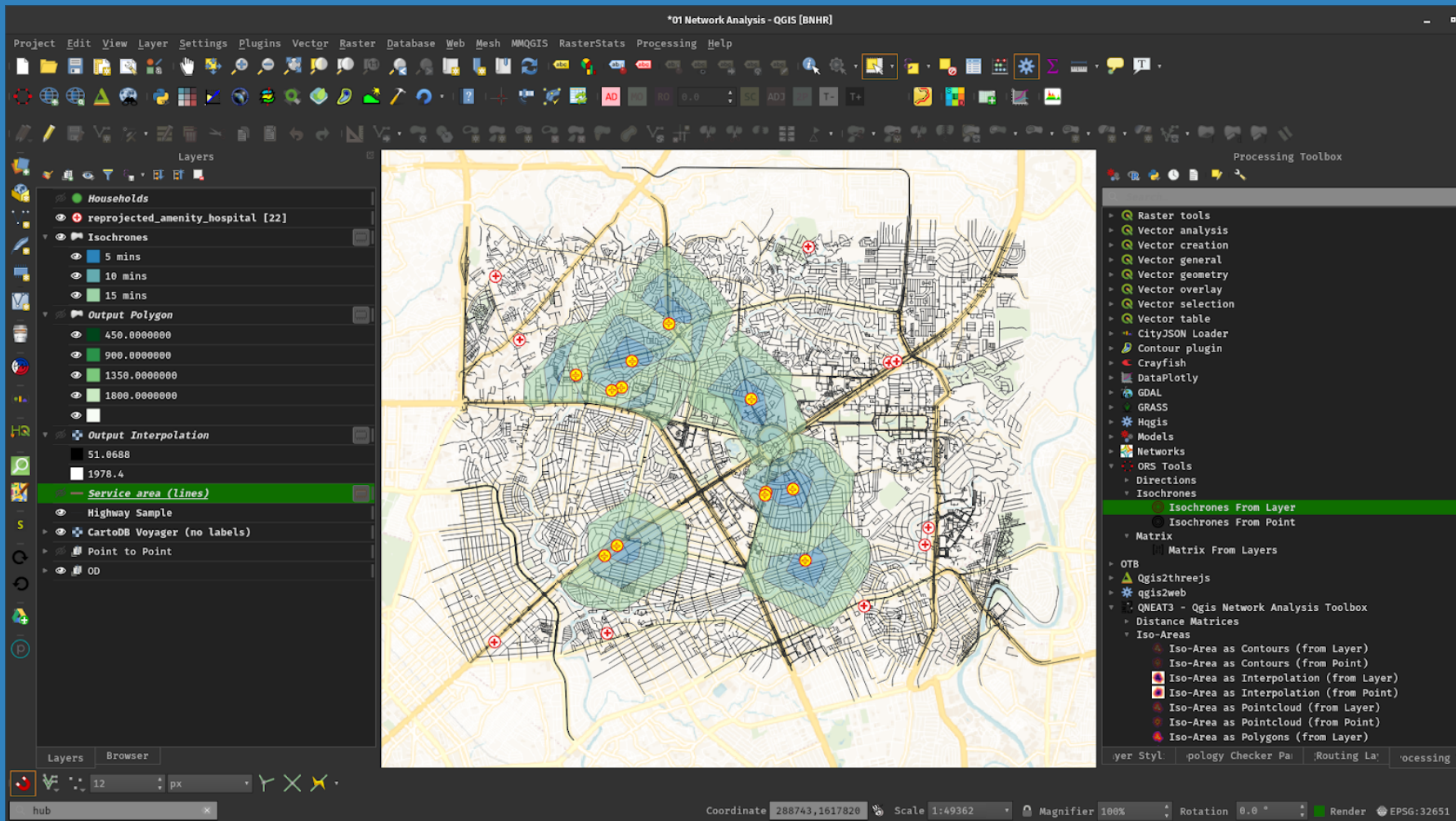
QGIS, the powerful desktop app



OSM vector data with different symbologies

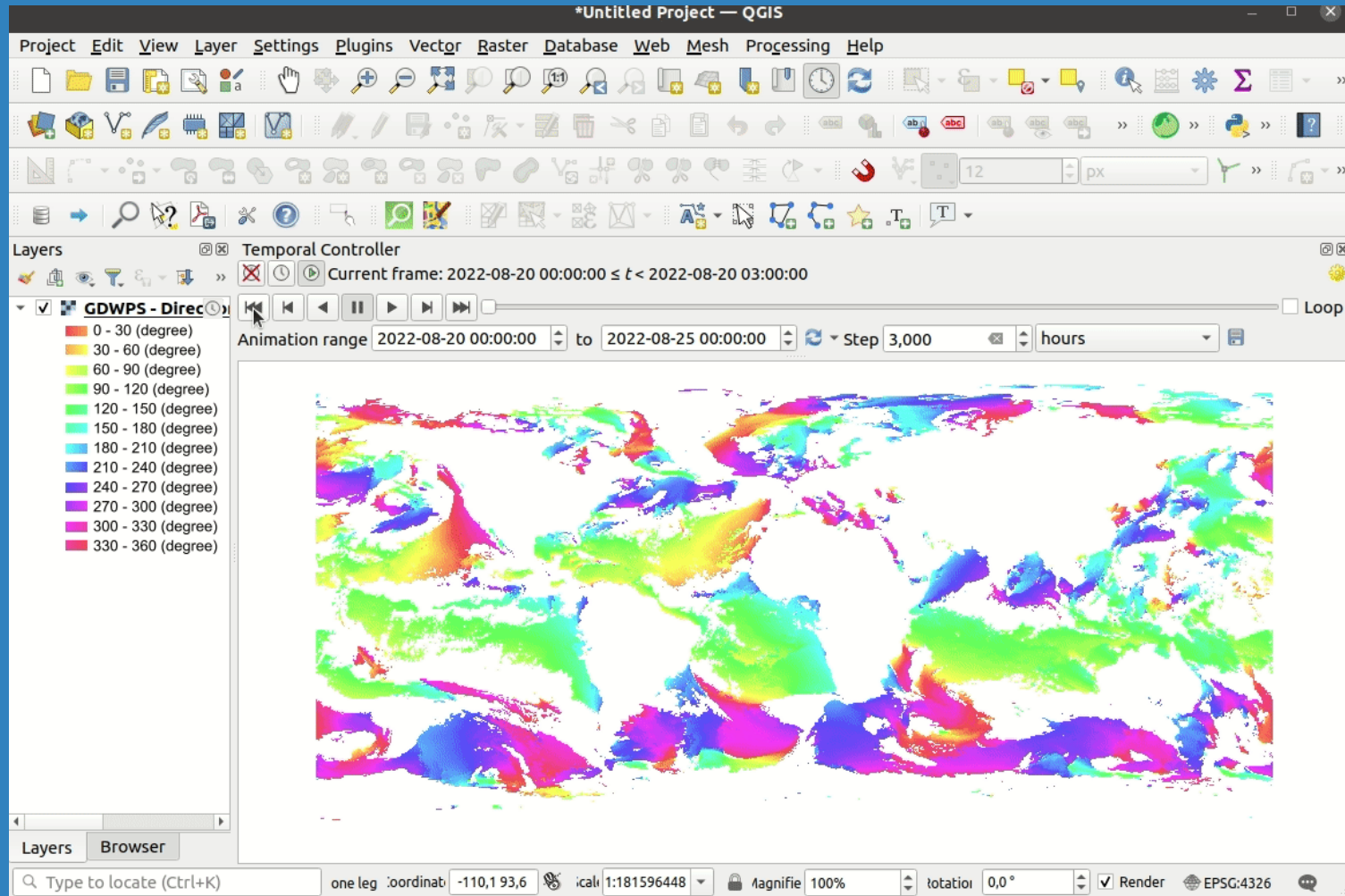


QGIS, the powerful desktop app





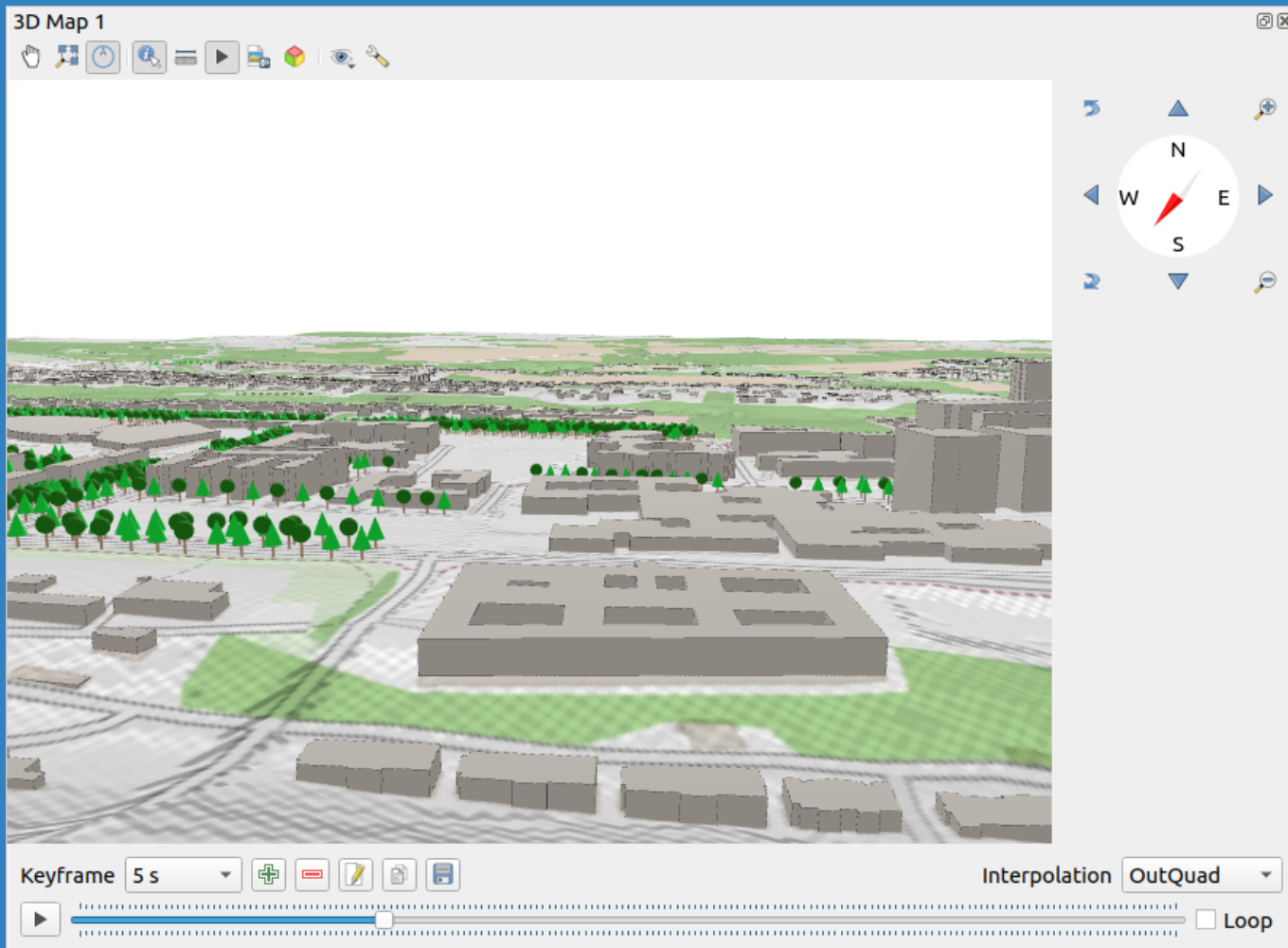
QGIS, the powerful desktop app



Remote data with temporal controller



QGIS, the powerful desktop app



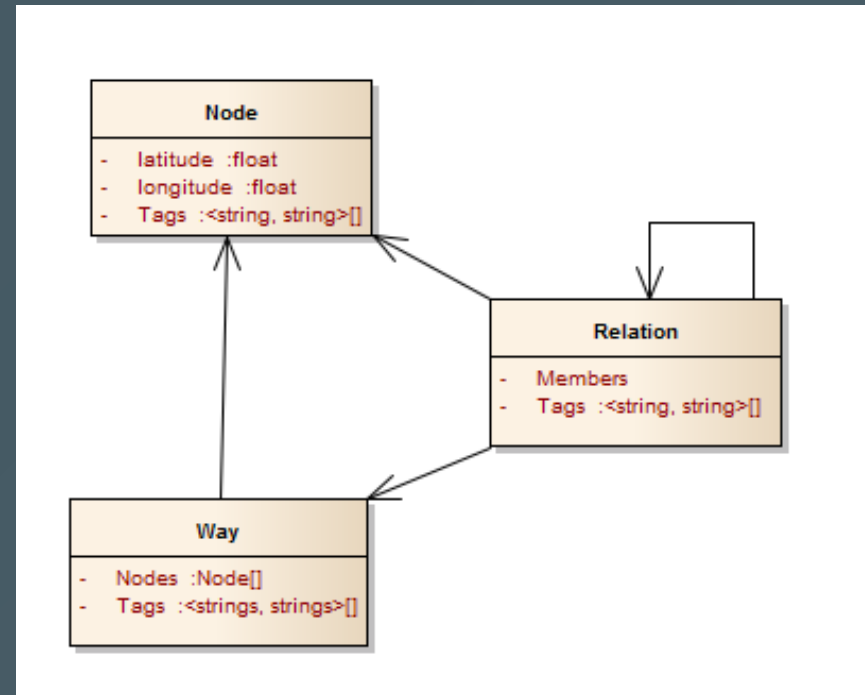


OSM data model

- 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

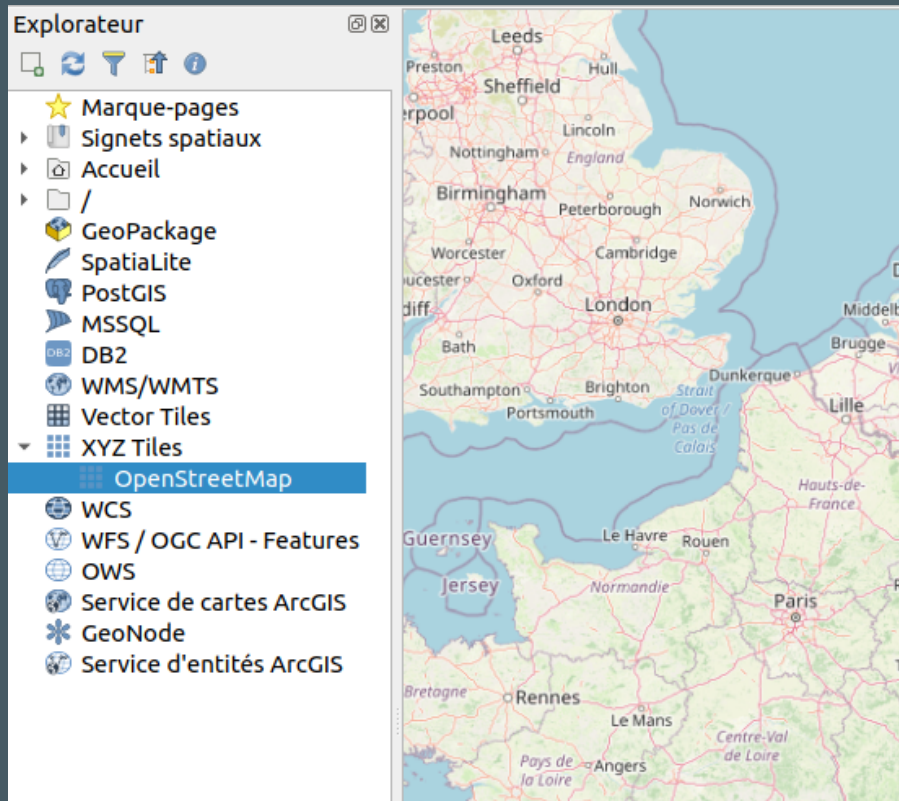


Let's see what is possible





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 😊
- ...

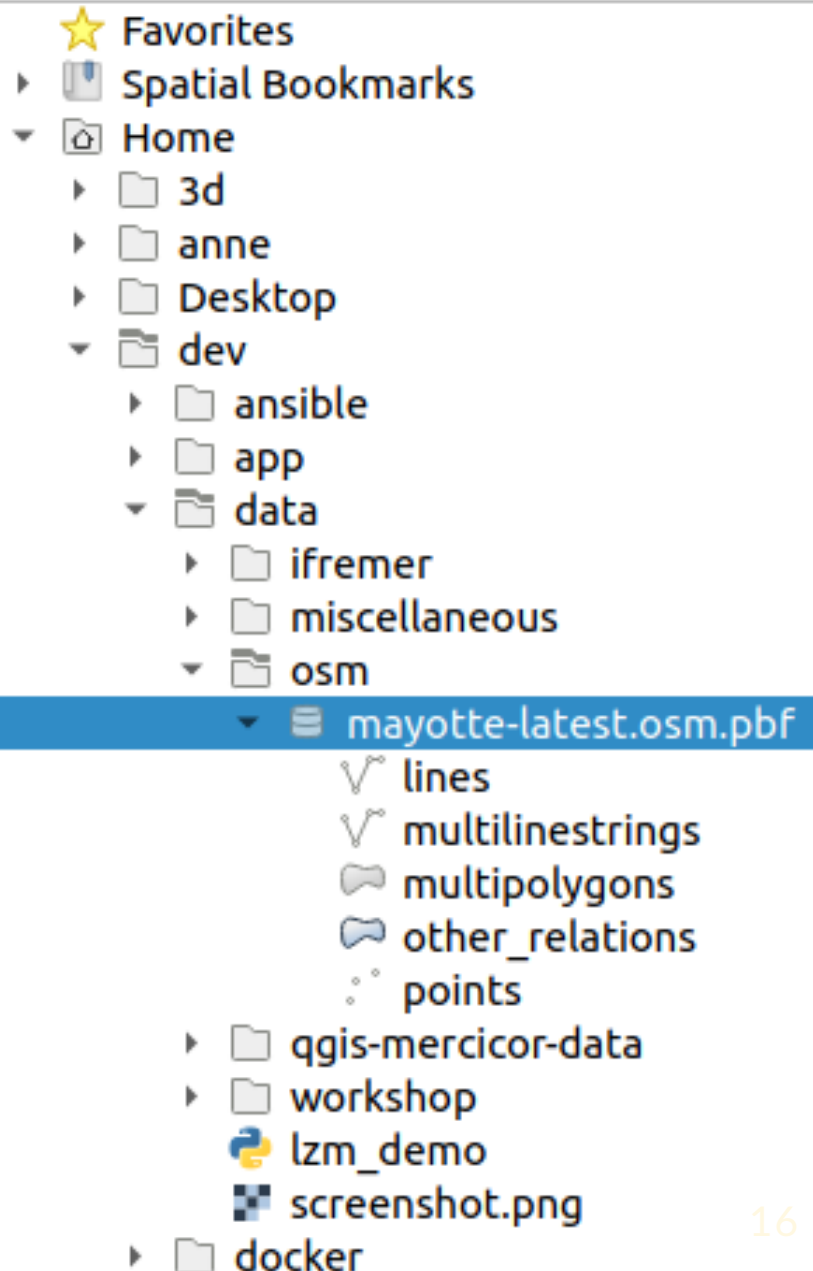




With QGIS only

- Load OSM XML or PBF files
 - Thanks to OGR in the background
- Different websites to download these files with worldwide coverage:
 - <https://download.geofabrik.de/>
 - <http://download.openstreetmap.fr/extracts/>
 - ...

Browser





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

	osm_id	name	barrier	highway	ref	address	is_in	place	man_made	other_tags
1	9110804195	NULL	NULL	NULL	NULL	NULL	NULL	NULL	communica...	"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	9110917	"denotation"=>"landmark", "genus"=>"Adansonia", "leaf_cycle"=>"deciduous", "leaf_type"=>"broadleaved", "natural"=>"tree", "species"=>"A. digitata", "genus"=>"...								

Show All Features



Use Processing Explode HStore

Explode HStore Field

ParametersLog

Input layer

points [EPSG:4326]

☐ Selected features only

HStore field

abc osm_id

Expected list of fields separated by a comma [optional]

Exploded

[Create temporary layer]

☒ Open output file after running algorithm

0%

Cancel

HelpRun as Batch Process...CloseRun

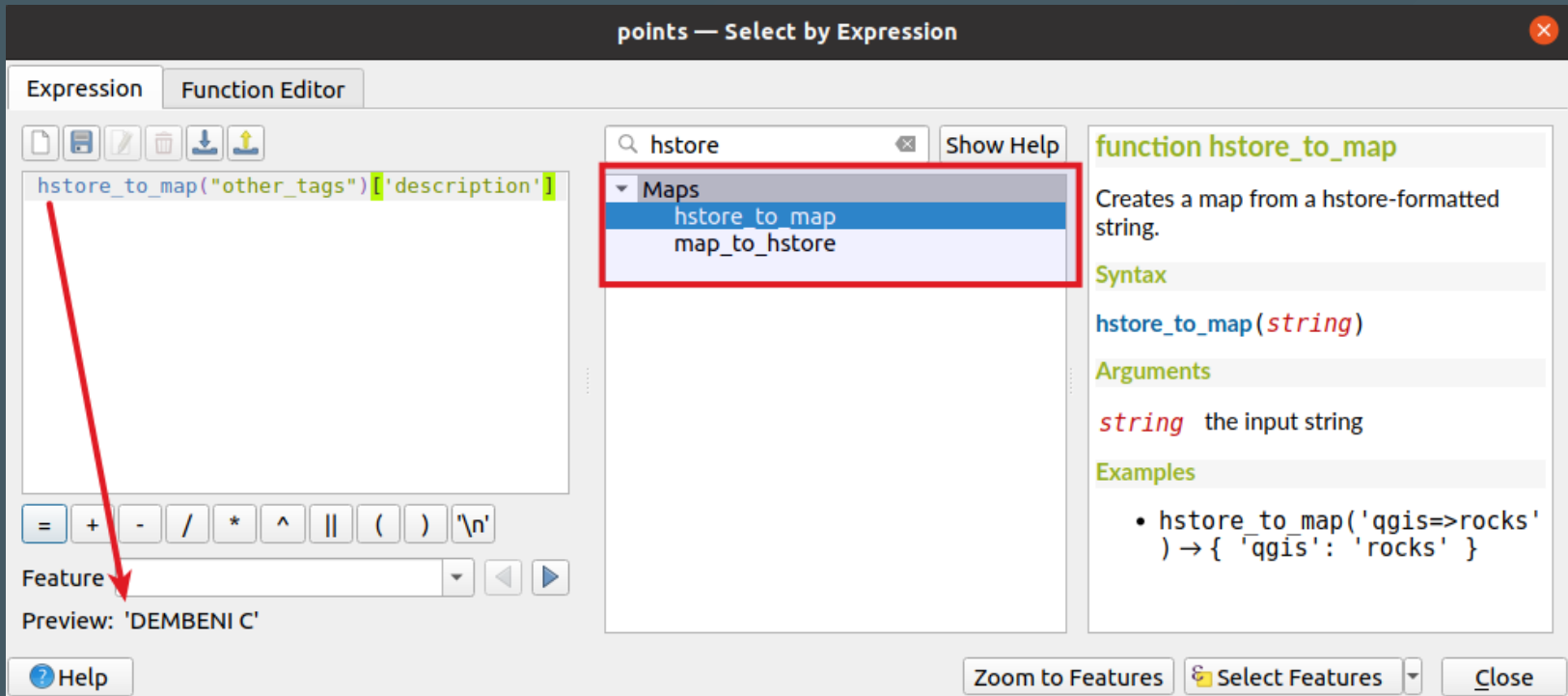
Explode HStore Field

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

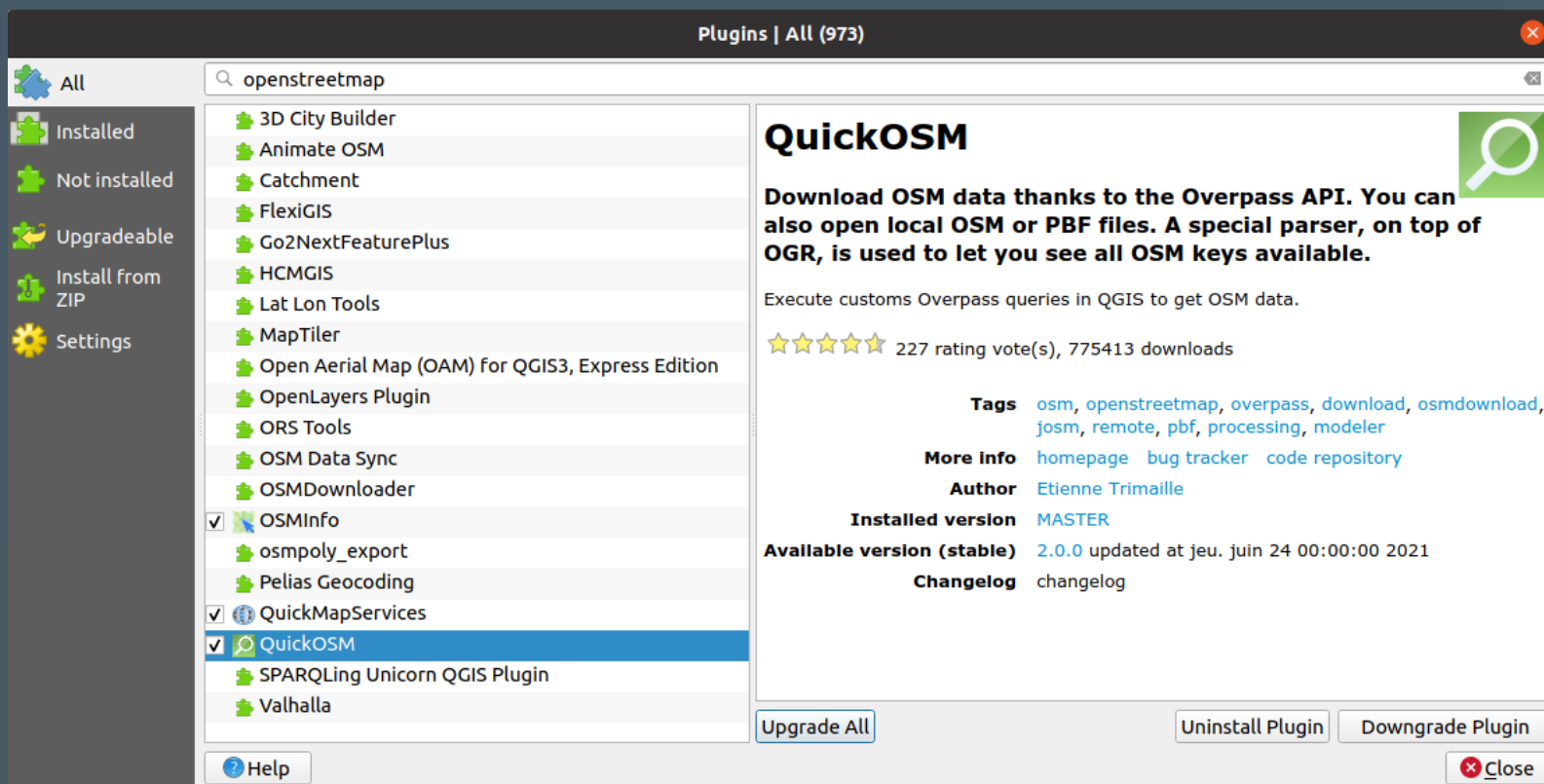


for selection, labelling ...



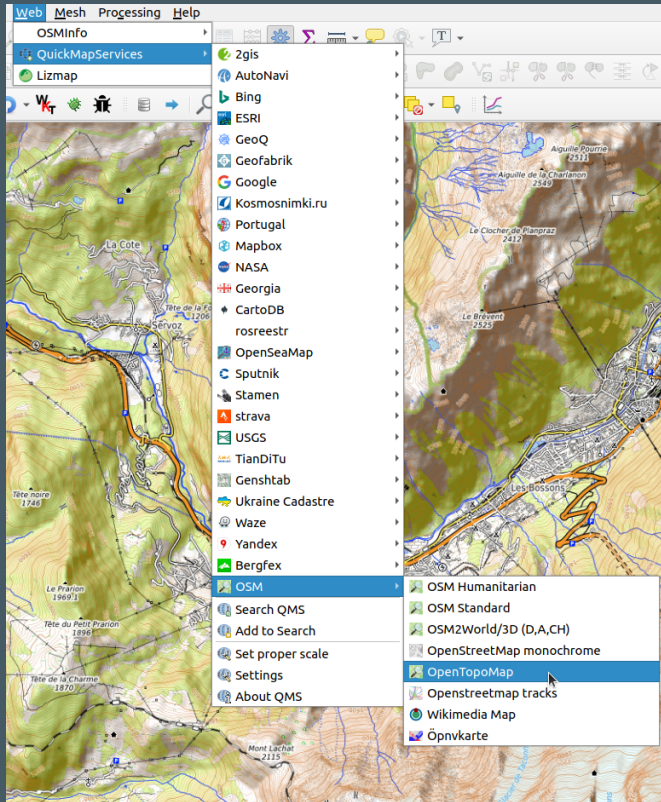
Using QGIS Plugins

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





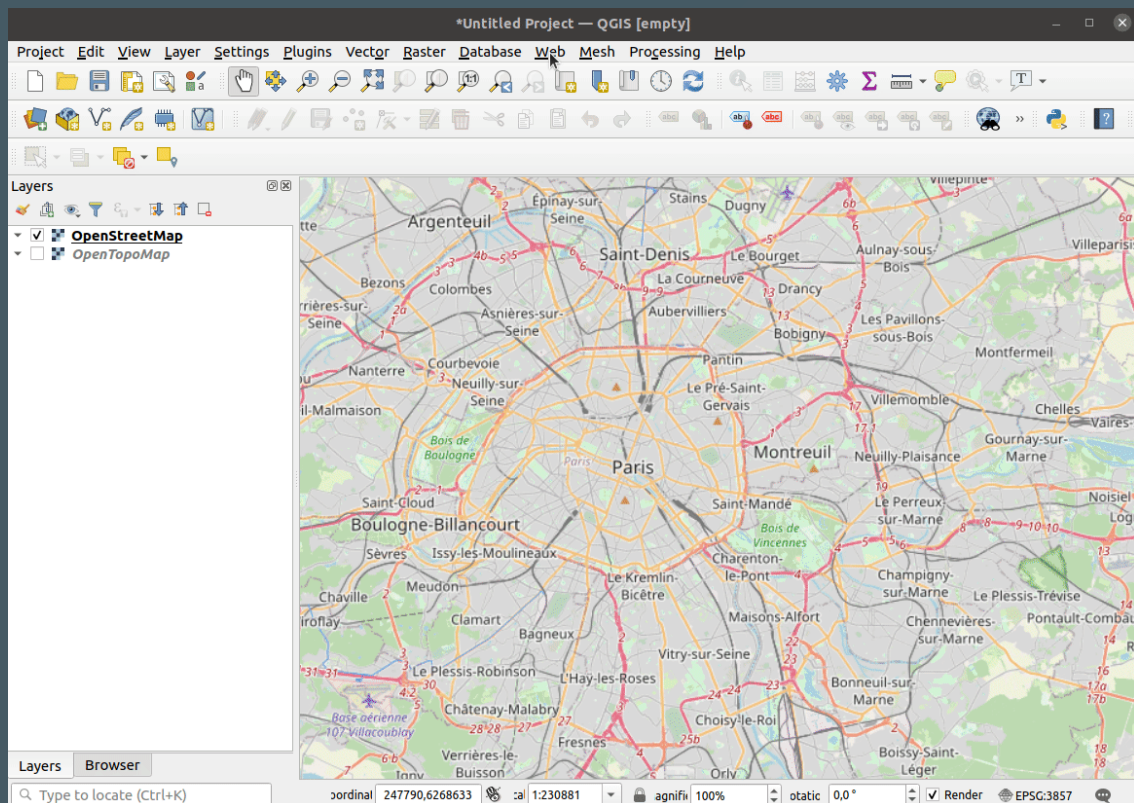
QuickMapServices plugin



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

	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 🧀

Thème

Requête rapide

Requête

Fichier OSM

Configuration

À propos

QuickOSM

Aide sur les clés/valeurs

Réinitialiser

Pré-réglage

Non obligatoire. Ex: boulangerie

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

Dans

Un village, une ville...

Lieu nommé requis quand la requête est "Dans".

Historique des requêtes

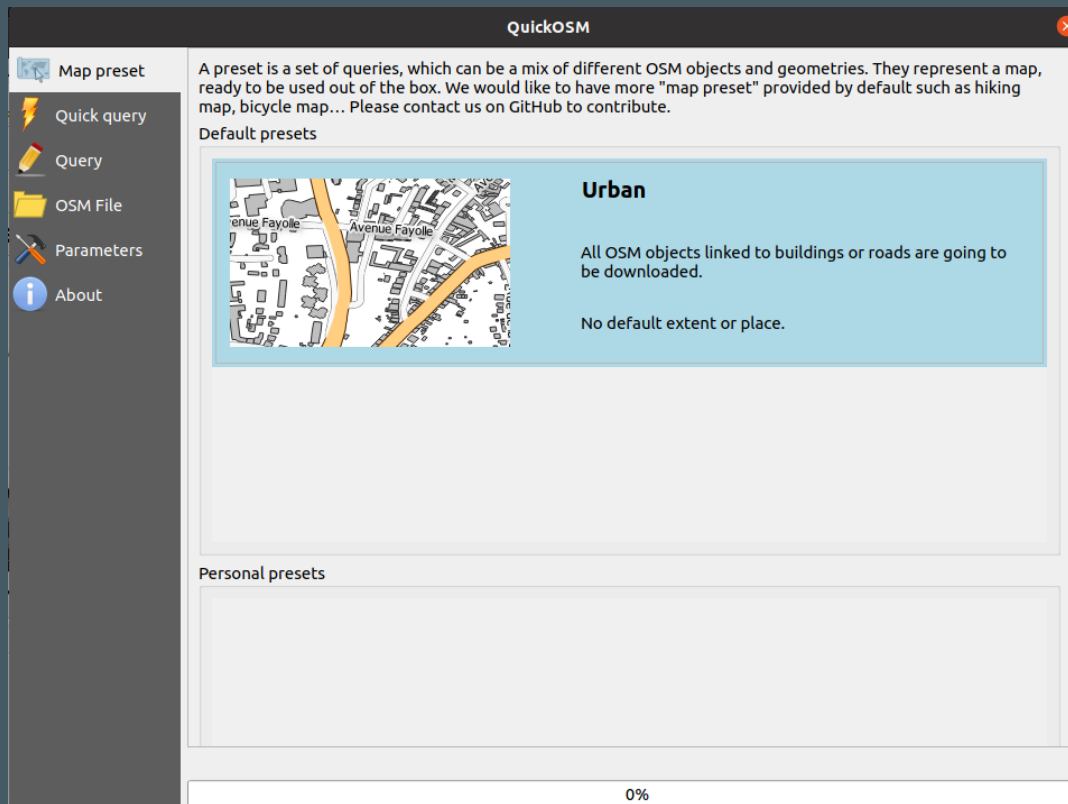
shop_bakery_baume les dames

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

Edit preset

General parameters

Preset name: Urban

Description(s): All OSM objects linked to buildings or roads are going to be downloaded.\nNo default extent or place.

Preset type: ☒ Basic ☐ Advanced

Building
Road

Query parameters

Associate QML style(s)

Layer name: building

Query: Preset: Not mandatory. Ex: bakery

	Key	Value	Add	Delete
1	building	Query on all values	+	-

Area:

Bbox: 0.000000000,0.000000000,0.000000000,0.000000000 [EPSG:4326]

Add a new query Validate Cancel

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



Map presets



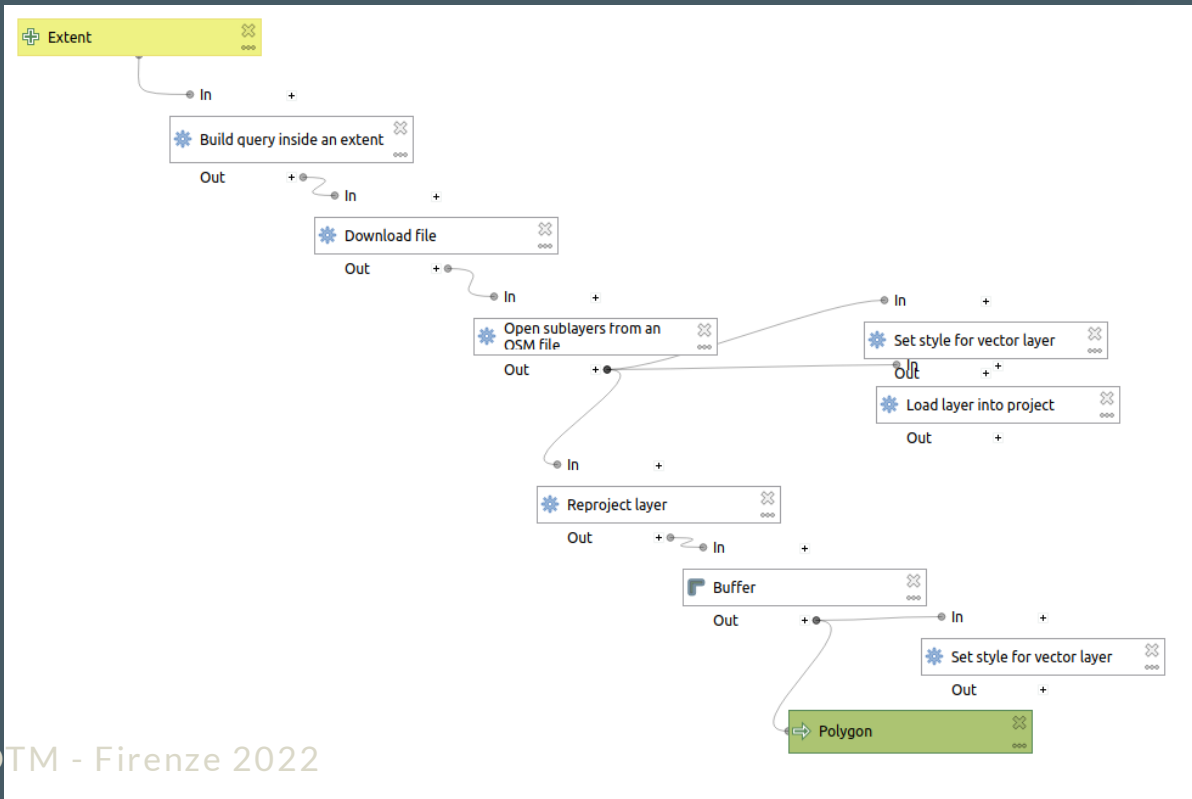
Bicycle map, landuse... map presets

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



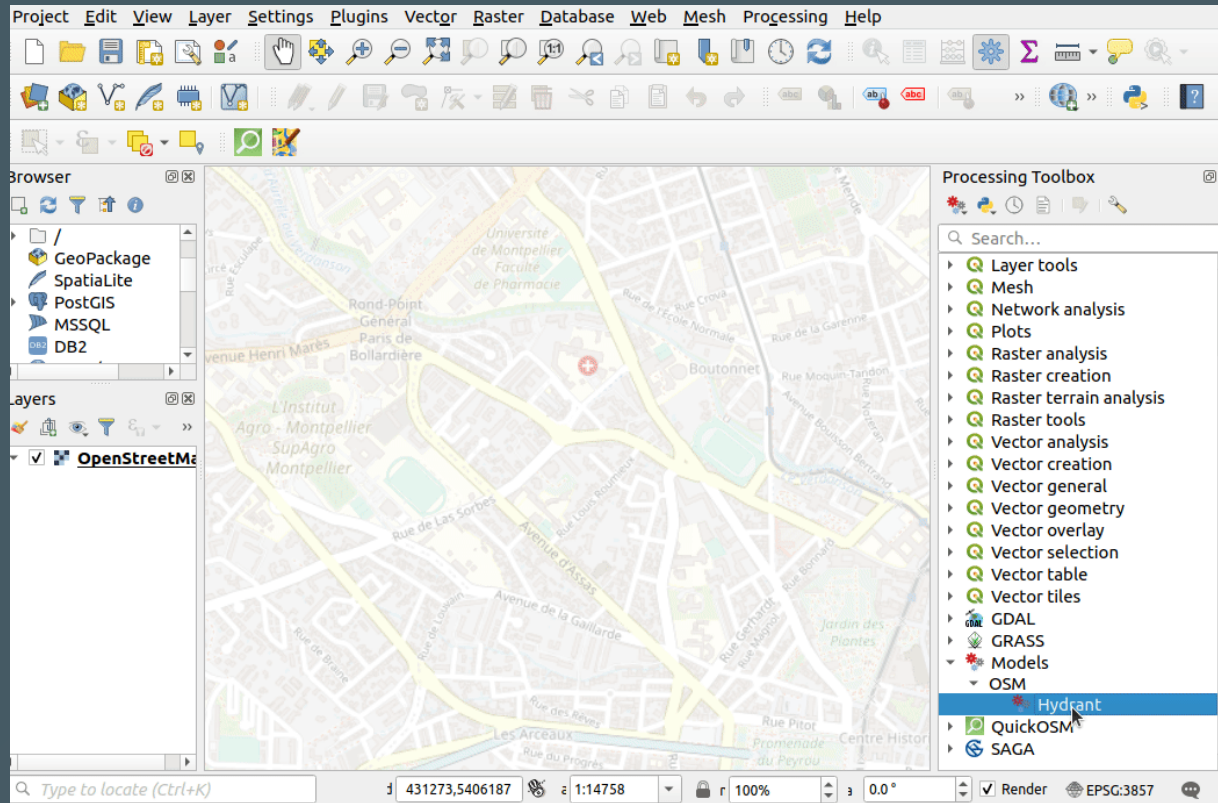
QuickOSM in Processing

- 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

OSM File

Map preset

Quick query

Query

OSM File

Parameters

About

☒ Points

☒ Lines

☒ Multilinestrings

☒ Multipolygons

☒ All tags

Directory

Format

File prefix

Preset

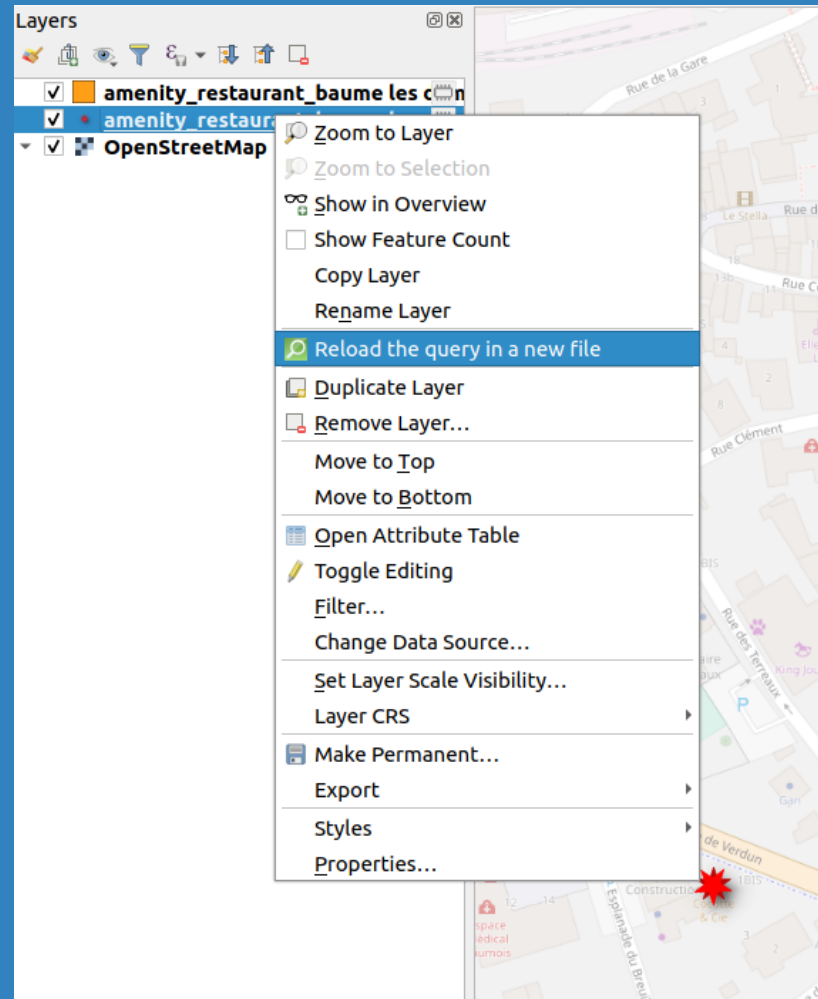
	Key	Value	Add	Delete
1	<input type="text" value="Query on all keys"/>	<input type="text" value="Query on all values"/>	<input type="button" value="Add"/>	<input type="button" value="Delete"/>



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

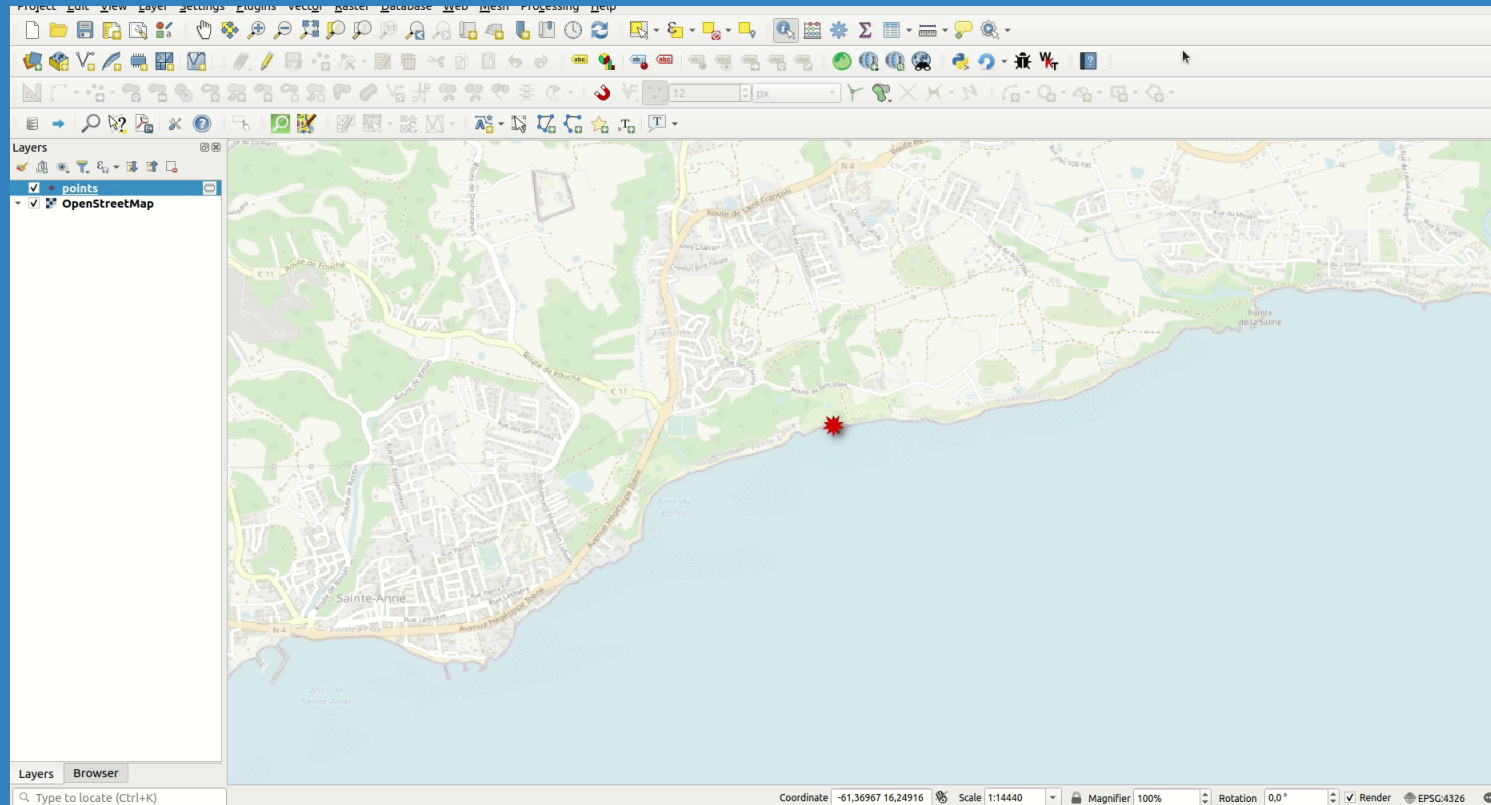
mapillary_guadeloupe — Features Total: 75, Filtered:

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

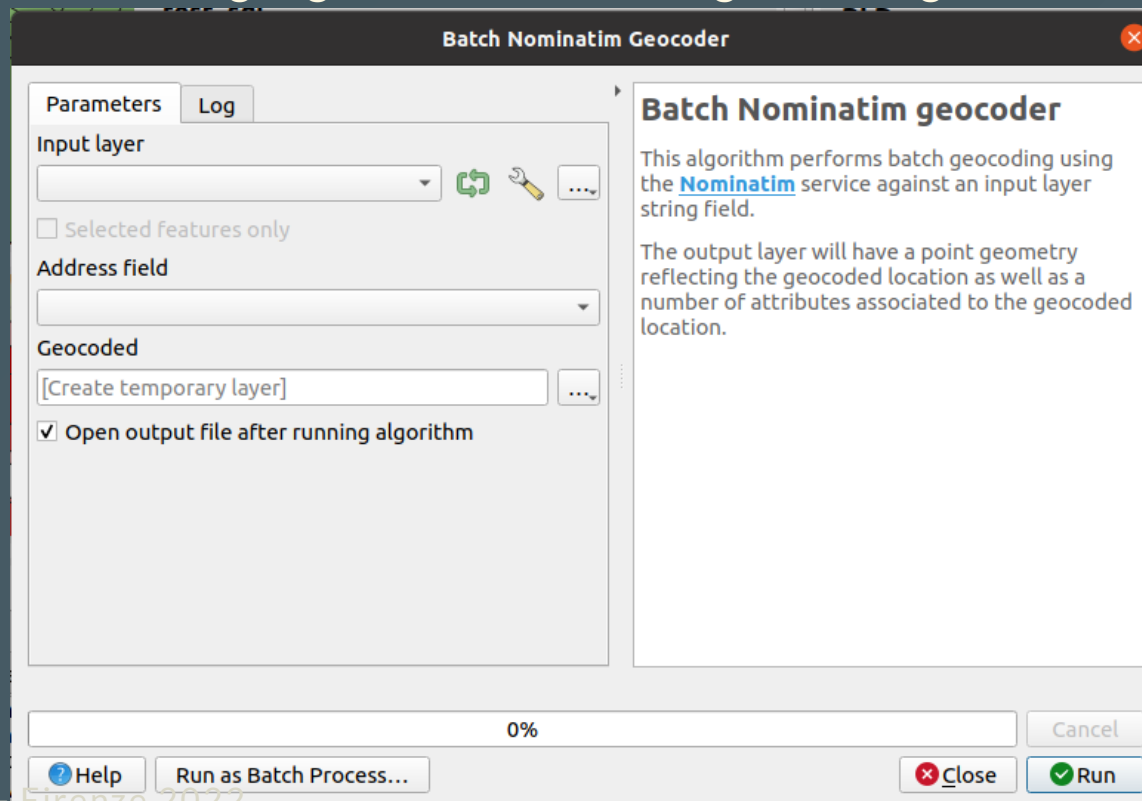
Issues with OSM relations

- 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

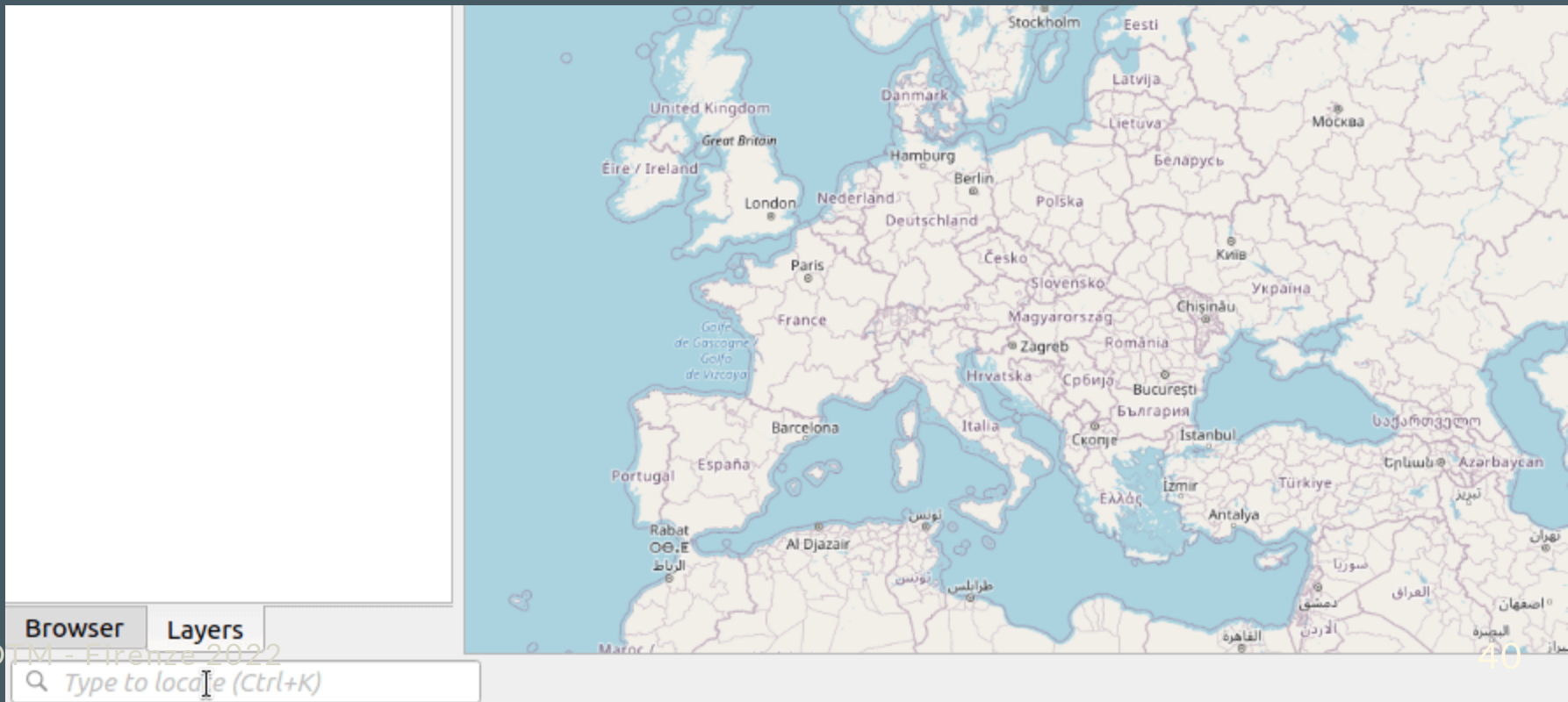
- New in QGIS 3.20 🌟
- No more plugin required
- <https://nominatim.qgis.org>
- Processing algorithm for batch geocoding





Geocoding

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





Routing

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

The screenshot displays the ORS Tools web interface. On the left, a map of Europe shows a red route starting from Hamburg, Germany, and ending in Berlin, passing through various cities like Cologne, Frankfurt, and Munich. The right sidebar contains the following sections:

- Resources:** Links for Sign Up, Dashboard, and Forum.
- Provider:** A dropdown menu set to 'openrouteservice'.
- Advanced Directions / Batch Jobs:** Tabs for selecting the mode of transport and optimization.
- Go with:** A dropdown menu set to 'driving-car'.
- fastest:** A dropdown menu set to 'fastest'.
- Points:** A list of 10 points with their coordinates, each preceded by a green plus icon and a red minus icon.
- Advanced Configuration:** A section with a 'Traveling Salesman' checkbox and 'Other Options' including 'Avoid tags' and 'Avoid countries'.
- Log:** A section for logging the route.
- Buttons:** Help, About, Close, and Apply buttons at the bottom.



Importing OSM in a database ?



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 Szczurban **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