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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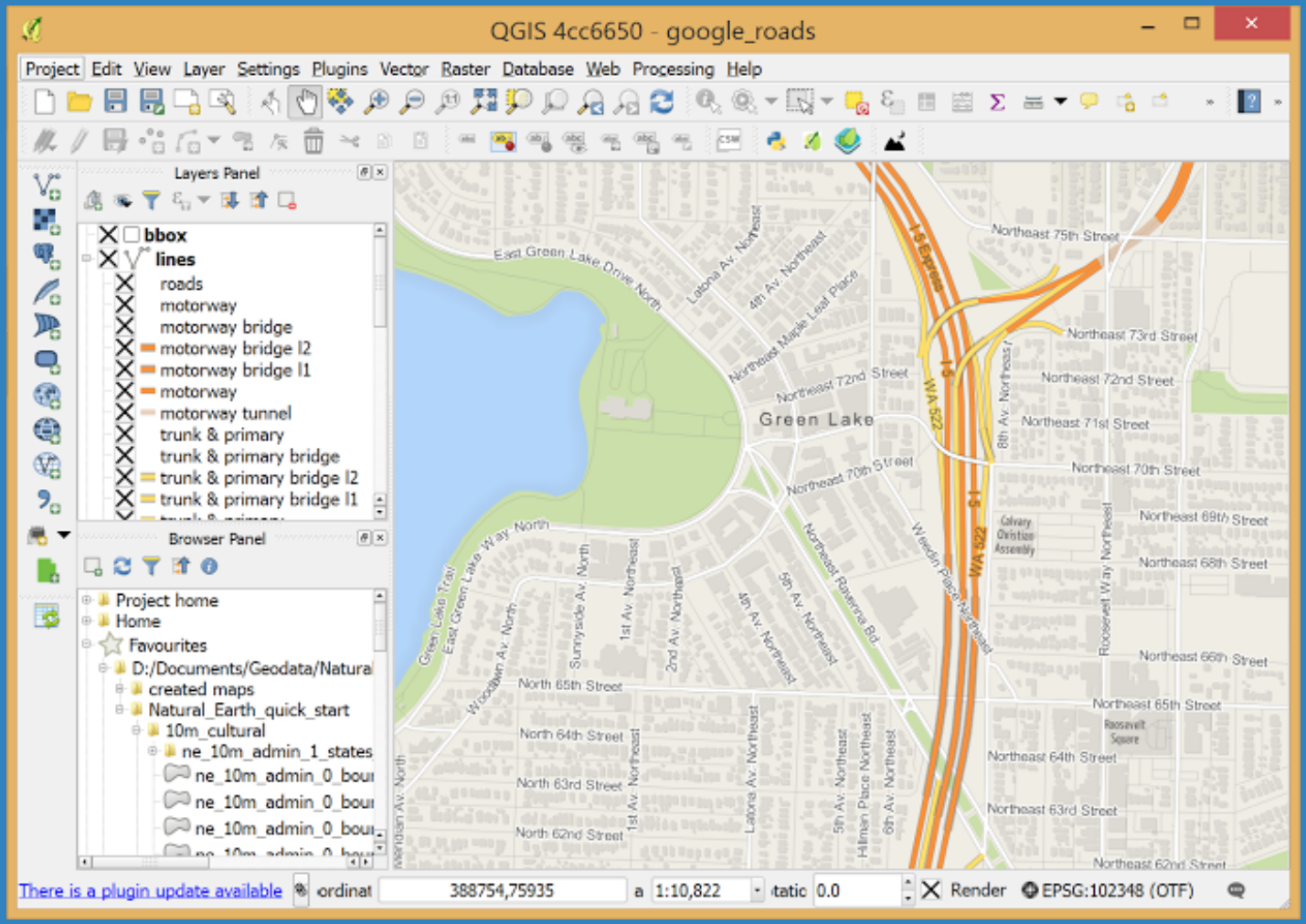
3Liz

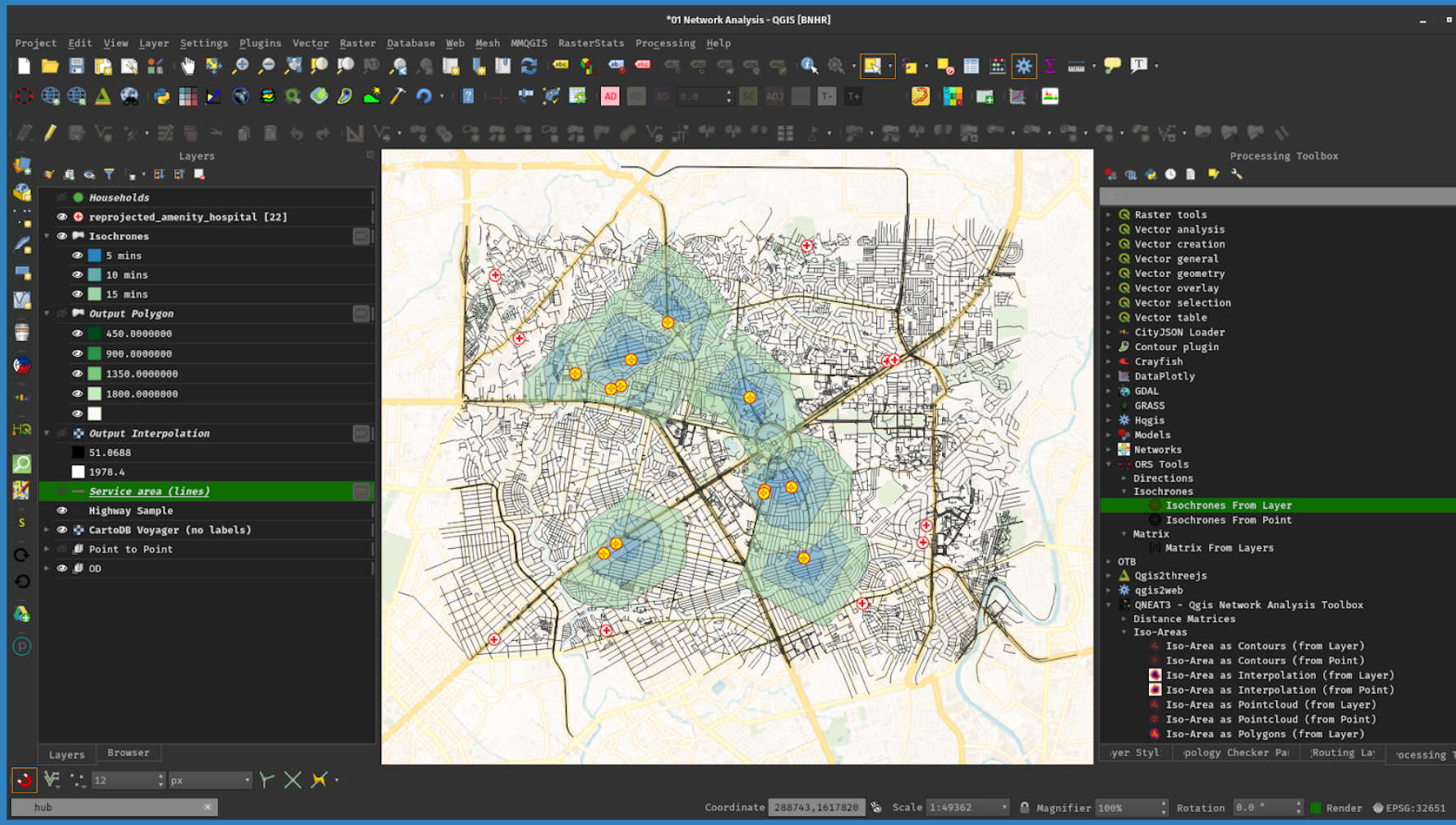
- **Open Source** forever, check our GitHub
- Contributors in QGIS, server side mainly, plugins
- ❤ QGIS Desktop ❤ QGIS Server ❤ PostGIS ❤
- Opensource solution for publishing QGIS Project on the web, **Lizmap Web Client**

QGIS, the powerful desktop app



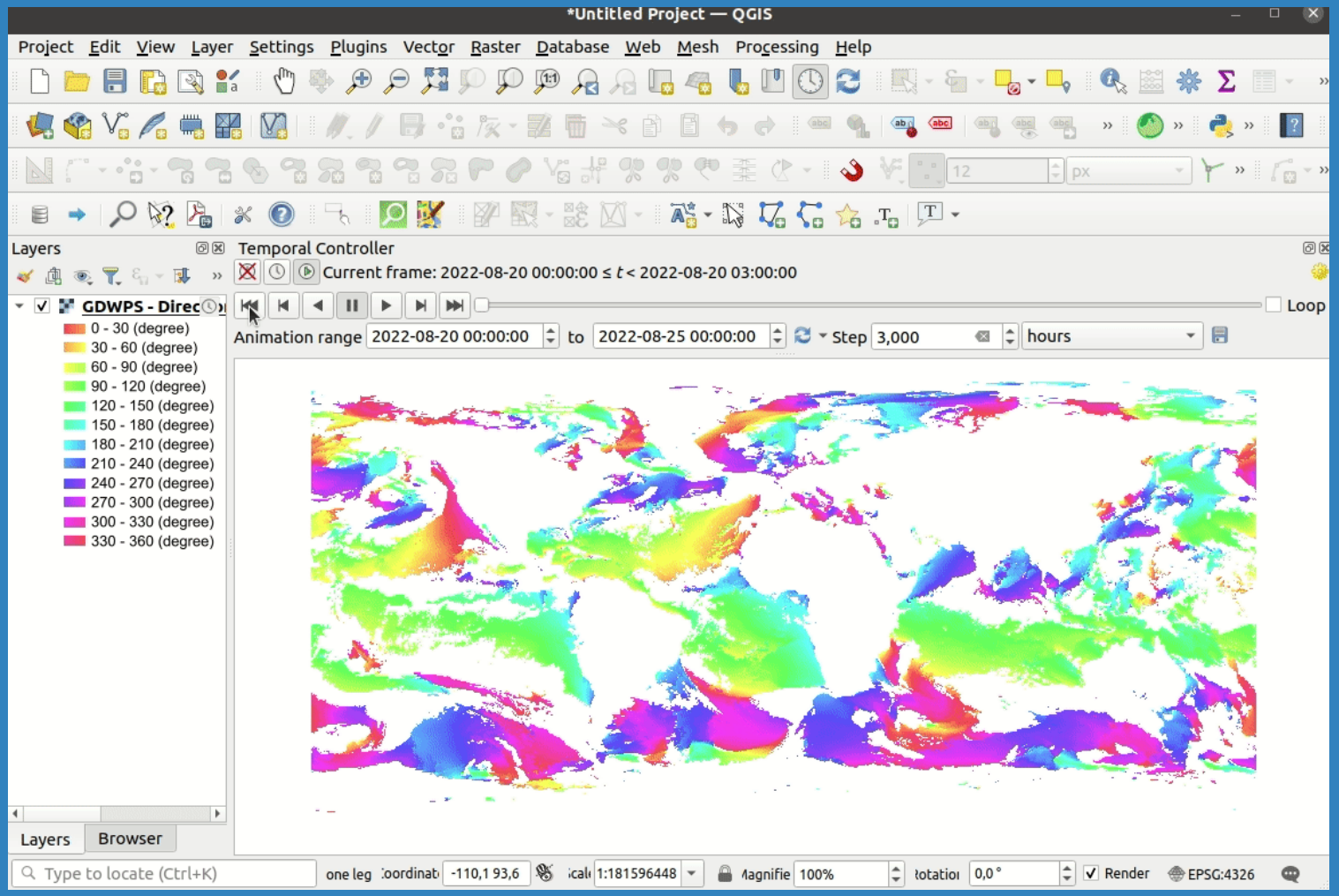
OSM vector data with different symbologies

QGIS, the powerful desktop app



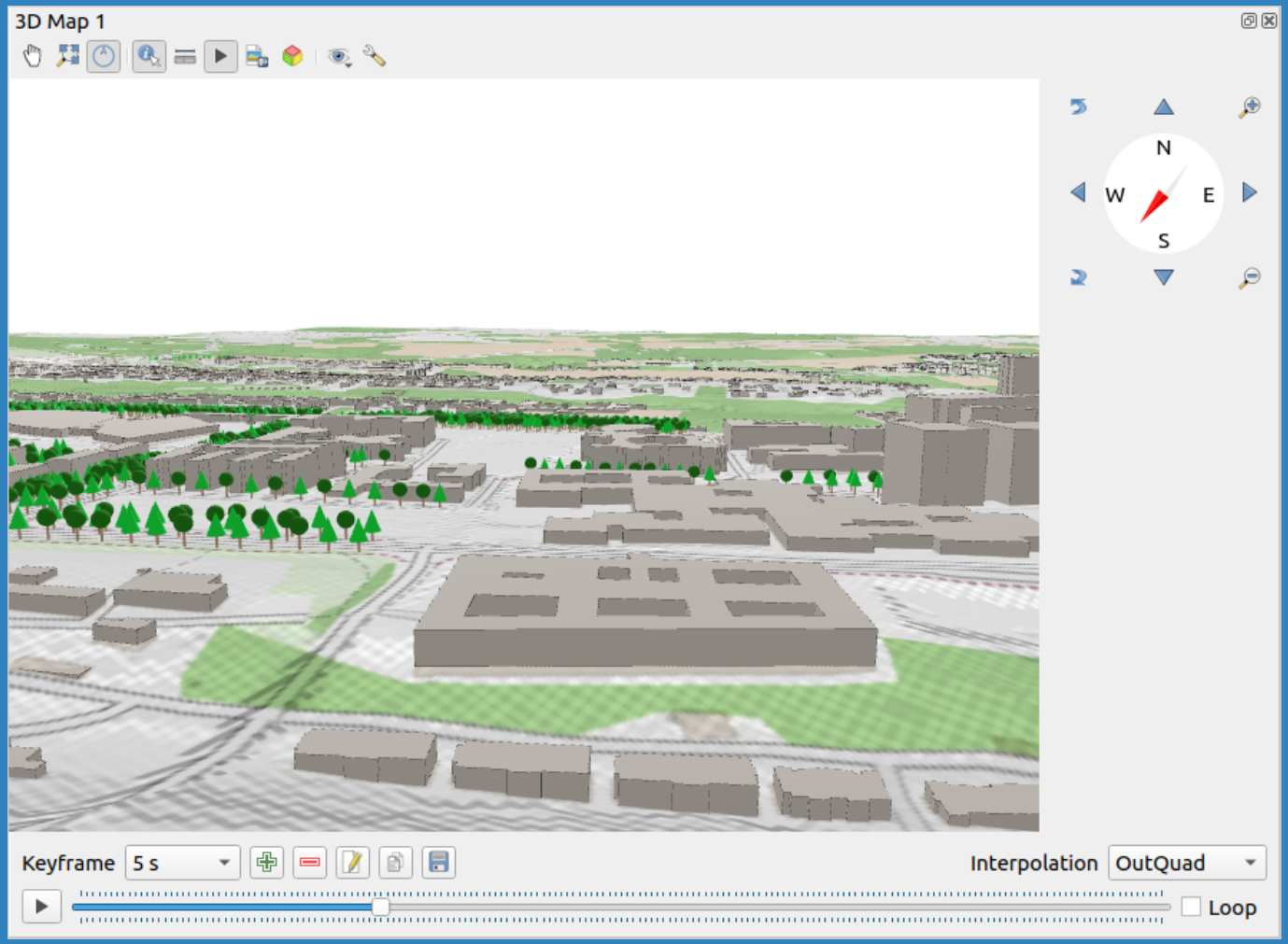
Isochrone analysis

QGIS, the powerful desktop app



Remote data with temporal controller

QGIS, the powerful desktop app

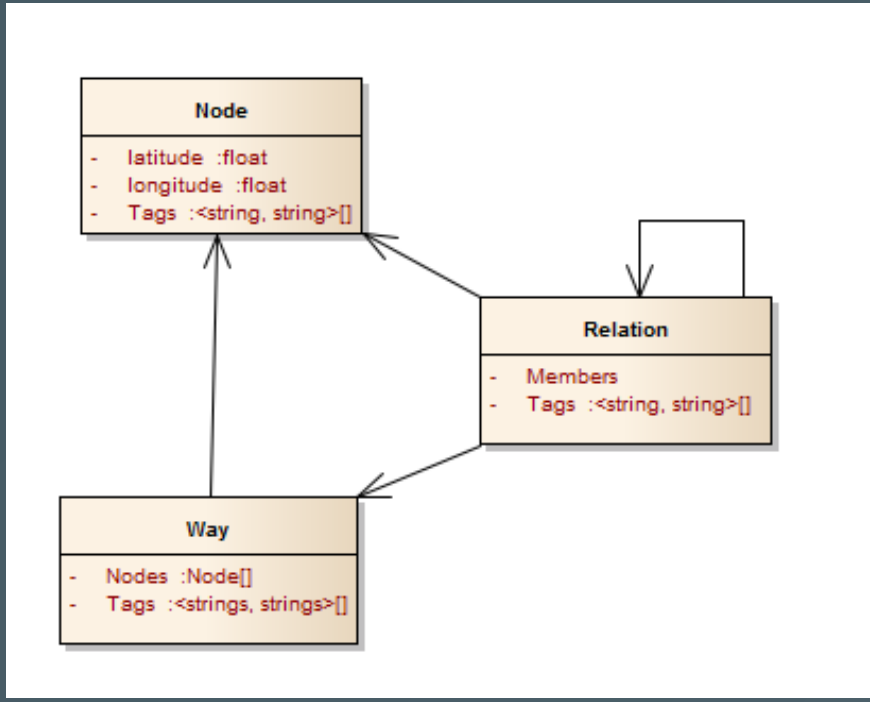


3D

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 ...

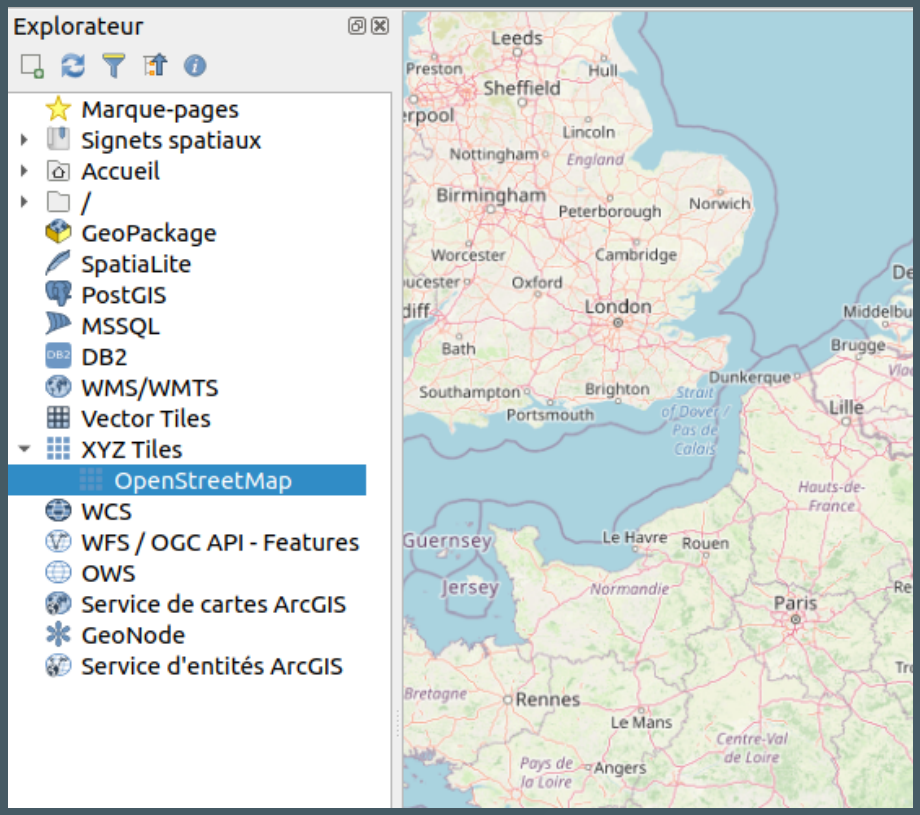
- to have up to date OSM data ?
- to work with small extent or a big extent ?
  - By the way, what is a small and big extent ? (for online API)
  - Density of data in different part of the worlds
- to have OSM metadata such as contributor, changeset, timestamp ?
- data designed for display or analysis 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*

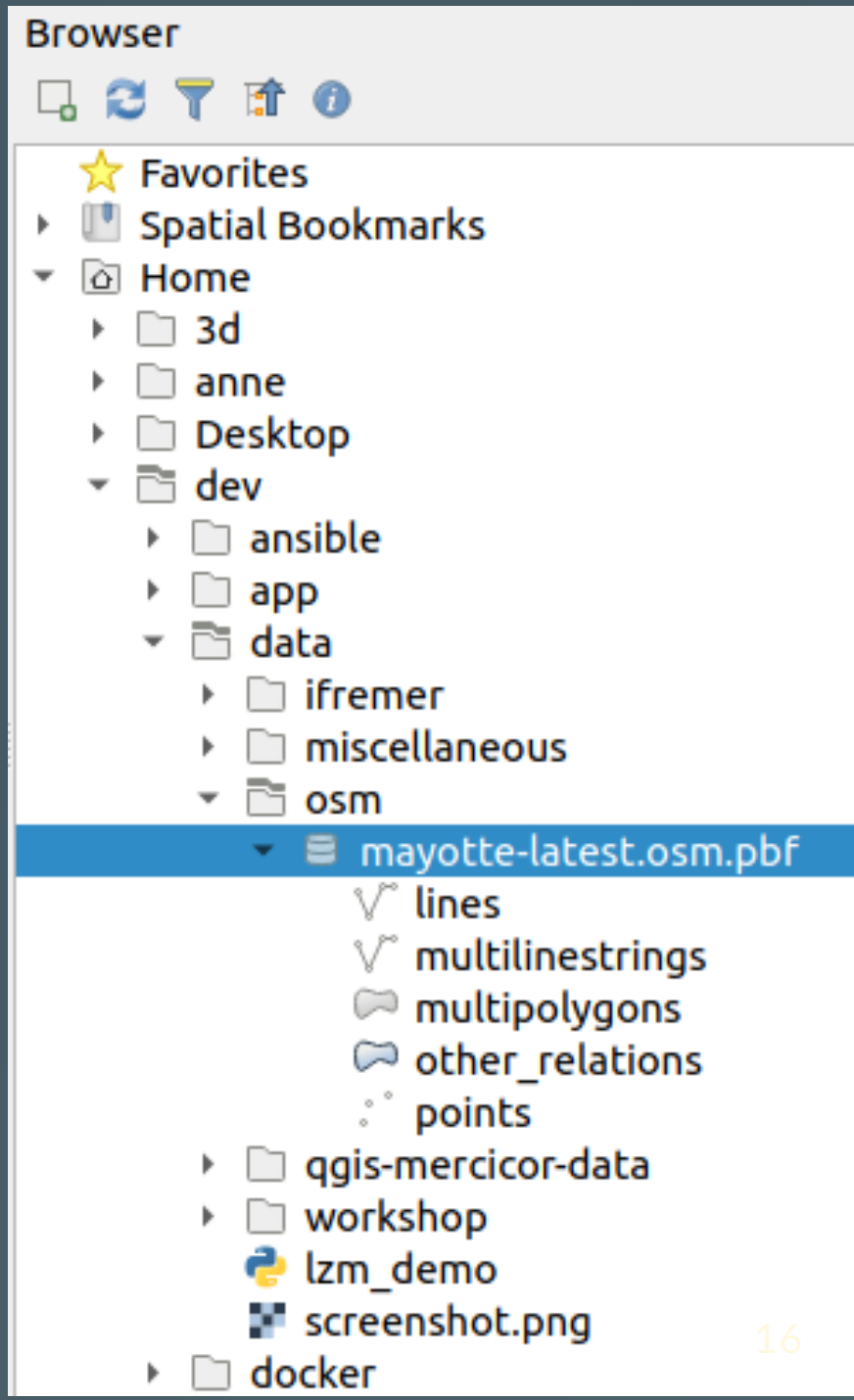


With QGIS only

- 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 😉
- ...

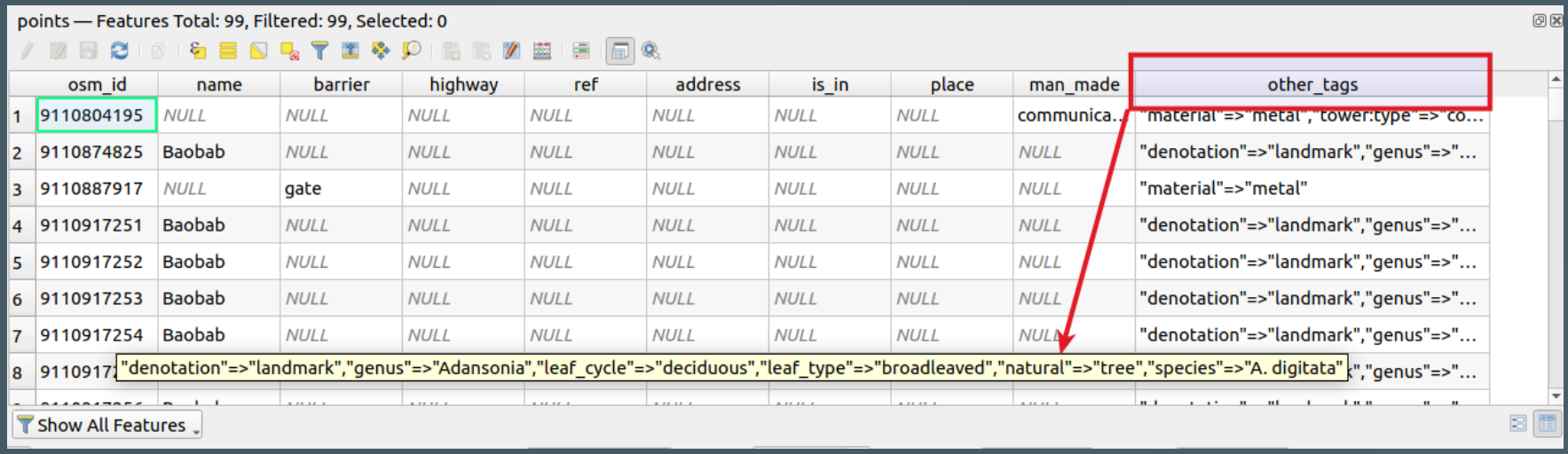
With QGIS only

- 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/
  - ...

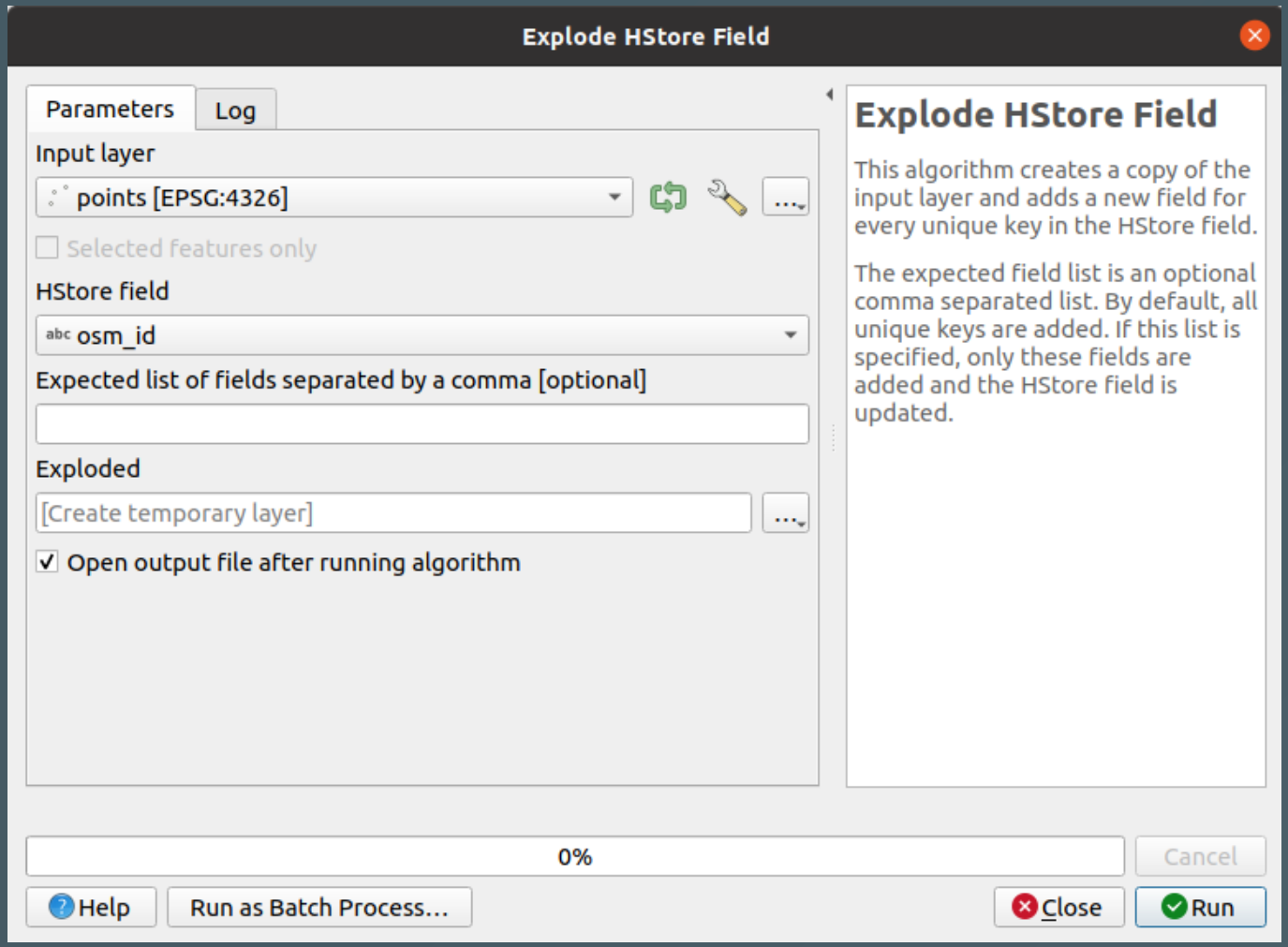


With QGIS only

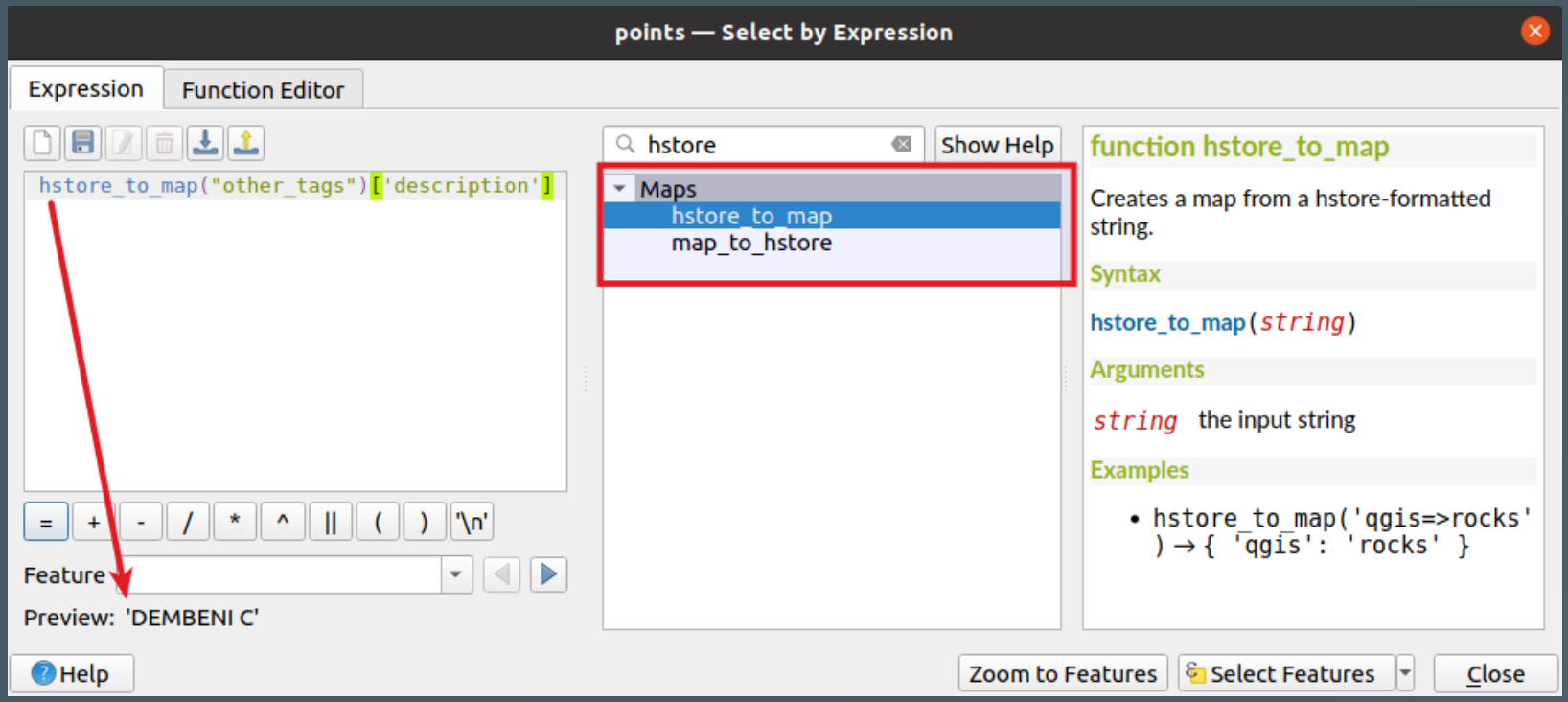
- It starts to be an issue if you want some **specific** fields
- This is called an **HStore** field



Use Processing Explode HStore



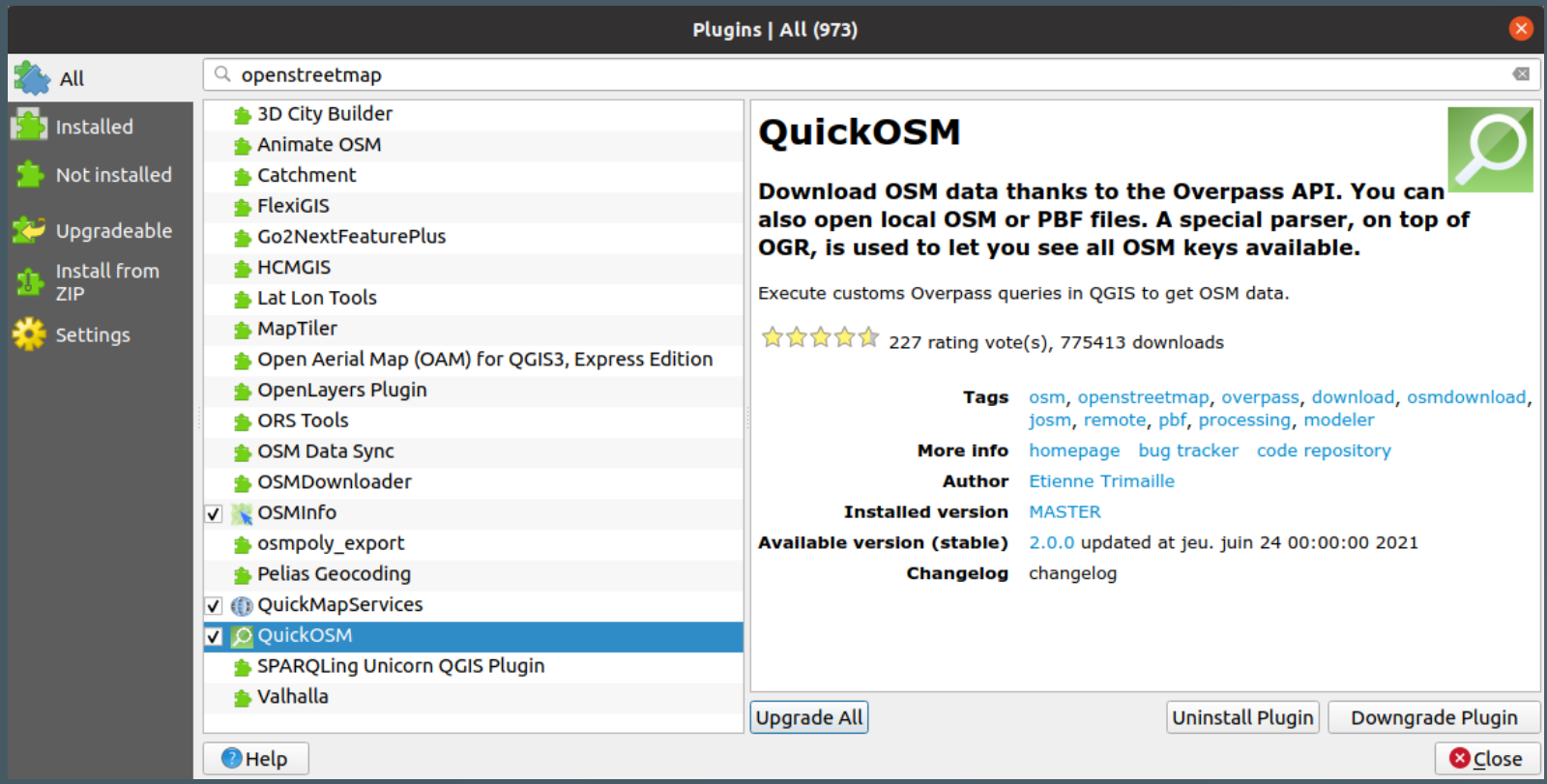
Or use QGIS Expression



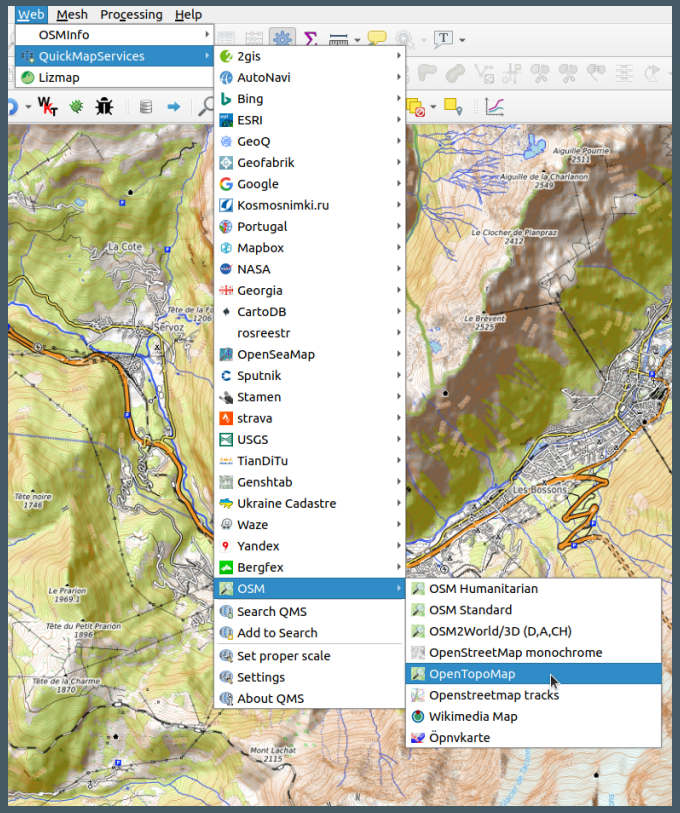
for selection, labelling ...

Using QGIS Plugins

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

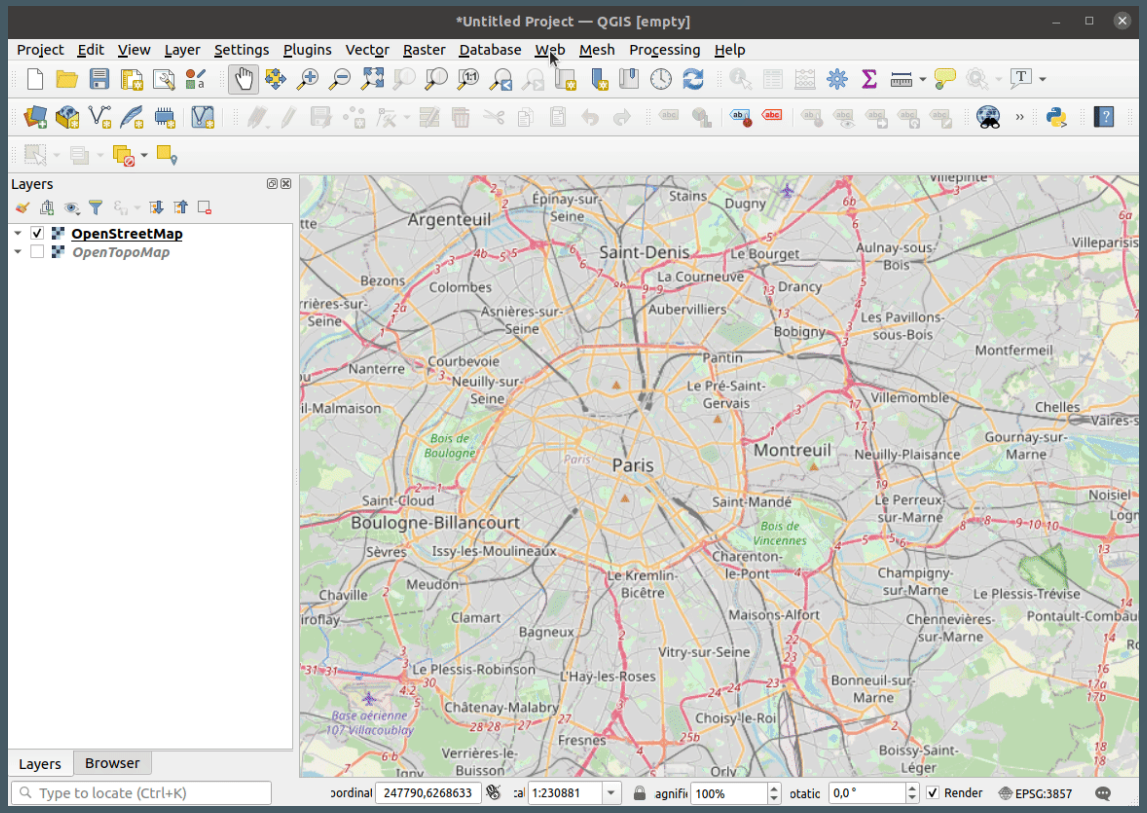


QuickMapServices plugin



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

QuickMapServices plugin



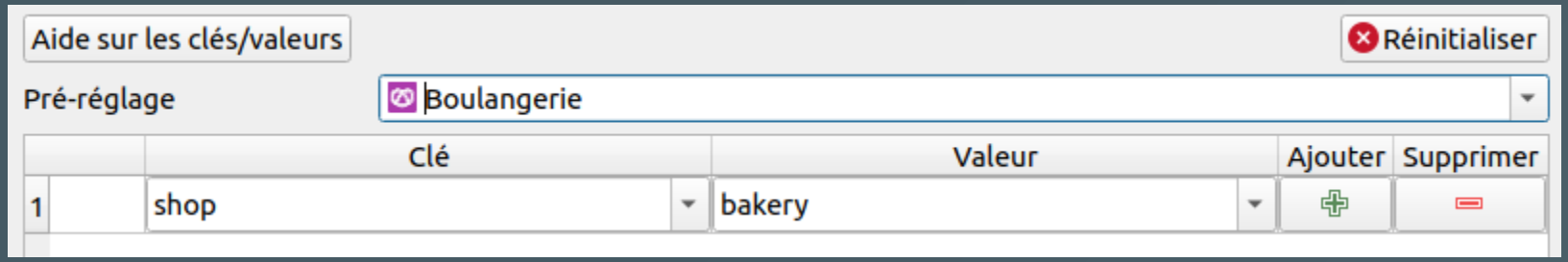
In *QuickMapServices*, go in *Settings* ➡️ *More services* ➡️ *Get contributed pack* to enable a **lot** of basemaps 🚀.

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

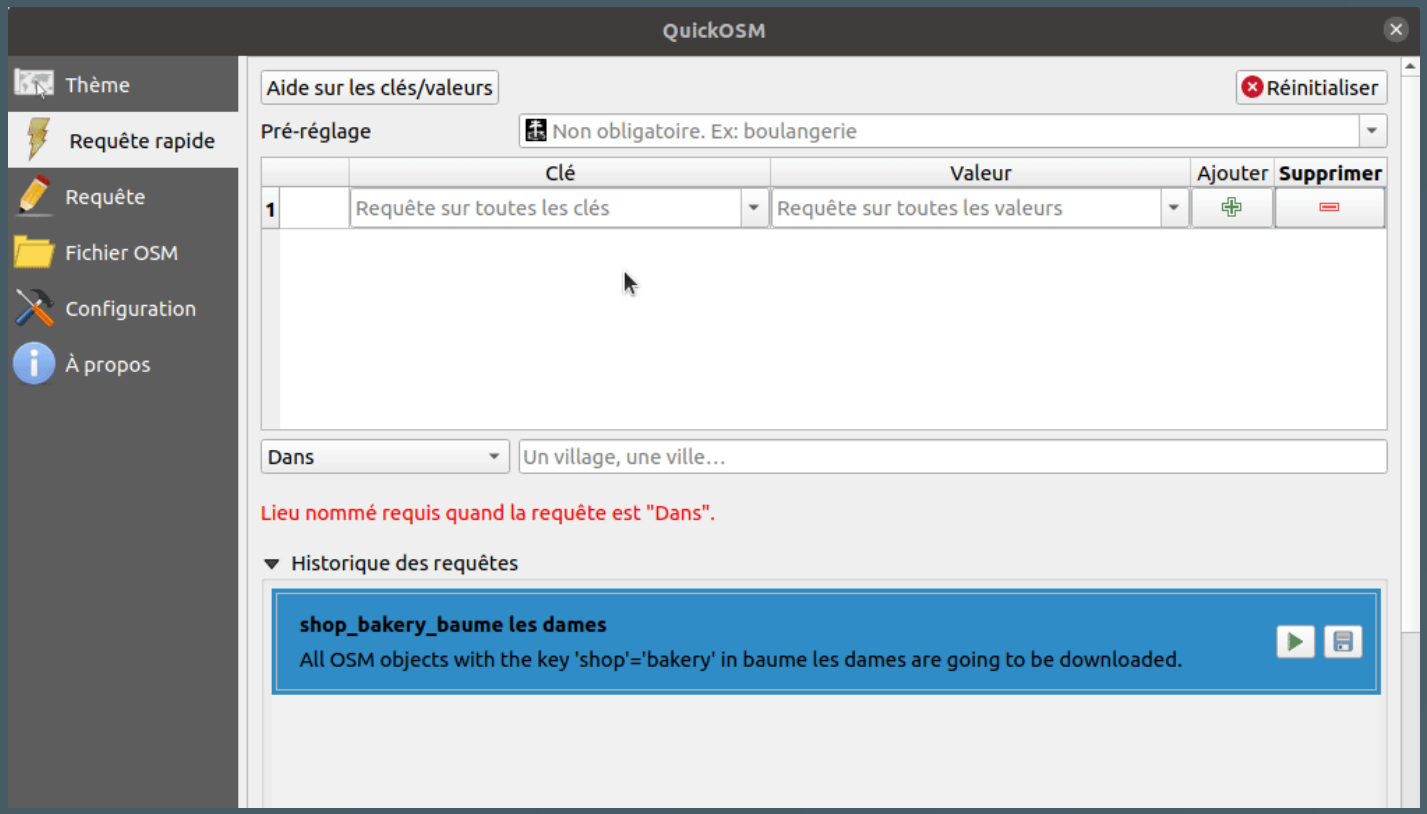
- Search in your native language
  - 🇬🇧 `Bakery`
  - 🇮🇹 `Panetteria`
  - 🇫🇷 `Boulangerie`
  - ➡️ `shop=bakery` in OSM
- Multi key/value support with `AND` / `OR` operator



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

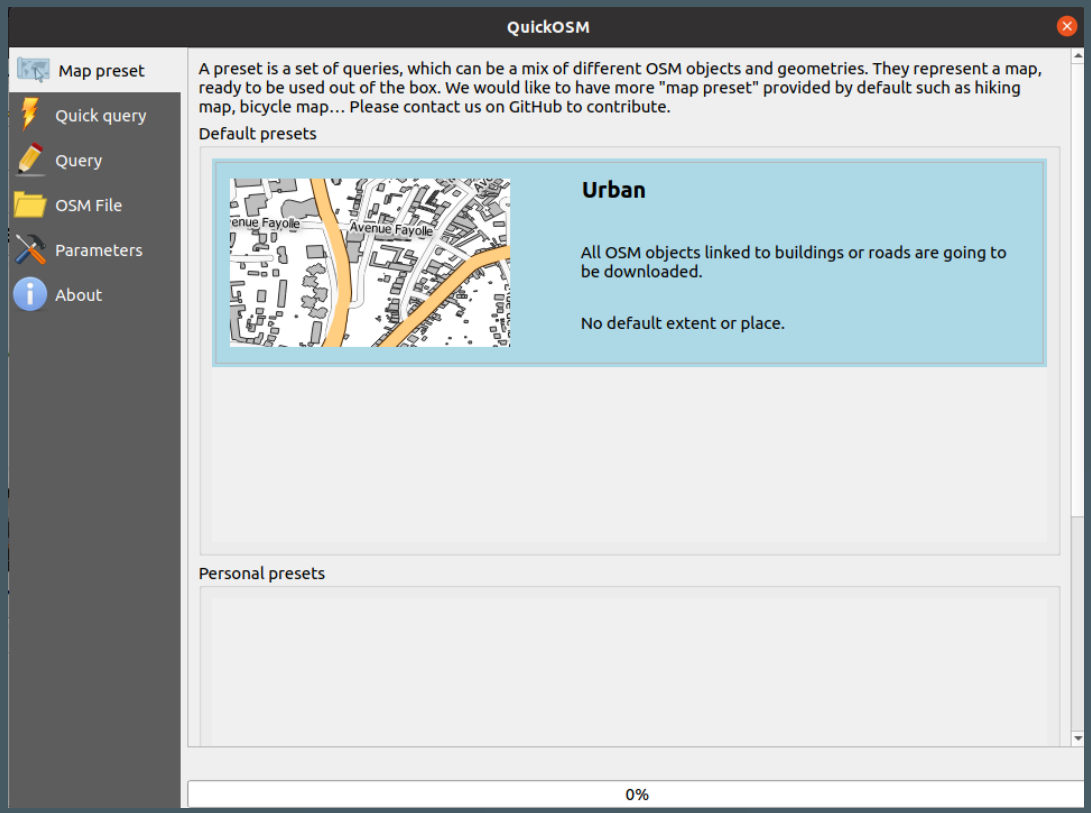
Quick Query

French people love 🥖 and 🧀

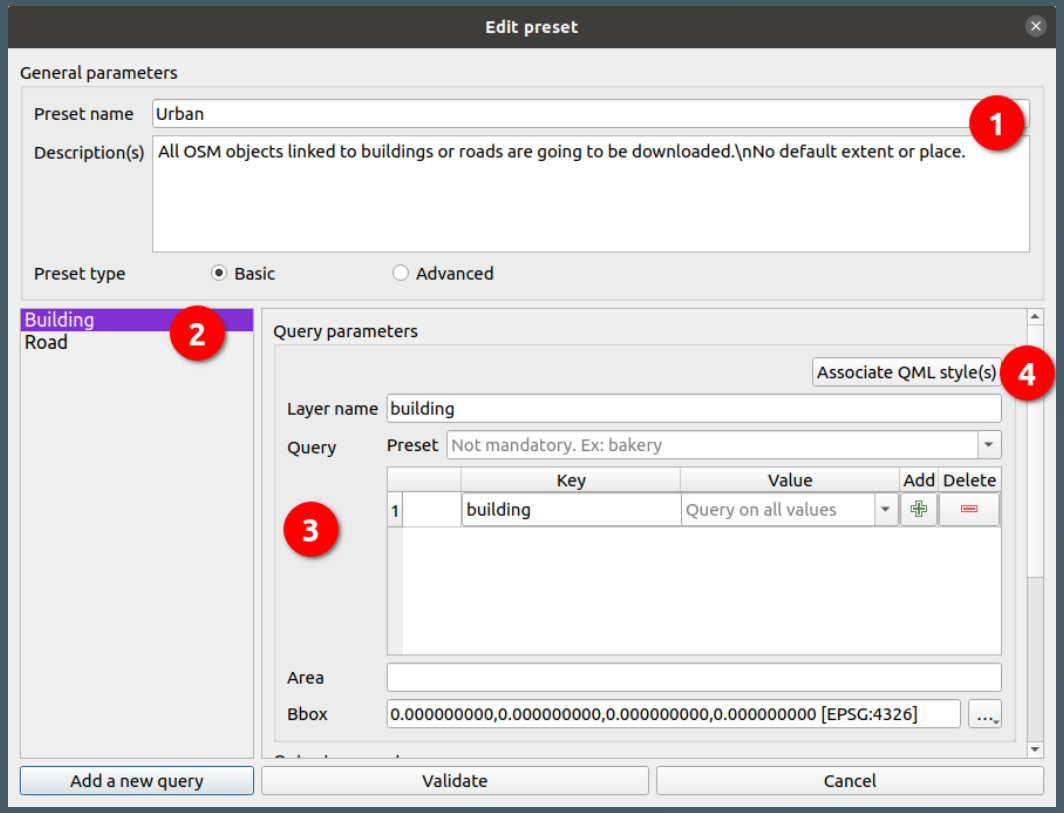


Map presets

- 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

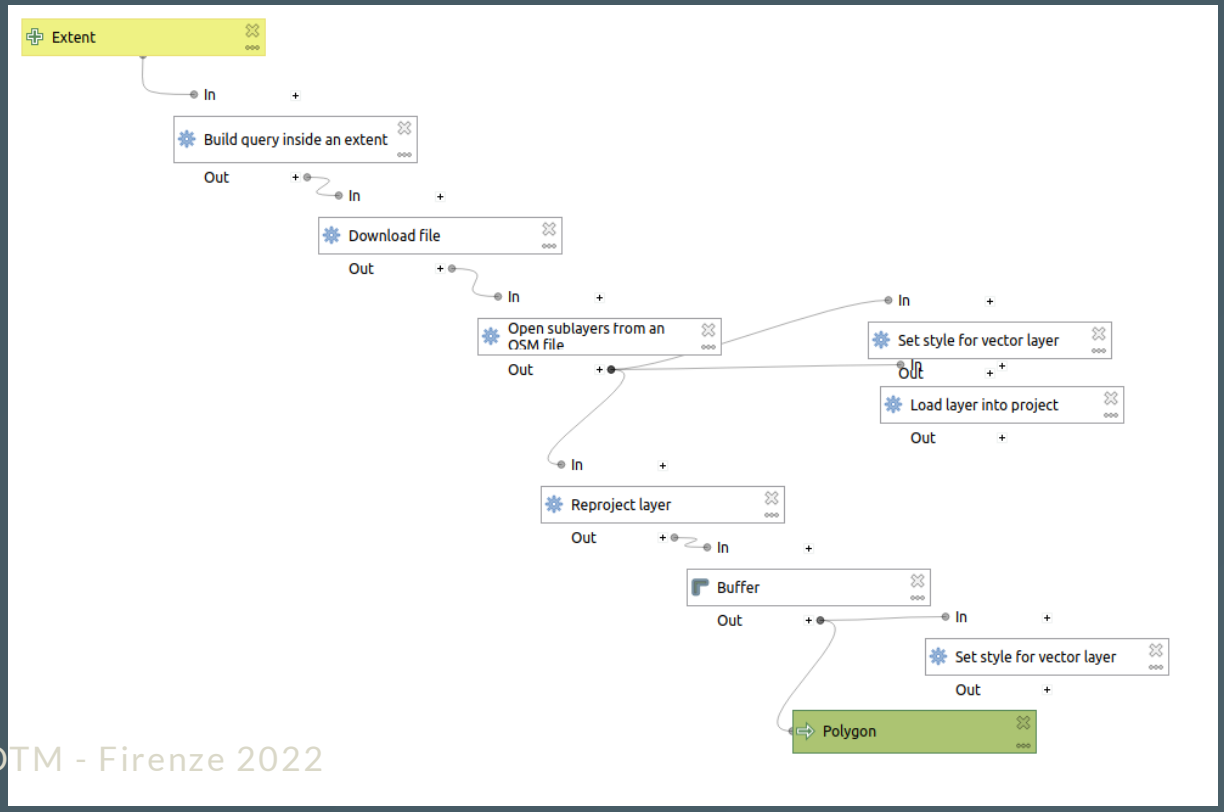
Map presets

Bicycle map, *landuse*... map presets

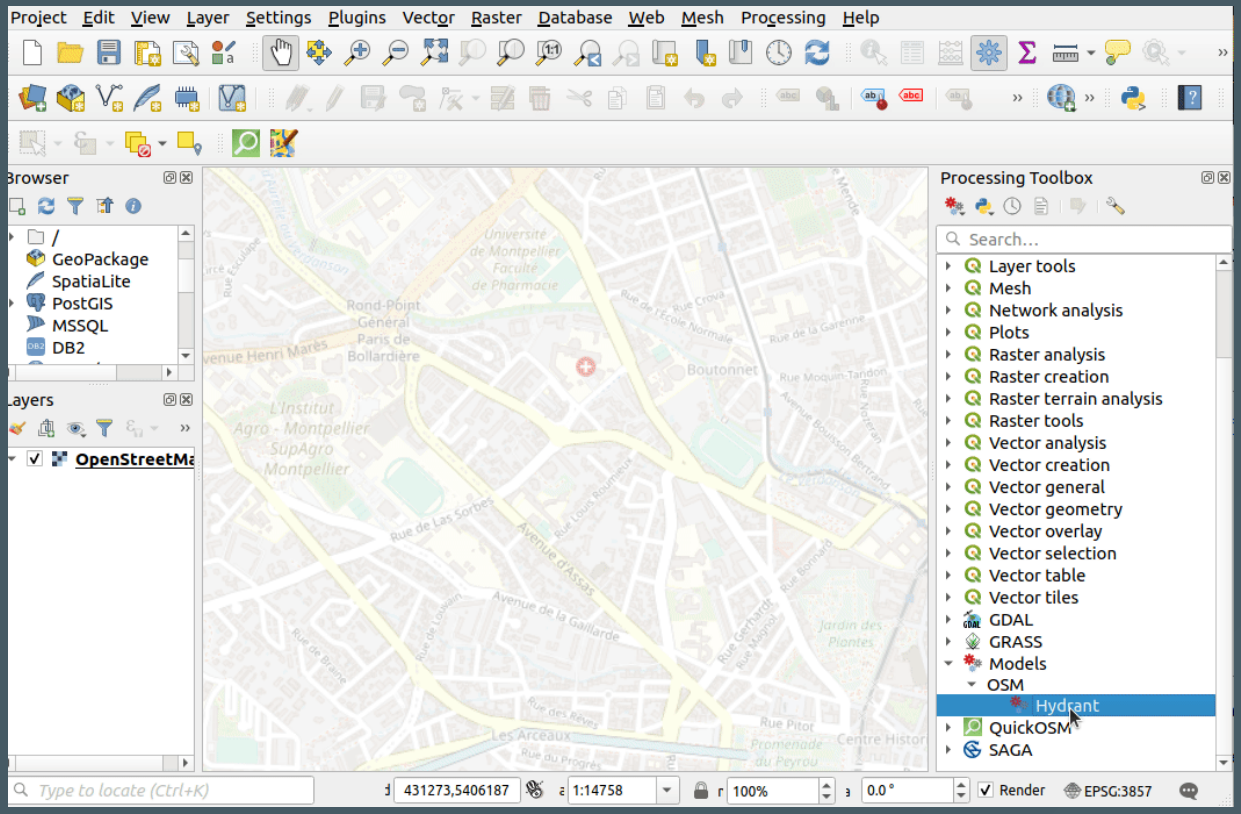
https://docs.3liz.org/QuickOSM/user-guide/map-preset/

QuickOSM in Processing

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

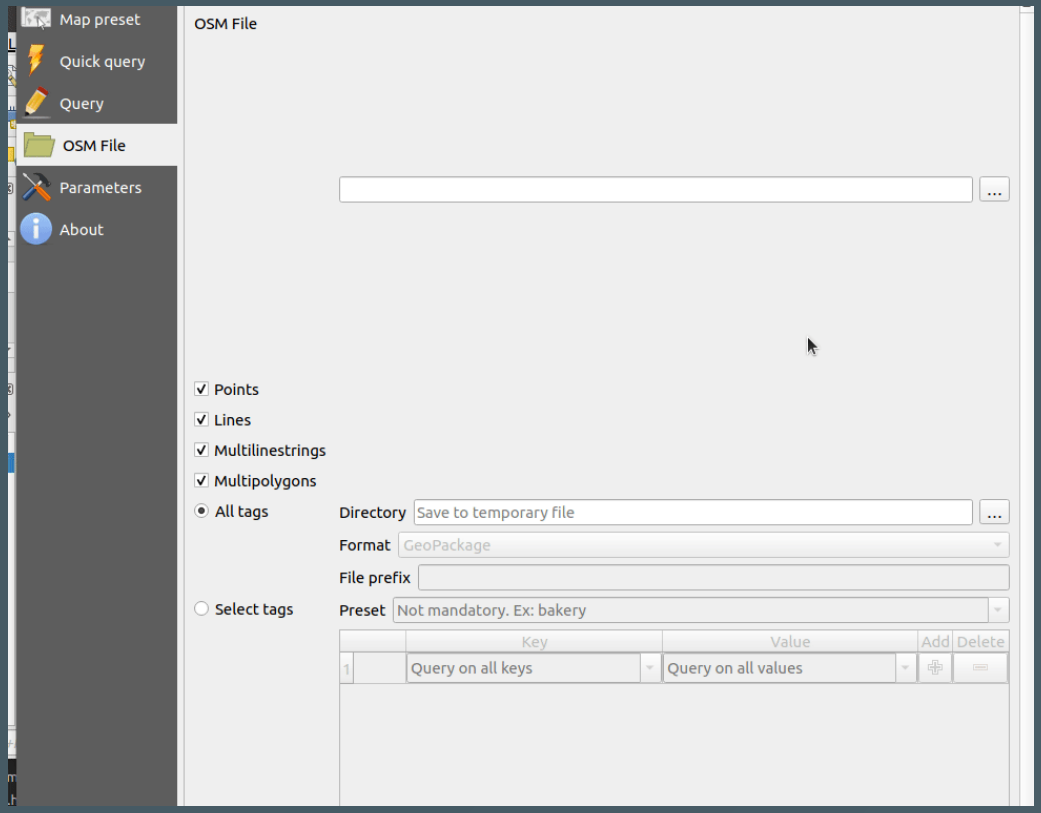


QuickOSM in Processing



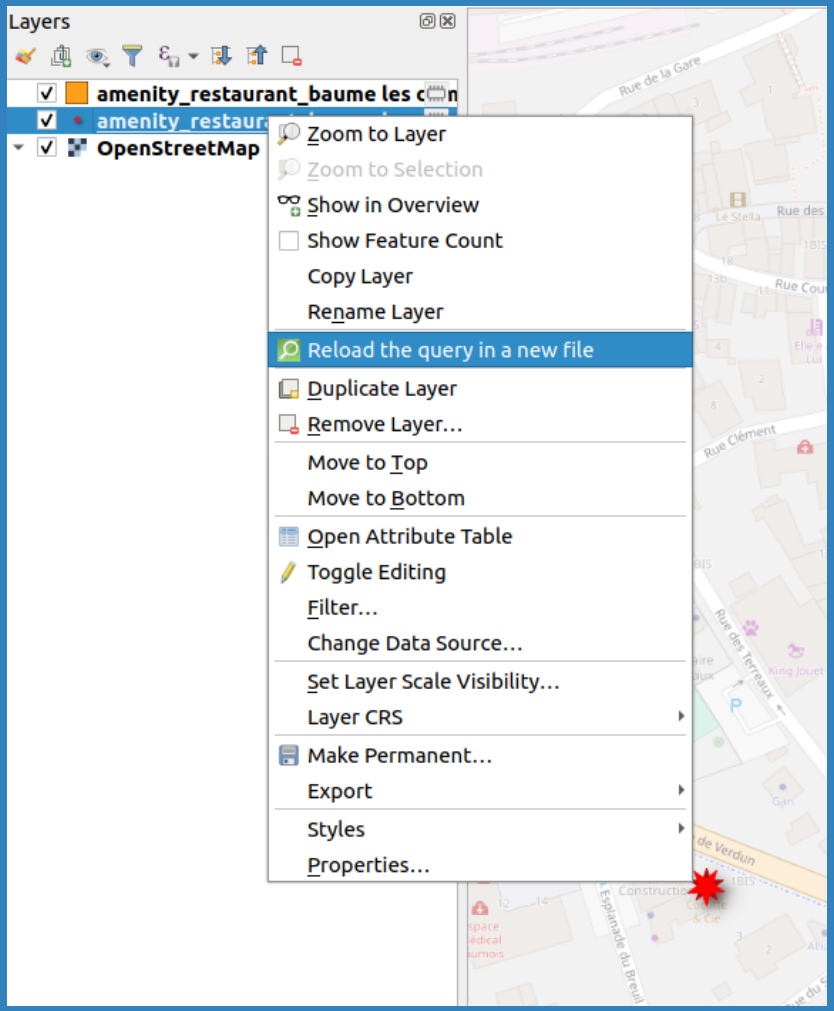
Local OSM file

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

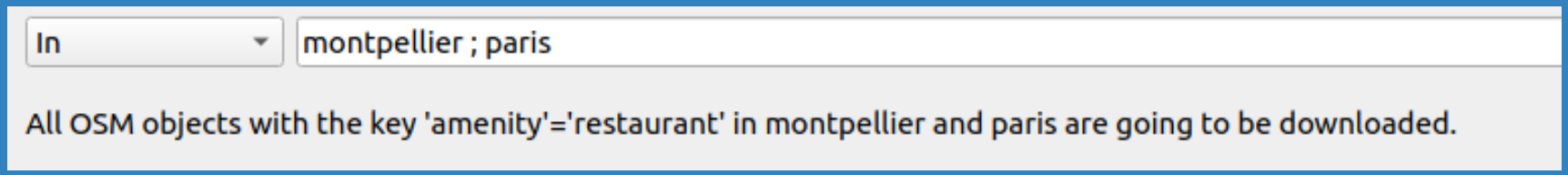


Some quick tips in QuickSOM

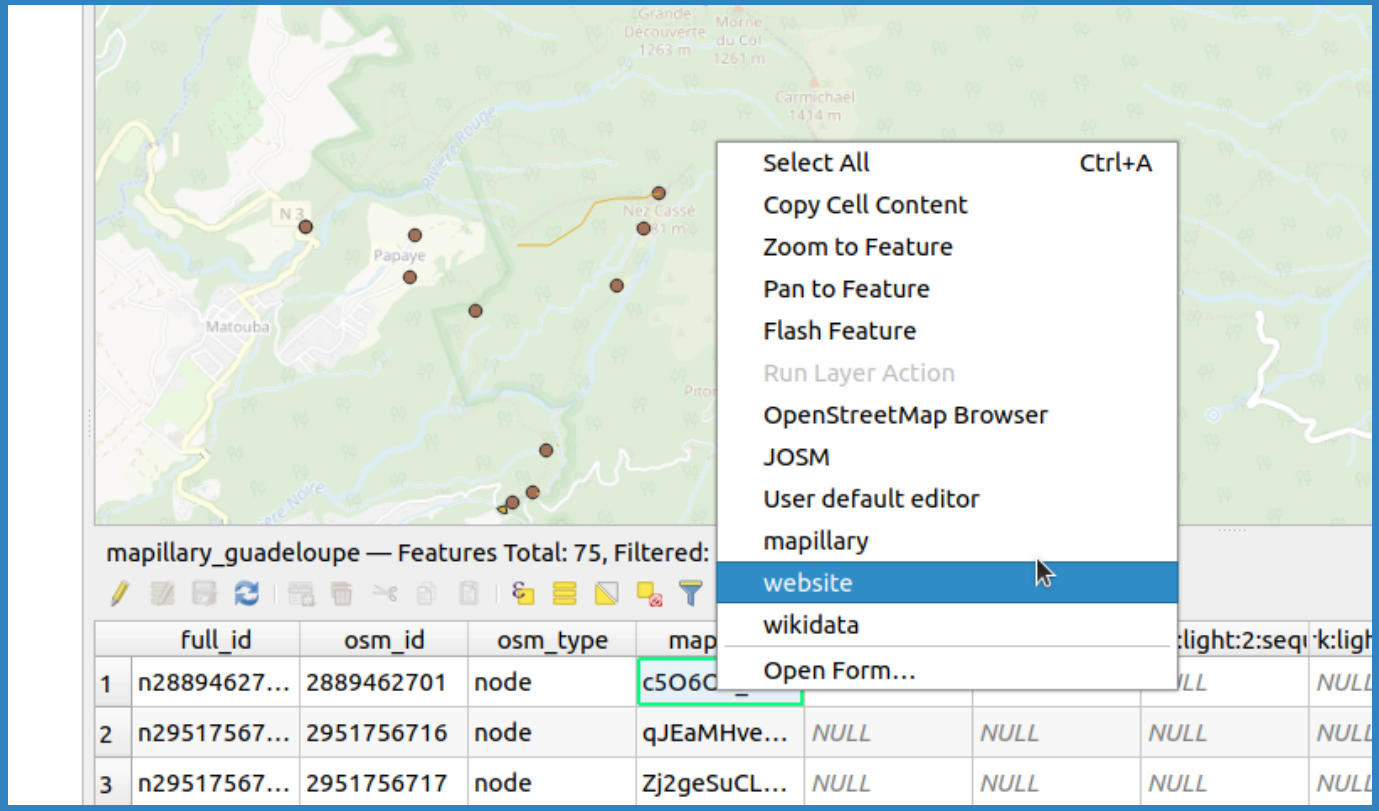
Reload the query to get latest update from OSM



Query many named places with ;

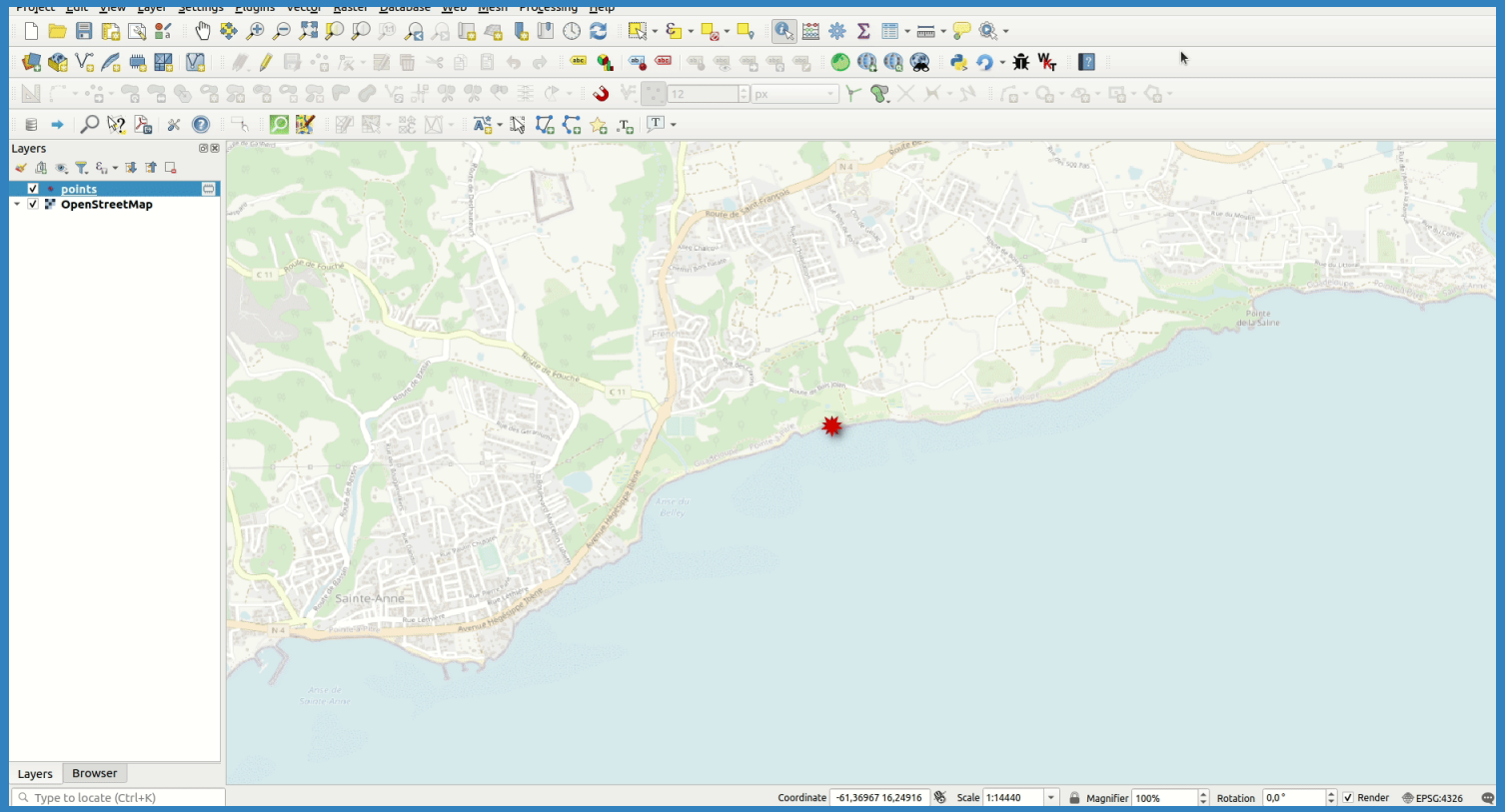


Default QGIS Actions available



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/

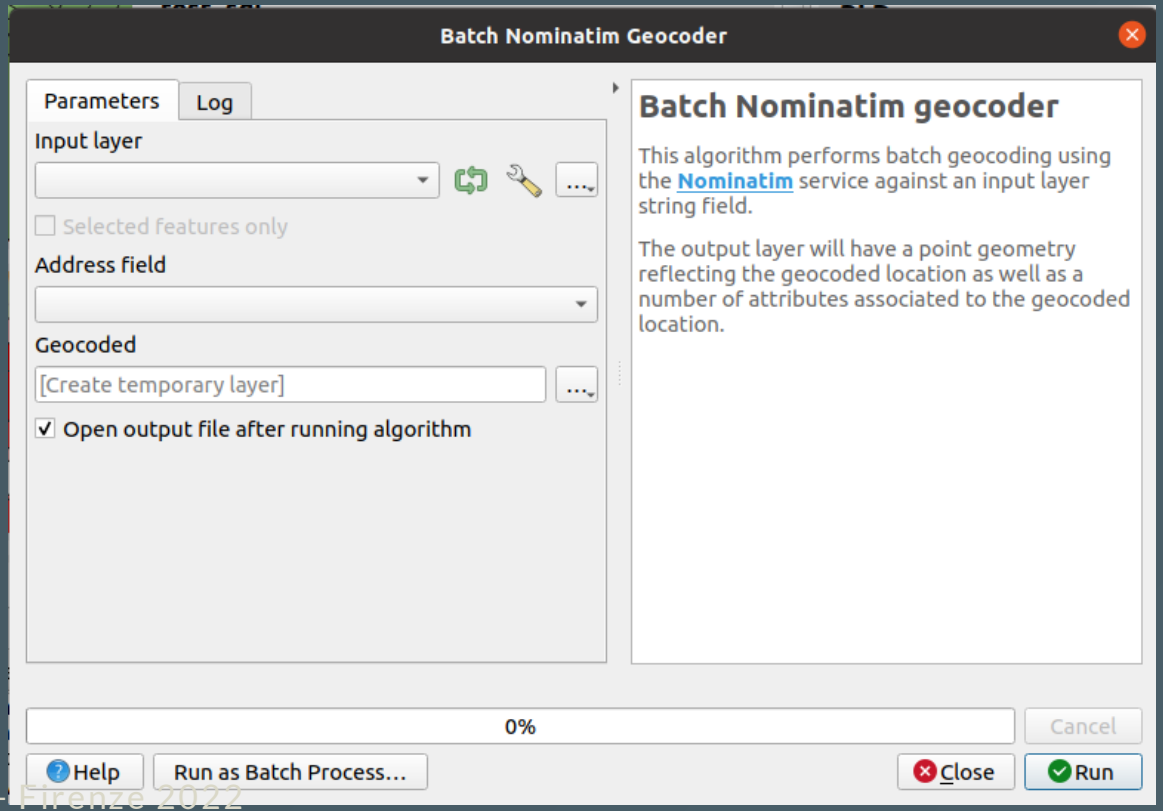
OSM relations

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

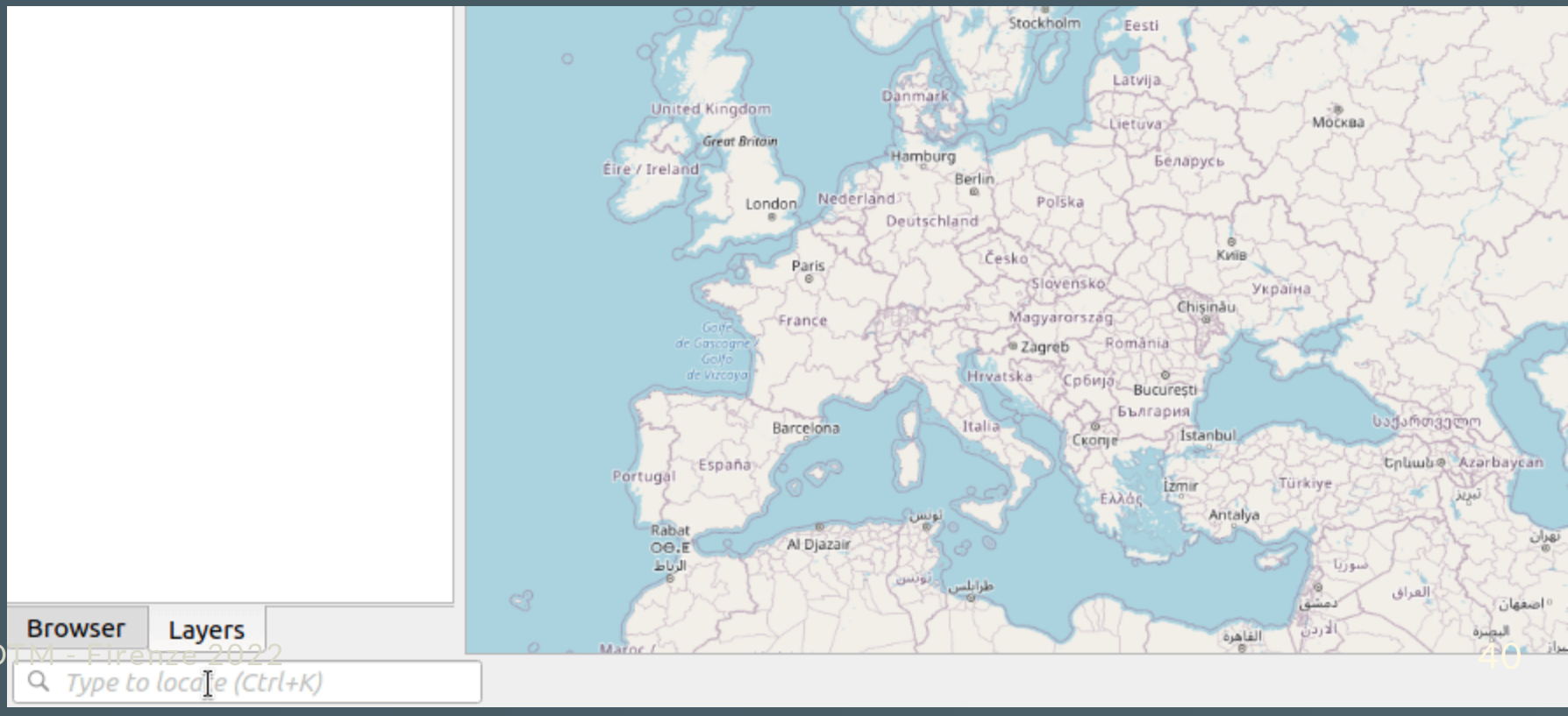
Geocoding

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



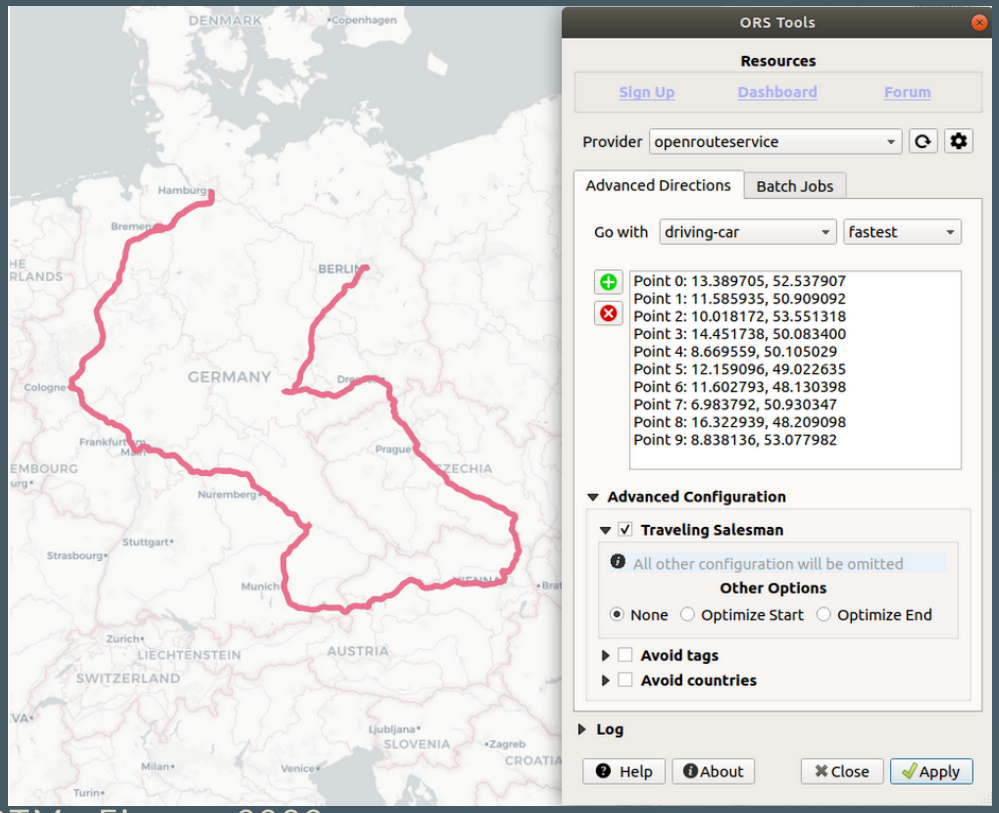
Geocoding

- 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



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

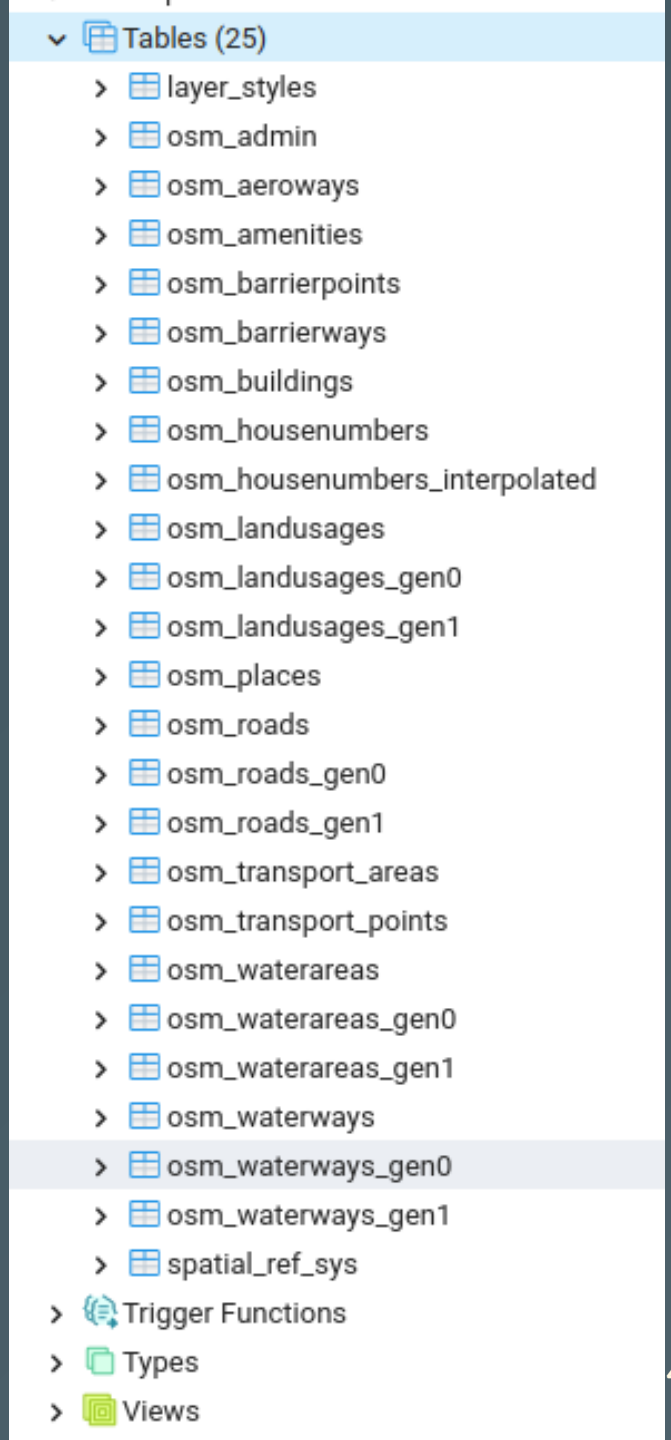
Database with docker

- 🐘 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



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