

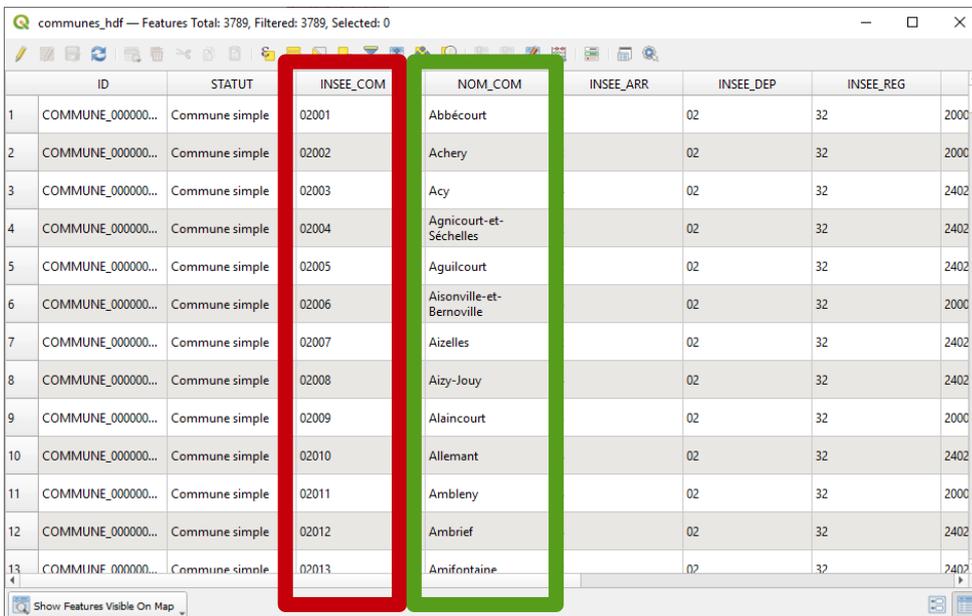
Mobility areas

Methodology

Mobility areas are drawn up on the basis of data on flows between origins and destinations. These data can come, for example, from home-work or home-study data from the population census, household travel surveys or other data sources such as mobile trace data (FCD, FMD)

For a rendering through a cartographic visualization, an animation or videos, it is necessary to have a layer of geographical objects corresponding to the zones (origins and destinations of flows) and to have a common zone/origin/destination identifier in the two data sources.

The strongest link in % of flows between two zones is recursively taken from the set of flows. The area of origin is aggregated with the pole area and forms a pool. Migration between zones or areas is then updated and the process is repeated until only one area remains.



ID	STATUT	INSEE_COM	NOM_COM	INSEE_ARR	INSEE_DEP	INSEE_REG	
1	COMMUNE_000000...	Commune simple	02001	Abbécourt	02	32	2000
2	COMMUNE_000000...	Commune simple	02002	Achery	02	32	2000
3	COMMUNE_000000...	Commune simple	02003	Acy	02	32	2402
4	COMMUNE_000000...	Commune simple	02004	Agnicourt-et-Séchelles	02	32	2402
5	COMMUNE_000000...	Commune simple	02005	Aguilcourt	02	32	2402
6	COMMUNE_000000...	Commune simple	02006	Aisonville-et-Bernoville	02	32	2000
7	COMMUNE_000000...	Commune simple	02007	Aizelles	02	32	2402
8	COMMUNE_000000...	Commune simple	02008	Aizy-Jouy	02	32	2402
9	COMMUNE_000000...	Commune simple	02009	Alaincourt	02	32	2000
10	COMMUNE_000000...	Commune simple	02010	Allemant	02	32	2402
11	COMMUNE_000000...	Commune simple	02011	Ambleny	02	32	2000
12	COMMUNE_000000...	Commune simple	02012	Ambrief	02	32	2402
13	COMMUNE_000000...	Commune simple	02013	Amifontaine	02	32	2402

INSEE_COM : zone Id

NOM_COM : zone label

FD_MOBPRO_2017_HDF — Features Total: 42...

	COMMUNE	DCLT	IPONDI	
128888	59350	59009	4,5958396049373	ZZZ
128889	59350	59009	3,7532271982963	ZZZ
128890	59350	59009	3,3359731205273	ZZZ
128891	59350	59009	3,4435878600769	ZZZ
128892	59350	59009	3,63029514739	ZZZ
128893	59350	59009	1,0829849954672	ZZZ
128894	59350	59009	4,3779044806577	ZZZ
128895	59350	59009	1,065112988909	ZZZ
128896	59350	59009	1,2989410287496	ZZZ
128897	59350	59009	3,3814316137765	ZZZ
128898	59350	59009	4,3098650083190	ZZZ
128899	59350	59009	0,96197725026158	ZZZ
128900	59350	59009	3,3941462721210	ZZZ

Show All Features

COMMUNE : origin

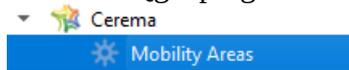
DCLT : destination

IPONDI : value (number of trips)

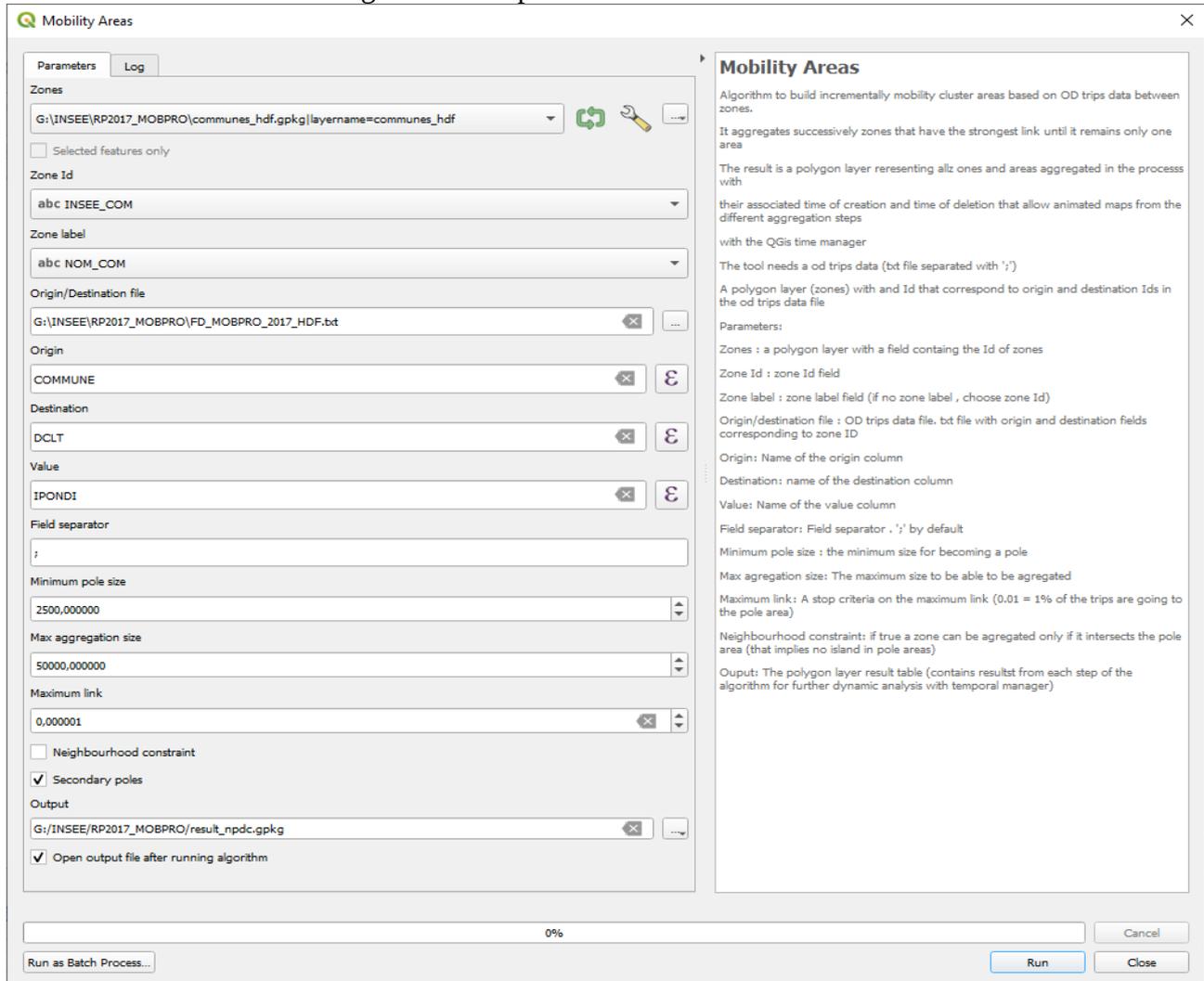
The zone identifier in the zone table (Communes HDF) corresponds to the zone identifiers of the origins and destinations in the flows table (FD_MOBPRO_2017_HDF)

Calculation of mobility areas

Once the Qgis plugin is installed, it appears in the processing box as below



With the above data the setting is for example



To be a cluster, an area must have more than 2,500 trips or migrations and if the cluster is greater than 50,000 it cannot be aggregated with another cluster in subsequent stages.

When the neighbourhood constraint is checked, in order to be aggregated, zones must intersect geographically the pole area.

Activating secondary poles enables to let appearing smaller poles that could be masked by the main attracting poles for a second level analysis.

QGIS Mobility Areas
✕

Parameters
Log

```

QGIS version: 3.22.2-Białowieża
QGIS code revision: 1601ec46d0
Qt version: 5.15.2
Python version: 3.9.5
GDAL version: 3.4.0
GEOS version: 3.10.0-CAPI-1.16.0
PROJ version: Rel. 8.2.0, November 1st, 2021
PDAL version: 2.3.0 (git-version: 9f35b7)
Algorithm started at: 2022-01-05T15:03:16
Algorithm 'Mobility Areas' starting...
Input parameters:
{ 'Destination' : 'DCLT', 'Maxaggregationsize' : 50000, 'Maximumlink' : 0.01,
'Minimumpolesize' : 2500, 'Origin' : 'COMMUNE', 'OriginDestinationFile' : 'G:\\INSEE\\
\\RP2017_MOBPRO\\FD_MOBPRO_2017_HDF.txt', 'Output' : 'G:/INSEE/RP2017_MOBPRO/
result_npc.gpkg', 'Separator' : ';', 'Value' : 'IFONDI', 'ZoneId' : 'INSEE_COM', 'ZoneLabel'
: 'NOI_COM', 'Zones' : 'G:\\INSEE\\RP2017_MOBPRO\\communes_hdf.gpkg|layername=communes_hdf'
}

Generating neighbourhood table...
Generating zones data...
Importing data...
Building cluster areas...
62473: Isbergues
62767: Saint-Pol-sur-Ternoise
99999: 99999
62193: Calais
59122: Cambrai
62041: Arras
62108: Berck
59183: Dunkerque
62160: Boulogne-sur-Mer
59392: Maubeuge
59350: Lille
62758: Saint-Martin-Boulogne
59139: Caudry
59178: Douai
59606: Valenciennes
62516: Lillers
62080: Bapaume
59249: Fourmies
59136: Le Cateau-Cambrésis
62040: Arques
62826: Le Touquet-Paris-Plage
62318: Étaples
62765: Saint-Omer
62525: Longuenesse
Execution completed in 133.75 seconds (2 minutes 14 seconds)
Results:
{'output' : 'G:/INSEE/RP2017_MOBPRO/result_npc.gpkg'}

Loading resulting layers
Algorithm 'Mobility Areas' finished
          
```

Mobility Areas

Algorithm to build incrementally mobility cluster areas based on OD trips data between zones.

It aggregates successively zones that have the strongest link until it remains only one area

The result is a polygon layer representing all zones and areas aggregated in the process with their associated time of creation and time of deletion that allow animated maps from the different aggregation steps with the QGIS time manager

The tool needs an OD trips data (txt file separated with ';')

A polygon layer (zones) with an Id that correspond to origin and destination Ids in the OD trips data file

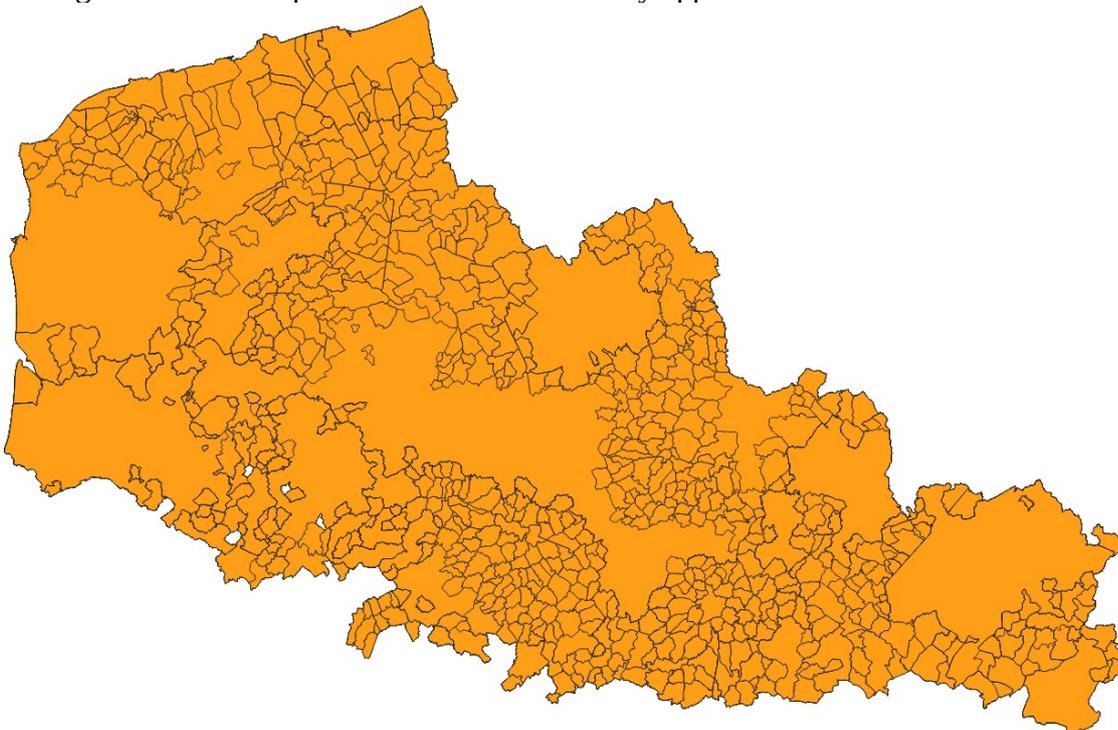
Parameters:

- Zones : a polygon layer with a field containing the Id of zones
- Zone Id : zone Id field
- Zone label : zone label field (if no zone label, choose zone Id)
- Origin/destination file : OD trips data file. txt file with origin and destination fields corresponding to zone ID
- Origin : Name of the origin column
- Destination : name of the destination column
- Value : Name of the value column
- Field separator : Field separator ';' by default
- Minimum pole size : the minimum size for becoming a pole
- Max aggregation size : The maximum size to be able to be aggregated
- Maximum link : A stop criteria on the maximum link (0.01 = 1% of the trips are going to the pole area)
- Output : The polygon layer result table (contains result from each step of the algorithm for further dynamic analysis with temporal manager)

0%
Cancel

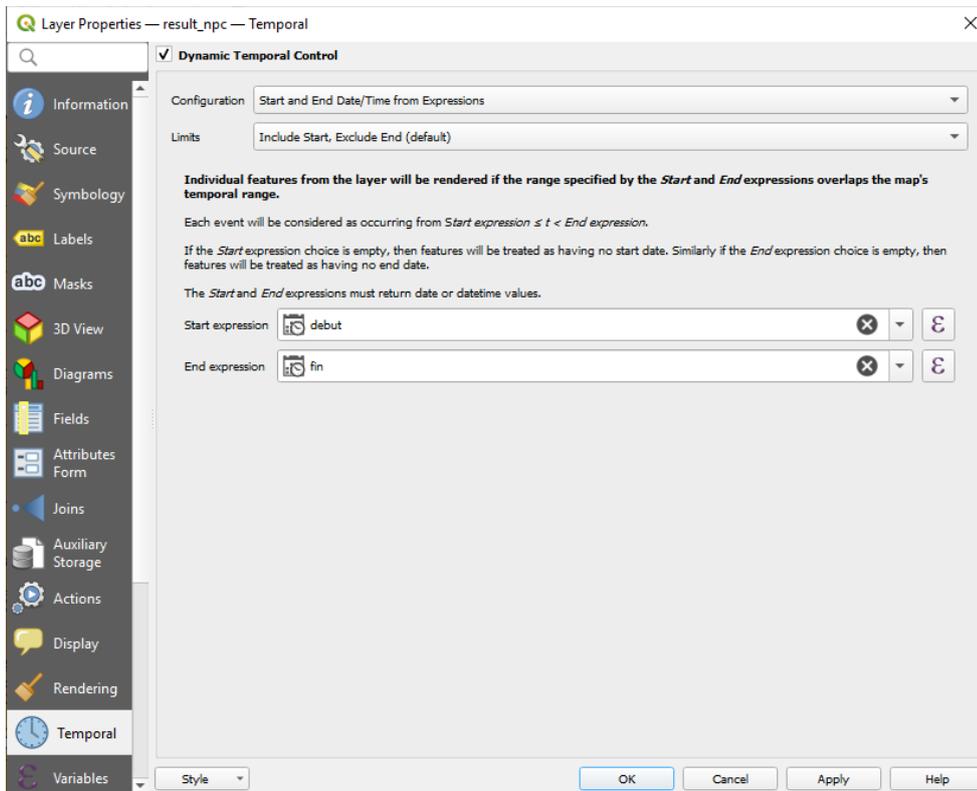
Run as Batch Process...
Change Parameters
Close

The algorithm lists the poles that have successively appeared and loads the result table

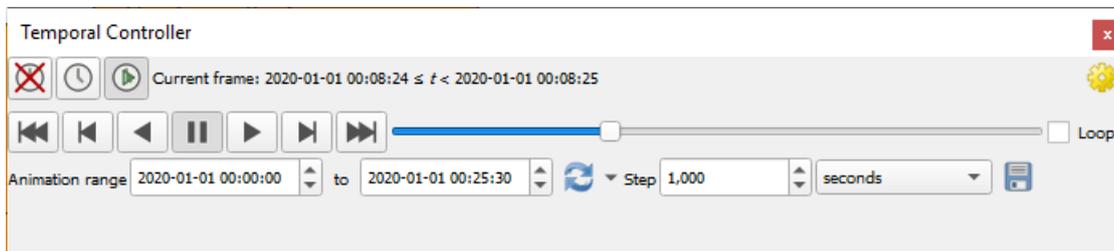


Making the animated map

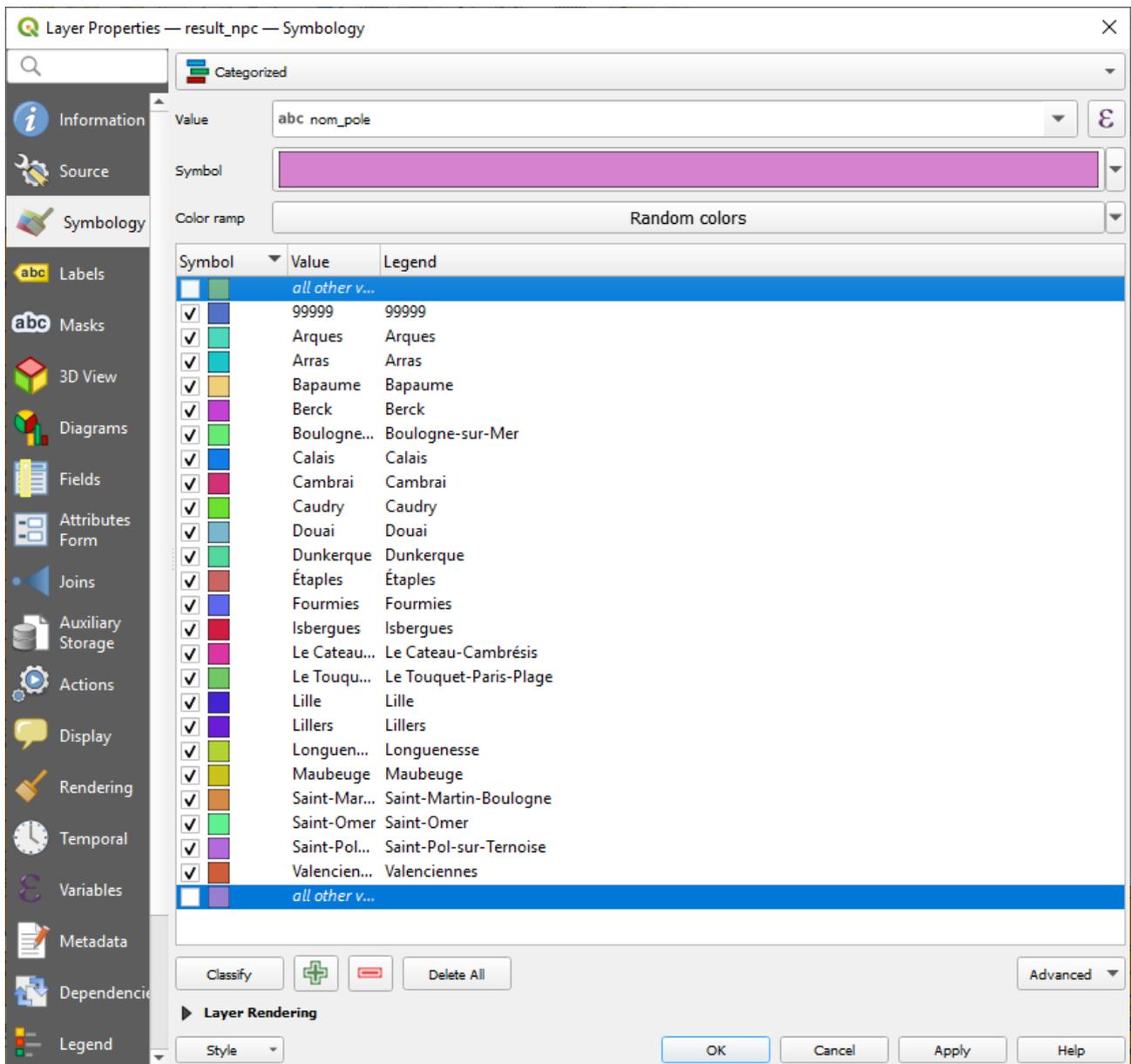
The result layer must first be set up: :



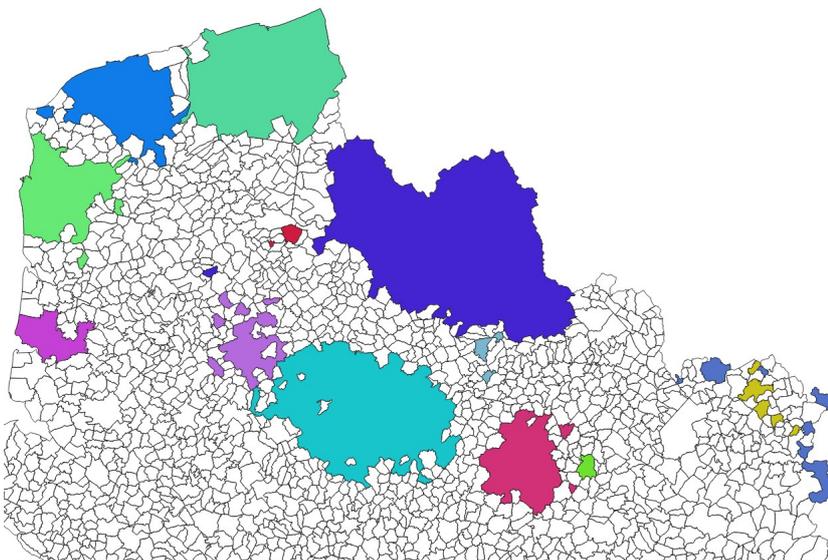
Then set the time controller with a step of 1s on the result layer



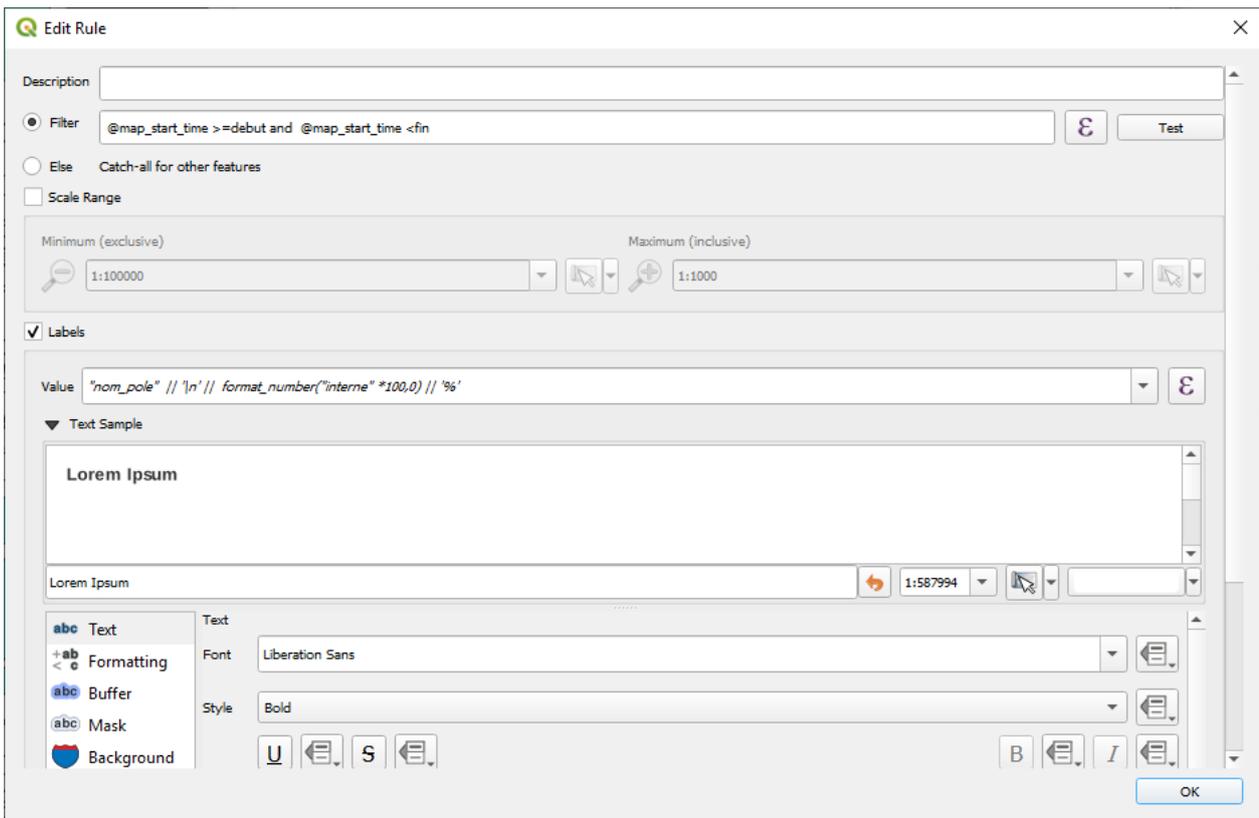
You can then perform a categorized thematic analysis on the column "city_name" and deactivate the values without labels



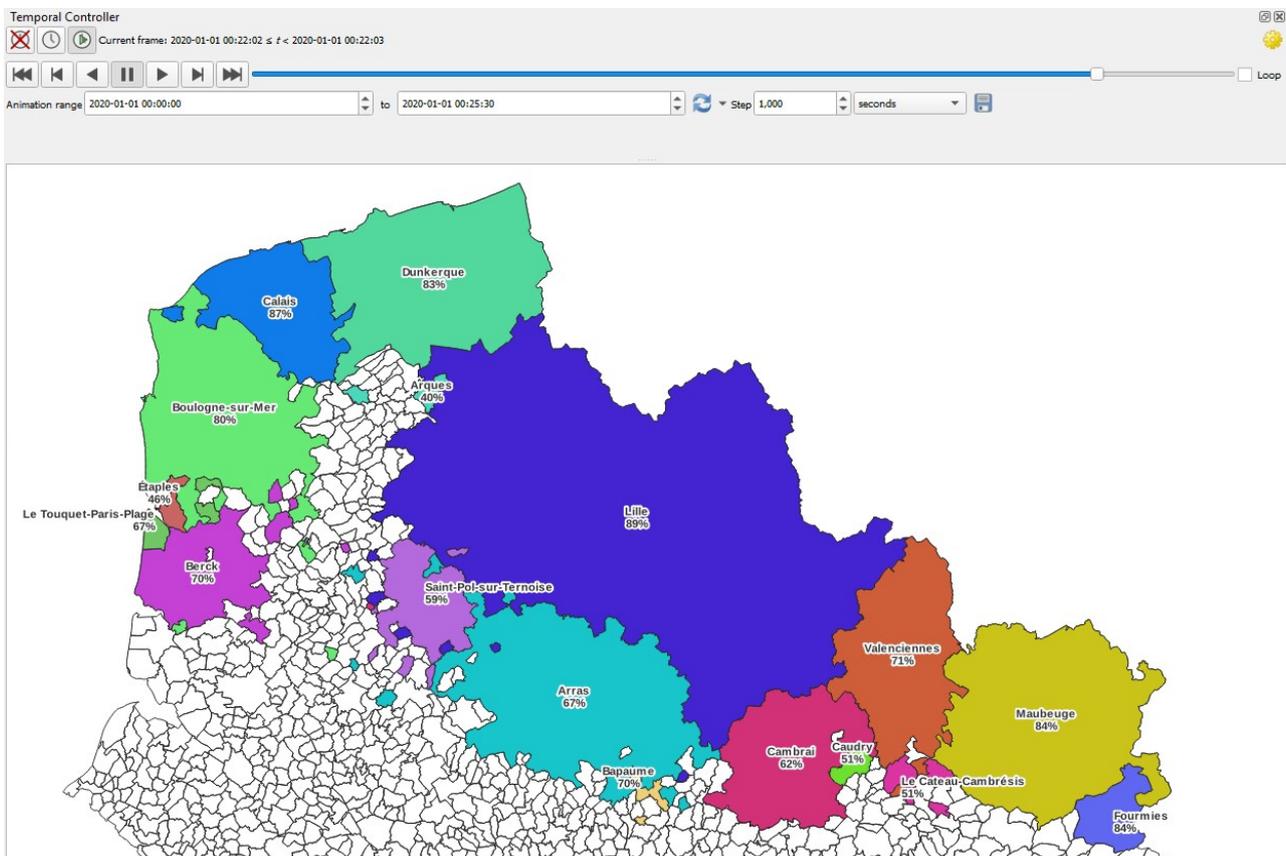
With the time controller, we can see the generation of mobility pools as a function of steps (seconds in the time controller)



The labels can then be set up to display the names of the pools and the percentage of autonomy, for example, by defining labels based on rules



And the result below in animated map

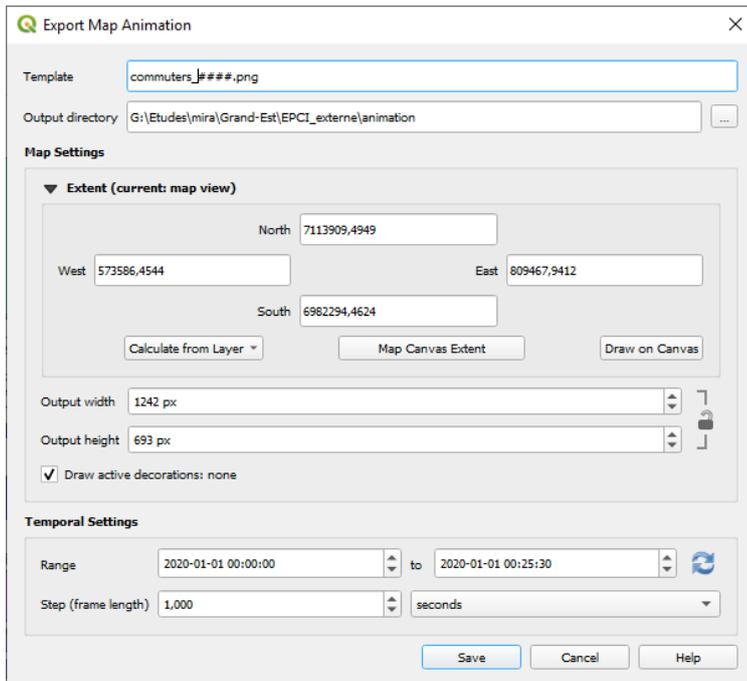


Generating a video

To generate a video there are several solutions.

The principle is to export a frame of each step from the time controller and then from an external tool to assemble each frame to make a video, for example with the open source tool ffmpeg

To do this, you just need to use the export of the animation from the time controller. The images will be called commuters_0001.png, commuters_0002.png, ...



Example of a command with ffmpeg to combine the images into a video "mobility_areas.mp4"
ffmpeg -r 1 -i b commuters_%04d.png -vcodec mpeg4 -y mobility_areas_hdf.mp4