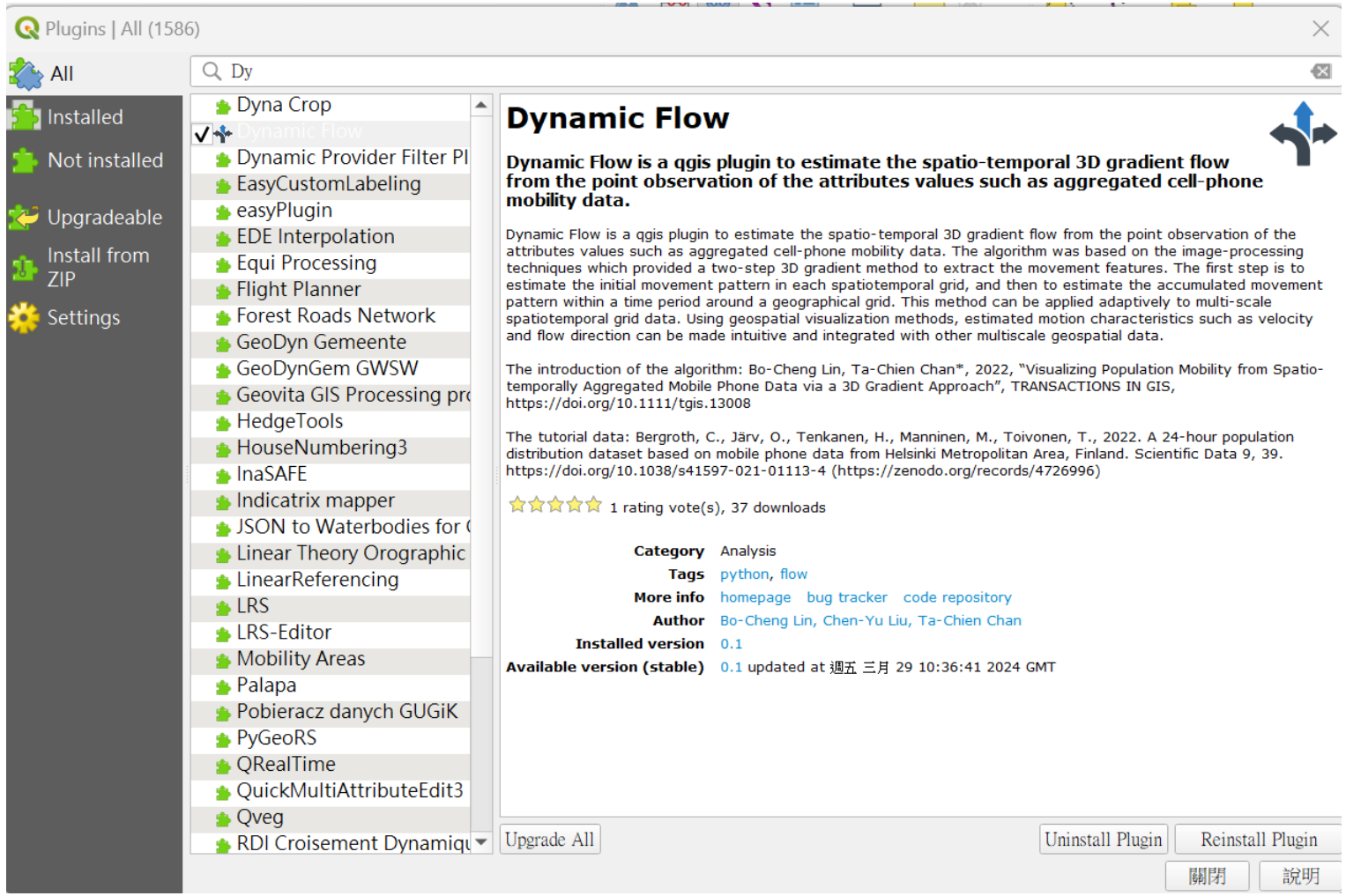
QGIS plugin: Dynamic flow

https://plugins.qgis.org/plugins/dynamic_flow/



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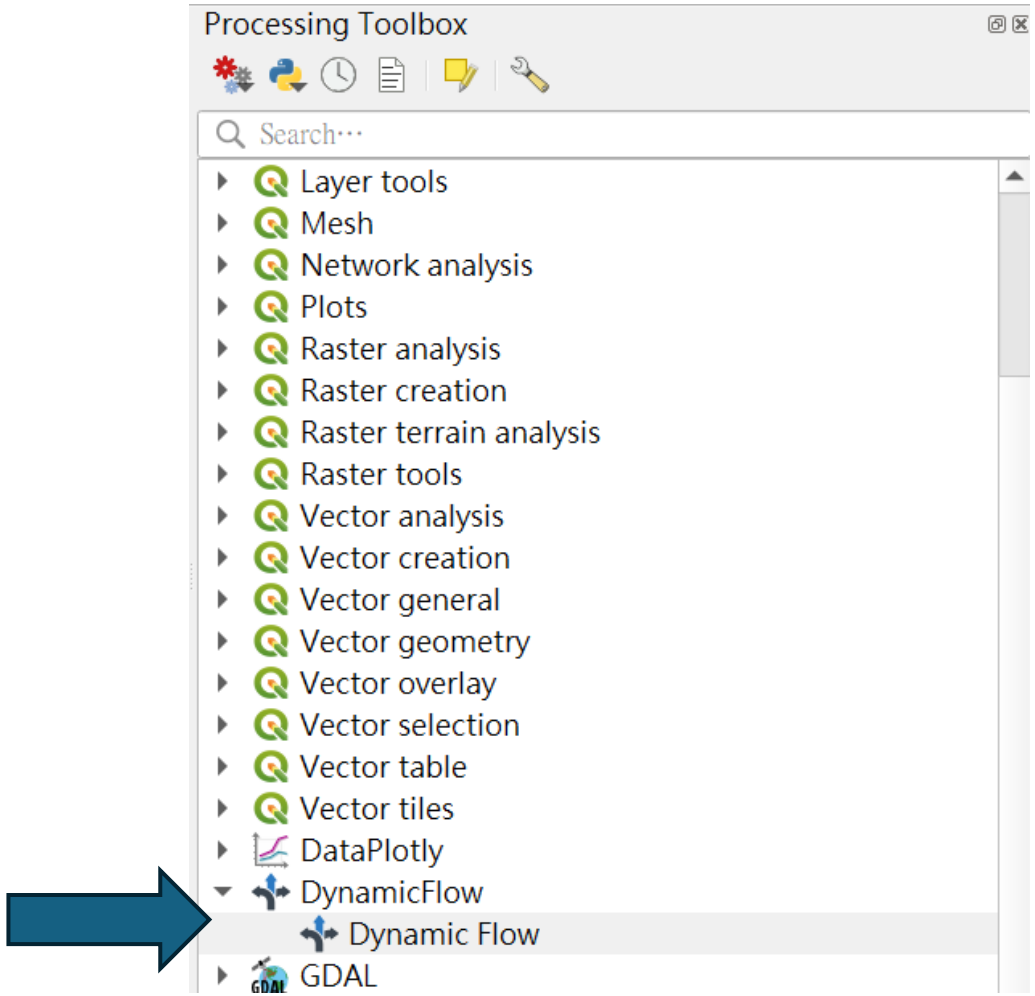
The “Dynamic Flow” plugin will be shown in the Processing Toolbox

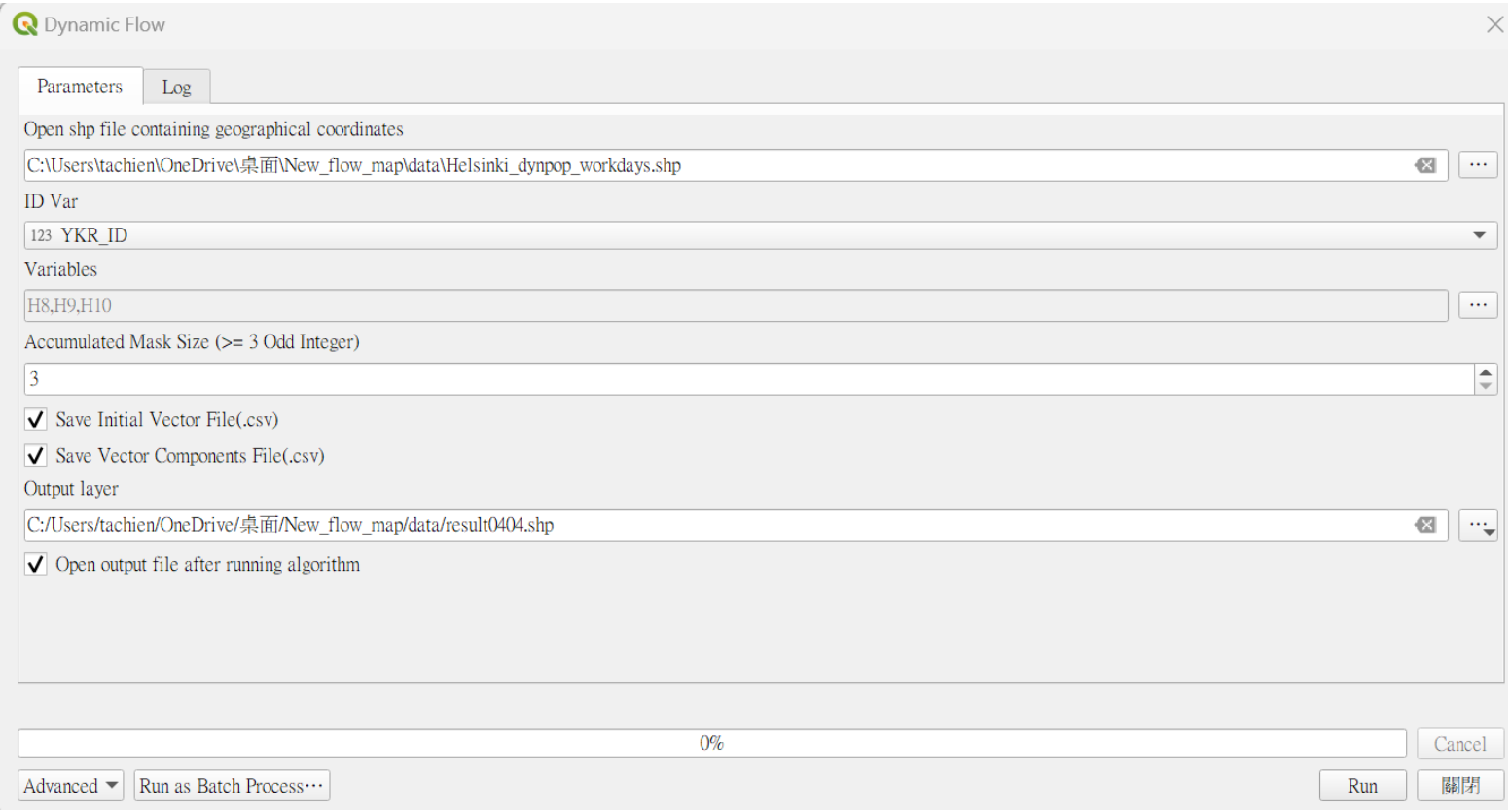


The introduction of the algorithm

- Bo-Cheng Lin, Ta-Chien Chan*, 2022, “Visualizing Population Mobility from Spatio-temporally Aggregated Mobile Phone Data via a 3D Gradient Approach”, TRANSACTIONS IN GIS, https://doi.org/10.1111/tgis.13008

The tutorial data can be download from the website

The tutorial data: Bergroth, C., Järv, O., Tenkanen, H., Manninen, M., Toivonen, T., 2022. A 24-hour population distribution dataset based on mobile phone data from Helsinki Metropolitan Area, Finland. Scientific Data 9, 39. https://doi.org/10.1038/s41597-021-01113-4 (https://zenodo.org/records/4726996)



Step 1: Load the shapefile and select at least three population observation time periods (e.g.: H8, H9, H10)

1. Select the dynamic flow in Processing Toolbox and execute it
2. Open the SHP file: Select the SHP file to import.
3.Grid ID: Enter the name of the grid number field
4. Time period: Select at least 3 consecutive times
5. Accumulated Spatial Mask Size: Accumulated spatial range (set the size of the square mask window, the value must be an odd number)
6.Output Initial Vector File: Whether to output the initial flow result of each time (.csv)
7.Output Vector Components File: Whether to output the components of each initial gradient vector (.csv)
8. Output layer: Output the file name containing the folder location

Preview the data in the shapefile

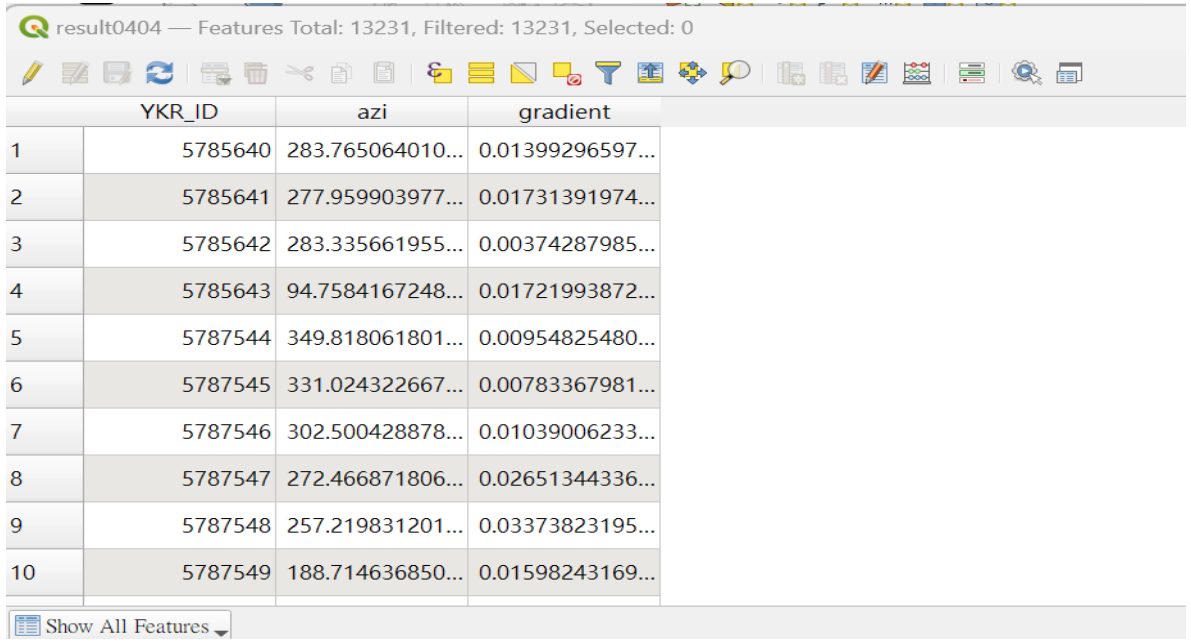
Helsinki_dynpop_workdays — Features Total: 13231, Filtered: 13231, Selected: 0

	YKR_ID	H0	H1	H2	H3	H4	H5	H6
1	5785640	0.00083	0.00078	0.00085	0.00082	0.00075	0.00102	0.00126
2	5785641	0.00185	0.00174	0.00182	0.00177	0.0017	0.00219	0.0025
3	5785642	0.00518	0.00481	0.00489	0.00477	0.00466	0.00593	0.00638
4	5785643	0.00561	0.00524	0.00531	0.0052	0.00512	0.00642	0.00687
5	5787544	0.00088	0.00086	0.00093	0.00092	0.00089	0.00109	0.00128
6	5787545	0.00072	0.00068	0.00074	0.00072	0.00066	0.0009	0.00111
7	5787546	0.00068	0.00064	0.0007	0.00067	0.00062	0.00084	0.00104
8	5787547	0.00083	0.00078	0.00085	0.00082	0.00076	0.00102	0.00127
9	5787548	0.00398	0.00388	0.00403	0.00403	0.00406	0.00473	0.0052
10	5787549	0.01456	0.01407	0.01415	0.01419	0.01463	0.0167	0.01716

Show All Features

When importing a SHP file into a grid space (point or area), its attributes must include the grid number (unique identification code, YKR_ID) and data for at least three time periods.

Preview the output layer



	YKR_ID	azi	gradient
1	5785640	283.765064010...	0.01399296597...
2	5785641	277.959903977...	0.01731391974...
3	5785642	283.335661955...	0.00374287985...
4	5785643	94.7584167248...	0.01721993872...
5	5787544	349.818061801...	0.00954825480...
6	5787545	331.024322667...	0.00783367981...
7	5787546	302.500428878...	0.01039006233...
8	5787547	272.466871806...	0.02651344336...
9	5787548	257.219831201...	0.03373823195...
10	5787549	188.714636850...	0.01598243169...

1. SHP file: fields include grid number, azimuth (azi) and gradient value (gradient)

Preview the output CSV file

flowestimated_h7toh12_initvec — Features Total: 13231, Filtered: 13231, Selected: 0

Inivec.csv

	field_1	YKR_ID	centroid	A2	G2	A3	G3
6	5	5787545	POINT (38137...	348.27331767...	0.0147725827...	345.01974287...	0.0115602897...
7	6	5787546	POINT (38162...	323.03527676...	0.0232604471...	323.71261018...	0.0168280480...
8	7	5787547	POINT (38187...	295.20935485...	0.0398583592...	290.06258764...	0.0296348359...
9	8	5787548	POINT (38212...	278.26626846...	0.1106015985...	275.03908798...	0.0955133095...
10	9	5787549	POINT (38237...	291.62923570...	0.0496766585...	277.38833654...	0.0345770950...
11	10	5787550	POINT (38262...	91.614457806...	0.1340250853...	94.512551035...	0.1152315421...

flowestimated_h7toh12_vcomp — Features Total: 13231, Filtered: 13231, Selected: 0

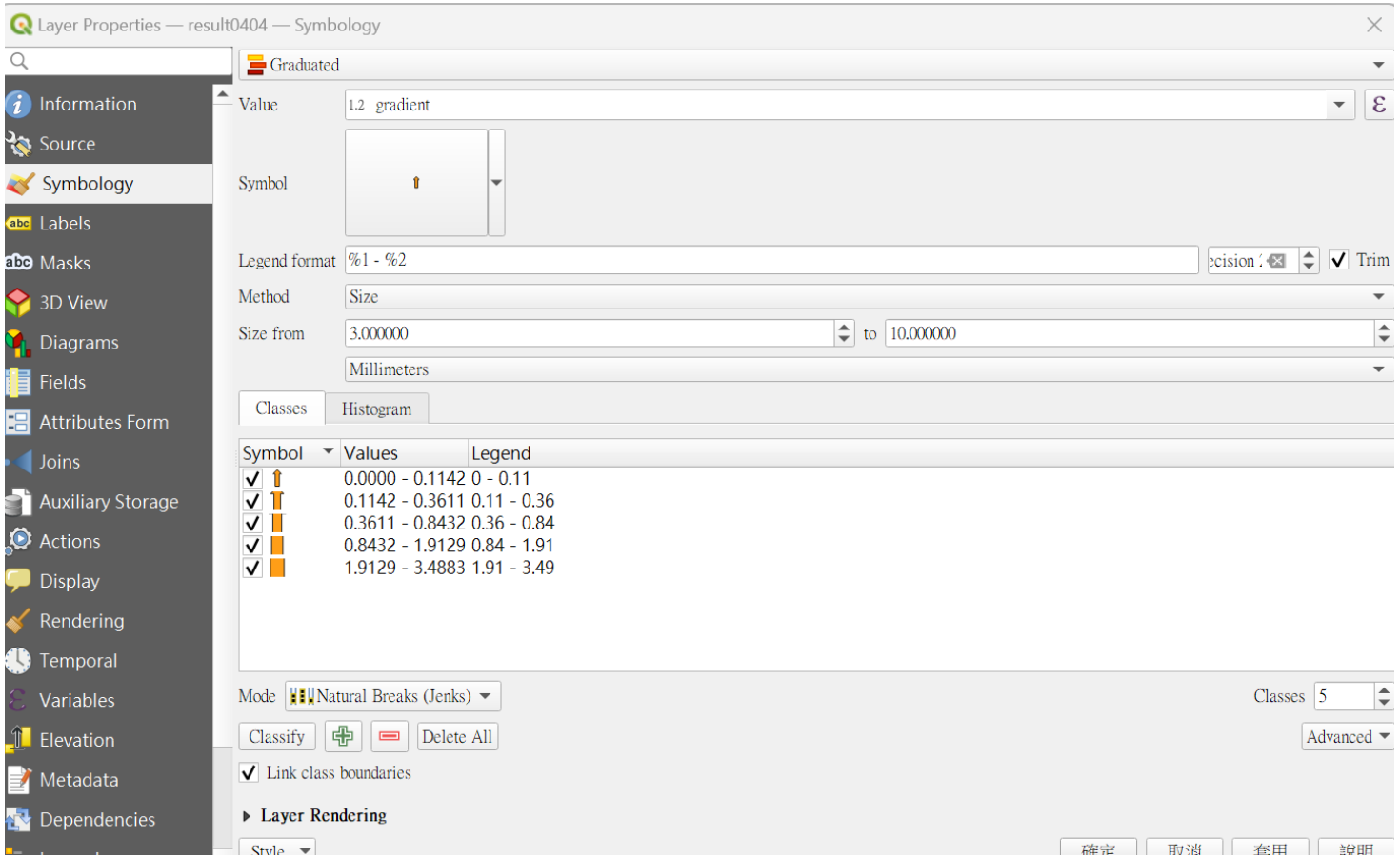
vcomp.csv

	field_1	YKR_ID	centroid	v_2_x	v_2_y	v_2_z	v_3_x
6	5	5787545	POINT (38137...	0.1854787380...	-0.893547205...	-0.408865539...	0.2534538539...
7	6	5787546	POINT (38162...	0.5623279696...	-0.747191140...	-0.354249424...	0.5811725751...
8	7	5787547	POINT (38187...	0.8409779191...	-0.395901896...	-0.368805949...	0.9175012837...
9	8	5787548	POINT (38212...	0.9583948279...	-0.139238493...	-0.249182655...	0.9890768150...
10	9	5787549	POINT (38237...	0.6244381352...	-0.247601194...	-0.740790566...	0.9211300134...
11	10	5787550	POINT (38262...	-0.982129574...	0.0276813850...	-0.186159180...	-0.995126836...

2. CSV file:

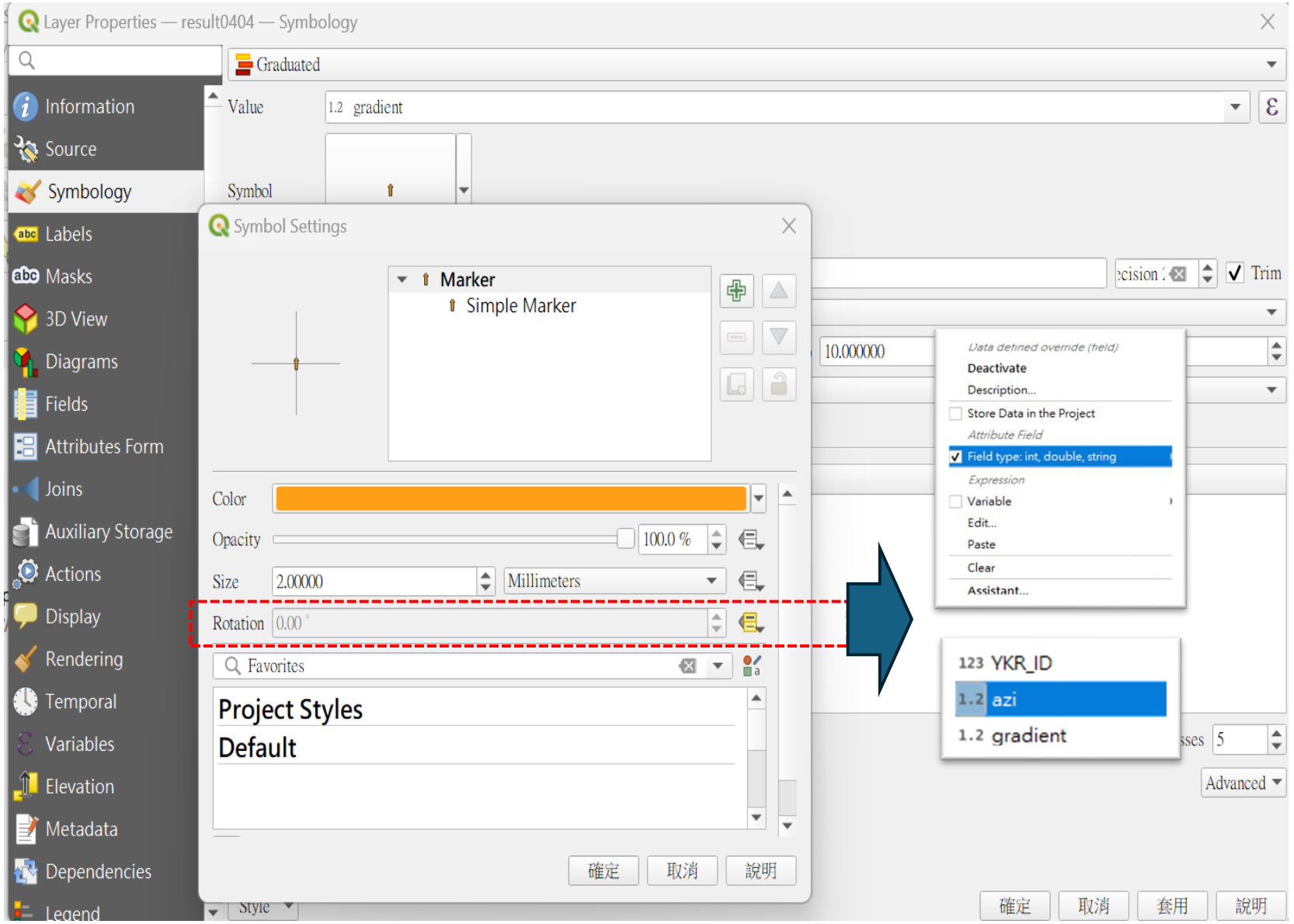
- Original file name_initvec.csv: It is the initial vector of each period. The Ai field represents the azimuth of the i-th period, and the Gi field represents the gradient of the i-th period.

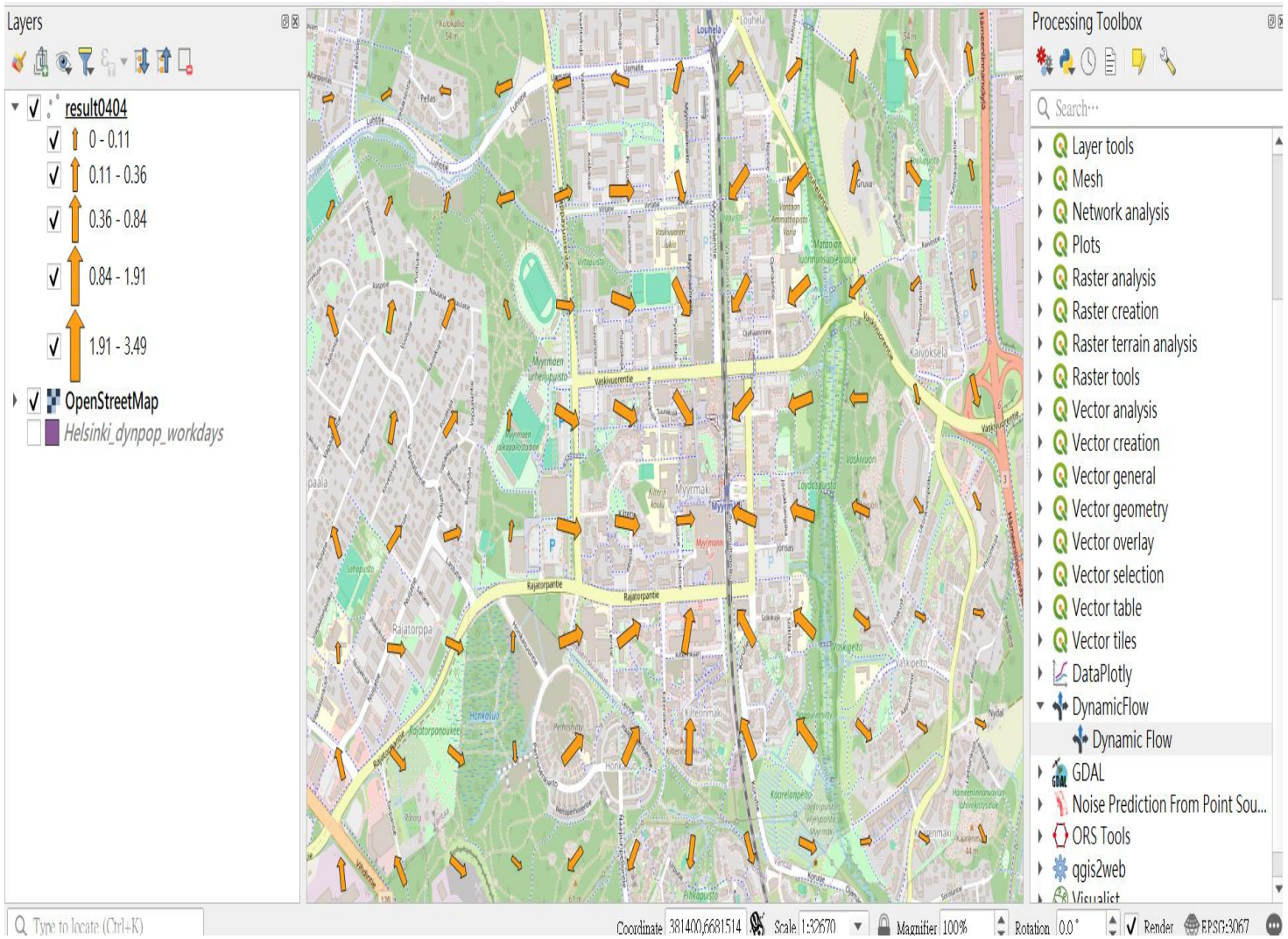
- Original file name_vcomp.csv: It is the three components of the initial vector of each period, v_i_x represents the gradient x component of the i-th period, v_i_y represents the gradient y component of the i-th period, v_i_t represents the gradient of the i-th period t component



Step 2: Visualize the gradients and flow direction

1. Start the symbology
2. Select Grading as the symbol type.
3. Select the gradient of the value
4. Click on the symbol: - Simple mark changes to arrow symbol
- Turn on advanced spin options
- Click the field type, a window will pop up to provide selectable numeric fields, and then select the orientation field
5. Method selection size
6. Set size to...
7. Select Natural Breaks in the classification mode Mode.
8. Press the sort button
9.Finally press OK





Step 3: Overlay the OpenStreetMap (OSM) and observe the specific POI