

Computer Aided Archaeology

09 - GIS II

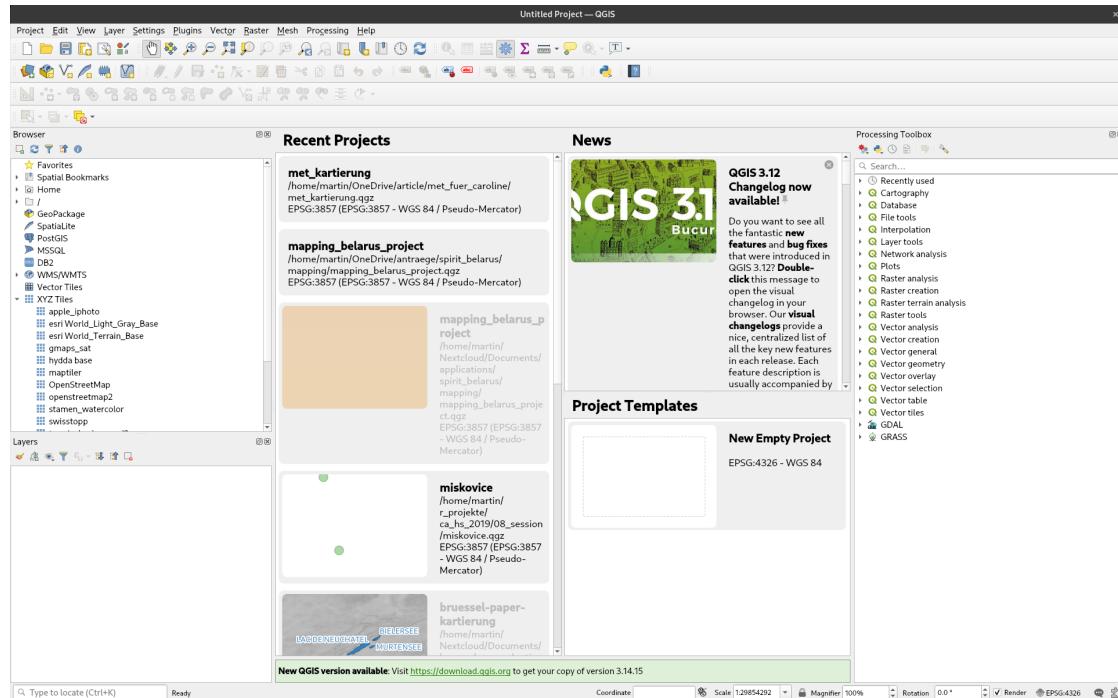
Martin Hinz

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24/11/21

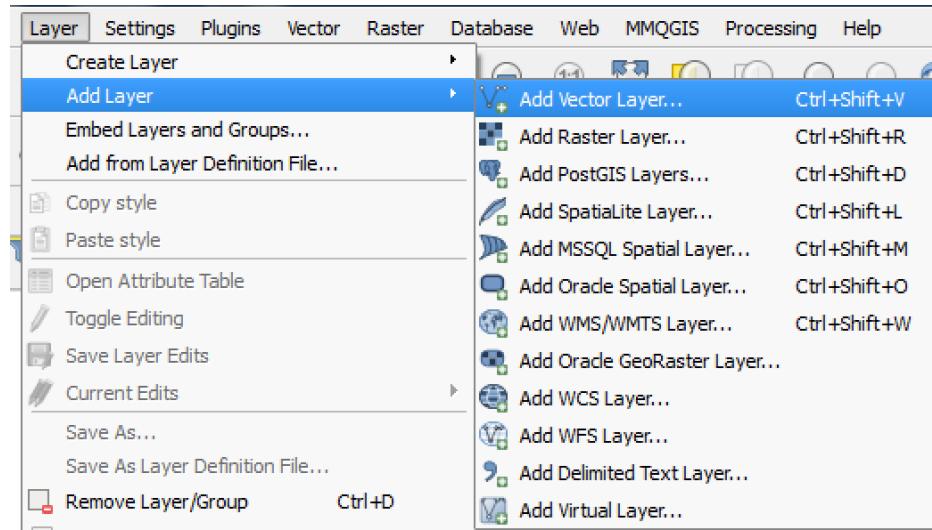
Importing Vector Data

Shape Files



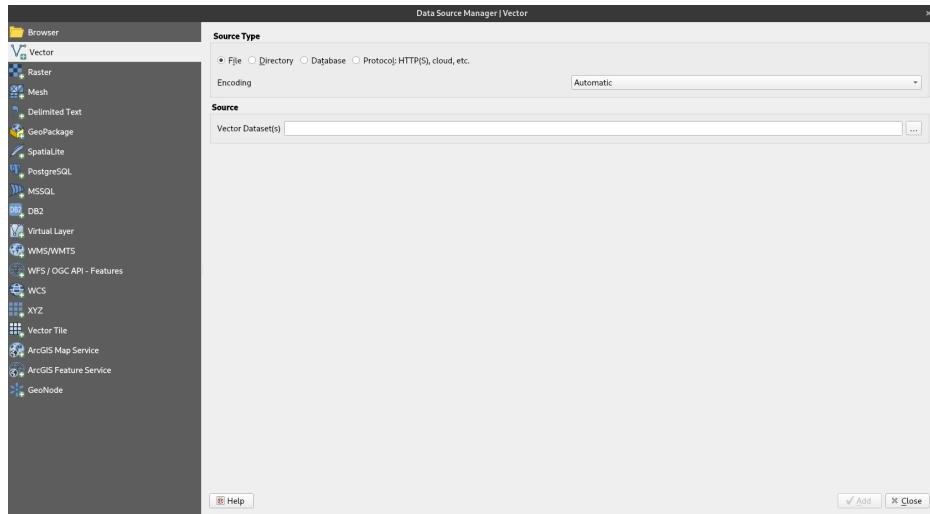
Importing Vector Data

Shape Files



Importing Vector Data

Shape Files



Importing Vector Data

Shape Files

CSV-Files

- General (textbased) spreadsheet format
- simple and robust

CSV-Files

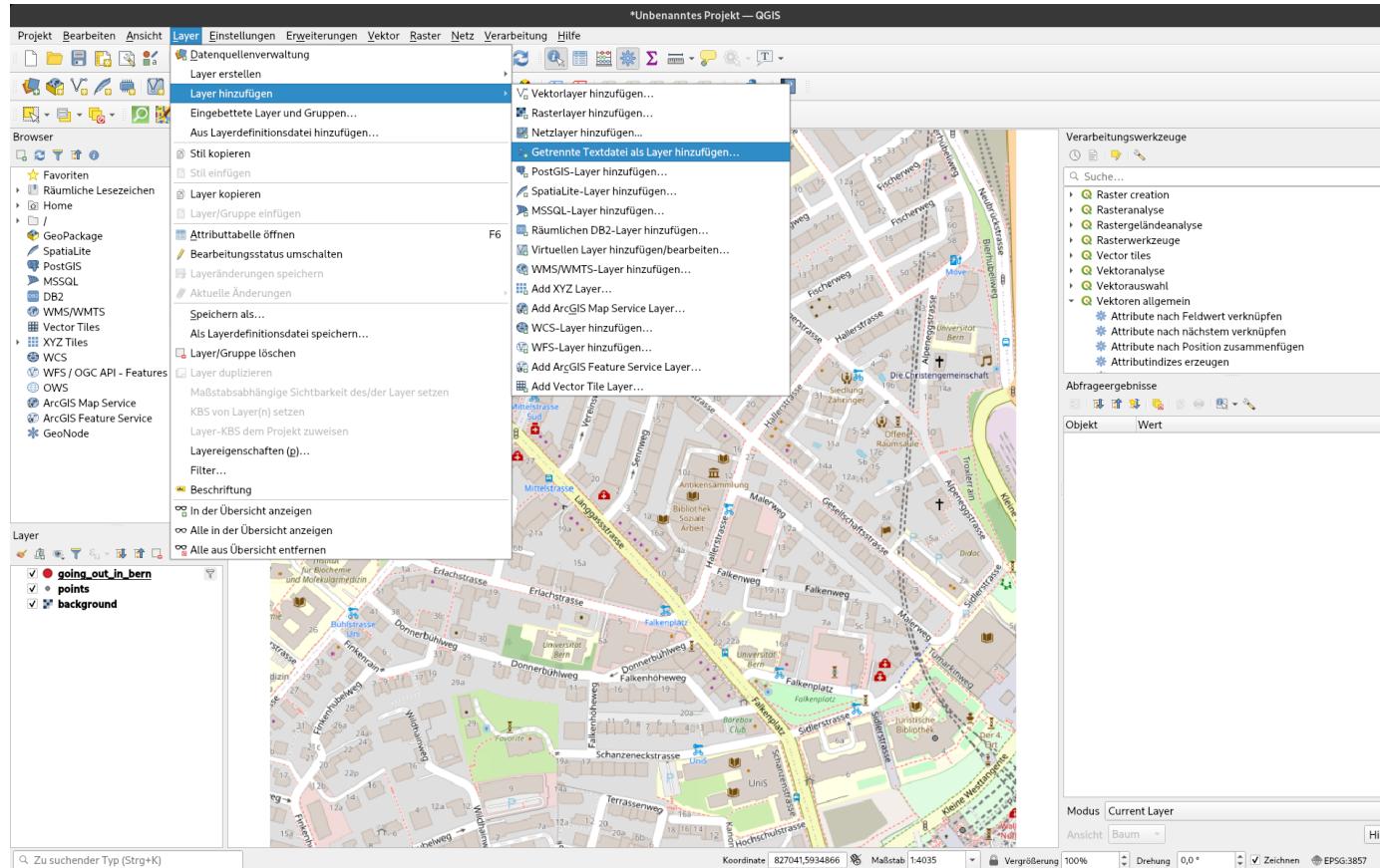
- Perfect for data exchange between Spreadsheet (Excel) and GIS

Screenshot of a CSV file in LibreOffice Calc:

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P		
1	Y	63116	pos_id	name	type	amenity	wheelchair	covered_name	network	opening_hours	operator	website	description	layer	location	contact_website	
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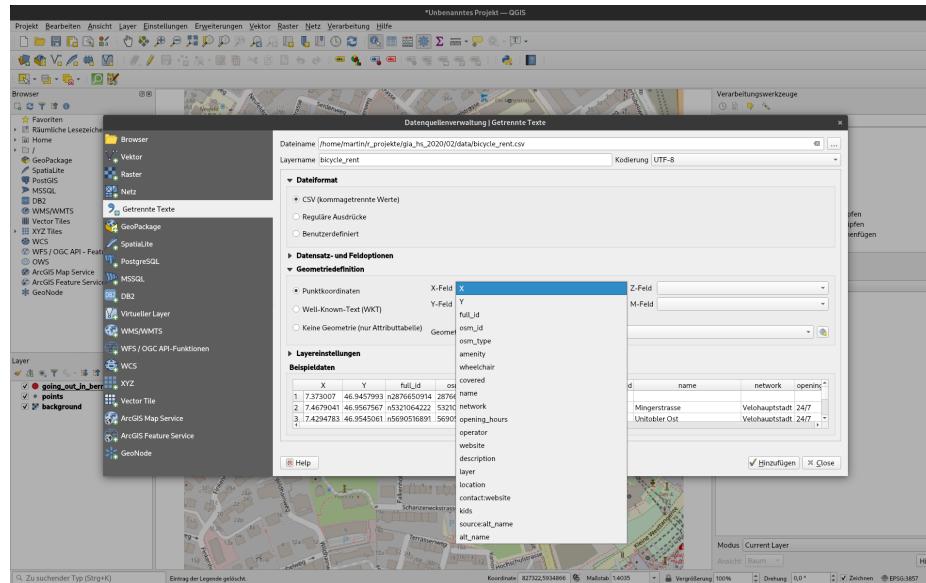
CSV Import

Load Text Layer



CSV Import

Set coordinate columns

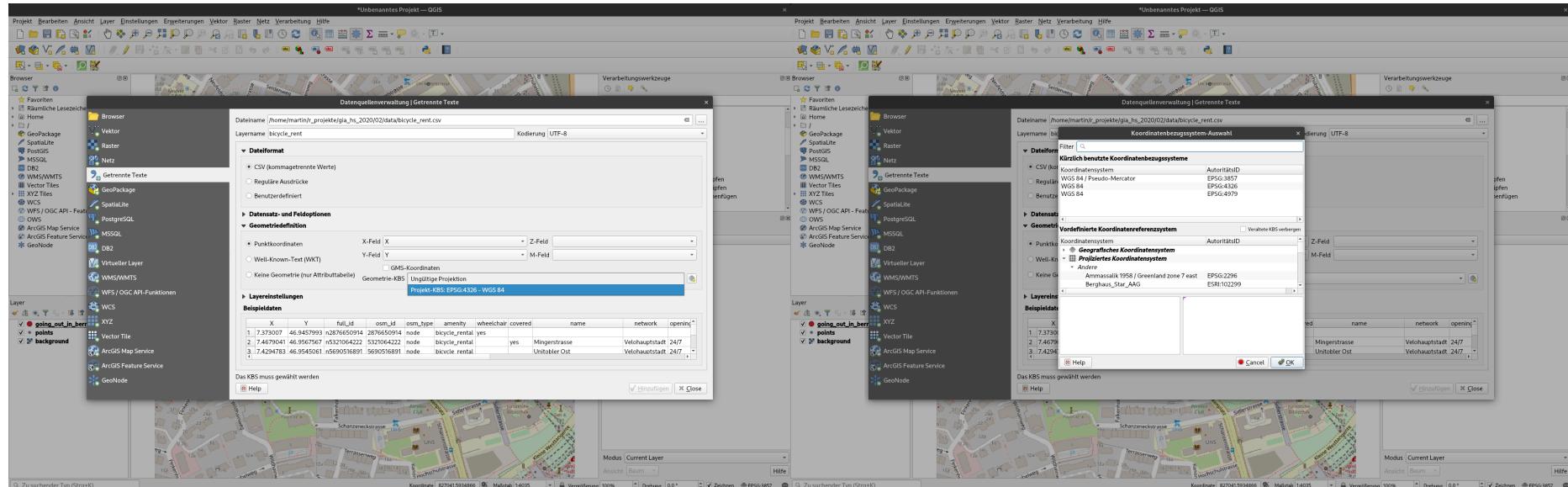


CSV Import

Set coordinate columns

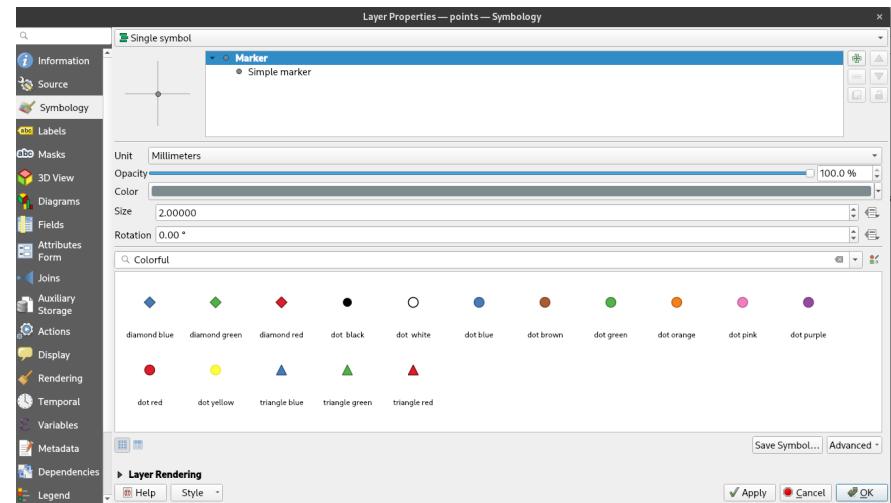
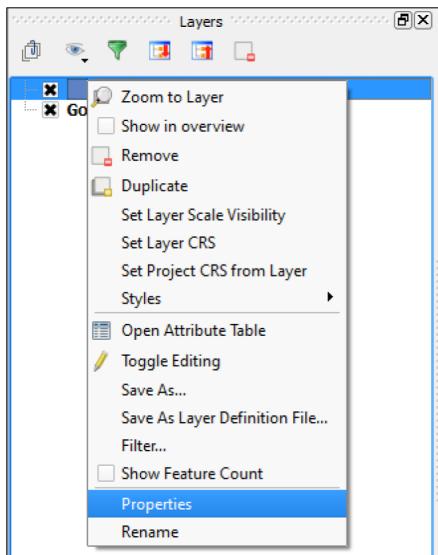
and Coordinate Reference System

You can also access more detailed Coordinate Reference settings.



Styling Features

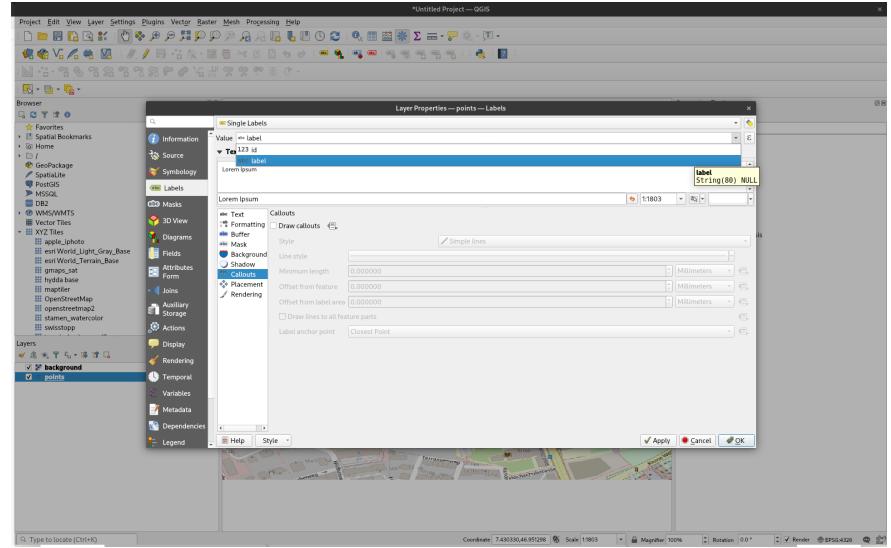
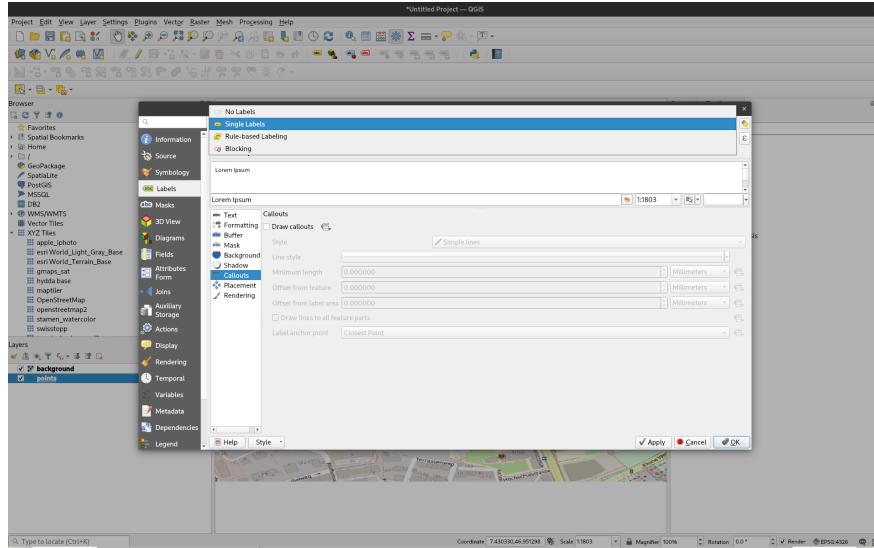
- Right-click the layer and select the Properties option
- Select "Symbology," and style as you like



For more Styling Options watch the [Video from the GIS Course](#)

Add labels to data

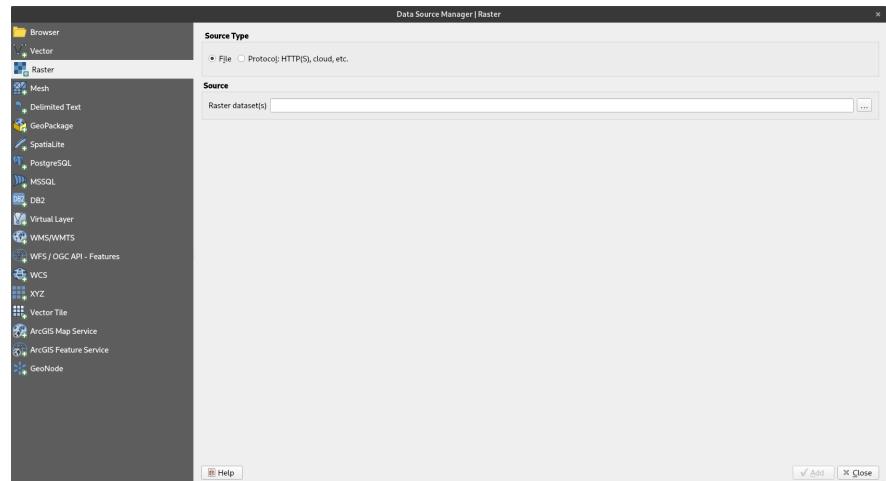
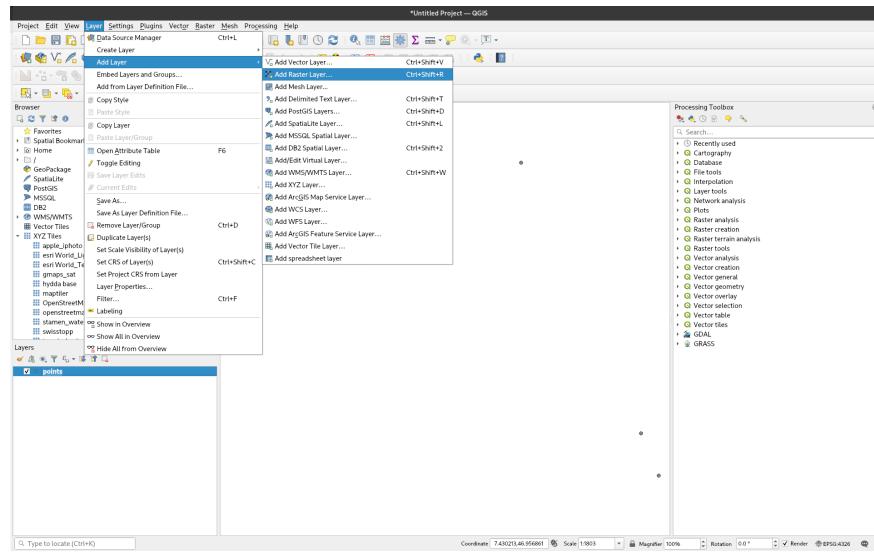
- From Properties, select "Labels", "Show labels"
- Select attribute for label (this time "label")
- Style as you like



For more Labeling Options watch the [Video from the GIS Course](#)

Importing Raster Data

GeoTiffs



Importing Raster Data

GeoTiffs

Layers

- Layers on top are drawn on top
- Just drag and drop within the Layers Panel to change order

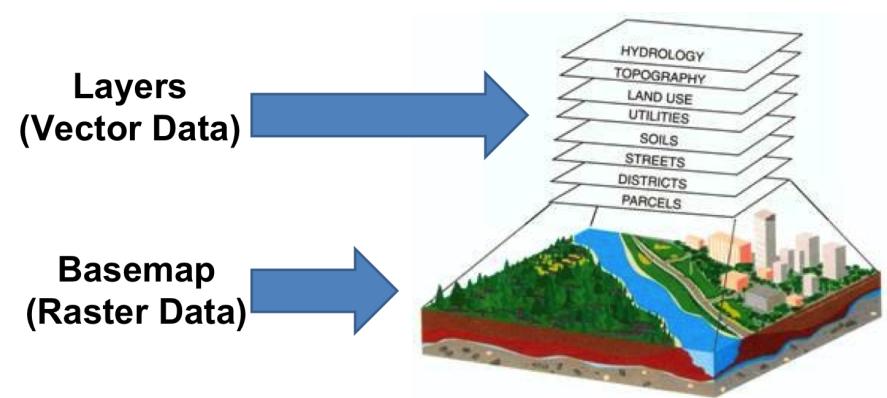


Image Source: <http://www.geocontrolling.com/co-je-gis.htm>

Choosing a Base Map

- Think about what someone reading your map needs to see for context
- Think about how the base map interacts with the data on your map

Hierarchy

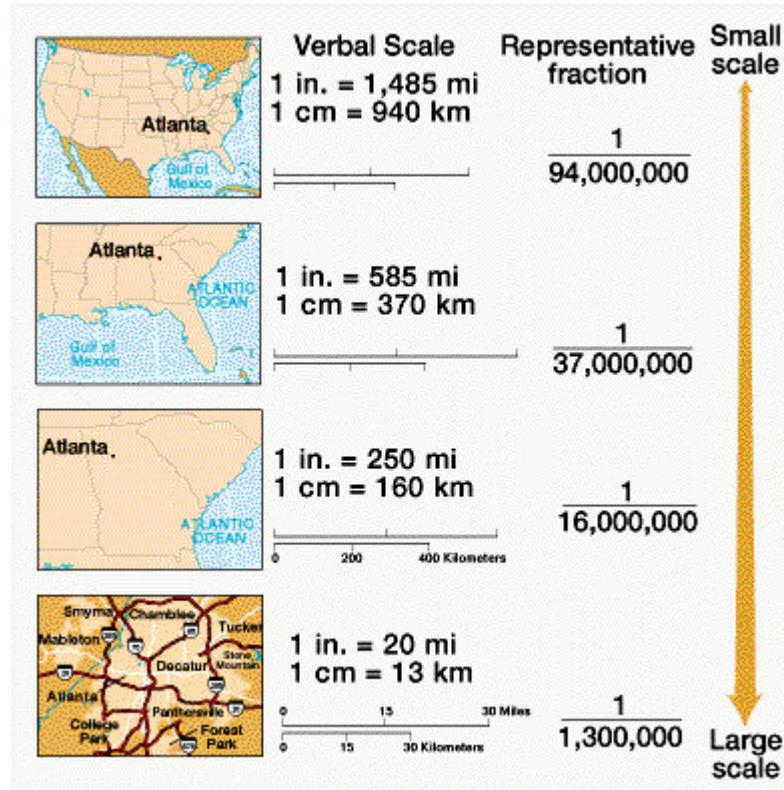
- If your data is the most important part of the map, make sure it looks more important than the base map
- Avoid base maps that strongly emphasize features that aren't relevant on your map

Colors

- Choose base maps with colors that complement the colors on your map
- The contrast between the color on your map and the color on the base map should be enough to make your layers clearly visible

Base Maps - Scale

- Base maps show different levels of detail at different scales
- Make sure the level of detail is appropriate to your map

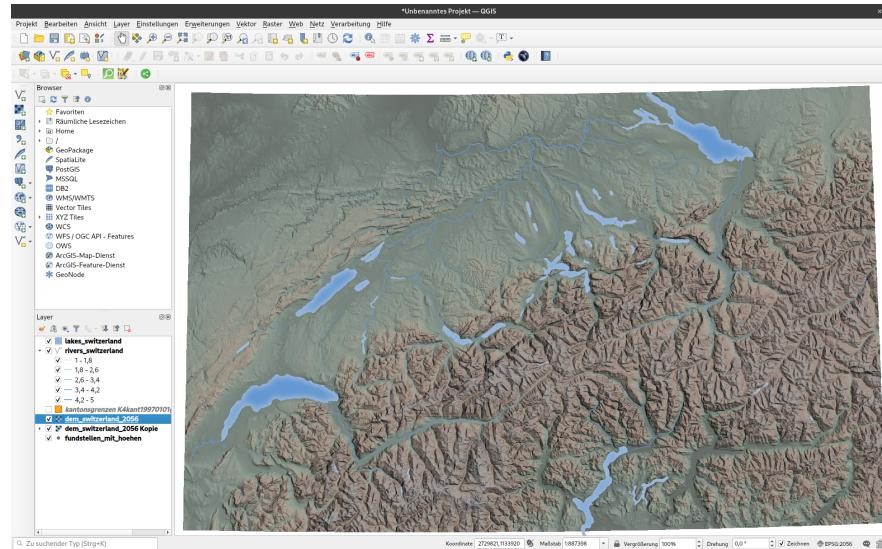


Source:

http://go.owu.edu/~jbkrygie/krygier_html/geog_222/geog_222_lo/geog_222_lo04.html

Background Maps - Options

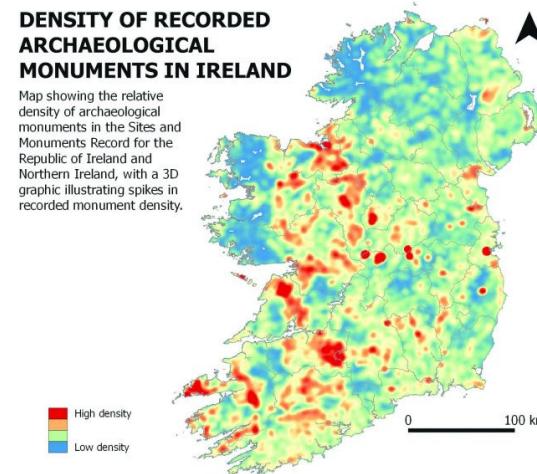
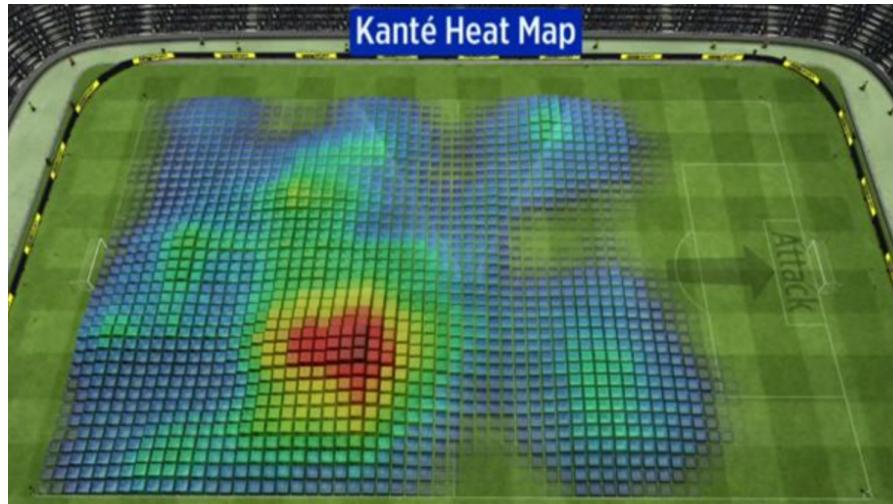
- use a scanned georeferences map
 - will look a bit awkward most of the times
- use a preproduced background map (eg. <https://www.naturalearthdata.com>)
 - useful for small scale background maps
- use a background map from a plugin (eg. the [QuickMapServices Plugin](#))
 - useful, if man made features are not a disturbing factor
- Build a background map from scratch
 - Probably the best results, but also the most complicated



A background map from scratch using elevation and waterbody information and hillshading

Visualising densities - Heatmaps

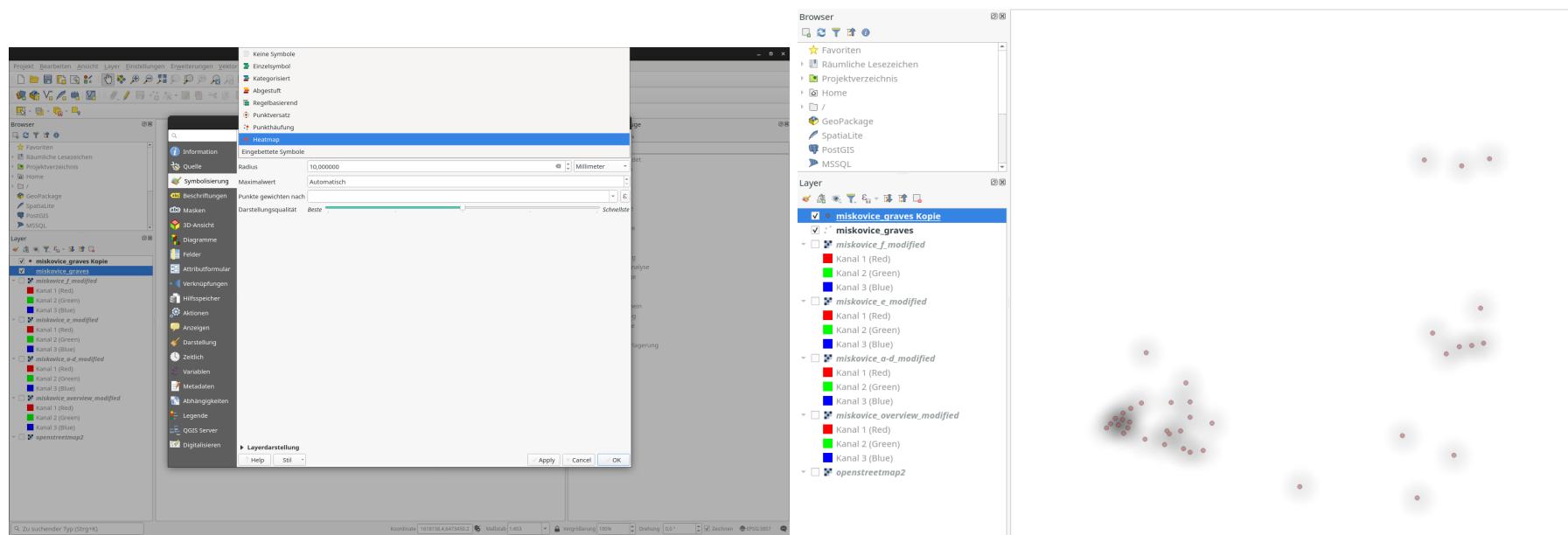
- Heatmaps are one of the best visualization tools for dense point data
- Heatmap is an interpolation technique that useful in determining density of input features
- Heatmaps are most commonly used to visualize crime data, traffic incidents etc.
- QGIS has a heatmap renderer that can be used to create an raster from a point layer.



Source: Berner Zeitung; <https://archaeologyireland.ie/>

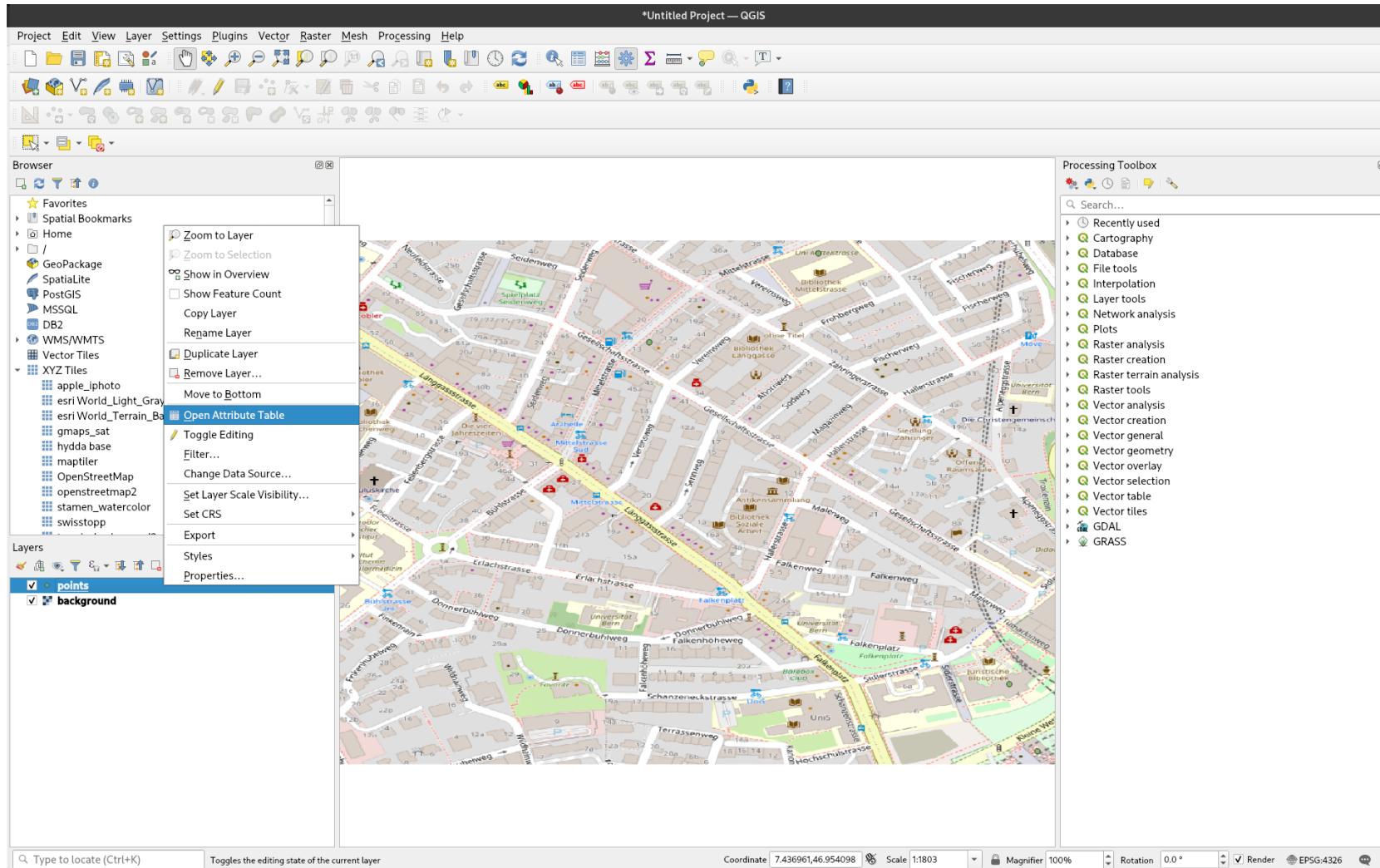
Heatmap in QGIS - Most simple solution

- right click on layer > Duplicate Layer
- right click on layer > Properties > Symbology > Heatmap
- enjoy a really simple heatmap



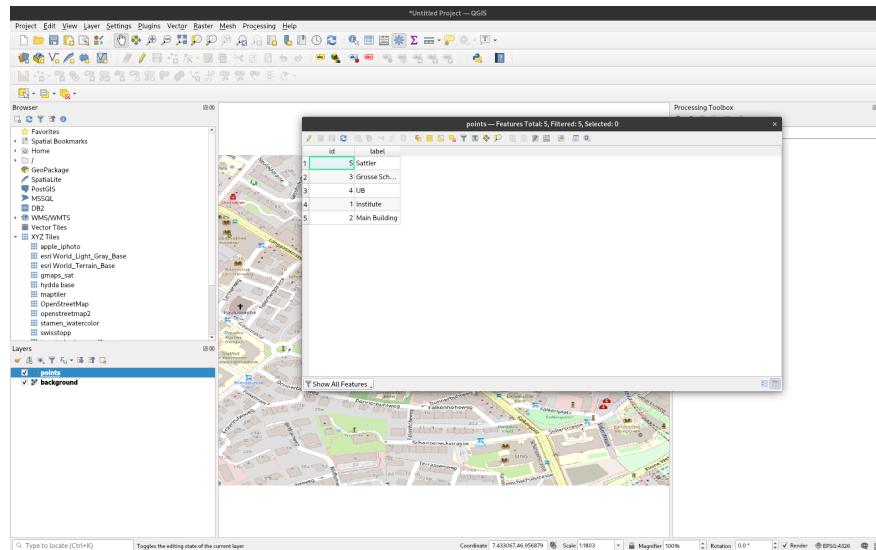
More complicated: watch the [Video from the GIS Course](#)

Attribute Table (Right click on layer)

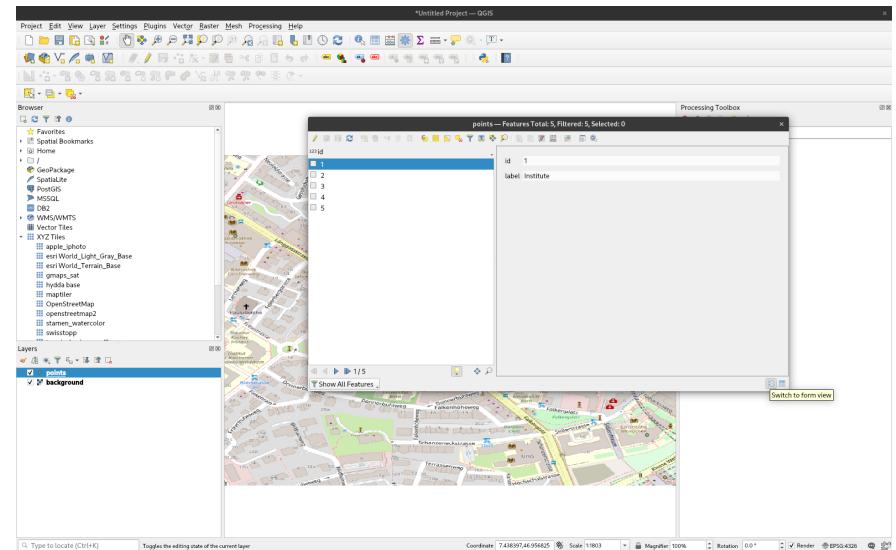


Attribute Table

Table View

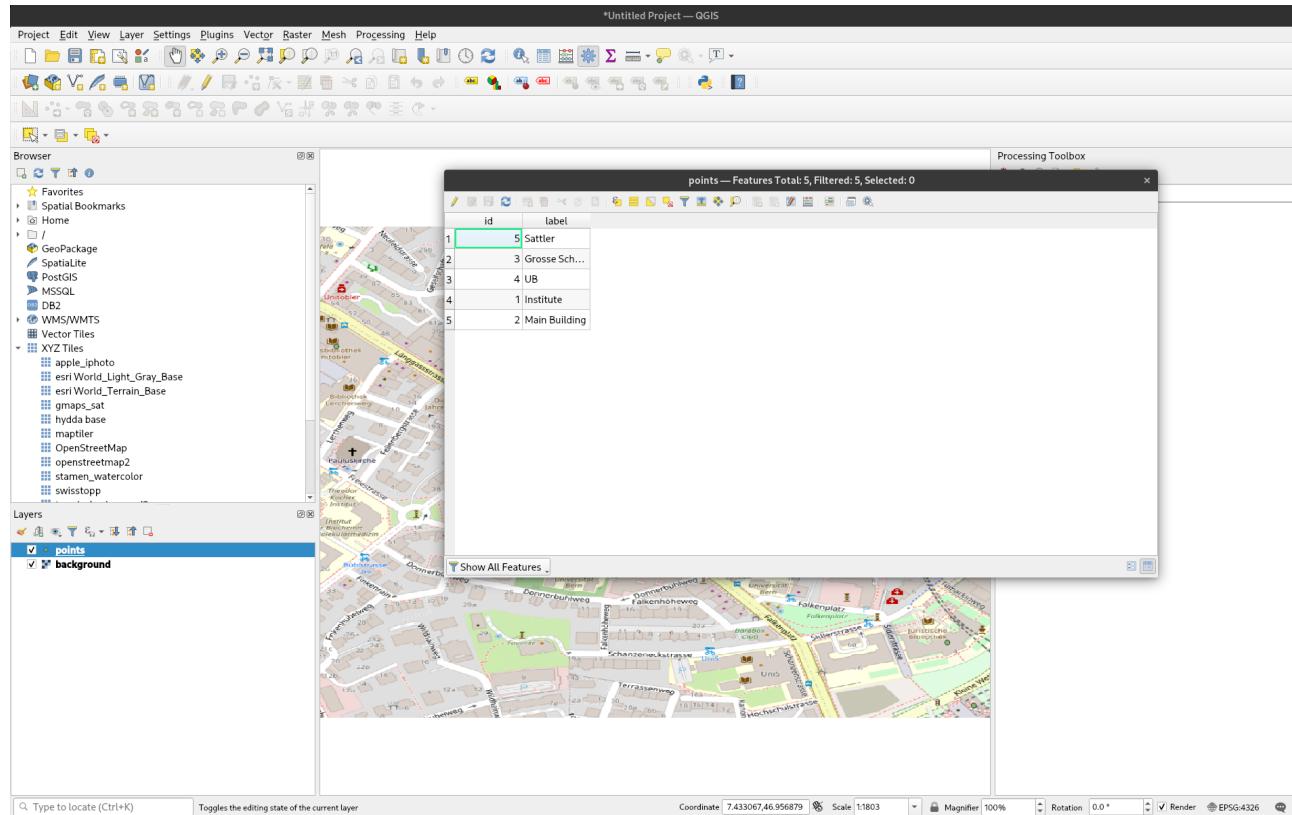


Form View



Shapefiles and Attribute Tables

- Column names can only be letters, numbers, and underscores "_"
- Column names can only be ten characters long



Basic Thematic Mapping

or: put data to your map

- simple: 1:1 relationship
- advanced: preparing pivot table and plotting eg. diagrams for that relationship
- a bit more complex: 1:m relationships

Simple: 1:1 relationship

1. Save your data to a csv

The screenshot shows two windows of LibreOffice Calc. The top window displays a table with the following data:

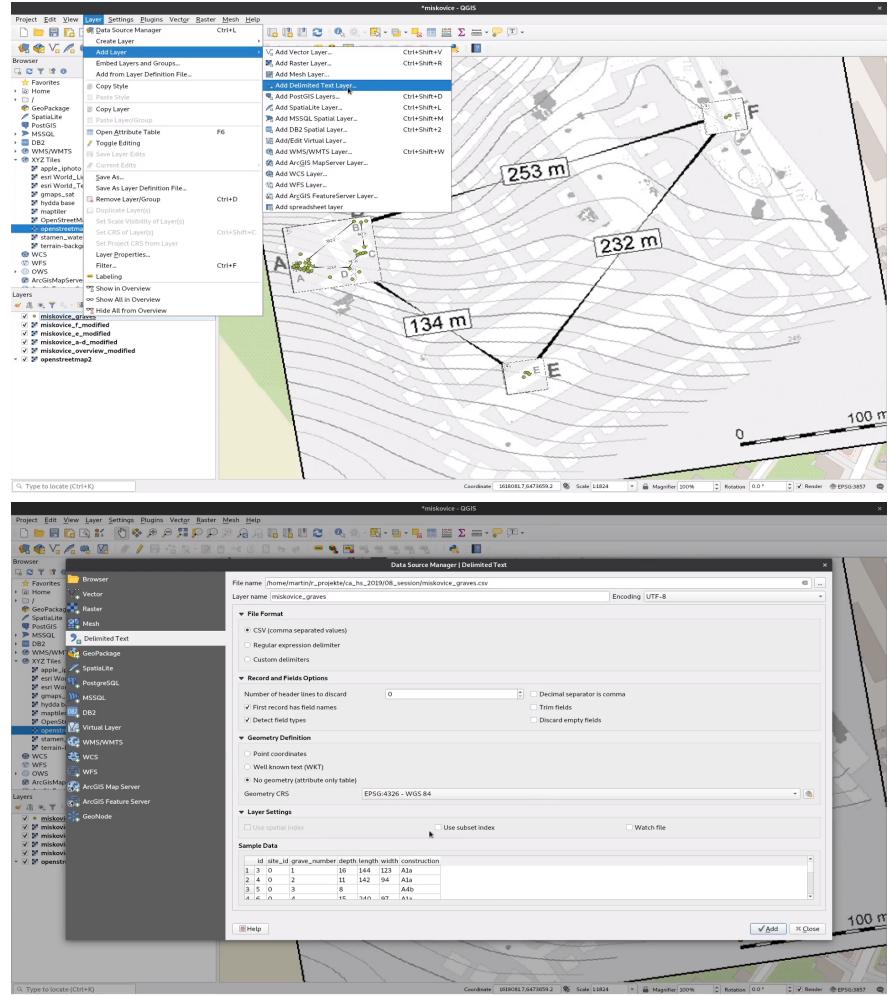
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2	C	2	15	142	94	A1a
3	D	3	20	130	98	A1b
4	E	4	16	130	98	A1b
5	F	5	16	130	98	A1b
6	G	6	17	137	102	B1
7	H	7	17	137	102	B1
8	I	8	17	137	102	B1
9	J	9	17	137	102	B1
10	K	10	17	183	98	A1a
11	L	11	17	183	98	A1a
12	M	12	17	183	98	A1a
13	N	13	17	183	98	A1a
14	O	14	17	183	98	A1a
15	P	15	17	183	98	A1a
16	Q	16	17	183	98	A1a
17	R	17	17	183	98	A1a
18	S	18	17	183	98	A1a
19	T	19	17	183	98	A1a
20	U	20	17	183	98	A1a
21	V	21	17	172	62	A1a
22	W	22	17	172	62	A1a
23	X	23	17	172	62	A1a
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25	Z	25	25	175	108	A1b
26	A	26	25	175	108	A1b
27	B	27	25	175	108	A1b
28	C	28	25	175	108	A1b
29	D	29	25	175	108	A1b
30	E	30	25	175	108	A1b
31	F	31	40	195	142	A2
32	G	32	40	195	142	A2
33	H	33	40	195	142	A2
34	I	34	40	195	142	A2
35	J	35	40	195	142	A2
36	K	36	40	195	142	A2
37	L	37	40	195	142	A2
38	M	38	40	195	142	A2
39	N	39	40	195	142	A2
40	O	40	40	195	142	A2
41	P	41	40	195	142	A2
42	Q	42	40	195	142	A2
43	R	43	40	195	142	A2
44	S	44	35	100	60	D

The bottom window shows the 'Save as' dialog box with the following settings:

- Places: My Document
- Name: miskovice_types_per_graves
- File name: miskovice_types_per_graves
- Type: Text CSV (.csv)
- Save with password:
- Encrypt with GPG key:
- Automatic file name extension:
- Edit filter settings:

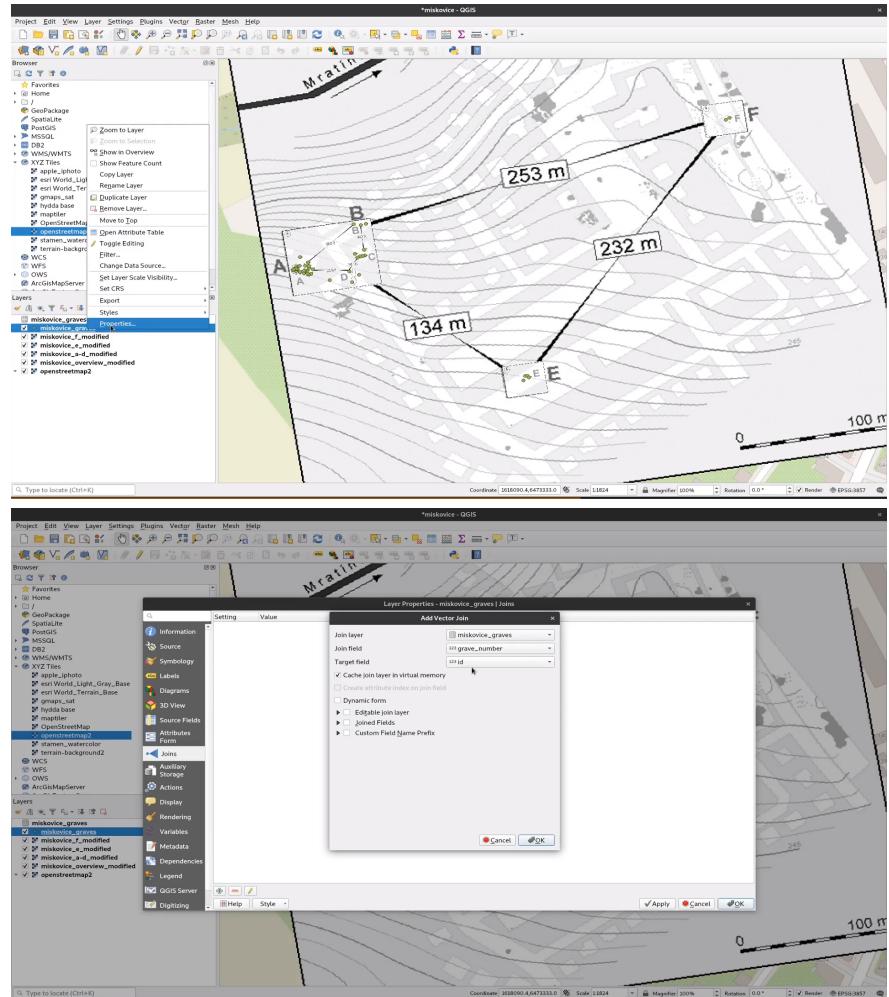
Simple: 1:1 relationship

1. Save your data to a csv
2. Add as Delimited Text Layer without coordinates



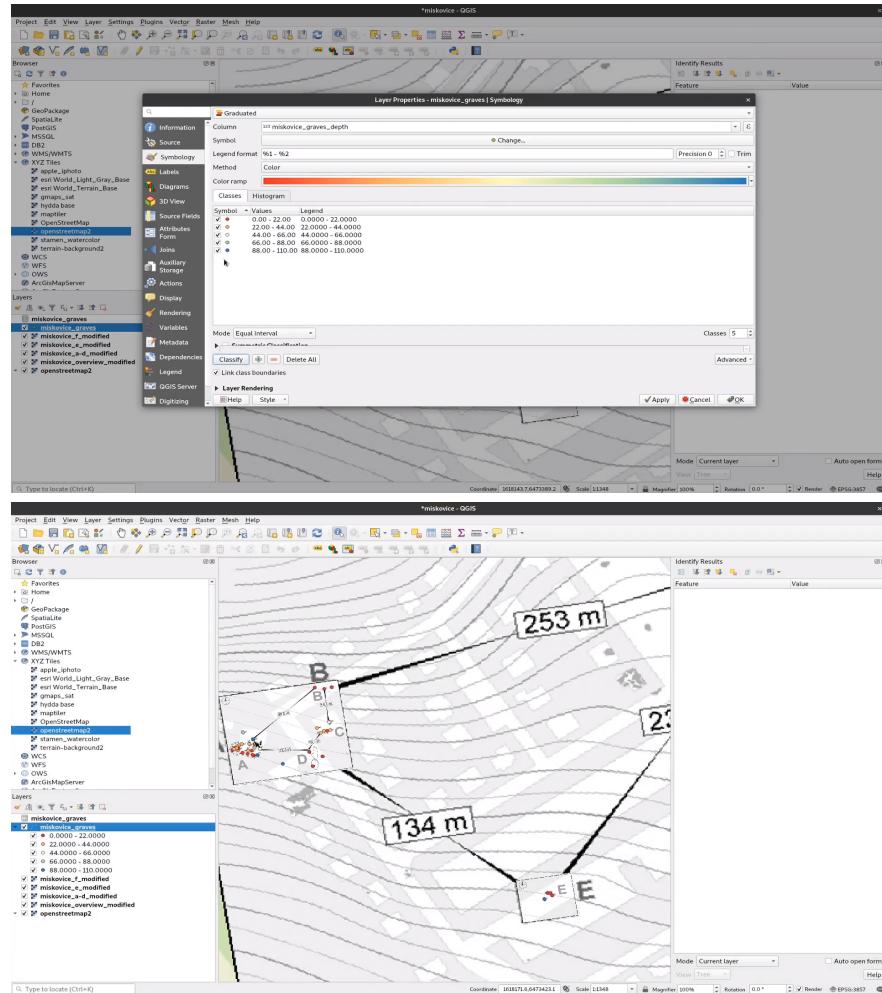
Simple: 1:1 relationship

1. Save your data to a csv
2. Add as Delimited Text Layer without coordinates
3. Join by common attribute (identifier)



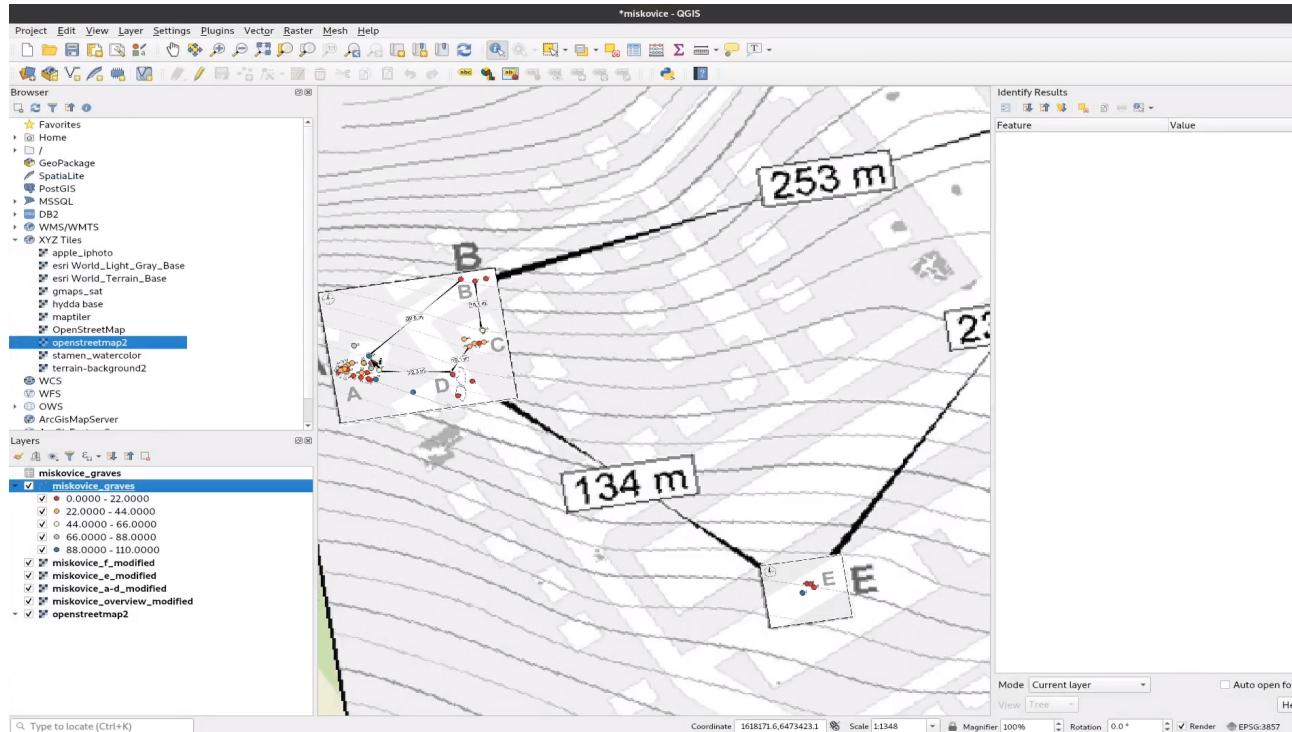
Simple: 1:1 relationship

1. Save your data to a csv
2. Add as Delimited Text Layer without coordinates
3. Join by common attribute (identifier)
4. Use new attributes in symbology



Simple: 1:1 relationship

Result



A map showing you the values of your data in space

Advanced - Diagrams

1. Make a pivot table and save as csv

Advanced - Diagrams

1. Save your data to a csv
2. Add as Delimited Text Layer without coordinates

Advanced - Diagrams

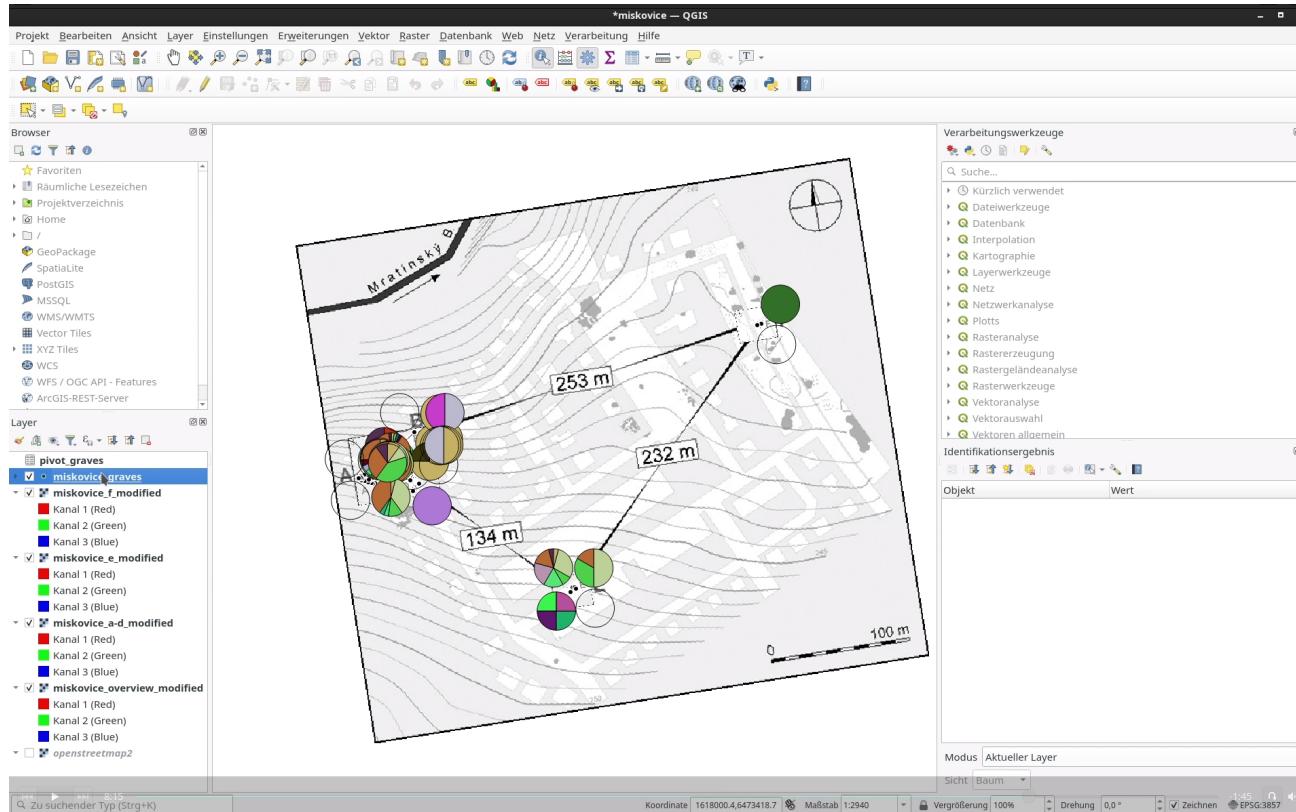
1. Save your data to a csv
2. Add as Delimited Text Layer without coordinates
3. Join by common attribute (identifier)

Advanced - Diagrams

1. Save your data to a csv
2. Add as Delimited Text Layer without coordinates
3. Join by common attribute (identifier)
4. Go to diagrams, select pie chart and add all columns

Advanced - Diagrams

Result



A map enhanced with diagrams.

Complex: 1:m relationships

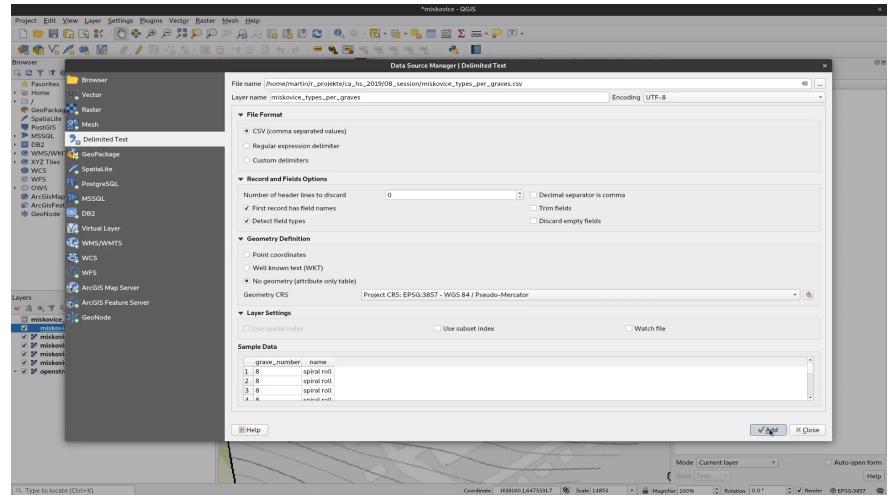
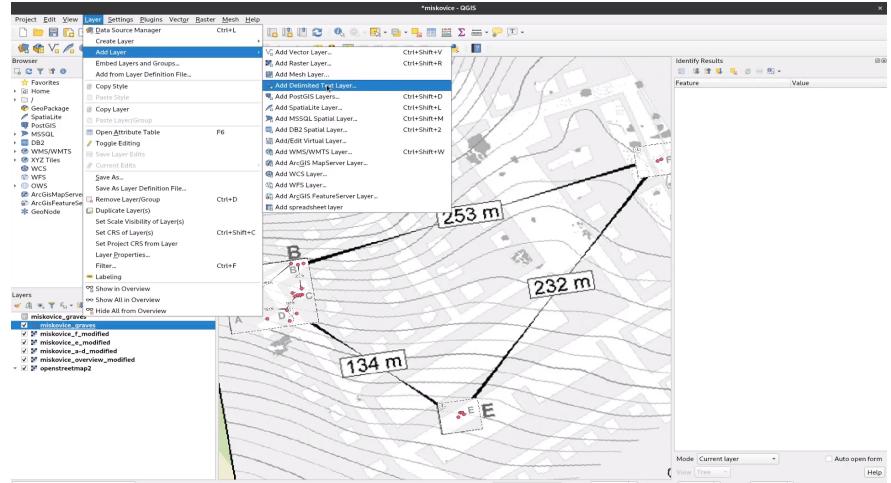
1. Get your data from the database (query) and save as csv

The screenshot shows two instances of LibreOffice Calc. The top instance displays a table with two columns: 'grave_number' and 'name'. The 'grave_number' column contains values from 1 to 40, and the 'name' column contains the word 'spiral roll' repeated 40 times. The bottom instance shows a 'Save as' dialog box, indicating the file is being saved as 'miskovice_graves.csv'.

grave_number	name
1	spiral roll
2	spiral roll
3	spiral roll
4	spiral roll
5	spiral roll
6	spiral roll
7	spiral roll
8	spiral roll
9	spiral roll
10	spiral roll
11	spiral roll
12	spiral roll
13	spiral roll
14	spiral roll
15	spiral roll
16	spiral roll
17	spiral roll
18	spiral roll
19	spiral roll
20	spiral roll
21	spiral roll
22	spiral roll
23	spiral roll
24	spiral roll
25	spiral roll
26	spiral roll
27	spiral roll
28	spiral roll
29	spiral roll
30	spiral roll
31	spiral roll
32	spiral roll
33	spiral roll
34	spiral roll
35	spiral roll
36	spiral roll
37	spiral roll
38	spiral roll
39	spiral roll
40	spiral roll

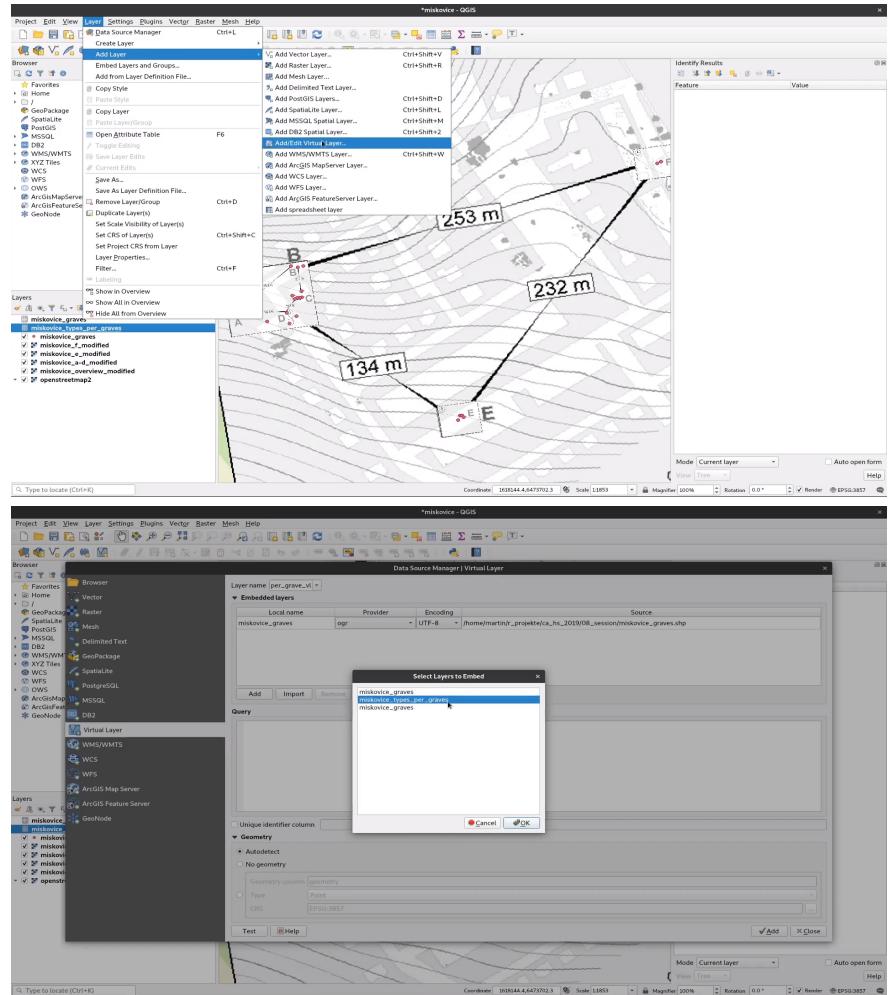
Complex: 1:m relationships

1. Get your data from the database (query) and save as csv
2. Add as Delimited Text Layer without coordinates



Complex: 1:m relationships

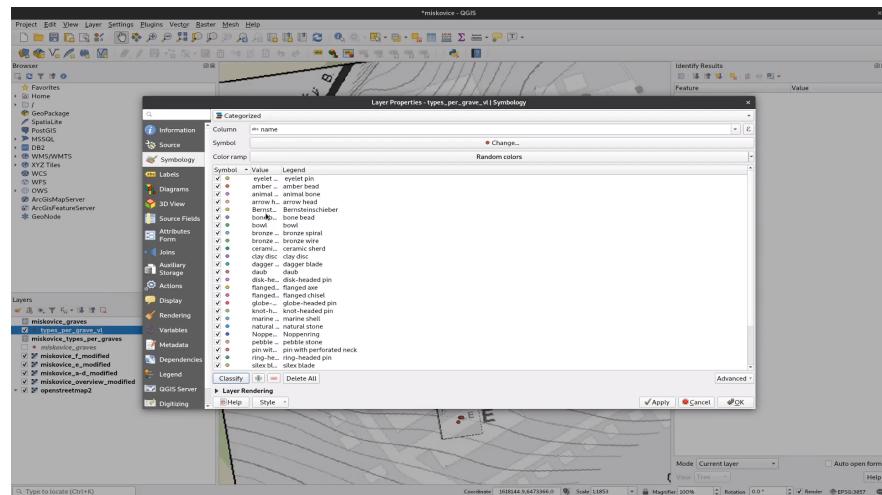
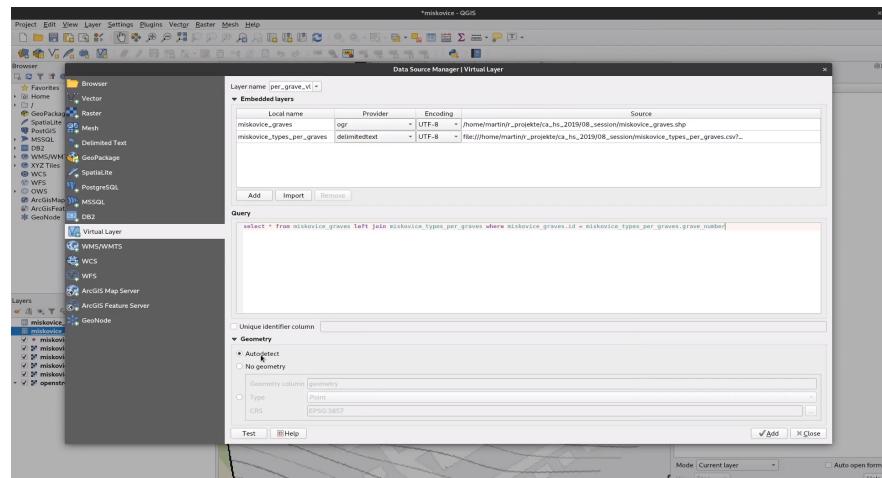
1. Get your data from the database (query) and save as csv
2. Add as Delimited Text Layer without coordinates
3. Add a virtual layer and "import" the "embedded" layers for your spatial (shp) and content informations (csv)



Complex: 1:m relationships

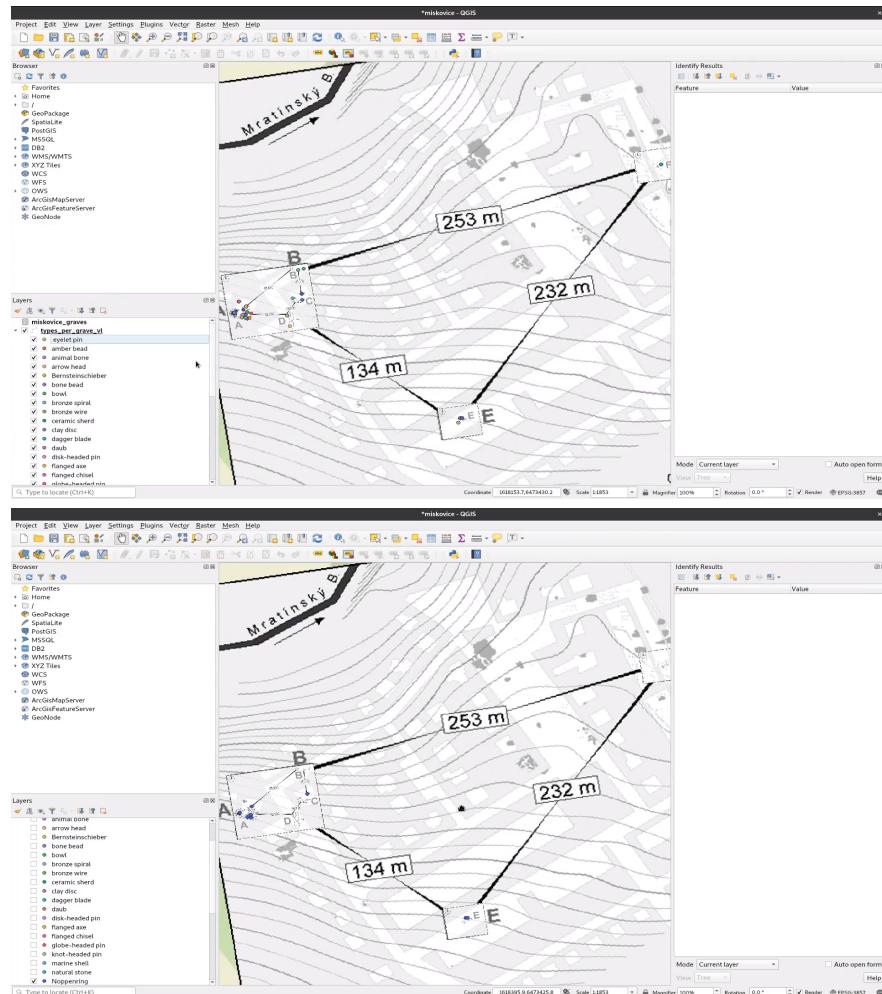
1. Get your data from the database (query) and save as csv
 2. Add as Delimited Text Layer without coordinates
 3. Add a virtual layer and "import" the "embedded" layers for your spatial (shp) and content informations (csv)
 4. Specify your sql query and select categorized from Symbology

```
SELECT * from miskovice_graves  
LEFT JOIN miskovice_types_per_grave  
WHERE miskovice_graves.id =  
miskovice_types_per_grave.grave_number;
```



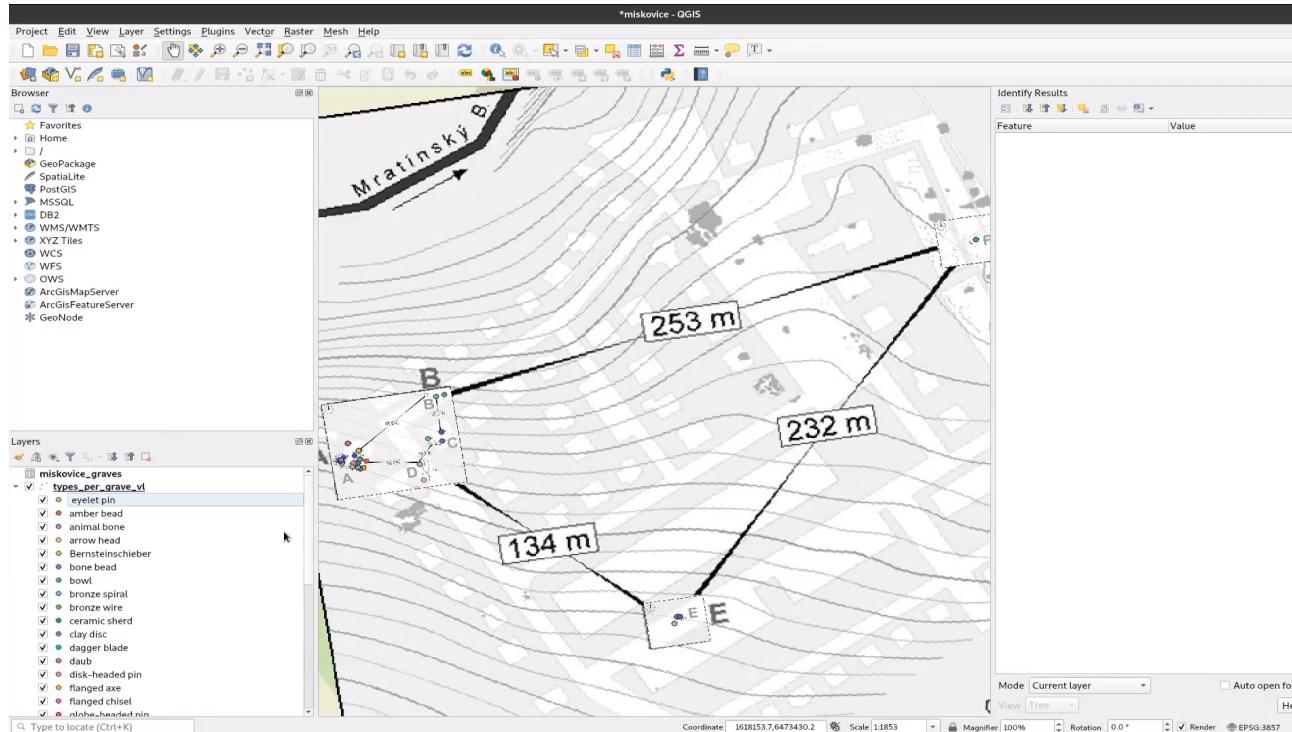
Complex: 1:m relationships

1. Get your data from the database (query) and save as csv
2. Add as Delimited Text Layer without coordinates
3. Add a virtual layer and "import" the "embedded" layers for your spatial (shp) and content informations (csv)
4. Specify your sql query and select categorized from Symbology
5. Your virtual layer now has symbols for different artefact types that you can turn on and off



Advanced - Diagrams

Result

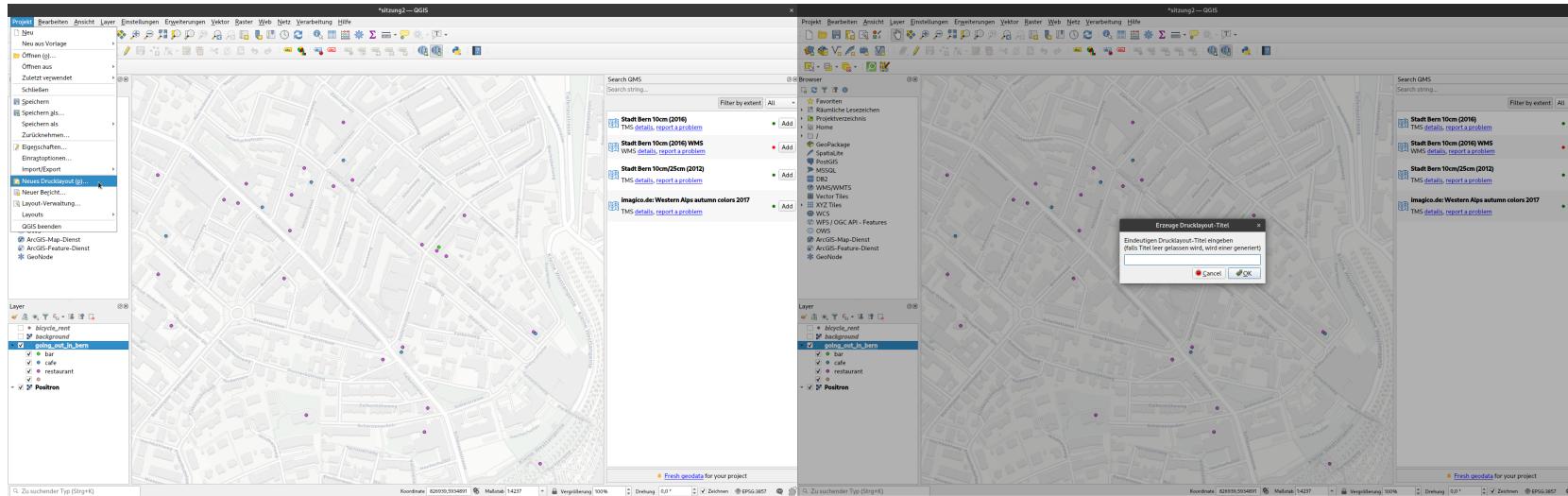


A layer where you can select which artefact type should be displayed.

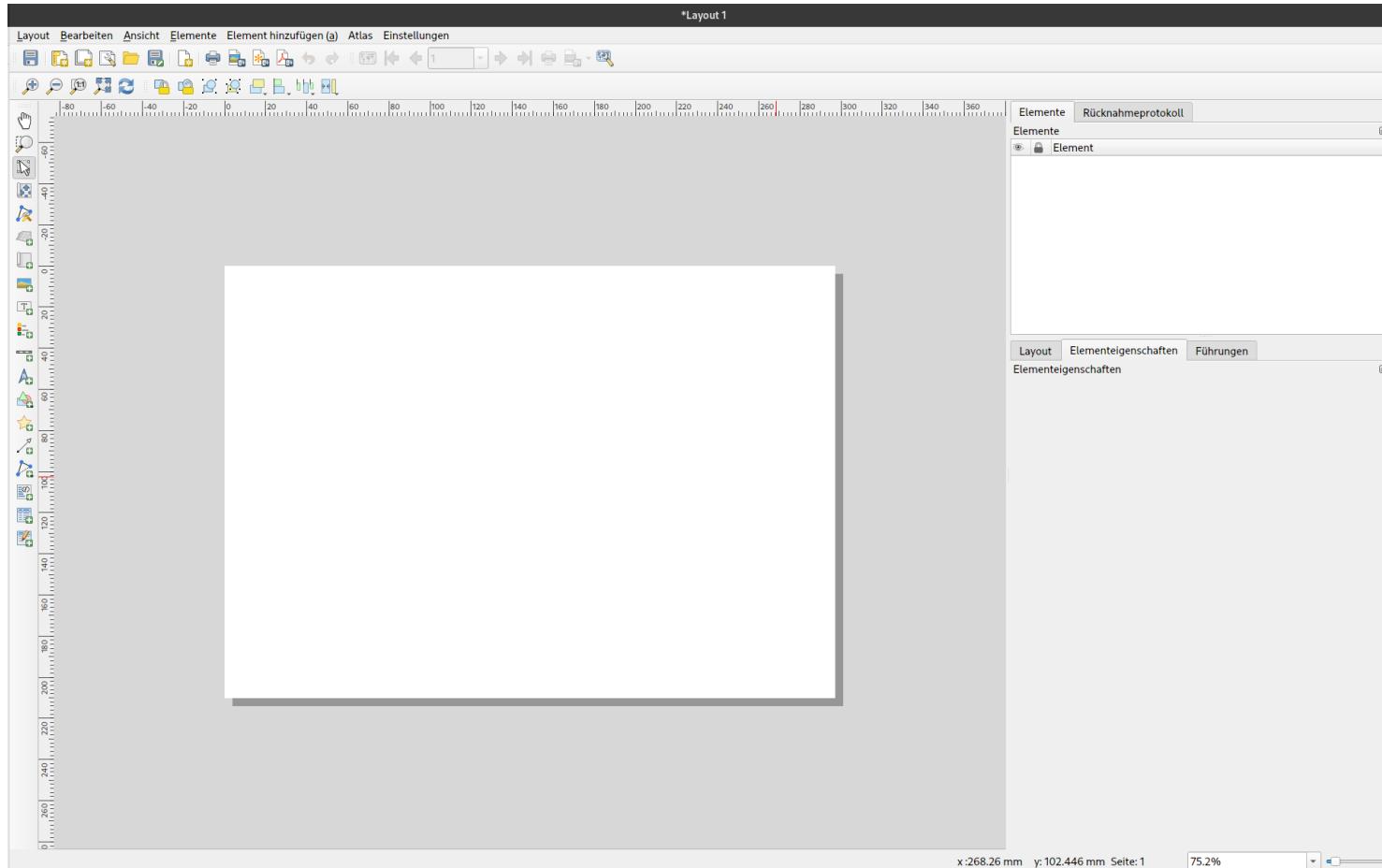
Print Composer

- How you make exportable and printable maps in QGIS
- Able to add map elements (legends, scales, text, etc)

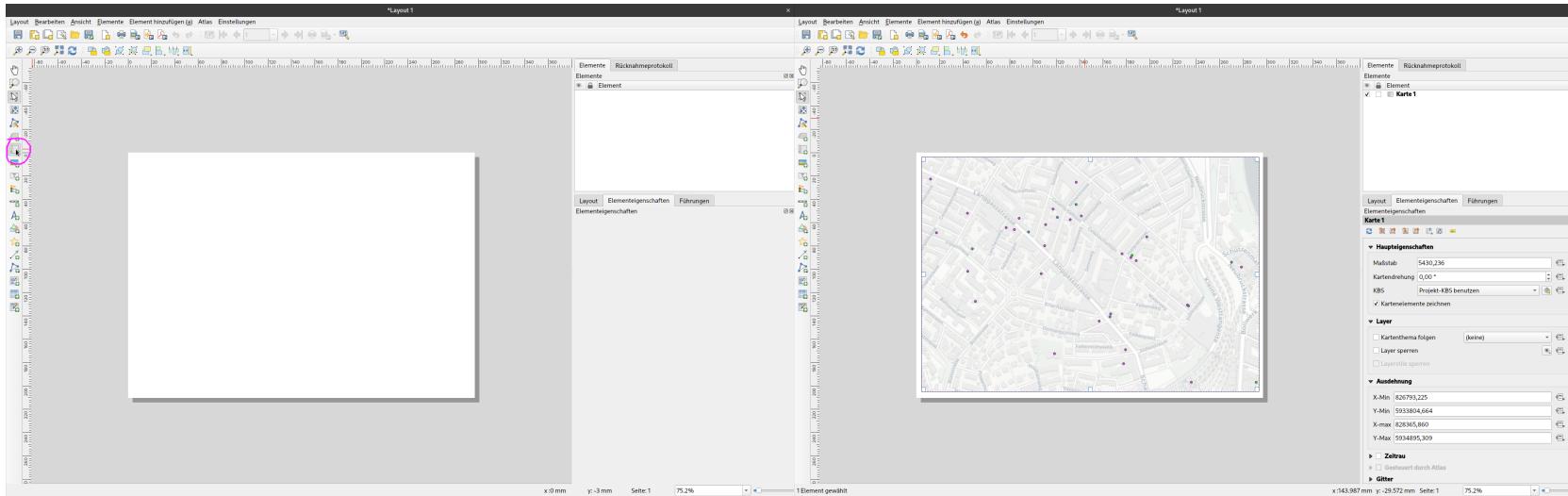
Create a new print composer



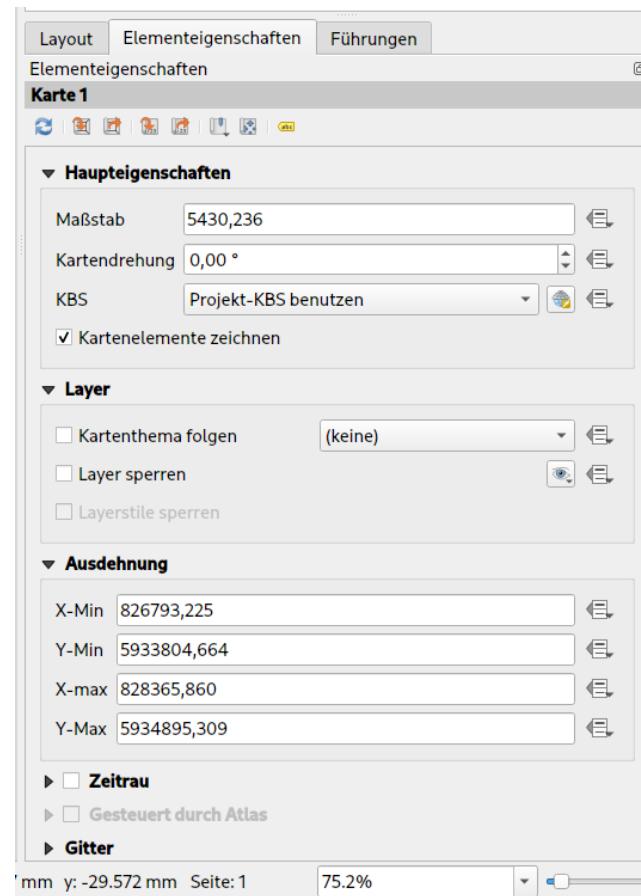
You are greeted with a blank slate



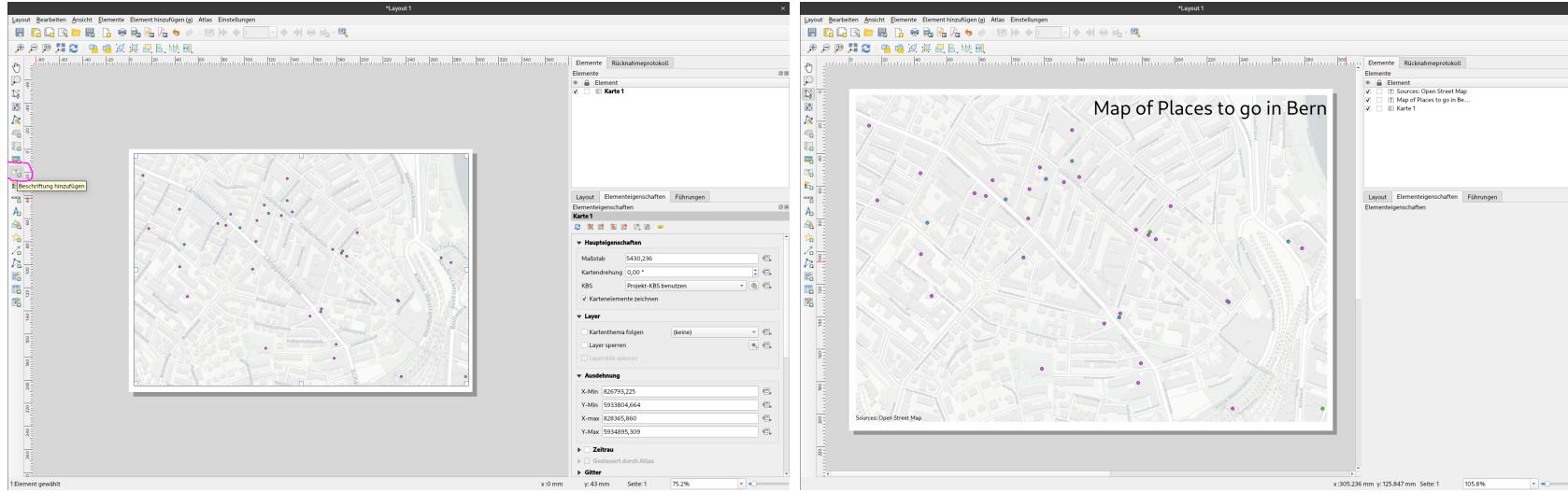
Add New Map tool will add your current map



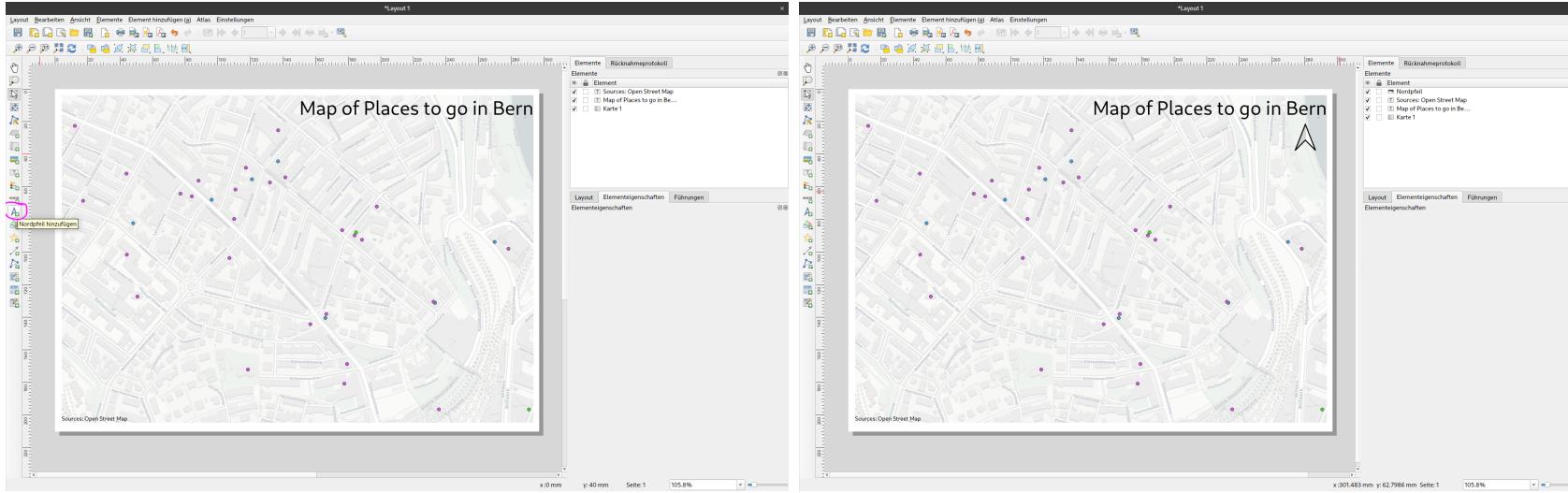
Customize item properties on the right



Don't forget a title and your sources

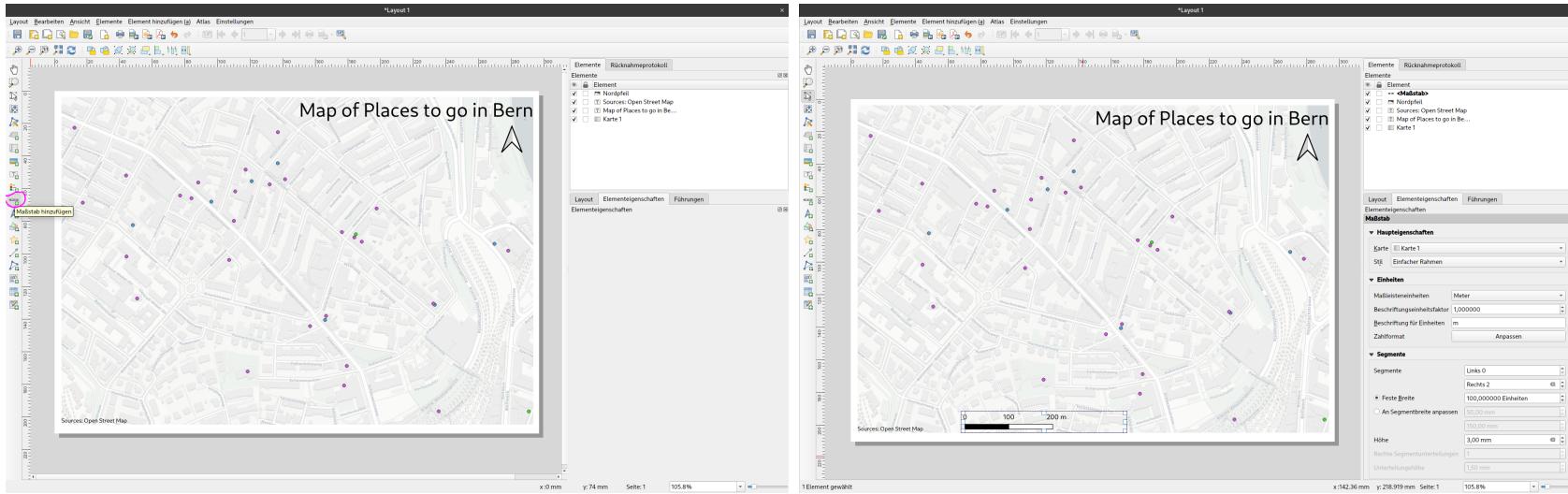


Adding North Arrow



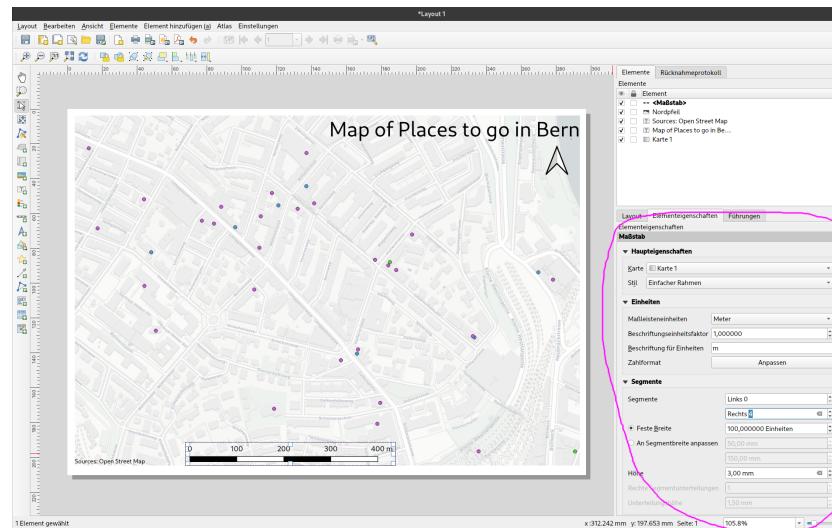
- You can select from multiple arrow types

Adding Scale bar

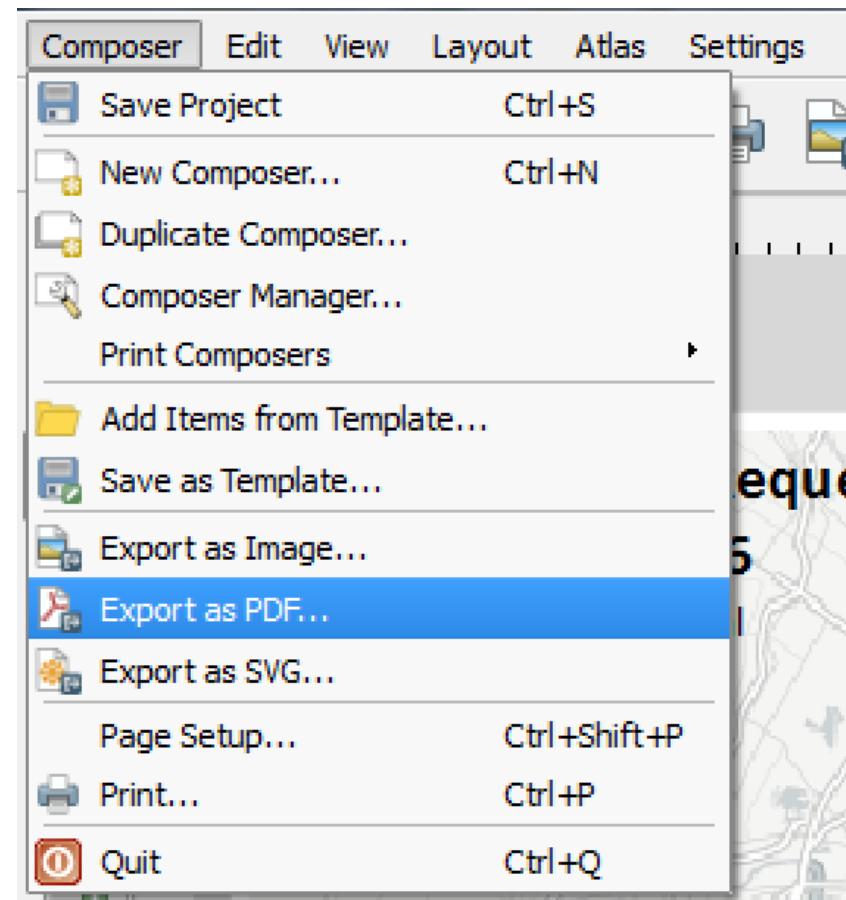


Adding Scale bar

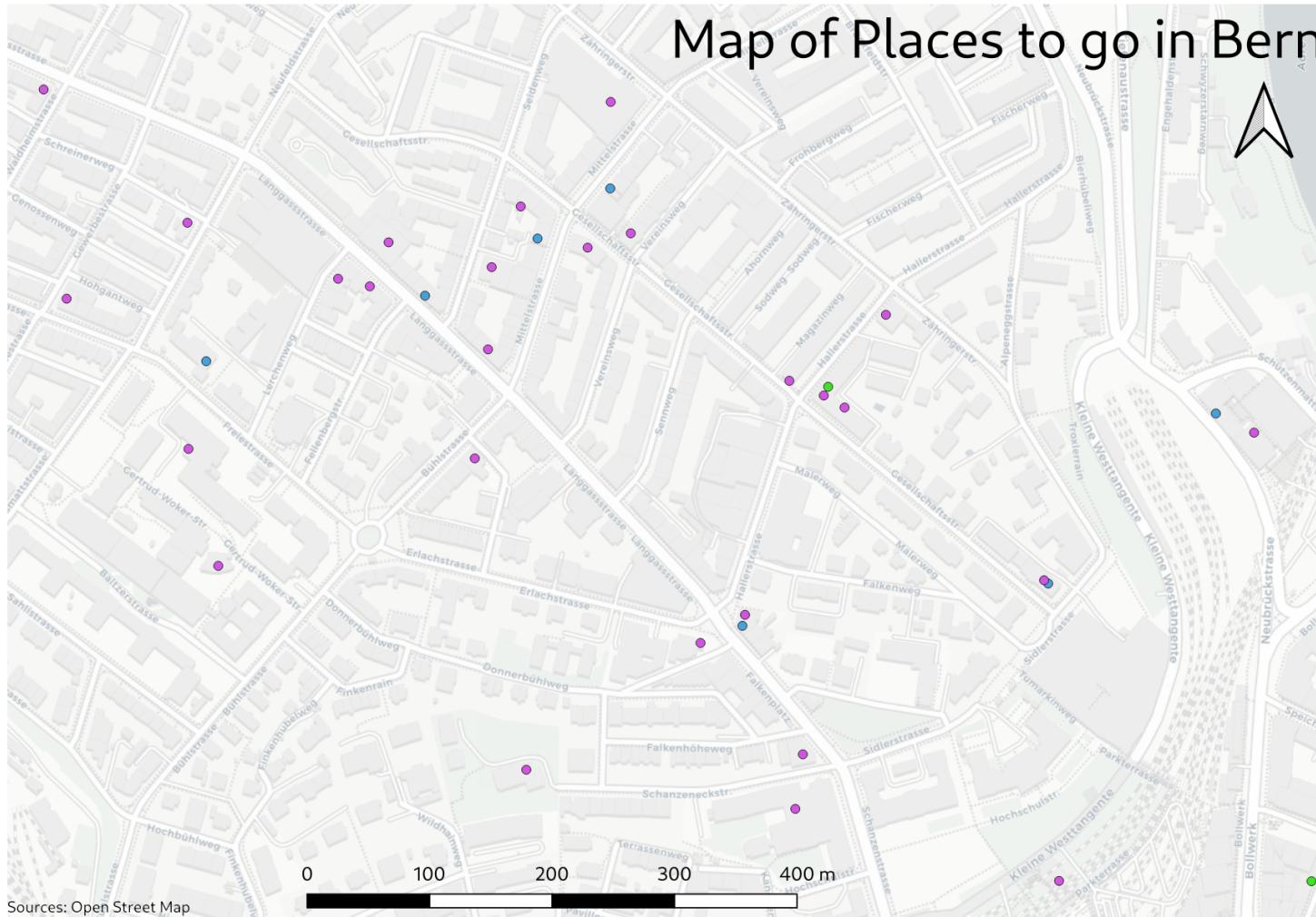
- You can also select and customize different styles of scale bars



There are a few exporting options



Now you can share your map or print it



Exporting

right click on layer > Export > Save features as...

- shp
- csv
 - geometry ('AS_XY')

Any questions?

You might find the course material (including the presentations) at

<https://berncodalab.github.io/caa>

You can contact me at

martin.hinz@iaw.unibe.ch