

# GIS in Archaeology

## 01 - Introduction

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18/09/24

based on [Datapolitan-Training/qgis-training](#)

You can download a [pdf of this presentation](#).

# aims and objectives

## aim

- Teach skills required for a complete GIS workflow
  - from data acquisition to analysis and cartographic output

## objectives

- Introduction to GIS and fundamental cartography
- Practical work with archaeological (spatial) data
- Spatial analyses
- Creation of "presentable" maps with different levels of information
- Learning the basics for later autonomous work with GIS

# outcomes

- You will be familiar with the foundational concepts in spatial analysis and mapmaking
- You will understand the structure and purpose of GIS
- You will be practiced in applying spatial concepts to real-world problems
- You will be able to conduct spatial analyses
- You will produce decent maps

# schedule

<b>18/09/24</b>	Introduction
<b>25/09/24</b>	<i>no class</i>
<b>02/10/24</b>	Working with QGIS
<b>09/10/24</b>	Making Maps
<b>16/10/24</b>	Georeferencing
<b>23/10/24</b>	Handling Spatial Data
<b>30/10/24</b>	Densities
<b>06/11/24</b>	Interpolation
<b>13/11/24</b>	<i>no class</i>
<b>20/11/24</b>	Making nicer Maps
<b>27/11/24</b>	Terrain Data
<b>04/12/24</b>	Least Cost Path Analysis
<b>11/12/24</b>	Site Catchment Analysis
<b>18/12/24</b>	Visibility Analysis

The programme may change or shift depending on how well we progress.

# organisational information

- Assessment:
  - active participation
  - homework
- You will need
  - to take part regularly
  - to make the homework
  - some frustration threshold...

If you do your homework at home, than you need a computer with QGIS:

<https://qgis.org/de/site/forusers/download.html>

All slides and additional (video) Material will be accessible via the course home page

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

# who are you?

**Please give a short statement about**

**What is your name?**

**What is your background in archaeology/computer/GIS?**

**One thing you hope to get out of the course**

*Describe a map you've seen/created/used recently and why it was interesting to you*

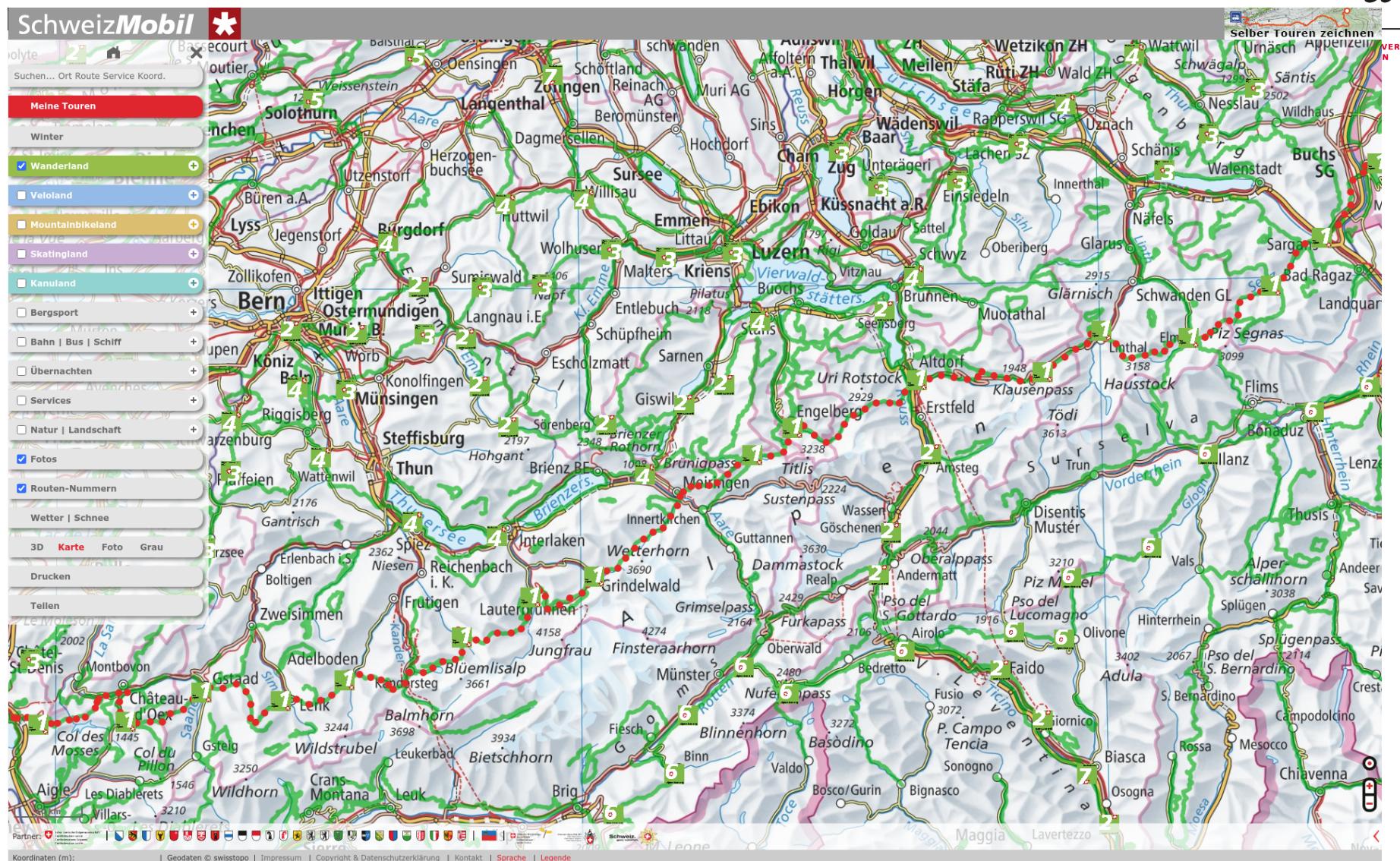
*Do you have any advice how we make this a successful seminar?*

# Why Do We Create Maps?

# Types of Maps

# General Reference Maps

- Show important physical features of an area
- Include natural and man-made features
- Usually meant to help aid in the navigation or discovery of locations
- Usually fairly simple
- Can be stylized based on the intended audience (tourists vs locals)



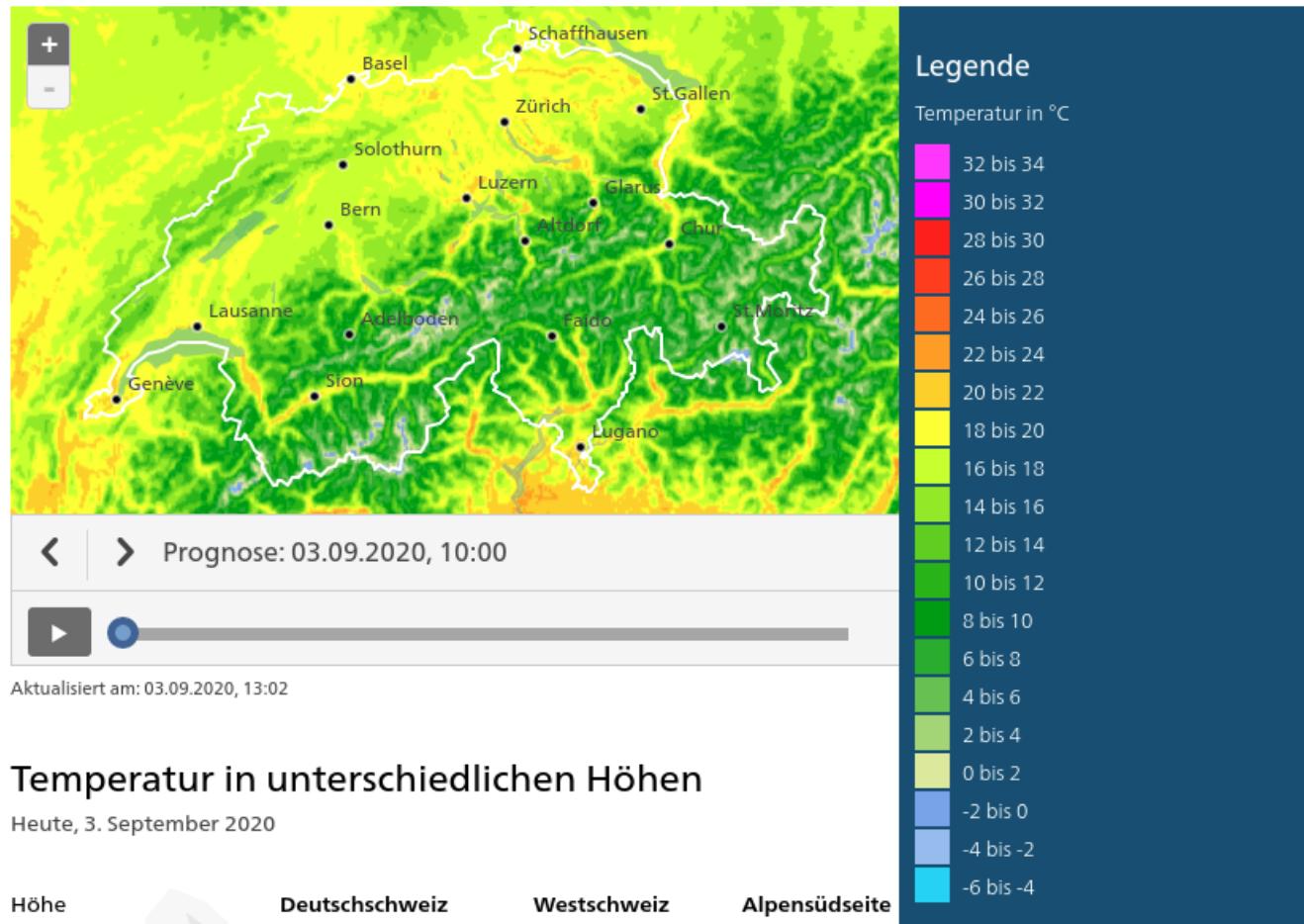
Source: <https://map.schweizmobil.ch/>

# Thematic Maps

- Focuses on a specific theme or subject area
- Features on the map represent the phenomenon being mapped
- Spatial features used for reference

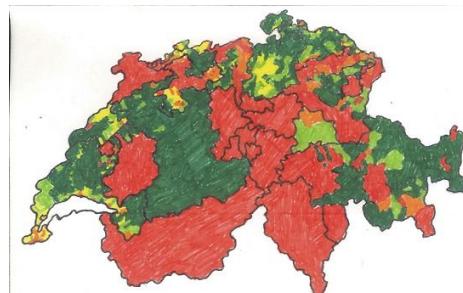
## Temperatur

X Schliessen



Source: <https://www.meteoschweiz.admin.ch/>

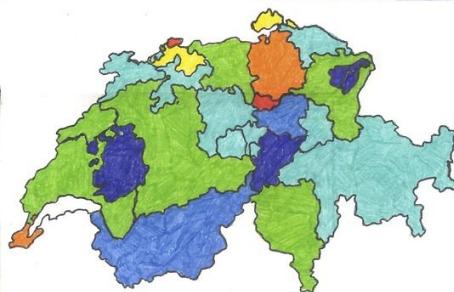
# Choropleth



## Language

- > 50% Protestant
- > 40% Protestant
- No religion exceeds 40%
- > 40% Catholic
- > 50% Catholic

(2000, Swiss Federal Statistics Office)



## Wealth

GDP Per Capita, Swiss Franc, 2010

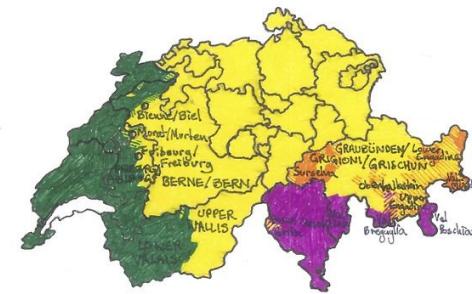
- 45000 - 50000
- 50000 - 55000
- 55000 - 61000
- 61000 - 67000
- 67000 - 80000
- 80000 - 105000
- 105000 - 125000
- 125000 - 150000

(Swiss Federal Statistics Office)

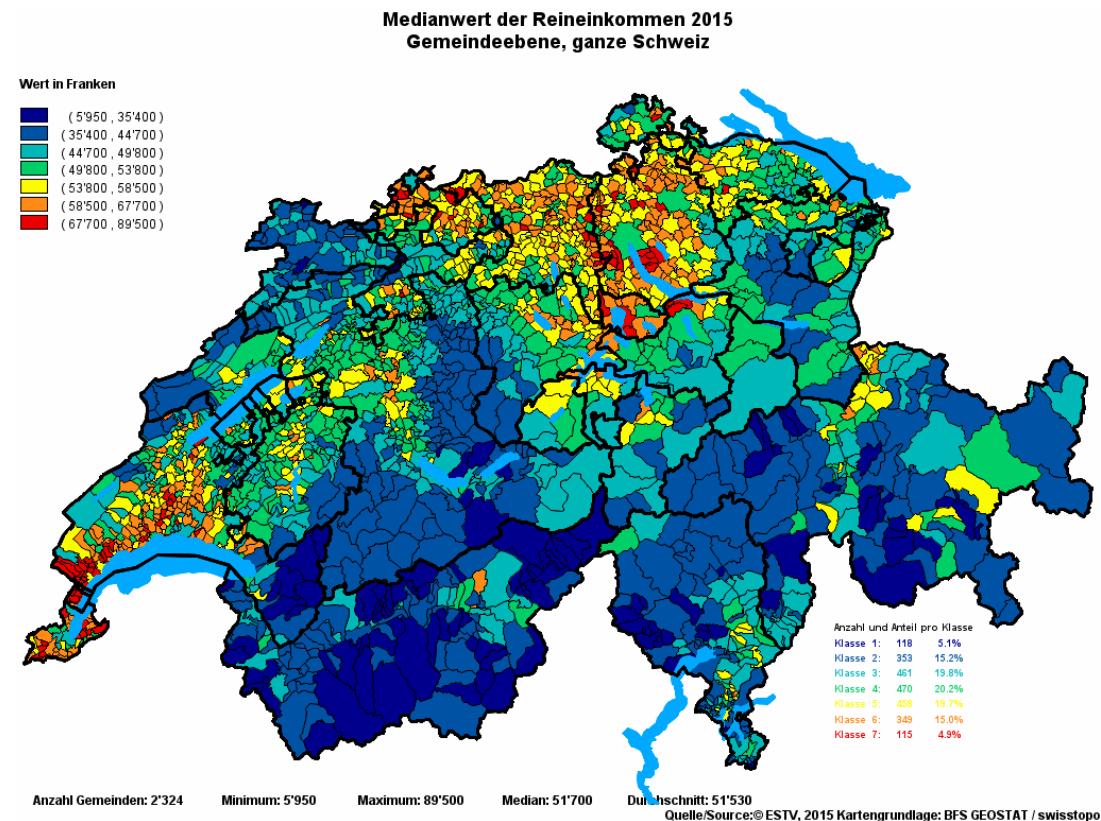
## Religion

- > 50% Protestant
- > 40% Protestant
- No religion exceeds 40%
- > 40% Catholic
- > 50% Catholic

(2000)

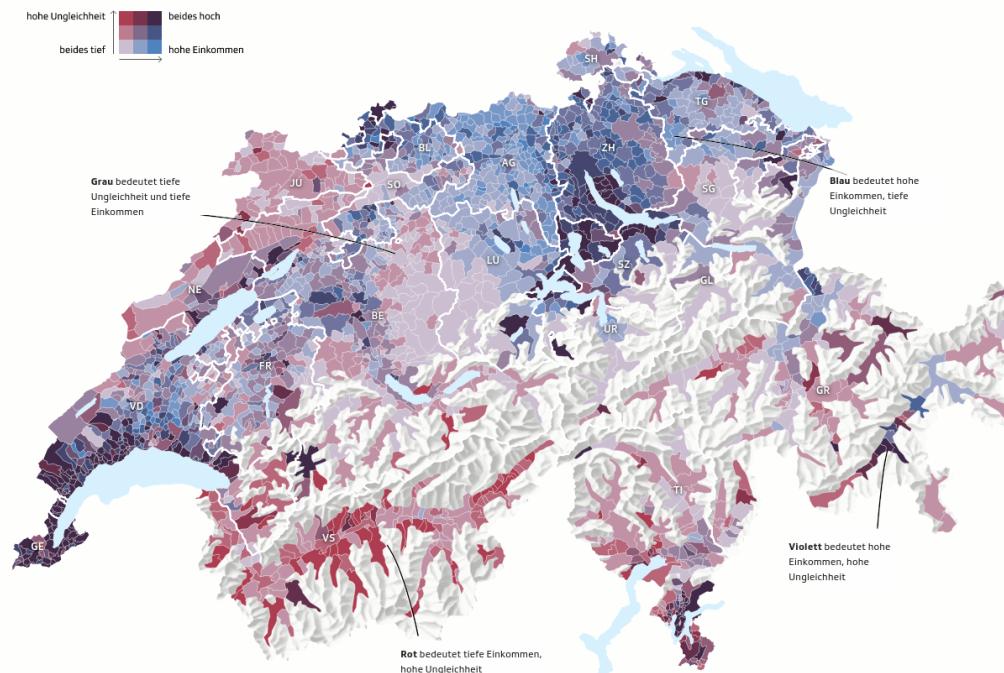


# Choropleth



Source: <http://www.estv2.admin.ch/>

# Choropleth



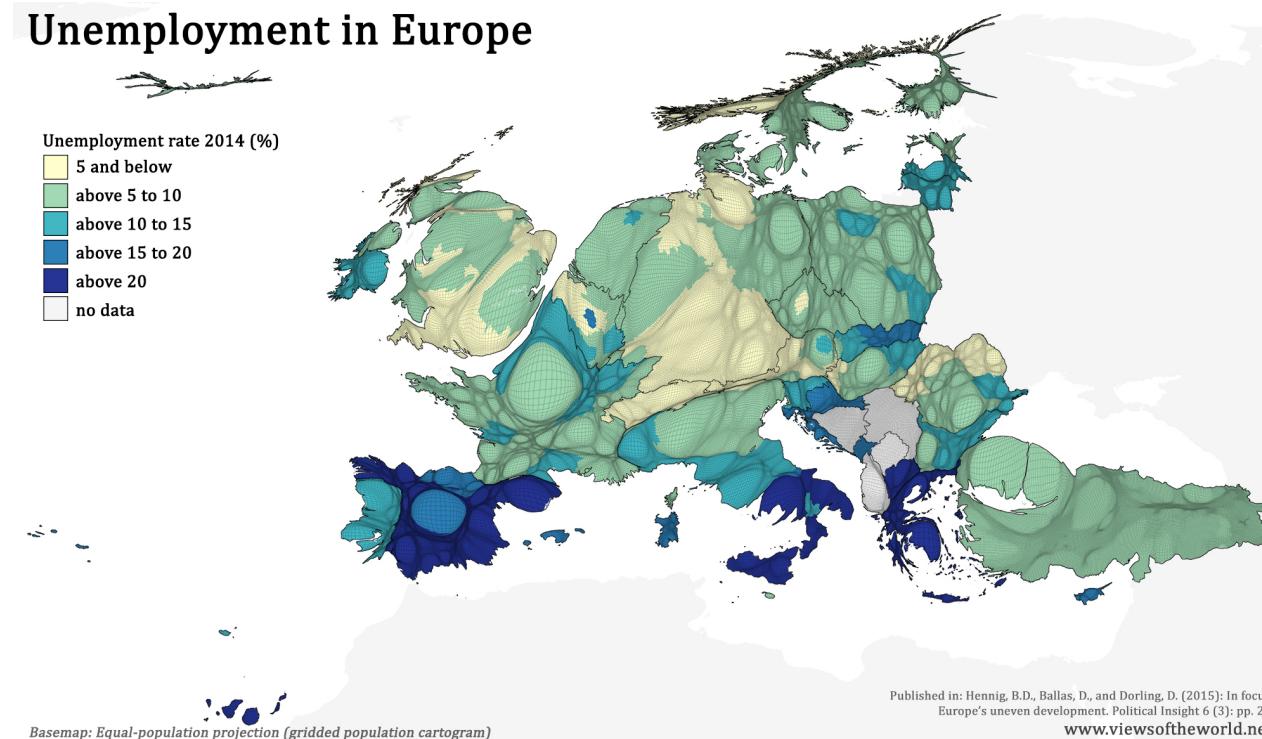
Source: <https://www.srf.ch/news/schweiz/interaktive-karte-so-ungleich-ist-das-einkommen-in-der-schweiz-verteilt>

# Area Cartogram – World Population



Source: <http://www.visualcapitalist.com/>

# Area Cartogram – European Unemployment rate



Source: <http://www.viewsoftheworld.net/>

# Distribution Map

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Heiko Steuer

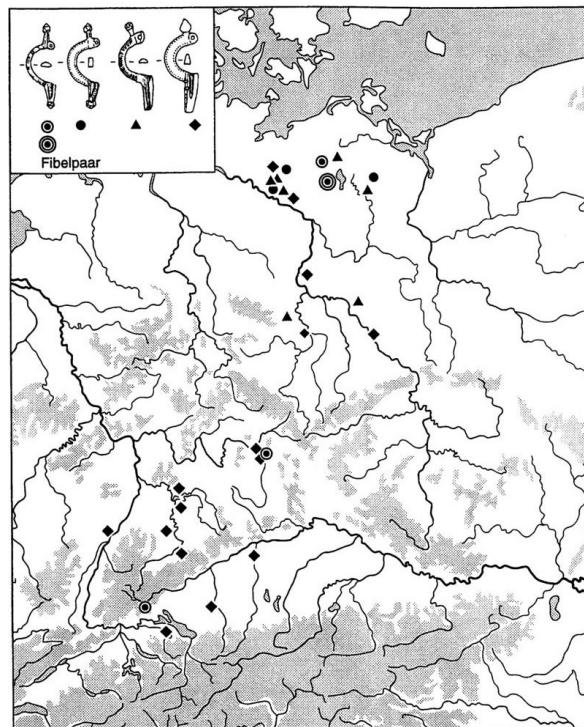


Abbildung 6. Verbreitungskarte der Bügelknopffibeln. Punktkreis: Typ Leipferdingen; Kreis: Typ Groß Nemerow; Dreieck: weitere Fibeln mit gestieltem Bügelknopf; Rhombus: Typ Leutkirch (nach Voß 1993, 174 Karte Abb. 27 mit Ergänzung).

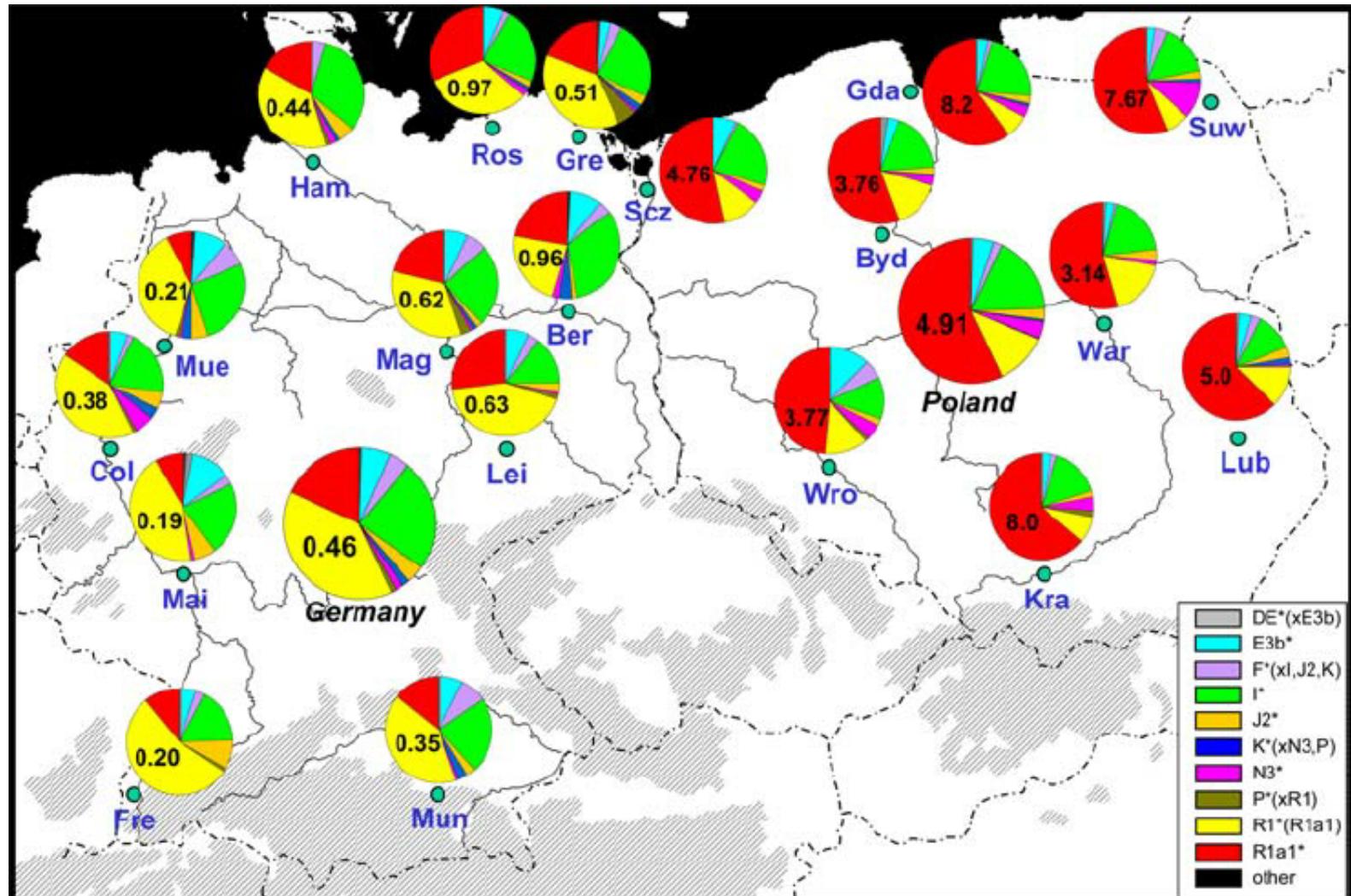
Source: Steuer 1998

# "Cultural" Map



Terberger et al. 2014

# "Genetic" Map

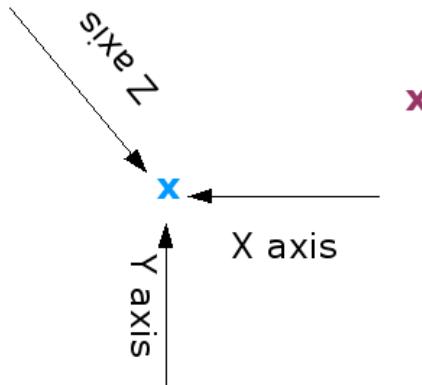


# Basic Map Elements

# Points

## Vector Point Feature

**Point Geometry (indicates the x,y and z position of the feature)**



**Point attributes (describe the feature)**

*Id, Name, Description*

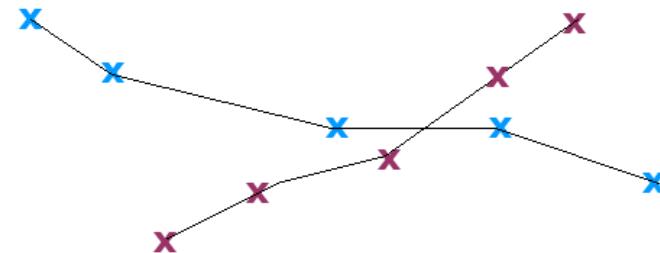
- 1, Tree, Outside our classroom
- 2, Light post, At the school entrance

[http://docs.qgis.org/2.8/en/docs/gentle\\_gis\\_introduction/vector\\_data.html#overview](http://docs.qgis.org/2.8/en/docs/gentle_gis_introduction/vector_data.html#overview)

# Lines

## Vector Polyline Feature

**Polyline Geometry (a series of connected vertices that do not form an enclosed shape)**



**Polyline attributes (describe the feature)**

*Id, Name, Description*

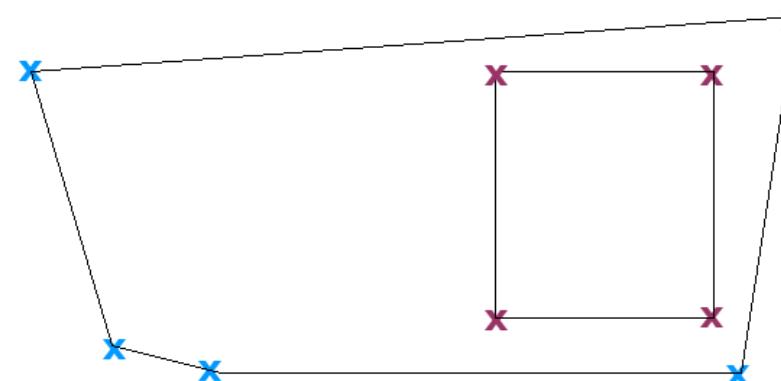
- 1, Footpath 1, From class to the playground
- 2, Footpath 2, From the school gate to the hall

[http://docs.qgis.org/2.8/en/docs/gentle\\_gis\\_introduction/vector\\_data.html#overview](http://docs.qgis.org/2.8/en/docs/gentle_gis_introduction/vector_data.html#overview)

# Polygons

## Vector Polygon Feature

**Polygon Geometry (a series of connected vertices that do form an enclosed shape)**



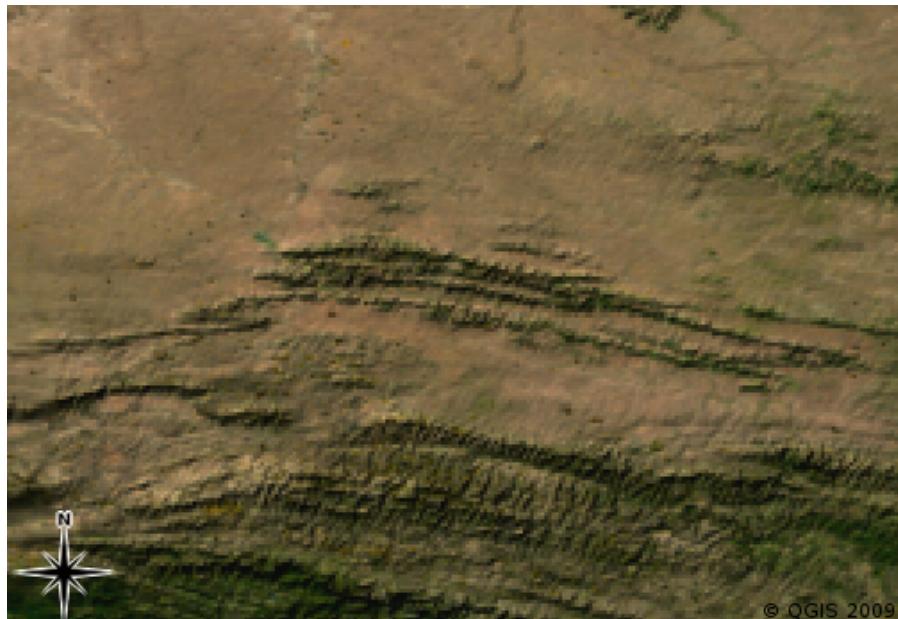
**Polygon attributes (describe the feature)**

*Id, Name, Description*

- 1, School Boundary, Fenceline for the school
- 2, Sports Field, We play soccer here

[http://docs.qgis.org/2.8/en/docs/gentle\\_gis\\_introduction/vector\\_data.html#overview](http://docs.qgis.org/2.8/en/docs/gentle_gis_introduction/vector_data.html#overview)

# Raster

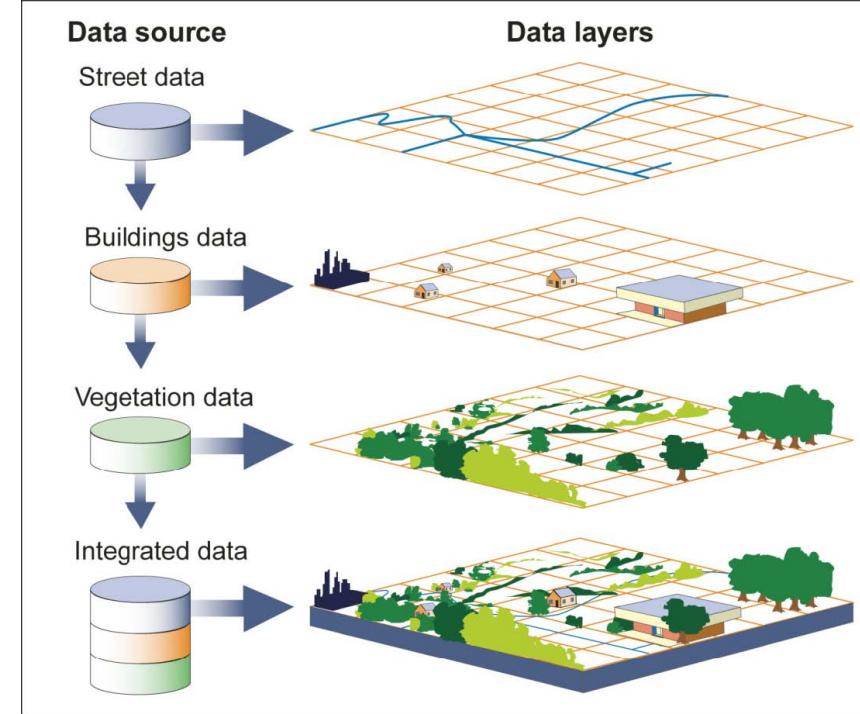


[https://docs.qgis.org/3.34/en/\\_images/raster\\_types.png](https://docs.qgis.org/3.34/en/_images/raster_types.png)

# How do we make maps?

# Geographic Information System (GIS)

A geographic information system (GIS) is a system designed to capture, store, manipulate, analyze, manage, and present spatial or geographic data. - Wikipedia



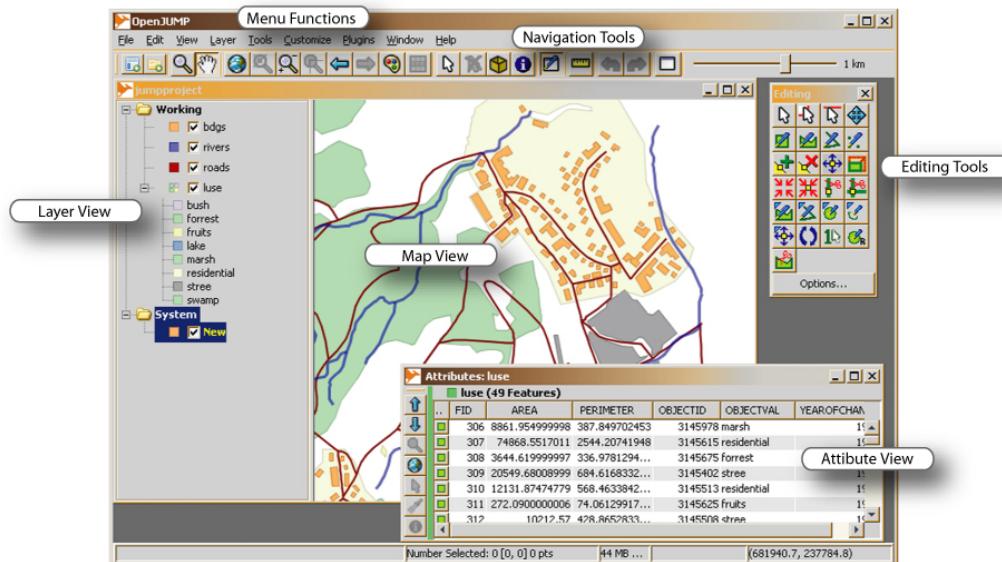
Source: GAO.

Or more simply

In a GIS, you connect **data** with **geography**. [GISgeography.com](http://GISgeography.com)

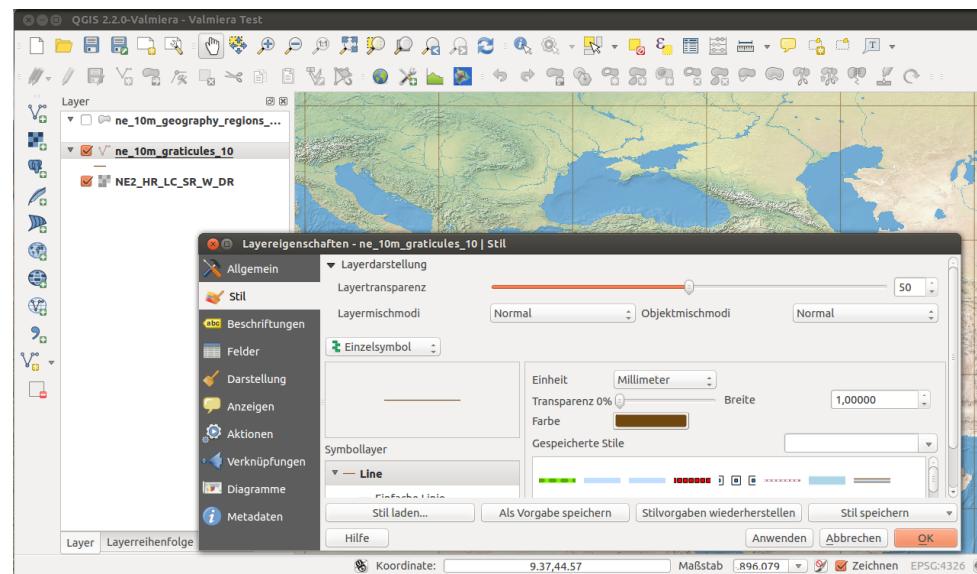
# Geographic Information Systems (GIS)

- Create interactive queries (user-created searches)
- Analyze spatial information
- Edit data in maps
- Present the results of all these operations



# QGIS

- a free and open source GIS software
- <https://www.qgis.org/>
- You might like to installed it... ;-)



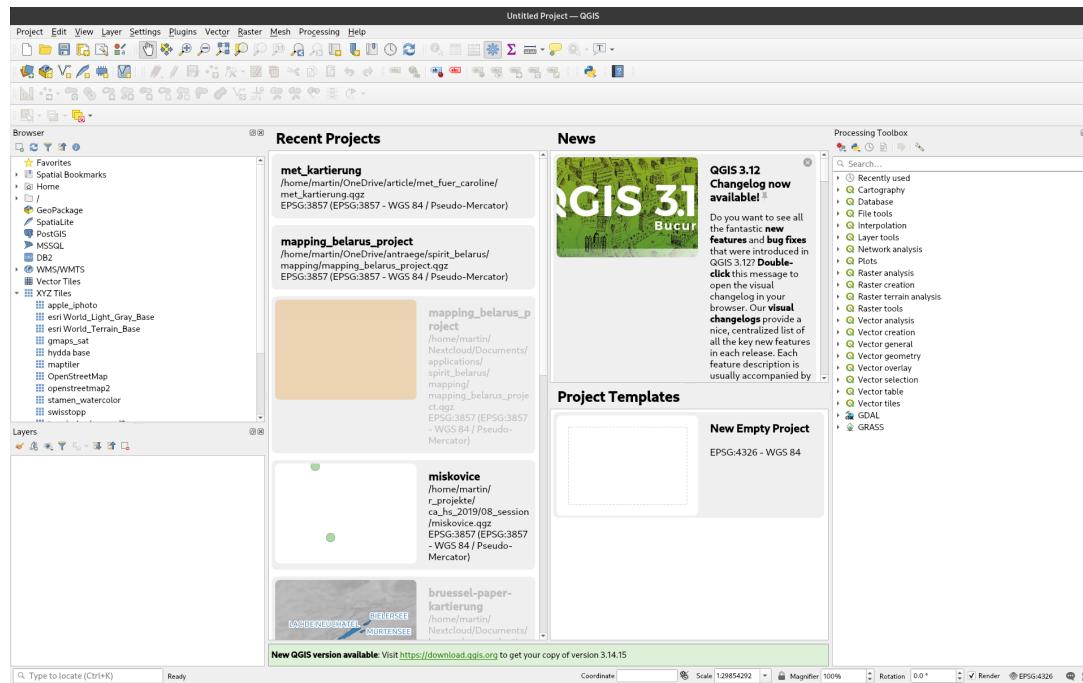
# Let's Get Started

## Getting Data

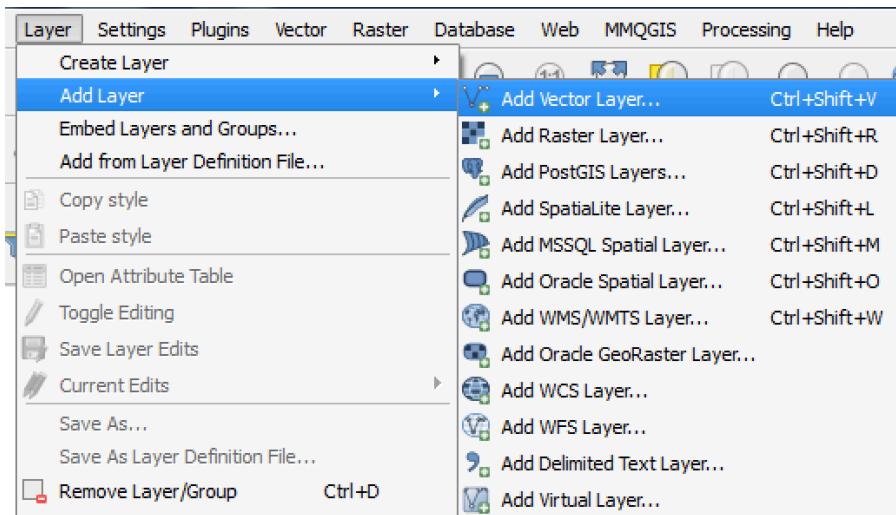
1. [Click this link](#) and download the file to your desktop
2. Unzip the file
3. [Click this link](#) and download the other file also to your desktop
4. Open QGIS

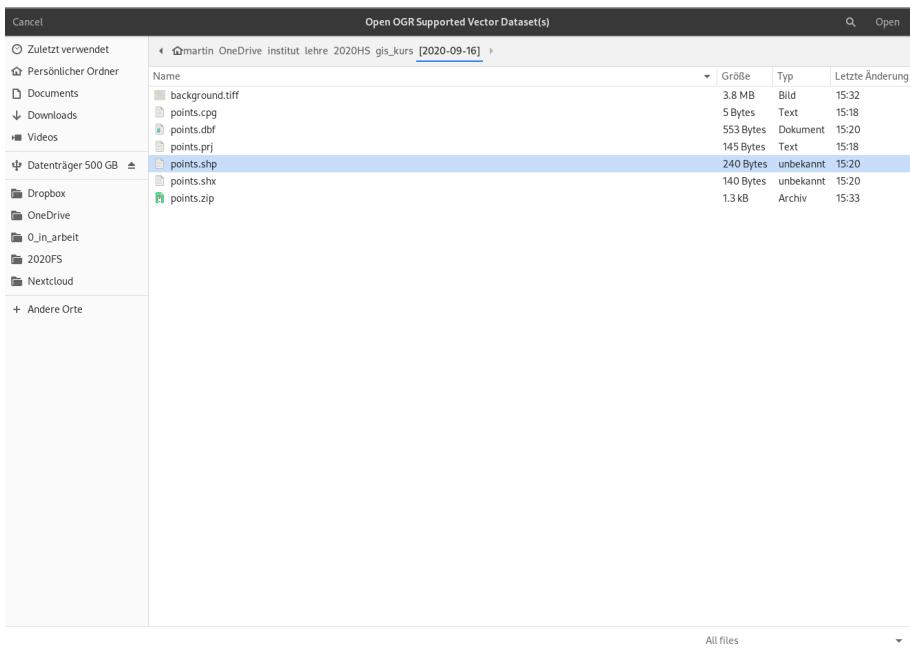
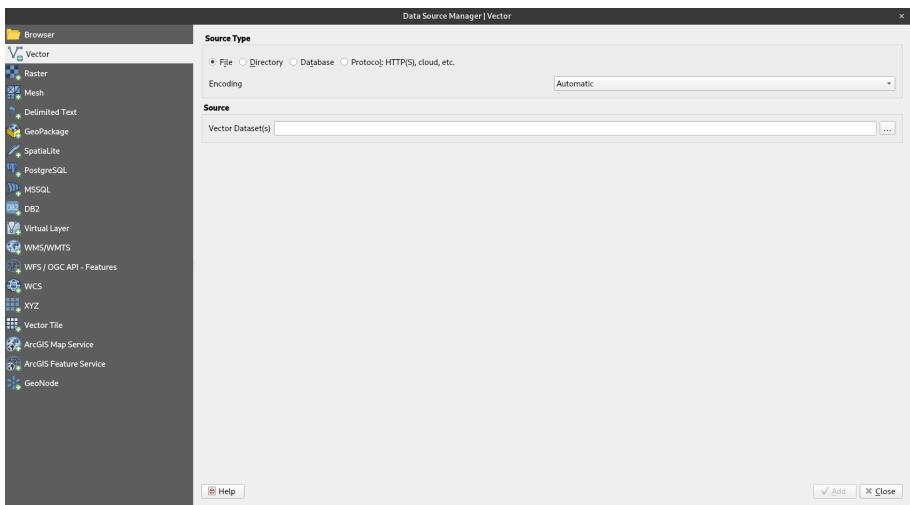


# QGIS Getting Started

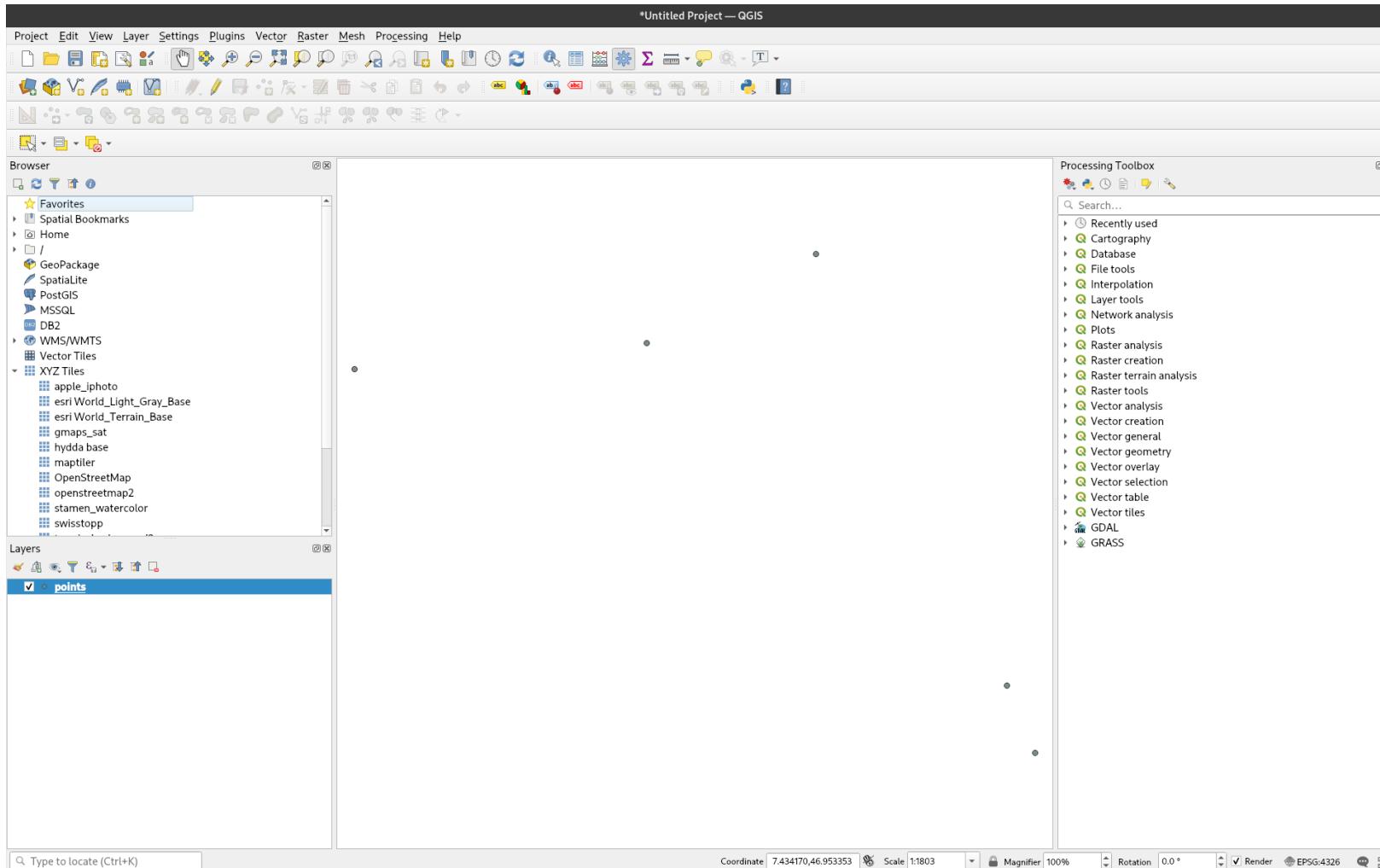


# QGIS Getting Started



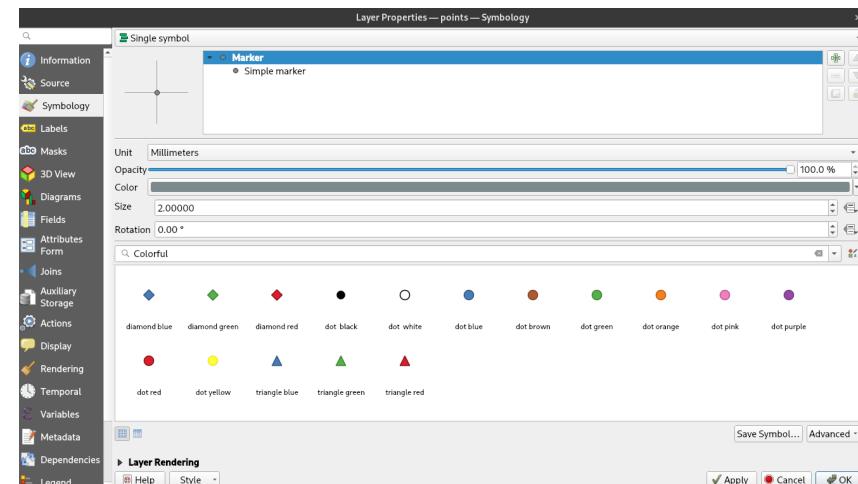
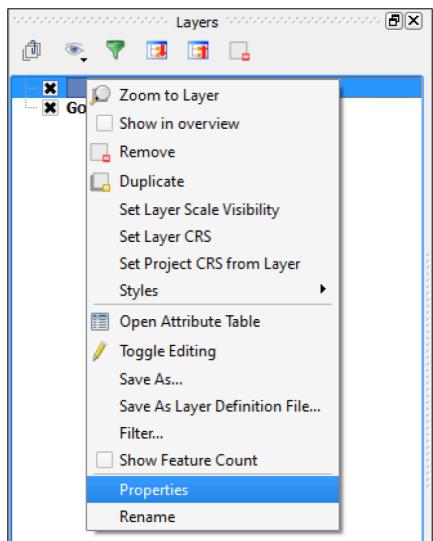


# QGIS Getting Started

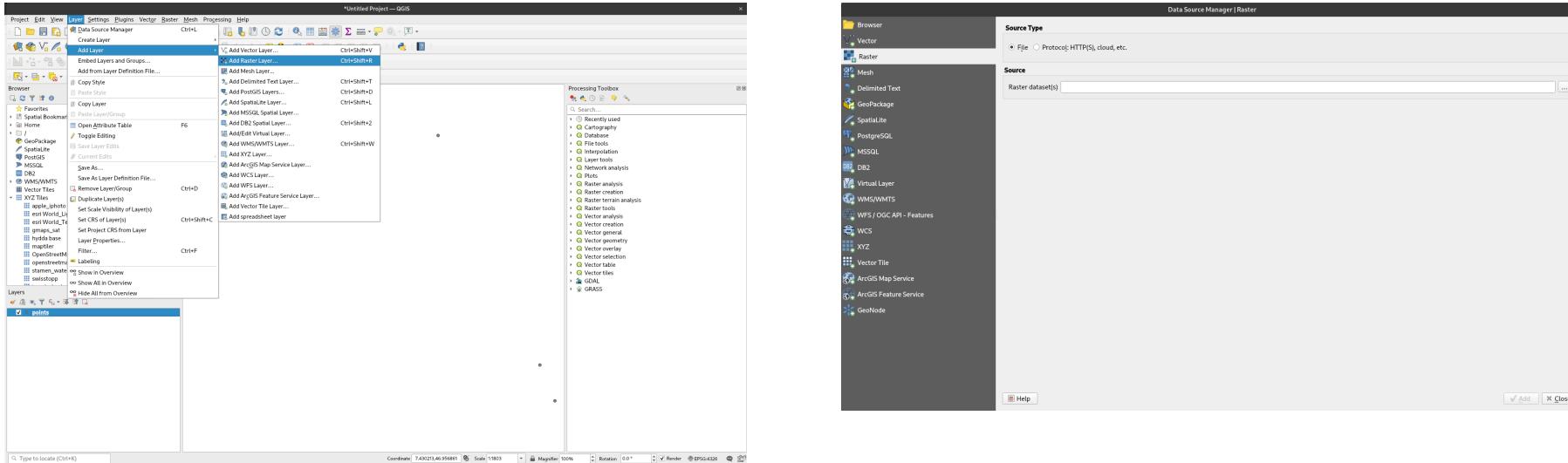


# Styling Features

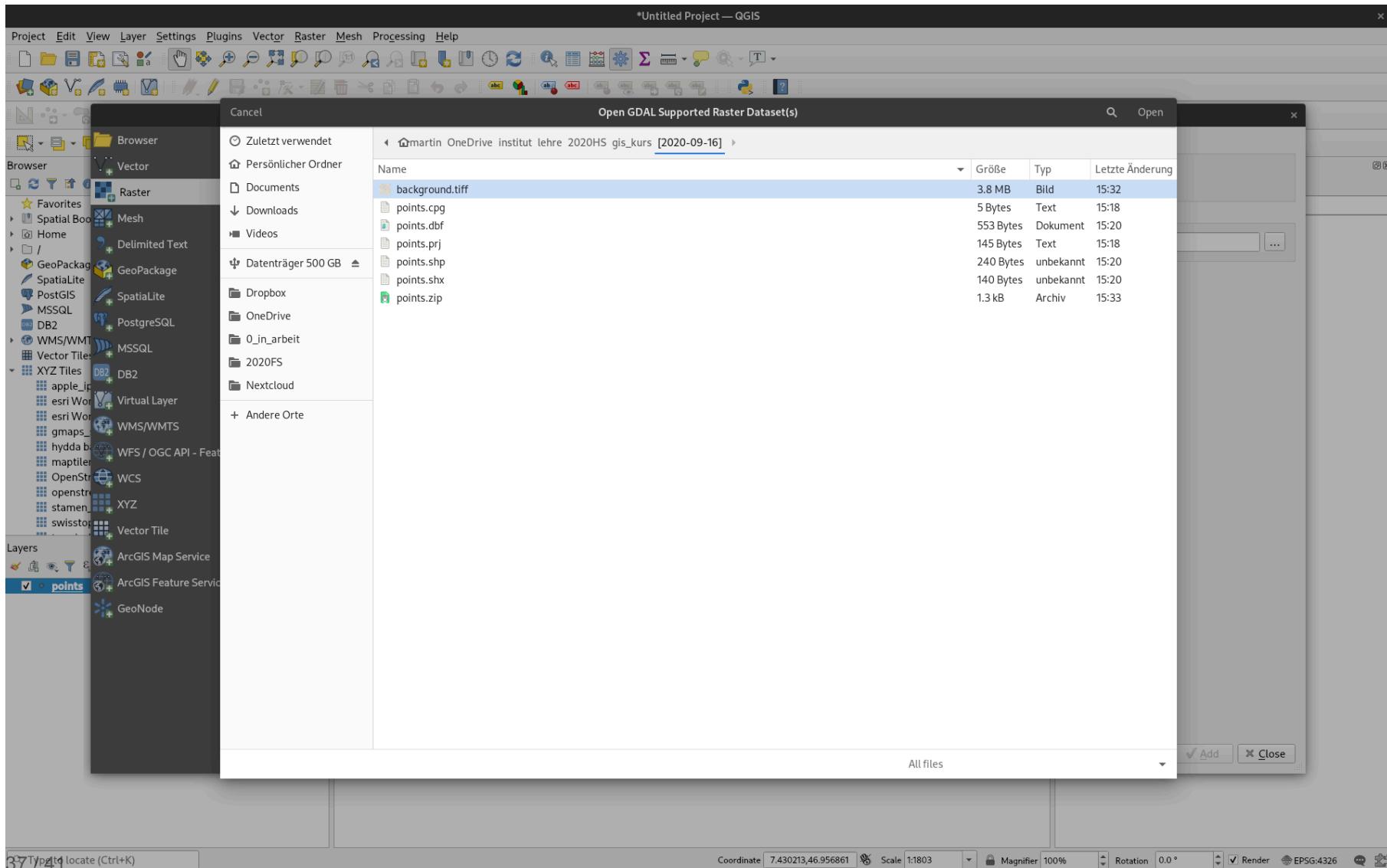
- Right-click the layer and select the Properties option
- Select "Symbology," and style as you like



# Add background

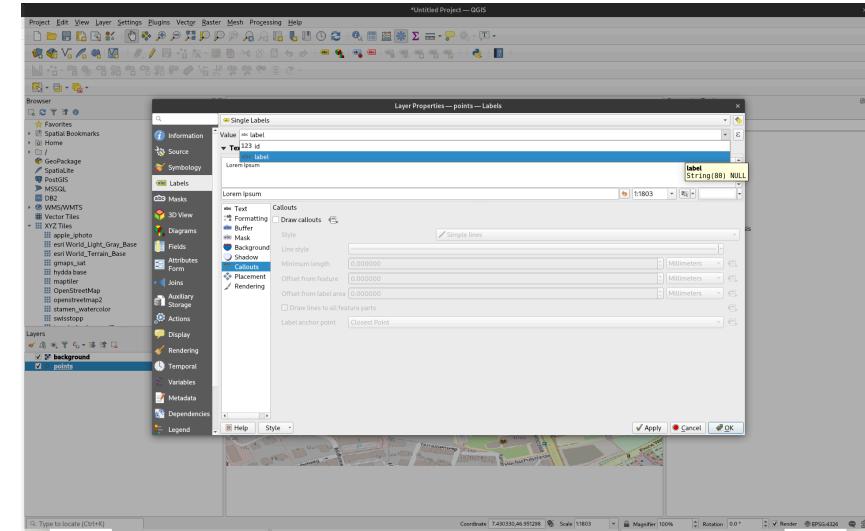
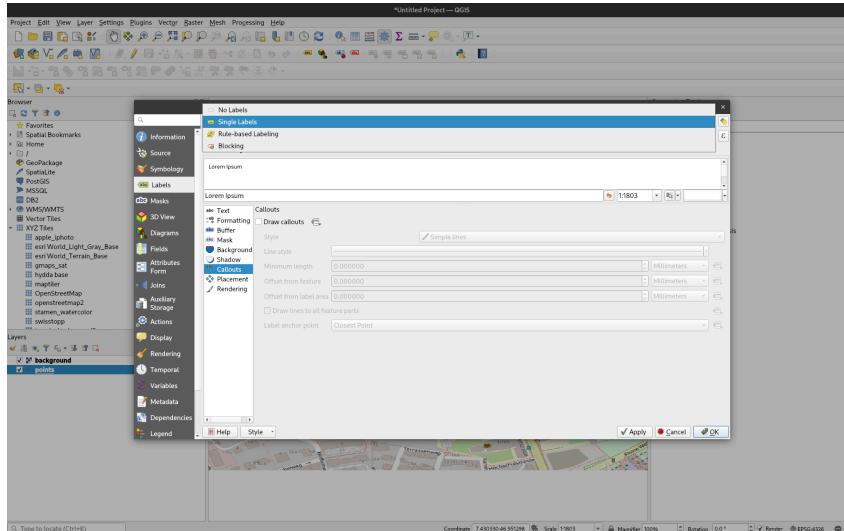


# Add background



# Add labels to data

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



# What We've Covered

- What is GIS
- Basic GIS concepts and tools
- Adding, styling, and labeling data in QGIS

# Homework

- Style the polygons however you'd like
- Change the outline color or add a pattern
- Style the labels
- Change the font, the font size, or other attributes
- Send me a screenshot

# Any questions?



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

[https://github.com/MartinHinz/gia\\_hs\\_2020](https://github.com/MartinHinz/gia_hs_2020)

You can see the rendered presentations at

[http://martinhinz.github.io/gia\\_hs\\_2020](http://martinhinz.github.io/gia_hs_2020)

You can contact me at

[martin.hinz@iaw.unibe.ch](mailto:martin.hinz@iaw.unibe.ch)

Source: <https://www.instagram.com/sadtopographies>