

Giulia Ruggeri



@giurugg



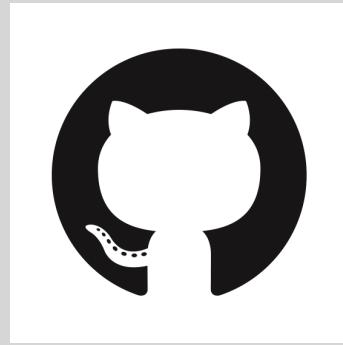
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# Working With Spatial Data With R: an Introduction

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## CODE AND PRESENTATION AVAILABLE



[https://github.com/gruggeri/r\\_lunch\\_feb2021](https://github.com/gruggeri/r_lunch_feb2021)

Few concepts before getting started  
with vector data...

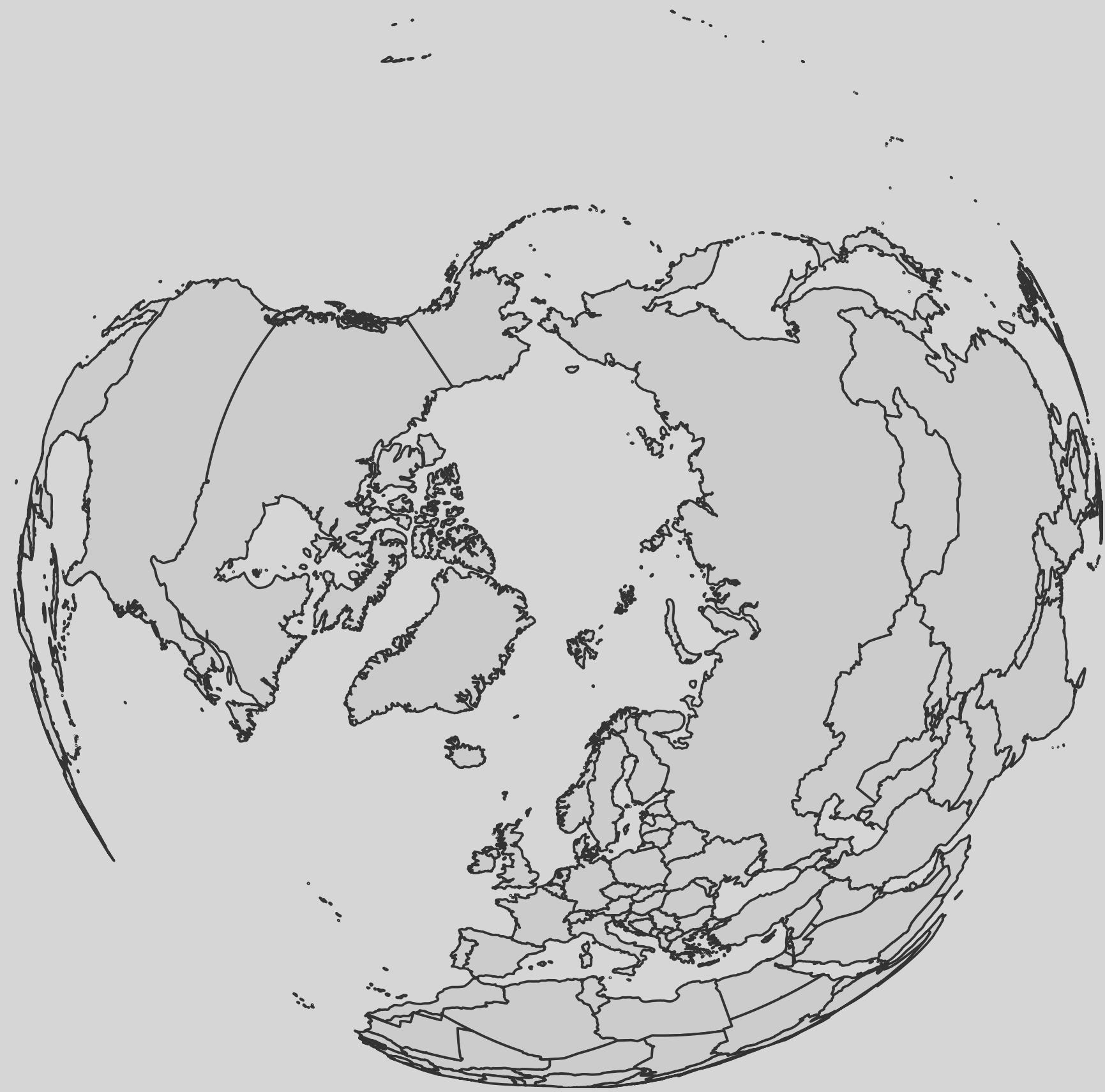
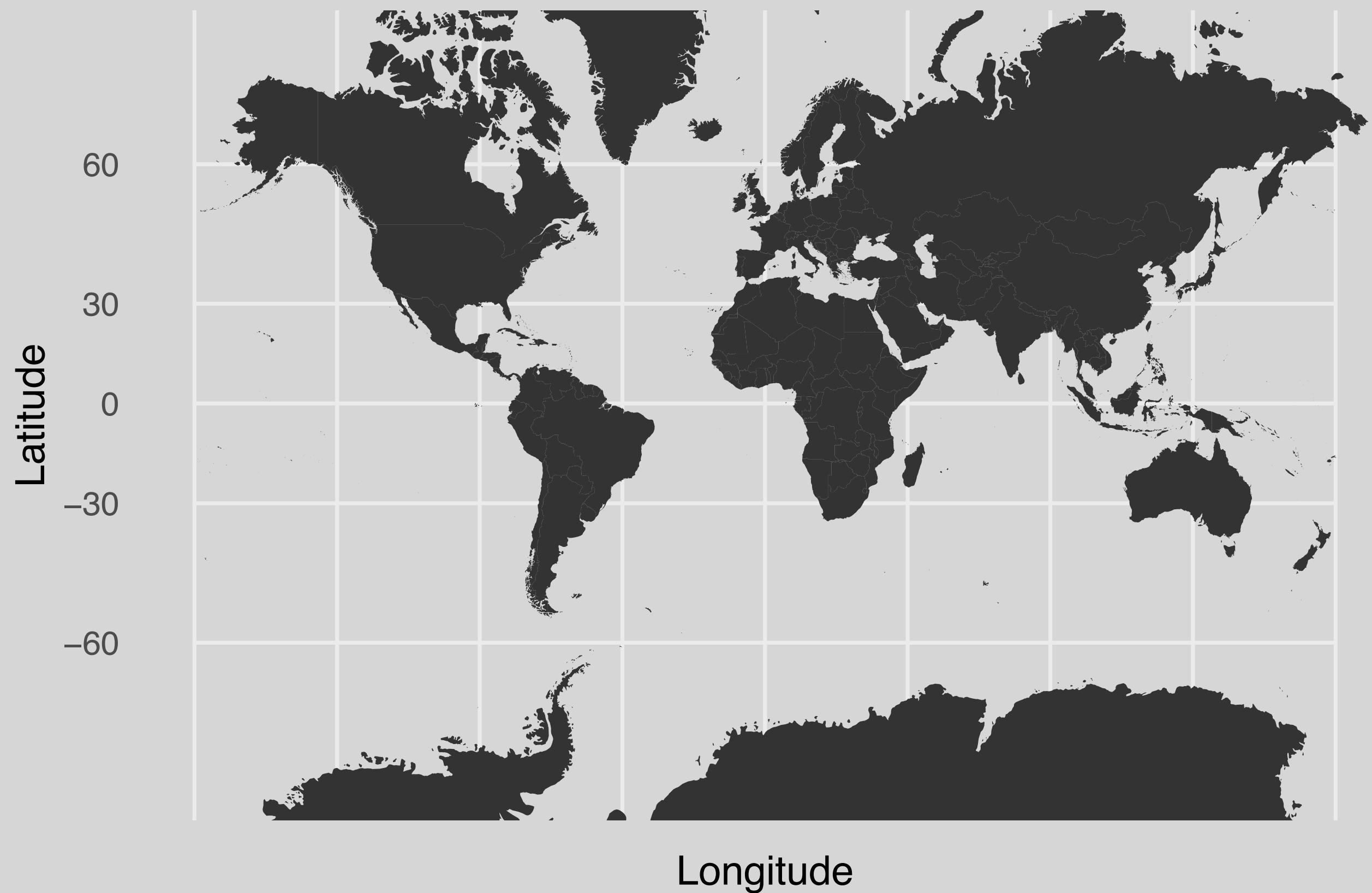
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## COORDINATE REFERENCE SYSTEM (CRS)

A coordinate reference system defines the mathematical approach used to **flatten (project)** a spherical object into 2D space...

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“Every plot is a projection”

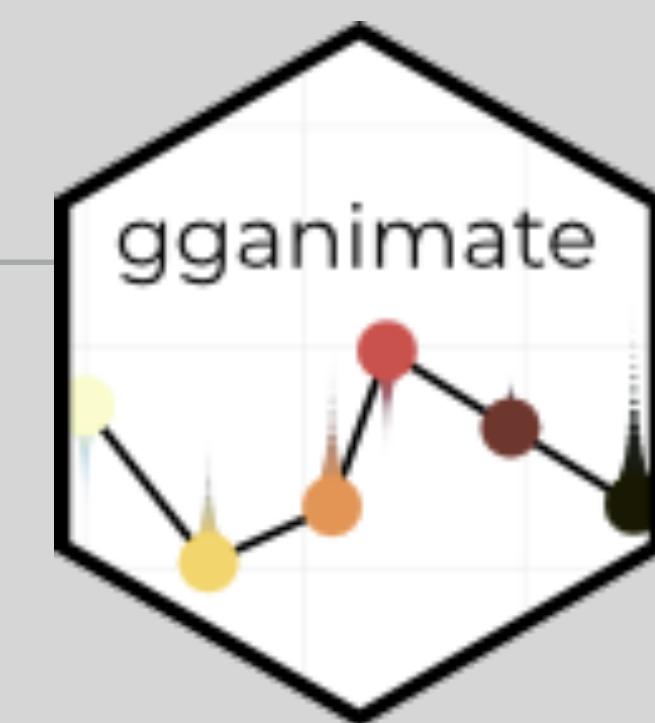
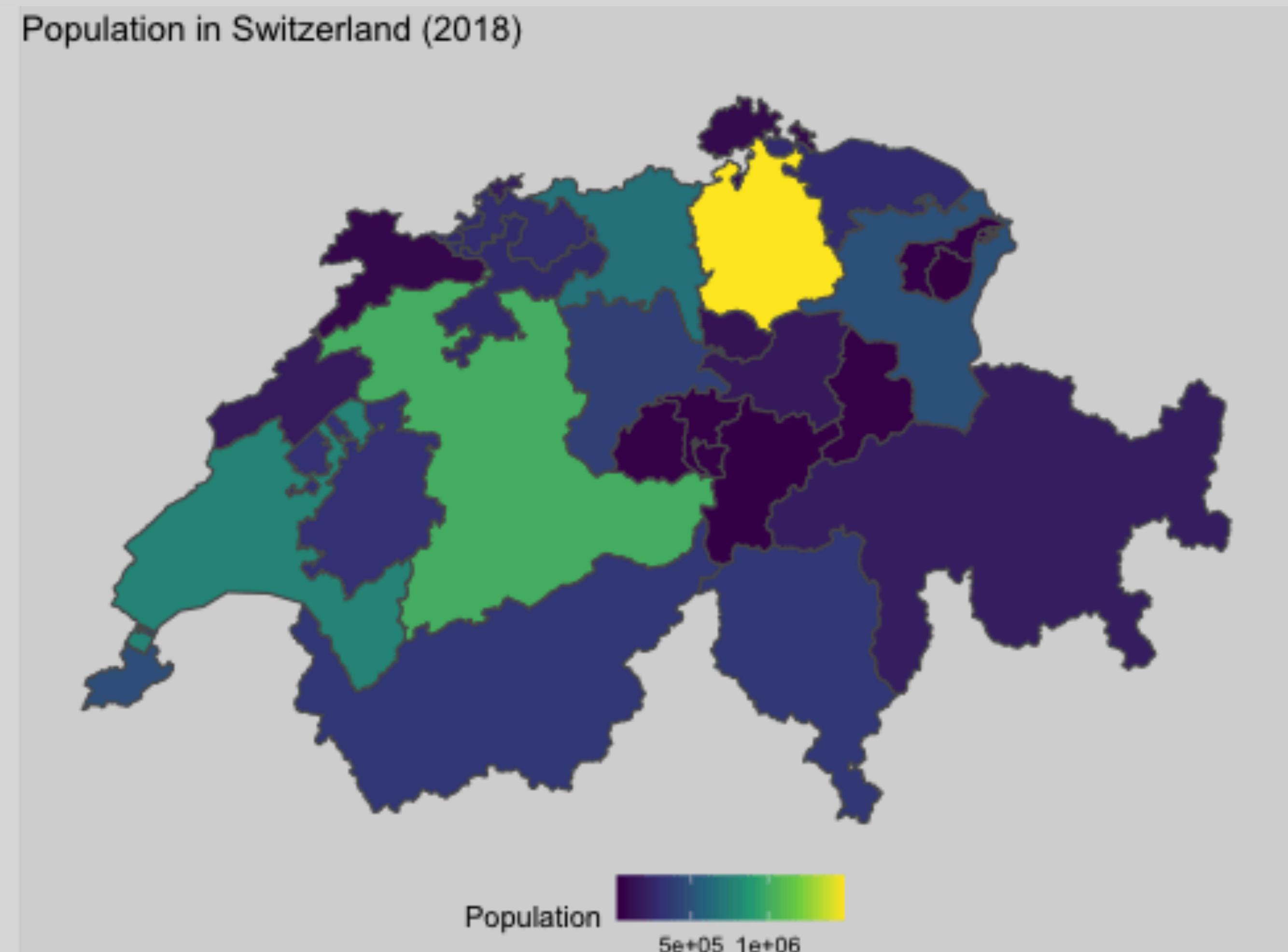


Let's get our hands dirty...

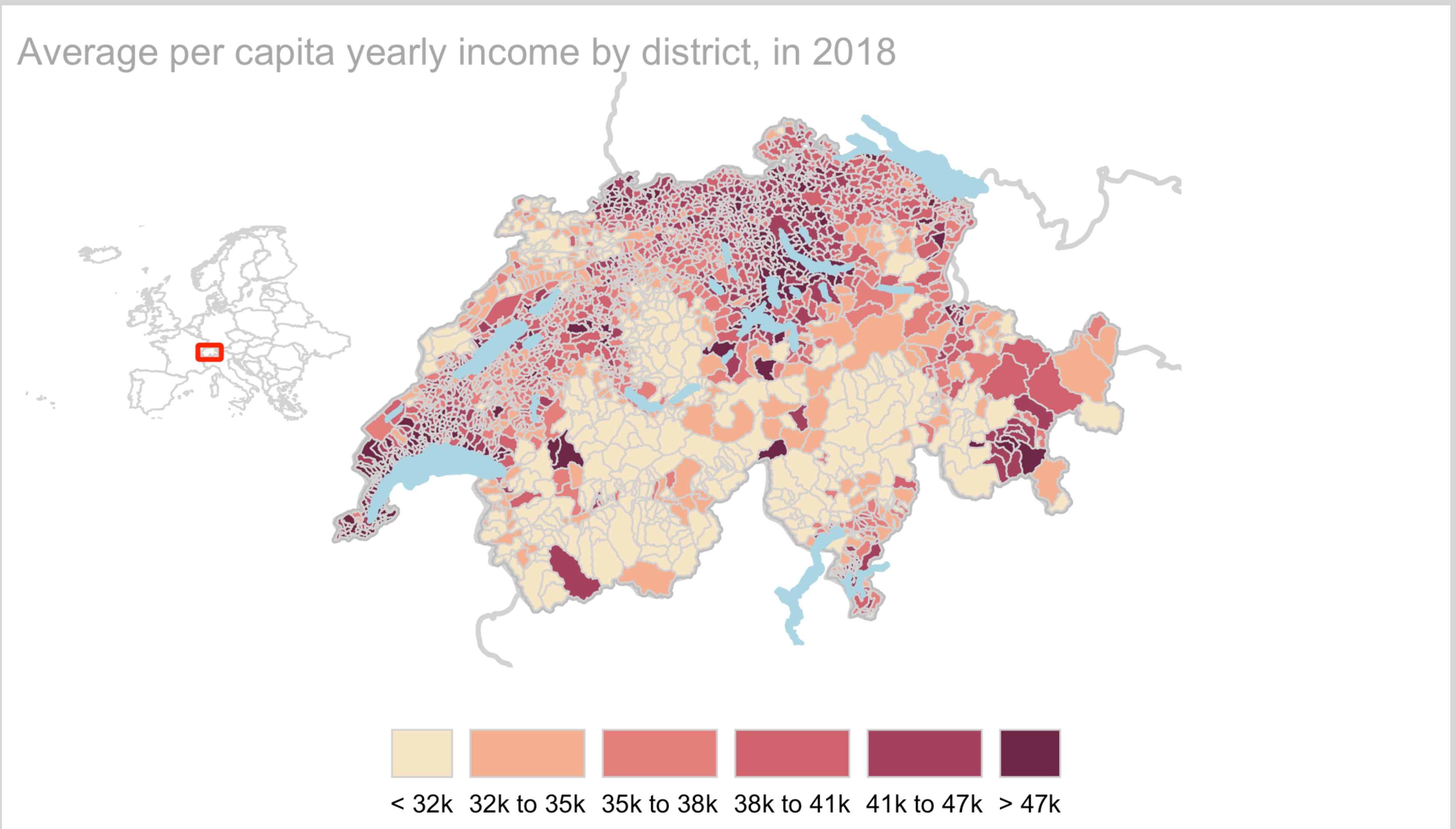
Why we use {ggplot2}...

# Advantages of using {ggplot2}: being able to create animations

Population in Switzerland (2018)



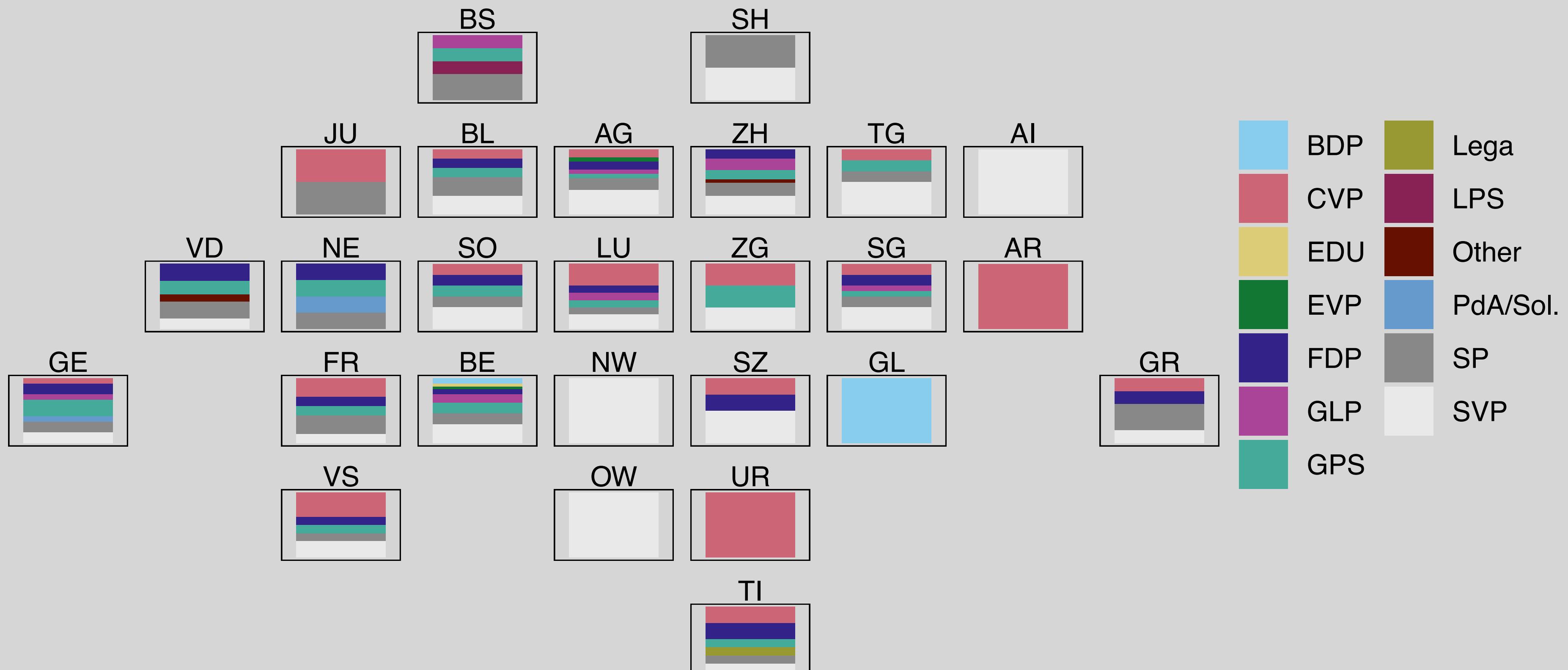
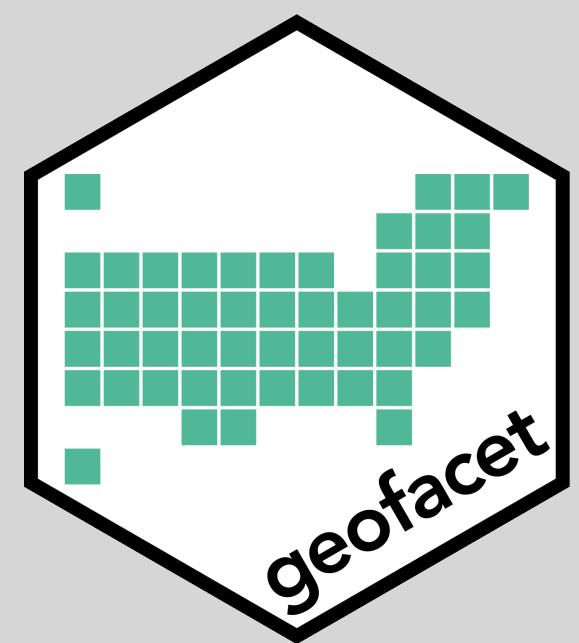
# Advantages of using {ggplot2}: {patchwork} and all other extensions



- **{patchwork}**: a library to combine multiple plots

More packages for spatial data  
visualization...

## Parties selected by canton, in the Swiss National Council Results of 2019 elections

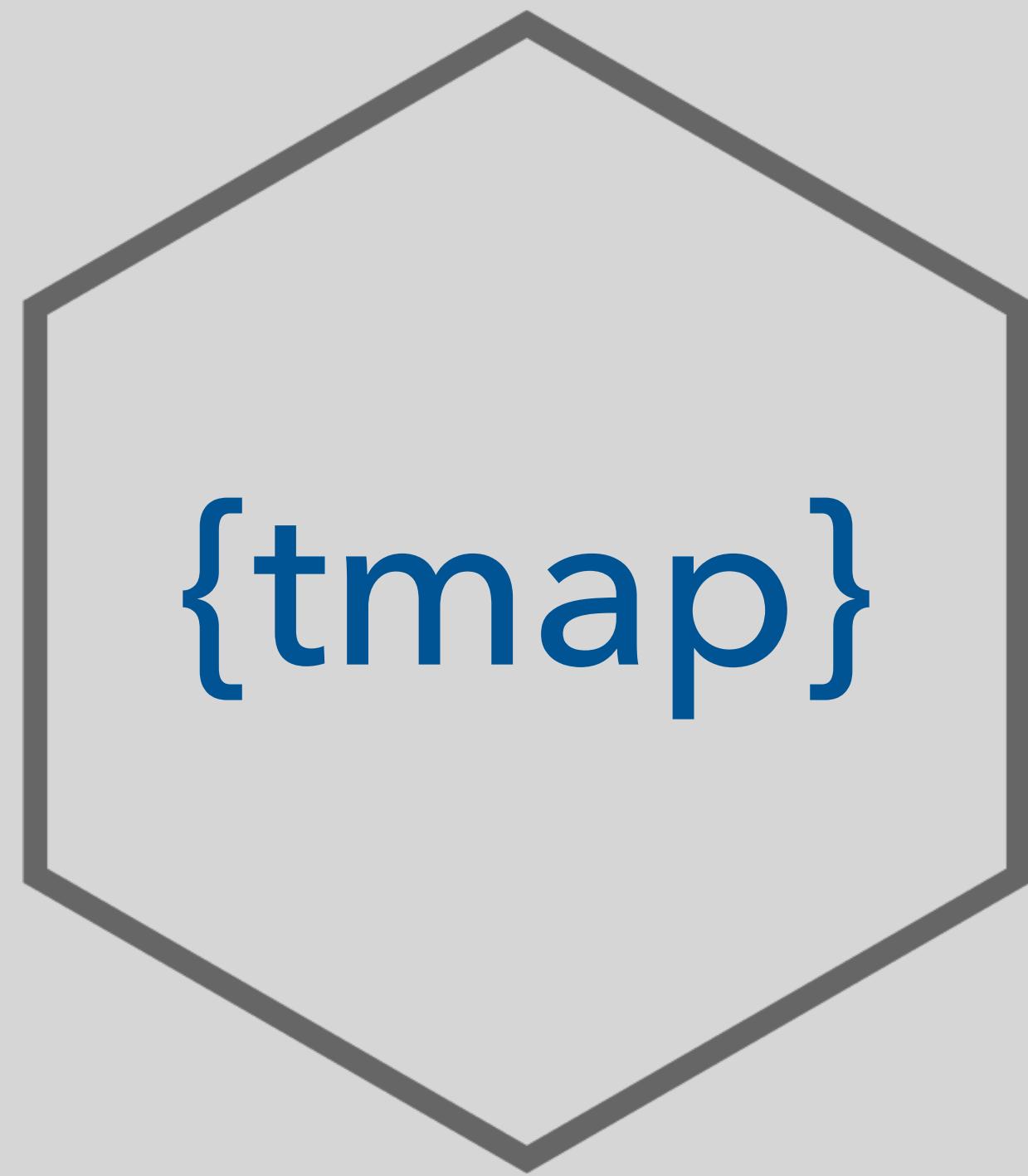


- **geo\_facet()**: an alternative to **facet\_wrap()**

# DOWNLOADING OPEN STREET MAP FEATURES

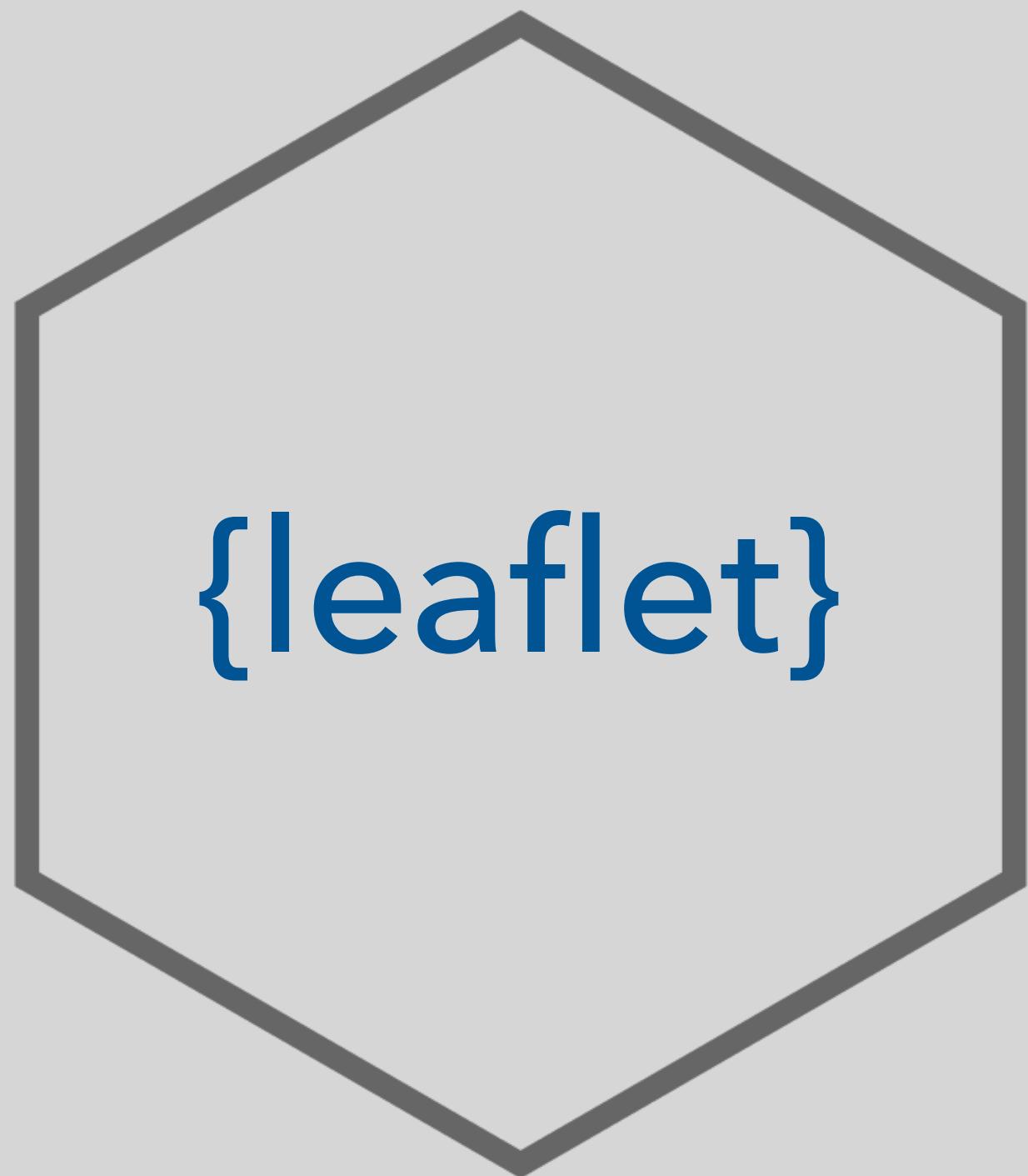


- {OSM}: a package to download Open Street Map features



*Sorry, no logo!*

*A cartography-specific visualization package*



*Interactive visualisation*

Recap: we have only worked with **vector**  
data

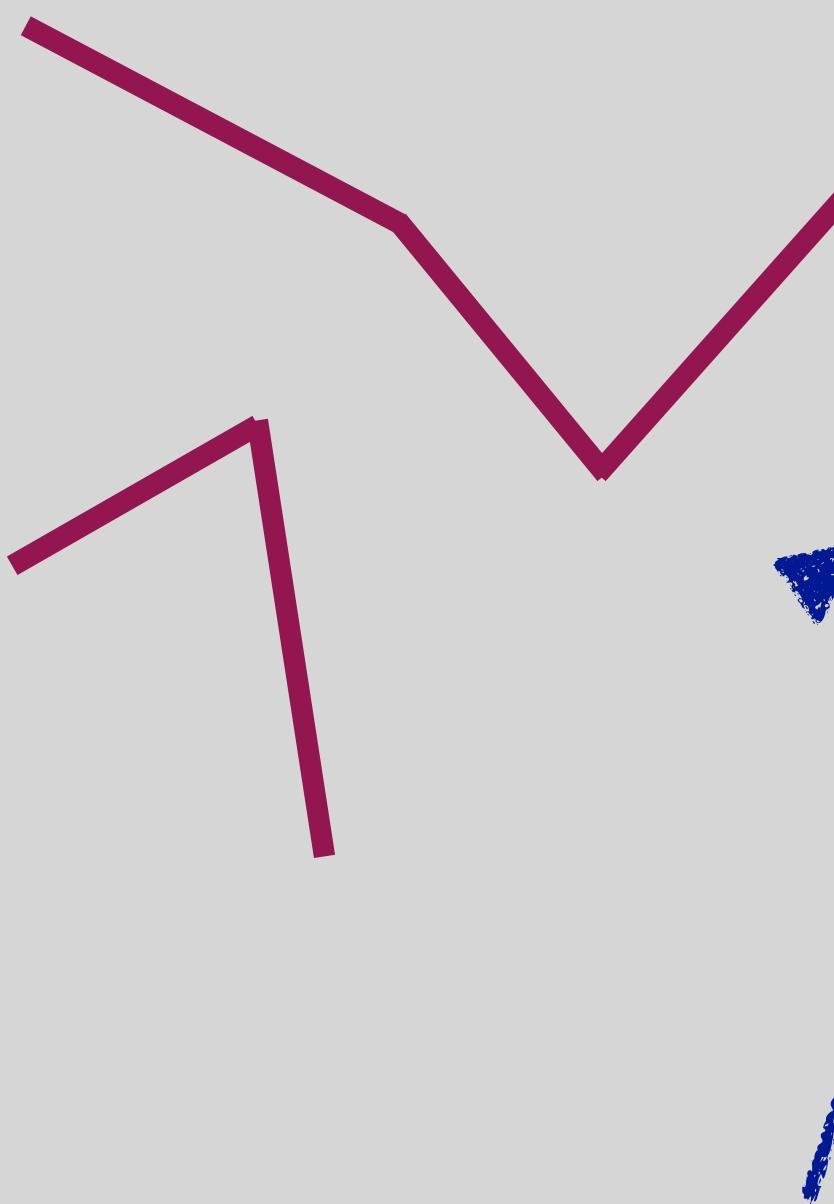
# VECTOR DATA

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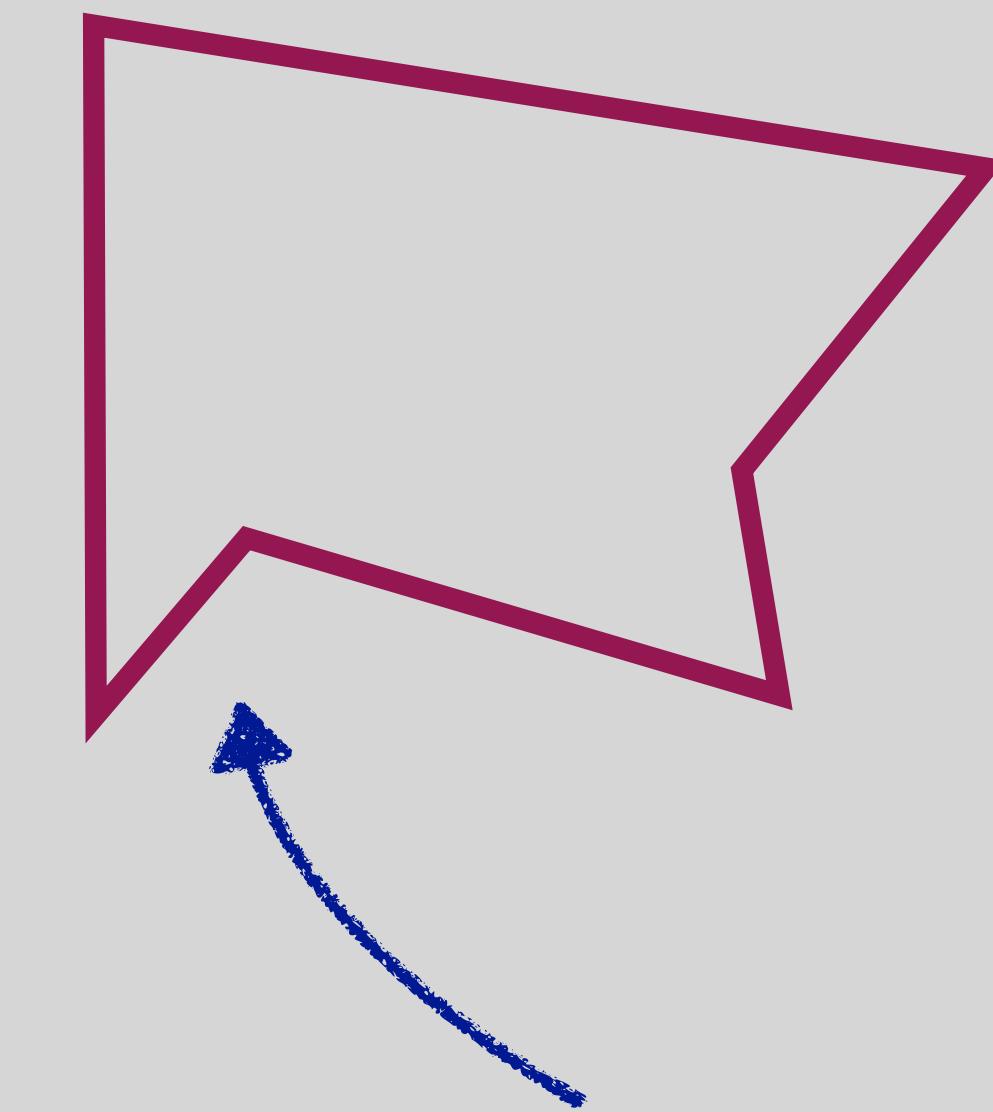
**Points**

eg. shop location, a  
house location etc...



**Lines**

eg. roads, train tracks,  
river, ski routes...



**Polygon**

eg. buildings, country  
borders, geological  
areas etc...

# VECTOR DATA

```
> class(lakes)
```

```
[1] "sf"
```

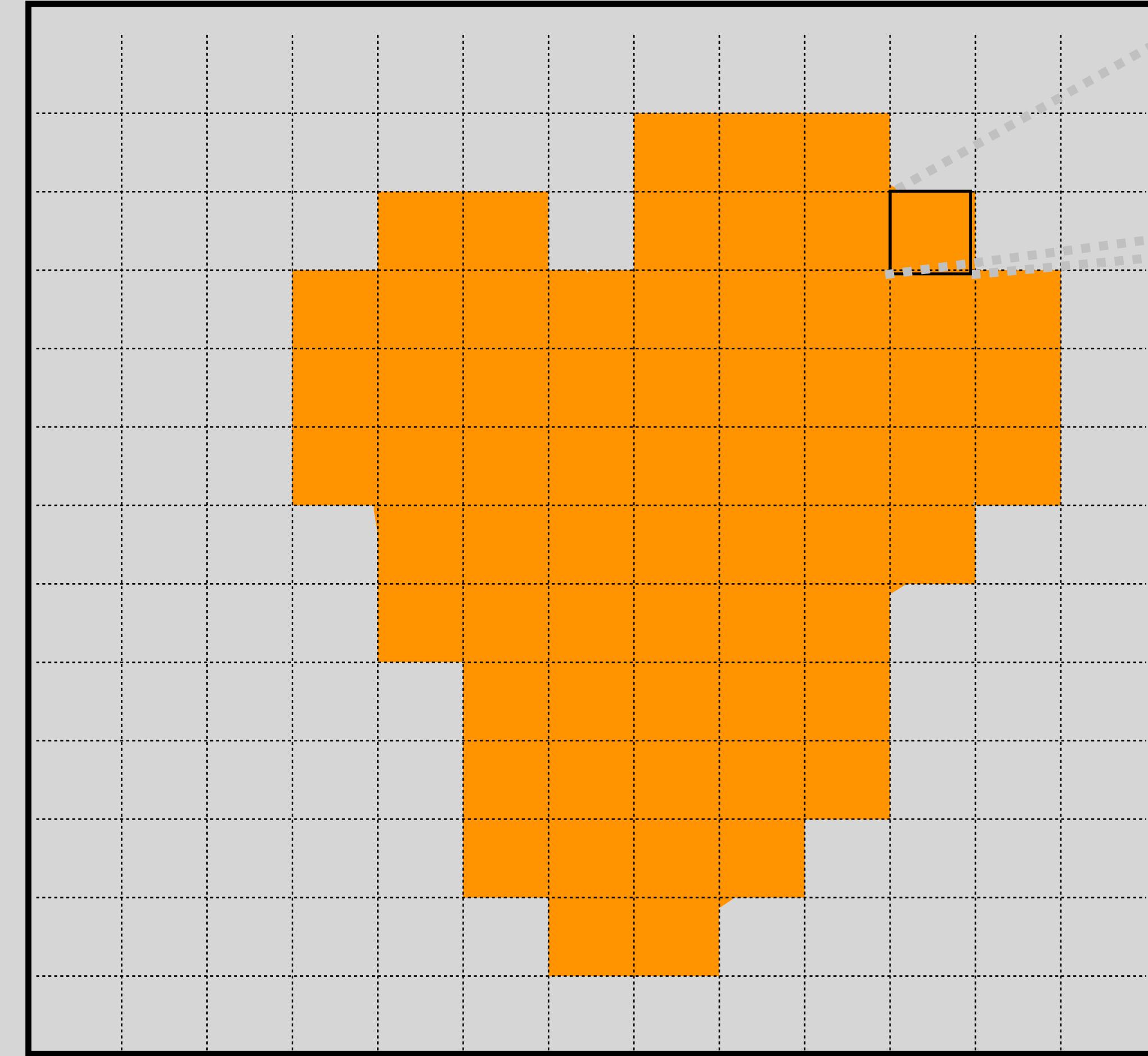
# "data.frame"

GMDNR	GMDNAME	SEE_HA	X_MIN	X_MAX	Y_MIN	Y_MAX	X_CNTR	Y_CNTR	geometry
9040	Greifensee	830	691664	695945	241896	247739	693800	245200	list(list(c(692683.664700001, 692813.9001, 692813.9001, 692683.664700001)))
9050	Zürichsee	8808	682600	714352	227657	247369	690500	235000	list(list(c(683302.653499998, 683630.3629, 683630.3629, 683302.653499998)))
9073	Thunersee	4784	614257	630110	167064	177248	621500	171200	list(list(c(615493.687199999, 616323.5606001, 616323.5606001, 615493.687199999)))
9089	Brienzsee	2977	634122	646709	170864	178693	640600	175000	list(list(c(644092.775800001, 645335.8466, 645335.8466, 644092.775800001)))
9148	Bielersee	3970	572052	584660	209652	220432	578500	213800	list(list(c(584494.4575, 584795.8244, 584210.511, 584494.4575)))
9151	Lac de Neuchâtel	21790	538531	570489	181794	206803	555600	194800	list(list(c(565335.279399998, 566216.3301, 566216.3301, 565335.279399998)))
9157	Baldeggsee	522	660947	663533	225508	229925	662200	227900	list(list(c(661451.324700002, 662175.9490999, 662175.9490999, 661451.324700002)))
9163	Sempachersee	1439	651767	657167	218806	224993	654300	221700	list(list(c(652068.659499999, 653230.2848, 653230.2848, 652068.659499999)))
9172	Hallwilersee	1023	657440	660135	233026	241217	658700	237200	list(list(c(657864.233600002, 658765.4239001, 658765.4239001, 657864.233600002)))
9175	Zugersee	3841	676884	682743	212835	226295	681200	215500	list(list(c(678905.442600001, 678942.498, 678942.498, 678905.442600001)))
9179	Vierwaldstättersee	11380	663950	690388	193694	215056	677100	204000	list(list(c(675475.117800001, 675272.8561999, 675272.8561999, 675475.117800001)))
9216	Sihlsee	1068	700059	704813	215726	223498	702200	220000	list(list(c(702311.646200001, 702663.9008999, 702663.9008999, 702311.646200001)))
9239	Sarnersee	736	657206	661416	188533	193515	659300	190900	list(list(c(661169.135600001, 661513.774, 661513.774, 661169.135600001)))
9267	Walensee	2417	725905	741407	219384	222315	733600	220500	list(list(c(727425.4595, 729240.241500001, 729240.241500001, 727425.4595)))
9270	Aegerisee	725	687237	691411	217452	221450	689500	219600	list(list(c(687748.813099999, 687922.1473001, 687922.1473001, 687748.813099999)))

Data types we did not cover: raster data

# RASTERS

Latitude



Longitude



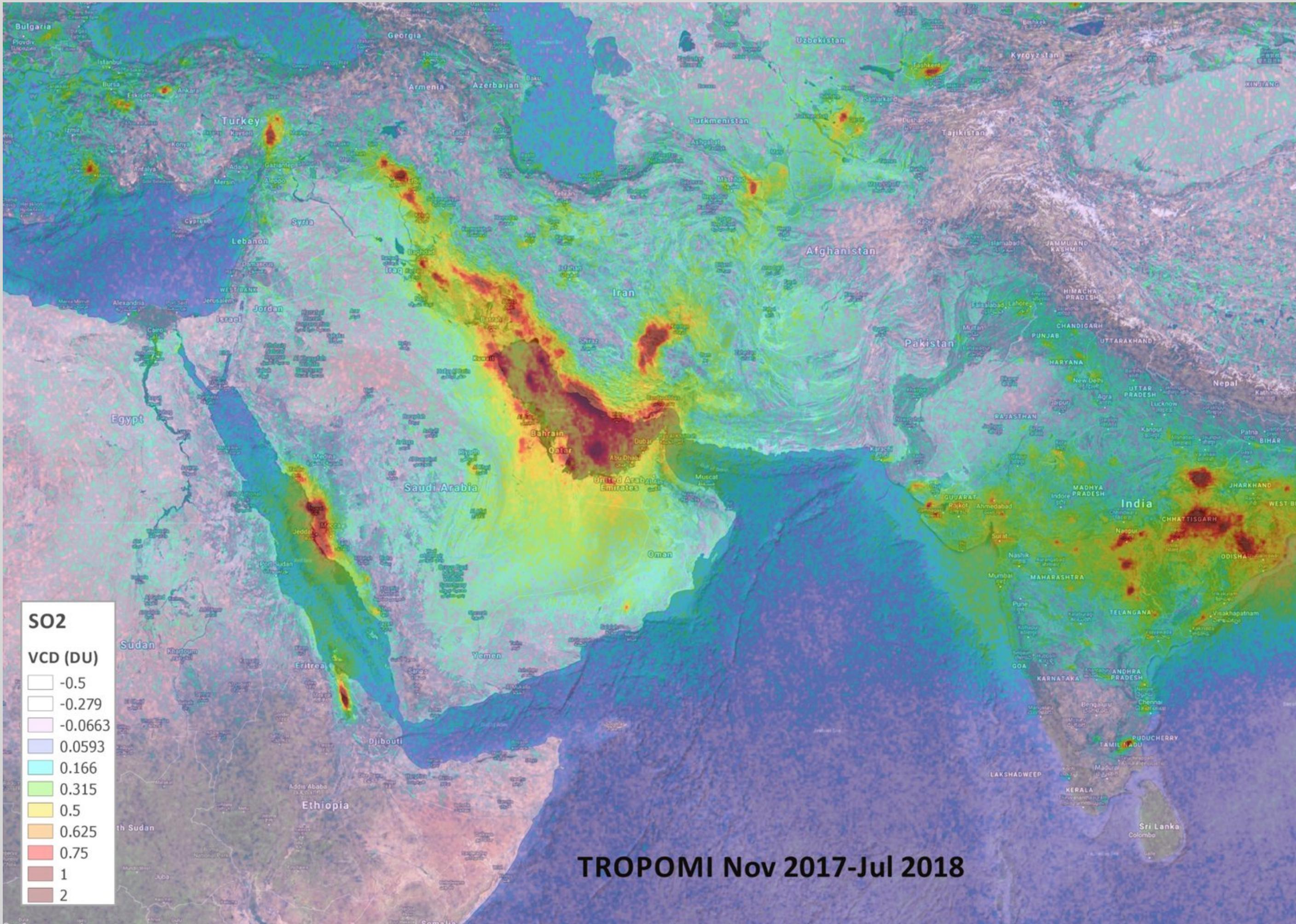
Cell

Width



# RASTERS: Example

- Used for continuous variables : eg. population density, air pollution, surface temperature



# R Packages

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## Import and manipulation

- {sf}
- {raster}
- {stars}
- {terra}

## Visualization

- {ggplot2}
- {tmap}
- {cartography}
- {leaflet}
- {rayshader}
- {mapdeck}

# Thank you for your attention!

## Contacts:



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