Quick high quality maps with R

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Preliminaries

- Usually I have big differences in knowledge and abilities of the participants - please tell, if it is too fast or slow.
- I have lots of hands-on coding **exercises** - later you can only learn on your own
- We have many **examples** - try them
- If there are questions - always ask
- R is more fun together - strong proponent of collaborative work!

Adjustments for online course

- Quick
- One slide - one example -
- Easy to use

Getting help on packages

```r
# provides details regarding contents of a package
help(package = "osmplotr")
# list vignettes available for a specific package
vignette(package="osmplotr")
# view specific vignette
vignette("data-maps")
```
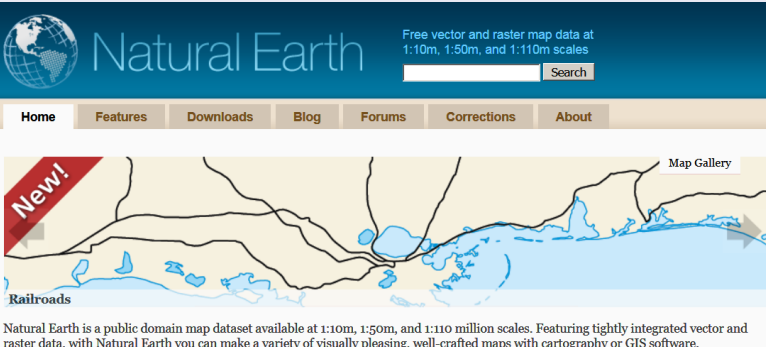
The `World` dataset

Natural Earth

- Dataset contains information from **Natural Earth**

`data(World)`

Natural Earth is a public domain map dataset available at 1:10m, 1:50m, and 1:110 million scales. Featuring tightly integrated vector and raster data, with Natural Earth you can make a variety of visually pleasing, well-crafted maps with cartography or GIS software.

The qtm command from the tmap package

Fast thematic map

- With **qtm** you can create a fast thematic map
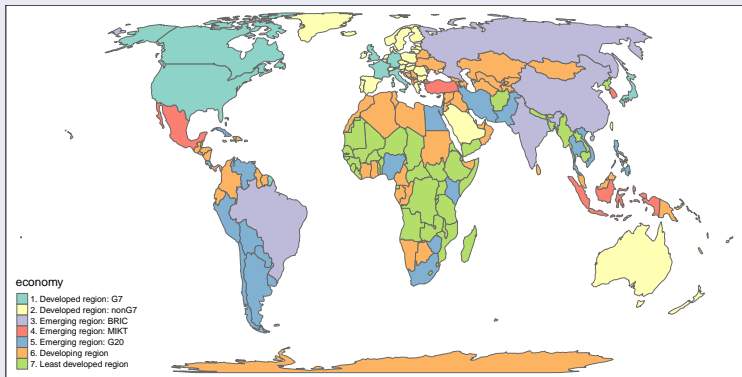- Example from the **Vignette** for the tmap package

```r
library(tmap)
data(World)
qtm(World)
```

To get more color in the map

Economic development status
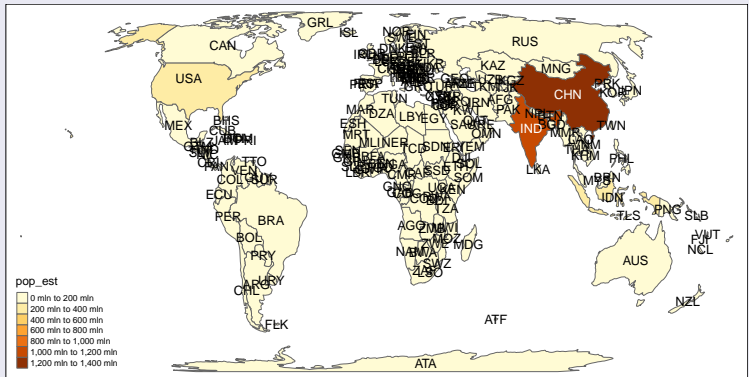
```
qtm(World, fill="economy")
```
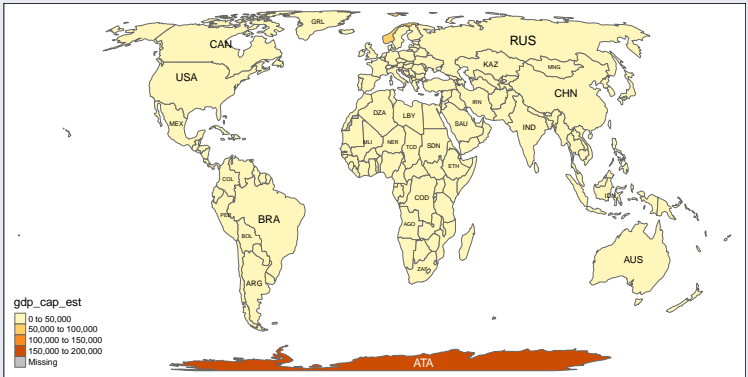
A map with text

Population

```
qtm(World, fill="pop_est", text="iso_a3")
```

This Scheme is better:

GDP per capita

```
qtm(World, fill="gdp_cap_est", text="iso_a3",
    text.size="AREA")
```

Topics of the World dataset

Available variables in the data set

- **ISO classification**
- country name
- Area, population, population density,
- **Gross Domestic Product**
- Gross domestic product **at purchasing power parities**
- Economy, income group

The World Dataset - Variables and what's behind

iso_a3	name	sovereignt	continen
AFG	Afghanistan	Afghanistan	Asia
AGO	Angola	Angola	Africa
ALB	Albania	Albania	Europe
ARE	United Arab Emirates	United Arab Emirates	Asia
ARG	Argentina	Argentina	South A
ARM	Armenia	Armenia	Asia
ATA	Antarctica	Antarctica	Antarcti
ATF	Fr. S. Antarctic Lands	France	Seven se

The variable `continent`

`qtm(World, fill="continent")`
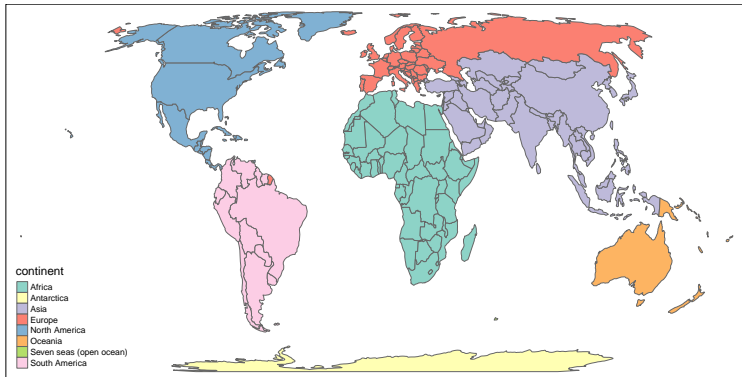
The variable `area`

```
qtm(World, fill="area") # Russia is huge
```
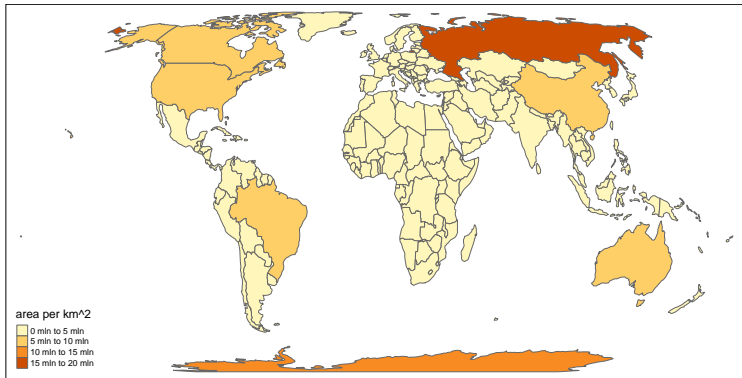
Population

```
qtm(World, fill="pop_est",fill.title="Population")
```
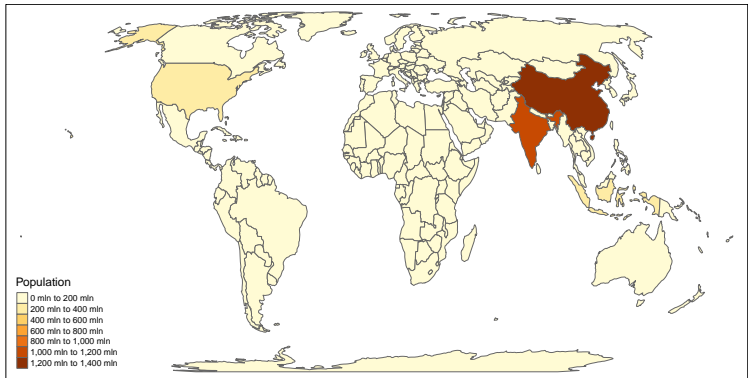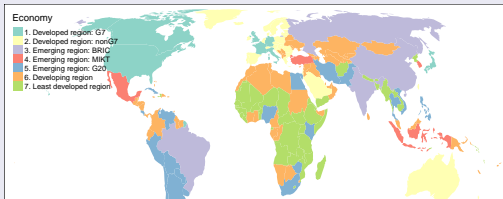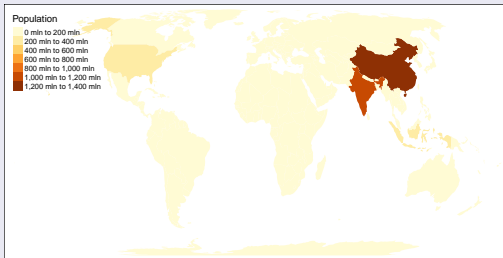
Two maps

Population and level of development

```
tm_shape(World) + tm_fill(c("pop_est", "economy"),
        title=c("Population", "Economy"))
```

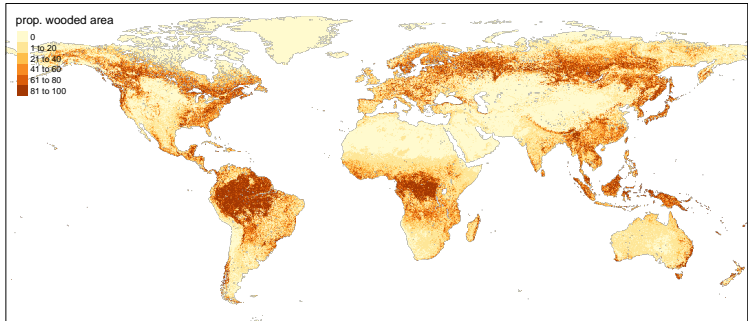# Netherlands - Population in the provinces

```r
data(land)
data(World)

tm_shape(land, relative=FALSE) +
    tm_raster("trees", title="prop. wooded area")
```

Visualize only one country

```r
tm_shape(World[World$name=="Austria", ]) +
    tm_polygons()
```
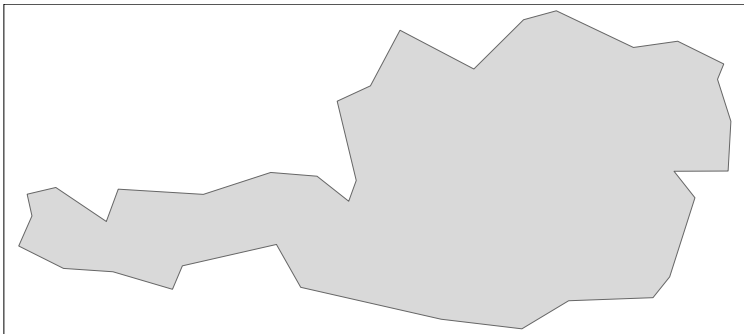
Load example data

Data source Eurostat

- Data about unemployment in Europe

```
url <- "https://raw.githubusercontent.com/Japhilko/
GeoData/master/2015/data/Unemployment07a13.csv"

Unemp <- read.csv(url)
```

Excursus: the command `match`

Create two example vectors

```
vec_a <- c("A",2,6,1,"C")
vec_b <- c(1,"C",2)
```

Bringing the two vectors together

- With the function `match` you can see which element of the first vector matches the second vector.

```
match(vec_a,vec_b)
```

```
## [1] NA  3 NA  1  2
```

Use the package `tmap` with your data
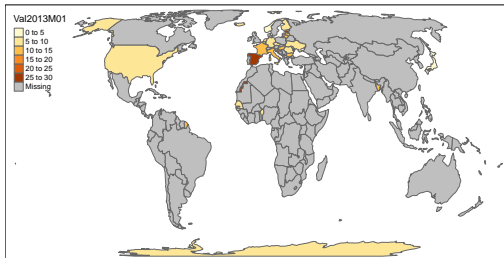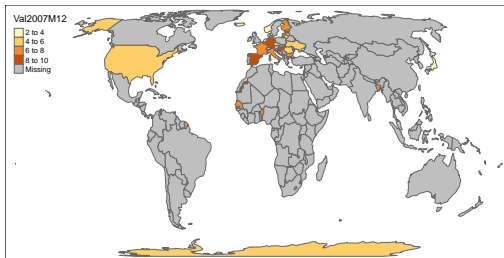
```r
library("tmap")
```

Match the data

```r
iso_a2<- substr(World$iso_a3,1,2)
ind <- match(iso_a2,Unemp$GEO)
World$Val2007M12 <- Unemp$Val2007M12[ind]
World$Val2013M01 <- Unemp$Val2013M01[ind]
```

Plot a map

```
qtm(World,c("Val2007M12","Val2013M01"))
```

Exercise: Visualisation of Eurostat data

First part - plot a map

- Download and import the data unemprate_by_sex.csv from ILIAS.
- Link the data with map data .
- Visualise the linked data in a map.

If you have that:

- Search for example **here** for datasets containing the country name and visualize the data with tmap.

The World-Dataset

The World Dataset in Package `tmap`

```
                    economy            income_grp gdp_cap_est life_exp well_being footprint inequality      HPI
1 7. Least developed region        5. Low income    784.1549   59.668        3.8      0.79  0.4265574 20.22535
2 7. Least developed region  3. Upper middle income  8617.6635       NA         NA        NA         NA       NA
3      6. Developing region  4. Lower middle income  5992.6588   77.347        5.5      2.21  0.1651337 36.76687
4      6. Developing region 2. High income: nonOECD 38407.9078       NA         NA        NA         NA       NA
                    geometry
1 MULTIPOLYGON (((5310471 451...
2 MULTIPOLYGON (((1531585 -77...
3 MULTIPOLYGON (((1729835 521...
4 MULTIPOLYGON (((4675864 313...
```

The package `tmaptools`

```
library(tmaptools)

citation("tmaptools")
```

```
##
## To cite package 'tmaptools' in publications use:
##
##    Martijn Tennekes (2020). tmaptools: Thematic Map
##    version 3.1. https://CRAN.R-project.org/package=
##
## A BibTeX entry for LaTeX users is
##
##    @Manual{,
##      title = {tmaptools: Thematic Map Tools},
##      author = {Martijn Tennekes},
##      year = {2020},
##      note = {R package version 3.1},
```

Geocoordinates

```
(gc_z <- geocode_OSM("Zürich"))

## $query
## [1] "Zürich"
##
## $coords
##         x          y
##  8.541042 47.374449
##
## $bbox
##       xmin      ymin      xmax      ymax
##  8.448006 47.320220  8.625441 47.434666
```

```r
library(osmplotr)
citation("osmplotr")
```

```
##
## To cite package 'osmplotr' in publications use:
##
##   Mark Padgham and Richard Beare (2018). osmplotr:
##   'OpenStreetMap' Data. R package version 0.3.2.
##   https://CRAN.R-project.org/package=osmplotr
##
## A BibTeX entry for LaTeX users is
##
##   @Manual{,
##     title = {osmplotr: Bespoke Images of 'OpenStre
##     author = {Mark Padgham and Richard Beare},
##     year = {2018},
##     note = {R package version 0.3.2},
```

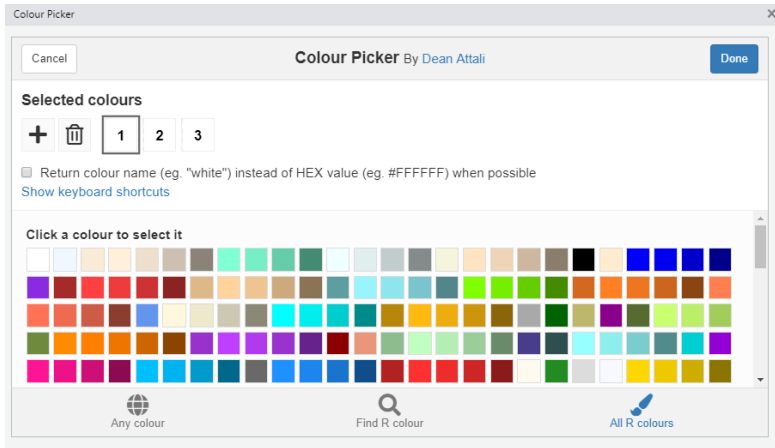# Buildings within a bounding box

```
bbox <- get_bbox (c(8.4539 , 49.4805  , 8.4774 , 49.4
dat_M <- extract_osm_objects (key = 'building', bbox
```

```
qtm(dat_M,fill=c("purple"),borders="black")
```

Colour picker

30daymapchallenge