Karten erstellen mit R

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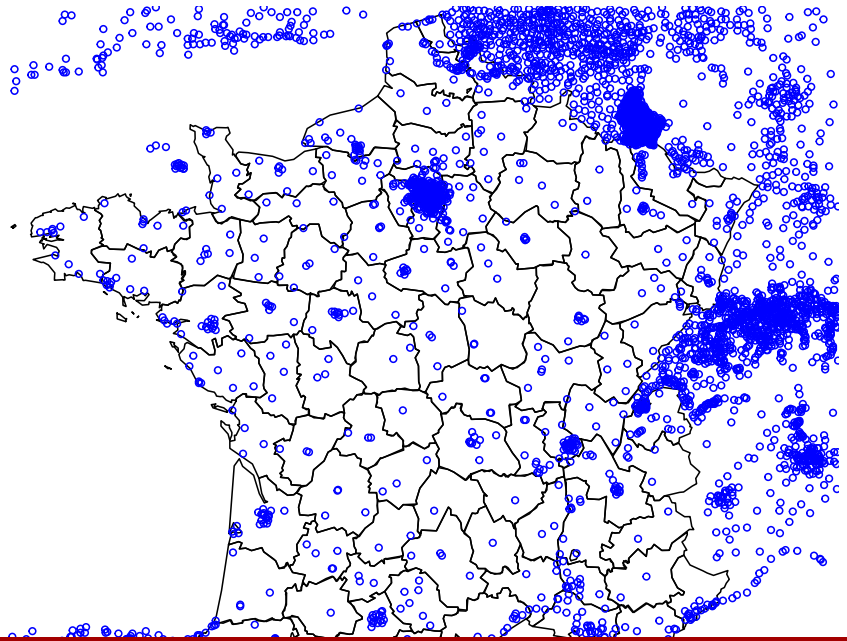
Gliederung

- Quellen für räumliche Daten
- Pakete zur Darstellung in Karten
- Quellen für inhaltliche Daten
- Verknüpfung von Daten
- Beispiele für die Darstellung in Karten

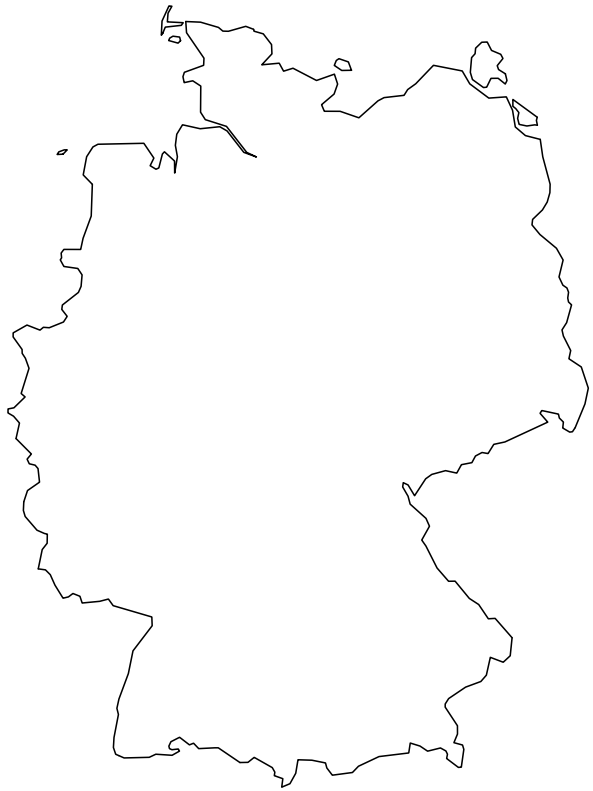
Das Paket maps

```
library(maps)
data(world.cities)
map("france")
map.cities(world.cities,col="blue")
```



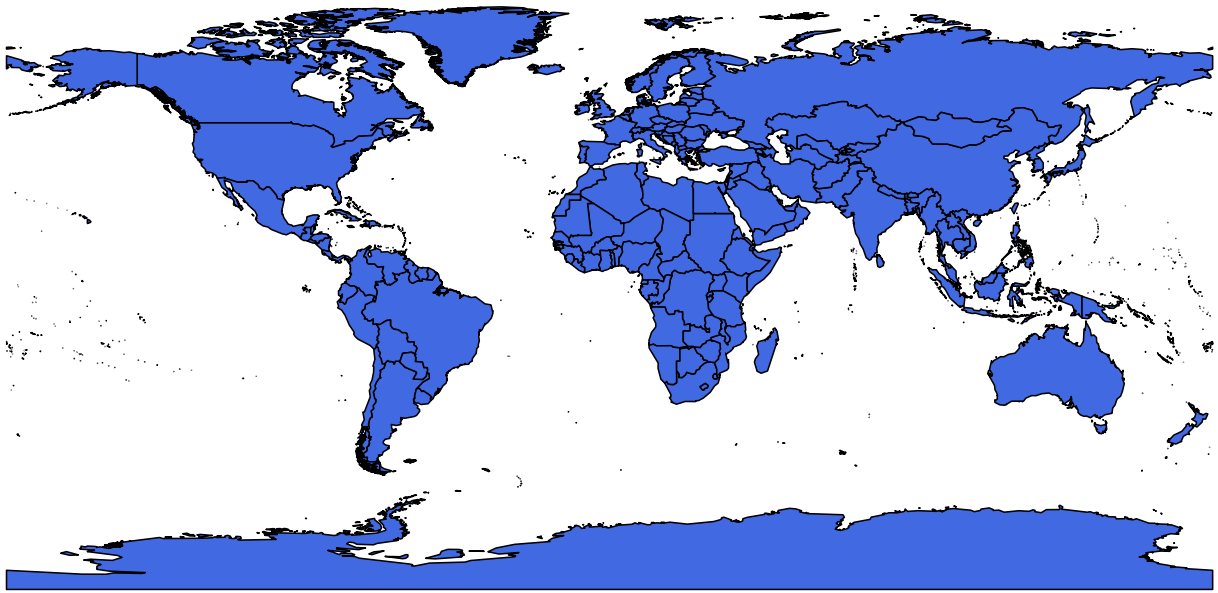
Grenzen sind recht grob

```
map("world", "Germany")
```



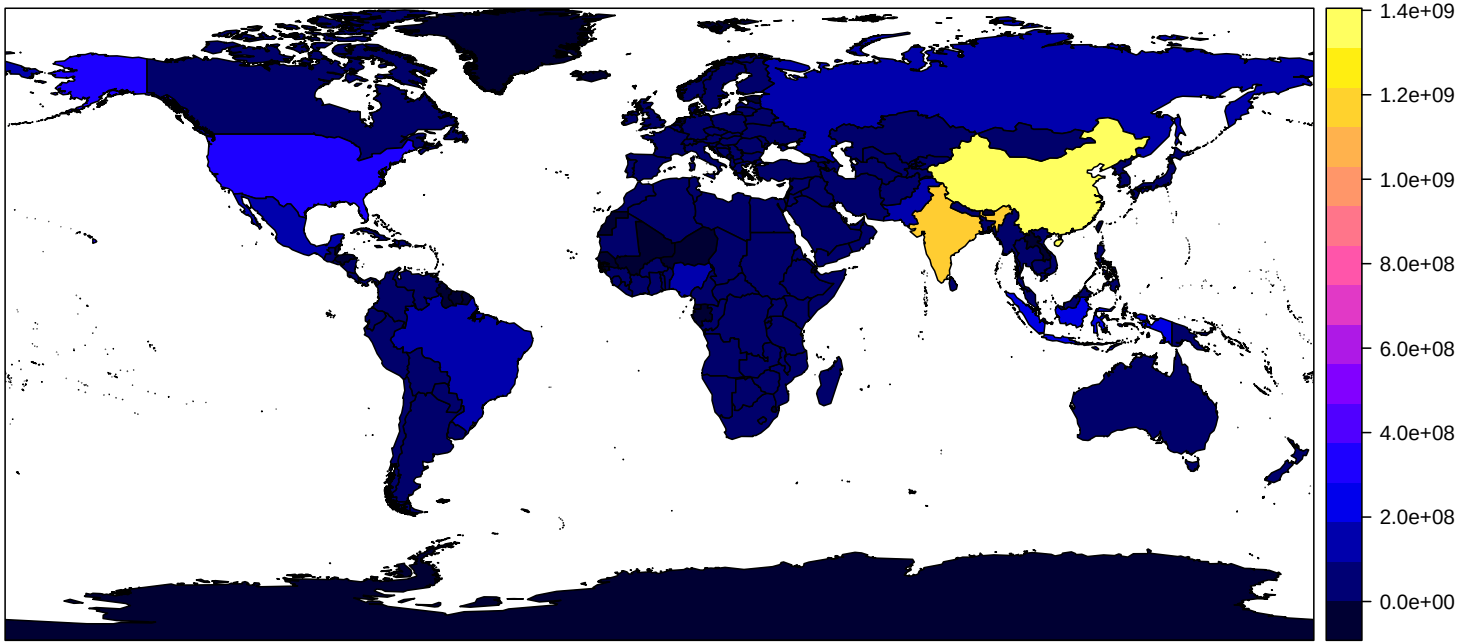
Das Paket maptools

```
library(maptools)
data(wrld_simpl)
plot(wrld_simpl,col="royalblue")
```



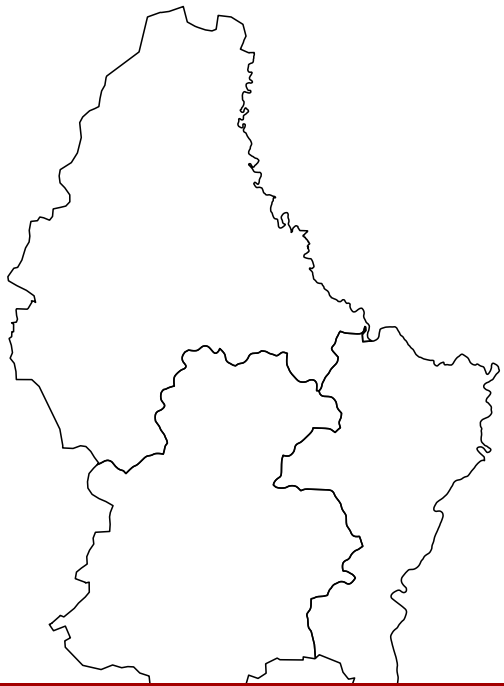
Das Paket sp

```
library(sp)
spplot(wrld_simpl,"POP2005")
```



Das Paket raster

```
library(raster)
LUX1 <- getData('GADM', country='LUX', level=1)
plot(LUX1)
```



Daten für das Luxemburg Beispiel

```
kable(head(LUX1@data))
```

OBJECTID	ID_0	ISO	NAME_0	ID_1	NAME_1	HAS
1	131	LUX	Luxembourg	1	Diekirch	LU.D
2	131	LUX	Luxembourg	2	Grevenmacher	LU.G
3	131	LUX	Luxembourg	3	Luxembourg	LU.L

Gemeinden in Deutschland

- Quelle: Bundesamt für Kartographie und Geodäsie

```
library(maptools)
krs <- readShapePoly("vg250_ebenen/vg250_krs.shp")
plot(krs)
```

Ortsnetzbereiche

Quelle: Bundesnetzagentur

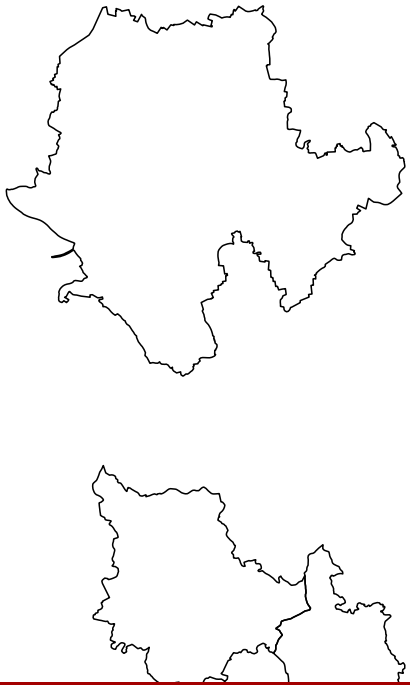
```
library(maptools)
setwd("D:/Daten/Daten/GeoDaten/")

onb <- readShapePoly("onb_grenzen.shp")
kable(head(onb@data))
```

	VORWAHL	NAME	KENNUNG
0	04651	Sylt	NA
1	04668	Klanxbüll	NA
2	04664	Neukirchen b Niebüll	NA
3	04663	Süderlügum	NA
4	04666	Ladelund	NA
5	04631	Glücksburg Ostsee	NA

Vorwahlbereiche rauß nehmen

```
vw_stg <- c("0711", "07121", "07122")
vw_reg_stg <- onb[onb@data$VORWAHL %in% vw_stg, ]
plot(vw_reg_stg)
```



Einen Vorwahlbereich ausschneiden

```
vwb <- as.character(onb@data$ONB_NUMMER)
vwb1 <- substr(vwb, 1,2)
vwb7 <- onb[vwb1=="07",]
plot(vwb7)
```

Das Paket rgdal

- Postleitzahlenbereiche - http://arnulf.us/PLZ

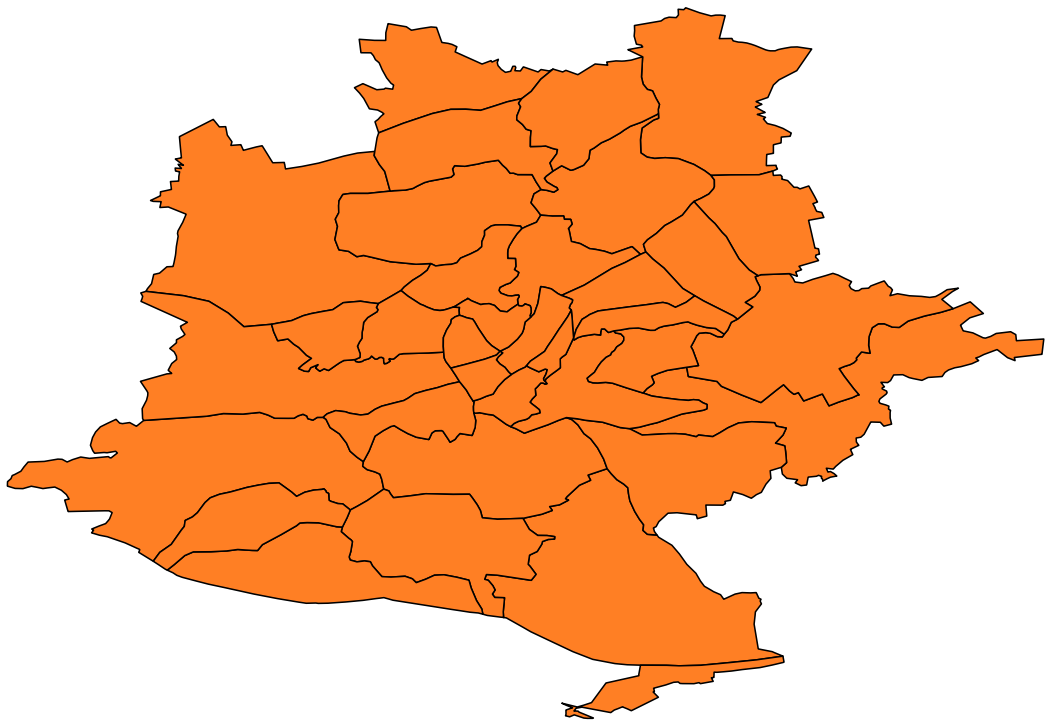
```
library(rgdal)
```

```
## OGR data source with driver: ESRI Shapefile
## Source: "post_pl.shp", layer: "post_pl"
## with 8270 features
## It has 3 fields
```

```
library(rgdal)
PLZ <- readOGR ("post_pl.shp","post_pl")
```

PLZ-Bereiche in Stuttgart

```
SG <- PLZ[PLZ@data$PLZORT99=="Stuttgart",]
plot(SG,col="chocolate1")
```



Daten verbinden - CO2 Emissionen

```
link <-
"https://raw.githubusercontent.com/Japhilko/
GeoData/master/data/CO2emissions.csv"
co2 <- read.csv(link)
```

X	V1	V2	V3	V4	V5	V6	V7
1	1.	Qatar	25.2	36.7	54.3	60.9	58.7
2	2.	Trinidad and Tobago	13.9	17.1	17.0	13.5	15.8
3	3.	Netherlands Antilles	32.6	26.9	22.6	35.0	34.3
4	4.	Kuwait	19.0	5.1	10.0	16.9	20.8

Wir müssen Länder in diesem Datensatz und Ländernamen in wrld_simpl-Datensatz zusammenbringen

Matching

```
ind <- match(wrld_simpl@data$NAME,co2$V2)
ind
```

```
##   [1]  80  97  73 141 137 142  NA  84  11   8  77  69   6
##  [18]  NA 172 179 126  62  NA  14 181 171  NA 215 213   5
##  [35] 182 214 189 145 130 199 116 165 104  35  45 166 13
##  [52]  56  22 200 151 201  49  26  96  31 133  NA  NA 10
##  [69] 178 120  29  38  NA  41 154 202 125 192 150  79   7
##  [86]  53  NA 105  39  92 101 184 152  NA 185  NA   4   1
## [103]  90 193  61  NA  NA 203  85  98  20  NA 216 138 11
## [120]  93  52 205 204  21 115 207   7 102  36  71  NA   1
## [137] 111  NA 170  NA  NA  NA  NA  NA  NA  NA  NA  NA   N
## [154]  28  32 206  18  87 160  51 164 140 157  46 123   7
## [171]  94  NA 161  NA  23 208  13  82  48  42  NA 114 17
## [188]  54 121 188  76  NA  74   2  99 153  NA 135 196   N
```

Struktur der Daten

```
co2vec<-co2$V3
str(co2vec)
```

```
##  Factor w/ 90 levels "","-","0","0.1",..: 48 28 57 37 47
```

```
co2vec<-as.character(co2vec)
str(co2vec)
```

```
##  chr [1:219] "25.2" "13.9" "32.6" "19.0" "25.0" "29.4" "
```

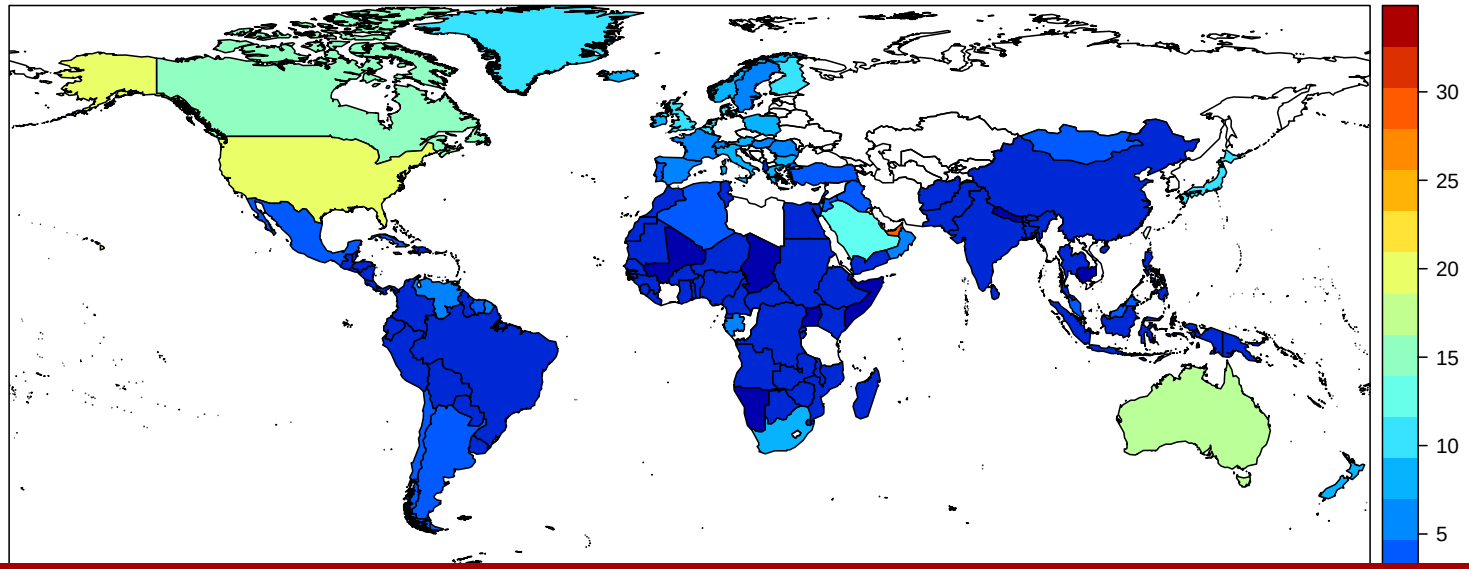
```
co2vec<-as.numeric(co2vec)
str(co2vec)
```

```
##  num [1:219] 25.2 13.9 32.6 19 25 29.4 29.1 24.1 25.9 18
```

Daten anspielen

```
wrld_simpl@data$co2_90 <- co2vec[ind]
```

```
library(colorRamps)
spplot(wrld_simpl,"co2_90",col.regions=matlab.like(100))
```



Zensus Atlas

https://ergebnisse.zensus2011.de/

Figure 2: Zensus Datenbank