STAT 451 - Visualizing Data - Autumn 2025

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Load R packages

```
library(tidyverse)
library(cowplot)
library(Ecdat)
```

Part 4 - Miscellaneous functions

Setting the figure size in RMarkdown

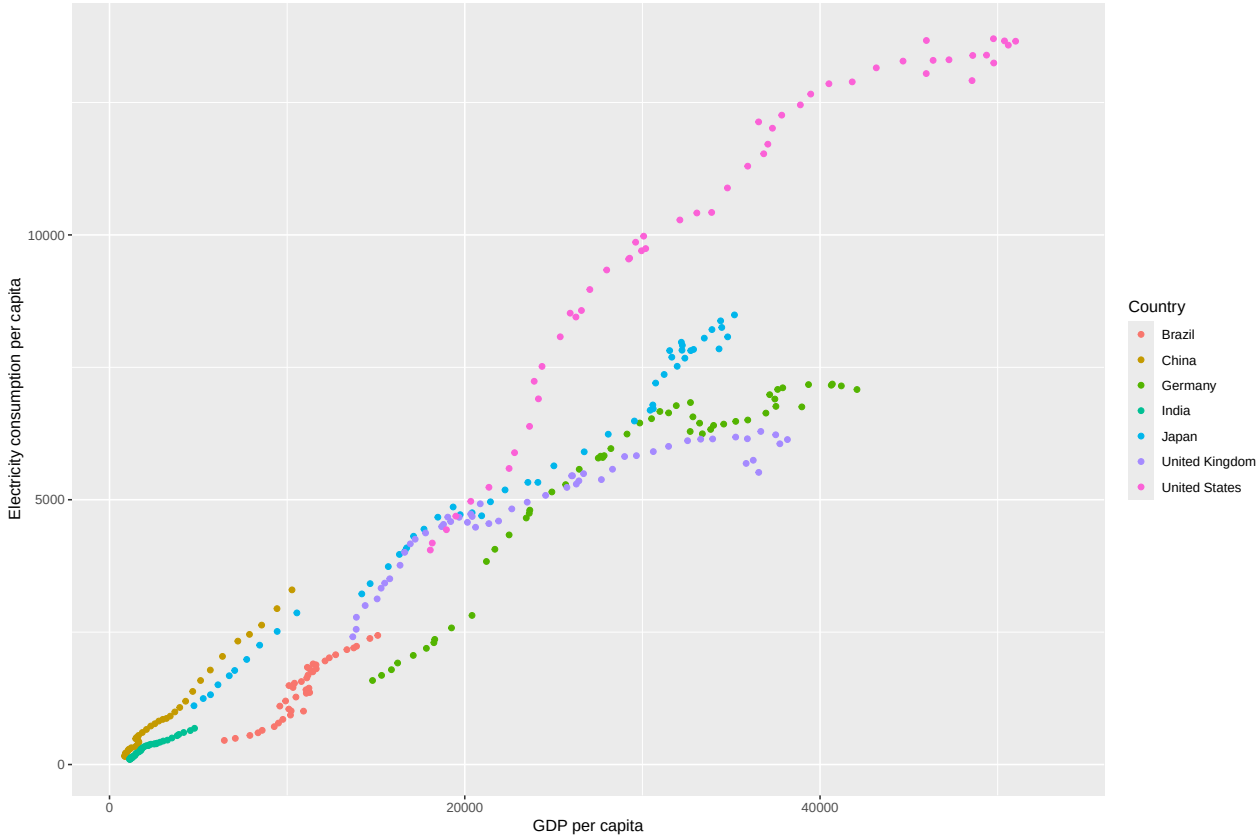
Define with knitr options at the beginning.

```
df <- read_csv("../../data/gapminder-data.csv")
```

```
## New names:
## Rows: 1512 Columns: 10
## -- Column specification
## -------------------------------------------------------- Delimiter: "," chr
## (1): Country dbl (9): ...1, Year, gdp_per_capita,
## Electricity_consumption_per_capita, und...
## i Use `spec()` to retrieve the full column specification for this data. i
## Specify the column types or set `show_col_types = FALSE` to quiet this message.
## * `` -> `...1`
```

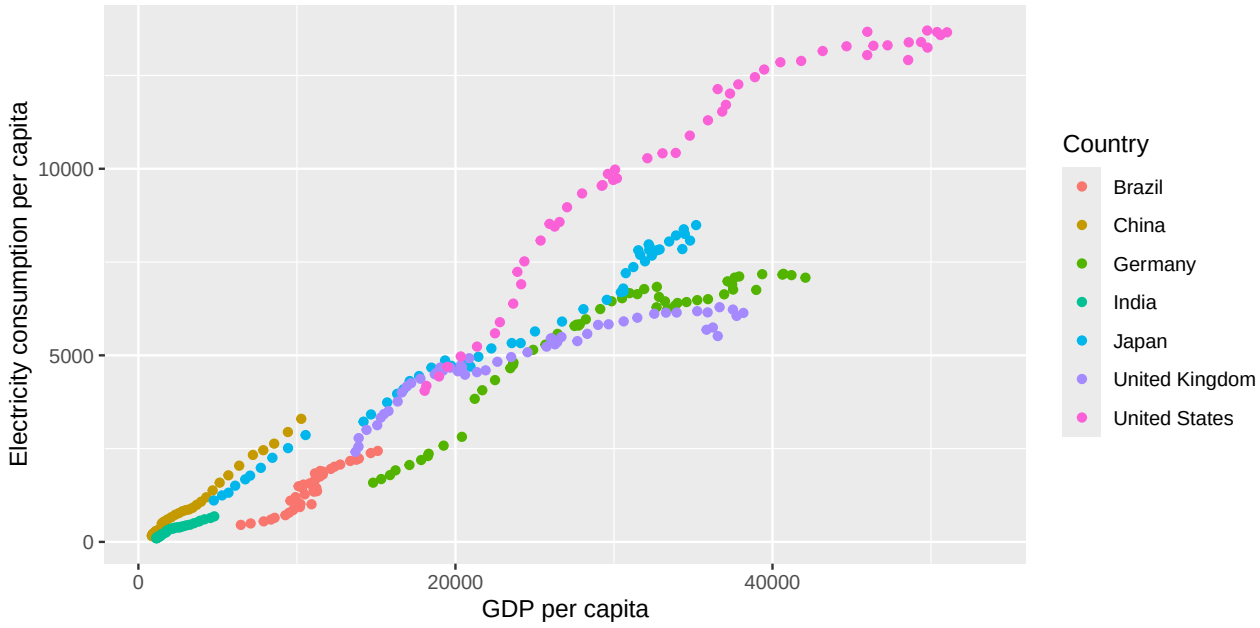
```
ggplot(df, aes(gdp_per_capita, Electricity_consumption_per_capita)) +
  geom_point(aes(color=Country)) +
  xlab("GDP per capita") +
  ylab("Electricity consumption per capita")
```

```
## Warning: Removed 1181 rows containing missing values or values outside the scale range
## (`geom_point()`).
```



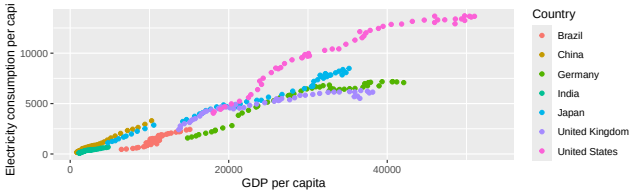

```
ggplot(df, aes(gdp_per_capita, Electricity_consumption_per_capita)) +
  geom_point(aes(color=Country)) +
  xlab("GDP per capita") +
  ylab("Electricity consumption per capita")
```

```
## Warning: Removed 1181 rows containing missing values or values outside the scale range
## (`geom_point()`).
```



```
ggplot(df, aes(gdp_per_capita, Electricity_consumption_per_capita)) +
  geom_point(aes(color=Country)) +
  xlab("GDP per capita") +
  ylab("Electricity consumption per capita")
```

```
## Warning: Removed 1181 rows containing missing values or values outside the scale range
## (`geom_point()`).
```



Setting the figure size when saving

```
ggsave(filename = "figures/small_memory_size.png", ggplot(mtcars, aes(x=wt, y=mpg)) +
  geom_point(size=2, shape=23) + theme_bw(base_size = 10),
  width = 5, height = 4, dpi = 150, units = "in", device='png')
ggsave(filename = "figures/big_memory_size.png", ggplot(mtcars, aes(x=wt, y=mpg)) +
  geom_point(size=2, shape=23) + theme_bw(base_size = 10),
  width = 5, height = 4, dpi = 300, units = "in", device='png')
ggsave(filename = "figures/big_figure.png", ggplot(mtcars, aes(x=wt, y=mpg)) +
  geom_point(size=2, shape=23) + theme_bw(base_size = 10),
  width = 10, height = 8, dpi = 300, units = "in", device='png')
```

You need to scale the figures to get the same size of dots and fonts.

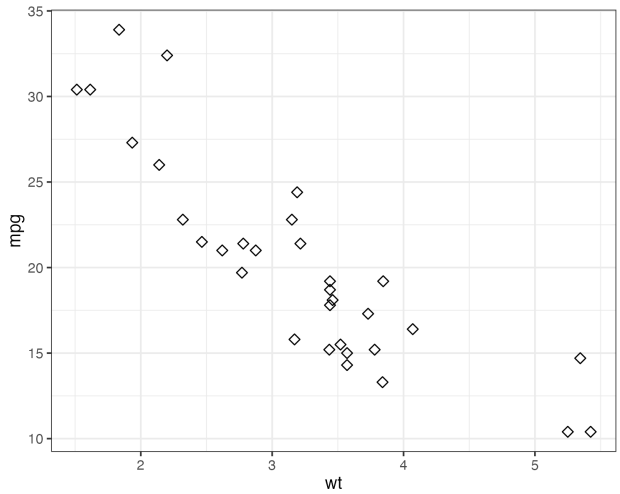


Figure 1: Small width and height

Highlighting parts of the map

We are interested in the gross state product (GSP) of the three states: New York, New Jersey and Connecticut.

```
us_map <- map_data("state")
us_prod <- Produc[Produc$year==1985,]
```

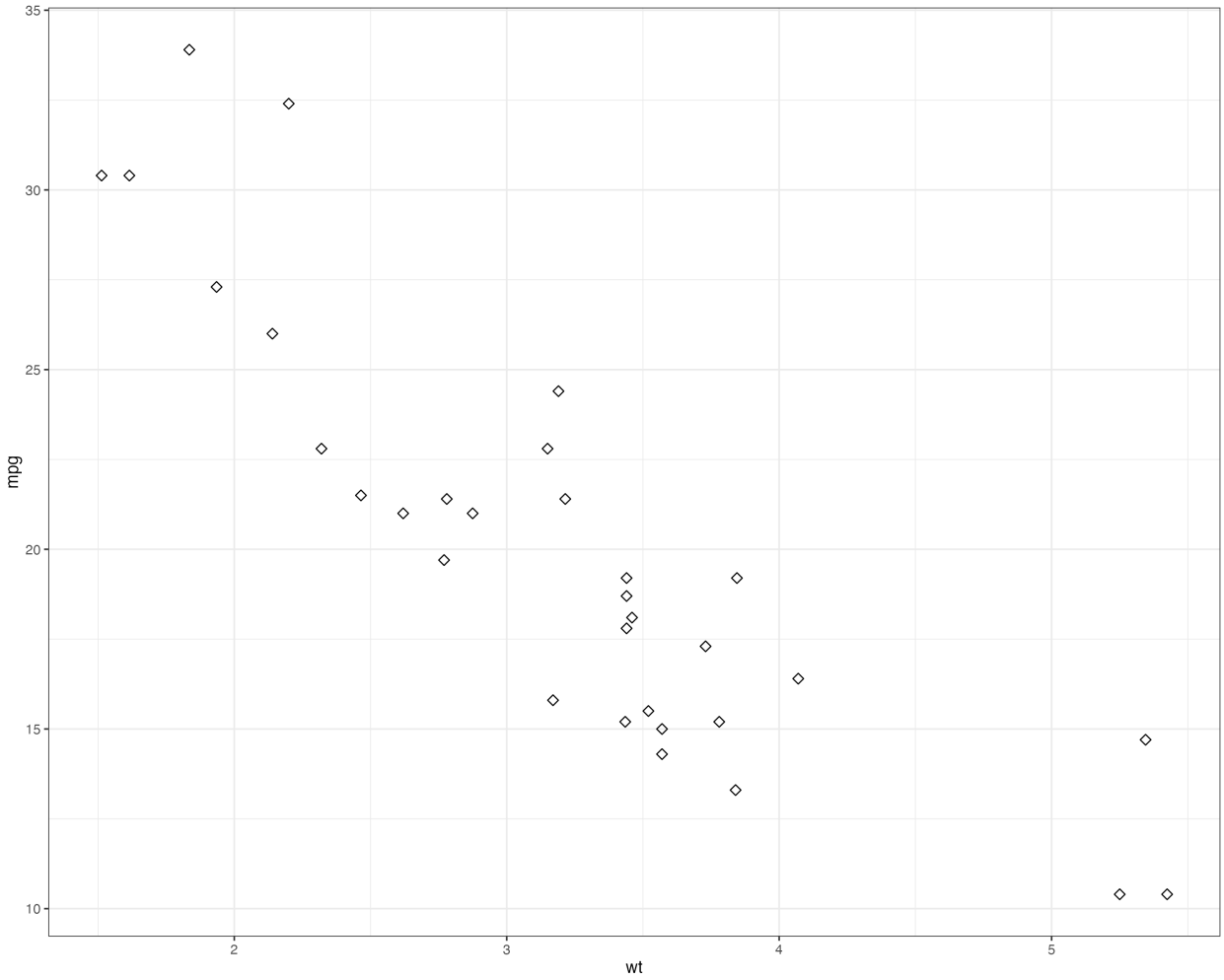
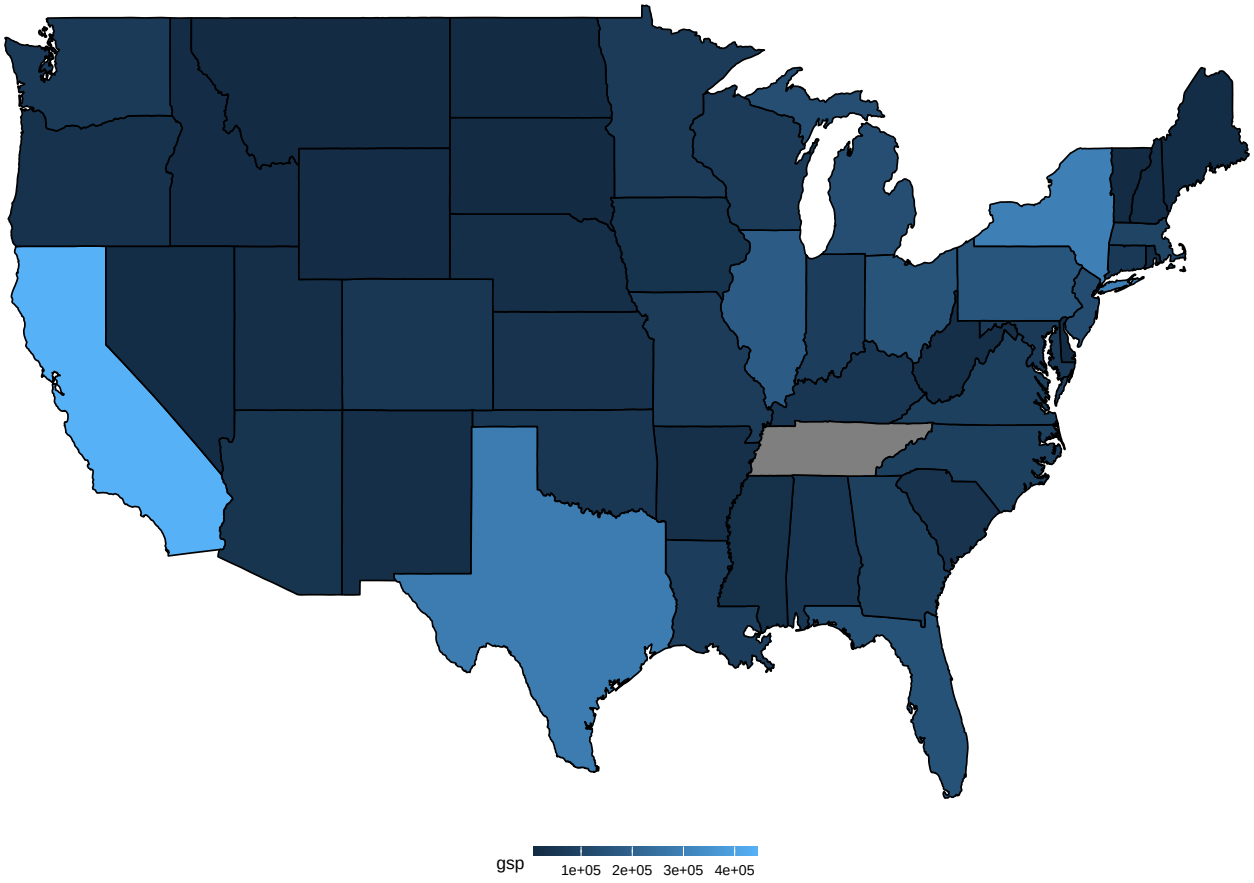
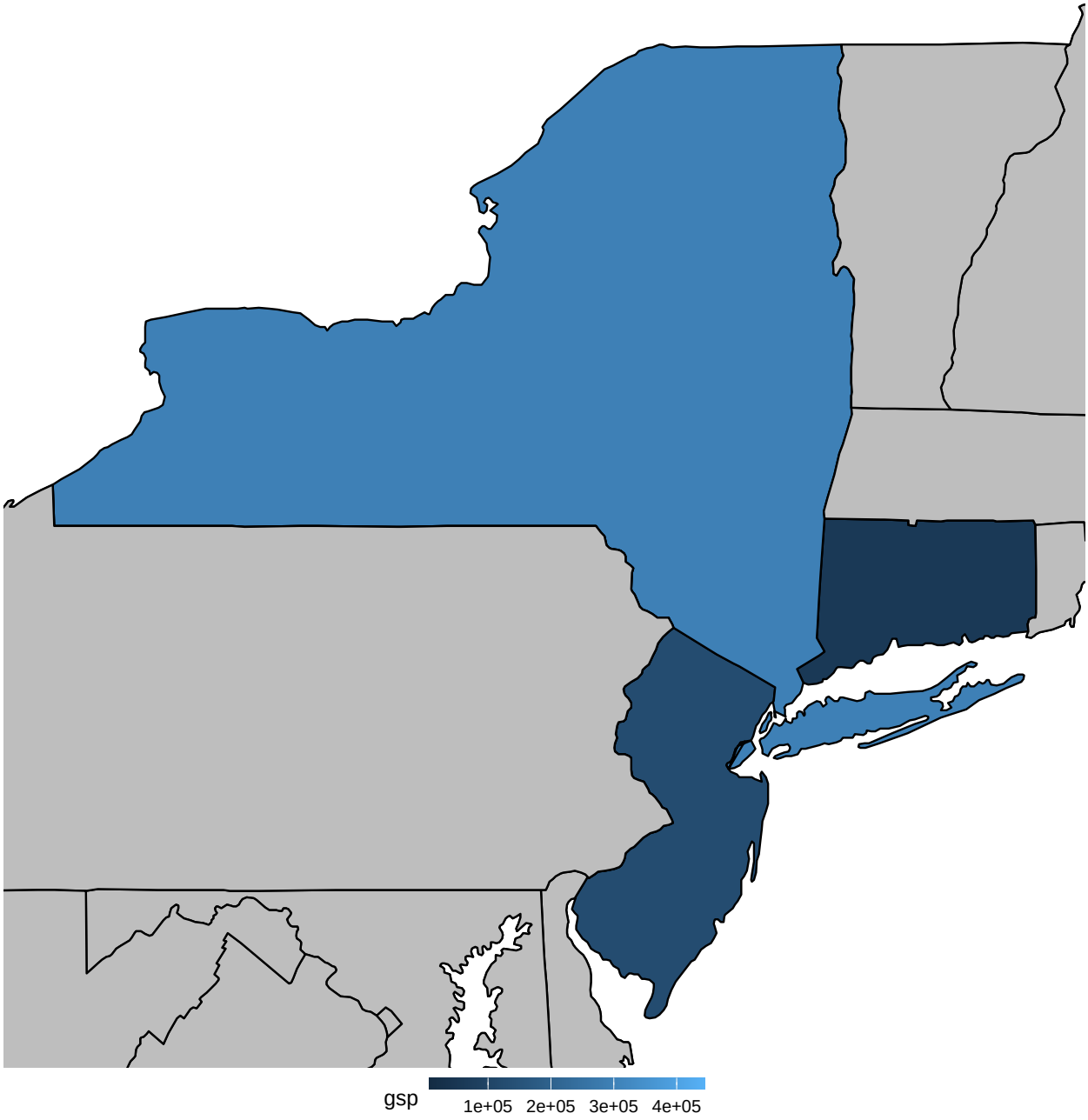


Figure 2: Big width and height

```
us_prod$region <- gsub("_", " ", tolower(us_prod$state))
merged_data <- left_join(us_map, us_prod[, c("region", "gsp")], by="region")
choropleth <- ggplot(merged_data) +
  geom_polygon(aes(x=long, y=lat, group=group, fill=gsp), color="black") +
  theme_void() +
  theme(legend.position="bottom") +
  scale_fill_continuous(guide=guide_colorbar(barheight=unit(2, units="mm"),
                                             barwidth=unit(5, units="cm")))
choropleth
```



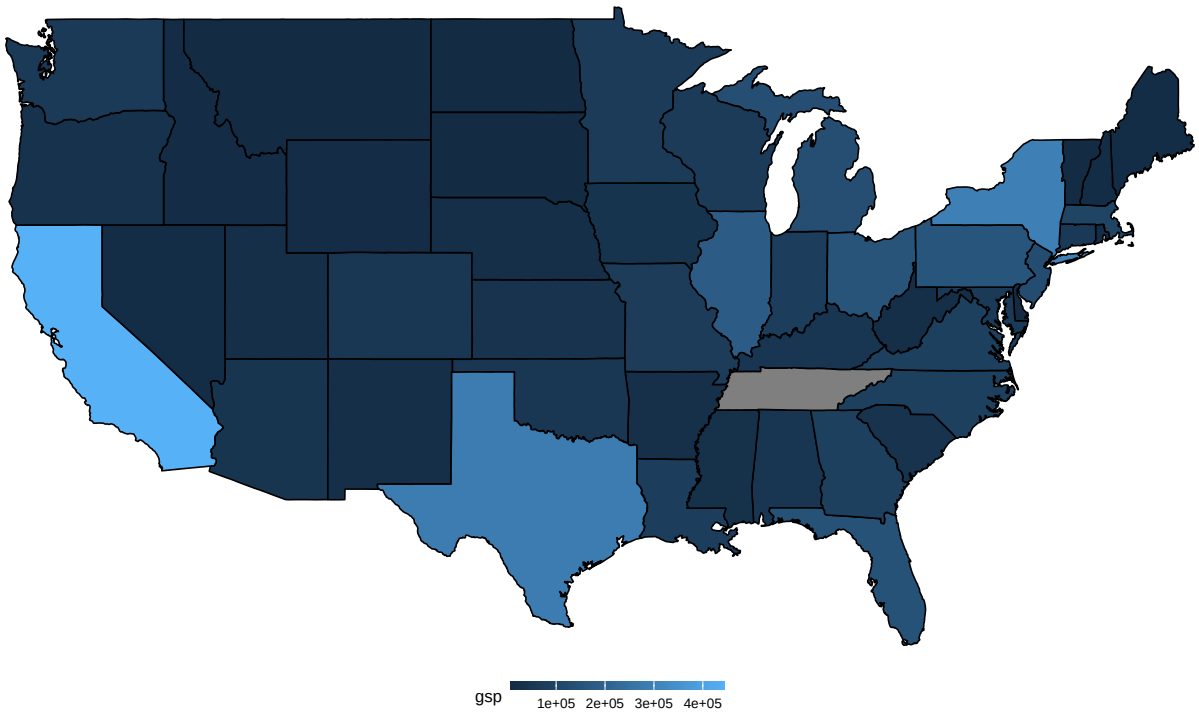

```
tristate <- c("new york", "new jersey", "connecticut")
long_lim <- merged_data$long[merged_data$region %in% tristate]
lat_lim <- merged_data$lat[merged_data$region %in% tristate]
outer <- merged_data[!merged_data$region %in% tristate,]

choropleth +
  geom_polygon(data=outer, aes(x=long, y=lat, group=group),
               fill="gray", color="black") +
  coord_fixed(xlim=c(min(long_lim), max(long_lim)),
              ylim=c(min(lat_lim),max(lat_lim)),
              ratio=1.3)
```



Changing the map projection

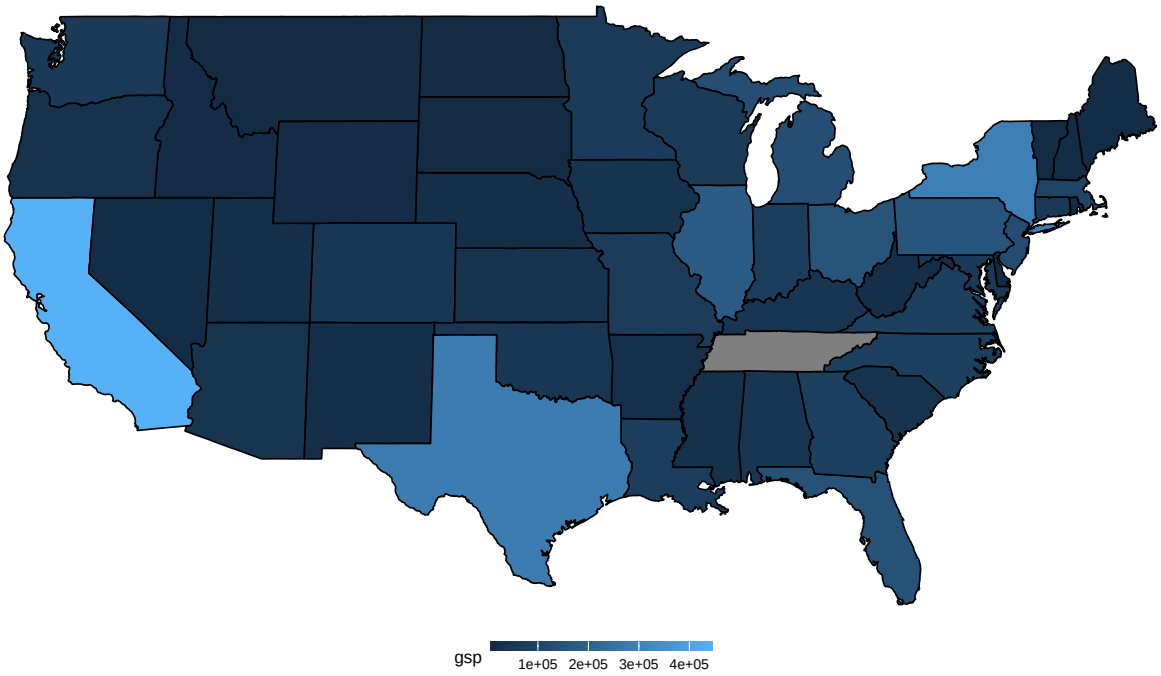
```
choropleth +
  coord_map() +
  ggtitle("US Map - mercator projection")
```

US Map − mercator projection




```
choropleth +
  coord_map(projection = "gilbert") +
  ggtitle("US Map - gilbert projection")
```

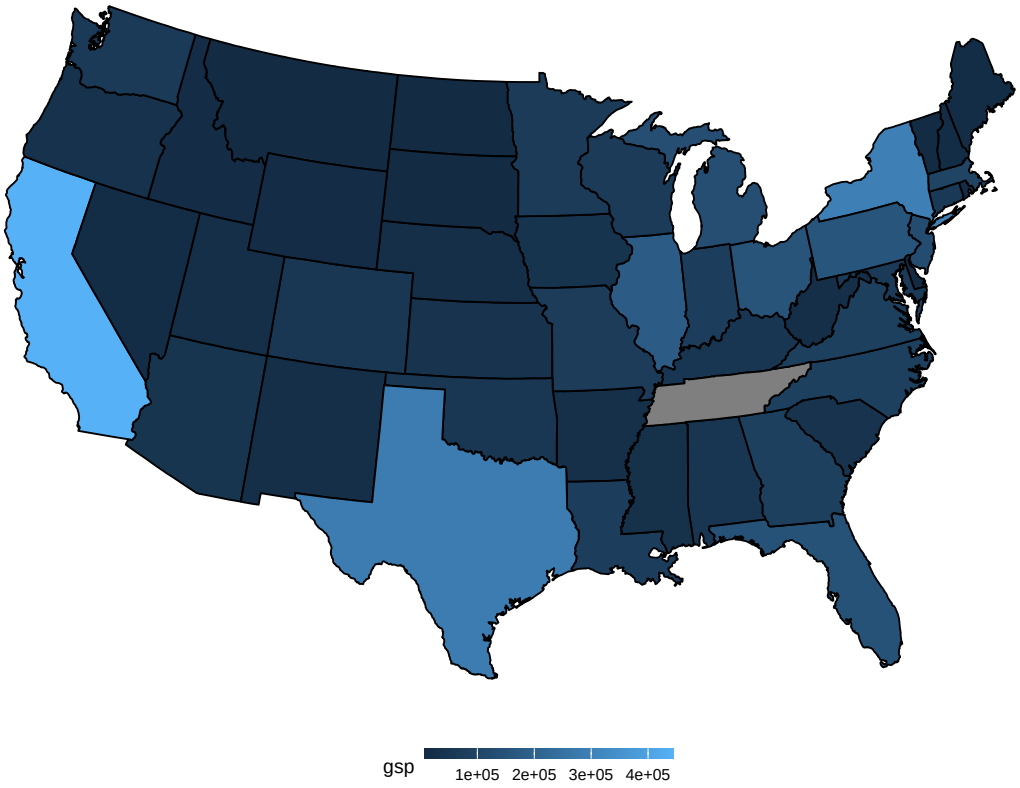
US Map − gilbert projection




```
choropleth +
  coord_map(projection = "conic", lat0 = 50) +
  labs(title = "US Map - conic projection",
```

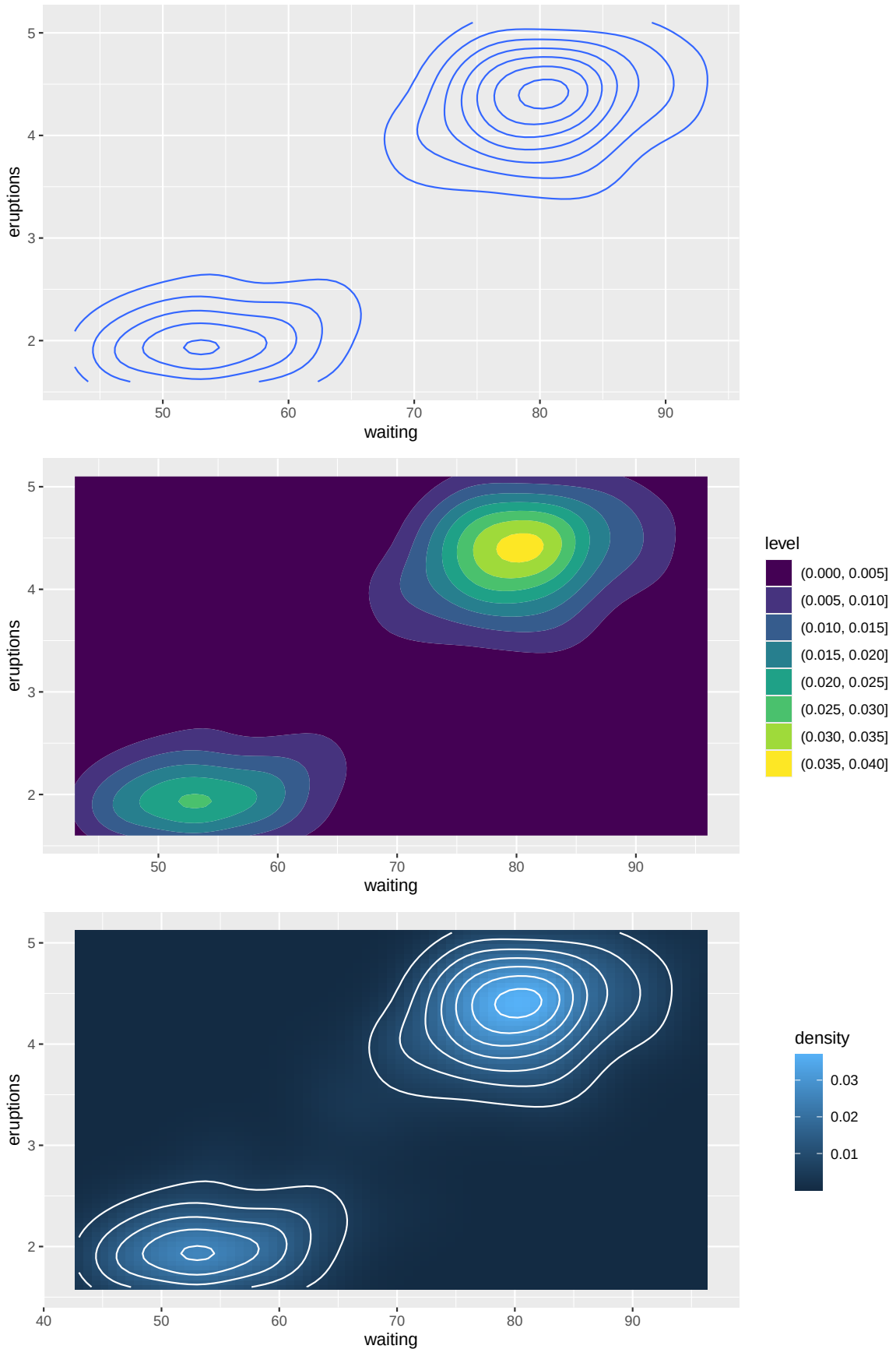
```
       subtitle = "latitute zero = 50")
```

US Map − conic projection
latitute zero = 50



Contour plots

```
p <- ggplot(faithfuld, aes(waiting, eruptions, z = density))
p1 <- p + geom_contour()
p2 <- p + geom_contour_filled()
p3 <- p + geom_raster(aes(fill = density)) +
  geom_contour(color="white")
plot_grid(p1, p2, p3, align = "v", nrow = 3, rel_heights = c(1/3, 1/3, 1/3))
```


eruptions
waiting
5
4
3
2
50
60
70
80
90
level
(0.000, 0.005]
(0.005, 0.010]
(0.010, 0.015]
(0.015, 0.020]
(0.020, 0.025]
(0.025, 0.030]
(0.030, 0.035]
(0.035, 0.040]
density
0.03
0.02
0.01
40

“‘