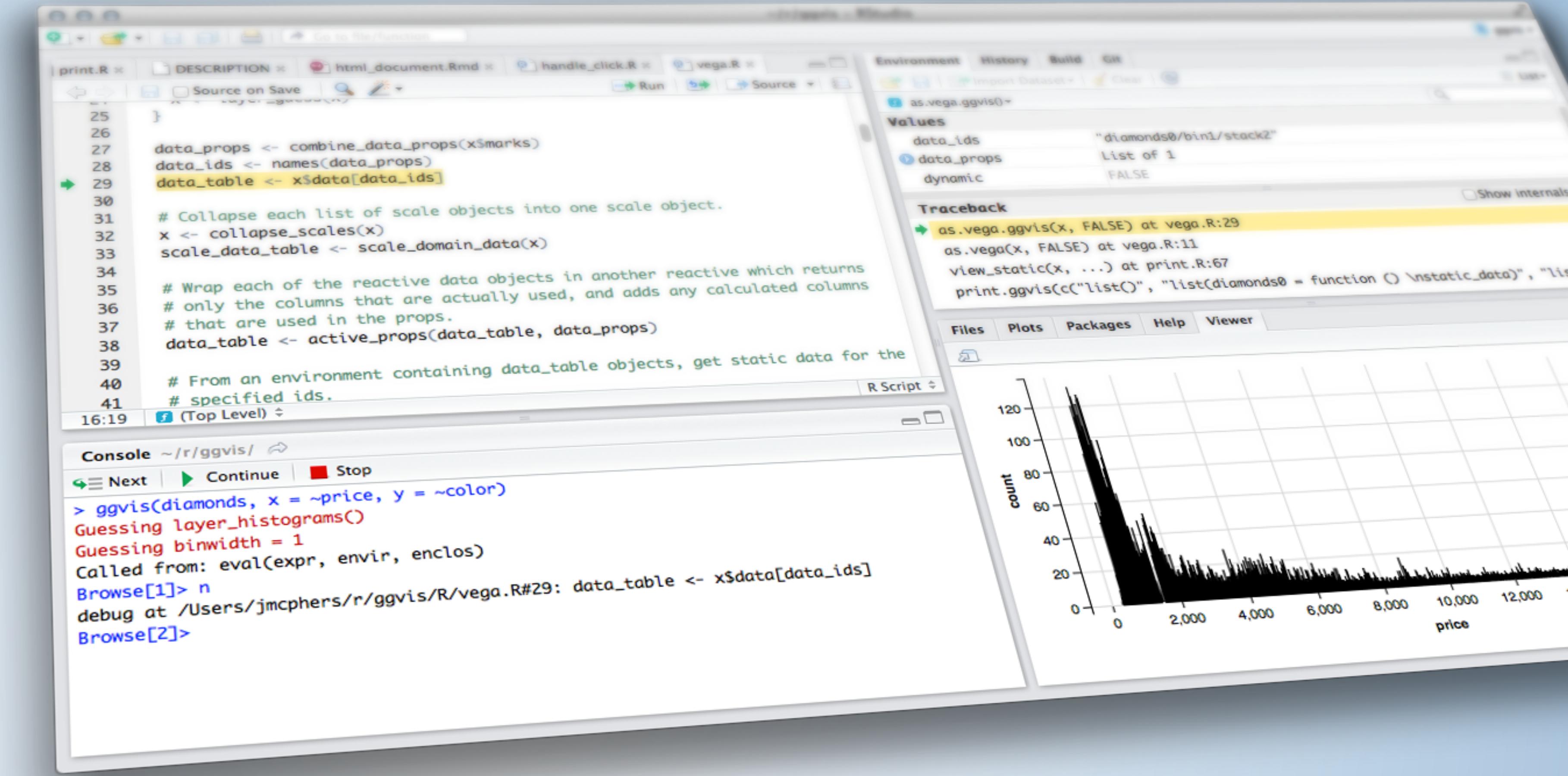


# LEAFLET FOR INTERACTIVE MAPS



Shiny from  R Studio™

# OUTLINE

- Motivation
- Shapefiles in R
- Leaflet
  - Basemaps
  - Lines
  - Points
  - Shapes
  - Legends & Colors
- leaflet.extras
  - Heatmaps

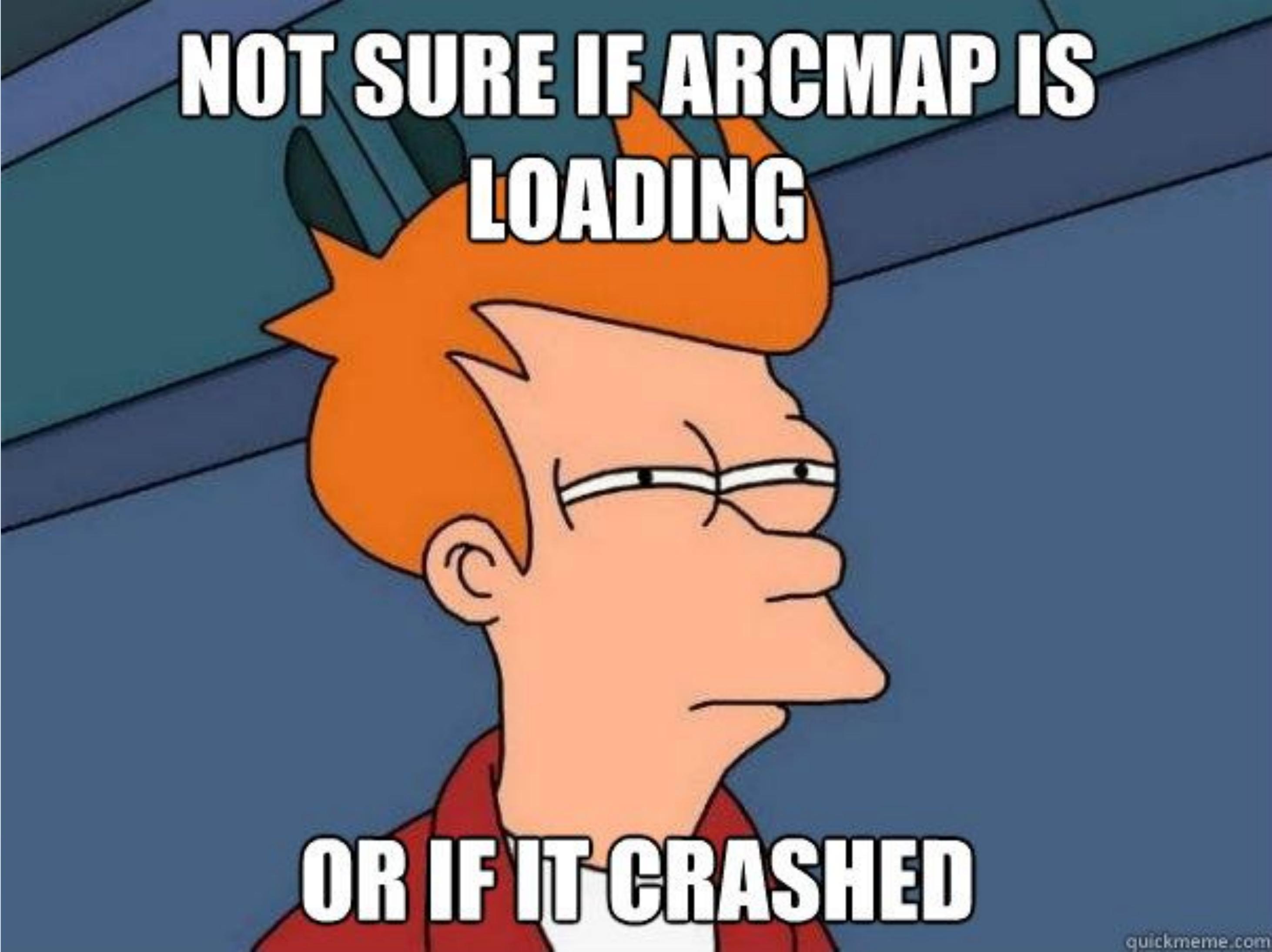
# Motivation



Map of the 1854 Cholera outbreak - John Snow

“‘I have the same problem’ is a famous last  
post in many forum-threads on the esri  
forum.”

—sebastian



A profile view of Fry from the TV show Futurama, looking thoughtful with his hand on his chin. He has orange hair and wears glasses. The background is a stylized blue and teal geometric pattern.

**NOT SURE IF ARCMAP IS  
LOADING**

**OR IF IT CRASHED**

“R and Leaflet are free and open-source, ArcMap is very much not.”

—Geoffrey Arnold

# Shapefiles

In R

# PACKAGES

- ▶ Install these packages:
  - ▶ rgdal: <https://github.com/cran/rgdal/blob/master/inst/README>
  - ▶ rgeos
  - ▶ sp
  - ▶ leaflet
  - ▶ leaflet.extras

# WHAT IS LEAFLET?

- R version of the Javascript API of Leaflet
- One of the ways to get interactive maps
  - Others include: tmap, mapview and plotly
- Documentation: <https://rstudio.github.io/leaflet/>

# Getting spatial data loaded into R

# LOADING SPATIAL DATA

- ▶ Sometimes your source data will be a data frame which you will need to join to spatial data, other times it will be included
- ▶ It may also be a CSV with coordinates, in those instances no further cleaning needs to take place



DEMO

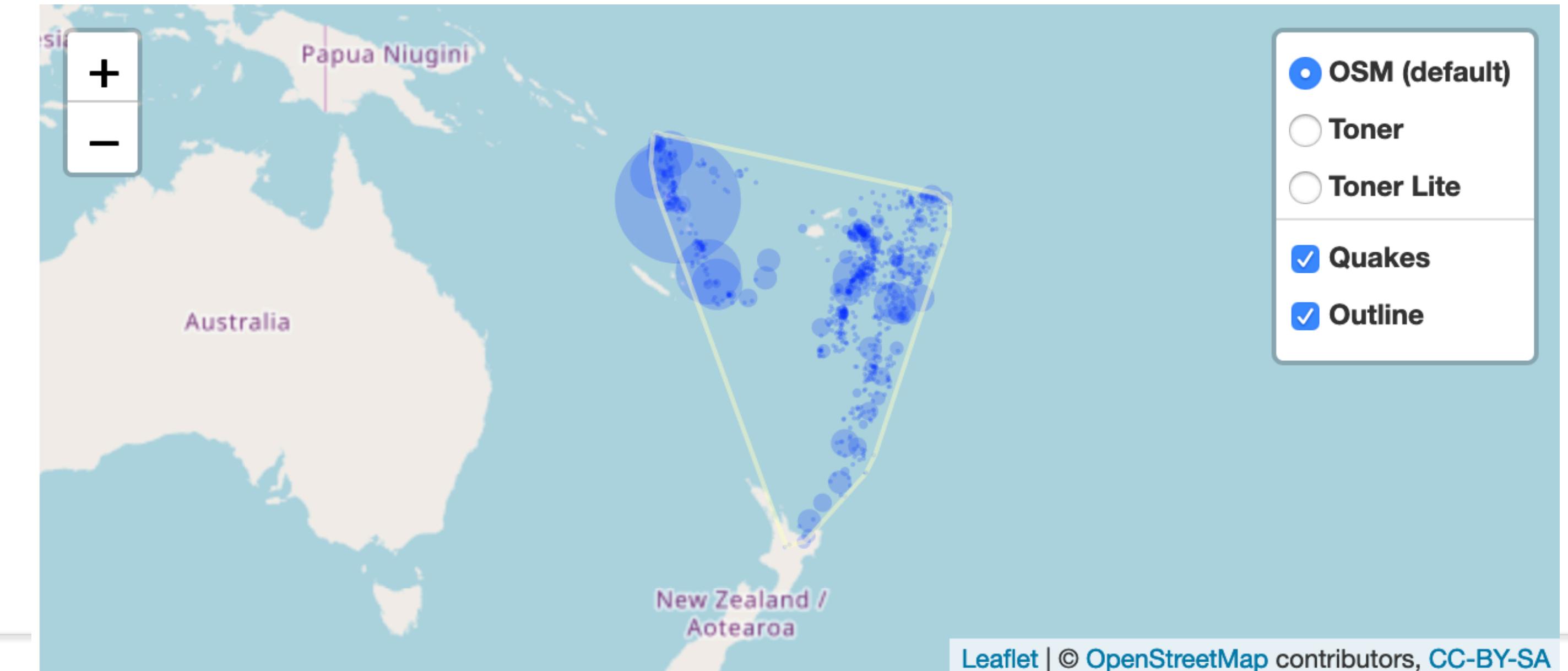
leaflet\_examples.Rmd  
Go to loading code chunk

# GROUP CONTROLS

In leaflet you can add groups and give them a name.

Group names are what show up in the layer control

```
addProviderTiles(providers$Stamen.Toner, group = "Toner") %>%  
addLayersControl(  
  baseGroups = c("OSM (default)", "Toner", "Toner Lite"),  
  overlayGroups = c("Quakes", "Outline"),  
  options = layersControlOptions(collapsed = FALSE))
```



Leaflet | © OpenStreetMap contributors, CC-BY-SA



# EXERCISE

- ▶ Create a map with layer controls
  - ▶ Get baseman provider names from here: <https://leaflet-extras.github.io/leaflet-providers/preview/>
    - ▶ Create 3 named basemap groups
    - ▶ Add a layer control that has the named base groups

5m 00s

# Shapes

# TYPICAL ARGUMENTS

- lng (if a column)
- lat (if a column)
- layerId
- group (for layerControls)
- stroke (boolean, shape outline)
- color (outline color, hex values)
- weight (outline width)
- opacity (alpha of the line)
- fill (boolean)
- fillColor (hex color)
- fillOpacity (alpha of fill)
- And more!



# EXERCISE

- ▶ Using the cds SpatialPolygonsDataframe create a polygon layer
  - ▶ Make sure to include a basemap

**5<sub>m</sub> 00<sub>s</sub>**



# SOLUTION

See `leaflet_exercises_solutions.Rmd`

```
leaflet(data = cds) %>%  
  addProviderTiles("Stamen.Toner") %>%  
  addPolygons()
```

# PALETTES

- palette (color brewer palette)
- domain (values to be colored)
- na.color
- alpha
- reverse (values of palette)
- bins
- pretty
- right (for cutting)
- n (number of quantities)
- probs
- levels
- ordered

# LEGENDS

- position (“bottomright” etc...)
- pal (palette from colorBrewer)
- values (domain from data)
- na.labels
- bins (buckets)
- colors
- labFormat (separate function  
labelFormat)
- title
- className (for custom CSS to apply)
- layerId (for input usage)
- group (for layerControls)
- digits
- big.mark
- transform (function to be applied to  
labels)



# EXERCISE

- ▶ Choropleth Polygon map with
  - ▶ Create a color palette for Life Expectancy at Birth (years) column in the merged Congressional District data.
  - ▶ addPolygons to a leaflet map and apply palette to column
    - ▶ Add a legend

5m 00s

Hint: <https://rstudio.github.io/leaflet/choropleths.html>

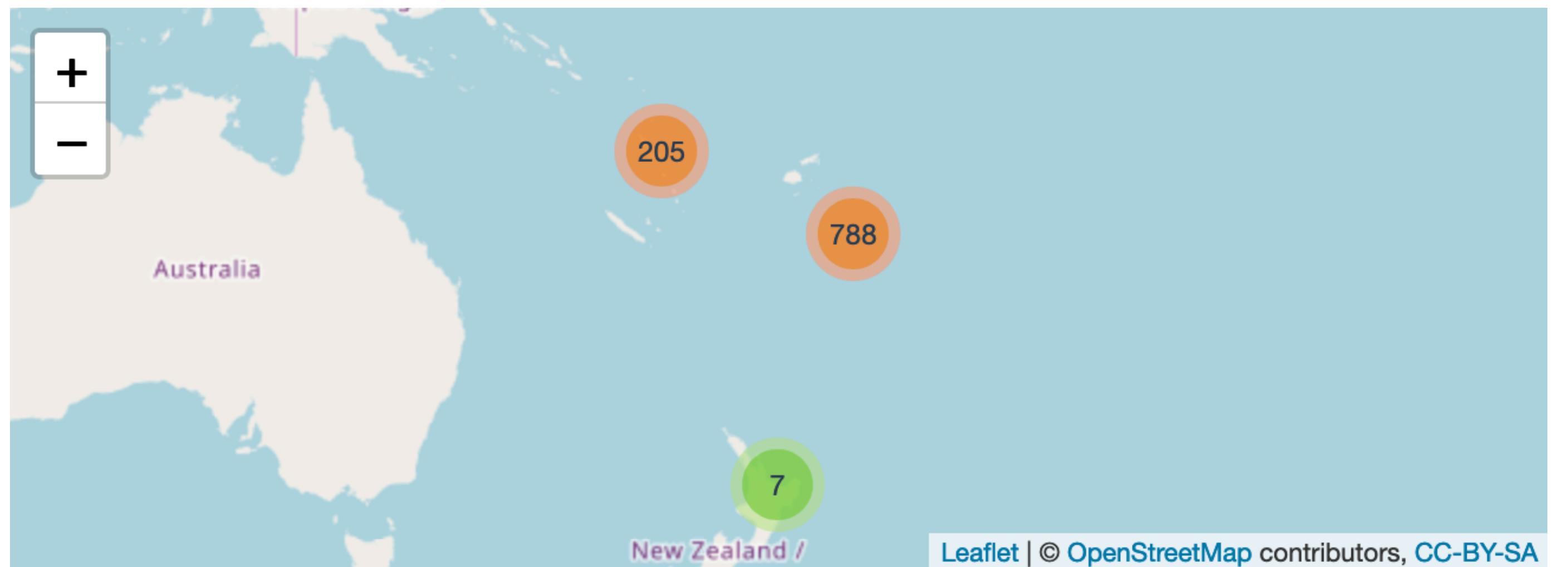


DEMO

leaflet\_examples.Rmd  
Go to polygon code chunk

# CLUSTERS

```
leaflet(quakes) %>%  
  addTiles() %>%  
  addMarkers(  
    clusterOptions =  
    markerClusterOptions()  
)
```



# WHY CLUSTERS?

- ▶ Sometimes there's just a ton of data to show and trying to visualize them will bring any browser window it a crawl.
- ▶ Example: [https://pittsburghpa.shinyapps.io/  
TreesNAt/](https://pittsburghpa.shinyapps.io/TreesNAt/)



# EXERCISE

- ▶ Go to `leaflet_exercises.Rmd` clusters code chunk
  - ▶ Use `311` data to create a cluster map
    - ▶ Create a factor palette
    - ▶ Create a legend
    - ▶ Make sure to include a basemap

5m 00s

Hint: <https://rstudio.github.io/leaflet/markers.html>



# SOLUTION

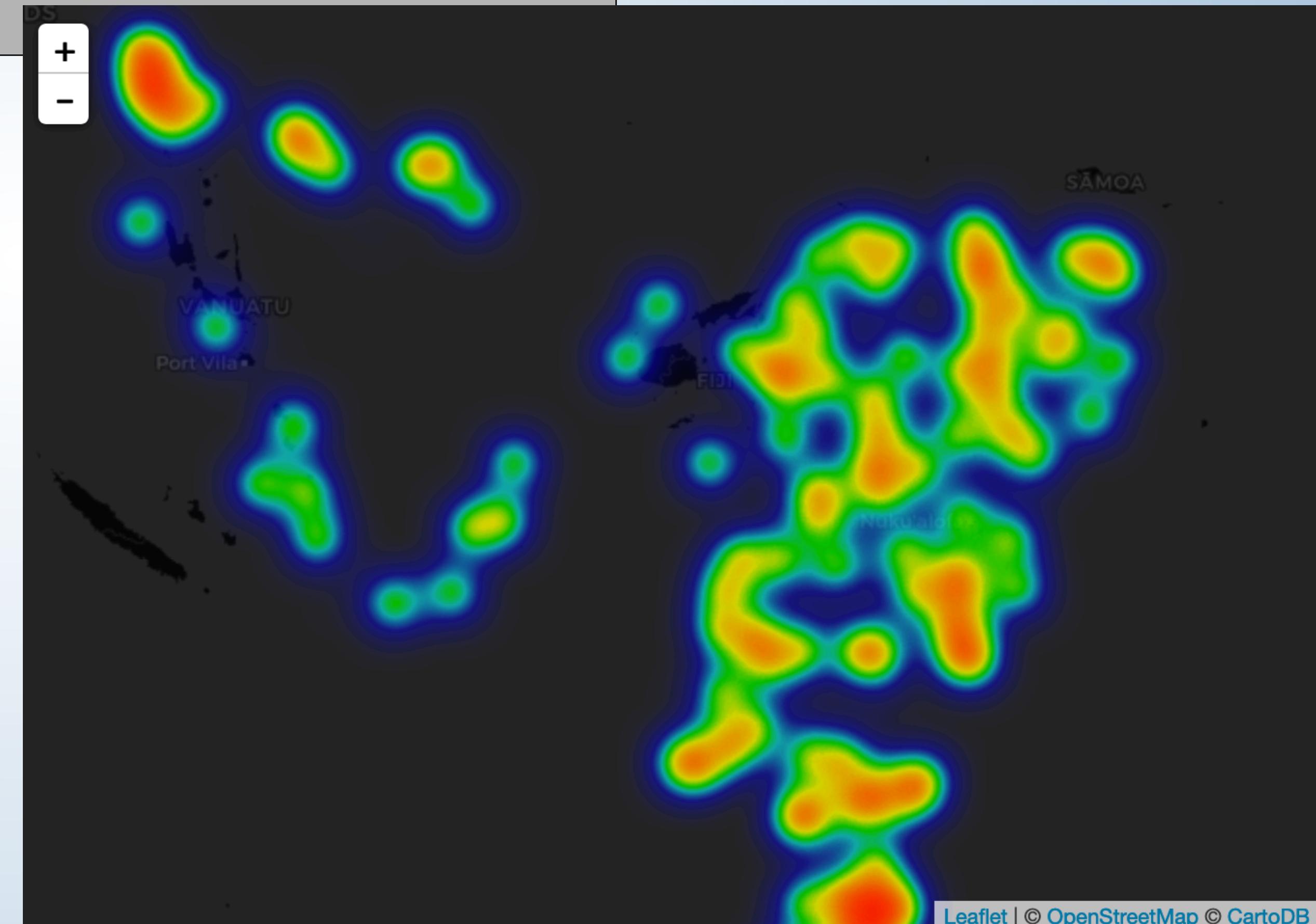
Go to `leaflet_exercises_solutions.Rmd`

leaflet  
.extras

# LEAFLET.EXTRAS

- ▶ Adds some pretty nice functions to complement leaflet
  - ▶ Tile caching: <http://rpubs.com/bhaskarvk/TileLayer-Caching>
  - ▶ weather icons: <http://rpubs.com/bhaskarvk/leaflet-weather>
  - ▶ Pulse icons: <http://rpubs.com/bhaskarvk/leaflet-pulseIcon>
  - ▶ and heat maps!

```
leaflet(quakes) %>%  
  addProviderTiles(providers$CartoDB.DarkMatter) %>%  
  setView( 178, -20, 5 ) %>%  
  addHeatmap(lng = ~long, lat = ~lat, intensity = ~mag,  
             blur = 20, max = 0.05, radius = 15)
```





# EXERCISE

- ▶ Using the pothole data create a heat map
  - ▶ This won't be very different from your cluster map from before.
  - ▶ Play around with the arguments for heat maps and find a good radius that looks good.
- ▶ Compare your settings with your neighbor

5m 00s

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# HOMEWORK

## Homework 2