

# mapping

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#usmap plot-11 Floyd-1999

```
rain_99 <- filter(rain, storm_id == "Floyd-1999")
rain_99 <- group_by(rain_99, fips)
rain_99 <- summarise(rain_99, sum_rain = sum(precip))
```

```
## `summarise()` ungrouping output (override with `.groups` argument)
```

```
rain_99 <- as.data.frame(rain_99)
rain_99$rainfall <- NA
for (i in 1:dim(rain_99)[1]){
  rain_99$rainfall[i] <- rain_99$sum_rain[i]/%25
}
rain_99$rainfall <- ordered(rain_99$rainfall, labels = c("[0.25]", "(25, 50]", "(50, 75]", "(75, 100]", "(100, 125]", "(125, 150]", "(150, 175]", "(175, 200]", "(200, 222]"))

line_99 <- filter(hurr_tracks, storm_id == "Floyd-1999")
line_99 <- separate(line_99, storm_id, c("id", "year"), "-")
line_99$date <- ymd_hm(line_99$date)
line_99 <- line_99[23:45,]

dt <- select(line_99, longitude, latitude)
data <- data.frame(
  lon = dt$longitude,
  lat = dt$latitude
)
dt <- usmap_transform(data)
```

```
## Warning in showSRID(uprojargs, format = "PROJ", multiline = "NO", prefer_proj =
## prefer_proj): Discarded datum unknown in CRS definition
```

```
dt99 <- dt

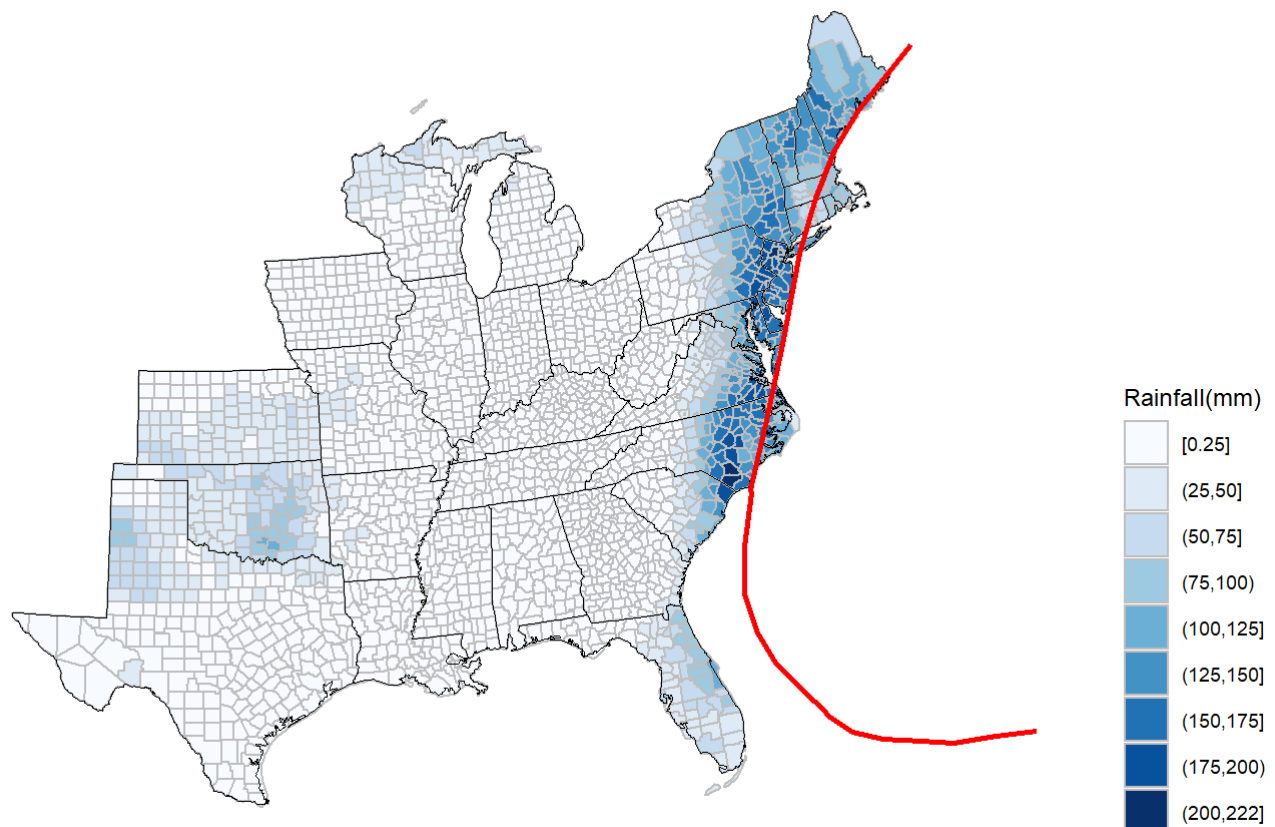
region <- fips_info(rain_99$fips)
MainStates <- map_data("state", region = region$full)

MainStates <- data.frame(
  lon = MainStates$long,
  lat = MainStates$lat,
  group = MainStates$group,
  order = MainStates$order,
  region = MainStates$region
)
MainStates <- usmap_transform(MainStates)
```

```
## Warning in showSRID(uprojargs, format = "PROJ", multiline = "NO", prefer_proj =
## prefer_proj): Discarded datum unknown in CRS definition
```

```
p11 <- plot_usmap(data = rain_99, values = "rainfall", color = "grey", include = rain_99$fips)
+
+   geom_polygon( data=MainStates, aes(x=lon.1, y=lat.1, group=group),
+                 color="black", size = 0.05, alpha = 0) +
+   scale_fill_brewer(palette = "Blues", name = "Rainfall(mm)") +
+   labs(title = "Floyd-1999") +
+   theme(plot.title = element_text(face = "bold", size = 14, hjust = 0.5)) +
+   theme(legend.position = "right")+
+   geom_path(data = dt, aes(x = lon.1, y = lat.1),
+             color = "red", size = 1)
p11
```

## Floyd-1999



#leaflet plot-21 Floyd-1999

```
library(leaflet)
```

```
## Warning: package 'leaflet' was built under R version 4.0.3
```

```

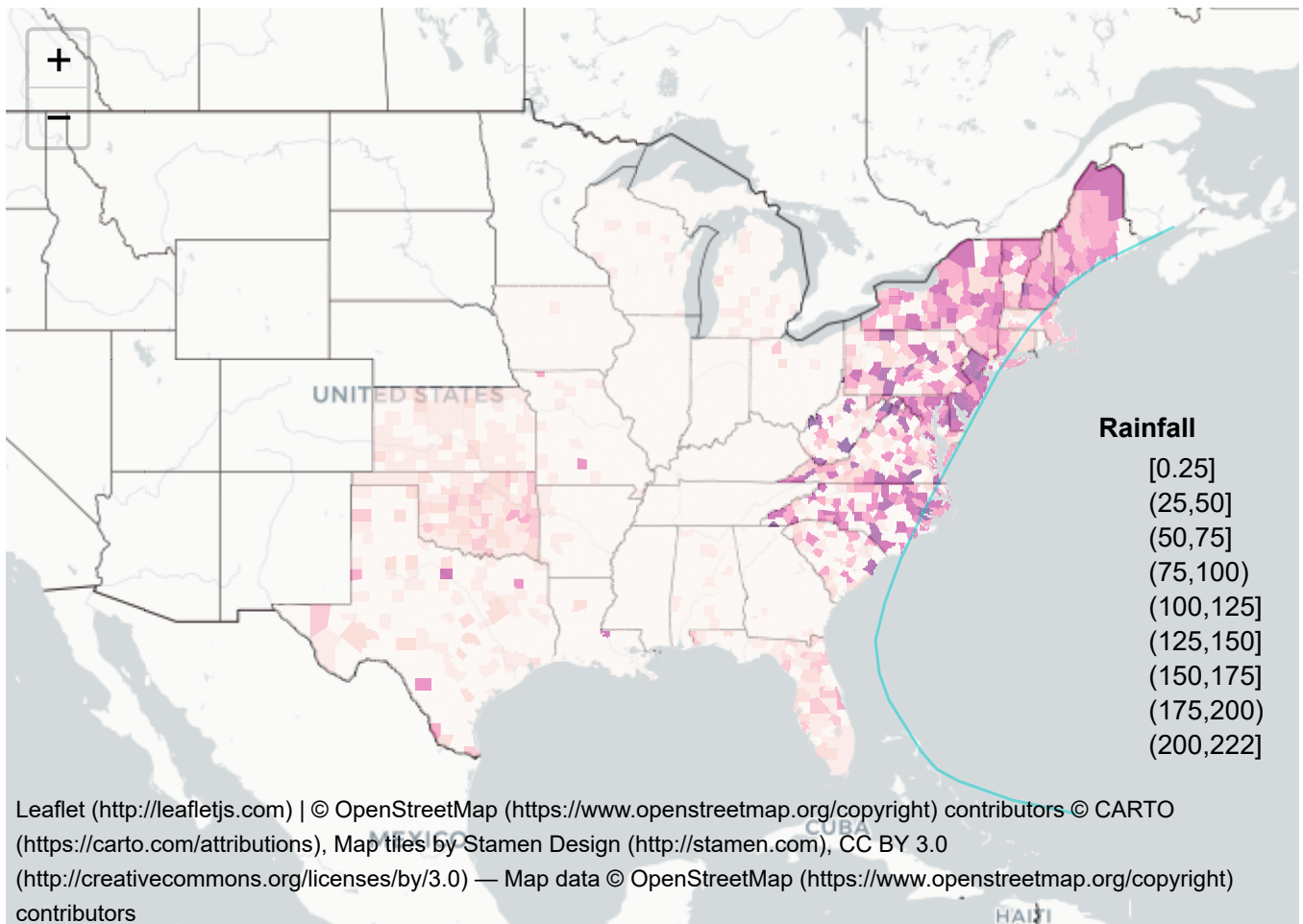
library(htmlwidgets)
library(htmltools)

factpal <- colorFactor("RdPu", rain_99$rainfall)

mapCounty = map("county", region = region$full, fill = TRUE, plot = FALSE)

p12 <- leaflet(data = rain_99) %>%
  addProviderTiles("CartoDB.Positron") %>%
  addProviderTiles(providers$Stamen.TonerLines,
    options = providerTileOptions(opacity = 0.75)) %>%
  setView(-89.275673, 37.098, zoom = 4) %>%
  addPolygons(data = mapCounty,
    color = ~factpal(rain_99$rainfall),
    fillOpacity = 0.5,
    smoothFactor = 0.1,
    weight = 1,
    stroke = FALSE) %>%
  addPolylines(data = dt99, ~lon, ~lat,
    color="darkturquoise",
    weight = 1.5)%>%
  addLegend(pal = factpal,
    values = rain_99$rainfall,
    position="bottomright",
    title = "Rainfall")
p12

```



## usmap plot-21 Allison-2001

```
rain_01 <- filter(rain, storm_id == "Allison-2001")
rain_01 <- filter(rain_01, lag>-5 & lag <3)
rain_01 <- group_by(rain_01, fips)
rain_01 <- summarise(rain_01, sum_rain = sum(precip))
```

```
## `summarise()` ungrouping output (override with `.groups` argument)
```

```
rain_01 <- as.data.frame(rain_01)
rain_01$rainfall <- NA

rain_limit <- 175

for (i in 1:dim(rain_01)[1]){
  if (rain_01$sum_rain[i] < rain_limit) {
    rain_01$rainfall[i] <- 0
  }
  else rain_01$rainfall[i] <- 1
}

rain_01$rainfall <- ordered(rain_01$rainfall, labels = c("Unexposed", "Exposed"))

line_01 <- filter(hurr_tracks, storm_id == "Allison-2001")
line_01 <- separate(line_01, storm_id, c("id", "year"), "-")
line_01$date <- ymd_hm(line_01$date)
line_01 <- line_01[1:55,]

dt <- select(line_01, longitude, latitude)
data <- data.frame(
  lon = dt$longitude,
  lat = dt$latitude
)
dt <- usmap_transform(data)
```

```
## Warning in showSRID(uprojargs, format = "PROJ", multiline = "NO", prefer_proj =
## prefer_proj): Discarded datum unknown in CRS definition
```

```
dt01 <- dt

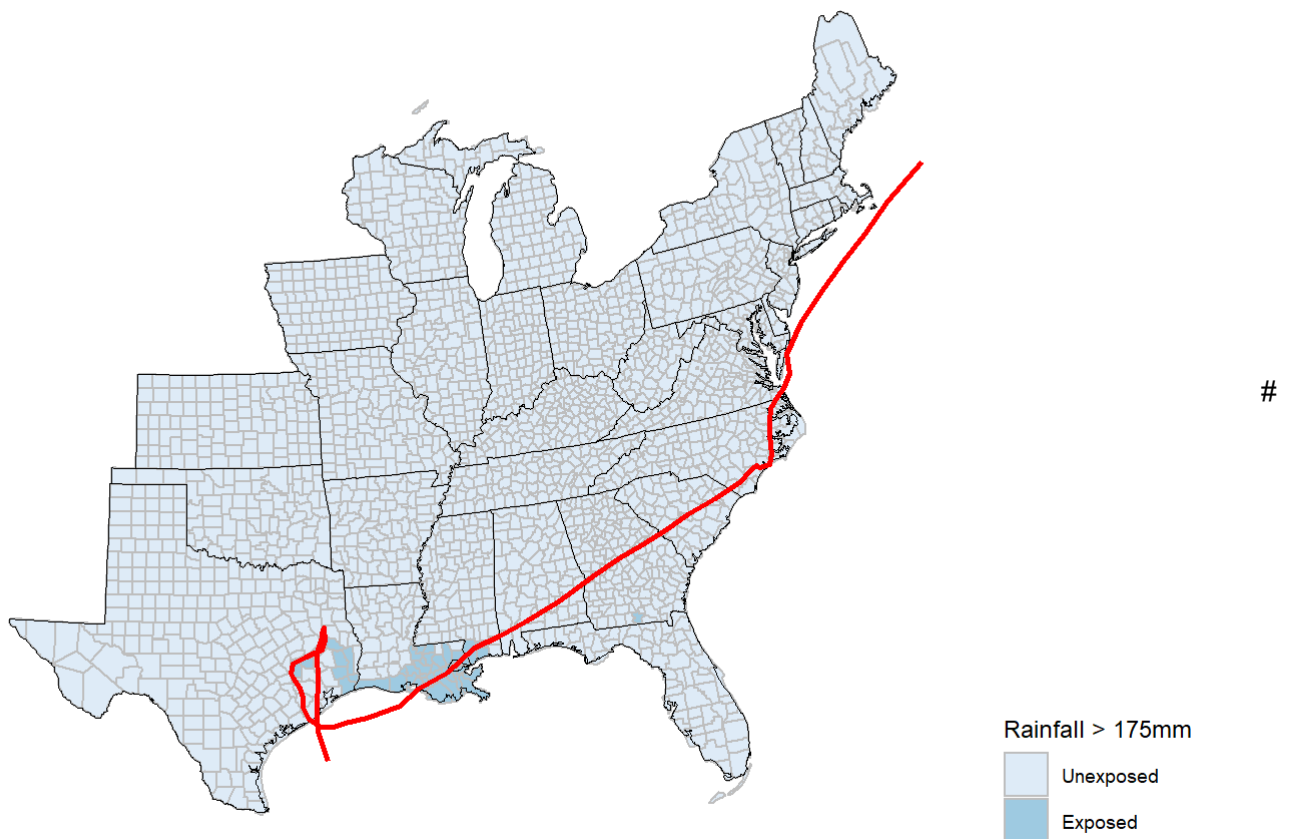
region <- fips_info(rain_01$fips)
MainStates <- map_data("state", region = region$full)

MainStates <- data.frame(
  lon = MainStates$long,
  lat = MainStates$lat,
  group = MainStates$group,
  order = MainStates$order,
  region = MainStates$region
)
MainStates <- usmap_transform(MainStates)
```

```
## Warning in showSRID(uprojargs, format = "PROJ", multiline = "NO", prefer_proj =
## prefer_proj): Discarded datum unknown in CRS definition
```

```
p21 <- plot_usmap(data = rain_01, values = "rainfall", color = "grey", include = rain_01$fips)
+
  geom_polygon( data=MainStates, aes(x=lon.1, y=lat.1, group=group),
    color="black", size = 0.05, alpha = 0) +
  scale_fill_brewer(palette = "Blues", name = "Rainfall > 175mm") +
  labs(title = "Allison-2001") +
  theme(plot.title = element_text(face = "bold", size = 14, hjust = 0.5)) +
  theme(legend.position = "right")+
  geom_path(data = dt, aes(x = lon.1, y = lat.1),
    color = "red", size = 1)
p21
```

## Allison-2001



leaflet plot-22 Allison-2001

```

pal <- colorFactor("RdPu", rain_01$rainfall)

mapCounty = map("county", region = region$full, fill = TRUE, plot = FALSE)

p22<- leaflet(data = rain_01) %>%
  addProviderTiles("CartoDB.Positron") %>%
  addProviderTiles(providers$Stamen.TonerLines,
                   options = providerTileOptions(opacity = 0.75)) %>%
  setView(-89.275673, 37.098, zoom = 4) %>%
  addPolygons(data = mapCounty,
              color = ~pal(rain_01$rainfall),
              fillOpacity = 0.5,
              smoothFactor = 0.1,
              weight = 1,
              stroke = FALSE) %>%
  addPolylines(data = dt01, ~lon, ~lat,
               color="red",
               weight = 1.5)%>%
  addLegend(pal = pal,
            values = rain_01$rainfall,
            position="bottomright",
            title = "Rainfall")

```

p22

