Untitled

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```
addRepo("geanders")


data("hurr_tracks")

data("rain")

head(hurr_tracks)
```

```
## # A tibble: 6 x 6
##   storm_id     usa_atcf_id date         latitude longitude  wind
##   <chr>        <chr>       <chr>           <dbl>     <dbl> <dbl>
## 1 Alberto-1988 AL011988    198808051800     32       -77.5    20
## 2 Alberto-1988 AL011988    198808060000     32.8     -76.2    20
## 3 Alberto-1988 AL011988    198808060600     34       -75.2    20
## 4 Alberto-1988 AL011988    198808061200     35.2     -74.6    25
## 5 Alberto-1988 AL011988    198808061800     37       -73.5    25
## 6 Alberto-1988 AL011988    198808070000     38.7     -72.4    25
```

```
head(rain)
```

```
##    fips     storm_id usa_atcf_id lag precip precip_max
## 1 01001 Alberto-1988    AL011988  -5    1.4        3.0
## 2 01001 Alberto-1988    AL011988  -4    3.9        6.6
## 3 01001 Alberto-1988    AL011988  -3    3.7        6.4
## 4 01001 Alberto-1988    AL011988  -2    6.9        9.9
## 5 01001 Alberto-1988    AL011988  -1    0.3        0.5
## 6 01001 Alberto-1988    AL011988   0    1.9        3.3
```

Data preparation

```
States<-c("texas","oklahoma","kansas","louisiana","arkansas","missouri","iowa","wisconsin","michigan","
MainStates<-map_data("county",States)
states<-map_data("state",States)
ggplot() + geom_polygon(data = MainStates, aes( x = long, y = lat, group = group), fill="white", color=
  theme_void() +
  coord_map()
```

```
## For Floyd-1999
raindata<-rain%>%filter(rain$storm_id== "Floyd-1999")
floyd_rain<-raindata%>%group_by(fips,storm_id)%>%summarise(precip_t=sum(precip))
```

```
## `summarise()` regrouping output by 'fips' (override with `.groups` argument)
```

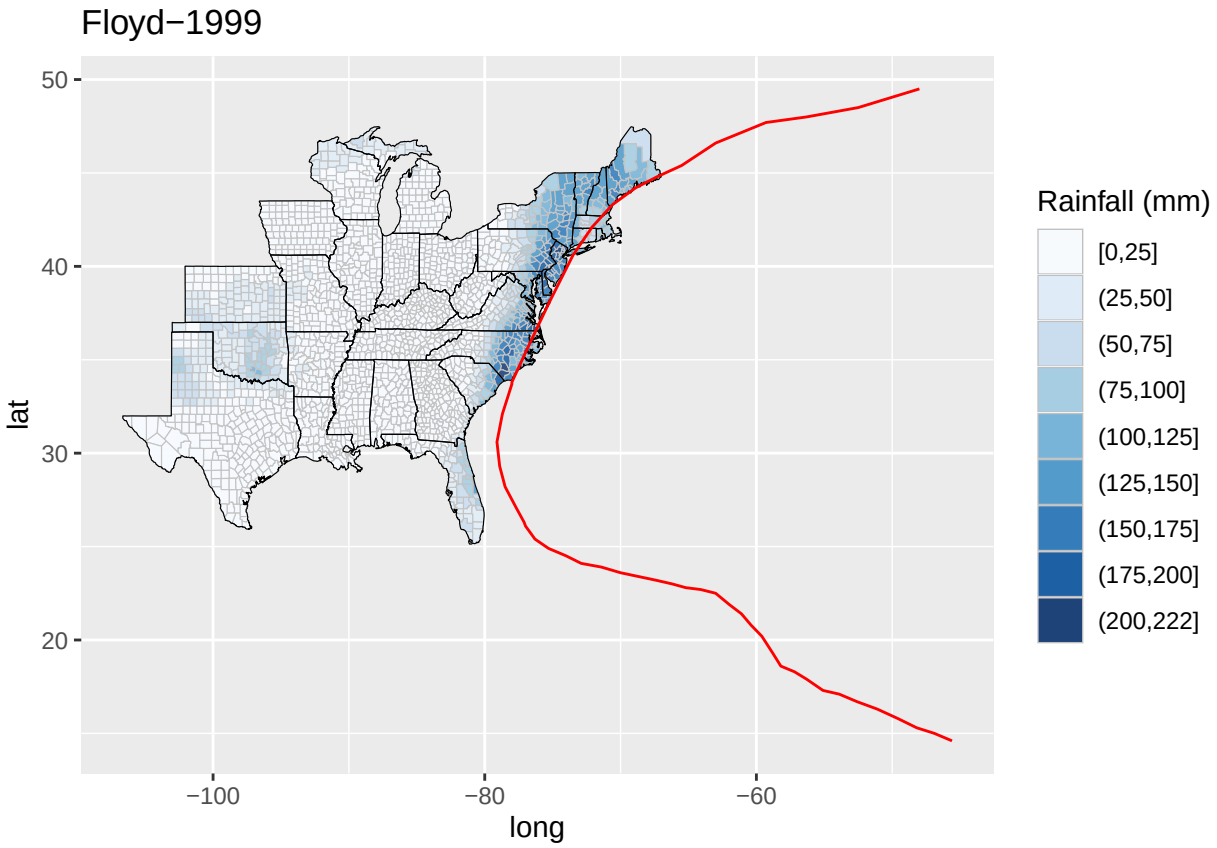
```
county<-county.fips
county$fips<-as.character(county$fips)
county$fips<-str_pad(county$fips,5,side="left",pad="0")
county%<>%separate(polyname,c("region","subregion"),sep=",")
floydr<-left_join(floyd_rain,county,by="fips")
Floyd_rain<-left_join(MainStates,floydr,by=c("region","subregion"))
Floyd_rain$precip_t[is.na(Floyd_rain$precip_t)]=0.01
Floyd_rain$precip_t<-cut(Floyd_rain$precip_t,breaks=c(-1,25,50,75,100,120,150,175,200,250),labels=c("[0
Floyd_track<-hurr_tracks%>%filter(storm_id=="Floyd-1999")

## For Allison-2001
raindata_1<-rain%>%filter(rain$storm_id=="Allison-2001")
allison_rain<-raindata_1%>%group_by(fips,storm_id)%>%summarise(precip_t=sum(precip))
```

```
## `summarise()` regrouping output by 'fips' (override with `.groups` argument)
```

```
allisonr<-left_join(allison_rain,county,by="fips")
Allison_rain<-left_join(MainStates,allisonr,by=c("region","subregion"))
Allison_rain$precip_t[is.na(Allison_rain$precip_t)]=0.01
Allison_rain$precip_t<-cut(Allison_rain$precip_t,breaks=c(-1,175,500),labels=c("Unexposed","Exposed"),o
Allison_track<-hurr_tracks%>%filter(storm_id=="Allison-2001")
```

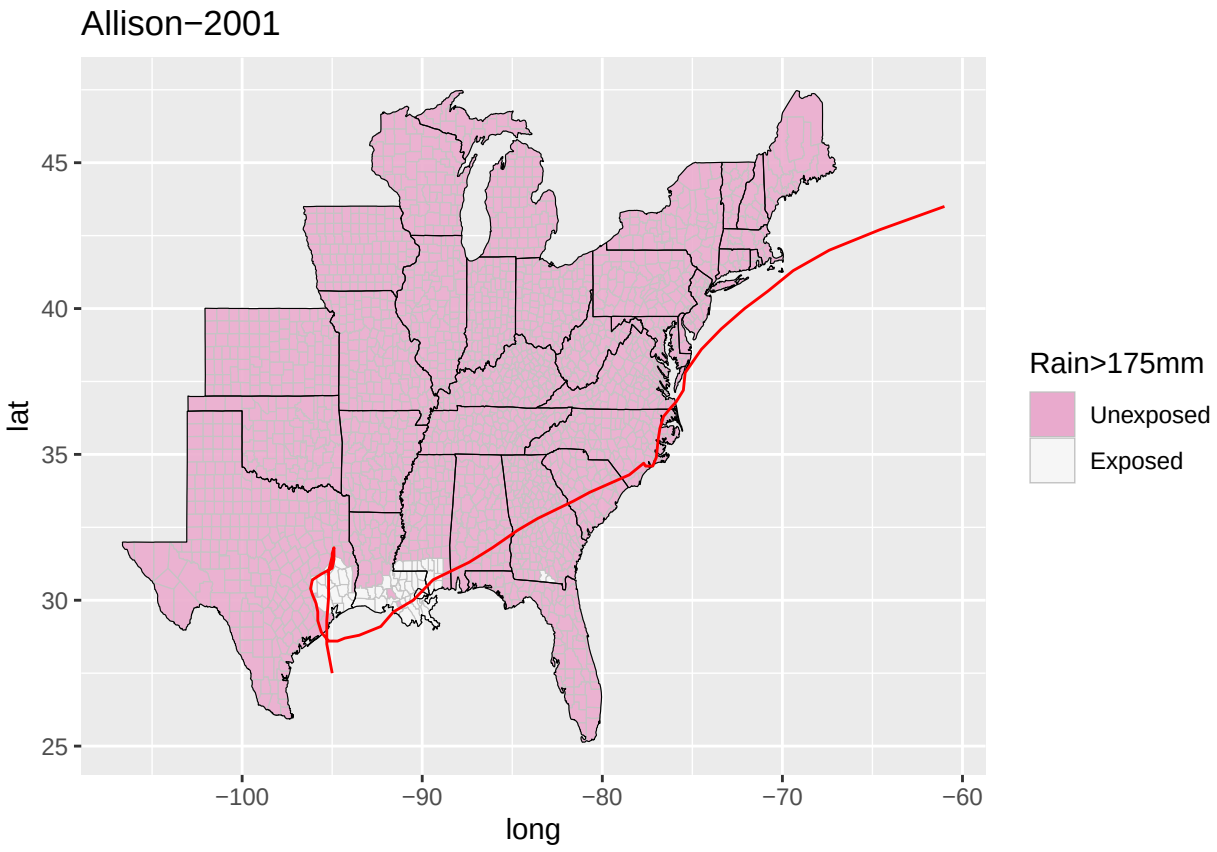
Plot Floyd-1999 using ggplot2

```
ggplot()+geom_polygon(data=Floyd_rain,aes(x=long,y=lat,fill=precip_t,group=group),color="grey",size=0.2
```



Plot Allison-2001 using ggplot2

```
ggplot()+geom_polygon(data=Allison_rain,aes(x=long,y=lat,fill=precip_t,group=group),color="grey",size=0
```

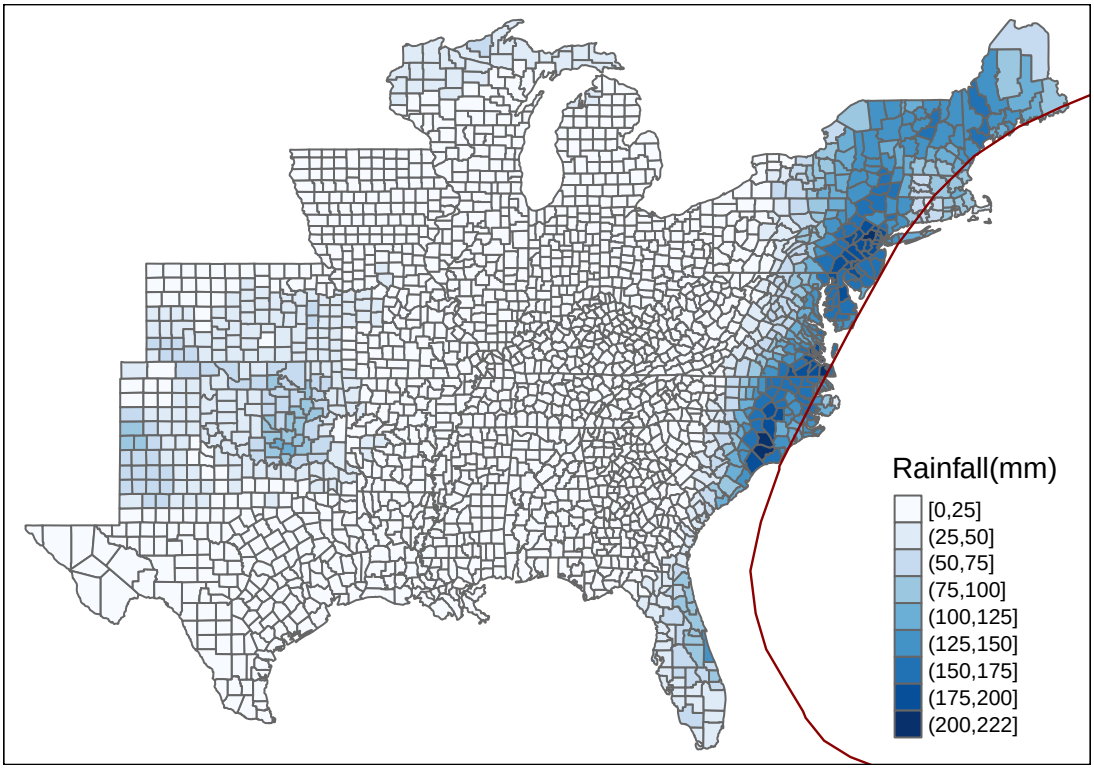


Plot Floyd-1999 using tmap

```
##At first, we need to transform the data frame to spatial data.
Map=st_as_sf(map('county',plot=F,fill=T))
Map%<>%separate(ID,c("region","subregion"),sep=",")
tf<-left_join(Map,county,by=c("region","subregion"))
tf_rain<-right_join(tf,floyd_rain,by="fips")
tf_rain$scale<-cut(tf_rain$precip_t,breaks=c(-1,25,50,75,100,120,150,175,200,250),labels=c("[0,25]","(25
t_Floyd_track=cbind(Floyd_track$longitude,Floyd_track$latitude)%>%Line()%>%
  Lines(ID='Floyd-1999')%>%list()%>%SpatialLines()
tm_shape(tf_rain,title="Floyd-1999")+
  tm_polygons("scale",palette="Blues",title="Rainfall(mm)")+
  tm_shape(t_Floyd_track)+tm_lines(col='red4',lwd =1.2)+tm_layout(main.title='Floyd-1999')
```

```
## Warning: The shape tf_rain contains empty units.
```

```
## Warning: Currect projection of shape t_Floyd_track unknown. Long-lat (WGS84) is
## assumed.
```



Plot Allison-2001 using tmap

```
af_rain<-right_join(tf,allison_rain,by="fips")
af_rain$scale<-cut(af_rain$precip_t,breaks=c(-1,175,500),labels=c("Unexposed","Exposed"),ordered_result
t_Allison_track=cbind(Allison_track$longitude,Allison_track$latitude)%>%
  Line()%>%Lines(ID='Allison-2001')%>%list()%>%SpatialLines()
tm_shape(af_rain,title="Floyd-1999")+
  tm_polygons("scale",palette=c("gray93","dodgerblue4"),title="Rain > 175 mm")+
  tm_shape(t_Allison_track)+tm_lines(col='red4',lwd=1.2)+tm_style("watercolor")+tm_layout(main.title='Al
```

```
## Warning: The shape af_rain contains empty units.
```

```
## Warning: Currect projection of shape t_Allison_track unknown. Long-lat (WGS84)
## is assumed.
```

Allison−2001