Environmental Epidemiology
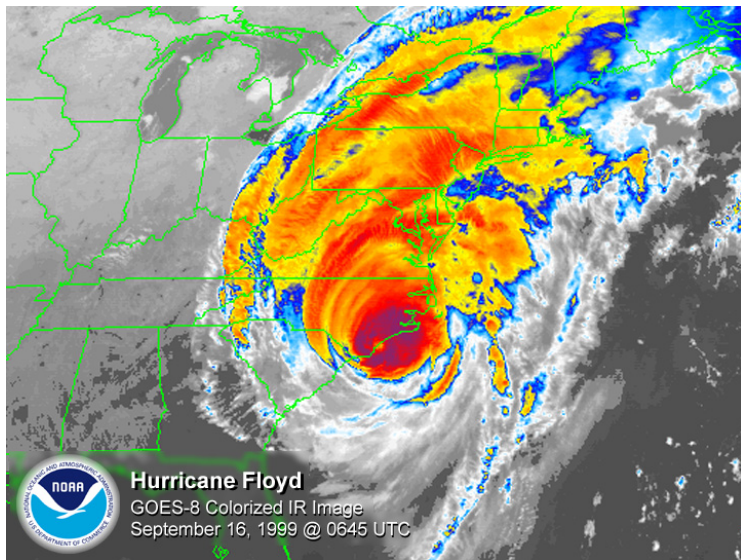
Estimating exposure to climate-related threats

Brooke Anderson

April 14, 2016

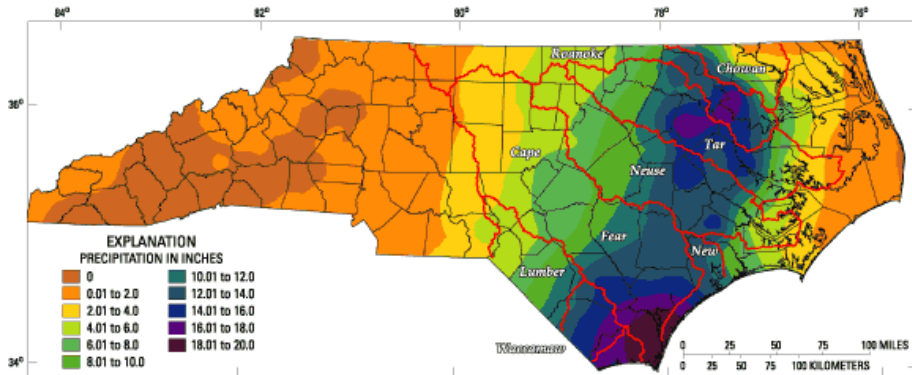# Hurricane Floyd

Hurricane Floyd
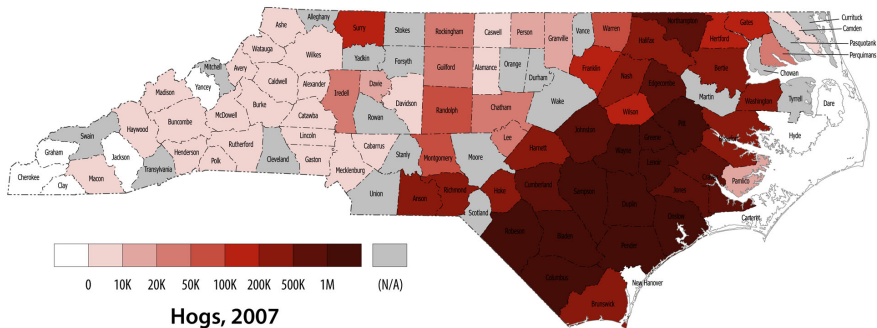GOES-8 Colorized IR Image
September 16, 1999 @ 0645 UTC

Source: NOAA

Hurricane Floyd

Source: National Geographic

Hurricane Floyd

Source: learnnc.org

Hurricane Floyd

Hogs, 2007

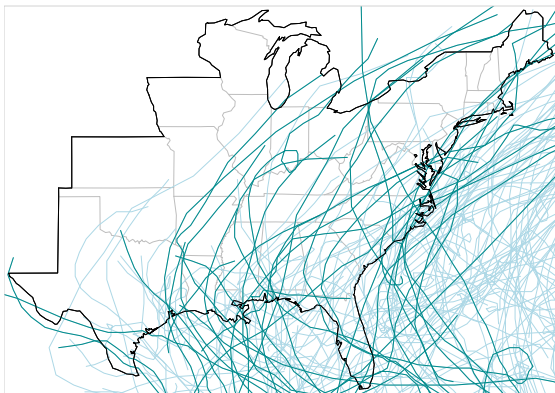0 10K 20K 50K 100K 200K 500K 1M (N/A)
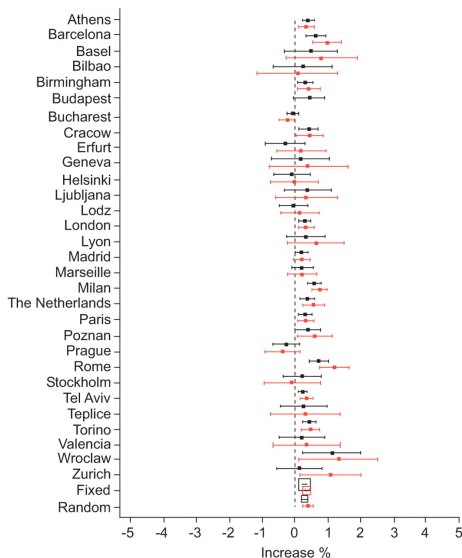
Source: learnnc.org

Hurricane Floyd

Source: AP

Scale of environmental epidemiology studies
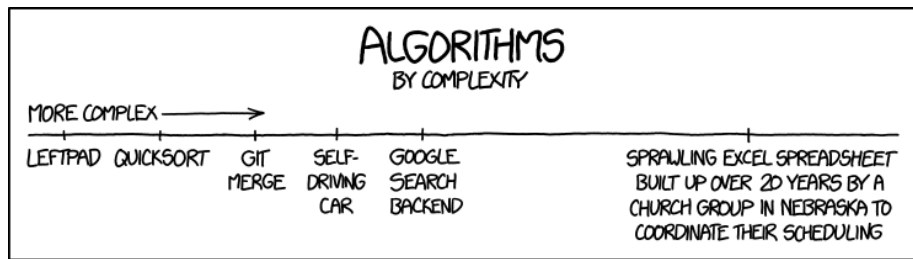
Scale of environmental epidemiology studies

Samoli et al., 2006

Scale of environmental epidemiology studies

Source: ihapss.jhsph.edu

R open source software

Date	Package	Title
2016-04-13	Blaunet	Calculate and Analyze Blau Status for Measuring Social Distance
2016-04-13	cIRT	Choice Item Response Theory
2016-04-13	DataCombine	Tools for Easily Combining and Cleaning Data Sets
2016-04-13	DESP	Estimation of Diagonal Elements of Sparse Precision-Matrices
2016-04-13	ebGenotyping	Genotyping and SNP Detection using Next Generation Sequencing Data
2016-04-13	GetTDData	Get Data for Brazilian Bonds (Tesouro Direto)
2016-04-13	glmbb	All Hierarchical Models for Generalized Linear Model
2016-04-13	GWRM	Generalized Waring Regression Model for Count Data
2016-04-13	HistData	Data Sets from the History of Statistics and Data Visualization
2016-04-13	metacom	Analysis of the 'Elements of Metacommunity Structure'
2016-04-13	miniCRAN	Create a Mini Version of CRAN Containing Only Selected Packages

R open source software

Source: xkcd.com

NOAA observational data

NOAA web services

Climate Data Online: Web Services Documentation

| Getting Started | Datasets | Data Categories | Data Types | Location Categories | Locations | Stations | Data |

Getting Started with Web Services v2

NCDC's Climate Data Online (CDO) offers web services that provide access to current data. This API is for developers looking to create their own scripts or programs that use the CDO database of weather and climate data. An access token is required to use the API, and each token will be limited to five requests per second and 1,000 requests per day.

Step 1: Request token

In order to access the CDO web services a token must first be obtained from the token request page.

NOAA web services
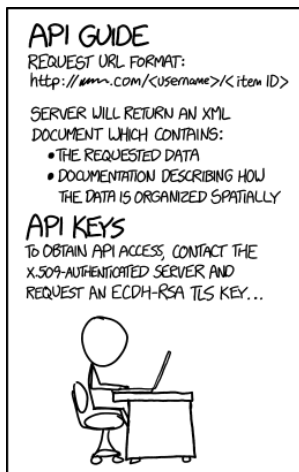
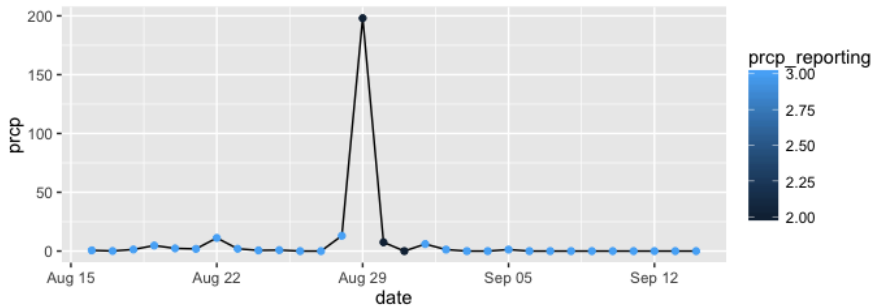

IF YOU DO THINGS RIGHT, IT CAN TAKE PEOPLE A WHILE TO REALIZE THAT YOUR "API DOCUMENTATION" IS JUST INSTRUCTIONS FOR HOW TO LOOK AT YOUR WEBSITE.
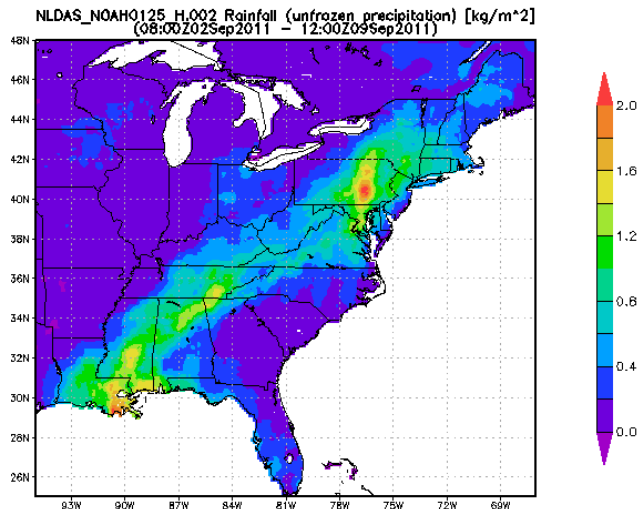
Source: xkcd.com

countyweather package

```r
df <- weather_fips(fips = "22071",
                   percent_coverage = 0.90,
                   date_min = "2005-08-15",
                   date_max = "2005-09-15")
ggplot(df, aes(x = date, y = prcp)) + geom_line() +
  geom_point(aes(color = prcp_reporting))
```
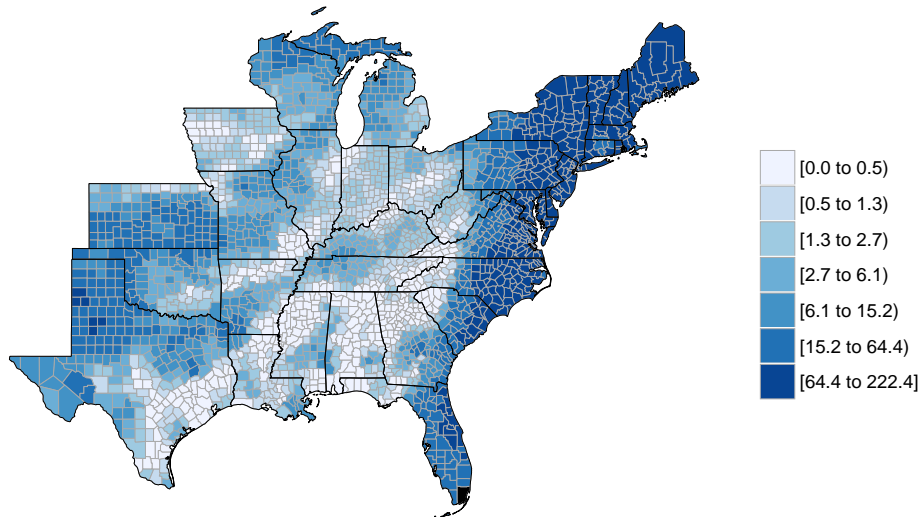
countyweather package

NLDAS-2 weather data
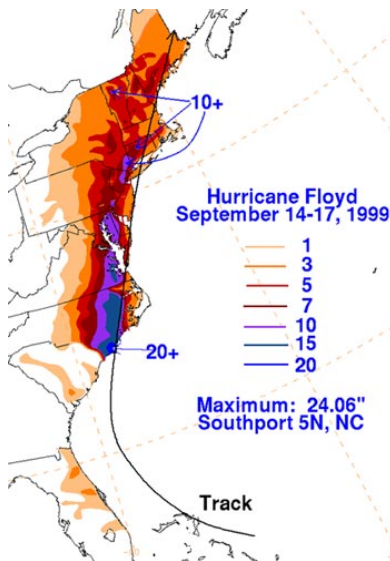
hurricaneexposure package

```r
library(hurricaneexposure)
data("hurr_tracks")
data("storm_rains")
map_1 <- map_counties(storm = "Floyd-1999",
                      metric = "weekly rainfall")
map_1
```
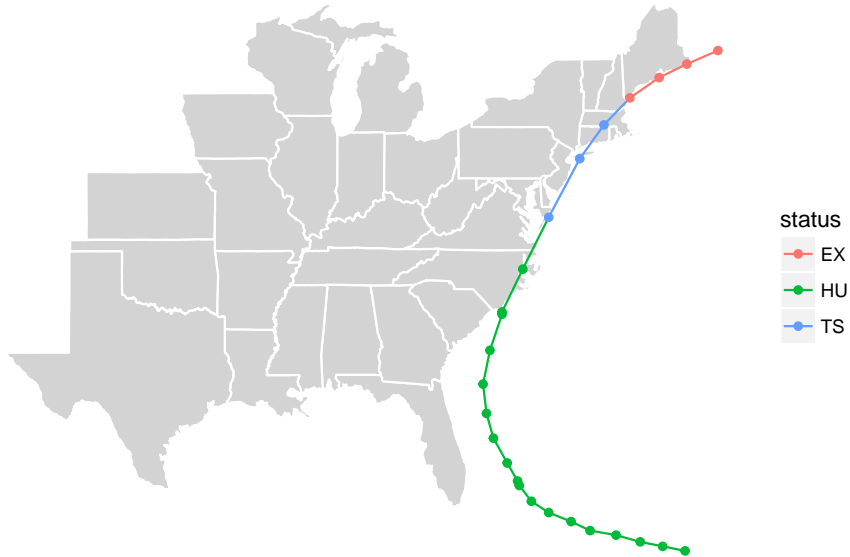
hurricaneexposure package

Legend:
- [0.0 to 0.5)
- [0.5 to 1.3)
- [1.3 to 2.7)
- [2.7 to 6.1)
- [6.1 to 15.2)
- [15.2 to 64.4)
- [64.4 to 222.4]

Floyd rains

hurricaneexposure package

status
- EX
- HU
- TS
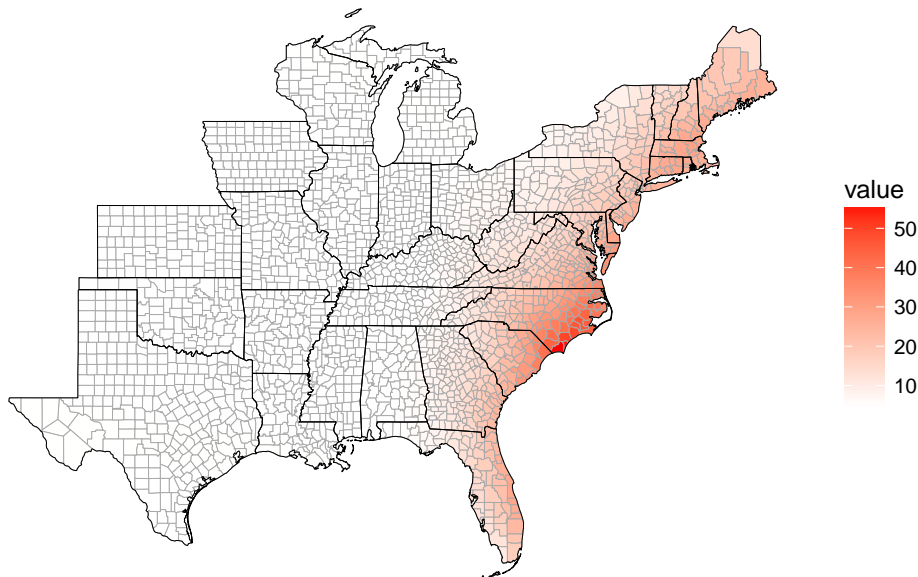
stormwindmodel package

```
library(stormwindmodel)
floyd_tracks <- subset(hurr_tracks, storm_id == "Floyd-1999")
grid_winds_floyd <- get_grid_winds(hurr_track = floyd_tracks,
                                    grid_df = tracts)
map_wind(grid_winds_floyd)
```

stormwindmodel package

stormwindmodel package

```
map_wind(grid_winds_floyd, break_point = 30)
```

stormwindmodel package

value

[0,30]

(30,55.4]