

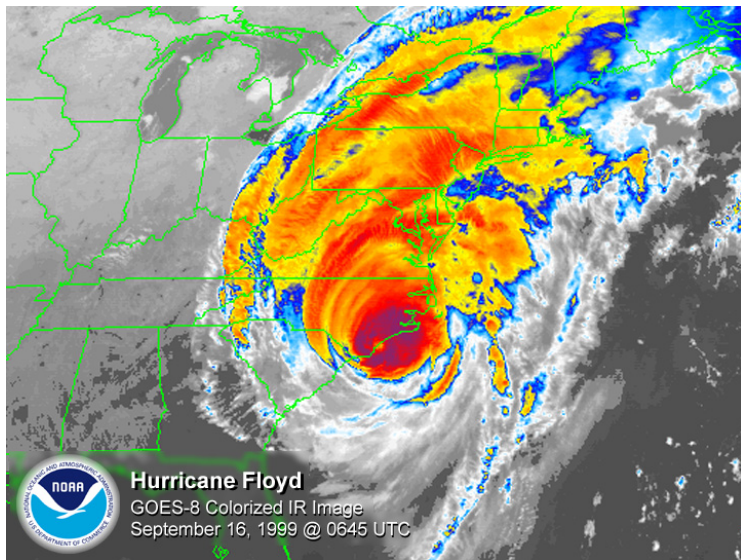
Environmental Epidemiology

Estimating exposure to climate-related threats

Brooke Anderson

April 14, 2016

Hurricane Floyd



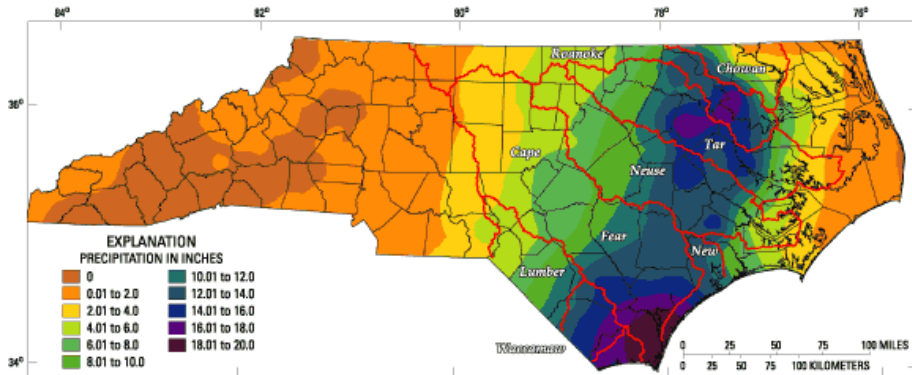
Source: NOAA

Hurricane Floyd



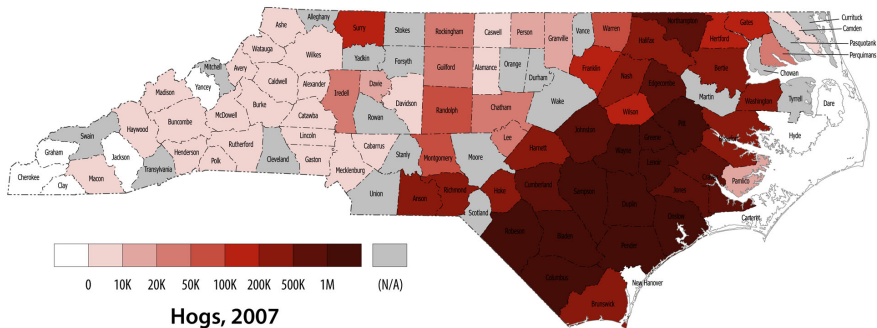
Source: National Geographic

Hurricane Floyd



Source: learnnc.org

Hurricane Floyd



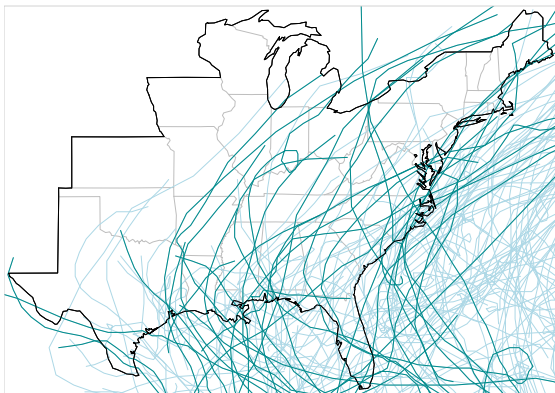
Source: learnnc.org

Hurricane Floyd

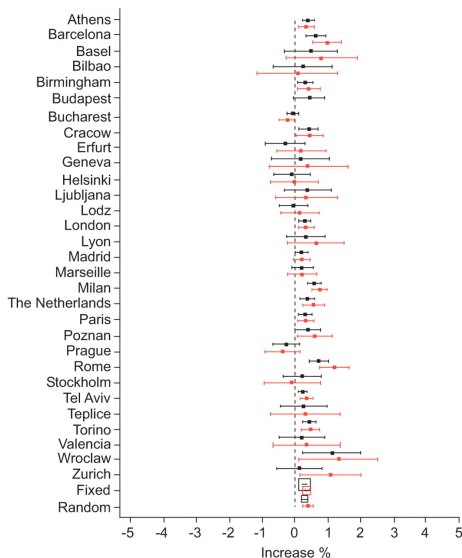


Source: AP

Scale of environmental epidemiology studies



Scale of environmental epidemiology studies



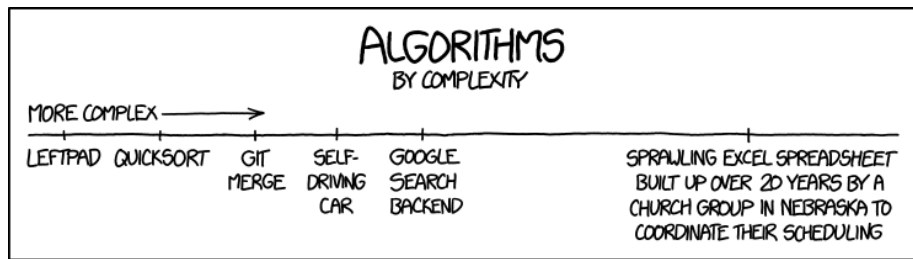
Samoli et al., 2006

R open source software

Available CRAN Packages By Date of Publication

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	GetTDDData	Get Data for Brazilian Bonds (Tesouro Direto)
2016-04-13	glmmb	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 NATIONAL CENTERS FOR
ENVIRONMENTAL INFORMATION
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION



Formerly the National Climatic Data Center (NCDC)... [more about NCEI](#) »

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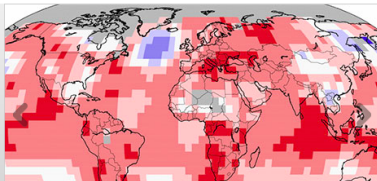


One of our data delivery systems is undergoing maintenance. This outage will delay delivery of all data ordered via our HDSS Access System (HAS) and all NEXRAD Level II and Level III data ordered via Climate Data Online through Thursday, April 14.

NOAA's National Centers for Environmental Information (NCEI) is responsible for preserving, monitoring, assessing, and providing public access to the Nation's treasure of climate and historical weather data and information. [Learn more about NCEI](#) »

How may we assist you?

- I want to search for data at a particular location.
- I want quick access to your products.
- I want to see your monthly climate reports.
- I want to find a specific dataset.
- I want to know about climate change and variability.



Assessing the Global Climate in February 2016

The February 2016 global temperature set a new record for the highest monthly departure from average.

1 2 3 4 5



Climate Data Online: Web Services Documentation

[Getting Started](#)

[Datasets](#)

[Data Categories](#)

[Data Types](#)

[Location Categories](#)

[Locations](#)

[Stations](#)

[Data](#)

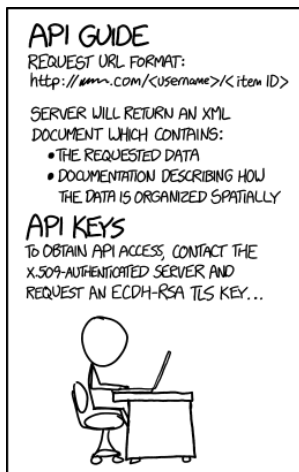
Getting Started with Web Services v2

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

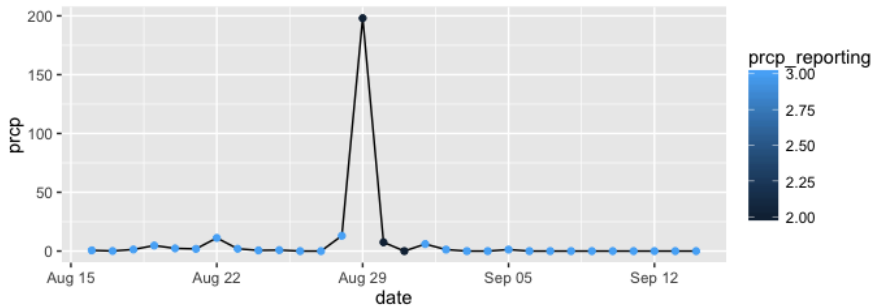


IF YOU DO THINGS RIGHT, IT CAN TAKE
PEOPLE A WHILE TO REALIZE THAT YOUR
"API DOCUMENTATION" IS JUST INSTRUCTIONS
FOR HOW TO LOOK AT YOUR WEBSITE.

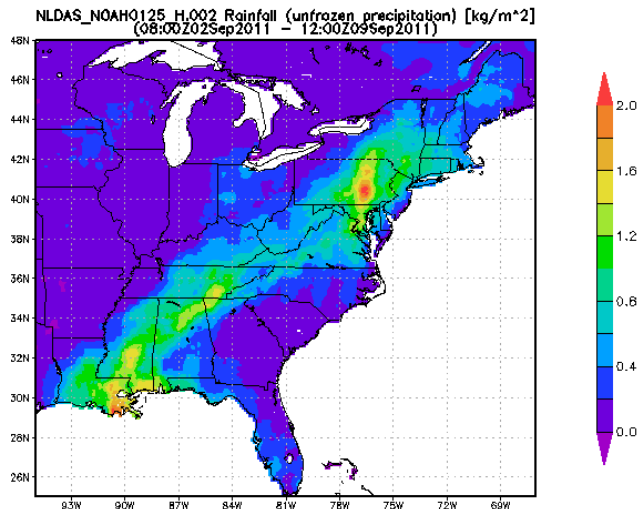
countyweather package

```
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



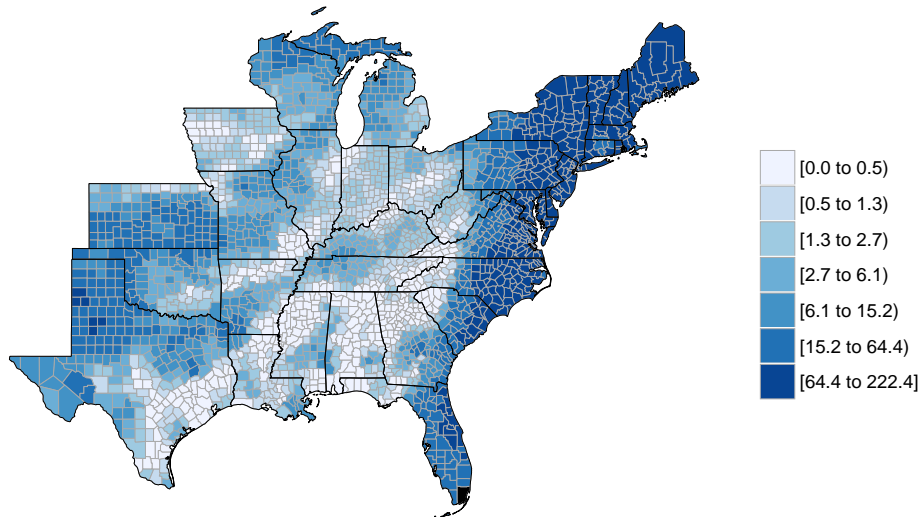
NLDAS-2 weather data



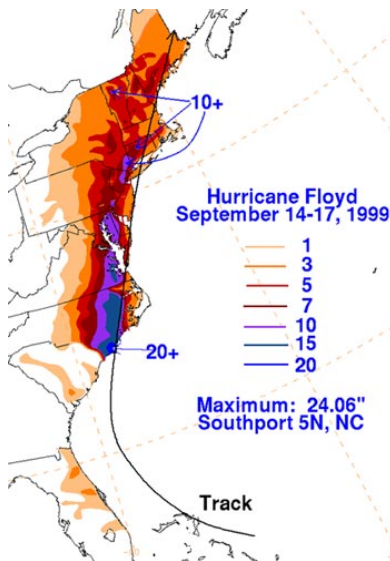
hurricaneexposure package

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

hurricaneexposure package

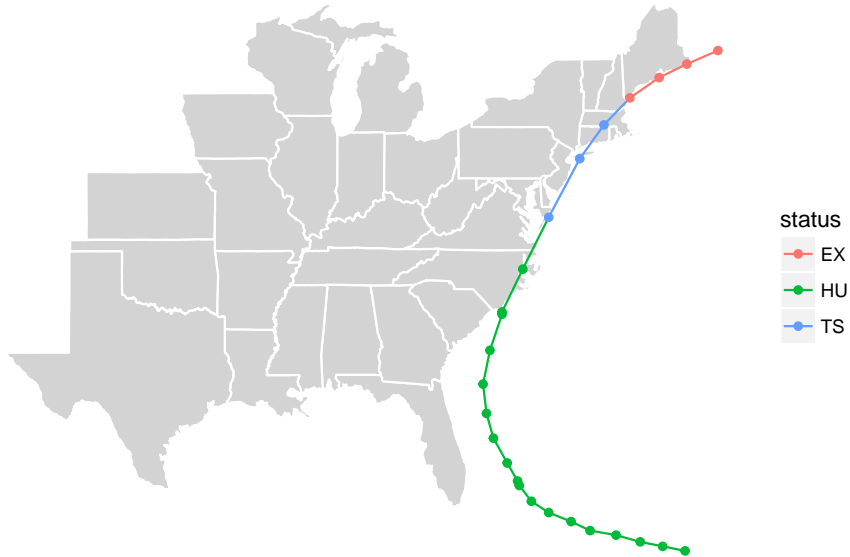


Floyd rains



Source: weather.gov

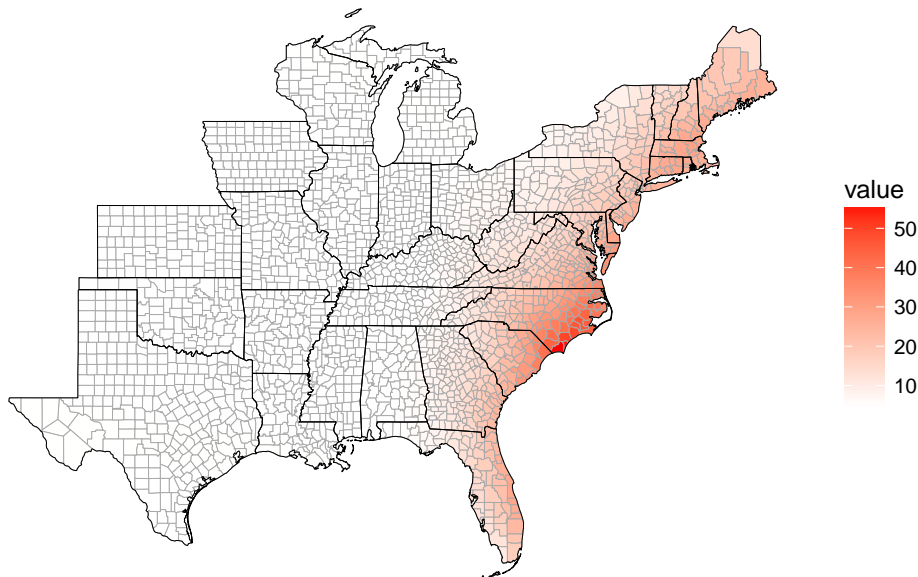
hurricaneexposure package



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

