# Package 'rainfreq'

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**Title** Rainfall Frequency (Design Storm) Estimates from the US National Weather Service

**Description** Estimates of rainfall at desired frequency (e.g., 1% annual chance or 100-year return period) and desired duration (e.g., 24-hour duration) are often required in the design of dams and other hydraulic structures, catastrophe risk modeling, environmental planning and management. One major source of such estimates for the USA is the NOAA National Weather Service's (NWS) division of Hydrometeorological Design Studies Center (HDSC). Raw data from NWS-HDSC is available at 1-km resolution and comes as a huge number of GIS files. This package provides functionality to easily access and analyze the 1-km GIS files provided by NWS' PF Data Server for the entire USA. This package also comes with datasets on record point rainfall measurements provided by NWS-HDSC.

**Version** 0.3

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**Depends** R (>= 3.0.2)

**Imports** RCurl, SDMTools

**VignetteBuilder** knitr

**Suggests** knitr, raster, maps

**License** MIT + file LICENSE

**LazyData** true

**NeedsCompilation** no

**Repository** CRAN

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`extract_freq` *Extract rainfall frequency estimates for desired region of the USA*

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## Description

Extract rainfall frequency estimates for desired region of the USA

## Usage

```
extract_freq(region_name = "se", storm_RP = 100, storm_duration = "24h",
  flag_down_read = TRUE, flag_down_only = FALSE, flag_read_only = FALSE,
  nws_data_path = "")
```

## Arguments

| | |
|---|---|
| `region_name` | region name. choose one of se(southeast), sw(southwest), mw(midwest), orb(ohio river basin and surrounding areas), hi(hawaii) and ak(alaska). default is se(southeast). **rainfreq** regional selection criterion is currently limited to the 50 states (plus DC). |
| `storm_RP` | storm return period in years. choose one of 1, 2, 5, 10, 25, 50, 100, 200, 500, 1000. default is 100 years. |
| `storm_duration` | storm duration in minutes, hours, or days. choose one of 5m, 10m, 15m, 30m, 60m (in minutes); 2h, 3h, 6h, 12h, 24h, 48h (in hours); 3d, 4d, 7d, 10d, 30d, 45d, 60d (in days). default is 24h. |
| `flag_down_read` | flag to indicate both downloading and reading of the data is desired. default is TRUE. |
| `flag_down_only` | flag to indicate only downloading of the data is desired. default is FALSE. |
| `flag_read_only` | flag to indicate only reading of the data is desired. default is FALSE. if set to TRUE a valid file path is required. |
| `nws_data_path` | location of downloaded nws zip files. when flag_read_only is TRUE it defaults to the working directory |

## Value

RasterLayer, if flag_down_only is set to FALSE, NULL otherwise; if the NWS website is not working a value of 10 is returned

## Author(s)

Gopi Goteti

## Examples

```
## Not run:
# southeast, 100yr-24hour storm
x_se <- extract_freq()
class(x_se)
print(x_se)
# midwest, 1000yr-48hour storm
x_mw <- extract_freq(region_name = "mw", storm_RP = 1000, storm_duration = "48h")
print(y_se)
# download only, southeast, 100yr-24hour storm
extract_freq(flag_down_read = FALSE, flag_down_only = TRUE)
# read after download, southeast, 100yr-24hour storm
x_se <- extract_freq(flag_down_read = FALSE, flag_read_only = TRUE)
print(x_se)

## End(Not run)
# record rainfall for the usa
data(rain_max_usa)
head(rain_max_usa)
# record rainfall for the world
data(rain_max_world)
head(rain_max_world)
```

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`rainfreq` *Rainfall frequency estimates for the USA from the NOAA National Weather Service (NWS) division Hydrometeorological Design Studies Center (HDSC).*

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## Description

Rainfall frequency estimates for the USA from the NOAA National Weather Service (NWS) division Hydrometeorological Design Studies Center (HDSC).

## Details

Data from NOAA NWS is available in various formats. **rainfreq** provides functionality to access the GIS format files provided by NWS' PF Data Server. **rainfreq** regional selection criterion is currently limited to the 50 states (plus DC). **rainfreq** also comes with datasets on record point rainfall measurements provided by NWS-HDSC http://www.nws.noaa.gov/oh/hdsc/record_precip/record_precip.html

## Author(s)

Gopi Goteti

## References

NOAA NWS HDSC http://www.nws.noaa.gov/oh/hdsc/index.html. Data in GIS format is available from the PF Data Server http://hdsc.nws.noaa.gov/hdsc/pfds/pfds_gis.html.

`rain_max_usa` *Record rainfall totals from the USA*

## Description

USA record point precipitation measurements from NOAA's National Weather Service, Hydrometeorological Design Studies Center. NOAA indicates that some records have not been verified.

## Usage

```
data(rain_max_usa)
```

## Format

Data frame with 8 columns and 19 rows

## Details

Variables:

- Duration - duration of the rainfall event
- Amount_in - total rainfall amount in inches
- Amount_mm - total rainfall amount in millimeters
- Location - region and country names
- Lat - latitude in decimal degrees
- Lon - longitude in decimal degrees
- Start_Date - starting date of the rainfall event in yyyy-mm-dd format
- Estimate - Yes or blank; Yes if the record has not been verified.

## Author(s)

Gopi Goteti

## References

USA record point precipitation measurements, http://www.nws.noaa.gov/oh/hdsc/record_precip/record_precip_us.html, extracted May 18 2014.

rain_max_world *Record rainfall totals from around the world*

## Description

World record point precipitation measurements from NOAA's National Weather Service, Hydrometeorological Design Studies Center. NOAA indicates that some records have not been verified.

## Usage

```
data(rain_max_world)
```

## Format

Data frame with 8 columns and 47 rows

## Details

Variables:

- Duration - duration of the rainfall event
- Amount_in - total rainfall amount in inches
- Amount_mm - total rainfall amount in millimeters
- Location - region and country names
- Lat - latitude in decimal degrees
- Lon - longitude in decimal degrees
- Start_Date - starting date of the rainfall event in yyyy-mm-dd format
- Estimate - Yes if the record has not been verified, blank otherwise

## Author(s)

Gopi Goteti

## References

World record point precipitation measurements, http://www.nws.noaa.gov/oh/hdsc/record_precip/record_precip_world.html, extracted May 18 2014.

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