'VulnToolkit'

April 12, 2014

`fld.dur` *Calculates the percent of time an elevation is submerged.*

Description

Calculates the percent of time an elevation is submerged

Usage

```
fld.dur(x, vec = x)
```

Arguments

`x`	elevation of interest
`vec`	a numeric vector of water levels

Value

`value`	the percent of measurements in 'vec' that fall above 'x'

`fld.frq` *Calculates the percent of high tides flooding an elevation of interest.*

Description

Calculates the percent of high tides flooding an elevation of interest.

Usage

```
fld.frq(x, vec = x)
```

Arguments

`x`	elevation of interest
`vec`	a numeric vector of high tide levels

Value

`value`	the percent of measurements in 'vec' that fall above 'x'

harcon *Scrapes harmonic constituent data from NOAA CO-OPS website.*

Description

Scrapes harmonic constituent data from NOAA CO-OPS website. Requires internet connection.

Usage

```
harcon(station)
```

Arguments

station	station name or ID number, available on CO-OPS site (http://co-ops.nos.noaa.gov/stations.html?type=

Value

dataset	a dataframe of harmonic constituents and their associated phases, amplitudes, and speeds.

HL.plot *Plots water level data and high/low tides extracted by HL()*

Description

Plots water level data and high/low tides extracted by HL(). Purpose is for quick and easy visual assessment of HL() output.

Usage

```
HL.plot(level, time, period = 13, phantom = TRUE, tides = "all")
```

Arguments

level	a numeric vector of water levels
time	a vector (numeric or POSIX*) indicating the time of water level measurements. Units must be minutes.
period	a single numeric or integer estimate of tidal period (full tidal cycle). Units must be hours.
phantom	a protective measure taken to prevent the inclusion of an artificial high or low tide at the end of the dataset. If the water level measurements end precisely at a low or high tide, this can be changed to FALSE.
tides	is used to optionally subset the output to include only high or low tides. This argument can be 'all' (default), 'H', or 'L'

Value

dataset	a plot of water levels, with red and blue dots superimposed on high and low tides.

HL *Extracts high and low tides from a record of water levels*

Description

Extracts high and low tides from a record of water levels

Usage

```
HL(level, time, period = 13, phantom = TRUE, tides = "all")
```

Arguments

level	a numeric vector of water levels
time	a vector (numeric or POSIX*) indicating the time of water level measurements. Units must be minutes.
period	a single numeric or integer estimate of tidal period (full tidal cycle). Units must be hours.
phantom	a protective measure taken to prevent the inclusion of an artificial high or low tide at the end of the dataset. If the water level measurements end precisely at a low or high tide, this can be changed to FALSE.
tides	is used to optionally subset the output to include only high or low tides. This argument can be 'all' (default), 'H', or 'L'

Value

dataset	a dataframe of tide levels, associated time stamps, and tide type ('H' or 'L').

NL_6min_2013 *New London water levels, 2013*

Description

Water levels from NOAA-COOPS station #8461490 in New London, CT. Data recorded at 6-minute intervals, in meters relative to MHW, and in the GMT time zone.

Usage

```
data(NL_6min_2013)
```

Format

A dataframe with 87591 rows and 3 variables.

Source

downloaded from http://co-ops.nos.noaa.gov/inventory.html?id=8461490 using `VulnToolkit::noaa()`

References

Center for Operational Oceanographic Products and Services

noaa *Scrapes water level data from NOAA-COOPS website*

Description

Scrapes water level data from NOAA-COOPS website. Requires internet connection.

Usage

```
noaa(begindate = "begindate", enddate = "enddate", station = "8467150",
                units = "meters", datum = "MHW", interval = "HL", time = "GMT")
```

Arguments

begindate, enddate	set desired date range and must be in YYYYMMDD format. If one or both dates are left unspecified, the first and/or last complete day of available data will be used.
station	station name or ID number, available on CO-OPS site (http://co-ops.nos.noaa.gov/stations.html?type= Default is Bridgeport, CT station.
units	can be 'feet' or 'meters'. Default is 'meters'
datum	vertical reference datum, set to 'MHW' by default. Can be 'station', 'NAVD', 'MLLW', 'MLW', 'MSL', 'MTL', 'MHW', 'MHHW', or 'IGLD' (some datums are not available at some sites)
interval	sets measurement interval; can be 'HL' (default), '6 minute', or 'hourly'
time	can be 'LST', 'GMT', or 'LST/LDT'. Not all time zones are available for all data. GMT appears to have wider availability than LST, so it is the default.

Value

dataset	a dataframe of water levels, associated time stamps, a station ID column, and tide type (if interval is set to 'HL')

noaa_datums *Scrapes elevation datums from NOAA-COOPS website*

Description

Scrapes elevation datums from NOAA-COOPS website. Requires internet connection.

Usage

```
noaa_datums(station)
```

Arguments

station	station name or ID number, available on CO-OPS site (http://co-ops.nos.noaa.gov/stations.html?type= Default is Bridgeport, CT station.

Value

dataset	a dataframe of vertical datum names and their elevations in meters relative to the station datum. Also contains a column of times associated with relevant datums (record maximum and minimums, lowest and highest astronomical tides).

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number.tides *Numbers tidal cycles, flood tides, and ebb tides in a set of water level data.*

Description

Numbers tidal cycles, flood tides, and ebb tides in a set of water level data.

Usage

```
number.tides(data, datetime, hl)
```

Arguments

data	dataframe containing water level measurements
datetime	date/time column from full dataset (used as 'time' argument in call to HL())
hl	output from HL()

Value

dataset	the dataframe noted in data, with additional columns assigning a number to each tidal cycle, ebb tide, and flood tide.

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vuln.kit *Calculates selected hydrologic parameters and vulnerability metrics*

Description

This function takes a set of water level data as an input, and calculates a set of flooding parameters.

Usage

```
vuln.kit(level, datetime, platform, units = "meters", frq.dur.inc = 0.005,
                    TV.inc = 0.1)
```

Arguments

level	a numeric vector of water levels
datetime	a POSIX* vector of time stamps that correspond to the measurements in 'level'
platform	elevation of the marsh platform (or another vertical position of interest). Should be in the units specified by units and relative to the same vertical datum as level.
units	length units used. 'meters' is default; 'feet' is alternative. If units are "feet," data is converted internally and output in meters.
frq.dur.inc	elevation interval used to calculate flooding frequency, duration, D90, and Ax. Defaults to 0.005 m. Units must correspond to units argument
TV.inc	Elevation interval used to calculate vulnerability metrics (DV, D90V). Defaults to 0.1 m. Units must correspond to units argument.

Value

output	a list containing two items:
dataset	a dataframe of elevations (relative to elevation set in platform argument), flooding frequencies (flooding events per year), flooding durations (hr yr-1), duration of 90th percentile flooding event (D90; hr), and mean flooding depth (A; m)
metrics	a dataframe containing the flooding frequency, flooding duration, D90, mean flooding depth, duration vulnerability, and D90 vulnerability, calculated at the vertical elevation set by platform argument

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VulnToolkit-package *A set of web scrapers and analytical tools to aid analysis of coastal wetlands and their vulnerability to sea-level rise.*

Description

VulnToolkit includes analytical tools to download data from NOAA-COOPS stations, including tide data, harmonic constituents, and station datums. VulnToolkit also includes tools for measuring hydroperiod and assessing vulnerability to hydrologic stress.

Details

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References

in preparation

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