Package 'TideCurves'

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Type Package

Title Analysis and Prediction of Tides

Version 0.0.3

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Description Tidal analysis of evenly spaced observed time series (time step 1 to 60 min) with or without shorter gaps.
The analysis should preferably cover an observation period of at least 19 years.
For shorter periods low frequency constituents are not taken into account, in accordance with the Rayleigh-Criterion.
The main objective of this package is to synthesize or predict a tidal time series.

License GPL-3

LazyData TRUE

Imports chron (>= 2.3-47), data.table (>= 1.9.6), fields (>= 8.3-6)

Depends R (>= 3.2.2)

RoxygenNote 6.0.1

NeedsCompilation no

Repository CRAN

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R topics documented:

Funcs — *Returns predictor vector for design matrix*

Description

Returns predictor vector for design matrix from 44 astronomical angular velocities.

Usage

```
Funcs(tdiff, xi)
```

Arguments

tdiff	Length of input time series.
xi	Transit index

Value

A list with the selected angular velocities, their ranks and the predictor vector (Values between -1, 1).

ResCurve — *Computes the residuum between the observed data and the synthesis*

Description

This function computes the residuum of the computed lunar and solar synthesis and the observed data

Usage

```
ResCurve(tcData, obsData)
```

Arguments

tcData	The results from the TideCurve function. Warning: The synthesis period must overlap with the analysis period. Must be a data.table object.
obsData	The observation data with the columns observation_date, observation_time and height. See attached data for correct formats.

Value

A list with two data.tables with the joined data input and the computed difference between the observed data and the synthesis (res)

`TideCurve` *Computes tide curves*

Description

Takes a data frame as input with three columns (see example dataset) and returns a tide curve. Internally the analysis is carried out in lunar days. One mean lunar day lasts 1.0350501 mean solar days. Therefore the analysis time period should start one lunar day after the first observation and end one lunar day before the last observation.

Usage

```
TideCurve(dataInput, otz = 1, km = -1, mindt = 30, asdate, astime, aedate,
  aetime, ssdate, sstime, sedate, setime)
```

Arguments

`dataInput`	A data frame with the columns observation_date, observation_time and height. See attached data for correct formats.
`otz`	The time zone of the observations
`km`	The number of nodes between two consecutive mean moon transits. Shall be less or equal to: round(1440 [min] / time step [min]) Example: Time step 5 min: Use km = 288 or even smaller. Leave on default (km = -1) and supply mindt, when unsure.
`mindt`	Observation time step in [min]. Default is 30.
`asdate`	A string indication the date you want the analysis to start with. Format: "yyyy/mm/dd".
`astime`	A string indicating the time you want the analysis to start with. Format: "hh:mm:ss"
`aedate`	A string indication the date you want the analysis to end with. Format: "yyyy/mm/dd".
`aetime`	A string indicating the time you want the analysis to end with. Format: "hh:mm:ss"
`ssdate`	Synthesis start date. This indicates the date you want your tide curve to start with. Format: See above
`sstime`	Synthesis start time. The starting time for your tide table. Format: See above
`sedate`	Synthesis end date. Format: See above
`setime`	Synthesis end time. Format: See above

Value

Returns a list with elements of the analysis, fitting and the tidal curve for given data

`synthesis.lunar`	The lunar synthesis data as a data.table object in UTC
`data.matrix`	The data needed for analysis
`tide.curve`	The solar tide curve as a data.table object (provided time zone)
`lm.coeff`	Coefficients for the km fitted linear models used in the synthesis
`diff.analyse`	Time in days spanning the analysis

References

Godin, Gabriel (1972) The Analysis of Tides. Toronto, 264pp

http://tidesandcurrents.noaa.gov/publications/glossary2.pdf

http://www.bsh.de/de/Produkte/Buecher/Berichte_/Bericht50/BSH-Bericht50.pdf

Examples

```
TideCurve(dataInput = tideObservation, asdate = "2015/12/06",
             astime = "00:00:00",      aedate = "2015/12/31",
             aetime = "23:30:00",      ssdate = "2015/12/17",
             sstime = "00:00:00",      sedate = "2015/12/31",
             setime = "23:30:00")
```

`tideObservation` *Sample file of high and low water times and heights*

Description

A sample dataset containing observation date, time and height of high and low water

Usage

```
tideObservation
```

Format

A data frame with 10267 rows and 3 variables

observation_date date of observation, character value in "yyyy/mm/dd" format

observation_time time of observation, character value in "hh:mm:ss" format

height observed value, numeric value

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