Package 'vineyard'

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Type Package

Title Budburst, Phenological and Yield Models for Vineyards

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Author D. Molitor [aut]
J. Junk [aut]
M. Sulis [aut]
J. A. Torres-Matallana [cre, aut]
S. Bhattacharya [ctb]
U. Leopold [ctb]
Luxembourg Institute of Science and Technology (LIST) [cph]

Maintainer J. A. Torres-Matallana <arturo.torres@list.lu>

Description Late frosts are a significant risk to grape production in frost-prone viticultural regions. Increasing air temperature because of climate change is likely to advance grape budburst and last frost events in spring. So far, it is unclear whether one trend will be more pronounced than the other, and hence, whether the risk of late frost damage will increase or decrease. The aim of this package is to provide tools for investigating e.g. the future frost risk in winegrowing regions by assessing the effect of simulated future climate conditions on the timing of budburst and last frost date. Late frost risk can be assessed by the implementation of phenological models for budburst of the grapevine.

License What license is it under?

Encoding UTF-8

LazyData true

RoxygenNote 6.1.1

R topics documented:

`DD.double.threshold` *Compute the degree-days by the lower and upper temperature thresholds*

Description

Implementation to compute the degree-days by the lower and upper temperature thresholds by Molitor et al., (2014).

Usage

```
DD.double.threshold(t.mean, a, b)
```

Arguments

`t.mean`	daily mean air temperature vector in Celsius degrees.
`a`	numeric, lower threshold temperature (in Celsius degrees) for vine growth.
`b`	numeric, upper threshold temperature (in Celsius degrees) for vine growth.

Value

a vector with the degree-days (in Celsius degrees) for vine growth.

References

Daniel Molitor, Jürgen Junk, Danièle Evers, Lucien Hoffmann, and Marco Beyer. A high-resolution cumulative degree day-based model to simulate phenological development of grapevine. Am. J. Enol. Vitic., (65:1):72–80, 2014.

DD.heat.threshold *Compute the degree-days by a heat threshold temperature*

Description

Implementation to compute the degree-days by a heat threshold temperature by Molitor et al., (2014).

Usage

```
DD.heat.threshold(t.mean, a, b, c)
```

Arguments

t.mean	daily mean air temperature vector in Celsius degrees.
a	numeric, lower threshold temperature (in Celsius degrees) for vine growth.
b	numeric, upper threshold temperature (in Celsius degrees) for vine growth.
c	numeric, heat threshold temperature (in Celsius degrees) for vine growth.

Value

a vector with the degree-days (in Celsius degrees) for vine growth.

References

Daniel Molitor, Jürgen Junk, Danièle Evers, Lucien Hoffmann, and Marco Beyer. A high-resolution cumulative degree day-based model to simulate phenological development of grapevine. Am. J. Enol. Vitic., (65:1):72–80, 2014.

DD.single.threshold *Compute the degree-days by the single temperature threshold*

Description

Implementation to compute the degree-days by the single temperature threshold by Molitor et al., (2014).

Usage

```
DD.single.threshold(t.mean, a)
```

Arguments

t.mean	daily mean air temperature vector in Celsius degrees.
a	numeric, threshold temperature (in Celsius degrees) for vine growth.

Value

a vector with the degree-days (in Celsius degrees) for vine growth.

References

Daniel Molitor, Jürgen Junk, Danièle Evers, Lucien Hoffmann, and Marco Beyer. A high-resolution cumulative degree day-based model to simulate phenological development of grapevine. Am. J. Enol. Vitic., (65:1):72–80, 2014.

`DD.single.triangle` *Compute the degree-days by the single triangle algorithm*

Description

Implementation to compute the degree-days by the single triangle algorithm by Nendel (2010).

Usage

```
DD.single.triangle(t.zero, t.min, t.mean, t.max)
```

Arguments

`t.zero`	numeric, threshold temperature (in Celsius degrees) for vine growth.
`t.min`	daily minimum air temperature vector in Celsius degrees.
`t.max`	daily maximum air temperature vector in Celsius degrees.

Value

a vector with the degree-days (in Celsius degrees) for vine growth.

References

Nendel, Class (2010). Grapevine bud break prediction for cool winter climates. Int. J. Biometeorol., 54, 231–241.

FillNA *Fill NA data in time series*

Description

Fill NA data in time series

Usage

```
FillNA(x)
```

Arguments

x	the input time series as xts object.

Value

a time series with the NAs replaced by data according to the na.locf zoo function.

Id.na *Find indexes for NA data in time series*

Description

Find indexes for NA data in time series

Usage

```
Id.na(x)
```

Arguments

x	the input time series as xts object.

Value

a vector with the index for NA data in the time series.

plot.na *Plot NA data in time series*

Description

Plot NA data in time series

Usage

```
## S3 method for class 'na'
plot(x, ids.na)
```

Arguments

x	the input time series as xts object.
ids.na	the vector which coniains indexes for NA data as provided by the Id.na function.

Value

plots with the NAs highlighted.

Raw2xts *Raw data to xts object*

Description

Raw data to xts object

Usage

```
Raw2xts(data)
```

Arguments

data	the dataframe to convert to xts time series.

Value

the xts object for the input dataframe.

Remich *Sample time series of meteorological data for Remich station.*

Description

A sample dataset containing time series of meteorological data for Remich station located in the Grand-Duchy of Luxembourg obtained by the Institut Viti-vinicole in Remich. The data covers the period from 1970 to 2017 at daily time interval.

References

https://agriculture.public.lu/de/weinbau-oenologie.html

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