Package 'temperatureresponse'

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Version 0.2

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Title Temperature Response

Depends R (>= 3.1.0)

Description Fits temperature response models to rate measurements taken at different temperatures. Etienne Low-Decarie,Tobias G. Boatman, Noah Bennett,Will Passfield,Antonio Gavalas-Olea,Philipp Siegel, Richard J. Geider (2017) <doi:10.1002/ece3.3576> .

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URL https://github.com/low-decarie/temperatureresponse

RoxygenNote 6.0.1

LazyData true

Imports graphics, stats, broom, dplyr, rootSolve, minpack.lm, AICcmodavg, numDeriv

NeedsCompilation no

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Repository CRAN

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R topics documented:

`amend_output` *amend_output*

Description

Helper function that add terms to the broom output of fit

Usage

```
amend_output(output, fit, f_equ, temp, rate, try_test, augment, return_fit)
```

Arguments

`output`	broom output of fit
`fit`	the model output of the fitting process
`f_equ`	equation with fitted parameters
`temp`	temperature values of measurements
`rate`	rate that changes with temperature
`try_test`	did the model fitting succeed or produce an error?
`augment`	add columns to the original dataset such as predictions, residuals and cluster assignments using package::broom (T/F)?
`return_fit`	return the model object (T/F)?

Value

a data frame of, depending on augment argument, if FALSE, parameters, if TRUE, data with predicted values

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`Emiliania_huxleyi` *Temperature response of the growth rate of Emiliania_huxleyi*

Description

A data set containing the temperature response of the growth rate of Emiliania_huxleyi

Usage

```
Emiliania_huxleyi
```

Format

A data frame with 39 rows and 3 variables:

temp temperature

rate growth rate ...

Source

`to_be_added`

`equ10` *Equation 10*

Description

Equation from Thomas et al. (2014)

Usage

```
equ10(temp, rate, augment = F, return_fit = F)
```

Arguments

`temp`	temperature (in Celsius)
`rate`	rate measurement
`augment`	logical wether the dataset with fits should be returned instead of the parameter values
`return_fit`	logical wether the model fit object should be returned

Value

a data frame of, depending on augment argument, if FALSE, parameters, if TRUE, data with predicted values

Examples

```
## Not run:
output <- with(Emiliania_huxleyi, equ10(temp=temp, rate=rate))

## End(Not run)
```

---

equ11 *Equation 11*

Description

Equation in Montagnes et al. 2008

Usage

```
equ11(temp, rate, augment = F, return_fit = F)
```

Arguments

temp	temperature (in Celsius)
rate	rate measurement
augment	logical wether the dataset with fits should be returned instead of the parameter values
return_fit	logical wether the model fit object should be returned

Value

depends on augment: if false, fitting parameters or fitted data

Examples

```
 ## Not run:
 output <- with(Emiliania_huxleyi, equ11(temp=temp, rate=rate))

## End(Not run)
```

equ12 *Equation 12*

Description

Equation in Montagnes et al (2008) citing Flinn (1991)

Usage

```
equ12(temp, rate, augment = F, return_fit = F)
```

Arguments

temp	temperature (in Celsius)
rate	rate measurement
augment	logical wether the dataset with fits should be returned instead of the parameter values
return_fit	logical wether the model fit object should be returned

Value

depends on augment: if false, fitting parameters or fitted data

Examples

```
output <- with(Emiliania_huxleyi, equ12(temp=temp, rate=rate))
```

equ13 *Equation 13*

Description

Equation in Ratkowsky et al. (1983)

Usage

```
equ13(temp, rate, augment = F, return_fit = F)
```

Arguments

temp	temperature (in Celsius)
rate	rate measurement
augment	logical wether the dataset with fits should be returned instead of the parameter values
return_fit	logical wether the model fit object should be returned

Value

depends on augment: if false, fitting parameters or fitted data

Examples

```
output <- with(Emiliania_huxleyi, equ14(temp=temp, rate=rate))
```

`equ14` *Equation 14*

Description

Equation from Kamykowski (1985)

Usage

```
equ14(temp, rate, augment = F, return_fit = F)
```

Arguments

`temp`	temperature (in Celsius)
`rate`	rate measurement
`augment`	logical wether the dataset with fits should be returned instead of the parameter values
`return_fit`	logical wether the model fit object should be returned

Value

a data frame of, depending on augment argument, if FALSE, parameters, if TRUE, data with predicted values

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`equ15` *Equation 15*

Description

New equation (based on sine)

Usage

```
equ15(temp, rate, augment = F, return_fit = F)
```

Arguments

temp	temperature (in Celsius)
rate	rate measurement
augment	logical wether the dataset with fits should be returned instead of the parameter values
return_fit	logical wether the model fit object should be returned

Value

a data frame of, depending on augment argument, if FALSE, parameters, if TRUE, data with predicted values

Examples

```
output <- with(Emiliania_huxleyi, equ15(temp=temp, rate=rate))
```

---

equ16 *Equation 16*

Description

Equation from "A Key Marine Diazotroph in a Changing Ocean: The Interacting Effects of Temperature, CO2 and Light on the Growth of Trichodesmium erythraeum IMS101". Challenging to fit to many datasets. Does not fit to example dataset.

Usage

```
equ16(temp, rate, augment = F, return_fit = F)
```

Arguments

temp	temperature (in Celsius)
rate	rate measurement
augment	logical wether the dataset with fits should be returned instead of the parameter values
return_fit	logical wether the model fit object should be returned

Value

a data frame of, depending on augment argument, if FALSE, parameters, if TRUE, data with predicted values

Examples

```
output <- with(Emiliania_huxleyi, equ16(temp=temp, rate=rate))
```

equ4 *Equation 4*

Description

Equation 4 is model H in Li & Dickie (1987) citing Hinshelwood (1947)

Usage

```
equ4(temp, rate, augment = F, return_fit = F)
```

Arguments

temp	temperature (in Celsius)
rate	rate measurement
augment	logical wether the dataset with fits should be returned instead of the parameter values
return_fit	logical wether the model fit object should be returned

Value

a data frame of, depending on augment argument, if FALSE, parameters, if TRUE, data with predicted values

Examples

```
output <- with(Emiliania_huxleyi, equ4(temp=temp, rate=rate))
```

equ5 *Equation 5*

Description

Equation 5 is model J from Li & Dickie (1987) citing Johnson et al. (1942) Does not currently work

Usage

```
equ5(temp, rate, augment = F, return_fit = F)
```

Arguments

temp	temperature (in Celsius)
rate	rate measurement
augment	logical wether the dataset with fits should be returned instead of the parameter values
return_fit	logical wether the model fit object should be returned

Value

a data frame of, depending on augment argument, if FALSE, parameters, if TRUE, data with predicted values

Examples

```
output <- with(Emiliania_huxleyi, equ5(temp=temp, rate=rate))
```

`equ6` *Equation 6*

Description

Equation 6

Usage

```
equ6(temp, rate, augment = F, return_fit = F)
```

Arguments

`temp`	temperature (in Celsius)
`rate`	rate measurement
`augment`	logical wether the dataset with fits should be returned instead of the parameter values
`return_fit`	logical wether the model fit object should be returned

Value

a data frame of, depending on augment argument, if FALSE, parameters, if TRUE, data with predicted values

Examples

```
output <- with(Emiliania_huxleyi, equ6(temp=temp, rate=rate))
```

equ7 *Equation 7*

Description

Equation 7 from Montagnes et al (2008) citing Schoolfield et al. (1981)

Usage

```
equ7(temp, rate, augment = F, return_fit = F)
```

Arguments

temp	temperature (in Celsius)
rate	rate measurement
augment	logical wether the dataset with fits should be returned instead of the parameter values
return_fit	logical wether the model fit object should be returned

Value

a data frame of, depending on augment argument, if FALSE, parameters, if TRUE, data with predicted values

Examples

```
output <- with(Emiliania_huxleyi, equ7(temp=temp, rate=rate))
```

equ8 *Equation 8*

Description

Equation in Li & Dickie (1987) citing Stoermer & Ladewski (1976): a*exp(-0.5*((temp-tref)/b)^2)

Usage

```
equ8(temp, rate, augment = F, plot_profile = F, return_fit = F)
```

Arguments

temp	temperature (in celsius or Kelvin)
rate	rate measurement
augment	logical wether the dataset with fits should be returned instead of the parameter values
plot_profile	logical should the model fitting profile be plotted
return_fit	logical wether the model fit object should be returned

Value

depends on augment: if false, fitting parameters or fitted data

Examples

```
output <- with(Emiliania_huxleyi, equ8(temp=temp, rate=rate))
```

`equ9` *Equation 9*

Description

Equation from Montagnes et al. 2008

Usage

```
equ9(temp, rate, augment = F, return_fit = F)
```

Arguments

`temp`	temperature (in Celsius)
`rate`	rate measurement
`augment`	logical wether the dataset with fits should be returned instead of the parameter values
`return_fit`	logical wether the model fit object should be returned

Value

a data frame of, depending on augment argument, if FALSE, parameters, if TRUE, data with predicted values

Examples

```
output <- with(Emiliania_huxleyi, equ9(temp=temp, rate=rate))
```

`fitmodellist` *Fit model list*

Description

Fits list of models (all models in package by default)

Usage

```
fitmodellist(temp, rate, augment = F, return_fit = F,
  models = paste0("equ", 4:15))
```

Arguments

`temp`	temperature (in Celsius)
`rate`	rate measurement (for example growth rate, but could also be abundance)
`augment`	logical wether the dataset with fits should be returned instead of the parameter values
`return_fit`	logical should the model object be returned
`models`	list of strings of equations to be fit such as paste0("equ",4:15)

Value

a data frame of, depending on augment argument, if FALSE, parameters, if TRUE, data with predicted values

Examples

```
output <- with(Emiliania_huxleyi, fitmodellist(temp=temp, rate=rate))
```

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