

Package ‘temperatureresponse’

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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](https://doi.org/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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amend_output	<i>amend_output</i>
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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 <code>package::broom</code> (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

Emiliana_huxleyi	<i>Temperature response of the growth rate of Emiliana_huxleyi</i>
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Description

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

Usage

```
Emiliana_huxleyi
```

Format

A data frame with 39 rows and 3 variables:

temp temperature

rate growth rate ...

Source

to_be_added

equ10	<i>Equation 10</i>
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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(Emiliana_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(Emiliana_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 whether the dataset with fits should be returned instead of the parameter values
return_fit	logical whether the model fit object should be returned

Value

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

Examples

```
output <- with(Emiliana_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 whether the dataset with fits should be returned instead of the parameter values
return_fit	logical whether the model fit object should be returned

Value

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

Examples

```
output <- with(Emiliana_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

 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(Emiliana_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(Emiliana_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(Emiliana_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(Emiliana_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(Emiliana_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(Emiliana_huxleyi, equ7(temp=temp, rate=rate))
```

 equ8

Equation 8

Description

Equation in Li & Dickie (1987) citing Stoermer & Ladewski (1976): $a \cdot \exp(-0.5 \cdot ((\text{temp} - \text{tref})/b)^2)$

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(Emiliana_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(Emiliana_huxleyi, equ9(temp=temp, rate=rate))
```

fitmodellist	<i>Fit model list</i>
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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 whether 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(Emiliana_huxleyi, fitmodellist(temp=temp, rate=rate))
```

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