Package 'RCarb'

November 9, 2018

Type Package

Title Dose Rate Modelling of Carbonate-Rich Samples

Version 0.1.0

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Description Dose rate modelling for carbonate-
rich samples in the context of trapped charged dating (e.g., luminescence dating) applications.

Depends R (>= 3.3.0), utils

Imports interp (>= 1.0), matrixStats (>= 0.50.0)

Suggests R.rsp (>= 0.42.0)

License GPL-3

Encoding UTF-8

LazyData true

VignetteBuilder R.rsp

RoxygenNote 6.1.1

NeedsCompilation no

R topics documented:

`RCarb-package` *RCarb - Dose Rate Modelling of Carbonate-Rich Samples*

Description

The package provides a dose rate modelling for carbonate-rich samples in the context of trapped charged dating (e.g., luminescence dating) applications.

Package:	RCarb
Type:	Package
Version:	0.1.0
Date:	2018-10-03
License:	GPL-3

References

This package bases on a MATLAB programme with name 'Carb', details can be found the following references:

Mauz, B., Hoffmann, D., 2014. What to do when carbonate replaced water: Carb, the model for estimating the dose rate of carbonate-rich samples. Ancient TL 32, 24–32.

Nathan, R.P., Mauz, B., 2008. On the dose-rate estimate of carbonate-rich sediments for trapped charge dating. Radiation Measurements 43, 14–25. doi:10.1016/j.radmeas.2007.12.012

`Example_Data` *Example data*

Description

Example data as shipped with *Carb* by Mauz & Hoffmann (2014). In contrast to the original data, `NA` values have been replaced by 0 and columns and rows have been transposed. Samples are now organised in rows and parameters in columns.

The data can be used to test 'RCarb' and play with the secondary carbonatisation process. Sample HD107 was remnamed to LV107 for the sake of consistency with Fig. 4 in Mauz & Hoffmann (2014).

Format

`Example_Data`: data.frame (28 x 29)

Each column has two attributes:

- `UNIT`: the unit, so far applicable, e.g. "ppm"
- `DESCRIPTION`: the column description

Version

0.1.0

Author(s)

Mauz & Hoffmann (2014), with minor modifcations by Sebastian Kreutzer, IRAMAT-CRP2A, UMR 5060, CNRS-Université Bordeaux Montaigne (France)

References

Mauz, B., Hoffmann, D., 2014. What to do when carbonate replaced water: Carb, the model for estimating the dose rate of carbonate-rich samples. Ancient TL 32, 24-32.

Examples

```
## show first elements of the example data
data(Example_Data, envir = environment())
head(Example_Data)

##show only column U230
Example_Data$U238
```

`model_DoseRate` *Model dose rate evolution in carbonate-rich samples*

Description

This function models the dose rate evolution in carbonate enrich environments. For the calculation internal functions are called.

Usage

```
model_DoseRate(data, length_step = 1L, max_time = 500L, n.MC = 100,
  method_control = list(), txtProgressBar = TRUE, verbose = TRUE,
  plot = TRUE, ...)
```

Arguments

`data`	data.frame (**required**): input data following the structure given in the example data set `data(Example_Data)`. The input data.frame should have at least one row (i.e. values for one sample). For multiple rows the function is automatically re-called.
`length_step`	numeric (with default): step length used for the calculation
`max_time`	numeric (with default): maximum temporal search range
`n.MC`	numeric (with default): number of Monte Carlo runs used for the error calculation
`method_control`	(*optional*): additional arguments that can be provided to the control the the modelling. See details for further information.
`txtProgressBar`	logical (with default): enables/disables the `txtProgressBar` for the MC runs
`verbose`	logical (with default): enables/disables verbose mode
`plot`	logical (with default): enables/disables plot output
`...`	further arguments passed to the underyling plot functions, see also details for further information. Supported standard arguments are `mfrow`, `xlim`, `xlab`.

Details

TODO

Value

The function returns numerical and graphical output

[NUMERICAL OUTPUT]

- A data.frame which is the combination of the input and values calculated by this function.

[GRAPHICAL OUTPUT]

- Two plots are returned: ##TODO

Function version

0.1.0

Author(s)

Sebastian Kreutzer, IRAMAT-CRP2A, UMR 5060, Université Bordeaux Montagine (France); based on MATLAB code given in Carb_2007a

References

Mauz, B., Hoffmann, D., 2014. What to do when carbonate replaced water: Carb, the model for estimating the dose rate of carbonate-rich samples. Ancient TL 32, 24–32.

Nathan, R.P., Mauz, B., 2008. On the dose-rate estimate of carbonate-rich sediments for trapped charge dating. Radiation Measurements 43, 14–25. doi:10.1016/j.radmeas.2007.12.012

Examples

```
##load example data
data("Example_Data", envir = environment())

##run the function for one sample from
##the dataset
model_DoseRate(
data = Example_Data[14,],
n.MC = 2,
txtProgressBar = FALSE
)
```

Reference_Data *Reference data*

Description

Reference values used for internal calculations.

Format

Reference_Data: list

NAME	TYPE	DIM	DESCRIPTION
DATAek	matrix	4 x 4	
DATAet	matrix	4 x 4	
DATAet230	matrix	4 x 4	
DATAeu	matrix	4 x 4	
DATAeu234	matrix	4 x 4	
DATAeu238	matrix	4 x 4	
DATApk	matrix	4 x 4	
DATApt	matrix	4 x 4	
DATApt230	matrix	4 x 4	
DATApu	matrix	4 x 4	
DATApu234	matrix	4 x 4	
DATApu238	matrix	4 x 4	
mejdahl	data.frame	36 x 4	beta-dose attenuation values for quartz grains according to Mejdahl (1979)

Version

0.1.0

References

Mejdahl, V., 1979. Thermoluminescence dating: beta-dose attenuation in quartz grains. Archaeometry 21, 61-72.

Examples

```
data(Reference_Data, envir = environment())
str(Reference_Data)
Reference_Data$DATAek
```

write_InputTemplate *Write table input template*

Description

This function creates a template table that can be used as input for the function model_DoseRate

Usage

```
write_InputTemplate(file = NULL, ...)
```

Arguments

file	character (optional): output path, if NULL nothing is written, but a template data.frame is returned.
...	additional arguments that can be passed to function write.table if file != NULL. Supported arguments are: sep, dec, fileEncoding‘

Function version

0.1.0

Author(s)

Sebastian Kreutzer, IRAMAT-CRP2A, UMR 5060, CNRS - Université Bordeaux Montaigne (France)

See Also

Example_Data, write.table

Examples

```
write_InputTemplate()

## Not run:
##Example with file output
write_InputTemplate(file = "~/Desktop/Input.csv")


## End(Not run)
```

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