Package ‘oxcAAR’

July 5, 2021

Type Package
Title Interface to ‘OxCal’ Radiocarbon Calibration
Version 1.1.1
Date 2021-06-06
Description A set of tools that enables using ’OxCal’ from within R. ’OxCal’ (<https://c14.arch.ox.ac.uk/oxcal.html>) is a standard archaeological tool intended to provide 14C calibration and analysis of archaeological and environmental chronological information. ’OxcAAR’ allows simple calibration with ’Oxcal’ and plotting of the results as well as the execution of sophisticated (’OxCal’) code and the import of the results of bulk analysis and complex Bayesian sequential calibration.
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Imports stringi, stringr, jsonlite
Suggests knitr, testthat, rmarkdown, ggplot2, ggridges, methods
VignetteBuilder knitr
RoxygenNote 7.1.1
Encoding UTF-8
NeedsCompilation no
Author Hinz Martin [aut, cre],
Clemens Schmid [aut],
Daniel Knitter [aut],
Carolin Tietze [aut]
Maintainer Hinz Martin <martin.hinz@iaw.unibe.ch>
Repository CRAN
Date/Publication 2021-07-05 17:20:02 UTC

R topics documented:

  Boundary ................................................. 2
calcurve_plot ........................................... 3
eexecuteOxcalScript .................................... 3
get_bp ................................................... 4
Boundary

Returns the OxCal code for a Boundary

Description

Boundary returns the OxCal code for a Boundary. For details concerning the Oxcal simulation please consult the help page of Oxcal.

Usage

Boundary(names)

Arguments

names a optional vector of names for the resulting Phases dates. If given, for each name a boundary is returned. If not given, one Boundary without name is returned.

Value

a string containing the respective Oxcal code
**calcurve_plot**  
*Plots calibrated dates on the calibration curve*

**Description**  
Plots calibrated dates on the calibration curve

**Usage**

```r
calcurve_plot(
  x,
  dates_sigma_ranges = NULL,
  uncal_range = TRUE,
  cal_range = TRUE
)
```

**Arguments**

- **x**  
an object of class `oxcAARCalibratedDate` or `oxcAARCalibratedDatesList`

- **dates_sigma_ranges**  
character. The sigma range used for the error bars ("two_sigma", "one_sigma" or "three_sigma")

- **uncal_range**  
logical. If TRUE (default), the plot contains error bars for the the uncalibrated age

- **cal_range**  
logical. If TRUE (default), the plot contains error bars for the the calibrated age

---

**executeOxcalScript**  
*Executes an Oxcal Script*

**Description**  
Takes an Oxcal Script, hands it over to oxcal and receives the output that is read from the output file

**Usage**

```r
executeOxcalScript(oxcal_script)
```

**Arguments**

- **oxcal_script**  
A string containing the Oxcal commands that should be processed.

**Value**

The path to the js output file
get_bp

Author(s)
Martin Hinz

get_bp
get bp values (ages)

Description
queries values from date objects

Usage
get_bp(x)

## Default S3 method:
get_bp(x)

## S3 method for class 'oxcAARCalibratedDate'
get_bp(x)

## S3 method for class 'oxcAARCalibratedDatesList'
get_bp(x)

Arguments
x an object of class oxcAARCalibratedDate or oxcAARCalibratedDatesList

Value
an integer or a numeric vector

See Also
Other getter functions: get_cal_curve(), get_name(), get_posterior_probabilities(), get_posterior_sigma_ranges(), get_raw_probabilities(), get_sigma_ranges(), get_std()

Examples
## Not run:
x <- oxcalCalibrate(c(5000, 4500, 3000), c(20, 50, 60))
get_bp(x)
y <- oxcalCalibrate(5000, 20)[[1]]
get_bp(y)
## End(Not run)
get_cal_curve

get_cal_curve  get calibration curve names

Description

queries values from date objects

Usage

get_cal_curve(x)

## Default S3 method:
get_cal_curve(x)

## S3 method for class 'oxcAARCalibratedDate'
get_cal_curve(x)

## S3 method for class 'oxcAARCalibratedDatesList'
get_cal_curve(x)

Arguments

x  an object of class oxcAARCalibratedDate or oxcAARCalibratedDatesList

Value

a string or a character vector

See Also

Other getter functions: get_bp(), get_name(), get_posterior_probabilities(), get_posterior_sigma_ranges(), get_raw_probabilities(), get_sigma_ranges(), get_std()

Examples

## Not run:
x <- oxcalCalibrate(5000, 20)
y <- oxcalCalibrate(5000, 20)[[1]]
get_cal_curve(x)
get_cal_curve(y)

## End(Not run)
get_name

get names (labcodes)

Description
queries values from date objects

Usage
get_name(x)

## Default S3 method:
get_name(x)

## S3 method for class 'oxcAARCalibratedDate'
get_name(x)

## S3 method for class 'oxcAARCalibratedDatesList'
get_name(x)

Arguments
x an object of class oxcAARCalibratedDate or oxcAARCalibratedDatesList

Value
a string or a character vector

See Also
Other getter functions: get_bp(), get_cal_curve(), get_posterior_probabilities(), get_posterior_sigma_ranges(), get_raw_probabilities(), get_sigma_ranges(), get_std()

Examples
## Not run:
x <- oxcalCalibrate(c(5000, 4500, 3000), c(20, 50, 60))
get_name(x)
y <- oxcalCalibrate(5000, 20)[[1]]
get_name(y)
## End(Not run)
**get_posterior_probabilities**

**get posterior raw probabilities**

---

**Description**

queries values from date objects

**Usage**

```r
get_posterior_probabilities(x)
## Default S3 method:
get_posterior_probabilities(x)
## S3 method for class 'oxcAARCalibratedDate'
get_posterior_probabilities(x)
## S3 method for class 'oxcAARCalibratedDatesList'
get_posterior_probabilities(x)
```

**Arguments**

- `x` an object of class `oxcAARCalibratedDate` or `oxcAARCalibratedDatesList`

**Value**

a list of three data.frames or a list of those lists

**See Also**

Other getter functions: `get_bp()`, `get_cal_curve()`, `get_name()`, `get_posterior_sigma_ranges()`, `get_raw_probabilities()`, `get_sigma_ranges()`, `get_std()`

---

**get_posterior_sigma_ranges**

**get posterior sigma ranges**

---

**Description**

queries values from date objects
Usage

get_posterior_sigma_ranges(x)

## Default S3 method:
get_posterior_sigma_ranges(x)

## S3 method for class 'oxcAARCalibratedDate'
get_posterior_sigma_ranges(x)

## S3 method for class 'oxcAARCalibratedDatesList'
get_posterior_sigma_ranges(x)

Arguments

x an object of class oxcAARCalibratedDate or oxcAARCalibratedDatesList

Value

a list of three data.frames or a list of those lists

See Also

Other getter functions: get_bp(), get_cal_curve(), get_name(), get_posterior_probabilities(),
get_raw_probabilities(), get_sigma_ranges(), get_std()

describe get_raw_probabilities
get raw probabilities

Description

queries values from date objects

Usage

get_raw_probabilities(x)

## Default S3 method:
get_raw_probabilities(x)

## S3 method for class 'oxcAARCalibratedDate'
get_raw_probabilities(x)

## S3 method for class 'oxcAARCalibratedDatesList'
get_raw_probabilities(x)

Arguments

x an object of class oxcAARCalibratedDate or oxcAARCalibratedDatesList
get_sigma_ranges

Value

a data.frame or a list of data.frames

See Also

Other getter functions: get_bp(), get_cal_curve(), get_name(), get_posterior_probabilities(), get_posterior_sigma_ranges(), get_sigma_ranges(), get_std()

Examples

## Not run:
x <- oxcalCalibrate(c(5000, 4500, 3000), c(20, 50, 60))
gc_raw_probabilities(x)
y <- oxcalCalibrate(5000, 20)[[1]]
gc_raw_probabilities(y)

## End(Not run)
get_std

See Also

Other getter functions: get_bp(), get_cal_curve(), get_name(), get_posterior_probabilities(), get_posterior_sigma_ranges(), get_raw_probabilities(), get_std()

Examples

```r
## Not run:
x <- oxcalCalibrate(c(5000, 4500, 3000), c(20, 50, 60))
get_sigma_ranges(x)
y <- oxcalCalibrate(5000, 20)[[1]]
get_sigma_ranges(y)
## End(Not run)
```

---

get_std

get std values (standard deviations)

Description

queries values from date objects

Usage

get_std(x)

## Default S3 method:
get_std(x)

## S3 method for class 'oxcAARCalibratedDate'
get_std(x)

## S3 method for class 'oxcAARCalibratedDatesList'
get_std(x)

Arguments

x  
an object of class oxcAARCalibratedDate or oxcAARCalibratedDatesList

Value

an integer or a numeric vector

See Also

Other getter functions: get_bp(), get_cal_curve(), get_name(), get_posterior_probabilities(), get_posterior_sigma_ranges(), get_raw_probabilities(), get_sigma_ranges()
**get_tidy_oxcalresult**

**Examples**

```r
## Not run:
x <- oxcalCalibrate(c(5000, 4500, 3000), c(20, 50, 60))
get_std(x)
y <- oxcalCalibrate(5000, 20)[[1]]
get_std(y)
## End(Not run)
```

**Description**

Transforms oxCAR output to a tidy data format. See [http://vita.had.co.nz/papers/tidy-data.html](http://vita.had.co.nz/papers/tidy-data.html) and [https://CRAN.R-project.org/package=broom](https://CRAN.R-project.org/package=broom)

**Usage**

```r
get_tidy_oxcalresult(x)
```

## Default S3 method:
```
get_tidy_oxcalresult(x)
```

## S3 method for class 'oxcAARCalibratedDate'
```
get_tidy_oxcalresult(x)
```

## S3 method for class 'oxcAARCalibratedDatesList'
```
get_tidy_oxcalresult(x)
```

**Arguments**

- `x`: an object of class oxcAARCalibratedDate or oxcAARCalibratedDatesList

**Value**

a data.frame (with list columns)

**Examples**

```r
## Not run:
x <- oxcalCalibrate(c(5000, 4500, 3000), c(20, 50, 60))
get_tidy_oxcalresult(x)
y <- oxcalCalibrate(5000, 20)[[1]]
get_tidy_oxcalresult(y)
## End(Not run)
```
is.oxcAARCalibratedDate

Checks if a variable is of class oxcAARCalibratedDate

Description

Checks if a variable is of class oxcAARCalibratedDate

Usage

is.oxcAARCalibratedDate(x)

Arguments

x  a variable

Value

true if x is a oxcAARCalibratedDate, false otherwise

is.oxcAARCalibratedDatesList

Checks if a variable is of class oxcAARCalibratedDatesList

Description

Checks if a variable is of class oxcAARCalibratedDatesList

Usage

is.oxcAARCalibratedDatesList(x)

Arguments

x    a variable

Value

true if x is a oxcAARCalibratedDatesList, false otherwise
oxcAARCalibratedDate  oxcAAR Calibrated Dates Object

Description

The function oxcAARCalibratedDate is used to create an object for a calibrated date.

Usage

```r
oxcAARCalibratedDate(
  name,  # a string giving the name of the date (usually the lab number)
  type,  # a string giving the type of the date in OxCal terminology ("R_Date", "R_Simulate", ...)
  bp,    # a integer giving the BP value for the date
  std,   # a integer giving the standard deviation for the date
  cal_curve,  # a list containing information about the calibration curve (name, resolution, bp, bc, sigma)
  sigma_ranges,  # a list of three elements (one, two, three sigma), each a data frame with start, end and probability giving
  raw_probabilities,  # a data frame of dates and the related probabilities for each date
  posterior_probabilities = NA,  # a data frame of dates and the related posterior probabilities for each date
  posterior_sigma_ranges = NA  # a list of three elements (one, two, three sigma), each a data frame with start, end and probability giving for the posterior probabilities
)
```

Arguments

- `name`: a string giving the name of the date (usually the lab number)
- `type`: a string giving the type of the date in OxCal terminology ("R_Date", "R_Simulate", ...)
- `bp`: a integer giving the BP value for the date
- `std`: a integer giving the standard deviation for the date
- `cal_curve`: a list containing information about the calibration curve (name, resolution, bp, bc, sigma)
- `sigma_ranges`: a list of three elements (one, two, three sigma), each a data frame with start, end and probability giving
- `raw_probabilities`: a data frame of dates and the related probabilities for each date
- `posterior_probabilities`: a data frame of dates and the related posterior probabilities for each date
- `posterior_sigma_ranges`: a list of three elements (one, two, three sigma), each a data frame with start, end and probability giving for the posterior probabilities

Value

an object of the class 'oxcAARCalibratedDate'
oxcalCalibrate

Description
A List of oxcAARCalibratedDate

Value
an object of the class 'oxcAARCalibratedDatesList'

oxcalCalibrate
Calibrates a 14C date using oxcal

Description
Calibrates a 14C date using oxcal

Usage
oxcalCalibrate(bp, std, names = 1:length(bp))

Arguments
bp A vector containing the bp dates of the measurements
std A vector containing the standard deviations of the measurements
names The names of the measurements, usually the Laboratory numbers

Value
An object of class oxcAARCalibratedDatesList
oxcalSimulate

Simulates 14C dates using oxcal

Description

Simulates 14C dates using oxcal

Usage

```r
oxcalSimulate(c_date, std, names = 1:length(c_date))
```

Arguments

- `c_date`: A vector containing the calendar dates to be simulated
- `std`: A vector containing the standard deviations for the simulated dates
- `names`: The names of the measurements, usually the Laboratory numbers

Value

An object of class `oxC14ARCalibratedDatesList`

oxcalSumSim

Sum calibration for simulated dates

Description

Sum calibration for simulated dates

Usage

```r
oxcalSumSim(
    timeframe_begin,
    timeframe_end,
    n,
    stds,
    date_distribution = c("equidist", "uniform")
)
```
Arguments

- `timeframe_begin, timeframe_end`
  - Beginning and end of the time frame for which dates should be simulated
- `n`
  - The number of dates that should be simulated
- `stds`
  - Either one standard deviation for all dates or a vector of standard deviations with length `n`
- `date_distribution`
  - A character string indicating which method should be used to distribute the dates in the given time frame, can be abbreviated

Details

The dates can be distributed using one of the following methods: 'equidist' distributed the `n` dates within the time frame with equal distance, 'uniform' random samples `n` dates from the given time interval with uniform distribution

Value

A list containing the following components:

- `dates`
  - The dates for the simulated sum calibration
- `probabilities`
  - The probabilities for the simulated sum calibration
- `date_distribution`
  - The distribution method used for the dates

oxcal_Sum

Wraps an Oxcal string into a Oxcal sum function

Description

Wraps an Oxcal string into a Oxcal sum function

Usage

oxcal_Sum(oxcal_string, name = "Sum")

Arguments

- `oxcal_string`
  - The Oxcal script that should be wrapped
- `name`
  - The name attribute for the resulting sum function

Value

A new oxcal script as string
parseFullOxcalOutput

Parses an Oxcal Output File completely into R

Description

Takes the output of Oxcal as vector of strings (one string per line) and parse it as list.

Usage

parseFullOxcalOutput(output)

Arguments

output The output of Oxcal as vector of strings (one string per line).

Value

A list containing all informations provided by Oxcal as list.

parseOxcalOutput

Parses an Oxcal Output File into R

Description

Takes the output of Oxcal as vector of strings (one string per line) and parse it as list.

Usage

parseOxcalOutput(result, first = FALSE, only.R_Date = T)

Arguments

result The output of Oxcal as vector of strings (one string per line).
first Return the first date only
only.R_Date Return the informations for R_Dates

Value

A list containing all informations provided by Oxcal as list.
Phase

*Returns the Oxcal code for Phase*

**Description**

Phase takes a set of R_Dates as vectors, and returns a bit of oxcal code that can be used to feed it into oxcal. In this code the R_Dates are encapsulated in an OxCal Phases, one Phase for each string. For details concerning the Oxcal simulation please consult the help page of Oxcal.

**Usage**

```r
Phase(r_dates_strings, names = "")
```

**Arguments**

- `r_dates_strings` a vector containing strings of OxCal code, usually consisting of R_Date commands, but any other code strings might be used that can be interpreted by OxCal within a Phase
- `names` a optional vector of names for the resulting Phases

**Value**

a string containing the respective Oxcal code

---

quickSetupOxcal

*Quick OxCal setup*

**Description**

Downloads the latest version of Oxcal and sets the executable path correctly

**Usage**

```r
quickSetupOxcal(os = Sys.info()\["sysname"\], path = tempdir())
```

**Arguments**

- `os` The operating system of the workstation. Default: automatic determination. Options:
  - `Linux`
  - `Windows`
  - `Darwin`
- `path` The path to the directory where Oxcal is or should be stored. Default: "tempdir()". I recommend thought to install it permanently.
**readOxcalOutput**

**Author(s)**
Clemens Schmid

**Examples**
```r
## Not run:
quickSetupOxcal()
## End(Not run)
```

---

readOxcalOutput  
*Reads the content of the Oxcal js output file*

**Description**
Reads the content of the Oxcal js output file as vector of strings for each line.

**Usage**
```r
readOxcalOutput(output_file)
```

**Arguments**
- `output_file`  
The path to a Oxcal js output file.

**Value**
The content of the Oxcal js output file as vector of strings for each line.

**Author(s)**
Martin Hinz

---

**R_Date**  
*Returns the Oxcal code for the calibration of 14C dates*

**Description**
R_Date takes names, BP dates and standard deviation for those dates as vectors, and returns a bit of oxcal code that can be used to feed it into oxcal. For details concerning the Oxcal calibration please consult the help page of Oxcal.

**Usage**
```r
R_Date(names, r_dates, stds)
```
Arguments

names         a vector of names for the dates
r_dates      a vector containing the BP dates that should be calibrated
stds         a vector containing the standard deviation that should be calibrated

Value

a string containing the respective Oxcal code

R_Simulate

Returns the Oxcal code for the simulation of 14C dates

Description

R_Simulate takes names, calendar dates and standard deviation for those dates as vectors, and returns a bit of oxcal code that can be used to feed it into oxcal. For details concerning the Oxcal simulation please consult the help page of Oxcal.

Usage

R_Simulate(c_dates, stds, names = 1:length(c_dates))

Arguments

c_dates      a vector containing the calendar dates that should be simulated
stds         a vector containing the standard deviation that should be simulated
names        a vector of names for the resulting simulated dates

Value

a string containing the respective Oxcal code

Sequence

Returns the Oxcal code for Sequence

Description

Sequence takes a set of Phases or R_Dates as vectors, and returns a bit of oxcal code that can be used to feed it into OxCal. In this code the Phases and/or R_Dates are encapsulated in an OxCal Phases, one Phase for each string. For details concerning the Oxcal simulation please consult the help page of Oxcal.

Usage

Sequence(sequence_elements, names = "")
setOxcalExecutablePath

Arguments

sequence_elements
a vector containing strings of OxCal code, usually consisting of Phase or R_Date commands, but any other code strings might be used that can be interpreted by OxCal within a Sequence

names
a optional vector of names for the resulting Sequences

Value

a string containing the respective Oxcal code

Description

Stores the path to the oxcal executable it in internally for other functions.

Usage

setOxcalExecutablePath(path)

Arguments

path
The path to the Oxcal executable

Author(s)

Martin Hinz

Examples

## Not run:
connectOxcal('/home/martin/Documents/scripte/OxCal/bin/OxCallinux')

## End(Not run)
wrap_in_boundaries  Wrap OxCal commands in Boundary commands

Description

wrap_in_boundaries takes a set of Phases or R_Dates as vectors, and returns a bit of oxcal code that can be used to feed it into OxCal. In this code the Phases and/or R_Dates are interleaved and wrapped in OxCal Boundaries, the number of Boundaries is equal to the number of strings + 1. The resulting string starts with a boundary, than the OxCal strings from the vector are interleaved with Boundary commands. For details concerning the Oxcal simulation please consult the help page of Oxcal.

Usage

wrap_in_boundaries(phases_strings, boundary_names = NA)

Arguments

phases_strings  a vector containing strings of OxCal code, usually consisting of Phase or R_Date commands, but any other code strings might be used that can be interpreted by OxCal inbetween a Boundary

boundary_names  a optional vector of names for the resulting Boundaries (length of phases_strings + 1). If not given, the boundaries are named with consecutive numbers.

Value

a string containing the respective Oxcal code
Index

* **getter functions**
  - get_bp, 4
  - get_cal_curve, 5
  - get_name, 6
  - get_posterior_probabilities, 7
  - get_posterior_sigma_ranges, 7
  - get_raw_probabilities, 8
  - get_sigma_ranges, 9
  - get_std, 10
  - quickSetupOxcal, 18
  - R_Date, 19
  - R_Simulate, 20
  - readOxcalOutput, 19
  - Sequence, 20
  - setOxcalExecutablePath, 21
  - wrap_in_boundaries, 22

**Boundary**, 2

calcurve_plot, 3

executeOxcalScript, 3

get_bp, 4, 5–10
get_cal_curve, 4, 5, 6–10
get_name, 4, 5, 6, 7–10
get_posterior_probabilities, 4–6, 7, 8–10
get_posterior_sigma_ranges, 4–7, 7, 9, 10
get_raw_probabilities, 4–8, 8, 10
get_sigma_ranges, 4–9, 9, 10
get_std, 4–10, 10
get_tidy_oxcalresult, 11

is.oxcAARCalibratedDate, 12
is.oxcAARCalibratedDatesList, 12

oxcAARCalibratedDate, 13, 14
oxcAARCalibratedDatesList, 14, 14, 15
oxcal_Sum, 16
oxcalCalibrate, 14
oxcalSimulate, 15
oxcalSumSim, 15

parseFullOxcalOutput, 17
parseOxcalOutput, 17
Phase, 18