Package ‘paleofire’

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Type Package
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Description Tools to extract and analyse charcoal sedimentary data stored in
the Global Charcoal Database. Main functionalities includes data extraction
and sites selection, transformation and interpolation of the charcoal
records as well as compositing.
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**Description**

The paleofire package provides tools to extract and analyse charcoal sedimentary data stored in the Global Charcoal Database. Main functionalities include data extraction and sites selection, transformation and homogenization of the charcoal records as well as regional to global composting.
Details

Package: paleofire
Type: Package
Version: 1.1.6
Date: 2015-04-22
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Author(s)
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Maintainer
Olivier Blarquez <blarquez at gmail.com>

References

See Also
http://gpwg.org

Examples

```r
## Not run:
## Interactive sites selection:
# ID=pfInteractive()

## Site selection using criterions
# Boreal Eastern North American sites with at least one
# dating point each 2500 year
ID=pfSiteSel(lat>50, lat<70, long>-90, long<-50, date_int<=2500, l12==1)
plot(ID, zoom="world")

## Modify plot
plot(ID, zoom="sites")

## Simple test for transforming data
# Select site 1 (Cynget Lake)
ID1=pfSiteSel(id_site==1)
plot(ID1)
```
# Transformation of data
TR=pfTransform(ID1,method=c("MinMax","Box-Cox","Z-Score"))

# Plot Transformed and raw data
# First retrieve raw data for Cygnet using pfExtract
RAW=pfExtract(ID=1)

dev.off()
par(mfrow=c(2,1))

plot(RAW[,3],RAW[,4],type="l")
plot(TR$Age,TR$TransData,type="l")

## Transforming and Compositing
## Example 1: Usage as in Power et al. 2008
## Data transformation
TR1=pfTransform(ID, method=c("MinMax","Box-Cox","Z-Score"),BasePeriod=c(200,2000))

## Diagnostic pdf file with transformed series:
# pfDiagnostic(ID, method=c("MinMax","Box-Cox","Z-Score"),BasePeriod=c(200,2000),
# FileName = "Diagnostic.pdf")

## Compositing: basic binning procedure
COMP=pfComposite(TR1, binning=TRUE, bins=seq(0,8000,500))
plot(COMP)

## The result matrix can be saved
# write.csv(COMP$Result,file="temp.csv")

## Compositing: Using the locfit package equivalent procedure to Daniau et al. 2012
COMP2=pfCompositeLFT(TR1, tarAge=seq(-50,8000,20), binhw=20, hw=500,nboot=100)
plot(COMP2)

## And save
write.csv(COMP2$Result,file="temp2.csv")

## End(Not run)

---

checkGCDversion  

**Check GCD package install**

**Description**

Check if GCD package is installed and up to date to ensure always using the most up to date GCD version. devtools package is required: on Windows install Rtools.exe depending on your R version [http://cran.r-project.org/bin/windows/Rtools/](http://cran.r-project.org/bin/windows/Rtools/)
Usage
checkGCDversion()

Details
Last GCD database version is downloaded and installed using:
library(devtools)
install_github("GCD", username="paleofire", ref="master")

Author(s)
O. Blarquez

Examples
## Not run: checkGCDversion()

---

Description
World coastlines

Usage
data(coast)

Format
A data frame with 9865 observations on the following 2 variables.

- Y Latitude
- X Longitude

Source
http://www.naturalearthdata.com/downloads/10m-physical-vectors/

Examples
data(coast)
**contiguous**

*Are cores sampled contiguously?*

**Description**

The function checks whether cores have been sampled contiguously or with a depth resolution <1cm.

**Usage**

```r
contiguous(x, threshold = 1)
```

**Arguments**

- `x`: An object of the class "pfSiteSel"
- `threshold`: Numeric, threshold for considering two samples as contiguous (default=1cm)

**Value**

Summary table of sites with the added contiguous logical column (TRUE–FALSE)

**Author(s)**

O. Blarquez

**See Also**

`pfResolution`

**Examples**

```r
x <- pfSiteSel(lat>12, lat<60, long<(-50), long>-140)
contiguous(x)
```

---

**kdffreq**

*Fire frequency using kernel density*

**Description**

Computes paleo-fire frequency for a set of fire events using a gaussian kernel density estimation procedure based on a defined bandwidth (see Mudelsee 2004 for details). Pseudo-replicated values are used to correct for edge bias, equivalent to "minimum slope" correction in Mann (2004).

**Usage**

```r
kdffreq(fevent, up = NULL, lo = NULL, bandwidth = NULL, nbboot = NULL, alpha = NULL)
```
Arguments

fevent  Numeric vector, set of dates
up      Numeric, upper age for fire frequency calculation
lo      Numeric, lower age for fire frequency calculation
bandwidth Numeric, bandwidth in years, or character for automatic bandwidth calculation (e.g. "bw.ucv" for unbiased cross validation) see bandwidth for details
nbboot  Numeric, number of bootstrap replicates
alpha   Numeric, confidence interval (default 0.01)

Value

ff data.frame, with fire frequency, bandwidth and CIs

Author(s)

O. Blarquez

References


See Also

plot.kdffreq

Examples

set.seed(123)
fevent=c(round(abs(rnorm(20,mean=7,sd=5))*1000),round(abs(rnorm(10,mean=8,sd=1))*1000))

ff=kdffreq(fevent,bandwidth = 1000, nbboot=10)

Description

Internal paleofire functions and functions waiting for man.
Add user defined charcoal data series to paleofire

Description

This function is used to create a "pfAddData" object, from user defined csv files containing charcoal data, to be passed to pfTransform. Usually csv files should contain three columns with Depth, Age, Charcoal quantity in this same order. A metadata csv file should also be specified with sites location information (three columns with: SITE_NAME, LATITUDE, LONGITUDE). CharAnalysis data files could also be used, in this case the file must include the following informations: DepthTop, DepthBottom, AgeTop, AgeBottom, Volume and Charcoal value in this exact order. Then the files are passed to the pretreatment function in order to calculate Charcoal Accumulation Rates (see pretreatment for details).

Usage

pfAddData(files, metadata = NULL, type = "NONE", Int = TRUE,
           first = NULL, last = NULL, yrInterp = NULL)

Arguments

files  Character, names and path to csv files.
metadata Character, name and path to the (unique) metadata csv file.
type Character, "NONE": user defined csv (default), "CharAnalysis": CharAnalysis data file.
Int Logical specifying whether the pretreatment function interpolates particle zero counts, default TRUE.
first, last Numeric, date of the first, last sample for accumulation rate calculation, if NULL first, last are automatically specified as the the minimum and maximum ages of the record respectively.
yrInterp Numeric, temporal resolution of the interpolated accumulation rates, if NULL, yrInterp is automatically specified as the median resolution of the record.

Value

out A list with merged data files that can be passed to pfTransform

Author(s)

O. Blarquez

See Also

pretreatment
Examples

```r
## Not run:
# Ad user own data from CharAnalysis file (csv)
# In this example we will use data from:
# Senici, D., A. Lucas, H. Y. H. Chen, Y. Bergeron, A. Larouche, B. Brossier, O.
# Blarquez, and A. A. Ali. 2013. Multi-millennial fire frequency and tree abundance
# differ between xeric and mesic boreal forests in central Canada. Journal of Ecology:
# 101, 356-367.
       "http://blarquez.com/public/data/Small.csv")
metadata=c("http://blarquez.com/public/data/metadata.csv")
mydata=pfAddData(files=files,metadata=metadata,type="CharAnalysis")

# Transform and compositing:
TR1=pfTransform(add=mydata, method=c("MinMax","Box-Cox","Z-Score"),
                BasePeriod=c(200,2000))
COMP2=pfCompositeLF(TR1, tarAge=seq(-50,8000,20), hw=500, nboot=100)
plot(COMP2)
## End(Not run)
```

---

**pfBoxCox**

*Box-Cox transformation of Charcoal series*

**Description**

Box-Cox transformation of charcoal series, the maximum likelihood estimation of lambda is derived from the boxcox.R function in the Venables and Ripley MASS library included in R 2.6.1

**Usage**

`pfBoxCox seriex, alpha = 0.01, type = "BoxCox1964"

**Arguments**

- `serie` A vector of charcoal values.
- `alpha` Numeric, the "shift" parameter, default=0.01.
- `type` Character, the Box-Cox transformation formulation, can be either "BoxCox1964" (default) for the original Box & Cox (1964) formulation, or "JohnDraper" for the John & Draper (1980) modulus transformation.

**Value**

- `X` Vector of transformed charcoal values
Author(s)

P. Bartlein

References


See Also

pfTransform

Examples

# Select a site
ID=pfSiteSel(site_name="Pas-de-Fond")

# Extract data
A=pfExtract(ID)

B=pfBoxCox(A[,4],0.1)
plot(B,type="l")

pfCircular

Circular block bootstrap procedure applied to charcoal records compositing results

Description

Block bootstrap has been proposed to test the significances of changes in stationary time series (Kunsch 1989). This procedure consists of splitting each charcoal series into n-b+1 overlapping blocks of data, where n is sample size and b the block size. These blocks are used to reconstruct resampled individual charcoal series that are in turn used to estimate the confidence intervals around the charcoal series composite mean.

Usage

bspCircular(comp, b = NULL, conf = c(0.05, 0.95), nboot = 1000, AgeLim = NULL)
**pfComposite**

Produce a composite serie from multiple charcoal records

**Arguments**

- **comp** A "pfComposite" object
- **b** A numeric giving block size, if NULL the optimal block size for a given series is given by: \( b = 2x(-1 / \log(p)) \), where \( p \) is the lag one autocorrelation coefficient of that series (Adams, Mann & Ammann 2003).
- **conf** Numeric, calculated confidence intervals.
- **nboot** Numeric, number of bootstrap replicates.
- **AgeLim** Numeric, years defining a period to restrict the analysis to.

**Value**

- **out** A "pfCircular" object with estimated confidence intervals.

**Author(s)**

O. Blarquez

**References**


**Examples**

```r
ID=pfSiteSel(lat>49, lat<75, long>6, long<50)
plot(ID, zoom="world")
TR1=pfTransform(ID, method=c("MinMax","Box-Cox","Z-Score"),BasePeriod=c(200,2000))

## Circular block bootstrapp

COMP=pfComposite(TR1, binning=TRUE, bins=seq(0,2000,100))
circ=pfCircular(COMP,conf=c(0.005,0.025,0.975,0.995),nboot=100)
plot(circ)
```

**pfComposite**  Produce a composite serie from multiple charcoal records

**Description**

Produce a composite serie from multiple charcoal records using bootstrap resampling, the sites charcoal values are binned and the mean in each bin is calculated prior the bootstrap procedure. This procedure is equivalent to Power et al. 2008.
Usage

\texttt{pfComposite(\texttt{TR}, \texttt{bins = NULL, nboot = 1000, binning = TRUE, conf = c(0.05, 0.95))}}

Arguments

- **TR**: An object returned by \texttt{pfTransform}
- **bins**: Numeric, the sequence for binning given in years (e.g. \texttt{bins=seq(from=0, to=10000, by=200)}). If unspecified the sequence is defined as \texttt{bins=seq(from=min age, to=max age, by=median resolution)}.
- **nboot**: Numeric, a number specifying the number of bootstrap replicates.
- **binning**: Logical, set to TRUE (default) for binning, if transformed data are first interpolated this argument can be set to FALSE (no binning).
- **conf**: Numeric, define confidence levels.

Value

Object of the class "pfComposite"

Author(s)

O.Blarquez

References


Examples

```r
## Composite charcoal record for North America:
ID=pfSiteSel(id_region="WNA0" & 112==1)
plot(ID)
## Transform data
res3=pfTransform(ID,method=c("MinMax","Box-Cox","Z-Score"),BasePeriod=c(200,4000))
## Composite
comp=pfComposite(res3,bins=seq(from=0, to=12000, by=200))
plot(comp)
```
pfCompositeLF

Produce a composite serie from multiple charcoal records using a local regression procedure (from the locfit package)

Description

Produces a composite series from multiple charcoal records by using a robust locally weighted scatterplot smoother (LOWESS). The robust LOWESS uses the locfit function from the locfit package and is applied repeatedly (nboot times) on bootstrapped charcoal sites samples. The records charcoal values are pre-binned prior to sites resampling. This procedure is equivalent to Daniau et al. (2012).

Usage

pfCompositeLF(TR, hw = 250, tarAge = NULL, binhw = NULL, nboot = 1000, conf = c(0.05, 0.95), pseudodata = FALSE, verbose = TRUE)

Arguments

- **TR**: An object returned by `pfTransform`
- **tarAge**: Numeric, the target ages for prebinning given in years (e.g. tarAge = seq(0, 10000, 20)). If unspecified the sequence is defined as tarAge=seq(from=min age, to=max Age, by=median resolution).
- **binhw**: Numeric, bin half width for the prebinning procedure (use the same value as tarAge intervals for overlapping bins or tarAge intervals/2 for non-overlapping bins).
- **nboot**: Numeric, a number specifying the number of bootstrap replicates.
- **hw**: Numeric, the half window width for the locfit procedure (in years).
- **conf**: Numeric, define confidence levels.
- **pseudodata**: Logical, if TRUE 10 percent of the data is reflected at the top and the bottom of the resampled serie prior of each locfit regression in order to correct for the edge effect introduced by the local regression, see Cowling & Hall (1996). Equivalent to "minimum slope" correction in Mann(2004).
- **verbose**: Logical: verbose or not...

Value

- **out**: A "pfCompositeLF" object.

Author(s)

O.Blarquez
References


Examples

    ID=pfSiteSel(id_region=="WNA0", ll2==1, long>=-160 & long<=-140)
    plot(ID, xlim=c(-180, -130), ylim=c(40, 80))
    TR=pfTransform(ID, method=c("MinMax","Box-Cox","MinMax","Z-Score"),
                    BasePeriod=c(200,2000), QuantType="INFL")
    COMP=pfCompositeL(F, tarAge=seq(-50,4000,10), hw=200, nboot=100)
    plot(COMP)

    # Note: comparing confidence intervals based on 100 replicates is not recommended
    # (100 is used to decrease analysis time)

pfDiagnostic  

Print diagnostic pdf for individual transformed series

Description

Print diagnostic pdf for individual transformed series, successive transformations could be specified (see example)

Usage

    pfDiagnostic(ID, add = NULL, Age = 0, Interpolate = FALSE, method = "Box-Cox", BasePeriod = c(-100, 1e+09), span = 0.3, RunWidth = 500, RunQParam = 0.5, st1Years = 500, alpha = 0.01, type = "BoxCox1964", FileName = "Diagnostic.pdf", QuantType = "ALL")
pfDiagnostic

Arguments

ID An object returned by \texttt{pfsiteSel} or \texttt{pfTransform}

\texttt{add} An object returned by \texttt{pfAddData}

\texttt{Interpolate} Logical, indicates whether data should be interpolated or not, default=FALSE

\texttt{Age} Numeric, if \texttt{Interpolate=TRUE}, Age is used to specify the ages where the interpolation took place. If \texttt{Age=0} the interpolated ages are automatically specified using the median resolution of the record(s). If \texttt{Age} is specified as a vector (e.g. \texttt{Age=(from=0, to=10000, by=10)}) the interpolation took place at specified ages.


\texttt{BasePeriod} Numeric, a parameter specifying the base period for calculating Z-score given in years BP (e.g. \texttt{BasePeriod=c(0, 4000)}), if empty or unspecified the base period corresponds to record length.

\texttt{span} Numeric, the span parameter for the LOESS or Smoothing spline methods

\texttt{RunWidth} Numeric, the width of the window for the "RunMed", "RunMean", "RunQuantile", "RunMin", and "RunMax" methods in years.

\texttt{RunQParam} Numeric, the parameter specifying which quantile should be calculated for the method "RunQuantile" (default=0.5 i.e. median).

\texttt{stlYears} Numeric, the bandwidth for stl decomposition, default=500 years.

\texttt{alpha} Numeric, alpha value to add before BoxCox calculation, see \texttt{pfBoxCox}.

\texttt{type} Character, the type of Box-Cox transformation, see \texttt{pfBoxCox} for details

\texttt{filename} Character, define output pdf file name e.g. \texttt{filename="mydata.pdf"}

\texttt{QuantType} Character, by default \texttt{QuantType="INFL"} and influx are automatically calculated, otherwise use \texttt{QuantType="NONE"} (not recommended).

Value

\texttt{filename.pdf} A diagnostic file is printed, each sites being printed on separate pages (specified using \texttt{filename="myfile.pdf"})

Author(s)

O. Blarquez

Examples

# Select boreal sites from Levavasseur 2012 PNV in Western North America
ID=pfsiteSel(id_region="WNA0", l12=1, long>=-160 & long<=-140)

# Print a diagnostic pdf for Box-Cox, Smoothened and Z-score tranformed data
pfDotMap

Produce maps of paleofire data

Description

Produce map graphics representing spatial variability in charcoal data from the Global Charcoal Database.

Usage

pfDotMap(TR, tarAge, hw, binhw = 0.5 * mean(diff(tarAge)),
fig.base.name = NULL, base.map = "coasts", grd.res = 5,
grd.ext = c(-180, 180, -90, 90), grd.lonlat = NULL,
proj4 = "+proj=longlat +ellps=WGS84 +datum=WGS84 +no_defs", n.boot = 1000,
cx.minsize = 0.3, cx.mult = 1)

Arguments

TR

An object returned by pfTransform

tarAge

Numeric, the target ages for prebinning given in years (e.g. tarAge = seq(0, 10000, 20)). If unspecified the sequence is defined as tarAge=seq(from=min age, to=max Age, by=median resolution).

hw

Numeric, the half window width for the locfit procedure (in years).

binhw

Numeric, bin half width for the prebinning procedure (use the same value as tarAge intervals for overlapping bins or tarAge intervals/2 for non-overlapping bins).

fig.base.name

Character sequence representing the base name for the figures. Can be preceded by a path as long as all directories in the path exist. One figure will be produced for each time bin, with years (and file suffix) appended to the base name automatically. A value of NULL (default) causes figures to be plotted to the current device in sequence.

grd.res, grd.ext

Desired grid resolution and extent in degrees. If grd.res is a single number, the grid will be defined with equal lon/lat resolution; a two-element vector (lon,lat) can also be supplied for unequal resolution. grd.ext is specified as a vector of the form c(min-lon, max-lon, min-lat, max-lat).

grd.lonlat

A data frame of coordinates for every grid cell center, to be used in cases where an irregular grid is desired. Columns must be named 'lon' and 'lat'. If specified, grd.res and grd.ext are ignored. Note that this option could have undesirable results for unusual grid definitions. In particular, the maximum radius for including sites in a grid cell is always calculated at the equator. For a regular lon/lat grid, this guarantees all sites will be included in at least one cell, because
equatorial cells are largest at the equator. If an irregular grid is specified such that this is not true, the maximum radius calculated could lead to sites excluded from all cells. In this case a warning is printed but the function proceeds anyway.

- **base.map**
  Currently, either 'coasts' or 'countries' to choose which base map (from required library 'rworldmap') to be plotted as the base map for all plots. Could easily be modified to accept any SpatialPolygons object.

- **proj4**
  proj.4 string representing the desired projection for plotted maps. Default is unprojected. See [http://www.spatialreference.org](http://www.spatialreference.org) to look up the string for your favorite projections.

- **n.boot**
  Number of bootstrap replicates to use when creating confidence intervals around each grid-cell mean. In each time bin X grid cell combination, replicates consist of composite z-score values for that bin, randomly sampled (with replacement) from sites within the grid cell (see 'Details' for precise description of sites included in each cell). I.e., no temporal bootstrapping is done here, so that bootstrap CI reflect only spatial variability.

- **cx.minsize, cx.mult**
  Parameters that crudely adjust plotted dot size. cx.minsize defines the minimum cex applied to any point in any map, cx.mult scales all points by an equivalent factor.

**Details**

Takes any pfTransform object as input, and allows any set of one or more time bins to be specified for plotting (one plot per bin). Time bins are specified as for pfCompositeLF (which is called by pfSimpleGrid. The extent, resolution, and projection of the desired grid are also user-specified.

Results will be plotted on a regular lon/lat grid. To determine which sites contribute to each grid cell value, the code searches within a specified great circle distance (i.e. on the surface of the globe) around each grid cell center. To avoid missing any sites, the distance is set equal to the greatest distance from a grid cell center to its most distant corner, which occurs at the equator where grid cells are largest. This conservative approach will result in many sites falling within multiple grid boxes. At all latitudes, the defined radii will overlap near the edges of the grid boxes. At higher latitudes, the lon/lat grid cells are physically much smaller, so overlap will be considerably greater. There are alternatives, like using a grid that is irregular in terms of lon/lat, or changing the area of grid cells depending on latitude. But all have their tradeoffs, and this one is simple.

Current version produces plots of mean CHAR, number of sites per grid cell, and number of grid cells contributed to by each site (due to overlapping radii described above). The mean plot additionally shows points in two sizes, representing those mean values whose 95"%" confidence intervals do (small dots) or do not (large dots) contain zero. Finally, a time series is plotted in each figure with the current time bin highlighted.

**Value**

Plots are produced on the current device or in pdf files defined by fig.base.name. In addition, a named list of useful objects is returned:

- **COMP**
  The binned composite generated for plotting.

- **bins**
  The list of bin endpoints.
A `SpatialPointsDataFrame-class` object containing all the grid-level statistics produced and plotted (mean influx value, bootstrap confidence interval, and number of sites per grid cell).

sp.sites

A `SpatialPointsDataFrame-class` object representing the number of grid cells influenced by each site.

plots

A list with one element for each bin. These elements are themselves named lists of trellis objects representing each of the plots produced ("mean", "sitesPerCell", "cellsPerSite", "timeSeries"). Note that these objects can be edited to some degree with the `update.trellis` function, and plotted or used in layouts as any other trellis graphics can.

Author(s)

R. Kelly

References


Examples

```r
## Not run:
## Composite charcoal record for North America:
ID=pfSiteSel(id_region=c("WNA"), lat1=1 & long<-130))
plot(ID)

## Transform data
res3=pfTransform(ID,method=c("MinMax","Box-Cox","Z-Score"),BasePeriod=c(200,4000))

## Plot maps for 1000-yr bins spanning 3-0 kBP
# dev.new(width=10,height=10) # A big plot area helps.
dotmap = pfDotMap( TR=res3, tarAge=seq(0,2000,1000), hw=500, grd.ext=c(-170,-80,40,80),
                   cx.minsize=2,cx.mult=3)
summary(dotmap)

# Plot the mean map from the first time bin
# newmap = update(dotmap$rplots[[1]]$mean, main="A relabeled map")
# newmap
```
pfExtract

Extract charcoal data for a list of sites

Description

Extract charcoal data from an object returned by `pfSiteSel`

Usage

`pfExtract(ID)`

Arguments

- `ID` An object returned by `pfSiteSel`.

Value


Author(s)

O. Blarquez

Examples

```r
## Retrieve a site
ID=pfSiteSel(site_name="Pas-de-Fond")
## Or a group of sites (Western North America)
ID=pfSiteSel(id_region="c(WNA0")

## Extract data
A=pfExtract(ID)

# Plot the first site raw charcoal data
plot(A[A[,1]==ID$site_id[1],3],A[A[,1]==ID$site_id[1],4],type="l",main=ID$site_name[1],
xlab="Age",ylab="raw Char")
```
pfGridding

Produce gridded maps of transformed charcoal values.

Description

The function uses weighted spatio-temporal interpolation to produce gridded maps of transformed charcoal values. Spatial grids are used to interpolate transformed charcoal values for a key period defined by `age`. For each grid cell the function search charcoal sites located in a radius defined by `distance_buffer` from the grid centre and at an elevation within a range defined by `elevation_buffer` from the mean elevation of the cell. Then the function search for charcoal samples within a temporal range from the key date defined by `time_buffer`. Finally a tricube distance weighting function is applied to each sample by considering it spatial distance to the grid centre and it temporal distance to the key date. This approach that weight samples according to their spatio-temporal location also down-weight charcoal sites that are poorly sampled.

Usage

```r
pfGridding(data, cell_sizex = NULL, cell_sizey = NULL, age = 0,
            cell_size = NULL, time_buffer = NULL, distance_buffer = NULL,
            raster_extent = NULL, elevation_buffer = NULL, proj4 = NULL,
            sea_mask = TRUE, other_mask = NULL, verbose = TRUE)
```

Arguments

data An object returned by `pfTransform`.
cell_sizex Numeric, grid cell width (m).
cell_sizey Numeric, grid cell height (m).
age Numeric, key date (years BP).
cell_size Numeric, grid cell size (bypass cell_sizex and cell_sizey and produce square cells).
time_buffer Numeric, temporal distance (years) from the key date to search for charcoal samples.
distance_buffer Numeric, spatial distance from the grid centres to search for charcoal samples (m).
raster_extent Numeric, define custom extent for the analysis such as `raster_extent = c(xmin, xmax, ymin, ymax)`
elevation_buffer Numeric, elevation range from the mean grid cell elevation to search for charcoal sites.
proj4 String, proj.4 string representing the desired projection for plotted maps. Default is Robinson (`"+proj=robin +lon_0=0 +x_0=0 +y_0=0 +ellps=WGS84 +datum=WGS84 +units=m +no_defs"`). See [http://www.spatialreference.org](http://www.spatialreference.org) to look up the string for your favorite projections.
sea_mask Logical, mask cells falling in the sea.
other_mask A sp object (Spatial Polygons DataFrame) used to mask data i.e. for not interpolating pixels under the mask (classical usage: ice extent mask). Note that the Spatial Polygons DataFrame projection must be used in the analysis and defined using proj4 argument, otherwise the mask should be reprojected (e.g. using rgdal::spTransform).
verbose Logical, verbose or not...

Value
A "pfGridding" object (list) that could be plotted using plot.pfGridding.

Author(s)
O.Blarquez

See Also
plot.pfGridding, pfTransform, pfDotMap

Examples
ID=pfSiteSel(id.region=="ENA0", 111==1, long>=85)

TR=pfTransform(ID, method=c("MinMax","Box-Cox","Z-Score"), BasePeriod=c(200,4000))

p=pfGridding(TR, age=1000)
summary(p)

## Not run:
require(raster)
plot(p$raster)

## Example of other_mask usage: we will use here Dyke 2003 ice extent map for North America
require(maptools)
ID=pfSiteSel(id.region=="ENA0", long>=100, lat>40)
TR=pfTransform(ID, method=c("MinMax","Box-Cox","Z-Score"), BasePeriod=c(200,4000))

## Define projection (same as Dyke 2003)
proj4="+proj=lcc +lat_1=49 +lat_2=77 +lat_0=49
+lon_0=-95 +x_0=0 +y_0=0 +ellps=clrk66 +datum=NAD27 +units=m +no_defs"

## Download the shapefile
where=getwd()
download.file("http://blarquez.com/public/data/ice_9500_calBP_lcc.shp",
paste0(where,"/ice_9500_calBP_lcc.shp"))
download.file("http://blarquez.com/public/data/ice_9500_calBP_lcc.dbf",
paste0(where,"/ice_9500_calBP_lcc.dbf"))
download.file("http://blarquez.com/public/data/ice_9500_calBP_lcc.shx",
paste0(where,"/ice_9500_calBP_lcc.shx"))
pfInteractive

GCD sites interactive selection

Description
Interactive selection of GCD sites by drawing a polygon on a map.

Usage
pfInteractive(addata = NULL)

Arguments
addata An optional XY matrix of coordinates to specify a polygon to be drawn on the map.

Value
An object of the class "pfSiteSel".

Author(s)
O. Blarquez

See Also
pfSiteSel

Examples
## Not run:
# Type:
ID=pfInteractive()
# And follow text instructions
## End(Not run)
pfKruskal

Analyse composite records by a Kruskal-Wallis ANOVA

Description

The function applies a Kruskal-Wallis ANOVA on binned data issued from a "pfComposite" object (of directly on "pfTransform" objects), in order to test the difference in biomass burning activity between different time periods.

Usage

pfKruskal(data, p.adj = "none", alpha = 0.05, bins = NULL, verbose = TRUE)

Arguments

data An object returned by pfComposite or pfTransform.
alpha Numeric, confidence level.
bins Numeric, bins to use if a "pfTransform" object is provided.
verbose Logical, verbose or not...

Value

A "pfKruskal" object containing multiple comparison results.

Author(s)

O. Blarquez

See Also

plot.pfKruskal.kruskal

Examples

## Composite charcoal record for Western Boreal North America:
ID=pfSiteSel(id_region="WNA0" & l12==1)
plot(ID)
## Transform data
res3=pfTransform(ID,method=c("MinMax","Box-Cox","Z-Score"),BasePeriod=c(200,4000))

## Composite
comp=pfComposite(res3,bins=seq(from=-500,to=12500,by=1000))
plot(comp)

## Kruskal Wallis Anova
comparison=pfKruskal(comp)
pfMinMax

MiniMax transformation of a charcoal serie

Description

MiniMax transformation of a charcoal serie

Usage

pfMinMax(serie)

Arguments

serie Numeric, a vector of charcoal values.

Value

out A vector of minimax transformed values.

Author(s)

O. Blarquez

See Also

pfTransform

Examples

## Retrieve a site
ID=pfSiteSel(site_name="Pas-de-Fond")
## Or a group of sites (Western North America)
ID=pfSiteSel(id_region="WNA")

## Extract data
A=pfExtract(ID)

## Plot the first site raw charcoal data
par(mfrow=c(1,2))
plot(A[,1]==ID$id_site[1],3,A[,1]==ID$id_site[1],4,type="l",main=ID$site_name[1],
xlab="Age",ylab="raw Char")
## Minimax transformation
B=pfMinMax(A[,1]==ID$id_site[1],4)
## Plot the first site Minimax transformed charcoal data
plot(A[,1]==ID$id_site[1],3,B,type="l",main=ID$site_name[1],
xlab="Age",ylab="Minimax")
pfPublication

Get citations for charcoal sites

Description

Get citations for charcoal sites

Usage

pfPublication(x, output = "data.frame")

Arguments

- **x**: A "pfSiteSel" object
- **output**: Defines the output as a "list" or a "data.frame" (default).

Value

A list or data frame with citation informations related to charcoal sites.

Author(s)

O. Blarquez

Examples

x = pfSiteSel(id_site %in% c(1:4))
pfPublication(x, output = "list")

pfResolution

Calculates age resolution indicators for charcoal records

Description

Calculates age resolution indicators for charcoal records selected using pfSiteSel or pfInteractive functions.

Usage

pfResolution(ID, AgeLim = NULL)

Arguments

- **ID**: An object of the class "pfSiteSel"
- **AgeLim**: Numeric, defines age limits for age resolution calculations (e.g. AgeLim=c(-50,6000))
**Value**

```r
data.frame
```

A data frame with the following informations: ID_SITE, SITE_NAME, Median Resolution of the record, Mean Resolution and Standard deviation

**Author(s)**

O. Blarquez

**Examples**

```r
ID=pfSiteSel(lat>40, lat<90, long>-100, long<=-50)
Res=pfResolution(ID, AgeLim=c(-50,8000))
head(Res)
```

---

**pfSimpleGrid**

*Produce simple gridded maps of paleofire data*

**Description**

Produce gridded map graphics representing spatial variability in charcoal data from the Global Charcoal Database.

**Usage**

```r
pfSimpleGrid(TR, tarAge, hw, binhw = 0.5 * mean(diff(tarAge)), fun = mean, n.boot = 0, prob.CI = c(0.025, 0.975), test.val = 0, proj4 = "+proj=longlat +ellps=WGS84 +datum=WGS84 +no_defs", res = 5, ext = c(-180, 180, -90, 90), fig.file.name = NULL, show.plots = TRUE, title.text = "", cols = NULL, cuts = NULL, zlim = NULL, base.map = "coasts", base.map.col = grey(0.7), base.map.lwd = 0.5)
```

**Arguments**

- **TR** An object returned by `pfTransform`
- **tarAge** Numeric, the target ages for prebinning given in years (e.g. `tarAge = seq(0, 10000, 20)`). If unspecified the sequence is defined as `tarAge=seq(from=min age, to=max Age, by=median resolution)`.
- **hw** Numeric, the half window width for the locfit procedure (in years).
- **binhw** Numeric, bin half width for the prebinning procedure (use the same value as `tarAge` intervals for overlapping bins or `tarAge` intervals/2 for non-overlapping bins).
- **fun** Function to be used for aggregating across sites.
- **n.boot** Number of bootstrap replicates to use when creating confidence intervals around each grid-cell value.
- **prob.CI** Vector of two quantiles to define the bootstrap CI for significance testing.
pfSimpleGrid

test.val Test value for bootstrap significance test.
proj4 proj4 string representing the desired projection for plotted maps. Default is unprojected. See http://www.spatialreference.org to look up the string for your favorite projections.
res,ext Desired grid resolution and extent. If grd.res is a single number, the grid will be defined with equal x/y resolution; a two-element vector (x,y) can also be supplied for unequal resolution. grd.ext is specified as a vector, matrix, or Extent object, as for the function raster::extent.
fig.file.name Character sequence representing the file name for the output figures. Can be preceded by a path as long as all directories in the path exist. The file will be a PDF with one figure per time bin, each on a separate page.
show.plots Logical indicating whether plots will be printed to the screen.
title.text Character sequence for labeling figures. Time bin bounds will be added automatically.
cols, cuts Vectors of color specifications and values defining the plot legend. Grid-cell values will be binned by cuts and assigned the colors in cols. If either are NULL, the function tries to guess at a good scheme. cuts may also be a single value specifying the number of bins.
cuts Defines range and resolution of color scale
zlim Two-element vector representing the bounds of the color scale. Ignored if cuts is fully specified, but otherwise used in defining the color bins.
base.map Currently, either 'coasts' or 'countries' to choose which base map (from required library 'rworldmap') to be plotted as the base map for all plots. Could easily be modified to accept any SpatialPolygons object.
base.map.col, base.map.lwd Color specifications for plotting the basemap.

Details

Takes any pfTransform object as input, and allows any set of one or more time bins to be specified for plotting (one plot per bin). Time bins are specified as for pfCompositeLF (which is called by pfSimpleGrid. The extent, resolution, and projection of the desired grid are also user-specified.

Records are first composited, and then aggregated with other sites falling in the same grid cell according to the specified function 'fun' (defaults to mean). This is a considerably simpler approach than the distance-based spatial binning used by pfDotMap, although it has its own tradeoffs (e.g. grid cells are unlikely to represent equal area).

A flexible bootstrapped significance test is implemented. Within each time bin X grid cell combination, composite z-score values are randomly sampled (with replacement) from sites within the grid cell. The function is applied to the sampled values. Quantiles of all bootstrap function evaluations are computed, and significance is reported if a user-specified test value is outside of these bootstrap CI. Note that bootstrap CI calculated here reflect only spatial variability, as no temporal resampling is performed.
Plots are produced on the current device and/or in pdf files according to input arguments. In addition, a named list of useful objects is returned:

**COMP**
The binned composite generated for plotting.

**tarAge**
The list of target ages used for temporal binning.

**sg.rast**
A `Raster-class` object containing the gridded output data

**sg.plots**
A list of trellis objects representing the composed plots. Note that these objects can be edited to some degree with the `update.trellis` function, and plotted or used in layouts as any other trellis graphics can.

**Author(s)**
R. Kelly

**References**

**See Also**
pfGridding

**Examples**

```r
## Not run:
ID=pfsiteSel(id_region=c("WNA"), l12==1 & long<=-130)
plot(ID)

## Transform data
res3=pfTransform(ID,method=c("MinMax","Box-Cox","Z-Score"),BasePeriod=c(200,4000))

## Plot maps for 1000-yr bins spanning 3-0 kBP
# dev.new(width=10,height=10) # A big plot area helps.
gridmap = pfSimpleGrid( TR=res3, tarAge=seq(0,2000,100), hw=500, ext=c(-170,-80,40,80))
summary(gridmap)

# Plot the mean map from the first time bin
```
pfSiteSel

Description
Main function used for site selection, uses data stored in data(paleofiresites) to perform site selection according to multiple criterion, those criterions could be either geographic, based on series attributes (e.g. # of datings), or on sites attributes (e.g. biome).

Usage
pfSiteSel(...)

Arguments
... Any combination of conditions defined by relational operators and or logical operators that are applied on the "paleofiresites" dataset. See examples below:

Details
Use data(paleofiresites):names(paleofiresites) to retrieve the conditions that could be used to select sites i.e.: id_site, site_name, lat, long, elev, pref_units, biome, id_region, id_country, id_site_type, water_depth, id_basin_size, id_catch_size, id_land_desc, dating_type, min_est_age, max_est_age, num_dating, age_model, data_source, qtype, rf99, l12, num_samp, date_int.

Value
An object of the class "pfSiteSel" (list) with "id_site" and "site_name" components.

Author(s)
O. Blarquez

See Also
paleofiresites
Examples

## Sites selection examples

### Select all sites
ID=pfSiteSel()

### Site in the Biome #8
ID=pfSiteSel(biome==8)
plot(ID, zoom="world")

### Site in the Biome #8 or in the Biome #6
ID=pfSiteSel(biome==8 | biome==6)

### Sites in North America by geographic location
ID=pfSiteSel(lat>25, lat<75, long<(-45), long>-150)
plot(ID, zoom="world")

### is equivalent to:
ID=pfSiteSel(lat>25 & lat<75 & long<(-45) & long>-150)
plot(ID, zoom="world")

### By region criterion
ID=pfSiteSel(id_region==c("ENA0","WNA0"))
plot(ID, zoom="world")

### WRONG, use the `%in%` operator when concatenating two characters
# ID=pfSiteSel(id_region `%in%` c("ENA0","WNA0"))
# plot(ID, zoom="world")

### Pas-de-Fond site
pfSiteSel(site_name="Pas-de-Fond")

### All sites in eastern North America that are not Pas-de-Fond
pfSiteSel(site_name!="Pas-de-Fond", id_region=="ENA0")

### Sites with on average one dating point every 250 to 300 yrs
pfSiteSel(date_int>=250 & date_int<=300)

### Sites between 0, 100 m elevation in Asia
ID=pfSiteSel(elev>0 & elev<100, id_region=="ASIA")

### All sites that are not marine nor fluvial
ID=pfSiteSel(id_land_desc!="MARI", id_site_type=!"FLUV" & id_site_type!="LFLU")
plot(ID)

---

**pfToKml**

*Export selected site to Google Earth kml format*

---

**Description**

Export sites selected using pfSiteSel function to Google Earth kml format.
pfTransform

Usage

pfToKml(x, file = "NULL")

Arguments

x An object of the class "pfSiteSel"
file File location and name with kml extension e.g. file="/Users/Olivier/Desktop/truc.kml"

Value

No value returned.

Author(s)

O. Blarquez

Examples

## Not run:
x = pfSiteSel(id_site=222)
pfToKml(x, file="site222.kml")
## End(Not run)

pfTransform  Transform charcoal data for unique to multiple series

Description

Charcoal data transformation, background estimation and homogenization for unique to multiple series, accepts objects returned by pfSiteSel.

Usage

pfTransform(ID = NULL, add = NULL, Interpolate = FALSE, Age = NULL, method = "Z-Score", BasePeriod = c(-100, 1e+09), span = 0.3, RunWidth = 500, RunQParam = 0.5, stlYears = 500, type = "BoxCox1964", alpha = 0.01, QuantType = "INFL", MethodType = NULL, verbose = TRUE)

Arguments

ID An object returned by pfSiteSel or pfTransform
add An object returned by pfAddData
Interpolate Logical, idicates wether data should be interpolated or not, default=FALSE
pfTransform

Age Numeric. If Interpolate=TRUE, Age is used to specified the ages where the interpolation took place. If Age=NULL (default) the interpolated ages are automatically specified using the median resolution of the record(s). If Age is specified as a vector (e.g. Age=(from=0,to=10000, by=10)) the interpolation took place at specified ages.


BasePeriod Numeric, a parameter specifying the base period for calculating Z-score given in years BP (e.g. BasePeriod=c(0, 4000)), if empty or unspecified the base period corresponds to record length.

span Numeric, the span parameter for the LOESS or Smoothing spline methods

RunWidth Numeric, the width of the window for the"RunMed", "RunMean", "RunQuartile", "RunMin", and "RunMax" methods in years.

RunQParam Numeric, the parameter specifying which quantile should be calculated for the method "RunQuartile" (default=0.5 i.e. median).

stlYears Numeric, the bandwidth for stl decomposition, default=500 years.

alpha Numeric, alpha value to add before BoxCox calculation, see pfBoxCox.

type Character, the type of Box-Cox transformation, see pfBoxCox for details.

QuantType Character, by default QuantType="INFL," and influx are automatically calculated, otherwise use QuantType="NONE" (not recommended).

MethodType Character, by default (MethodType=NULL) imply that when for a specific site two charcoal unit exist the function pick the one define by pref_unit. By passing different arguments to MethodType user can modify the analysis to pick non preferred units by referring to more general methods for instance MethodType = "POLS" will choose charcoal records from pollen slides, or MethodType = "SIEV" sieved macro charcoal series. Type (paleofiredata); levels(paleofiredata$METHOD) for available methods.

verbose Logical, verbose or not...

Value An object of the class "pfTransform".

Author(s)
O. Blarquez

Examples
## Select the site Pas-de-Fond
ID=pfSiteSel(site_name="Pas-de-Fond")
# Transform data sequentially using pfTransform function
tr=pfTransform(ID,method=c("MinMax","Box-Cox"))

## Plot transformed data for the first site
plot(tr$Age[,1],tr$TransData[,1],type="l")

---

Plot CHAR

### Description
Plot an object of the class "CHAR" returned by the pretreatment function. Original accumulation rates are presented using grey bars, accumulation rates interpolated at equal time steps are presented by a black curve.

### Usage
```r
## S3 method for class 'CHAR'
plot(x, ...)
```

### Arguments
- `x` An object of the class "CHAR".
- `...`

### Author(s)
O. Blarquez

### Examples
```r
## In this example we will use the charcoal record of the Lac du Loup (Blarquez et al. 2010)
## Load raw charcoal data in mm^2
A=read.csv("http://blarquez.com/public/code/loupchar.csv")
C=A[,6] # charcoal areas
P_=A[,1:5] # CmTop, CmBot, AgeTop, AgeBot, Volume

## Calculates charcoal accumulation rate (CHAR, mm2.cm^2.yr^-1)
CHAR=pretreatment(params=P_,serie=C_,Int=TRUE)
plot(CHAR)
```
## plot.contiguous

*Plot "contiguous" object*

### Description

Plot an object returned by `contiguous`, plot contiguous cores (or sites) in green (T) and non-contiguous cores in red (F).

### Usage

```r
## S3 method for class 'contiguous'
plot(x, ylim = NULL, xlim = NULL, ...)  
```

### Arguments

- `x` An object returned by `contiguous`
- `ylim` Numeric, ylim for the graph
- `xlim` Numeric, xlim for the graph
- `...` ...

### Value

A plot.

### Author(s)

O. Blarquez

### See Also

`contiguous`

### Examples

```r
x <- pfsiteSel(lat > 12, lat < 60, long < (-50), long > -140)
cont <- contiguous(x)
plot(cont)
```
**plot.kdffreq**

### Description
Plot fire frequency calculated using the `kdffreq` function.

### Usage
```r
## S3 method for class 'kdffreq'
plot(x, ylim = NULL, xlim = NULL, ...) 
```

### Arguments
- `x`: Object returned by `kdffreq`
- `xlim`: Numeric x axis limits
- `ylim`: Numeric, y axis limits
- `...`: other arguments

### See Also
- `kdffreq`

### Examples
```r
set.seed(123)
fevent=c(round(abs(rnorm(20,mean=7, sd=5))*1000),round(abs(rnorm(10,mean=8, sd=1))*1000))

ff=kdffreq(fevent,bandwidth = 1000, nbboot=10)
plot(ff)
```

---

**plot.pfcircular**

### Description
Plot circular block bootstrap percentiles.

### Usage
```r
## S3 method for class 'pfcircular'
plot(x, ylim = NULL, xlim = NULL, ylab = NULL,
     xlab = NULL, main = NULL, text = FALSE, ...)
```
Arguments

- **x**: A "pfCircular" object.
- **ylim**: Numeric, x axis limits.
- **xlim**: Numeric, y axis limits.
- **ylab**: Character, y axis label.
- **xlab**: Character, x axis label.
- **main**: Character, title of the plot.
- **text**: Logical, text options.

Author(s)

O. Blarquez

Examples

```r
ID=pfSiteSel(lat>49, lat<75, long>6, long<50)
TR1=pfTransform(ID, method=c("MinMax", "Box-Cox", "Z-Score"), BasePeriod=c(200, 2000))

# Circular block bootstrapp
COMP=pfComposite(TR1, binning=TRUE, bins=seq(0, 2000, 100))
circ=pfcircular(COMP, conf=c(0.005, 0.025, 0.975, 0.995), nboot=100)
plot(circ)
```

Description

Plot a pfComposite object.

Usage

```r
## S3 method for class 'pfComposite'
plot(x, type = "ci", conf = c(0.05, 0.95),
     palette = "jet", add = "NONE", text = FALSE, main = NULL, ...)
```

Arguments

- **x**: A "pfComposite" object.
- **type**: Character, type of plot among "ci", "prctile", "density"
- **conf**: Numeric, confidence levels.
- **palette**: Character, color palette used with type=c("prctile", "density") among "jet" and "BW".
add  Character, add="NONE" by default, add="sitenum" could be specified to plot the sites number in each bin along with the composite curve.
main  Character, title of the plot.
text  Logical, text options.

Author(s)
O. Blarquez

Examples

### Composite charcoal record for North America:
ID=pfSiteSel(id_region="WNA8",l12=1)
### Transform data
res3=pfTransform(ID,method=c("MinMax","Box-Cox","Z-Score"),BasePeriod=c(200,4000))
### Composite
comp=pfComposite(res3,bins=seq(0,5000,200))
plot(comp,type="density",smoothing=TRUE,spar=0.3)

plot.pfCompositeLF  plot.pfCompositeLF

Description
Plot pfCompositeLF object

Usage

### S3 method for class 'pfCompositeLF'
plot(x, type = "ci", add = "NULL", conf = c(0.05, 0.95), palette = "jet", xlim = NULL, ylim = NULL, main = "Composite", text = FALSE, what = "loclip", ...)

Arguments

x  A "pfCompositeLF" object.
type  Character, type of plot among "ci", "prctile", "density"
add  Character, add=NULL by default, add="sitenum" could be specified to plot the sites number in each bin along with the composite curve.
conf  Numeric, confidence levels.
palette  Character, color palette used with type=c("prctile", "density") among "jet" and "BW".
xlim  Numeric, x axis limits.
**plot.pfGridding**

Plot a "pfGridding" object.

**Description**

Plot maps presenting gridded and transformed charcoal values obtained from the `pfGridding` function.

**Usage**

```r
## S3 method for class 'pfGridding'
plot(x, continuous = TRUE, col_class = NULL,
     col_lim = NULL, xlim = NULL, ylim = NULL, empty_space = 10,
     cmap = "YlGn", anomalies = TRUE, file = NULL, points = FALSE,
     add = NULL, add_color = "white", plot_countries = FALSE, ...)
```
Arguments

- **x**: An object returned by `pfGridding`.
- **continuous**: Logical, plot continuous (TRUE) or discrete (FALSE) colors on the map.
- **col_class**: Numeric, if continuous is false define here color classes (single values: col_class=5, or sequences col_class=seq(-15,15,5) are accepted.)
- **col_lim**: Numeric, limits for plotting grid cells values, grid cells with values beyond col_lim are not plotted.
- **xlim**: Numeric, map limits.
- **ylim**: Numeric, map limits.
- **empty_space**: Percentage, define empty space around the map.
- **cpal**: String, color palette to use see `brewer_pal`.
- **anomalies**: Logical, adapt output for plotting anomalies or not (color classes, etc..)
- **file**: Path/Filename.tiff, the function can output a GeoTiff file if desired.
- **points**: Logical, plot charcoal sites on the map?
- **add**: An object of the class "SpatialPolygonsDataFrame" (sp) to be plotted on the map.
- **add_color**: Color of the added SpatialPolygonsDataFrame.
- **plot_countries**: Logical, default FALSE (if TRUE plot countries borderlines and coastlines)

Value

A ggplot2 "gg" object that could be further manipulated.

Author(s)

O. Blarquez

See Also

`pfGridding`

Examples

```r
ID=pfSiteSel(id_region=="ENA0", lat==1, long<-85)
TR=pfTransform(ID, method=c("MinMax", "Box-Cox", "Z-Score"), BasePeriod=c(200,4000))
p=pfGridding(TR, age=1000)
plot(p, empty_space=100)

# require(ggplot2)
# pp=plot(p, empty_space=100)
# pp+ggtitle("my title."))
```
plot.pfKruskal

Plot a "pfKruskal" object.

Description

Plot a "pfKruskal" object using boxplots and showing significant differences between the periods using letters.

Usage

## S3 method for class 'pfKruskal'
plot(x, trend = FALSE, outliers = FALSE, xlim = NULL, ylim = NULL, ...)

Arguments

x An object returned by pfKruskal.
trend Logical, show trend using linear regression?
outliers Logical, show outliers?
xlim Numeric, x axis limits.
ylim Numeric, y axis limits.
...

Details

If two periods share the same letter their rank (median) is not significantly different at the confidence level specified by alpha. If not, equality could be rejected at the confidence level specified by alpha.

Value

Return a ggplot2 "gg" object.

Author(s)

O. Blarquez

See Also

pfKruskal
Examples

## Composite charcoal record for Western Boreal North America:

```r
ID = pfSiteSel(id_region="WNA0" & 112==1)
plot(ID)
```

## Transform data

```r
res3 = pfTransform(ID, method = c("MinMax", "Box-Cox", "Z-Score"), BasePeriod = c(200, 4000))
```

## Composite

```r
comp = pfComposite(res3, bins = seq(from = -500, to = 12500, by = 1000))
plot(comp)
```

## Kruskal Wallis Anova

```r
comparison = pfKruskal(comp)
plot(comparison)
```

```r
# p = plot(comparison)
# require(ggplot2)
# p + ggtitle("my title")
```

Description

Plot an object of the class "pfSiteSel"

Usage

```r
## S3 method for class 'pfSiteSel'
plot(x, add = NULL, type = "Map", zoom = "Sites",
     pch = ",", xlim = NULL, ylim = NULL, cex = 1,
     plot_countries = FALSE, ...)
```

Arguments

- `x`: An object of the class "pfSiteSel".
- `add`: An object returned by pfAddData (optional).
- `type`: Character, type of plot among "Map" or "Chronology".
- `zoom`: Character, zooming factor for type="Map": "Sites" or "World"
- `pch`: Pointer type see `plot`
- `xlim`: Numeric, x axis limits.
- `ylim`: Numeric, y axis limits.
- `cex`: Numeric, size of points.
- `plot_countries`: Logical, default FALSE (if TRUE plot countries borderlines and coastlines)
- `...`: ...
Author(s)
O. Blarquez

Examples

```
ID=pfSiteSel(id_region="ENA0", long>-100)
plot(ID, zoom="world")
```

Description
Plot "potveg" object i.e. produce a map by overlaying charcoal sites on potential vegetation maps. Uses ggplot2 syntax.

Usage

```
## S3 method for class 'potveg'
plot(x, size = 4, palette = NULL, alpha = 0.5, 
     text = FALSE, ...)
```

Arguments

- `x` A "potveg object."
- `size` Size of the dots on the map.
- `palette` A custom color palette can be specified.
- `alpha` Transparency of charcoal sites dots
- `text` Logical: plot sites as numbers referring to potential vegetation index (text=TRUE) or as points (text=FALSE, default).
- `...`

Value
A ggplot2 ("gg") object that can be further modified (see example)

Author(s)
O. Blarquez

See Also

`potveg`
Examples

```r
# not run
# require(paleofire)
# ID=pfSiteSel(c(1:10))
# obj=potveg(ID,classif="l12")
# plot(obj)
# #Return a ggplot object
# require(ggplot2)
# p=plot(obj,text=TRUE,alpha=1)
# p+ggtitle("My title")
```

Description

Retrieve potential vegetation types based on charcoal sites location

Usage

```r
potveg(ID, classif = "rf99", buffer = NULL)
```

Arguments

- **ID**: An object of the class "pfSiteSel"
- **buffer**: Distance in m that defines a radius around each site to calculate the dominant vegetation type by kernel density estimation.

Value

An object of the class "potveg" i.e. a list containing two data frames: "site_data" for charcoal sites and associated potential vegetation type, "map" data frame used for mapping data. See `plot.potveg` for details.

Author(s)

O. Blarquez

References


See Also

plot.potveg

Examples

```r
## Not run:
require(paleofire)
ID=pfSiteSel(c(1:10))
obj=potveg(ID, classif="112")
head(obj$site_data)

## End(Not run)
```

pretreatment  

*Calculate particles accumulation rates for sediment records*

Description

This is the R version of the CharAnalysis CharPretreatment.m function originally developed by P. Higuera and available at https://sites.google.com/site/charanalysis

Usage

```r
pretreatment(params, serie, Int = TRUE, first = NULL, last = NULL, yrInterp = NULL)
```

Arguments

- `serie`: A proxy record to be transformed in accumulation rates, could be particle counts, surfaces, volumes, etc.
- `params`: A matrix with the following columns: CmTop, CmBot, AgeTop, AgeBot, Volume, in the same order.
- `Int`: Logical specifying whether the function interpolates particle zero counts, default TRUE
- `first, last`: Date of the first, last sample for accumulation rate calculation, if NULL first, last are automatically specified as the minimum and maximum ages of the record respectively
- `yrInterp`: Temporal resolution of the interpolated accumulation rates, if NULL, yrInterp is automatically specified as the median resolution of the record

Value

Return an output structure with the following:

- `cmI`: interpolated depths
- `ybpI`: interpolated ages
- `accI`: accumulation rates
**summary.pfSiteSel**

**Author(s)**
O. Blarquez translated from P. Higuera CharPretreatment.m function

**Examples**

```r
## Not run:
# In this example we will use the charcoal record of the Lac du Loup from Blarquez et al. (2010).
# Blarquez, O., C. Carcailllet, B. Mourier, L. Bremond, and O. Radakovitch. 2010. Trees in the
# subalpine belt since 11 700 cal. BP: origin, expansion and alteration of the modern forest.
# The Holocene 20:139-146.

# Load raw charcoal data in mm^2
A=read.csv("http://blarquez.com/public/code/loupchar.csv")
C=A[,6] # charcoal areas
P=A[,1:5] # CmTop, CmBot, AgeTop, AgeBot, Volume

# Calculates charcoal accumulation rate (CHAR, mm2.cm-2.yr-1)
CHAR=pretreatment(params=P_,serie=C_,int=TRUE)
plot(CHAR)

## End(Not run)
```

---

**Description**

Return a summary table for an object of the class "pfSiteSel"

**Usage**

```r
## S3 method for class 'pfSiteSel'
summary(object, ...)
```

**Arguments**

- `object` An object of the class "pfSiteSel".
- `...`

**Value**

Data.frame, returns the following informations: "id_site", "lat", "long" "elev", "min_est_age", "max_est_age", "num_dating", "date_int", "num_samp", "l12", "rf99".

**Author(s)**
O. Blarquez
Examples

```r
ID=pfSiteSel(id_site==2)
summary(ID)

tricube

Tukey’s Tricube weight function

Description
From the EGRET package http://usgs-r.github.io/EGRET/ Robert Hirsch and Laura De Cicco

Usage

```r
tricube(d, h)
``` 

Arguments

d numeric vector of distances from the point of estimation to the given sample value

h numeric value, the half-window width, measured in the same units as d

Details

Computes the tricube weight function on a vector of distance values (d), based on a half-window width of h, and returns a vector of weights that range from zero to 1.

Value

w numeric vector of weights, all 0<=w<=1

Examples

```r
h<-10
d<-c(-11,-10,-5,-1,-0.01,0,5,9.9,10,20)
tricube(d,h)
```
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