

Package ‘GCD’

July 21, 2025

Type Package

Title Global Charcoal Database

Version 4.0.7

Date 2020-10-26

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Description Contains the Global Charcoal database data. Data include charcoal series (age, depth, charcoal quantity, associated units and methods) and information on sedimentary sites (localisation, depositional environment, biome, etc.) as well as publications informations. Since 4.0.0 the GCD mirrors the on-line SQL database at <<http://paleofire.org>>.

URL <http://paleofire.org>

License GPL (>= 2)

Depends R(>= 3.5.0)

Suggests paleofire

Imports raster

LazyLoad yes

Encoding UTF-8

RoxygenNote 7.1.1

NeedsCompilation no

Repository CRAN

Date/Publication 2020-10-26 19:30:07 UTC

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GCD-package	<i>GCD: Global Charcoal Database data</i>
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Description

The GCD package provides Global Charcoal Database data updated at regular intervals to be used in conjunction with the paleofire package.

Details

Package: GCD
Type: Package
Version: 4.0.0
Date: 2018-03-01
License: GPL (>=2)

Author(s)

Global Paleofire Working Group <paleofire gmail.com>

References

Power, M., J. Marlon, P. Bartlein, and S. Harrison. 2010. Fire history and the Global Charcoal Database: a new tool for hypothesis testing and data exploration. *Palaeogeography, Palaeoclimatology, Palaeoecology* 291:52-59.

See Also

<http://paleofire.org>

Examples

```
rm(list=ls())

library(GCD)

## Charcoal data:

data(paleofiredata)
head(paleofiredata)

## Associated sites informations:

data(paleofiresites)
head(paleofiresites)
```

basin_size	<i>Basin size</i>
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Description

Basin size

Format

A data frame with 7 observations on the following 5 variables.

ID_BASIN_SIZE a numeric vector

BASIN_SIZE_CODE a character vector

BASIN_SIZE_DESC a character vector

BASIN_SIZE_RANGE_MIN a character vector

BASIN_SIZE_RANGE_MAX a character vector

Examples

```
data(basin_size)
## maybe str(basin_size) ; plot(basin_size) ...
```

charcoal_methods	<i>Extraction methods</i>
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Description

Charcoal extractions methods present in the database

Format

A data frame with 13 observations on the following 3 variables.

ID_METHOD a factor with levels ACID CPRO GRAV HNPk HVLQ IMAG NOTK OPPF OTHE POLS SIEV SIPO THSL

METHOD a factor with levels Acidification of sample using gas chromatography to measure elemental carbon (Verardo et al 1990) charcoal part Identified as opaque phytoclasts/pyrofusinite in palynofacies analysis Charcoal part. Identified in thin slides (soil micromorphology) Charcoal particles identified by imaging software Charcoal separated by heavy liquid preparation Cumulative probability (95% confidence interval) alluvial soil charcoal GRAVIMETRIC chemical assay (Winkler method) Hand picked charcoal from soil samples Not known Other Pollen slide Sieved Sieved + Pollslide

METH_CODE a numeric vector

Examples

```
data(charcoal_methods)
## maybe str(charcoal_methods) ; plot(charcoal_methods) ...
```

charcoal_units	<i>Charcoal units</i>
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Description

Charcoal units used in GCD

Format

A data frame with 169 observations on the following 4 variables.

unit a factor with levels %125 %DWT %TOF %WTO 100P 1012 1220 1422 1424 3869 5015 5075 6914 7510 7738 7PRA 8POS ABSC ARCC AREA ARPG BCCT C004 C010 C01K C040 C100 C120 C125 C140 C150 C180 C250 C65X CARE CCMY CG2M CHCO CHRX CM10 CMGR CMLL COML CP20 CPAR CPRA DC13 FRAG G05I G10I G250 GCHG GCMY GRG1 GRGR GRPC GT05 GT10 GT12 GT15 GT18 GT1M GT24 GT25 GT2X GT30 GT38 GT50 GT53 GT5C LT12 LT13 LT18 LT1M LT25 LT40 M2GR M2ML MCM3 MM2C MM2G MMDW MMML MT10 MULT NOTK ORDI OTHE PCM1 PCMY PHYT PP25 PP51 PP52 PPML PPOL PRAB PROB PTC0 PTC2 PTC3 PTCT PX25 SQC0 SQCU SQCY SQG1 SQG5 SQL5

TOCA TOM1 TOM2 TOM3 TOM4 TOM5 TOM6 TOM7 TOM8 TOM9 TOMX TOTA UCMY V025 V100 V125
V255 V501 X01K X105 X106 X120 X125 X150 X15G X160 X180 X18C X20P X250 X25P X310
X37P X459 X500 X50U X512 X515 X520 X53C X550 X55P X55U XA1K XARE XARP XARS XC25
XCM3 XCOP XFML XFRG XFRP XFRS XIMG XPEA XPEE XPIX XRIF

qtype a factor with levels C0P0 CONC INFL NOTK OTHE SOIL

type a character vector

code a numeric vector

Examples

```
data(charcoal_methods)
## maybe str(charcoal_methods) ; plot(charcoal_methods) ...
```

date	<i>Date table</i>
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Description

Table with the dating information contained in GCD

Format

A data frame with 4872 observations on the following 8 variables.

- ID_SITE** a numeric vector
- DATE_LAB_NUMBER** a factor with many levels
- DEPTH** a numeric vector
- TICKNESS** a numeric vector
- AGE** a numeric vector
- ERROR** a numeric vector
- ID_DATE_TYPE** a numeric vector
- ID_MAT_DATED** a factor with levels

obtained ~~

Examples

```
data(date)
## maybe str(date) ; plot(date) ...
```

date_type	<i>Type of dates in date.rda</i>
-----------	----------------------------------

Description

Type of dates in date.rda

Format

A data frame with 31 observations on the following 4 variables.

ID_DATE_TYPE a numeric vector

DATE_TYPE_CODE a character vector

DATE_TYPE_NAME a character vector

DATE_TYPE_NUMBER a numeric vector

obtained ~~

Examples

```
data(date_type)
## maybe str(date_type) ; plot(date_type) ...
```

depo_context	<i>Depositional contexts</i>
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Description

Depositional contexts

Format

A data frame with 17 observations on the following 4 variables.

ID_DEPO_CONTEXT a numeric vector

DEPO_CONTEXT_CODE a character vector

DEPO_CONTEXT_NAME a character vector

DEPO_CONTEXT_NUMBER a numeric vector

Examples

```
data(depo_context)
## maybe str(depo_context) ; plot(depo_context) ...
```

GCD-internal*Internal GCD Data*

Description

Internal GCD Data

lands_desc*Landscape description elements*

Description

Landscape description elements

Format

A data frame with 20 observations on the following 3 variables.

ID_LANDS_DESC a numeric vector**LANDS_DESC_CODE** a character vector**LANDS_DESC_NAME** a character vector**Examples**

```
data(lands_desc)
## maybe str(lands_desc) ; plot(lands_desc) ...
```

mat_dated*Material Dated*

Description

Material Dated

Format

A data frame with 23 observations on the following 4 variables.

ID_MAT_DATED a numeric vector**MAT_DATED_STANDARD_LEVEL** a character vector**MAT_DATED_TYPE** a character vector**MAT_DATED_HIGH_LEVEL** a character vector

obtained ~~

Examples

```
data(mat_dated)
## maybe str(mat_dated) ; plot(mat_dated) ...
```

paleofiredata	<i>GCD Charcoal data</i>
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Description

Charcoal series from the Global Charcoal Database

Format

A data frame with 134269 observations on the following 4 variables.

ID_SITE a numeric vector

DEPTH a numeric vector

EST_AGE a numeric vector

QUANTITY a numeric vector

METHOD a factor with levels ACID CPRO GRAV HNPk HVLQ IMAG NOTK OREC OTHE POLS SIEV

UNIT a factor see [paleofiresites](#) for details

TYPE a factor with levels C0P0 CONC INFL NOTK OTHE SOIL

Examples

```
data(paleofiredata)
## maybe str(paleofiredata) ; plot(paleofiredata) ...
```

paleofiresites	<i>GCD sites information</i>
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Description

Sites description and features

Format

A data frame with 881 observations on the following 17 variables.

id_site sites primary key from GCD v4.x.x
 id_site_old sites primary key from GCD v3.x.x, deprecated
 pref_units a factor, see help("charcoal_units") and data("charcoal_units") for details
 site_name a character vector
 lat a numeric vector
 long a numeric vector
 elevation a numeric vector of elevations
 country a character vector
 continent a factor with levels Africa Antarctica Asia Australia Europe North America
 South America
 ISO3 ISO3 code by country
 num_dating a numeric vector
 min_est_age a numeric vector
 max_est_age a numeric vector
 num_samp a numeric vector
 has_depth factor indicating presence of depths associated to ages
 date_int a numeric vector, interval in years between two dates
 qtype a factor, see help("charcoal_units") and data("charcoal_units") for details
 water_depth a numeric vector
 depo_context a character vector, see help("depo_context") and data("depo_context") for details
 id_site_type a character vector, see help("site_type") and data("site_type") for details
 id_basin_size a character vector, see help("basin_size") and data("basin_size") for details
 id_lands_desc a character vector, see help("lands_desc") and data("lands_desc") for details
 l12 a numeric vector, Levavasseur et al. 2012
 rf99 a numeric vector, Ramankutty et al. 1999
 gcd_version main GCD releases
 num_version a numeric vector: version number 401 meaning 4.0.1
 update_date date of data update in the GCD

Details

l12 levels

0= Water
 1= Boreal forest
 2= Desert vegetation
 3= Grassland and dry shrubland
 4= Savannas and dry woodlands

5= Temperate forest
 6= Tropical forest
 7= Tundra
 8= Warm temperate
 9= Warm desert
 10= Cold desert

rf99 levels

0= Water
 1= Tropical Evergreen Forest/Woodland
 2= Tropical Deciduous Forest/Woodland
 3= Temperate Broadleaf Evergreen Forest/Woodland
 4= Temperate Needleleaf Evergreen Forest/Woodland
 5= Temperate Deciduous Forest/Woodland
 6= Boreal Evergreen Forest/Woodland
 7= Boreal Deciduous Forest/Woodland
 8= Evergreen/Deciduous Mixed Forest/Woodland
 9= Savanna
 10= Grassland/Steppe
 11= Dense Shrubland
 12= Open Shrubland
 13= Tundra
 14= Desert
 15= Polar Desert/Rock/Ice

References

Ramankutty, N., and J.A. Foley (1999). Estimating historical changes in global land cover: croplands from 1700 to 1992, *Global Biogeochemical Cycles* 13(4), 997-1027.

Levvasseur, G., M. Vrac, D. M. Roche, and D. Paillard. 2012. Statistical modelling of a new global potential vegetation distribution. *Environmental Research Letters* 7:044019.

Examples

```
data(paleofiresites)
## maybe str(paleofiresites) ; plot(paleofiresites) ...
```

pub

Publication List

Description

List of GCD publications with DOI and link.

Usage

```
data("pub")
```

Format

A data frame with 664 observations on the following 4 variables.

id_pub a numeric vector
 citation a character vector
 link web addresses
 DOI DOI

Examples

```
data(pub)
## maybe str(pub) ; plot(pub) ...
```

site_type	<i>Type of sites</i>
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Description

Type of sites

Format

A data frame with 53 observations on the following 4 variables.

ID_SITE_TYPE a numeric vector
SITE_TYPE_LEVEL a character vector
SITE_TYPE_DESC a character vector
SITE_TYPE_HIGH_LEVEL a character vector

Examples

```
data(site_type)
## maybe str(site_type) ; plot(site_type) ...
```

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