Package 'ISRaD'

November 17, 2018

Title Tools and Data for the International Soil Radiocarbon Database

Version 0.1.0.904

Description This is the central location for data and tools for the development, maintenance, analysis, and deployment of the International Soil Radiocarbon Database. This database and package have been developed in collaboration between the U.S. Geological Survey Powell Center and the Max Planck Institute.

Depends R (>= 3.3.0)

Imports shiny, openxlsx, devtools, raster, dplyr, plyr, tidyr, RCurl, ggplot2, assertthat, rcrossref, forecast, SoilR, pangaear, tidyverse, usethis

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Encoding UTF-8

LazyData true

RoxygenNote 6.1.1

Suggests knitr, rmarkdown

VignetteBuilder knitr

R topics documented:

`checkTempletFiles` *Check ISRaD Templet files*

Description

Check that the Templet information file and the templet file match appropriately.

Usage

```
checkTempletFiles(outfile = "")
```

Arguments

`outfile`	file to dump the output report. Defaults to an empty string that will print to standard output.

Value

returns NULL

Examples

```
## Not run:
checkTempletFiles()

## End(Not run)
```

`compile` *Compile ISRaD data product*

Description

Construct data products to the International Soil Radiocarbon Database.

Usage

```
compile(dataset_directory, write_report = FALSE, write_out = FALSE,
  return_type = c("none", "list")[2], checkdoi = F)
```

Arguments

dataset_directory	string defining directory where completed and QC passed soilcarbon datasets are stored
write_report	boolean flag to write a log file of the compilation (FALSE will dump output to console). File will be in the specified in the dataset_directory at "database/ISRaD_log.txt". If there is a file already there of this name it will be overwritten.
write_out	boolean flag to write the compiled database file as .csv in dataset_directory (FALSE will not generate output file but will return)
return_type	a string that defines return object. Default is "none". Acceptable values are "none" or "list" depending on the format you want to have the database returned in.
checkdoi	set to F if you do not want the QAQC check to validate doi numbers

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ISRaD.build *ISRaD.build builds the database and updates objects in R package*

Description

Wrapper function that combines tools for rapid deployment of R package data objects. Meant to be used by the maintainers/developers of ISRaD

Usage

```
ISRaD.build(ISRaD_directory = getwd(), geodata_directory)
```

Arguments

ISRaD_directory	directory where the ISRaD package is found
geodata_directory	directory where geospatial climate datasets are found. Necessary to create ISRaD_Extra

Value

runs QAQC on all datafiles, moves files that fail QAQC, updates ISRaD_Data, updates ISRaD_Extra

Examples

```
## Not run:
ISRaD.build(ISRaD_directory="~/ISRaD/", geodata_directory="~/geospatial_datasets")

## End(Not run)
```

`ISRaD.extra` *ISRaD.extra*

Description

Fills in transformed and geospatial data where possible, generatating an enhanced version of ISRaD.

Usage

```
ISRaD.extra(database, geodata_directory)
```

Arguments

`database`	soilcarbon dataset object
`geodata_directory`	directory where geospatial data is found

Details

Fills fraction modern, delta 14C, delta-delta values, profile coordinates, and SOC stocks frmo entered data, and fills soil taxonomy, and climatic data from

Value

returns new ISRaD_extra object with derived, transformed, and filled columns

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`ISRaD.extra.Cstocks` *ISRaD.extra.Cstocks*

Description

Calculates soil organic carbon stock

Usage

```
ISRaD.extra.Cstocks(database)
```

Arguments

`database`	ISRaD dataset object.

Details

Function first fills lyr_bd_samp and lyr_c_org. SOC stocks can only be calculated if organic carbon concentration and bulk density data are available. SOC stocks are then calculated for the fine earth fraction (<2mm).

Value

returns ISRaD_data object with filled columns

Author(s)

J. Beem-Miller

`ISRaD.extra.delta_delta`
ISRaD.extra.delta_delta

Description

: Calculates the difference between sample delta 14C and the atmosphere for the year of collection

Usage

```
ISRaD.extra.delta_delta(database)
```

Arguments

`database`	ISRaD dataset object.

Details

: Creates new column for delta delta value. Observation year and profile coordinates must be filled (use ISRaD.extra.fill_dates, and ISRaD.extra.fill_coords fxs). Calls SoilR for atmospheric data (Hua et al. 2013). Atmospheric data are corrected for the northern hemisphere zone 2 or southern hemisphere zones 1+2, depending on profile coordinates.

Value

returns ISRaD_data object with new delta delta columns in relevant tables

Author(s)

: J. Beem-Miller and C. Hicks-Pries

References

: Hua et al., 2013; Sierra et al., 2014

ISRaD.extra.fill_14c *ISRaD.extra.fill_14c*

Description

: Fills delta 14C from fraction modern if delta 14C not reported.

Usage

```
ISRaD.extra.fill_14c(database)
```

Arguments

database	ISRaD dataset object.

Details

: Warning: xxx_obs_date_y columns must be filled for this to work!

Value

returns ISRaD_data object with filled delta 14C columns

Author(s)

: J. Beem-Miller & A. Hoyt

References

: Stuiver and Polach, 1977

ISRaD.extra.fill_coords *ISRaD.extra.fill_coords*

Description

Fills profile coordinates from site coordinates if profile coordinates not reported.

Usage

```
ISRaD.extra.fill_coords(database)
```

Arguments

database	ISRaD dataset object.

Value

returns ISRaD_data object with filled profile coordinates

Author(s)

J. Beem-Miller

`ISRaD.extra.fill_dates` *ISRaD.extra.fill_dates*

Description

Fills frc_obs_date_y and inc_obs_date_y columns from lyr_obs_date_y if not reported.

Usage

```
ISRaD.extra.fill_dates(database)
```

Arguments

`database`	ISRaD dataset object.

Details

This function must be run prior to the ISRaD.extra.fill_14c, ISRaD.extra.fill_fm, and ISRaD.extra.delta_delta for the layer and fraction tables.

Value

returns ISRaD_data object with filled obs_date_y columns

`ISRaD.extra.fill_fm` *ISRaD.extra.fill_fm*

Description

Fills fraction modern from delta 14C if fraction modern not reported.

Usage

```
ISRaD.extra.fill_fm(database)
```

Arguments

`database`	ISRaD dataset object.

Details

: Warning: xxx_obs_date_y columns must be filled for this to work!

Value

returns ISRaD_data object with filled fraction modern columns

Author(s)

: J. Beem-Miller & A. Hoyt

References

: Stuiver and Polach, 1977

`ISRaD.extra.fill_soilorders`
ISRaD.extra.fill_soilorders

Description

Fills pro_usda_soil_order field from pro_soil_taxon field.

Usage

```
ISRaD.extra.fill_soilorders(database)
```

Arguments

`database`	ISRaD dataset object.

Details

This function is a static conversion script written at the Fall 2018 Powell Center workshop and therefore performance is not guaranteed for new entries.

Back fills pro_usda_soil_order based on USDA classifications

Value

returns ISRaD_data object with filled pro_usda_soil_order column

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`ISRaD.extra.geospatial.climate`
ISRaD.extra.geospatial.climate

Description

Extracts values from gridded (2.5' arc) climate data using ISRaD profile coordinates.

Usage

```
ISRaD.extra.geospatial.climate(database, geodata_directory)
```

Arguments

`database`	ISRaD dataset object.
`geodata_directory`	directory where geospatial climate datasets are found.

Details

Adds new climate fields BIO1-BIO19:

BIO1 = Annual Mean Temperature, BIO2 = Mean Diurnal Range (Mean of monthly (max temp - min temp)), BIO3 = Isothermality (BIO2/BIO7) (* 100), BIO4 = Temperature Seasonality (standard deviation *100), BIO5 = Max Temperature of Warmest Month, BIO6 = Min Temperature of Coldest Month, BIO7 = Temperature Annual Range (BIO5-BIO6), BIO8 = Mean Temperature of Wettest Quarter, BIO9 = Mean Temperature of Driest Quarter, BIO10 = Mean Temperature of Warmest Quarter, BIO11 = Mean Temperature of Coldest Quarter, BIO12 = Annual Precipitation, BIO13 = Precipitation of Wettest Month, BIO14 = Precipitation of Driest Month, BIO15 = Precipitation Seasonality (Coefficient of Variation), BIO16 = Precipitation of Wettest Quarter, BIO17 = Precipitation of Driest Quarter, BIO18 = Precipitation of Warmest Quarter, BIO19 = Precipitation of Coldest Quarter

All BIO## variables are from http://www.worldclim.org/bioclim V1.4 at 2.5 resolution and are based on site lat and long

Value

An ISRaD_data object with additional rows containing values from geospatial datasets. See description for details.

Author(s)

J. Grey Monroe, Alison Hoyt

References

http://www.worldclim.org/

`ISRaD.extra.geospatial.soil`
ISRaD.extra.geospatial.soil

Description

brief summary description of function

Usage

```
ISRaD.extra.geospatial.soil(database, geodata_directory)
```

Arguments

`database`	ISRaD dataset object.
`geodata_directory`	directory where geospatial climate datasets are found.

Details

very detailed description of function, especially if it involves the creation of new columns

Author(s)

your name

References

any references of literature or datasets relevant to understand the function. (remove this entire line if there are no references)

`ISRaD.flatten` *ISRaD.flatten*

Description

: Joins tables in ISRaD based on linking variables and returns "flat" dataframes

Usage

```
ISRaD.flatten(database, table)
```

Arguments

`database`	ISRaD dataset object: e.g. ISRaD_data, or ISRaD_extra
`table`	ISRaD table of interest ("flux", "layer", "interstitial", "fraction", "incubation"). Must be entered with "".

Details

: ISRaD.extra.flatten generates flat files (2 dimensional matrices) for user specfied ISRaD tables by joining higher level tables (metadata, site, profile, layer) to lower level tables (layer, fraction, incubation, flux, interstitial).

Value

returns a dataframe with nrow=nrow(table) and ncol=sum(ncol(meta),ncol(site),ncol(profile),...,ncol(table))

Author(s)

: J. Beem-Miller

References

:

ISRaD.save.xlsx *ISRaD.save.xlsx*

Description

saves data object as xlsx file in ISRaD template format

Usage

```
ISRaD.save.xlsx(database, template_file, outfile)
```

Arguments

database	ISRaD dataset object.
template_file	path and name of template file to use.
outfile	path and name to save the excel file

Author(s)

J Grey Monroe

ISRaD.shiny *ISRaD.shiny*

Description

generate reports of ISRaD data

Usage

```
ISRaD.shiny()
```

ISRaD_data *ISRaD database object*

Description

Complete database object compiled for ISRaD diamonds.

Usage

```
ISRaD_data
```

Format

A list of data frames. The names of the data frames and their columns reflect the structure of the ISRaD data master template.

ISRaD_extra *ISRaD extra database object*

Description

Complete database object compiled for ISRaD. Includes extra variables calculated using ISRaD.extra function. diamonds.

Usage

```
ISRaD_extra
```

Format

A list of data frames. The names of the data frames and their columns reflect the structure of the ISRaD data master template. Additional columns have been added and certain variables have been filled in when possible.

QAQC *QAQC*

Description

Check the imported soil carbon dataset for formatting and entry errors

Usage

```
QAQC(file, writeQCreport = F, outfile = "", summaryStats = T,
  dataReport = F, checkdoi = T)
```

Arguments

file	directory to data file
writeQCreport	if TRUE, a text report of the QC output will be written to the outfile. Default is FALSE
outfile	filename of the output file if writeQCreport==TRUE. Default is NULL, and the outfile will be written to the directory where the dataset is stored, and named by the dataset being checked.
summaryStats	prints summary statistics. Default is TRUE
dataReport	prints list structure of database. Default is FALSE
checkdoi	set to F if you do not want the QAQC check to validate doi numbers

read_Treat2016 *Read in data for Treat 2016.*

Description

Currently doesn't work and is under development

Usage

```
read_Treat2016(dowloadDir = "temp")
```

Arguments

dowloadDir	directory where data files will be downloaded

Value

writes out files for individual data objects

Examples

```
## Not run:
read_Treat2016()
compile("~/Dropbox/USGS/ISRaD_Data/Compilations/Treat/converted/")

## End(Not run)
```

read_YujiHe2016 *Read He 2016*

Description

Read in the data from Yuji He's 2016 Science paper as a raw csv file

Usage

```
read_YujiHe2016(Yujie_file = NULL)
```

Arguments

Yujie_file	The raw csv data

Value

ISRaD compliant file structure with only columns that overlap with original data

`reports` *reports*

Description

generate reports of ISRaD data

Usage

```
reports(database = NULL, report = "entry_stats")
```

Arguments

`database`	ISRaD data object
`report`	Parameter to define which type of report you want. The default (and only option currently) is "entry_stats".

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