

# Package ‘ISRaD’

April 13, 2022

**Title** Tools and Data for the International Soil Radiocarbon Database

**Version** 2.2.3

**Description** This is the central location for data and tools for the development, maintenance, analysis, and deployment of the International Soil Radiocarbon Database (ISRaD). ISRaD was developed as a collaboration between the U.S. Geological Survey Powell Center and the Max Planck Institute for Biogeochemistry. This R package provides tools for accessing and manipulating ISRaD data, compiling local data using the ISRaD data structure, and simple query and reporting functions for ISRaD. For more detailed information visit the ISRaD website at: <<https://soilradiocarbon.org/>>.

**Depends** R (>= 3.5.0)

**Imports** readxl,  
writexl,  
raster,  
dplyr (>= 0.8),  
tidyr (>= 1.0),  
RCurl,  
ggplot2,  
maps,  
httr,  
rio

**License** GPL-2

**Encoding** UTF-8

**LazyData** true

**RoxygenNote** 7.1.1

**Suggests** devtools,  
knitr,  
rmarkdown,  
rgdal

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checkTemplateFiles	<i>Check ISRaD Template/Info files</i>
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## Description

Check that the template information file and the template file match appropriately.

## Usage

```
checkTemplateFiles(outfile = "", verbose = TRUE)
```

## Arguments

outfile	file to dump the output report. Defaults to an empty string that will print to standard output
verbose	if TRUE (default) will print output to specified outfile

## Details

Used in compile() function, but primarily a development tool

## Value

Nothing (run for side effects).

## Examples

```
checkTemplateFiles()
```

---

compile

*Compile ISRaD data product*


---

## Description

Compiles template files into ISRaD database format.

## Usage

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

## Arguments

dataset_directory	Directory where completed QAQCed template files are stored.
write_report	Boolean flag to write a log file of the compilation. File will be in the specified dataset_directory at "database/ISRaD_log.txt". If a file with this name already exists in this directory it will be overwritten.
write_out	Set to TRUE to write the compiled database file in .xlsx format in dataset_directory
return_type	A string that defines return object. Acceptable values are "none" or "list"; default is "list".
checkdoi	Set to FALSE if you do not want to validate DOIs during QAQC. (Warning: time consuming).
verbose	Set to TRUE to print results of function to console.

## Examples

```
# Load example dataset Gaudinski_2001
entry <- ISRaD::Gaudinski_2001
# Save as .xlsx file
ISRaD.save.entry(
  entry = entry,
  template_file = system.file("extdata", "ISRaD_Master_Template.xlsx", package = "ISRaD"),
  outfile = file.path(tempdir(), "Gaudinski_2001.xlsx")
)
# Compile .xlsx file/s in dataset_directory into ISRaD database object
ISRaD.compiled <- compile(tempdir(),
  write_report = TRUE, write_out = TRUE,
  return_type = "list", checkdoi = FALSE, verbose = TRUE
)
```

---

convert_fm_d14c	<i>convert_fm_d14c</i>
-----------------	------------------------

---

### Description

convert fraction modern to d14c and d14c to fraction modern

### Usage

```
convert_fm_d14c(fm = NA, d14c = NA, obs_date_y, verbose = TRUE)
```

### Arguments

fm	fraction modern
d14c	delta 14c in per mille
obs_date_y	year of observation/sample collection
verbose	prints message stating which conversion was performed

### Details

Convenience function for radiocarbon unit conversions. Recommended to set verbose = FALSE for batch conversions.

### Author(s)

J. Beem-Miller

### Examples

```
convert_fm_d14c(fm = 0.97057, obs_date_y = 2005)
convert_fm_d14c(d14c = -35.86611, obs_date_y = 2005)
```

---

future14C	<i>Future atmospheric 14C dataset for delta-delta calculation</i>
-----------	---

---

### Description

Data from: Sierra, C. "Forecasting atmospheric radiocarbon decline to pre-bomb values", Radiocarbon, Vol 60, Nr 4, 2018, p 1055.1066 DOI:10.1017/RDC.2018.33

### Usage

```
future14C
```

### Format

dataframe

---

Gaudinski_2001	<i>Gaudinski Harvard Forest example dataset</i>
----------------	---

---

**Description**

Data from Gaudinski, J., 2001, Belowground carbon cycling in three temperate forests of the eastern United States, University of California Irvine, Ph.D. thesis

**Usage**

Gaudinski\_2001

**Format**

list

---

graven	<i>Graven dataset for delta-delta calculation</i>
--------	---

---

**Description**

Data from Graven et al 2017 <https://www.geosci-model-dev.net/10/4405/2017/gmd-10-4405-2017.pdf>

**Usage**

graven

**Format**

dataframe

---

ISRaD.extra	<i>ISRaD.extra</i>
-------------	--------------------

---

**Description**

Fills transformed and geospatial data where possible to generate an enhanced version of ISRaD.

**Usage**

ISRaD.extra(database, geodata\_directory)

**Arguments**

database	ISRaD dataset object
geodata_directory	directory where geospatial data are found

**Details**

Fills fraction modern, delta 14C, delta-delta, profile coordinates, bulk density, organic C concentration, and SOC stocks from entered data; fills soil and climatic data from external geospatial data products

**Value**

New ISRaD\_extra object with derived, transformed, and filled columns.

**Examples**

```
# Load example dataset Gaudinski_2001
database <- ISRaD::Gaudinski_2001
# Fill ISRaD.extra data
database.x <- ISRaD.extra(database,
  geodata_directory = system.file("extdata", "geodata_directory", package = "ISRaD")
)
```

---

ISRaD.extra.calc\_atm14c

*ISRaD.extra.calc\_atm14c*

---

**Description**

Calculates atmospheric 14c in the year of sampling for each record in an ISRaD object

**Usage**

```
ISRaD.extra.calc_atm14c(database, future = TRUE)
```

**Arguments**

database	ISRaD object
future	Project atmospheric radiocarbon into the future?

**Details**

Creates new column for atmospheric 14c (xxx\_atm14c). Observation year and profile coordinates must be filled (use ISRaD.extra.fill\_dates, and ISRaD.extra.fill\_coords functions). The relevant atmospheric 14c data (northern or southern hemisphere or tropics) are determined by profile coordinates. Projection for 2016 to 2021 uses the four quarter average projected atmospheric radiocarbon concentration for Central Europe as estimated in Sierra (2019).

Notes: Central Europe projection (Sierra, 2019) used for northern hemisphere samples as these projections perform better against observations than northern hemisphere projection; southern hemisphere and tropic atmospheric radiocarbon projection are lagged by 2.5 per mille, as this is the mean lag observed from 2000 to 2015 in the Graven (2017) dataset.

**Value**

ISRaD\_data object with new atmospheric zone and atmospheric 14c columns in relevant tables.

**Author(s)**

J. Beem-Miller and C. Hicks-Pries

**References**

Graven et al. 2017 <<https://www.geosci-model-dev.net/10/4405/2017/gmd-10-4405-2017.pdf>>; Sierra, C. "Forecasting atmospheric radiocarbon decline to pre-bomb values", Radiocarbon, Vol 60, Nr 4, 2018, p 1055.1066 DOI:10.1017/RDC.2018.33

**Examples**

```
# Load example dataset Gaudinski_2001
database <- ISRaD::Gaudinski_2001
# Fill profile coordinates
database.x <- ISRaD.extra.fill_coords(database)
# Fill dates
database.x <- ISRaD.extra.fill_dates(database.x)
# Fill delta 14C from fraction modern
database.x <- ISRaD.extra.fill_rc(database.x)
# Fill atmospheric 14c
database.x <- ISRaD.extra.calc_atm14c(database.x)
```

---

ISRaD.extra.Cstocks	<i>ISRaD.extra.Cstocks</i>
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---

**Description**

Calculates soil organic carbon stock

**Usage**

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

**Arguments**

database            ISRaD dataset object.

**Details**

Function first fills lyr\_bd\_samp, lyr\_c\_org, lyr\_c\_inorg, lyr\_coarse\_tot. Notes:

- 1) SOC stocks can only be calculated if organic carbon concentration and bulk density data are available
- 2) SOC stocks are calculated for the fine earth fraction (<2mm).

**Value**

ISRaD\_data object with filled columns "lyr\_coarse\_tot\_filled", "lyr\_bd\_samp\_filled", "lyr\_c\_inorg\_filled", "lyr\_c\_org\_filled", "lyr\_soc\_filled".

**Author(s)**

J. Beem-Miller

**Examples**

```
# Load example dataset Gaudinski_2001
database <- ISRaD::Gaudinski_2001
database.x <- ISRaD.extra.Cstocks(database)
```

---

ISRaD.extra.delta\_delta

*ISRaD.extra.delta\_delta*

---

**Description**

Calculates the difference between sample delta 14c and the atmosphere for the year of collection (delta-delta)

**Usage**

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

**Arguments**

database            ISRaD dataset object

**Details**

Creates new column for delta-delta value. Function "ISRaD.extra.calc\_atm14c" should be run first.

**Value**

ISRaD\_data object with new delta-delta columns in relevant tables.

**Author(s)**

J. Beem-Miller

**Examples**

```
# Load example dataset Gaudinski_2001
database <- ISRaD::Gaudinski_2001
# Fill profile coordinates
database.x <- ISRaD.extra.fill_coords(database)
# Fill dates
database.x <- ISRaD.extra.fill_dates(database.x)
# Fill delta 14C from fraction modern
database.x <- ISRaD.extra.fill_rc(database.x)
# Fill atmospheric 14c
database.x <- ISRaD.extra.calc_atm14c(database.x)
# Fill delta delta
database.x <- ISRaD.extra.delta_delta(database.x)
```



---

```
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**

ISRaD\_data object with filled profile coordinates.

**Author(s)**

J. Beem-Miller

**Examples**

```
# Load example dataset Gaudinski_2001
database <- ISRaD::Gaudinski_2001
# Fill profile coordinates
database.x <- ISRaD.extra.fill_coords(database)
```

---

```
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**

QAQC does not require frc\_obs\_date\_y or inc\_obs\_date\_y fields to be filled in. Therefore it is recommended to run this function prior to running the functions "ISRaD.extra.fill\_rc" and "ISRaD.extra.calc\_atm14c", which require xxx\_obs\_date\_y data.

**Value**

ISRaD\_data object with filled frc\_obs\_date\_y and inc\_obs\_date\_y fields.

**Examples**

```
# Load example dataset Gaudinski_2001
database <- ISRaD::Gaudinski_2001
# Fill dates
database.x <- ISRaD.extra.fill_dates(database)
# Fraction table now has lyr_obs_date_y values in frc_obs_date_y field
```

---

ISRaD.extra.fill_rc	<i>ISRaD.extra.fill_14c</i>
---------------------	-----------------------------

---

**Description**

Fills delta 14c or fraction modern data if either are missing

**Usage**

```
ISRaD.extra.fill_rc(database)
```

**Arguments**

database            ISRaD dataset object.

**Details**

Warning: xxx\_obs\_date\_y columns must be filled for this to work! This function also fills standard deviation and sigma values. Note that this function replaces two older functions ("ISRaD.extra.fill\_fm" and "ISRaD.extra.fill\_14c") from ISRaD v1.0 that did not work properly.

**Value**

ISRaD\_data object with filled radiocarbon data columns in all tables

**Author(s)**

J. Beem-Miller & A. Hoyt

**References**

Stuiver and Polach, 1977

## Examples

```
# Load example dataset Gaudinski_2001
database <- ISRaD::Gaudinski_2001
# Note that some flx_14c values are NA
is.na(database$flux$flx_14c)
is.na(database$layer$lyr_14c)
# Fill dates
database.x <- ISRaD.extra.fill_dates(database)
# Fill rc values
database.x <- ISRaD.extra.fill_rc(database.x)
# Missing radiocarbon data has now been filled if possible, e.g. column flx_14c in the "flux" table
is.na(database$flux$flx_14c)
```

---

ISRaD.extra.geospatial

*ISRaD.extra.geospatial*


---

## Description

Extracts data from a user-supplied raster file and adds data as a new variable at the profile level

## Usage

```
ISRaD.extra.geospatial(
  database,
  geodata_directory,
  CRS = "+proj=longlat +datum=WGS84 +no_defs +ellps=WGS84 +towgs84=0,0,0"
)
```

## Arguments

database	ISRaD dataset object
geodata_directory	Directory where geospatial data are found
CRS	Coordinate reference system used for geospatial datasets

## Details

Generic function that uses geographic coordinates of profiles to extract data from one or more raster files. Raster data will be added as new variables at the profile level.

The new variable name will be a concatenation of "pro\_", and the file name (excluding the file extension). The ISRaD file name convention for geospatial files uses a 6 component string, separated by "\_". Missing components can be replaced with "x" ("x"s will be dropped before creating variable names). The 6 components are as follows:

- 1) Short description of the data type, e.g. "bd" for bulk density
- 2) Top layer depth or exact depth (numeric, cm)
- 3) Bottom layer depth (numeric, cm)
- 4) Year of data observation (numeric)
- 5) Data units (e.g. mmyr for mean annual precipitation)

#### 6) Any relevant notes

Coordinate reference system can be specified with the "CRS" argument; default is WGS84. Note that all files in geodata\_directory must use the same CRS.

### Value

Updated ISRaD\_extra object with new columns at the profile level

### Examples

```
# Load example dataset Gaudinski_2001
database <- ISRaD::Gaudinski_2001
# Fill profile coordinates
database <- ISRaD.extra.fill_coords(database)
# Run function
# Note that geospatial data in pkg is only for the Gaudinski_2001 dataset
# Users may supply their own geospatial data as long as it can be read by the raster package
database.x <- ISRaD.extra.geospatial(database,
  geodata_directory = system.file("extdata", "geodata_directory", package = "ISRaD")
)
```

---

ISRaD.extra.geospatial.keys

*ISRaD.extra.geospatial.keys*

---

### Description

Recode numeric values from categorical geospatial data products

### Usage

```
ISRaD.extra.geospatial.keys(database, geodata_keys)
```

### Arguments

database	ISRaD dataset object
geodata_keys	directory where geospatial data are found

### Details

Generic function that reads .csv files paired with categorical raster data and recodes extracted data in the ISRaD\_extra object. For the function to work, the .csv filenames must be identical to the corresponding raster filenames (except for the file extension). Additionally, the first column of the .csv file must contain the numeric identifier and the second column the corresponding character value.

**Value**

Updated ISRaD\_extra object with recoded columns.

**Examples**

```
# Load example dataset Gaudinski_2001
database <- ISRaD::Gaudinski_2001
# Fill profile coordinates
database <- ISRaD.extra.fill_coords(database)
# Fill geospatial data
database.x <- ISRaD.extra.geospatial(database,
  geodata_directory = system.file("extdata", "geodata_directory", package = "ISRaD")
)
# Recode numeric data to categorical
database.x <- ISRaD.extra.geospatial.keys(database.x,
  geodata_keys = system.file("extdata", "geodata_keys", package = "ISRaD")
)
```

---

ISRaD.extra.norm14c\_year

*ISRaD.extra.norm14c\_year*


---

**Description**

Normalizes delta 14c values to a given year (norm\_year)

**Usage**

```
ISRaD.extra.norm14c_year(
  df,
  obs_d14c,
  obs_year,
  atm_zone,
  norm_year,
  verbose = FALSE
)
```

**Arguments**

df	data frame with columns for observed d14c (obs_d14c), observation year (obs_year), and atmospheric zone (atm_zone)
obs_d14c	observed delta 14c value to be normalized
obs_year	year in which obs_d14c was observed (sample collection year)
atm_zone	atmospheric zone for obs_d14c. Must be one of c("NHc14", "SHc14", "Trop-icsc14"). "NHc14" = > 30 degrees latitude; "SHc14" = < -30 latitude; "Trop-icsc14" = < 30 & > -30 degrees latitude.
norm_year	desired normalization year
verbose	Show progress bar? TRUE/FALSE (default = FALSE)

## Details

Creates new column for normalized 14c in provided data frame. This function works by creating a one pool steady-state model using atmospheric 14c over the period 1850 to 2021. Turnover time is determined by fitting the model to the observed delta 14c (obs\_d14c) in the observation year (obs\_year), and the normalized 14c value is calculated by running the model forwards or backwards to the desired normalization year (norm\_year).

See the example for information on how to run the function when the "df" argument corresponds to a table from an ISRaD object, e.g. "flux", "layer", etc..

Note: There is no guarantee that normalized 14c values will be meaningful as the model assumes a well-mixed homogenous system, and this is rarely the case in soils. Can be very slow for large datasets!

## Value

data frame with normalized 14c values in new column.

## Author(s)

J. Beem-Miller and J. Randerson

## Examples

```
# Load example dataset Gaudinski_2001
database <- ISRaD::Gaudinski_2001
# Fill profile coordinates
database.x <- ISRaD.extra.fill_coords(database)
# Fill dates
database.x <- ISRaD.extra.fill_dates(database.x)
# Fill delta 14C from fraction modern
database.x <- ISRaD.extra.fill_rc(database.x)
# Fill atmospheric 14c
database.x <- ISRaD.extra.calc_atm14c(database.x)
# Run normalization function for the year 2010 with layer data
database.x$layer <- ISRaD.extra.norm14c_year(
  df = database.x$layer,
  obs_d14c = "lyr_14c",
  obs_year = "lyr_obs_date_y",
  atm_zone = "pro_graven_zone",
  norm_year = 2010,
  verbose = TRUE
)
```

---

ISRaD.flatten

*ISRaD.flatten*


---

## Description

Joins tables in ISRaD based on linking variables and returns flat data frame/s

**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 2-dimensional matrices for user-specified ISRaD tables by joining higher level tables (metadata, site, profile, layer) to lower level tables (layer, fraction, incubation, flux, interstitial).

**Value**

A dataframe with `nrow = nrow(table)` and `ncol = sum(ncol(meta), ncol(site), ncol(profile), ..., ncol(table))`

**Author(s)**

J. Beem-Miller

**Examples**

```
# Load example dataset Gaudinski_2001
database <- ISRaD::Gaudinski_2001
fractions <- ISRaD.flatten(database, "fraction")
layers <- ISRaD.flatten(database, "layer")
```

---

ISRaD.getdata

*ISRaD.getdata*


---

**Description**

Retrieves most recent version of ISRaD data from github

**Usage**

```
ISRaD.getdata(
  directory,
  dataset = "full",
  extra = FALSE,
  force_download = FALSE
)
```

**Arguments**

directory	Location of ISRaD_database_files folder. If not found, it will be created.
dataset	Specify which data you want. Options are c("full", "flux", "interstitial", "incubation", "fraction", "layer")
extra	TRUE/FALSE. If TRUE, the ISRaD_extra object will be returned. If FALSE, ISRaD_data will be returned. Default is FALSE.
force_download	TRUE/FALSE. If ISRaD_database files already exist in the specified directory, new data will not be downloaded by default. If force_download is set to TRUE, the newest data from github will be downloaded and overwrite any existing files.

**Value**

ISRaD data object

**Examples**

```
# Return full dataset ("full")
ISRaD_full <- ISRaD.getdata(tempdir(), dataset = "full", extra = FALSE)
# Return full dataset plus "extra" filled data
ISRaD_extra <- ISRaD.getdata(tempdir(), dataset = "full", extra = TRUE)
# Return only fraction data, including filled fraction data
ISRaD_fractions <- ISRaD.getdata(tempdir(), dataset = "fraction", extra = TRUE)
```

---

ISRaD.read.entry	<i>ISRaD.read.entry</i>
------------------	-------------------------

---

**Description**

Reads ISRaD data object from Excel file in standard template format

**Usage**

```
ISRaD.read.entry(
  entry,
  template_file = system.file("extdata", "ISRaD_Master_Template.xlsx", package =
    "ISRaD")
)
```

**Arguments**

entry	ISRaD data object.
template_file	Directory path and name of template file to use (defaults to the ISRaD_Master_Template file built into the package).

**Author(s)**

J. Beem-Miller



**Examples**

```
# Load example dataset Gaudinski_2001
entry <- ISRaD::Gaudinski_2001
ISRaD.save.entry(
  entry = entry,
  template_file = system.file("extdata", "ISRaD_Master_Template.xlsx", package = "ISRaD"),
  outfile = file.path(tempdir(), "Gaudinski_2001.xlsx")
)
# Read in .xlsx file
ISRaD.read.entry(file.path(tempdir(), "Gaudinski_2001.xlsx"))
```

---

ISRaD.rep.count.all	<i>ISRaD.rep.count.all</i>
---------------------	----------------------------

---

**Description**

Generates a report of counts of observations at each level of the database

**Usage**

```
ISRaD.rep.count.all(database)
```

**Arguments**

database	ISRaD data object
----------	-------------------

**Value**

A tibble of observation counts, one column for each database table.

**Examples**

```
# Load example dataset Gaudinski_2001
database <- ISRaD::Gaudinski_2001
ISRaD.rep.count.all(database)
```

---

ISRaD.rep.count.frc	<i>ISRaD.rep.count.frc</i>
---------------------	----------------------------

---

**Description**

Generates a report of fraction level observations, including fraction scheme and properties. Note that this function only counts rows, not 14C observations.

**Usage**

```
ISRaD.rep.count.frc(database)
```

**Arguments**

database            ISRaD data object

**Examples**

```
# Load example dataset Gaudinski_2001
database <- ISRaD::Gaudinski_2001
ISRaD.rep.count.frc(database)
```

---

ISRaD.rep.entry.stats    *ISRaD.rep.entry.stats*

---

**Description**

Generates a report of metadata statistics for all entries

**Usage**

```
ISRaD.rep.entry.stats(database)
```

**Arguments**

database            ISRaD data object

**Examples**

```
# Load example dataset Gaudinski_2001
database <- ISRaD::Gaudinski_2001
ISRaD.rep.entry.stats(database)
```

---

ISRaD.rep.site.map        *ISRaD.rep.site.map*

---

**Description**

Generates a world map showing locations of all ISRaD sites

**Usage**

```
ISRaD.rep.site.map(database)
```

**Arguments**

database            ISRaD data object

**Examples**

```
# Obtain current ISRaD data
database <- ISRaD.getdata(tempdir(), dataset = "full", extra = FALSE)
# Generate a map of all ISRaD sites
ISRaD.rep.site.map(database)
```

---

ISRaD.report

*ISRaD.report*


---

### Description

Generate basic summary reports of ISRaD data

### Usage

```
ISRaD.report(database, report)
```

### Arguments

database	ISRaD data object
report	Parameter to define which type of report is desired. The default is "count.all" other options include "entry.stats", "count.frc", or "site.map".

### Details

Wrapper for the simple reporting functions ISRaD.rep.count.all, ISRaD.rep.count.frc, ISRaD.rep.entry.stats, ISRaD.rep.site.map

### Examples

```
# Load example dataset Gaudinski_2001
database <- ISRaD::Gaudinski_2001
# Report metadata statistics
ISRaD.report(database, report = "entry.stats")
# Report summary statistics for all levels of the database
ISRaD.report(database, report = "count.all")
# Generate a map of all ISRaD sites
ISRaD.report(database, report = "site.map")
```

---

ISRaD.save.entry

*ISRaD.save.entry*


---

### Description

Saves ISRaD data object to .xlsx file

### Usage

```
ISRaD.save.entry(
  entry,
  template_file = system.file("extdata", "ISRaD_Master_Template.xlsx", package =
    "ISRaD"),
  outfile
)
```

**Arguments**

entry	ISRaD data object
template_file	Directory path and name of template file to use (defaults to the ISRaD_Master_Template file built into the package). Not recommended to change this.
outfile	File name and path for .xlsx output

**Details**

This function can be used to save a single entry (or a compiled database in the standard template format) to an .xlsx file.

Note: Replaces the function "ISRaD.save.xlsx" as that function depended on the package openxlsx, which was unstable at the time. This a simpler function and does not maintain the formatting of the template file. The code for the original function is available in the ISRaD github repository in the [devScripts](#) directory.

**Author(s)**

J. Beem-Miller

**Examples**

```
# Load example dataset Gaudinski_2001
entry <- ISRaD::Gaudinski_2001
ISRaD.save.entry(
  entry = entry,
  template_file = system.file("extdata", "ISRaD_Master_Template.xlsx", package = "ISRaD"),
  outfile = file.path(tempdir(), "Gaudinski_2001.xlsx")
)
```

---

QAQC

---

*QAQC*


---

**Description**

Checks template files for data coherence, formatting, and data entry errors

**Usage**

```
QAQC(
  file,
  writeQCreport = FALSE,
  outfile_QAQC = "",
  summaryStats = TRUE,
  dataReport = FALSE,
  checkdoi = TRUE,
  verbose = TRUE,
  local = TRUE
)
```

### Arguments

file	File path for template file to be checked
writeQCreport	If TRUE, a text report of the QC output will be written to the outfile. Default is FALSE
outfile_QAQC	Filename of the output file (if writeQCreport is TRUE). Default is NULL, with the outfile being written to the directory where the template file is stored and named according to the file being checked.
summaryStats	Prints summary statistics. Default is TRUE.
dataReport	Prints list structure of database. Default is FALSE.
checkdoi	Set to FALSE if you do not want the QAQC check to validate DOIs (if TRUE this will be time consuming). Default is TRUE.
verbose	Set to TRUE to print results of function to console. Default is TRUE.
local	Set to FALSE to fetch most up-to-date template and template info files. If TRUE, the local files or files from CRAN package will be used. Default is TRUE.

### Details

This function can also be called from the [ISRaD website](#).

### Examples

```
# Load example dataset Gaudinski_2001
entry <- ISRaD::Gaudinski_2001
# Save as .xlsx file
ISRaD.save.entry(
  entry = entry,
  template_file = system.file("extdata", "ISRaD_Master_Template.xlsx", package = "ISRaD"),
  outfile = file.path(tempdir(), "Gaudinski_2001.xlsx")
)
# Run QAQC
QAQC(file.path(tempdir(), "Gaudinski_2001.xlsx"))
```

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