Package: urbanAnnualRunoff (via r-universe)

September 15, 2024

Title R Package for Deriving Urban Surfaces for Storm Runoff Analysis

Version 0.1.0

Description Used in Project KEYS for generating inputs to runoff model
ABIMO for application in cities with data scarcity.

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URL https://github.com/KWB-R/urbanAnnualRunoff

BugReports https://github.com/KWB-R/urbanAnnualRunoff/issues

Depends R (>= 3.5.0)

Imports dplyr, foreign, kwb.utils, lubridate, magrittr, raster, rlang,
stringr, tibble, tidyselect

Suggests caret, covr, DT, fs, knitr, kwb.abimo, kwb.ml, openxlsx,
remotes, rmarkdown

VignetteBuilder knitr

Remotes github::kwb-r/kwb.abimo, github::kwb-r/kwb.ml,
github::kwb-r/kwb.utils

Encoding UTF-8

LazyData true

Roxygen list(markdown = TRUE)

RoxygenNote 7.1.2

Repository https://kwb-r.r-universe.dev

RemoteUrl https://github.com/KWB-R/urbanAnnualRunoff

RemoteRef HEAD

RemoteSha 668221077f734dbb678317ba1d7e4031493f058a

Contents

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calculate_loads   *Emissions: calculate loads*

Description

The annual load is calculated with V x c. For for heavy metals -> l/m2-year x ug/l = ug/m2-year; for BOD/COD/TSS -> l/m2-year x mg/l = mg/m2-year

Usage

```
calculate_loads(abimo_inpout, concentrations)
```

Arguments

abimo_inpout   data.frame or SpatialPolygonsDataFrame with ABIMO input and output as re-
                trieved by postProcessABIMO

concentrations concentrations data frame as retrieved by read_concentrations

Value

add calculated loads as additional colums to abimo_inpout data.frame or SpatialPolygonsDataFrame

---

computeABIMOclimate   *abimo: compute climate*

Description

read Climate Engine data and compute (source: https://app.climateengine.org/climateEngine)

Usage

```
computeABIMOclimate(
  rawdir,
  file_inp,
  file_out,
  summer_month_start = 4,
  skip = 6,
  sep = "",
  dec = "."
)
```

Arguments

rawdir	rawdir
file_inp	name of input file
file_out	name of output file to be written in "raw_dir"
summer_month_start	
	number of month where summer half year starts (default: 4)
skip	skip (default: 6)
sep	sep (default: ")
dec	dec (default: '.')

Value

data frame with yearly summed measurements (summer half year, total year sum) and also text file written to "raw_dir" with "out_file" name

---

fix_abimo_shares   *Fix ABIMO shares*

Description

Fix ABIMO shares

Usage

```
fix_abimo_shares(abimo)
```

Arguments

abimo   abimo object

Value

fixed percental shares (PROBAU, PROVGU, STR_FLGES)

---

get_abimo_stats   *Get ABIMO Statistics*

Description

Get ABIMO Statistics

Usage

```
get_abimo_stats(abimo_inpout)
```

Arguments

abimo_inpout   abimo_inpout

Value

tibble with columns "catchment_km2", "rainfall_cbm", "infiltration_cbm", evapotrans_cbm and "vrr" (1 - runoff_cbm / rainfall_cbm)

---

get_scenario_results   *Get Scenario Results*

Description

Get Scenario Results

Usage

```
get_scenario_results(paths)
```

Arguments

paths   paths to directory containing all ABIMO scenario results

Value

tibble

---

makeFLGES	*compute ABIMO variable FLGES (block area without street area)*

Description

compute ABIMO variable FLGES (block area without street area)

Usage

```
makeFLGES(subcatchmSPobject)
```

Arguments

subcatchmSPobject

      subcatchmSPobject

Value

???

---

makeOverlay	*spatial overlay of subcatchments and raster holding information required by ABIMO*

Description

spatial overlay of subcatchments and raster holding information required by ABIMO

Usage

```
makeOverlay(
  rawdir,
  rasterData,
  subcatchmSPobject,
  overlayName,
  subcatchmNamesCol
)
```

Arguments

rawdir   Path to data directory.

rasterData   Name of raster file containing classified image.

subcatchmSPobject

      Spatial dataset containing subcatchment polygons (ABIMO Blockteilflächen) (sp object type, R package sp).

overlayName   Name of output overlay object.

subcatchmNamesCol

                  Name of column in the attribute table of subcatchmSPobject that contains the subcatchment identifiers. This is used for naming the elements of the resulting list

Value

save overlay as .Rdata in directory "rawdir" with filename defined in

---

makePROBAU   *compute ABIMO variable PROBAU (covered sealed area)*

Description

compute ABIMO variable PROBAU (covered sealed area)

Usage

```
makePROBAU(rawdir, rasterData, overlayName, targetValue)
```

Arguments

rawdir	rawdir
rasterData	rasterData
overlayName	overlayName
targetValue	targetValue

Value

???

---

makeSTR_FLGES   *compute ABIMO variable STR_FLGES (street area of block area)*

Description

compute ABIMO variable STR_FLGES (street area of block area)

Usage

```
makeSTR_FLGES(
  rawdir,
  subcatchmSPobject,
  rasterData,
  overlayName,
  targetValue,
  mask,
  add_streets_outside_subcatchments = FALSE
)
```

Arguments

rawdir   rawdir

subcatchmSPobject

                subcatchmSPobject

rasterData   rasterData

overlayName   overlayName

targetValue   targetValue

mask   mask

add_streets_outside_subcatchments

                boolean (TRUE/FALSE), if TRUE: as is done for Berlin, street area outside of the subcatchment polygons is distributed among the polygons in proportion to their area. thus: street area of polygon = internal street area + allocated external street area, if FALSE: only street area within subcatchments are counted (default: FALSE)

Value

STR_FLGES

---

makeVG   *compute ABIMO variable VG (soil sealing percentage)*

Description

based on online global land use data

Usage

```
makeVG(rawdir, subcatchmSPobject, rasterData, targetValue)
```

Arguments

rawdir   rawdir

subcatchmSPobject

                subcatchmSPobject

rasterData   rasterData

targetValue   targetValue

Value

???

---

padCODE   *helper function: pad CODE column of ABIMO table*

Description

helper function: pad CODE column of ABIMO table

Usage

```
padCODE(string)
```

Arguments

string   string with CODE identifier

Value

padded CODE identifier (with leading "0" depending of maximium character length)

---

postProcessABIMO   *abimo: postprocess*

Description

read dbf results file and joins with input shapefile

Usage

```
postProcessABIMO(path_input, path_output)
```

Arguments

path_input   path of ABIMO input shapefile

path_output   path of ABIMO output DBF file

Value

joined SpatialPolygonsDataFrame with ABIMO input and output

---

read_concentrations   *Emissions: read concentrations from OgRe database*

Description

imports data from OgRe database and selects relevant substances for case study sites (Beijing, Jinxi) and calculates mean concentrations over all structures (column: "mean"). In addition new columns (short_name, unit_load, label_load) are created

Usage

```
read_concentrations(path)
```

Arguments

path   path to OgRe database file "annual_mean_conc.csv"

Value

data frame with selected substances and column

---

scenario_results_beijing

Results of ABIMO Scenario Analysis For Beijing

Description

A dataset for ABIMO modelling results for Beijing case study

Usage

```
scenario_results_beijing
```

Format

A data.frame with 21 rows and 20 variables:

scenario_name name of scenario

catchment_km2 sum of FLGES ans STR_FLGES (in square kilometers)

rainfall_cbm total rianfall in catchment ABIMO (in cubicmeters/year)

runoff_cbm calculated runoff by ABIMO (in cubicmeter)

infiltration_cbm calculated infiltration by ABIMO (in cubicmeter/year)

evapotrans_cbm calculated evapotranspiration by ABIMO (in cubicmeter/year)

vrr calculated volume rainfall retained (1-runoff_cbm/rainfall_cbm)

abimo_inpout tibble with ABIMO input/output (only water balance)

abimo_inpout_emissions tibble with ABIMO input/output (water balance + emissions)

BOD.kg_yr Biological Oxygen Demand (in kg/year)

COD.kg_yr Chemical Oxygen Demand (in kg/year)

TSS.kg_yr Total Supended Solid (in kg/year)

Pb.kg_yr Lead (in kg/year)

Cd.kg_yr Cadmium (in kg/year)

Cr.kg_yr Chrome (in kg/year)

Cu.kg_yr Copper (in kg/year)

Ni.kg_yr Nickel (in kg/year)

Va.kg_yr Vanadium (in kg/year)

Zn.kg_yr Zinc (in kg/year)

---

scenario_results_jinxi

Results of ABIMO Scenario Analysis For Jinxi

Description

A dataset for ABIMO modelling results for Jinxi case study

Usage

    scenario_results_jinxi

Format

A data.frame with 3 rows and 20 variables:

scenario_name name of scenario

catchment_km2 sum of FLGES ans STR_FLGES (in square kilometers)

rainfall_cbm total rianfall in catchment ABIMO (in cubicmeters/year)

runoff_cbm calculated runoff by ABIMO (in cubicmeter)

infiltration_cbm calculated infiltration by ABIMO (in cubicmeter/year)

evapotrans_cbm calculated evapotranspiration by ABIMO (in cubicmeter/year)

vrr calculated volume rainfall retained (1-runoff_cbm/rainfall_cbm)

abimo_inpout tibble with ABIMO input/output (only water balance)

abimo_inpout_emissions tibble with ABIMO input/output (water balance + emissions)

BOD.kg_yr Biological Oxygen Demand (in kg/year)

COD.kg_yr Chemical Oxygen Demand (in kg/year)

TSS.kg_yr Total Supended Solid (in kg/year)

Pb.kg_yr Lead (in kg/year)

Cd.kg_yr Cadmium (in kg/year)

Cr.kg_yr Chrome (in kg/year)

Cu.kg_yr Copper (in kg/year)

Ni.kg_yr Nickel (in kg/year)

Va.kg_yr Vanadium (in kg/year)

Zn.kg_yr Zinc (in kg/year)

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