Package 'GR2MSemiDistr'

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Type Package

Title A package for hydrological modelling with a semidistribute GR2M model version

Version 2.0.5

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Description This package run a semidistributed GR2M version applying a Weighted Flow Accumulation algorithm using TauDEM (required)

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Encoding UTF-8

Depends R (>= 3.6),

Imports airGR, foreach, hydroGOF, ncdf4, raster, rgdal, rgeos, rtop, tictoc, lubridate, FME

LazyData true

RoxygenNote 7.1.0

R topics documented:

`Create_Forcing_Inputs` *Prepare forcing data (Dates, Precip, PotEvap, Qobs) for each subbasin.*

Description

Prepare forcing data (Dates, Precip, PotEvap, Qobs) for each subbasin.

Usage

```
Create_Forcing_Inputs(Shapefile, Database, Precip, PotEvap, Qobs = NULL,
  DateIni, DateEnd, Resolution = 0.01, Factor = 1, Positions = NULL,
  Members = NULL, Horiz = NULL, Update = FALSE)
```

Arguments

Shapefile	Subbasin shapefile with attributes of Region, Area and ID.
Database	Directory where forcing data (precip, pet) in netcdf format are located.
Precip	Precipitation filename (in netcdf format).
PotEvap	Evapotranspiration filename (in netcdf format).
Qobs	Observed streamflow filename (data in m3/s). NULL as default.
DateIni	Initial date 'mm/yyyy' for export data.
DateEnd	Final date 'mm/yyyy' for export data.
Resolution	Resolution to resample rasters and extract areal mean values for each subbasin. 0.01 as default.
Factor	Factor between 1 and 1.2 to buffer subbasins and extract data. 1 as default
Positions	Cell numbers to extract data faster for each subbasin. NULL as default
Members	Number of ensemble members. NULL as default.
Horiz	Number of months for forcastting. NULL as default.
Update	Contiditional to take into account just the last forcing value for updating model. FALSE as default.

Value

Export and save a text file with forcing data inputs (Dates, Precip, Evap, Qobs).

Optim_GR2MSemiDistr *Model parameter optimization with SCE-UA algorithm.*

Description

Model parameter optimization with SCE-UA algorithm.

Usage

```
Optim_GR2MSemiDistr(Parameters, Parameters.Min, Parameters.Max,
  Max.Functions = 10000, Optimization = "NSE", Location, Shapefile,
  Input = "Inputs_Basins.txt", WarmIni, RunIni, RunEnd, IdBasin,
  Remove = FALSE, No.Optim = NULL, IniState = NULL)
```

Arguments

Parameters	GR2M (X1 and X2) model parameters and a multiplying factor to adjust monthly P and PET values.
Parameters.Min	Minimum GR2M (X1, X2, fprecip and fpet) model parameters values.
Parameters.Max	Maximum GR2M (X1, X2, fprecip and fpet) model parameters values.
Max.Functions	Maximum number of functions used in the optimization loop. 10000 as default.
Optimization	Mono-objective evaluation criteria for GR2M (NSE, lnNSE, KGE, RMSE, R, PBIAS).
Location	Directory where 'Inputs' folder is located.
Shapefile	Subbasin shapefile.
Input	Forcing data texfile (Dates, Precip, PotEvap, Qobs). 'Inputs_Basins.txt' as default.
WarmIni	Initial date (in 'mm/yyyy' format) of the warm-up period.
RunIni	Initial date (in 'mm/yyyy' format) of the model simulation period.
RunEnd	Final date (in 'mm/yyyy' format) of the model simulation period.
IdBasin	ID for the outlet subbasin (from shapefile attribute table).
Remove	Logical value to remove streamflows of the outlet subbasin (IdBasin). FALSE as default.
No.Optim	Calibration regions not to be optimized.
IniState	Initial GR2M states variables. NULL as default.

Value

Best GR2M model parameters.

Routing_GR2MSemiDistr *Routing simulated monthly streamflows for each subbasin.*

Description

Routing simulated monthly streamflows for each subbasin.

Usage

```
Routing_GR2MSemiDistr(Location, Model, Shapefile, Dem, AcumIni, AcumEnd,
  Save = FALSE, Update = FALSE, Positions = NULL, all = FALSE)
```

Arguments

Location	Directory where 'Inputs' folder is located.
Model	Model results from Run_GR2MSemiDistr.
Shapefile	Subbasin shapefile.
Dem	Raster DEM.
AcumIni	Initial date 'mm/yyyy' for accumulation.
AcumEnd	Final date 'mm/yyyy' for accumulation.

Save	Logical value to save raster results for each time-step. FALSE as default.
Update	Logical value to update a previous accumulation csv file. FALSE as default.
Positions	Cell numbers to extract data faster for each subbasin. NULL as default.
all	Conditional to consider all the period of model from GR2MSemiDistr. FALSE as default

Value

Export and save an accumulation csv file.

`Run_GR2MSemiDistr` *Run the GR2M model for each subbasins.*

Description

Run the GR2M model for each subbasins.

Usage

```
Run_GR2MSemiDistr(Parameters, Location, Shapefile,
  Input = "Inputs_Basins.txt", WarmIni = NULL, RunIni, RunEnd,
  IdBasin = NULL, Remove = FALSE, Plot = FALSE, IniState = NULL,
  Regional = FALSE, Update = FALSE, Save = TRUE)
```

Arguments

Parameters	GR2M model parameters (X1 and X2) and multiplying factors for P and PET.
Location	Directory where 'Inputs' folder is located.
Shapefile	Subbasin shapefile.
Input	Forcing data texfile (Dates, Precip, PotEvap, Qobs). 'Inputs_Basins.txt' as default.
WarmIni	Initial date (in 'mm/yyyy' format) of the warm-up period.
RunIni	Initial date (in 'mm/yyyy' format) of the model simulation period.
RunEnd	Final date (in 'mm/yyyy' format) of the model simulation period.
IdBasin	ID for the outlet subbasin (from shapefile attribute table).
Remove	Logical value to remove streamflows of the outlet subbasin (IdBasin). FALSE as default.
Plot	Logical value to plot observed and simulated streamflow timeseries. FALSE as default.
IniState	Initial GR2M states variables. NULL as default.
Regional	Logical value to simulate in a regional mode (more than one outlet). FALSE as default.
Update	Logical value to update a previous production and qsubbasin '.csv' files. FALSE as default.
Save	Logical valute to export simulation results as '.Rda'. TRUE as default.

Value

GR2M model outputs for each subbasin.

`Uncertainty_GR2MSemiDistr` *Uncertainty analysis of GR2M model parameters with the MCMC algorithm.*

Description

Uncertainty analysis of GR2M model parameters with the MCMC algorithm.

Usage

```
Uncertainty_GR2MSemiDistr(Parameters, Parameters.Min, Parameters.Max,
  Niter = 1000, Location, Shapefile, Input = "Inputs_Basins.txt",
  WarmIni, RunIni, RunEnd, IdBasin, Remove = FALSE, IniState = NULL)
```

Arguments

`Parameters`	GR2M (X1 and X2) model parameters and a multiplying factor to adjust monthly P and PET values.
`Parameters.Min`	Minimum GR2M (X1, X2, fprecip and fpet) model parameters values.
`Parameters.Max`	Maximum GR2M (X1, X2, fprecip and fpet) model parameters values.
`Niter`	Number of iterations. 1000 as default.
`Location`	Directory where 'Inputs' folder is located.
`Shapefile`	Subbasin shapefile.
`Input`	Forcing data texfile (Dates, Precip, PotEvap, Qobs). 'Inputs_Basins.txt' as default.
`WarmIni`	Initial date (in 'mm/yyyy' format) of the warm-up period.
`RunIni`	Initial date (in 'mm/yyyy' format) of the model simulation period.
`RunEnd`	Final date (in 'mm/yyyy' format) of the model simulation period.
`IdBasin`	ID for the outlet subbasin (from shapefile attribute table).
`Remove`	Logical value to remove streamflows of the outlet subbasin (IdBasin). FALSE as default.
`IniState`	Initial GR2M states variables. NULL as default.

Value

Parameter and streamflow uncertanty bounds.

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