Package 'GR2MSemiDistr'

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Type Package

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

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Description This package run a semidistributed GR2M version using a Weighted Flow Accumulation algorithm using TauDEM_537 (required)

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Encoding UTF-8

Depends R (>= 3.6),

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

LazyData true

RoxygenNote 7.1.0

R topics documented:

`Create_Forcing_Inputs` *Prepare model inputs at subbasin scales in airGR format from gridded datasets.*

Description

Prepare model inputs at subbasin scales in airGR format from gridded datasets.

Usage

```
Create_Forcing_Inputs(Subbasins, Precip, PotEvap, Qobs = NULL, DateIni,
  DateEnd, Save = FALSE, Update = FALSE, Resolution = 0.01,
  Buffer = 1.1, Members = NULL, Horiz = NULL)
```

Arguments

`Subbasins`	Subbasins shapefile.
`Precip`	Netcdf file for precipitation (in mm/month).
`PotEvap`	Netcdf file for potential evapotranspiration (in mm/month).
`Qobs`	Observed streamflow (in m3/s). NULL as default.
`DateIni`	Initial date of the data (in mm/yyyy format).
`DateEnd`	Final date of the data (in mm/yyyy format).
`Save`	Boolean to save database as textfile. FALSE as default.
`Update`	Boolean to extract the last values for model updating. FALSE as default.
`Resolution`	Resolution to resample gridded data. 0.01 as default.
`Buffer`	Multiplicative factor to buffer subbasins extents. 1.1 as default.
`Members`	Number of ensemble members for model forcasting. NULL as default.
`Horiz`	Number of months for model forcasting. NULL as default.

Value

Return a dataframe with datavase in airGR format (DatesR,P,E,Q).

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

Description

Model parameter optimization with SCE-UA algorithm.

Usage

```
Optim_GR2MSemiDistr(Data, Subbasins, RunIni, RunEnd, WarmUp = NULL,
  Parameters, Parameters.Min, Parameters.Max, Max.Functions = 5000,
  Optimization = "NSE", No.Optim = NULL)
```

Arguments

Data	File with input data in airGR format (DatesR,P,E,Q).
Subbasins	Subbasins shapefile.
RunIni	Initial date of model simulation (in mm/yyyy format).
RunEnd	Final date of model simulation (in mm/yyyy format).
WarmUp	Number of months for warm-up. NULL as default.
Parameters	GR2M model parameters and correction factor of P and E.
Parameters.Min	Minimum values of GR2M model parameters and correction factor of P and E.
Parameters.Max	Maximum values of GR2M model parameters and correction factor of P and E.
Max.Functions	Maximum number of function evaluation for optimization. 5000 as default.
Optimization	Objective function (NSE, KGE, RMSE).
No.Optim	Regions not to be optimized. NULL as default.

Value

Optimal GR2M model parameters.

Routing_GR2MSemiDistr *Routing simulated monthly streamflows for each subbasin.*

Description

Routing simulated monthly streamflows for each subbasin.

Usage

```
Routing_GR2MSemiDistr(Model, Subbasins, Dem, AcumIni = NULL,
  AcumEnd = NULL, Positions = NULL, Save = FALSE, Update = FALSE)
```

Arguments

Model	Model results from Run_GR2MSemiDistr.
Subbasins	Subbasins shapefile.
Dem	Raster DEM.
AcumIni	Initial date for accumulation (in mm/yyyy format). NULL as default
AcumEnd	Final date for accumulation (in mm/yyyy format). NULL as default
Positions	Cell numbers to extract data faster for each subbasin. NULL as default.
Save	Boolean to results as text file. FALSE as default.
Update	Boolean to update a previous accumulation file. 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(Data, Subbasins, RunIni, RunEnd, WarmUp = NULL,
  Parameters, IniState = NULL, Regional = FALSE, Save = FALSE,
  Update = FALSE)
```

Arguments

Data	Database in airGR format (DatesR,P,E,Q).
Subbasins	Subbasins shapefile.
RunIni	Initial date for model simulation (in mm/yyyy format).
RunEnd	Final date for model simulation (in mm/yyyy format).
WarmUp	Number of months for warm-up. NULL as default.
Parameters	Model parameters and correction factor of P and E.
IniState	Initial states variables. NULL as default.
Regional	Boolean to simulate in a regional mode (more than one hydrological station). FALSE as default.
Save	Boolean to save outputs as text files. FALSE as default.
Update	Bollean to update previous outputs text files. FALSE 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(Data, Subbasins, Dem, RunIni, RunEnd,
  WarmUp = NULL, Parameters, Parameters.Min, Parameters.Max, Niter,
  IniState = NULL, Positions = NULL, MCMC = NULL)
```

Arguments

Data	File with input data in airGR format (DatesR,P,E,Q).
Subbasins	Subbasins shapefile.
Dem	Raster DEM filename.
RunIni	Initial date of model simulation (in mm/yyyy format).
RunEnd	Final date of model simulation (in mm/yyyy format).
WarmUp	Number of months for warm-up. NULL as default.
Parameters	GR2M model parameters and correction factor of P and E.
Parameters.Min	Minimum values of GR2M model parameters and correction factor of P and E.
Parameters.Max	Maximum values of GR2M model parameters and correction factor of P and E.
Niter	Number of iterations. 1000 as default.
IniState	Initial GR2M states variables. NULL as default.
Positions	Cell numbers to extract data faster for each subbasin. NULL as default.
MCMC	MCMC data in .Rda format.

Value

Lower(Q5) and upper (Q95) streamflows uncertainty bounds.

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