

Package ‘GR2MSemiDistr’

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Type Package

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

Version 3.0.0

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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

LazyData true

RoxygenNote 7.1.0

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Create_Forcing_Inputs *Prepare model data inputs in airGR format.*

Description

Prepare model data inputs in airGR format.

Usage

```
Create_Forcing_Inputs(Subbasins, Precip, PotEvap, Qobs = NULL, DateIni,
  DateEnd, Resolution = 0.01, Buffer = 1, Save = TRUE,
  Positions = NULL, Members = NULL, Horiz = NULL, Update = FALSE)
```

Arguments

Subbasins	Subbasins shapefile.
Precip	Netcdf filename for precipitation dataset.
PotEvap	Netcdf filename for potential evapotranspiration dataset.
Qobs	Observed streamflow (in m3/s). NULL as default.
DateIni	Initial date for subsetting data (in mm/yyyy format).
DateEnd	Final date for subsetting data (in mm/yyyy format).
Resolution	Resolution to resample gridded-datasets. 0.01 as default.
Buffer	Factor to create a buffer of subbasins. 1 as default.
Save	Boolean to save database as textfile.
Positions	Cell numbers of subbasins to extract data faster. NULL as default
Members	Number of ensemble members for forecasting. NULL as default.
Horiz	Number of months for forecasting. NULL as default.
Update	Boolean to extract the last value for updating model. FALSE as default.

Value

Return a dataframe with data inputs in airGR format (DatesR,P,Ep,Q).

Optim_GR2MSemiDistr	<i>Model parameter optimization with SCE-UA algorithm.</i>
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Description

Model parameter optimization with SCE-UA algorithm.

Usage

```
Optim_GR2MSemiDistr(Data, Subbasin, RunIni, RunEnd, WarmUp, 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)
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.
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.
Subbasins	Subbasins shapefile.

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, Subbasin, Dem, AcumIni, AcumEnd,
    Positions = NULL, Save = FALSE, Update = FALSE)
```

Arguments

Model	Model results from Run_GR2MSemiDistr.
Subbasin	Subbasin shapefile.
Dem	Raster DEM.
AcumIni	Initial date for accumulation (in mm/yyyy format).
AcumEnd	Final date for accumulation (in mm/yyyy format).
Positions	Cell numbers to extract data faster for each subbasin. NULL as default.
Save	Boolean to save raster results for each time-step. FALSE as default.
Update	Boolean to update a previous accumulation file. FALSE as default.

Value

Export and save an accumulation csv file.

Run_GR2MSemiDistr	<i>Run the GR2M model for each subbasins.</i>
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Description

Run the GR2M model for each subbasins.

Usage

```
Run_GR2MSemiDistr(Data, Subbasin, RunIni, RunEnd, Parameters,
  IniState = NULL, Regional = FALSE, Update = FALSE, Save = TRUE)
```

Arguments

Data	File with input data in airGR format (DatesR,P,E,Q)
RunIni	Initial date of model simulation (in mm/yyyy format).
RunEnd	Final date of model simulation (in mm/yyyy format).
Parameters	GR2M model parameters and correction factor of P and E.
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.
Subbasins	Subbasins shapefile.

Value

GR2M model outputs for each subbasin.

Uncertainty_GR2MSemiDistr	<i>Uncertainty analysis of GR2M model parameters with the MCMC algorithm.</i>
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Description

Uncertainty analysis of GR2M model parameters with the MCMC algorithm.

Usage

```
Uncertainty_GR2MSemiDistr(Data, Subbasin, Dem, RunIni, RunEnd, WarmUp,
  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)
Dem	Raster DEM.
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.
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.
Subbasins	Subbasins shapefile.

Value

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

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