Latest developments of the airGR rainfall-runoff modelling R package: new calibration procedures and other features
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GR is a family of lumped hydrological models designed for flow simulation at various time steps. The models are freely available in an R package called airGR (Coron et al., 2017a, 2017b). The models can easily be implemented on a set of catchments with limited data requirements.

How to use other R packages to perform parameters estimation

- Definition of the necessary function:
  - transformation of parameters to real space (available in airGR)
  - computation of the value of the performance criterion (e.g. RMSE)

```
> OptimGR4J <- function(Param_Optim) {
  Param_Optim_Vre <- airGR::TransfoParam_GR4J(ParamIn = Param_Optim,
                                             Direction = "TR")
  OutputModel <- airGR::RunModel_GR4J(InputModel = InputOptimModel,
                                       Parameters = Param_Optim_Vre)
  OutputCrit <- airGR::ErrorCrit_RUN4J(InputModel = InputOptimModel,
                                         OutputModel = OutputModel)
  return(OutputCrit$CritValue)
```

- Definition of the lower and upper bounds of the four GR4J parameters in the transformed parameter space

```
lowerGR4J <- rep(-9.99, times = 4)
upperGR4J <- rep(+9.99, times = 4)
```

- Local optimisation
  - Single-start (here) or multi-start approach to test the consistency of the local optimisation

```
startGR4J <- c(4.1, 3.9, -0.9, -8.7)
```

- Global optimisation
  - Most often used when facing a complex response surface, with multiple local minima

```
control = list(trace = 1))
```

- Differential Evolution
  - Particle Swarm
  - MA-LS-Chains

```
optPSO <- hydroPSO::hydroPSO(fn = OptimGR4J,
                              lower = lowerGR4J, upper = upperGR4J,
                              control = list(trace = 1))
```

Future developments

- New version of CemaNeige that allows to use satellite snow cover area for calibration (Ribouet et al., accepted)
- Parameters maps on France for GR4J, GR5J & GR6J models for ungauged basins (Poncelet et al., submitted)

References


Download the airGR package

The airGR package is available on the Comprehensive R Archive Network: https://CRAN.R-project.org/package=airGR/