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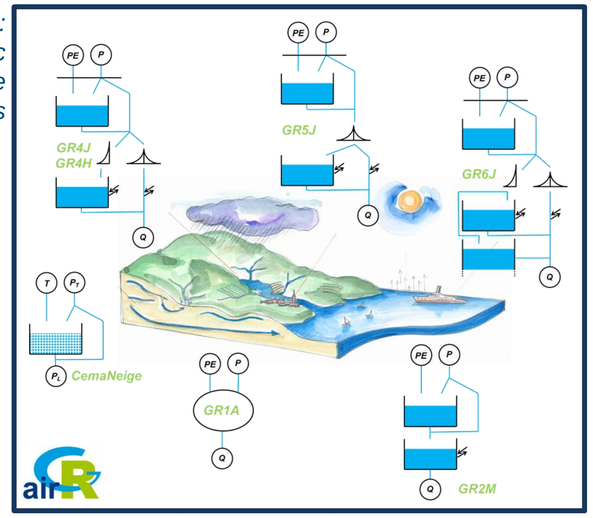
airGR: an R-package suitable for large sample hydrology presenting a suite of lumped hydrological models

GR is a family of lumped hydrological models designed for flow simulation at various time steps. The models are now available in a flexible R-package called airGR (Coron et al., 2017, submitted). The models can easily be implemented on a set of catchments with limited data requirements.

The GR hydrological models

The GR models were designed with the objective to be as efficient as possible for **flow simulation at various time steps**, ranging from hourly to interannual (Perrin et al., 2009).
The model structures were developed to have warranted complexity and **limited data requirements**.
The models can be applied on a wide range of conditions, including snowy catchments thanks to the CemaNeige **snow routine**.

Fig. 1: Schematic diagram of the GR models



The airGR functionalities

- Easy implementation on numerous catchments
- Data requirements limited to precipitation, temperature and streamflow time series
- One **automatic calibration procedure**
- A set of **efficiency criteria**
- Limited computation times (use of Fortran routines to run the models)
- Pre-defined **graphical plots**
- Outputs include simulated flow time series and internal variables
- Easy implementation of external user-defined models, efficiency criteria or optimization algorithms
- **Online Tutorial**: https://webgr.irstea.fr/airGR-website
- R-embedded help following the R standards

Fig. 2: Main components of the airGR package

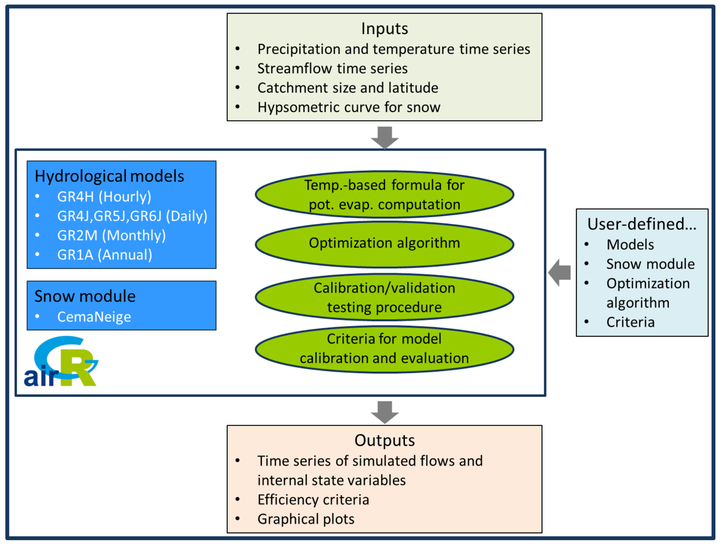
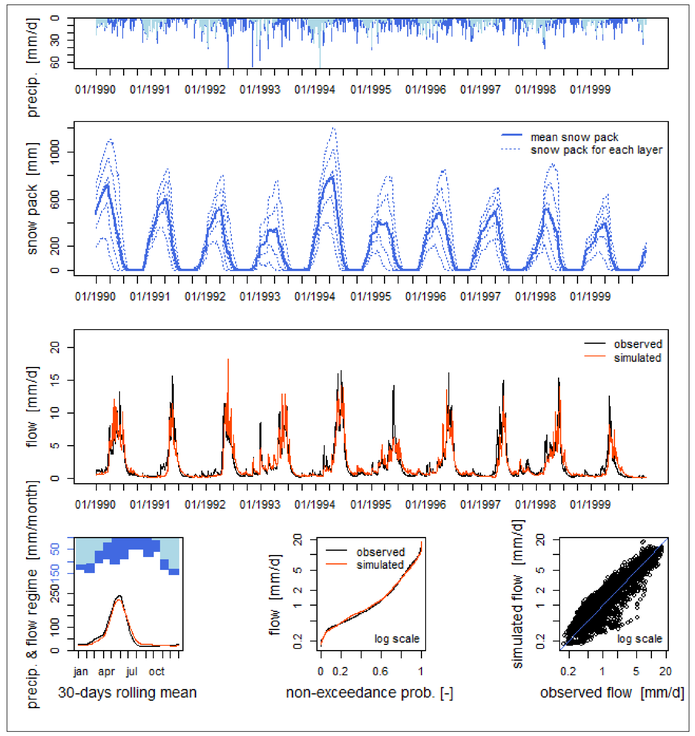


Fig. 3: Example of graphical outputs produced by the airGR package (GR4J + CemaNeige)



Future developments

Shiny interface and teaching-friendly functions.

Download the airGR package

The airGR package is available after email registration on the following website:
http://webgr.irstea.fr/airgr/?lang=en

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Download the package (v1.0.3 release Dec. 2016): https://webgr.irstea.fr/airgr/?lang=en

References
Coron L., Thirel G., Perrin C., Delaigue O., Andréassian V., airGR: a suite of lumped hydrological models in an R-package, *Environmental Modelling and software*, 2017, submitted.
Perrin, C., C. Michel et V. Andréassian, 2009. A set of hydrological models (Chapter 16). *Environmental Hydraulics*. J. M. Tanguy. Paris, ISTE Ltd, John Wiley & Sons. Volume 2 Mathematical models: 493-509.

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