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Latest developments of the airGR rainfall-runoff modelling R-package: new calibration procedures and other features

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Parsimonious and simple lumped rainfall-runoff models are useful tools for research and engineering. From years of experience, the Hydrology Group at Irstea (Antony) developed the GR models suite. Recently, aiming at providing an open source tool, the team started to develop an R package (R Core Team, 2017), named airGR (Coron et al., 2017a, b), containing these simulation models (including the GR4J model). The airGR package permits running calibration/validation protocols with six hydrological models running at different time steps (hourly to annual), one snow accumulation and melt model, one automatic calibration procedure and a set of efficiency criteria, pre-defined graphical plots.

It is now possible to use several alternative methods to the in-house automatic calibration procedure. For example, when the time series is too short to calibrate the GR4J model (e.g., less than 6 months), it is now possible to use a predefined parameter set list that gives better performance in validation than classical calibration (Andréassian et al., 2014). In addition, the package now contains several vignettes presenting how to use global optimization algorithms such as differential evolution algorithm (DE), particle swarm optimization (PSO), MA-LS-Chains algorithm or parameter estimation within a Bayesian MCMC framework, for calibrating airGR models. Lastly, the use of several sampling-based methods for sensitivity analysis is illustrated.

Thanks to its success (about 5,000 downloads so far), the development team carries on the development to improve the code, offer new features and improve the documentation. Recently, the development team also developed a new package, airGRteaching (Delaigue et al., 2017) (see abstract EGU2018-5074), which depends on airGR, and has expressly been developed for educational purposes, in order to avoid the difficulties that students may have with R programming.

References

Andréassian V., Bourgin F., Oudin L., Mathevet T., Perrin C., Lerat J., Coron L., Berthet L. (2014). Seeking genericity in the selection of parameter sets: impact on hydrological model efficiency. Water Resources Research, 50, 10, 8356–8366, DOI: 10.1002/2013WR014761.

Coron L., Thirel G., Delaigue O., Perrin C., Andréassian V. (2017a): The Suite of Lumped GR Hydrological Models in an R package, Environmental Modelling & Software, 94, 166-171, DOI: 10.1016/j.envsoft.2017.05.002.

Coron L., Perrin C., Delaigue O., Thirel G., Michel C. (2017b). airGR: Suite of GR Hydrological Models for Precipitation-Runoff Modelling. R package version 1.0.9.64. URL: https://webgr.irstea.fr/en/airGR/.

Delaigue O., Coron L., Brigode P. (2017). airGRteaching: Tools to Simplify the Use of the airGR Hydrological Package for Education (Including a Shiny Interface). R package version 0.1.8.3. https://webgr.irstea.fr/en/airGR/.

R Core Team (2017). R: A language and environment for statistical computing. R Foundation for Statistical Computing, Vienna, Austria. URL https://www.R-project.org/.