



GR4J : a parsimonious model for rainfall-runoff simulations

C. Perrin, V. Andréassian, C. Michel, L. Oudin
Cemagref, Hydrosystems Research Unit, Antony, France
(charles.perrin@cemagref.fr / Fax: +33 1 40 96 61 99)

Modelling the rainfall-runoff transformation has become of tremendous importance in many applications of operational hydrology. Hydrological models can be used for various applications in water resources management and engineering, such as flood estimation, flood forecasting, long term low flow forecasting, trend detection or design and management of reservoirs. In the recent years, although most of the new models show more and more complex structures, a few modellers still advocates for the usefulness of parsimonious rainfall-runoff models. Though they have intrinsically some limitations, lumped conceptual models have the advantage to be lowly parameterised and to limit the problems of uncertainty due to poorly defined parameters and too complex model structures.

The GR4J daily model is one of these simple models (see e.g. Edijatno et al., 1999 and Perrin et al., 2003). With only four parameters, the model showed a good robustness in comparative studies (see e.g. Perrin et al., 2001) and was extensively tested, not only in France but also in various climate conditions in the US, Australia, etc.

The objective of the presentation is to detail the structure of this simple rainfall-runoff and to show though a few simple applications, how the model can be used, either under simple spreadsheets or with a simple executable file.

Reference:

Edijatno, Nascimento, N.O., Yang, X., Makhlof, Z., Michel, C., 1999. GR3J: a daily watershed model with three free parameters. *Hydrological Sciences Journal* 44(2), 263-277.

Perrin, C., Michel, C., Andréassian, V., 2001. Does a large number of parameters enhance model performance ? Comparative assessment of common catchment model structures on 429 catchments. *Journal of Hydrology* 242(3-4), 275-301.

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