



Comparative study of regionalization methods for simulating low-flows from a small number of model parameters

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Issues with water resource management result from both an increasing demand and climate changes. The situations of low-flows, droughts and more generally lack of water are critically scrutinized. In this context, there is a need for tools to assist water agencies in the prediction and management of reference low-flows at gauged and ungauged catchment locations.

IRSTEA developed GR2M-LoiEau, a conceptual distributed rainfall-runoff model, which is combined with a regionalized model of snow storage and melt. GR2M-LoiEau relies on two parameters which are regionalized and mapped throughout France. This model allows to cartography annual and monthly reference low-flows. The input meteorological data come from the distributed mesoscale atmospheric analysis system SAFRAN, which provides daily solid and liquid precipitations and temperatures data from everywhere in the French territory. In order to fully exploit these daily meteorological data to estimate daily statistics on low flows, a new version of GR2M-LoiEau is being developed at a daily time step, yet keeping only a few regionalized parameters.

The aim of this study is to design a comprehensive set of tests to allow comparing low-flows obtained with different regionalization methods used to estimate low-flow model parameters. The new version of GR2M-LoiEau being not yet operational, the tests are made with GR4J (Perrin, 2002), a conceptual rainfall-runoff model, which already provides daily estimations, but involves four parameters that cannot easily be regionalized. Many studies showed the good prediction performances of this model.

This work includes two parts. On the one hand, good criteria must be identified to evaluate and compare model results, good predictions of the model being expected about low flows and reference low flows, but also annual means and high flows.

On the other hand, two methods of regionalization will have to be compared to estimate model parameters. The first one is rough, all the parameters regionalized in one time. The second one is a gradual regionalization method.