



The airGR galaxy: Hydrological tools around GR models

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The airGR galaxy

Hydrological tools around GR models



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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 (<https://hydrogr.github.io/airGR>). airGR goes along with other R packages which allow performing data assimilation, modelling integrated water resources management, and teaching hydrological modelling.

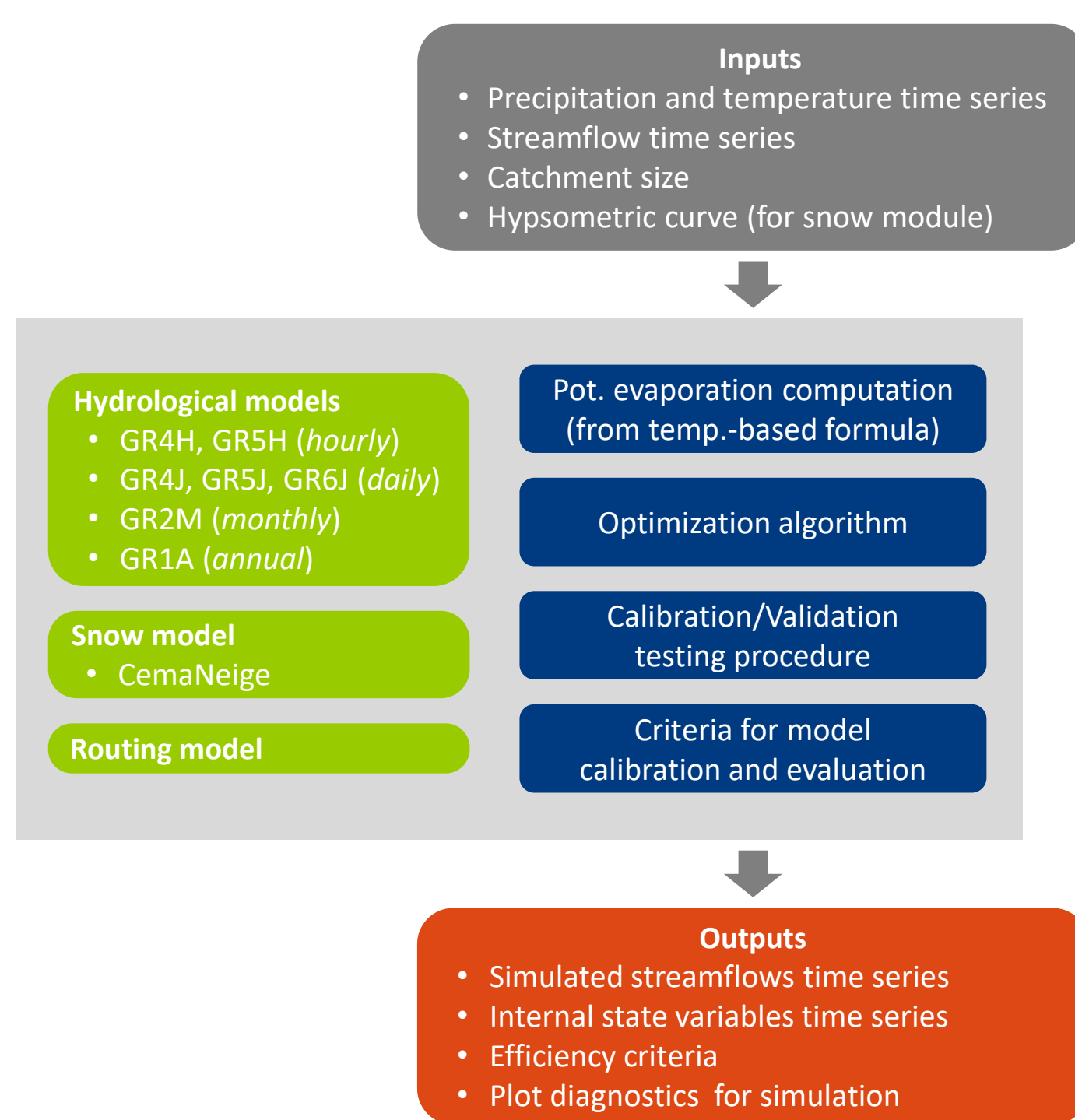
GR hydrological models

- Designed with the objective to be as efficient as possible for flow simulation at various time steps (from hourly to annual)
- Warranted complexity structures and limited data requirements
- Can be applied to a wide range of conditions, including snowy catchments (CemaNeige snow routine included)

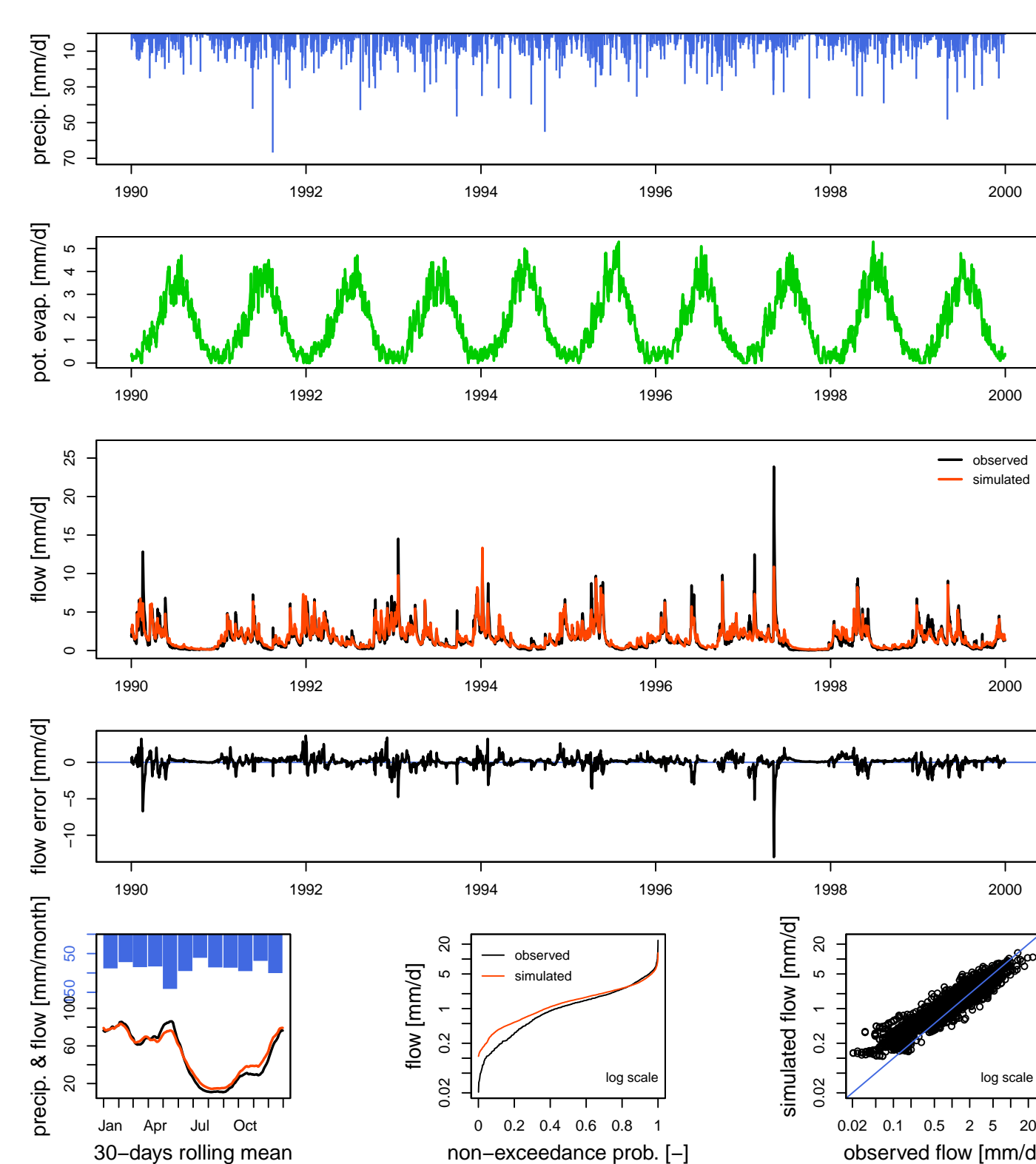
airGR galaxy tools



Main components of the airGR R-package



airGR R-package plot diagnostics example



airGRteaching GUI

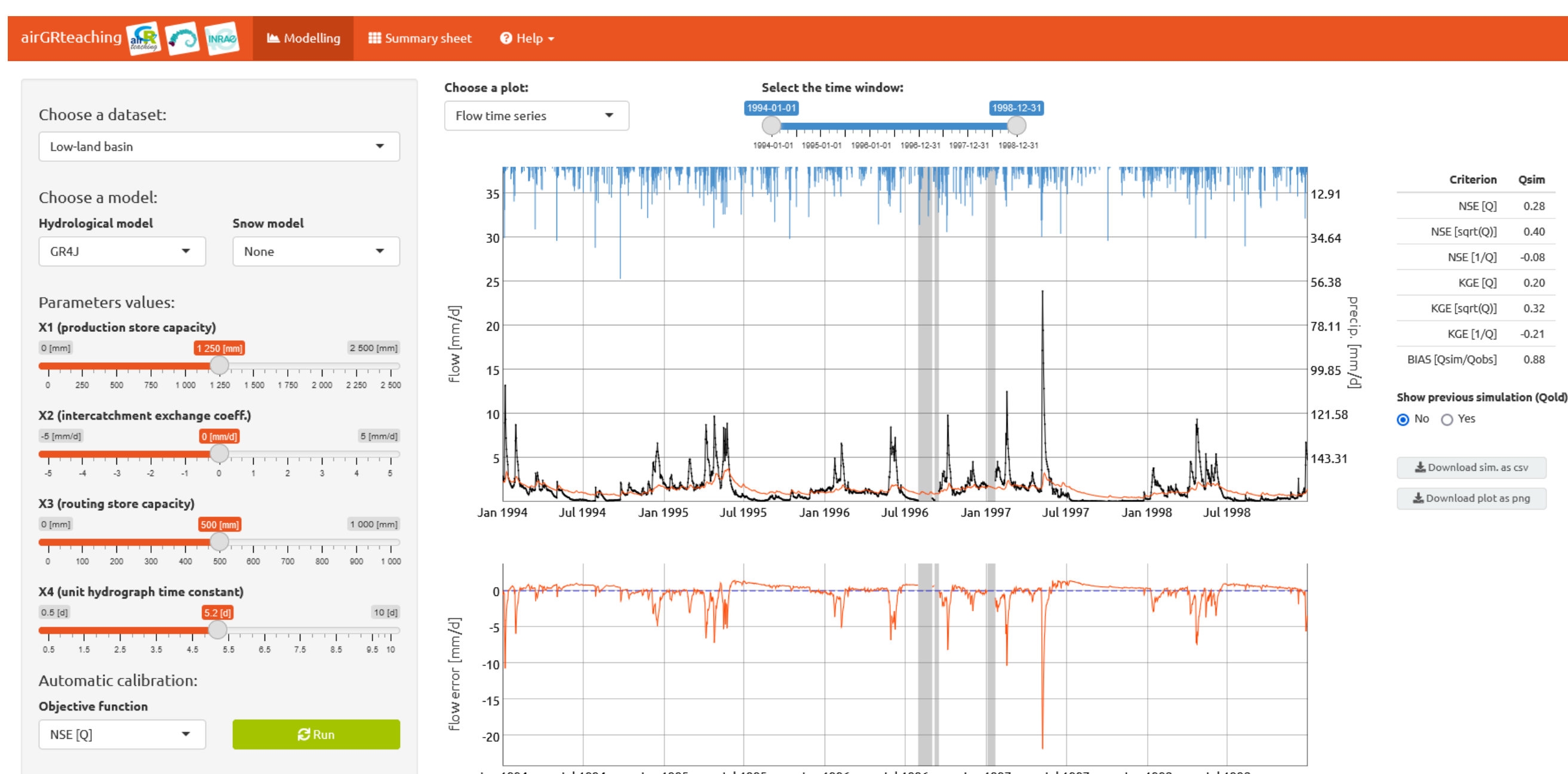
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- Manual parameter setting and interactive graphs
- Automatic setting of parameters
- Visualization of the internal states of the models

airGRteaching R-package

- Simplified functions for hydrological modelling
- Static and interactive graphs
- GUI running on user time series

airGRteaching GUI to learn hydrological modelling

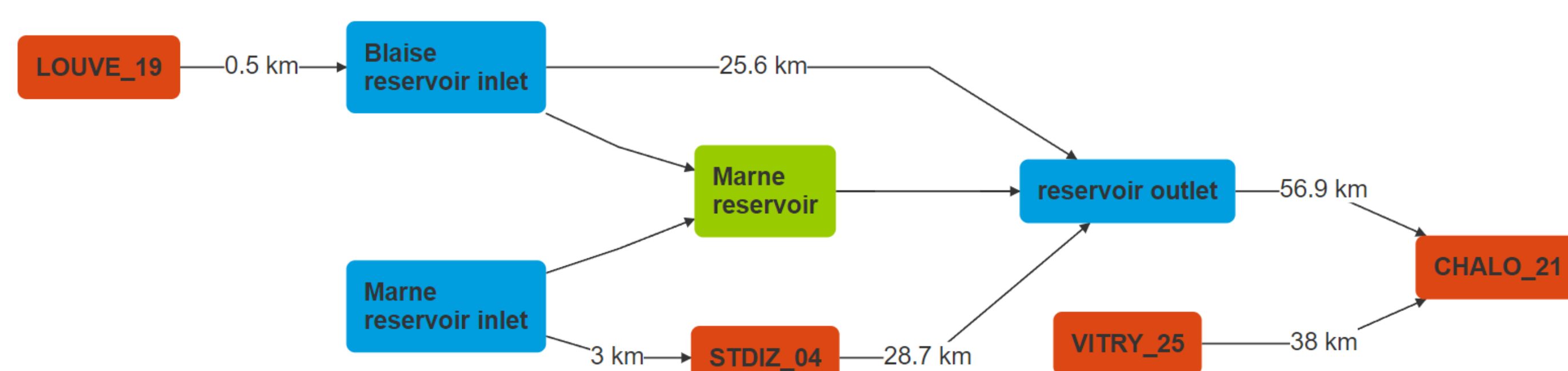


airGRiwm R-package

IAHS2022-105 | S4

- Simplifies the semi-distribution mode of the airGR package
- Integrates human influences and their managements

airGRiwm R-package network diagram

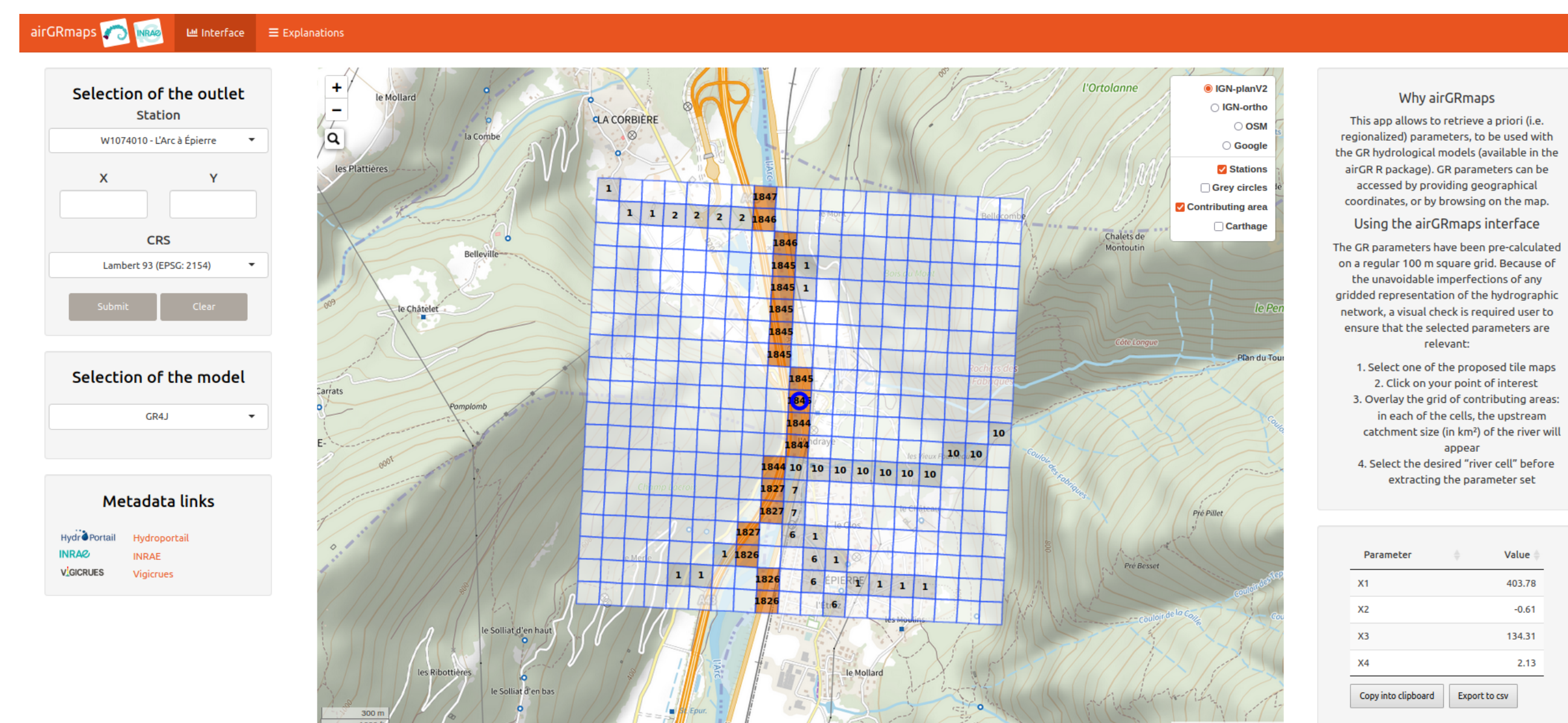


airGRmaps GUI

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- Parameter maps over France for GR4J & GR5J models for ungauged bassins available soon through a Shiny interface

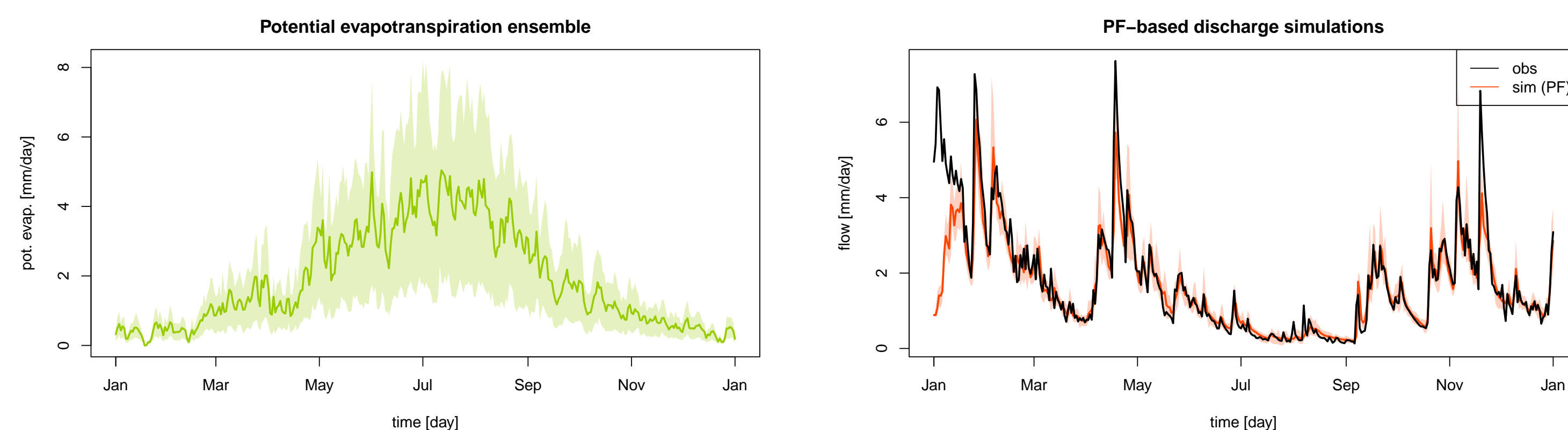
airGRmaps GUI to get parameter values of GR4J or GR5J all over France



airGRdatassim R-package

- Models:
 - ▷ only daily hydrological models (GR4J, GR5J & GR6J)
- Methods:
 - ▷ Ensemble Kalman Filter (EnKF)
 - ▷ Particle Filter (PF)
- Assimilated variable:
 - ▷ streamflow
- Specific perturbation procedures:
 - ▷ meteorological forcing uncertainties
 - ▷ model states

Perturbed PET & data assimilation simulation using the Particle Filter via airGRdatassim



baseflow R-package

- Computes hydrograph separation

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