



# Evaluation of a semi-distributed model through an assessment of the spatial coherence of Intercatchment Groundwater Flows

Alban de Lavenne, Guillaume Thirel, Vazken Andréassian, Charles Perrin,  
Maria-Helena Ramos

## ► To cite this version:

Alban de Lavenne, Guillaume Thirel, Vazken Andréassian, Charles Perrin, Maria-Helena Ramos. Evaluation of a semi-distributed model through an assessment of the spatial coherence of Intercatchment Groundwater Flows. EGU General Assembly 2016, Apr 2016, Vienna, Austria. Geophysical Research Abstracts, 18, pp.1, 2016. hal-02603536

**HAL Id: hal-02603536**

**<https://hal.inrae.fr/hal-02603536>**

Submitted on 16 May 2020

**HAL** is a multi-disciplinary open access archive for the deposit and dissemination of scientific research documents, whether they are published or not. The documents may come from teaching and research institutions in France or abroad, or from public or private research centers.

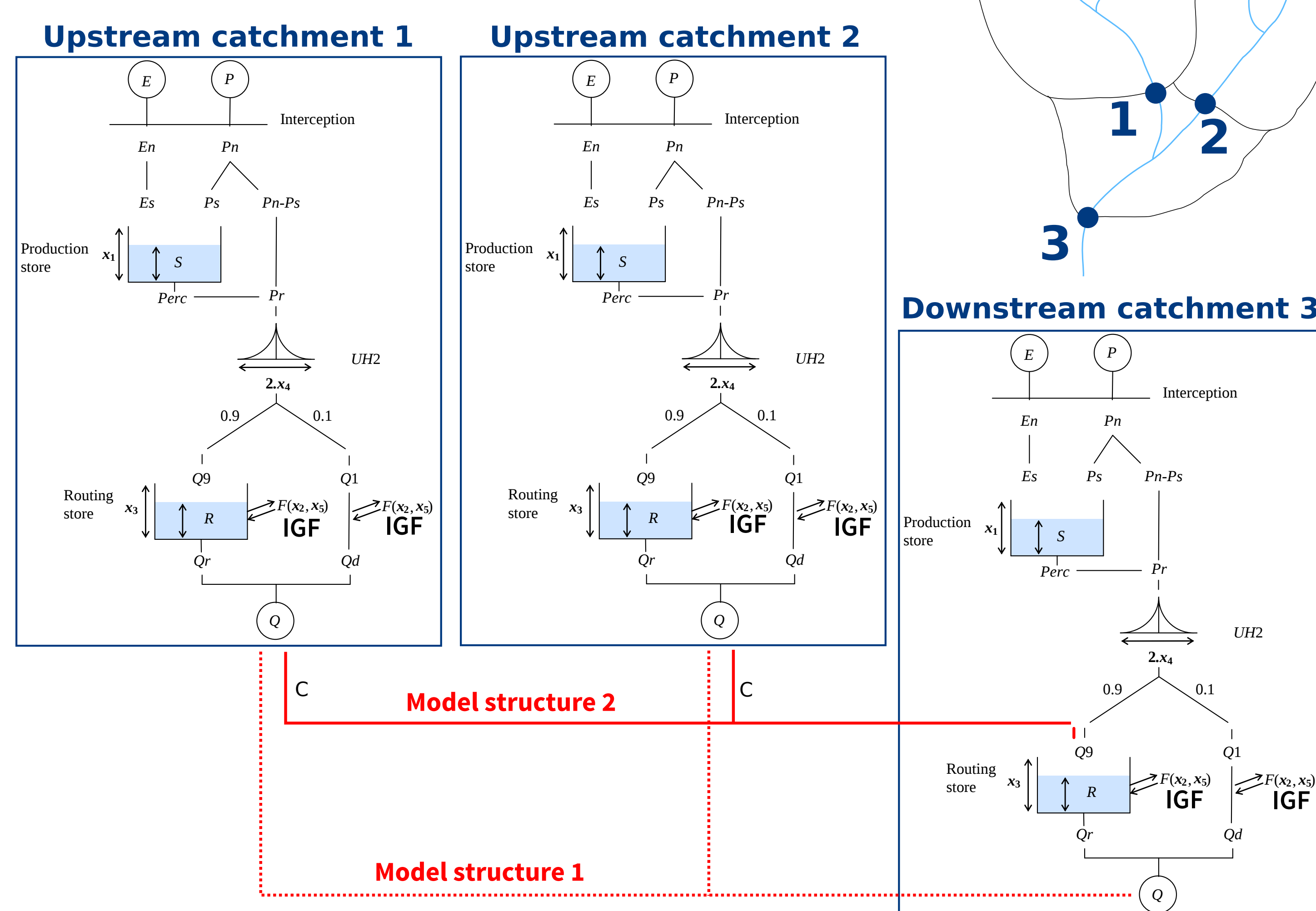
L'archive ouverte pluridisciplinaire **HAL**, est destinée au dépôt et à la diffusion de documents scientifiques de niveau recherche, publiés ou non, émanant des établissements d'enseignement et de recherche français ou étrangers, des laboratoires publics ou privés.



# EVALUATION OF A SEMI-DISTRIBUTED MODEL THROUGH AN ASSESSMENT OF THE SPATIAL CONSISTENCY OF INTERCATCHMENT GROUNDWATER FLOWS

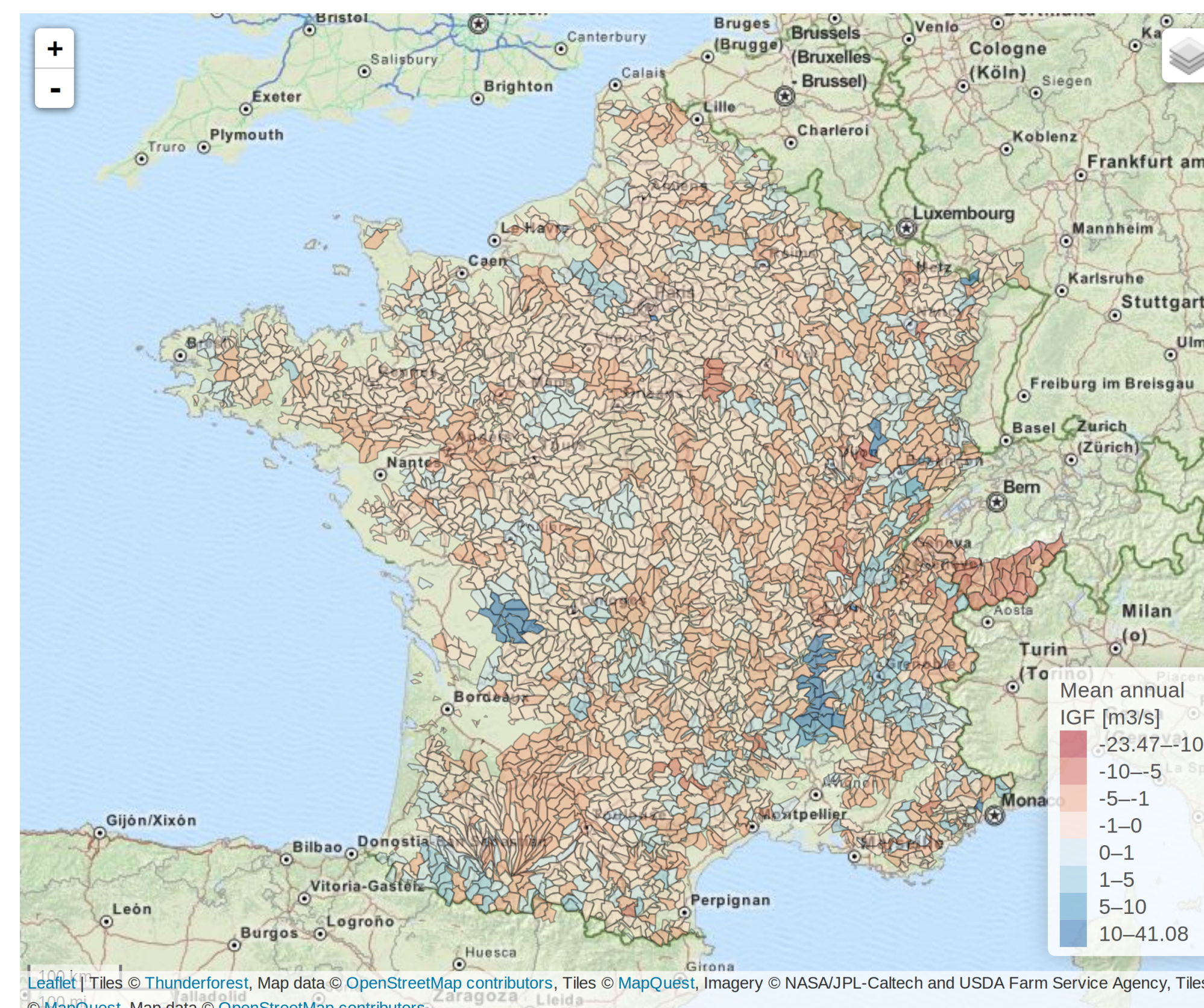
We propose to evaluate two structures of a semi-distributed model using spatial consistency of simulated intercatchment groundwater flows (IGF). The idea is that the water that is lost in one place should be recovered somewhere else within the catchment to guarantee a spatially consistent water balance in time.

## GRSD model structure

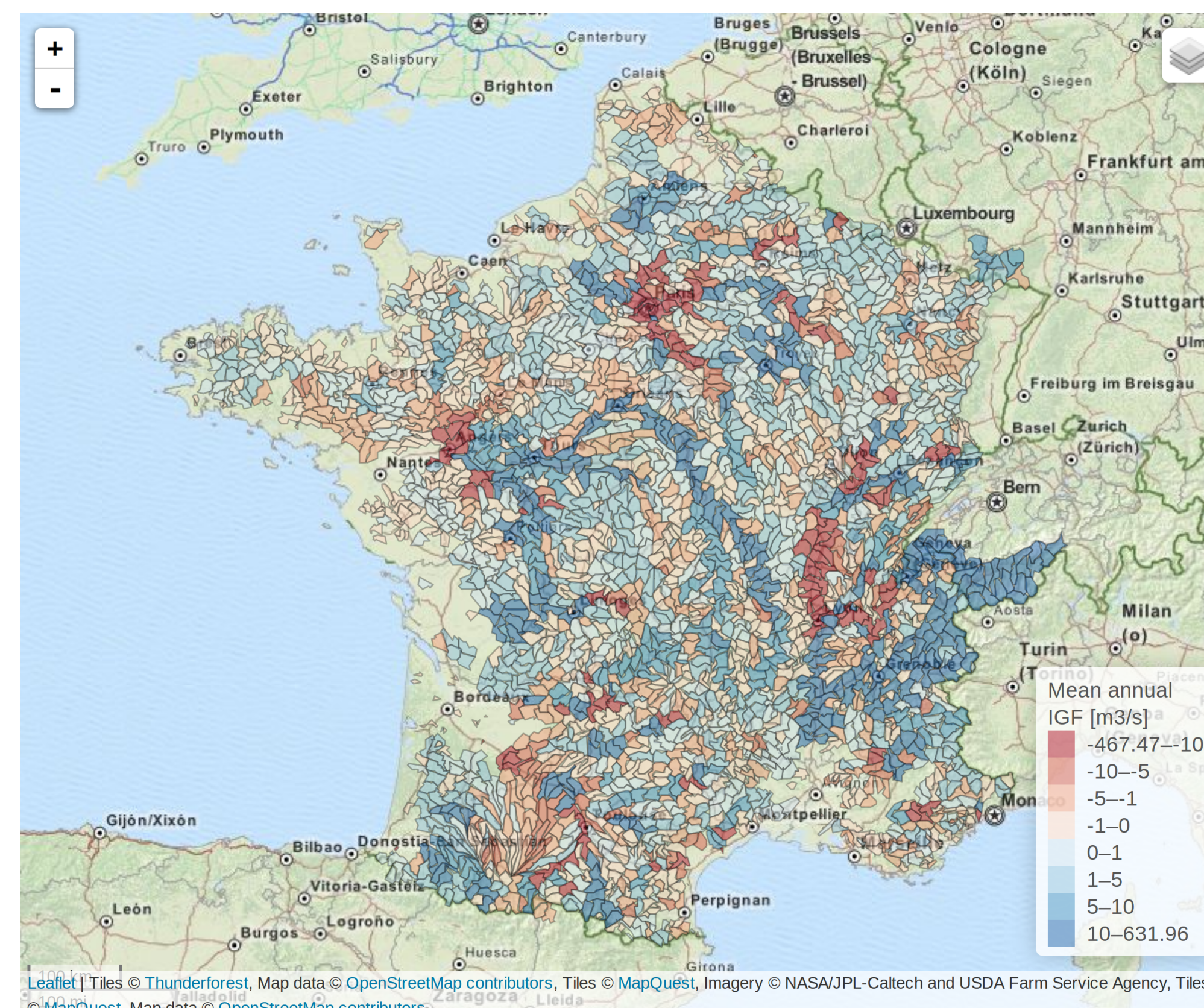


The semi-distributed model GRSD is based on an implementation of a lumped daily GR5J model (5 parameters) on each subcatchment. GR5J is composed of two stores: a production store (capacity  $X1$ ) and a routing store (capacity  $X3$ ), which is filled by the output of a unit hydrograph (of time base  $X4$ ). Two other parameters,  $X2$  and  $X5$ , are used to quantify the IGF. Outflow simulations of upstream catchments are routed downstream using a streamflow celerity (parameter  $C$ ).

## Model structure 1



## Model structure 2



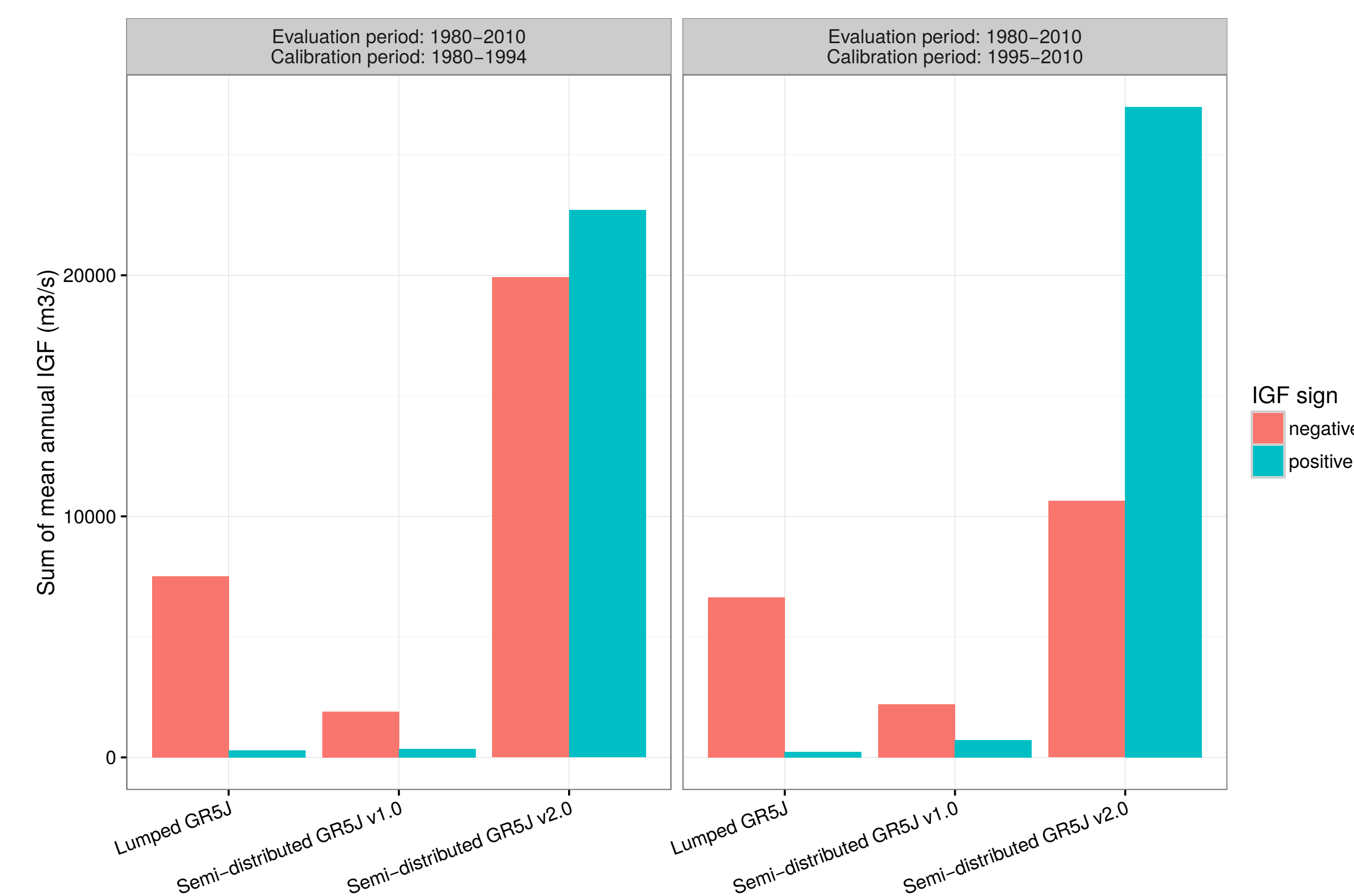
Two model structures are modelling intercatchment groundwater flow in a different way (figure left):  
**Structure 1:** Upstream simulations are directly routed downstream so they are not considered in IGF.  
**Structure 2:** Upstream simulations are filling the downstream routing reservoir, so it can be included in IGF.

## IGF spatial consistency

- The two model structures give totally different maps of intercatchment groundwater flows.
- Structure 1: most of the catchments are leaking.
- Structure 2: leakage concerns mostly upstream catchments whereas downstream catchments are gaining water (spatial consistency).

## Water balance analysis

- Structure 1: most of the water that is released to the groundwater is never recovered somewhere else.
- Structure 2: enables to nearly close the water balance for one of the two calibration periods.
- New constraints have to be found on the model structure and calibration in order to reinforce this spatial consistency.



\*de Lavenne A., Thirel G., Andréassian V., Perrin C., Ramos M.-H. Irstea, HBAN, Antony, France. \*alban.de-lavenne@irstea.fr