

RIVERS Brazil

Representing Human Intervention in Rivers

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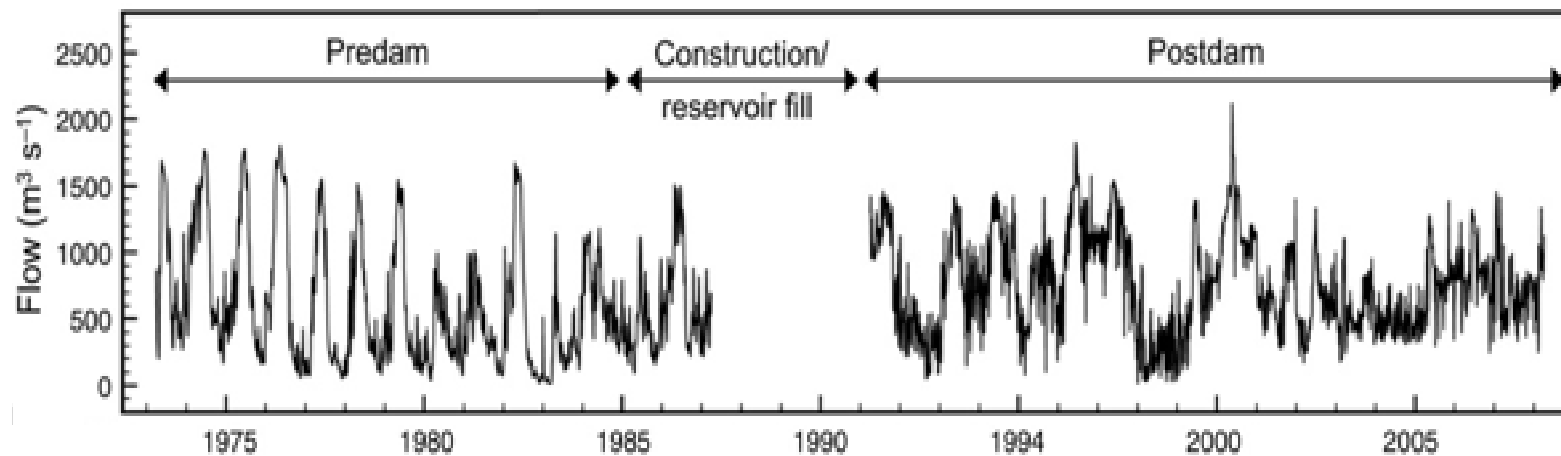
Introduction

Aim:

Represent water resource management in JULES, including reservoirs, abstractions, etc.

Motivation:

- Improved forecasts of water availability, river flow and floods
- Investigate future changes (climate, socio-economic, water management)



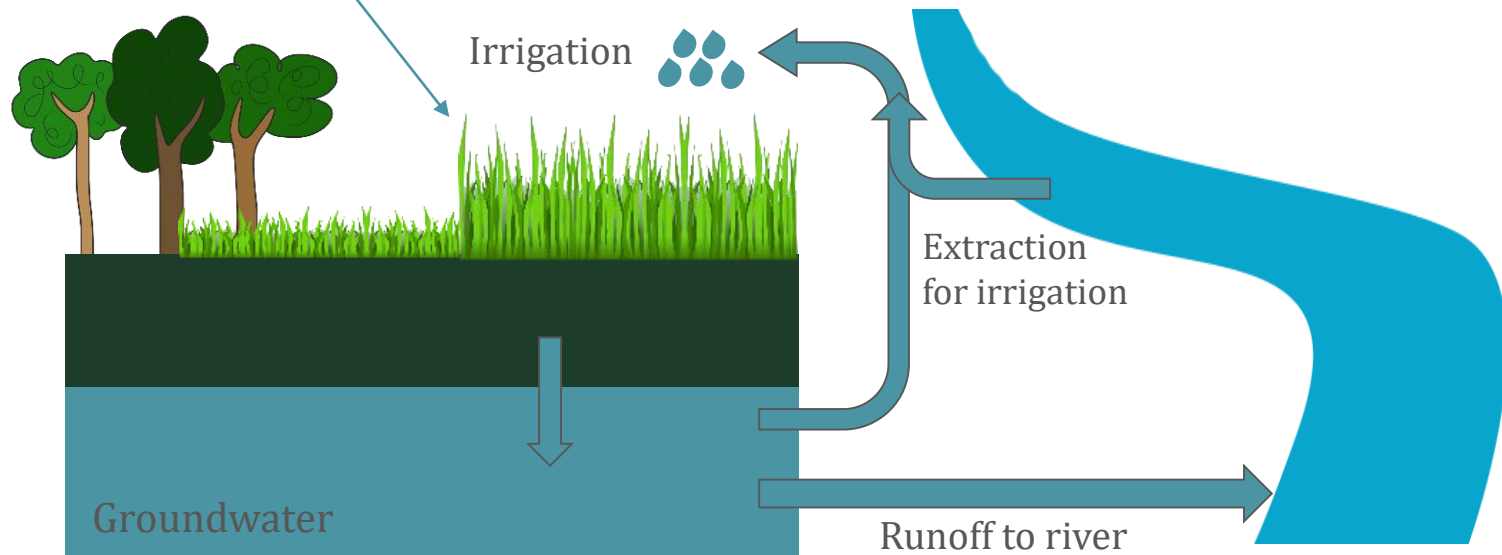
Kelsie Timpe, and David Kaplan *Sci Adv* 2017;3:e1700611

JULES and water resources

JULES currently (vn5.5) can represent irrigation and (unregulated) riverflow.

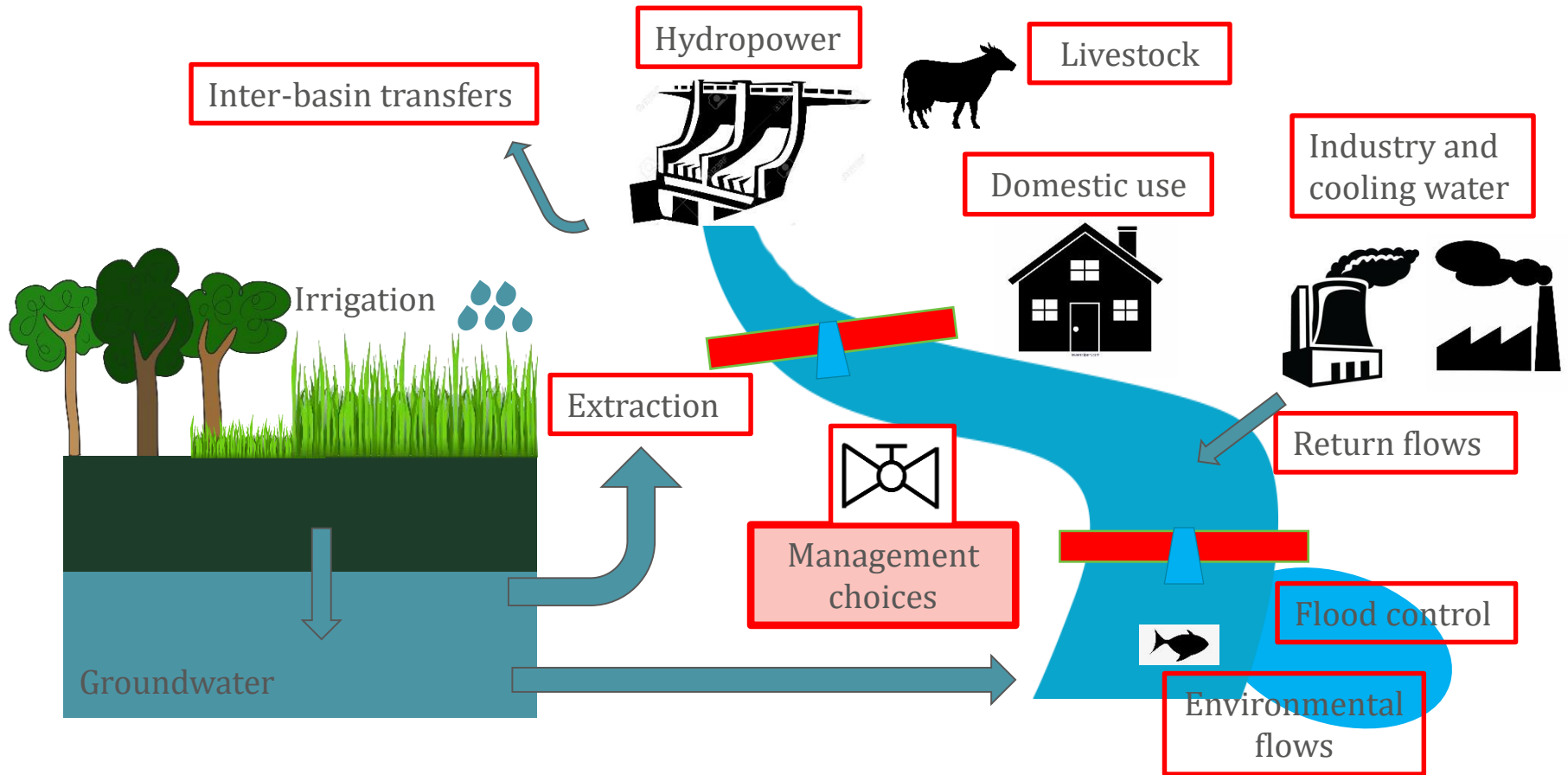
Crops are modelled using a crop model, or within the main vegetation scheme

Water for irrigation comes first from groundwater, then from river.



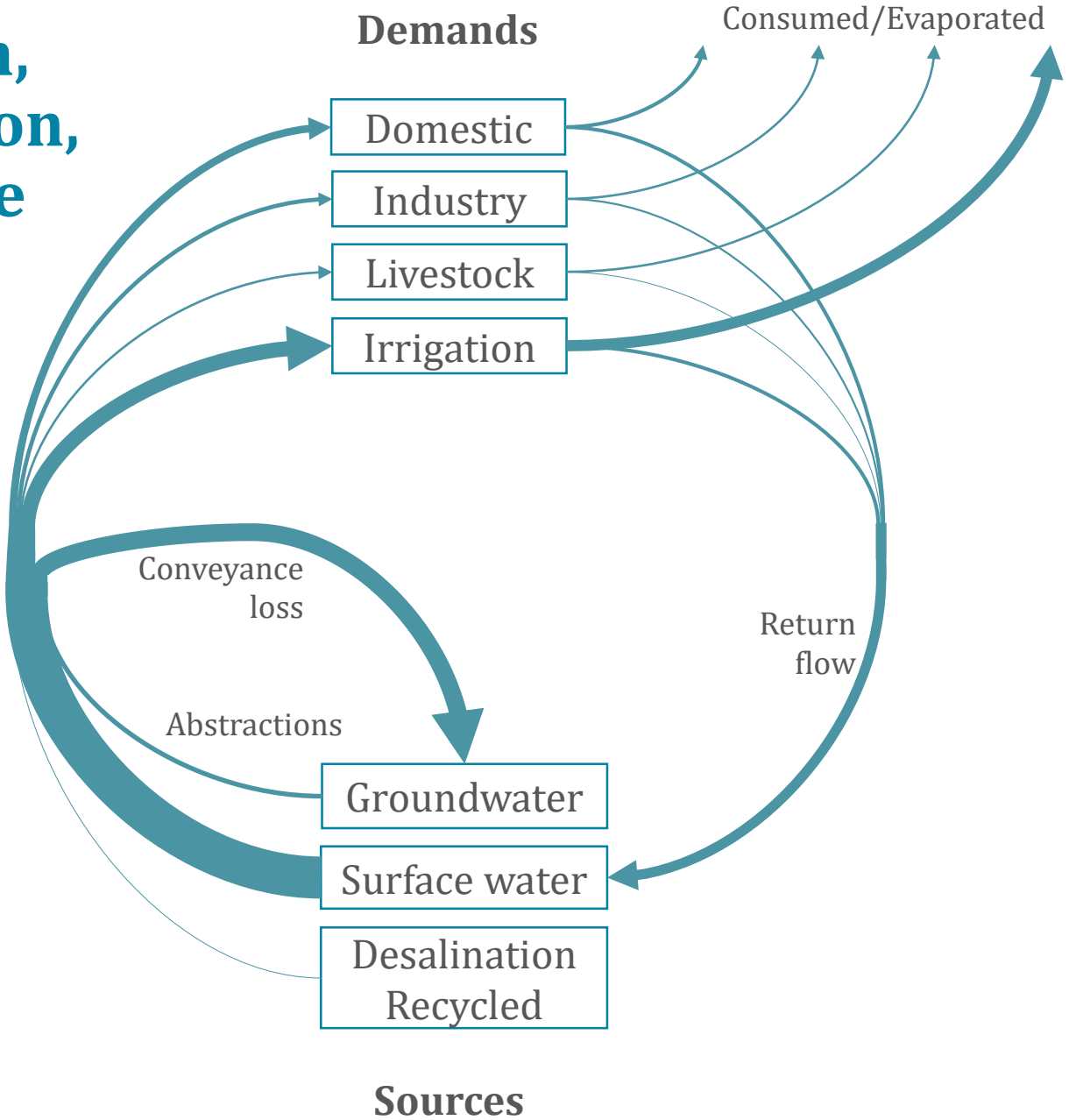
JULES currently neglects many aspects of water resource management.

JULES and water resources



In this project we aim to represent many of the missing processes, focussing on rivers.

Abstraction, Consumption, & Discharge

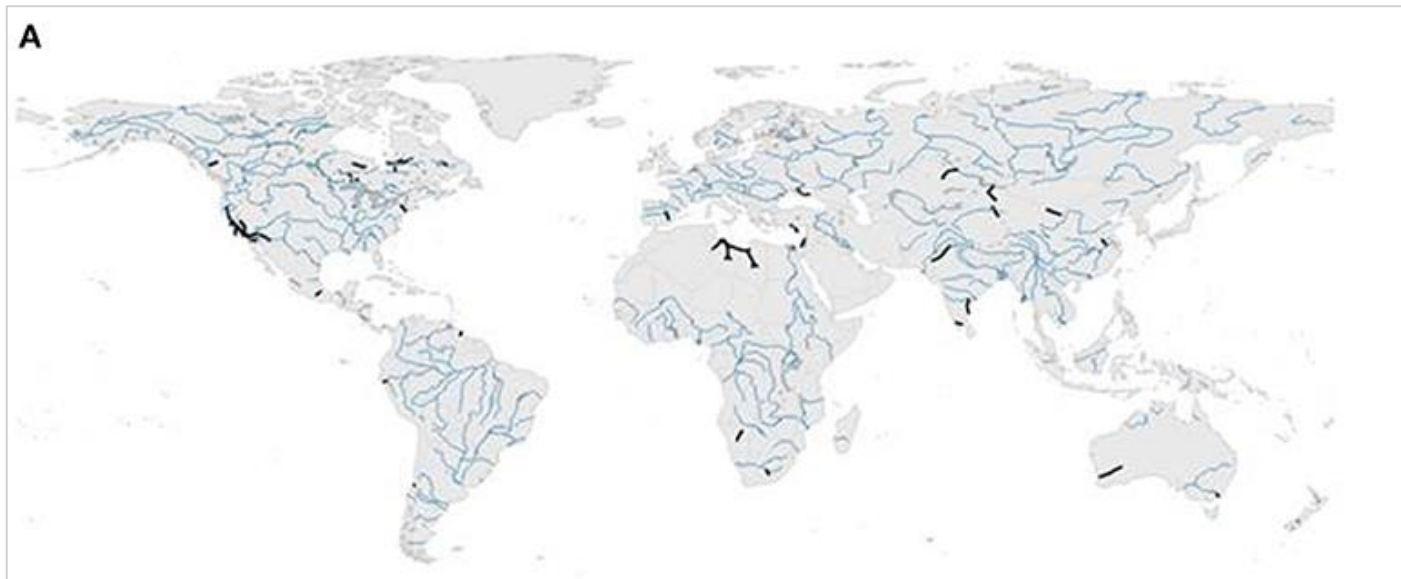
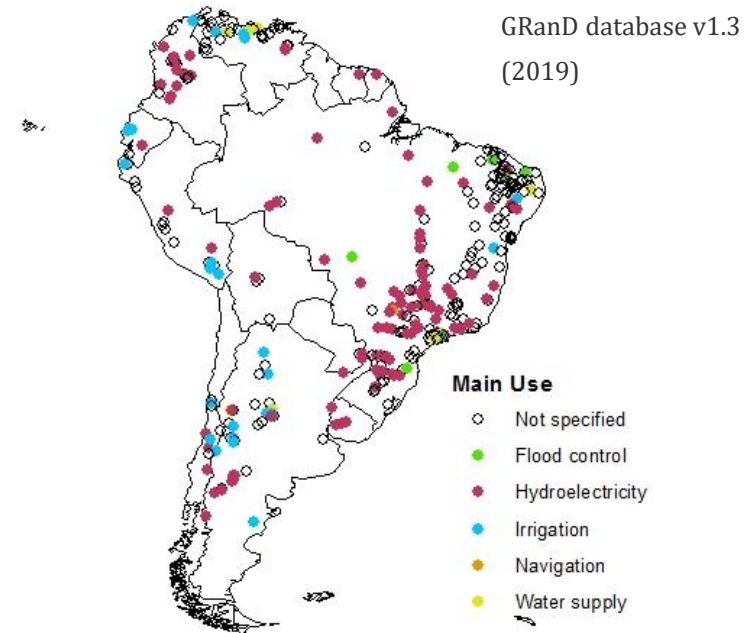


Reservoirs & Transfers

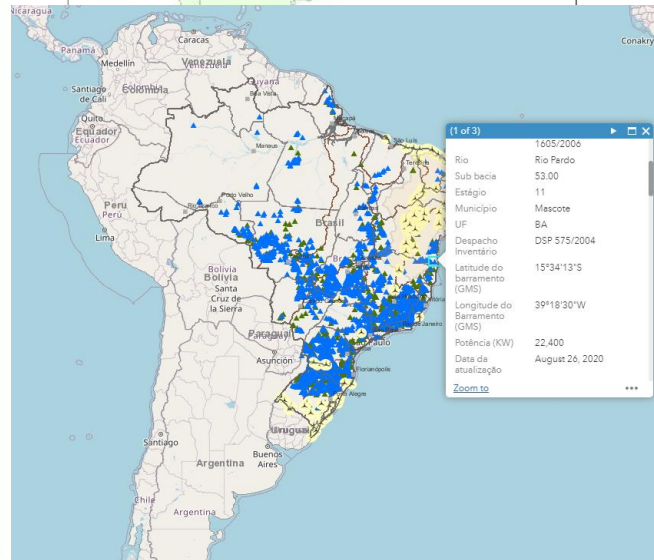
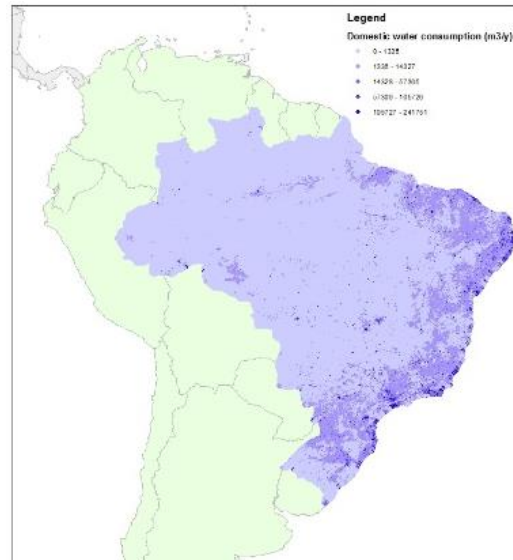
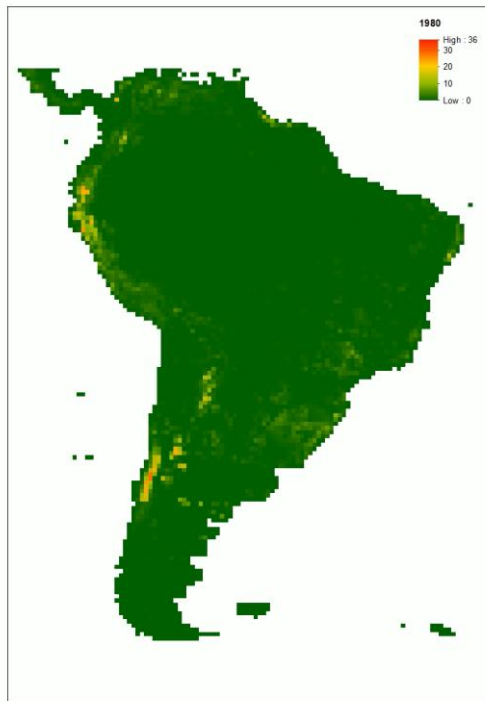
Reservoirs identified as “major” or “minor”:

- Major reservoirs operate with release rules, dependent on purpose
- Minor reservoirs “fill and spill” from local runoff

Transfers as demands with “return flow” to destination grid box



Data



Input

Demands:
domestic, livestock,
irrigation, industrial,
environmental, transfers.

Conveyance loss
Return flow
Prioritisation
Water source

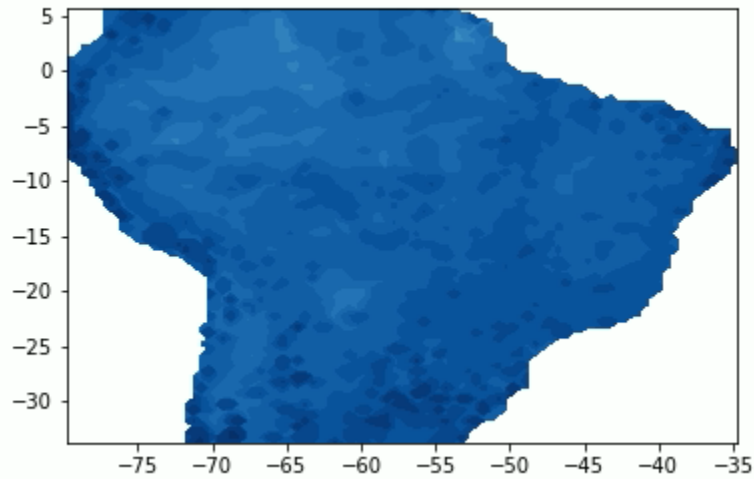
Major reservoirs:
size, use, age.
Minor reservoirs:
size, catchment area.

Evaluation

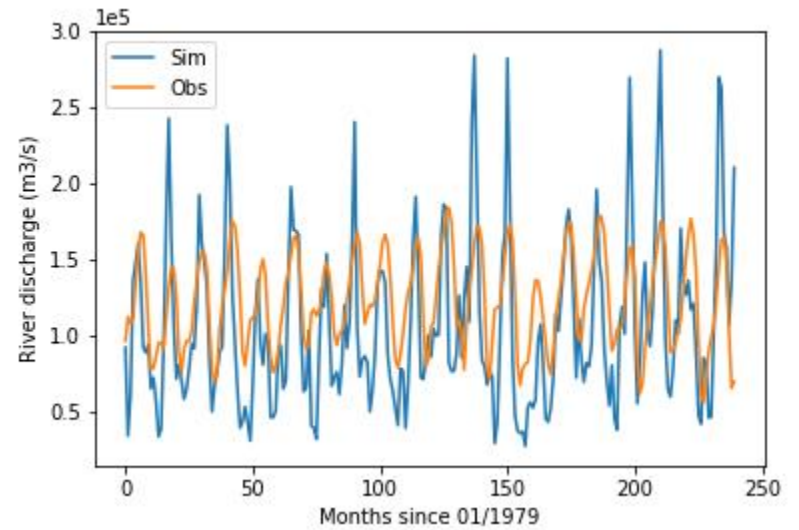
River flow
Reservoir discharge

Preliminary results

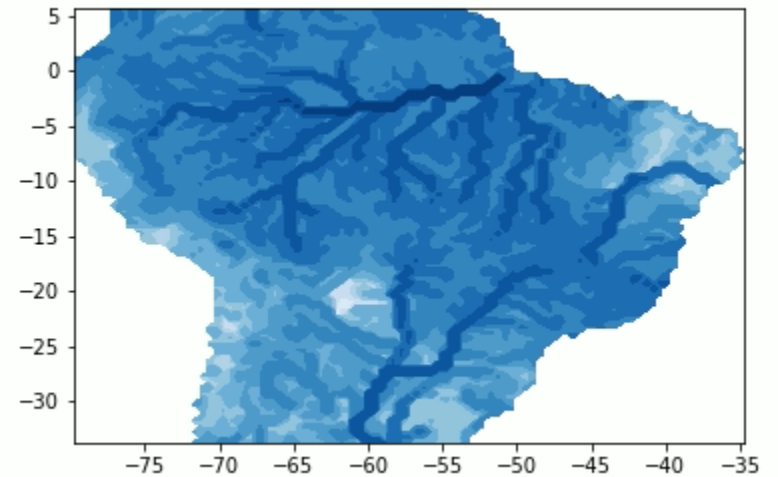
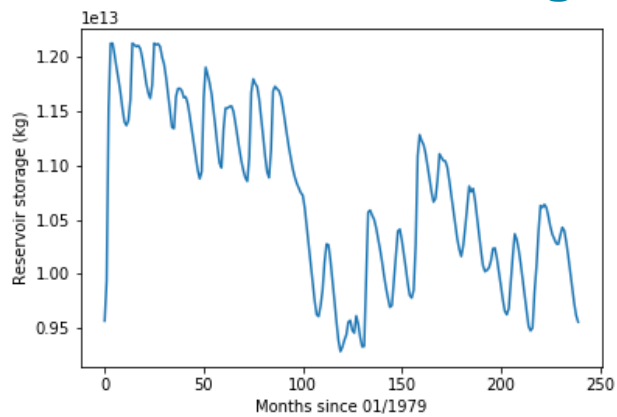
Water demand



Riverflow



Reservoir storage



Summary

So far

- Representation of water resource management in JULES.
- Data collected for run over South America.

Next

- Application and evaluation over South America.

Hydro-JULES

- Global runs
- Coupling with UK water resource model