Development of a semi-distributed hydrological model on a tidal-affected river

V. Mansanarez[1,2], G. Thirel[2], O. Delaigue[2], and B. Liquet[1]

[1]Université de Pau et des Pays de l'Adour, E2S UPPA, CNRS, LMAP, Pau, France
[2]Université Paris-Saclay, INRAE, UR HYCAR, 92160, Antony, France
Corresponding email: valentin.mansanarez@inrae.fr

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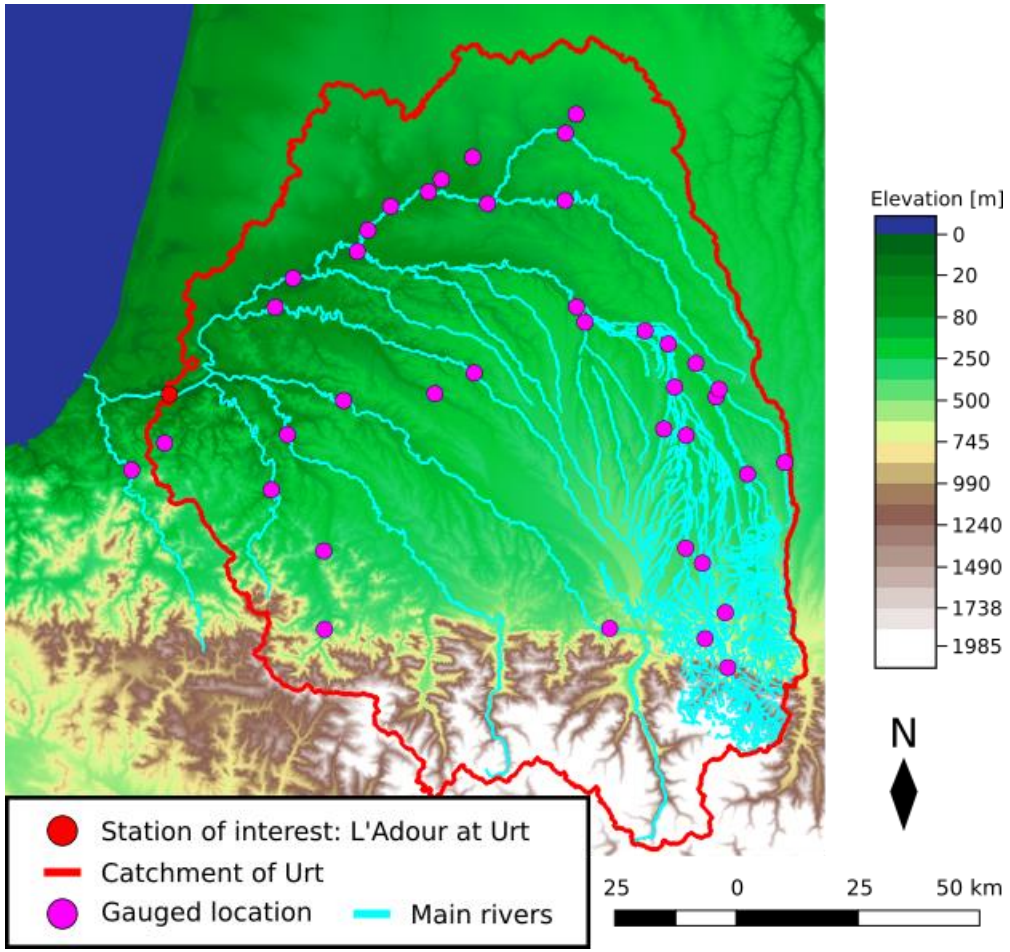
Rationale: Accounting for tidal influence in a rainfall-runoff model

- Tidal influence can slow down streamflow or even reverse it at river mouths
- Rainfall-runoff usually do not take into account for tidal influence
- Hydrodynamic models are heavy tools that are CPU and data consuming: they may not be appropriate for nation-wide applications

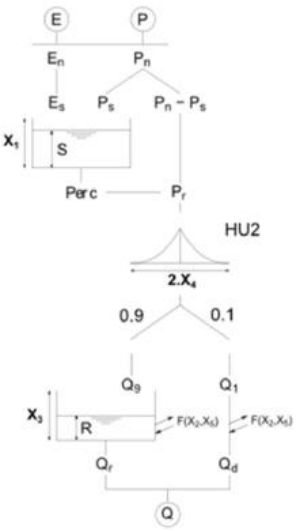
Study area: the Adour River at Urt

- One ungauged station: the Adour River at Urt
- Flows are affected by strong tidal influence at the Urt station
- 39 gauged stations with available hourly discharge time series

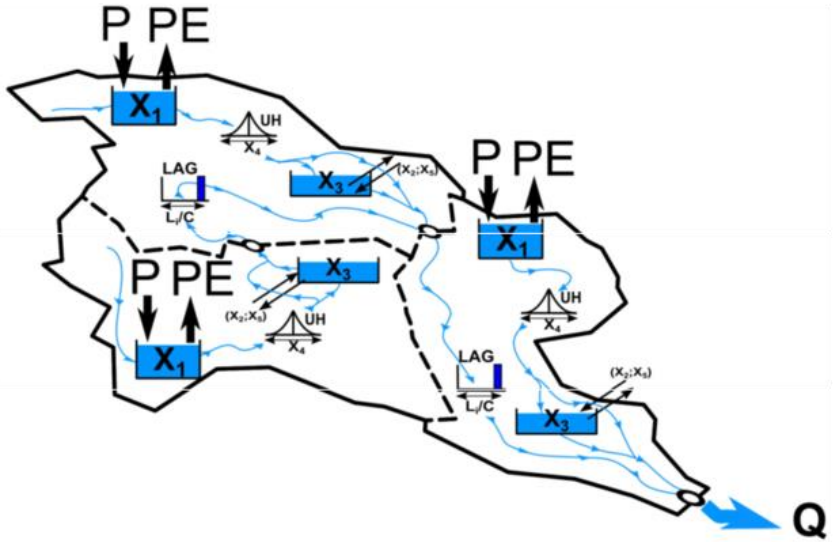


Hydrological modelling (HM)

- GRSD model (Lobligeois et *al.*, 2014), a Semi-Distributed rainfall-runoff model based on a lumped GR model
- Catchment divided into hydrological units following the drainage network.
- Hydrological units outlets comprise both gauged and ungauged locations, following a predefined maximal size for each unit.
- The GR5H lumped hourly rainfall-runoff model from Le Moine (2008) is applied on each unit.



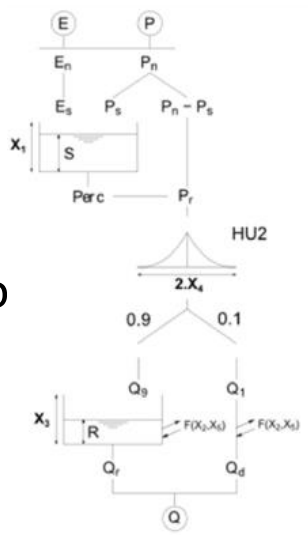
(a) *GR5J*



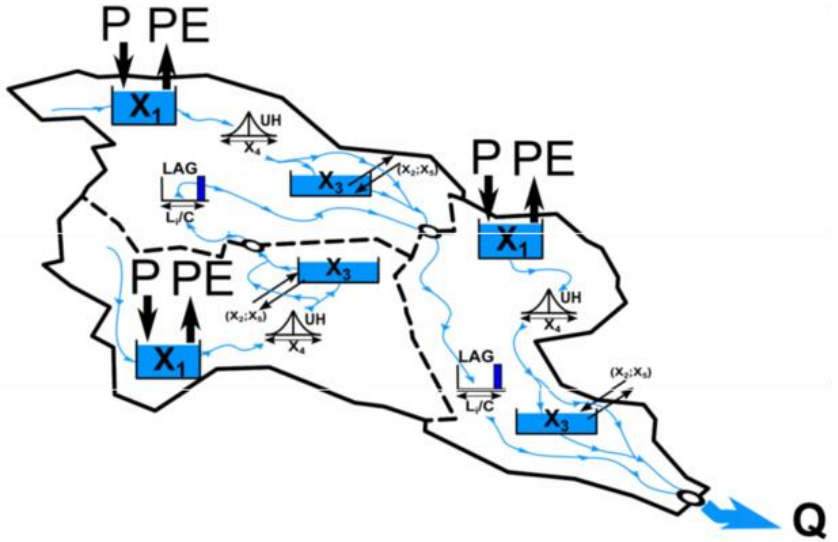
(b) *GRSD*

Hydrological modelling (HM)

- Units have their own inputs (P, PET and T) and 5 parameters.
- Their outflows are routed to the downstream unit using a linear lag propagation model adding one free extra parameter: the average flow velocity C.



(a) *GR5J*

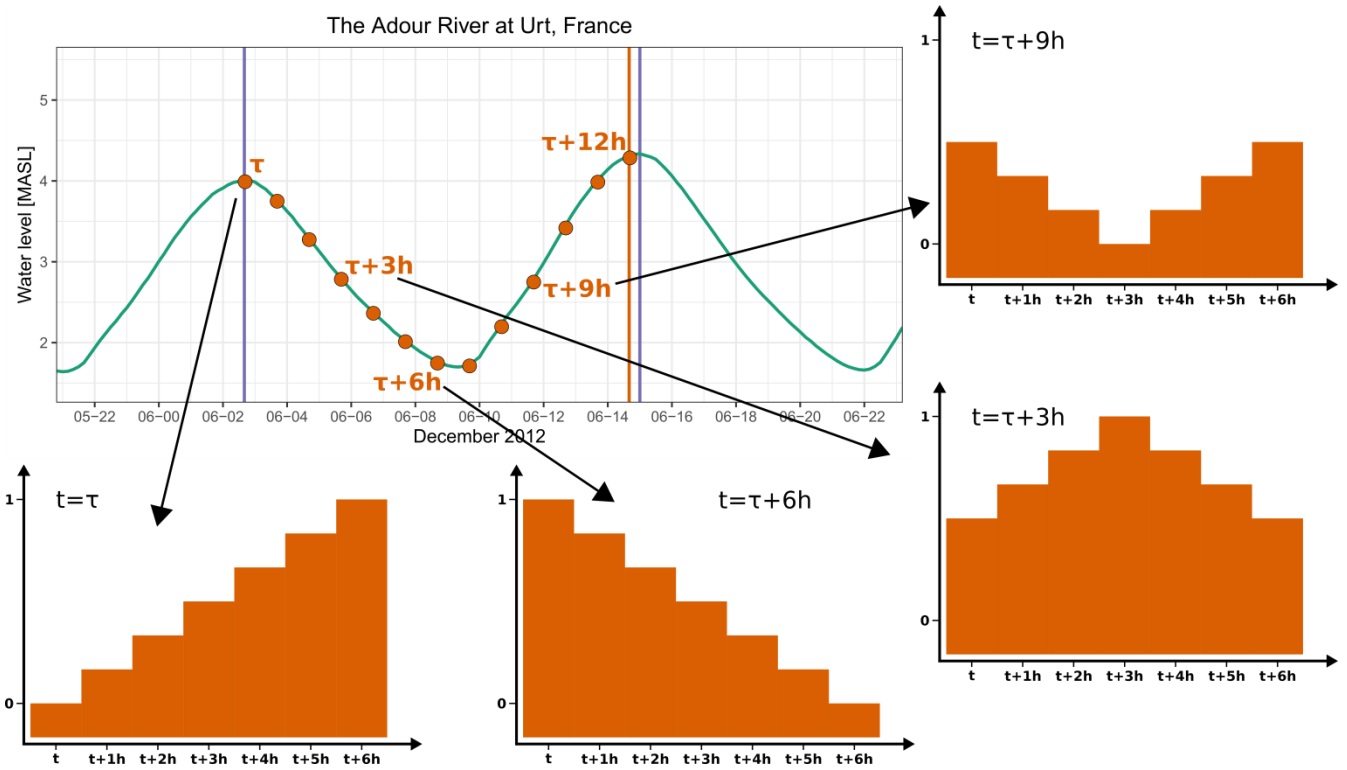


(b) *GRSD*

- Parameter C is related on each hydrological unit to hydraulic propagation knowing all the hydraulic lengths within the catchment area.

Accounting for tidal influence

- The propagation of the modelled streamflow to the downstream unit is delayed or stopped on each hydrological unit depending of how strong is the tidal influence.
- Use of unit hydrographs to do that



Any suggestion?

- Any reference?
- Any question?

Thanks!

References

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