

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

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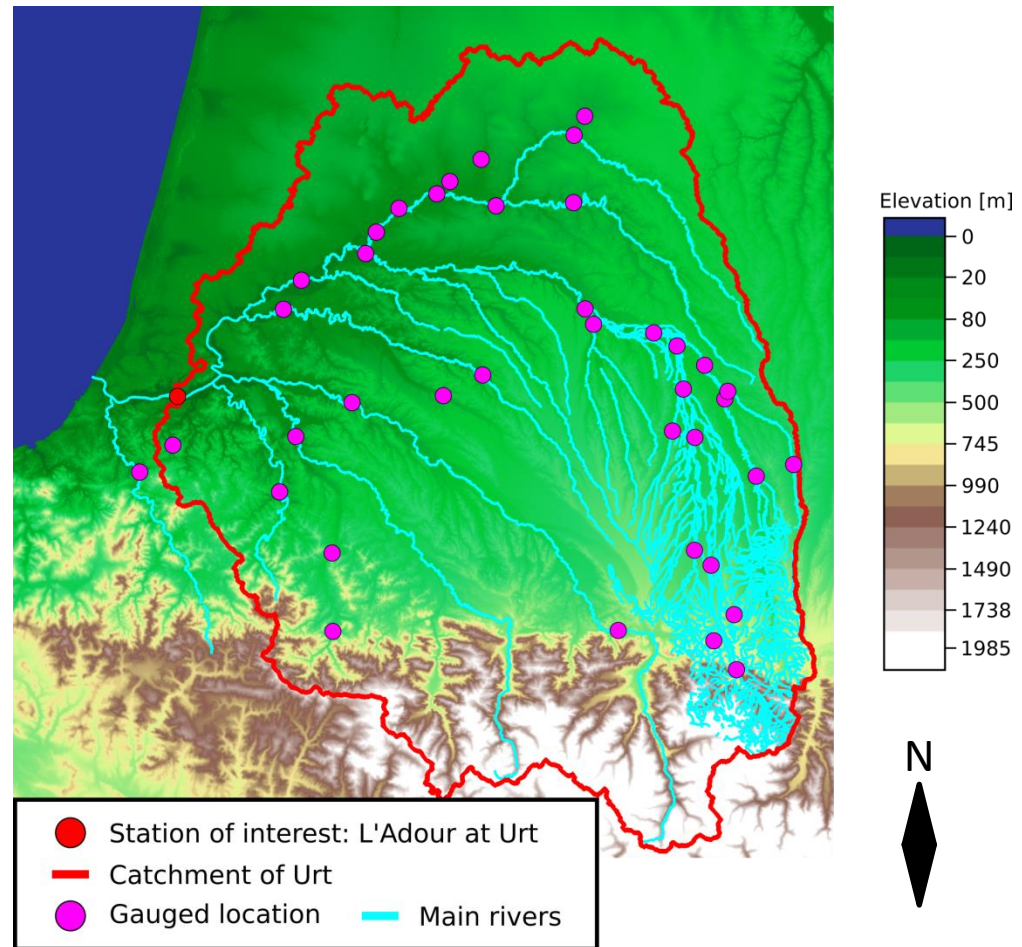


# Rationale: Accounting for tidal influence in a rainfall-runoff model

- 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

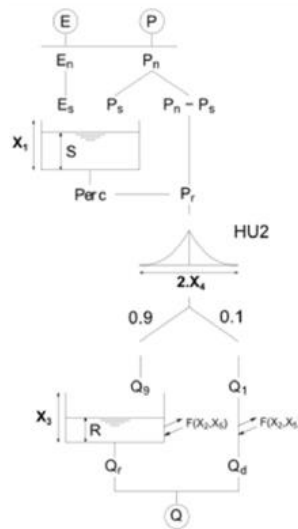
# Study area: the Adour River at Urt

- 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

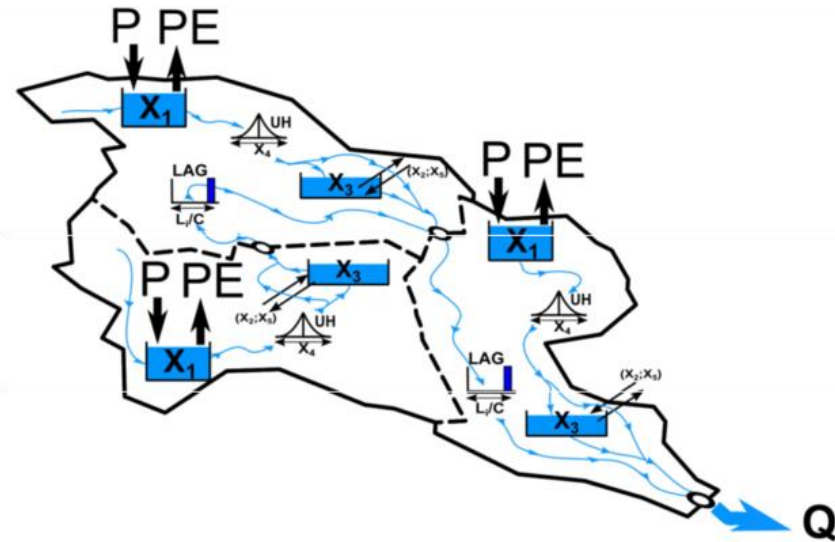


# Hydrological modelling (HM)

- 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.



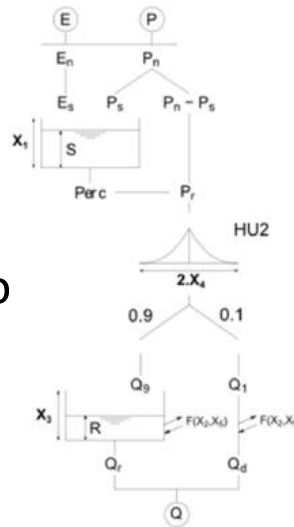
(a) GR5J



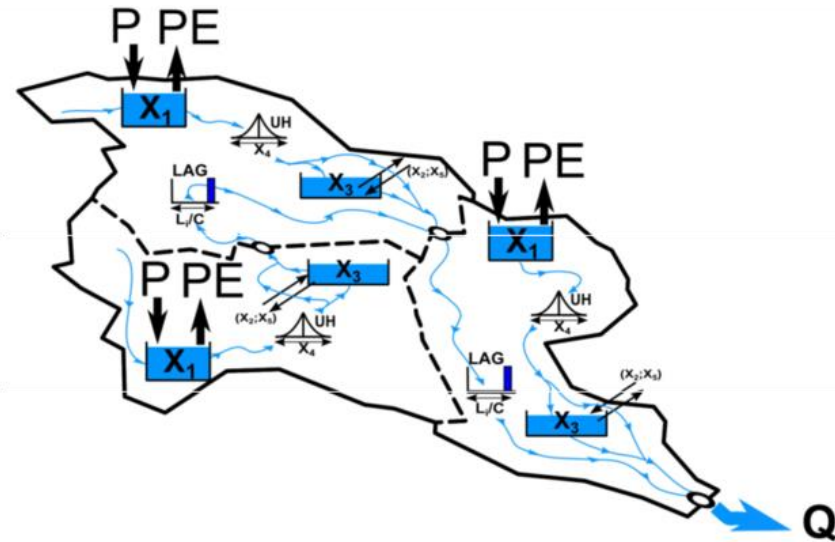
(b) GRSD

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



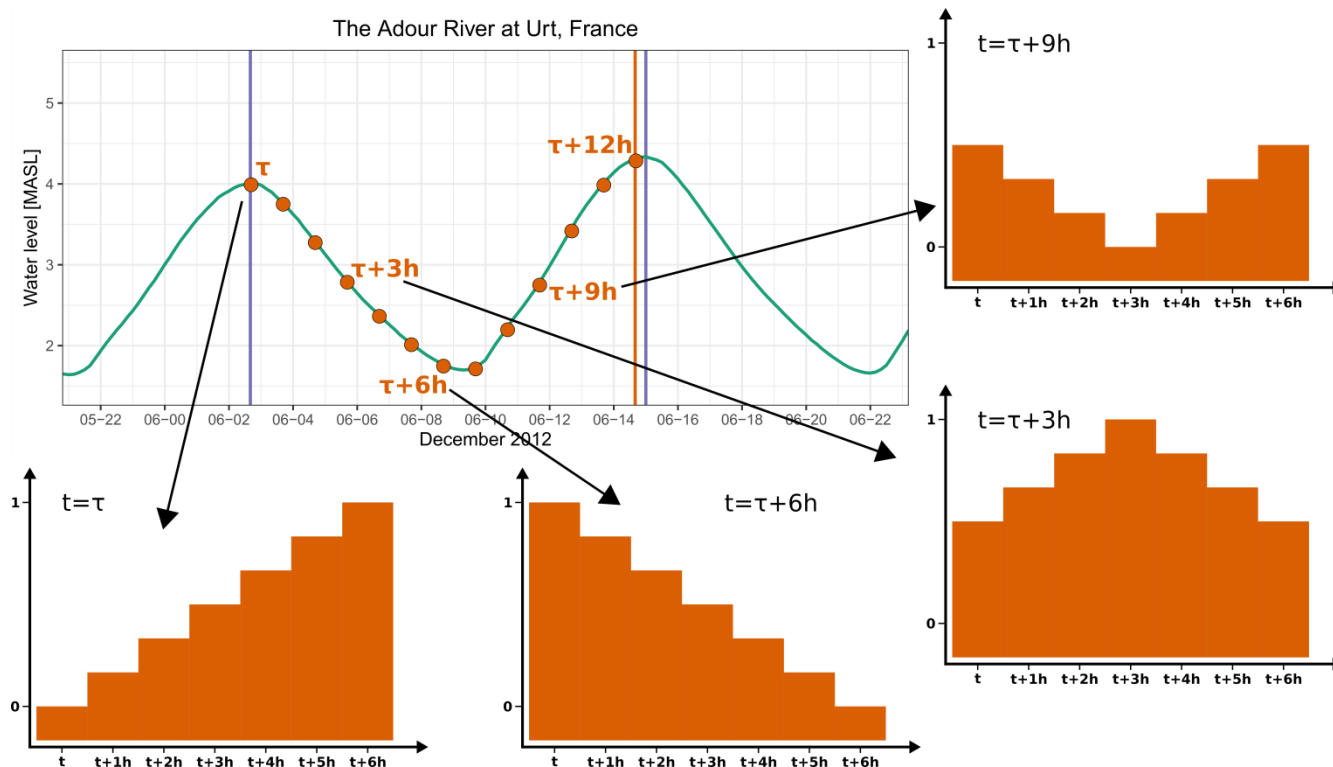
(a) GR5J



(b) GRSD

# 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

- de Lavenne, A., Thirel, G., Andréassian, V., Perrin, C., and Ramos, M.-H. (2016). Spatial variability of the parameters of a semi-distributed hydrological model, *Proc. IAHS*, 373, 87-94, doi:[10.5194/piahs-373-87-2016](https://doi.org/10.5194/piahs-373-87-2016).
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