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

V. Mansanarez\textsuperscript{1,2}, G. Thirel\textsuperscript{2}, O. Delaigue\textsuperscript{2}, and B. Liquet\textsuperscript{1}

\textsuperscript{1}Université de Pau et des Pays de l'Adour, E2S UPPA, CNRS, LMAP, Pau, France
\textsuperscript{2}Université Paris-Saclay, INRAE, UR HYCAR, 92160, Antony, France
Corresponding email: valentin.mansanarez@inrae.fr
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 (Lobliegeois 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.
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.
Accounting for tidal influence

• The propagation of the modelled streamflow to the downstream unit is delayed or stopped on each hydrological unit depending on how strong is the tidal influence.

• Use of unit hydrographs to do that
Any suggestion?

• Any reference?
• Any question?

Thanks!
References