# Colloque TSMR – CFBR
## Transport sédimentaire : rivières et barrages réservoirs
## 15 au 17 mars 2022 – Saclay

# Bank erosion processes: Field survey and analytical modeling – Case of the Allier River

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## Key issues

Few quantitative studies of the ***erosion of riverbanks made of cohesionless sand-gravel alluvia***.

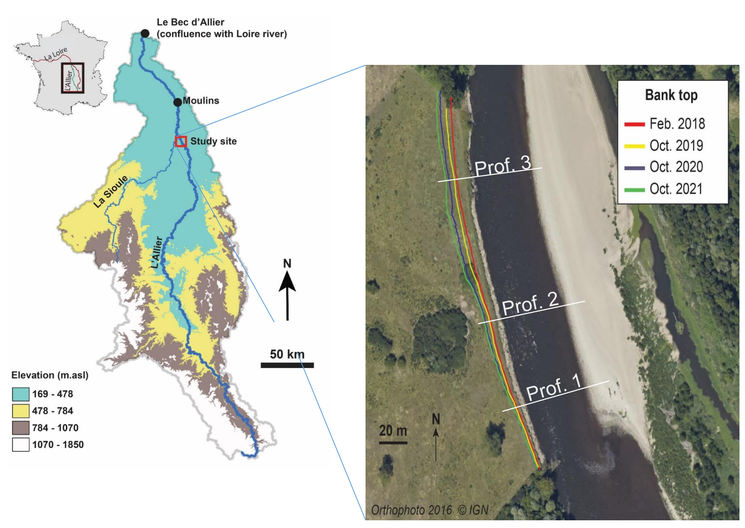
*needs* →
- Investigating and quantifying the relative influences of forcing parameters, such as changes in the water level, on the bank lateral retreat
- Calibrating existing models to the specific case of coarse cohesionless bank material.

*This study:*
- 3-year hydro-morphological field survey on the Méplan site (Allier river, France)
- Evaluation of the Bank Stability and Toe Erosion Model (BSTEM, National Sedimentation Laboratory, Oxford, MS, USA) as a predicting tool for riverbank lateral erosion

→ In particular, ***influence of the erodability coefficient $K_d$*** on the model results

## Geomorphological setting

- Study site: "Le Méplan" (Contigny)
- Alluvial reach of the Allier river
- Meander extrados
- Pasture area: low vegetation cover
- 190m-long section
- >3 m/yr bank lateral retreat




- Average bank height = 3,8m
- Composite bank:

*Cohesive silts (avg. $D_{50}$=59µm)*

*Mid - Coarse sands (224µm<avg. $D_{50}$<862µm) ± gravels*

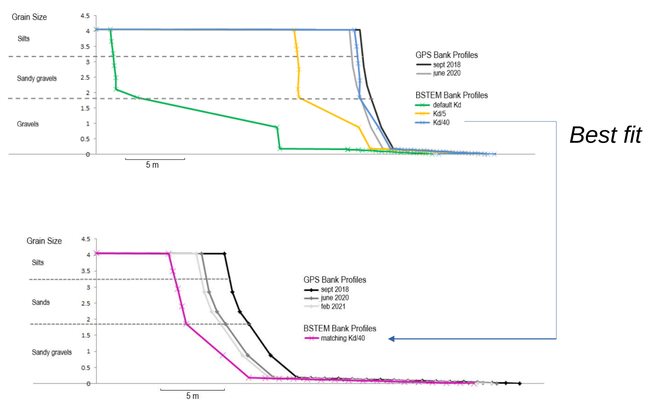
*Sandy gravels (862µm<avg. $D_{50}$<6600µm)*

## BSTEM vs. Field results

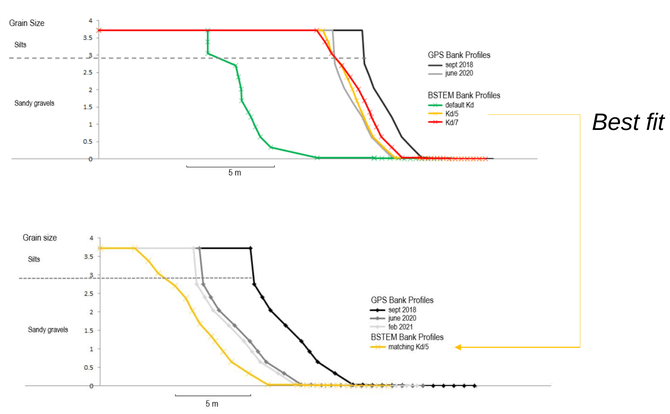
- **Calibration tests**
- Flood events
- Sept. 18 – June 20

- **Validation tests**
- Flood events
- June 20 – Feb. 21

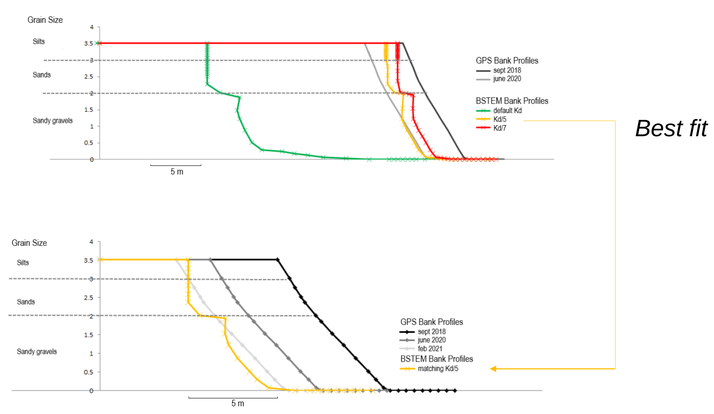
• Bank profile n°1




• Bank profile n°2

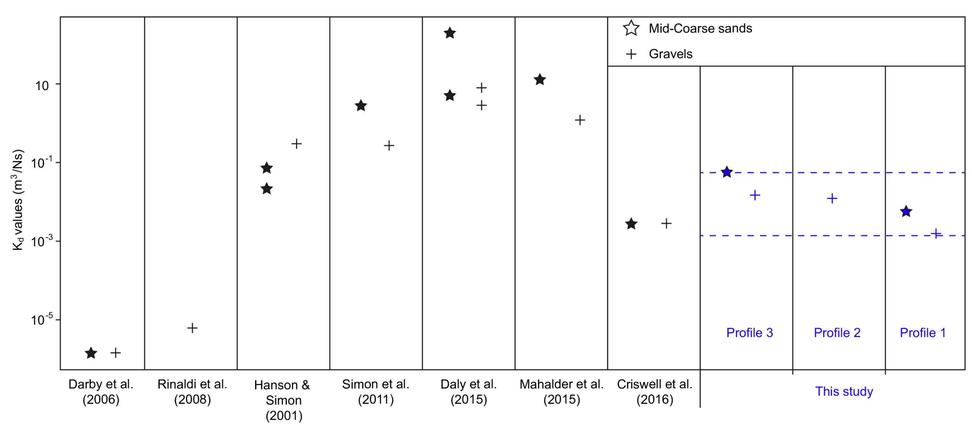



• Bank profile n°3




× **Default parameters: overestimation of the bank retreat**
× **Best fits in $K_d$ not validated for every flood event**

## Discussion: modeling parameters




- Difficulties in estimating $K_d$ (and $\tau_c$) of non-cohesive coarse sediments
- Best-fit Kd values of this study within the literature range

→ ***How to better constrain these parameters?***