Session 3 : Modélisation numérique et expérimentale des processus sédimentaires

Reconstruction de bancs de galets alternés en laboratoire

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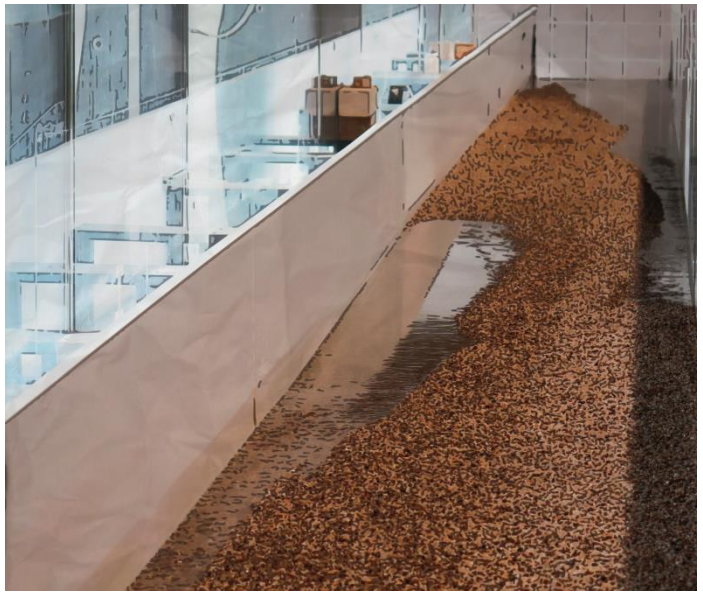
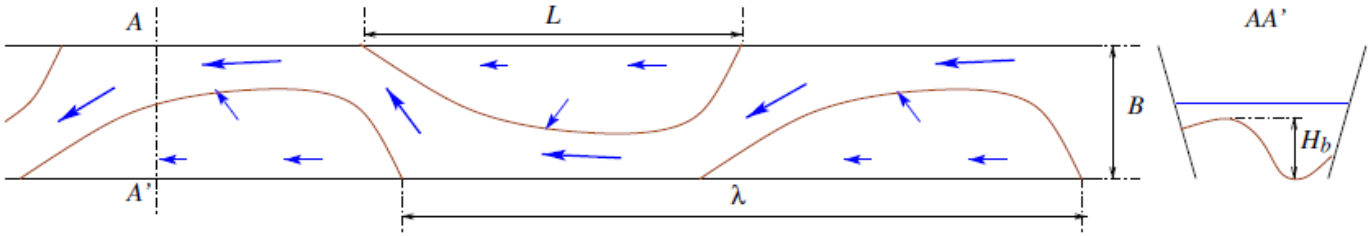


Alternate bars

- **Typical feature** in engineered alpine rivers with high sediment supply



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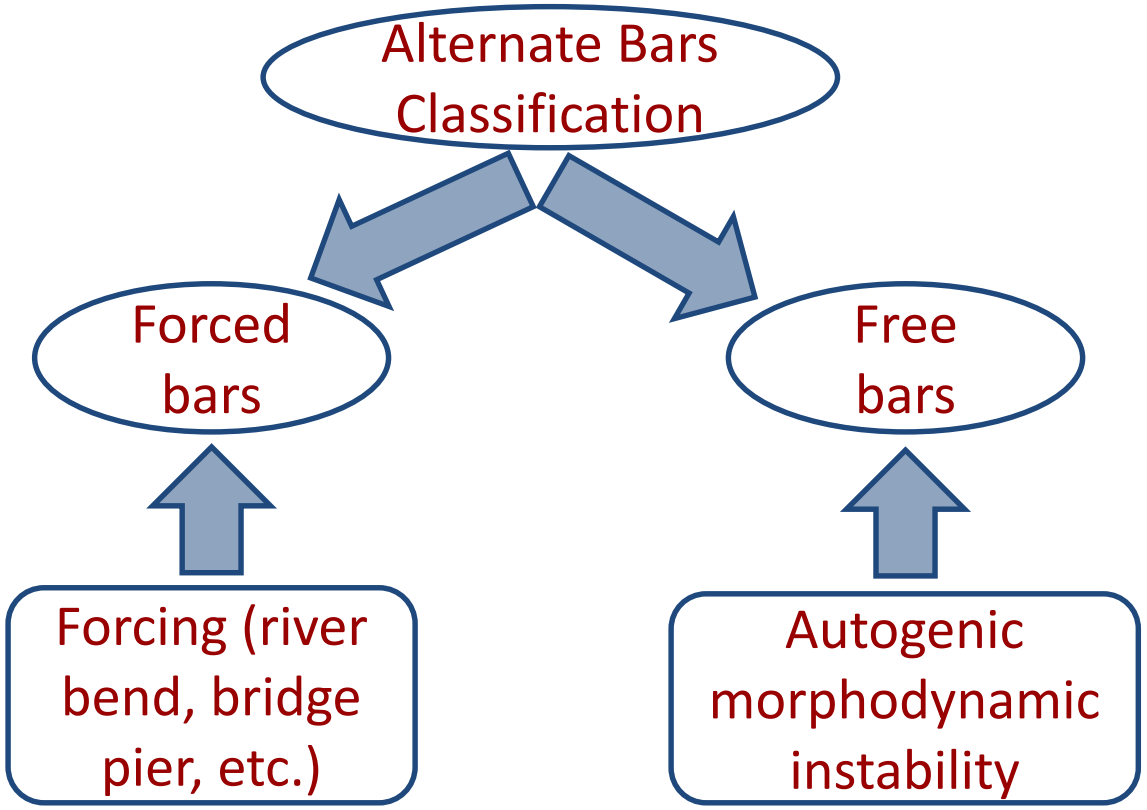


Engineering problems:

- Decrease water discharge & sediment transport capacity

- Induce side bank erosion

- Enhance flood risk by trapping fine sediments (Vegetated bars)

Impact of fine sediments on an alternate gravel bar system

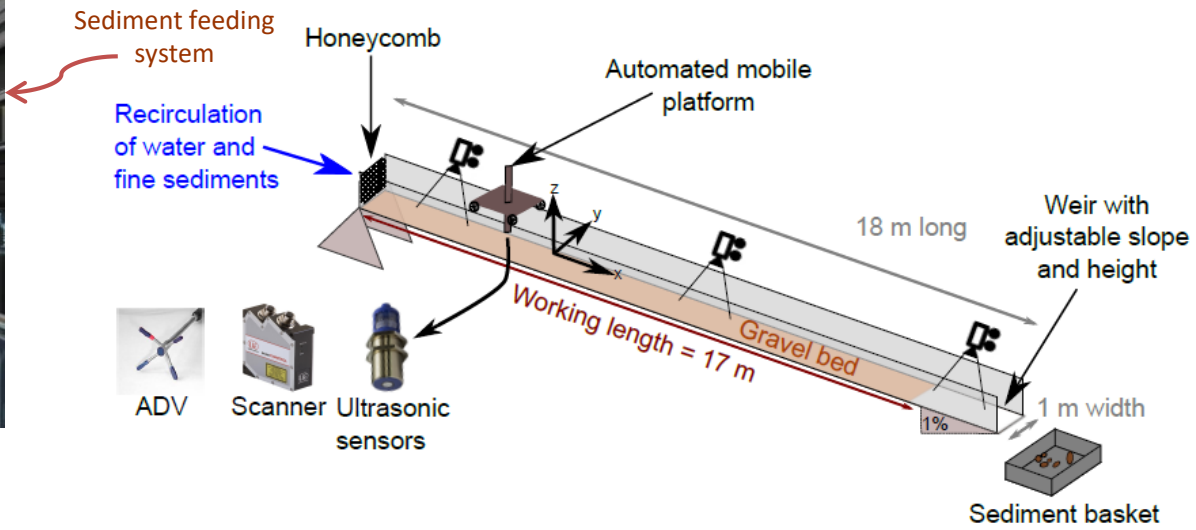
- Effects of fine sediment infiltration/ deposition on the bar morphology?
- Effects of bar morphology on fine sediment deposits?

Methodology

Reconstructing a quasi-steady alternate gravel bar system in a **laboratory flume**

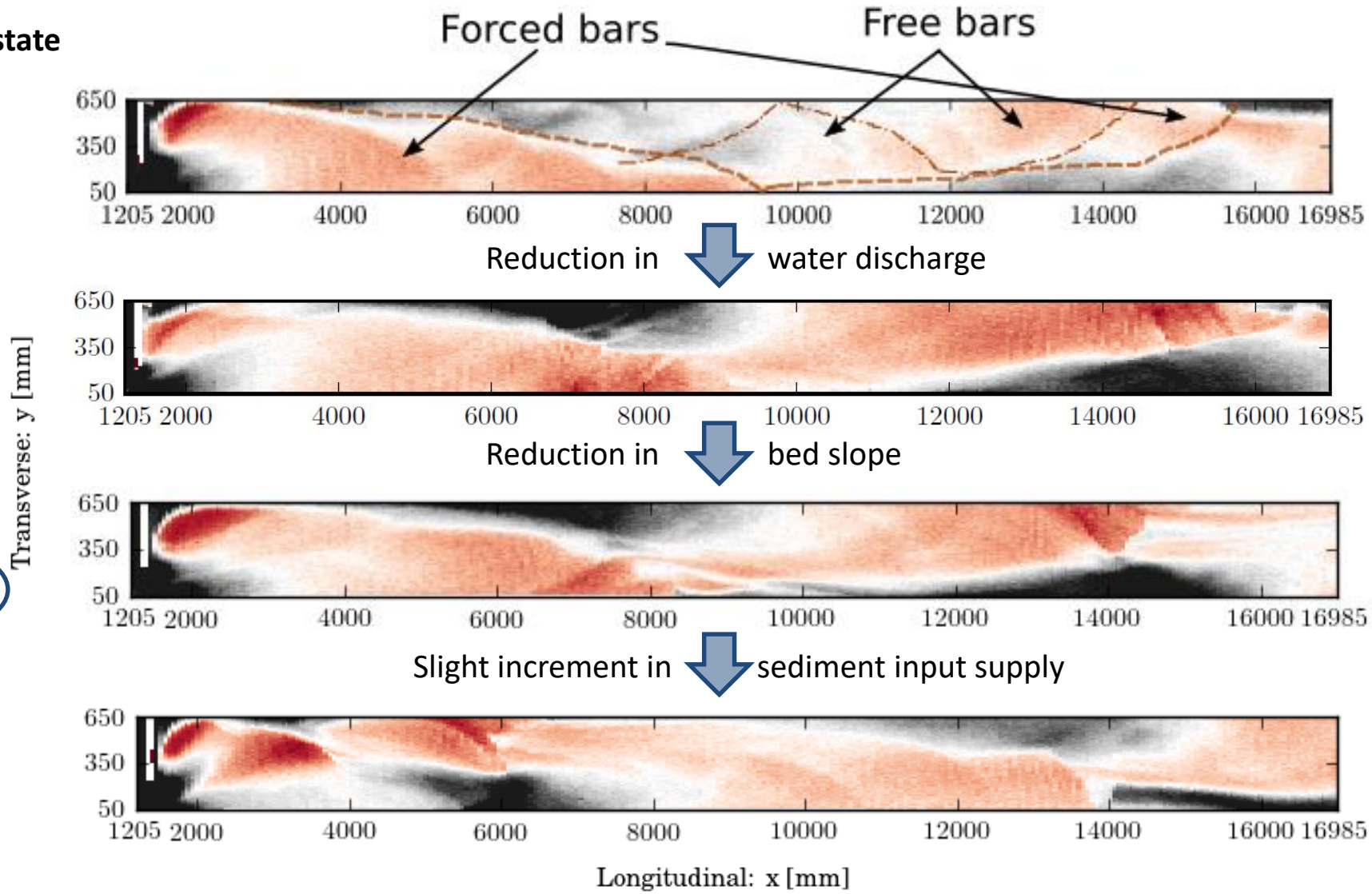
Perturbing the alternate gravel bar system by adding suspended fine sediments with recirculating flow

Top view of the flume



A reference case of alternate bars without fine sediments

Equilibrium state



Superimposed system of free and forced bars

A system of quasi-steady forced alternate bars

A system of quasi-steady forced alternate bars with reduced λ_b

Modified the system of forced bars

Conclusions

- Two forced alternate gravel bars (6-7 m each) developed by deposition of excess of sediments in the flume. (Ref. case: Exp7)
- Superimposition of smaller bedforms like free bars, dunes and antidunes over forced bars was reduced by decreasing the water discharge and slope of the bed.
- Caution: Input sediment supply; a small change in it can alter the dynamics of forced alternate bars.

Perspectives