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## Infiltration of silt-sized sediment in a gravel-bed channel

A. Herrero, Céline Berni, B. Camenen

► **To cite this version:**

A. Herrero, Céline Berni, B. Camenen. Infiltration of silt-sized sediment in a gravel-bed channel. EGU General Assembly, Apr 2014, Vienne, Austria. pp.1, 2014. hal-02603634

**HAL Id: hal-02603634**

**<https://hal.inrae.fr/hal-02603634>**

Submitted on 16 May 2020

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## 1. Motivation

Social and environmental issues [1]:

- Affection of river habitat: fish spawning
- Exploitation of wells
- River dams management: influence of flushing operations
- Contaminant mass balance: substances absorbed by suspended sediment

## 3. Experimental procedure

Influence of variables:

- Suspended fine sediment concentration
- Flow velocity
- Slope

Future experiments: correction of fine sediment mass to keep suspended sediment concentration constant



Time evolution of infiltrated mass

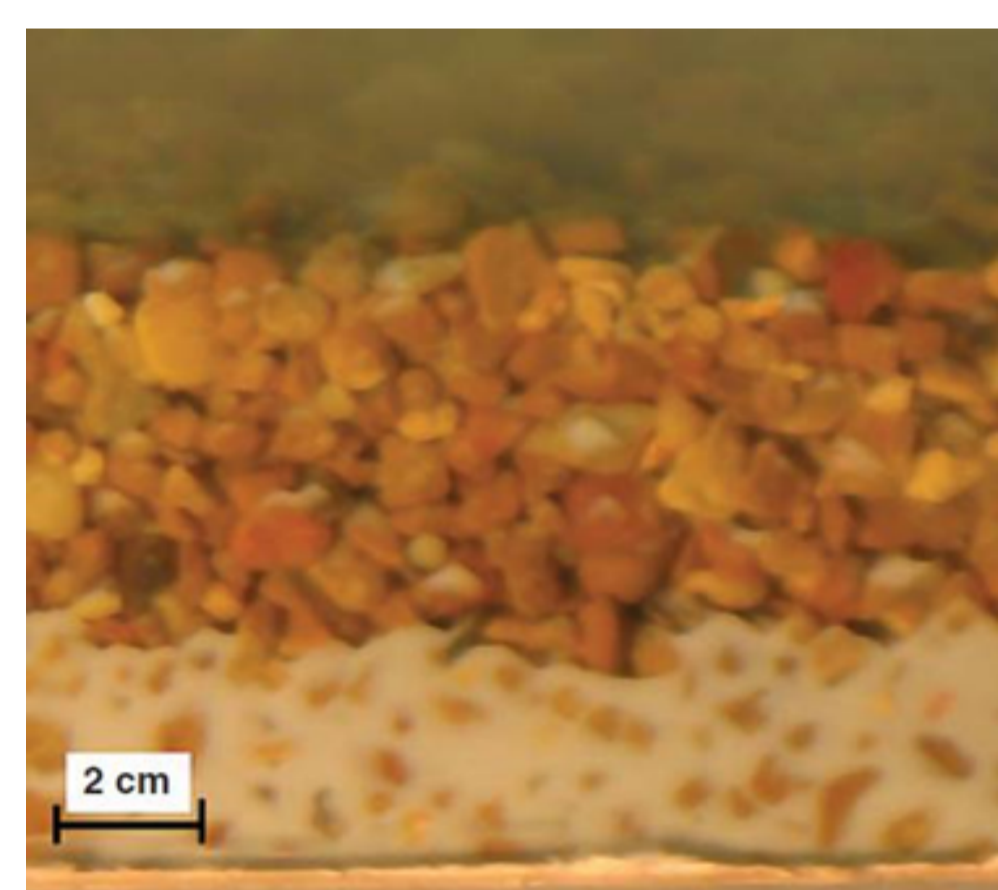
Equilibrium state: bed samples for fine sediment infiltration profiles

## 4. Mechanism of infiltration

Influence of coarse-fine sediment diameter ratio



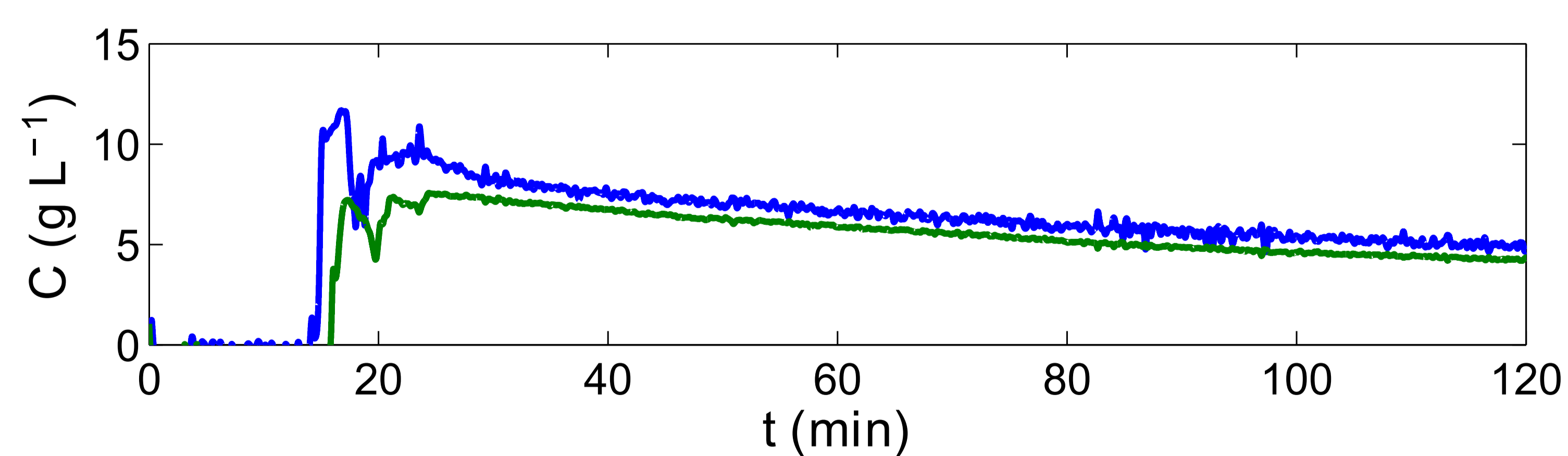
Sealing process: clogged layer at bed surface [2]



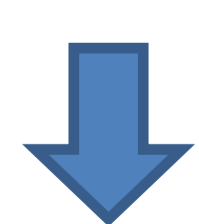
Full infiltration: upwards filling with fine sediment [3]

$$\frac{D_c}{D_f} \approx 10 \text{ to } 14$$

## 5. Suspended sediment concentration

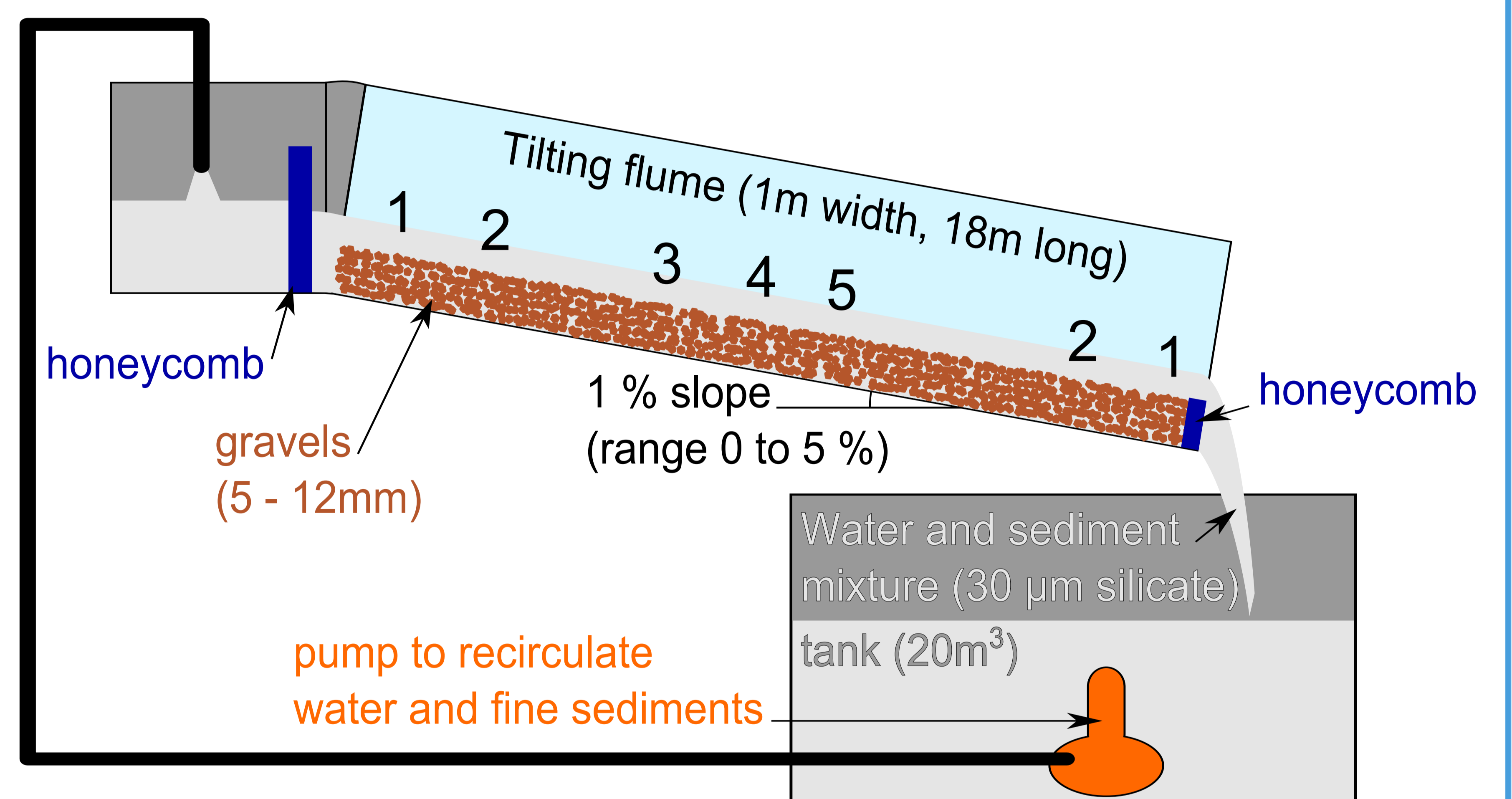
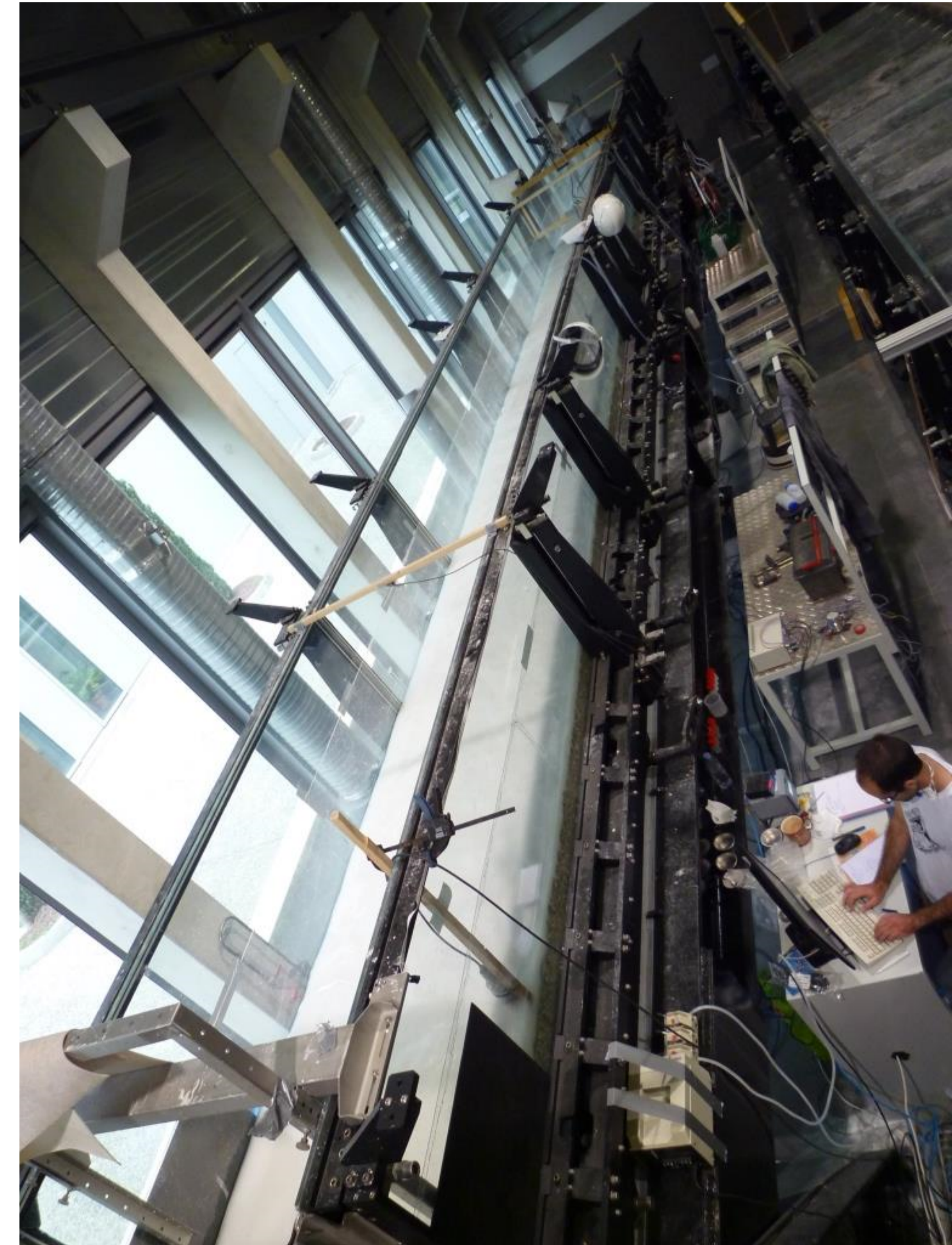


Exponential decrease



Stabilization of fine sediment infiltration

## 2. Experimental setup



1. Turbidimeter



Suspended sediment concentration

2. Ultrasonic sensors



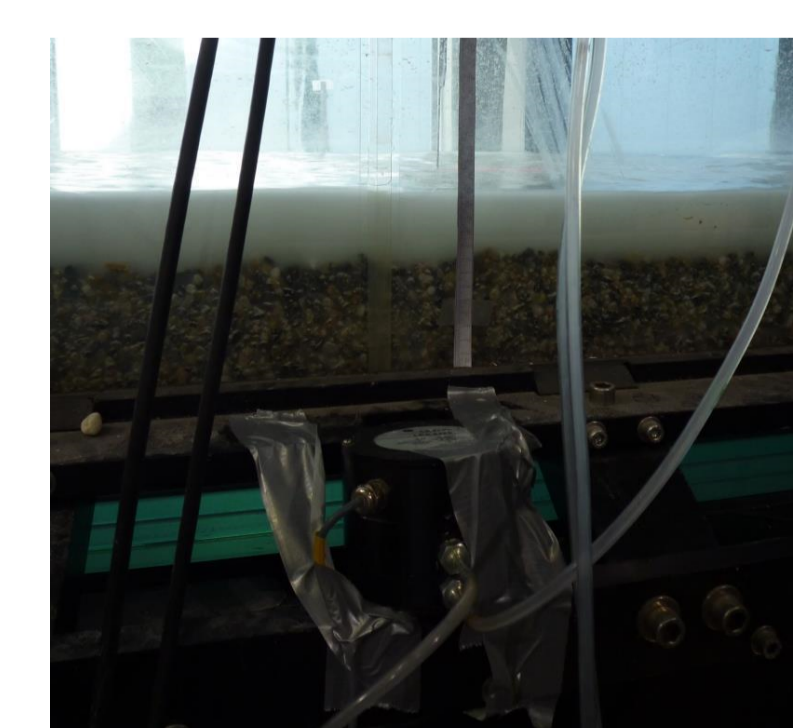
Water depth

3. Acoustic Doppler Velocimeter



Flow velocity

4. Pressure sensors



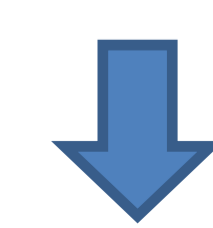
Subsurface water pressure

5. Pitot tube



Subsurface water velocity

Permeability



Fine sediment content evolution

[1] Wood, P. J. and Armitage, P. D. (1997) Biological effects of fine sediment in the lotic environment. Environmental management, 21(2), 203-217.  
 [2] Gibson, S., Abraham, D., Heath, R. and Schoellhamer, D. (2010) Bridging process threshold for sediment infiltrating into a coarse substrate. J. Geotech, Geoenviron. Eng., 136(2), 402-406.  
 [3] Einstein, H. A. (1968) Deposition of suspended particles in a gravel bed. J. Hydraul. Div. Am. Soc. Civ. Eng., 94(5), 1197-1205.