

Action 2.5

Evaluation de la vulnérabilité des barrages vis-à-vis des aléas torrentiels

RISBA

RISCHIO DEGLI SBARRAMENTI ARTIFICIALI
RISQUES DES BARRAGES

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PATROCCO Davide , ROPELE Paolo ,
COLLE Franco, LEGUERN Jules, RIFAÏ
Ismail

Problèmes
torrentiels

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Excès
sédimentaires

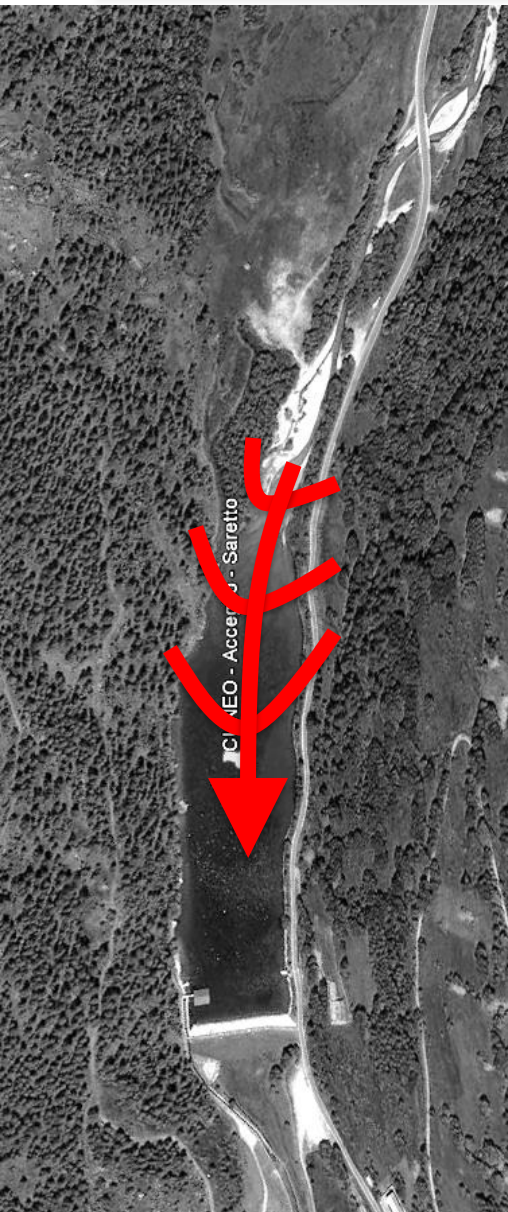
Passe déversante
libre

Barrage « au fil de l'eau »
Capacité de 30,4 MW
Mis en service oct. 2000
Coût total 43 M€

2 vannes radiales

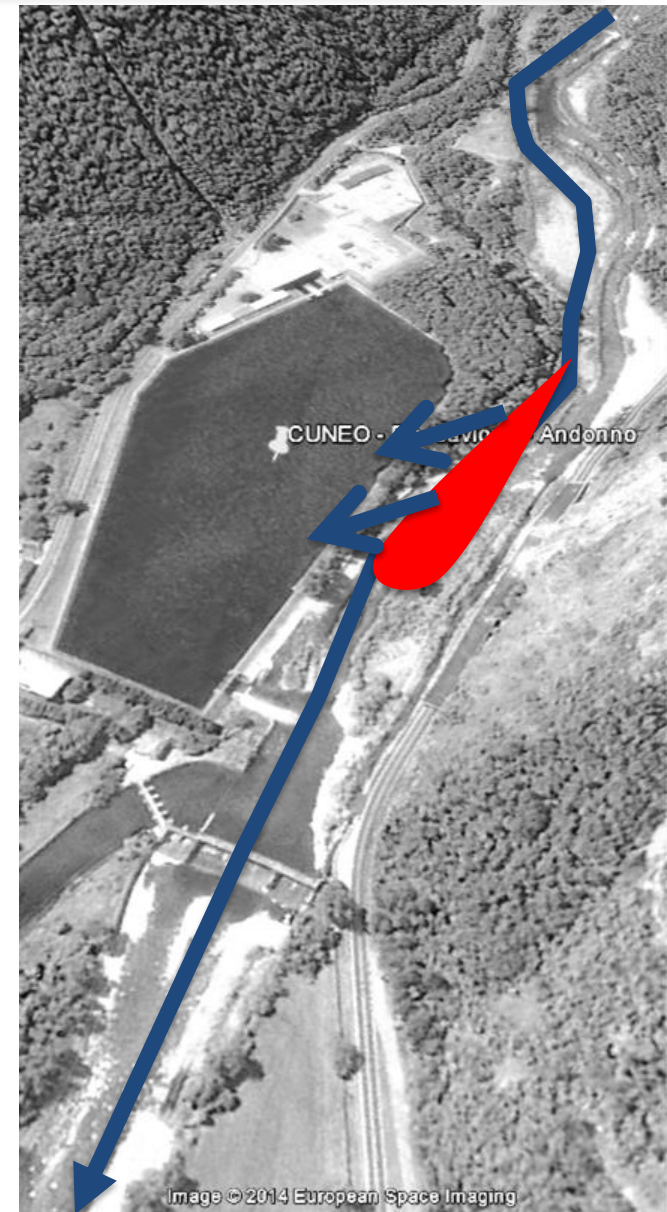
Prise d'eau
pour le
(3 K)

Photos: Olivier CAYLA. Before and after the July 27th 2010
flood on the Jagran River (Pakistan)



2 problèmes:

- Erosion des ouvrages
- Sedimentation



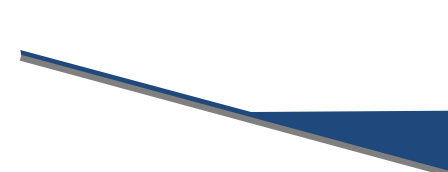
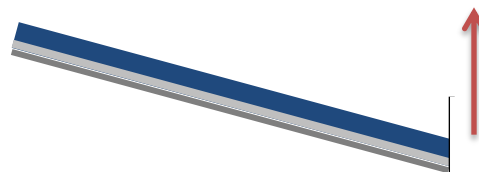
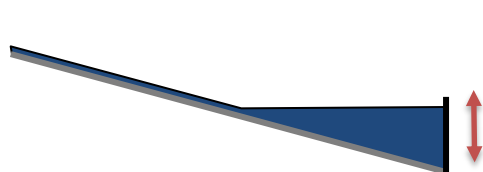
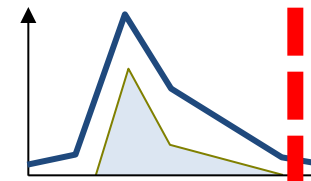
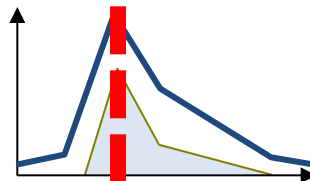
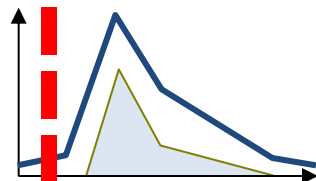


Crue 2013 sur La Cougar Creek (Canada). Réactivation local du lit, 3 morts (Photo jonathan hayward ap sipa)



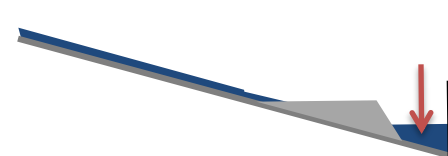
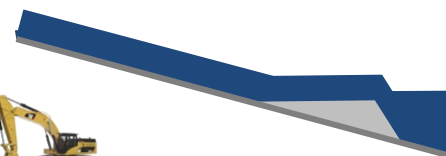
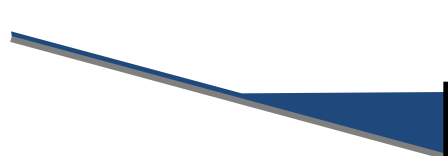
See a video of a dam erosion real scale experiment realised during the IMPACT european project

(info about the IMPACT project: http://www.impact-project.net/impact_project_overview.htm)



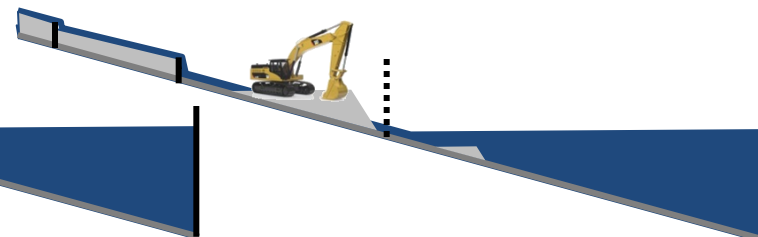
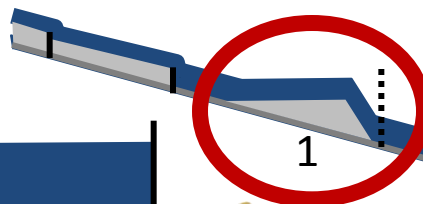
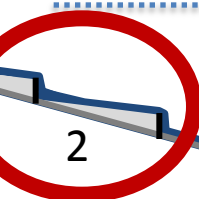
Chasse hydraulique/Mise en transparence

Transparence sédimentaire



Curage mécanique

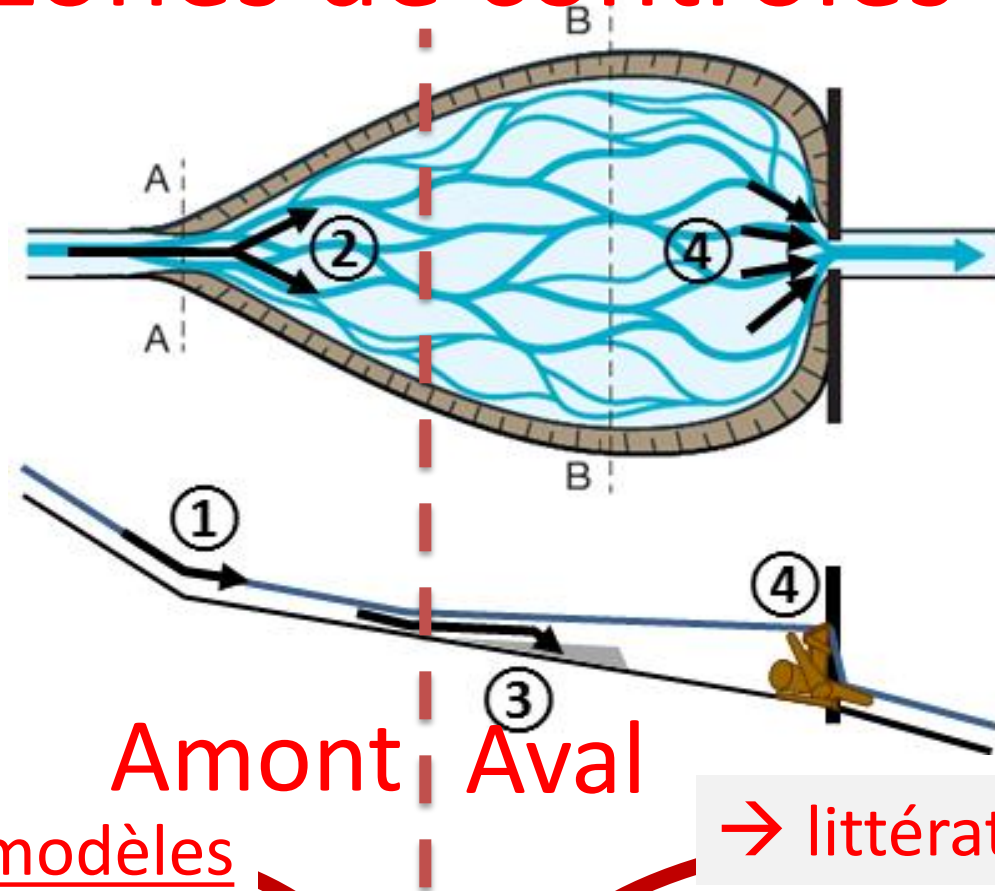
Augmentation durée de vie de la retenue



Correction torrentielle

Limitation des apports à la retenue

2 zones de contrôles



Amont Aval

→ modèles

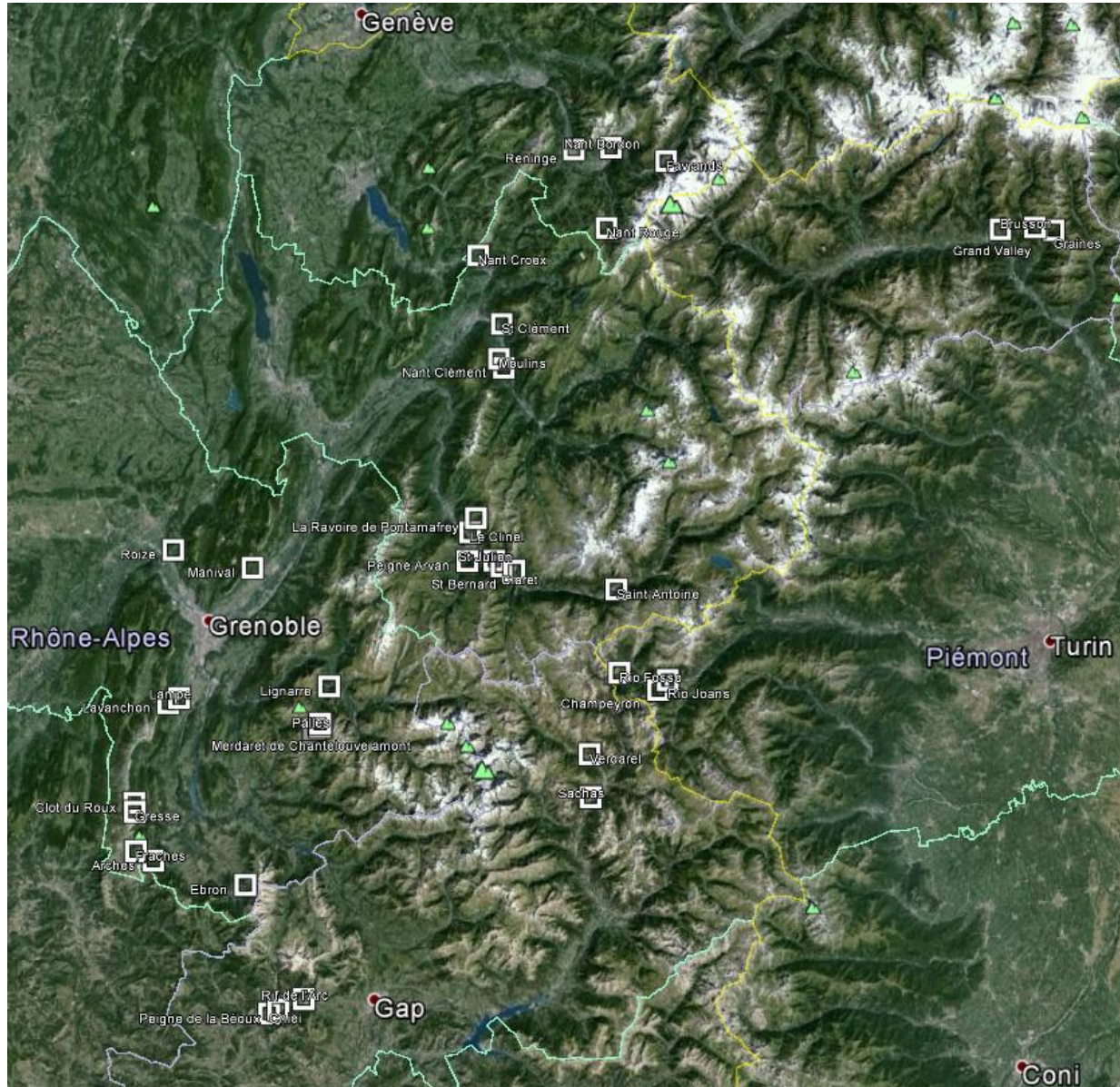
① pente

② largeur

→ littérature

③ vitesses

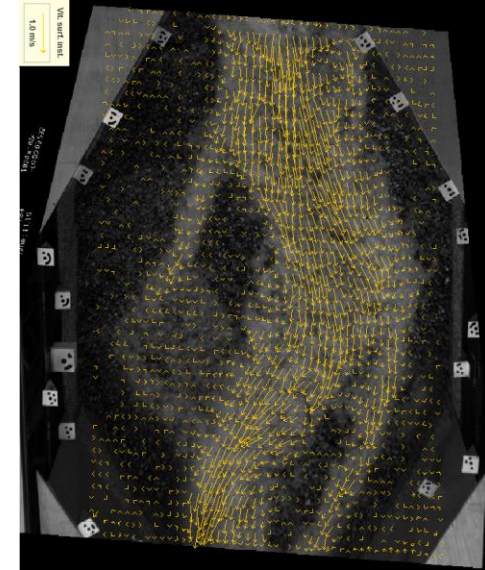
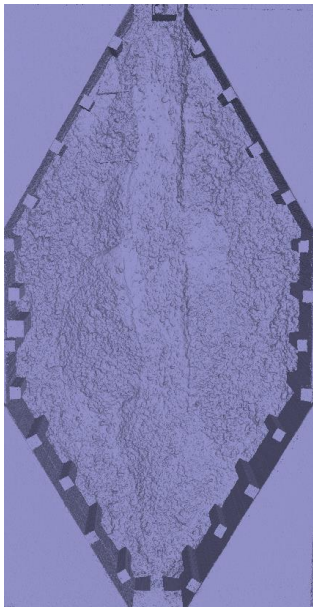
④ blocage

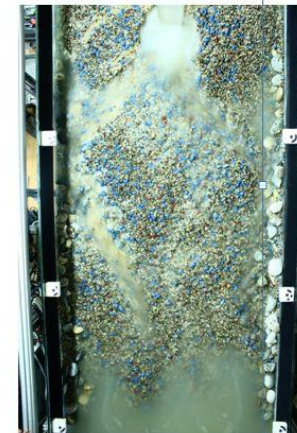
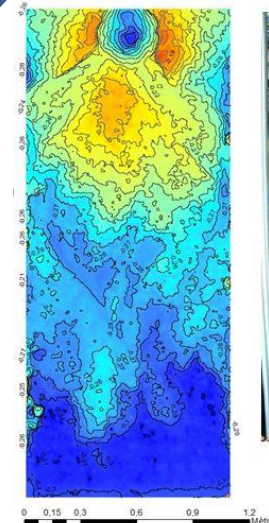
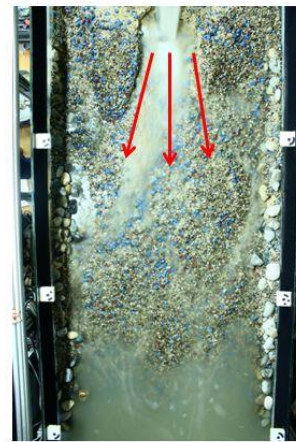
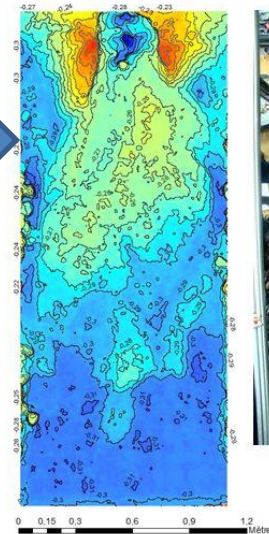
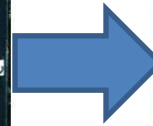
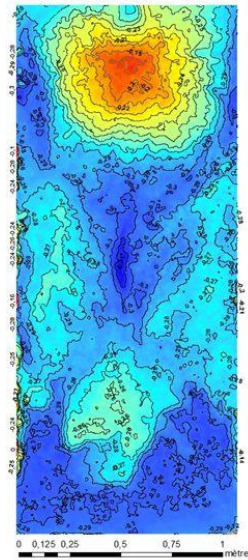


Enquêtes de terrain

~40 ouvrages
France et Italie

Modèle physique au laboratoire





→ Phénomène complexe
→ Autocurage important (pendant la crue et en fin de crue)

Protection contre
sédimentation + érosion

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petites ouvertures
nécessaires

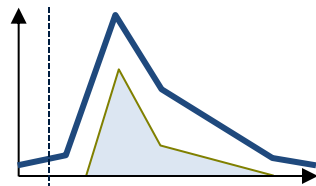


Protection contre
érosion

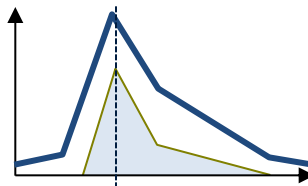
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grandes ouvertures
souvent suffisante

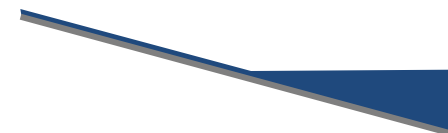
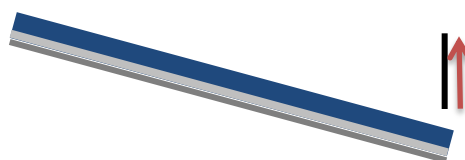
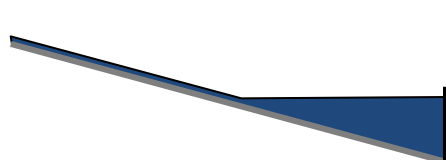
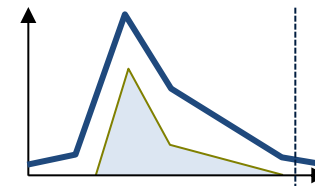




Chasse hydraulique/Mise en transparence

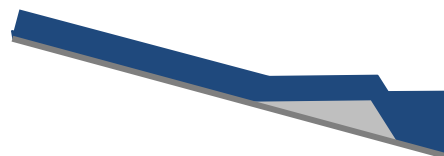
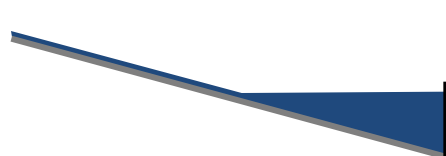


Transparence sédimentaire



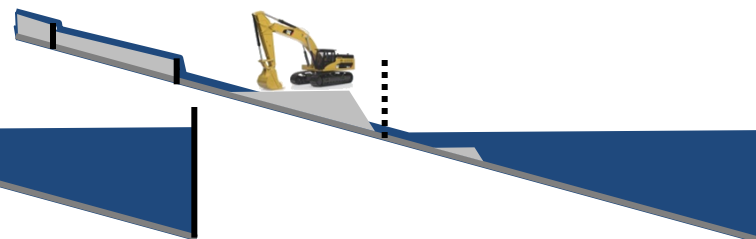
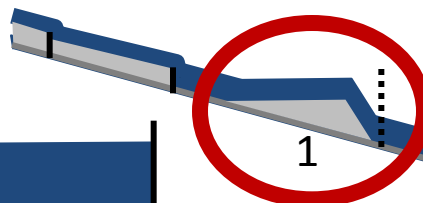
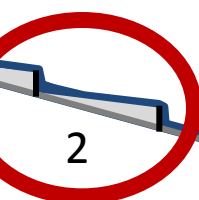
Curage mécanique

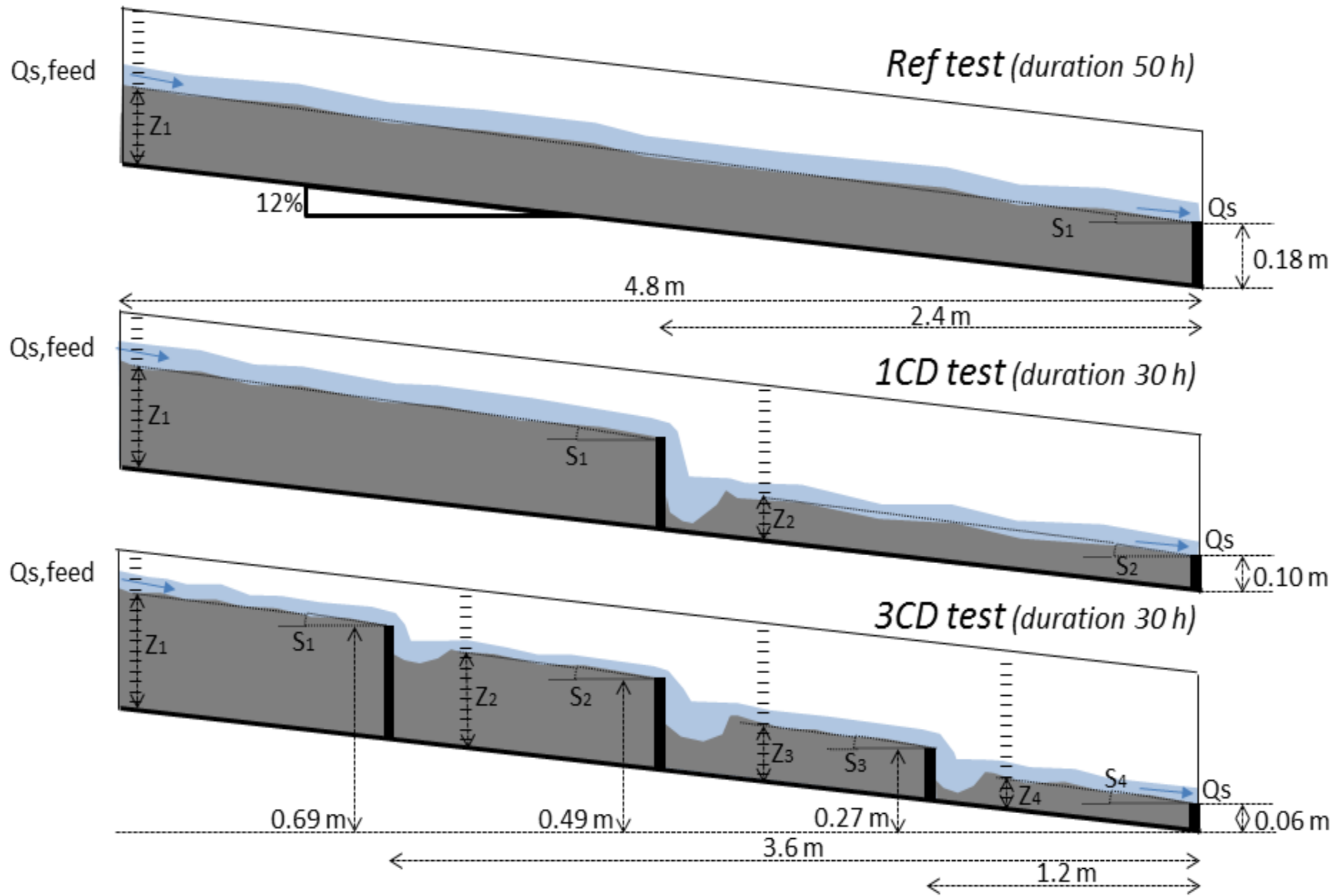
Augmentation durée de vie de la retenue



Correction torrentielle

Limitation des apports à la retenue





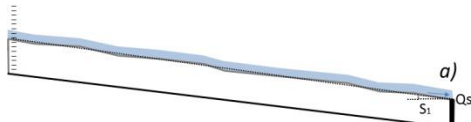
Voir vidéo de l'expérience



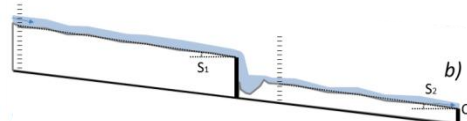
- Fluctuations de débit solide
- Stockage temporaire



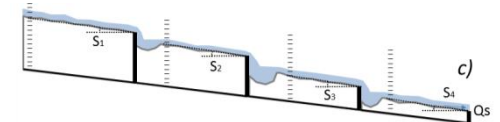
Effet des barrages sur le transport solide → export sédimentaire plus réguliers et moins intenses



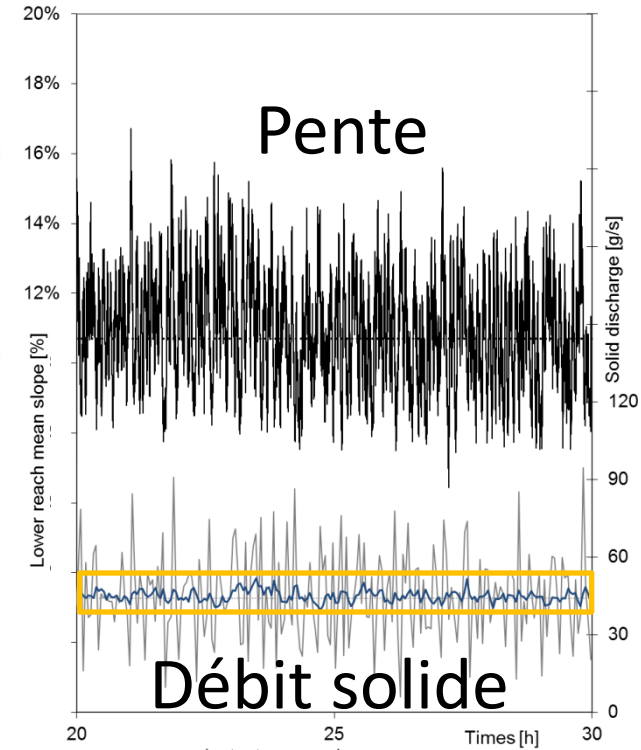
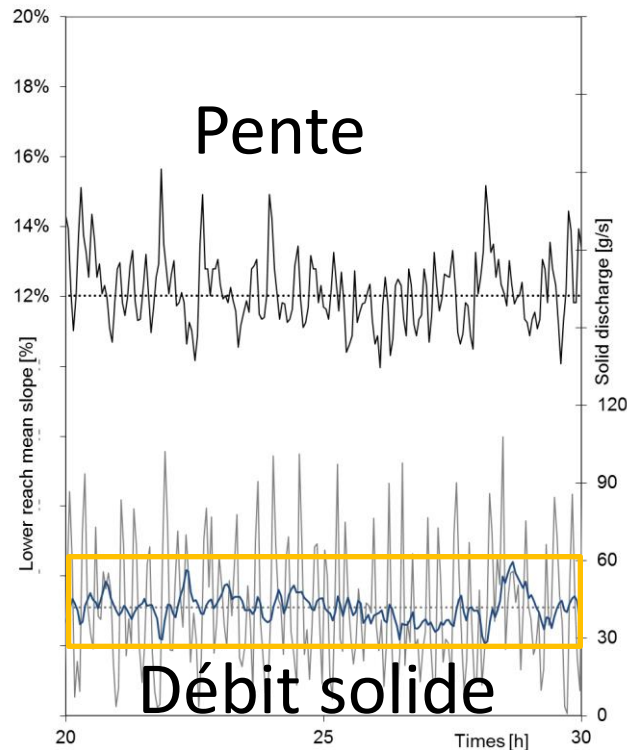
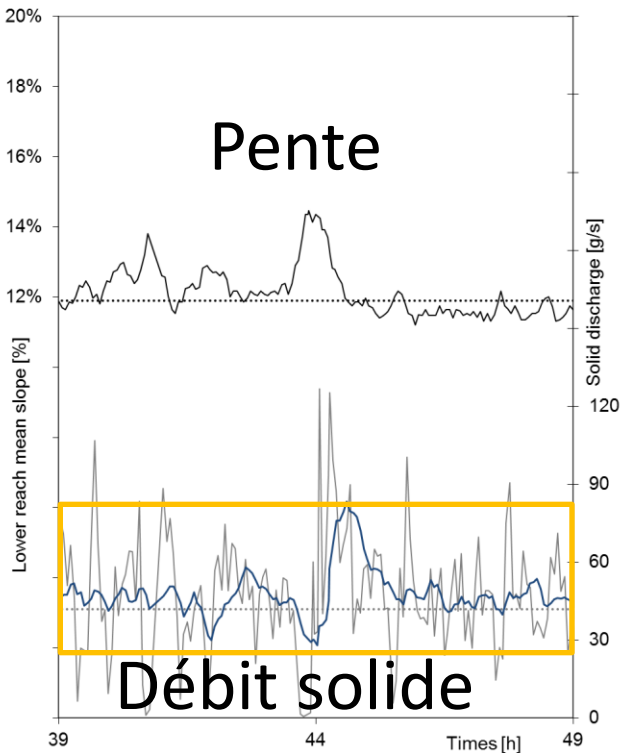
a) Reference test : Time evolution of flume mean slope and solid discharge



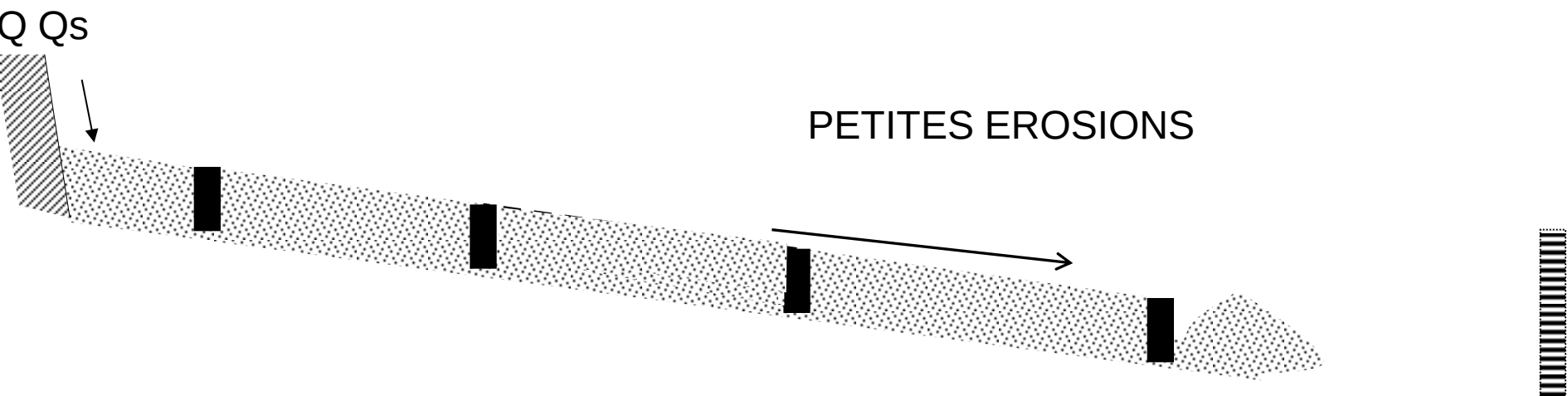
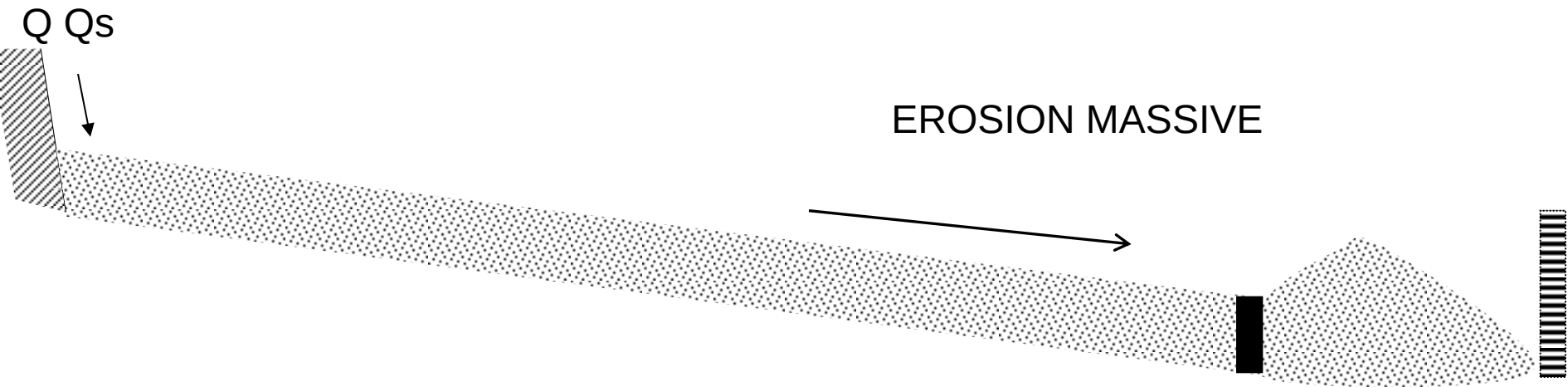
b) 1CD test : Time evolution of lower reach mean slope and solid discharge



c) 3CD test : time evolution of lower reach mean slope and solid discharge



— Instantaneous slope Median reach slope
 — Outlet bedload discharge Solid feeding rate
 — Mean moving value on 10 measures



Potection contre les crues torrentielles

→ Protection locale contre les érosions

→ Transparence hydraulique et sédimentaire
si possible

→ Piéges à graviers en amont de la retenue

→ Barrages des corrections en compléments

Merci de votre attention

Grazie per l'attenzione
