



PICS
Prévision Immédiate Intégrée
des Impacts des Crues Soudaines



Subvention
ANR-17-CE03-0011

Restitution du projet ANR PICS, Aix en Provence, 18 mai 2022

Pierre Javelle, Daniela Peredo, Maria-Hélène Ramos,
Charles Perrin, Pierre-André Garambois, François Colleoni



HIWeather



Les évolutions des modèles hydrologiques

Prévision immédiate et intégrée des Impacts des Crues Soudaines



INRAE



Université
Gustave Eiffel

VIGICRUES

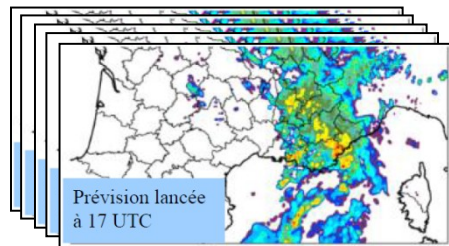
Introduction

PICS

Prévision Immédiate Intégrée
des Impacts des Crues Soudaines



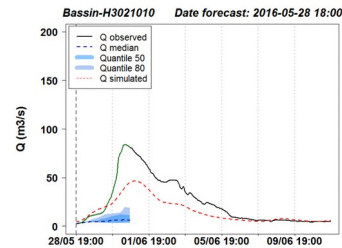
PLUIE



Radar + Prévision
numérique (0-6h)



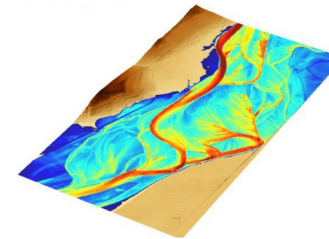
DEBITS



Modèles
hydrologiques



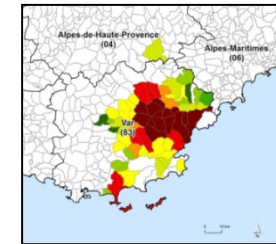
INONDATION S



Modèles
hydrauliques



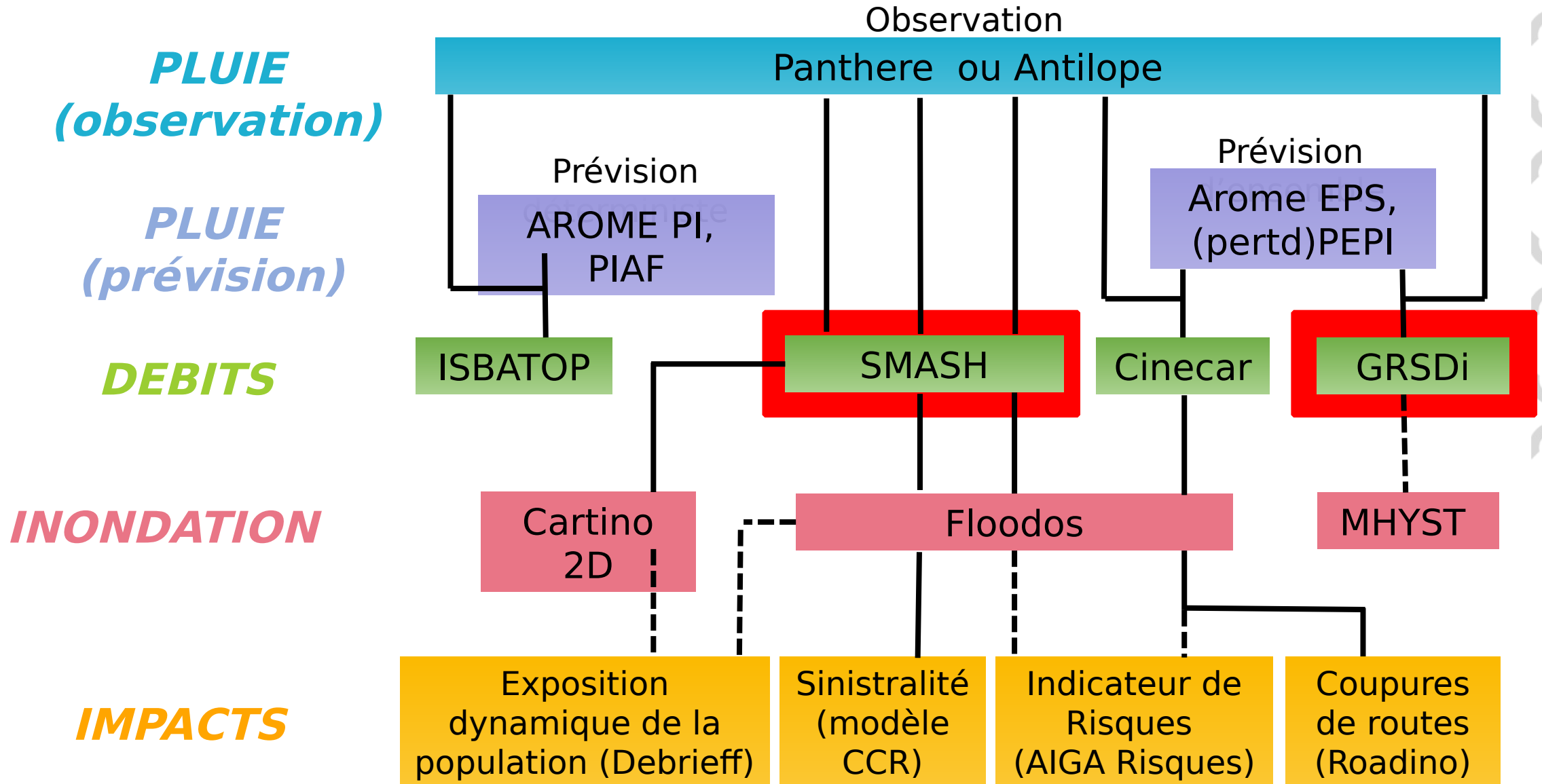
IMPACTS SOCIO- ECONOMIQUES



Modèles de
vulnérabilité



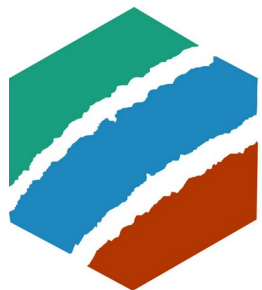
Les chaines de prévision testées





: premiers modèles GR

P!CS
Prévision Immédiate Intégrée
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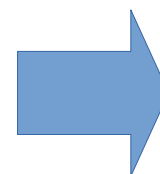
Cemagref
Antony

<https://webgr.inrae.fr>



Claude MICHEL

Modèles pluie-débit du
« Génie Rural » (GR)



**Robustes,
Parcimonieux,
« Conceptuels »**

Des modèles enrichis au fil des ans



Modèle GR développé
par Perrin et al (2008)



Les modèles GR du projet

(Antony)

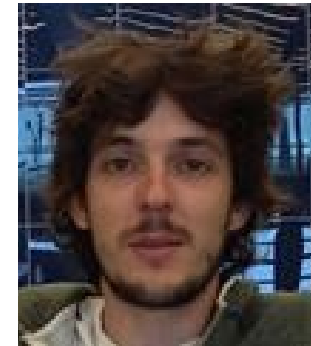
GRSDi



Thèse de Daniela Peredo

SMASH

(Aix-en-P)



Thèse de Maxime Jay-Allemand

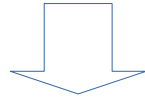
PICS
Prévision Immédiate Intégrée
des Impacts des Crues Soudaines



Les modèles GR du projet

(Antony)

GRSDi



GRP

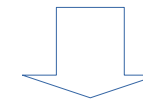


Bassins jaugés

VIGICRUES

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(Aix-en-P)

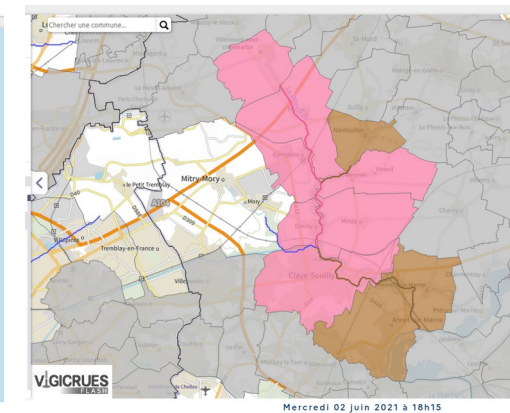
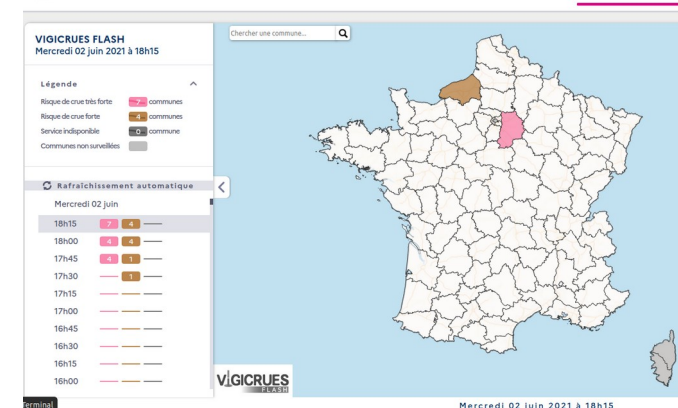
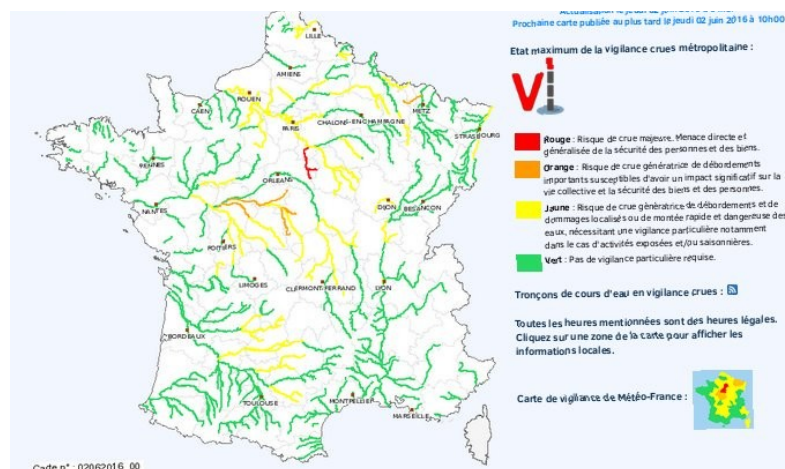


AIGA

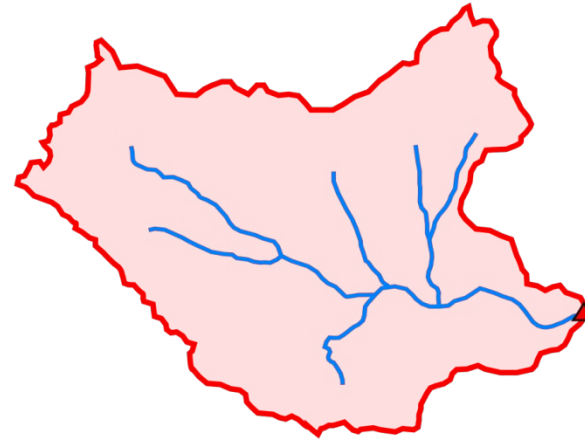
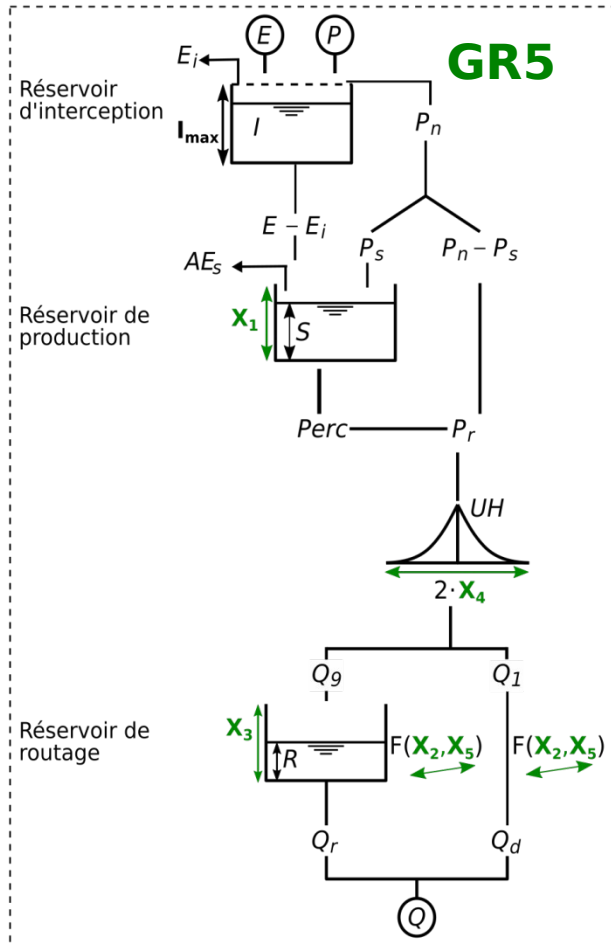


Bassins non-jaugés

VIGICRUES
FLASH



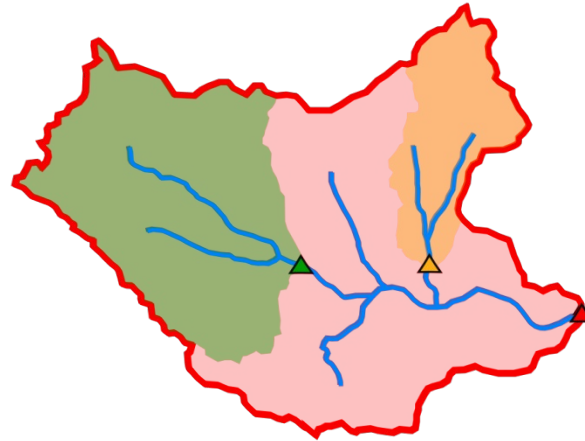
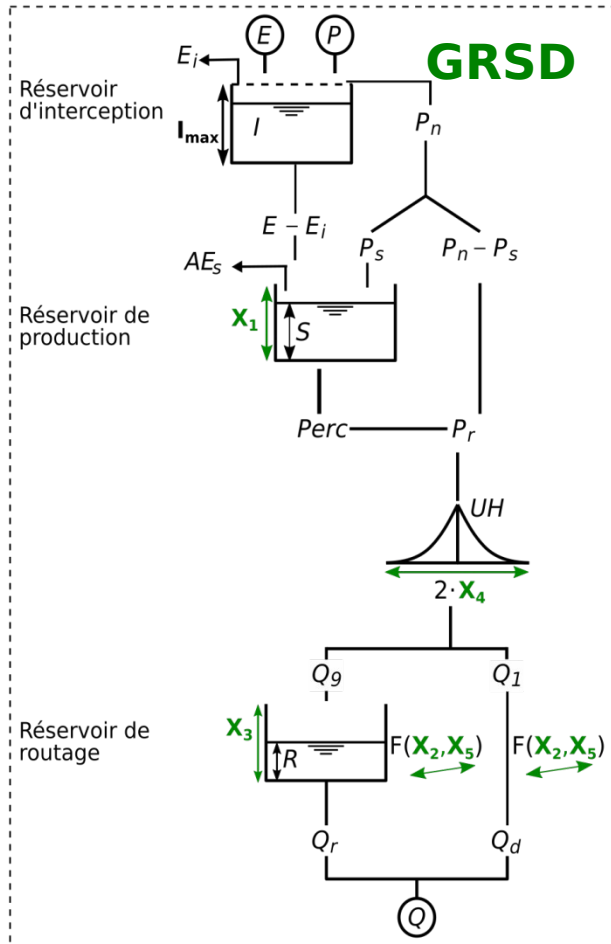
De GRSD à GRSDi



△ Exutoire jaugé



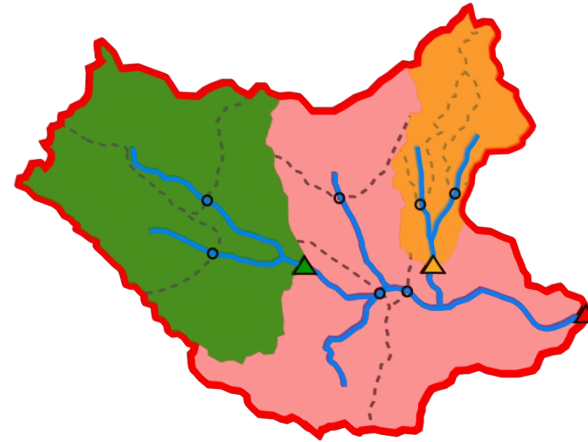
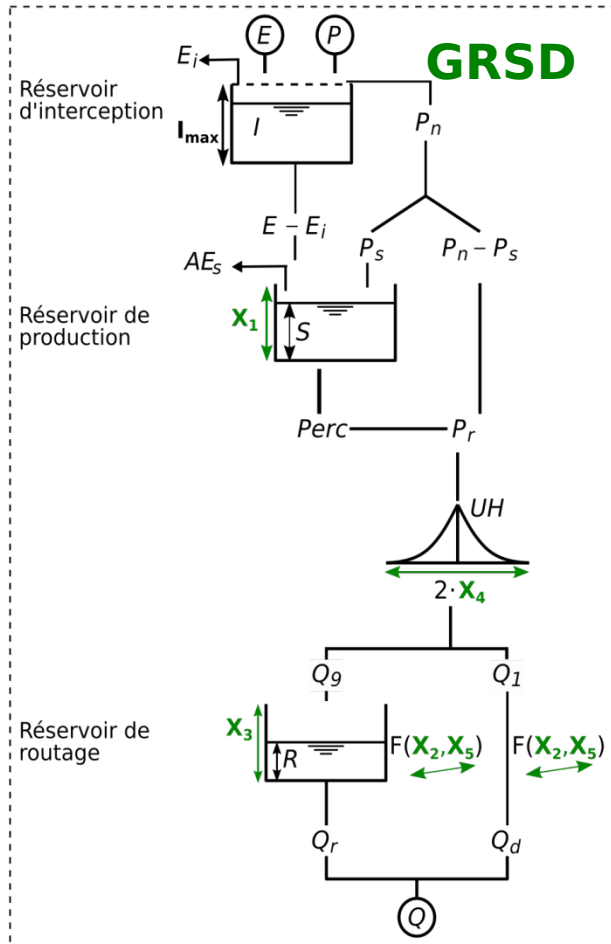
De GRSD à GRSDi



△ Exutoire jaugé



De GRSD à GRSDi

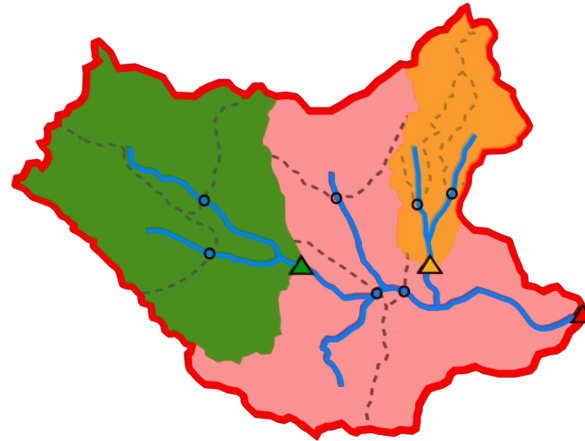
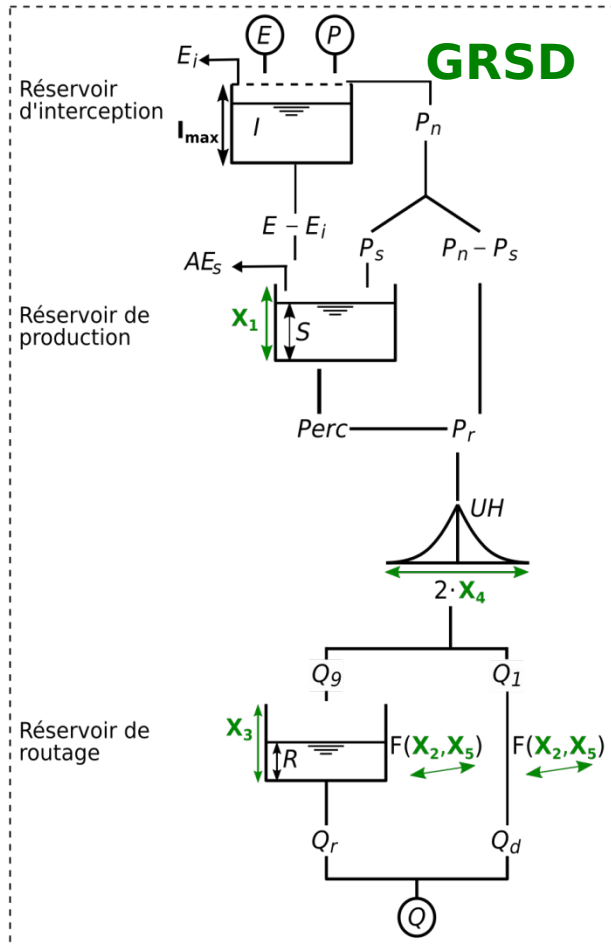


Δ Exutoire jaugé

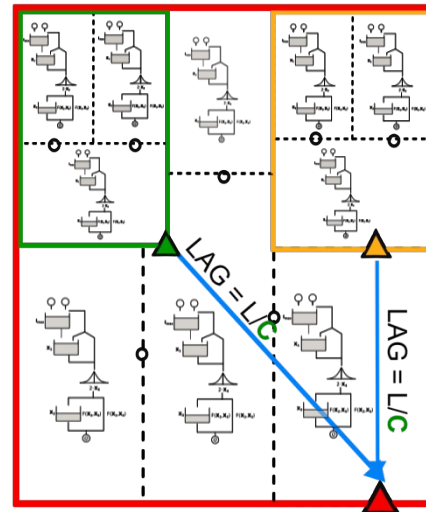
\circ Exutoire non jaugé



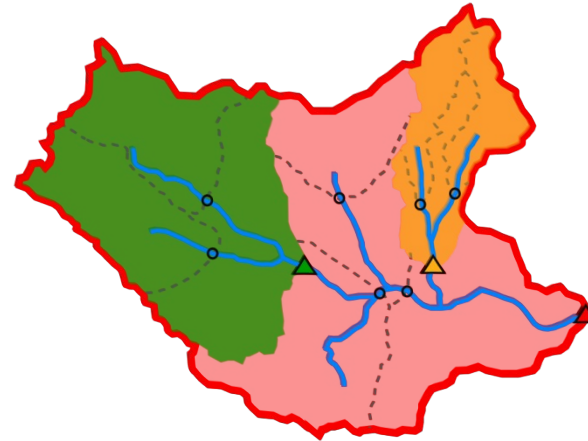
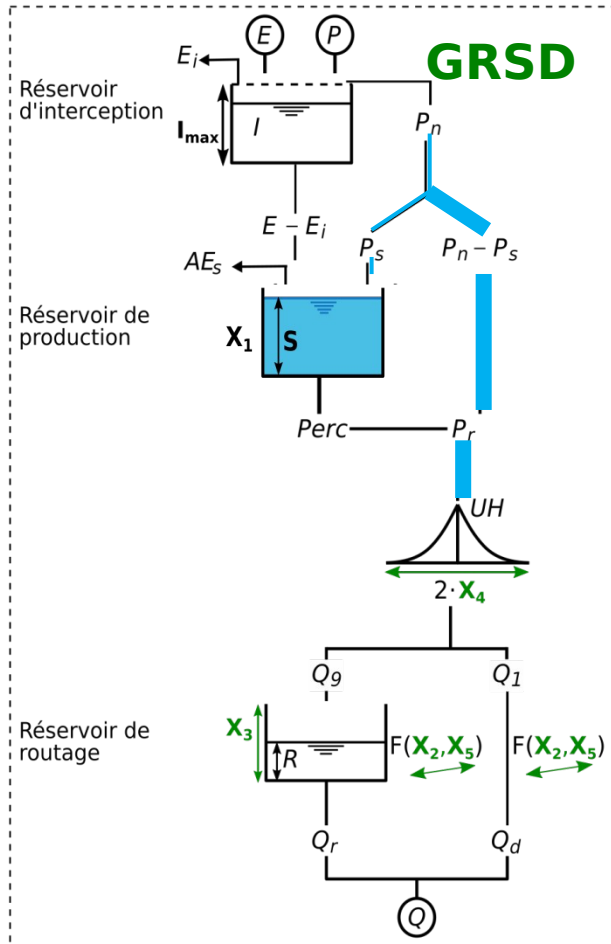
De GRSD à GRSDi



- △ Exutoire jaugé
- Exutoire non jaugé

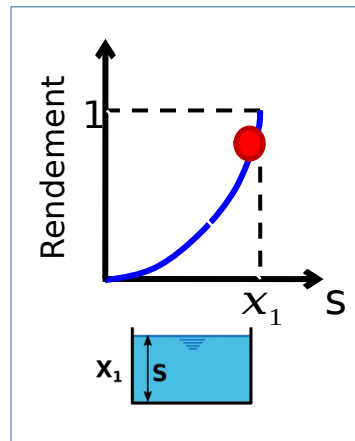


De GRSD à GRSDi

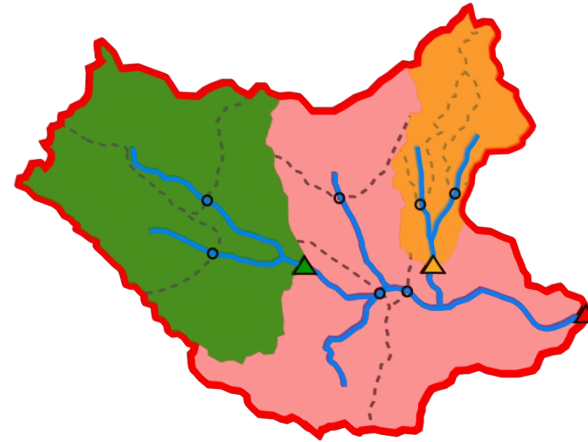
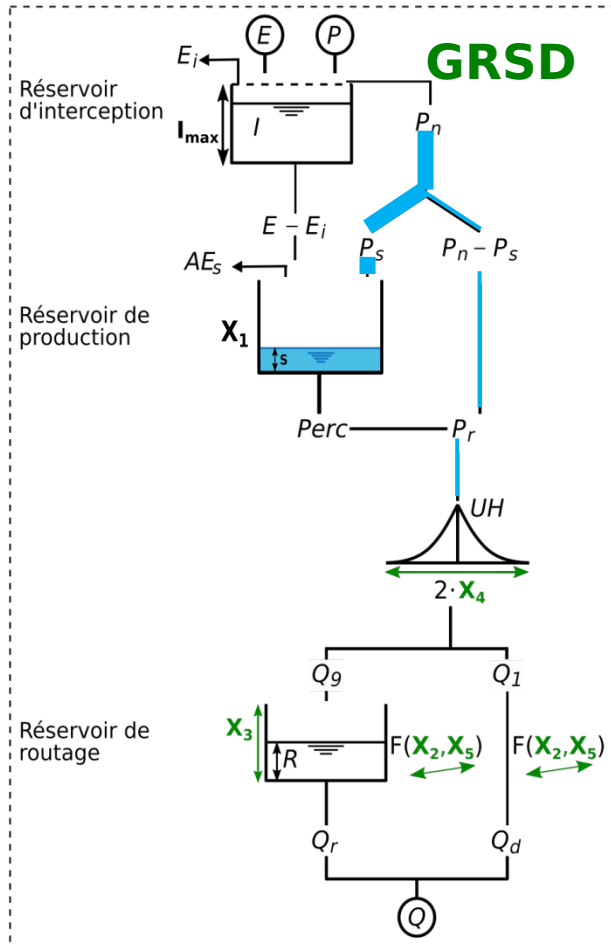


△ Exutoire jaugé

○ Exutoire non jaugé

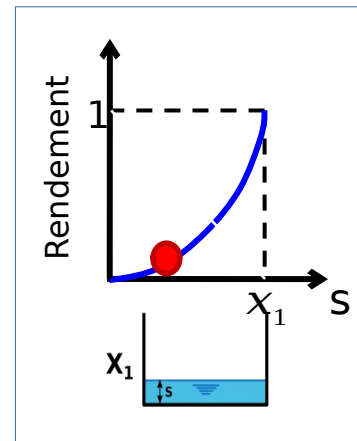
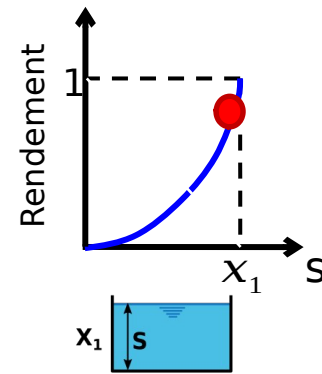


De GRSD à GRSDi

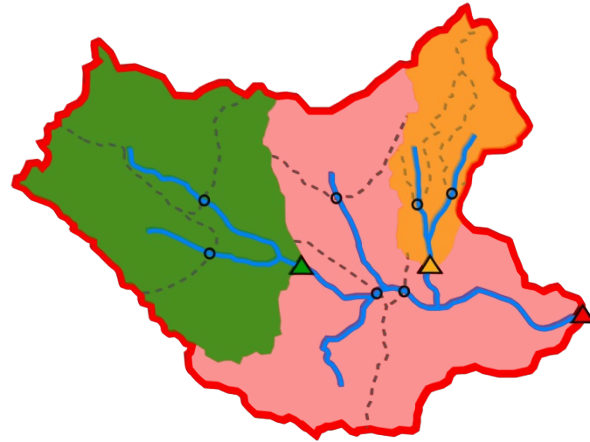
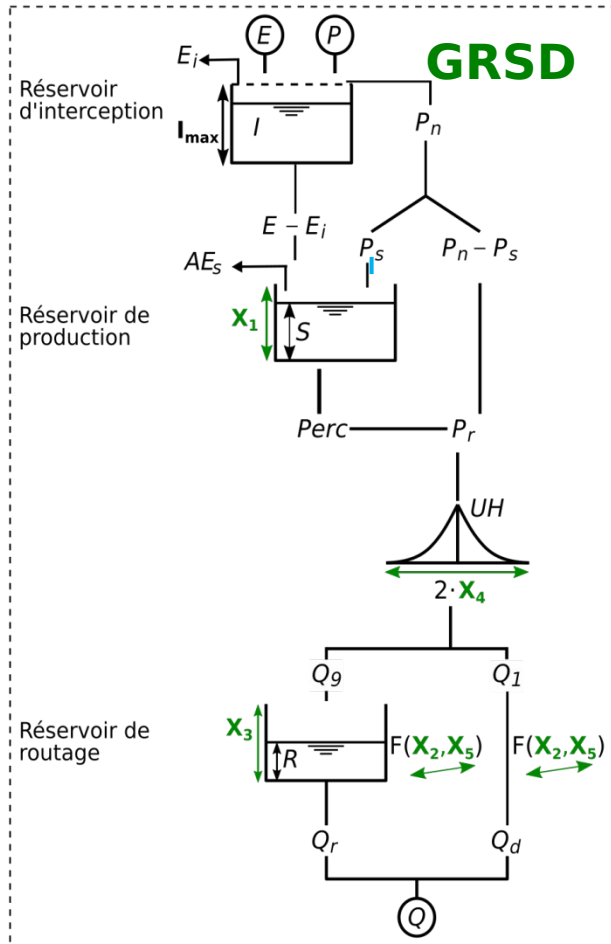


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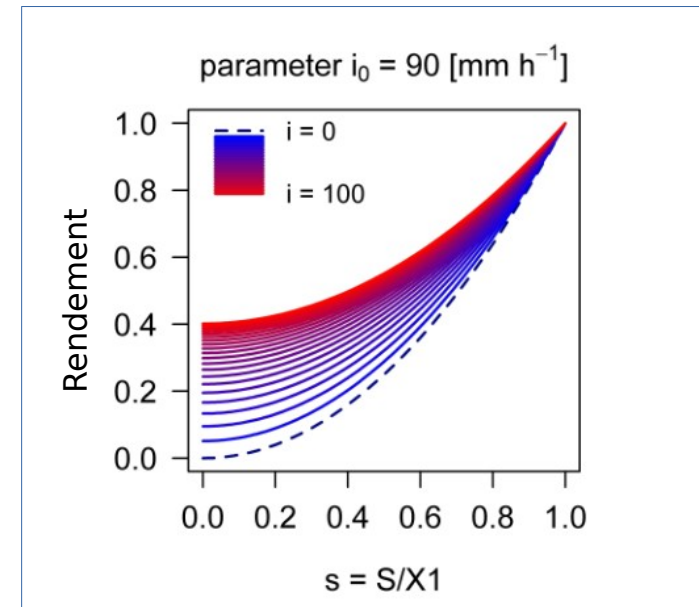
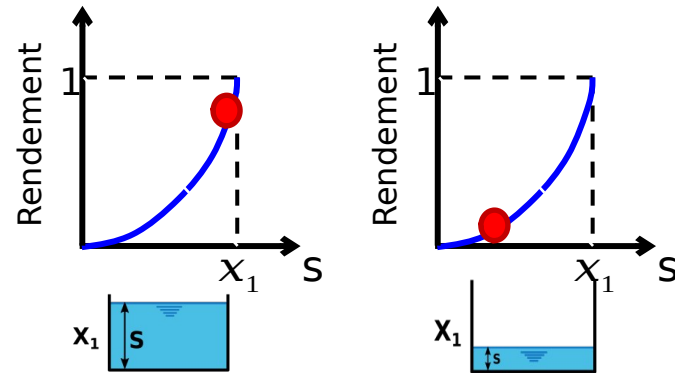
\circ Exutoire non jaugé



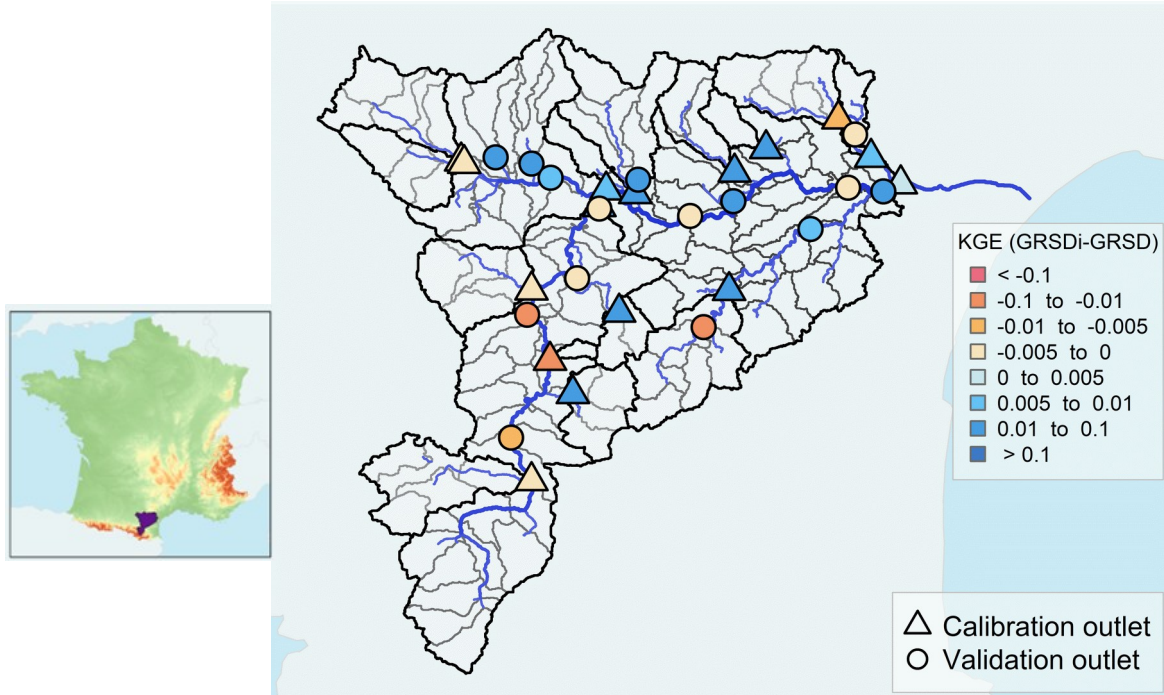
De GRSD à GRSDi



- Δ Exutoire jaugé
- \circ Exutoire non jaugé



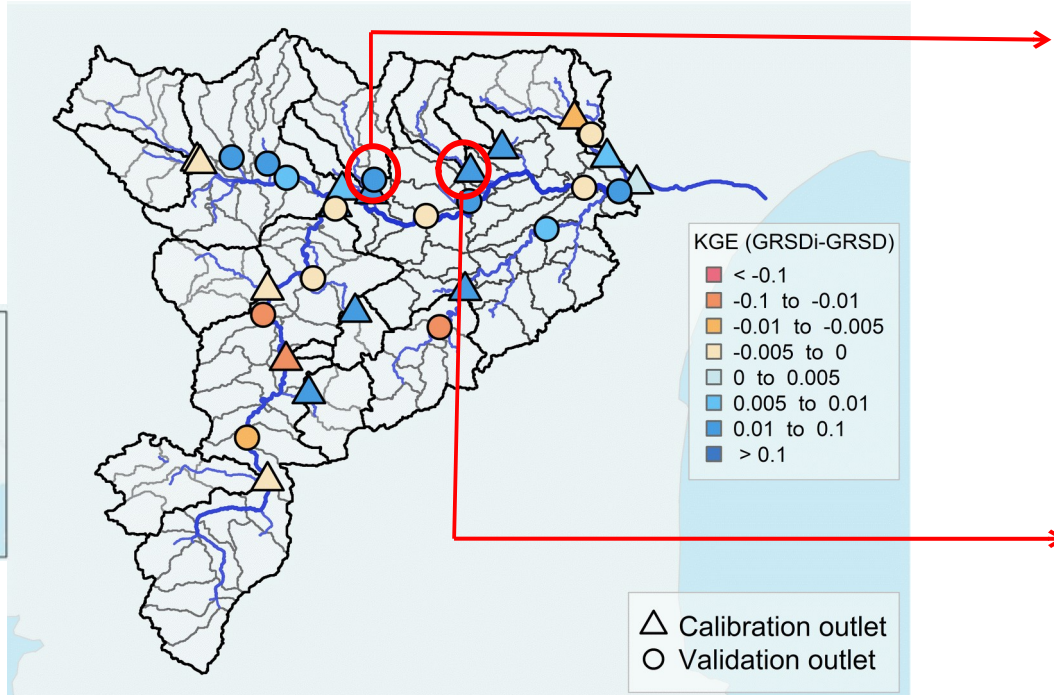
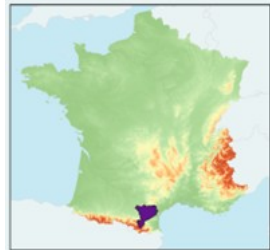
De GRSD à GRSDi



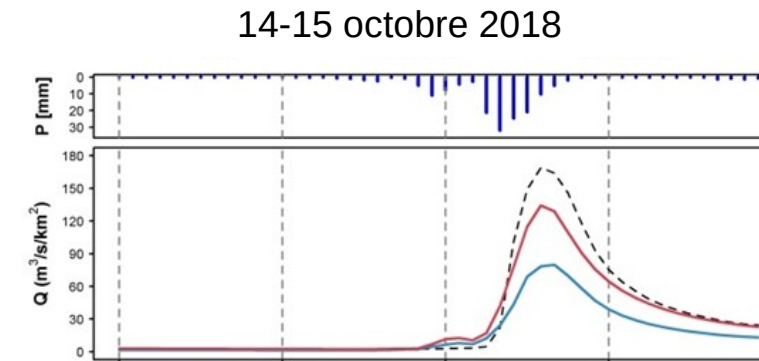
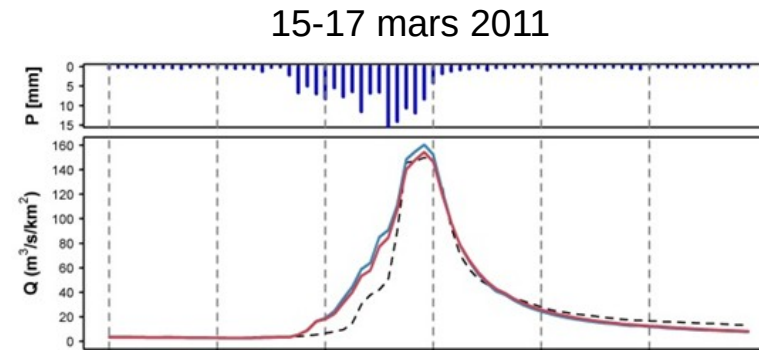
Performance globale KGE (2008-2018)



De GRSD à GRSDi

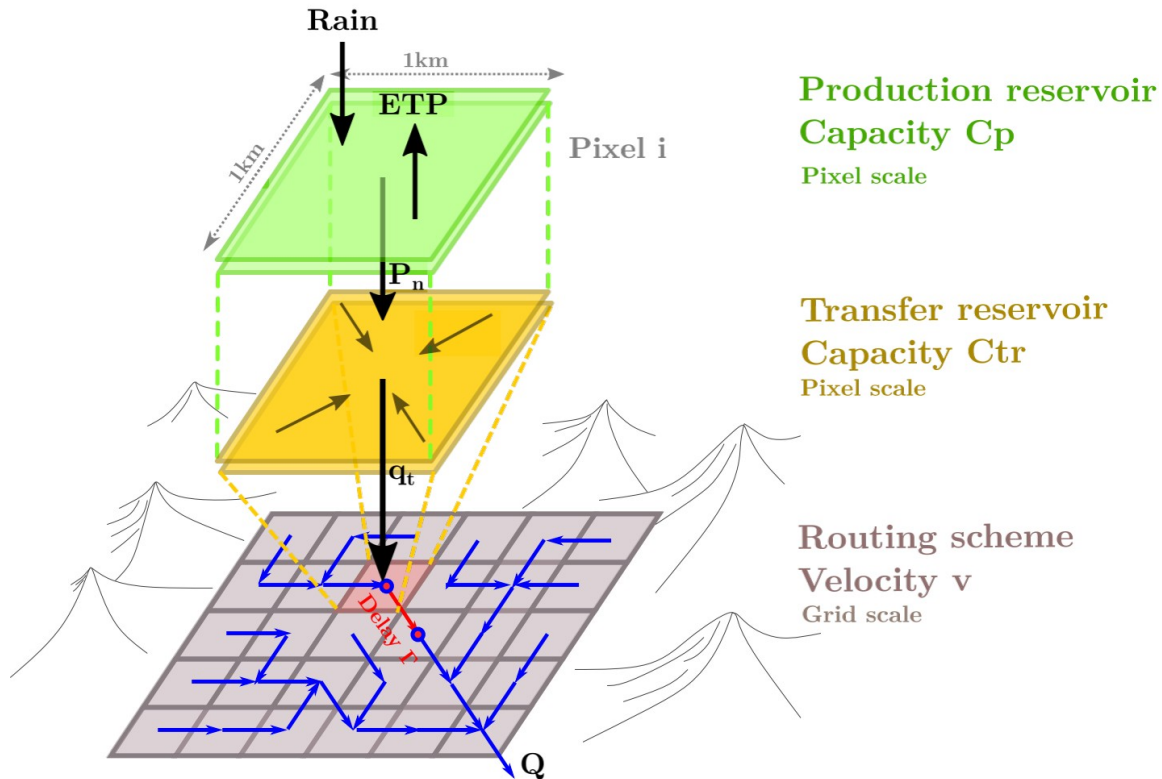


Performance globale KGE (2008-2018)



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Spatially distributed **M**odelling and **AS**similation for **H**ydrology

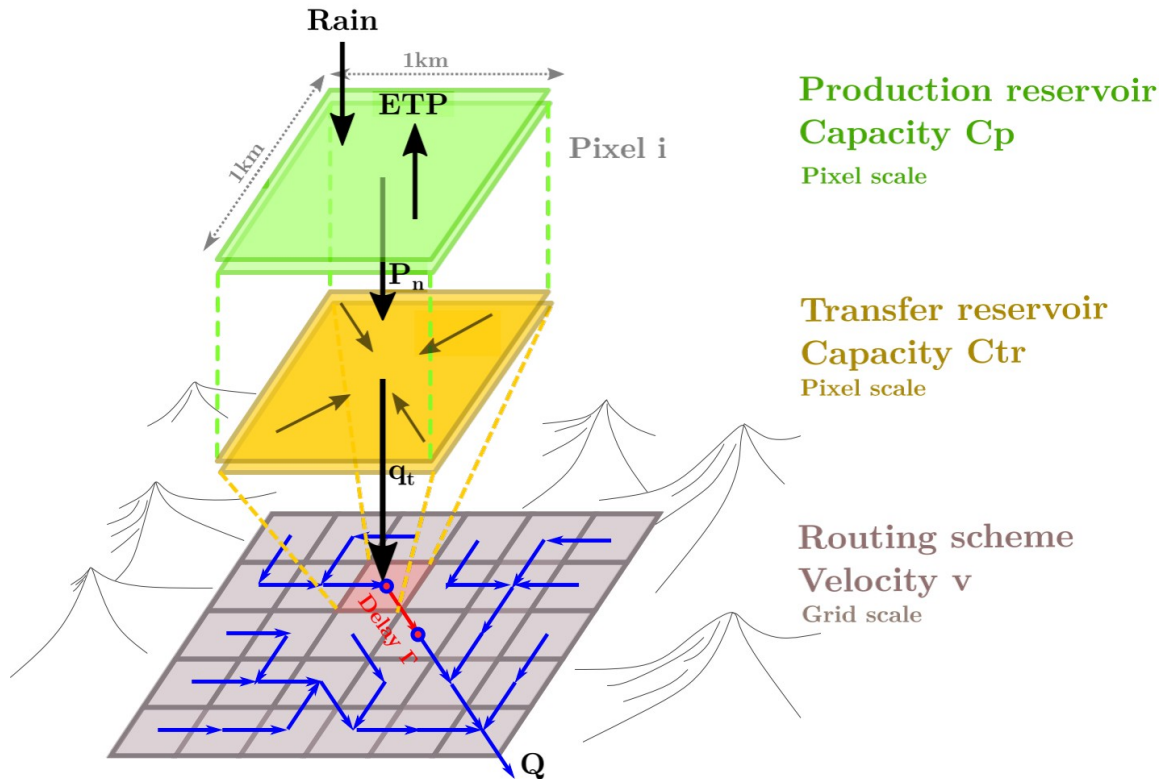


Version « à 3 paramètres »

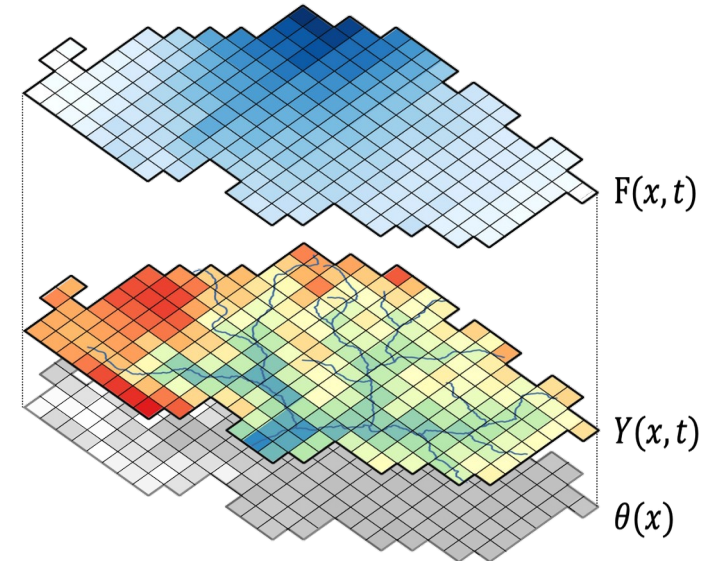


SMASH

Spatially distributed Modelling and ASsimilation for Hydrology



+



Optimisation spatiale des paramètres à l'aide de l' **Analyse variationnelle**

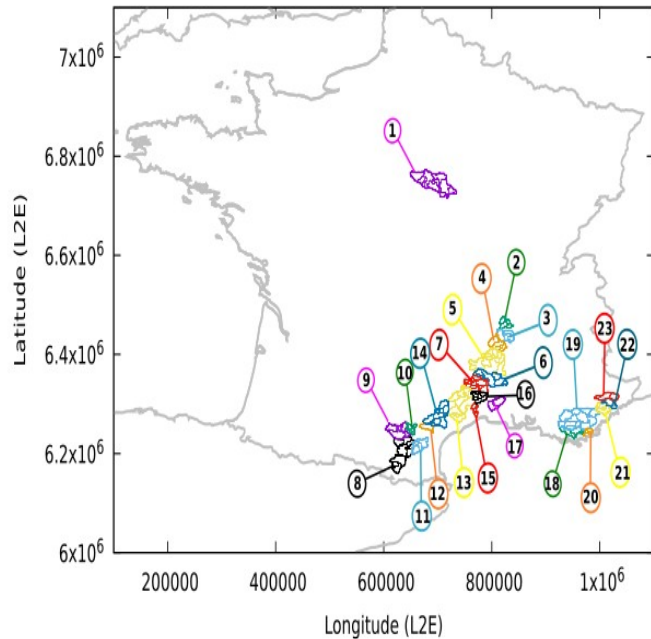
=> Descente de gradient (modèle adjoint, TAPENADE)

Version « à 3 paramètres »

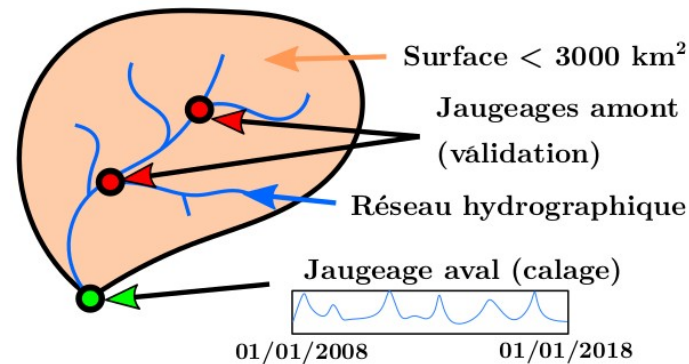


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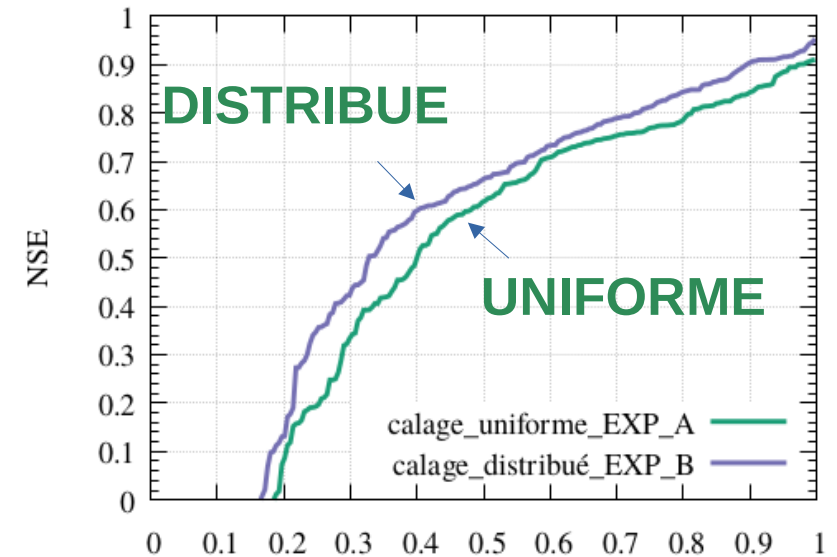
Calage à l'aval, validation à l'amont



23 jauges aval (calage)



119 jauges amont (validation)



Validation spatio-temporelle

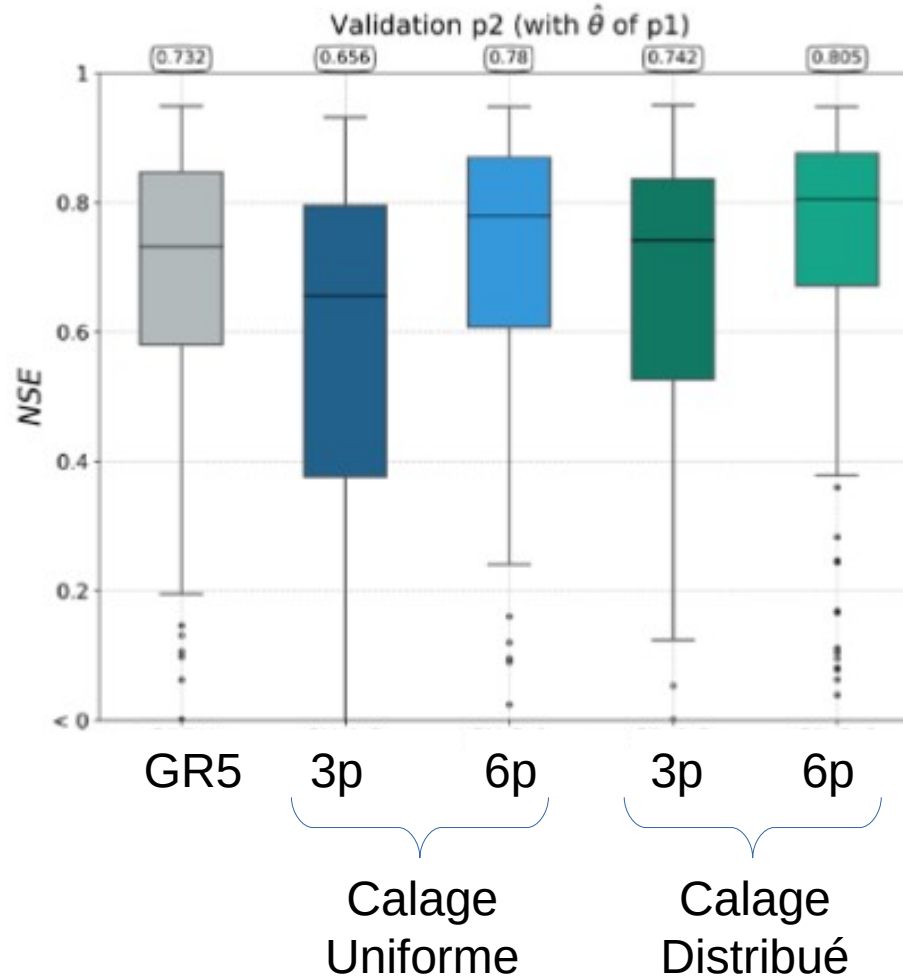


SMASH

Vers une version à 6 paramètres



Validation temporelle
(312 jauges aval)



PA Garambois



François Colleoni



Conclusions

Objectifs actuels : descendre à de la plus fine échelle (spatiale et temporelle)

Afin de réduire les incertitudes, besoin d'outils de calage performants (régularisations)

En prévision, besoin d'assimiler les observations de débit

Besoin également d'intégrer des prévisions de pluie pour augmenter l'anticipation

