FLASH FLOODS AND PLUVIAL FLOODING

ISPRA

REGIONE AUTONOMA DELLA SARDEGNA

MINISTERO DELL'AMBIENTE E DELLA TUTELA DEL TERRITORIO E DEL MARE

Working Group F Thematic Workshop

Flood warning procedure in France : current status and evolution to improve flash flood forecasting

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SCHAPI/MEEDDM

26th-28th May 2010, Cagliari, Italy

Floods in France

5 millions people live in flood areas (12 000 towns)

Paris, le zouave 1982

Inondations dans la Somme : la gare d'Abbeville.

Somme, north of France, 2001

Floods in France

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20 000 km of main rivers are surveyed by the national hydrological vigilance (on the 120 000 km rivers larger than 1m)

Loire basin, 2008

Marseille, 2003

Floods in France

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20 000 km of main rivers are surveyed by the national hydrological vigilance (on the 120 000 km rivers larger than 1m)

90 % population in flood areas is concerned by the hydrological vigilance

But most damages outside of the main water courses in the last years

Gard, south of France, 2002

Small river on Loire basin, 2008

Flood Prevention reorganisation

New act « loi Risques n°2003-699 » related to prevention of natural and technological risks and reparation of damage

→ a legal framework for flood forecasting

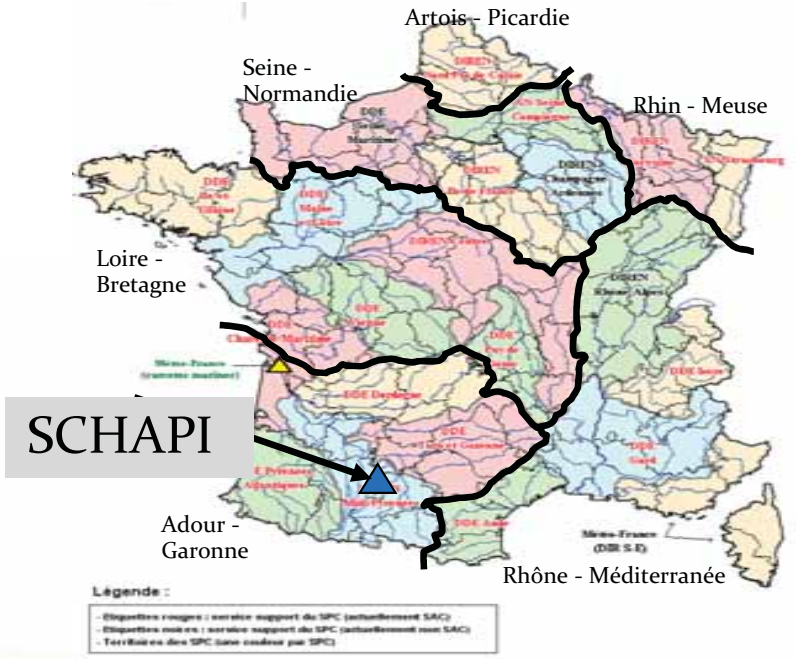
Prefects required to draw up “Schémas directeurs de prévision des crues” Flood Forecasting Master Plans

Prefects responsible for monitoring, forecasting and transmission of information related to floods

The challenge of the reorganisation in 2002 : Alert and Observation → Forecasting and Warning

Before 2002 :
52 autonomous Flood Alert Units

After 2005 :
22 Flood Forecasting Centres and SCHAPI



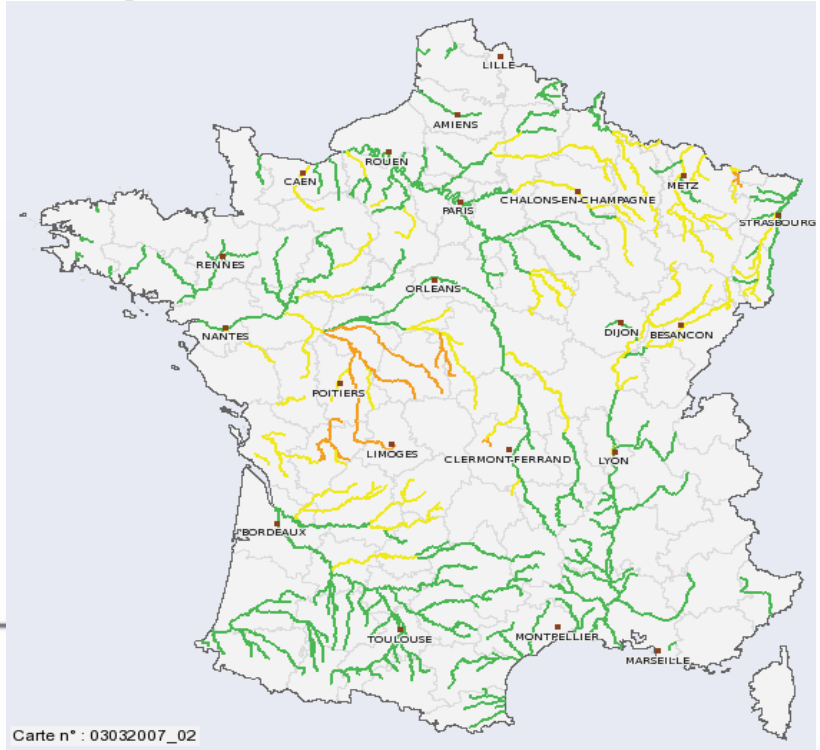
The Flood Vigilance System (July 2006)

- To better anticipate flood crises through regular and formatted information
- To use a common decision-aid system for a graduated involvement of civil security
- To directly inform the population to help them become actor

www.vigicrues.gouv.fr

Published at 10:00 AM and 4:00 PM, updated if necessary

Pushed at the same time to State authorities



The 4 risk levels (24 hour lead time)

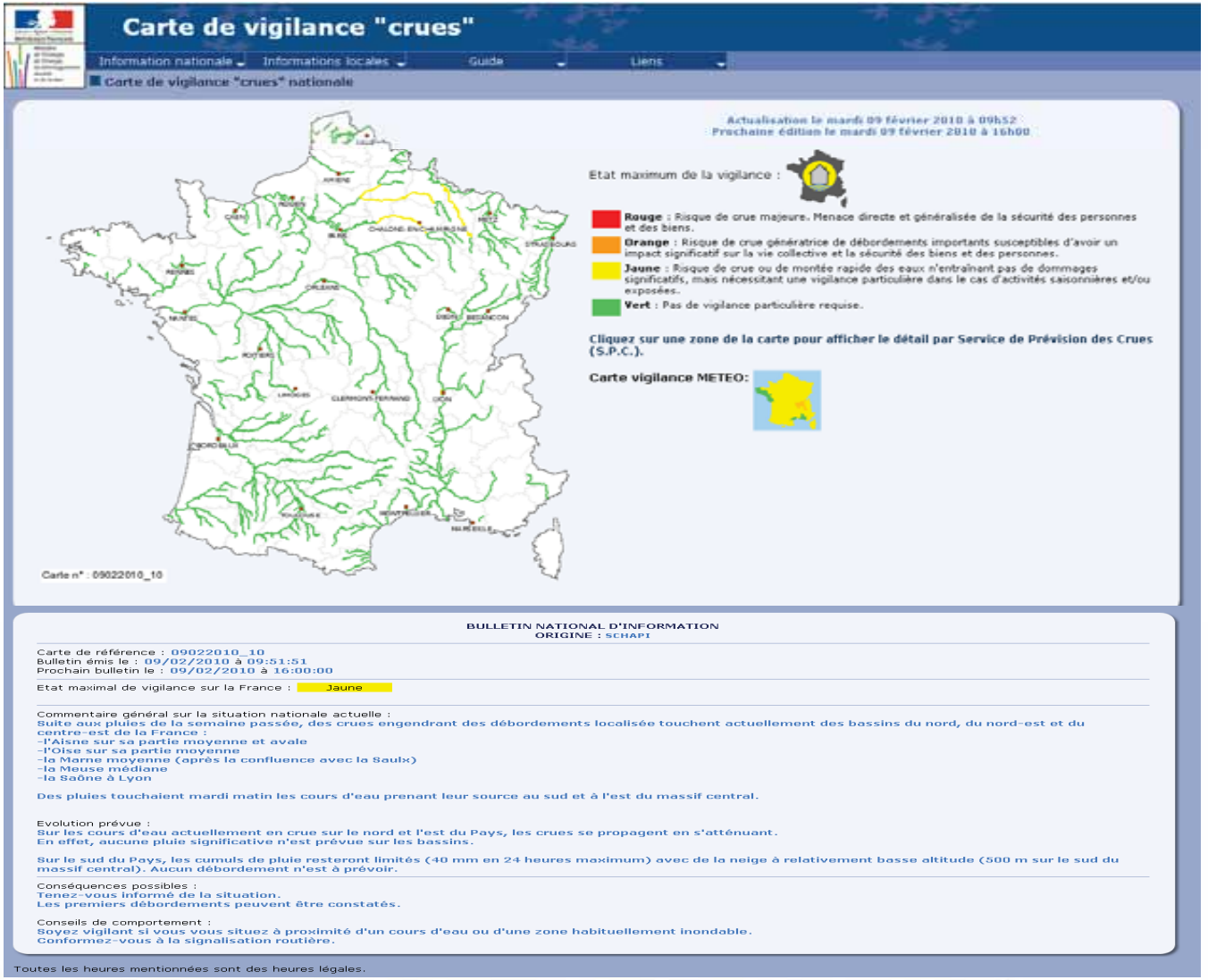
	Level 4 : RED	
	Major risk of flood directly and extensively threatening people and property	***Rare and catastrophic flood***
	Level 3 : ORANGE	
	Risk of flood with considerable overflow liable to significantly affect the daily life and security of people and property	***Generalized overflow, greatly affected circulation, evacuations***
	Level 2 : YELLOW	
	Risk of high or rapid rising water not involving significant damage but requiring particular vigilance in the case of seasonal and/or outdoor activities	***Localized overflow, localized road closures, isolated houses involved, disruption of river activities***
	Level 1 : GREEN	
	No particular vigilance required	***Situation normal***

3 levels of information

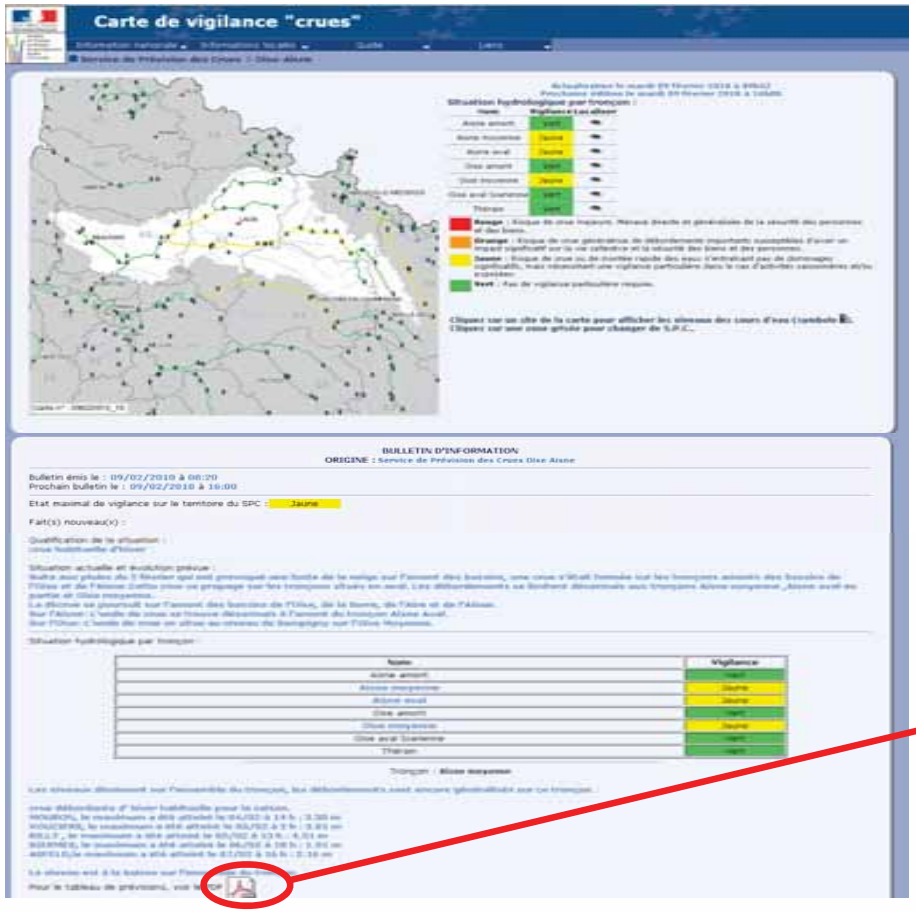
... the national map

and

bulletin



... the regional map and bulletin with detailed information on the evolution of water levels for each of the sections, and forecasts



SITUATION ACTUELLE ET EVOLUTION PREVUE SUR LE TRONCON
Aisne moyenne

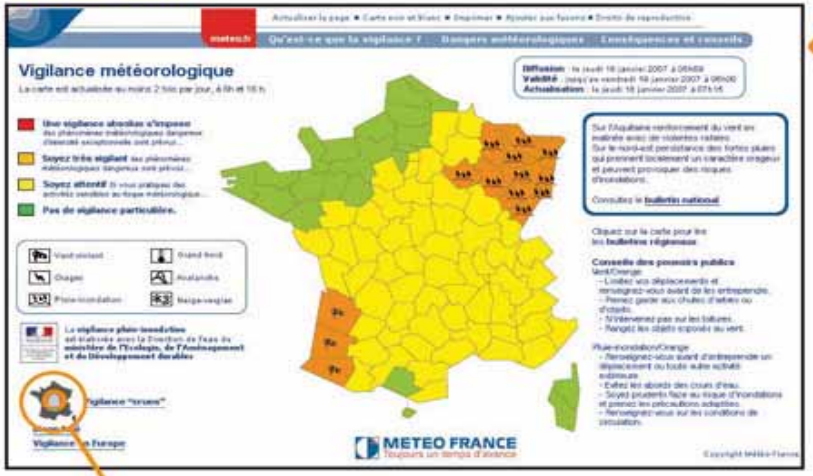
Service de Prévision des Crues Oise Aisne

Station	Crue de référence n°1	Crue de référence n°2	Observation passée	Observation	Prévision n°1	Prévision n°2
Mouron	21/12/1993	30/12/2001	08/02/2010 13h	09/02/2010 7h	dans les 24h	entre 24h et 48h
Cote (m)	3.86	3.36	2.88	2.66	baisse	baisse
Débit (m3/s)						
Vouziers	21/12/1993	23/01/1995	08/02/2010 13h	09/02/2010 7h	dans les 24h	entre 24h et 48h
Cote (m)	4.37	4.18	3.62	3.55	baisse	baisse
Débit (m3/s)						
Rilly	22/12/1993	24/01/1995	08/02/2010 13h	09/02/2010 7h	dans les 24h	entre 24h et 48h
Cote (m)	5.62	5.33	4.12	4.00	baisse	baisse
Débit (m3/s)						
Biermes	22/12/1993	25/01/1995	08/02/2010 13h	09/02/2010 7h	dans les 24h	entre 24h et 48h
Cote (m)	3.96	3.50	1.53	1.37	baisse	baisse
Débit (m3/s)						
Asfeld	23/12/1993	27/01/1995	08/02/2010 13h	09/02/2010 7h	dans les 24h	entre 24h et 48h
Cote (m)	3.52	2.73	2.12	2.10	baisse	baisse
Débit (m3/s)						

... the local level with real-time access to the stations, references to past floods and information on the stations

Since December 2007 : the “rainfall-flood” vigilance a joint meteo and hydro procedure to account for flood risk over the overall surface

www.meteo.fr



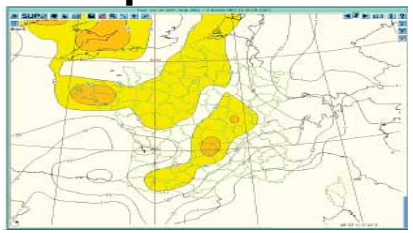
www.vigicrues.ecologie.gouv.fr

Various tools depending on anticipation

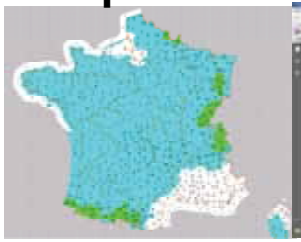
10 days | 5 days | 3 days | 1 day | 12 hours

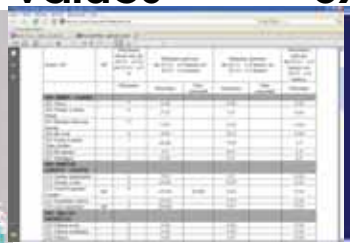
Rainfall data

CEP probabilities



Expertised values



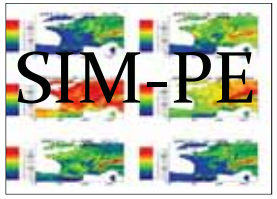


8x3h model data

Vigilance procedure

EFAS

SIM-PE



Decision-aid graphs

Soil moisture

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MINISTERO DELL'AMBIENTE

improving flash flood assessment at national scale

- risk assessment
  - small scale evaluation
  - national methodology
  - study of past events
- national extent
- local communities
- forecasting and warning
  - test sites
  - use of AROME NWP (Météo France)
  - transfer of information
- formation et information
  - public
  - local responsible
- land use management
  - risk reduction measures
  - regulation

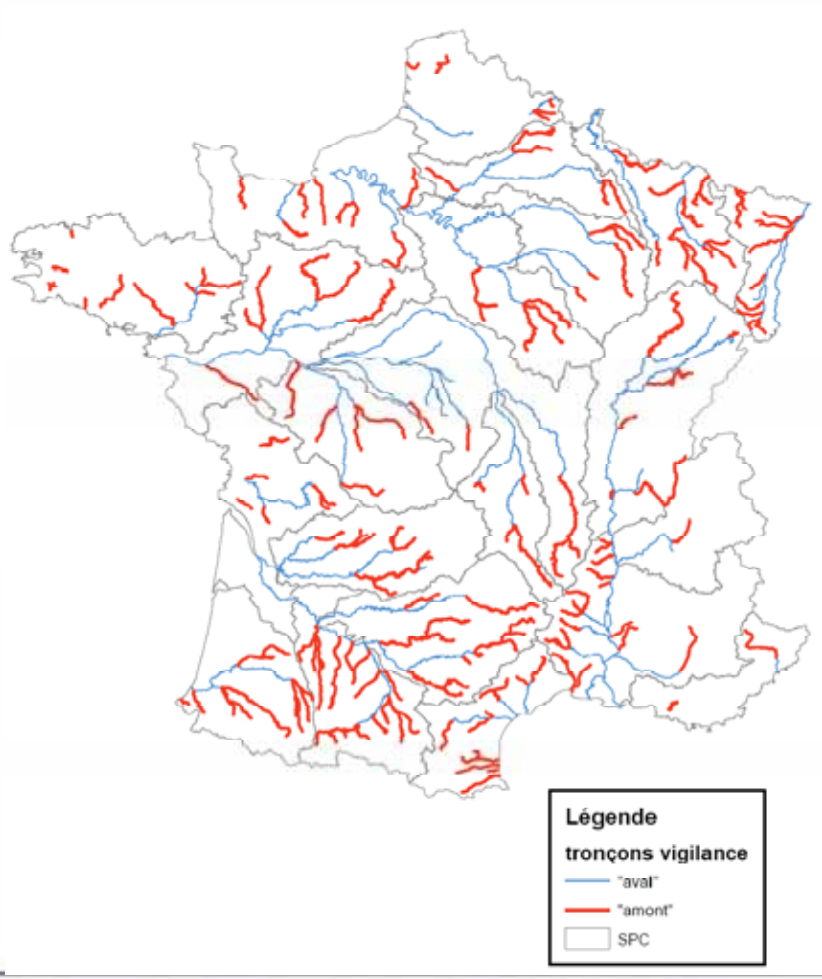
Our main R&D operational activities related to flash floods?

Improve precipitation estimations and forecasts (IMPRINTS, nowcasting, AROME 2,5 km grid Météo France NWP model)

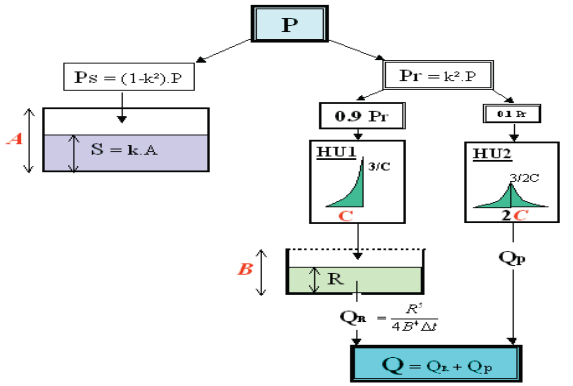
Provide specific global and distributed rainfall/runoff models with soil moisture initial conditions


le Gardon en crue photo D. Jeannot

Flash Flood models



Global GRs rainfall/runoff models

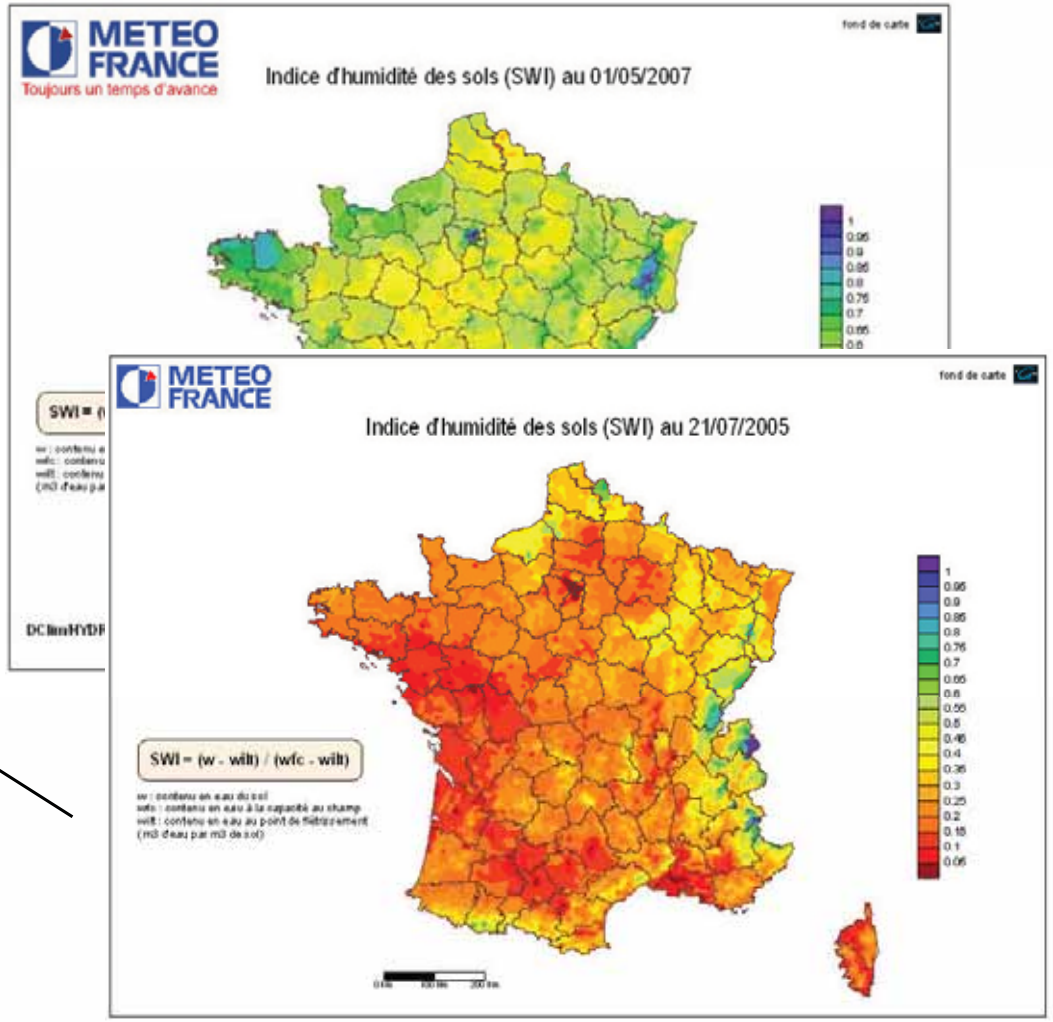


ATHYS / distributed rainfall/runoff model

Model initialisation

A. Marchandise
M. Coustau
Y. Tramblay

S



SWi ISBA

Base Flow

Groundwater level

…..

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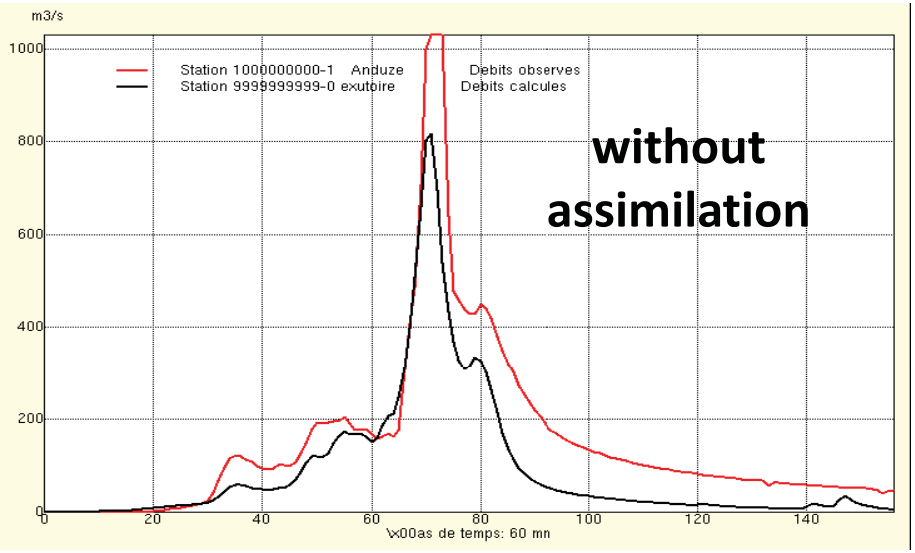
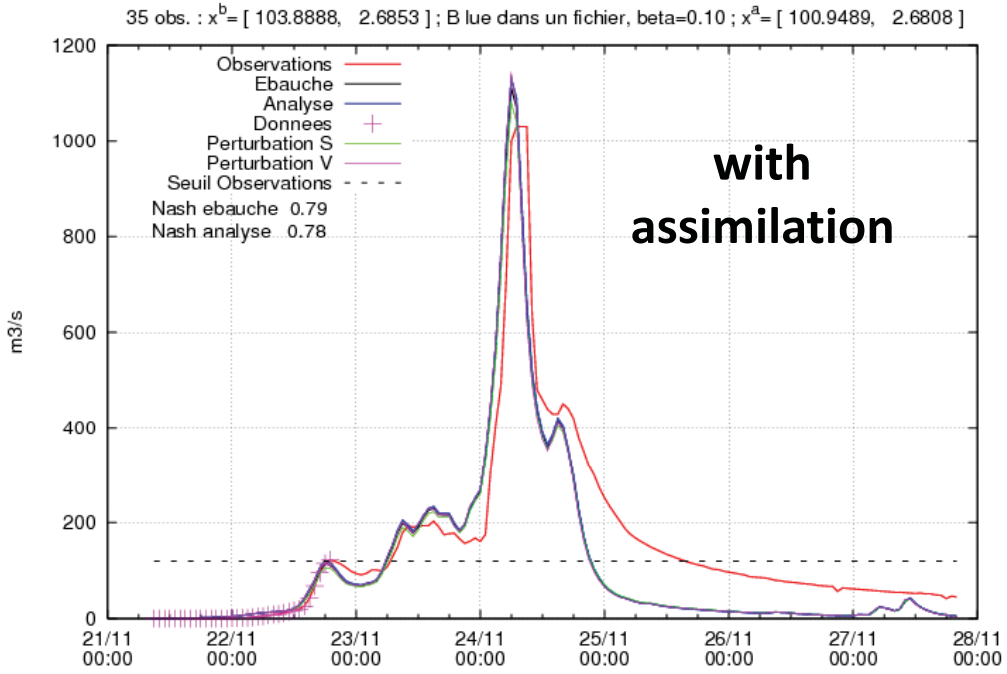
Include data assimilation


le Gardon en crue photo D. Jeannot

Results of assimilation with BLUE method on the flood first time steps (CERFACS)





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Provide specific global and distributed rainfall/runoff models with soil moisture initial conditions

Include data assimilation

Increase the river network under surveillance in partnership with local communities


le Gardon en crue photo D. Jeannot

Thank you for your attention

and select

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for hydrological vigilance