

Workshop HazRunOFF

27 novembre 2019

Services de Prédiction des Crues Maine Loire Aval



“Vigicrues” and the flood forecast in the Loire estuary

Introduction

- « Vigicrues » : French state device which aim to warn and forecast flood
 - the organization
 - the warning procedure
 - the forecast graphics
- la Loire : an example of forecasting in estuary
 - the estuary description and equipments
 - the model used to make forecast



The French warning flood device



METEOROLOGIST

provide meteorological data (observations and forecasts)

HYDROMETERS

collect and analyze hydrological data (water level and flow) from the 1500 real-time measuring stations available on www.vigicrues.gouv.fr. They perform the stream gauging

FLOOD FORECASTERS

aggregate and evaluate these data. They make forecasts for the network of rivers supervised by the State. They produce and broadcast at least twice a day (at 10am and 4pm) and, if necessary, day and night, if the situation requires it.

A LOCAL AND NATIONAL REPORT AND THE ASSOCIATED FLOOD WARNING MAP



PRÉFET
DE LA RÉGION
PAYS DE LA LOIRE

FLOOD FORECASTERS

aggregate and evaluate these data. They make forecasts for the network of watercourses supervised by the State. They produce and broadcast at least twice a day (at 10am and 4pm) and, if necessary, day and night, if the situation requires it.

A LOCAL AND NATIONAL REPORT AND THE ASSOCIATED FLOOD WARNING MAP

FLOOD WARNING

On the map, each stream is divided into sections with a color : green, yellow, orange or red. It indicates the level of warning required to cope with the risk of flooding for the next 24 hours. It is associated with behavioral tips.

INFORMATION BROADCASTING



Site

www.vigicrues.gouv.fr



Mayors

Following the alert triggered by the prefects, they warn the population and mobilize rescue.



Médias


nationaux et locaux

The flood warning procedure

!	Level 4 : RED Risk of major flood. Direct and widespread threat to the safety of people and goods.	Rare and catastrophic flood.
!	Level 3: ORANGE Flood risk generating significant overflows likely to have a significant impact on the collective life and the safety of property and people.	Generalized overflows, highly disturbed circulation, evacuations.
!	Level 2: YELLOW Risk of flooding or rapid rise of waters not causing significant damage, but requiring particular warning in the case of seasonal and / or exposed activities.	Localized overflows, isolated cuts of roads, isolated houses affected, disruption of activities related to the river.
!	Level 1: GREEN No special warning required	Normal situation



L'état maximum de la vigilance crues métropolitaine est **orange**.


 Risque de crue génératrice de débordements importants susceptibles d'avoir un impact significatif sur la vie collective et la sécurité des biens et des personnes.

Afficher les informations de
mon territoire


 Se géolocaliser

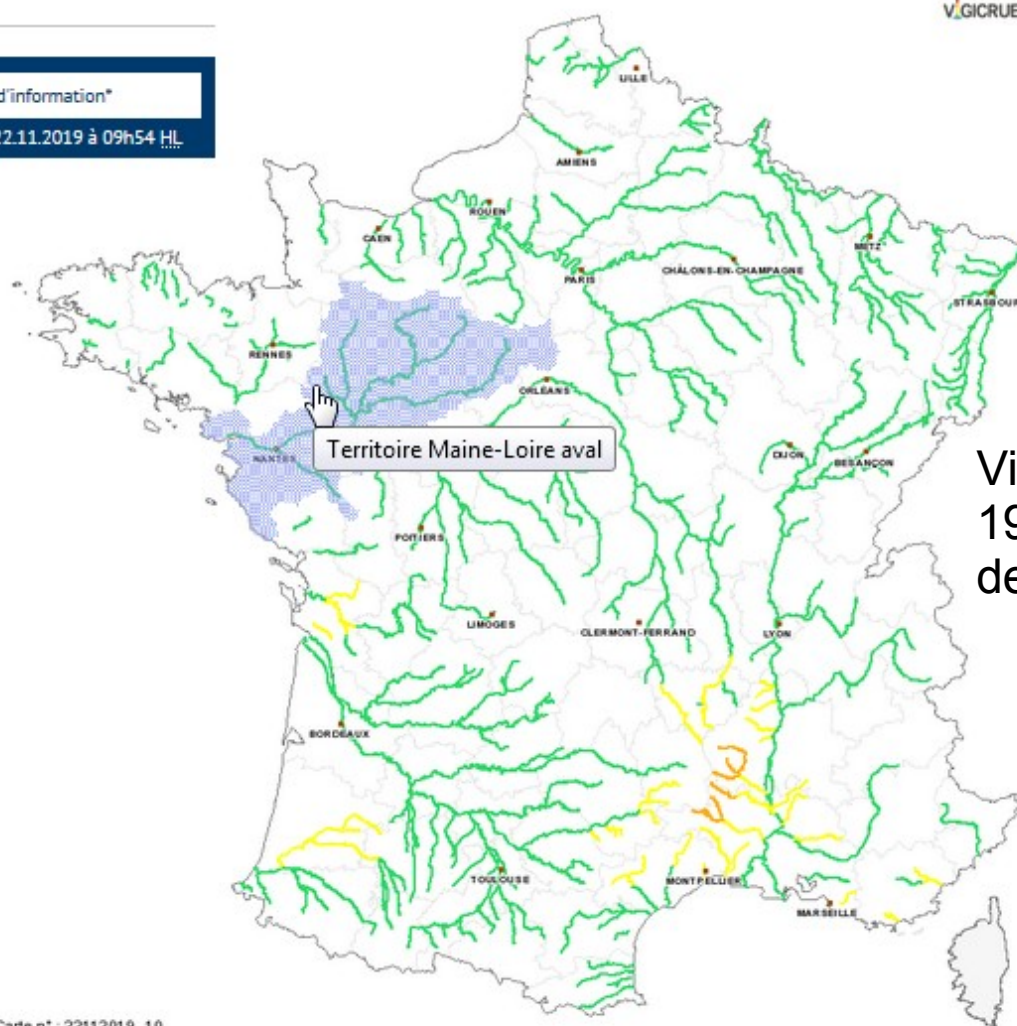
Accéder au bulletin d'information*

*Production de l'information : 22.11.2019 à 09h54 H.L.

Cliquez sur une zone de la carte
pour afficher les informations
locales

Légende

- 
 Rouge :
Risque de crue majeure
[Tout lire](#)
- 
 Orange :
Risque de crue génératrice de débordements importants
[Tout lire](#)
- 
 Jaune :
Risque de crue génératrice de débordements [Tout lire](#)
- 
 Vert :
Pas de vigilance particulière requise.



Vigicrues is divided in
19 flood forecasting
departments

























Vigicrues

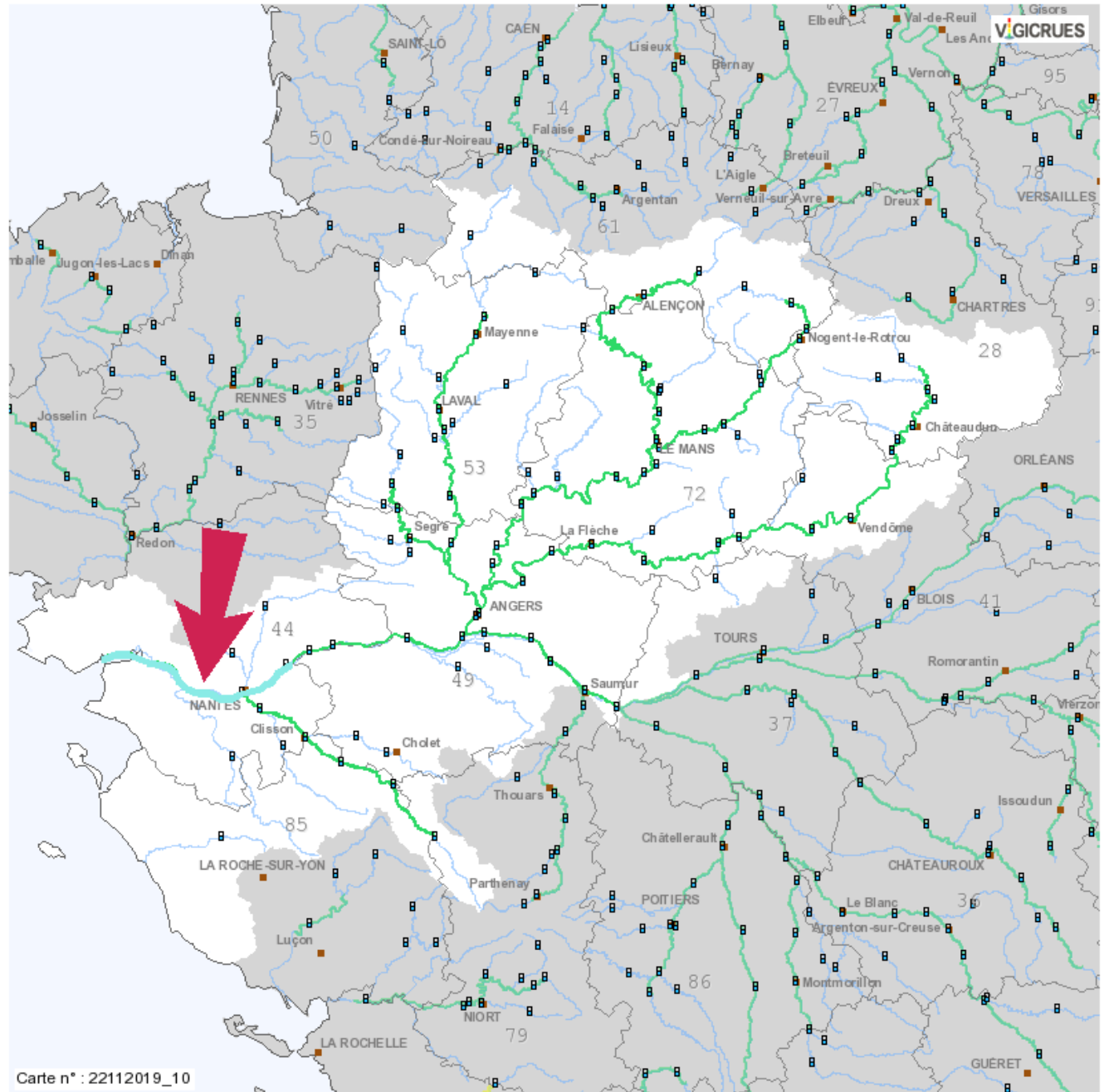
Territoire Maine-Loire aval

Accéder au bulletin d'information local*

*Production de l'information : 22.11.2019 à 08h17 HL

Situation par tronçon de vigilance crues :

Voir sur la carte	Nom	Vigilance	RSS
	Loire saumuroise	+ Vert	
	Loire aval	+ Vert	
	Loire estuaire	+ Vert	
	Oudon	+ Vert	
	Mayenne	+ Vert	
	Sarthe amont	+ Vert	
	Huisne	+ Vert	
	Sarthe aval	+ Vert	
	Loir amont	+ Vert	
	Loir aval	+ Vert	
	Basses vallées angevines	+ Vert	
	Sèvre nantaise	+ Vert	
	Autres stations	+	



Carte n° : 22112019_10

Vigicrues

Station Nantes [Pont Anne de Bretagne] (Loire)

[Commentaires à la station](#)



Prévision : La prévision comporte des incertitudes. Les niveaux attendus ont une probabilité de 80% de se trouver dans la fourchette du graphique ci-dessous. Les prévisions réalisées à Nantes correspondent aux niveaux attendus à pleine mer.

Graphique

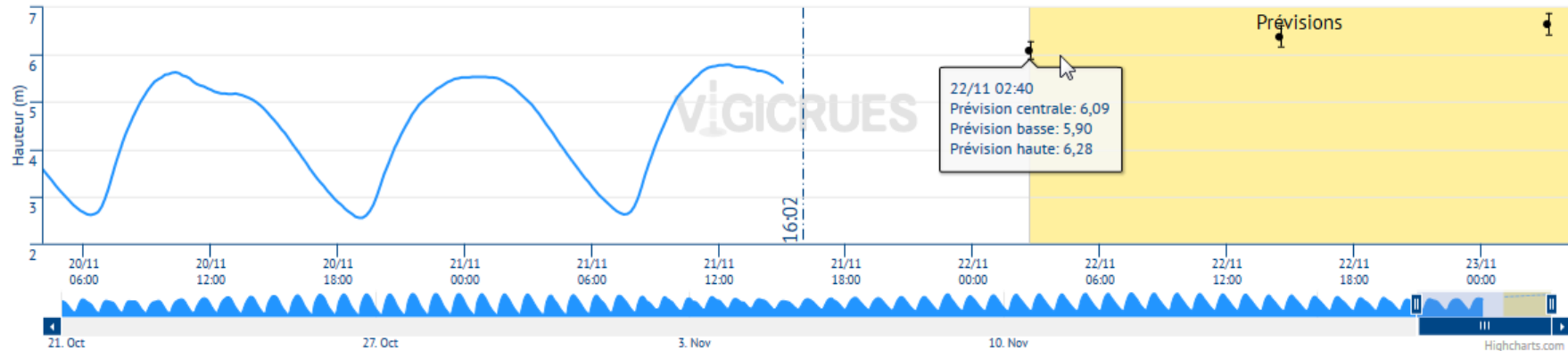
Observation

Prévision

Info station

Nantes [Pont Anne de Bretagne] (Loire) - **Hauteurs** - 21/11/2019 16:02

Afficher les données sur : 1 jour 3 jours 7 jours 14 jours 30 jours Zoom initial

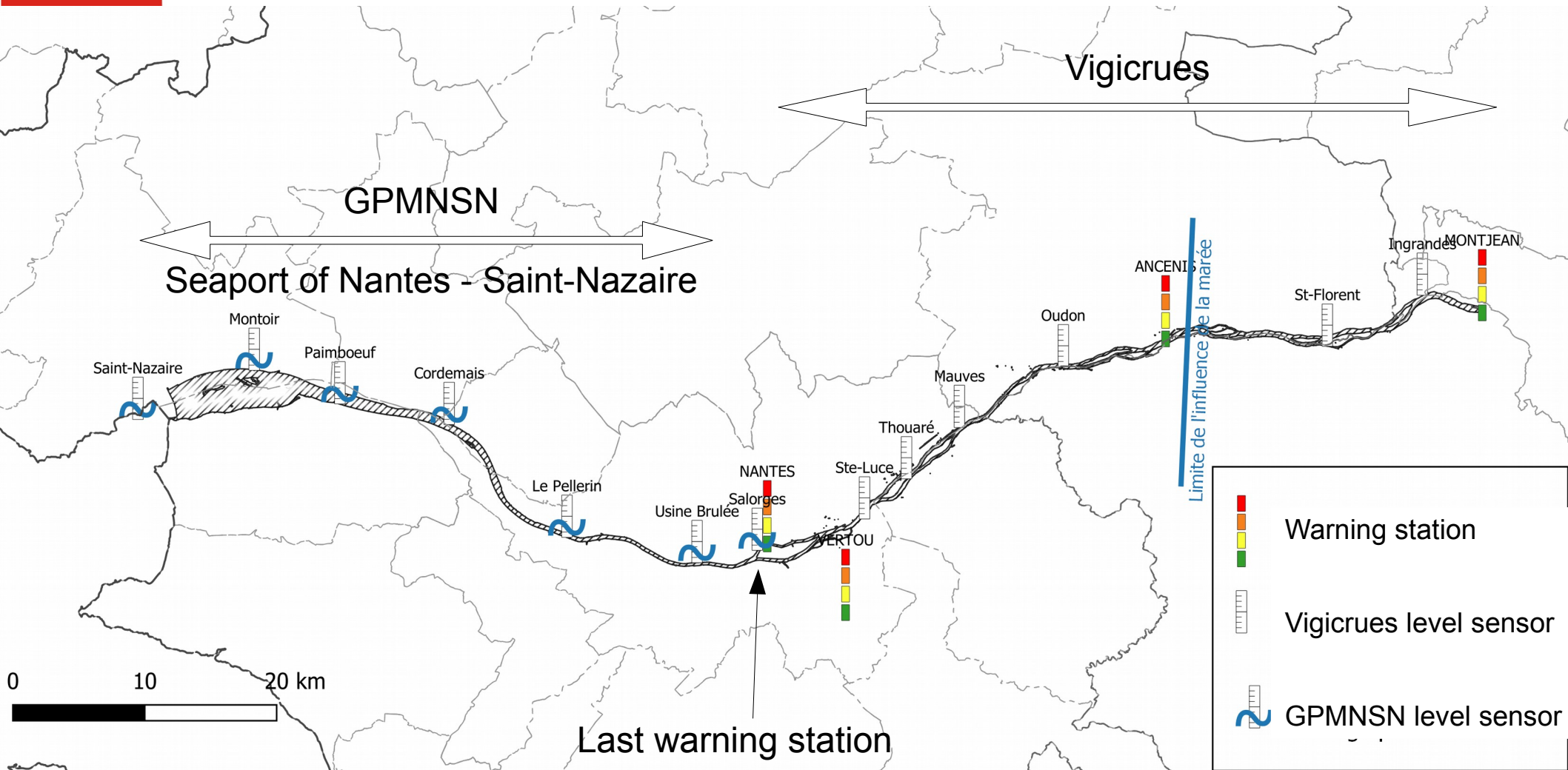


Légende

— Nantes [Pont Anne de Bretagne] ...

The forecast are provided with 3 trends : the low, the high and the middle trend

The Loire estuary



Flood forecast on Loire estuary

Today we make flood forecast 6 day a week all year long :

- Ancenis (low tide forecast)
- Nantes (high tide forecast)

To make forecast, we use a hydraulic model developped by EDF (French electricity supplier) and CEREMA (French technical institute).

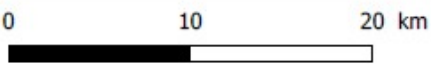
The MASCARET software is a one-dimensional hydraulic modeling code with free surface, based on shallow water equations.

We still use abacuses made with historical flood.

« A Finite Volume Solver for 1D Shallow-Water Equations Applied to an Actual River », N. Goutal and F. Maurel, Int. J. Numer. Meth. Fluids 2002; 38:1-19

« MASCARET : a 1-D Open-Source Software for Flow Hydrodynamic and Water Quality in Open Channel Networks », N. Goutal, J.-M. Lacombe, F. Zaoui and K. El-Kadi-Abderrezzak, River Flow 2012 – Murillo (Ed.), pp. 1169-1174

Mascaret Loire Estuaire



Upstream limit condition :

Montjean observation flow
+
Flow forecast made by
Vigicrues

Downstream limit condition :
Saint-Nazaire observation level
+
3 models of levels from Meteo
France (French weather forecast)
and ECMWF (European Centre for
Medium-Range Weather Forecasts) :

AROME, ARPEGE and CEP

Upstream limit condition :

Remouillé observation flow
+
Hydrologic model

Upstream limit condition :

Clisson observation flow
+
Hydrologic model

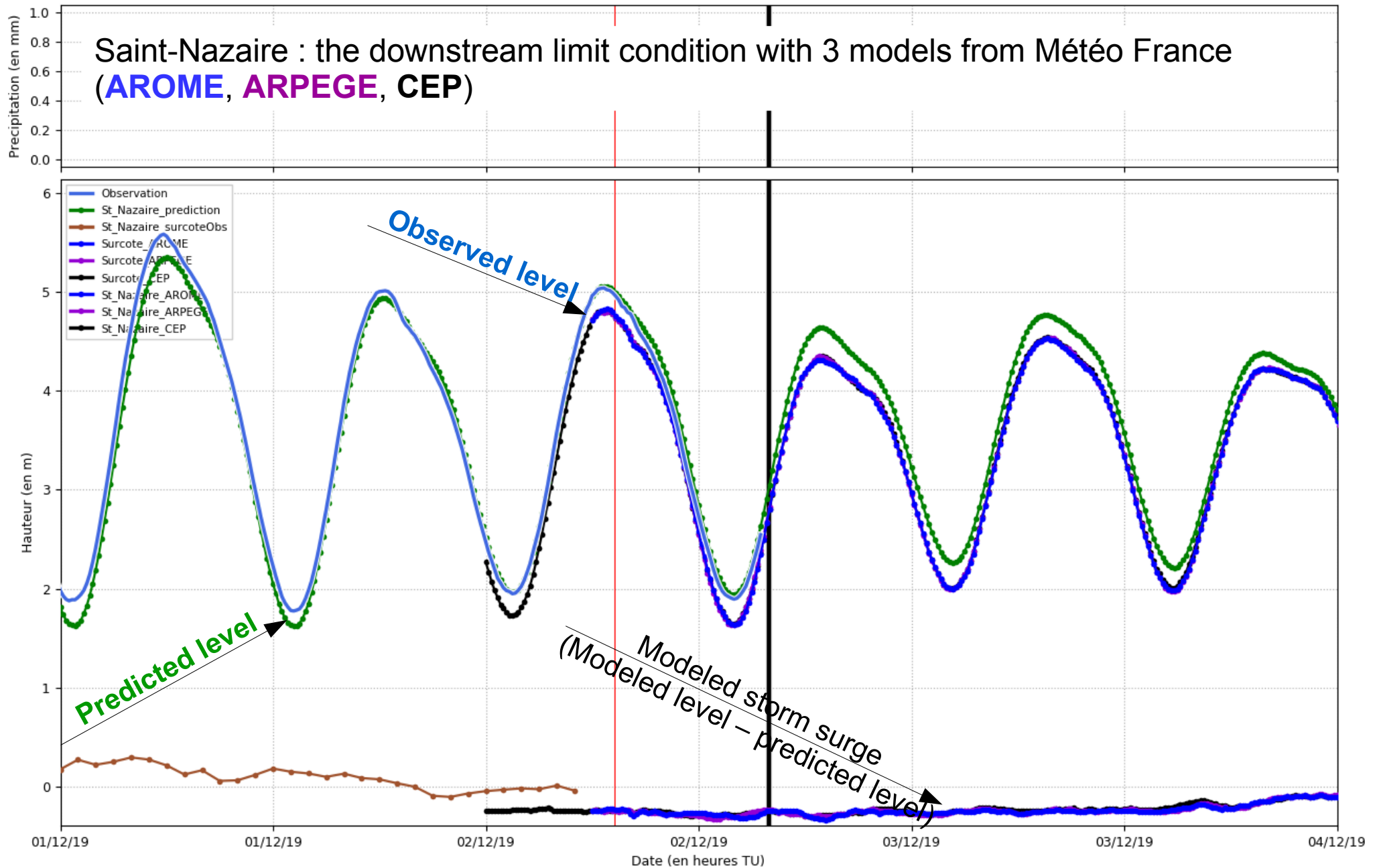
Légende

Mascaret
Extrémities
● actif
Sorties
★ Actif

Météo France level forecast

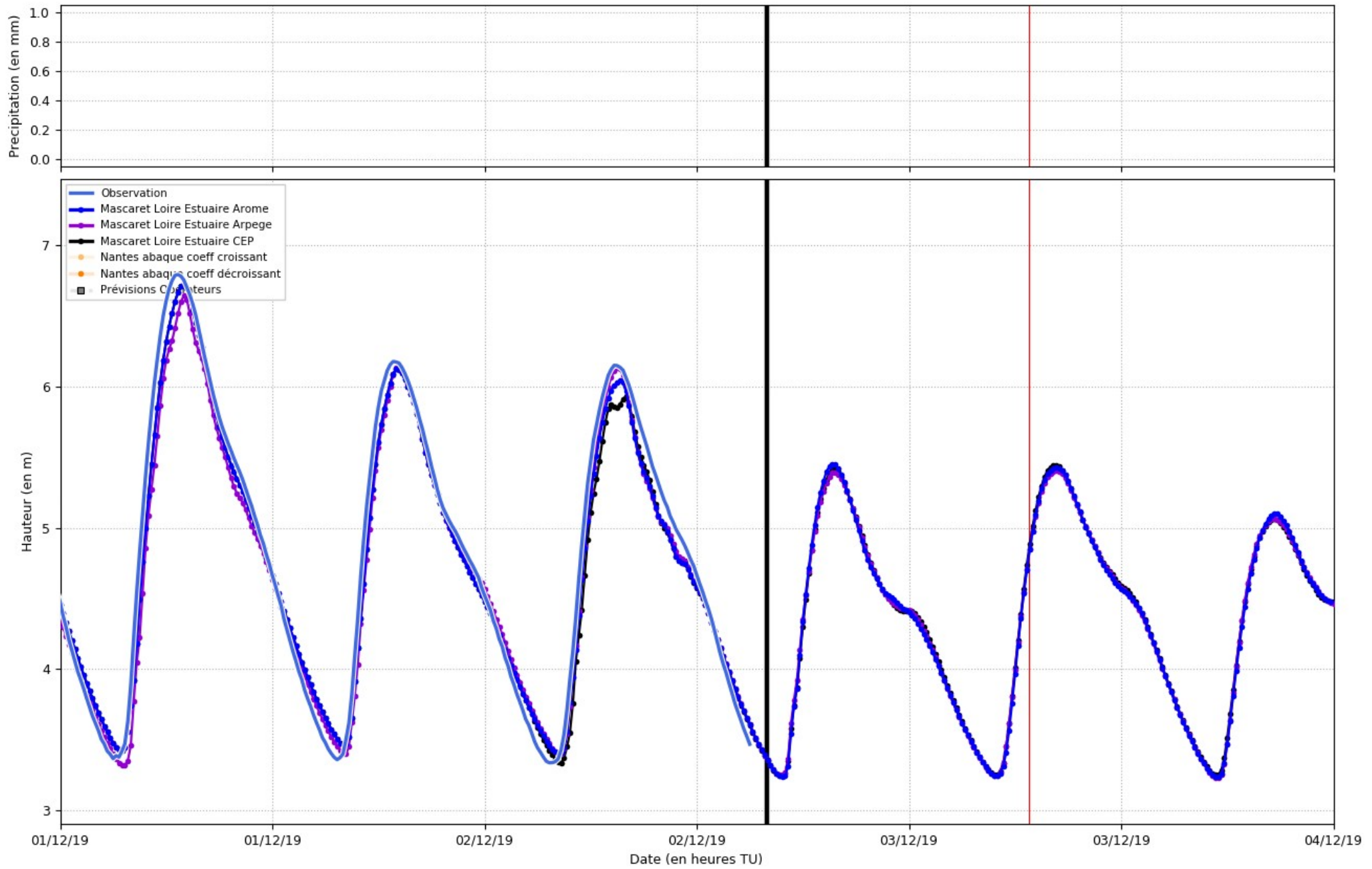
La Loire à Saint-Nazaire

Saint-Nazaire : the downstream limit condition with 3 models from Météo France
(**AROME**, **ARPEGE**, **CEP**)



Model result

La Loire à Nantes

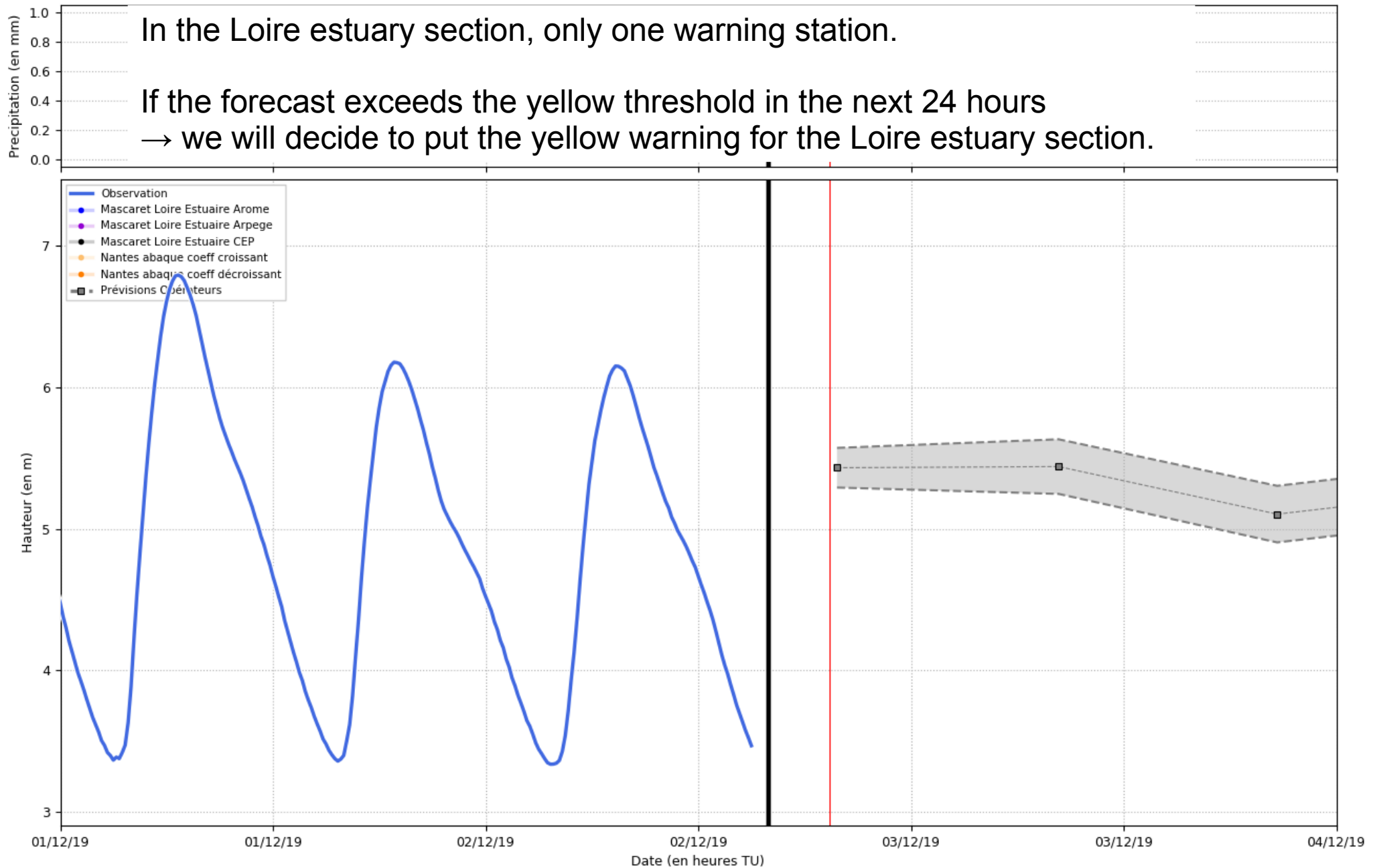


Vigicrues level forecast

La Loire à Nantes

In the Loire estuary section, only one warning station.

If the forecast exceeds the yellow threshold in the next 24 hours
→ we will decide to put the yellow warning for the Loire estuary section.



Prospect

A new warning and forecast station on the Loire Estuary section ?

Industrial issues are present throughout the Loire from Nantes to Saint-Nazaire. Make forecasts in this zone could help these industries to cope with the risk of flooding and/or pollutant spreading in Loire.

