

Team 05 Presentation 3

Presentation 3: Results of 2nd Week



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Aims & Objectives

“Modeling the effect of accidental water pollution in the lower Var during a storm”



Objectives

- Identify Source-Pathway-Receptor
- Model the pathway
- Quantify impacts on Receptors



Source-Pathway-Receptor

Source

- Factory discharge 
- Storm flow 
- Agriculture 
- Road 

Pathway

- Advection 
- Sediment transport 
- Overtopping 





Receptor

- Environment 
 - Wildlife 
 - Contamination 
- People 
- Property 



Source-Pathway-Receptor

Source

- **Factory discharge** 
- **Storm flow** 
- **Agriculture** 
- **Road** 

Pathway

- **Advection** 
- **Sediment transport** 
- **Overtopping** 

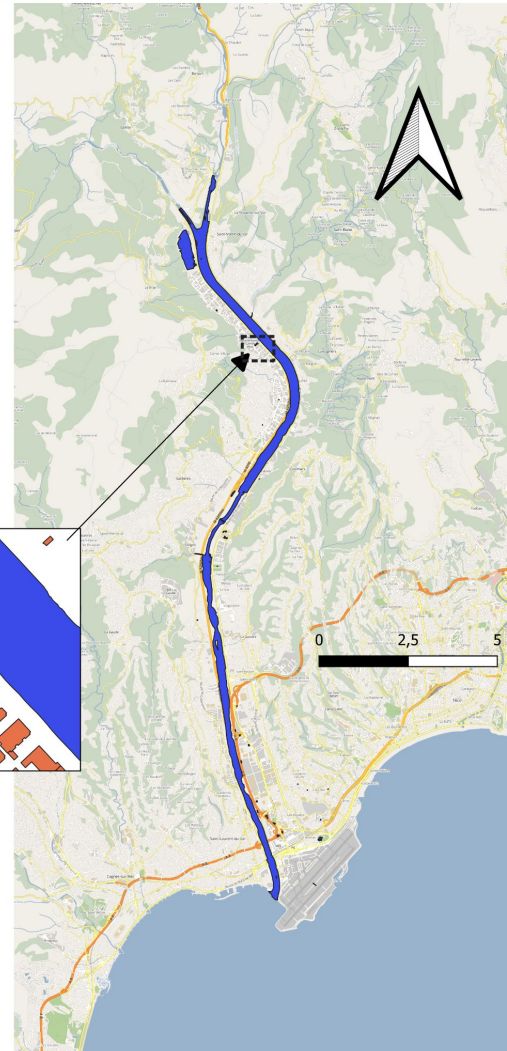
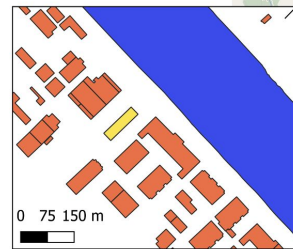
Receptor

- **Environment** 
 - **Wildlife** 
 - **Contamination** 
- **People** 
- **Property** 



Source

Sensitives areas
in the Var



Var Catchment

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Source



NO	Pollutant Name	Chemical Name	Concentration	Total Approximation
1	Nutrients & Agricultural Pollutants	Nitrate (NO ₃ ⁻)	50.0 mg/L	50 mg/L
2	Organic Pollutants (Chemical Oxygen Demand Components)			125 mg/L
3	Hydrocarbons			1 mg/L
4	Heavy Metals	Lead (Pb)	0.1 mg/L	2 mg/L
5	Other Industrial & Wastewater Pollutants			11 mg/L

Polluant	Discharge Limit	Source
Suspended Solid (SS)	20 mg/L	Decree of July 15, 2015
Nitrates (NO_3^-)	15 mg/L	Directive 98/93 and Decree of July 15, 2015
Nitrite (NO_2^-)	0.5 mg/L	Directive 98/93
Silver (Ag)	0.1 $\mu\text{g/L}$	Directive 98/93
Lead (Pb)	10 $\mu\text{g/L}$	Directive 98/93



Source :

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Var Catchment

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Pathway

- **Direct Infiltration**
- **Stormwater Runoff**
- **Retention in Subsoil**
- **Transport Networks**
- **Old Industrial Sites**

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Var Catchment

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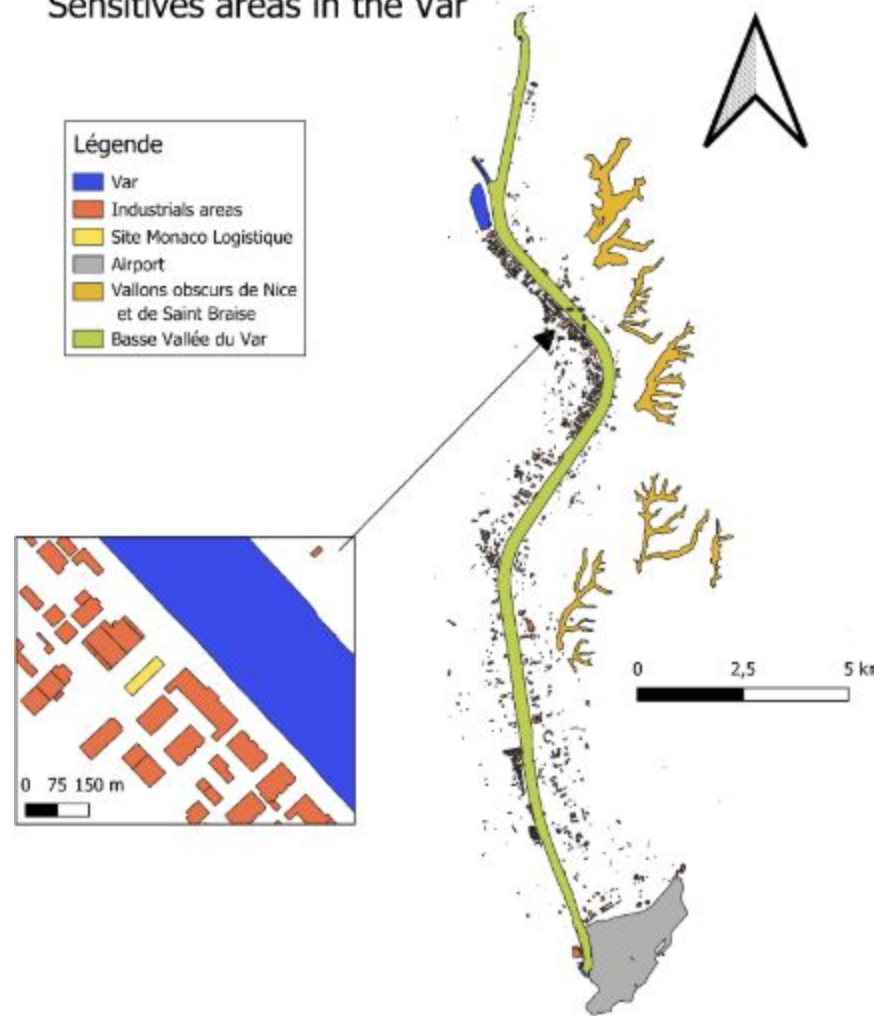
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Receptor

The **EU Natura 2000** identifies 2 sites:

1. “Basse Vallée du Var”
 2. “Vallons obscurs de Nice et de Saint Braise”
- Nearly **200** bird species.
 - A vital stopover, nesting, and wintering site for waterfowl, raptors, and migratory birds.

Sensitives areas in the Var



Var Catchment

- The Vallons Obscurs of Nice and Saint-Braise are steep, urban-adjacent areas hosting rich biodiversity and sensitive **wetland** habitats.
- Approximately **350,000 people** live downstream from the plant.
- **1740** different industrial buildings are near to the Var



Modelling

Scenarios

Historical events

*Future climate
impacts*

“Business as usual”

Pathway modelling

*Coupled HEC-RAS
1D+2D*

Telemac 2D

*Pollutant
extent*

*Pollutant
duration*

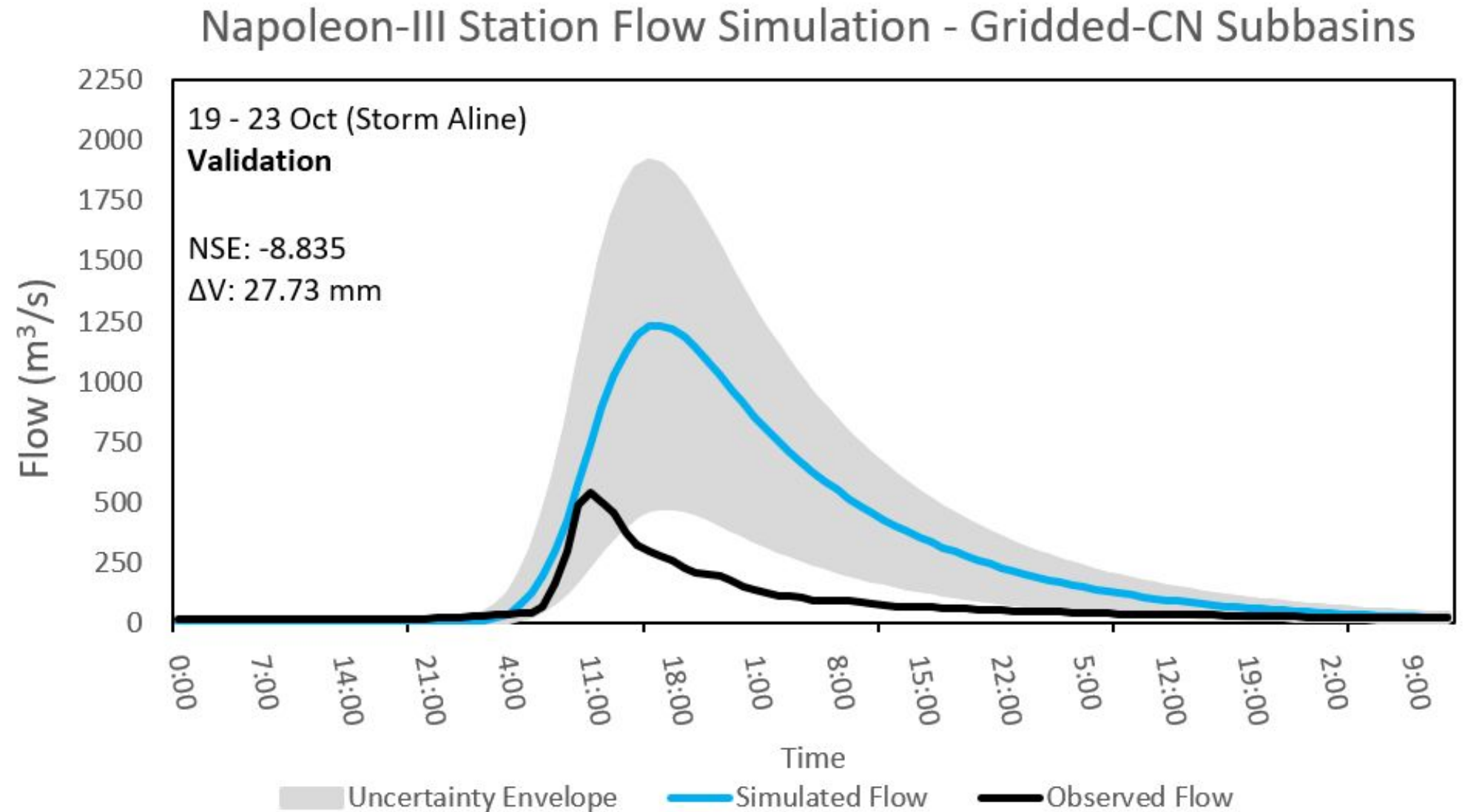
Impacts

Property damage

NATURA 2000

*Karst
contamination*

HEC-HMS



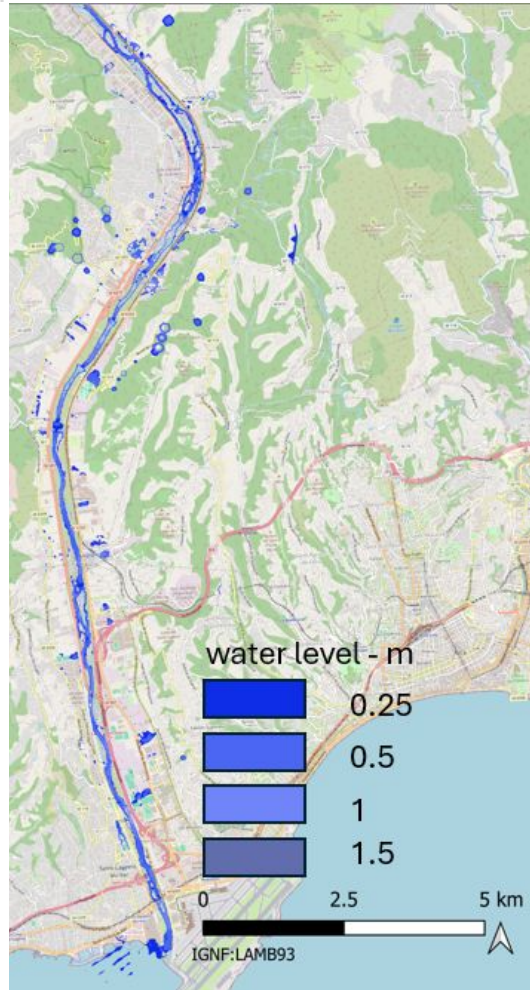


Telemac results

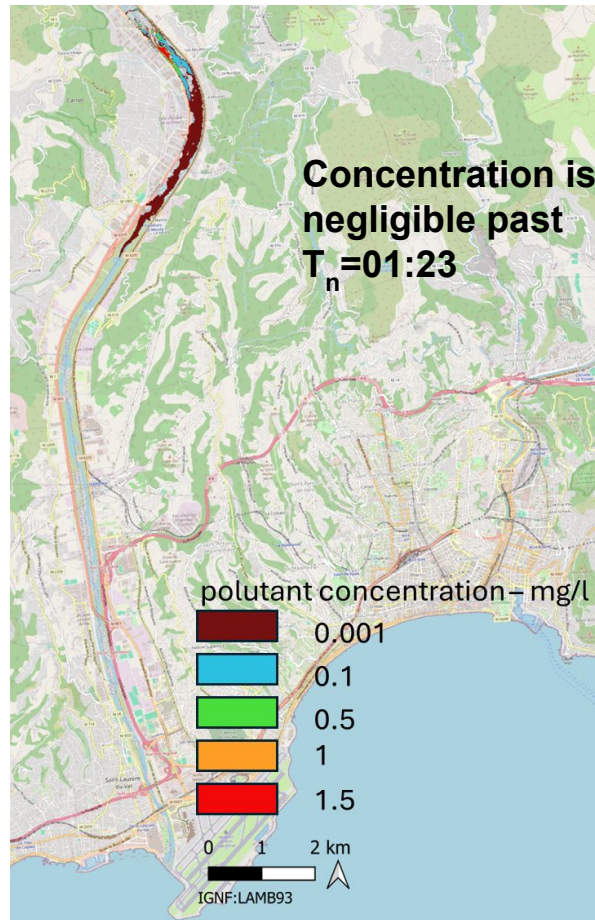
Steady case

25m resolution

Unsteady 2020 case (flood peak)

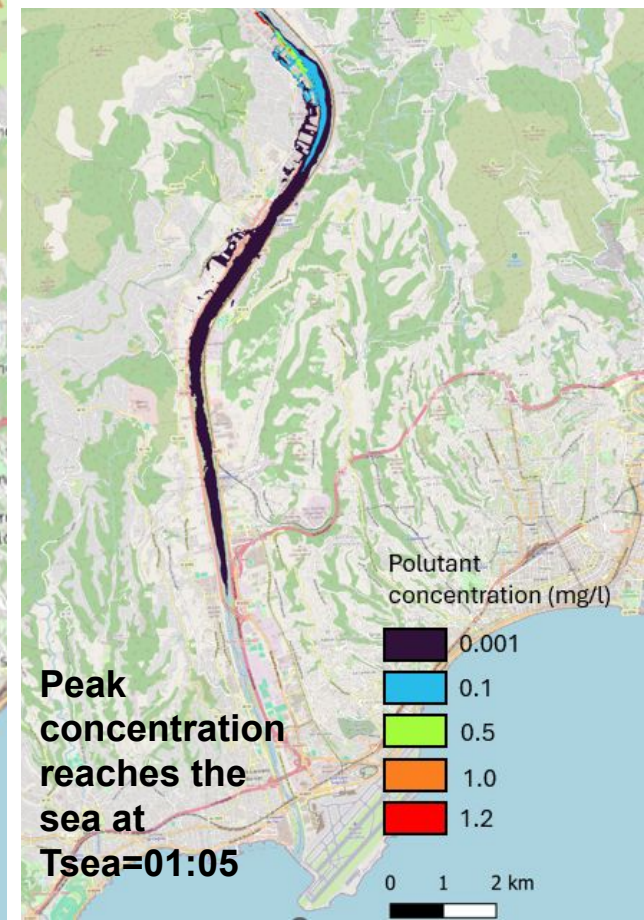


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Pollutant concentration 500 mg/L at 0.3m³/s

Var Catchment



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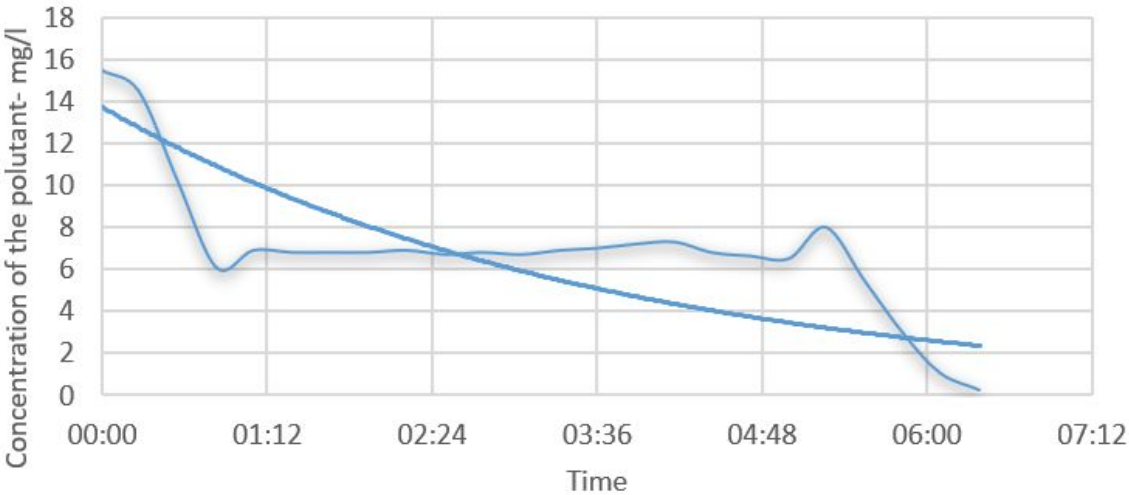


Telemac



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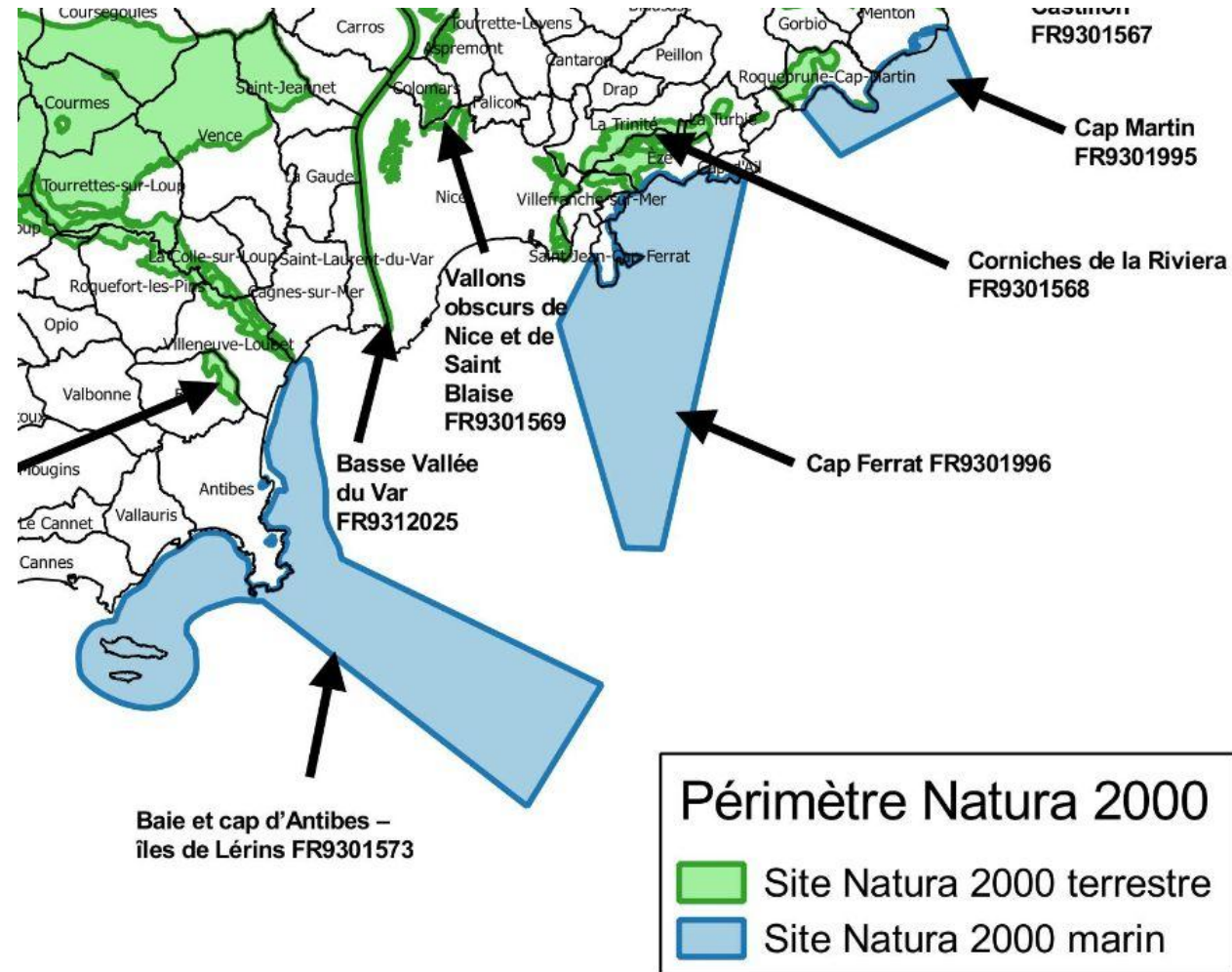
Change in polutant concentration as a function of time



Var Catchment

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Environmental impacts



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Var Catchment

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Legal setting regarding pollution

European Level:

- **WFD (2000)**: Ensures 'good ecological status' of water through management plans and monitoring.
- **Urban Waste Water Directive (1991)**: Controls wastewater discharge to protect the environment.
- **Habitats Directive (1992)**: Protects natural habitats and species via the Natura 2000 network.
- **REACH Regulation (2006)**: Controls chemicals' use to protect water quality.

France Level:

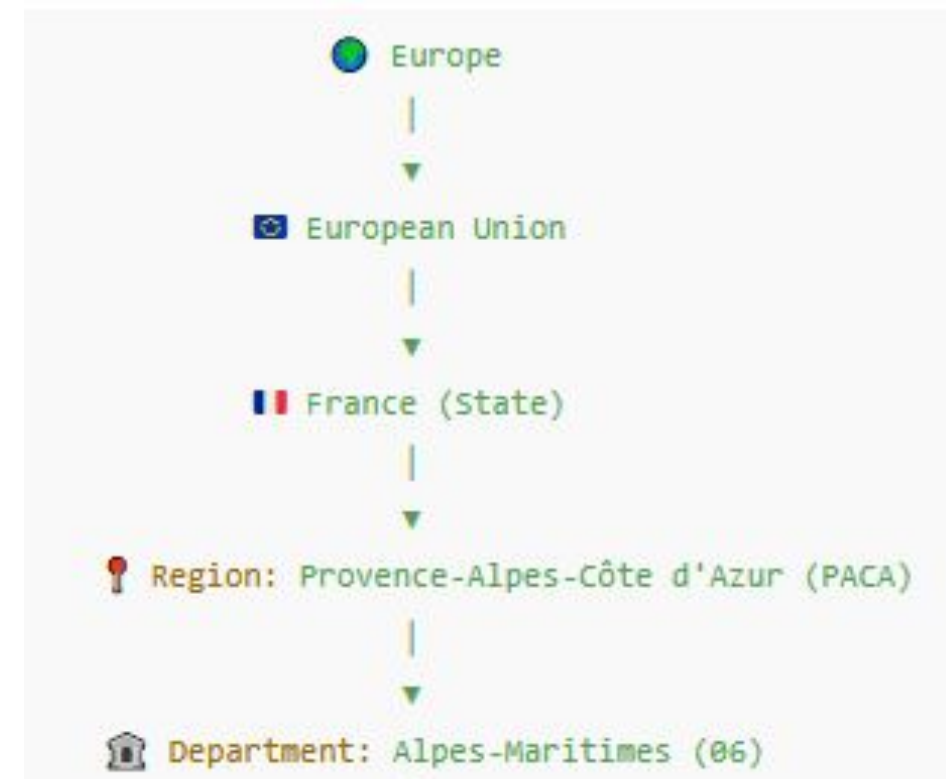
- **LEMA Law (2006)**: Introduces taxes to limit pollution and strengthens water control.
- **Environmental Code**: Regulates industrial/agricultural water discharges.
- **Classified Installations Law (1976)**: Controls risky industrial activities.
- **ICPE Regulation**: Monitors activities with environmental risks.
- **2015 Decree**: Sets wastewater discharge limits

Regional Level:

- **SDAGE Plan (Rhône-Mediterranean)**: Strategy for water quality and sustainable management.
- **SAGE Plans**: Local measures for water management.

Departmental Level:

- **Alpes-Maritimes Regulation**: Sets drinking water quality standards (lead, nitrates, pesticides).
- **Air Quality Plan (PACA, 2025)**: Reduces air pollutants to improve water quality.
- **Rhône-Méditerranée Water Agency**: Works to improve water quality in the region.



Possible solutions



Nbs

Constructed Wetlands

Removes NH_4^+ , NO_2^- , NO_3^- , PO_4^{3-} , heavy metals



Riparian Buffer Zones and Vegetation Strips

Retains NH_4^+ , NO_2^- , NO_3^- , PO_4^{3-}



Green Filters & Bioactive Barriers

Removes NO_3^- , PO_4^{3-} , heavy metals

Biofiltration Systems combined with SuDS

Captures NO_2^- , NO_3^- , PO_4^{3-} , heavy metal



Incorporate lateral water catchment areas into planned flood zone



Var Catchment

Incorporate bioadsorbents in bed layers

(biochar or zeolite)



NBS + Conv.
Technologies

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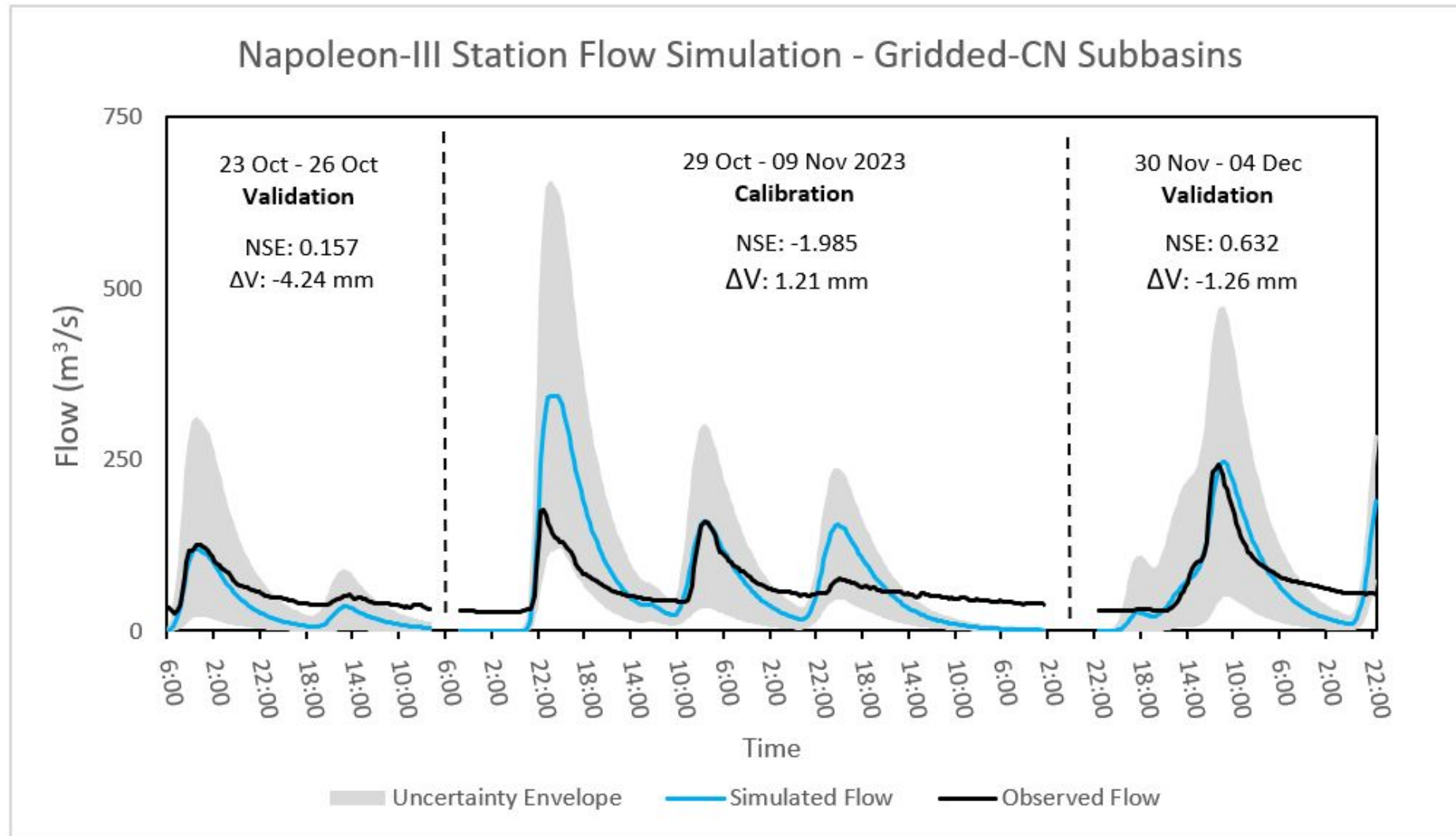


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Appendix: HEC-HMS Validation



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