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Hydroinformatics for water resources and water related hazards management in Europe

Tordera Catchment - Gloria Storm: Hydrological and hydraulic analysis

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Tordera Catchment - Gloria Storm: Hydrological and hydraulic analysis

The goal of the project is to understand the gloria storm using the La Tordera catchment as an example. The main tasks include:

- Complete hydrological analysis of the catchment for the 2020 Gloria storm event,
- Calibration of the model with observational data,
- Uncertainty analysis of the results. Possible explanations and likely sources of uncertainty,

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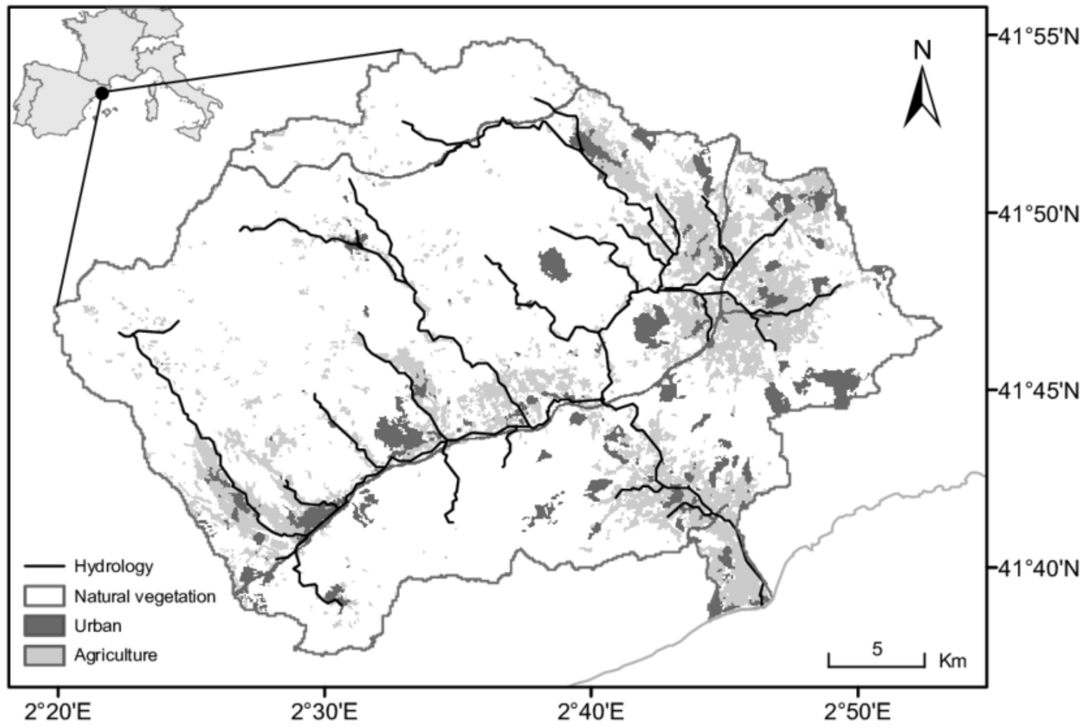
La Tordera catchment



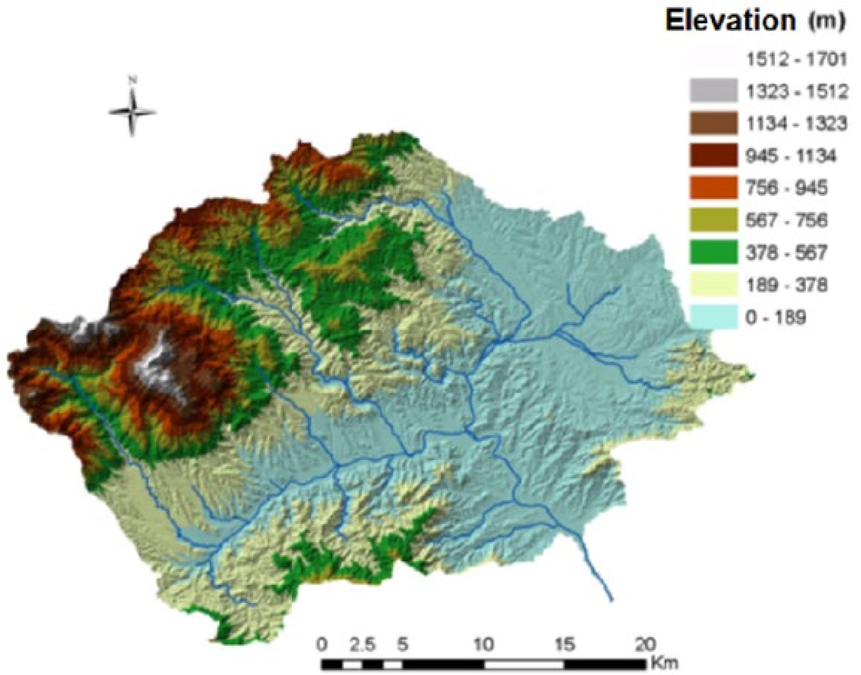


Figure 1 Location and topography of catchment

Gloria Storm

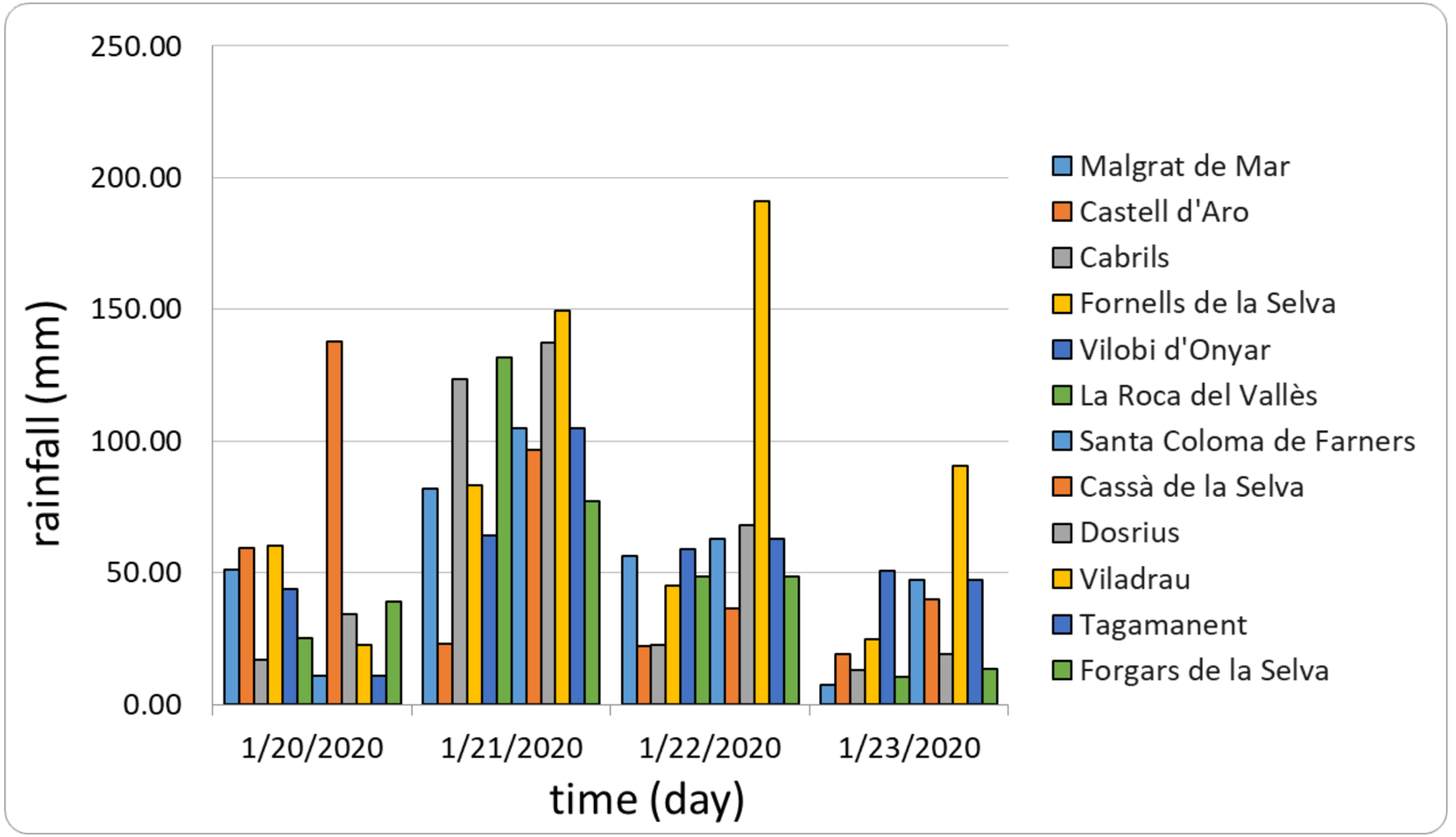
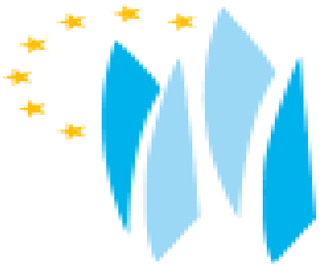


Figure 2 Observed rainfall at the different measuring station during the Gloria Storm

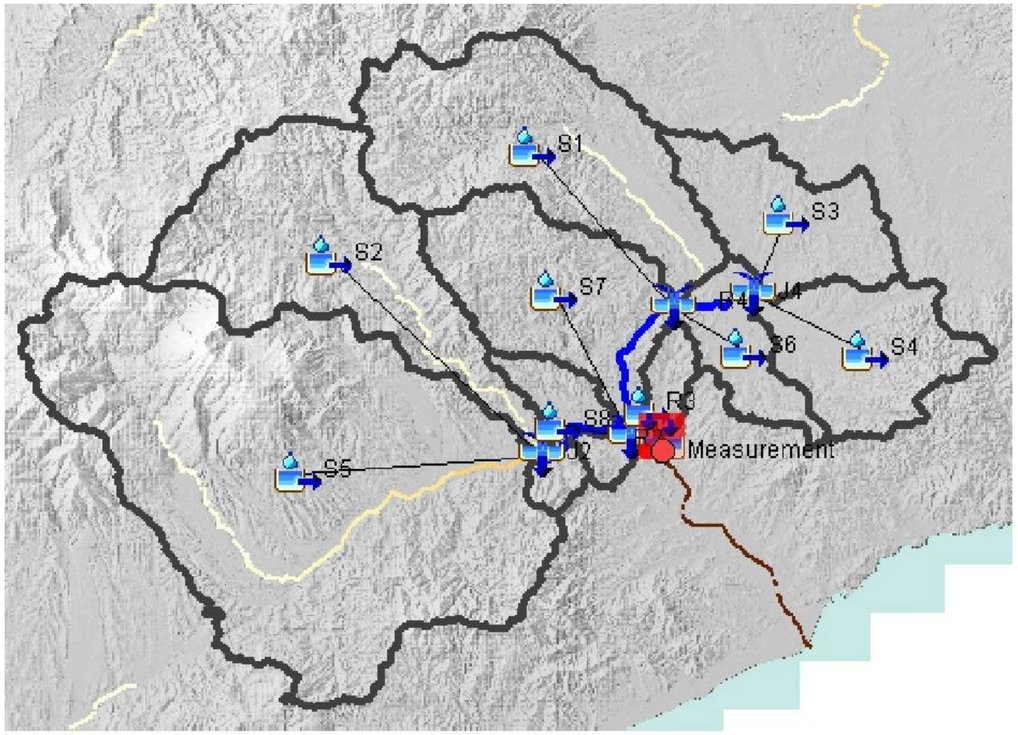
Methods of making a project
HEC-HMS

Methods used to implement the project are:

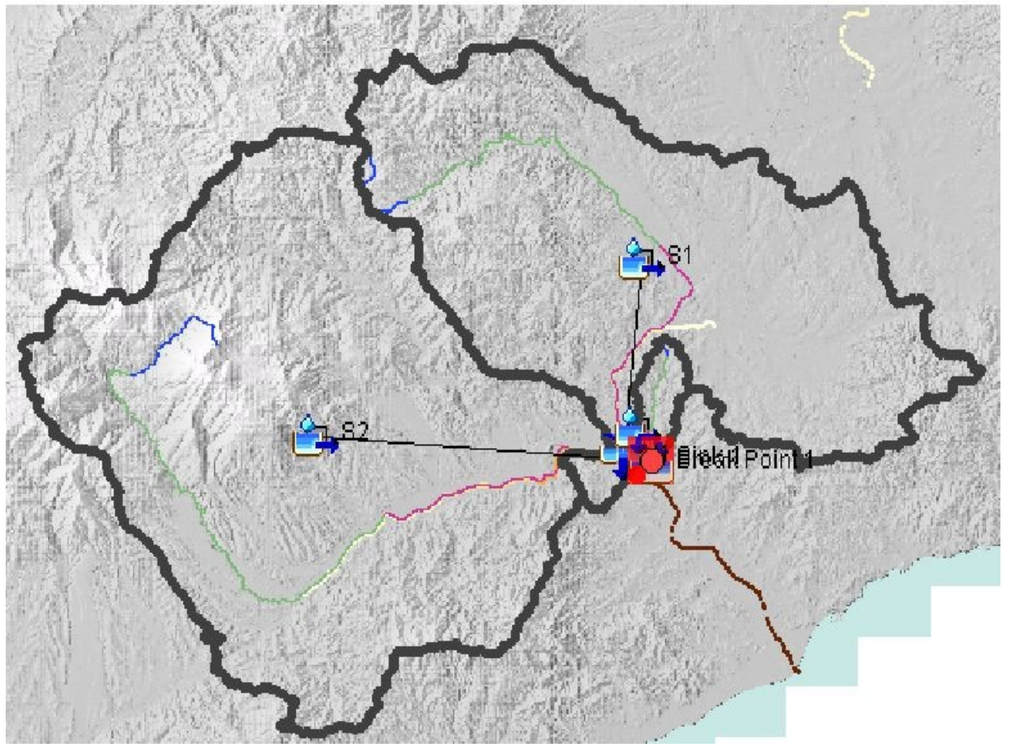
- Loss Method: SCS Curve number,
- Transform Method: SCS Unit Hydrograph,
- Baseflow Method: Recession,
- Routing Method: Muskingum,



Two models



a)



b)

a) Model with 9 sub-catchments
b) Model with 3 sub-catchments

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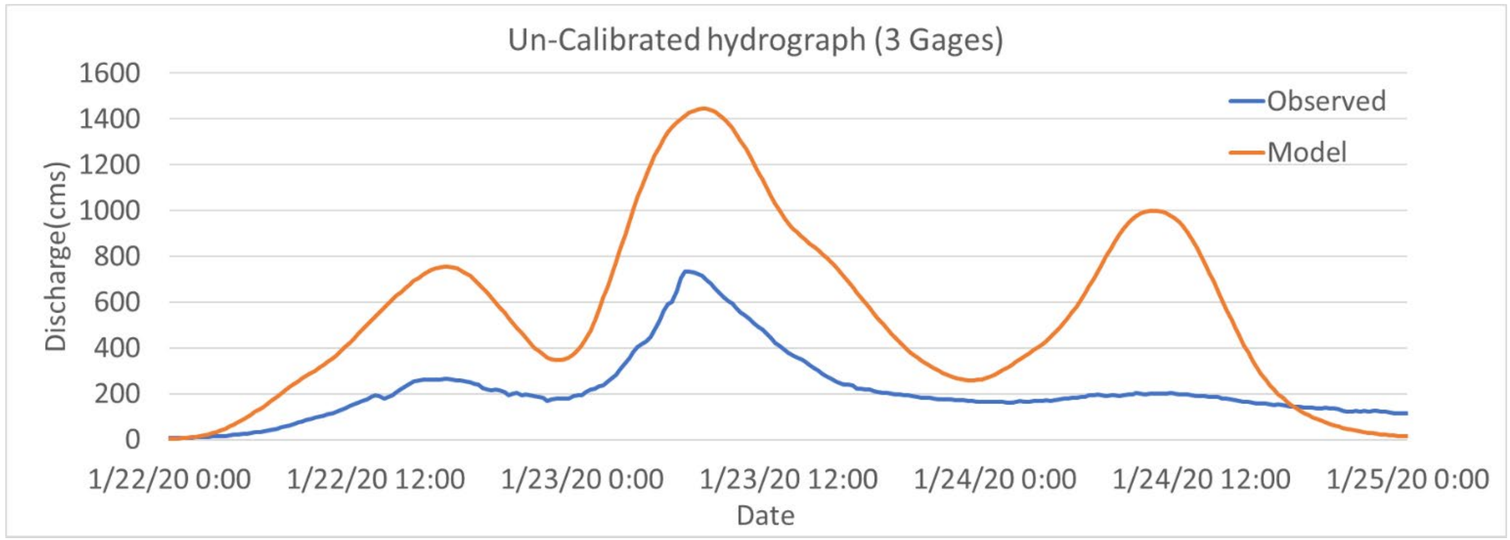
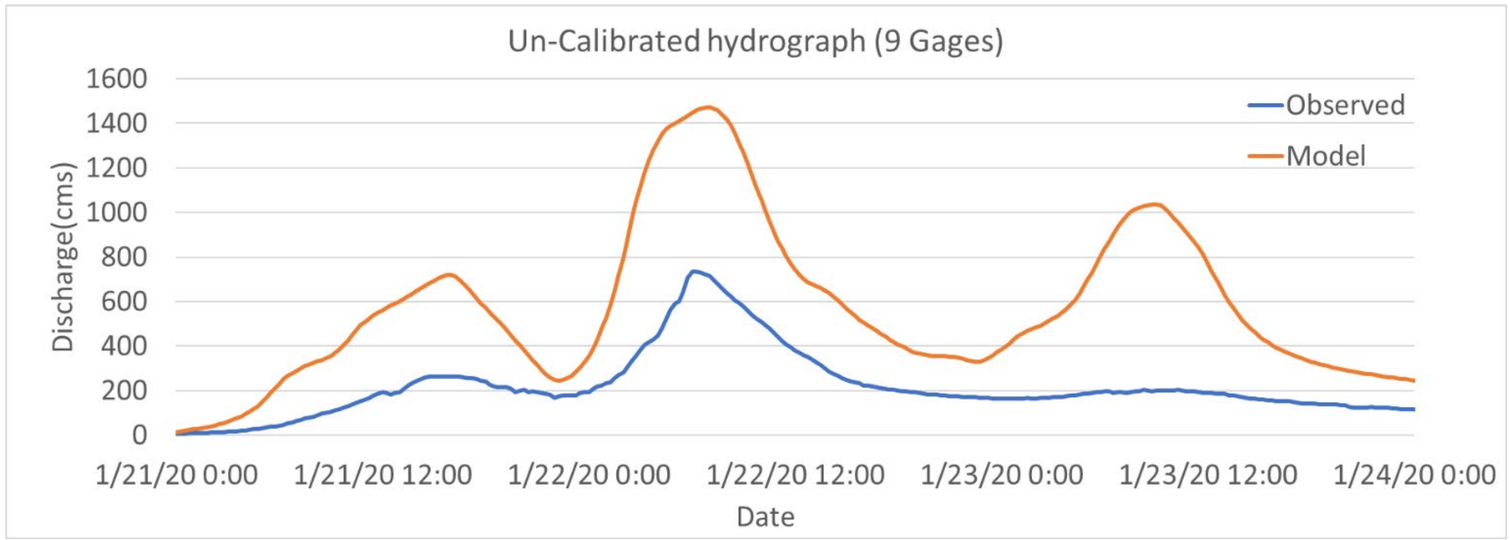
Results before calibration





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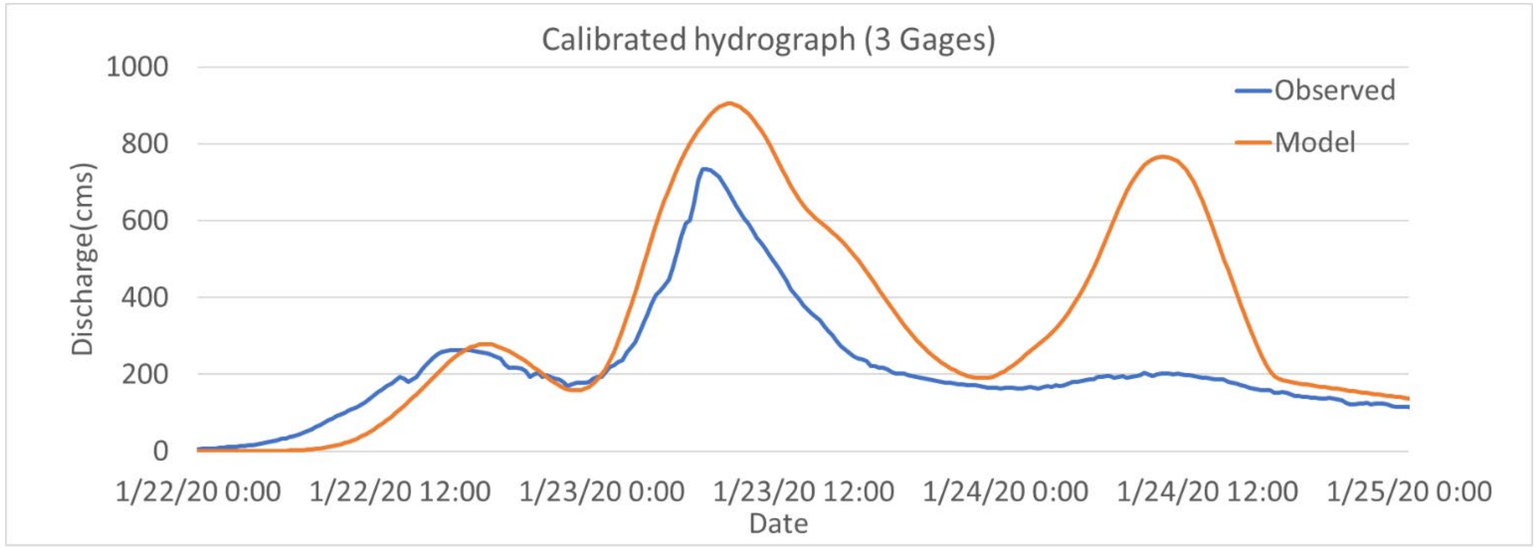
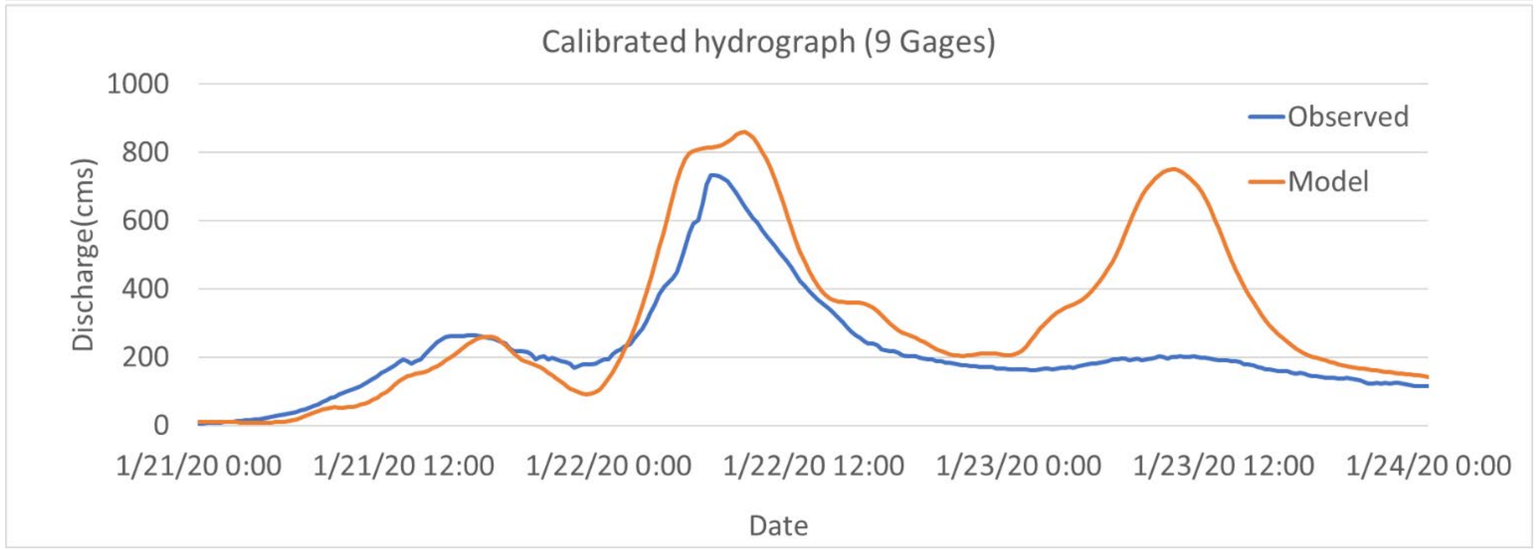
Results after calibration





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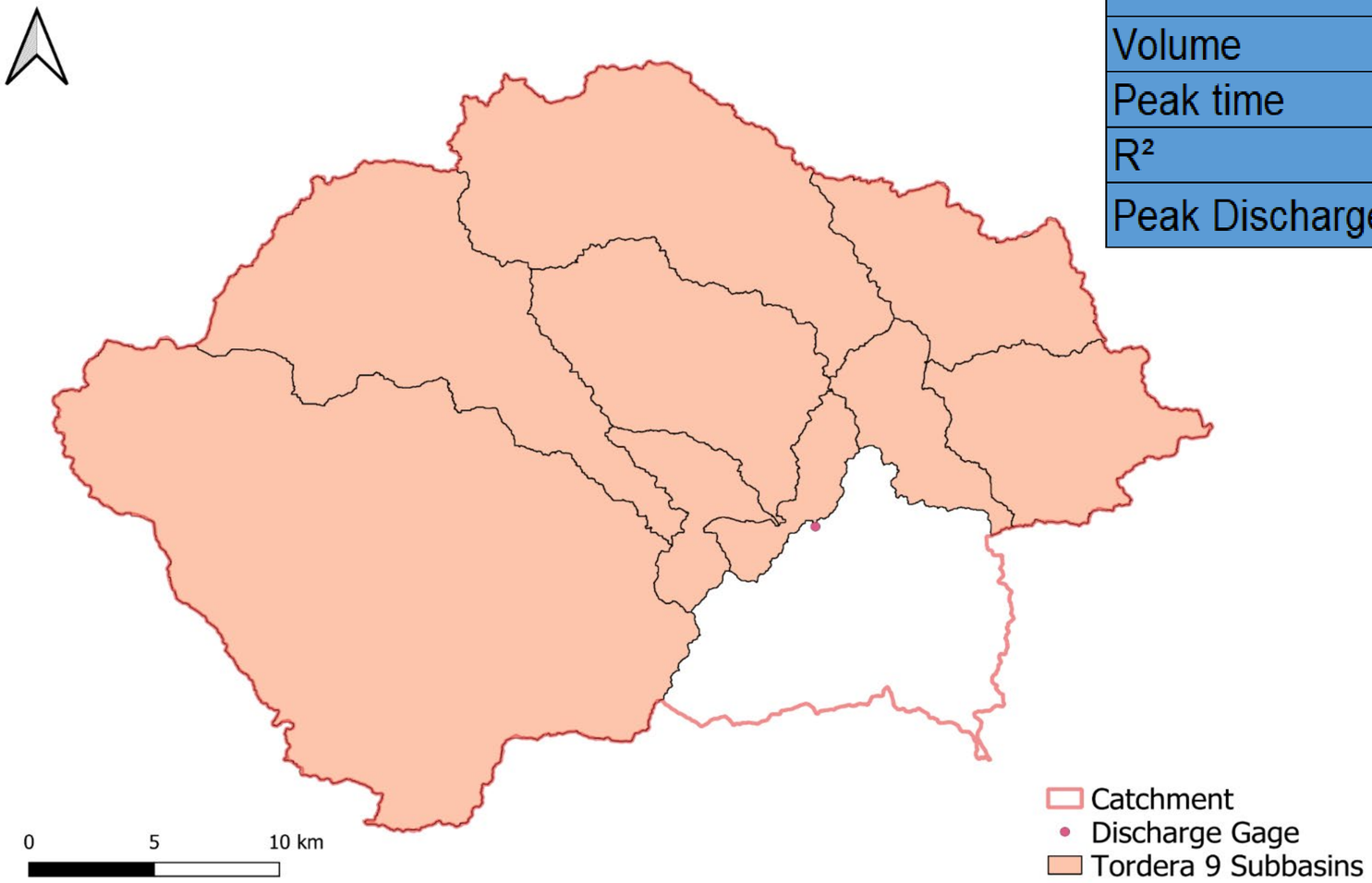
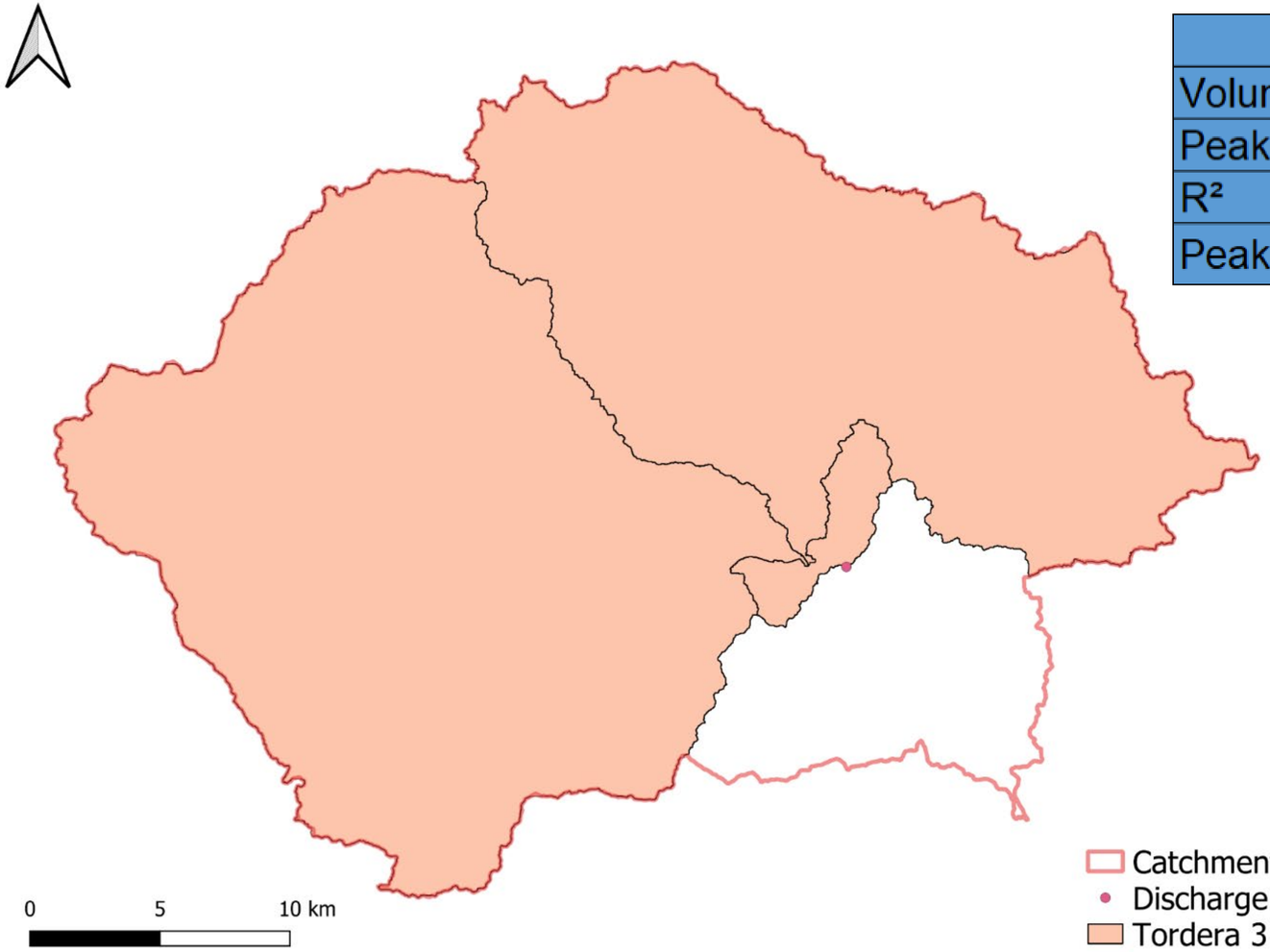
Results with 9 Subbasins



		Simulation with 9 subassins
Volume	[1000m3]	92178.00
Peak time		1/22/2020 8:00
R^2		0.81
Peak Discharge	[m^3/s]	859.10

Results with 3 Subbasins



		Simulation with 3 subassins
Volume	[1000m3]	100592.03
Peak time		1/22/2020 7:30
R^2		0.75
Peak Discharge	[m^3/s]	504.41

Definition of Uncertainty

Uncertainty can be understood as the lack of confidence regarding an analysis, model or data; derived from imprecisions introduced by the model structure and input data.

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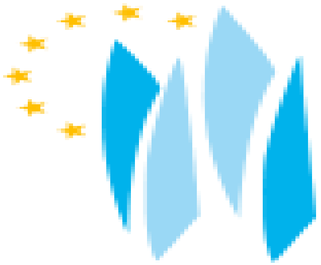
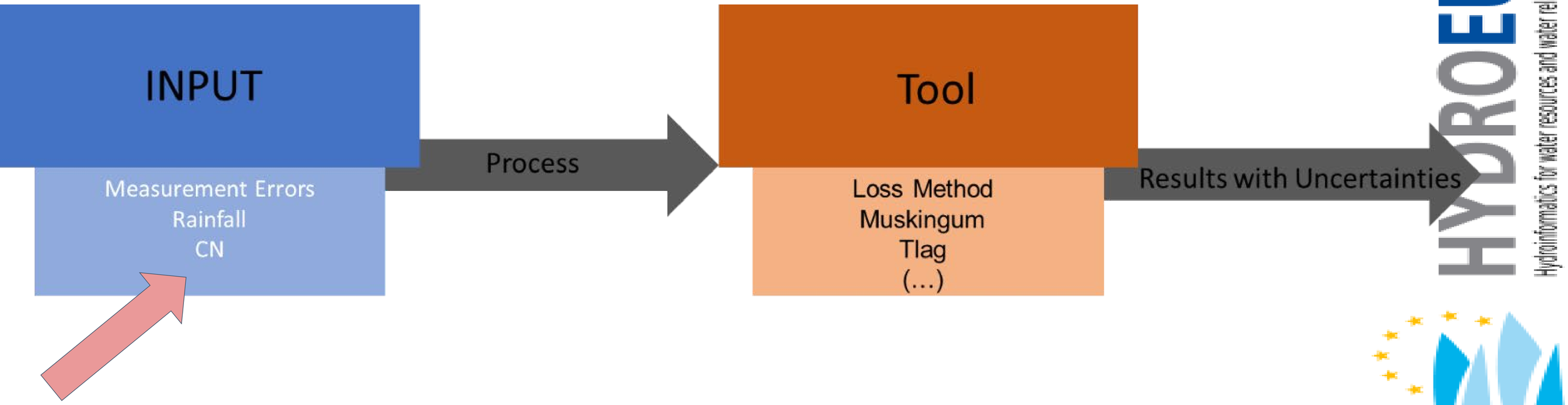


Sources of Uncertainties



Measurement station

Broke bridge at C35
Discharge Measurement station

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Precipitation

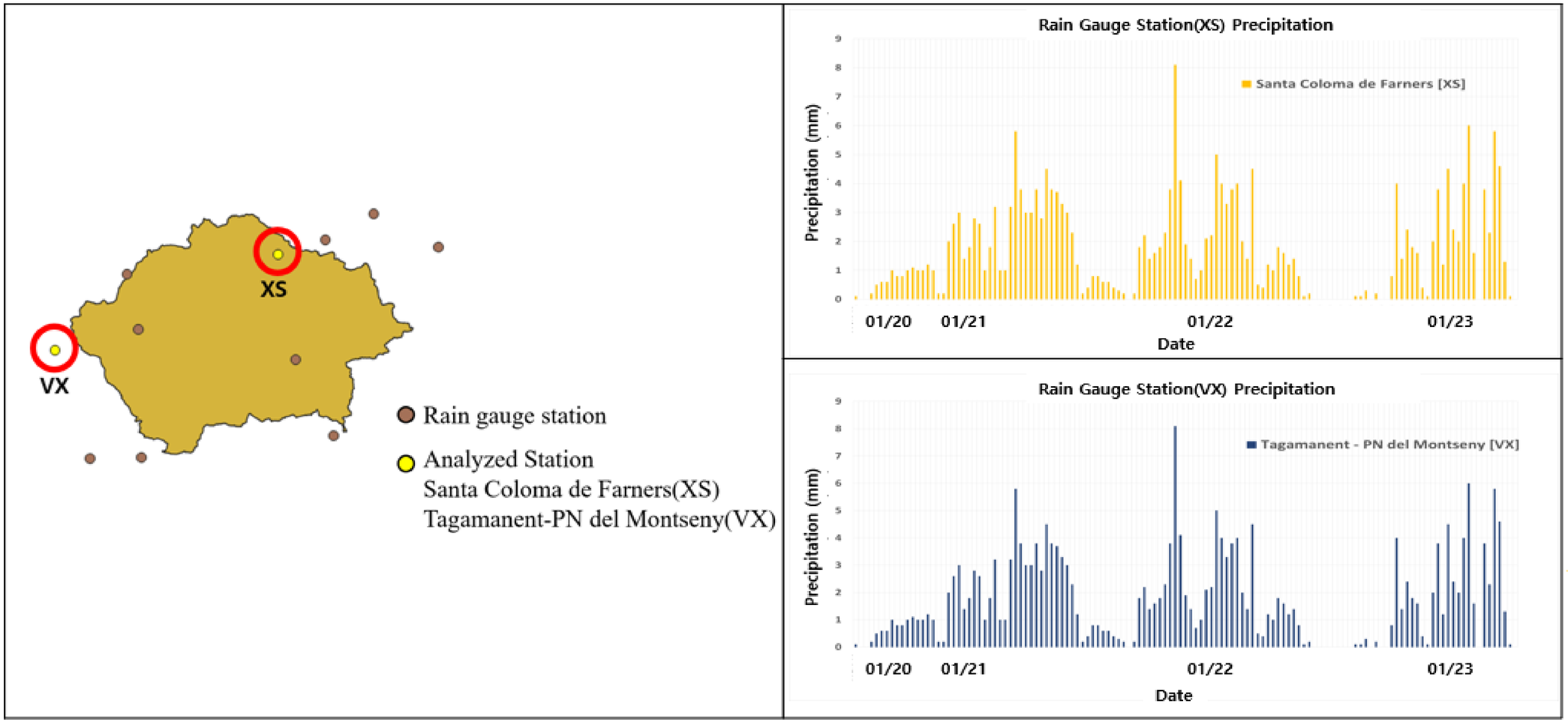


Figure 6 Rain Gauge Station Precipitation(XS,VX)

Precipitation

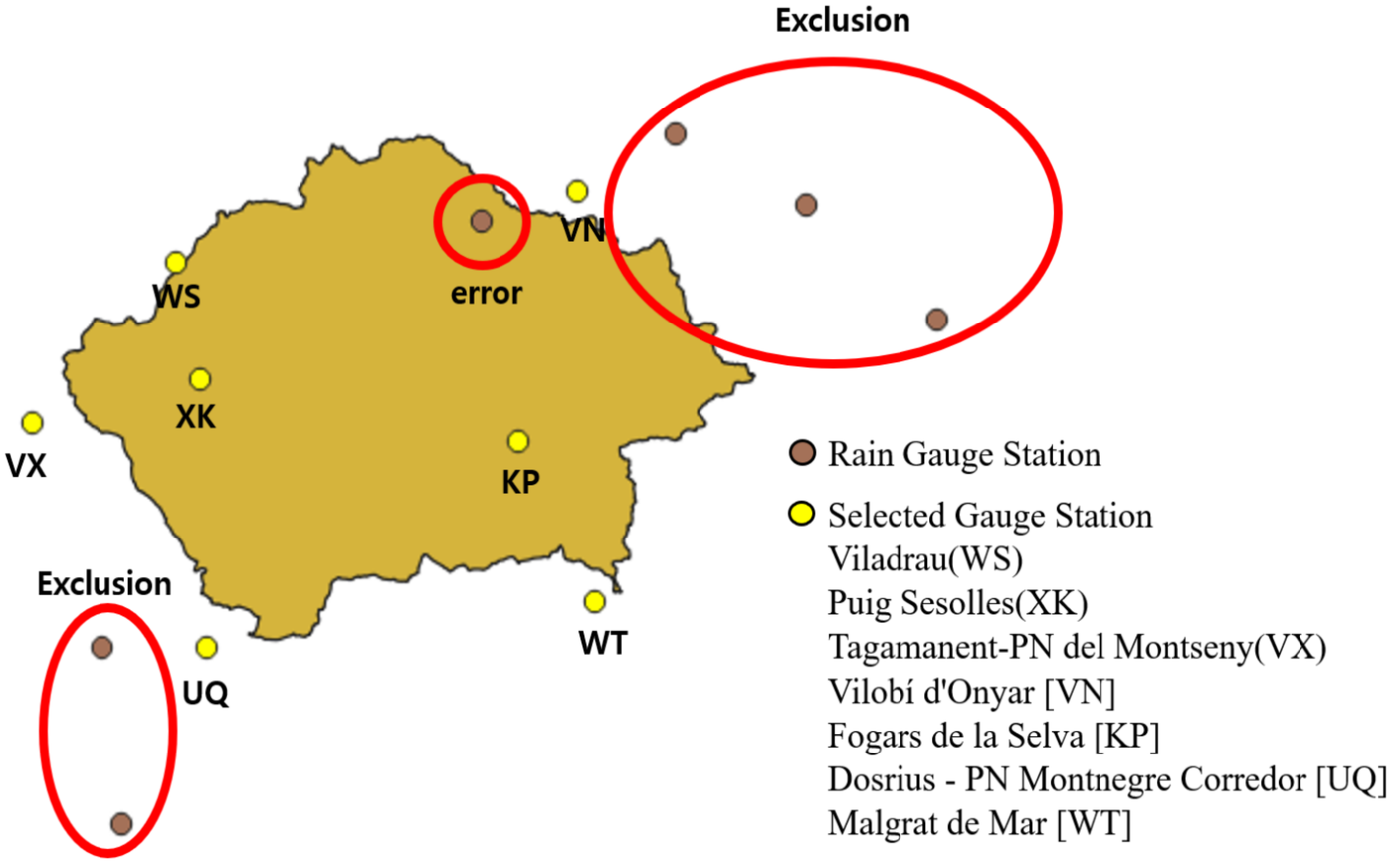


Figure 7 Rain Gauge Station Data Selection in catchment

CN Numbers

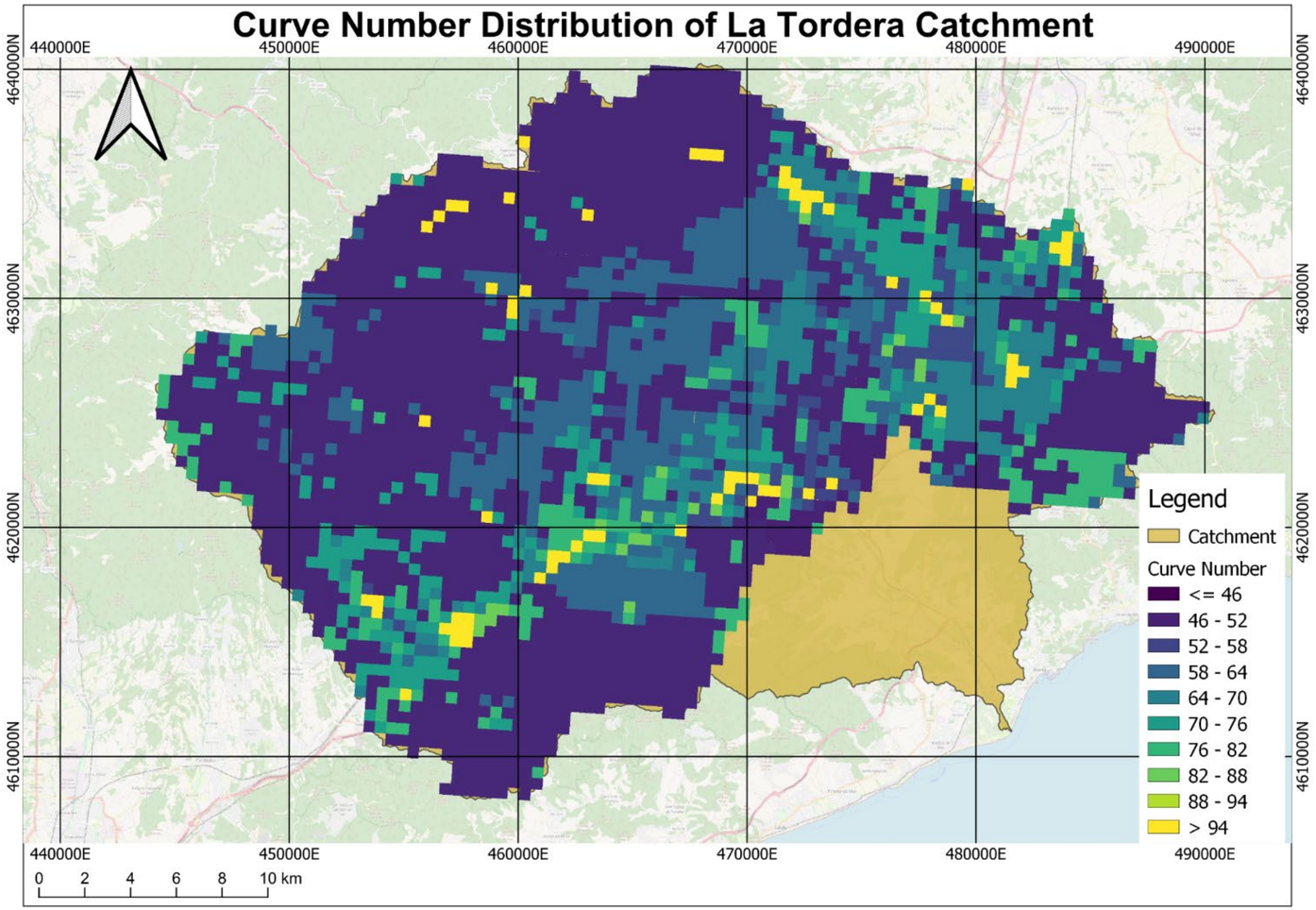
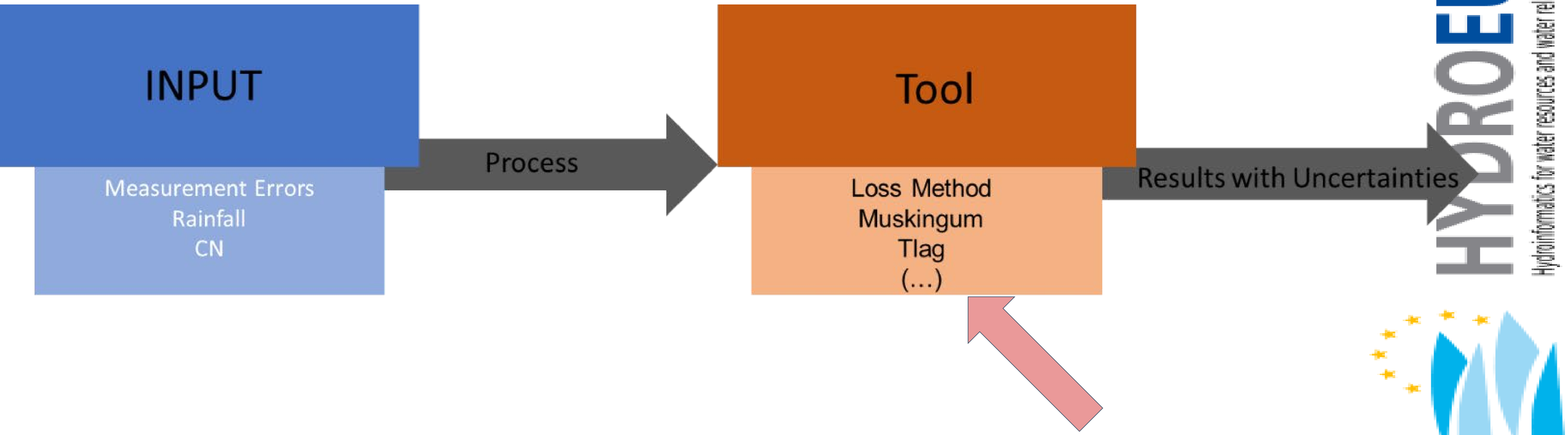


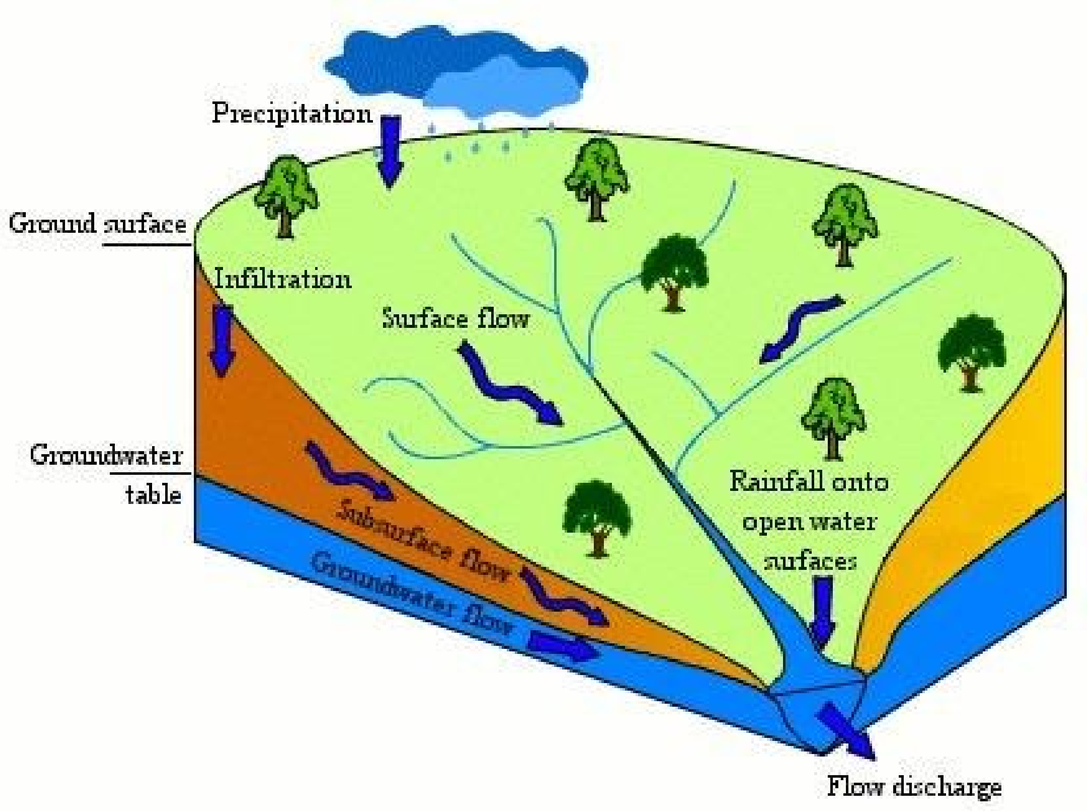
Figure 8 Curve number repartition in the basin.

Sources of Uncertainties



Loss method

SCS Curve Number



Solutions to decrease uncertainty

- Adding rain measuring stations inside the model
- Verify the calibration of the measurement station
- Calibrate the station for extreme events
- Change the Loss method to the most suitable one
- Increase the number of subbasins

Conclusions

- As computer models are “simplified” representations of reality, 100% accuracy is not possible as many uncertainties exist in the nature of a model.
- Errors during data gathering, simplifications and the methodologies can be the sources of the uncertainties.
- Limits of the models should be understood and must be kept in mind while concluding the results.
- Having multiple models and running sensitivity analysis may help to understand the limitations and also help to manage uncertainties.