HYDROEUROPE

Hydroinformatics for water resources and water related hazards management in Europe

HYDROEUROPE TEAM 7 WEEK 1 PRESENTATION

UNCERTAINTY IN HYDROLOGICAL ANALYSIS

CHAND Rajesh Kumar ,CHUNG Hong Ho ,DALON Thibaut
DAVOINE Florian ,LAGRANGE Quentin ,LEPLEY Florian
LIU Chia-An ,BUCKSTÖVER Mira ,MORILLON Camille
PAKOA Rodrigue ,XUTUC Abigail

Brandenburg University of Technology Cottbus - Senftenberg

Newcastle University

POLYTECH NICE-SOPHIA

UNIVERSITAT POLITÈCNICA DE CATALUNYA BARCELONATECH

VUB VRIJE UNIVERSITEIT BRUSSEL

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Background

Ahr catchment

WEST OF GERMANY

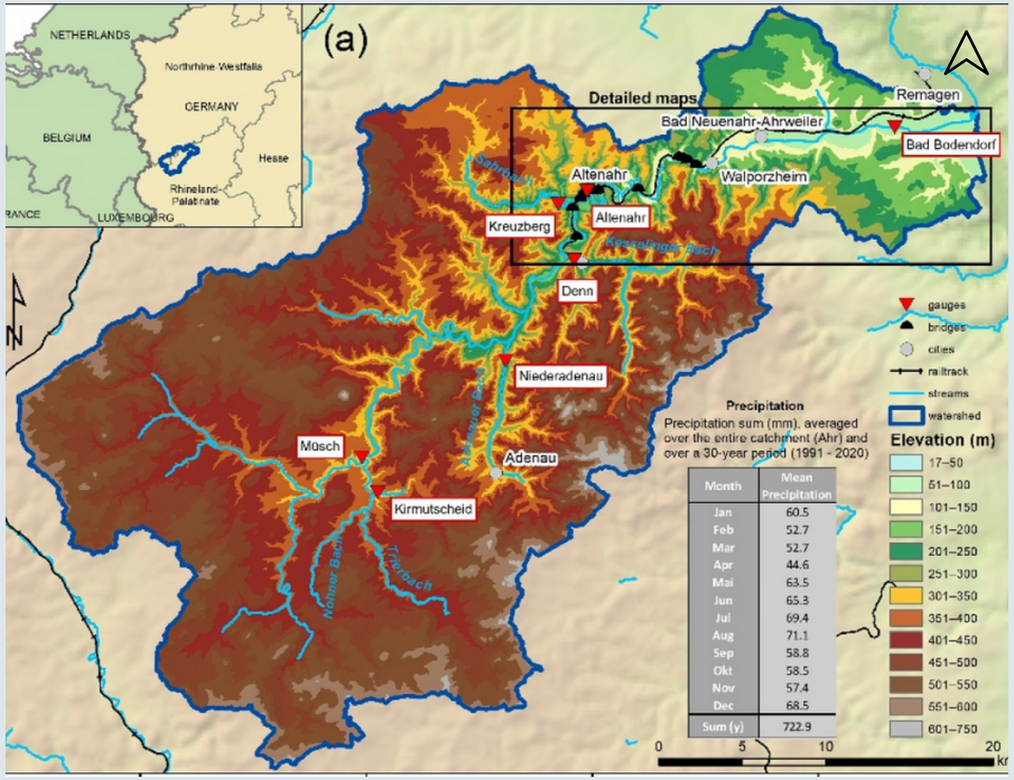


Fig. 1 : Boundaries of the Ahr watershed

Vesubie catchment

SOUTH-EAST OF FRANCE

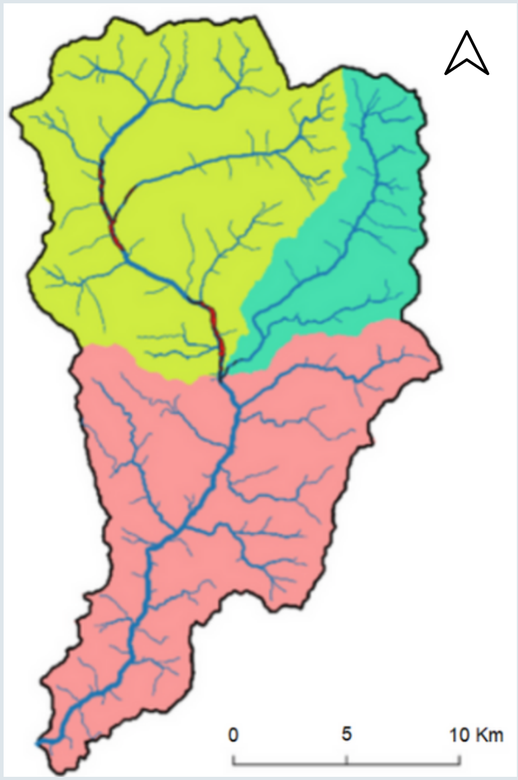


Fig. 2 : Limits of the Vésubie catchment area

Flooding

Ahr Catchment

Fig. 3 : Photos of flood damage, Ahr catchment area

July 2021
~200 people dead
~30 billion euro Damaged

Vesubie catchment

Oct 2020
10 people dead
1,5 billion euro damaged

Catchment Characteristics

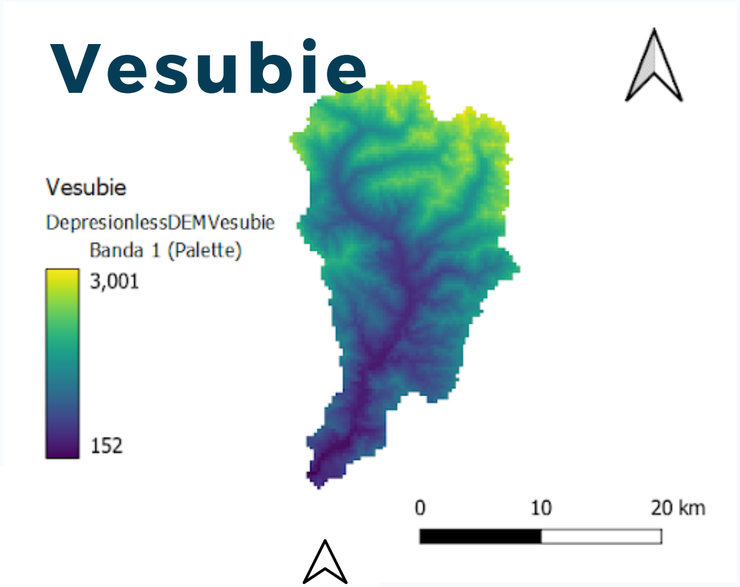


Fig. 4 : Altimetry of Vesubie valley

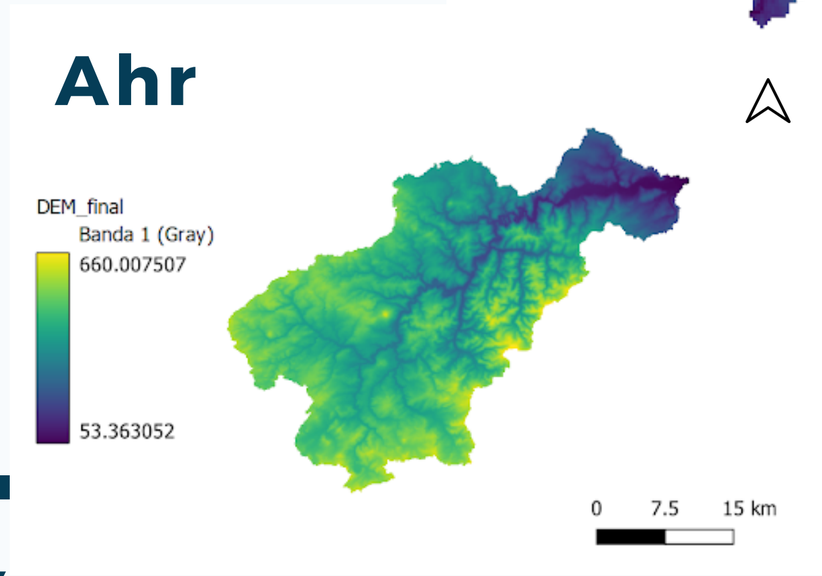


Fig. 5 : Altimetry of Ahr valley

	Ahr catchment	Vesubie catchment
Area	899.3 km²	392.1 km²
Main Land uses	Forests (56%) Agricultural (36%)	Forests (49 %) Semi-natural (45%)
Main soil types	Type C (92 %)	Type C (73 %) Type B (19 %)
Curve Number	82	80

- Land Use + Soil type combinations give similar hydrologic conditions
- Similar runoff potential would be expected

Topographies

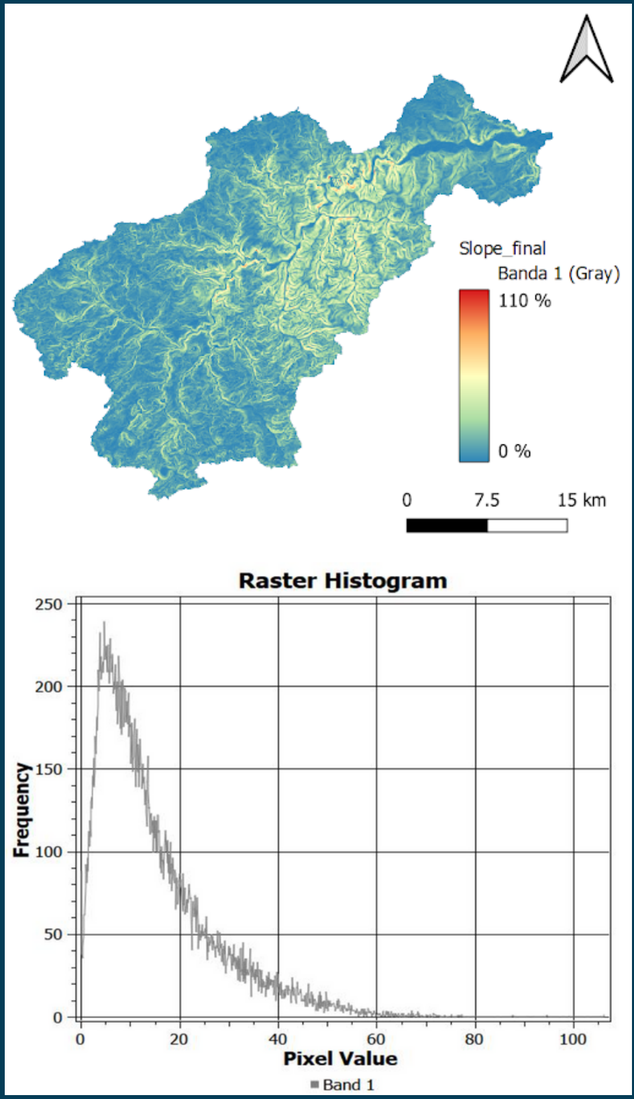


Fig. 6 : Surface elevation distribution, Ahr catchment

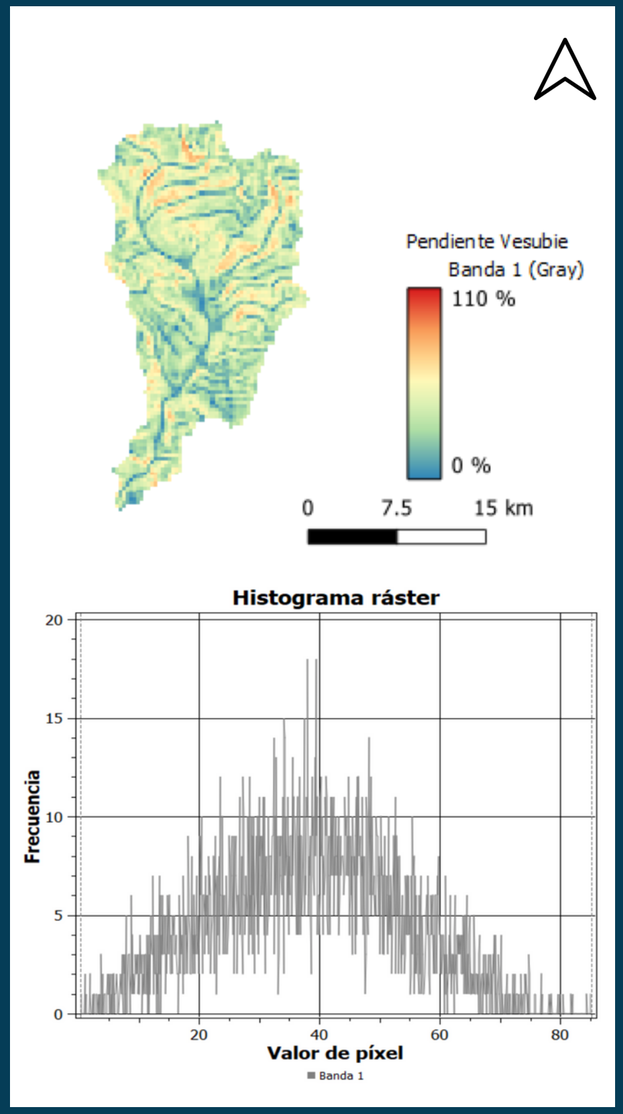
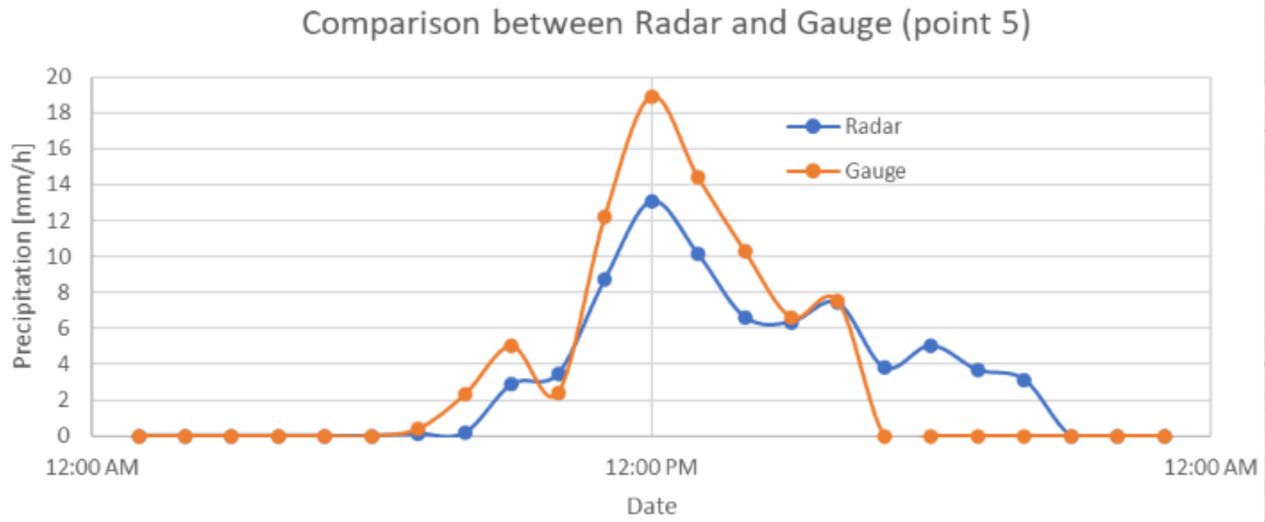


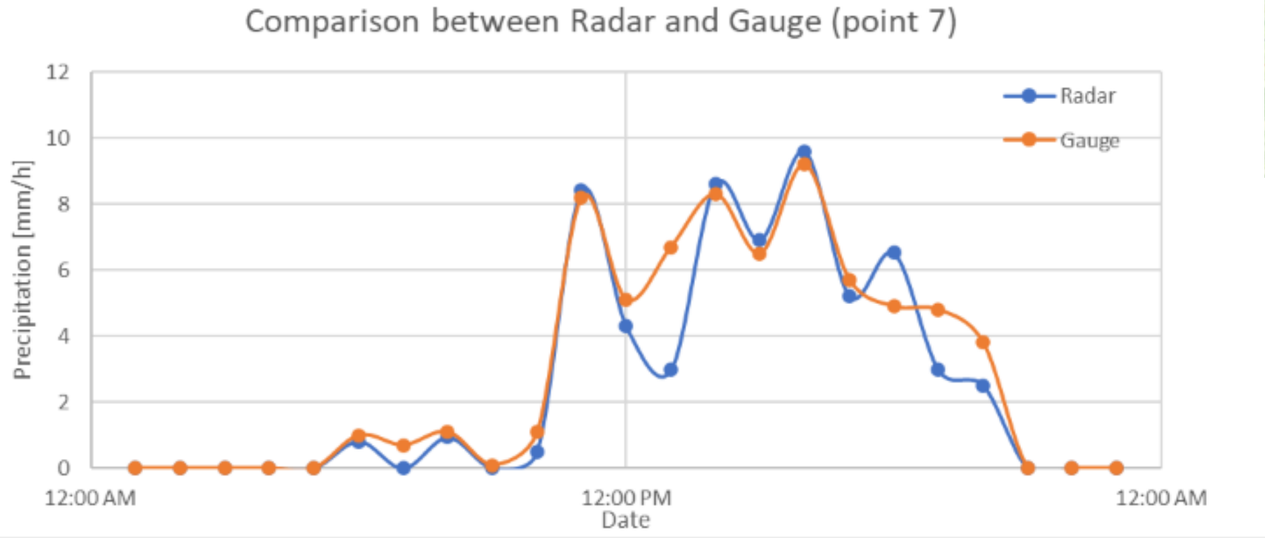
Fig. 7 : Surface elevation distribution, Vesubie catchment

	Ahr catchment	Vesubie catchment
Mean Slope	14.72 %	38.27 %
Majority of slopes	0 % - 20 %	20 % - 60 %
Maximum slope	85.10 %	106.32 %

- For Vesubie catchment
  - Topography increases the runoff potential
  - Greater flood velocities can be expected

Rainfall Time Series





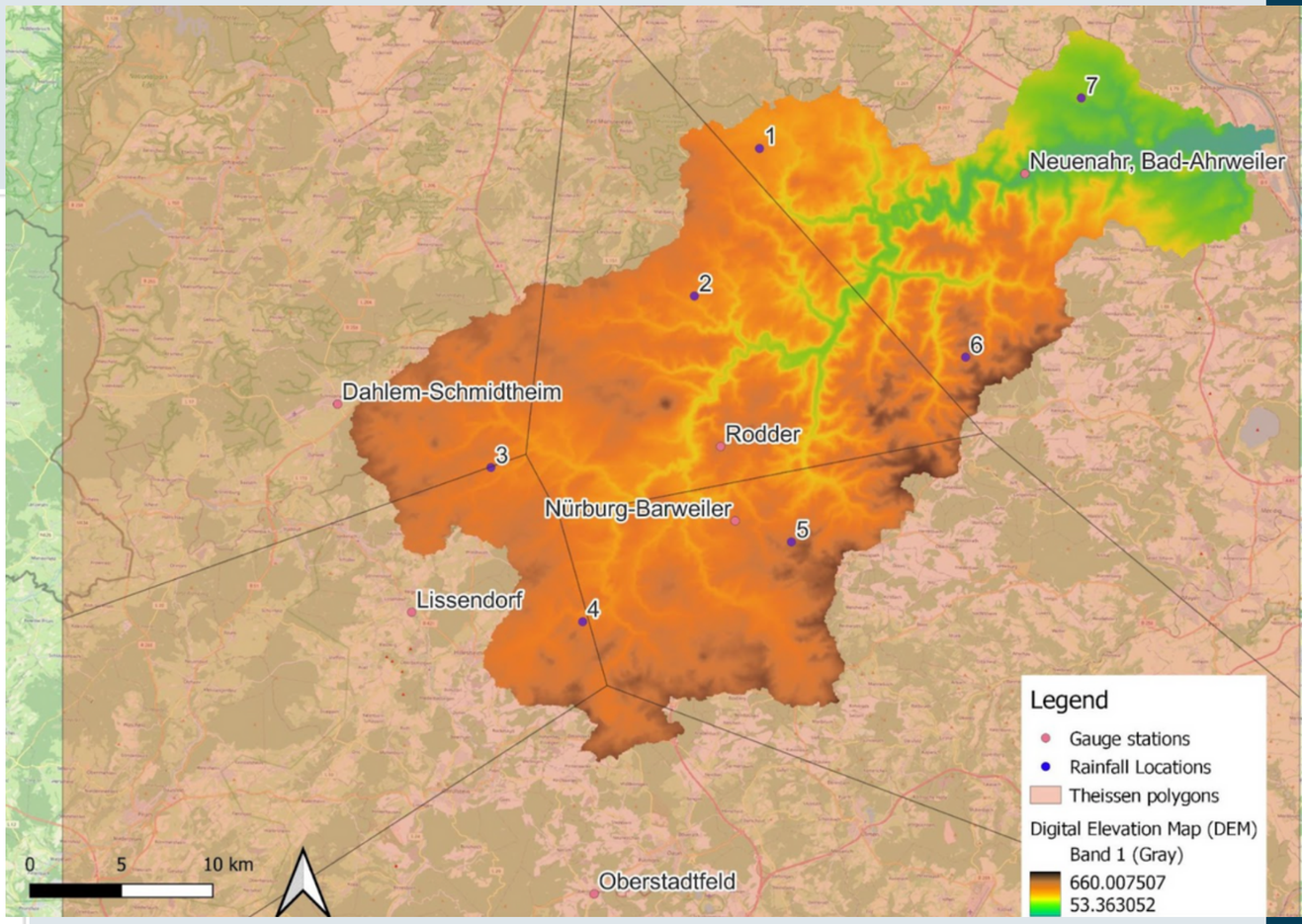


Fig. 8 : Distribution of rain gauges and associated Thiessen polygons

Fig. 9 : Precipitation versus time graphs

Hec-Hms modelling

Analysis of the impact of :

- **Different spatial rainfall intensities**
- **Different temporal rainfall intensities**

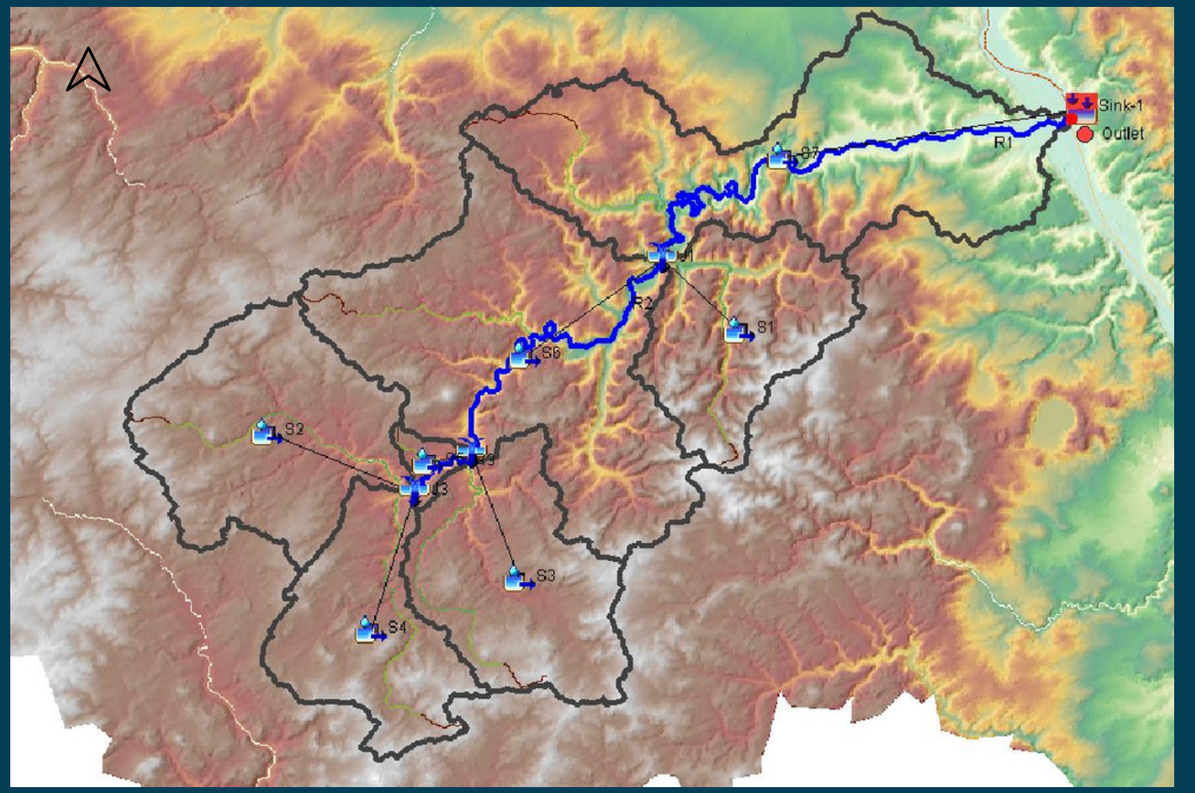


Fig. 10 : Representation of the HEC-HMS model of the Ahr watershed.

Results :Temporal Intensity

- Same rainfall amount for all Scenario

Input Scenario

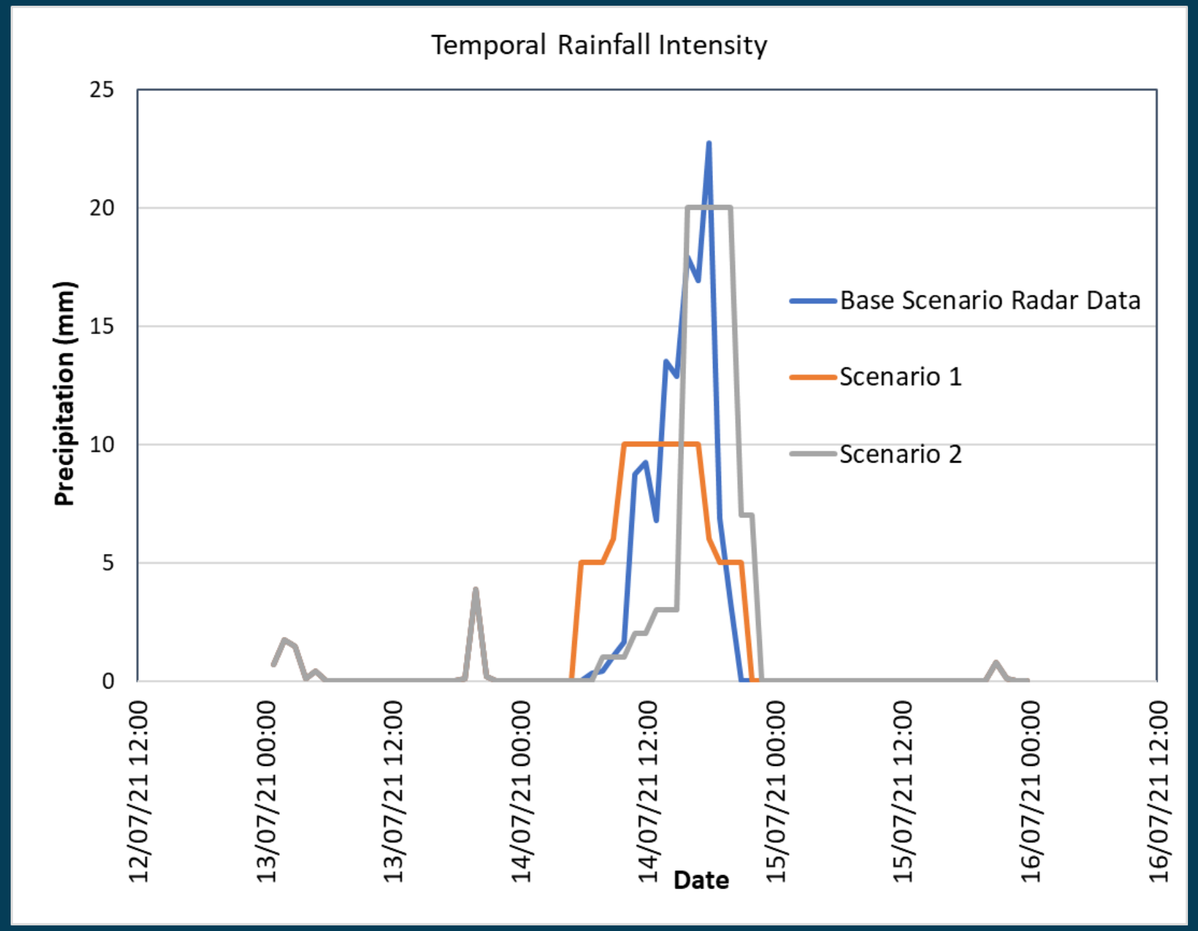


Figure 11 : Rainfall Scenarios for Hydrological Model

Ouput Hydrograph

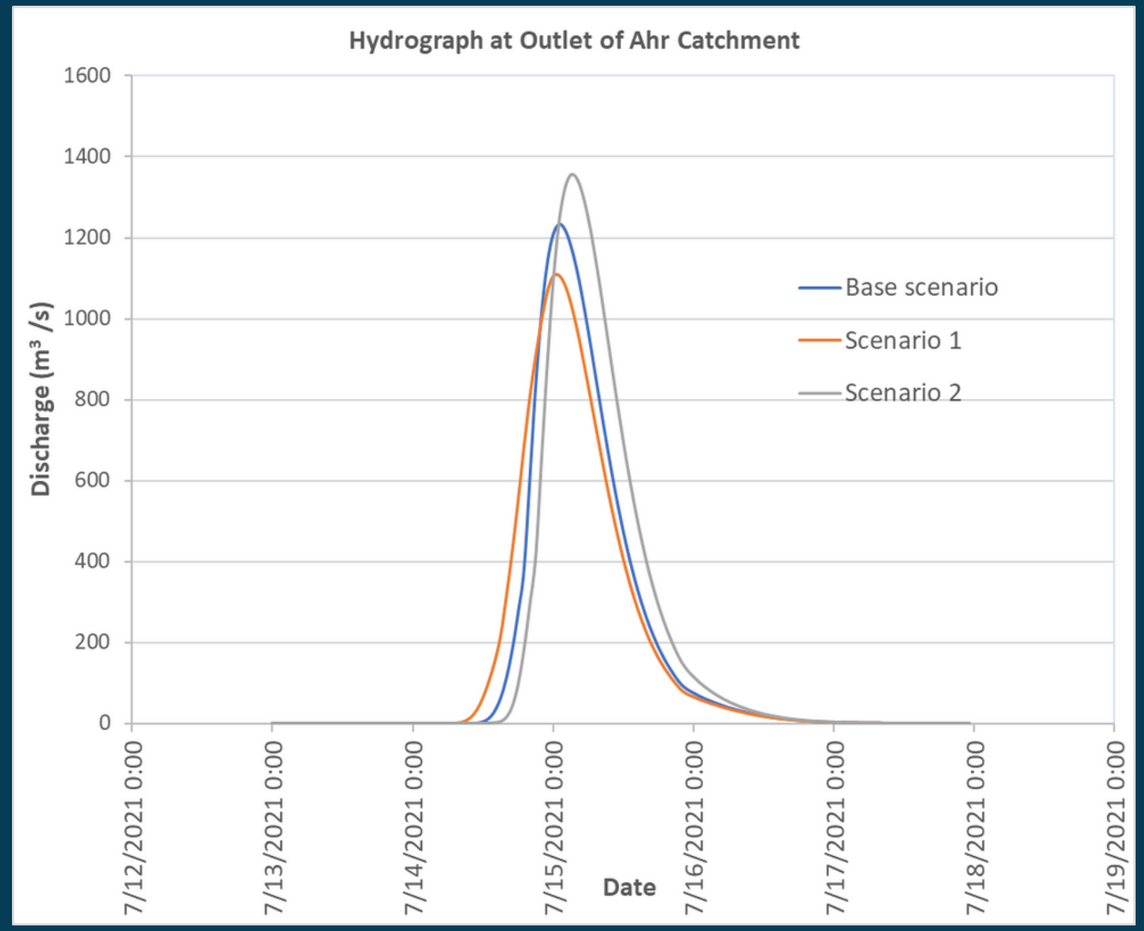


Figure 12 : Output Hydrograph at Ahr Outlet

Results: Spatial Intensity

- Same Runoff Volume in cathmnent for all Cases

Input Scenario

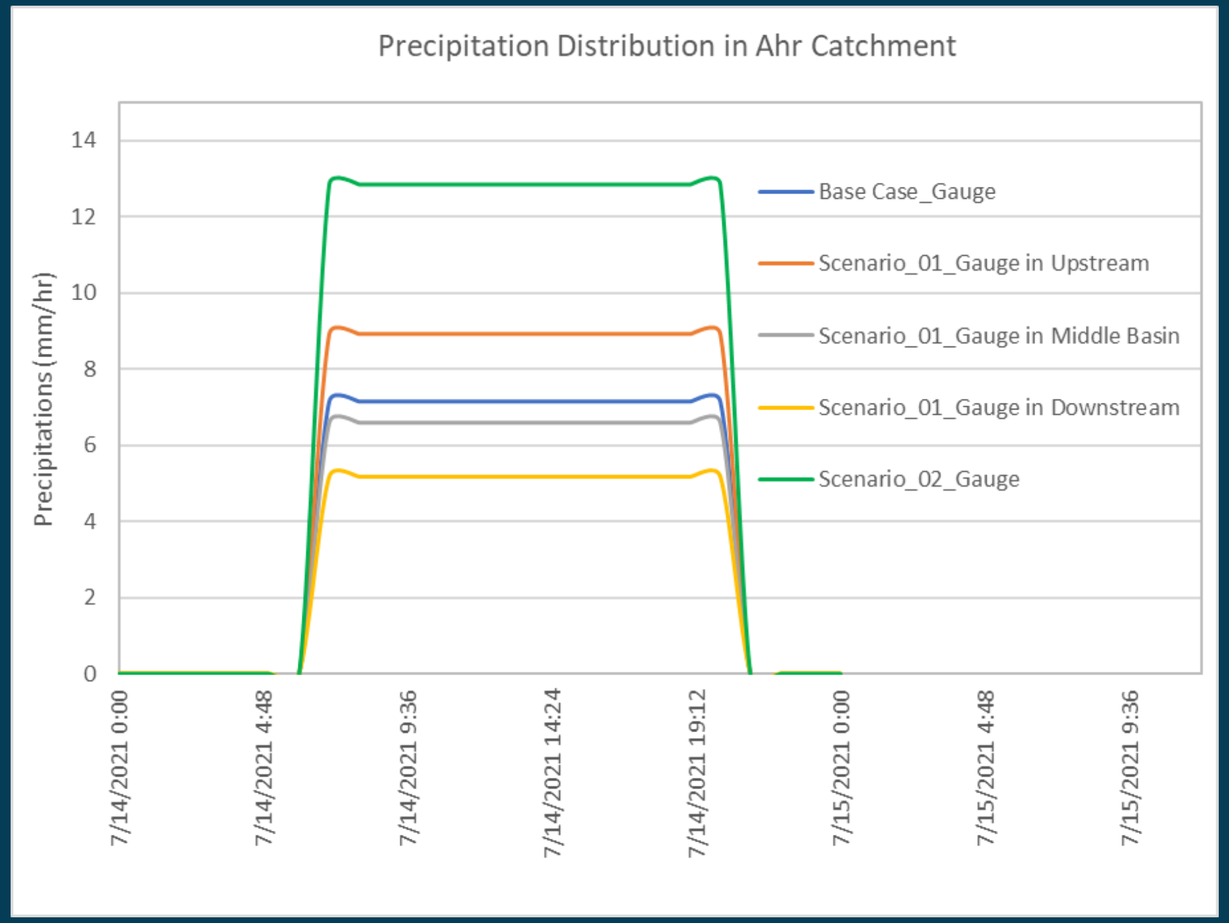


Figure 13 : Rainfall Scenarios for Spatial distribution input to model

Output Hydrograph

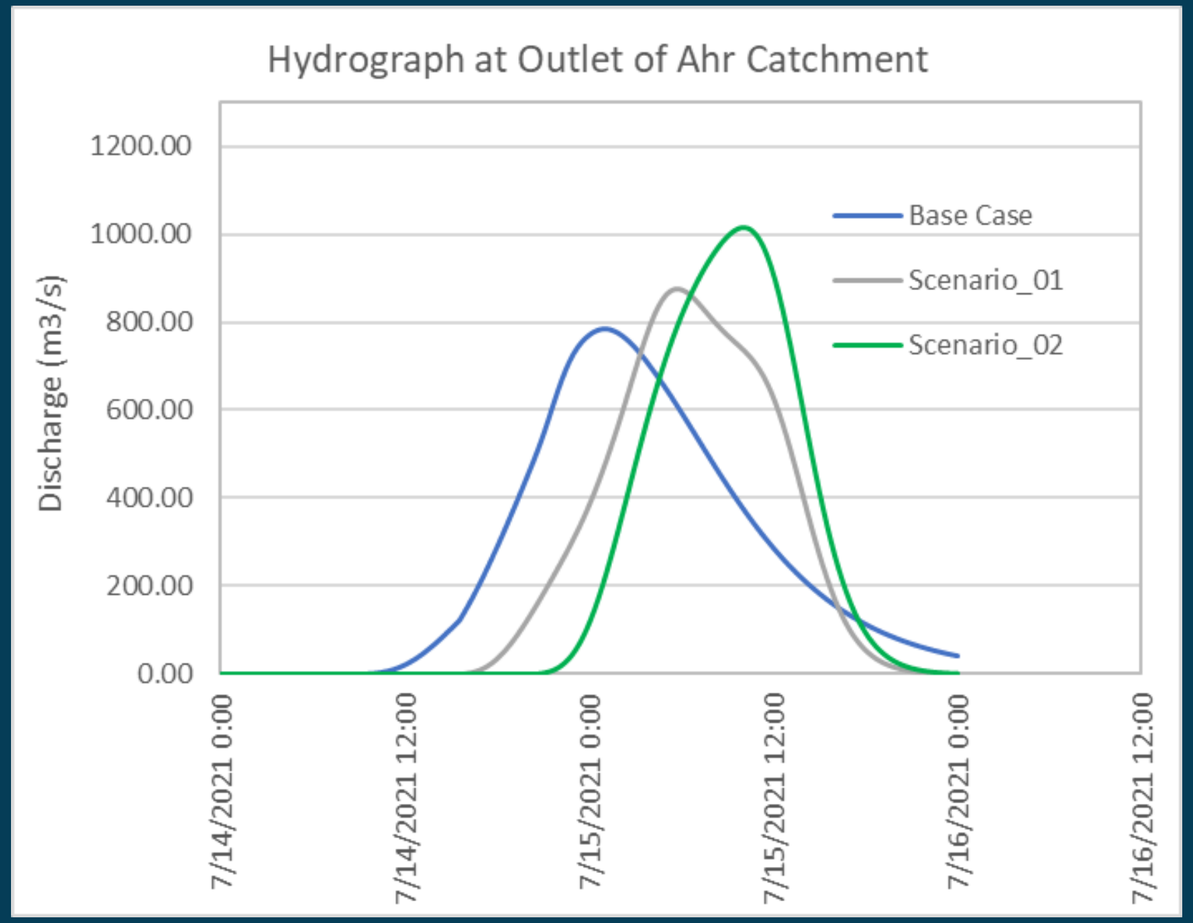


Figure 14 : Output Hydrograph at Ahr Outlet

Conclusion

- Gauge measurement Data underestimate or overestimates the rainfall in the area far from the Gauge location (Depending on Spatial Interpolation)
- Spatial Distribution influences the Hydrological Models
- Higher rainfall in upstream mountainous region result higher peak
- Rainfall Intensity seems sensitive to peak flow (Flash Flood)
- Shorter and Higher precipitation increase flash floods