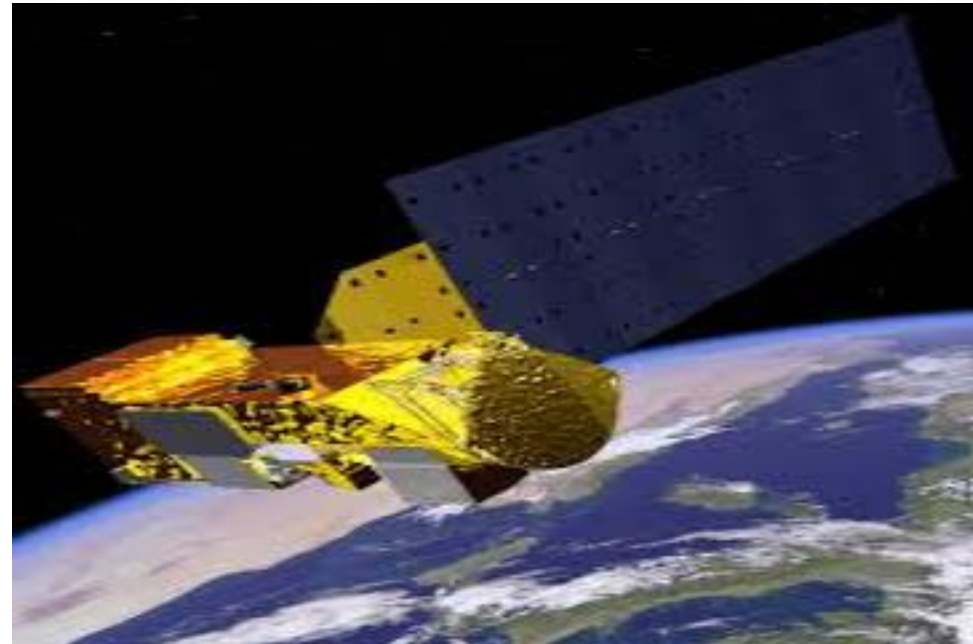


# **USE OF SATELLITE SOIL MOISTURE TO IMPROVE FLASH FLOOD SIMULATIONS AT UPSTREAM SHIGUAN RIVER, CHINA**

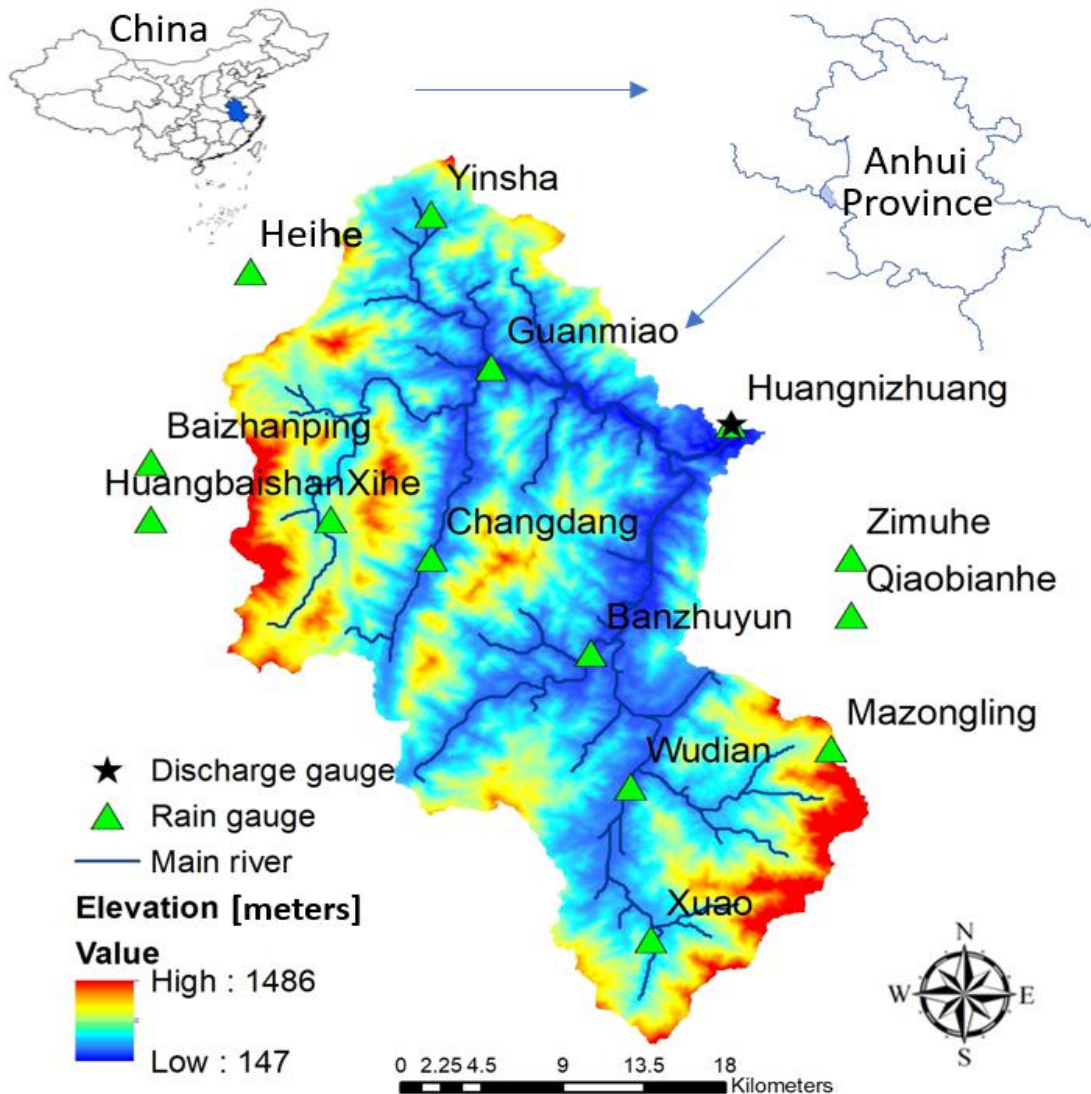
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2 International Institute for Earth System Science, Nanjing University, Nanjing, Jiangsu, China



# Study area



# Data and model

- Hourly discharge observations were collected from the Annual Hydrological Report produced by the Bureau of Hydrology, Ministry of Water Resources, P. R. China, from 2010 to 2015;
- 15 flood events were selected for this study;
- A two-layer rainfall-runoff model, MISDc-2L, was employed;
- GLEAM soil moisture was used to determine initial conditions.

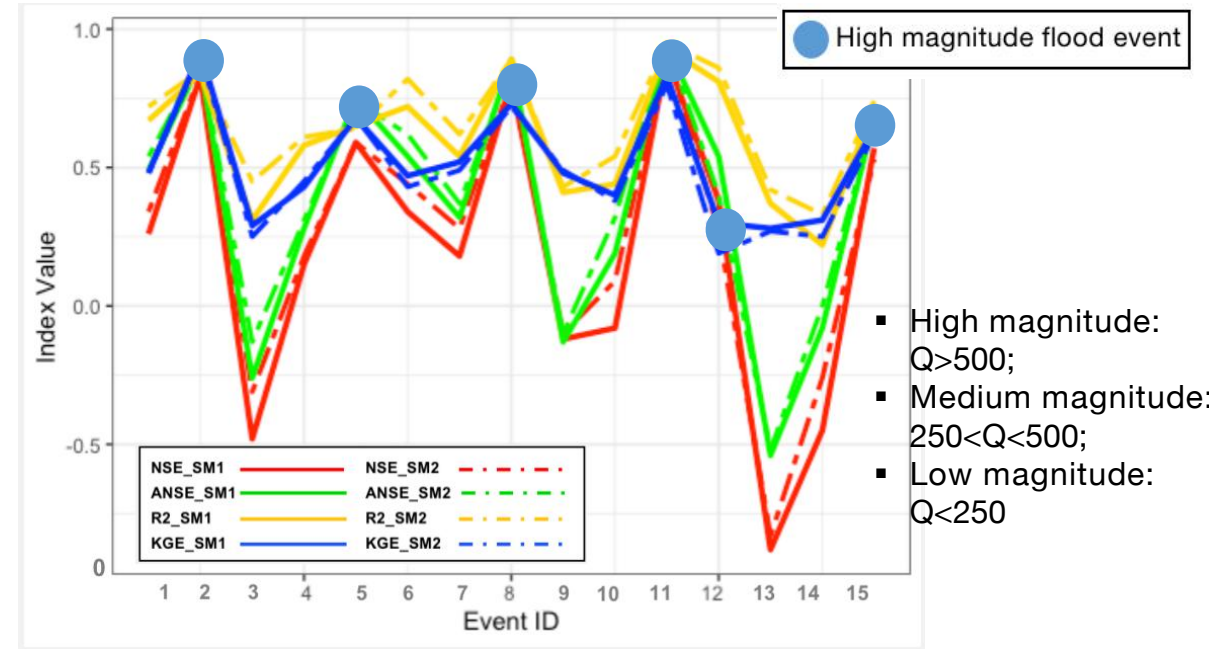
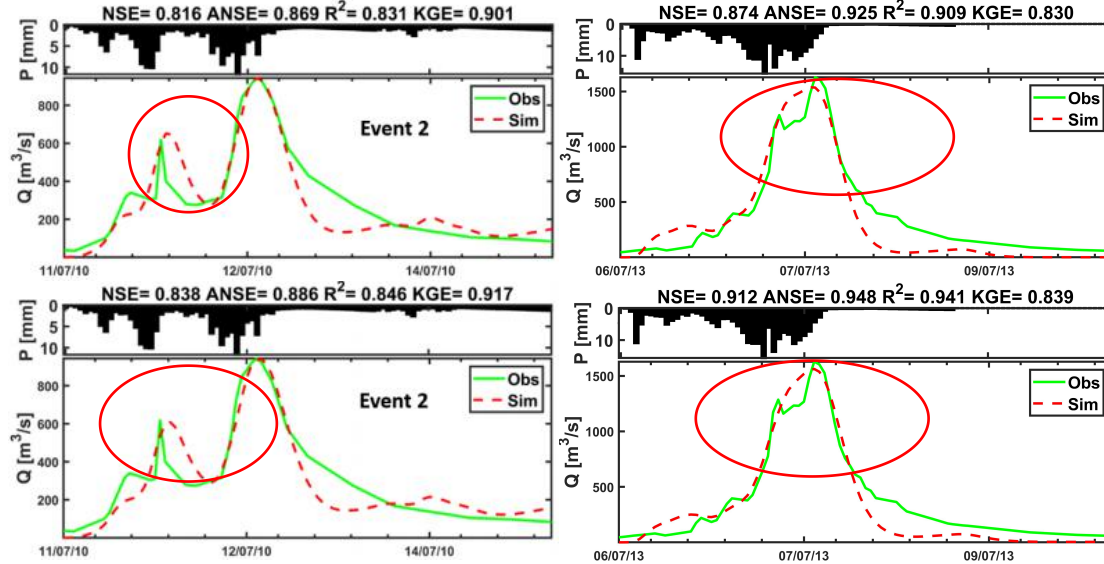
# ➤ Including surface and root-zone soil moisture (SM) into MISDc-2L



## 1. Single-flood events simulation

Average

Surf+Root



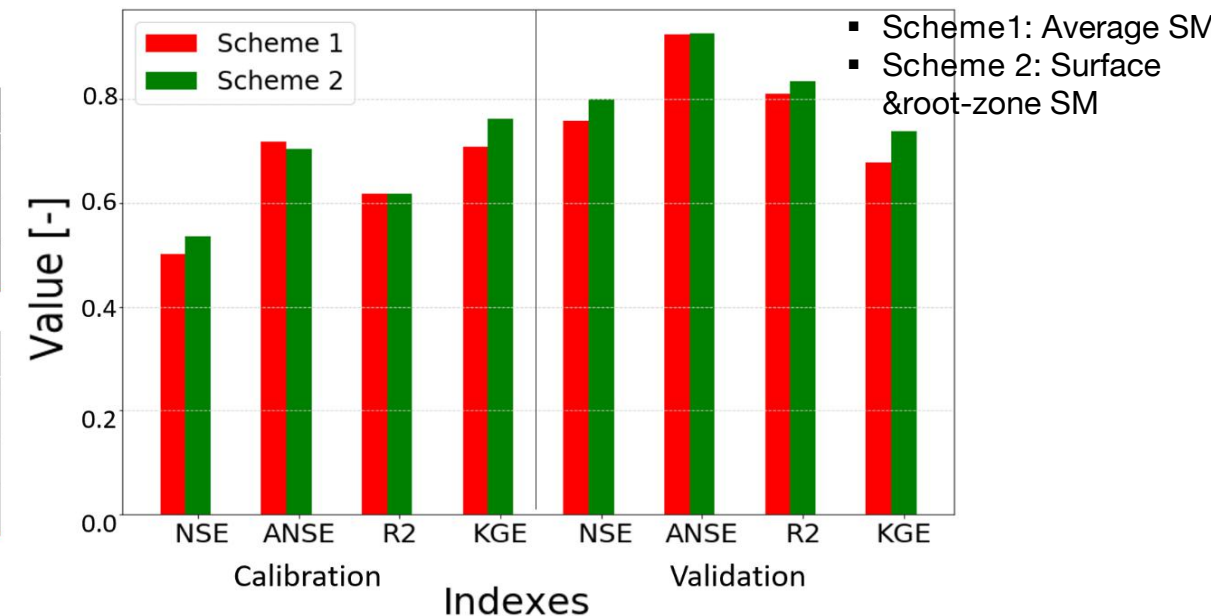
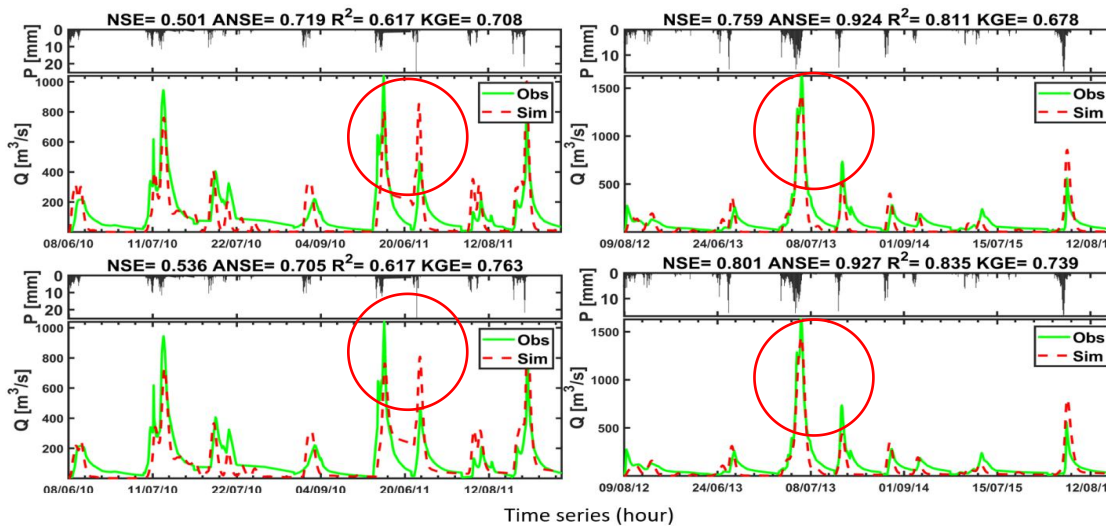
## 2. Split-sample simulation

Calibration

Validation

Average

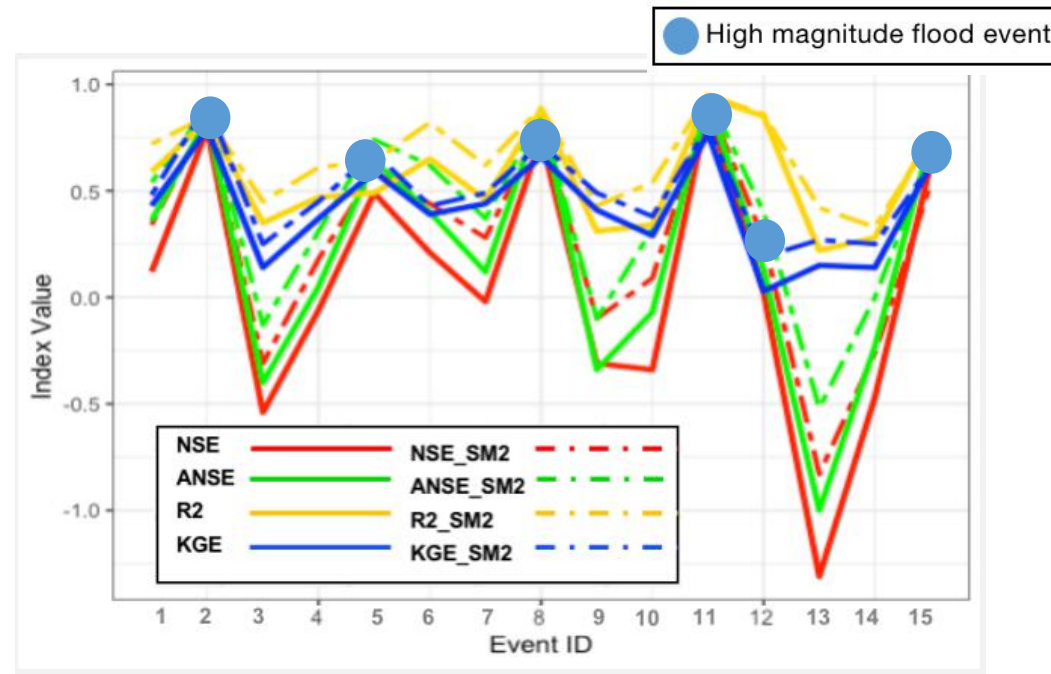
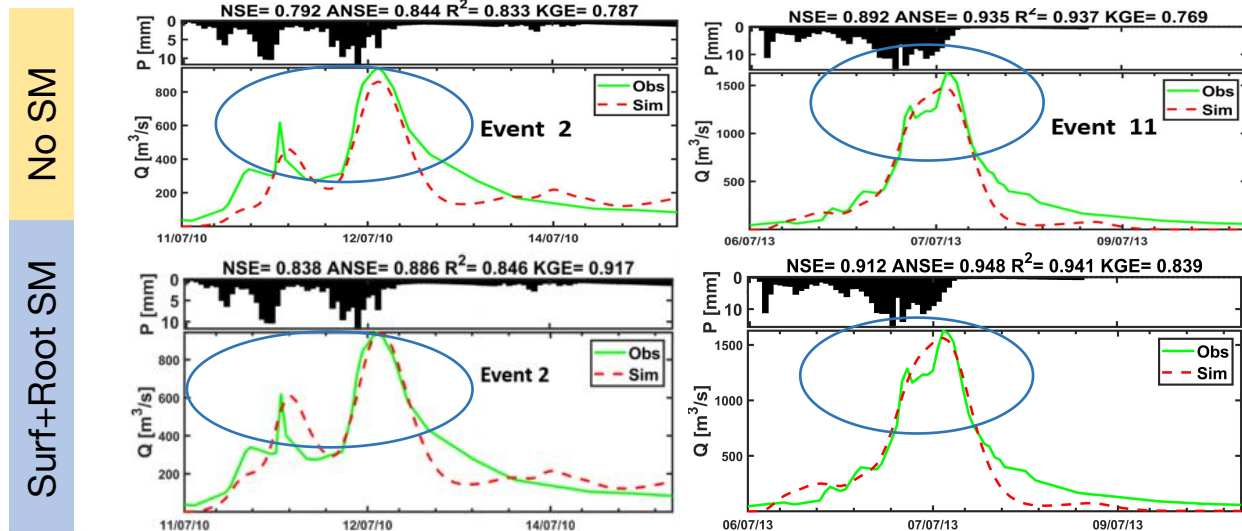
Surf+Root





# ➤ Benifit of using SM to determine initial condition

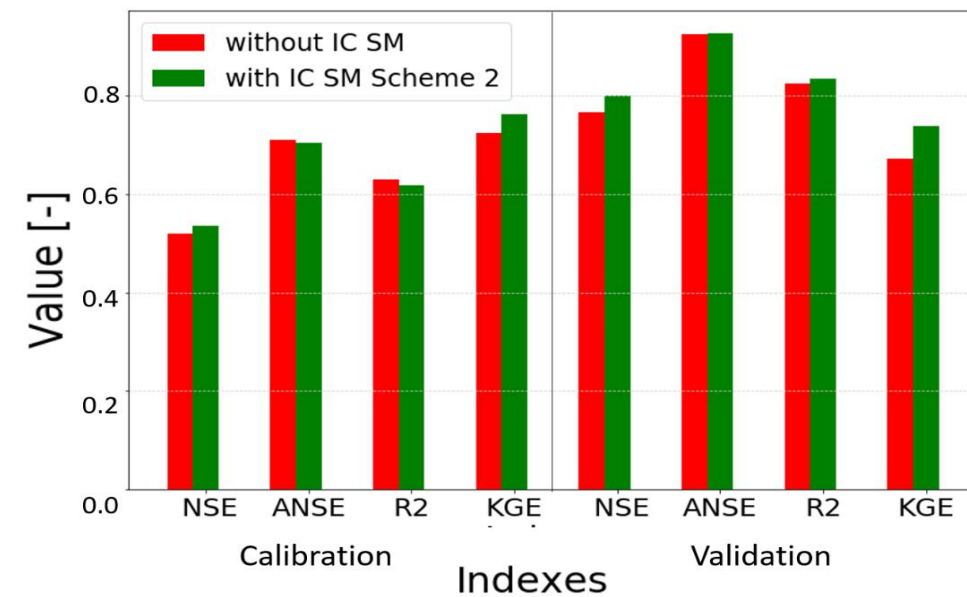
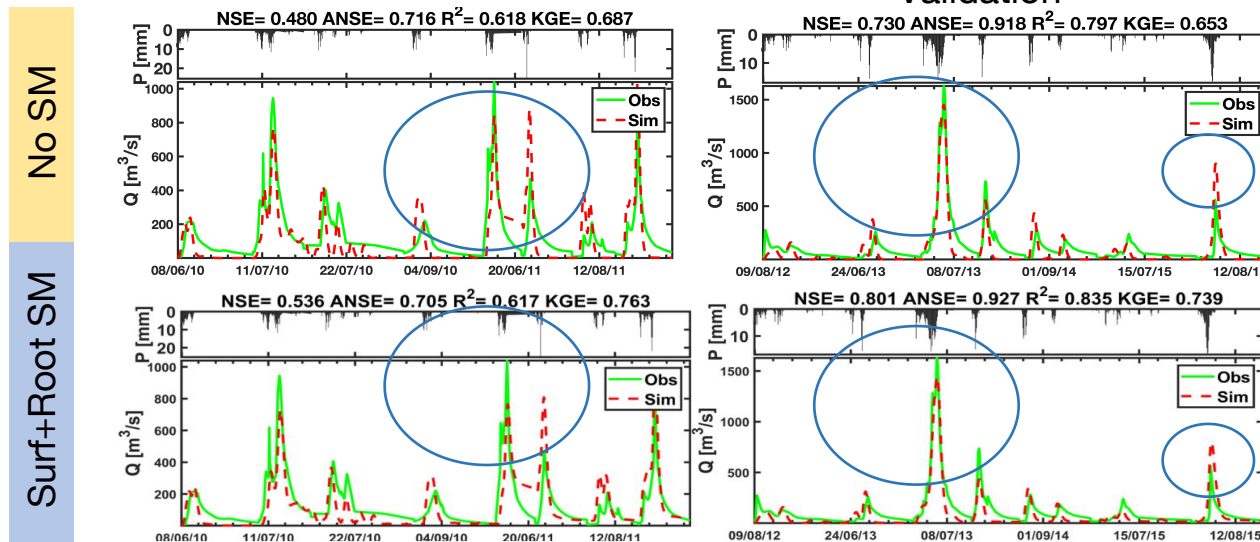
## 1. Single-flood events simulation



## 2. Split-sample simulation

Calibration

Validation



# ➤ Performance varies with flood magnitude

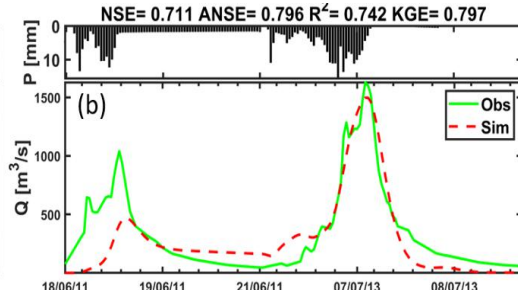
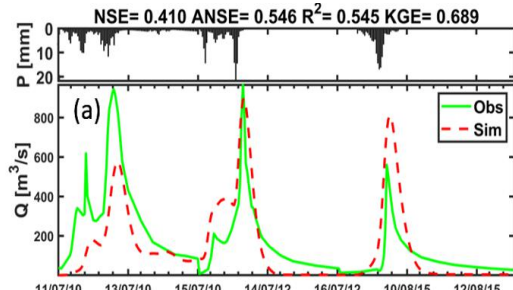


## Simulation without SM

### Calibration

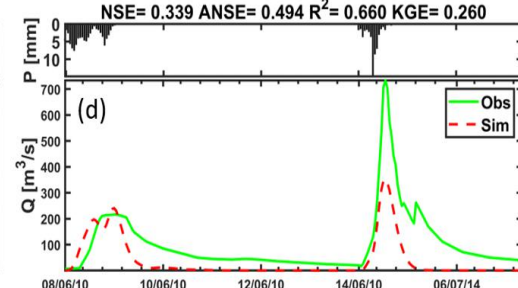
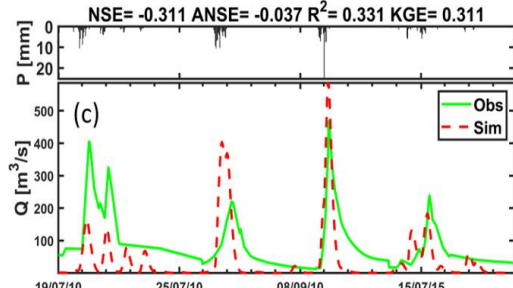
### Validation

High



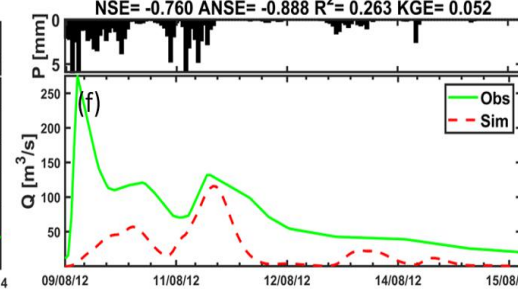
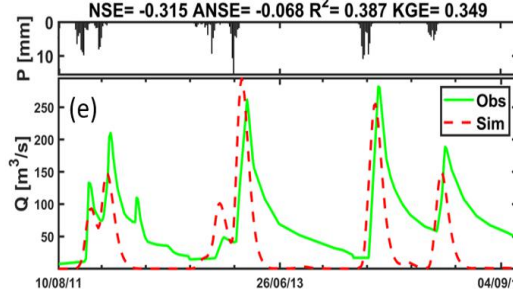
Sample ID 3

Medium



Sample ID 8

Low



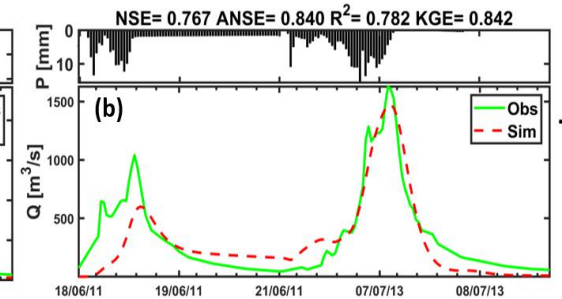
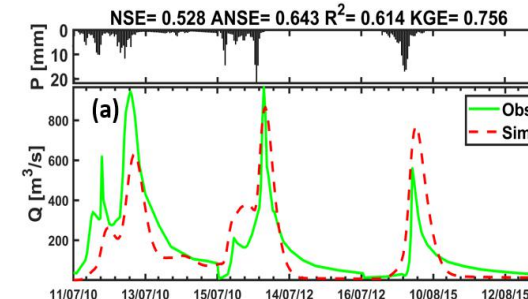
Sample ID 12

Time series (hour)

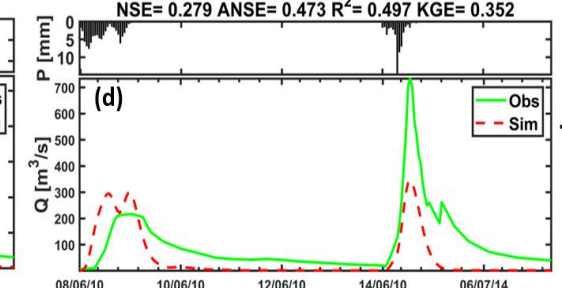
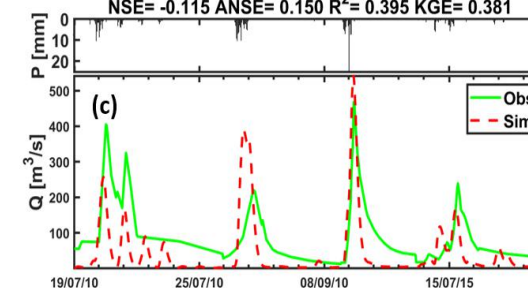
## Simulation with SM scheme 2

### Calibration

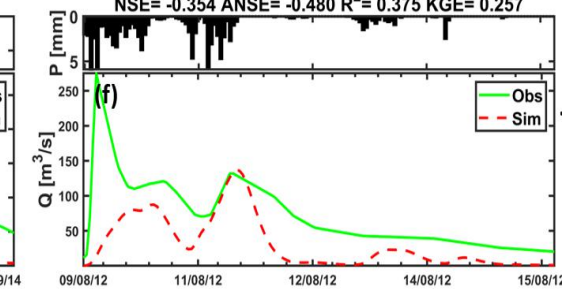
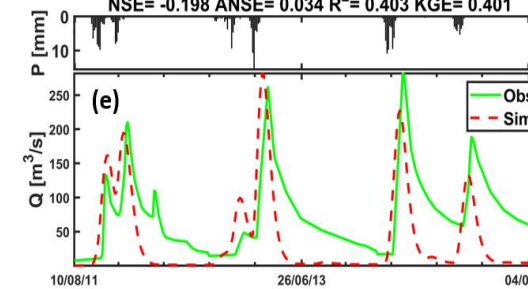
### Validation



Sample ID 3



Sample ID 8



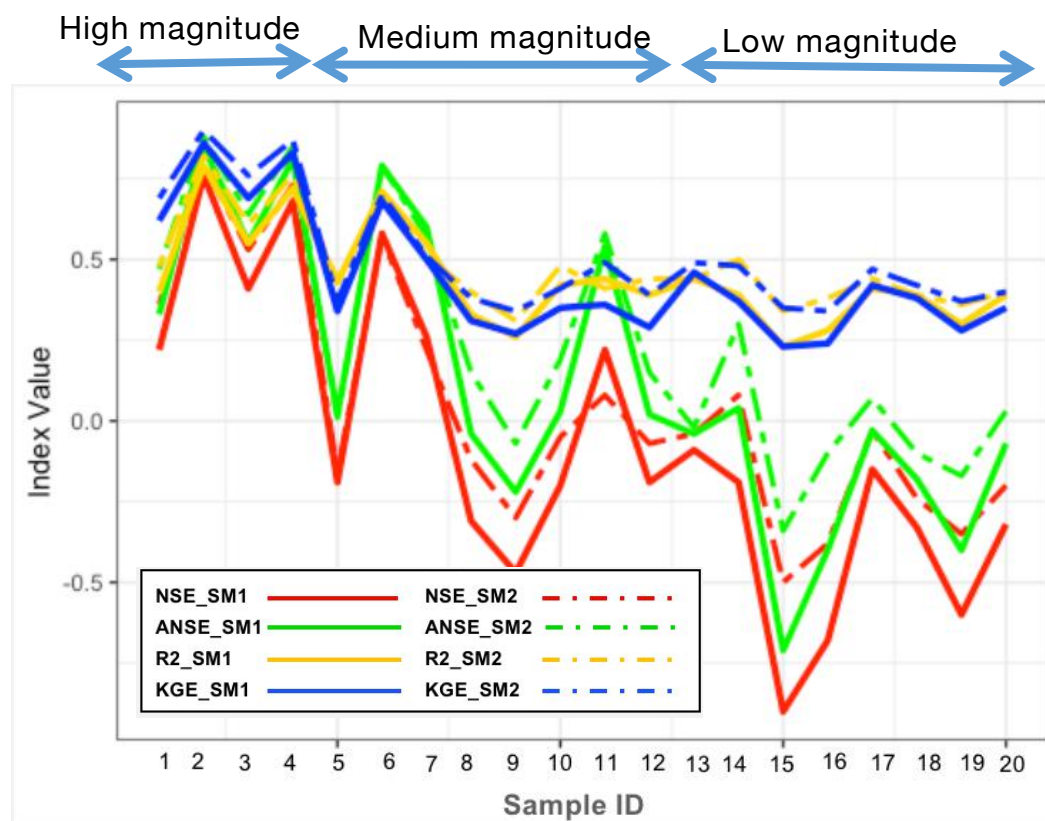
Sample ID 12

Time series (hour)

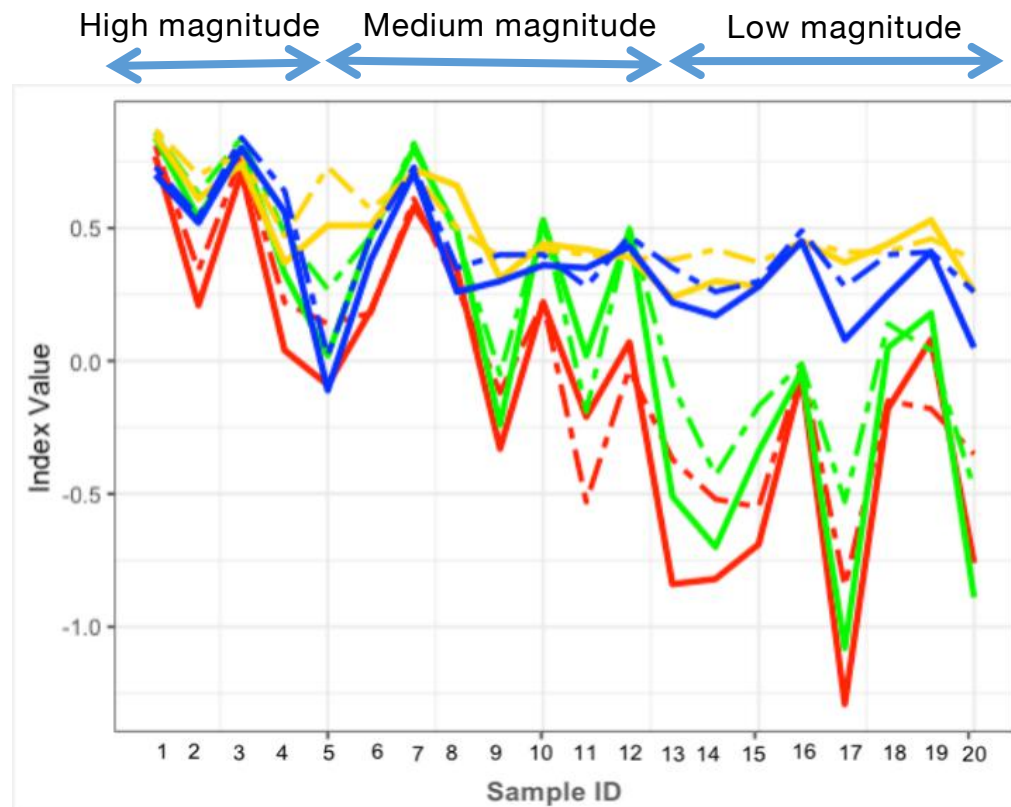
a~b High magnitude flood event; c~d Medium magnitude; e~f Low Magnitude

# ➤ Performance varies with flood magnitude

## Calibration



## Validation





# Conclusions

- ❖ The MISDc-2L model is able to simulate flood simulations at upstream Shiguan River, and its performance varies with flood magnitude.
- ❖ The GLEAM soil moisture data was found to be helpful to determine the initial conditions of the MISDc-2L model and especially improved the peak flood simulations.
- ❖ Accounting for the different effects of surface SM and root-zone SM, especially root-zone soil moisture, substantially improves flash flood simulations.