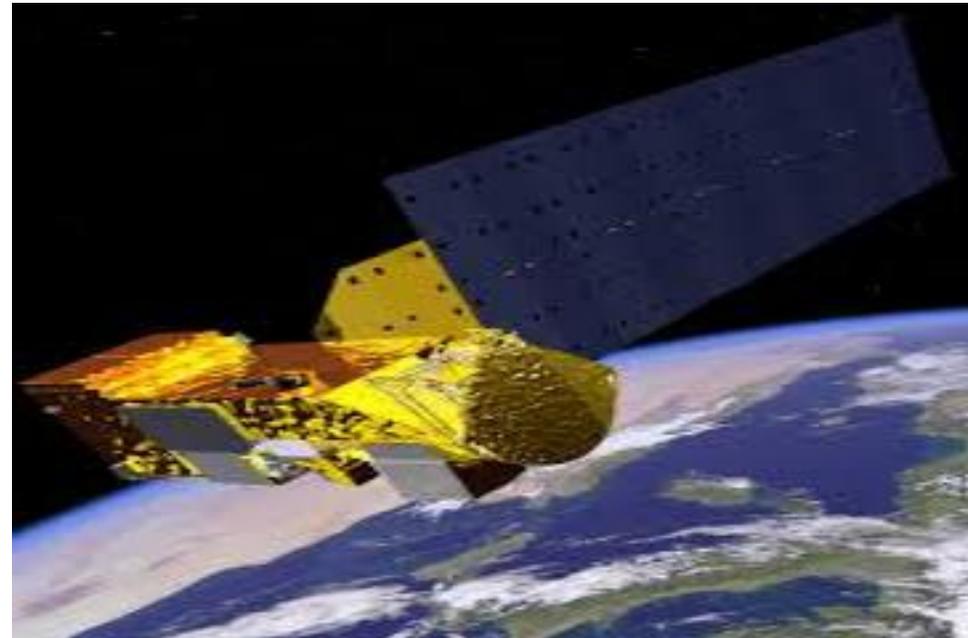


USE OF SATELLITE SOIL MOISTURE TO IMPROVE FLASH FLOOD SIMULATIONS AT UPSTREAM SHIGUAN RIVER, CHINA

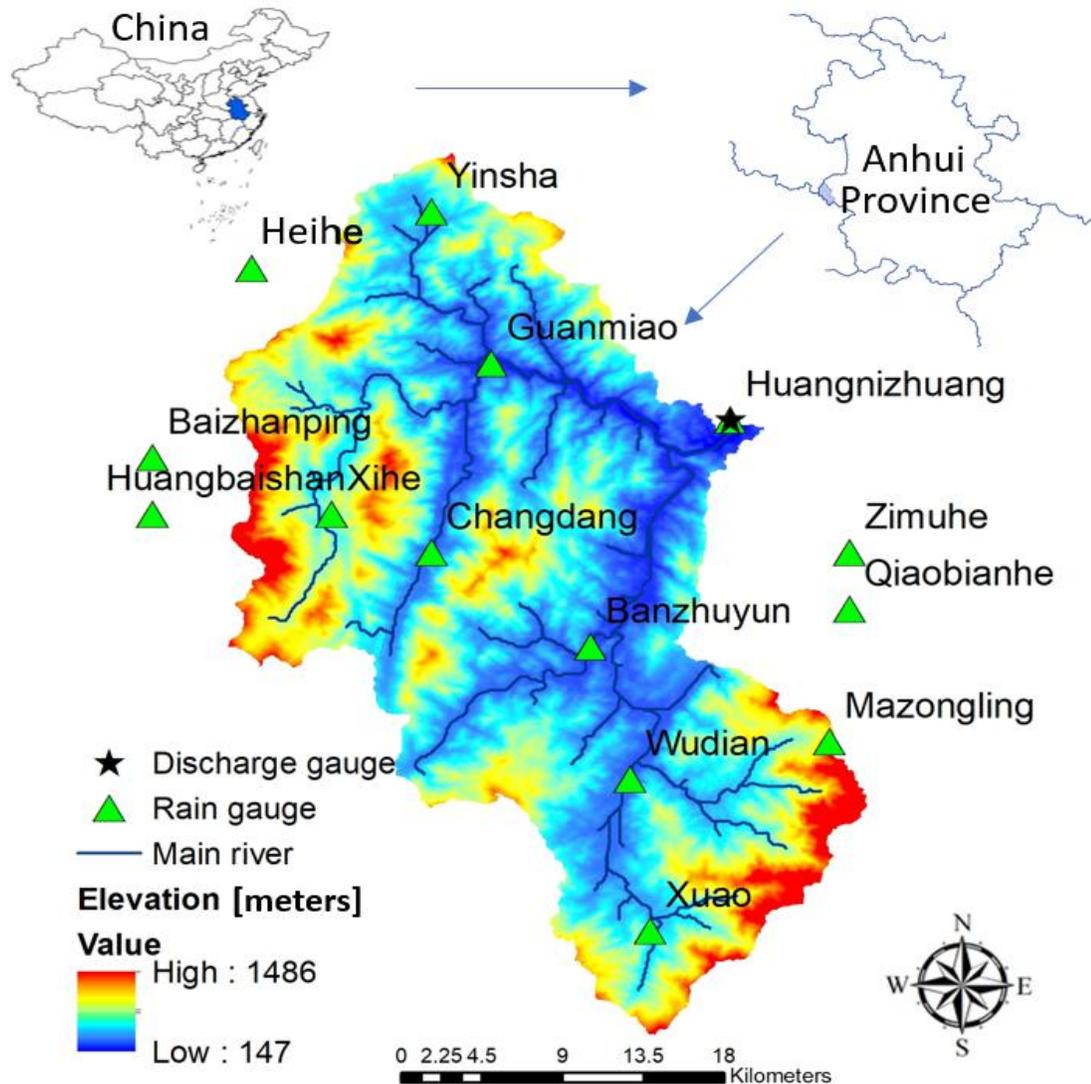
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2 International Institute for Earth System Science, Nanjing University, Nanjing, Jiangsu, China



Study area



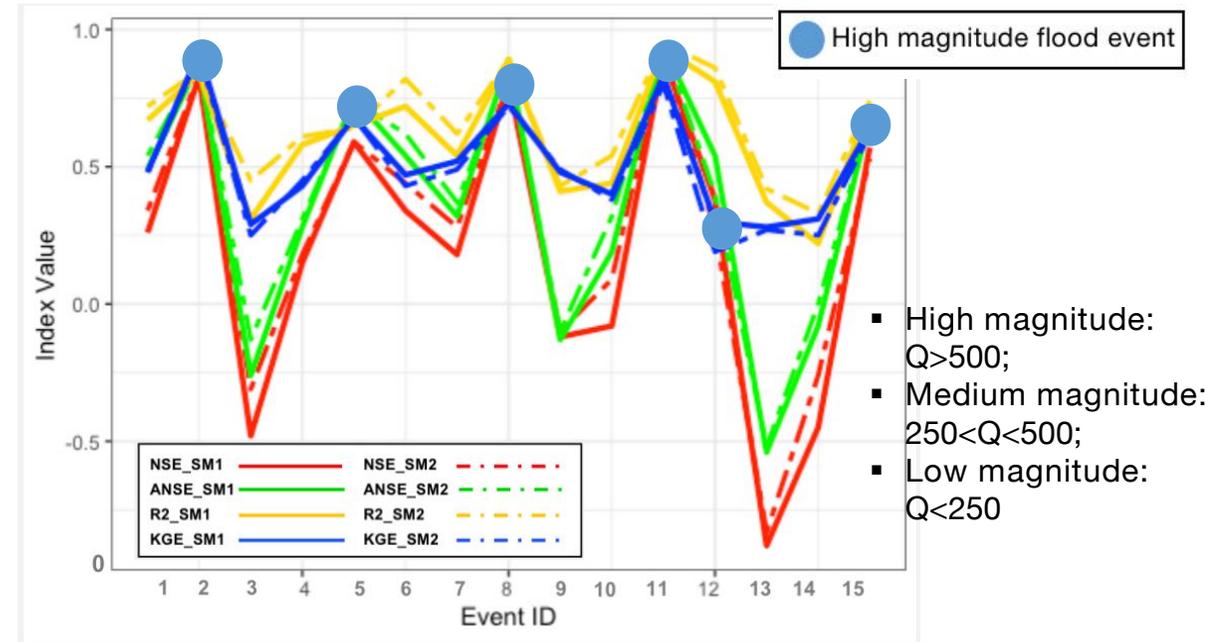
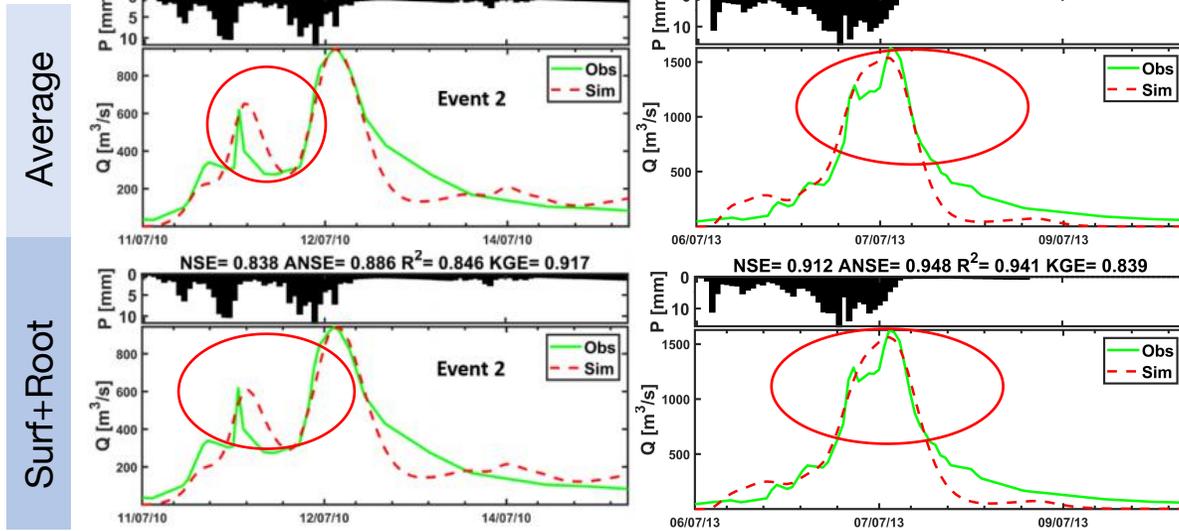
Data and model

- 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.

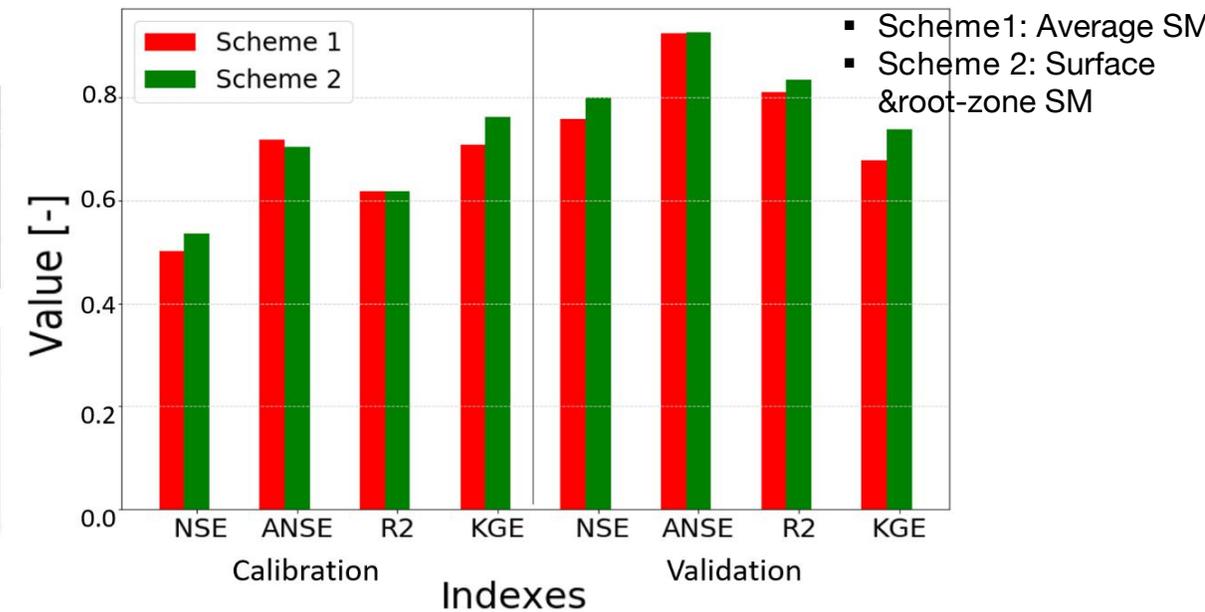
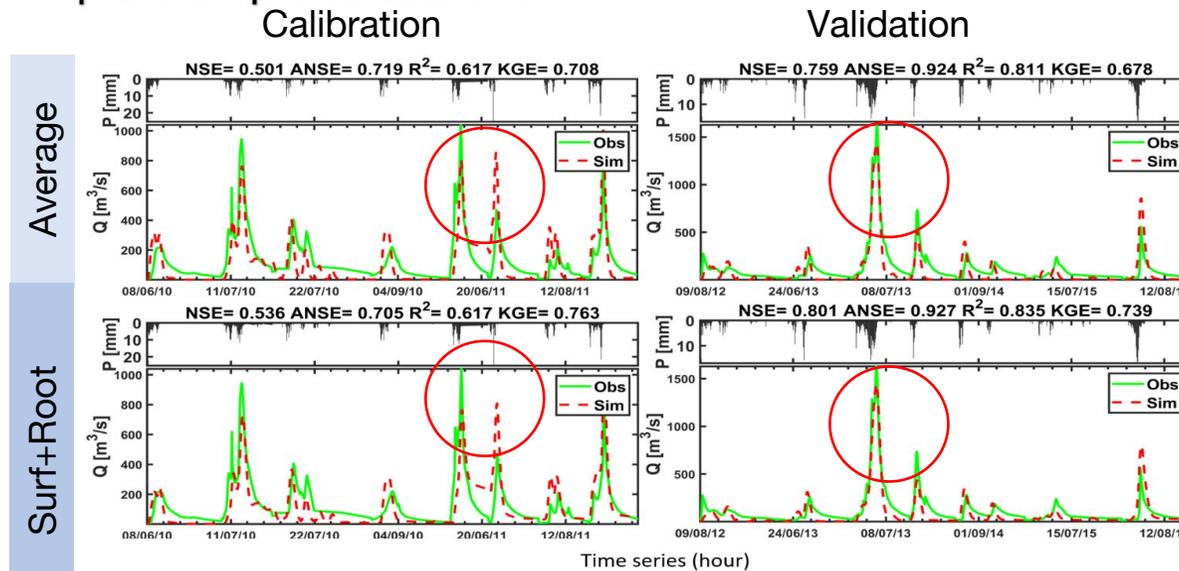
➤ Including surface and root-zone soil moisture (SM) into MISDc-2L



1. Single-flood events simulation



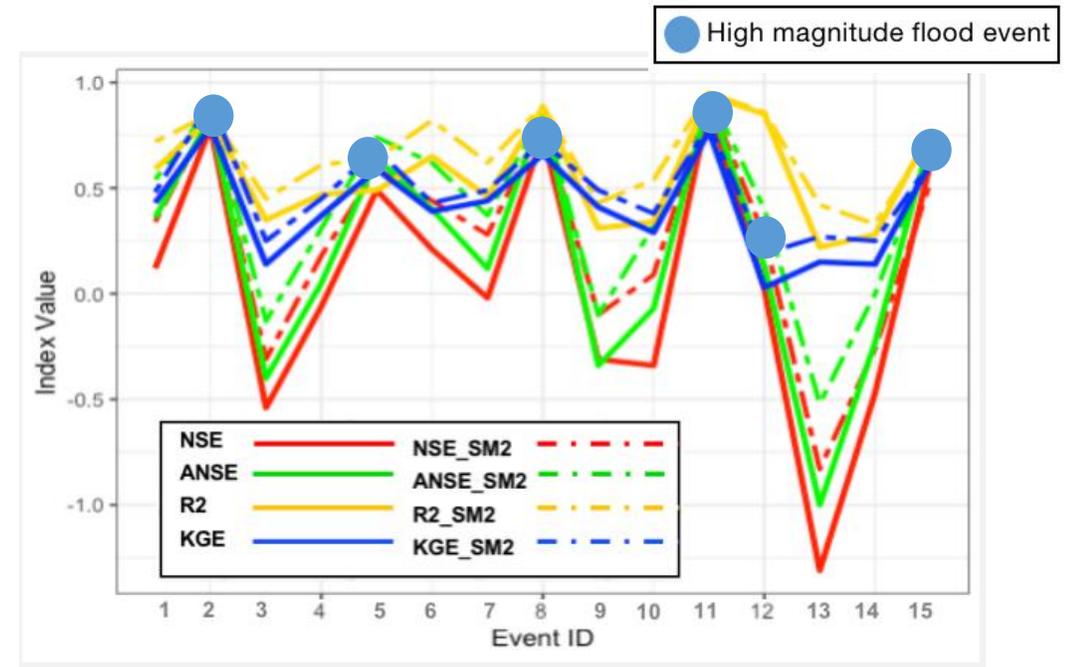
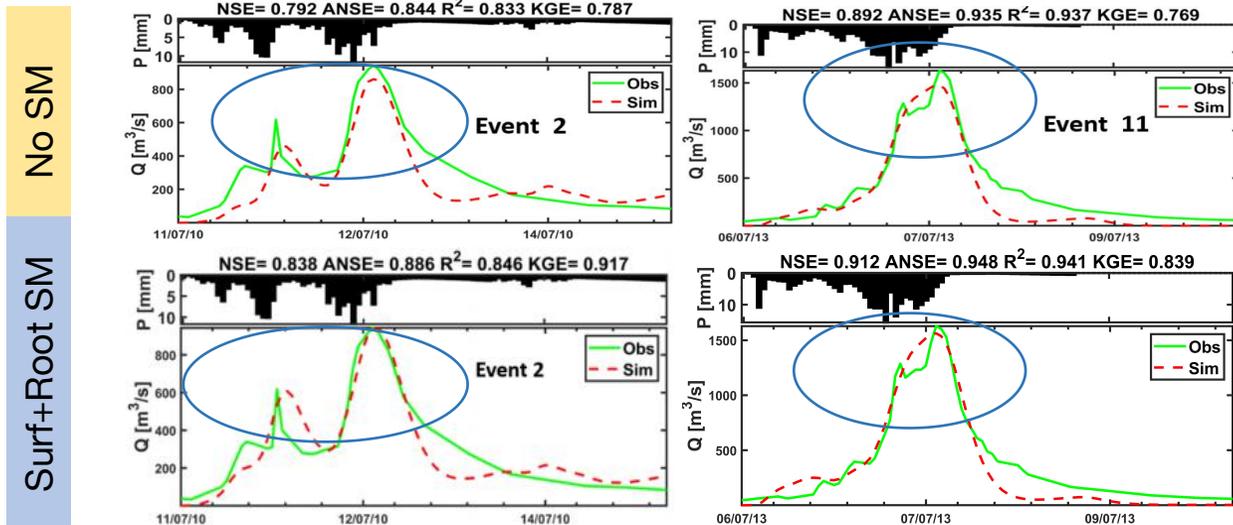
2. Split-sample simulation



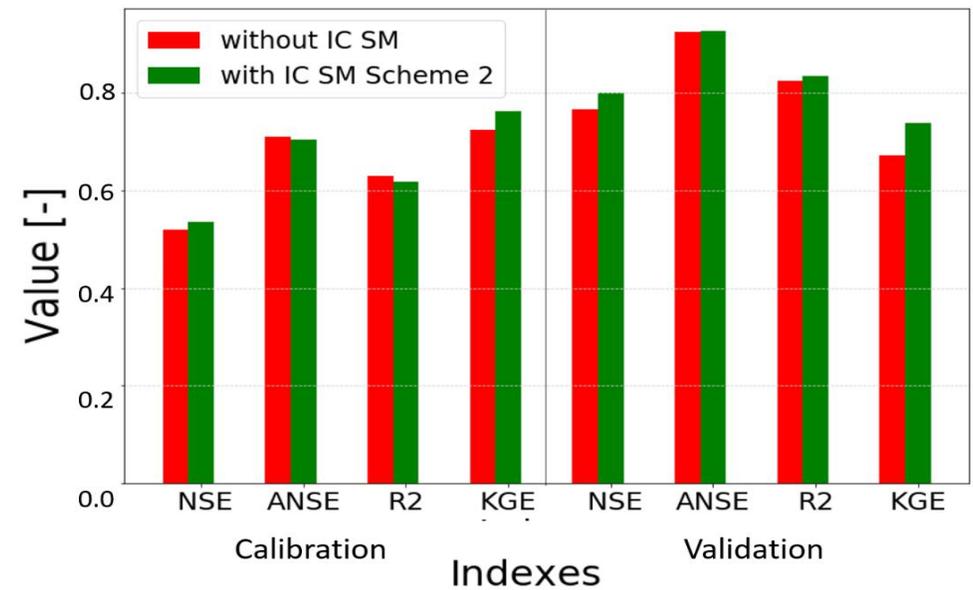
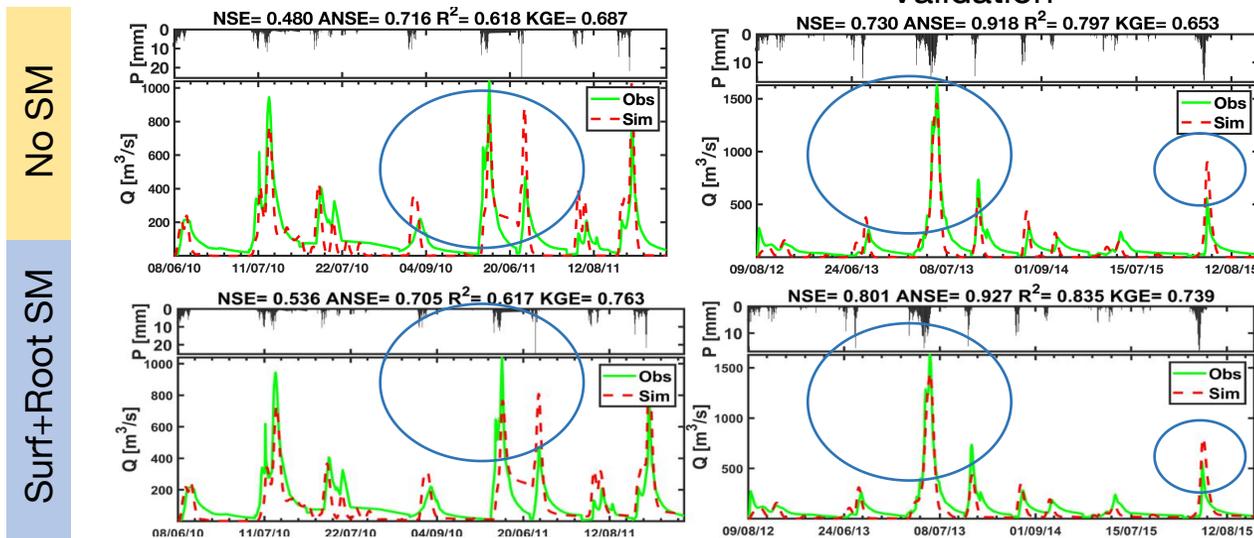
➤ Benefit of using SM to determine initial condition



1. Single-flood events simulation



2. Split-sample simulation



➤ Performance varies with flood magnitude



Simulation without SM

Simulation with SM scheme 2

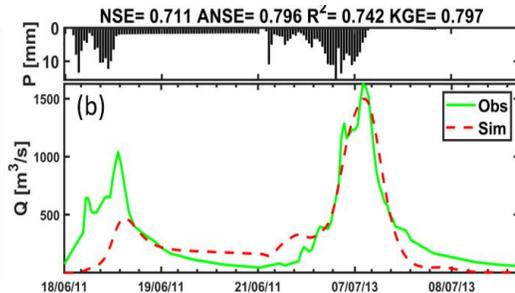
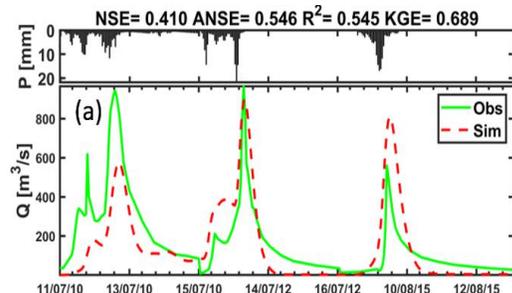
Calibration

Validation

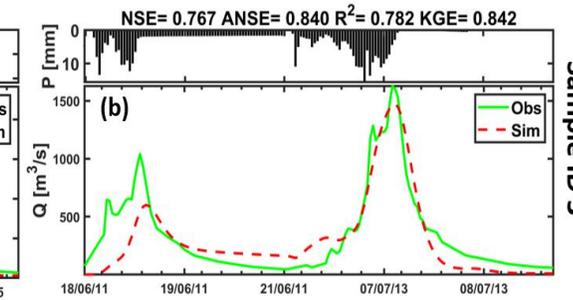
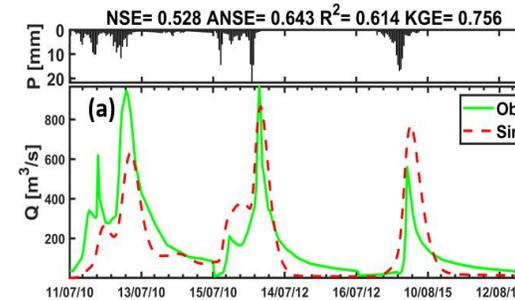
Calibration

Validation

High

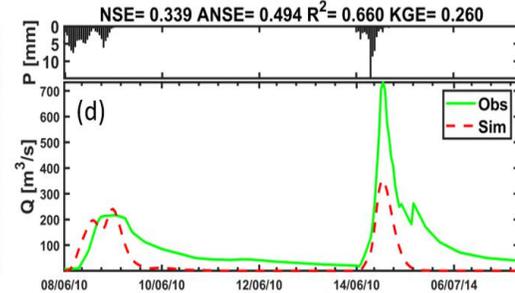
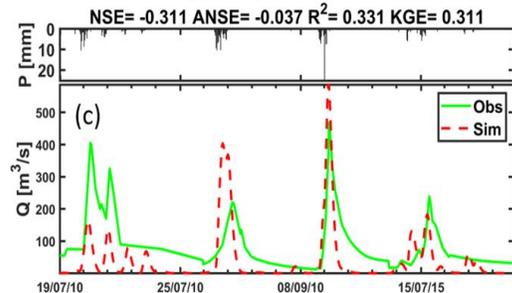


Sample ID 3

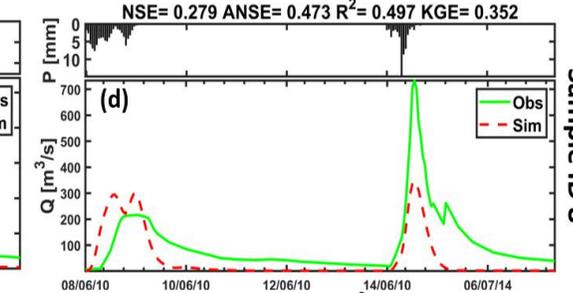
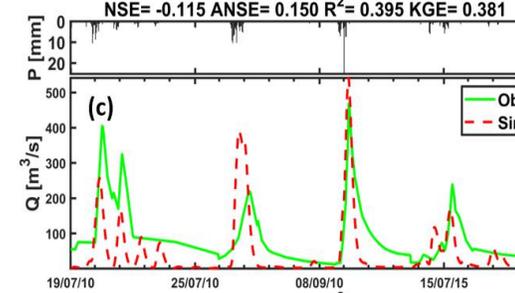


Sample ID 3

Medium

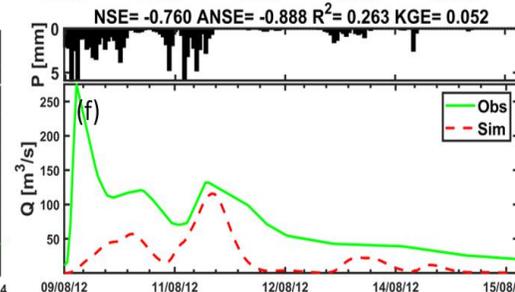
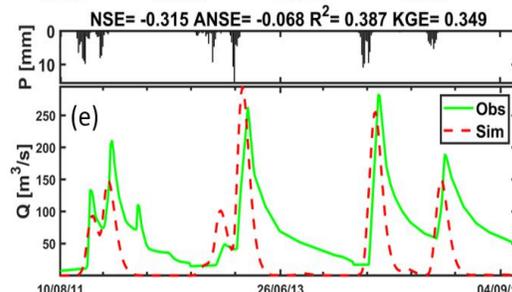


Sample ID 8

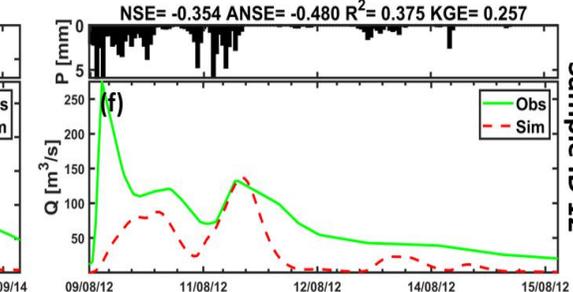
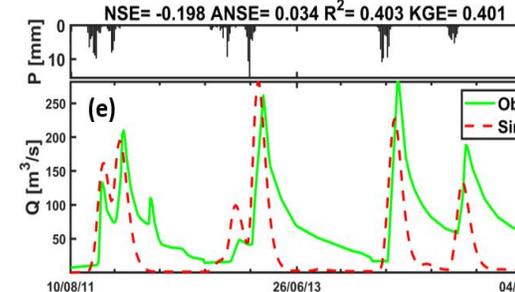


Sample ID 8

Low



Sample ID 12



Sample ID 12

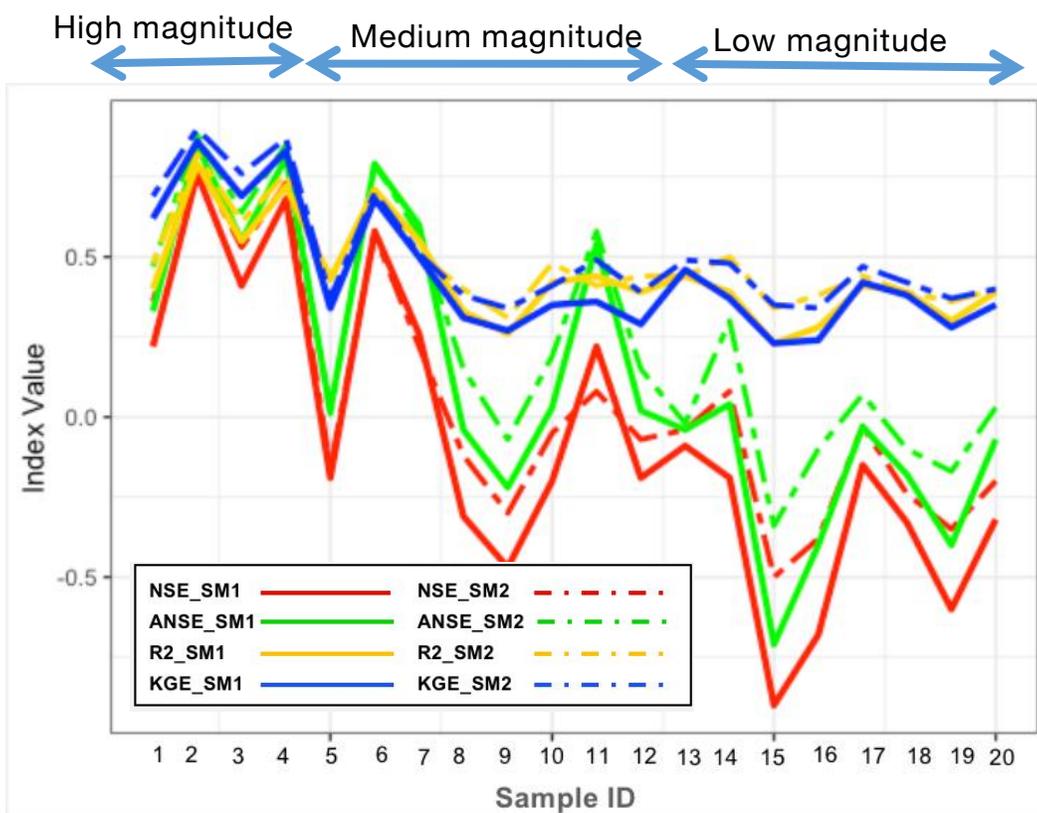
Time series (hour)

Time series (hour)

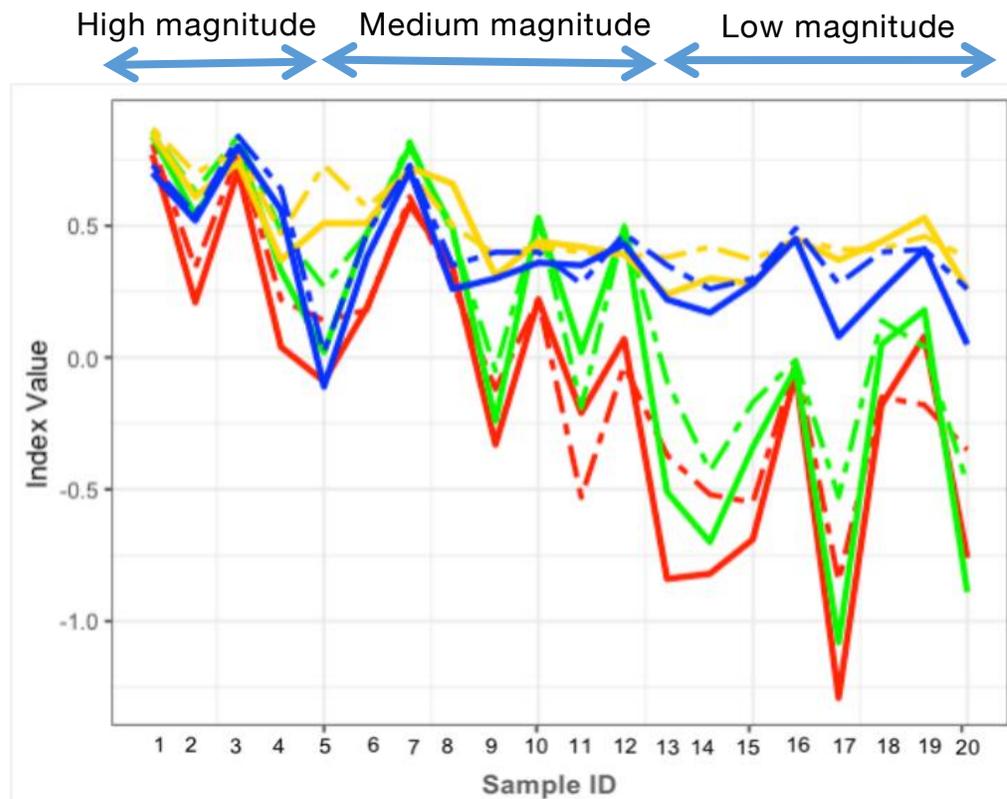
a~b High magnitude flood event; c~d Medium magnitude; e~f Low Magnitude

➤ 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.