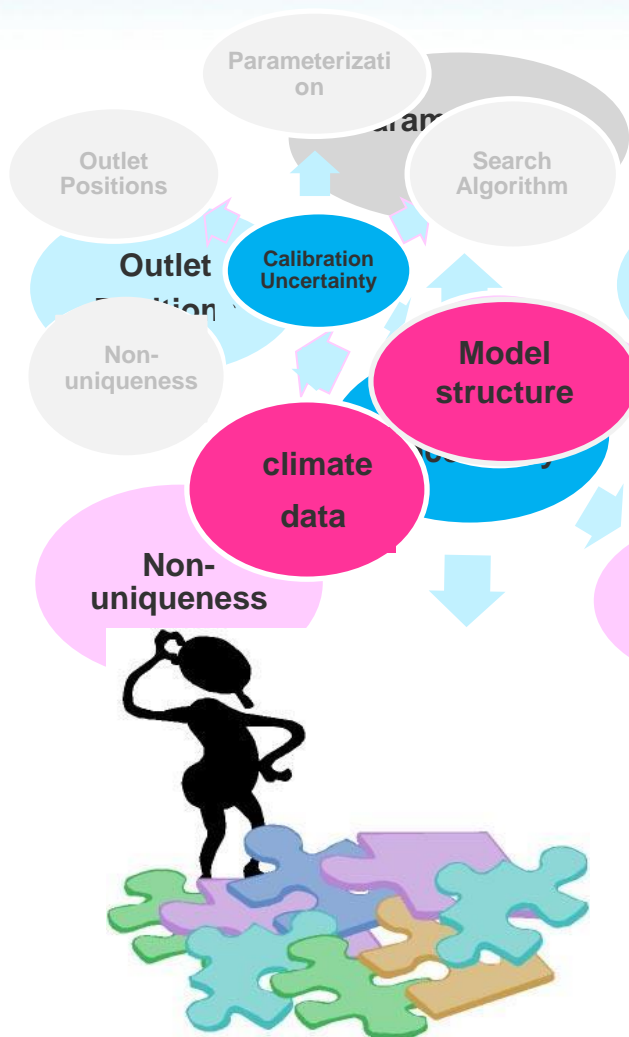


The Impact of Climate Data Uncertainty on Calibration of the SWAT Model

SWAT conference, Toulouse, France, July 16-20- 2013

B. Kamali, Jamshid Mousavi, Karim Abbaspour, Hong Yang

Objectives



Objective 1

- Successful application of hydrologic models depends on **Calibration Process** results of simulator?

Search Algorithm
Different sources of climate data are available for a watershed

1. Which data sources are more reliable?
2. Can adding more quantitative climate information be helpful?

Objective 2

- What is the impact of climate data on model output?

Study area



Karkheh River Basin (KRB):

Located in South Western of Iran

Area: 51000 km^2

Climate: Semi -Arid

It is the third largest catchment in the country

It is considered as the food basket of Iran

Four sources of climate data were available for the catchment

Objective

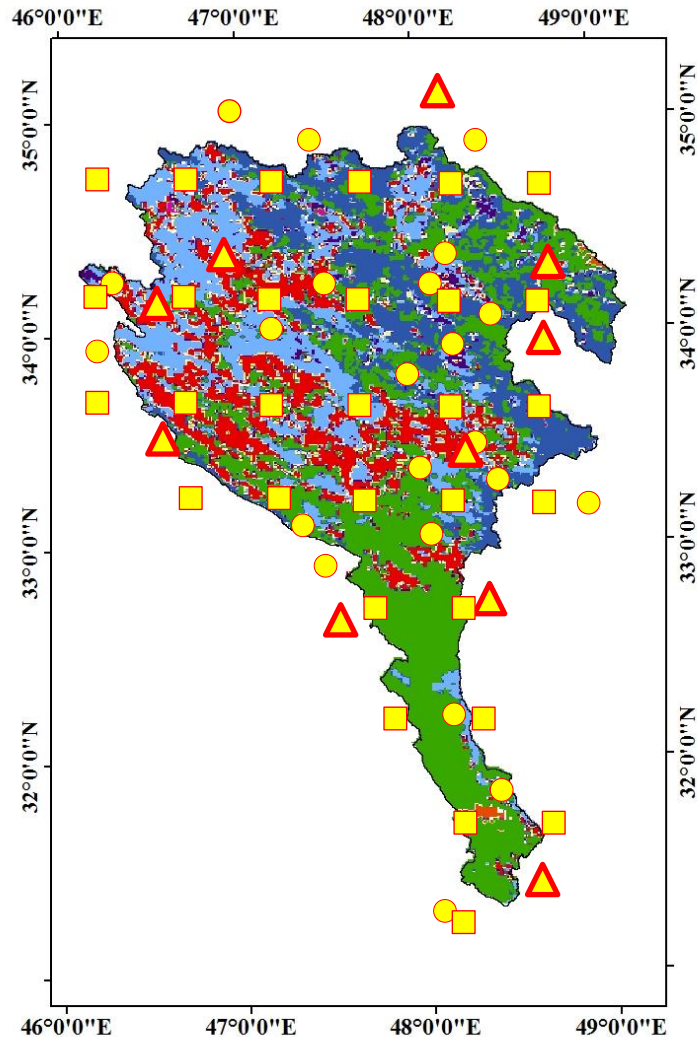
Material

Results

conclusion

2

Climate data



Climate Source 2 (C2) with 930 grid points

Climate Source 1 (C1) with 930 grid points
Iranian Ministry of Foreign Affairs (CRU)
Weather Service of Iranian Meteorological Organization

C4: GFDL-ESM2M (GCM)

Dataset	Climate
Dataset 1	C1
Dataset 2	C2
Dataset 3	C3
Dataset 4	C4
Dataset 5	C1& C2
Dataset 6	Best C1&C2

Objective

Material

Results

conclusion

3

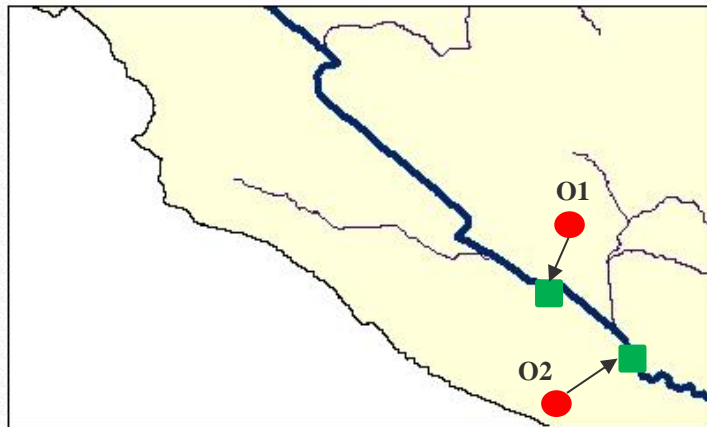
SWAT Structuring

- The results of first Set-up were not convincing
Simulated discharge values were far from observed discharge values
- **Three important issues** governed the structure of simulator

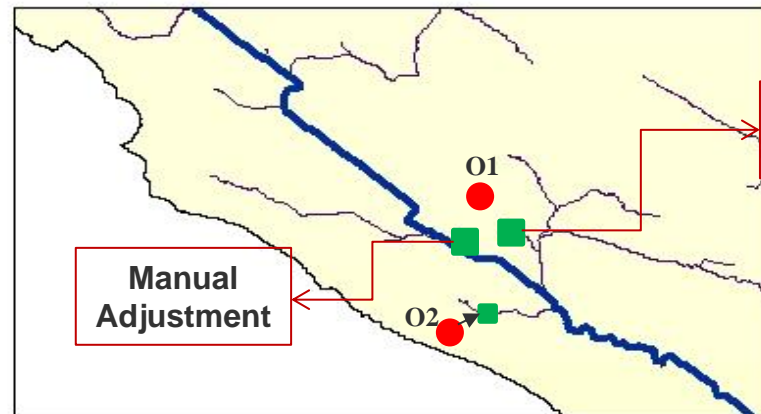


1: Stream Network Construction in SWAT

Initial drainage area: 12000 hec



Initial drainage area: 8000 hec



Objective

Material

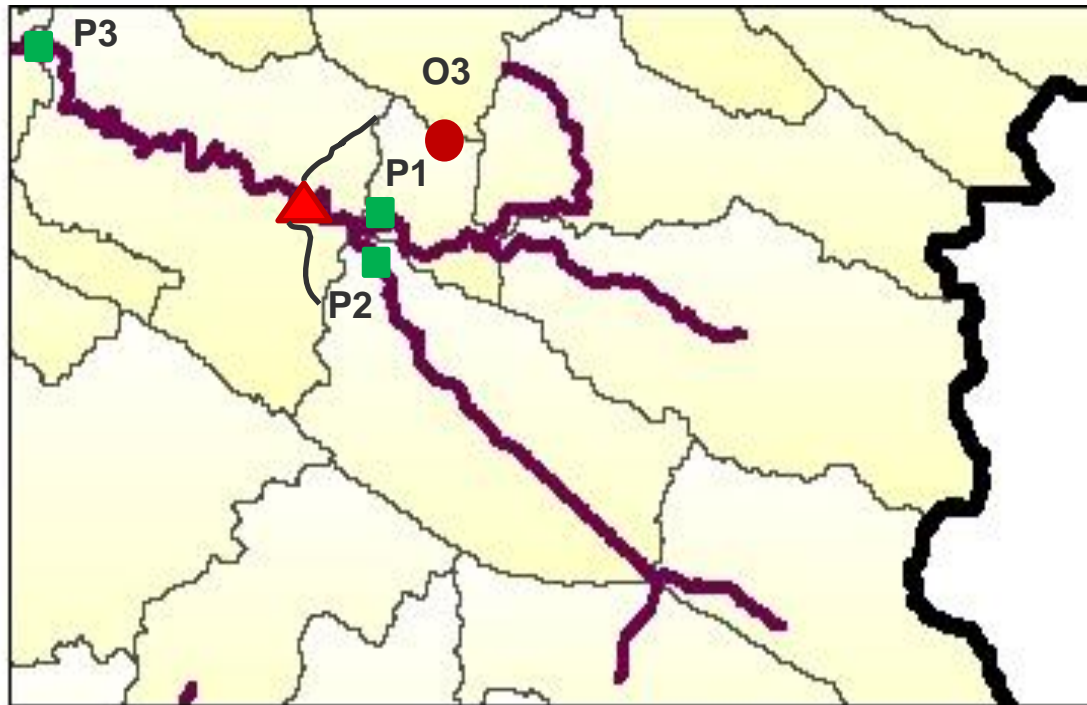
Results

conclusion

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SWAT Structuring

2: Considering discharge values after intersection of tributaries



P1 and P2: Underestimated
P3: far from real position

Increasing resolution through changing threshold imposed many calculation cost

Add manual outlets

Objective

Material

Results

conclusion

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Model Structuring



3. Lack of sufficient data may lead to wrong information

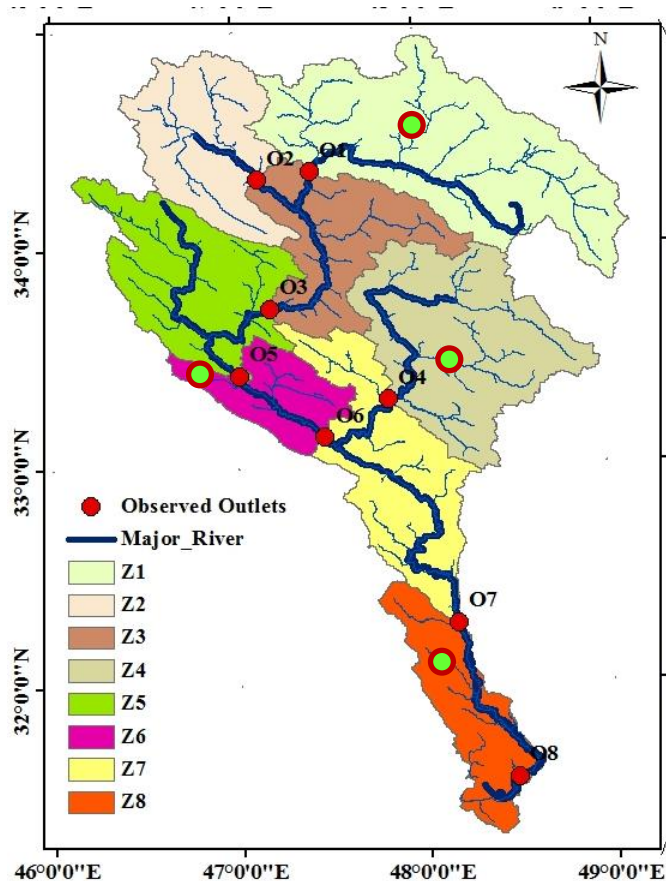
The resolution in structure of SWAT should be compatible with its ability in representing watershed characteristics

Modelers should prevent from imposing unnecessary resolution and calculation costs

Modelers should prevent from giving wrong information to the model



Final Observed outlets



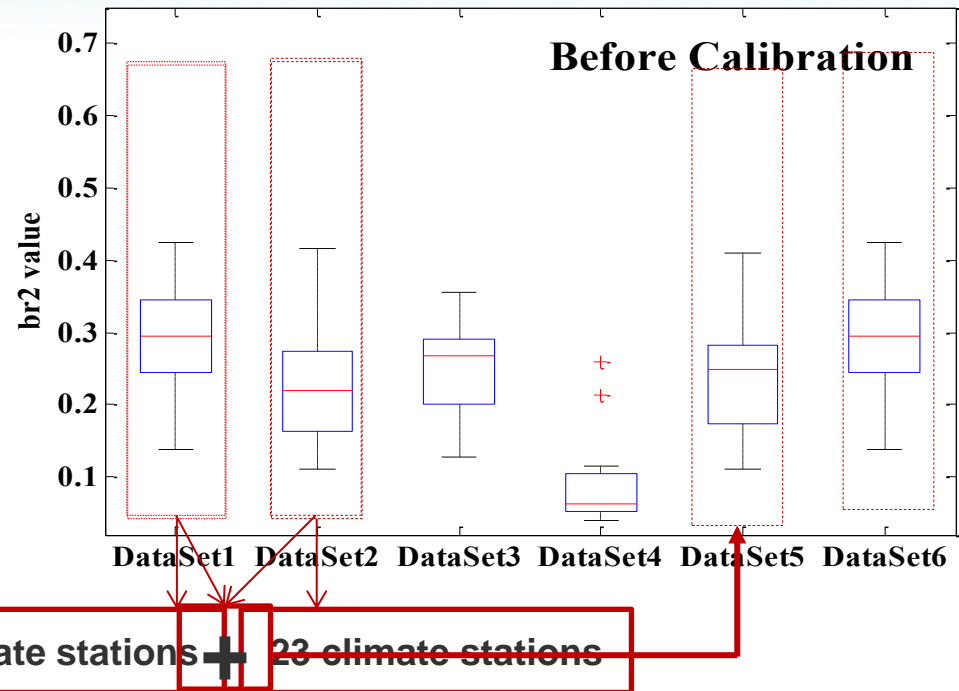
- After model restructuring, 12 outlets used for calibration
 - 8 outlets on major rivers
 - 4 outlets on tributaries

The performance of different climate sets were compared in terms of calibrating 12 discharge outlets

Evaluation the performance of different datasets

Before calibration

- Dataset1 with fewer numbers of stations performed better
- Adding more stations does not necessarily lead to better simulations
- Qualitative information is more helpful than quantitative

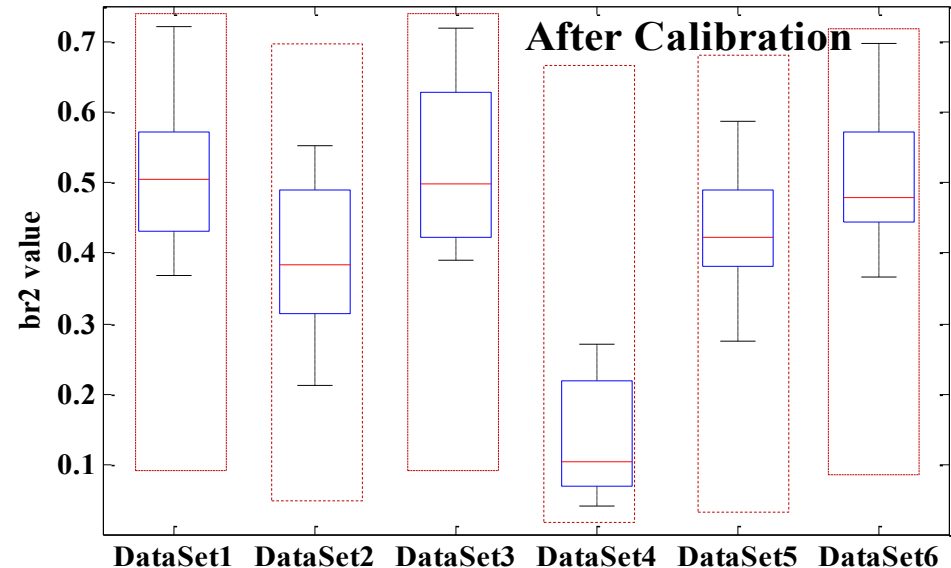


How do these datasets perform after calibration?

Evaluation the performance of different datasets

After Calibration

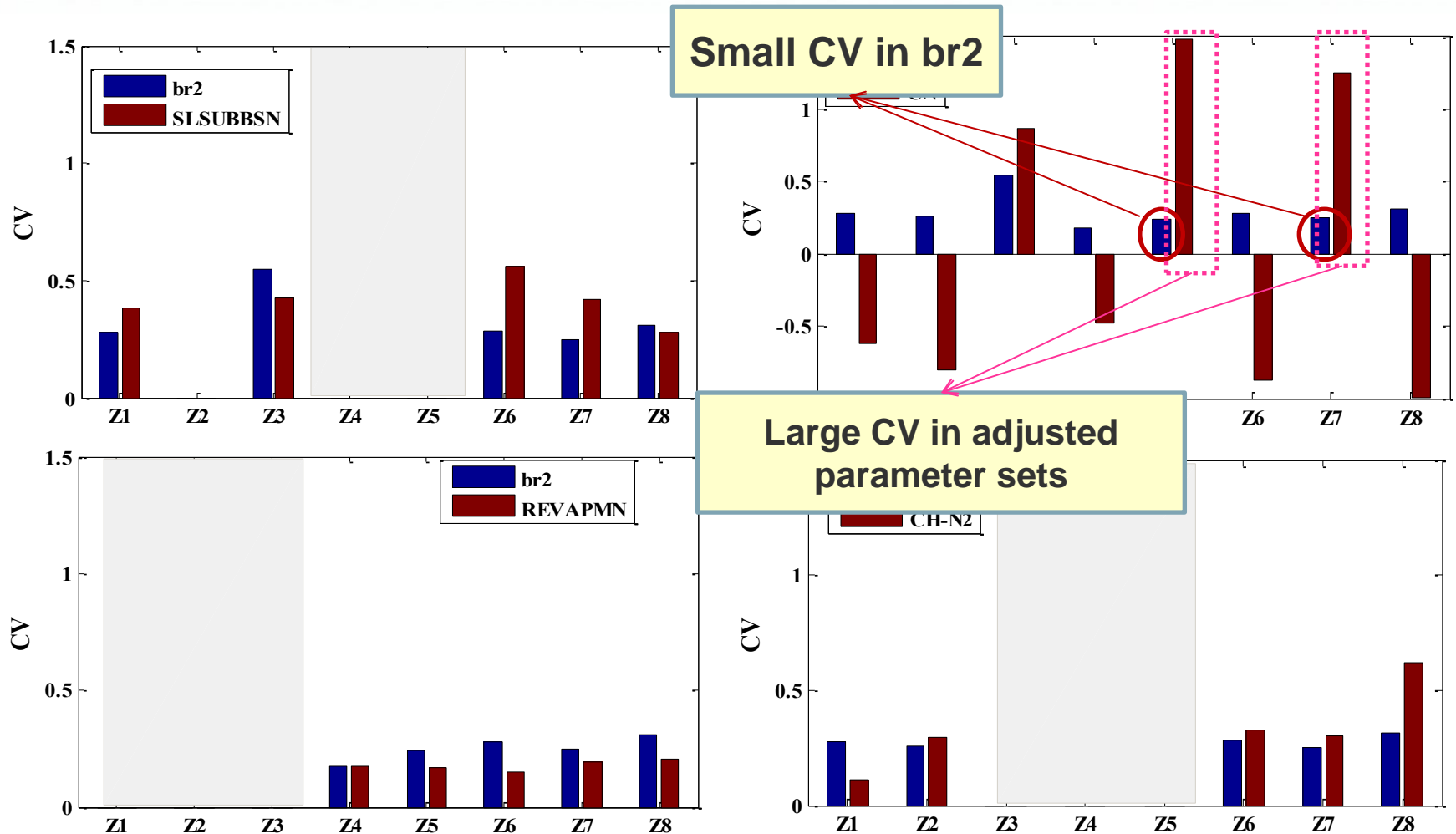
- Dataset4 did not much improved
- Datasets 1&3&6 have similar performance
- Datasets 2&5 have similar performances and in between



Different Datasets have similar mean performances

How do they perform in final adjusted parameters?

Comparing the final parameter sets



Conclusion

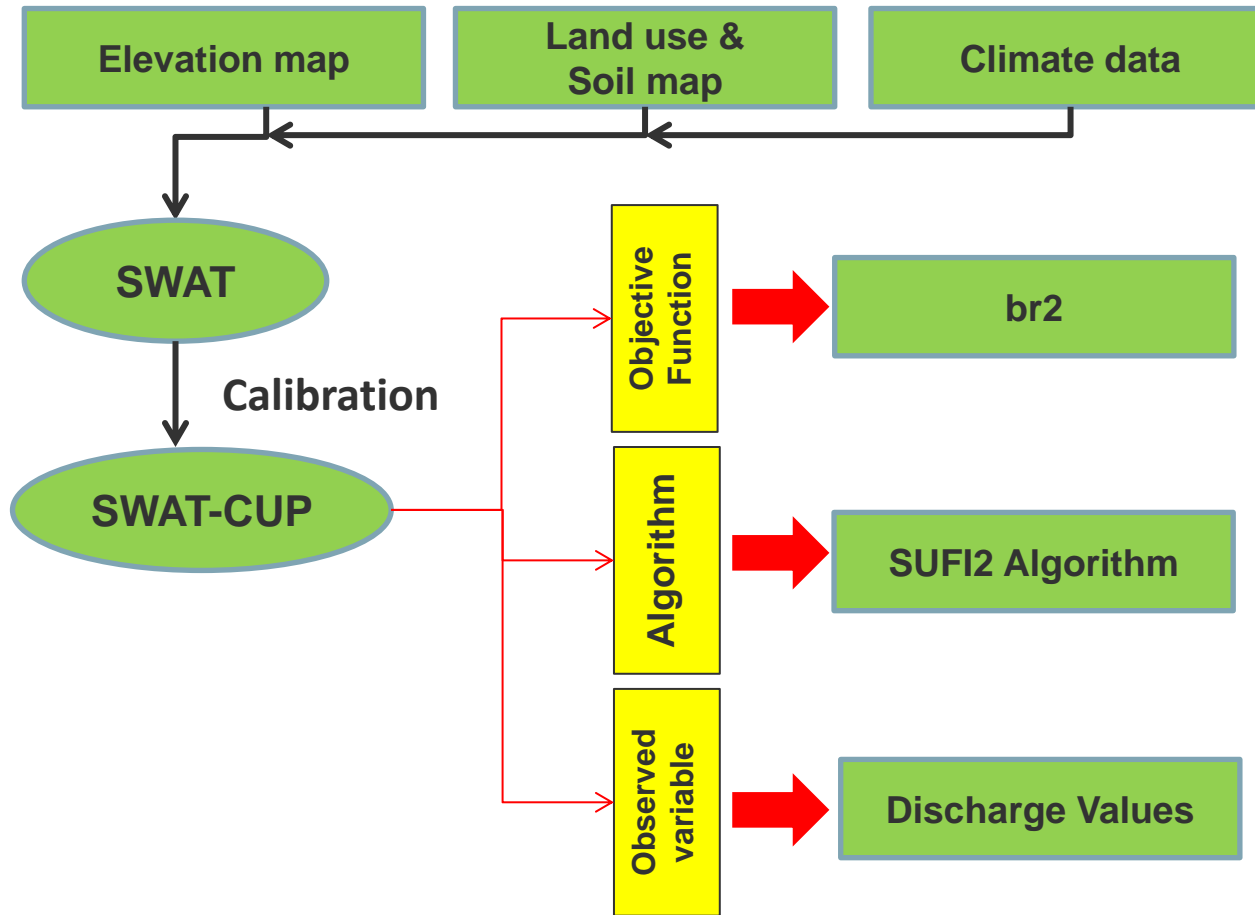
- Each dataset adjusts the model with different parameter sets
- There are uncertainties within adjusted parameters obtained from different sources
- These uncertainties will propagate in model output
- These uncertainties need to be considered at the first step before the results are used for next management policies



**Thanks For Your
Attention!**



SWAT and SWAT-CUP



Structure of presentation

Introduction

Conceptual hydrologic models are useful tools to:

- Hydrologic modeling and calibration
- Model structure and climate data → Objective
- Analyze hydrologic characteristics of watersheds

Material

- Water resource management
- SWAT and SWAT-CUP
- Climate change impacts
- Study Area;

Successful application of hydrologic models depends
on **Calibration Process**

Results

- Model re-structuring;
- Climate data impact

Conclusion

Material

Results

conclusion

SWAT and SWAT-CUP

