A Step Towards Narrowing the Gaps in the field of Water Resources Management by Satellite Estimated Rainfall Data

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Outline:

- Introduction & background
- Objective
- Methodology
- Data collection & processing
- Model development
- Result analysis
- Summary

Introduction & Background:

- Flooding is an annual recurrent event in Bangladesh
- Total protection against flood is neither possible nor feasible
- A basin model with reasonable accuracy could alleviate the problem to some extent by flood forecasting and disaster preparation application

Introduction & Background:

Flood Damage:

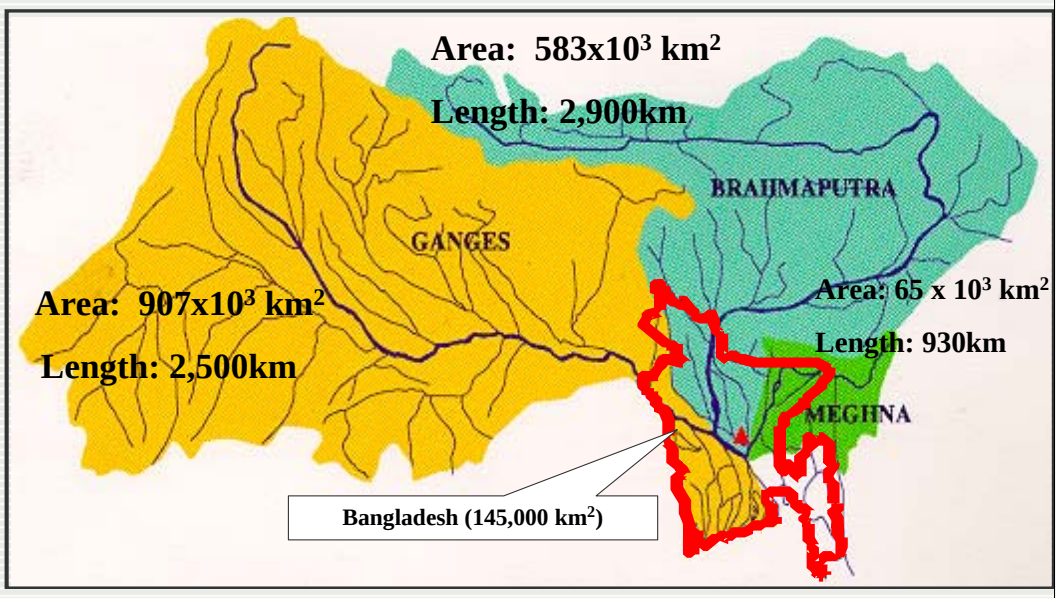
- Area affected by flood – 38 districts
- Crop Damage:
  - fully-793,140 hectares
  - partly- 656,187 hectares
- Affected People –10 million;
- People taking refuge – 373,939 in 1601 shelters;
- Housing units destroyed – 89,048
- Deaths – 192.

(Year: August 2007)

December 5, 2007

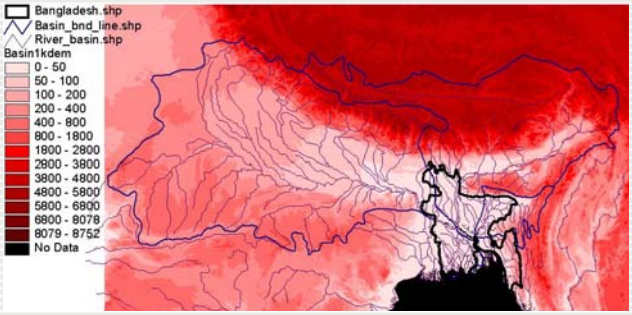
Introduction & Background

Study Area:



Introduction & Background

Causes of flood:



- ✓ Low topography of the country with excessive runoff from the drainage basins (92% of its located outside Bangladesh)
- ✓ Coast line is conical in shape
- ✓ Backwater effect and poor drainage facilities

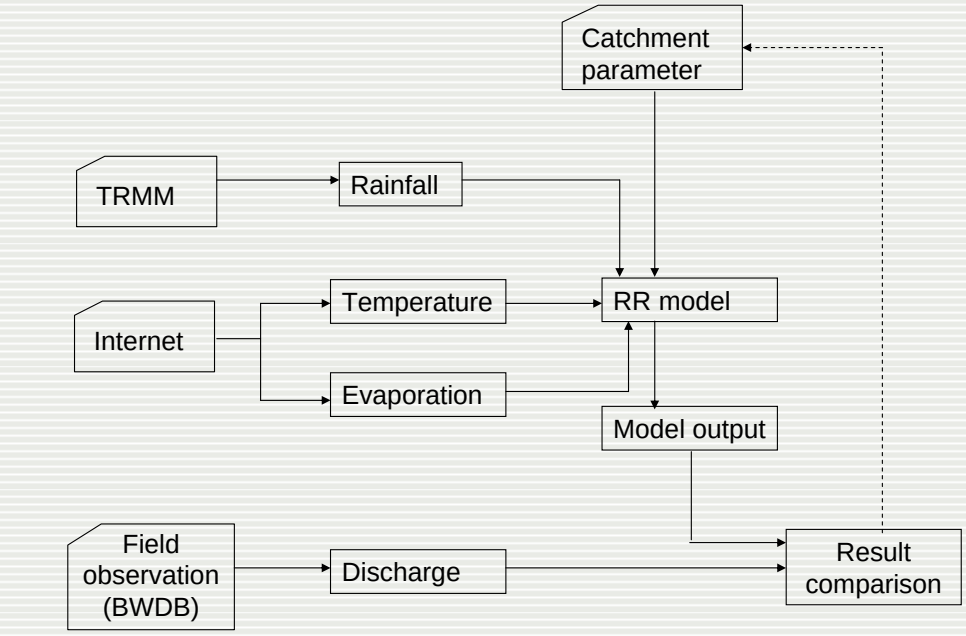
Objectives:

To develop the GBM basin model using remotely sensed data, which can provide enough flood information few days ahead

Specific objectives:

- ✓ To develop a simulation model of the GBM basin with remotely sensed data
- ✓ To compare the measured discharge with the total amount of rainfall
- ✓ To simulate basin discharge under climate change scenarios

Methodology:

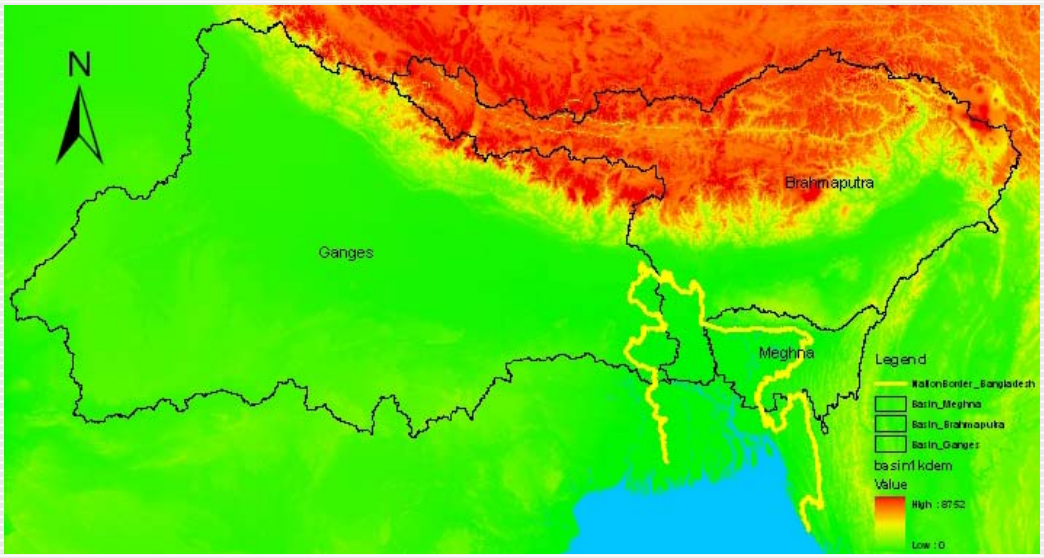


Data Collection & Processing:

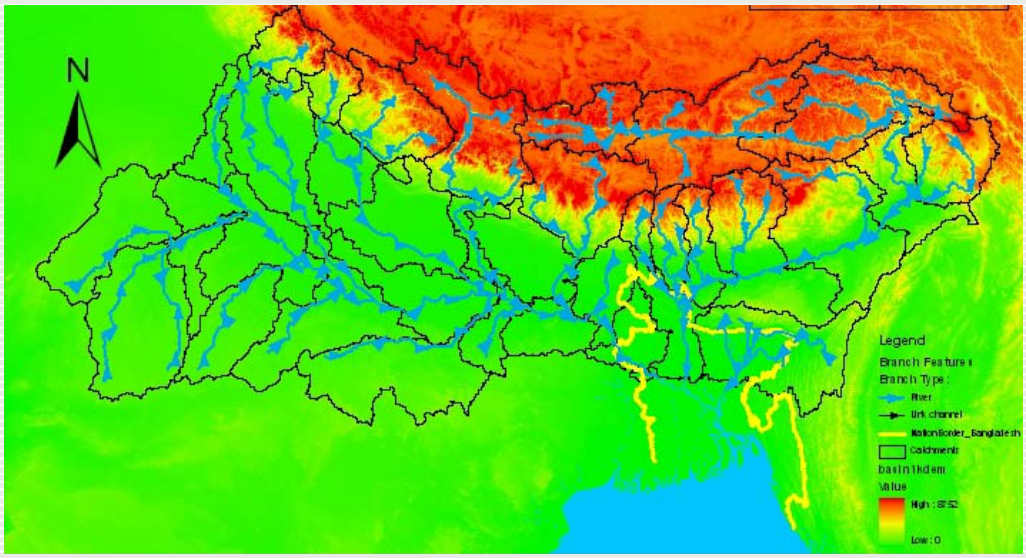
Data sources:

- Rainfall (TRMM- 3B42RT)
- Discharge (BWDB, IWM)
- DEM (IWM, USGS)
- Evaporation (NASA)
- Soil Type (FAO, ISRIC)
- Land-use (USGS)

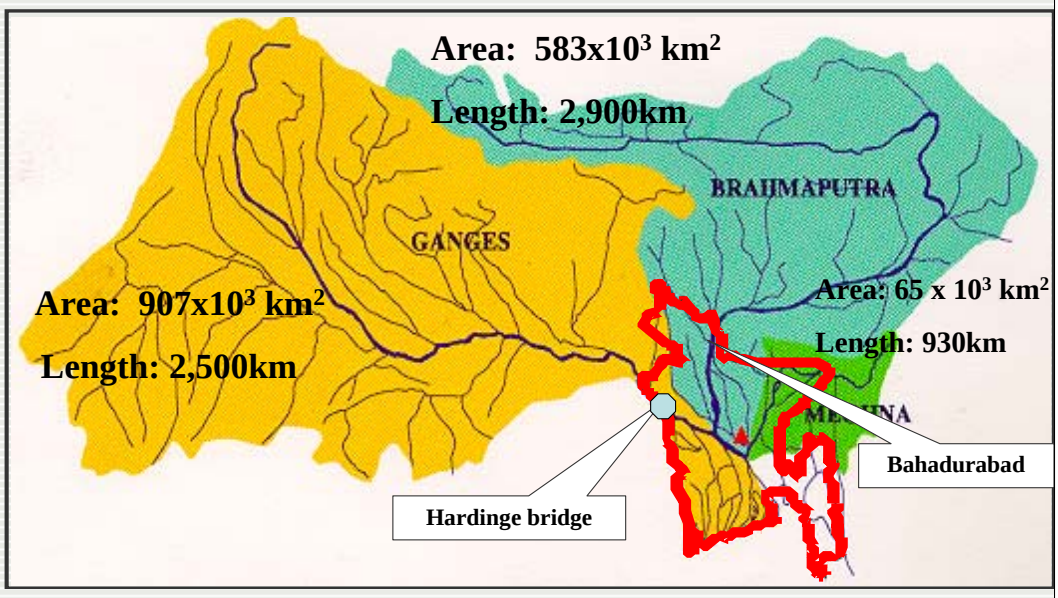
Data Collection & Processing:



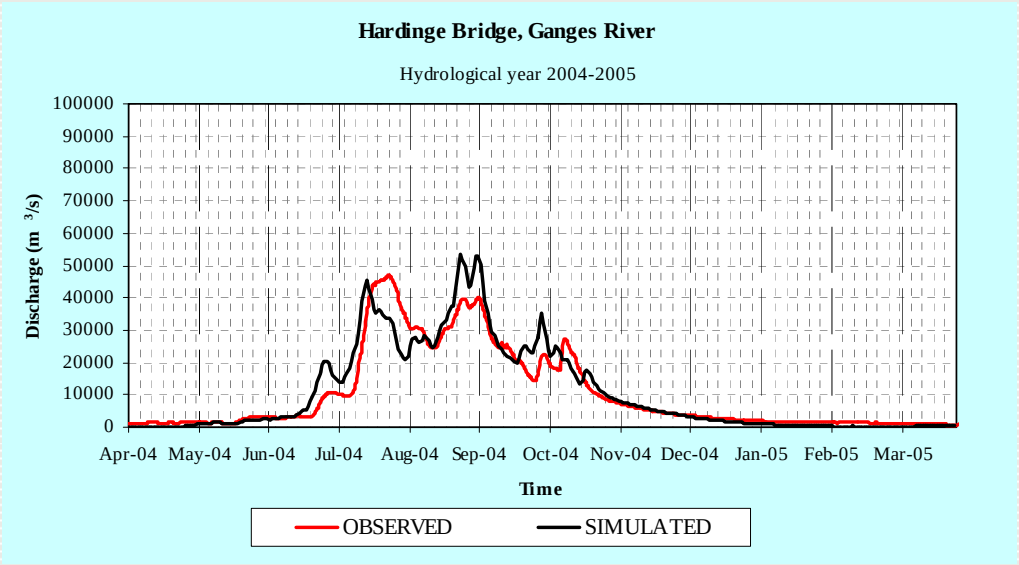
Model Development:



Model Result:



Result analysis:



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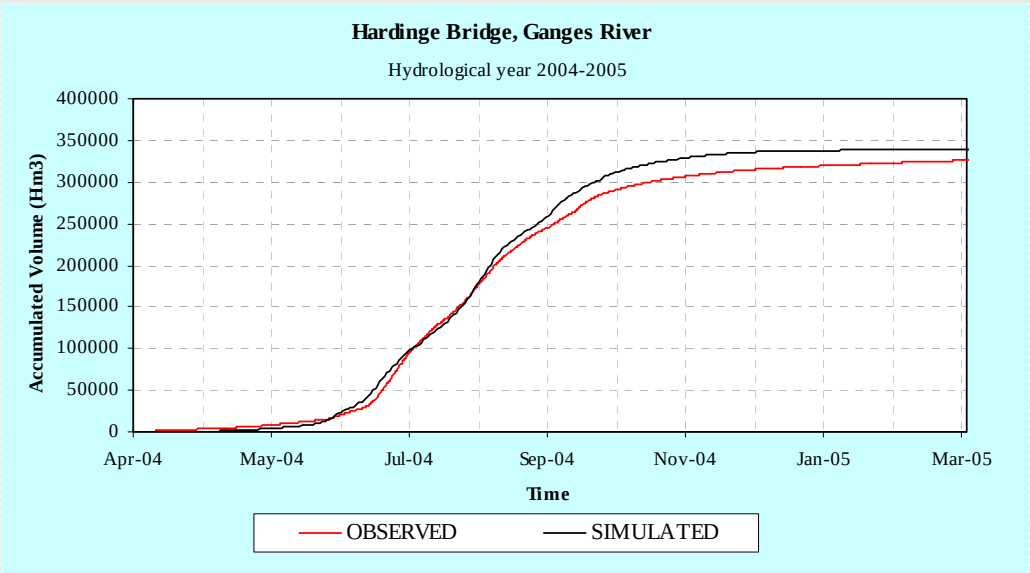

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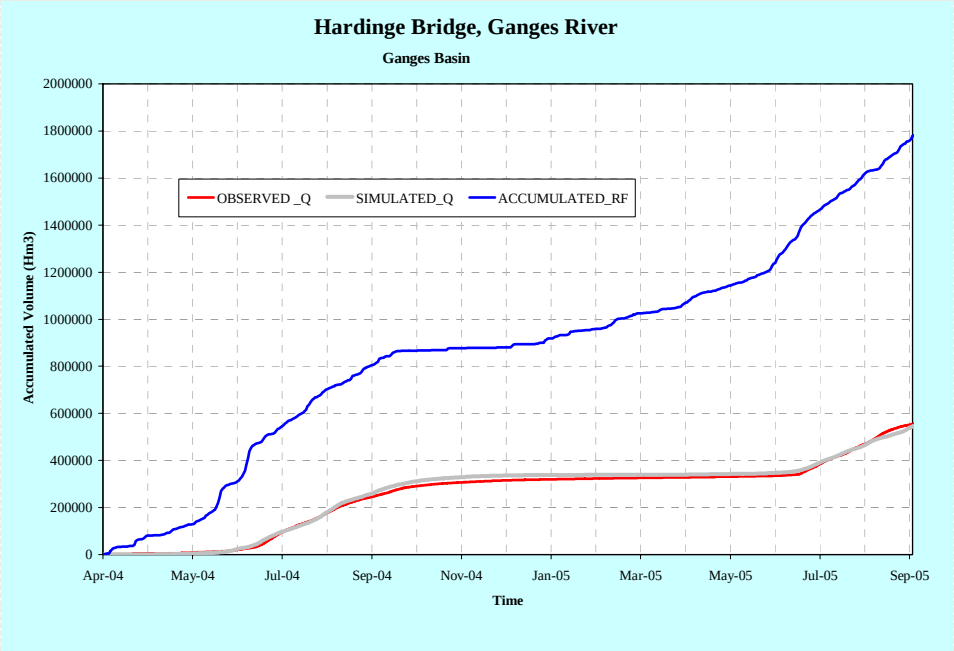
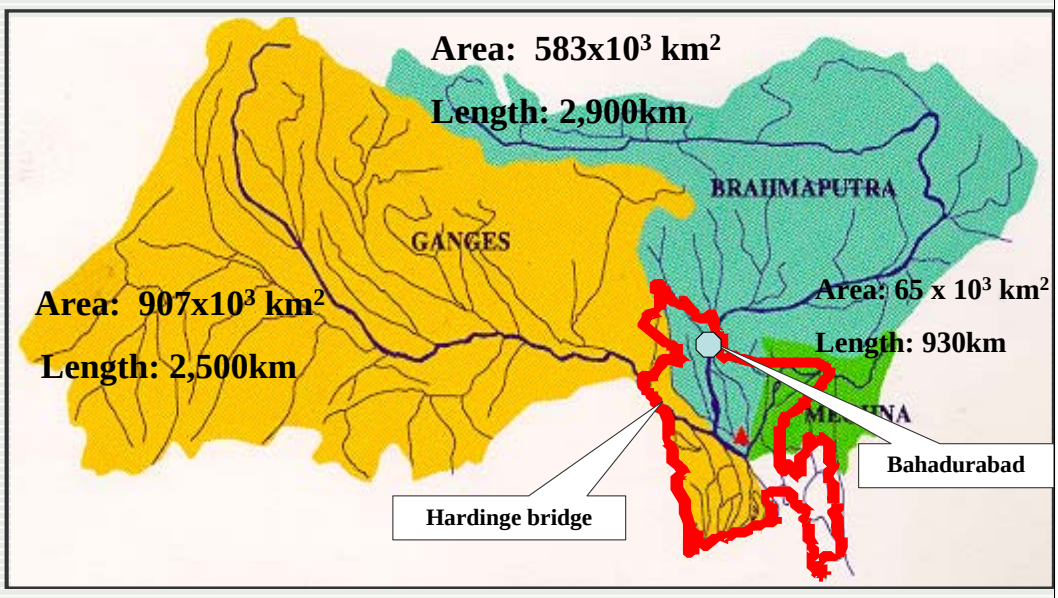


Model Result:



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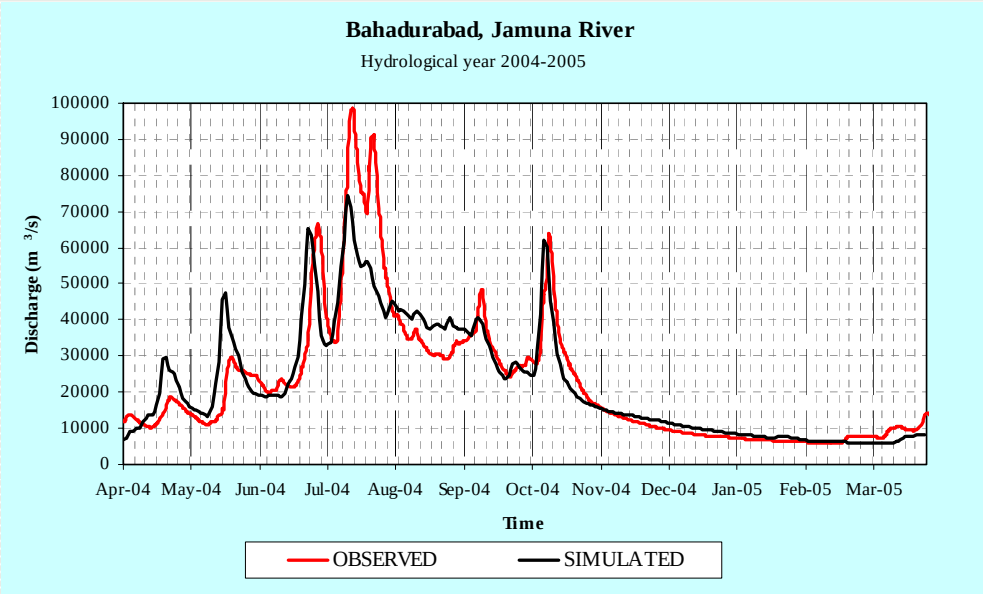

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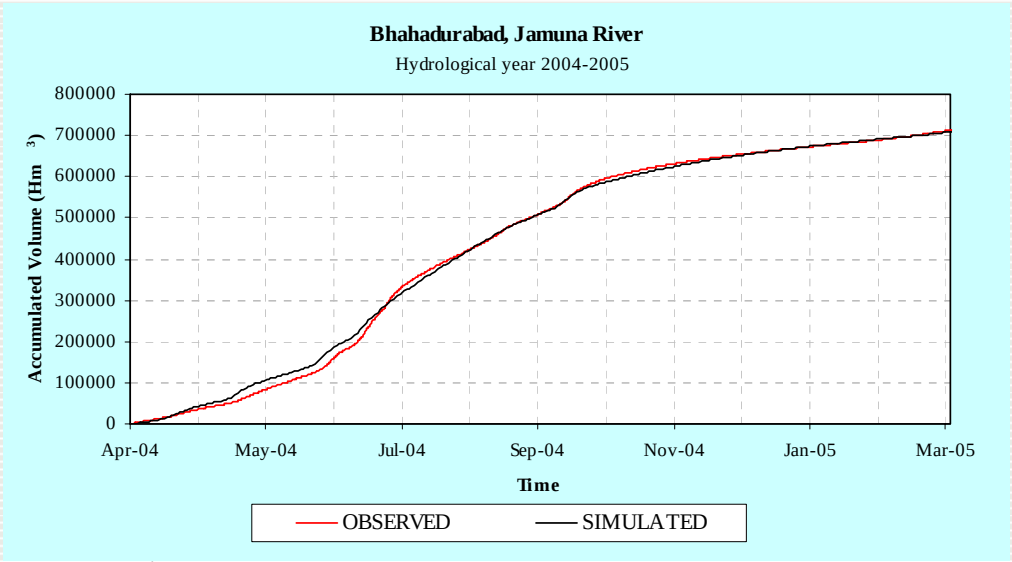

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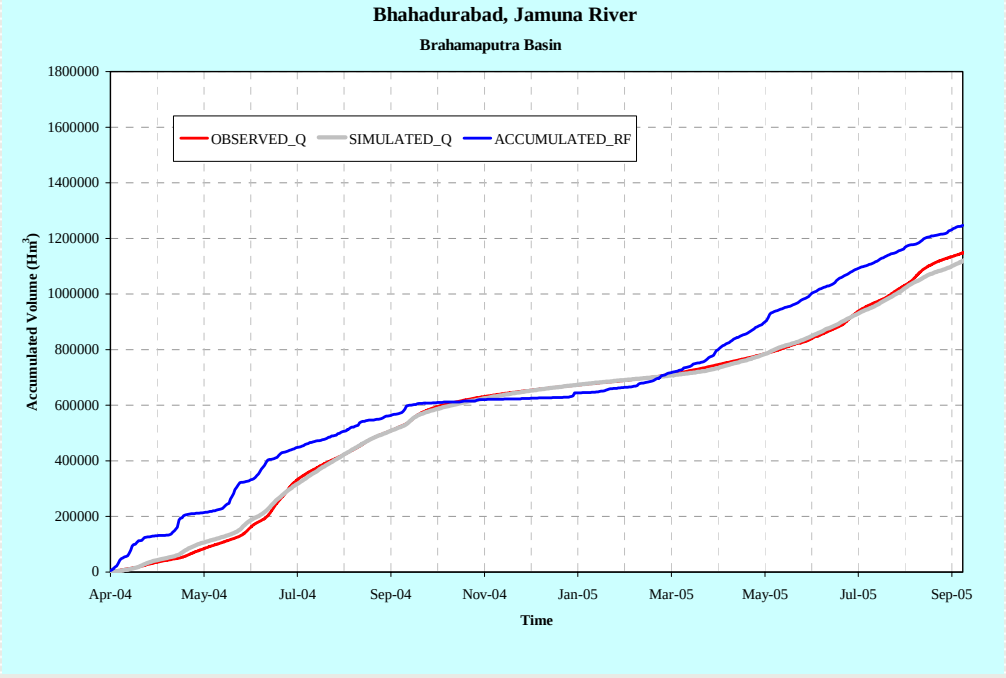
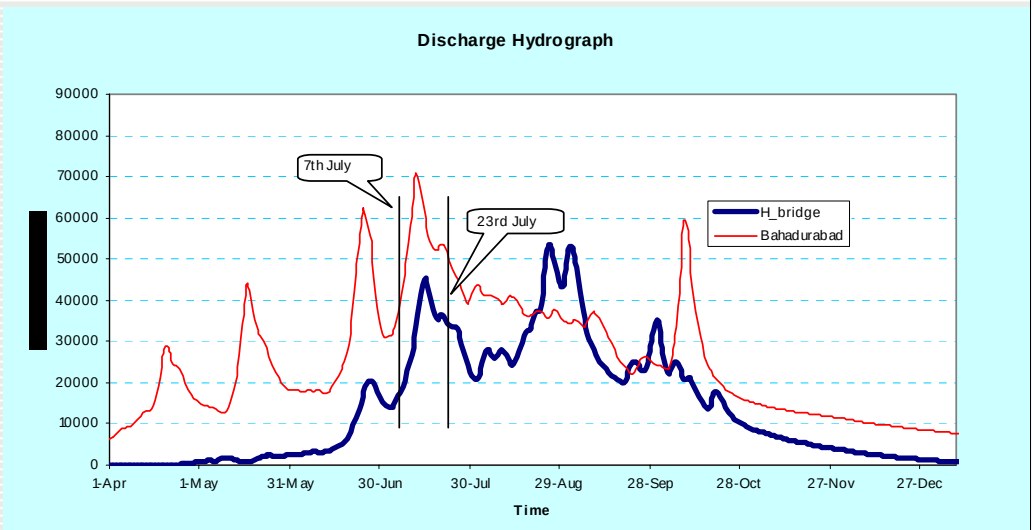


Result analysis:

Sensitivity test:



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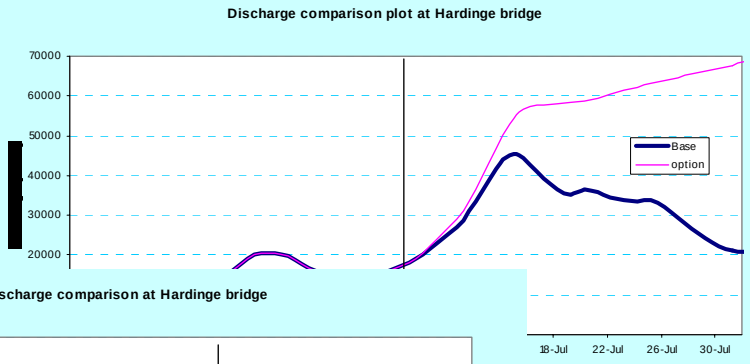

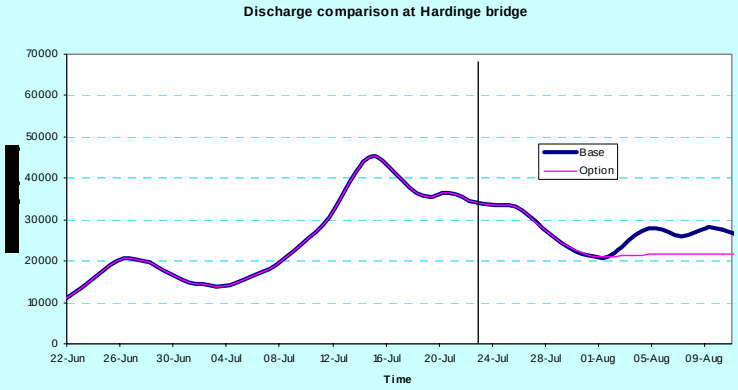

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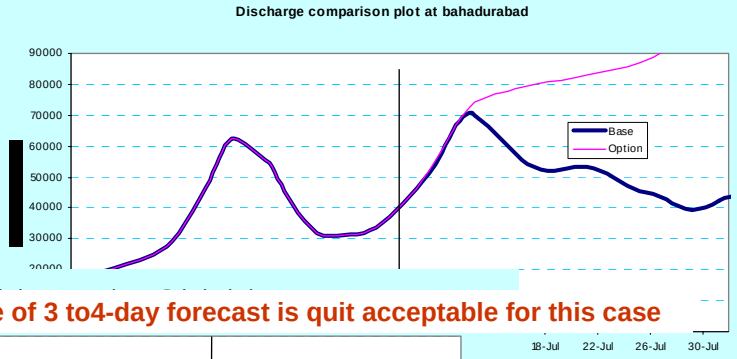
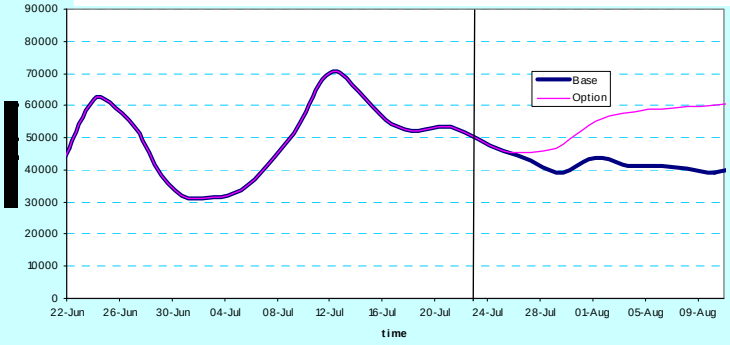
Result analysis:

Sensitivity test:



Performance of 3 to4-day forecast is quit acceptable for this case



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Summary:

- ✓ The satellite derived rainfall data is very promising
- ✓ Yearly accumulated volume of rainfall over the Ganges basin and generated runoff at the outlet varies within acceptable range.
- ✓ On the other hand, the accuracy of satellite measured rainfall over Brahmaputra basin is beyond the acceptable range
- ✓ Sensitivity analysis gives some indication about the forecasting condition, if no rainfall forecast is available, which is very encouraging in the field of flood forecasting
- ✓ Further efforts are needed to improve the model performance to make it operational

Summary:

- ✓ Consistency and accuracy of the satellite data needed to be checked before further calibration especially for the Brahmaputra basin area
- ✓ It is hoped that there will be significant improvement in the model performance if validated rainfall data can be used


Thank You