

Simulation of 1999 Flood in White Volta basin

Water Resources in Developing Countries: Planning &
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Background - the Volta basin

- Six riparian countries in West Africa
- Basin area approx. 400,000 sq.km
- Annual rainfall: 1000-1140mm
- Average annual runoff approx. 41.6 billion m³ (104 mm)
- Main economic activities
 - crop production,
 - livestock keeping,
 - agro-industry and fishing



Floods in the basin: Northern Ghana

- Periodic floods in northern part of Ghana
- Floods may be due to opening of spillway of the Bagre dam in neighbouring Burkina Faso or heavy rainfall
- Recent Flood events
 - Sept. 1999: killed 48 and displaced 9000 others
 - 2007: killed at least 20 people and made an estimated 400,000 people homeless



Project Objective

Simulate the Sept. 1999 flood in Northern Ghana using the CHyM model, with emphasis on the White Volta

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sin (a sub-basin of the Volta)

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BBC NEWS

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Tuesday, September 14, 1999 Published at 16:32 GMT 17:32 UK

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World: Africa

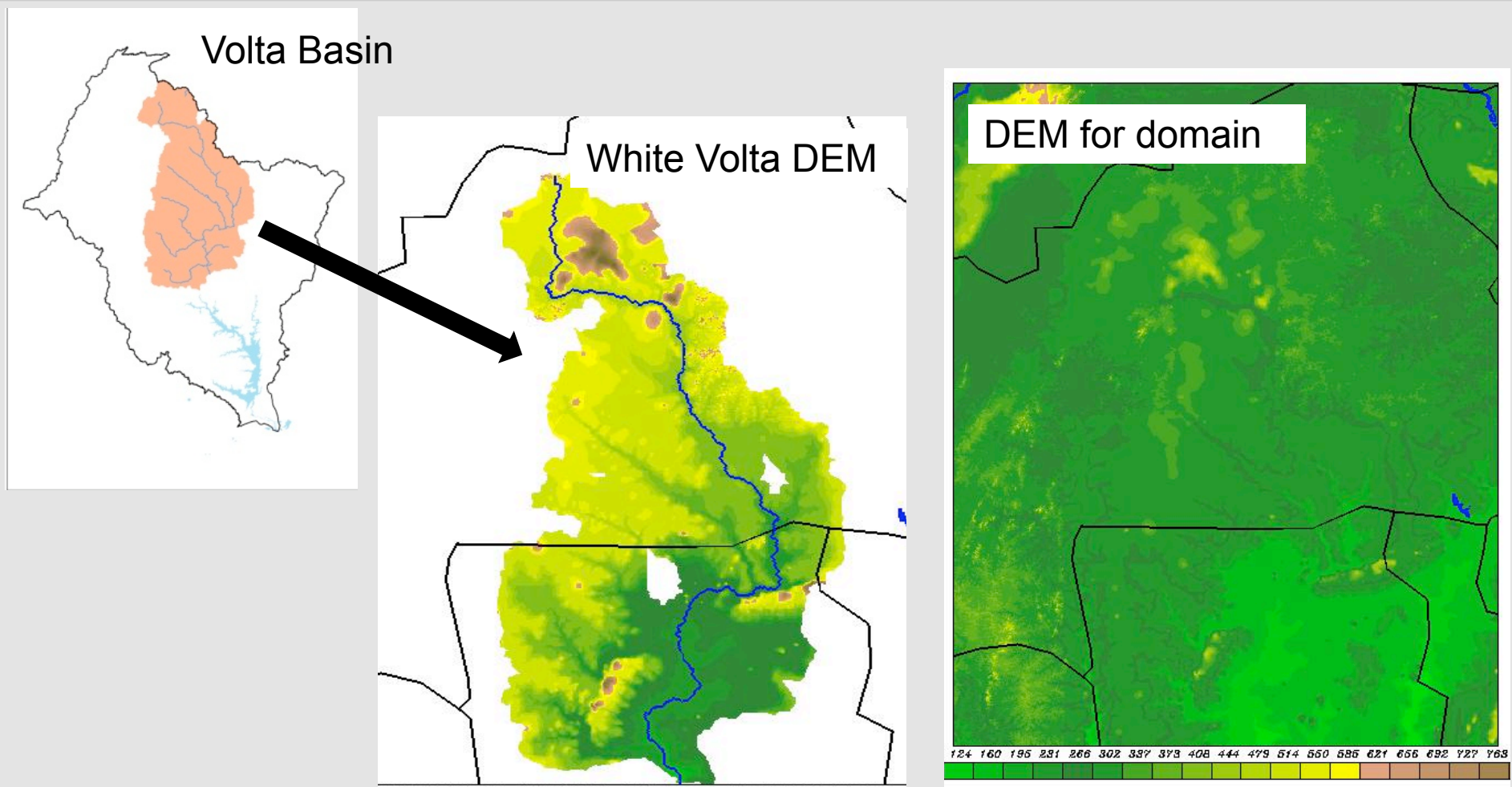
Heavy rains devastate northern Ghana



At least 48 people have died from an outbreak of cholera in northern Ghana after torrential rains and flooding.

Some 9,000 people have been made homeless, crops have been destroyed and roads and bridges in the Upper

Study Area - White Volta Basin

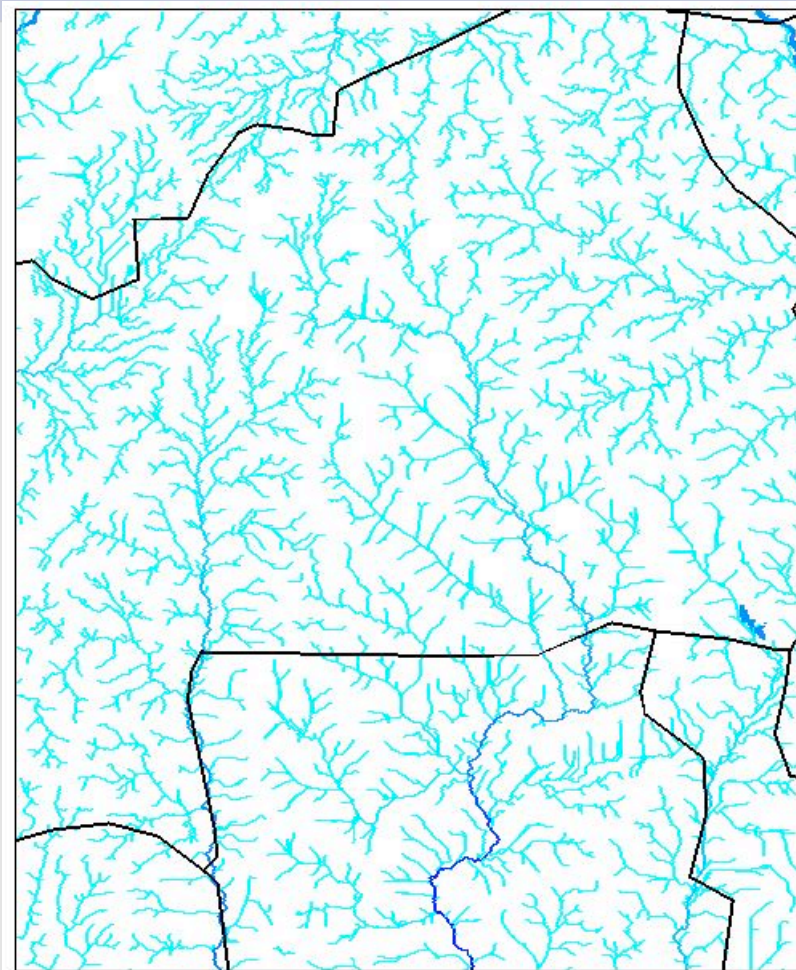
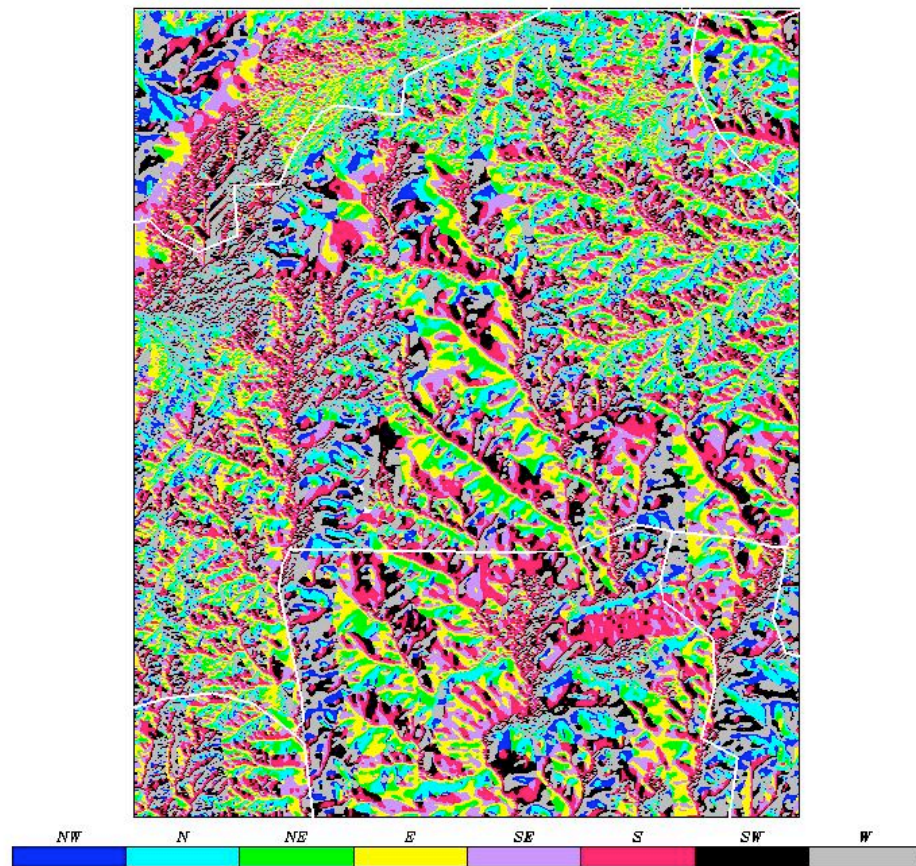


Methodology

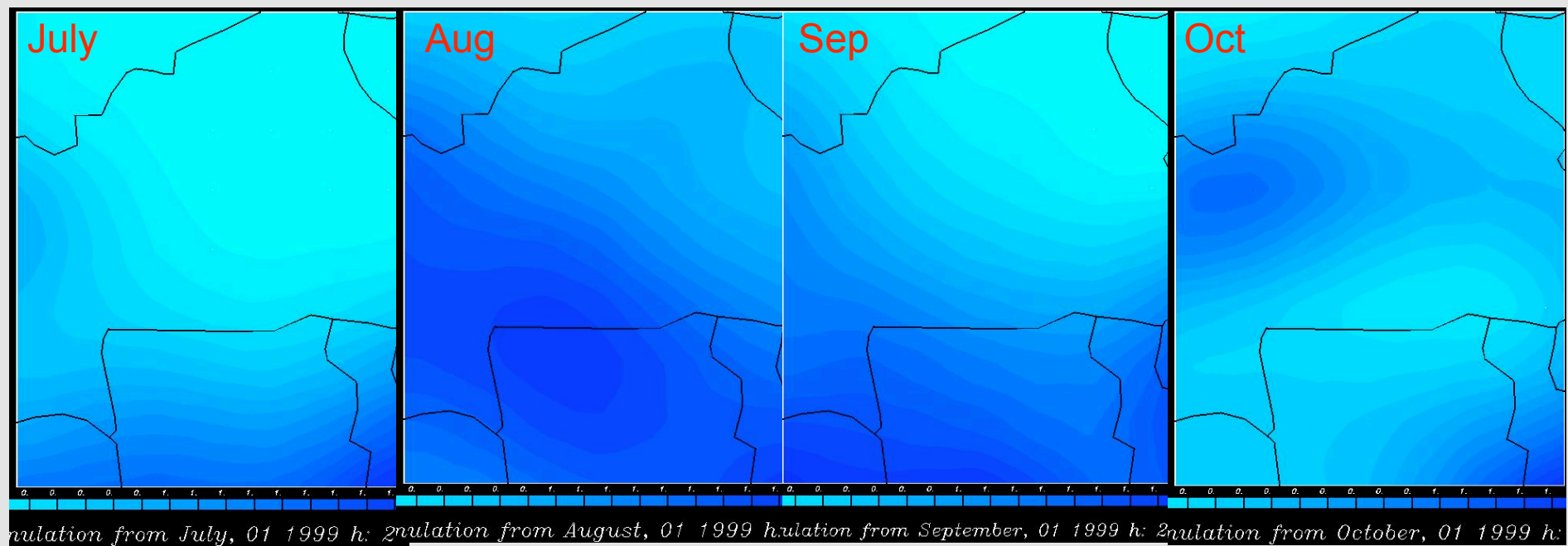
- CHyM4 model used
- ERA40 data used to drive CHyM
- Main interest in September 1999 flood
- Simulation for 4 months in 1999 (July – October)
- Simulation time-step was hourly
- Output was daily average flows

Results

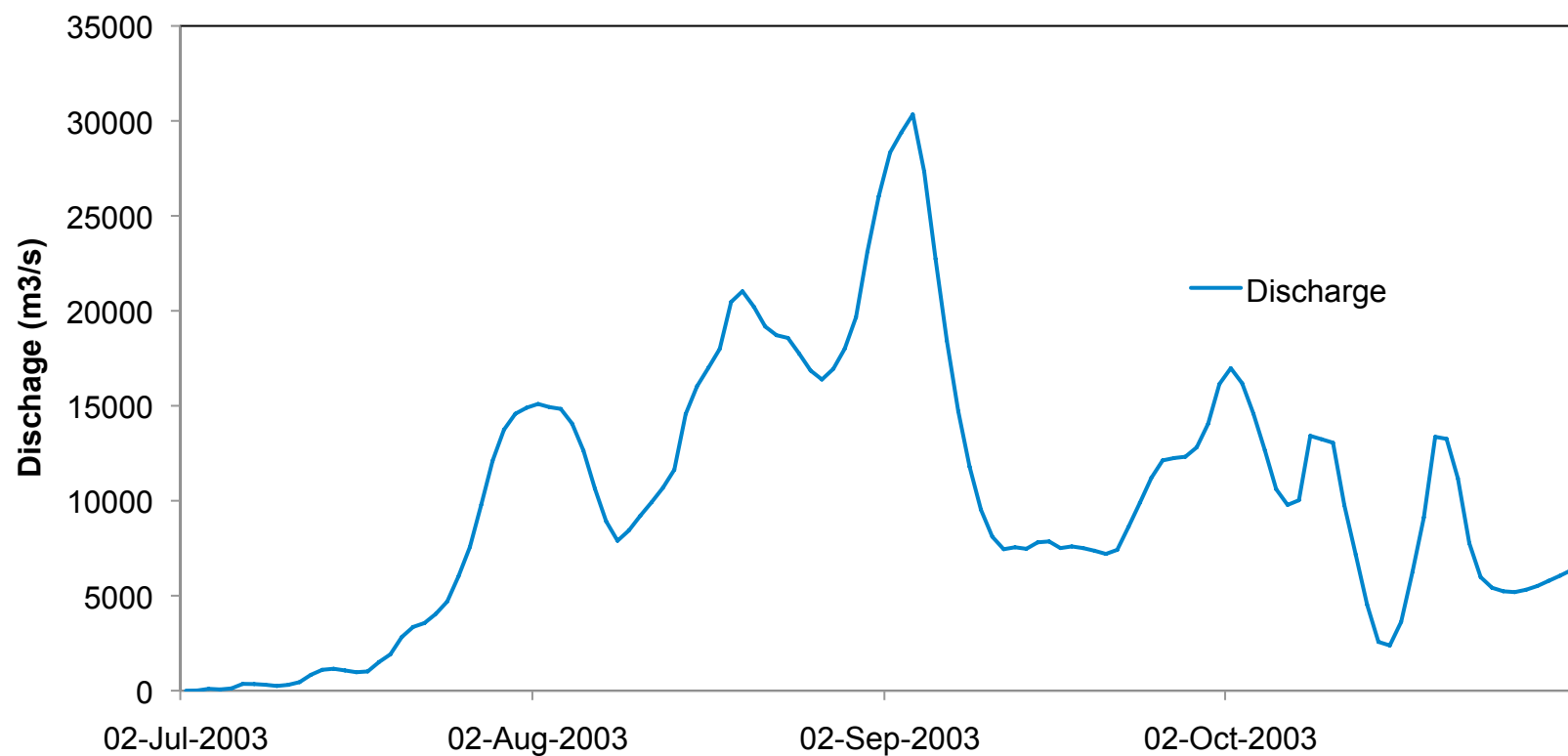
Flow Direction Map



Rainfall field



Results



Conclusions

- Although the model was not calibrated and validated for the study basin, the expected trend in discharge was observed for the simulation period
- CHyM4 model was successfully used to simulate the Sept. 1999 flood in Northern Ghana



THANK YOU