Modeling the hydrology of the Congo Basin

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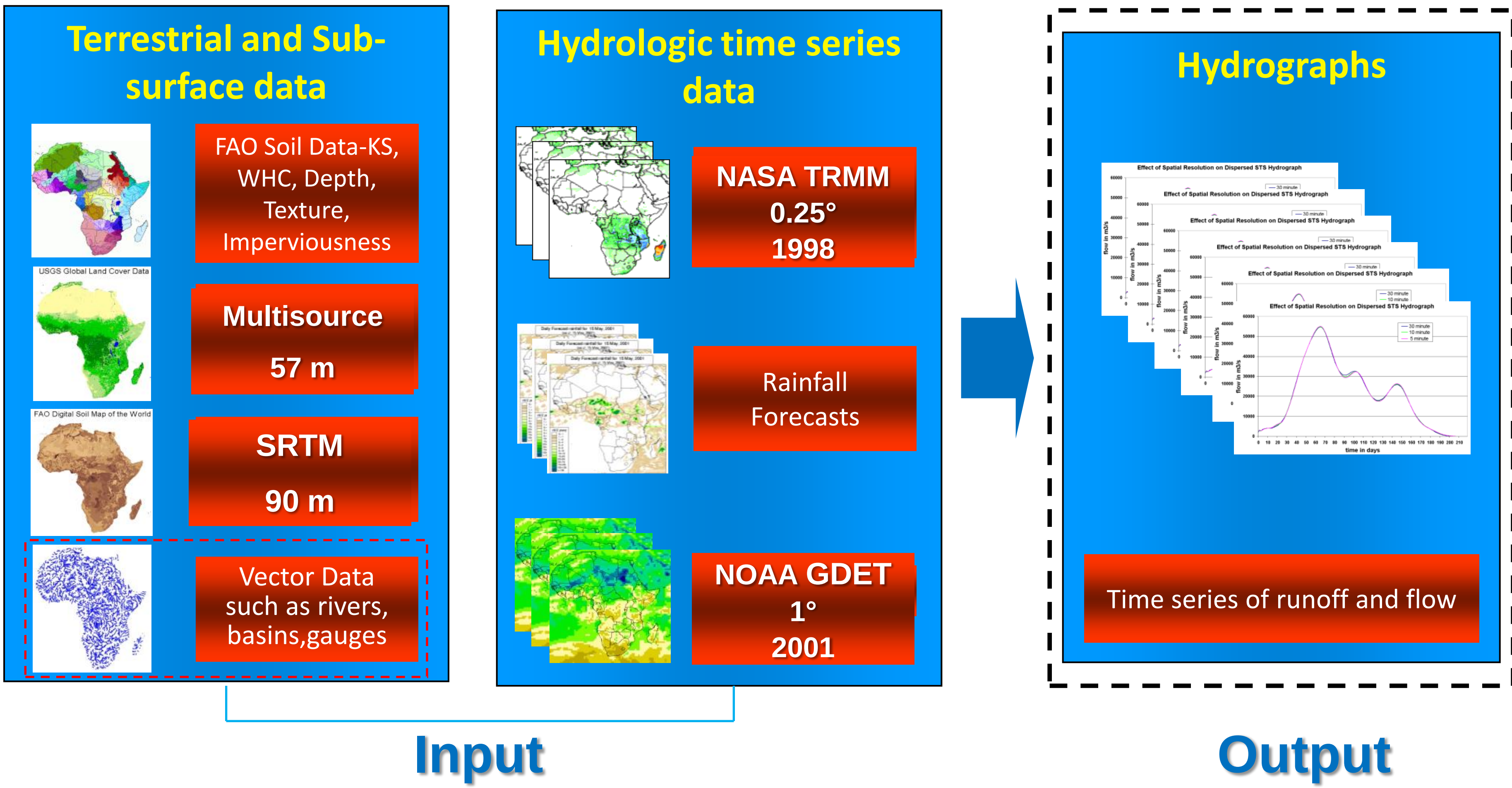
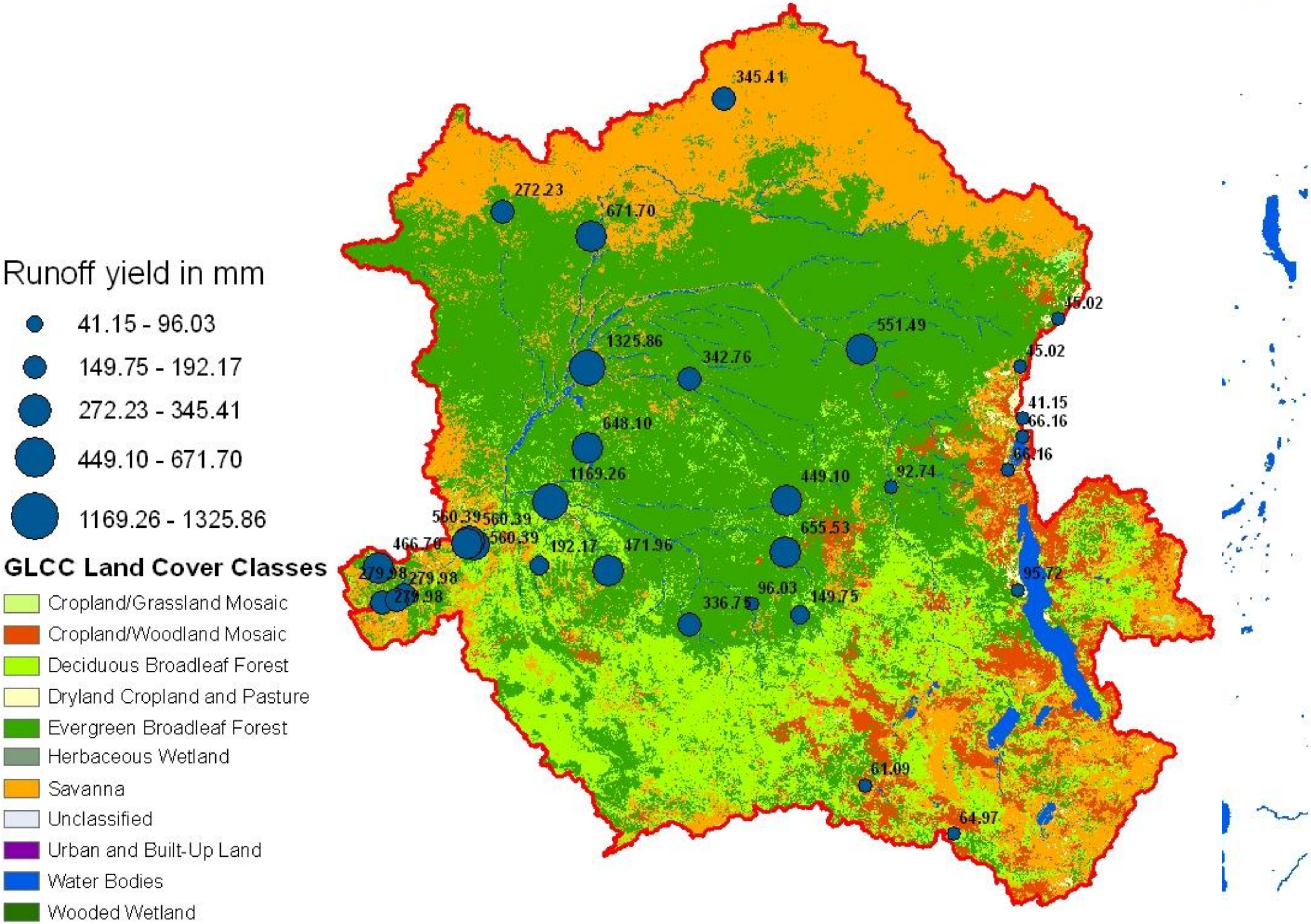
- Flow-routing with improved Basin-wide input data for parameterizing model
- Assessing impacts of forest cover change on Basin-wide flow
- Modeling impacts of deforestation on Basin-wide hydrology (scenario testing)

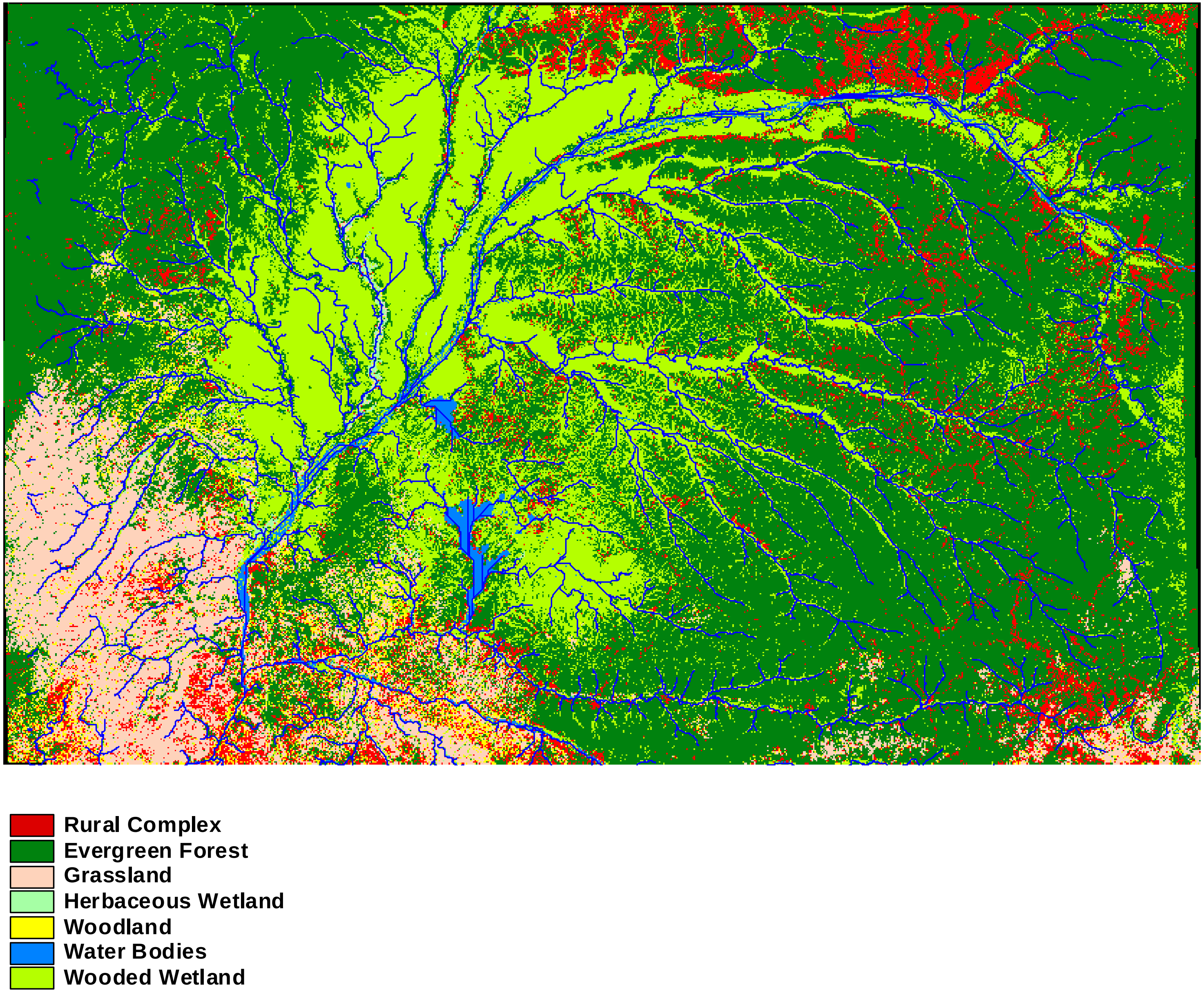
Geospatial Stream Flow Model (GeoSFM)



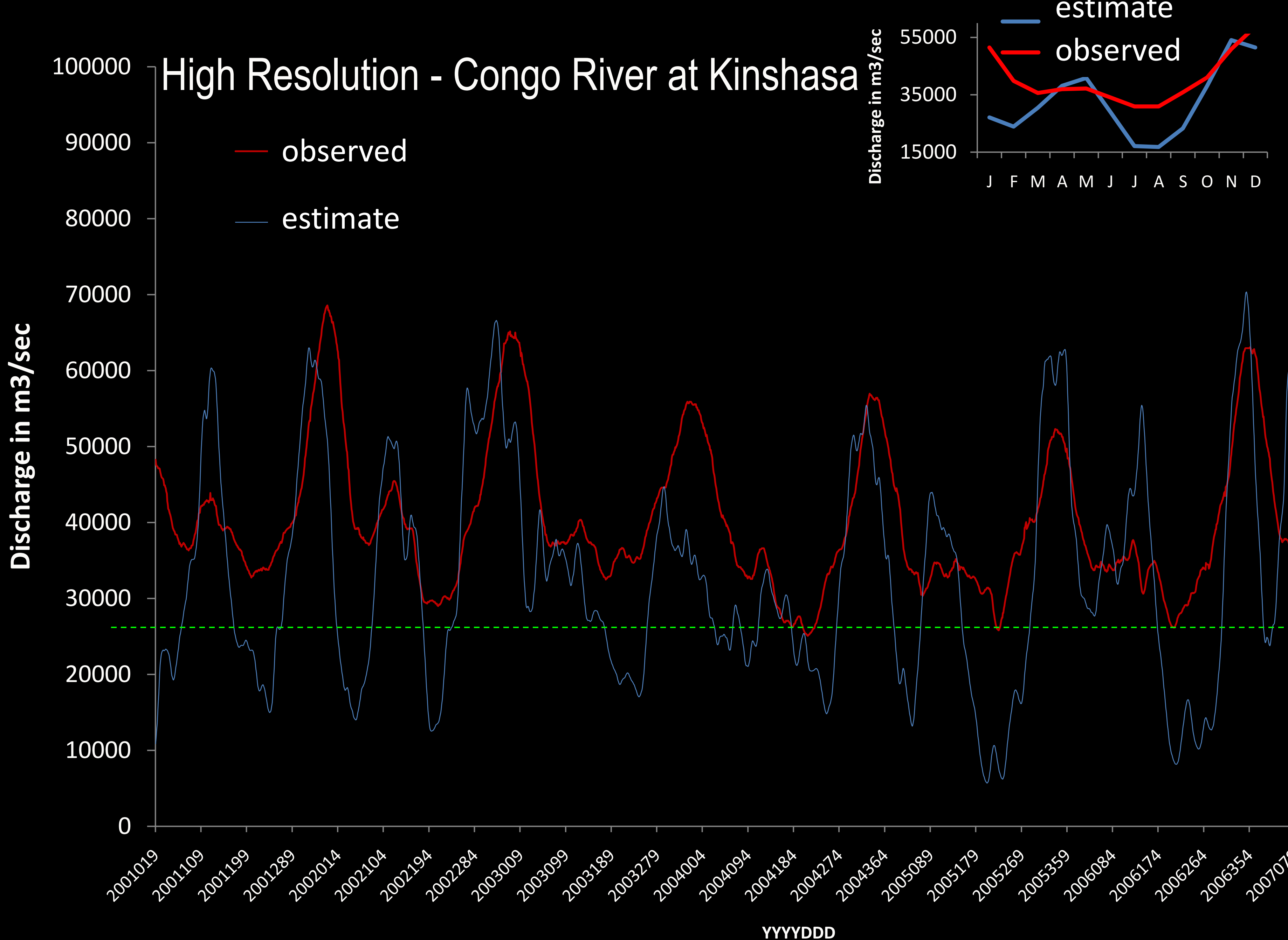
Pervez et al. 2007

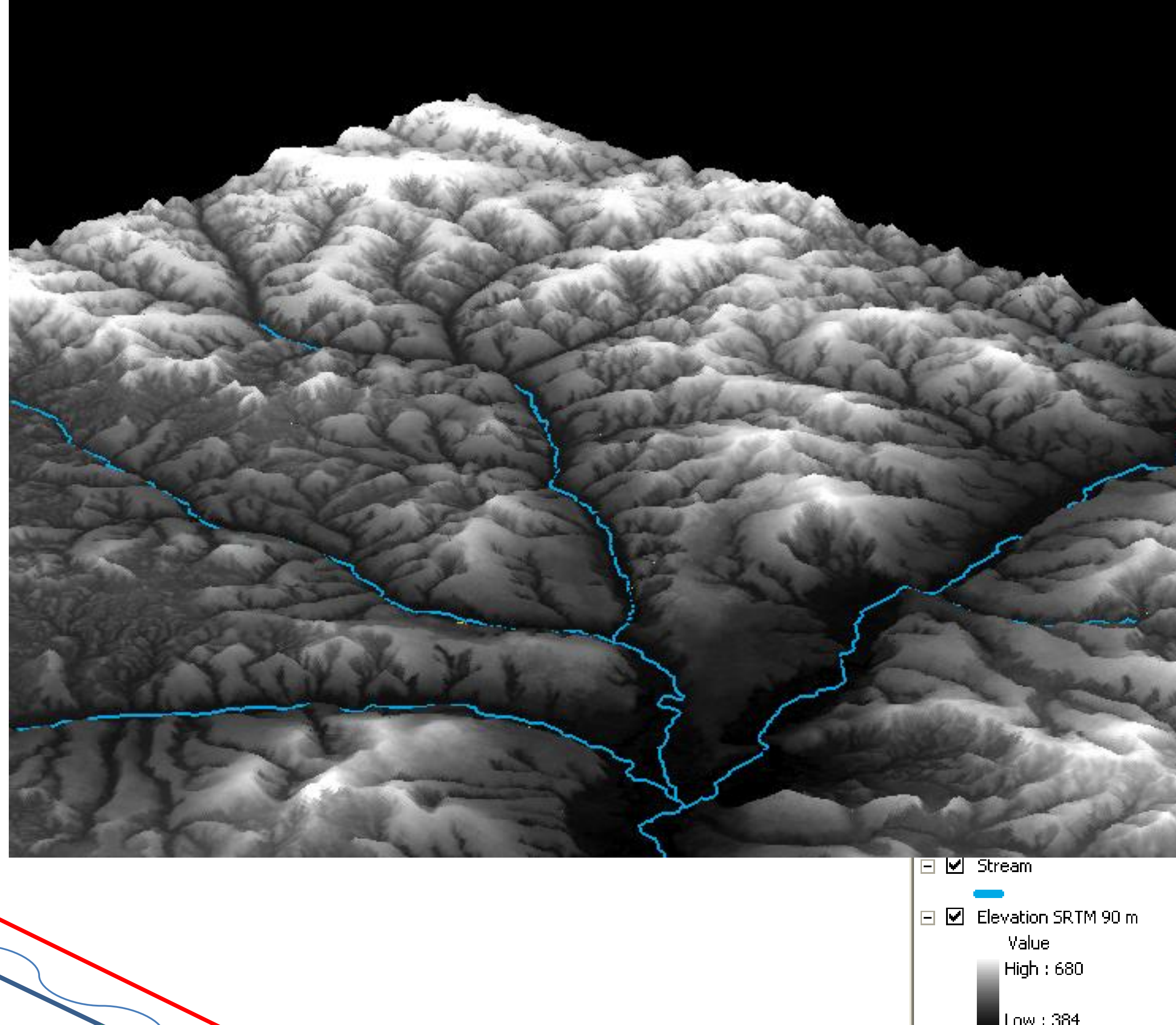
Coarse resolution Data – Watershed wide analysis

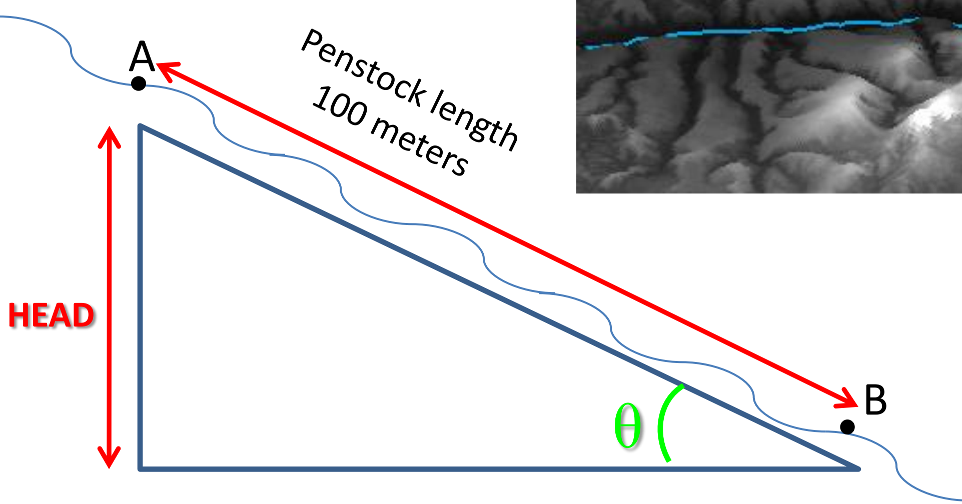




High resolution Data – Core Area (Zone Test)


High Resolution - Congo River at Kinshasa
observed
estimate
Discharge in m3/sec
YYYYDDD
0
10000
20000
30000
40000
50000
60000
70000
80000
90000
100000
2001019
2001109
2001199
2001289
2002014
2002104
2002194
2002284
2003009
2003099
2003189
2003279
2004004
2004094
2004184
2004274
2004364
2005089
2005179
2005269
2005359
2006084
2006174
2006264
2006354
estimate
observed
Discharge in m3/sec
55000
35000
15000
J F M A M J J A S O N D





$$\text{Head (meter)} = 100 * \sin\theta$$

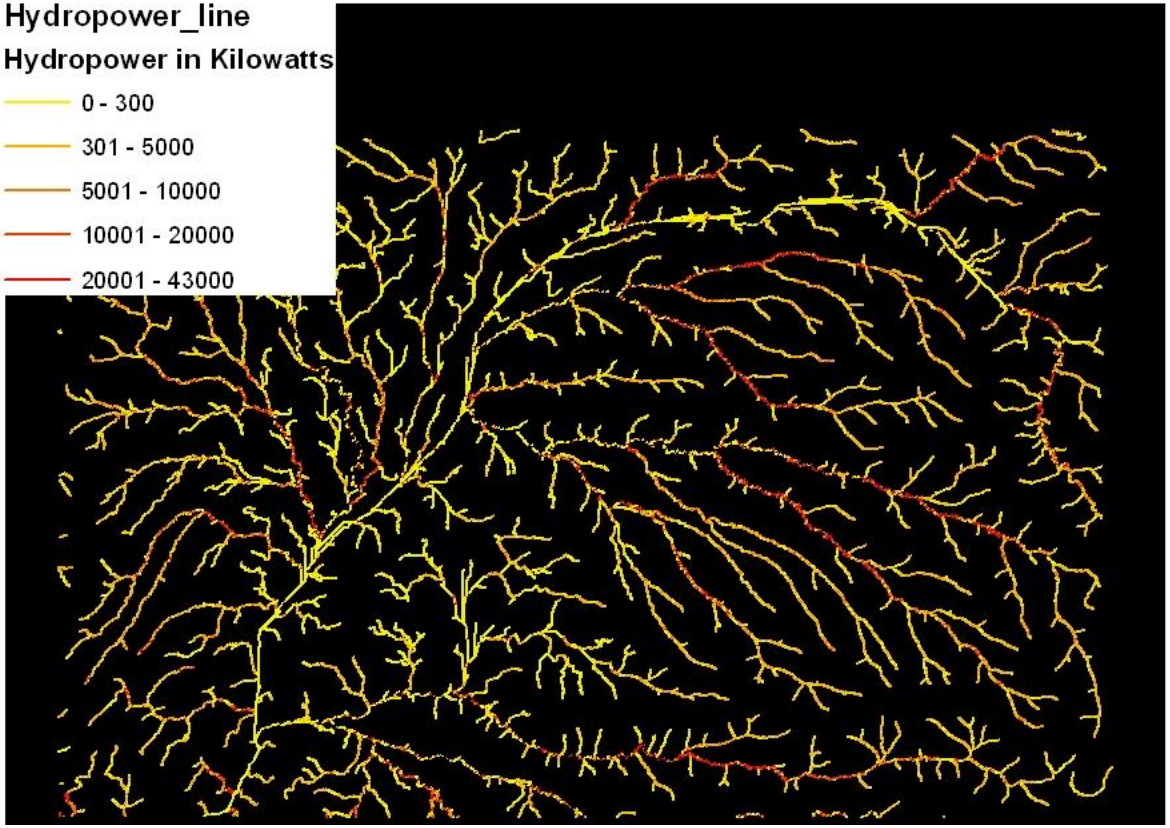
Hydropower Potential Estimation

Power $[L^2 \cdot M \cdot T^{-3}]$ = Head [L] * Q $[L^3T^{-1}]$ * p $[ML^{-3}]$ * g $[LT^{-2}]$ * 0.001

P is hydropower potential in Kilowatts (KW)
H is head in m
Q is flow in m^3/s
p is water density of 1000 kg/m^3
g is gravitational acceleration of 9.81 m/s^2

(Asante et al, 2007)

Stream discharge and hydropower potential



Interaction between Congo River Basin hydrology and carbon stocks and fluxes within the Basin and beyond

The amount of runoff volume produced on the surface is related to carbon flux to the atmosphere

Freshwater inputs from large rivers [such as the Congo] significantly impact the oceanic carbon cycle in the tropical Atlantic

One of the most successful project types in the carbon market to date has been hydroelectricity