Increasing the spatial resolution and accuracy of precipitation data within the SWAT model through the incorporation of CHIRPS data

ALYSSA LE

NARCISA PRICOPE

UNIVERSITY OF NORTH CAROLINA - WILMINGTON

# Soil and Water Assessment Tool (SWAT) Model





• 29 subbasins



Nzoia Basin, western Kenya



 358 Hydrologic Response Units





## **Most Prevalent Soils**



**FAO Soil Classification** 

# Soil and Water Assessment Tool (SWAT) Model

One of the most widely used hydrologic models for the determination of climate change impacts on water balance, streamflow, and sediment and nutrient transport (Gassman et al., 2012)



Required on a daily time step, often unavailable in data scarce regions. Data unavailability frequently cited in upper Nile basins. (Griensven et al., 2012)

# Previous Work

## Armanios and Fisher, 2014

- Entirely remotesensing –based hydrologic budget
- Rufiji Basin, Tanzania
- Long-term policy, not real-time management

## Khan et al., 2011

- Hydroclimatology of Lake Victoria
- TRMM data
- Use within the CREST hydrologic model

# Serrat-Capdevila et al., 2014

 Equal or inferior in performance to simulations with few ground-based rain gauges

## Station Locations

(University of Santa Barbara Climate Hazards Group)

Station Name	Years of Complete Records
Kitale/Kitae	7
Kitale	14
Kakamega	11
Eldoret	12



Climate Forecast System Reanalysis Locations

(National Centers for Environmental Prediction)

 38 kilometer horizontal resolution

✤ 30 locations



Climate Hazards Group InfraRed Precipitation with Station (CHIRPS) Station Locations

 30-year rainfall dataset that combines satellite imagery with in situ station data

825 stations



# **Comparison of Precipitation Inputs**



# CFSR Data Accuracy



#### SENSITIVE PARAMETERS

- Groundwater delay time
- Baseflow alpha factor
- SCS runoff curve number
- Soil available water capacity
- Groundwater revap coefficient

# CHIRPS Data Accuracy



# References

Armanios, D. E., & Fisher, J. B. (2014). Measuring water availability with limited ground data: assessing the feasibility of an entirely remote-sensing-based hydrologic budget of the Rufiji Basin, Tanzania, using TRMM, GRACE, MODIS, SRB, and AIRS. *Hydrological Processes, 28*, 853-867. doi:10.1002/hyp.9611

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