

# Drought and Agricultural Productivity Assessment and Prediction System with DSSAT Crop Modeling

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**JPL/CALTECH**



# Objectives

Provide crop productivity information (mid term forecast) to the agricultural communities served by the SERVIR

We propose to forecast model crop outputs in progression of cropping season for optimal results

# Why Model?

Use for manipulation and experiments that are impractical, too expensive, too lengthy or impossible (in real-world social and economic systems)

Identify best management practices and strategies (through optimization)

Study long term affects and options (predictions and projections)

Allow to control environmental and experimental conditions

Allow hypothetical and exploratory situations to be investigated

Allow insight to be gained into the relative importance of different variables and parameters

# What can models produce?



## "Predictions"

- Point prediction: temperature tomorrow
- Behaviour: trends, patterns in Nairobi e
- Differences: system response with/without an intervention

# Crop Modeling: A complicated system ...

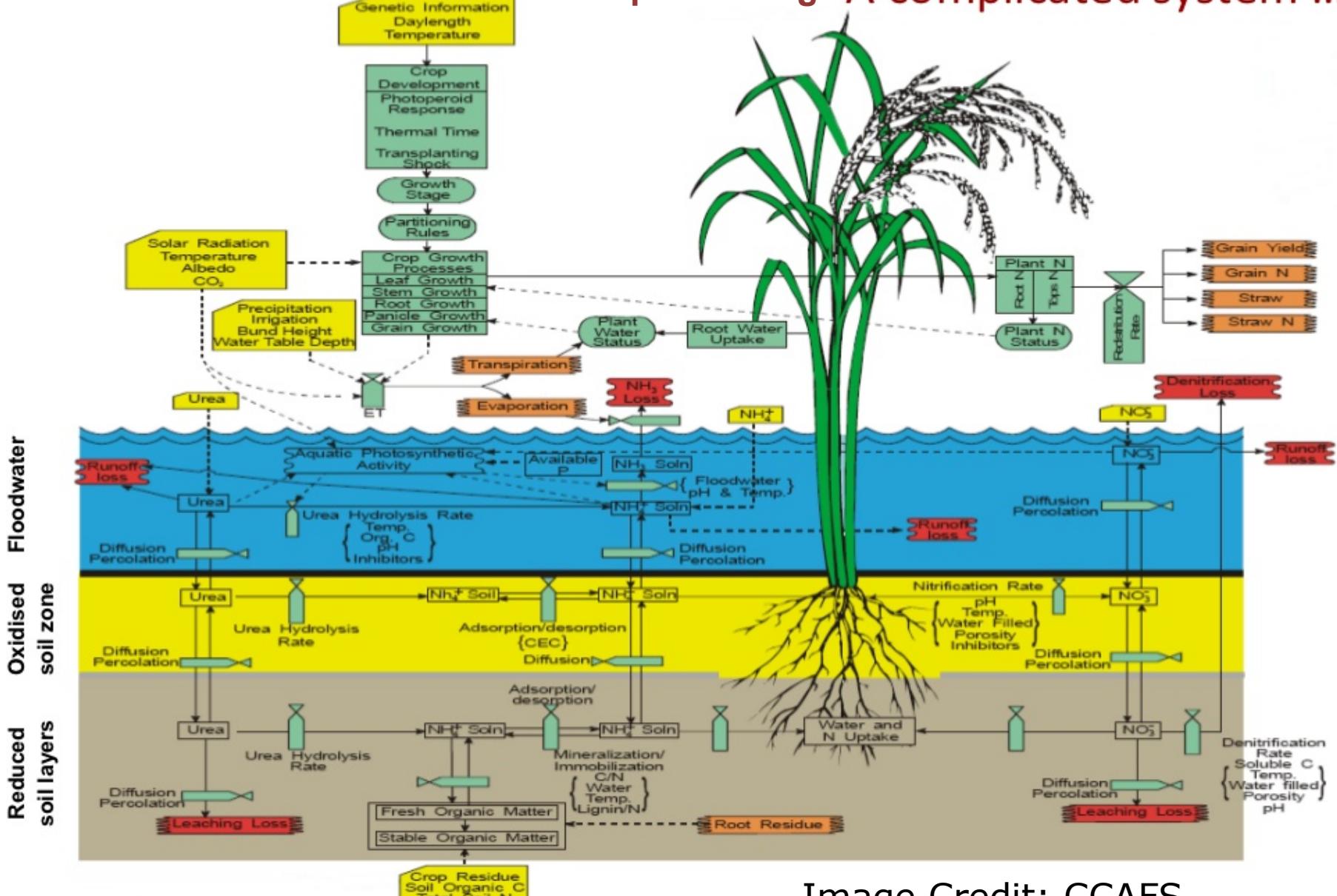
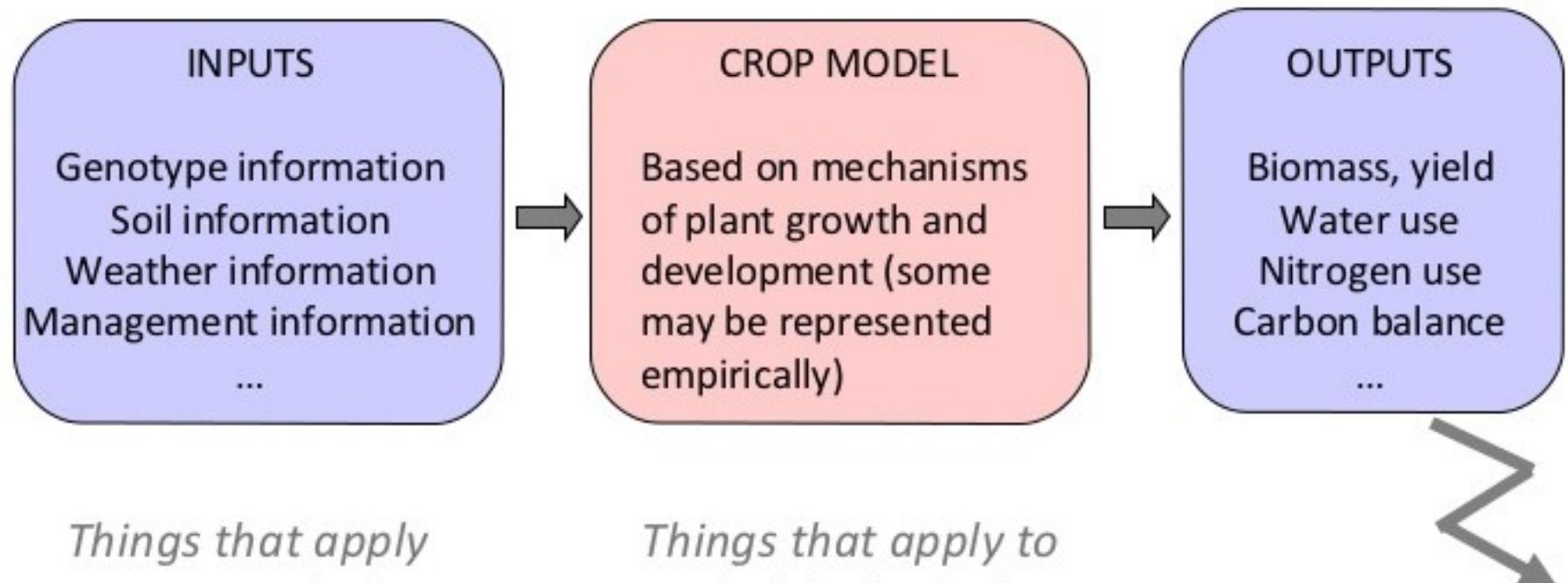


Image Credit: CCAFS

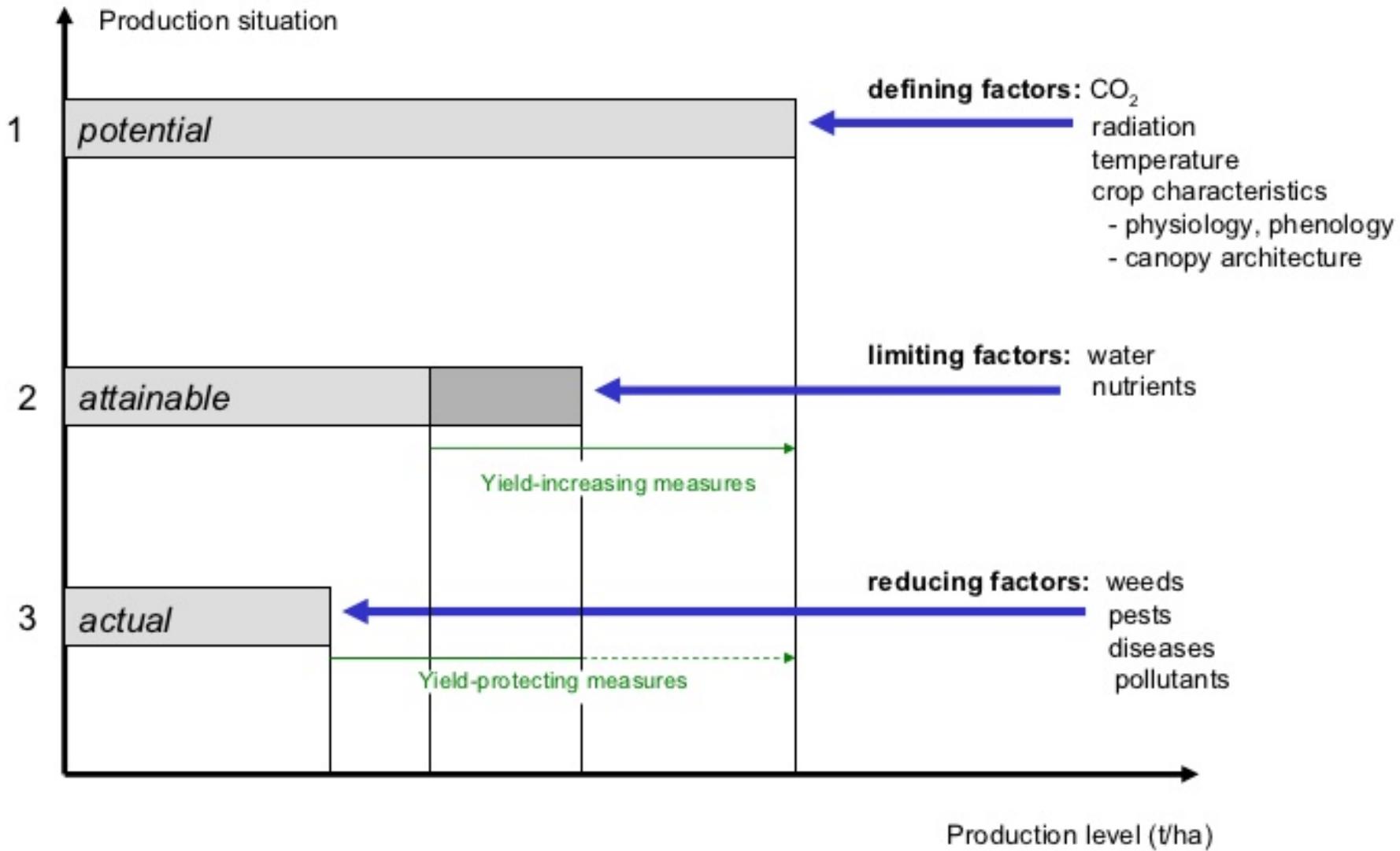
... but it can be modelled to a useful extent

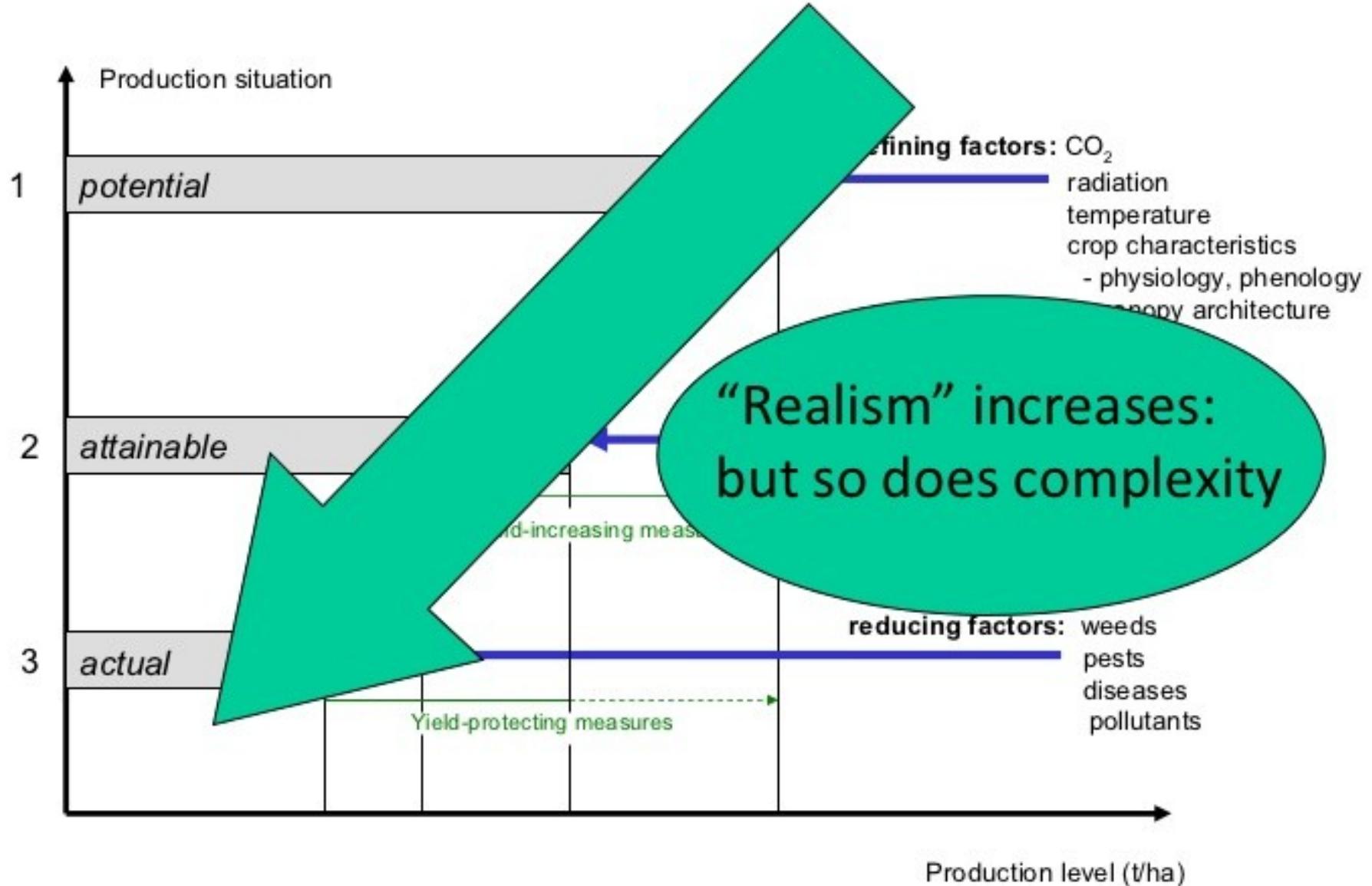


*Things that apply  
to one particular  
situation (e.g. a  
field plot)*

*Things that apply to  
the biophysical  
world in general*

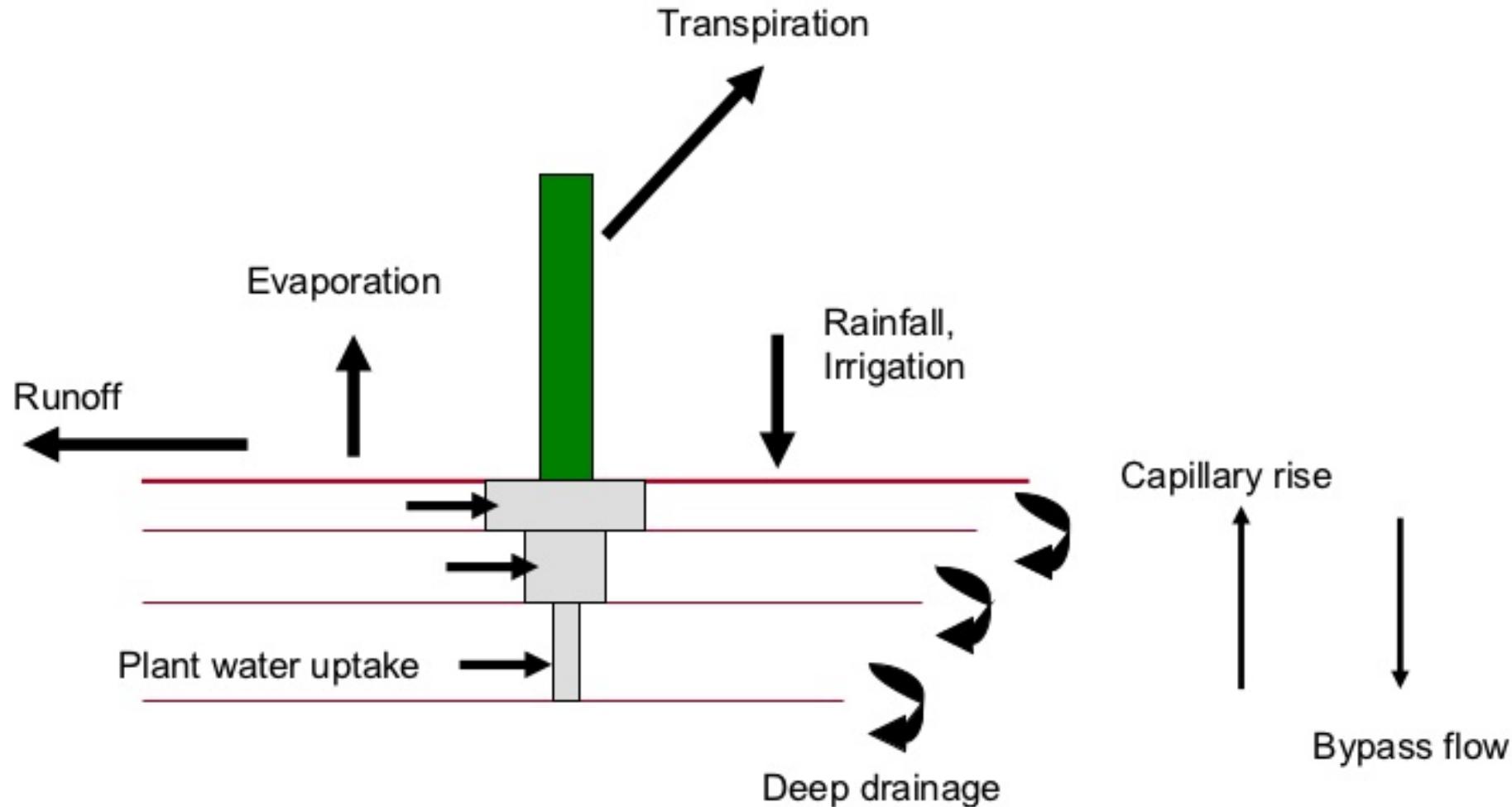
Use in  
some way





Crop modelling is 50 years old: some of it is “mature science”

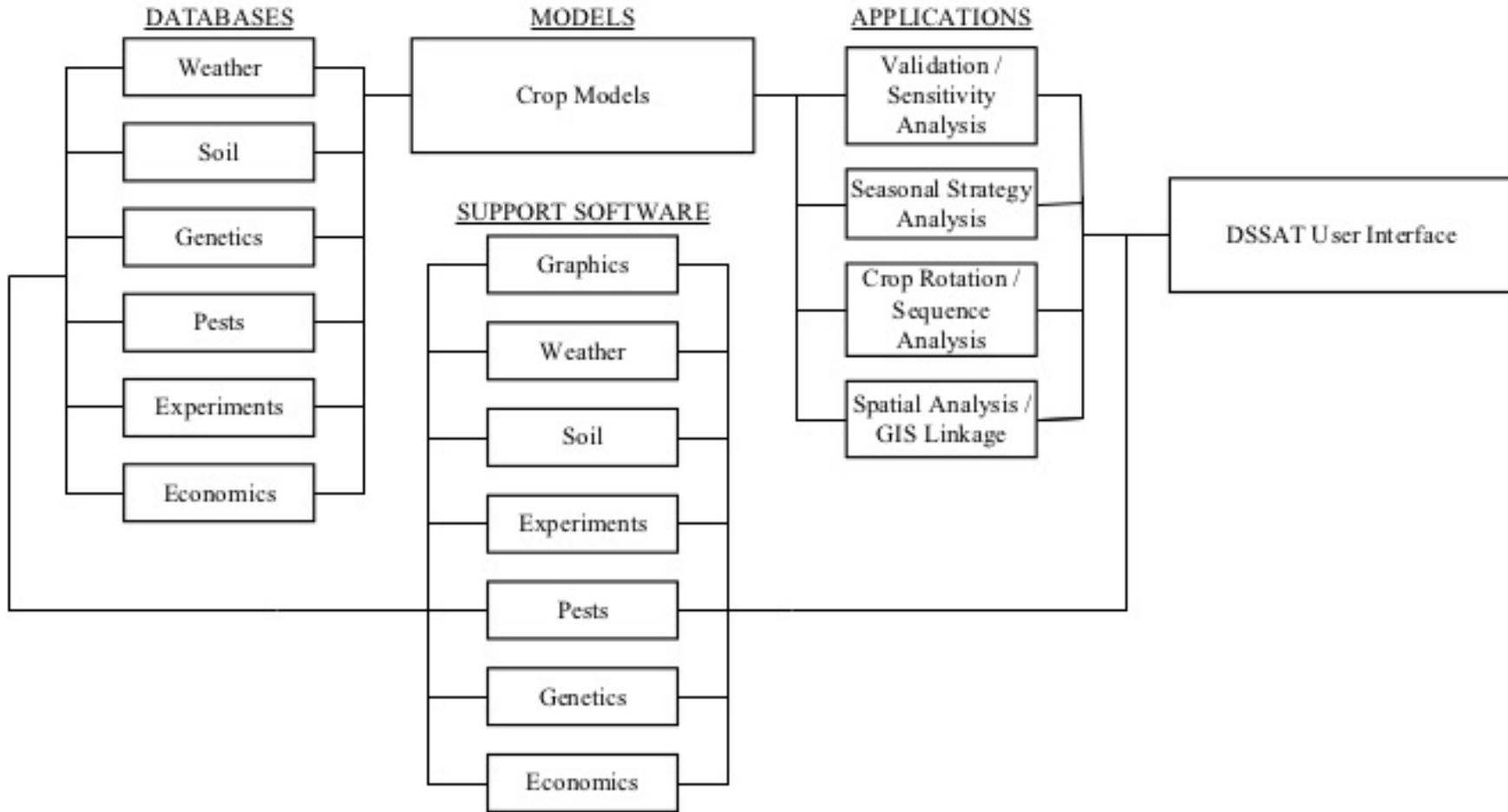
Crop model water balance in a layered soil (from late 1970s): Ritchie's tipping bucket



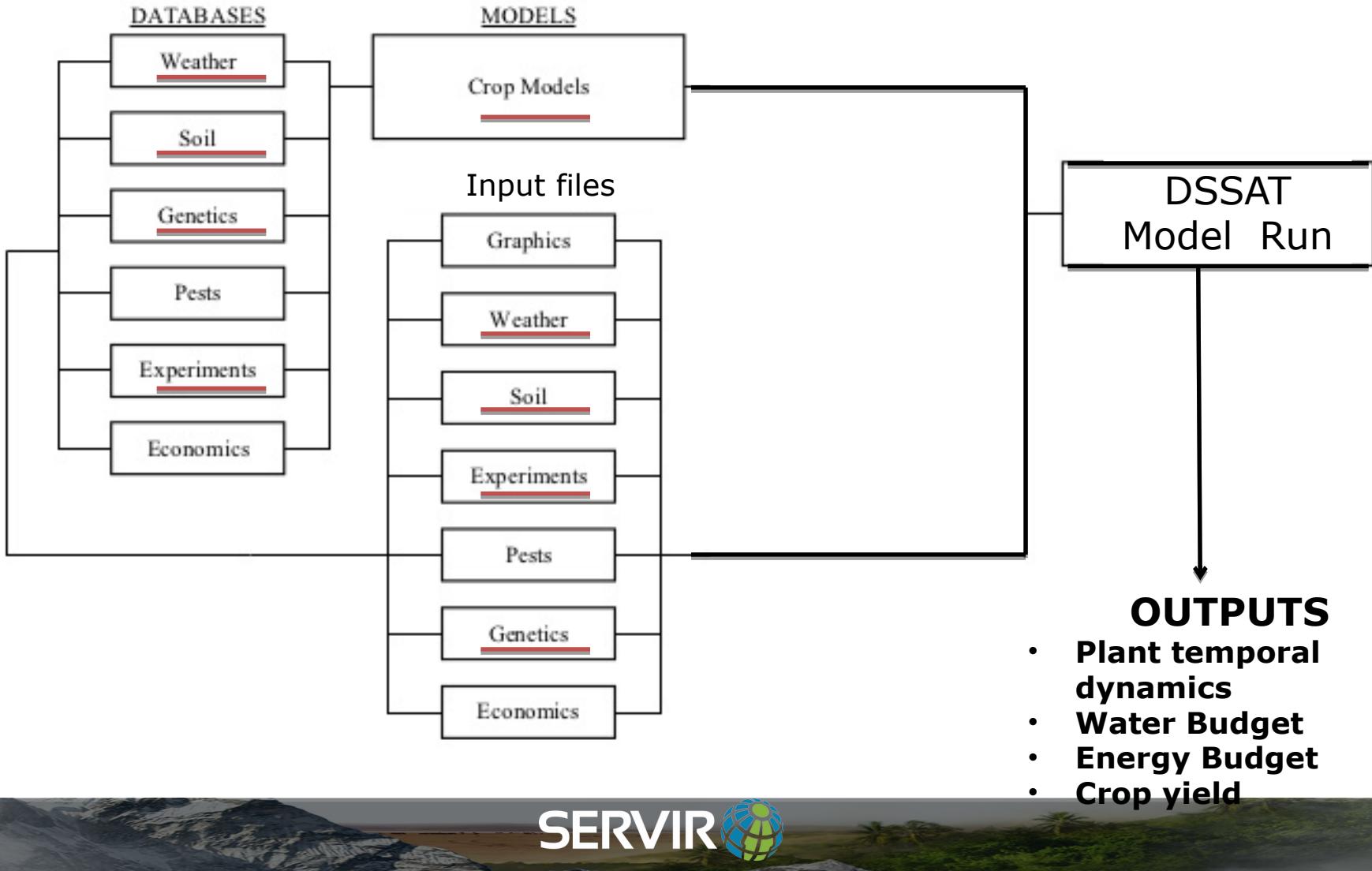
**DSSAT**  
**Decision Support System for**  
**Agrotechnology Transfer**

Image Credit: CCAFS

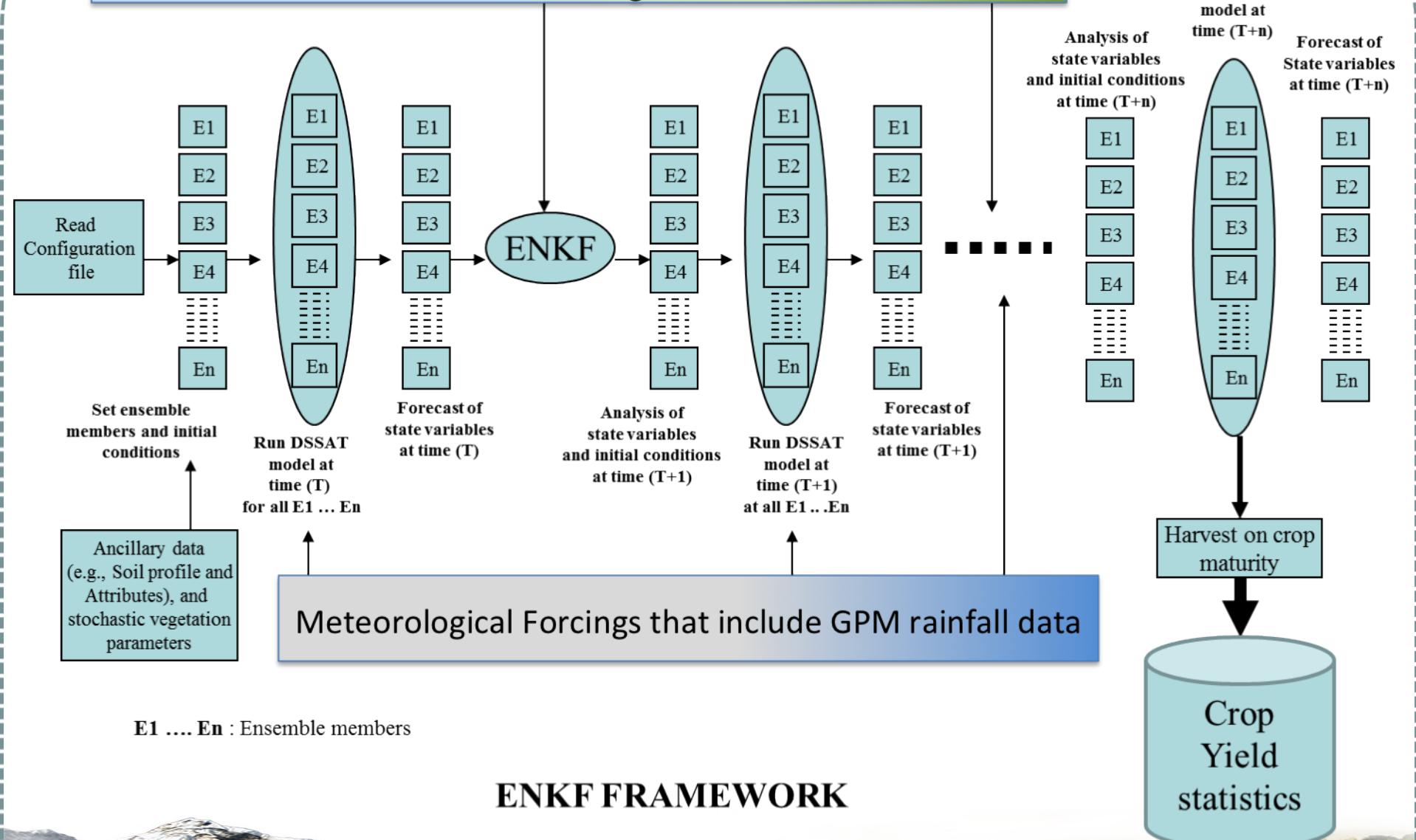
# Components of DSSAT



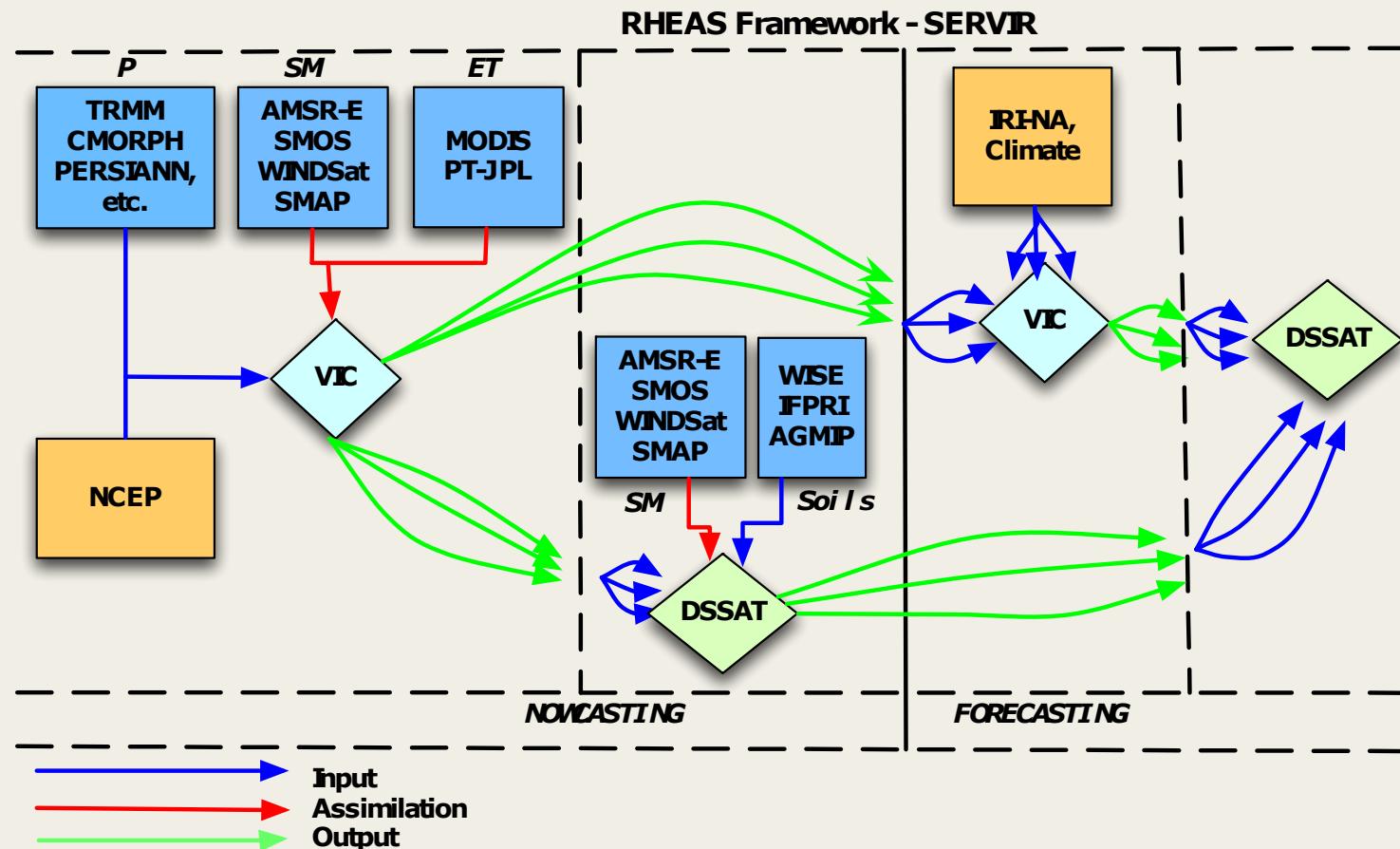
# Components of DSSAT



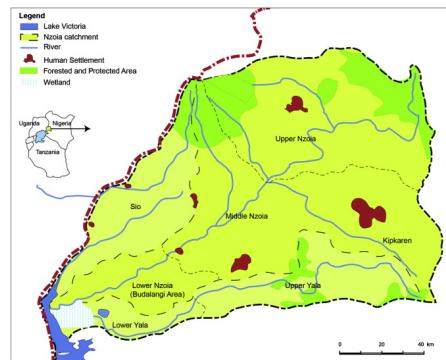
## SMAP high resolution soil moisture and radar backscatters, and MODIS-based vegetation attributes



# Provide SERVIR-Africa with linked drought and crop productivity nowcasts and forecasts.



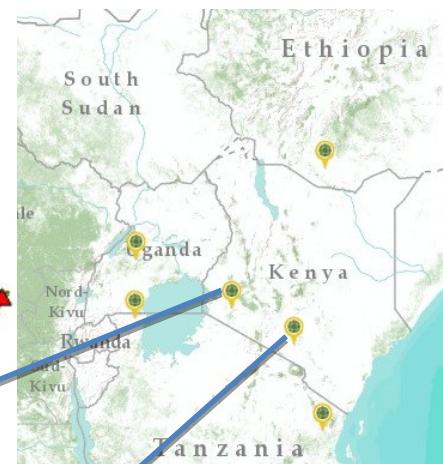
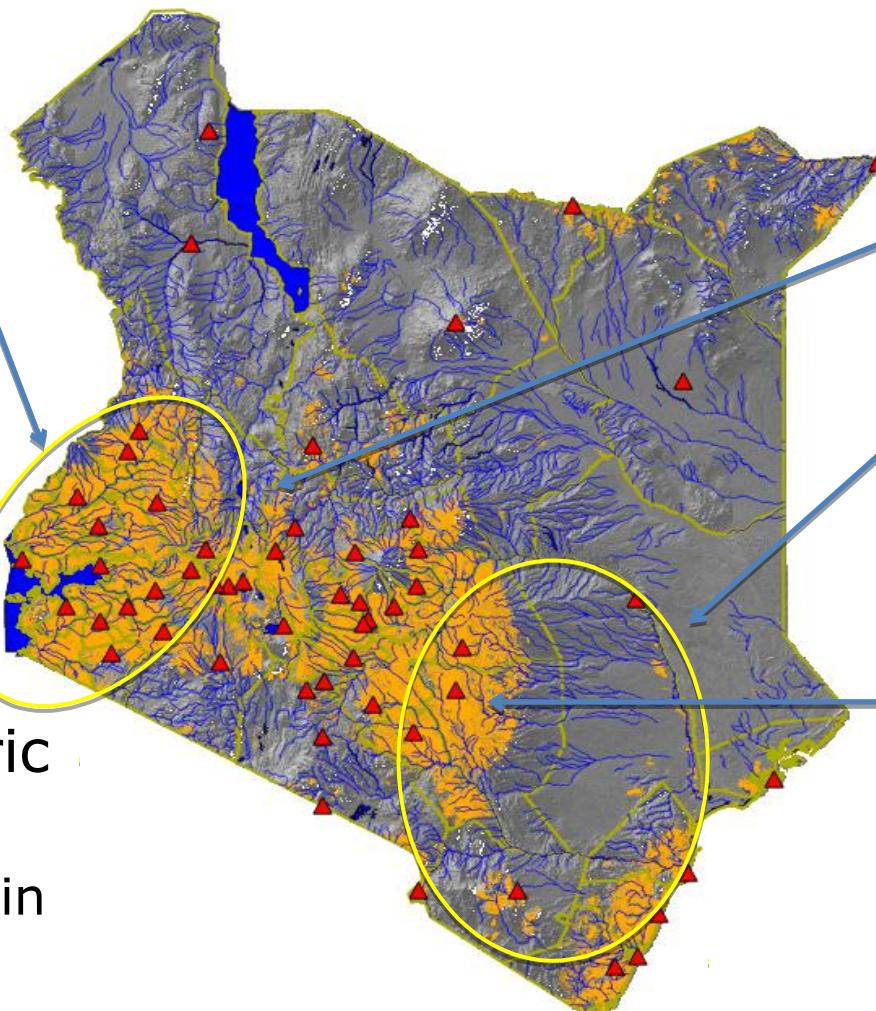
# Nzoia Pilot Study



Nzoia River Basin

Initial focus on  
Kenyan  
watersheds/agric  
ulture

1. Nzoia/Yala Basin
2. Upper Tana

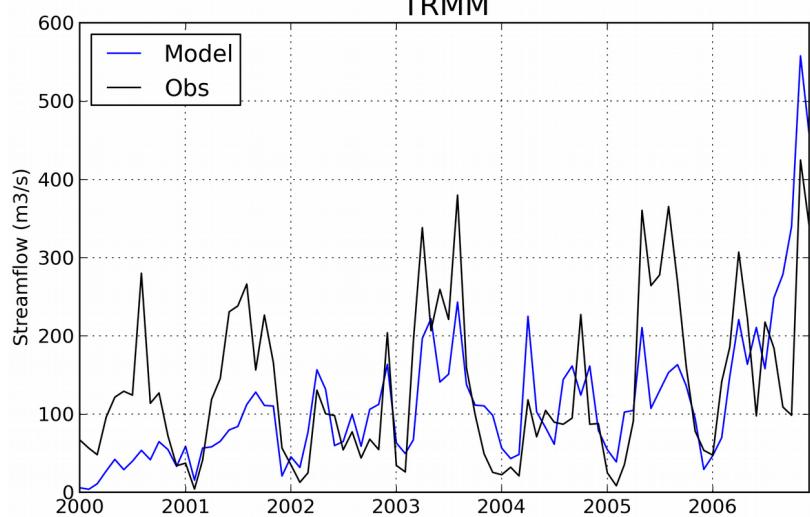
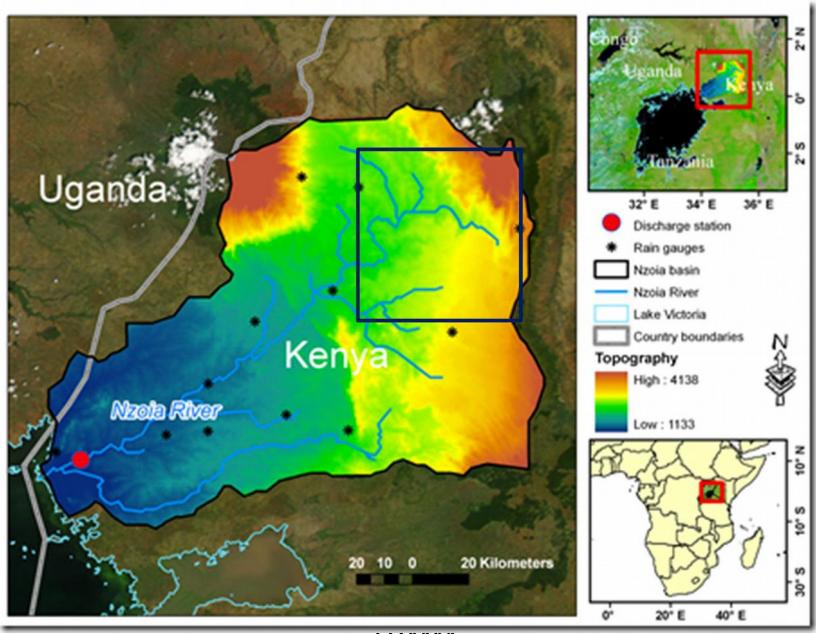


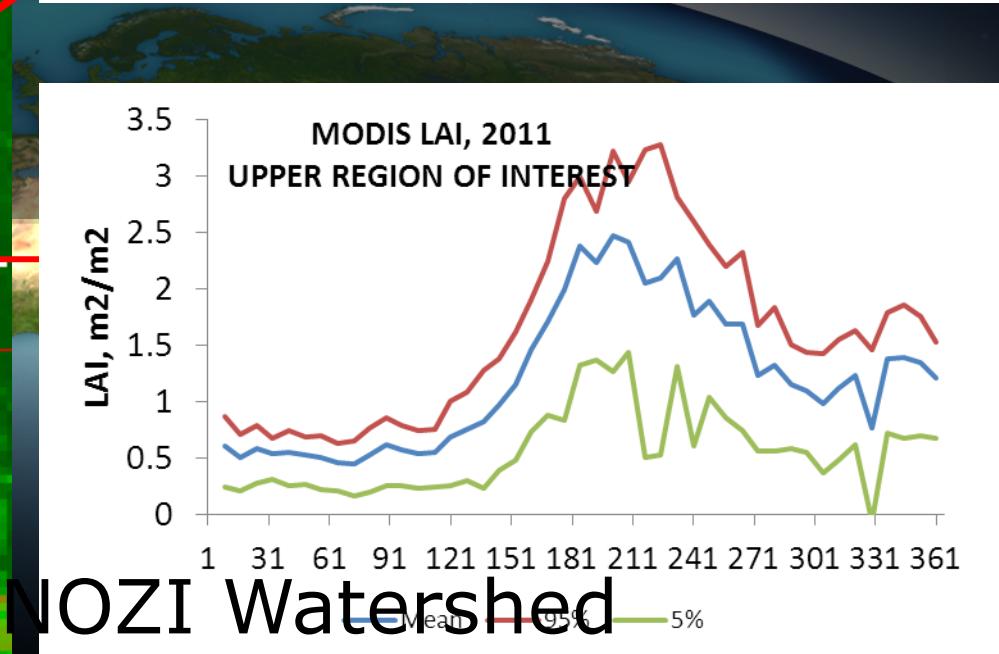
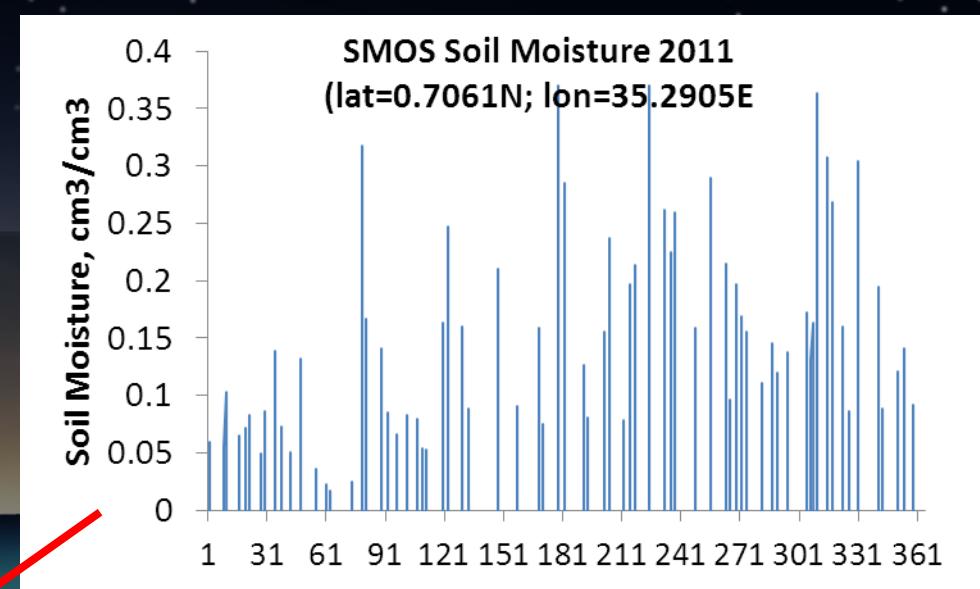
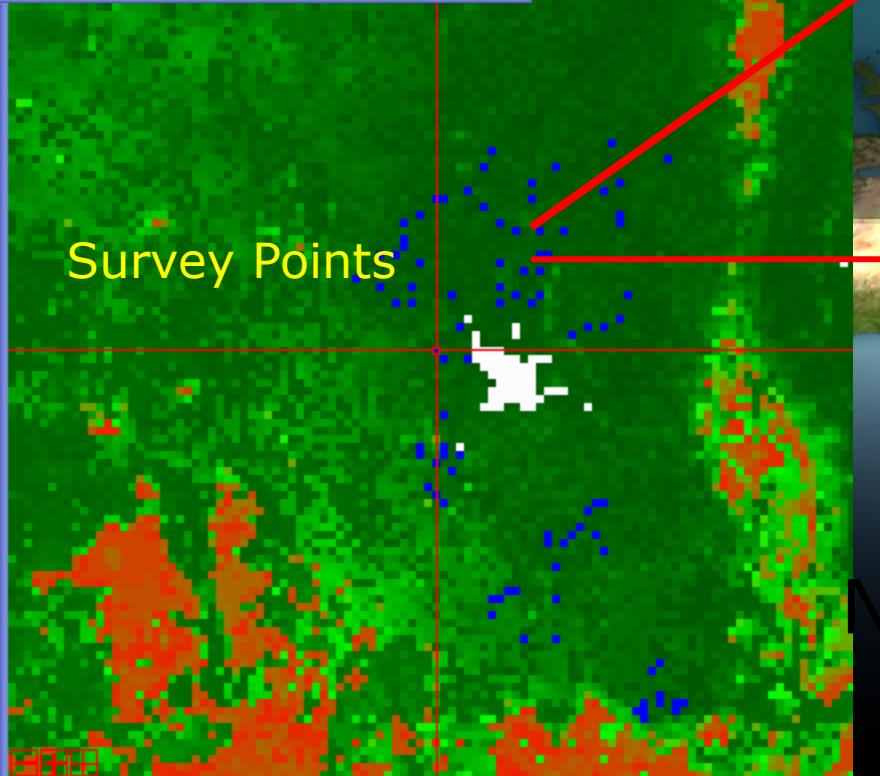
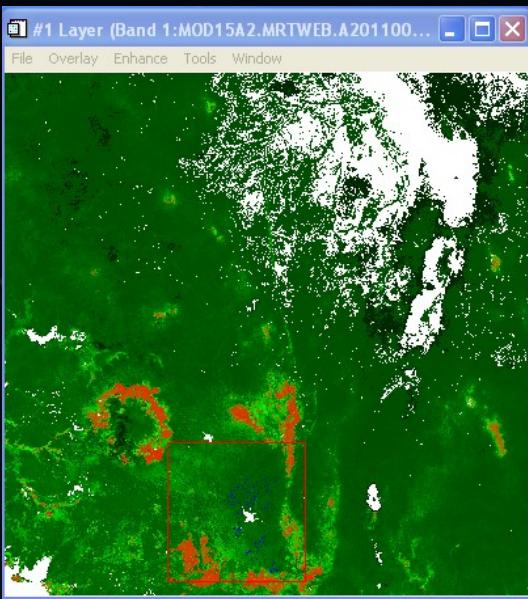
CCAF  
Research  
Stations



Tana River

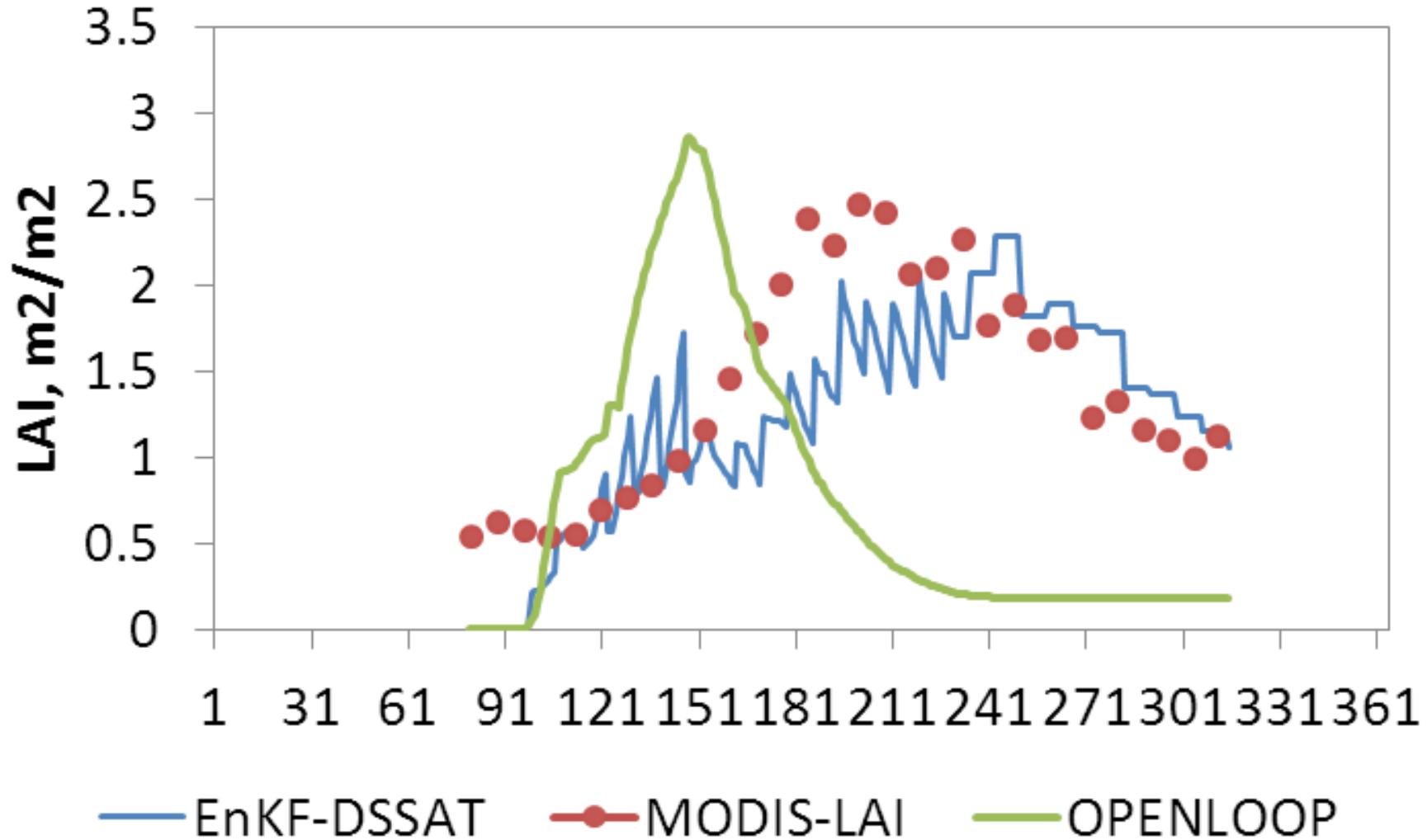
# Nzoia Study



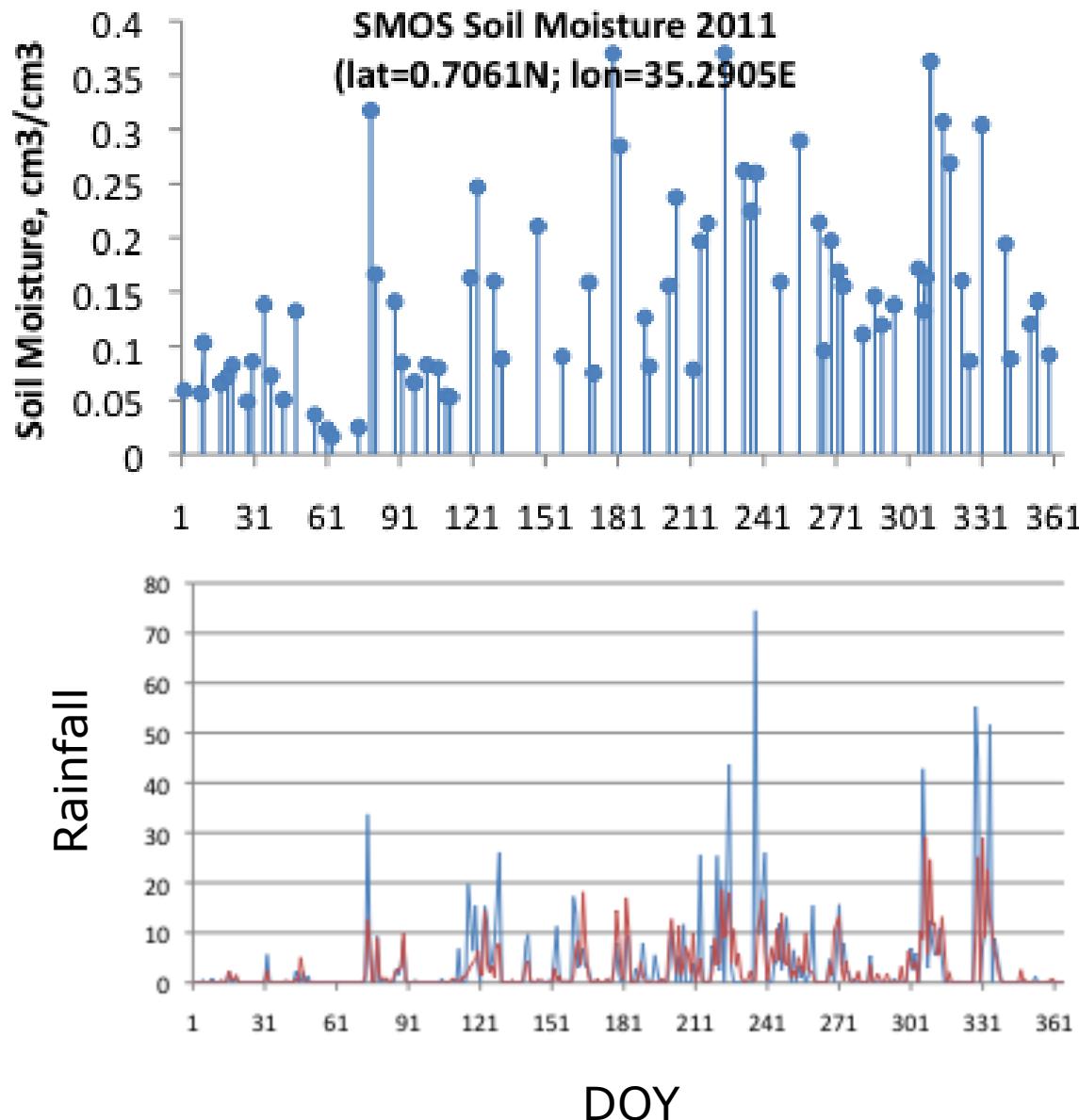


NOZI Watershed

Nzoia Watershed



NOTE: IMPROVE CLIMATE INPUTS; CROP MODEL PARAMETERS;  
FURTHER TESTING AND EVALUATION NEEDED; THIS IS JUST PRELIMINARY TEST RESULTS



The End

Thank you!  
Feedback, comments,  
suggestions are appreciated.

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