

# Opportunities and challenges for seasonal prediction in the GHA



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**JOHNS HOPKINS UNIVERSITY**

# Key Themes



- **Regionalization**
- **Forecast Evaluation**
- **Lead time vs. skill**
- **Emerging tools**

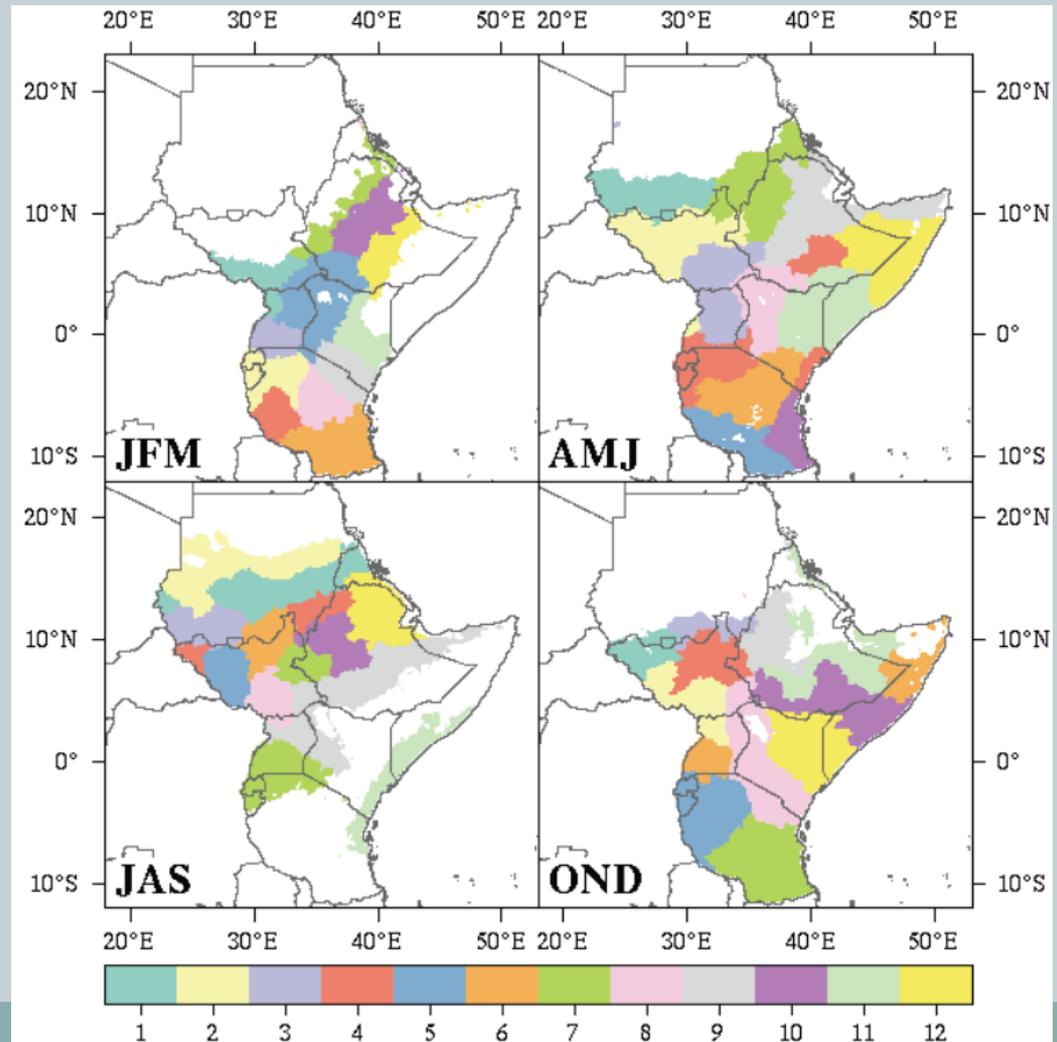
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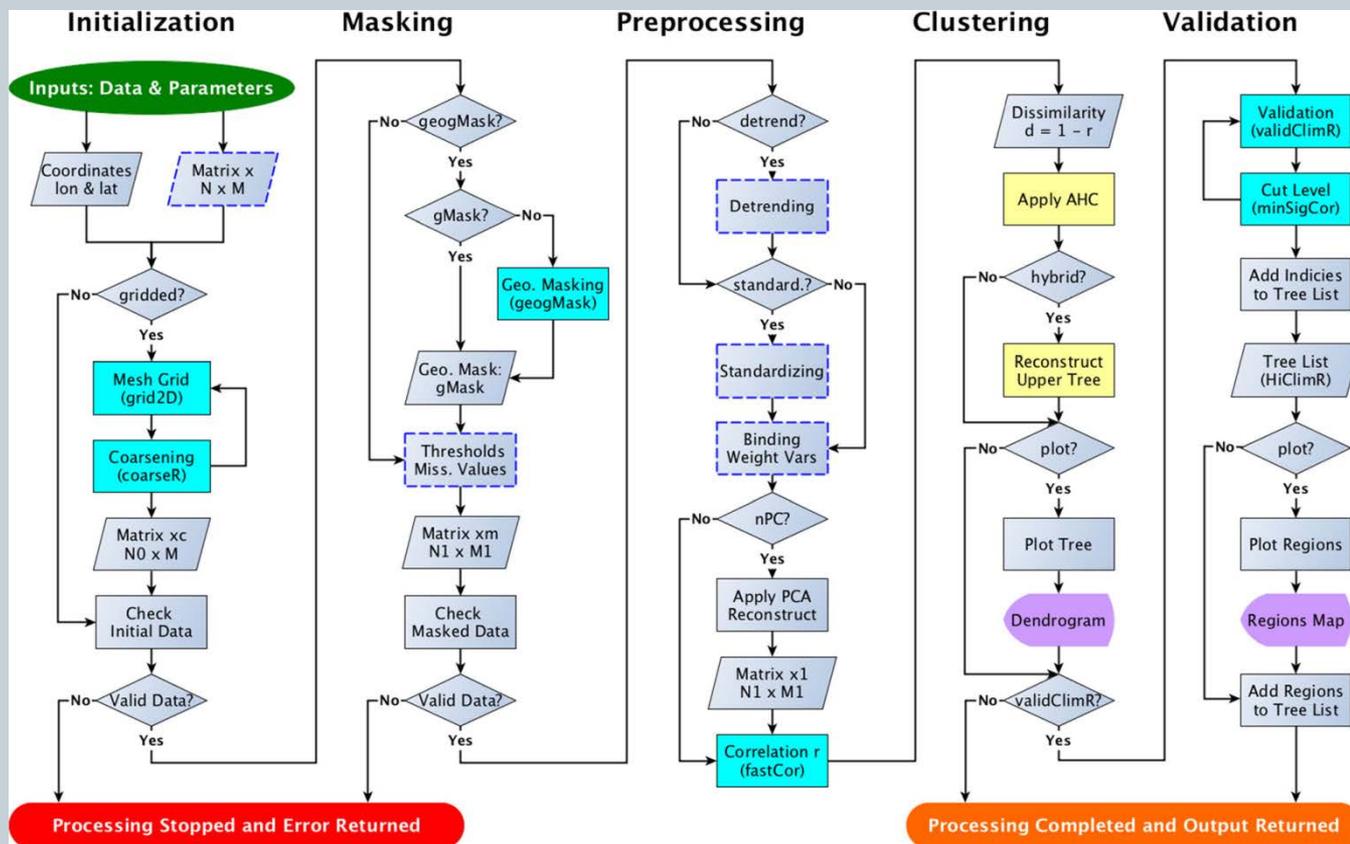
# Regionalization

- A critical step for generating statistical forecast models
- Also critical for interpreting and evaluating dynamical models

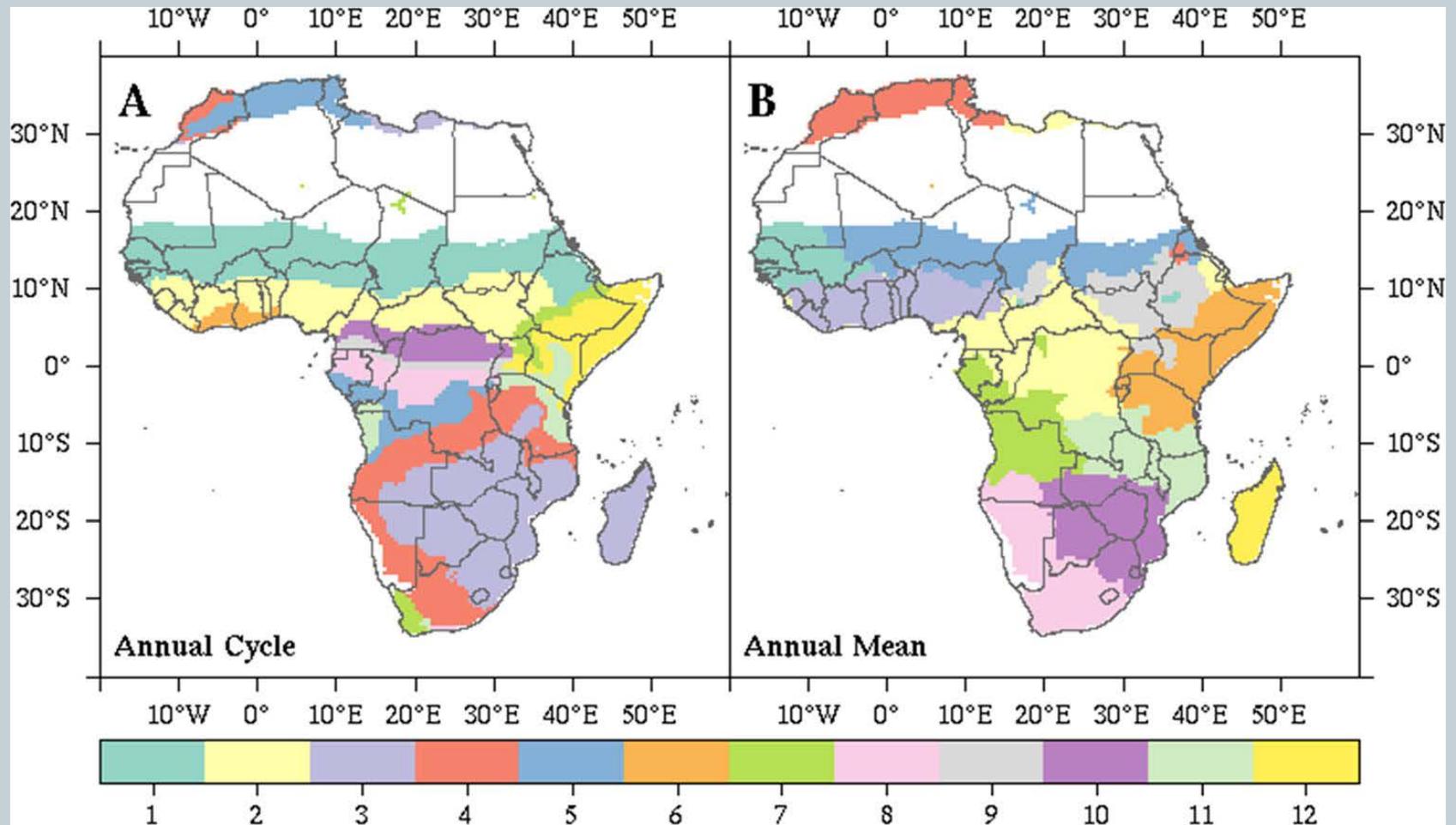


# Regionalization

- The Hierarchical Clustering in R (HiClimR) open source regionalization tool is now available.



# Regionalization



# Key Themes

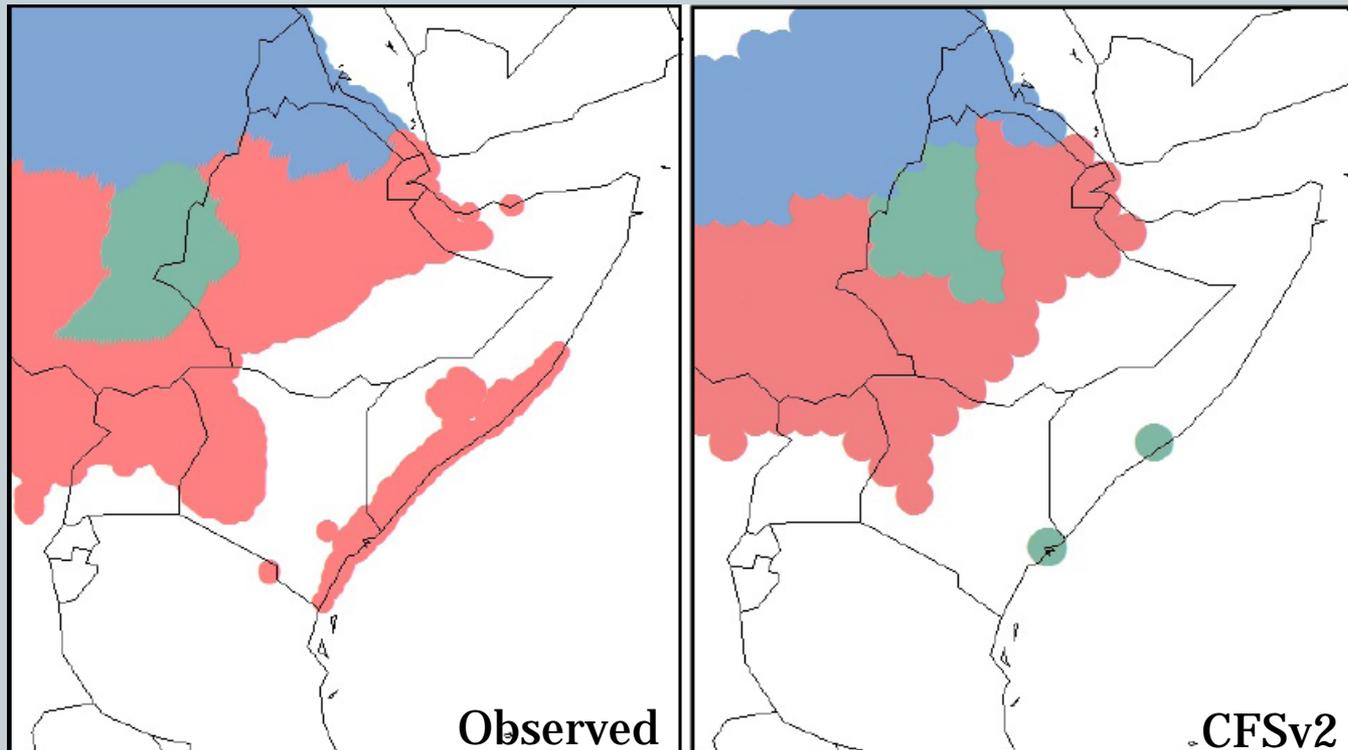


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# Evaluation



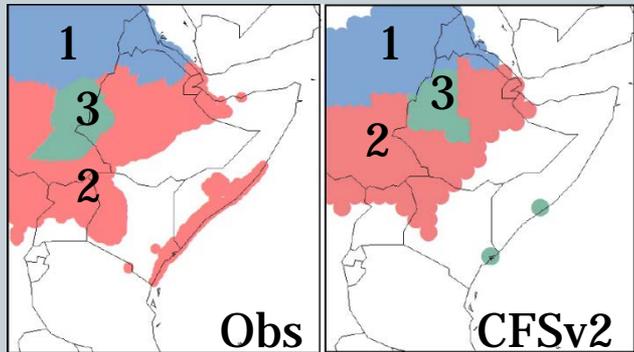
- In some months, CFSv2 produces regions that resemble observations.



# Evaluation

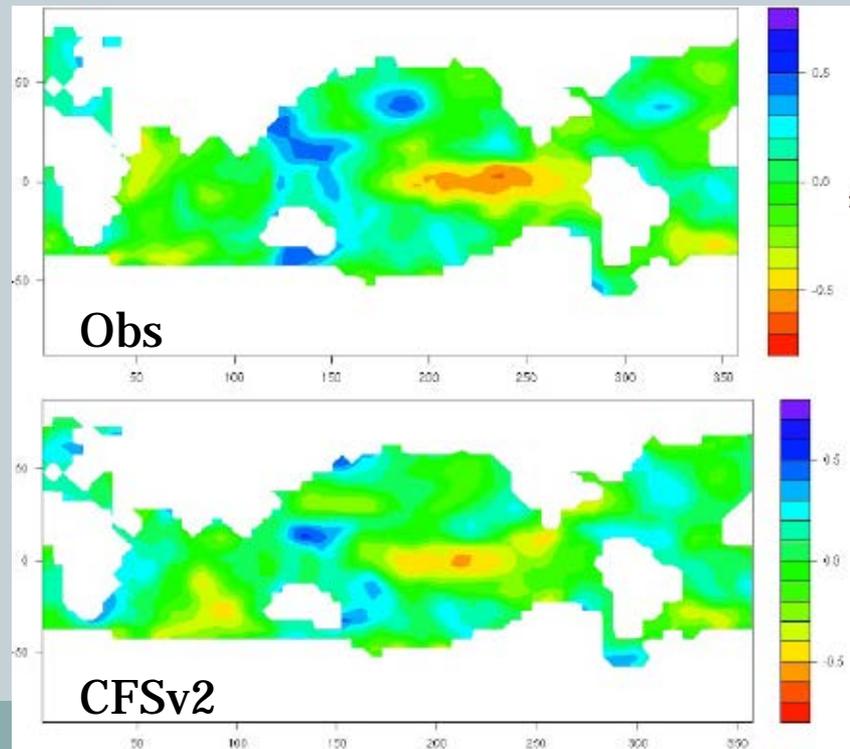


- However, correlations between precipitation and global sea surface temperature are problematic.



**Correlation = 0.52**

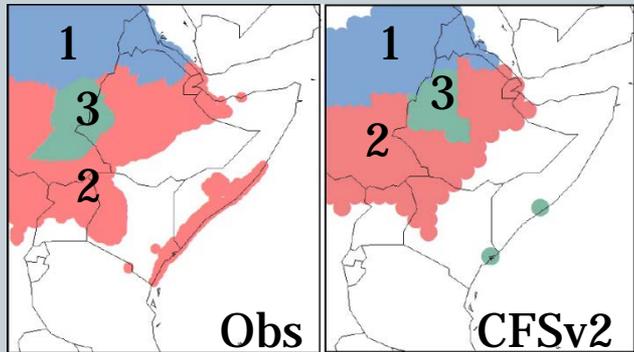
## Region 2: SST Correlation



# Evaluation

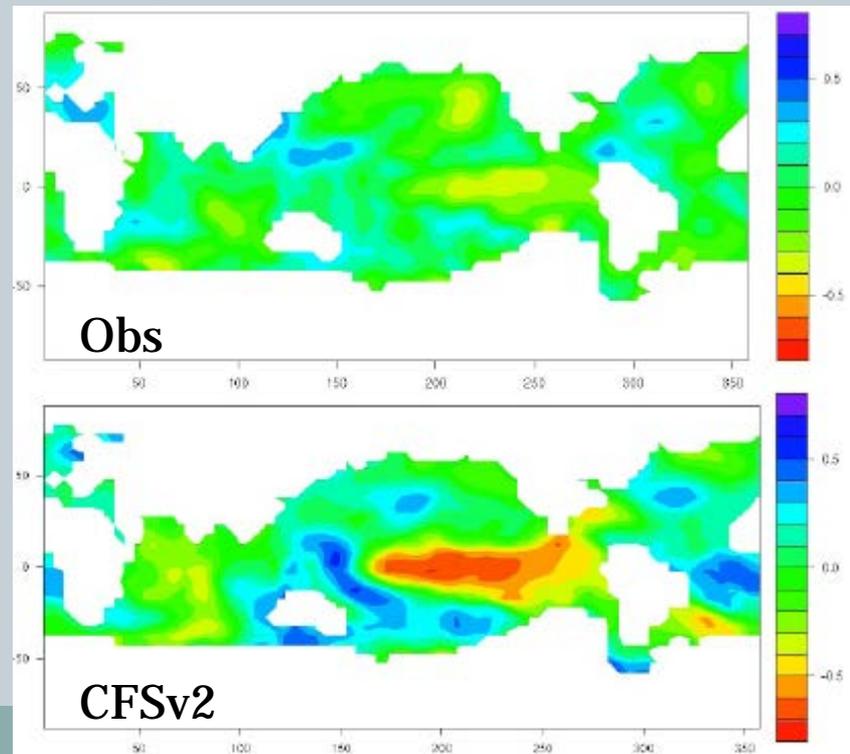


- However, correlations between precipitation and global sea surface temperature are problematic.



**Correlation = 0.22**

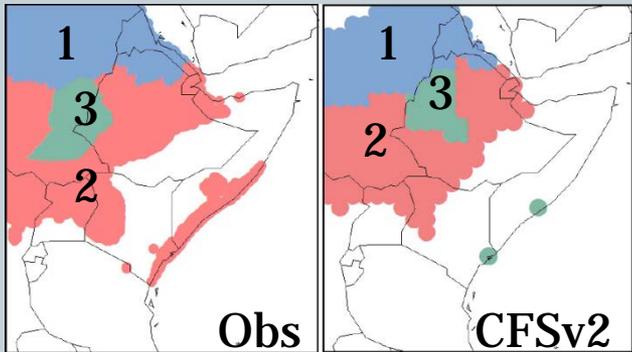
## Region 1: SST Correlation



# Evaluation

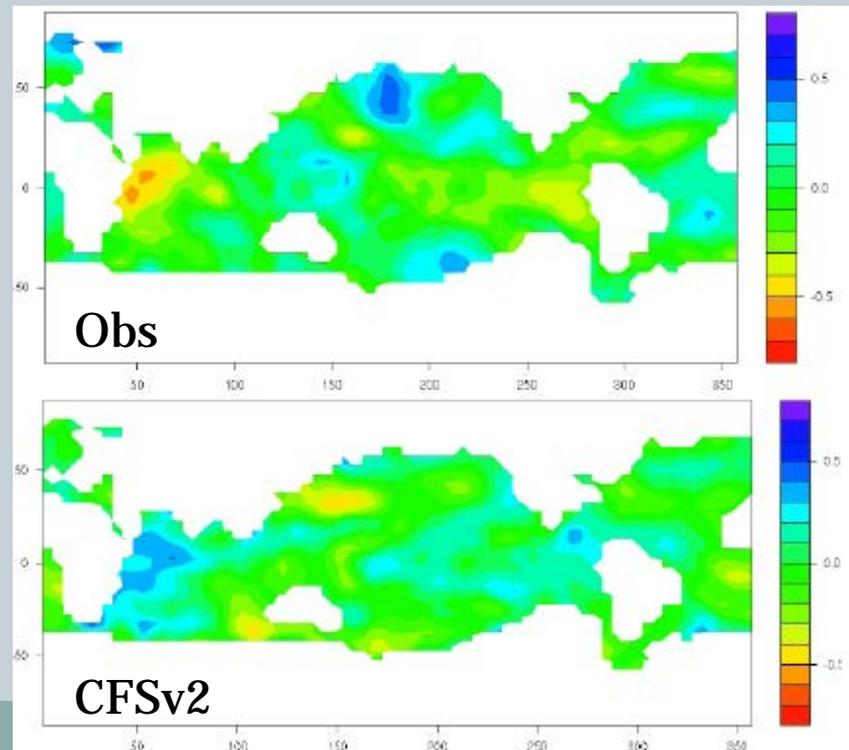


- However, correlations between precipitation and global sea surface temperature are problematic.



**Correlation = 0.16**

## Region 3: SST Correlation

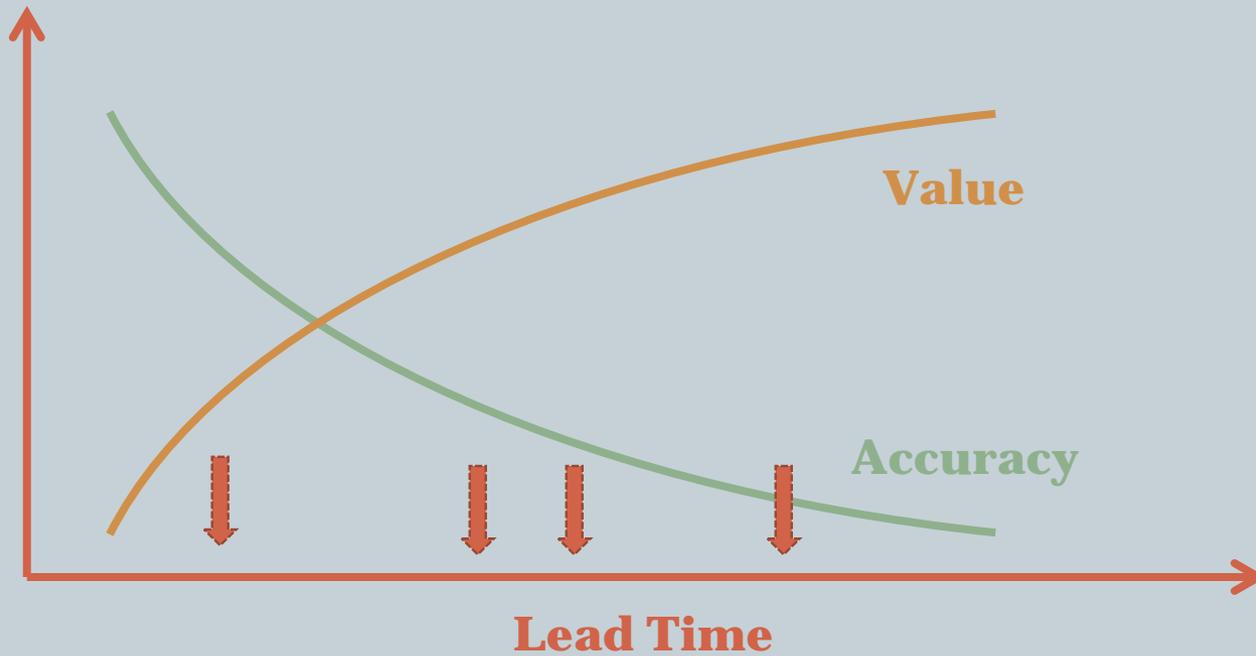


# Key Themes

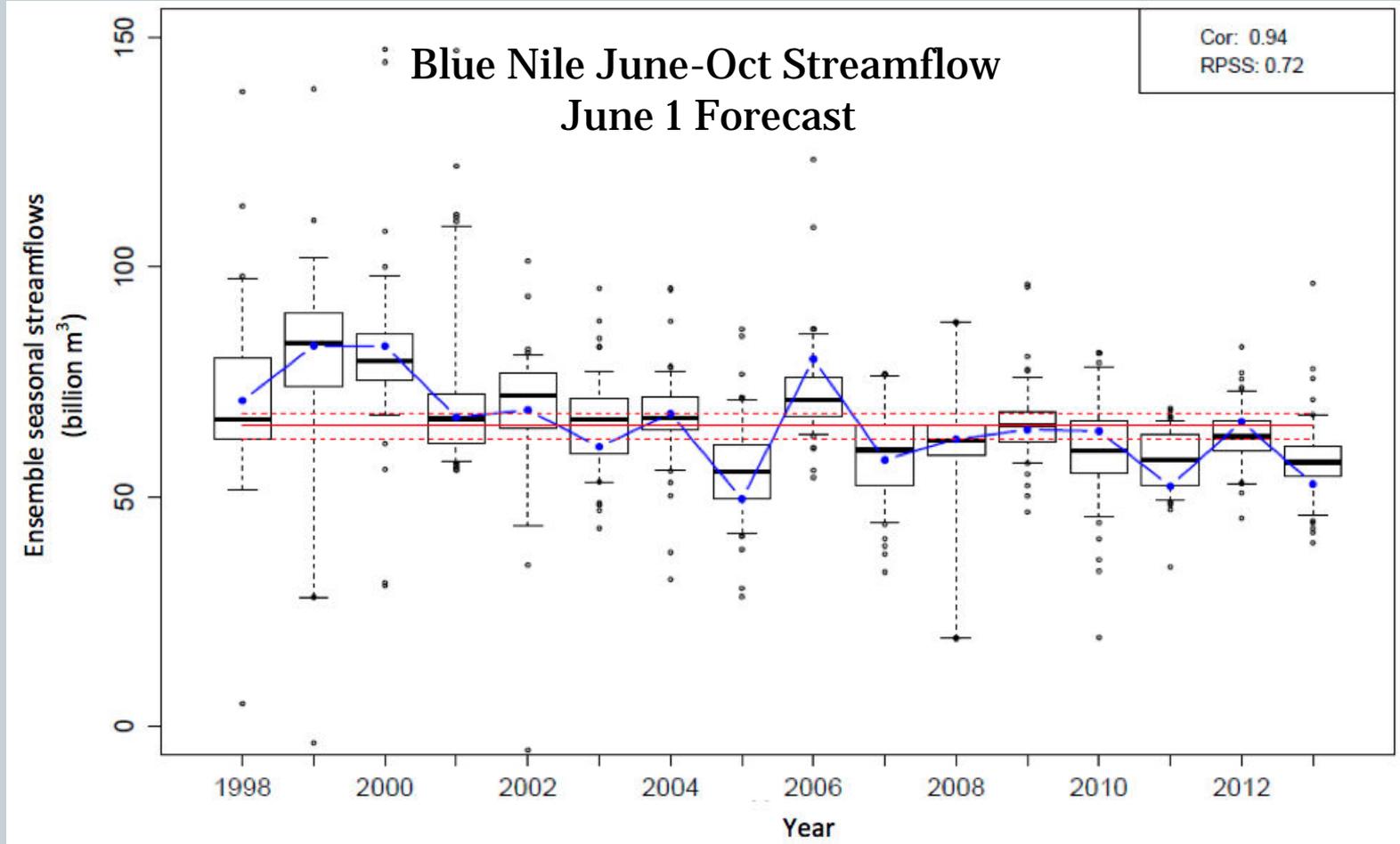


- Regionalization
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- **Lead time vs. skill**
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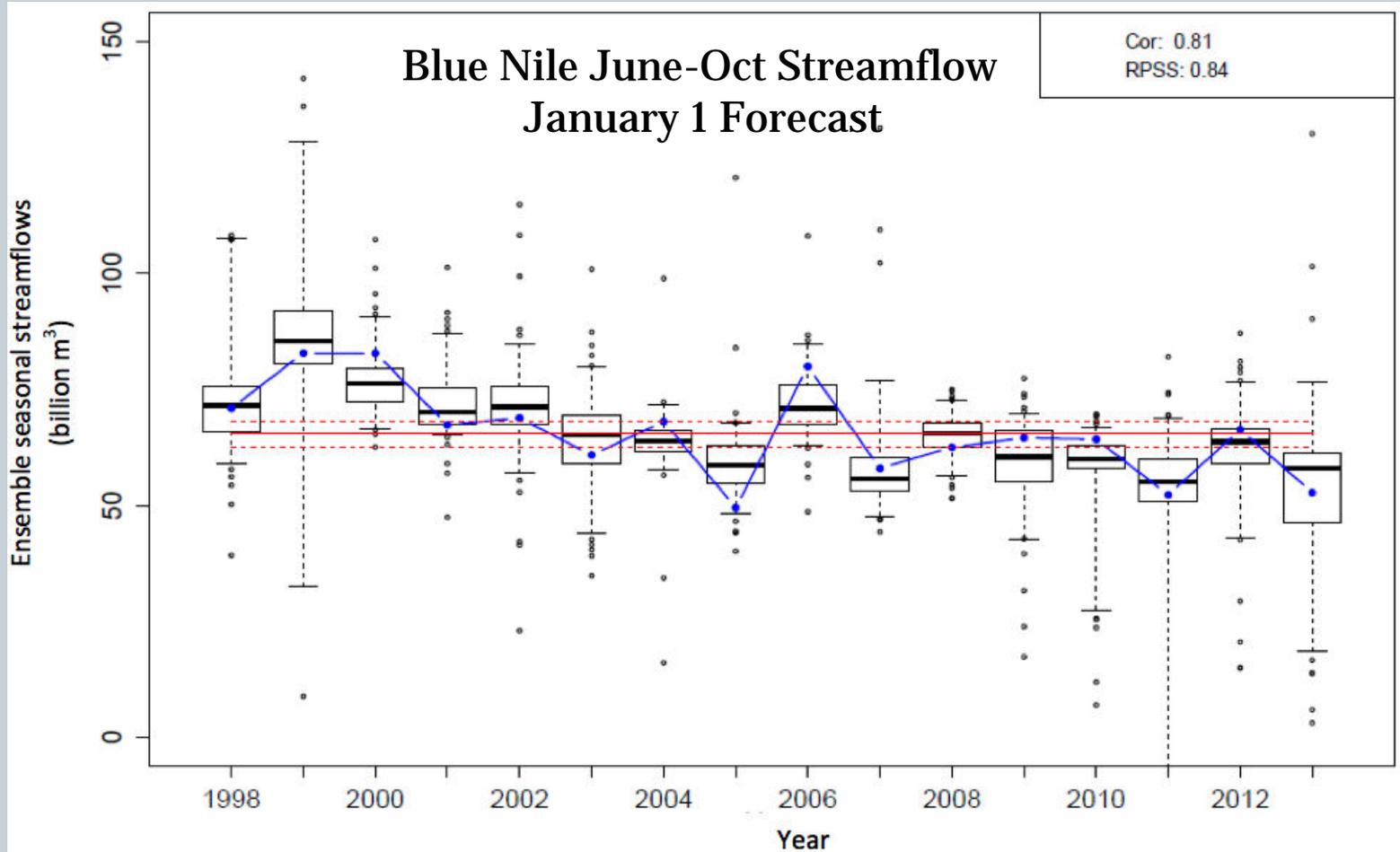
# Lead time vs. skill



# Lead time vs. skill



# Lead time vs. skill



# Key Themes



- Regionalization
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- **Emerging tools**

# Emerging Tools: Interactive Forecasts



## *Predictand*

## *Upload Predictand*

No file selected.

**Starting year & month  
(yyyy-mm):**

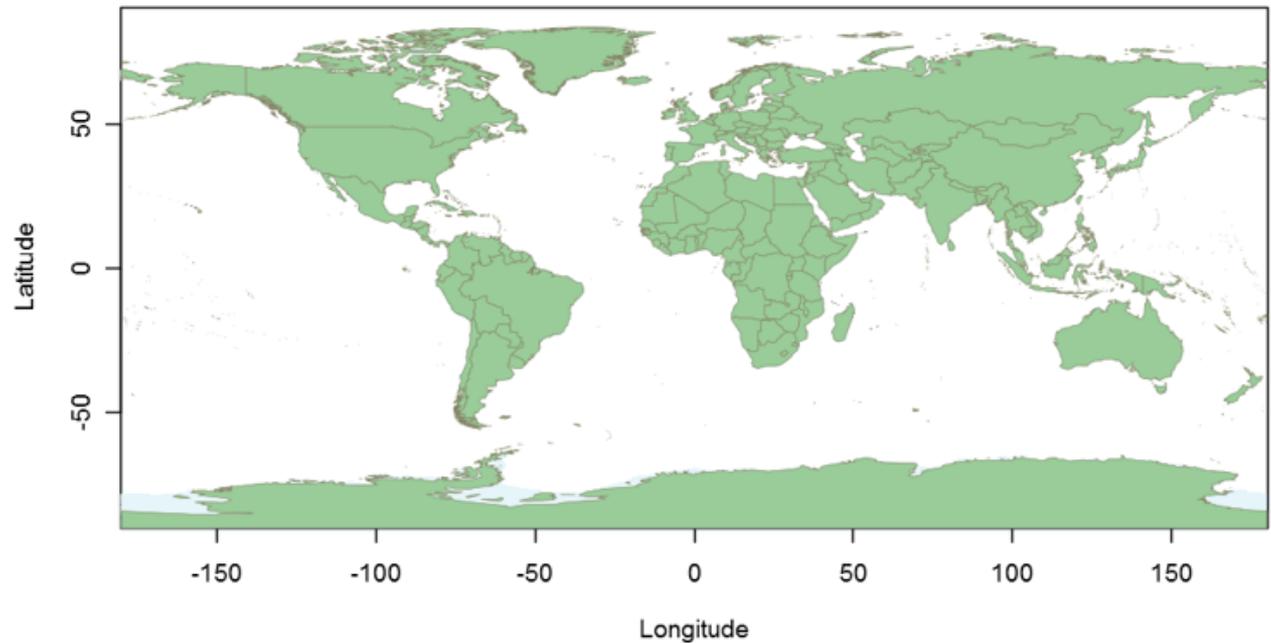
1948-01

**Ending year & month  
(yyyy-mm):**

2013-12

***Summary of Precipitation  
Over Selected Region***

## ***Semi-Automated Interactive Prediction Models***



# Emerging Tools: Interactive Forecasts



## Predictand

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CHIRPS

CRU

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Starting year & month  
(yyyy-mm):

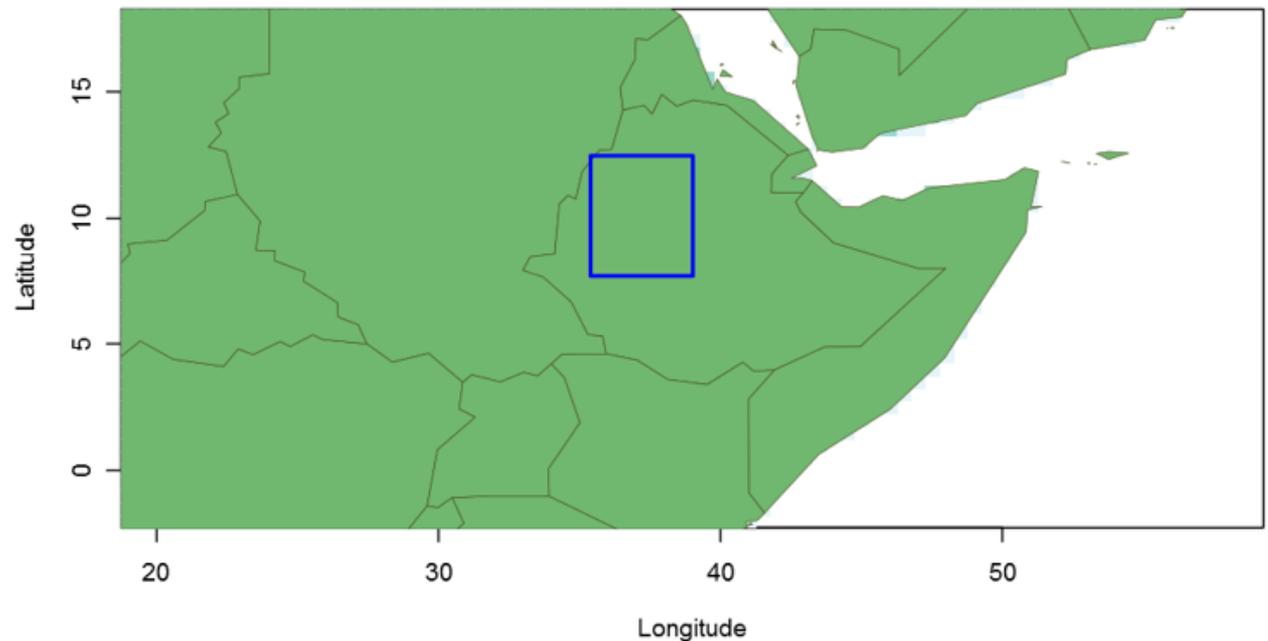
1948-01

Ending year & month  
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2013-12

*Summary of Precipitation  
Over Selected Region*

## Semi-Automated Interactive Prediction Models



# Emerging Tools: Interactive Forecasts

## Summary of Precipitation Over Selected Region

Trend

## Select Months of Interest

June  
July  
August  
September  
October

## Lead Time in Months for Prediction



## Choose Predictors

- Sea Surface Temperature
- Mean Sea Level Pressure

## Geopotential Pressure Level

1000  
925  
850  
700

## Wind Pressure Level

1000  
925  
850  
700

## Air Temperature Pressure Level

1000

## Preprocessing Options

Detrend  
Standardize  
PCA

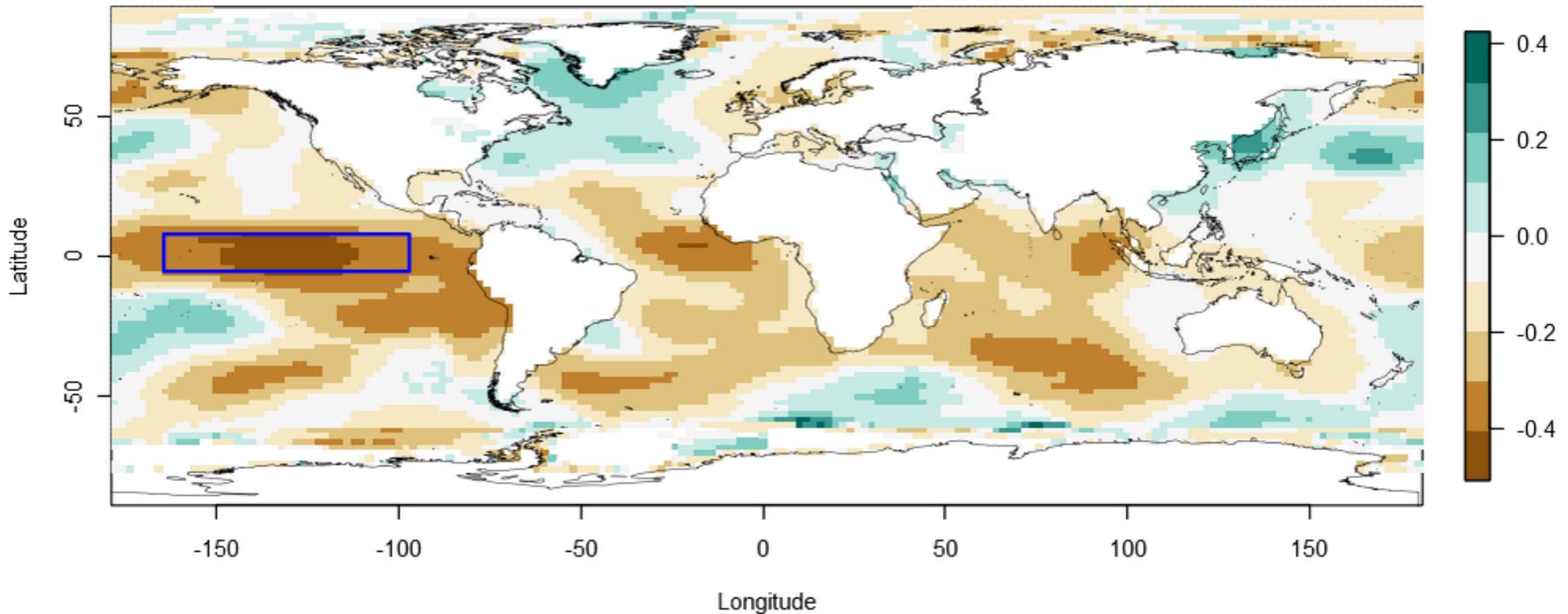
## Select Models

GLM  
SGLM  
GAM  
SGAM  
Bagging  
RF  
Boosting  
SVM  
ANN  
MARS  
ALL

# Emerging Tools: Interactive Forecasts



Correlation of Precipitation over selected Region with SST

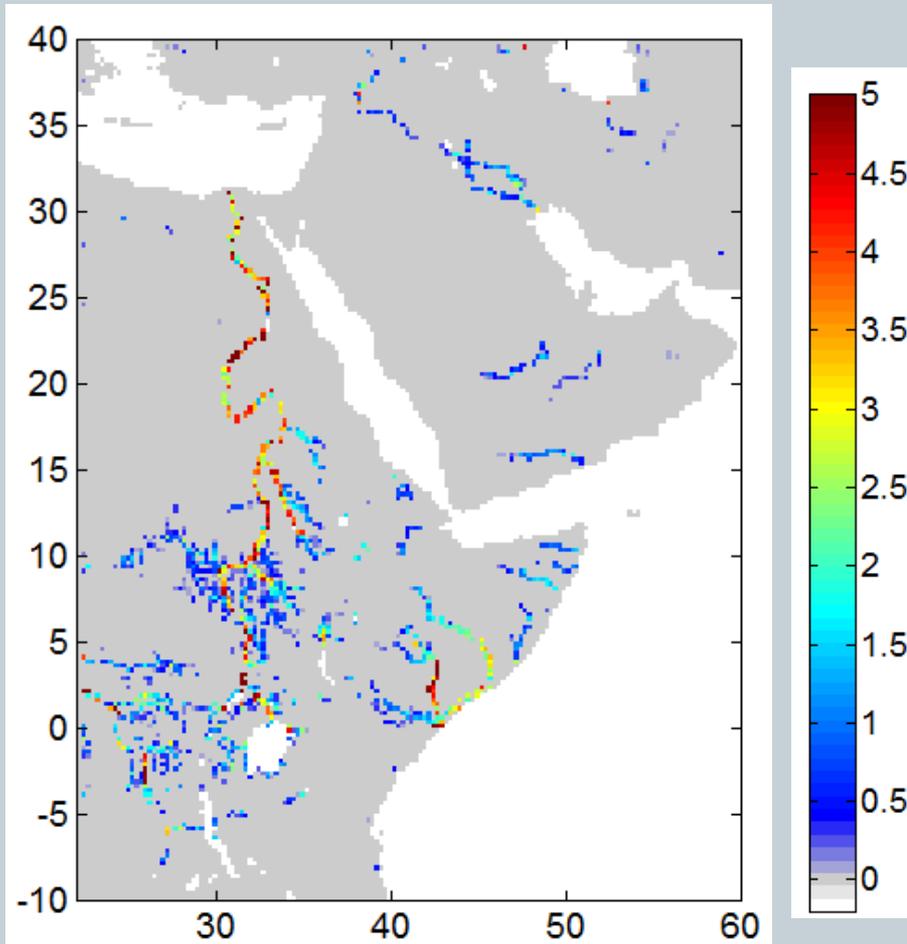




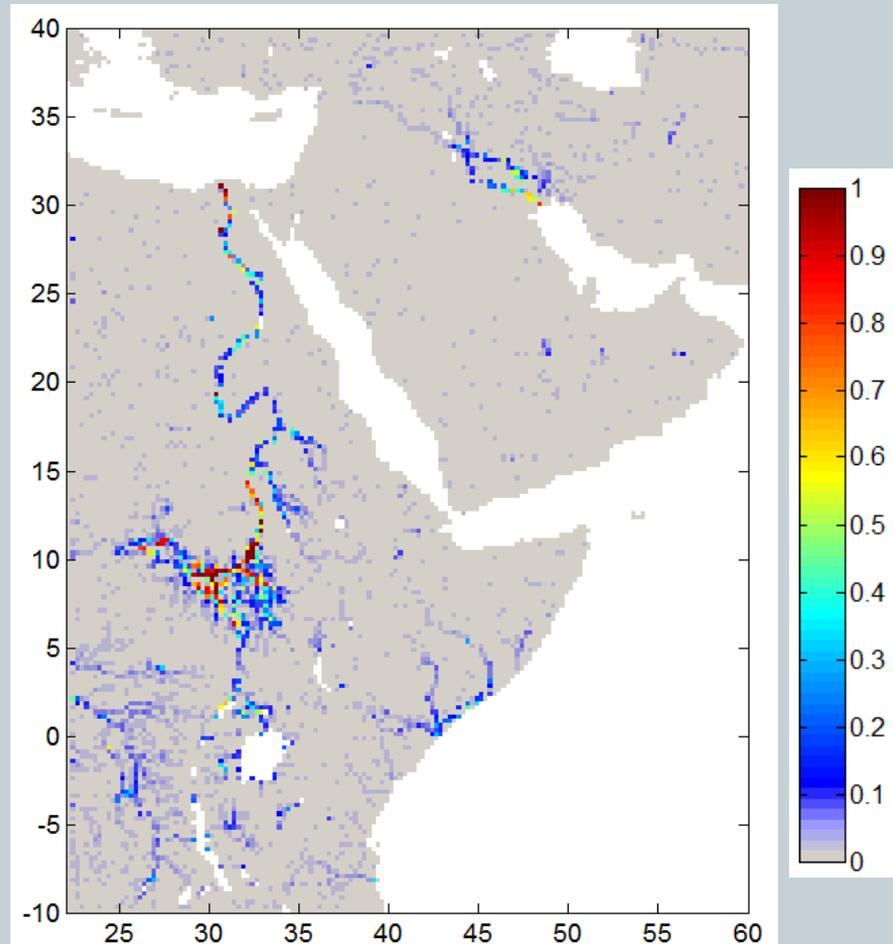
# Emerging Tools: LIS-HYMAP flow model



Flood depth (m): June 6, 2014



Average Flooded Fraction, 2014



# Thank you



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