

Capacity Development Activities in RCOFs:
Current Practices and Recommendations for
Centralized Training Workshops

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Outline

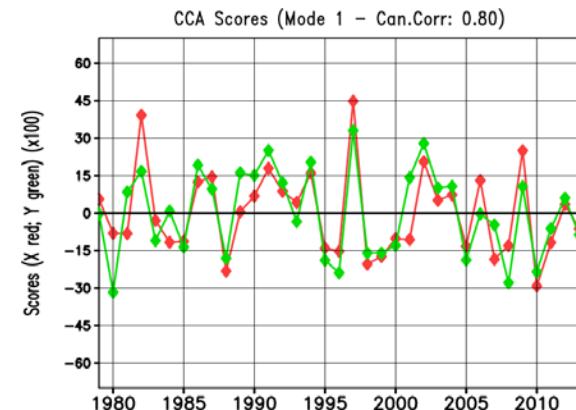
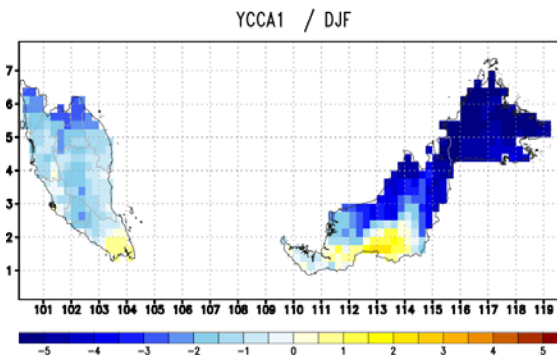
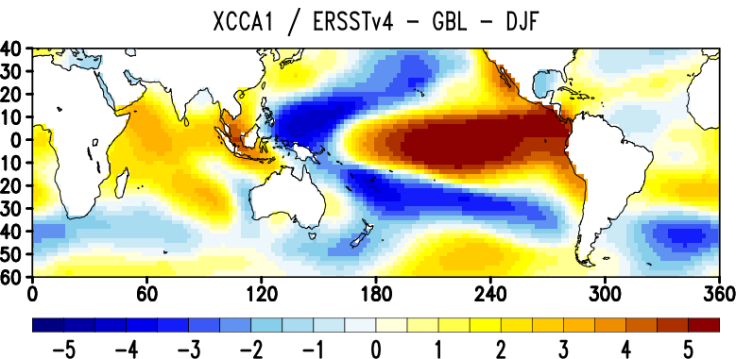
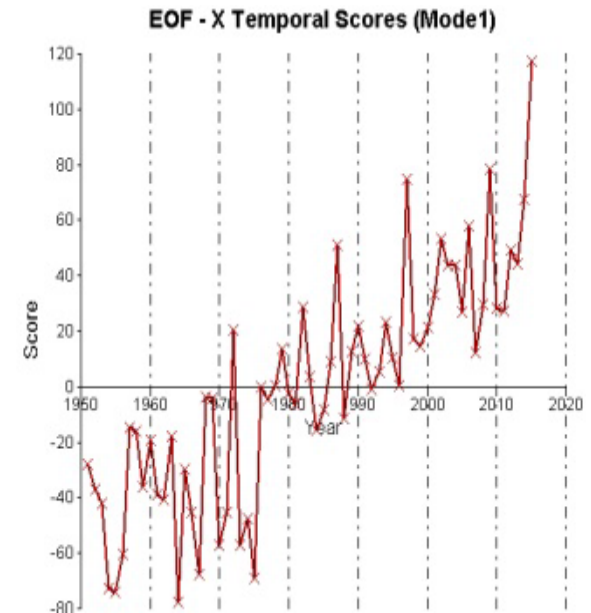
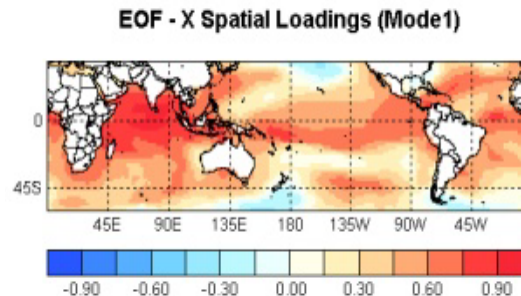
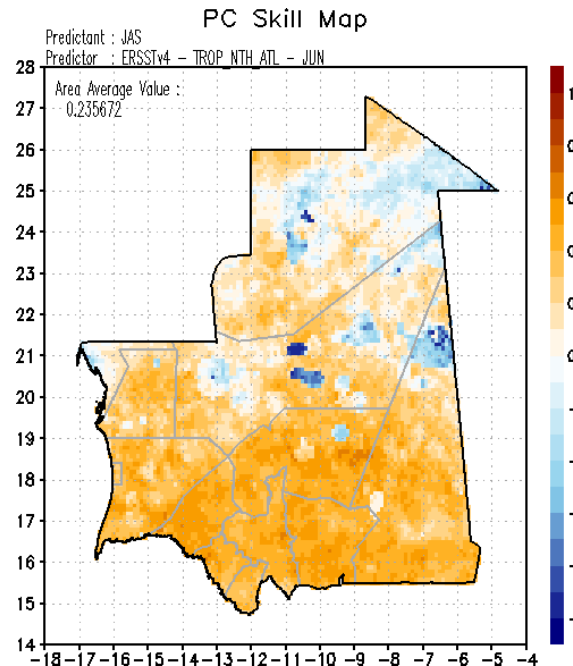
- Current Practices for Capacity Development
- Knowledge Gaps in RCOF Training
- Competencies required for seasonal forecasting
- Improving Seasonal Forecasts
- Centralized Training Workshops
- Addressing the sub-seasonal time scale
- Climate Monitoring

Current Practices

- Pre-COF training workshops
 - Two-to-five day training workshops generally on seasonal forecasting
 - Participants run seasonal forecast experiments
 - Prepare seasonal outlooks to feed into the regional consensus outlooks
 - Various methods to make seasonal outlooks
 - Linear Regression
 - CCA forced with observed SST
 - CCA forced with dynamical model predicted SST
 - Statistical downscaling of dynamical models
- Issues
 - No continuity in terms of attendance
 - Gap in the understanding of the science behind the forecasts
 - Data quality
 - Little emphasis on the interpretation of the forecasts

Gaps

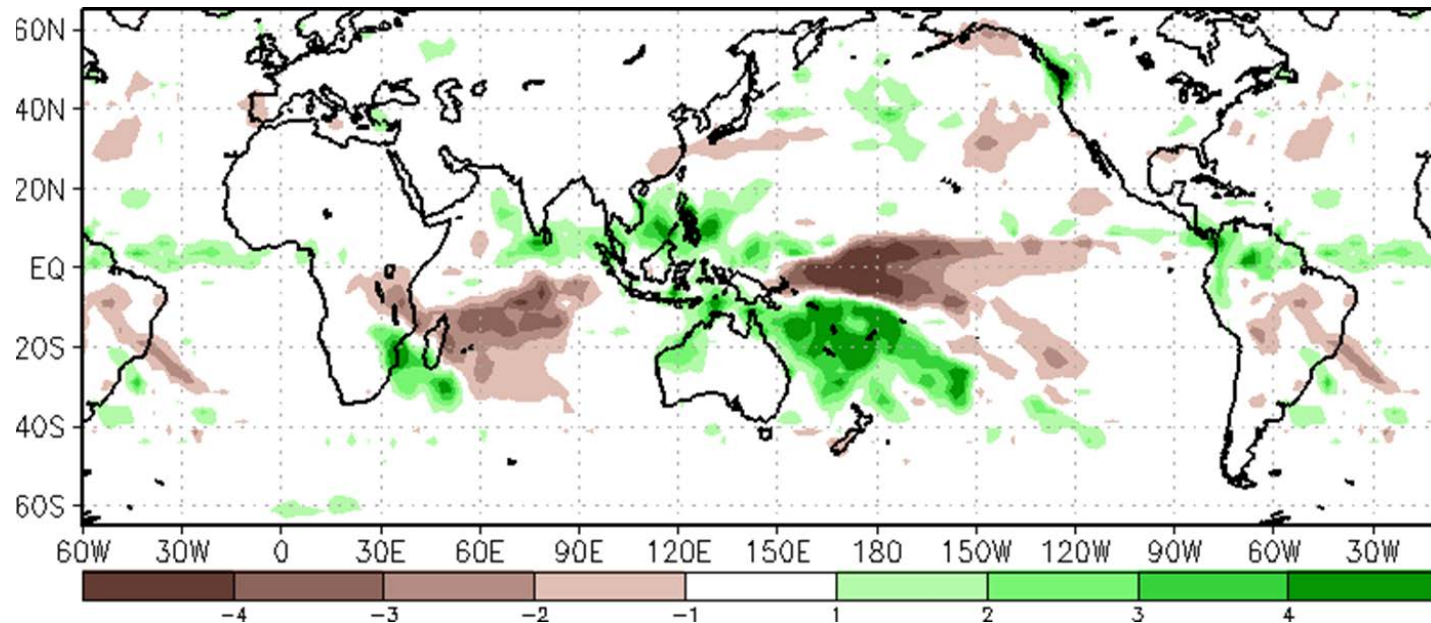
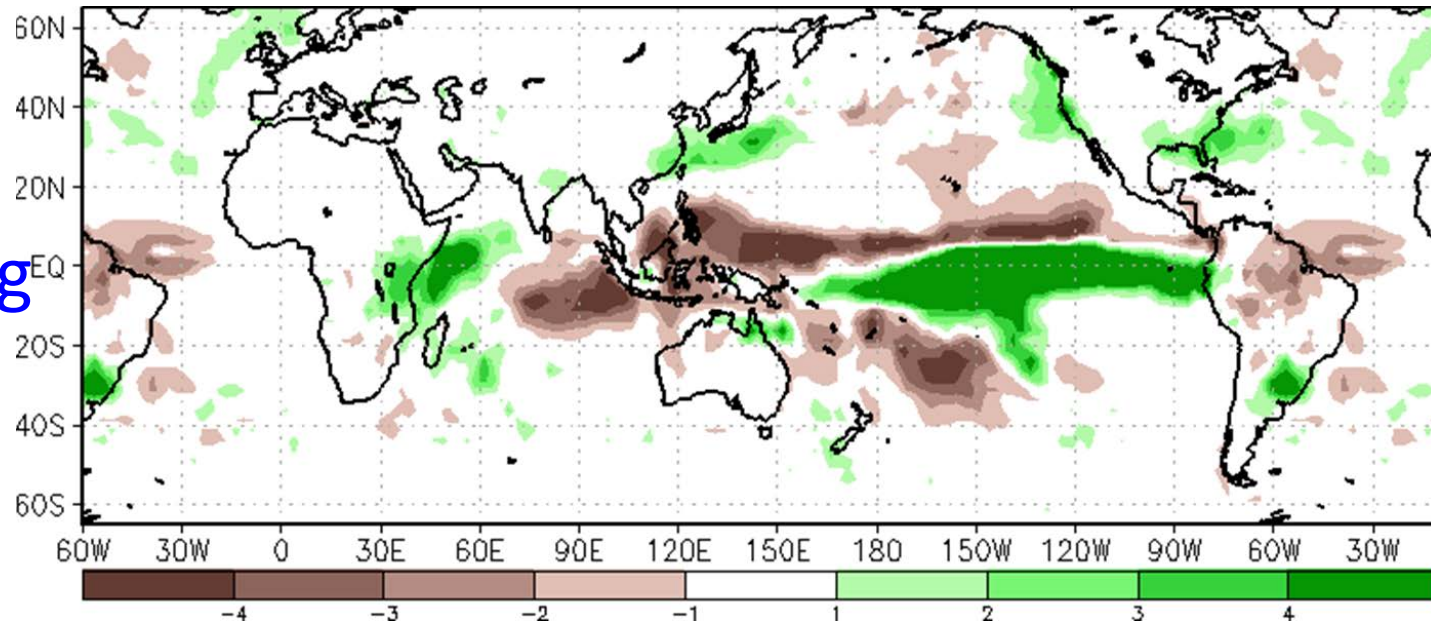
Interpretation of Results from Forecast Experiments



Seasonal Precipitation Anomaly

Gaps

Understanding
Modes of
Variability

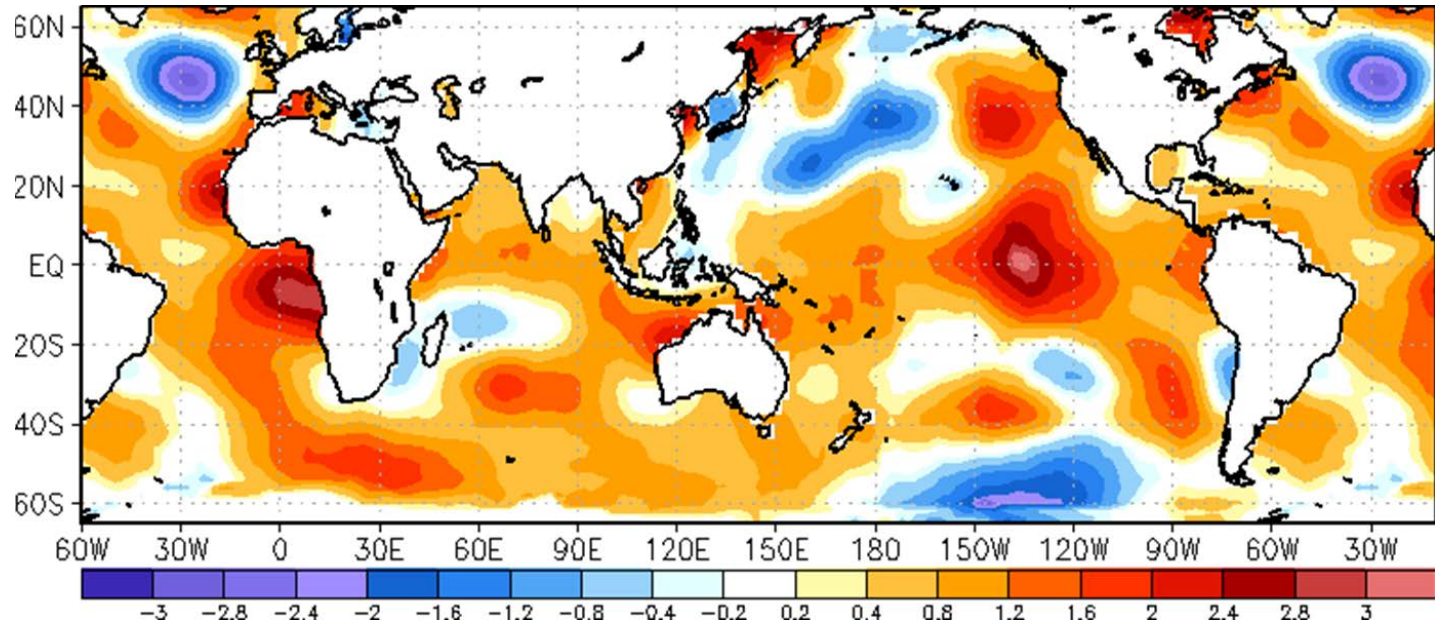


Sea Surface Temperature Anomaly

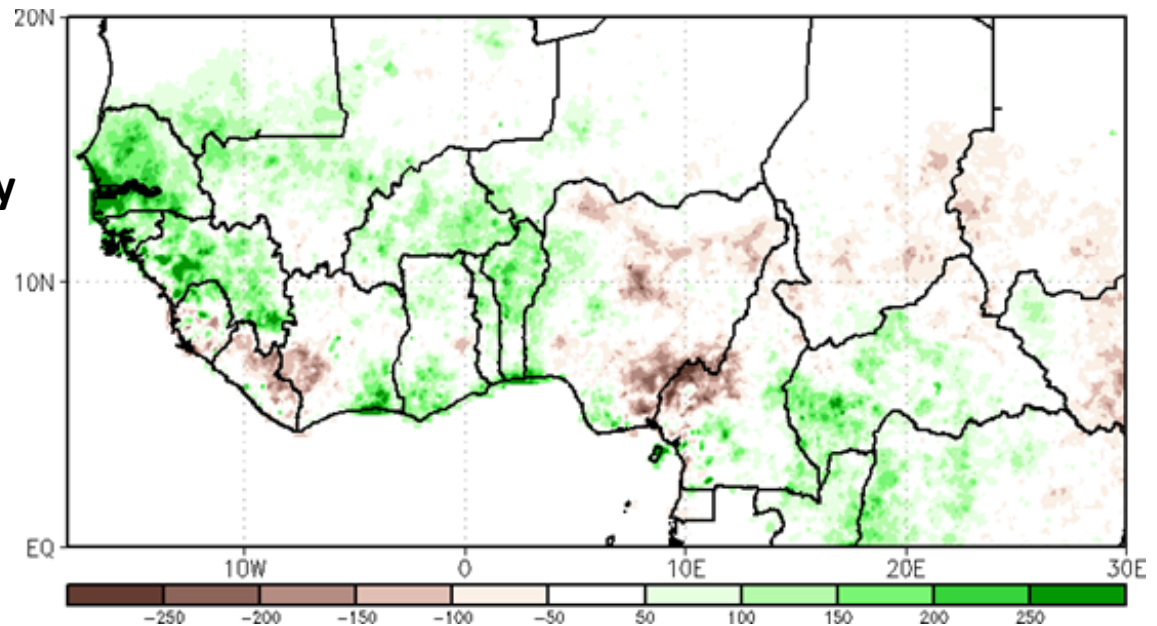
Gaps

El Nino is
NOT
Everything

El Nino 2009
and Sahel
rainfall

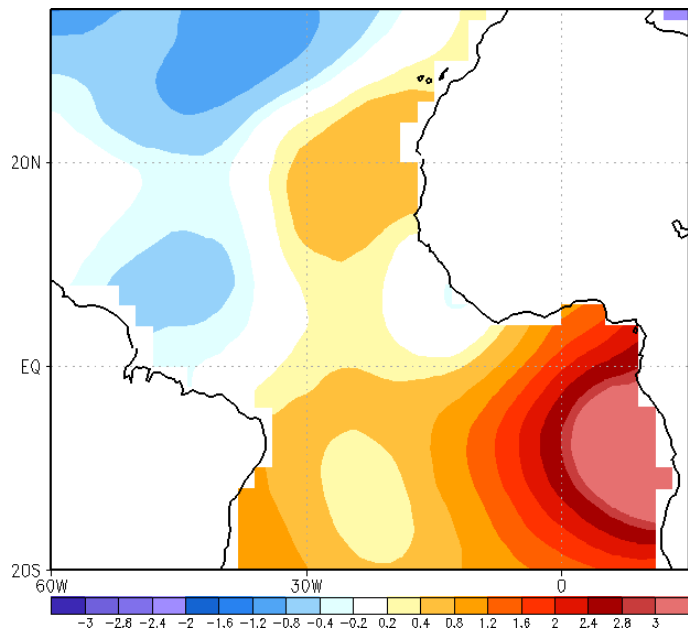


**Jul-Sep 2009
Rainfall Anomaly**

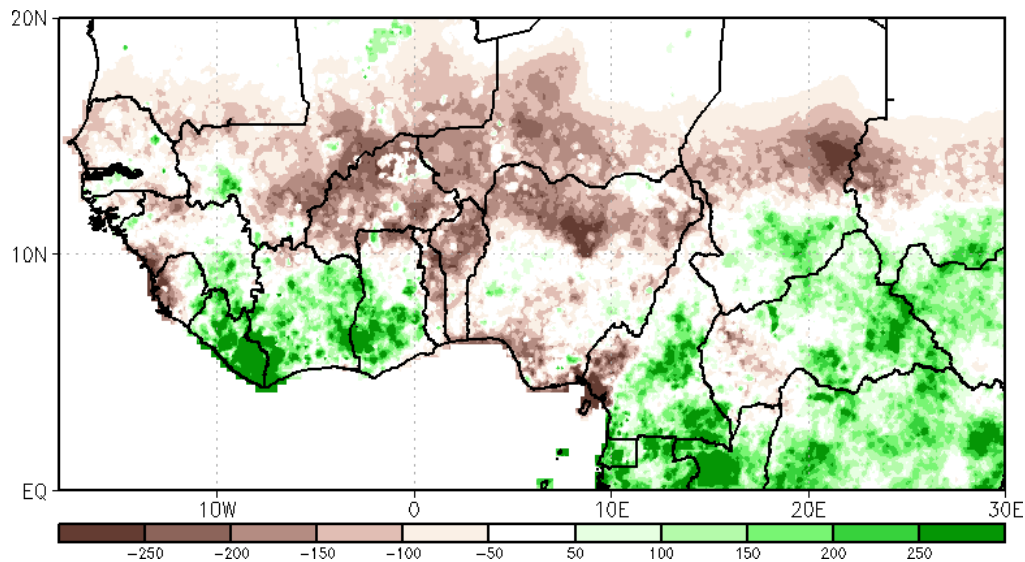


Atlantic and Sahel Summer rainfall

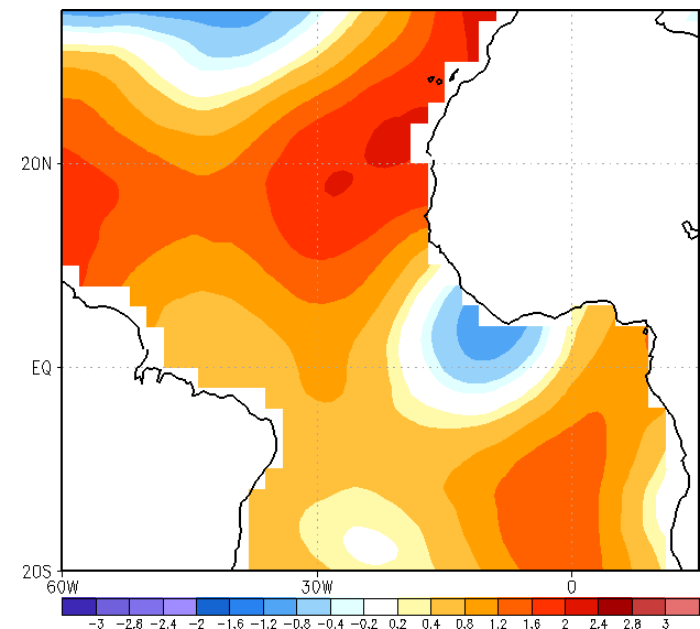
June 1984



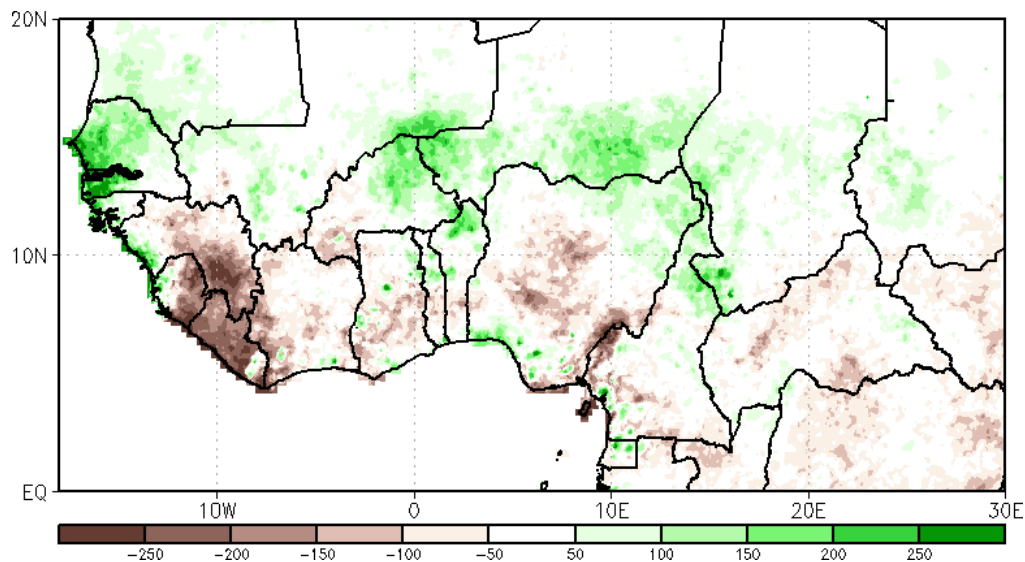
JAS 1984



June 2005



JAS 2005



Competencies Required Operational Seasonal Forecasting

- Knowledge of statistics and climatology
- Knowledge of the physical parameters that impact outlooks
 - Trends
 - Physical modes and impacts (ENSO, IOD, AO, AAO, etc.)
- Understanding of environmental modeling
 - Statistical
 - Dynamical
- Ability to think through what goes into the forecast, NOT just transpose models (How do I combine dynamical model output with trend, CCA, analogs, etc.)

Competencies Required Operational Seasonal Forecasting

- Ability to use GIS to map outlooks
- Ability to communicate the outlook in writing and orally
 - Technical communication: Properly explain the science behind the outlook
 - Non- technical communication: Ability to distill down the outlook and explain probabilities
- Ability to verify forecasts and to communicate uncertainty

Improving Seasonal Forecasts

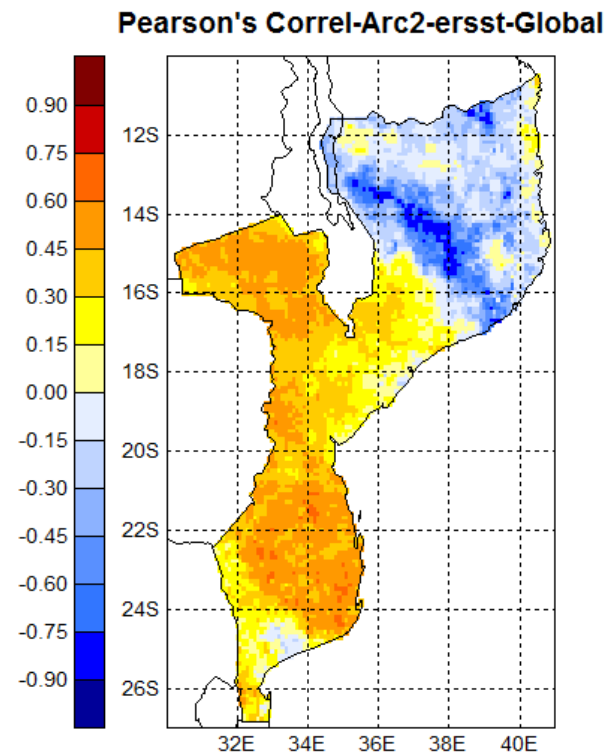
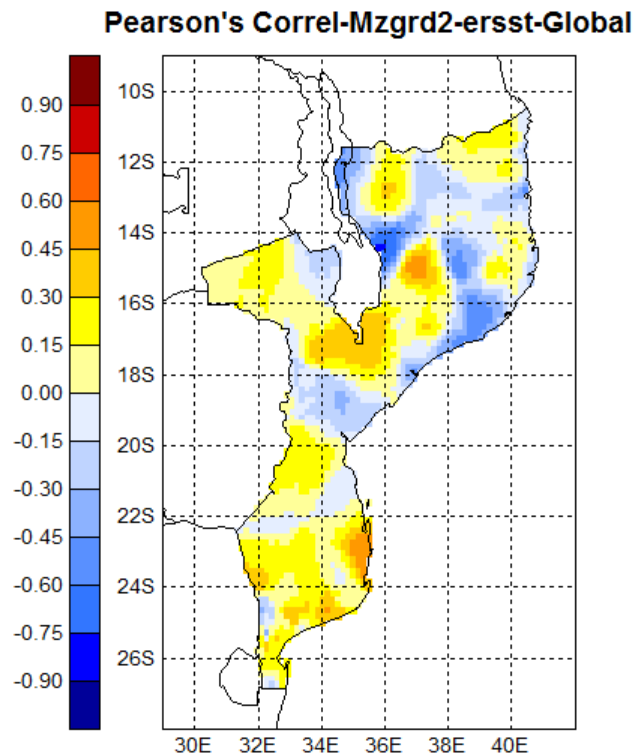
Pre-COF Training workshops must entice participants to be enthusiastic about continuously conducting diagnostics studies, essential to document sources of predictability and to improve forecasts

- SSTs are excellent predictors but it is NOT just SST
- Explore other variables that sometime might be connected to SST
 - Winds
 - Geopotential Height
 - Stream Function

Improving Seasonal Forecasts (Cnt'd)

Good quality data is important

Effects of Data on Forecast Skill

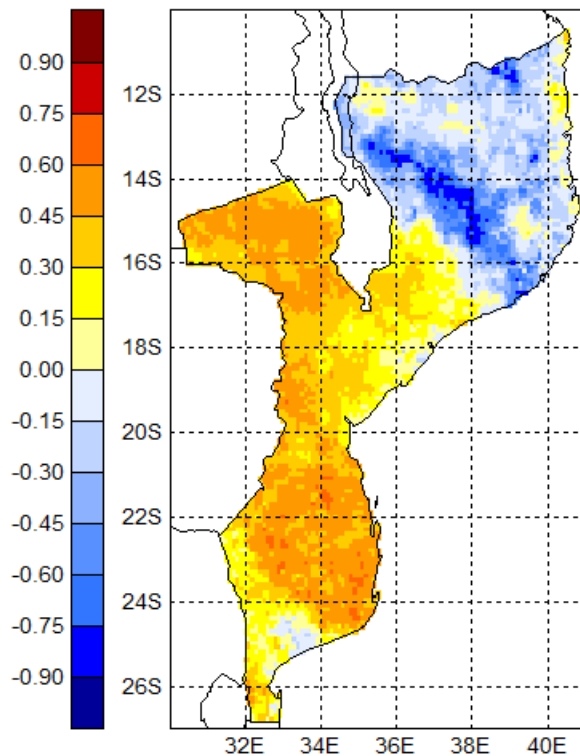


Improving Seasonal Forecasts (Cnt'd)

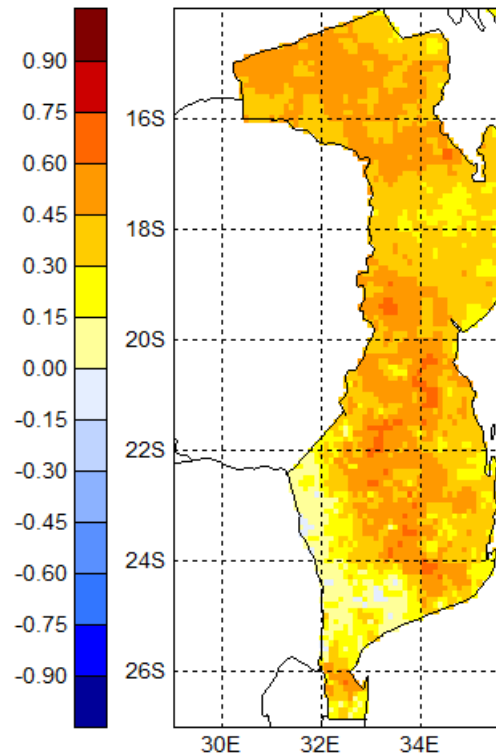
Diagnostics, diagnostics, and even more diagnostics

Benefit of Diagnostics

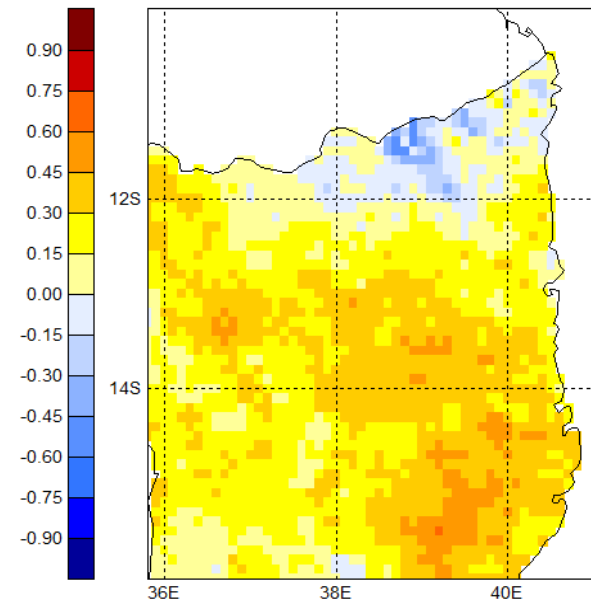
Pearson's Correl-Arc2-ersst-Global



Pearson Corri-Arc2-sst-Rg2-TP



Pearson Corri-Arc2-cfsv2-v850-Rg1-IO



Improving Seasonal Forecasts (Cnt'd)

An operational seasonal forecasting system must include:

- The writing of forecast bulletins with discussion of the current state of the climate and the tools used for the forecasts
- An update of the forecasts on a monthly basis.
- Continuous verifications of the forecasts and keeping an archive of the forecast verifications
- Sharing forecasts and forecast verifications with the user community via a website and through other outreach activities

New Paradigm for Pre-COF Capacity Development

Centralized Training

- Design Pre-COF training to address knowledge gap in seasonal forecasting
 - Introduce participants to various climate prediction tools
 - Make good use of GCM outputs from several global centers
 - Deterministic forecasts
 - Bias corrected ensemble probabilistic forecasts
 - Statistical downscaling
 - Dynamical downscaling
- Interpret forecasts and generate consensus seasonal outlooks

New Paradigm for Pre-COF Capacity Development

Centralized Training

Effective training workshops include a combination of hands-on exercises and lectures

- Hands-on Exercises: Tools for seasonal forecasting
 - Access to observations (SST, rainfall, 2mT)
 - Access to GPC MME forecasts
 - Statistical package for the downscaling of MME
 - Interpretation of results from forecast experiments
 - Making real time forecasts and discussion
 - Building objective consensus seasonal forecasts
 - GIS to map forecasts

New Paradigm for Pre-COF Capacity Development

Centralized Training

- Lectures with focus on climate basic state and variability
 - Review of monsoon systems
 - Modes of variability: ENSO; MJO; NAO, AO, AAO, etc.
 - Impacts of modes of variability on regional climate
 - Practical exercises on deriving indices
 - Reflect on the use of climate information

New Paradigm for Pre-COF Capacity Development

Centralized Training

Sub-Seasonal Forecasting

Should this timescale be addressed in RCOFs?

- Knowledge of the state of the MJO:
 - Understand MJO impacts on regional rainfall
- Fluent in the use and interpretation of NWP model outputs
 - Bias corrected forecasts
 - Calibrated probability forecasts
- Make probabilistic sub-seasonal forecasts based on convergence of evidence between MJO signal and NWP outputs

New Paradigm for Pre-COF Capacity Development

Centralized Training

Climate Monitoring

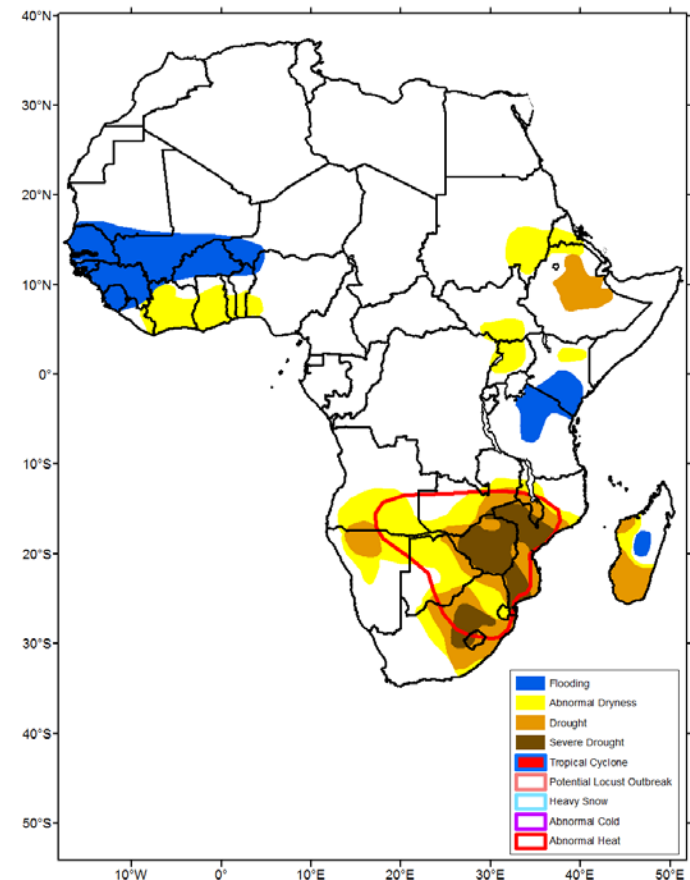
- Essential for effective delivery of climate services
- Provide timely and relevant information related to climate hazards
 - Evolution of rainfall and temperature anomalies
 - Standardized Precipitation Indices one three and six months
 - Temperatures anomalies and heat index
 - Soil moisture, runoff, and vegetation indices

New Paradigm for Pre-COF Capacity Development

Centralized Training

Impact-Based Forecasts

- Require to work with the user community
- Provide timely and relevant information related to climate hazards
 - Evolution of rainfall and temperature anomalies
 - Standardized Precipitation Indices one three and six months
 - Temperatures anomalies and heat index
 - Soil moisture, runoff, and vegetation indices
 - Input from sector applications



NOAA-USAID Series

Global International Training Workshop Climate Variability and Predictions

- 2009, Vietnam, SE Asia, Africa
- 2010, Turkey, Mediterranean
- 2011, Senegal, Africa-Caribbean
- 2012, Costa Rica, Central America
- 2013, Turkey, Global

- 2014, Turkey, Global
- 2015, Indonesia, SE Asia
- 2016, Turkey, Global
- 2017, India, South Asia
- 2018, Ecuador, Global

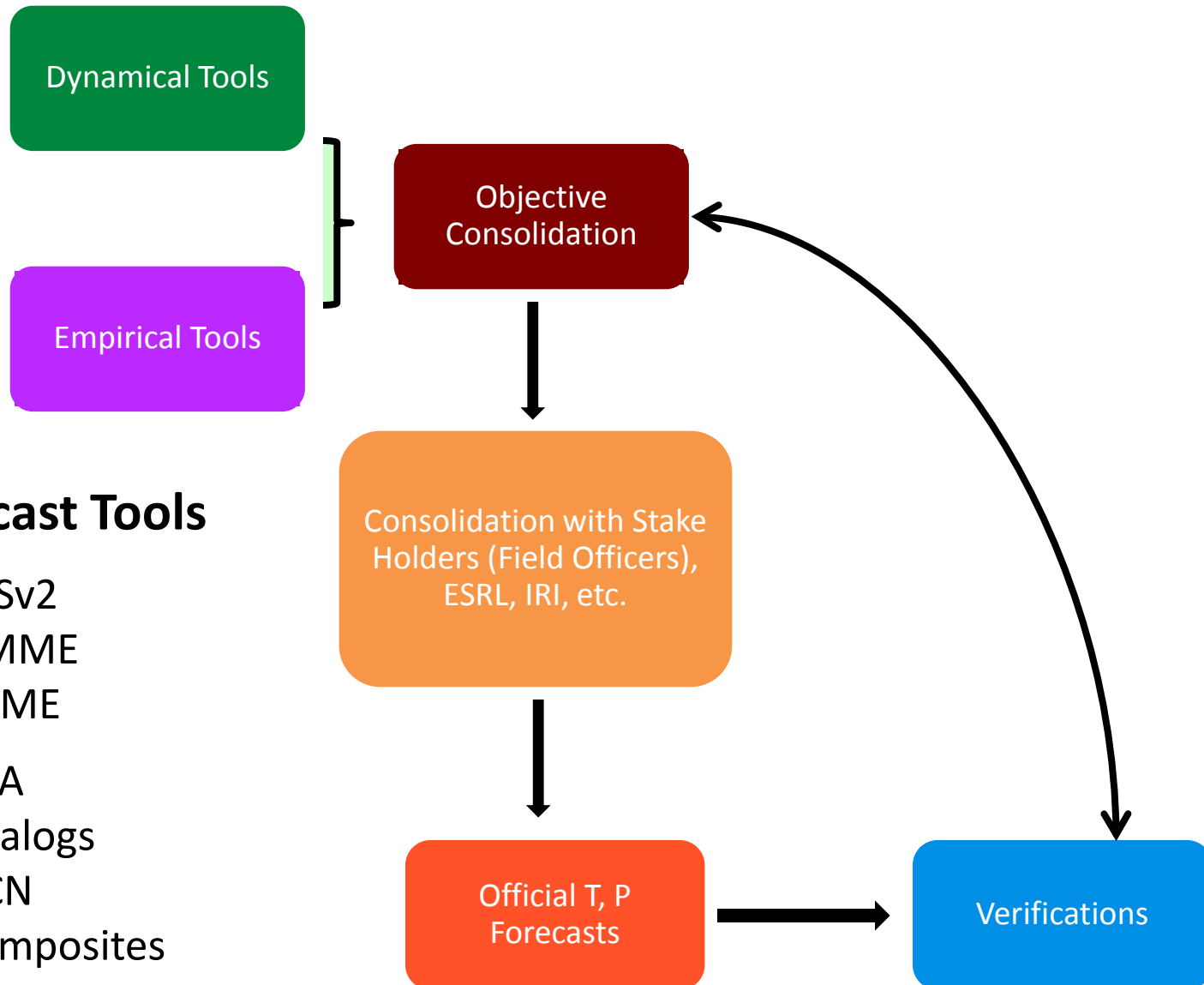
10th ITWCVP to focus on pillars of the CSIS to include

- Climate data management
- Climate monitoring
- Climate forecasting
- Climate projections???

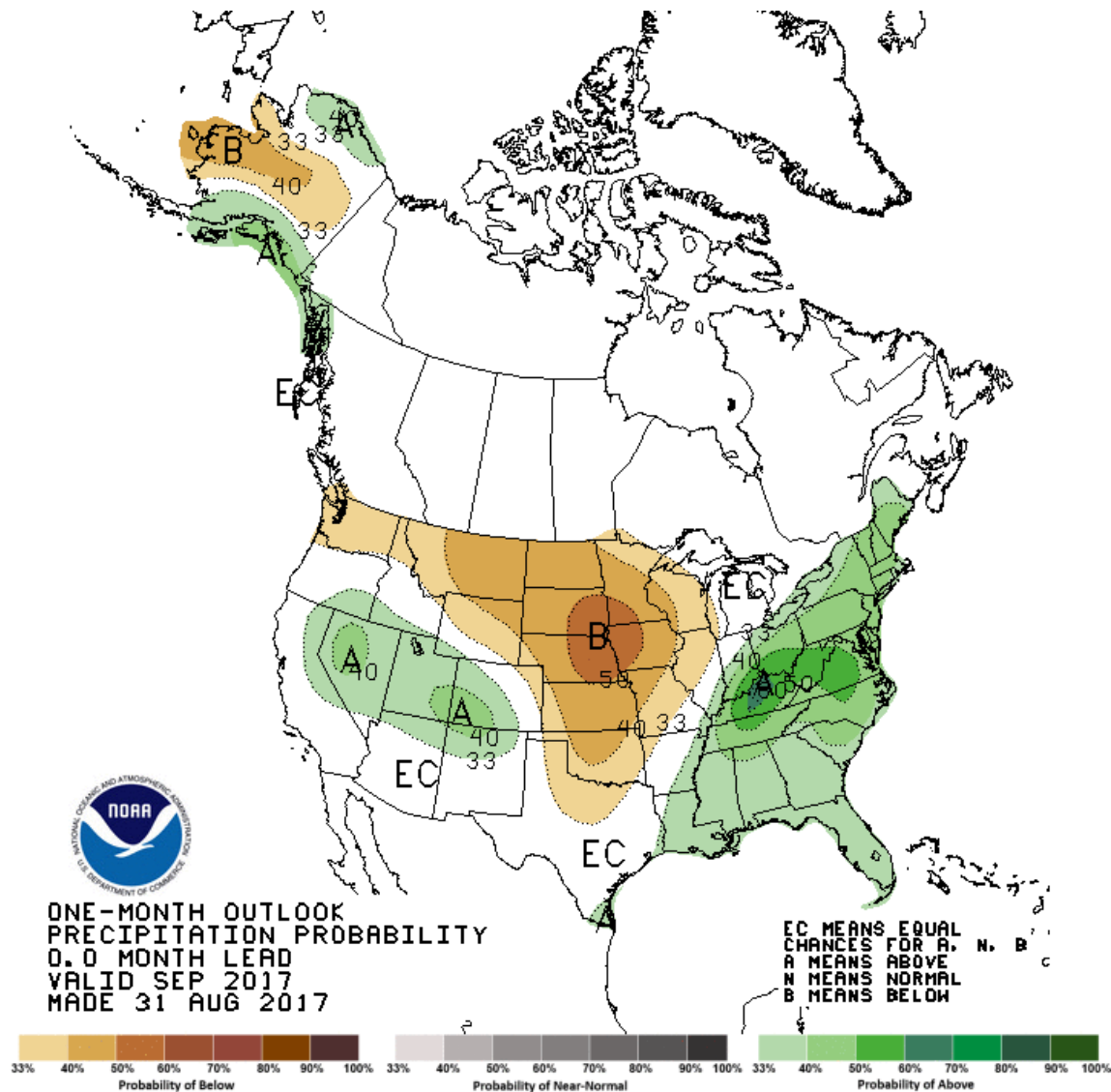
Recommendations

- Pre-COF training workshops must be structured to meet the needs of the scientists
- Emphasis
 - Tools for seasonal forecasting
 - Understanding of sources of predictability
 - Use of GCM in seasonal forecasts
 - Interpretation of results from seasonal forecast experiments
 - Building consensus seasonal outlooks
 - Use of GIS to map seasonal forecasts
 - Communication of seasonal forecasts to the users
 - Forecast verifications
- Institutional Engagement
 - Sustain the training
 - Operationalize seasonal forecasts

CPC Long Range Forecast Process



CPC Monthly and Seasonal Outlooks



Gracias

Thank you