PEACE, PROSPERITY AND
REGIONAL INTEGRATION

SEASONAL PREDICTION OF USER-TAILORED AND CLIMATE PRODUCTS FOR THE GHA AT ICPAC

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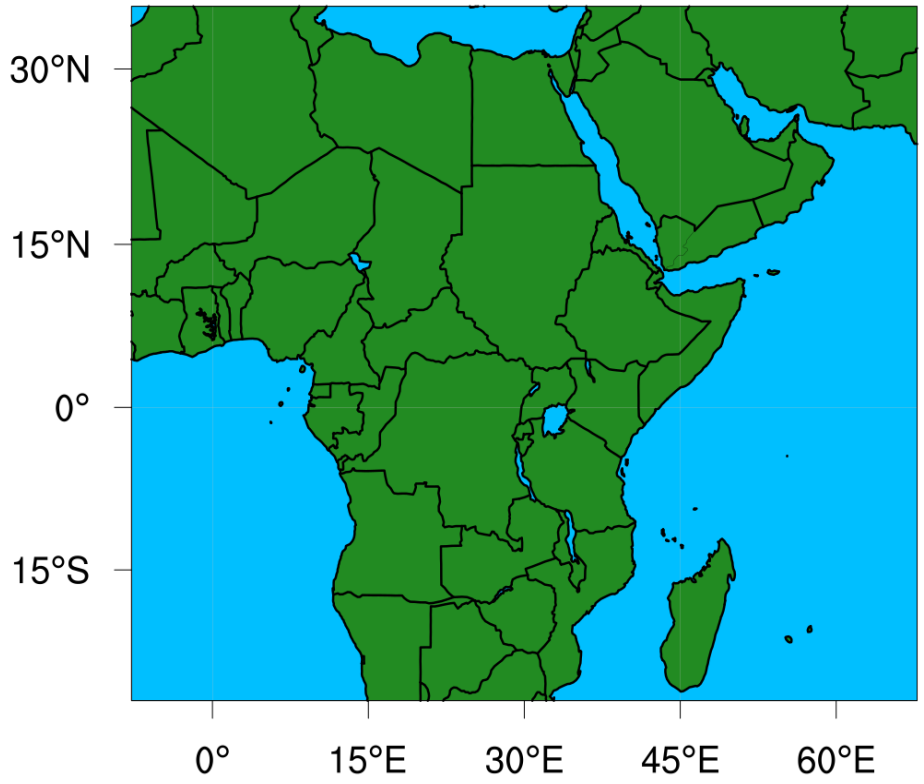
SEASONAL FORECASTING

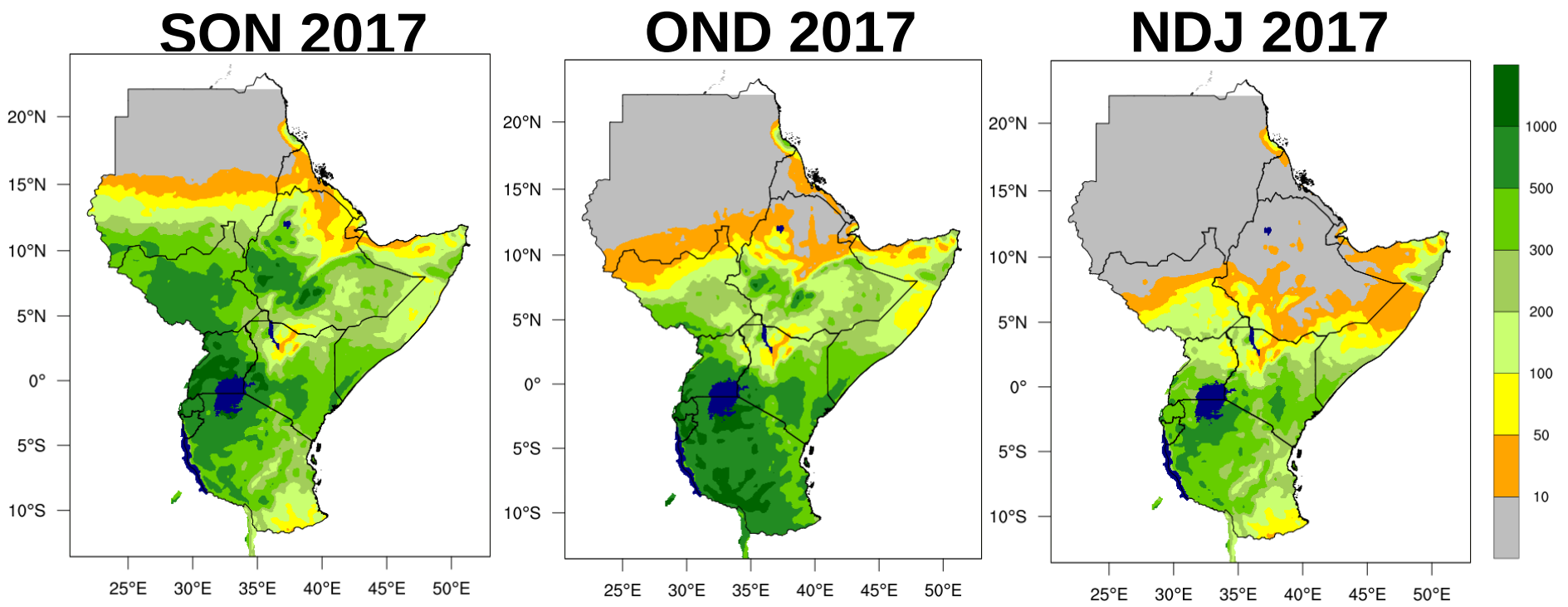
- RCM and GCM deterministic and probabilistic monthly and seasonal forecasts issued every month
- The Weather Research and Forecasting is run every 10-day for medium-range forecasts and every month for three months ahead rolling predictions
- Seven GCM model outputs (10-28 ensemble members) are downloaded from IRI Data Library every month for monthly and seasonal forecasts.

REGIONALIZED PRODUCTS

- A single realization of CFSv2 GCM forecast is downscaled with at least a month lead time forecast
- More realizations will be added as ICPAC's computing power increases
- WRF provides details that can be utilized to generate societally relevant products

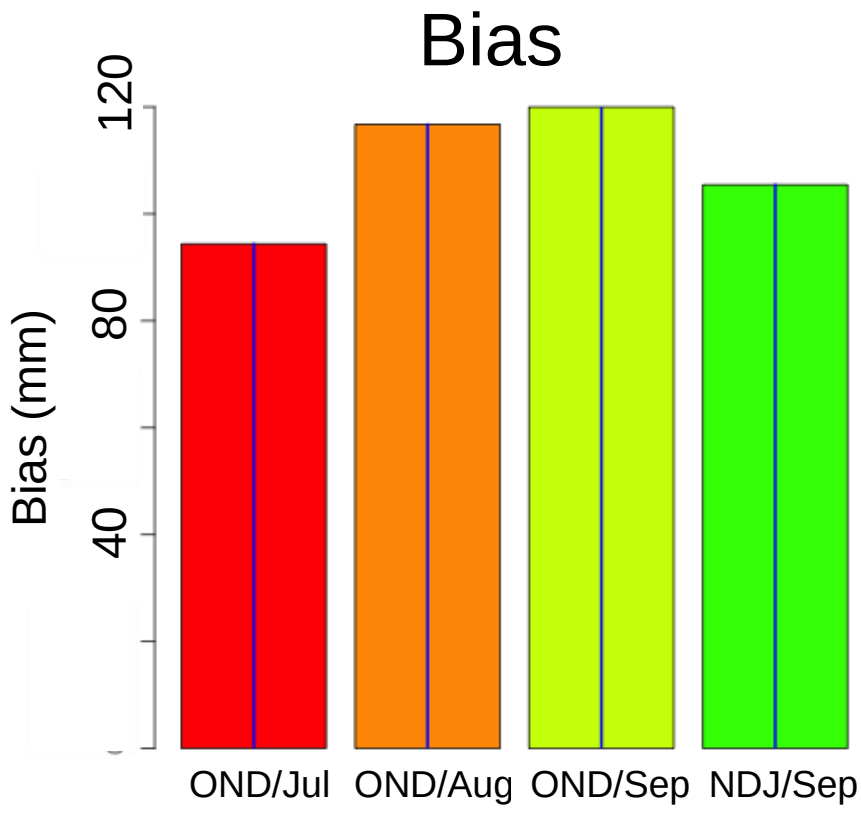


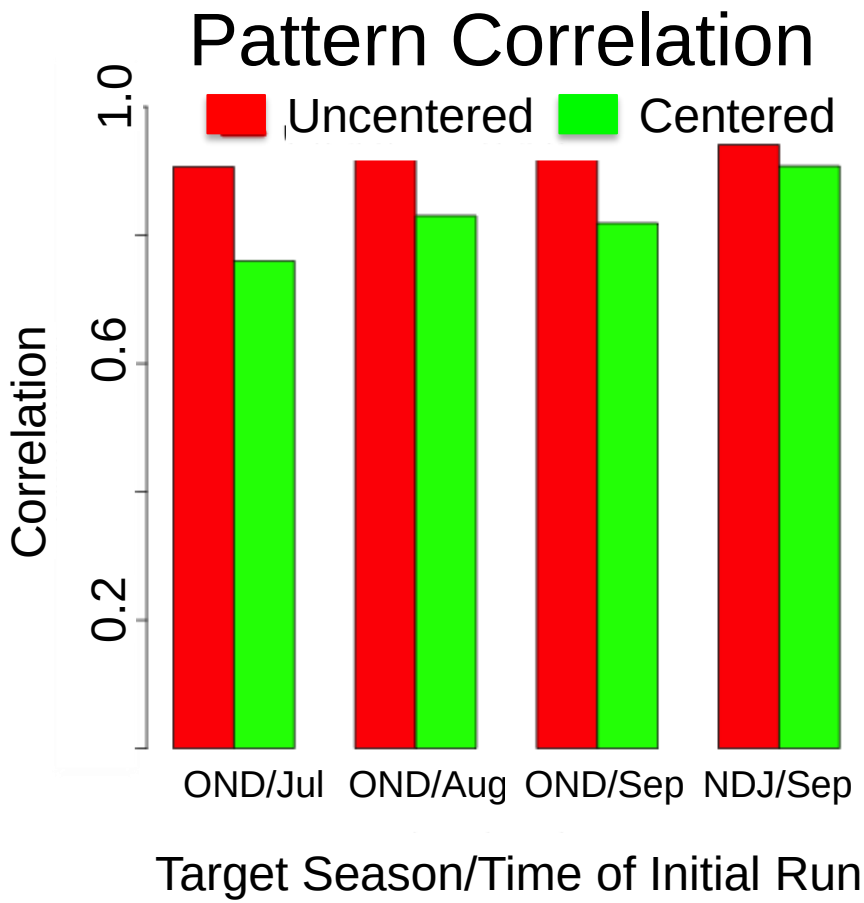
DETERMINISTIC WRF FORECASTS



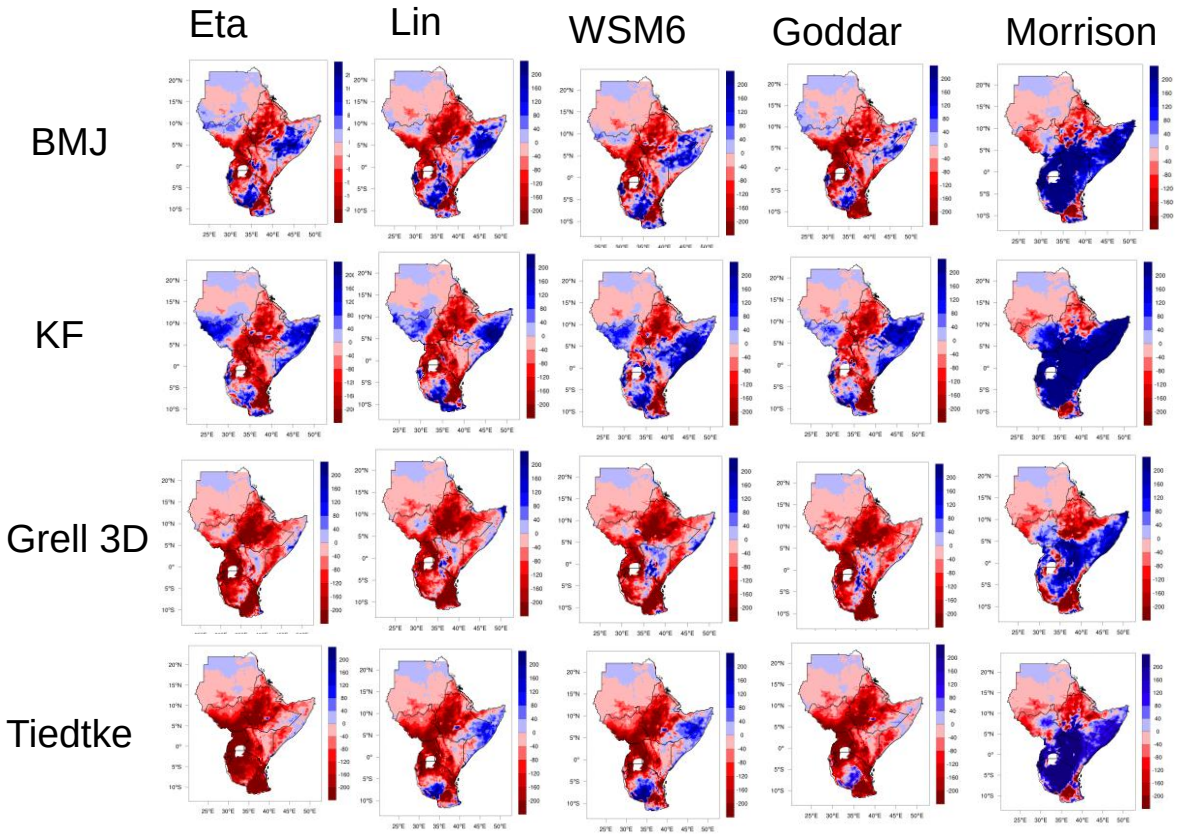
WRF FORECAST PERFORMANCE

Model overestimates rainfall but produces climatologically consistent rainfall patterns



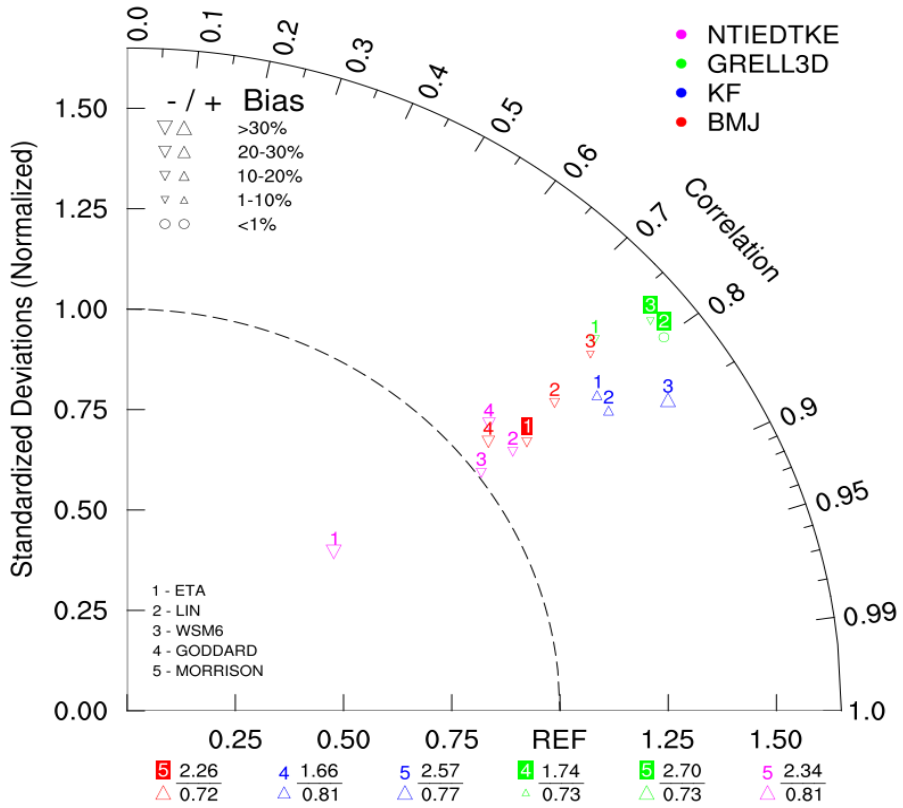


WRF SENSITIVITY WORK AT ICPAC



- Different physics parameterization schemes yield different results
- Sensitivity study crucial to improve the WRF model applicable for GHA
- Current consideration is for convection and microphysics schemes sensitivities of WRF

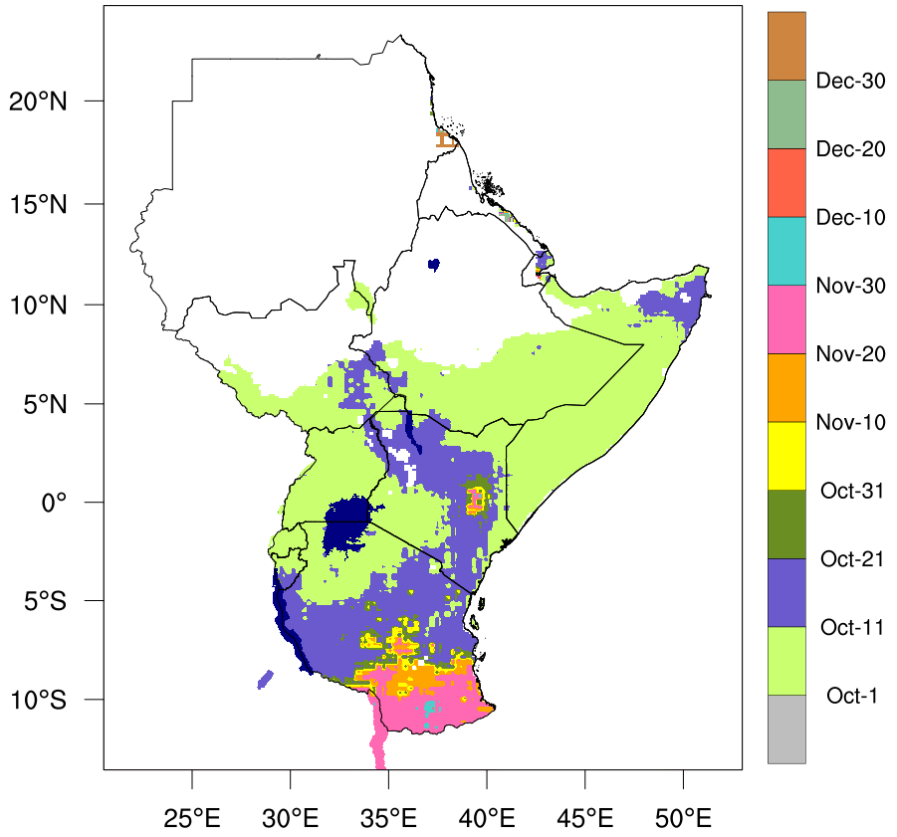
WRF SENSITIVITY WORK AT ICPAC



- Skill for combinations of sensitivity simulations for MAM
- Best model configuration should yield high correlation, low bias, and same variance as observed
- KF has the highest correlation, but excessive over estimation, while Eta largely underestimate observation
- Final customization work will produce consistent and better forecasts

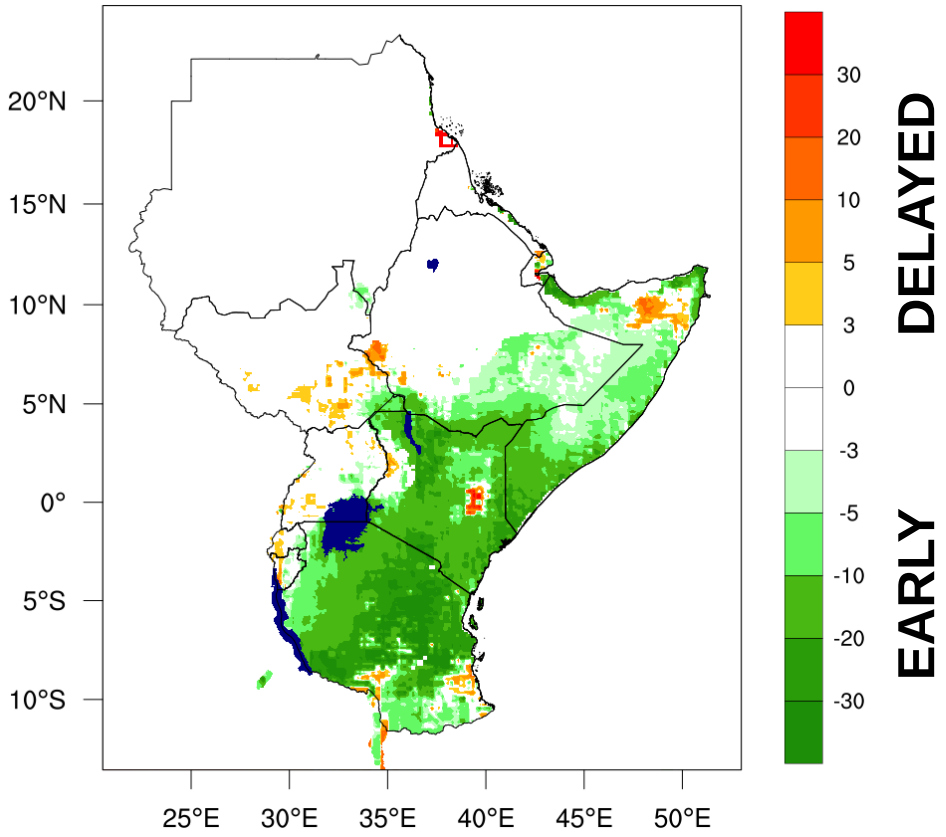
REGIONALIZED USER-ORIENTED PRODUCTS (OND 2017)

ONSET DATE



When will the season begin?

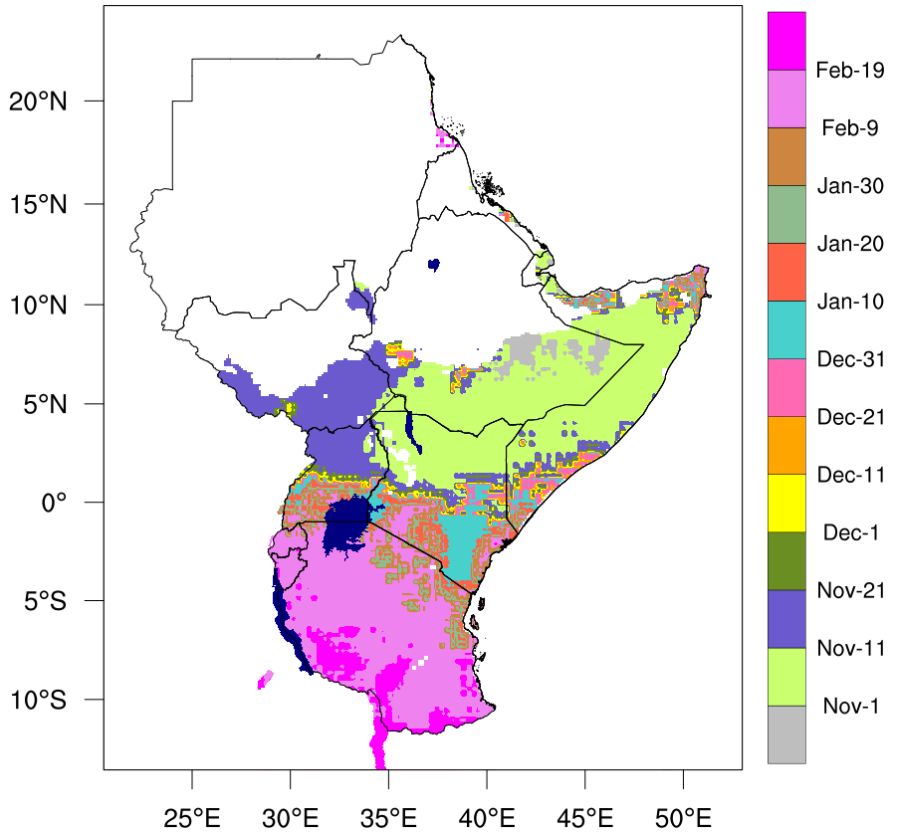
ANOMALY (DAYS)



How late or early?

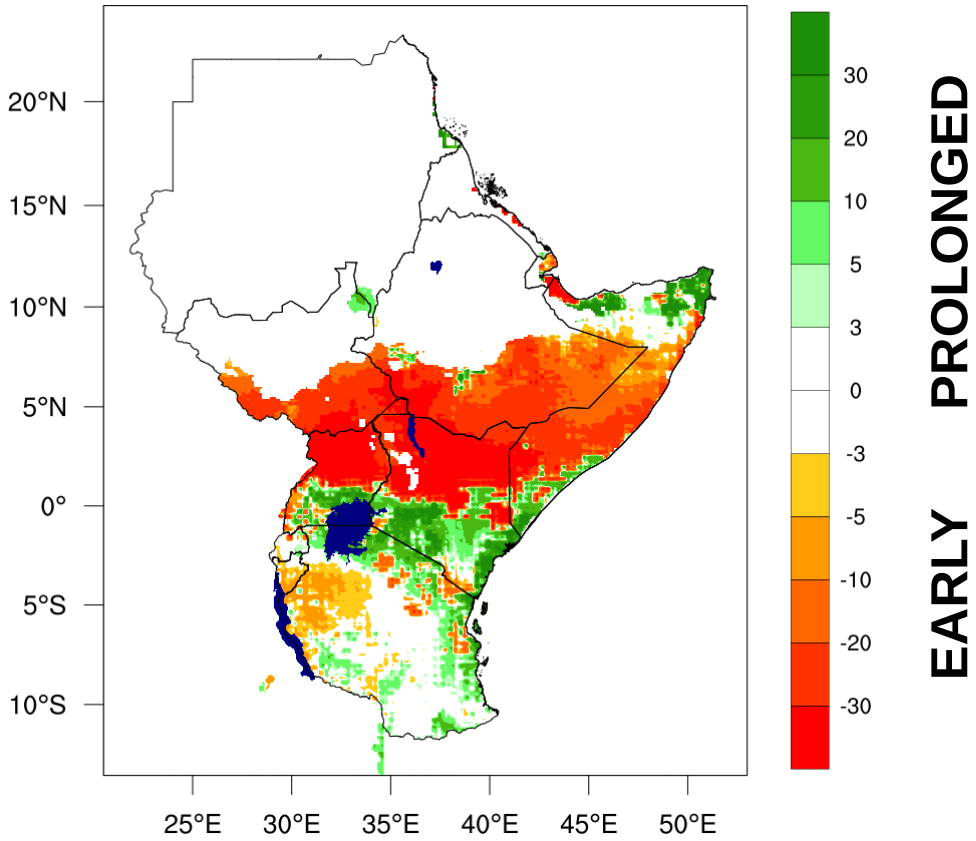
REGIONALIZED USER-ORIENTED PRODUCTS (OND 2017)

CESSATION



When will the season end?

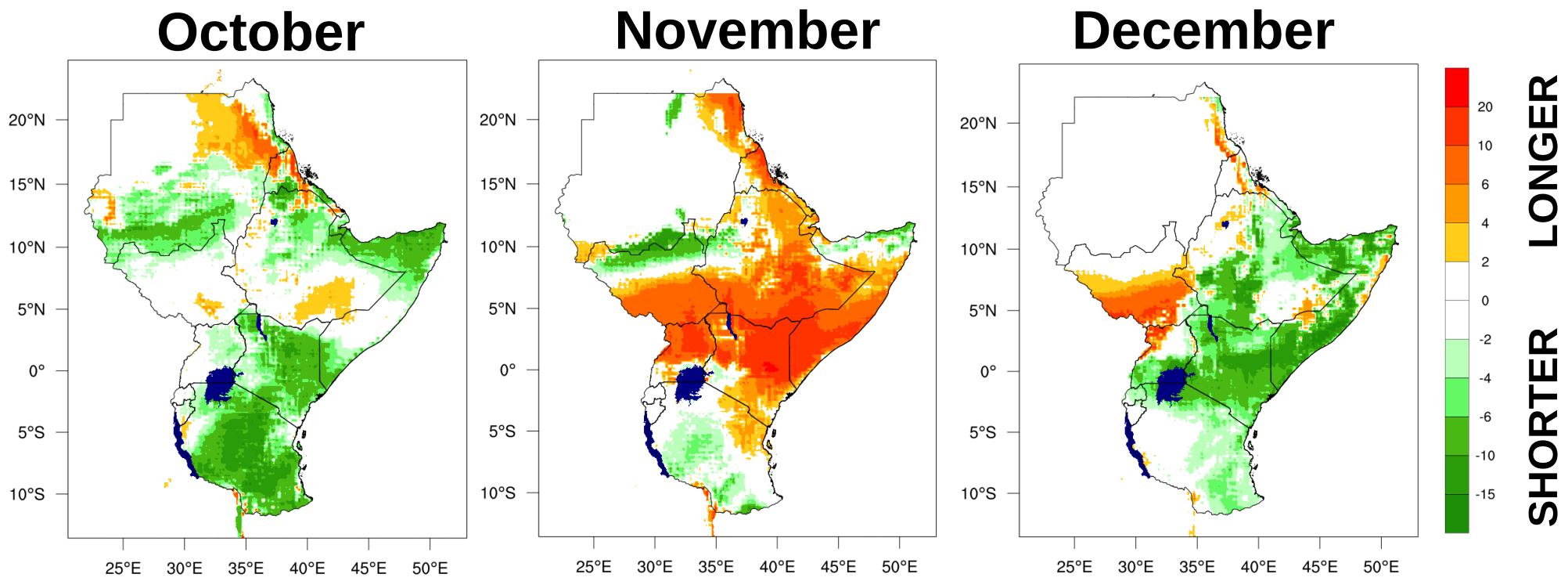
ANOMALY (DAYS)



How late or early?

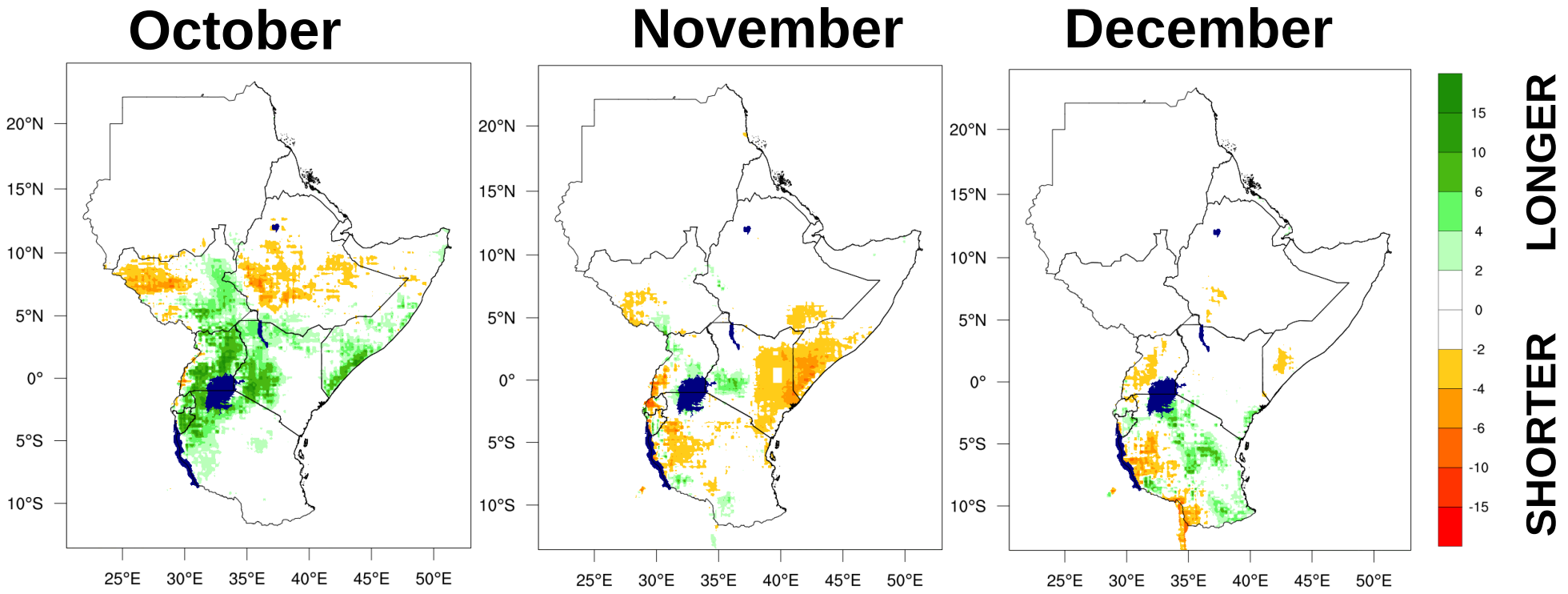
EXTENDED DRY ANOMALIES FOR OND 2017

Continuous days with < 1 mm/day



EXTENDED WET ANOMALIES FOR OND 2017

Continuous days with > 5 mm/day



STATISTICAL DOWNSCALED FORECASTING

- Statistical downscaling is based on 7 GCM model outputs (CMC1, CMC2, GFDL, CESM1, CFSv2, NASA, CCSM4) with each model having 10-28 ensemble members (At present, linear regression and simple bias correction)

- Data are downloaded from IRI Data Library every month for monthly and seasonal forecasts

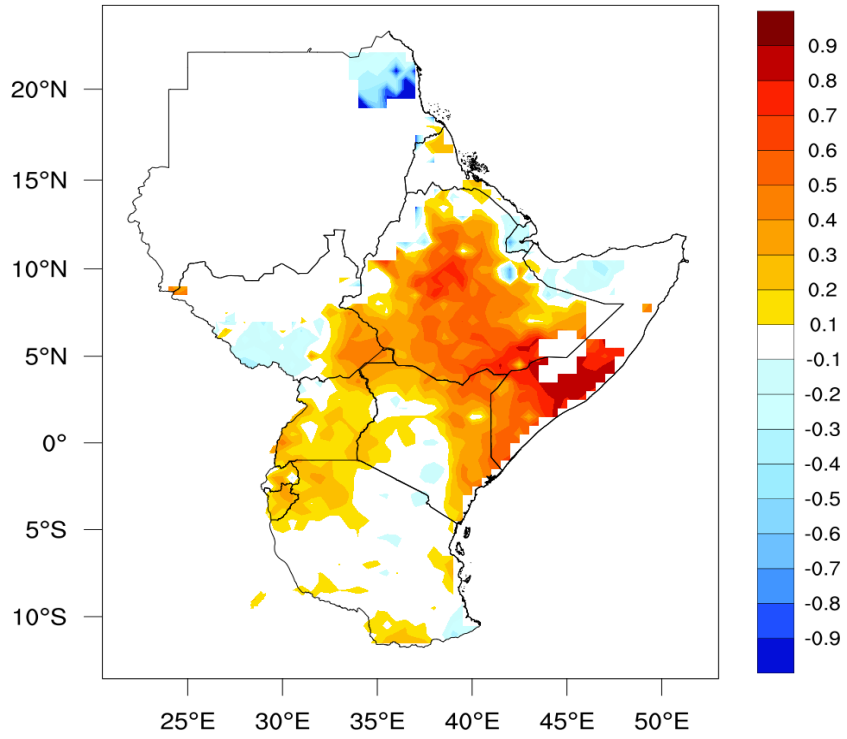
- CPT and GeoCOF based statistically downscaled forecasts are also produced.

- Raingauge-merged CHIRPS data for observation

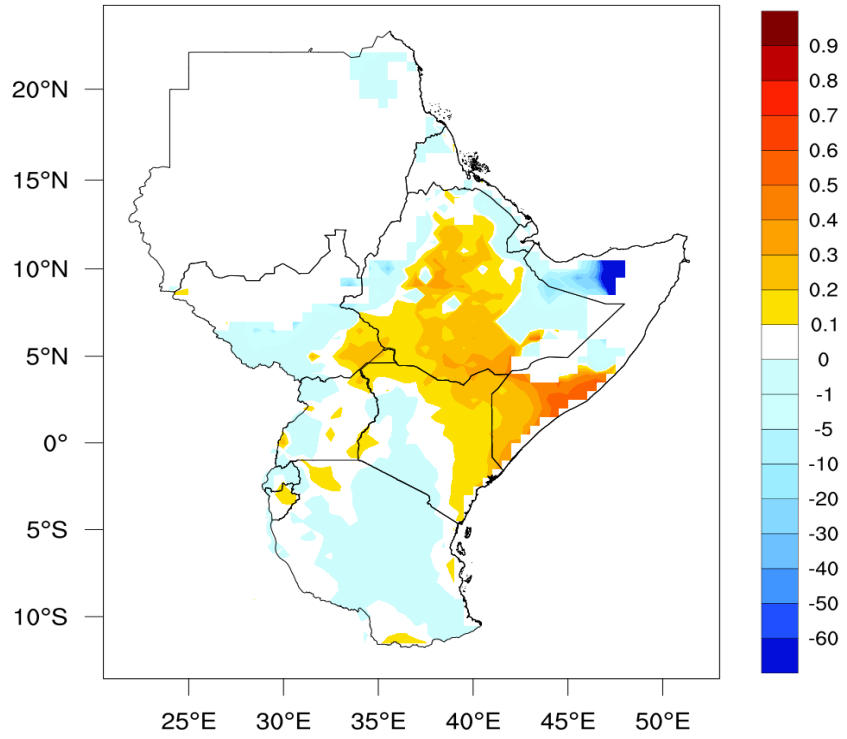
GCM FORECAST PERFORMANCE FOR OND

Skills are assessed for 1982-2010 hindcasts using raingauge merged CHIRPS

CORRELATION



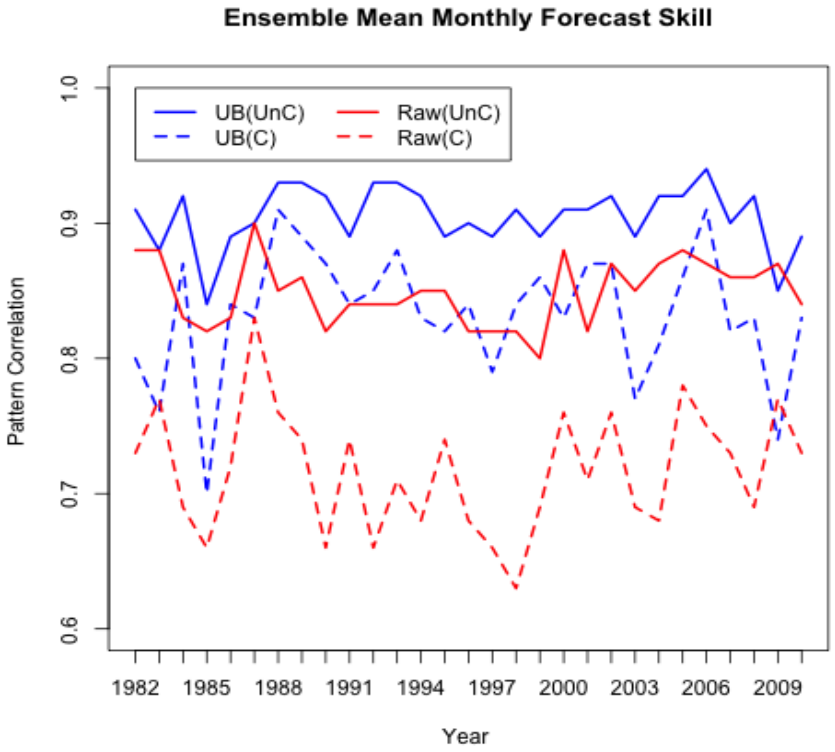
MSSS



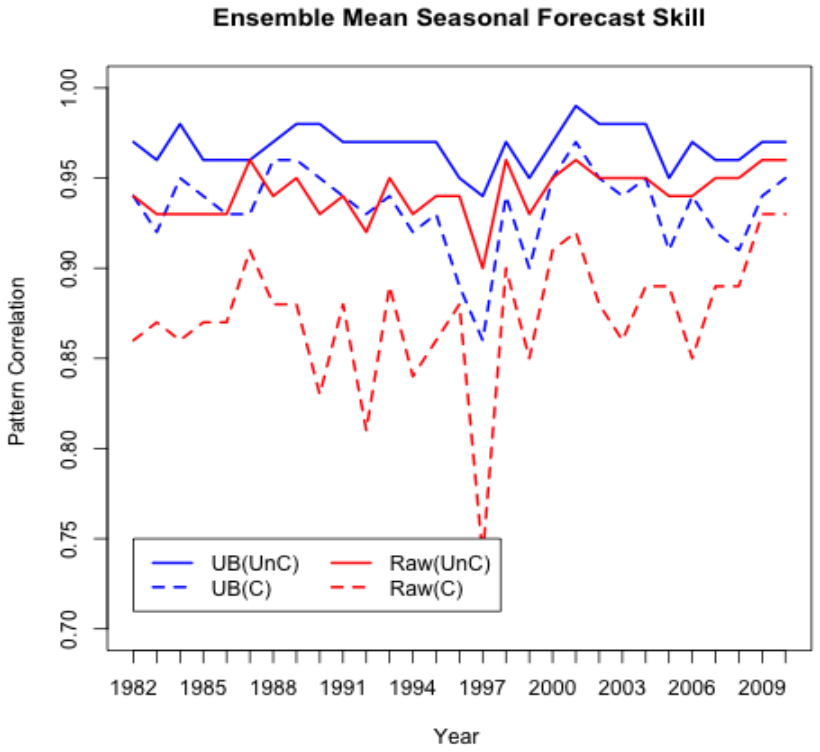
FORECAST PERFORMANCE FOR OND

Unbiased ensemble mean-based forecasts capture the observed spatial rainfall patters Well on monthly and seasonal timescales

Monthly

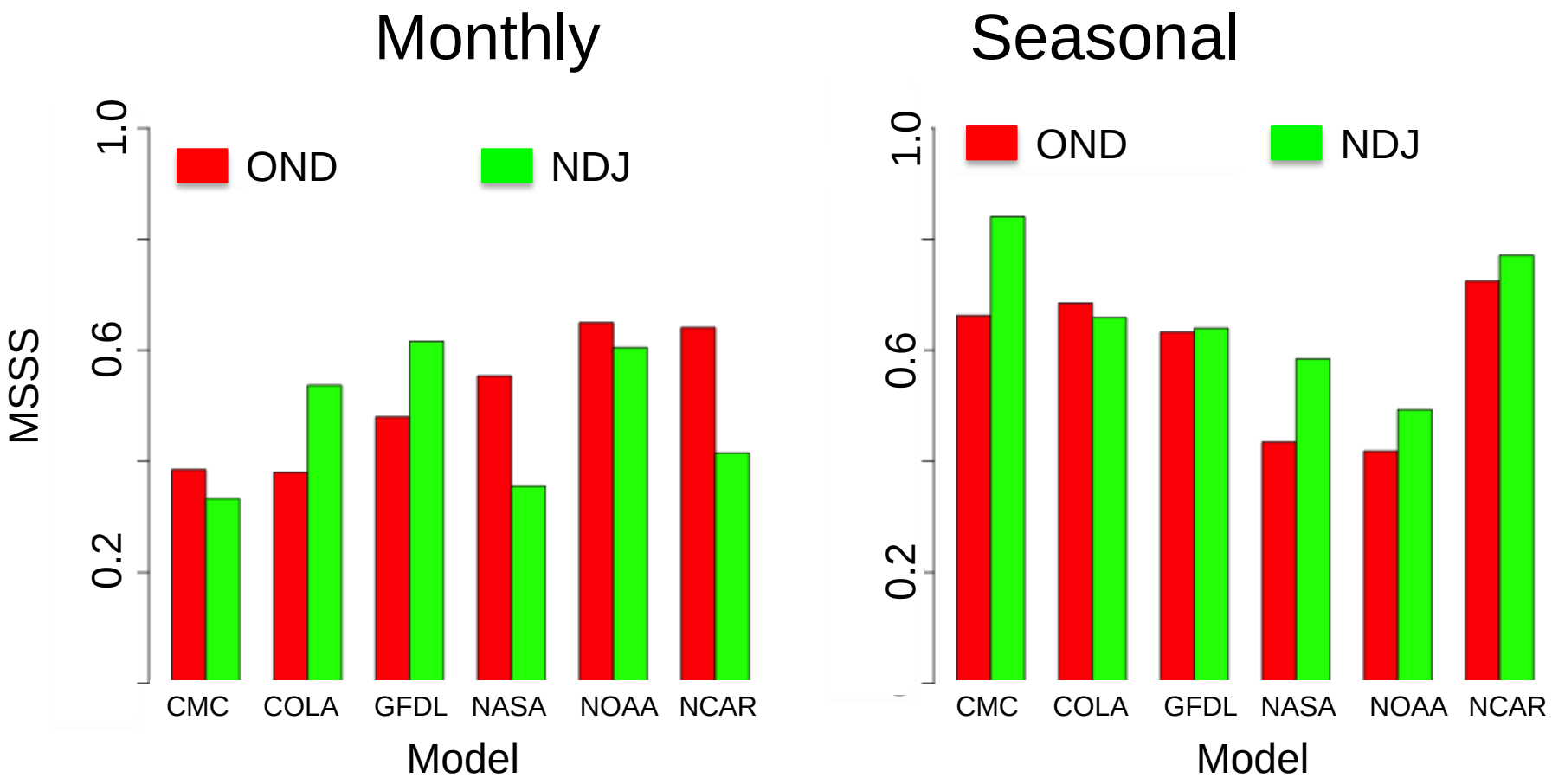


Seasonal

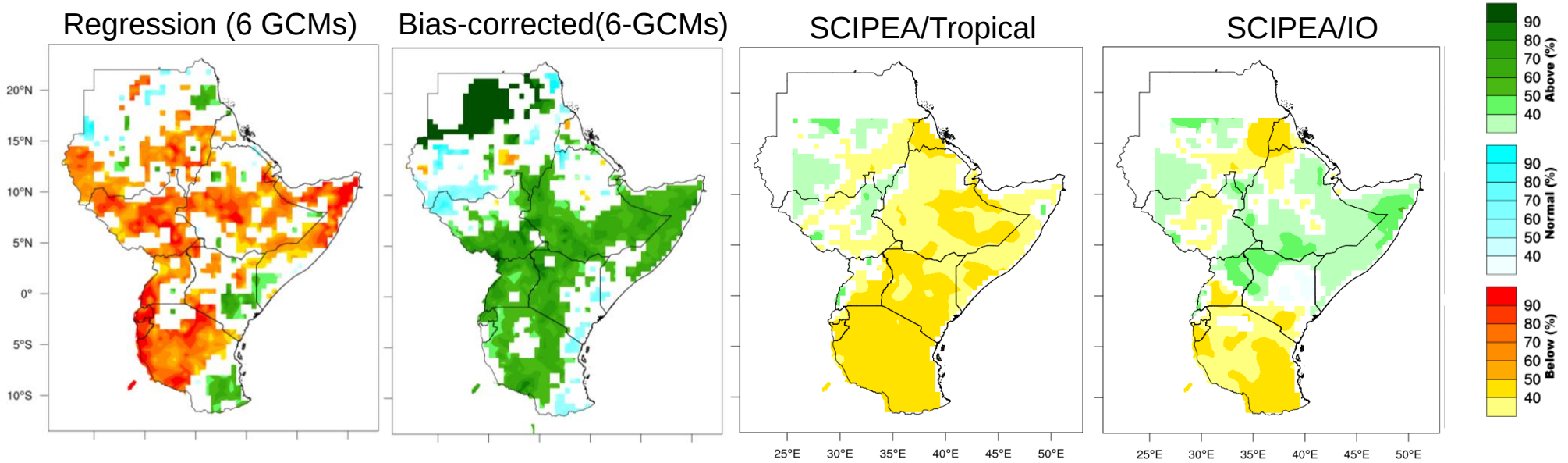


INDIVIDUAL GCM FORECAST PERFORMANCE

Skills vary between seasons and models.

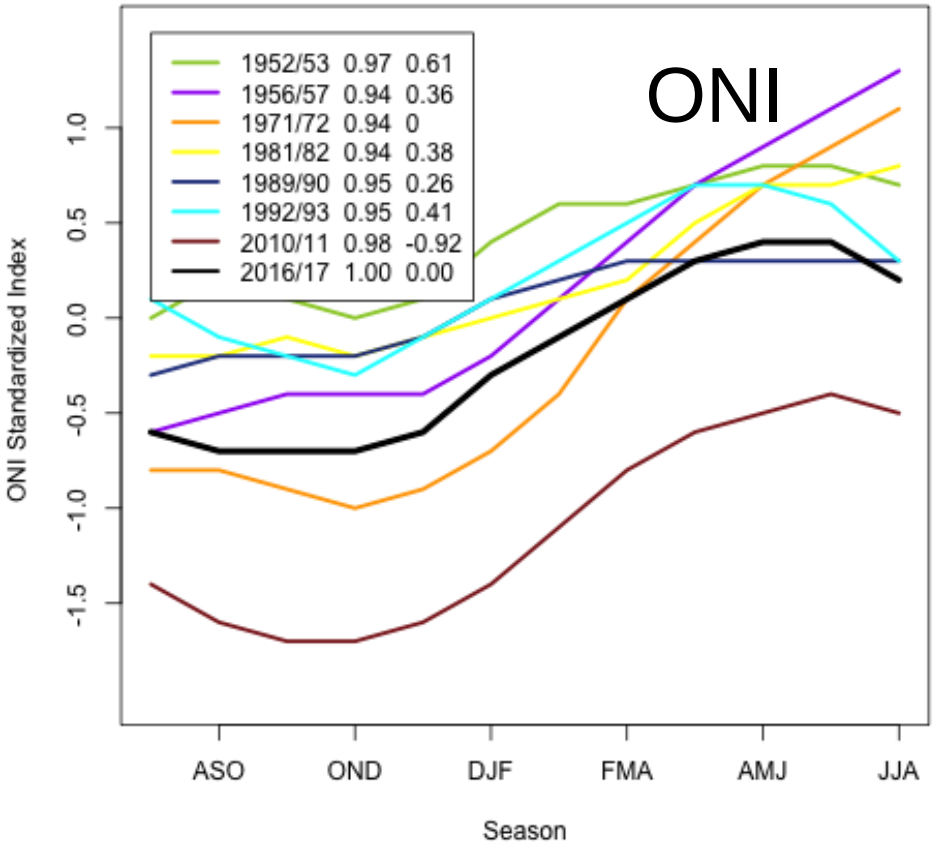


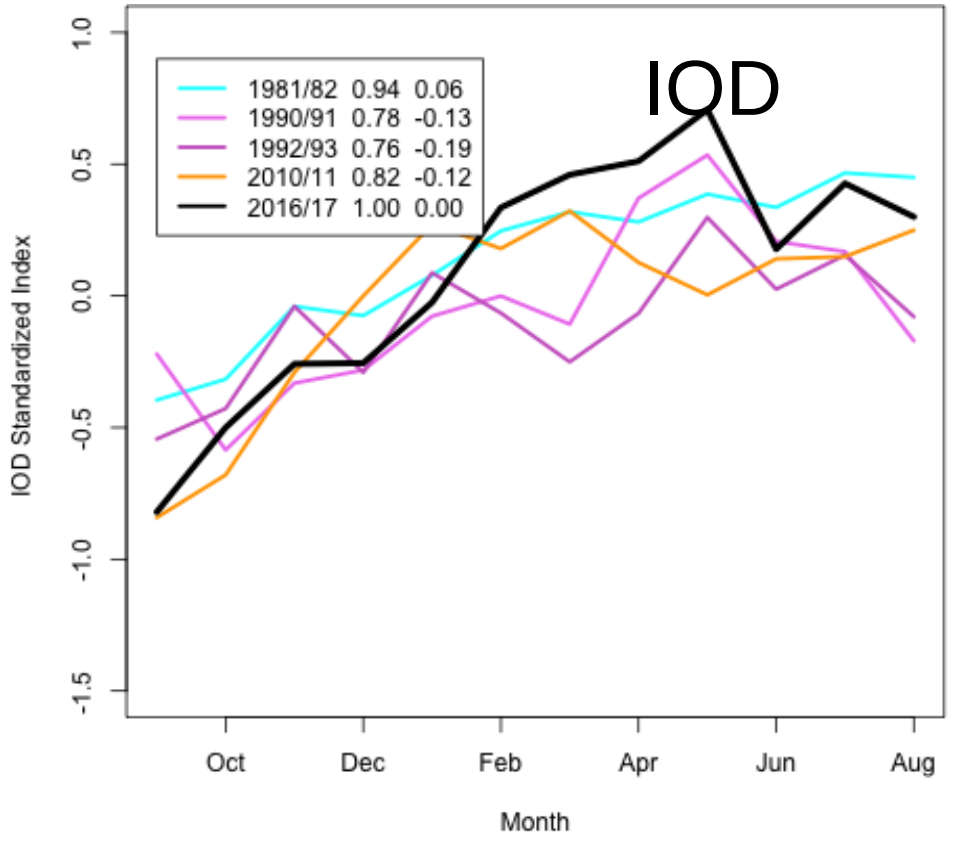
INPUTS FOR FORECAST UPDATE



Differences in model forecasts from August initialization are small, albeit trending towards a wetter category and a relaxation of the dry category towards normal

ANALOGUES


ONI
1952/53 0.97 0.61
1956/57 0.94 0.36
1971/72 0.94 0
1981/82 0.94 0.38
1989/90 0.95 0.26
1992/93 0.95 0.41
2010/11 0.98 -0.92
2016/17 1.00 0.00
ONI Standardized Index
1.0
0.5
0.0
-0.5
-1.0
-1.5
ASO
OND
DJF
FMA
AMJ
JJA
Season


IOD
1981/82 0.94 0.06
1990/91 0.78 -0.13
1992/93 0.76 -0.19
2010/11 0.82 -0.12
2016/17 1.00 0.00
IOD Standardized Index
1.0
0.5
0.0
-0.5
-1.0
-1.5
Oct
Dec
Feb
Apr
Jun
Aug
Month

WHAT WAS FORECAST

- The season is likely to start early over much of the region although the equatorial sector will likely experience early withdrawal and shorter than average rainy period

- Extended dry periods are expected during November, but October is expected to have shorter dry spells compared to average.

OUR PLAN

- Customize a state-of-the-art Regional Climate Model for the region
  - Reproduce past observations
  - Year-to-year variabilities captured
  - Establish baselines for user relevant products
- Continue engaging NMHSs and stakeholders to identify needs and improve products
  - Advance the use of climate information and services in critical areas of regional importance

OUR PLAN

- Develop a system that enables NMHSs to access ICPAC's computing resources to analyze high resolution model forecasts
  - Co-produce downscaled products that are relevant locally and nationally
  - Update forecasts from three-month rolling model outputs
  - Multi-model ensemble
- Regional Center of Excellence for advancement of climate knowledge

Thank you