Seasonal forecast dynamical downscaling over Sub-Sahara Africa

Presenter

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Team members

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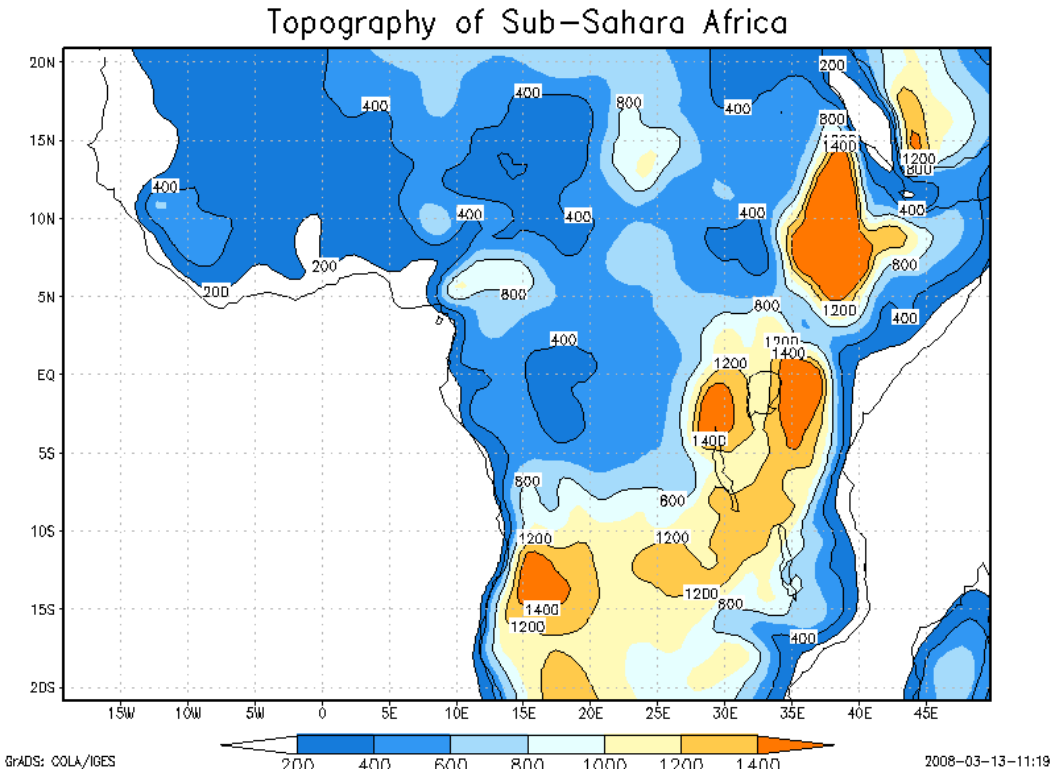
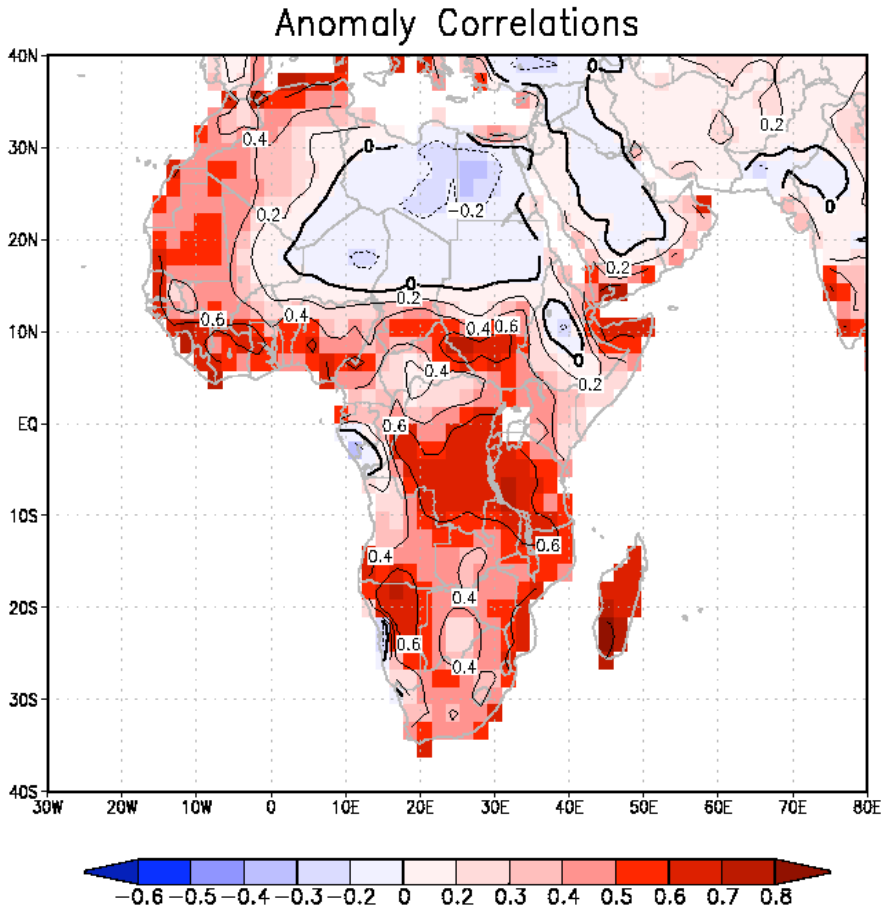
Outline

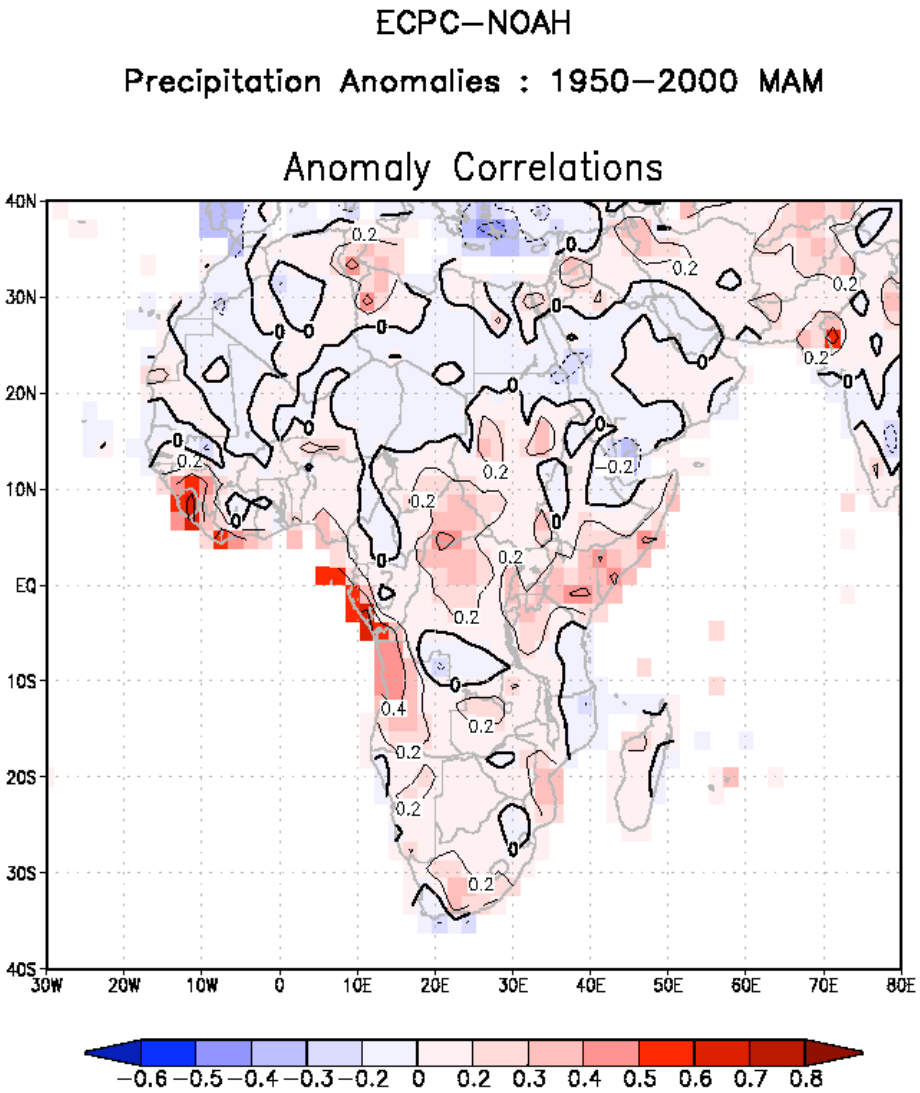
- Introduction – Motivation and domain
- GCM forecast
- Downscaling forecasts using RSM – T2m and precip
- Precipitation frequency and accumulation
- Summary and future plans

Topography and domain

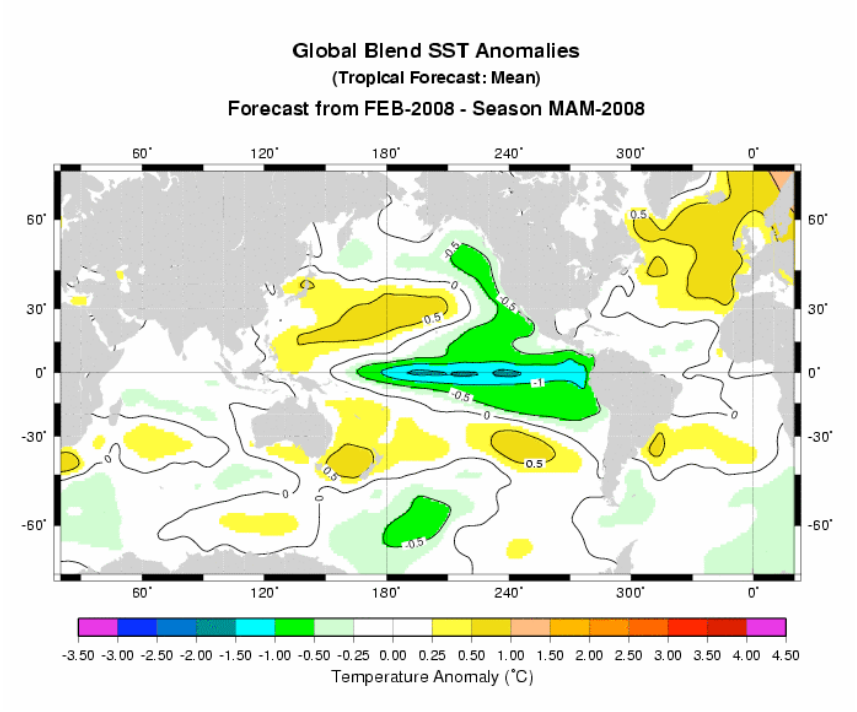


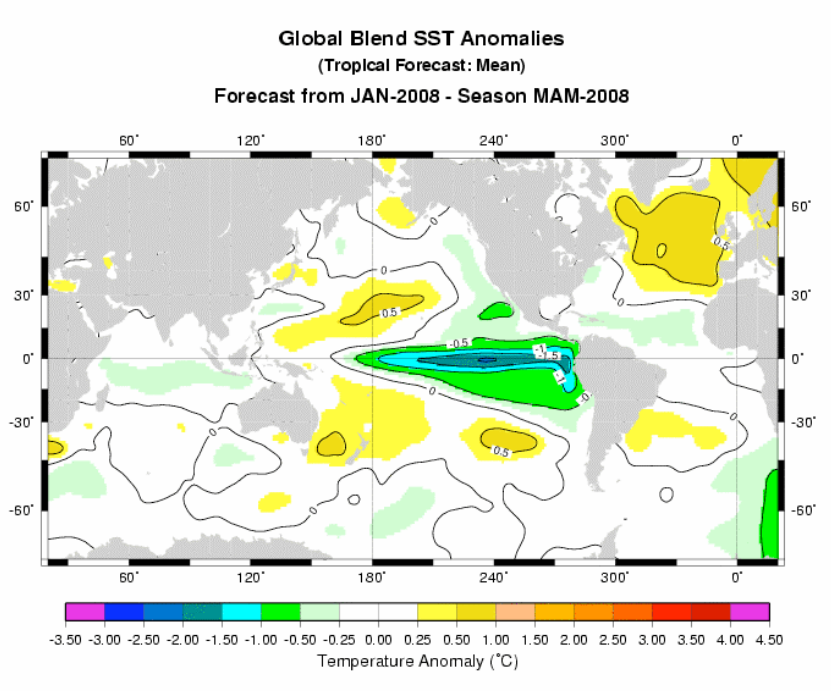
GCM Forecasts

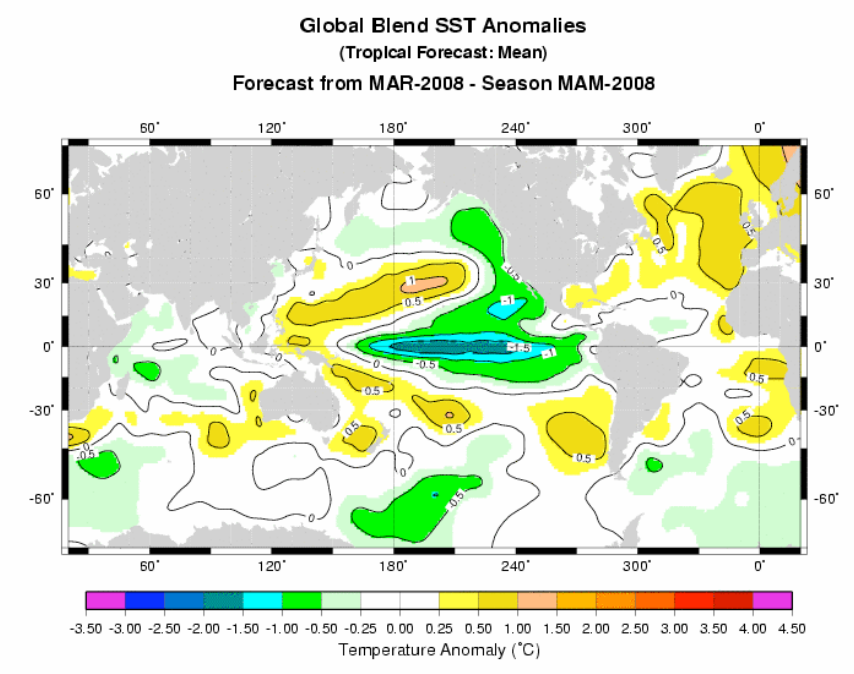




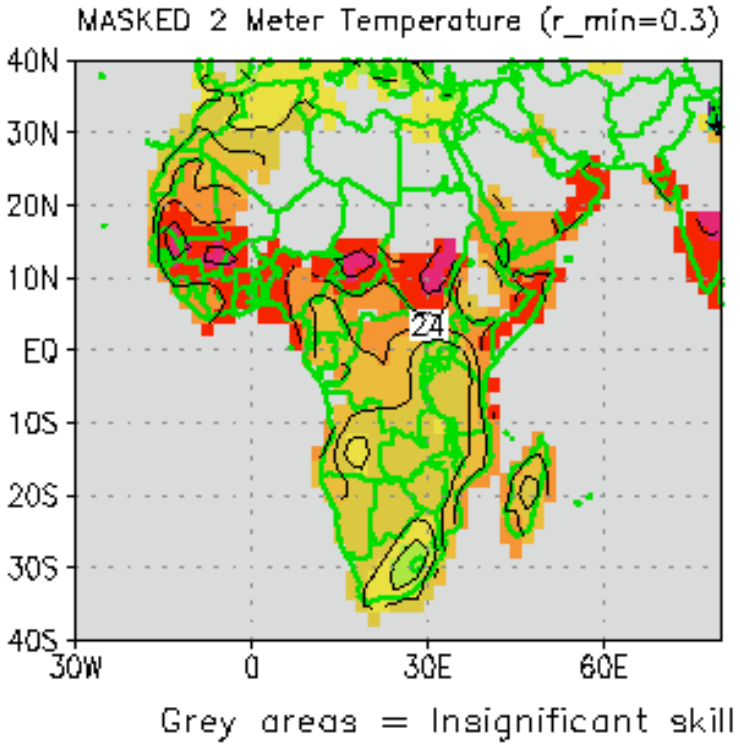
SST Forecasts

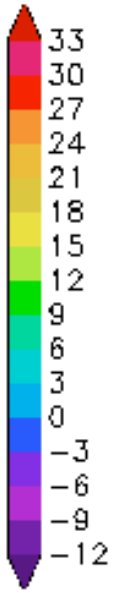


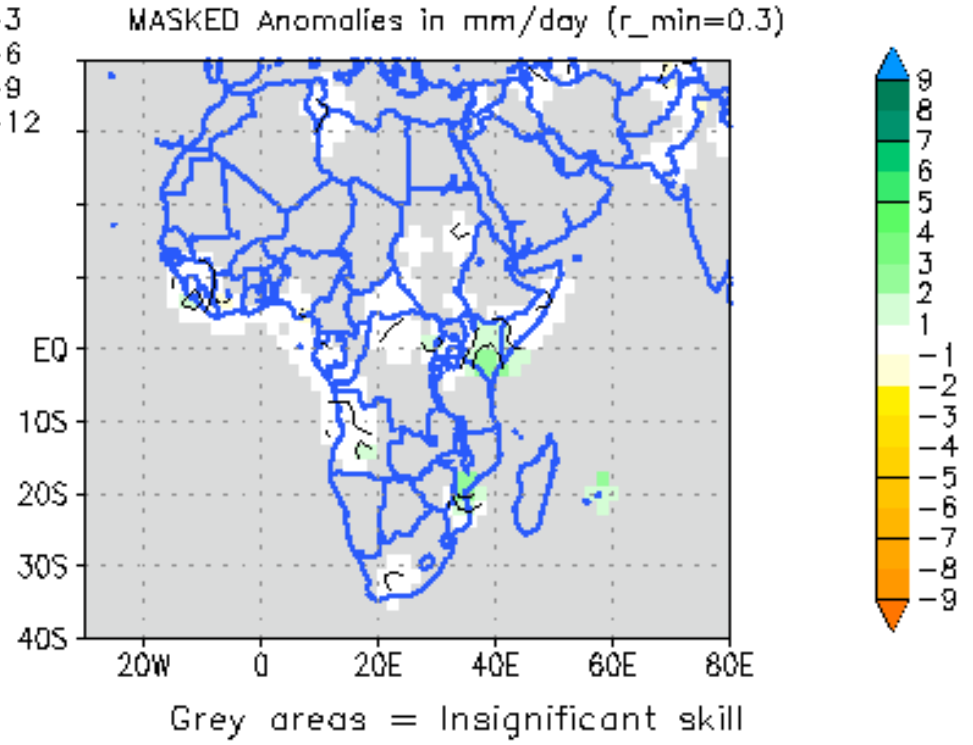




GCM 1-month lead forecast MAM 2008





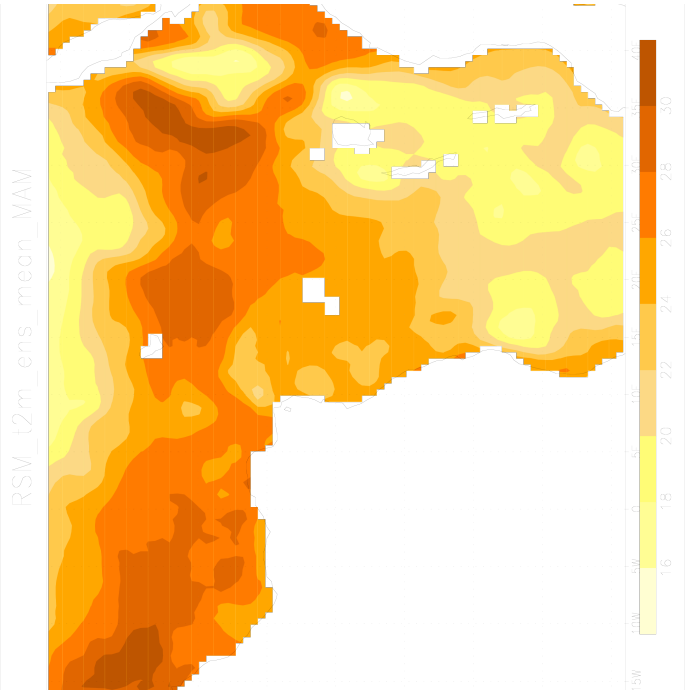


REGIONAL SPECTRAL MODEL
(RSM)

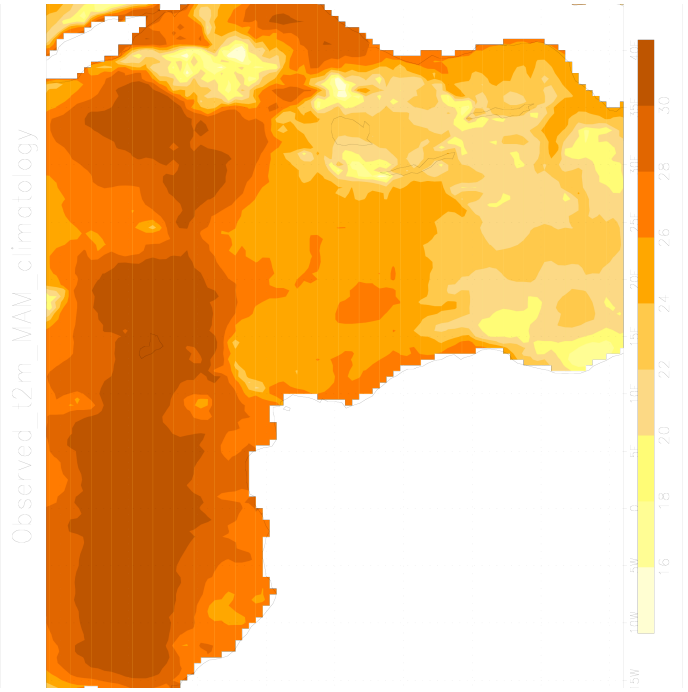
- **Grid Spacing: 60km (~ x=129, y=80 grid points)**
- **Time Step: 400s**
- **Lateral forcing: ECPC GCM**
- **Completed one season forecast MAM 2008**
- **8 ensemble model runs**

RSM Results

RSM T2m forecast MAM 2008

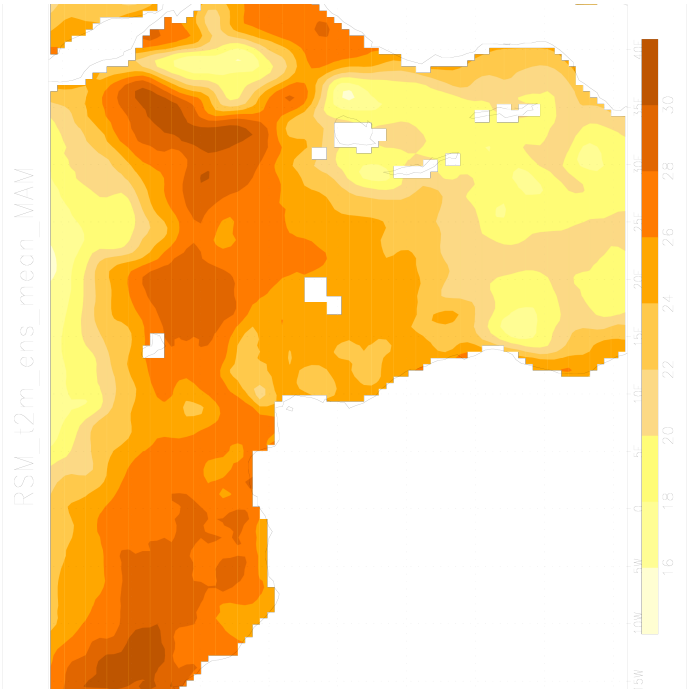


Observed climatology MAM 1961-1990

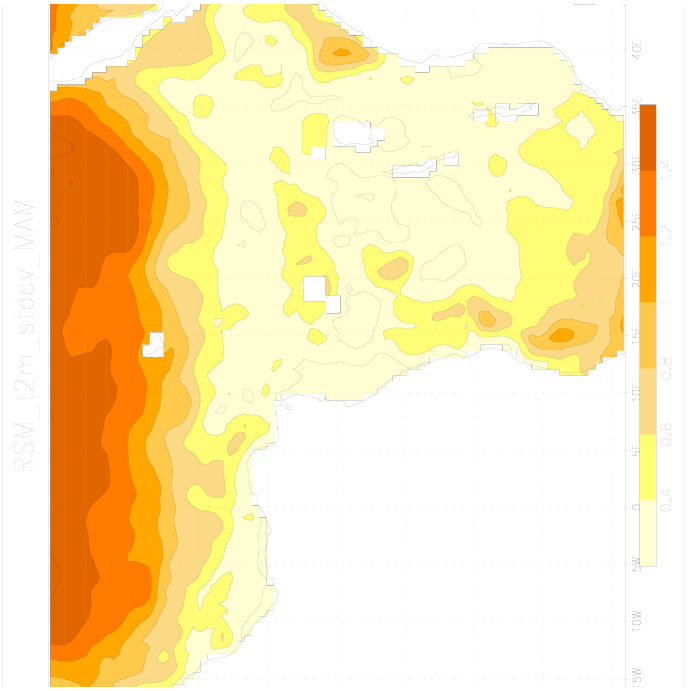


RSM Results

RSM T2m forecast MAM 2008

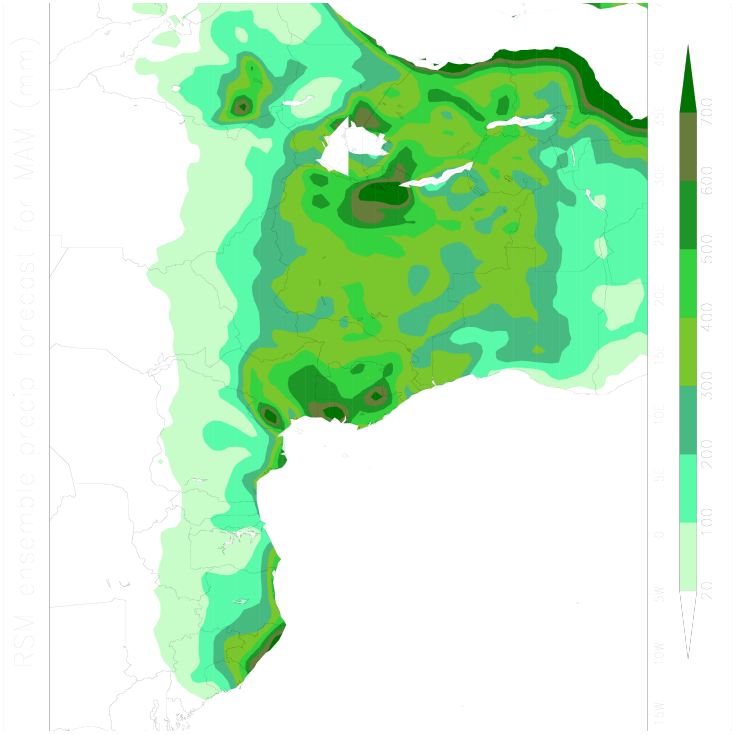


RSM T2m stdev MAM 2008

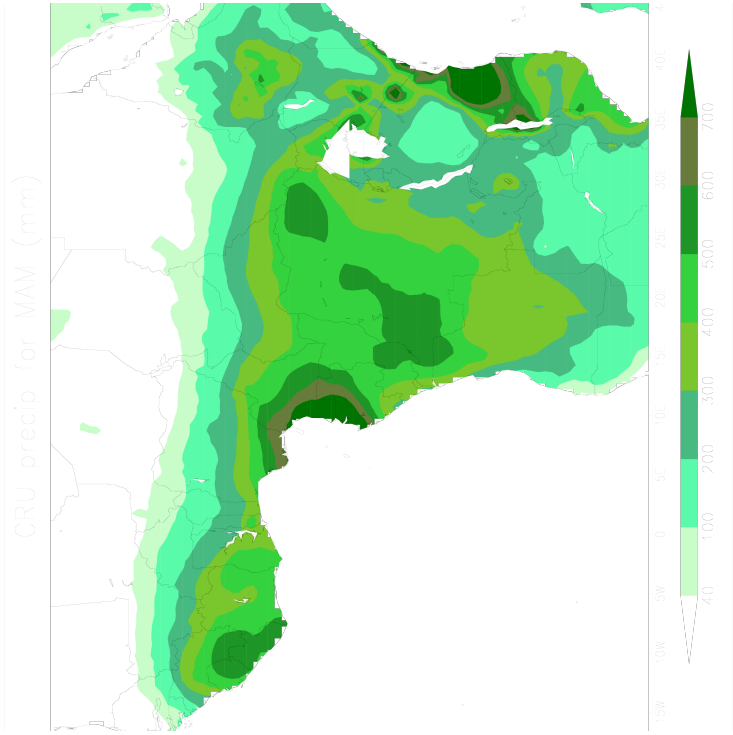


RSM Results

Ensemble Mean Precip

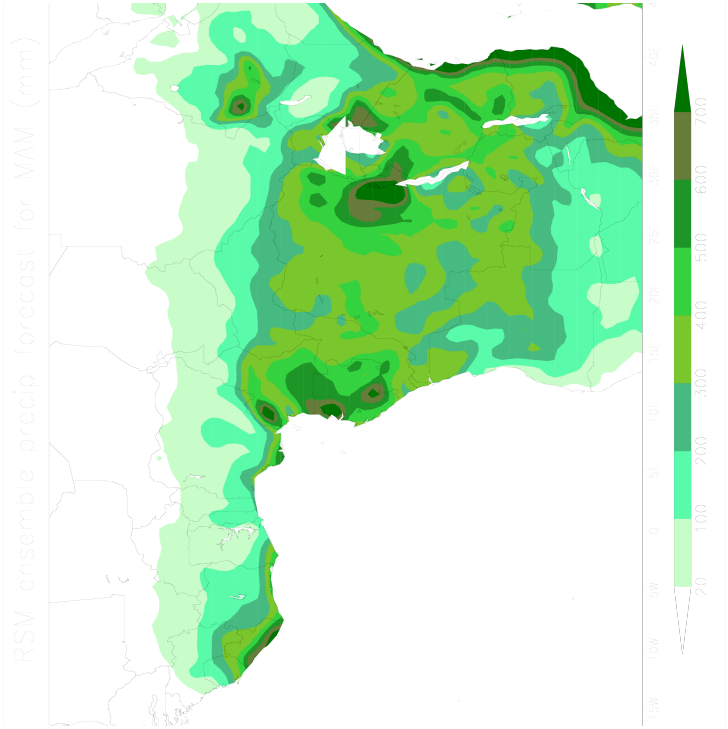


CRU Precip

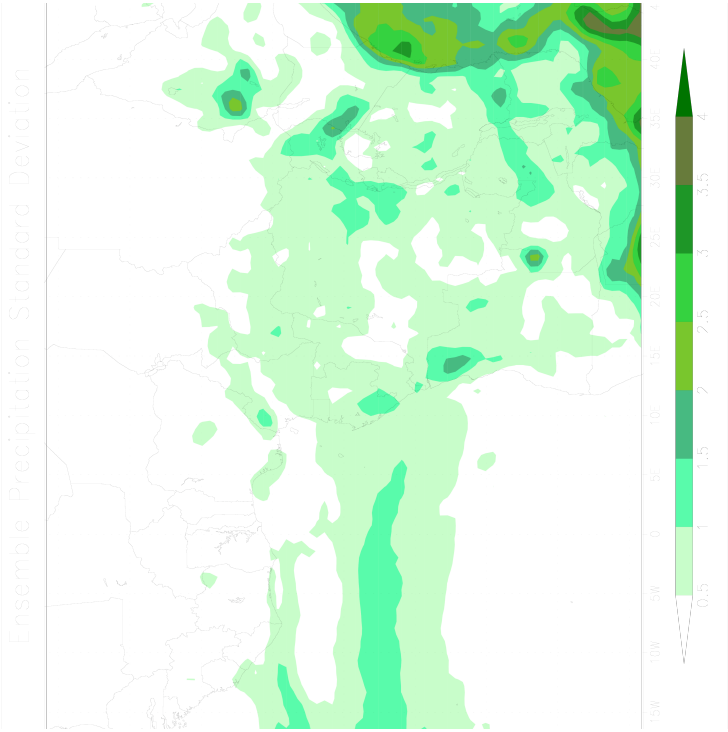


RSM Results

Precip. Forecasts MAM 2008

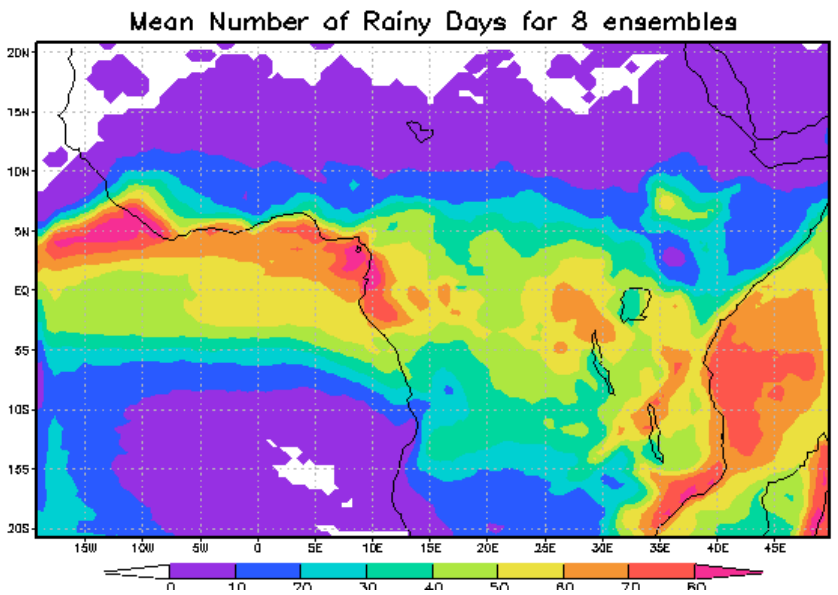


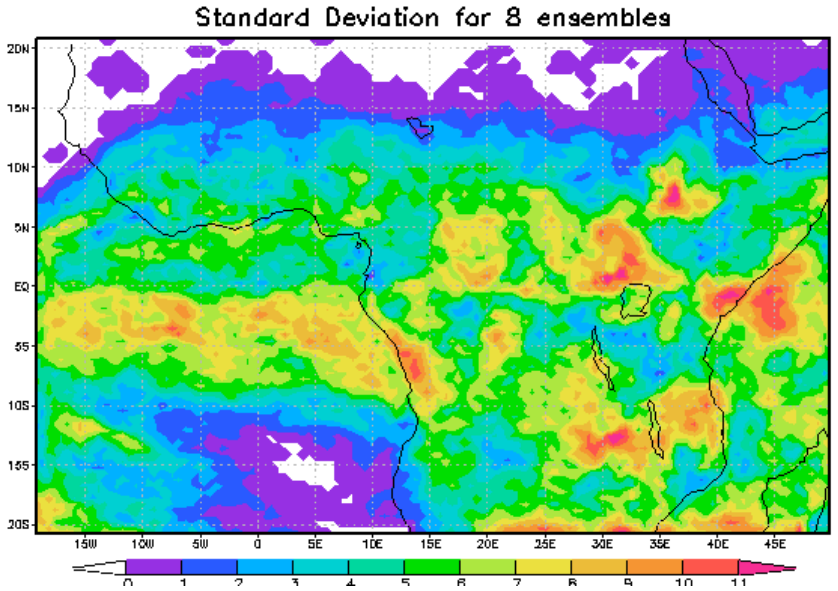
RSM precip stdev MAM 2008



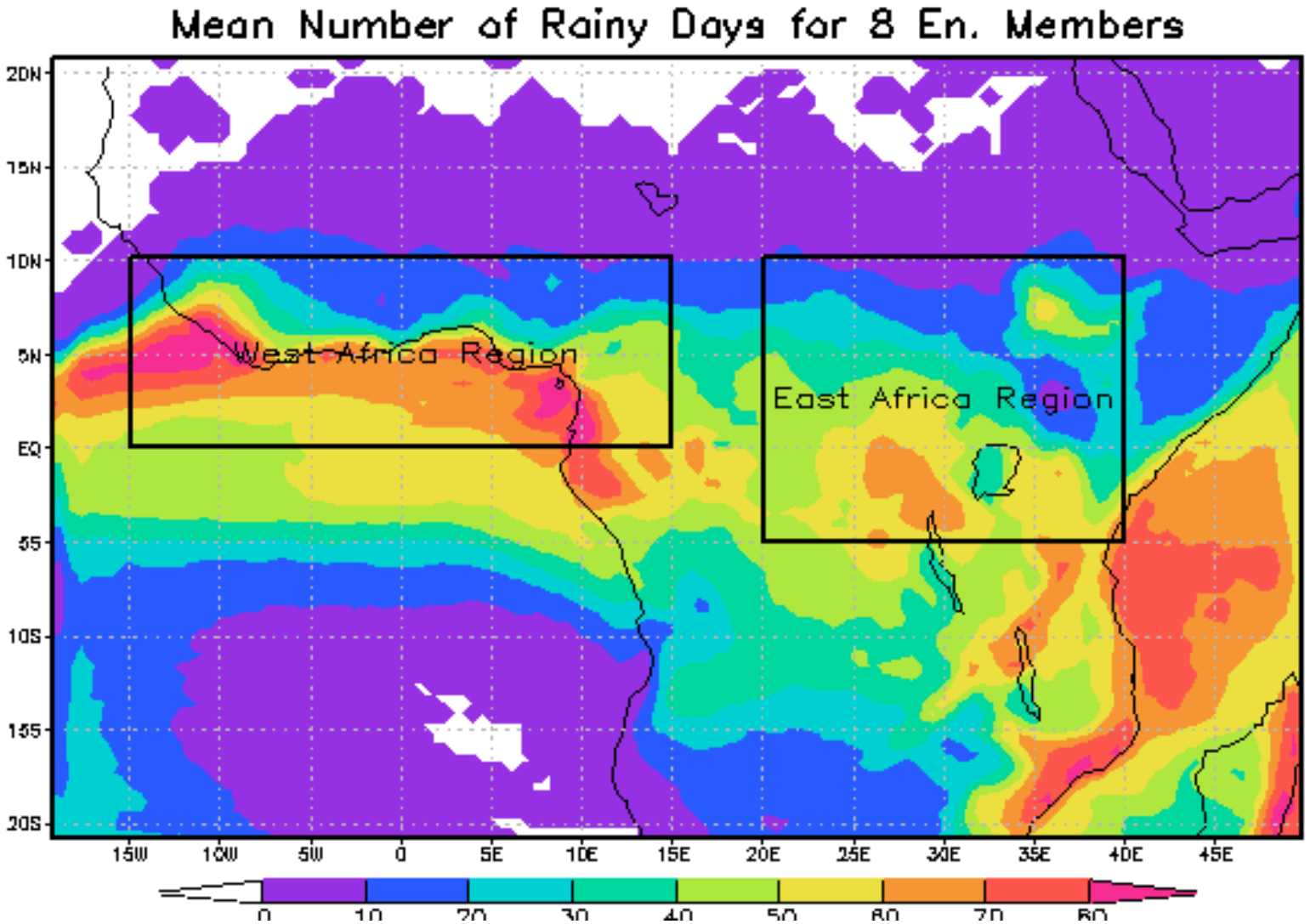
RSM Results

Precipitation Frequency (ensemble mean and spead)

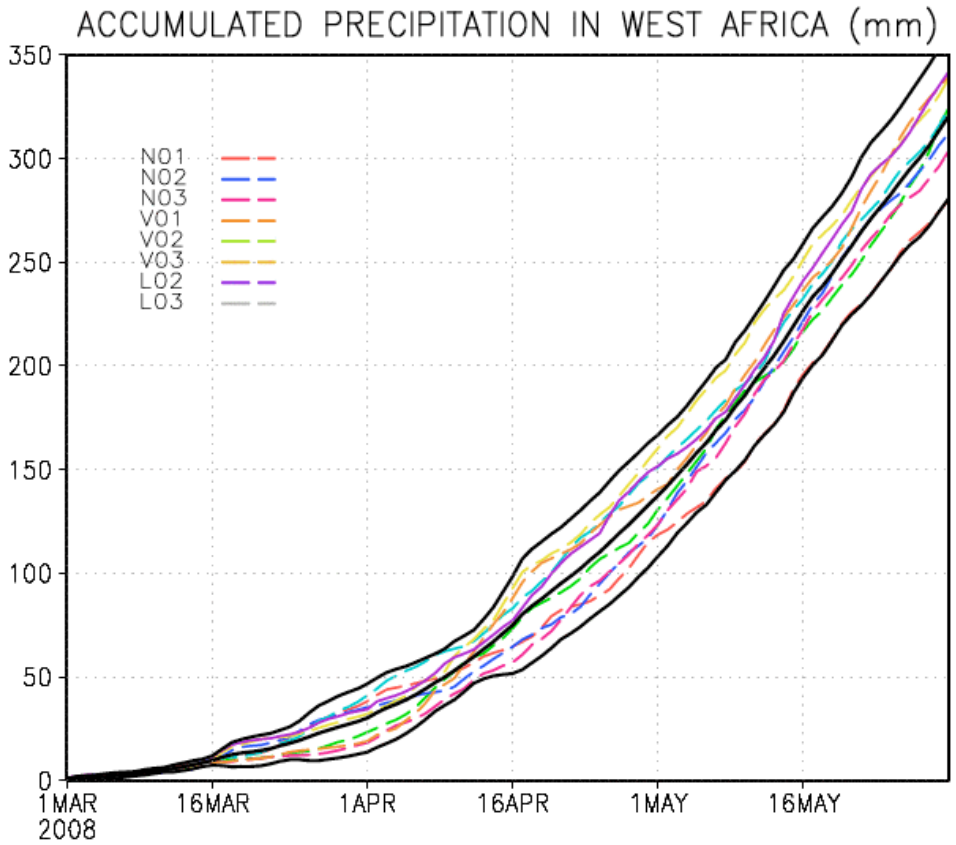


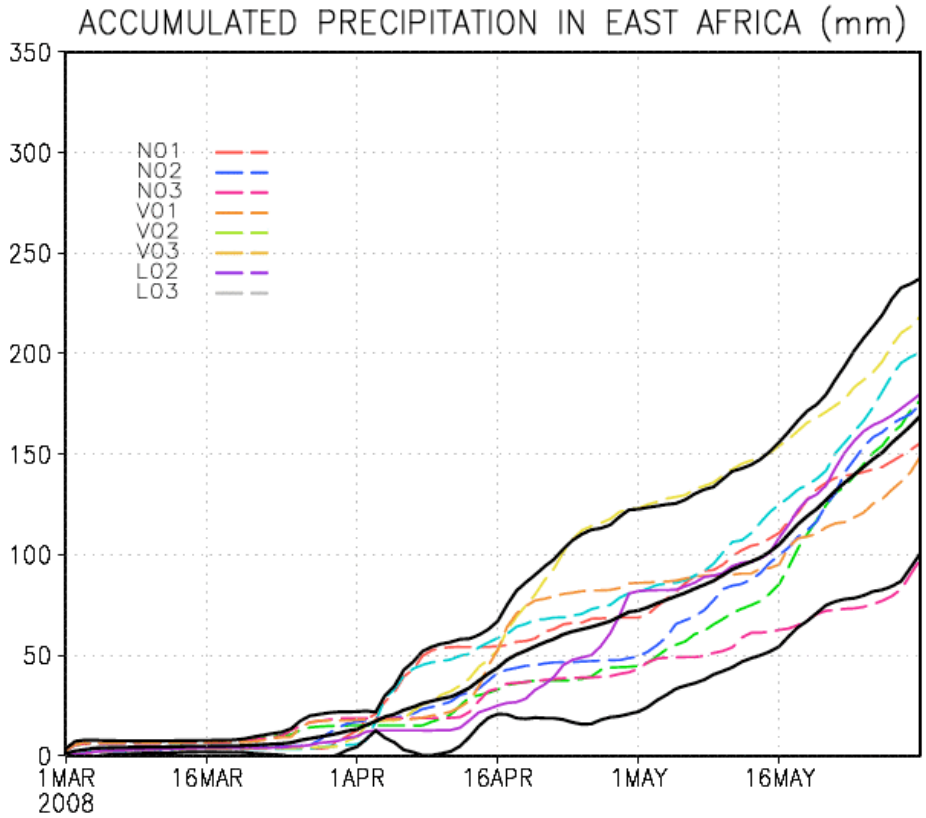


Area average subdomains



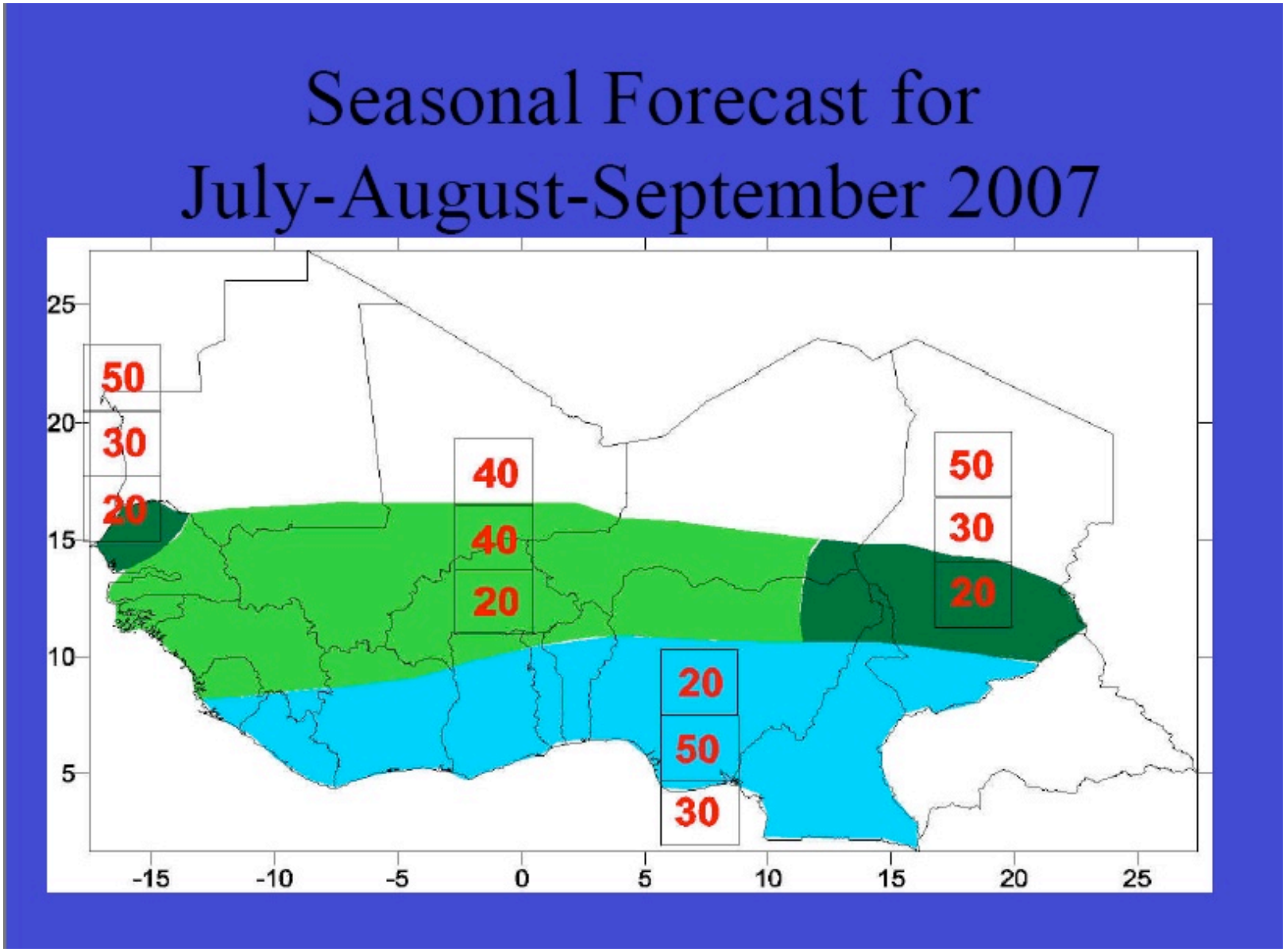
Accumulated precipitation





Ensemble mean ± 2σ

Example of Operational Consensus Forecast



Summary

- RSM captures regional features better than GCM
- Uncertainties in accumulated forecast precipitation is lower in West Africa possible due to land surface features
- RSM demonstrates potential for forecasting the rainfall onset
- RSM tends to position rainfall band slightly southward than observed

Future Work Plan

- RSM hindcasts are required in order to test the model errors and skill over Africa
- Recruit talented graduate students to conduct sensitivity studies to obtain optimal model configuration (domain, resolution, parameterization schemes)