Participant from Nigerian Meteorological Agency(NiMet)

- Climate Services Unit
- Name: Agatha Oluchukwu

**Anokwu**

2024 MAM and AMJ Climate Forecasts

Outline

1. Time series analysis of Climate variability (seasonal and annual cycles, interannual/interdecadal variability) and trends

2. Composite analysis

3. Analogue Analysis

4. Linear regression, principal component, canonical correlation analysis

5. Teleconnections analysis (i,e ENSO, AMO, IOD, SIOD, Atlantic Dipole, NAO, AO, SAM, Benguela Nino, Mediterranean SSTAs)

6. Interactions analysis between seasons (summer and following winter) and regions for the same target season (i.e summer African monsoon and Atlantic cyclone activity)

7. Single Model Ensemble Analysis (i,e ECMWF, NCEP, UKMET)

8. Multi-model Ensemble Analysis (ie MME, Copernicus, IRI)
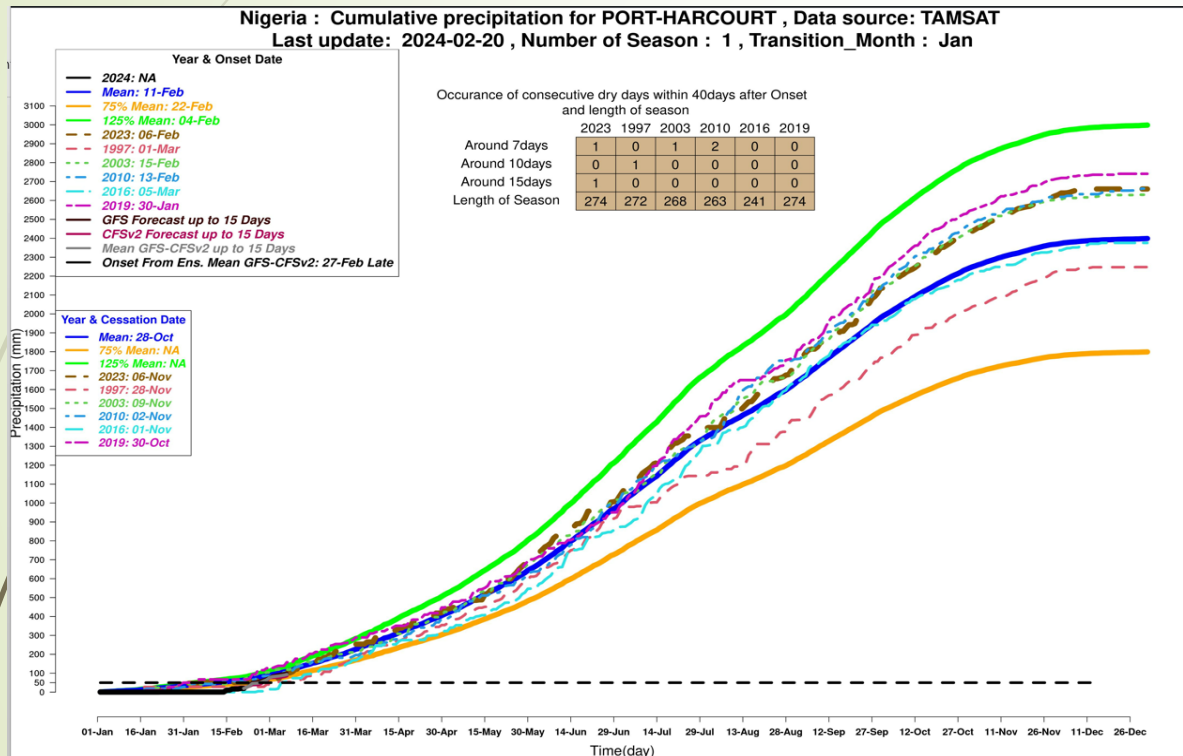
MAM Rainfall analysis 1991-2023
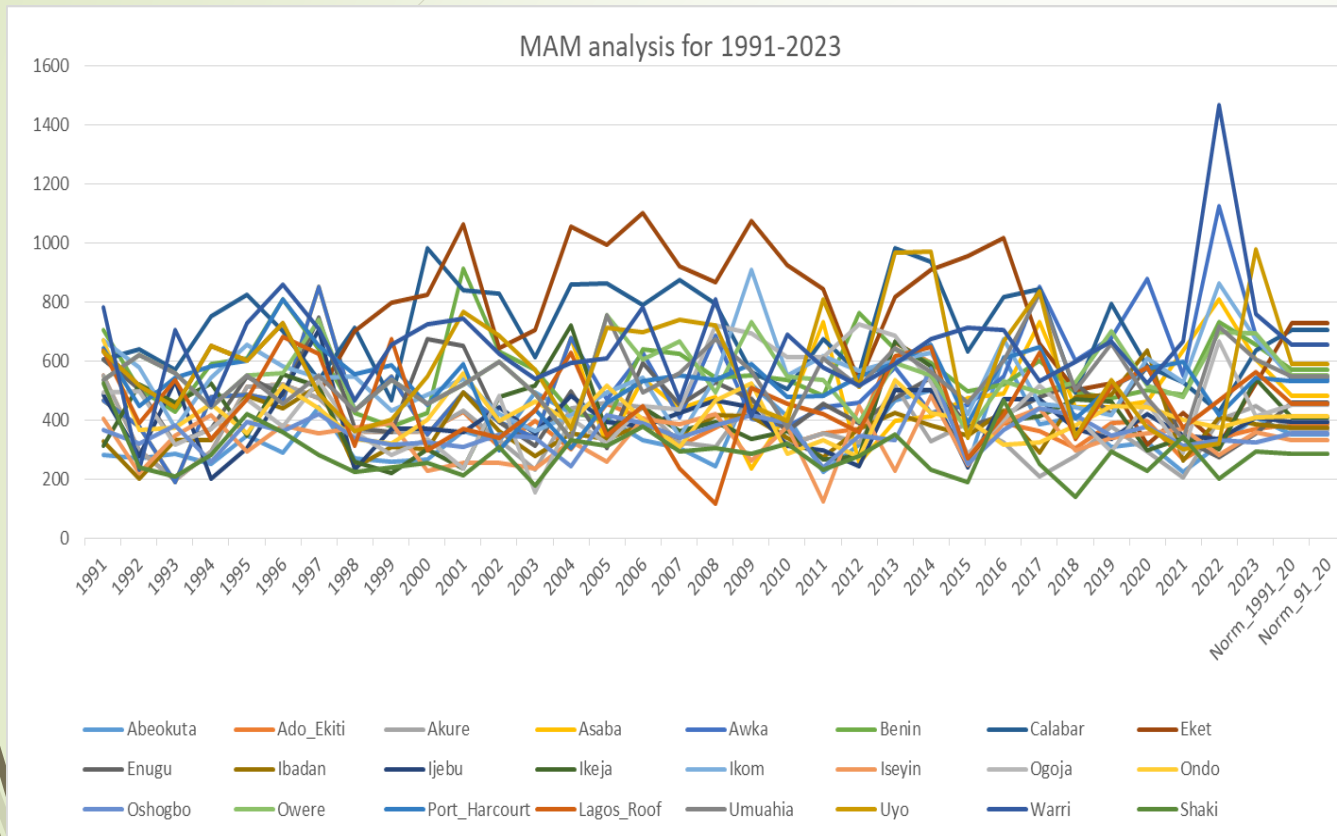
- MAM trend from 1991 to 2023 over Nigeria.

- The general pattern showed similar, high and low seasonal cumulative.

- Year 2022 showed highest cumulative seasonal MAM
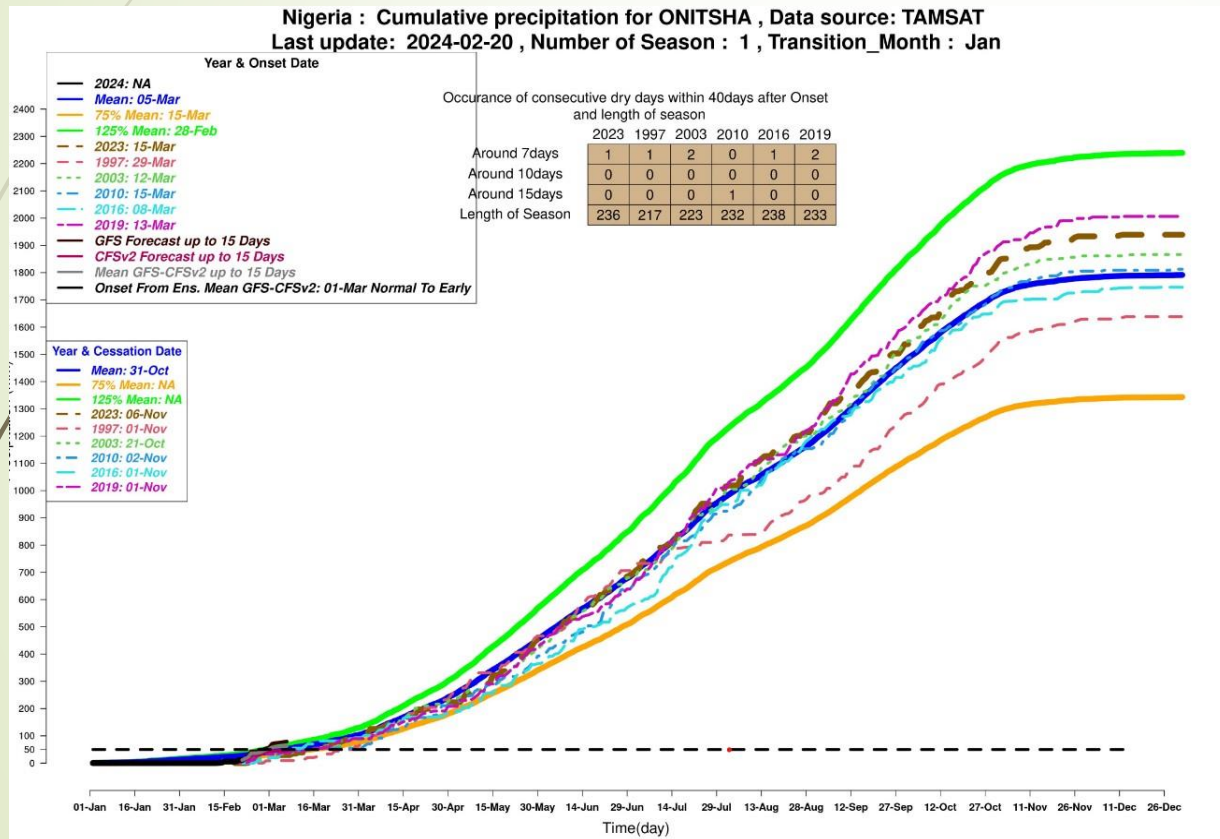
AMJ Rainfall analysis 1991-2023

AMJ analysis for 1991 to 2023
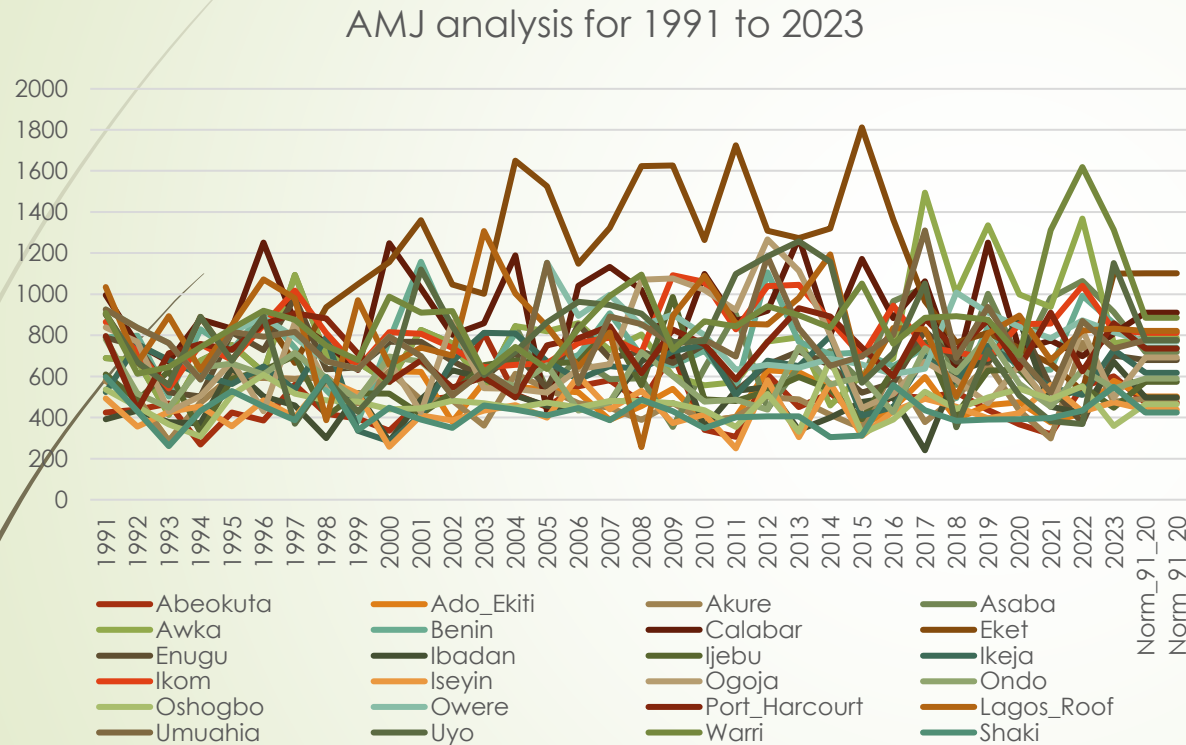
- AMJ trend from 1991 to 2023 over Nigeria.

- The general pattern showed similar, high and low seasonal cumulative.

- Year 2015 showed highest cumulative seasonal AMJ in Eket station

Past and current State of a station(PH) coast of Nigeria

Nigeria : Cumulative precipitation for PORT-HARCOURT , Data source: TAMSAT
Last update: 2024-02-20 , Number of Season : 1 , Transition_Month : Jan

➡ This analysis shows that in the last decade, rainfall has been within the band of normal especially the positive side.

Past and current State of a station(Onitsha) inland of the south East Nigeria

Nigeria : Cumulative precipitation for ONITSHA , Data source: TAMSAT
Last update: 2024-02-20 , Number of Season : 1 , Transition_Month : Jan

➡ This analysis shows that in the past few years, rainfall has been within the band of normal especially the positive side.

Past and current State of a station(Oshogbo) inland of the south West Nigeria
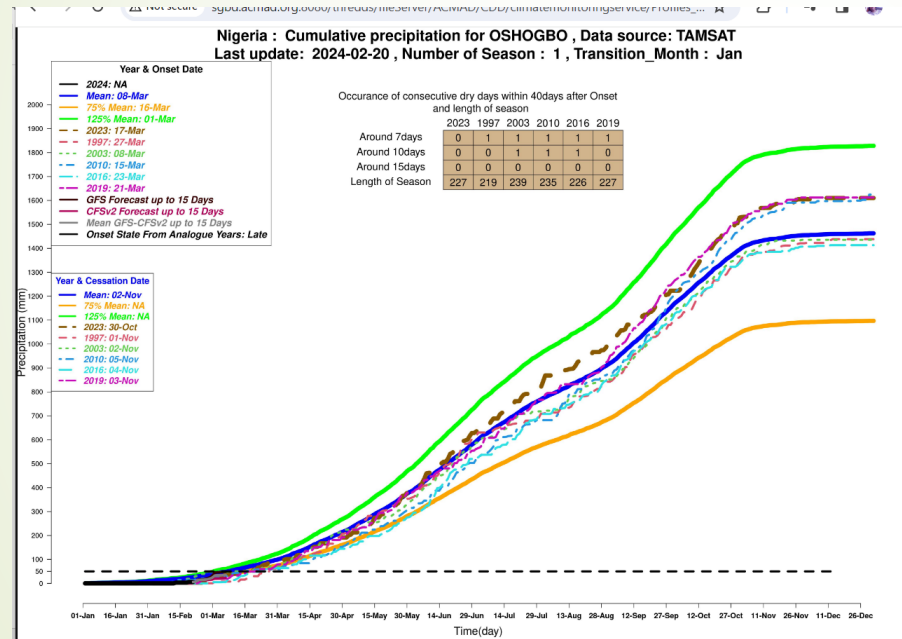
- This analysis shows that in the past few years, rainfall has been within the band of normal especially the negative side.

A review of the 2023 MAM cumulative Rainfall Observation over South of Nigeria

MAM 2023 in Nigeria
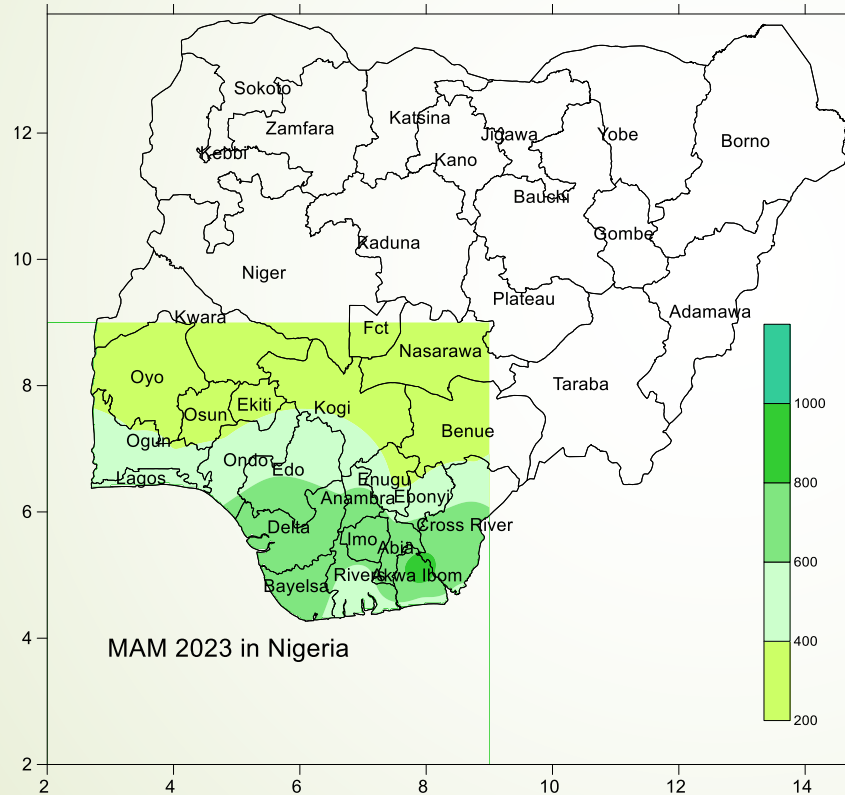
- The MAM cumulative rainfall observation range from 270-960mm in 2023.

MAM departure from Normal in 2023
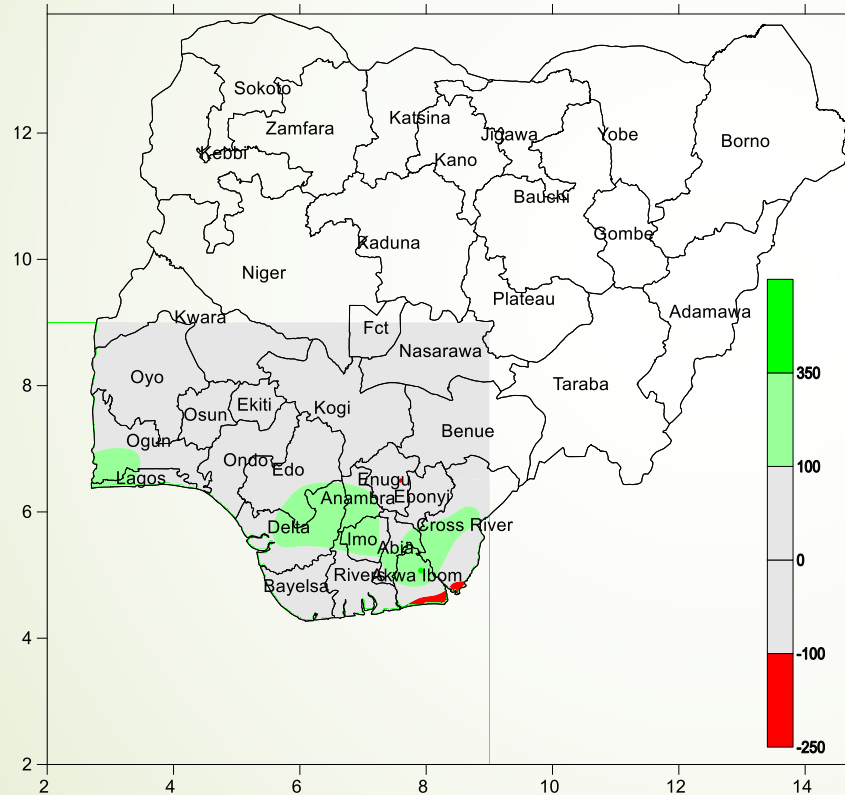
- The departure from long time mean shows over 75% normal rainfall in MAM season across Southern Nigeria.

- Few areas recorded above normal and south east coast had a short fall.

Predicted MAM for 2023
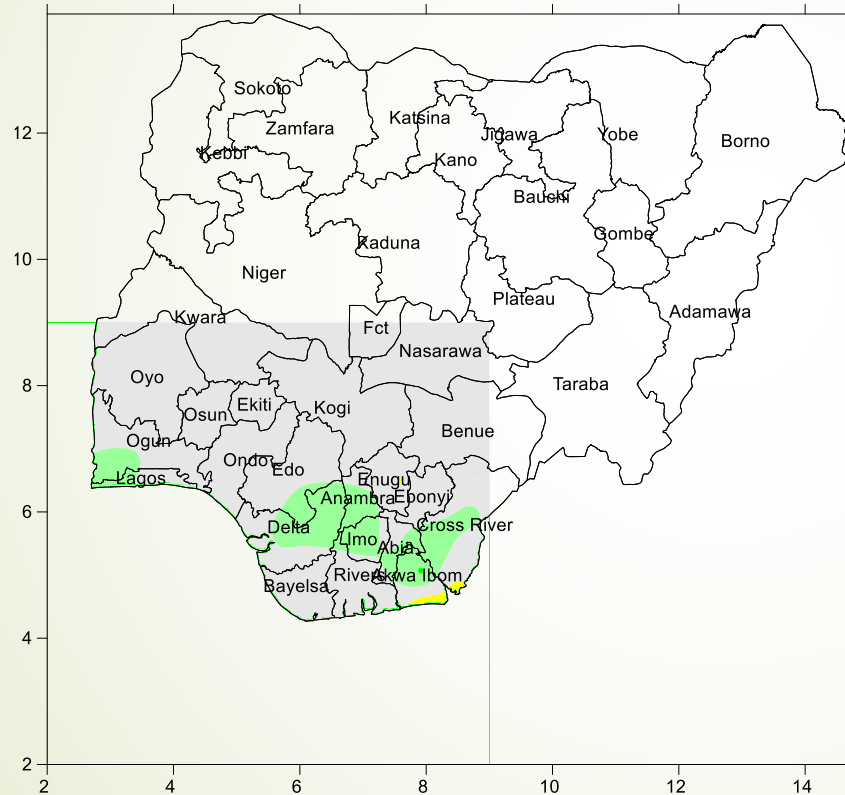
- The anticipated rainfall pattern came out very well
- Above 80% accuracy.

Approach to forecast for MAM and AMJ for 2024.

➡ Paying a close attention to nino 3.4 region, gulf of Guinea, and Indian Ocean region and equatorial region.
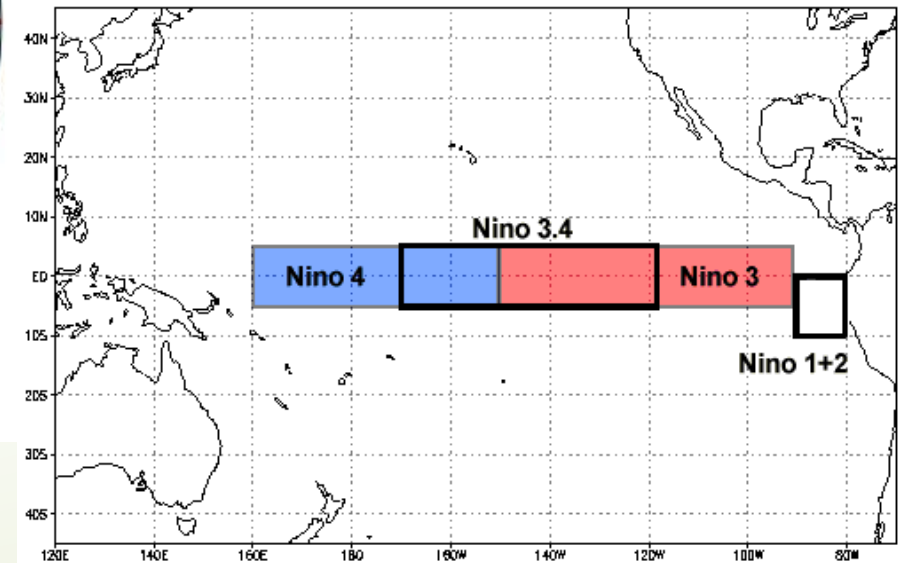
ENSO phase issued in January 2024

Official NOAA CPC ENSO Probabilities (issued Jan. 2024)

based on -0.5°/+0.5°C thresholds in ERSSTv5 Niño-3.4 index

- **La Nina**
- **Neutral**
- **El Nino**

Percent Chance (%): 0, 10, 20, 30, 40, 50, 60, 70, 80, 90, 100

Season: DJF, JFM, FMA, MAM, AMJ, MJJ, JJA, JAS, ASO
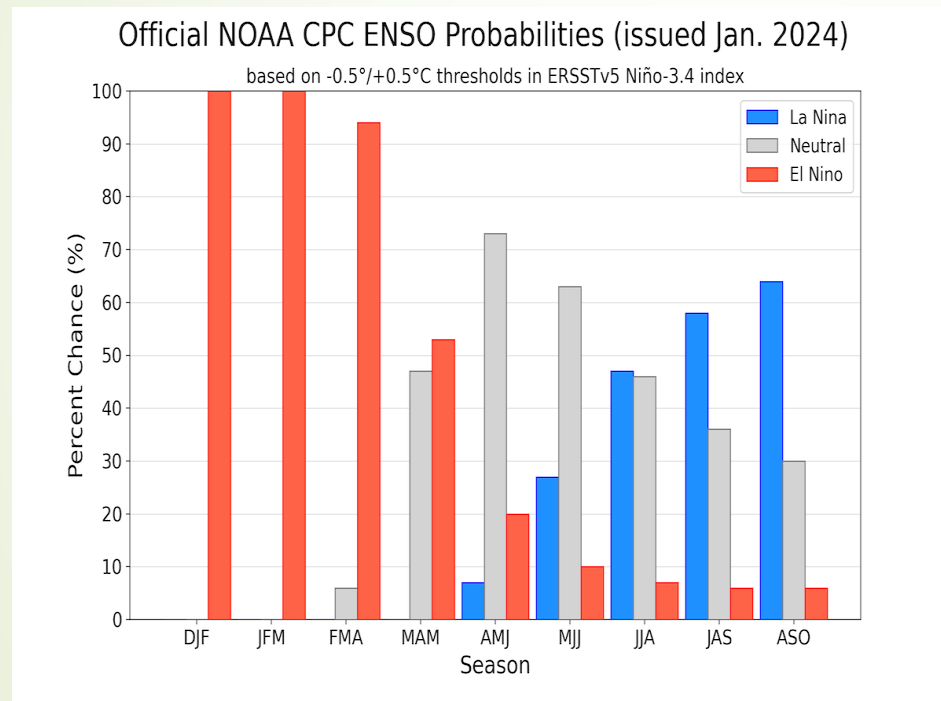
- ➡ DJF,JFM showed strong El Niño phase then the phase began to decrease further in the season.

- ➡ Neutral phase pushing through fast and becomes dominant in AMJ and MJJ

Mid January ENSO outlook for 2024

Mid–January 2024 IRI Model–Based Probabilistic ENSO Forecasts

ENSO state based on NINO3.4 SST Anomaly Neutral ENSO: –0.5 °C to 0.5 °C
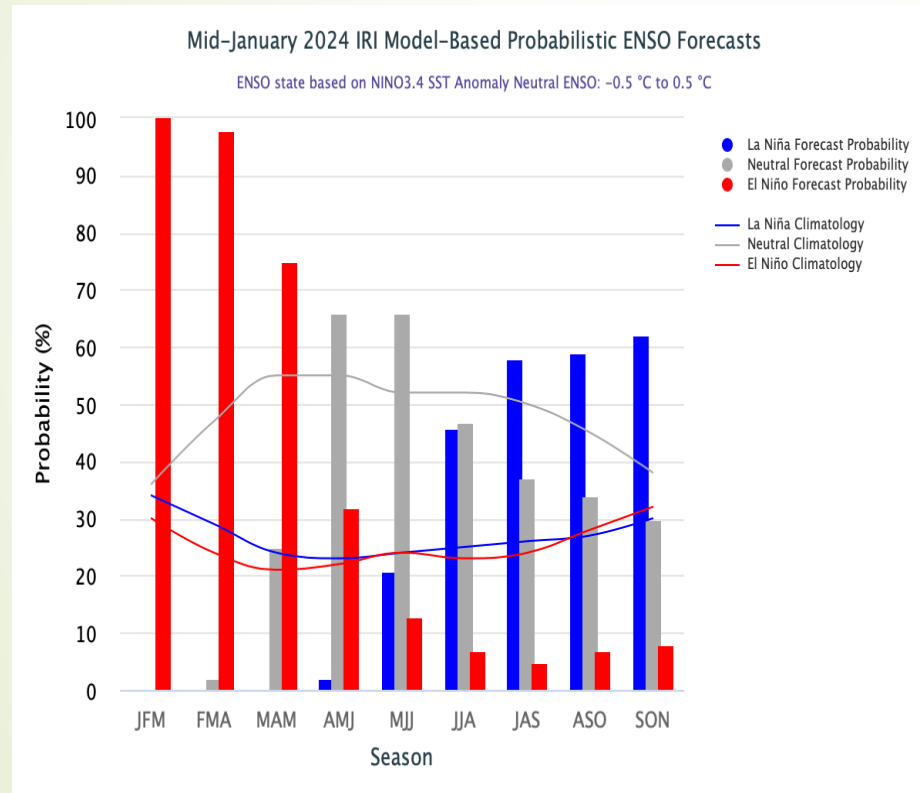
➡ Between early January and Mid January outlook showed a short fall in El Nino phase in FMA and MAM

February ENSO outlook for 2024

Mid–February 2024 IRI Model–Based Probabilistic ENSO Forecasts

ENSO state based on NINO3.4 SST Anomaly Neutral ENSO: −0.5 °C to 0.5 °C
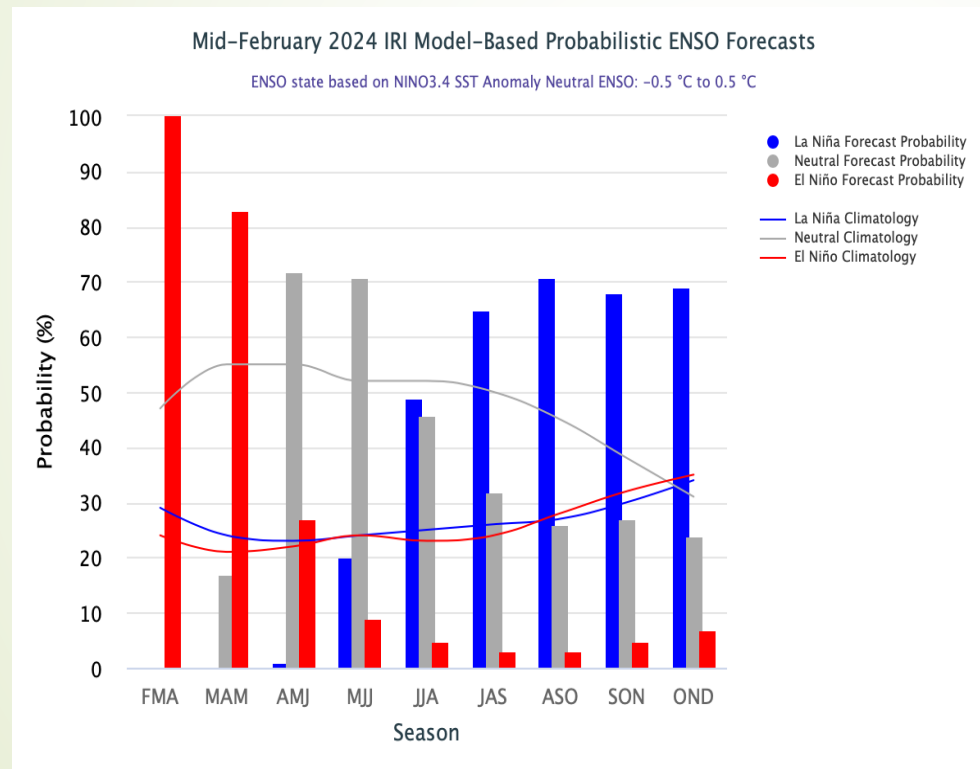
➡ ENSO outlook in February has further confirm that FMA and MAM will maintain El Niño while AMJ and MJJ will be Neutral afterword's the La nina phase becomes dominant.

Looking at the Analogue years(2003,2010,2016 and 2019)

Trend Analysis of MAM Analogue Years
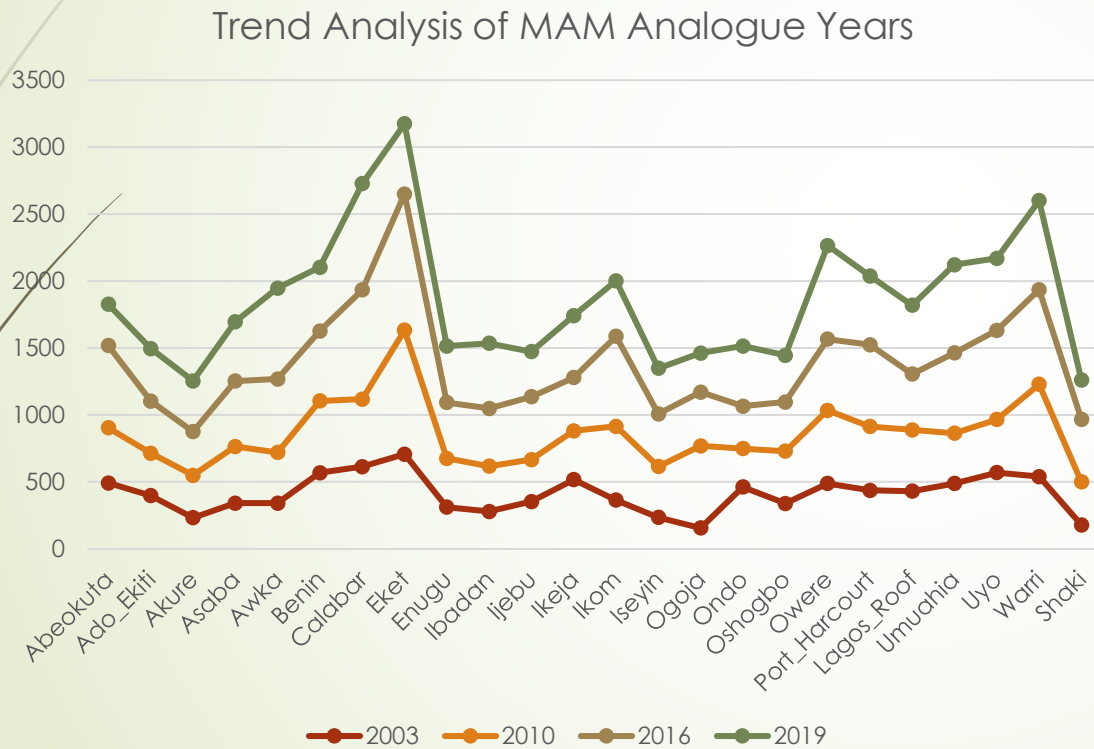
- The seasonal trend look very similar.

- From 2003 to 2019 rainfall showed a positive increase in cumulative value.

MAM departure from Normal: Focus is Analogue years

MAM Dep map of analogue years
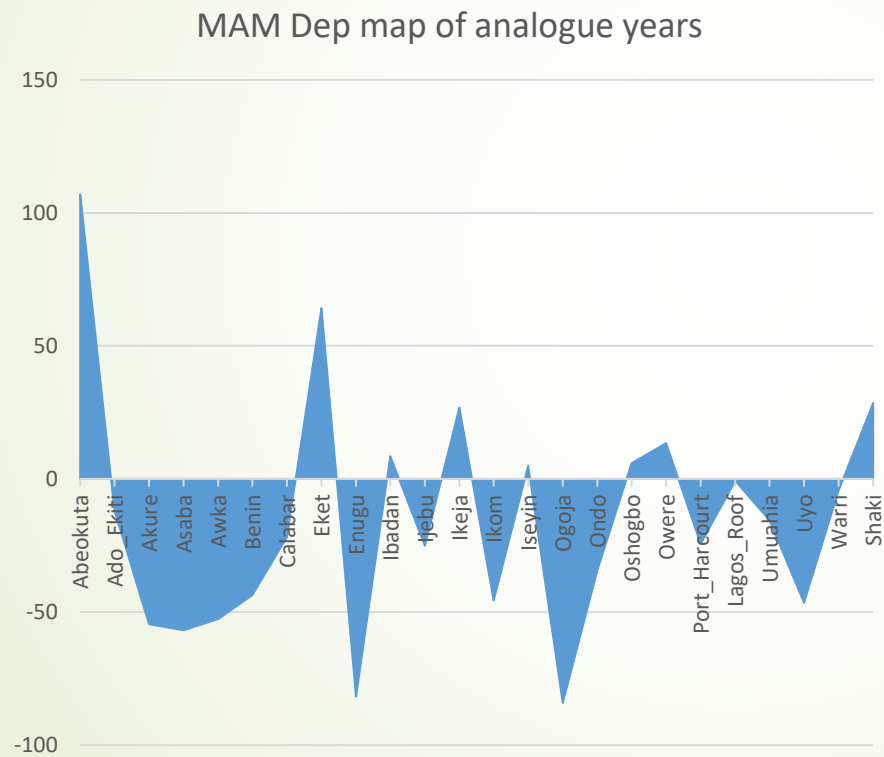
- ➧ Most all the station fell within the normal band,
- ➧ Four station out of 24 station fell off the normal band.

AMJ Report over Nigeria

Analogue years Avg, Dep for AMJ
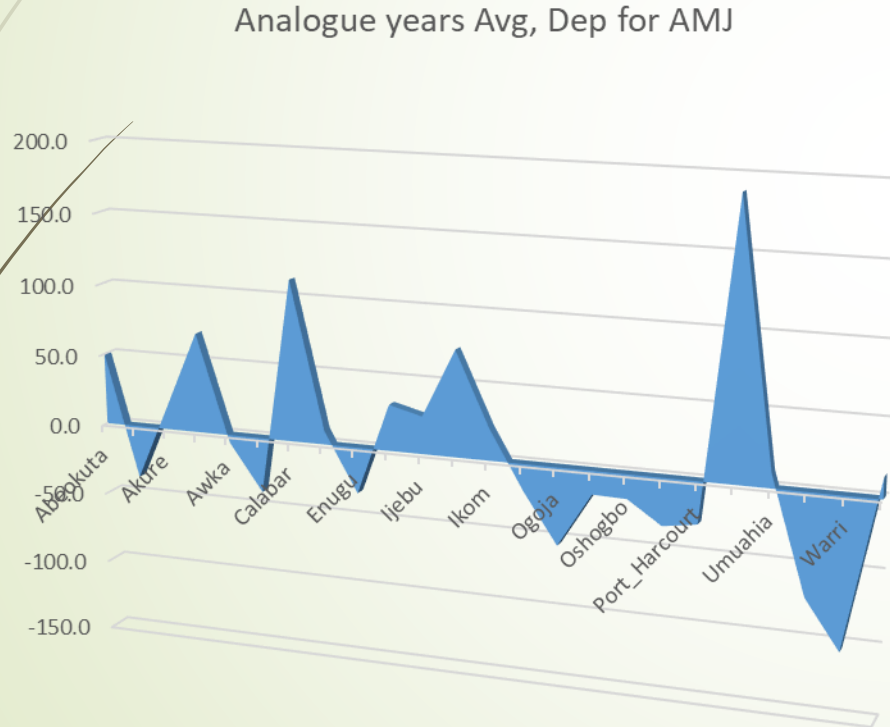
- The AMJ showed that three stations fell off the normal band;

- The suggest that majority of the station in the south were within the normal band in the last decades.

Behavour of SST's of the Analogue years 2003
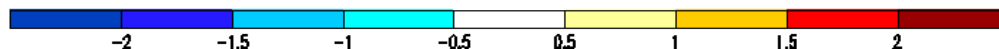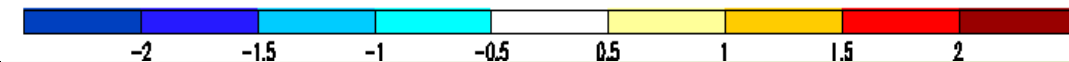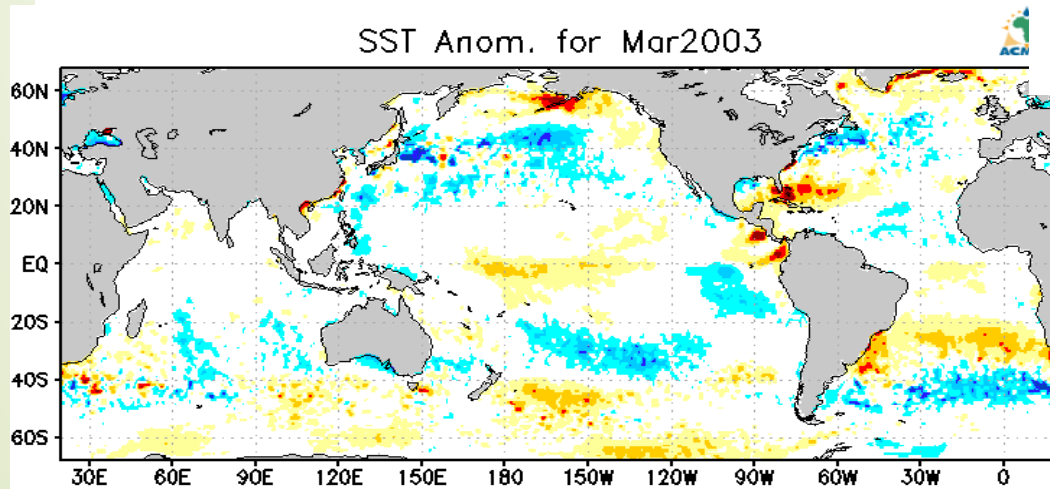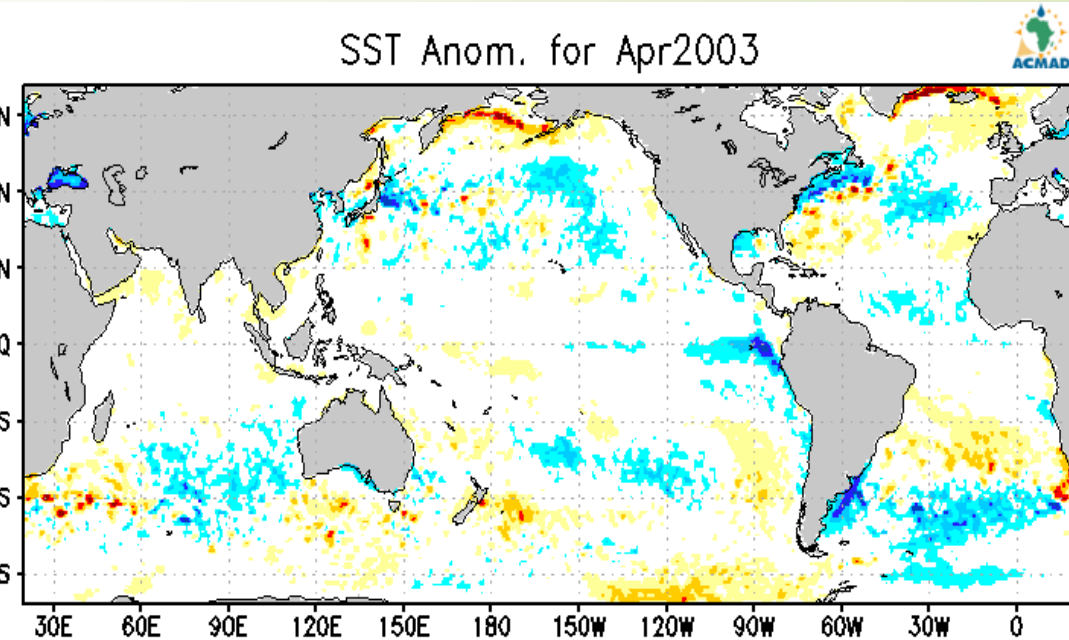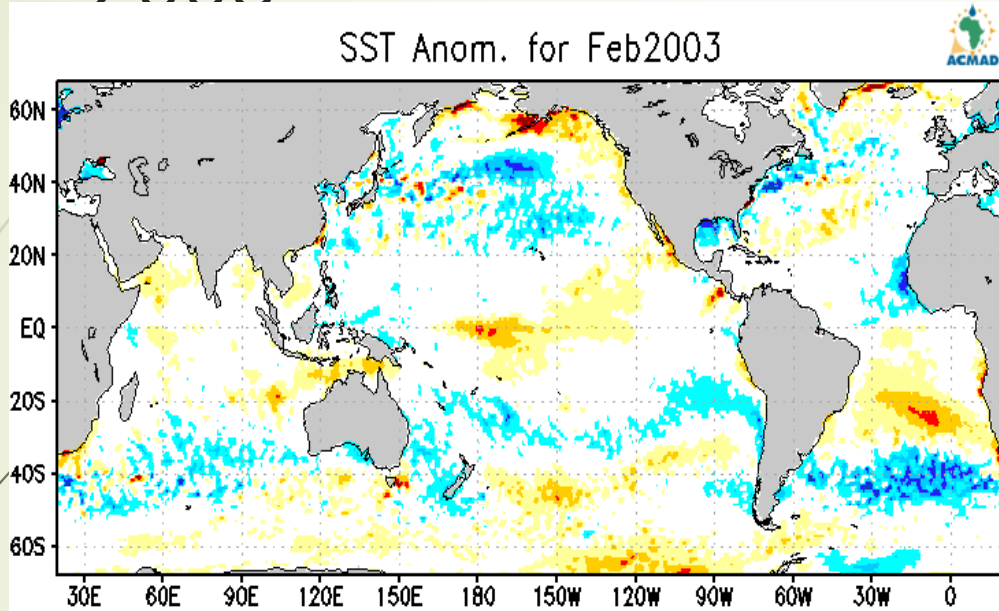
Behavour of SST's of the Analogue years 2003
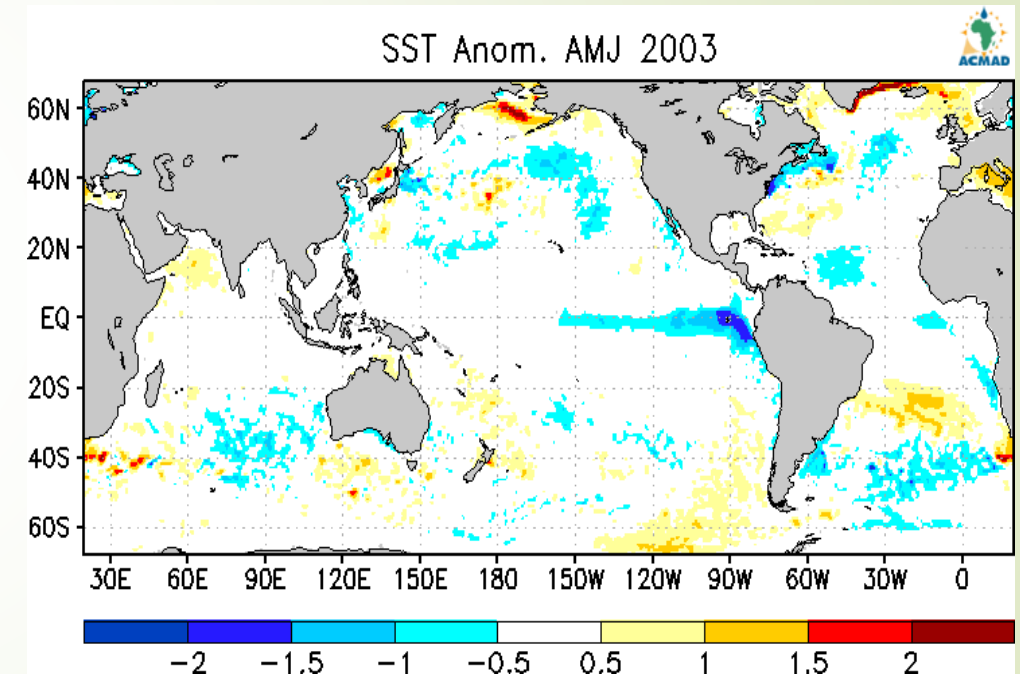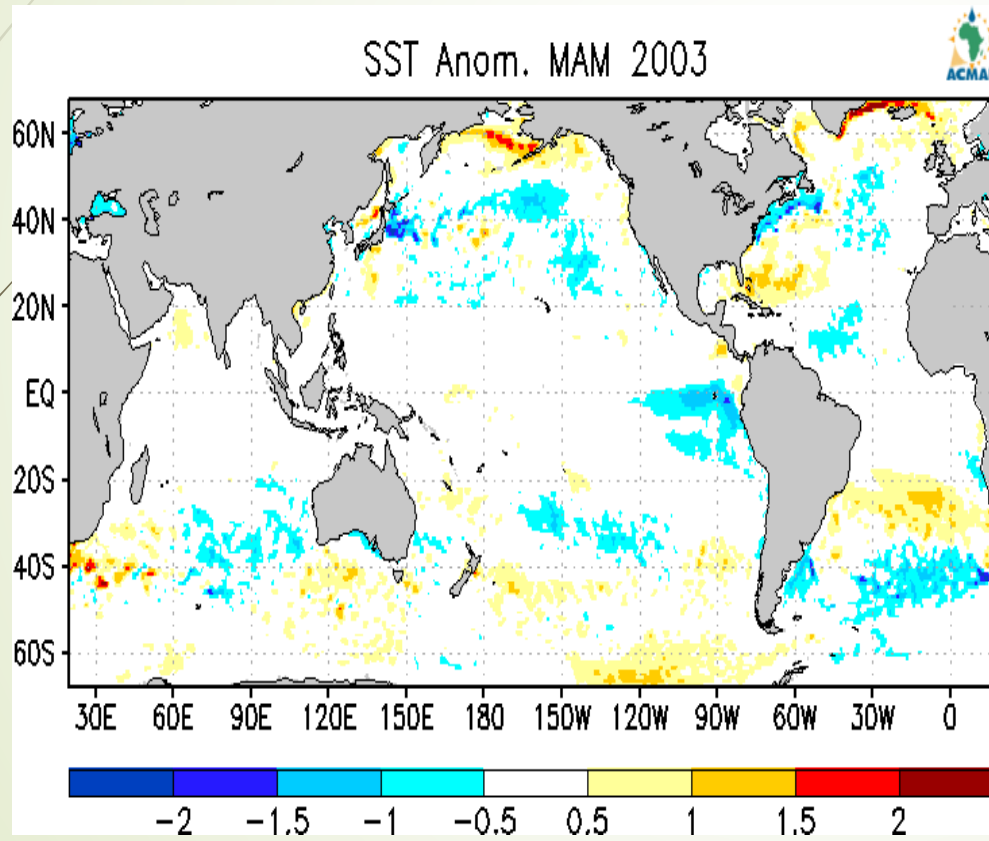
SST Anom. MAM 2003

SST Anom. AMJ 2003
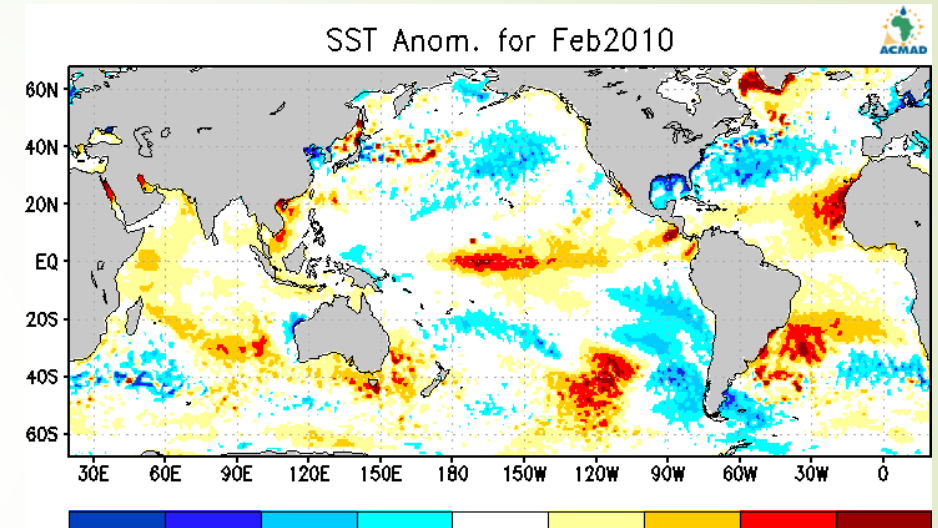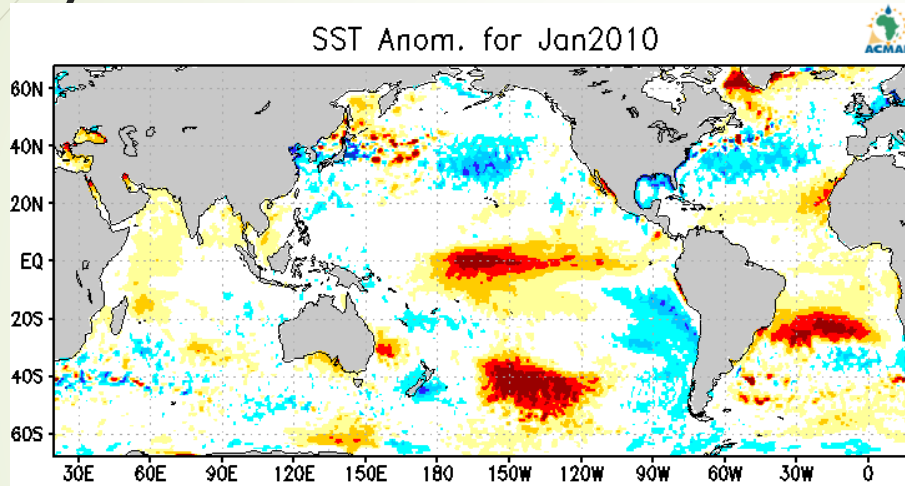
Behavour of SST's of the Analogue years 2010
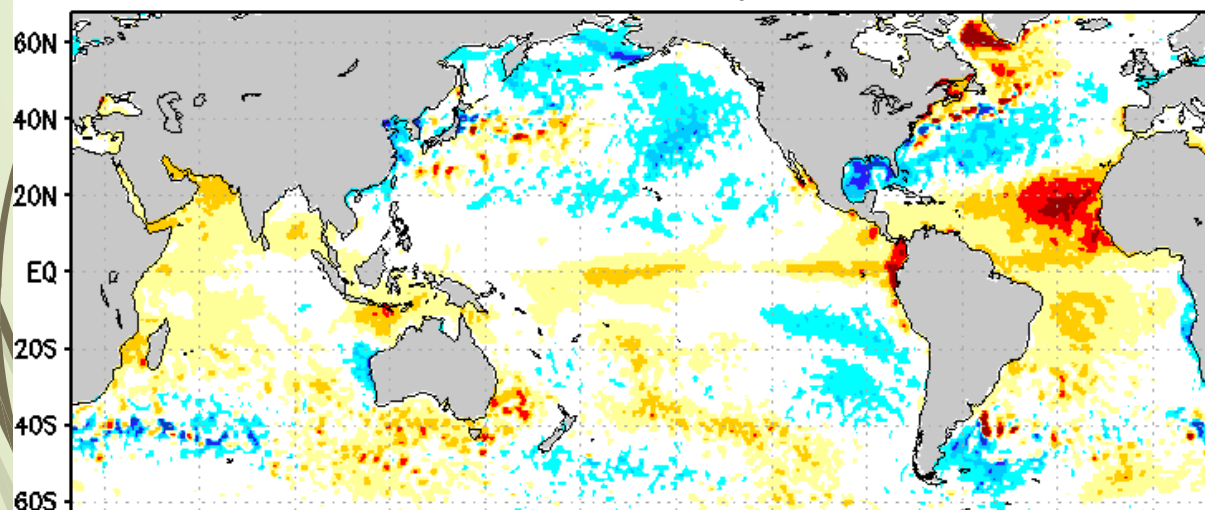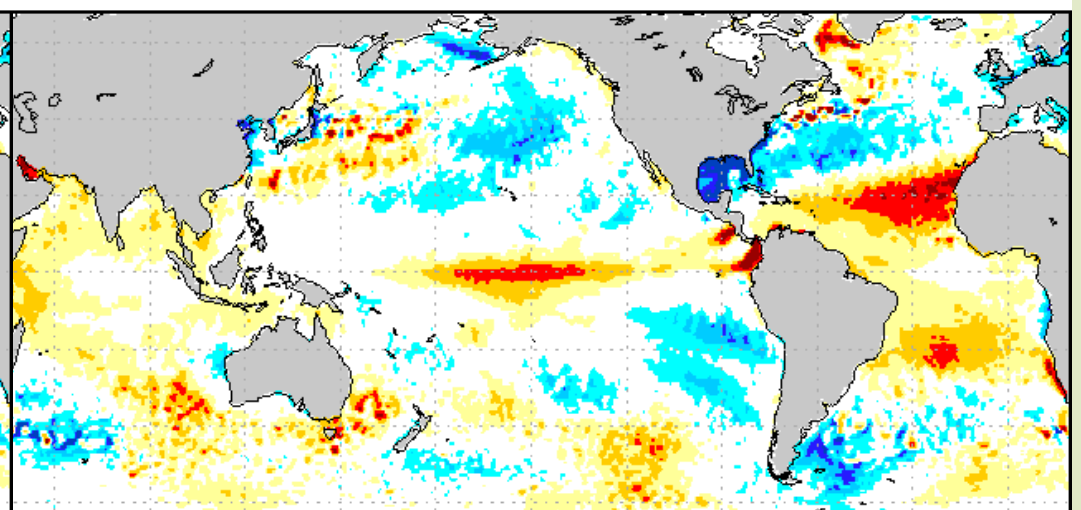
Behavour of SST's of the Analogue years 2016
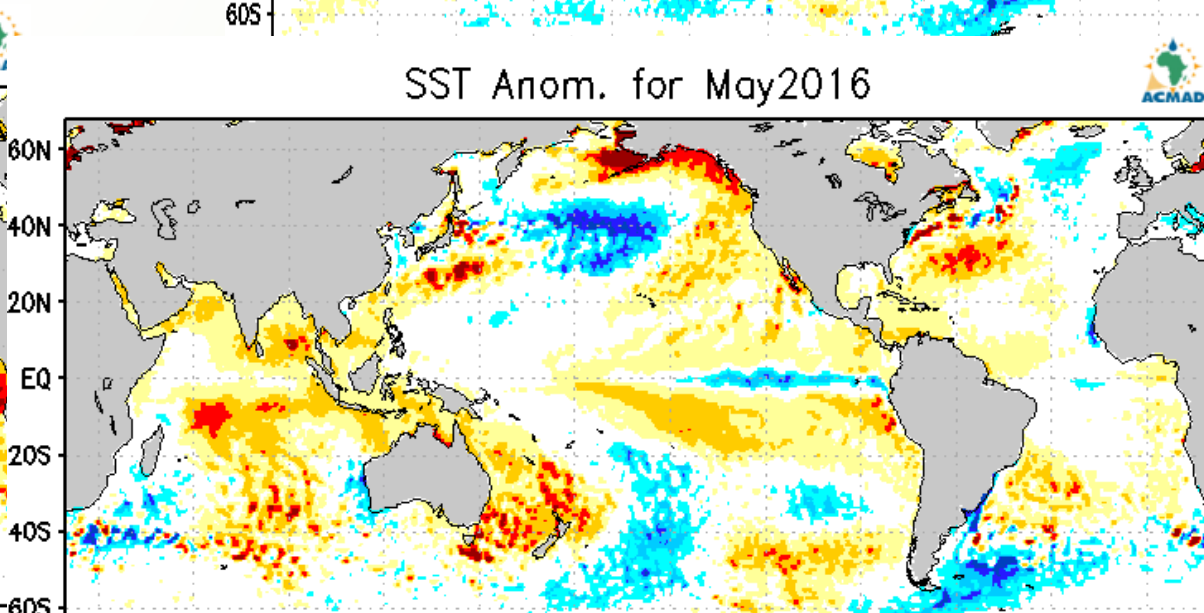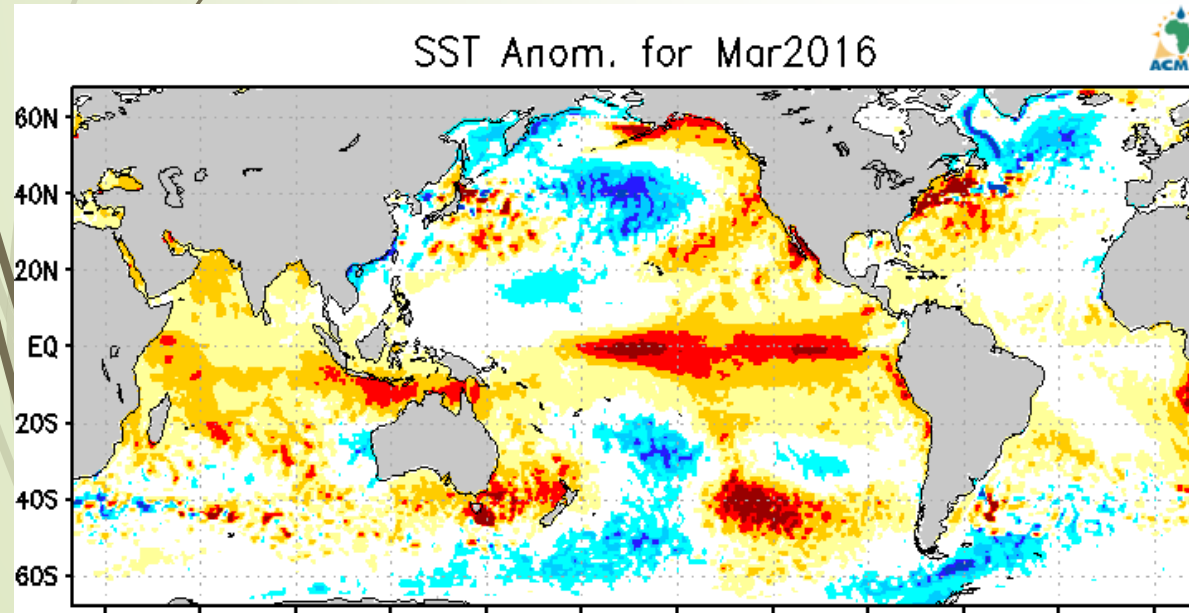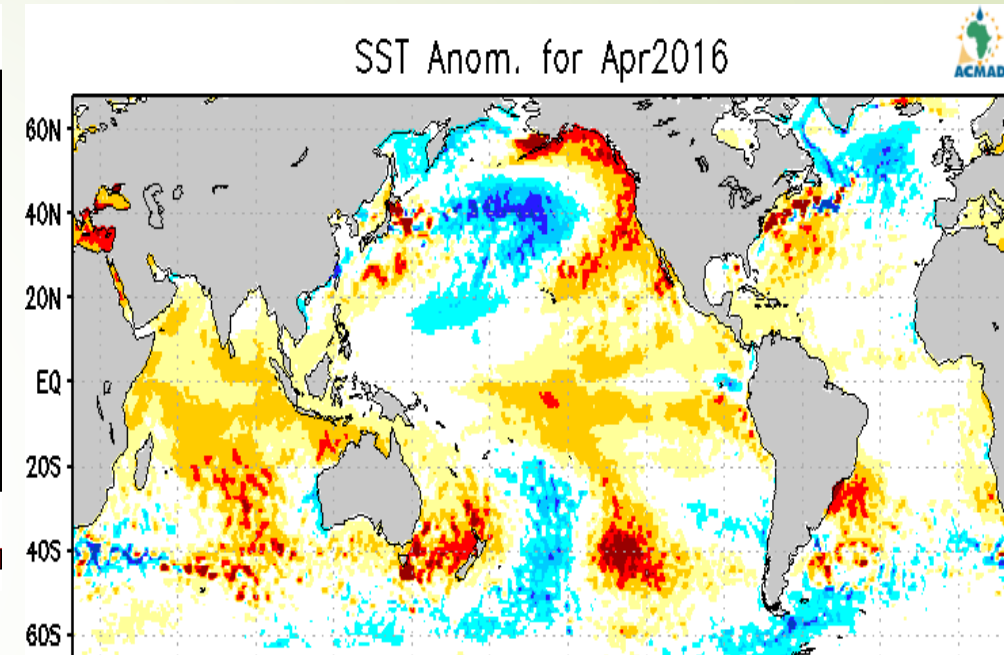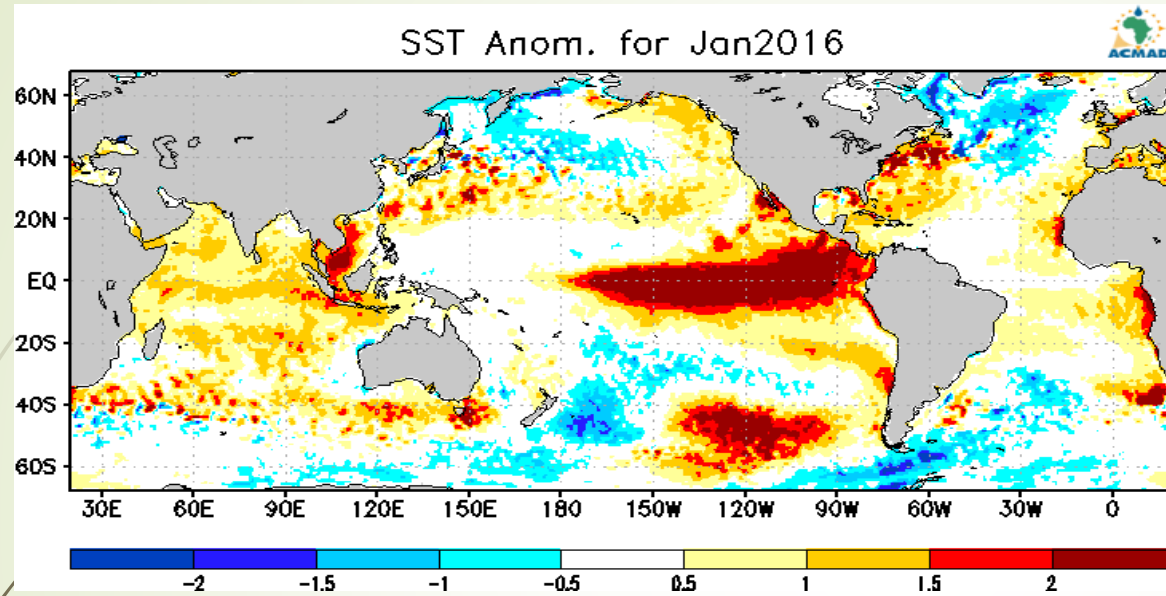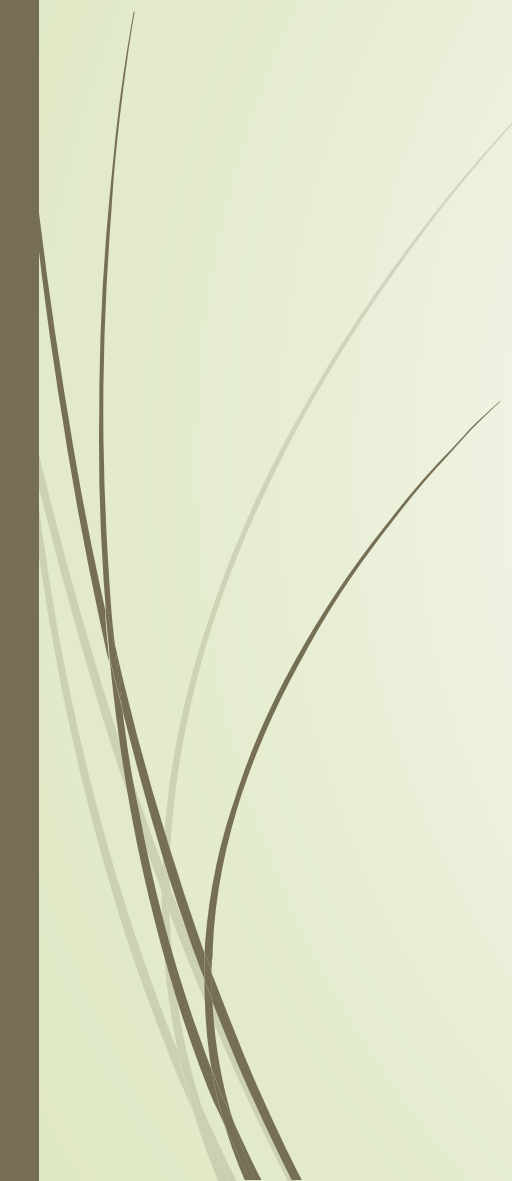
Behavour of SST's of the Analogue years 2019
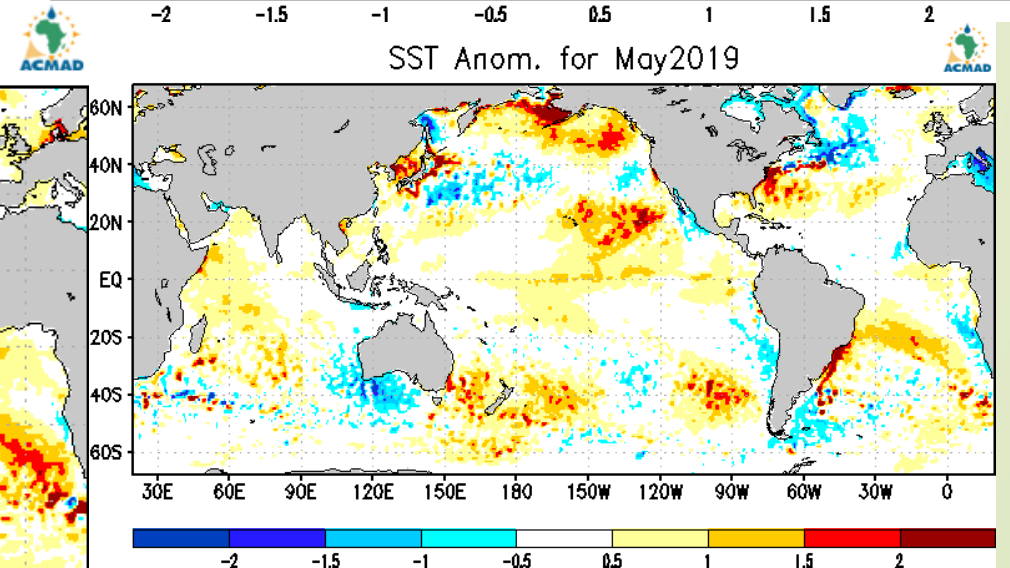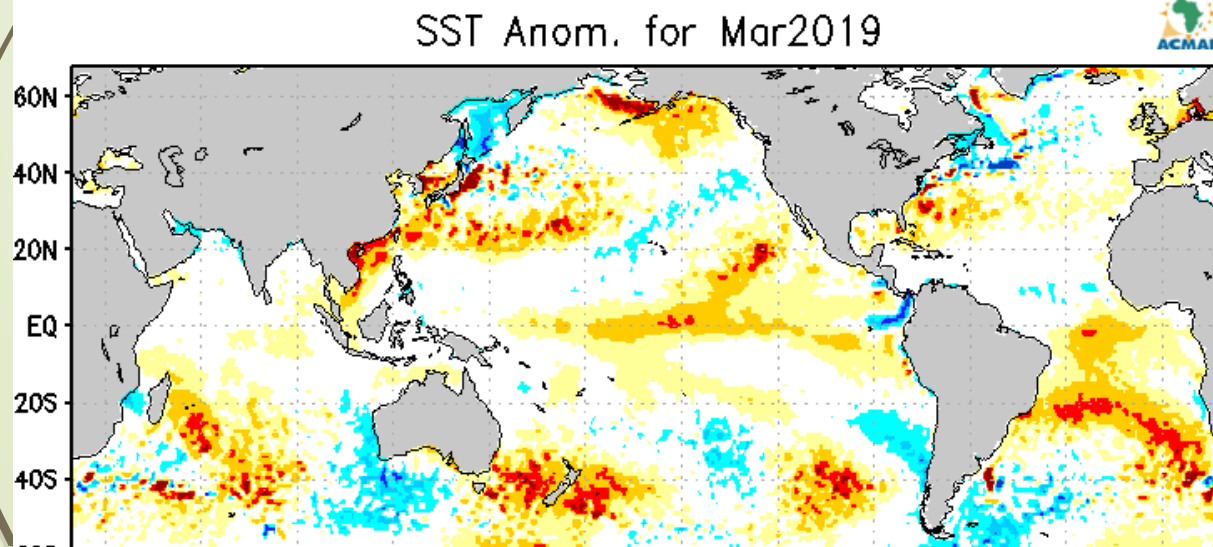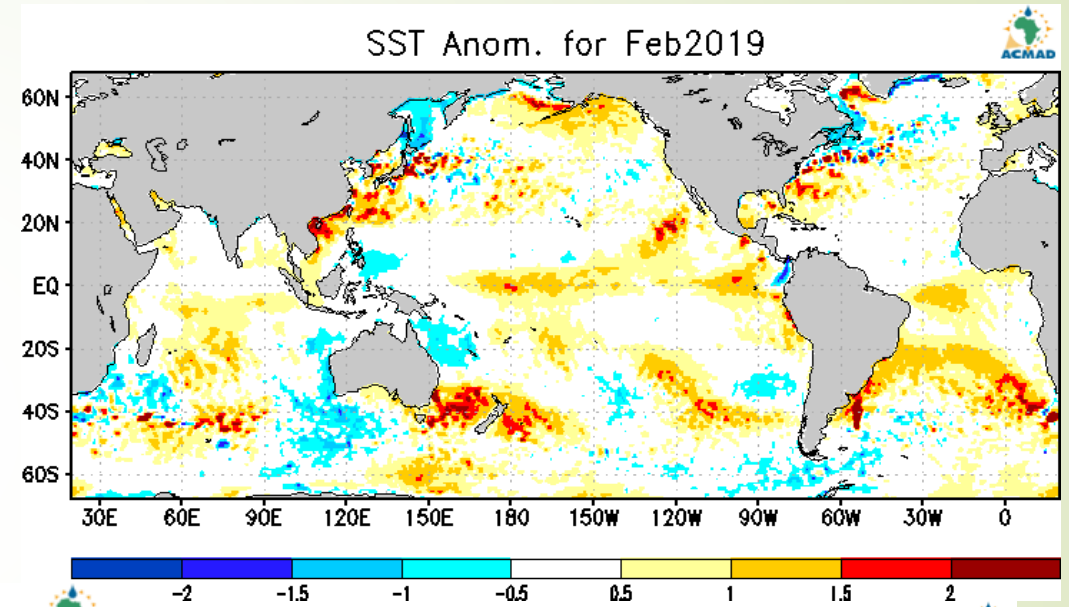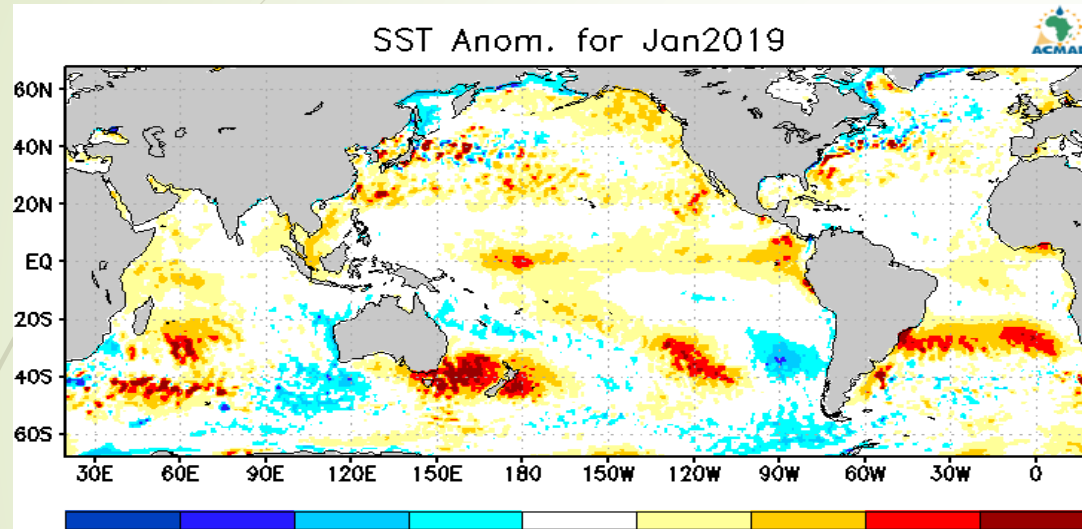
Behavour of SST's of the Analogue years

- For the four analogue years, 2010 and 2016 appear to behavour closer to the expected pattern in 2024 MAM and AMJ.

SST forecast MAM 2024 from different
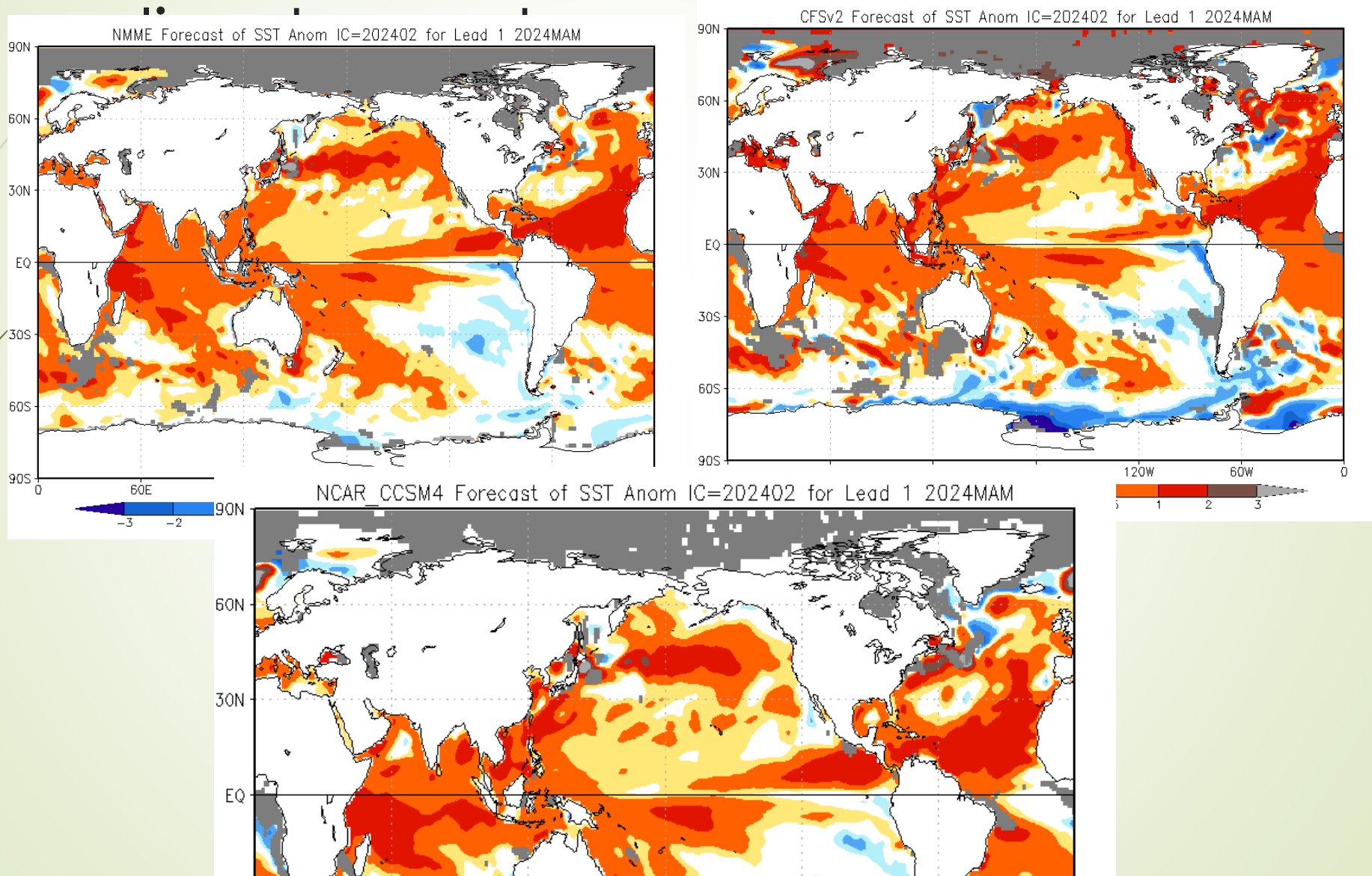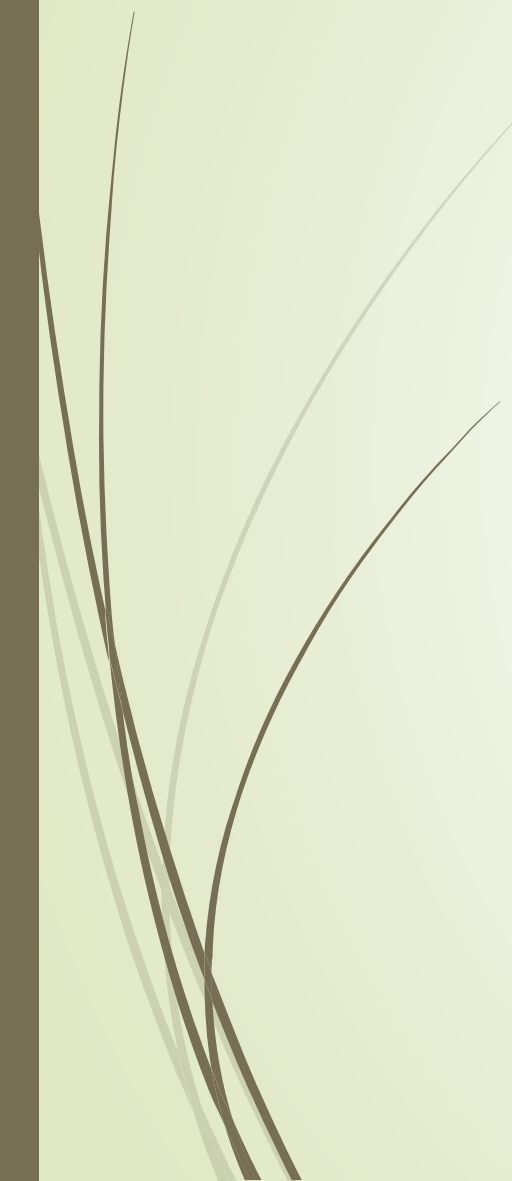
SST forecast AMJ 2024 from different Centre's
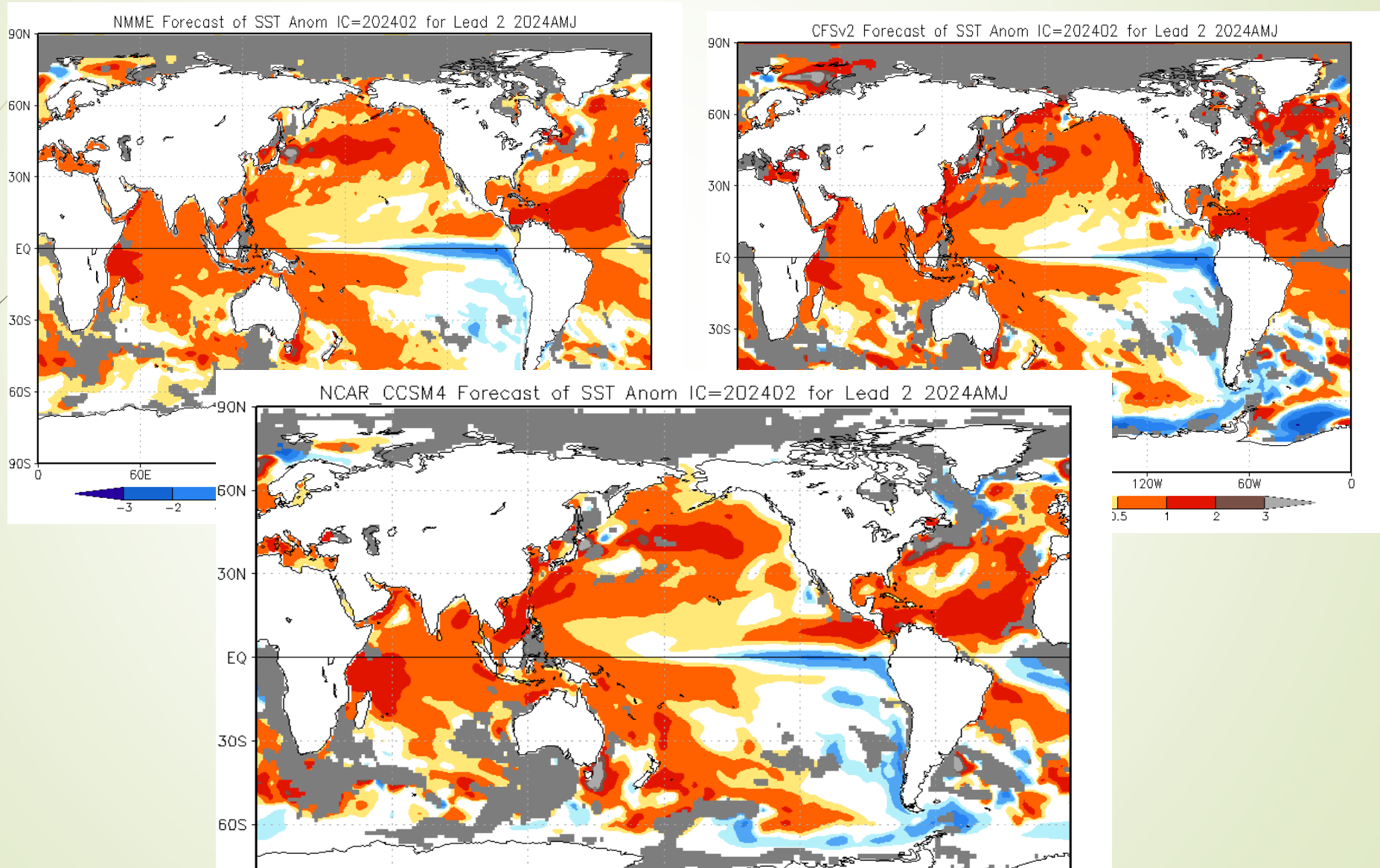
Comment on current and future ENSO phase

- The skill of the forecast map were good and the projection follows that the current El Nino will decrease to neutral phase from MAM into AMJ, thereafter becomes strong La Nina

Forecast over Africa from IRI Multi Model esemble for MAM and AMJ

IRI Multi–Model Probability Forecast for Precipitation for March–April–May 2024, Issued February 2024

IRI Multi–Model Probability Forecast for Precipitation for April–May–June 2024, Issued February 2024
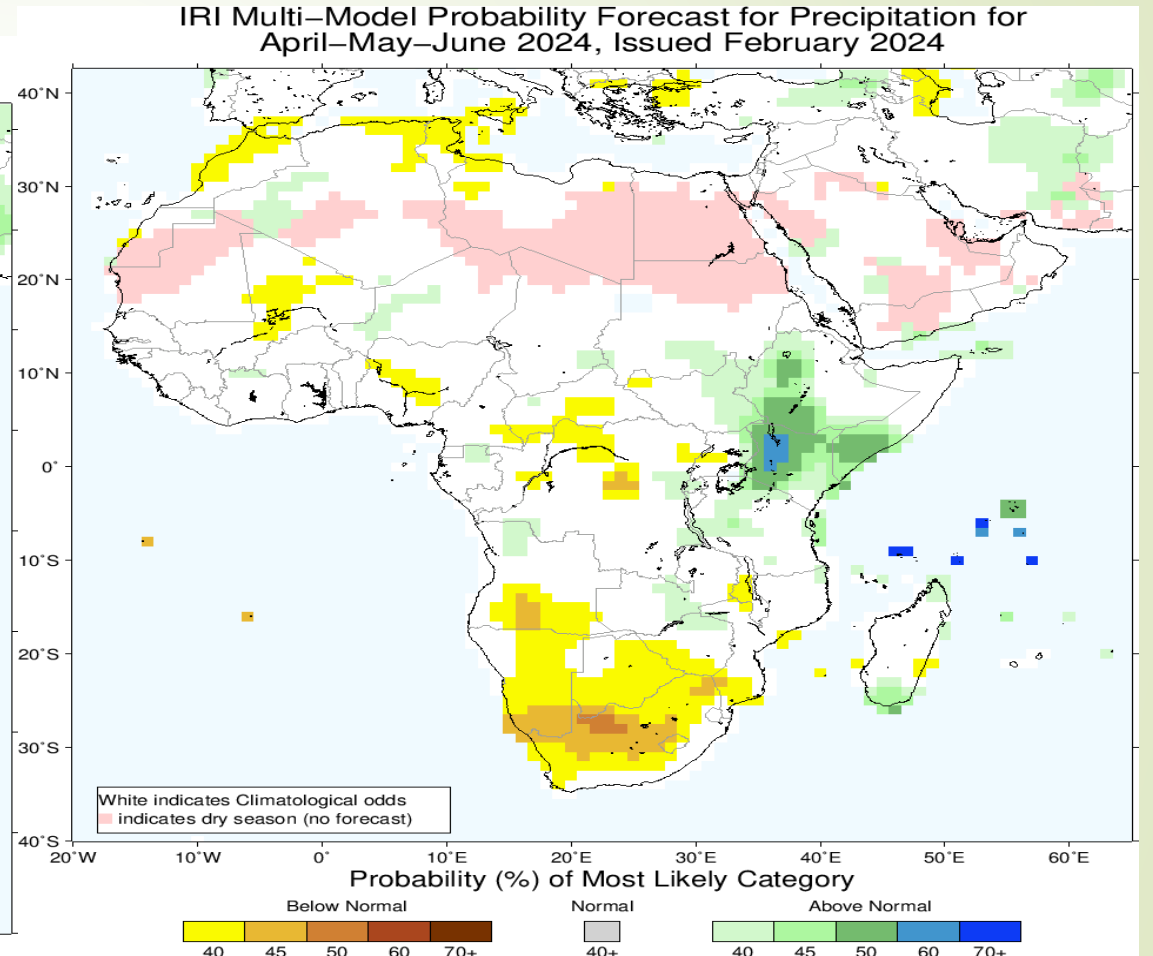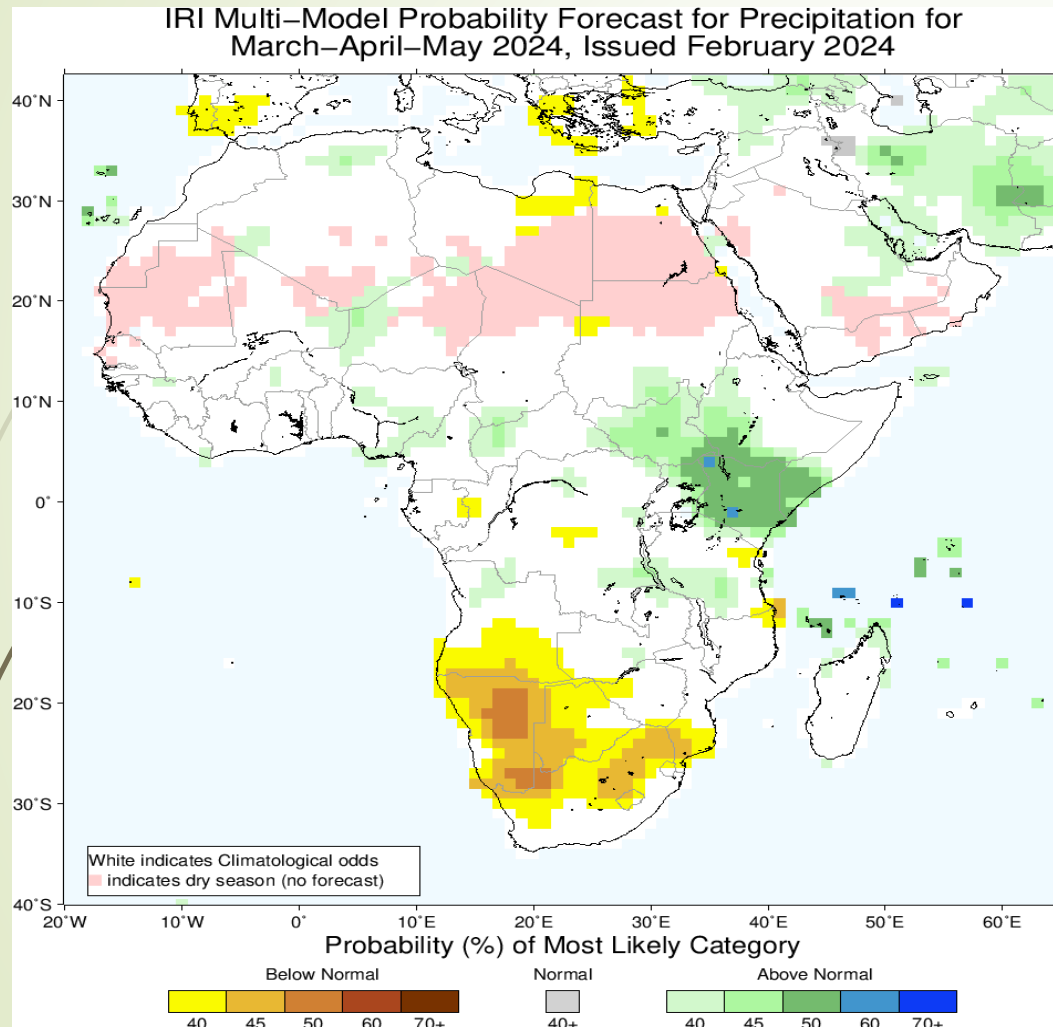
Forecast Run for MAM and AMJ. The Skill map for MAM and AMJ for Tamsat data was good. Goodness index ranges from 0.15 to 0.26. Note, other runs were carried out but the focus is on highest skill result
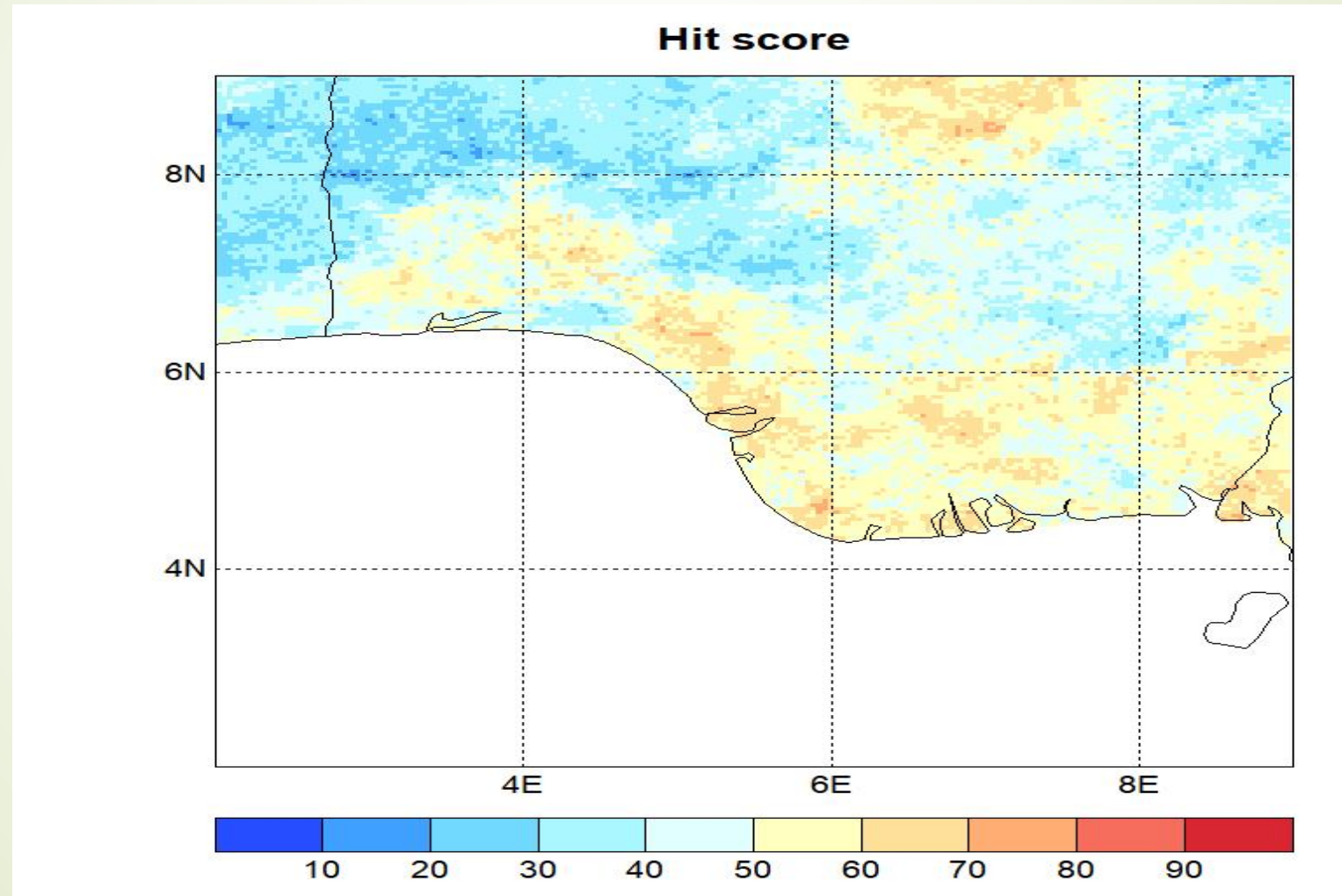
MAM run suggest above to normal rainfall forecast.
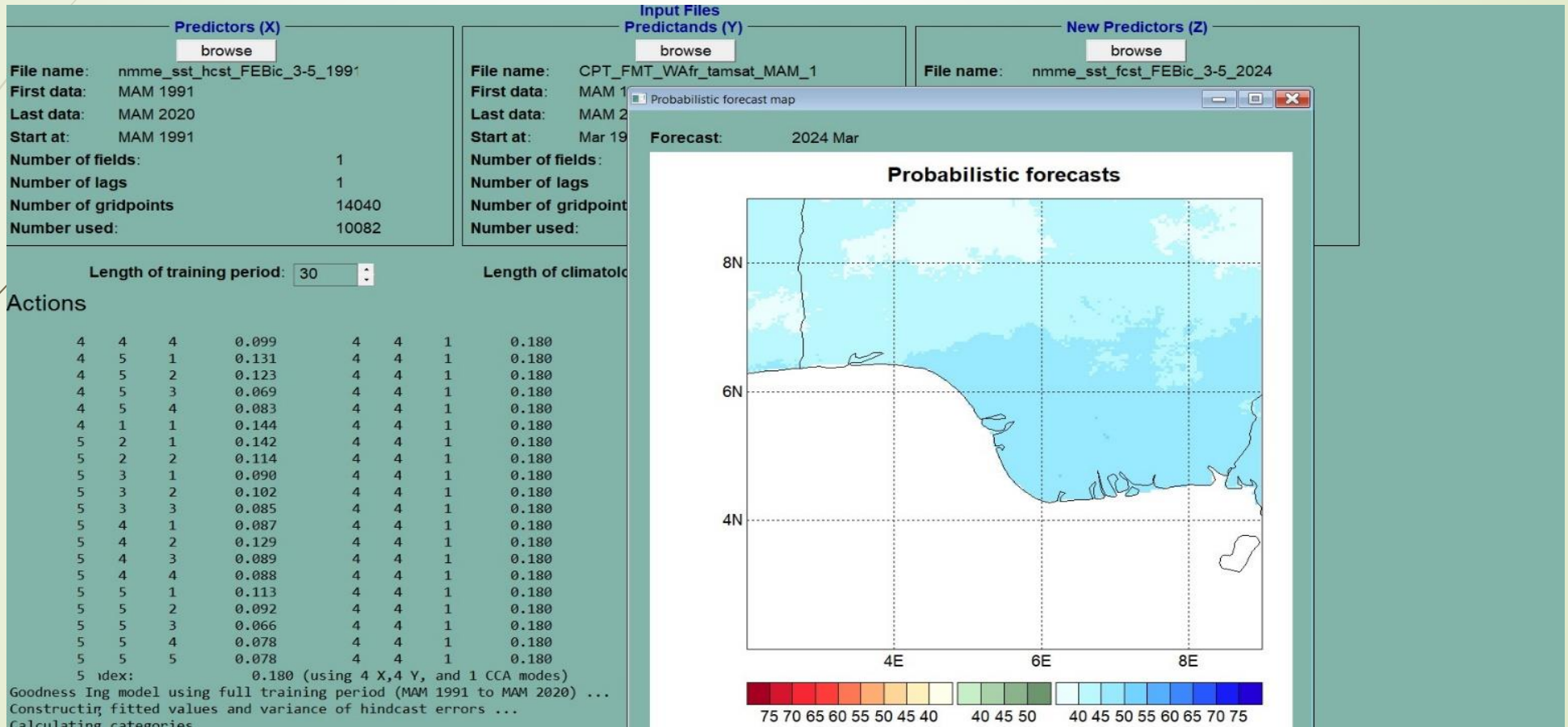
Forecast Run for MAM suggest a warm eastern pacific and cold Gulf of Guinea brings about shortfall in rainfall over southern Nigeria
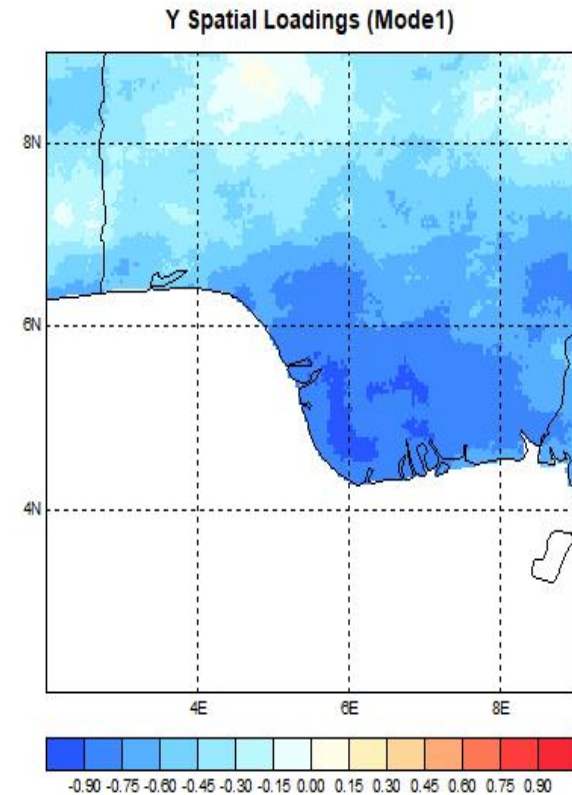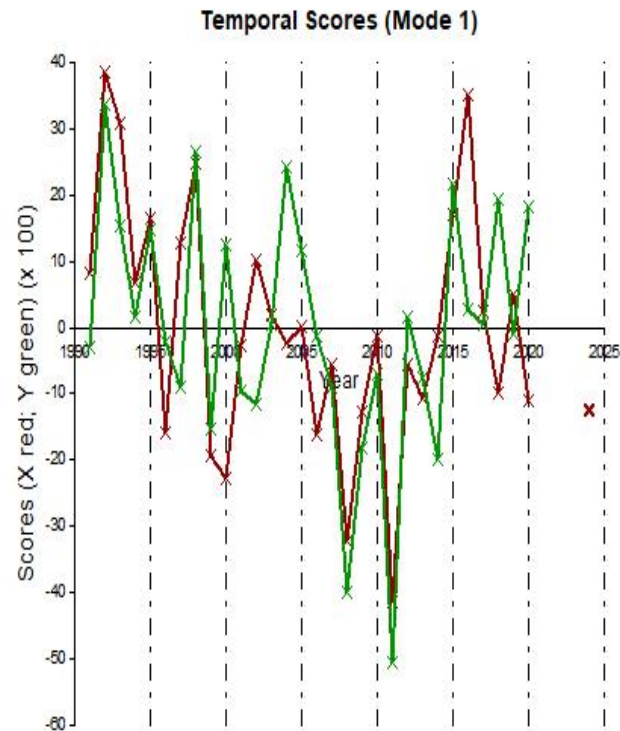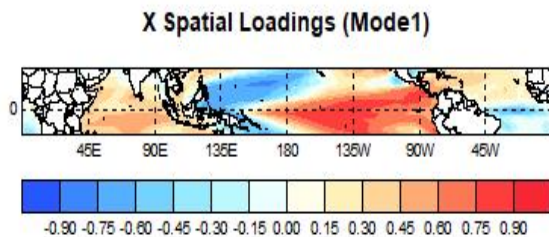
AMJ Hit score: This map support the skill map

AMJ run suggest normal to above

MAM forcast for 2024

MAM Forecast for 2024

- Normal rainfall is expected across the southern Nigeria for the MAM season.
- Few areas will likely experience above normal rainfall.
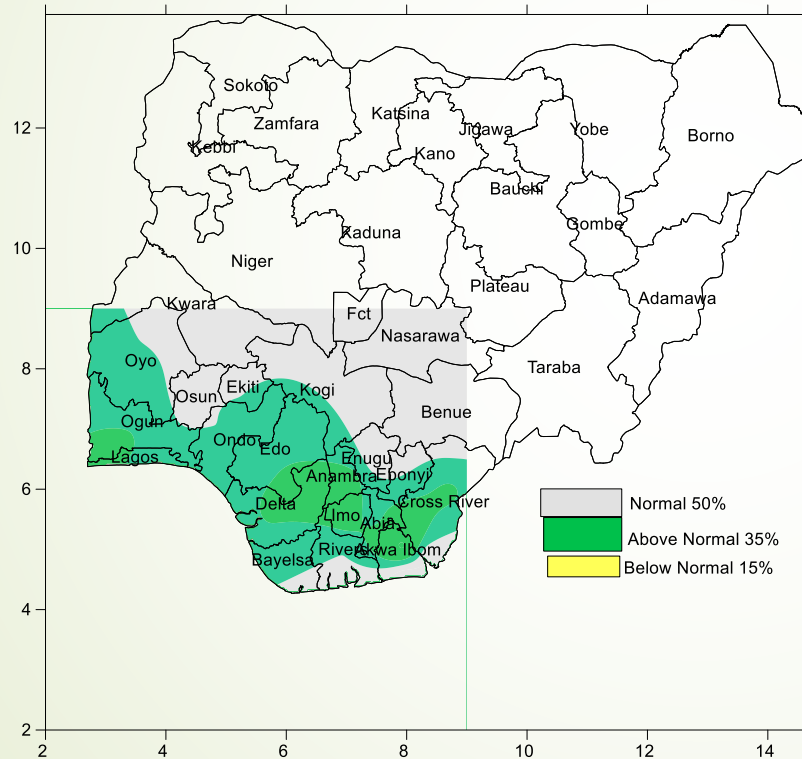- The chance for below normal rainfall is very slim based on the features on ground.

AMJ Forecast for 2024

- Normal rainfall is expected across the southern Nigeria for the AMJ season.

- More areas will likely experience above normal rainfall compare to MAM season.

- The chance for below normal rainfall is very low as well.