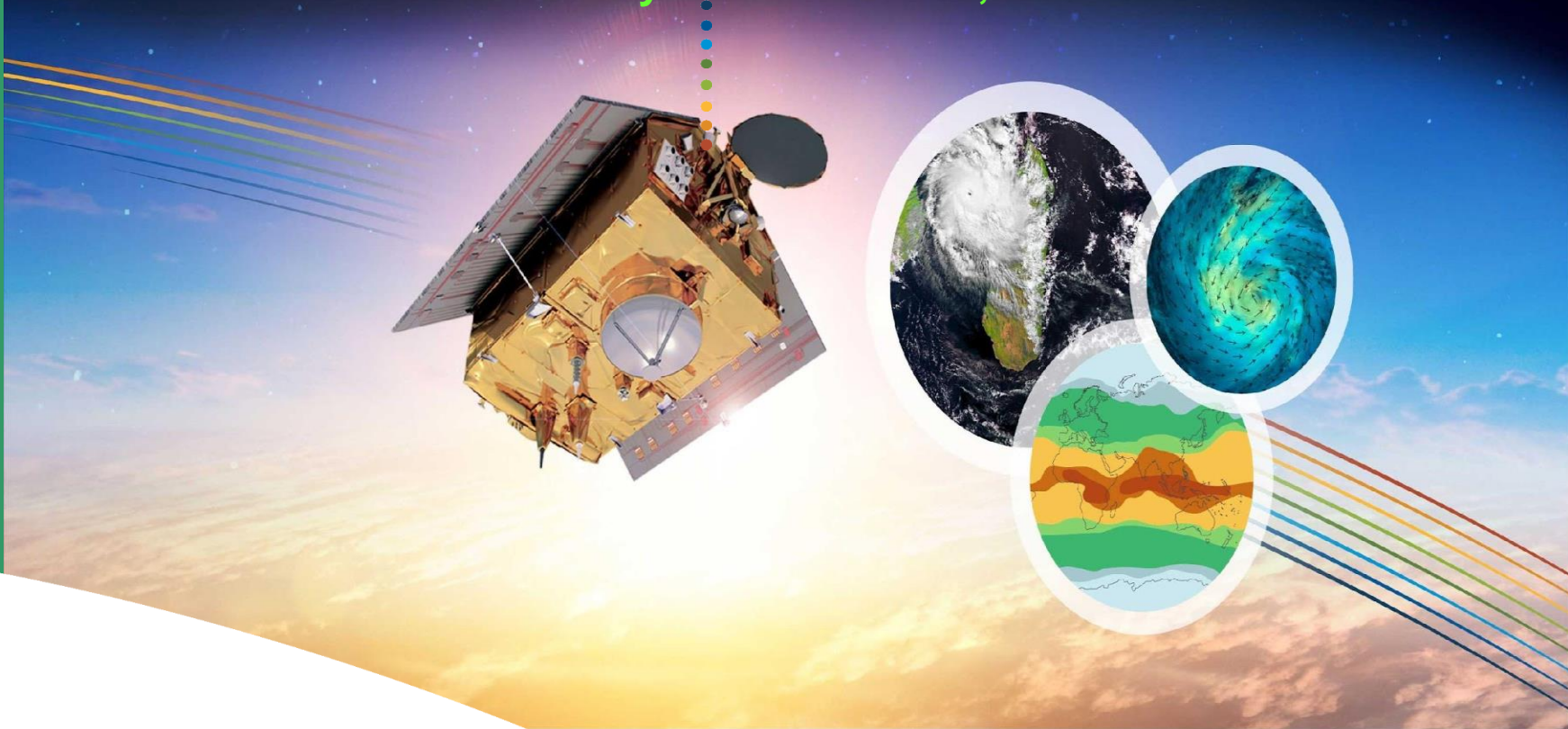


Seasonal Forecasting Workshop on agro-hydro-climatic characteristics of the main rainfall season in the Gulf of Guinea countries / PRESAGG -11

Accra, GHANA

February 26 to March 01, 2024



Technical Note for: MAM & AMJ 2024
Issued: Feb 2024



Prepared By: ACMAD Team



Outline

1. *Time series analysis of Climate variability (seasonal and annual cycles, interannual/interdecadal variability) and trends*
2. *Composite analysis*
3. *Analogue Analysis*
4. *Teleconnections analysis (i.e ENSO, AMO, IOD, SIOD, Atlantic Dipole, NAO, AO, SAM, Benguela Nino, Mediterranean SSTAs)*
5. *Linear regression, principal component, canonical correlation analysis*
6. *Teleconnections analysis (i.e ENSO, AMO, IOD, SIOD, Atlantic Dipole, NAO, AO, SAM, Benguela Nino, Mediterranean SSTAs)*
7. *Interactions analysis between seasons (summer and following winter) and regions for the same target season (i.e summer African monsoon and Atlantic cyclone activity)*
8. *Single Model Ensemble Analysis (i.e ECMWF, NCEP, UKMET)*
9. *Multi-model Ensemble Analysis (ie MME, Copernicus, IRI)*
10. *Consolidation and consensus Analysis*



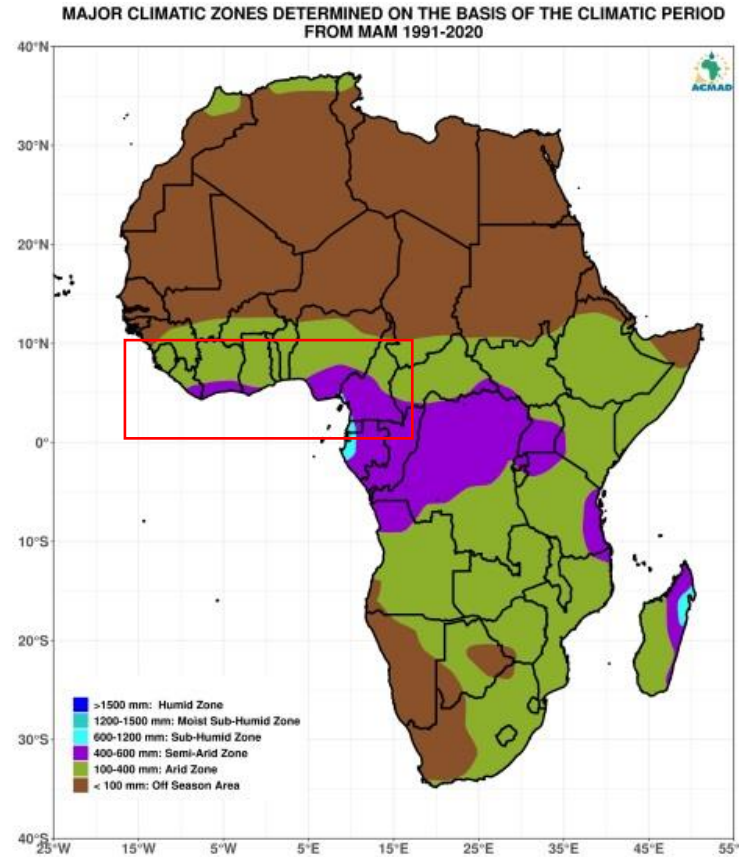
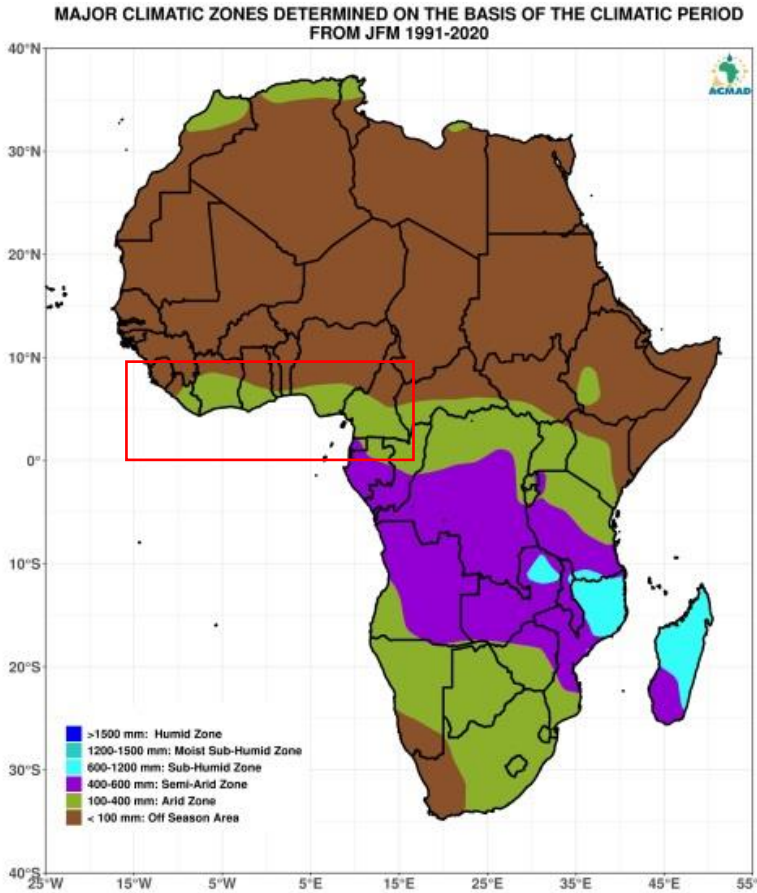
Step 1:

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

Time series analysis of Climate variability and trends (Climatic zones)

Season 1 = MARCH-APRIL-MAY

Season 2 = APRIL-MAY-JUNE

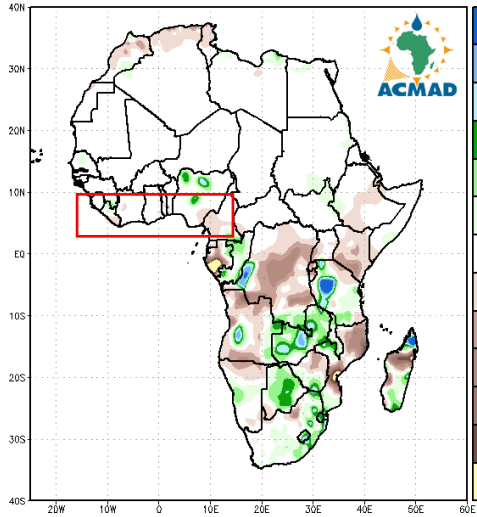




Time series analysis of Climate variability and trends(Persistence forecast)

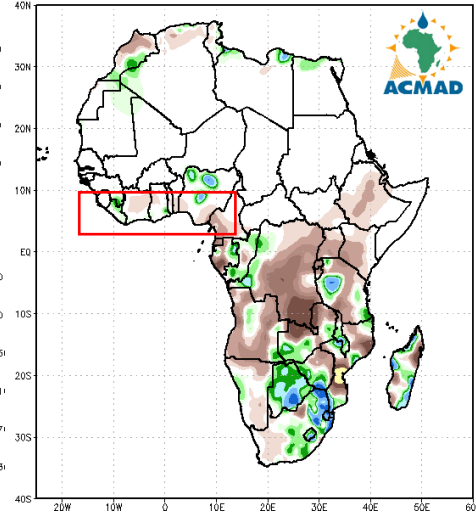
Latest 90-days

CPC-Uni 90day Precip Anomaly (mm)
Period: 22Nov2022 to 19Feb2023



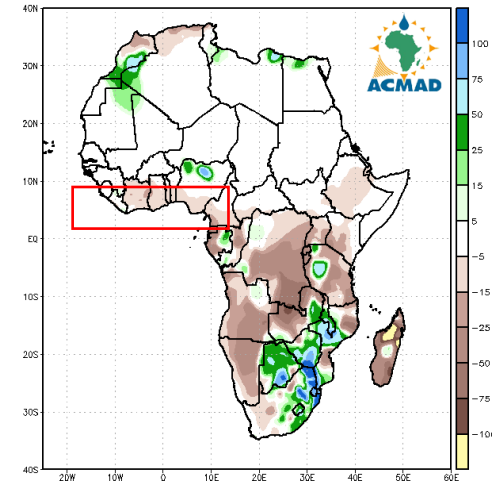
Last 30-days

CPC-Uni 30day Precip Anomaly (mm)
Period: 21Jan2023 to 19Feb2023

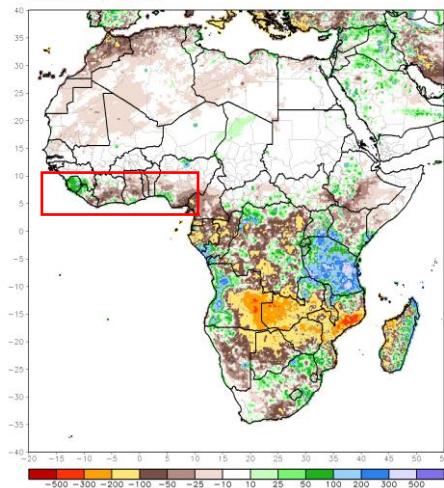


Last 10-days

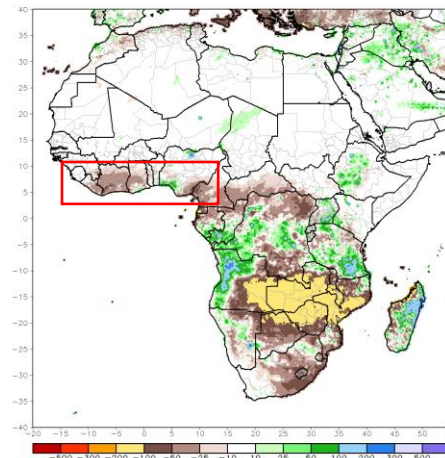
CPC-Uni 10day Precip Anomaly (mm)
Period: 10Feb2023 to 19Feb2023



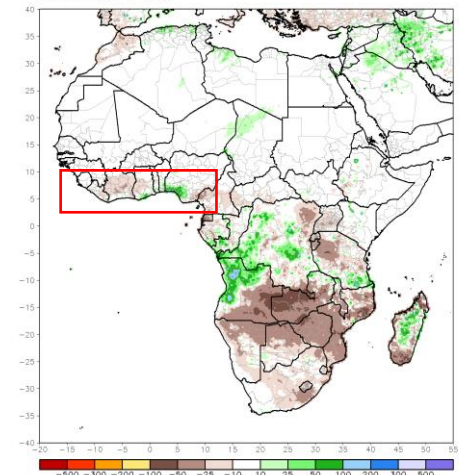
RFE2 90-Day Total Rainfall Anomaly (mm)
Period: 27Nov2023 - 24Feb2024



RFE2 30-Day Total Rainfall Anomaly (mm)
Period: 26Jan2024 - 24Feb2024



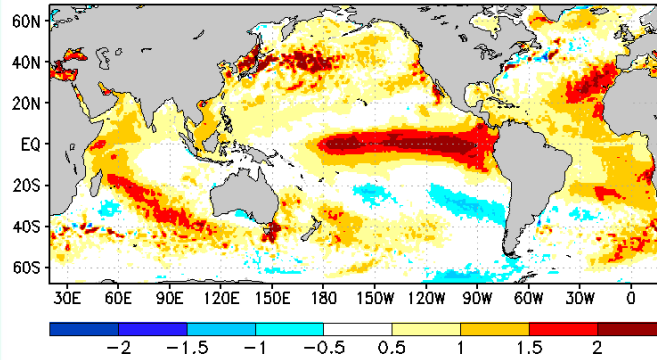
RFE2 10-Day Total Rainfall Anomaly (mm)
Period: 15Feb2024 - 24Feb2024



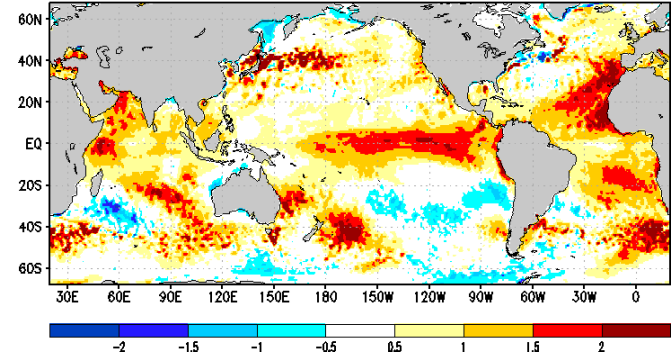


State of the Global Ocean – Current Status

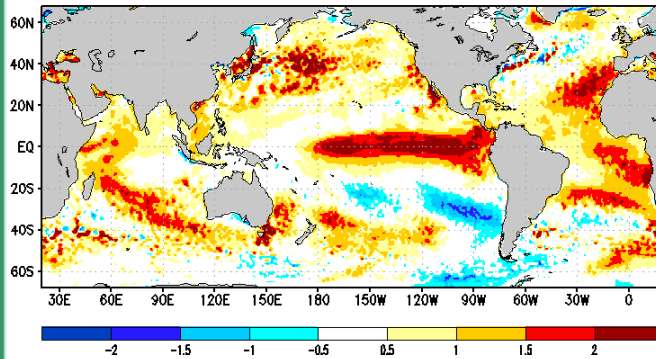
SST Anom. NDJ 2023/2024



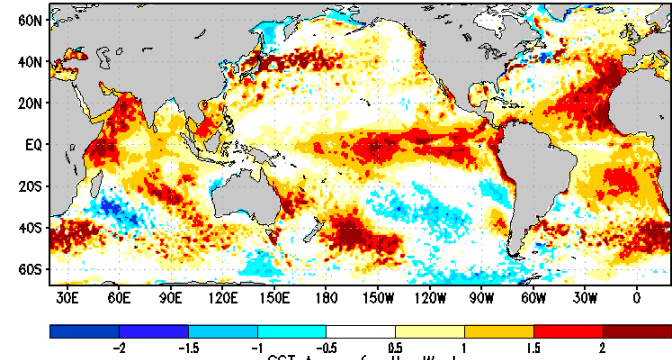
SST Anom. for the Week
From 21Jan2024 to 17Feb2024



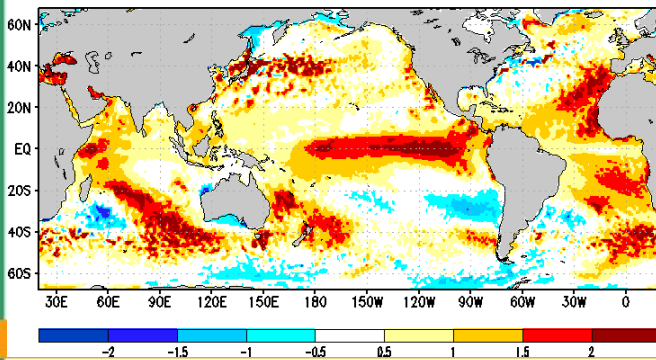
SST Anom. for Dec2023



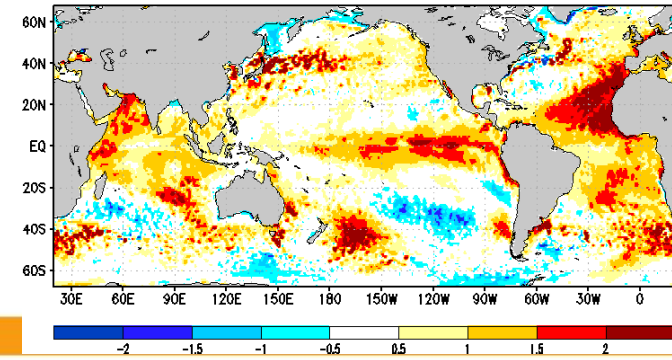
SST Anom. for the Week
From 04Feb2024 to 10Feb2024



SST Anom. for Jan2024



SST Anom. for the Week
From 11Feb2024 to 17Feb2024



Time series analysis of Climate variability (seasonal and annual cycles, interannual/interdecadal variability) and trends (1/4)



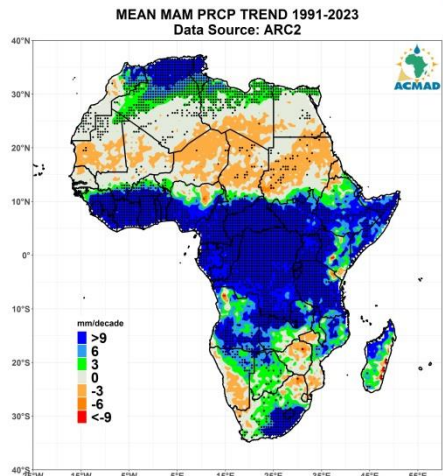
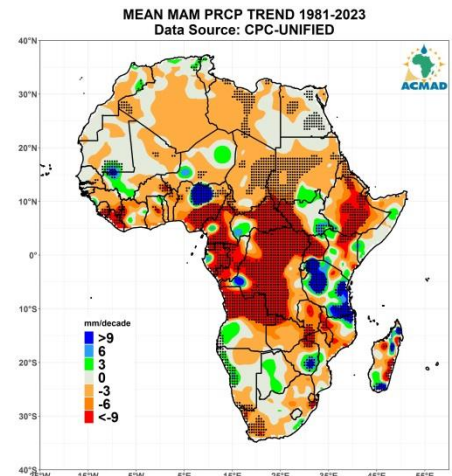
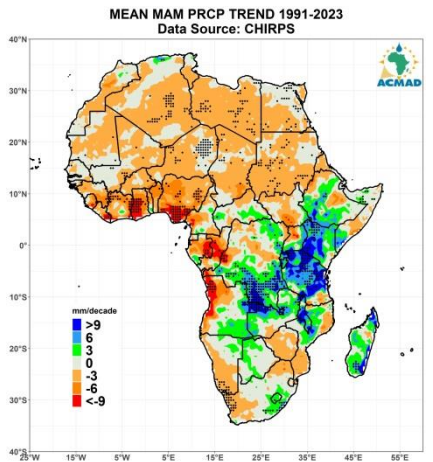
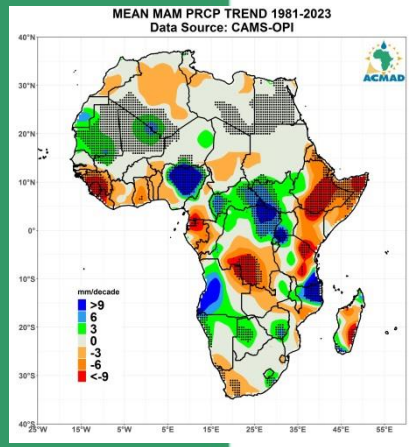
CAMS-OPI

CHIRPS

Season 1 MAM

CPC-UNI

ARC2



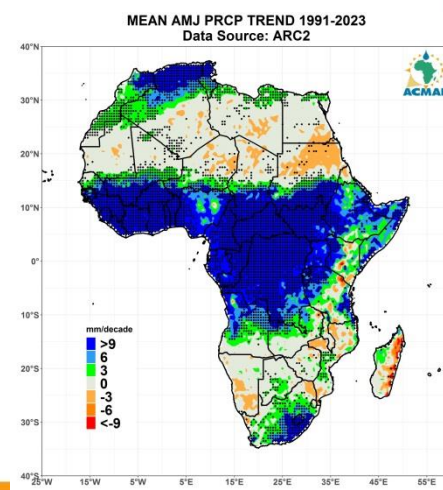
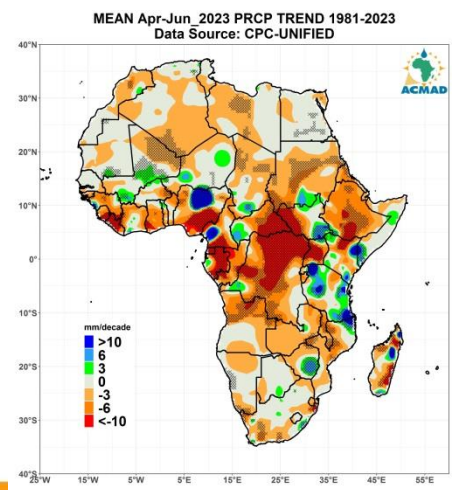
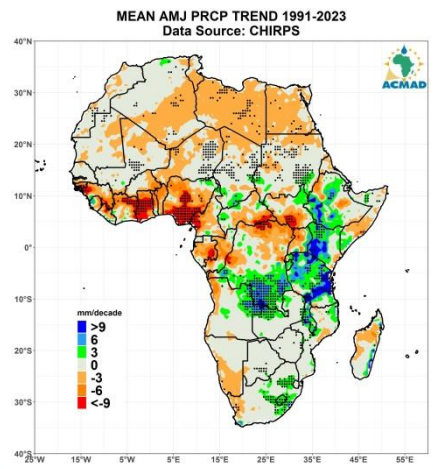
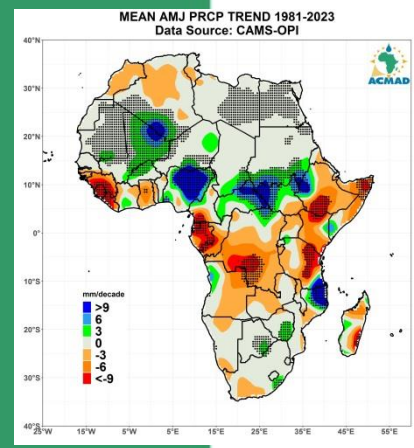
Season 2 AMJ

CAMS-OPI

CHIRPS

CPC-UNI

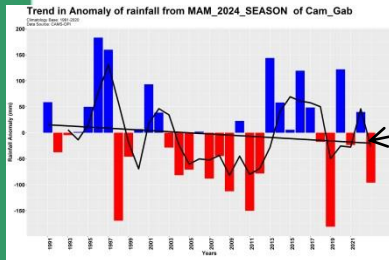
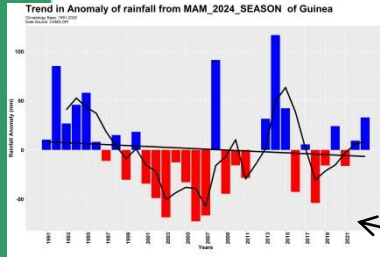
ARC2



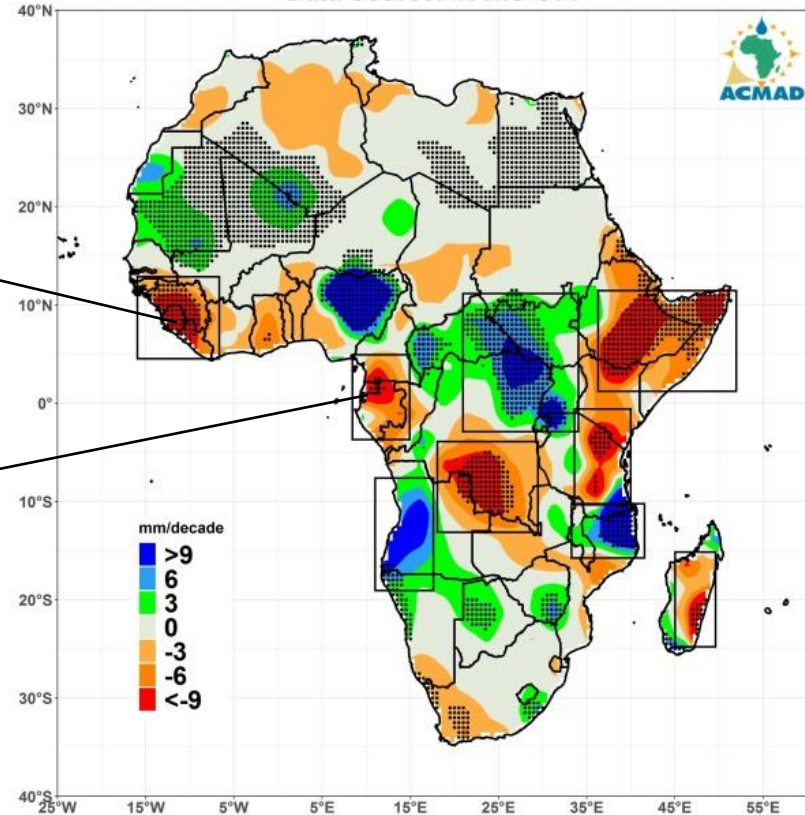


Time series analysis of Climate variability (seasonal and annual cycles, interannual/interdecadal variability) and trends (1/5)

MAM Season 1



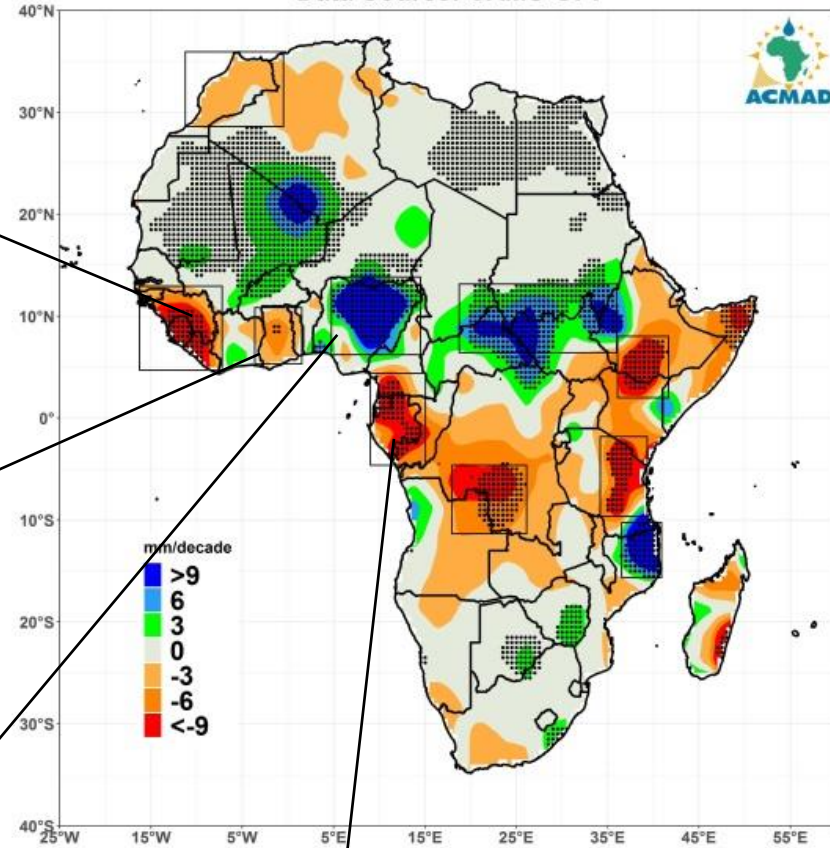
MEAN MAM PRCP TREND 1981-2023
Data Source: CAMS-OPI



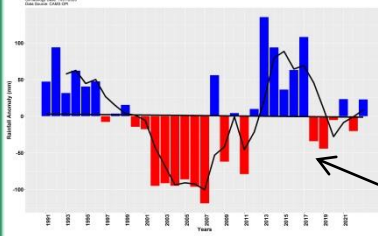


Time series analysis of Climate variability (seasonal and annual cycles, interannual/interdecadal variability) and trends (1/6)

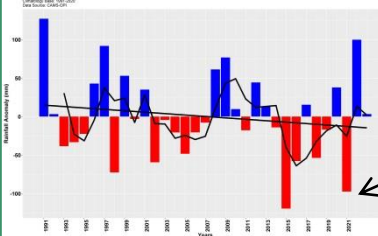
MEAN AMJ PRCP TREND 1981-2023
Data Source: CAMS-OPI



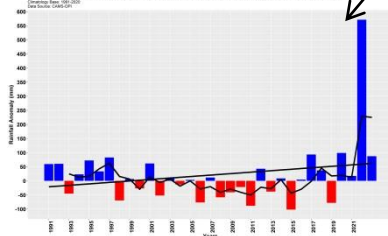
Trend in Anomaly of rainfall from AMJ_2024_SEASON of Guinea



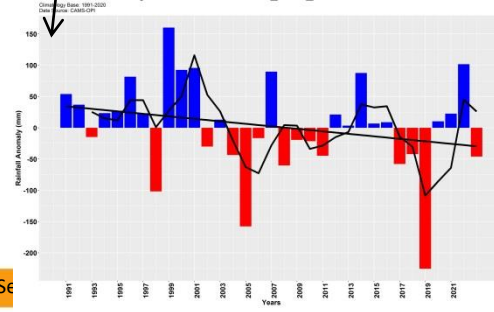
Trend in Anomaly of rainfall from AMJ_2024_SEASON of Ghana



Trend in Anomaly of rainfall from AMJ_2024_SEASON of Nigeria



Trend in Anomaly of rainfall from AMJ_2024_SEASON of CAM-GAB







Step 2:

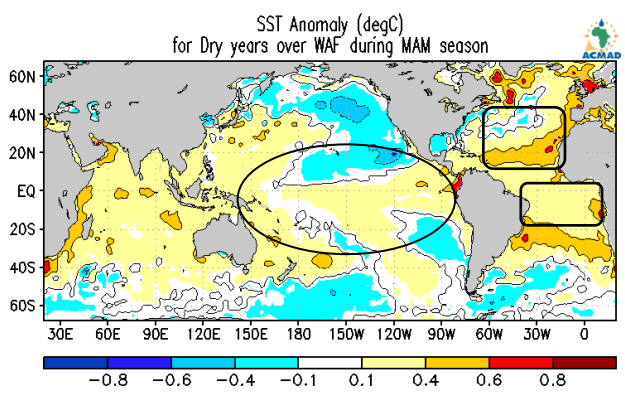
**Identification of Drivers Patterns for Dry and Wet years
Comparative Analysis with the drivers projected status**

Composite analysis (Dry Years) – SSTs & Rainfall (MAM)

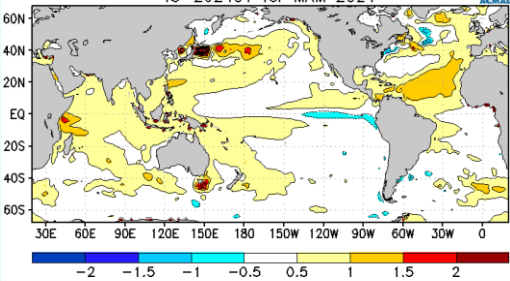


DRY

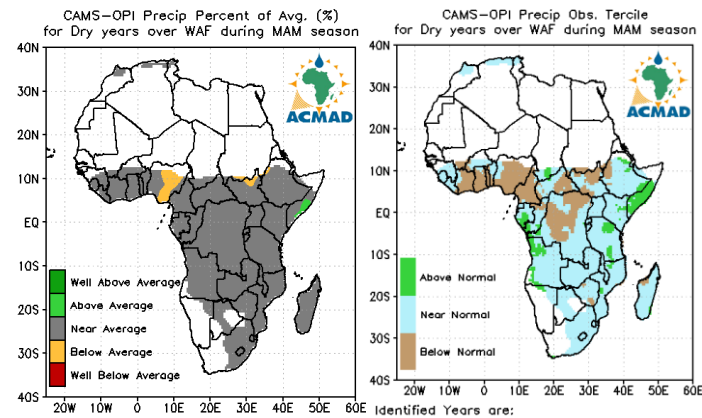
SST Composite



Identified Years are:
1982 1991 1995 1997 2013 2014 2020
NMME Fcst of SST Anom:
IC=202401 for MAM 2024



Rainfall Composite



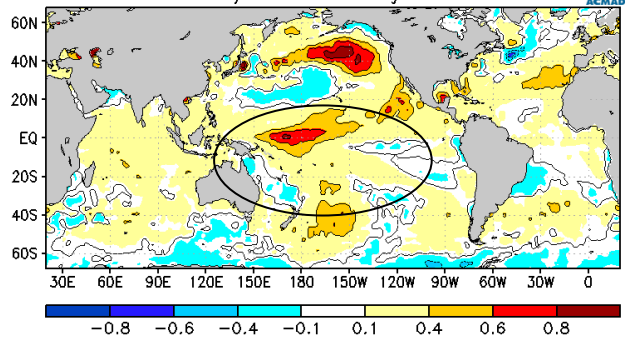
Identified Years are:
1987 1990 1998 1999 2003 2007 2010 2011

Identified Years are:
1987 1990 1998 1999 2003 2007 2010 2011

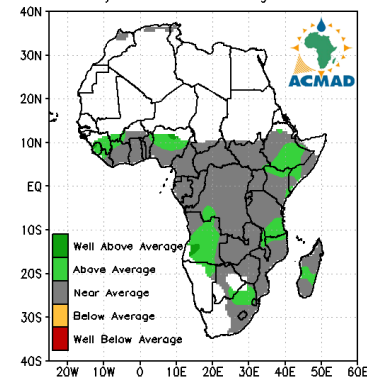
CAF
1981
1988
1993
1998
2004
2005
2011
2019

WET

SST Anomaly (degC) for Wet years over WAF during MAM season

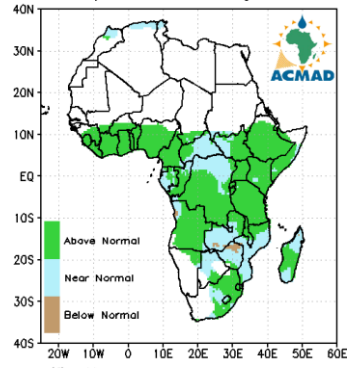


CAMS-OPI Precip Percent of Avg. (%) for Wet years over WAF during MAM season

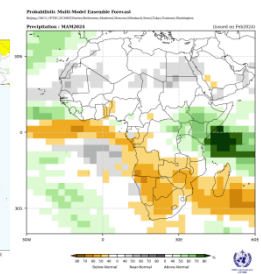
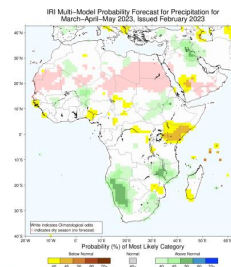
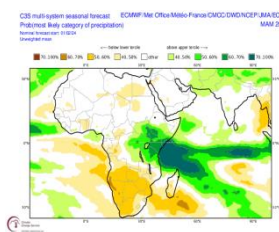
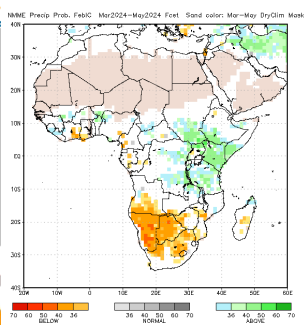


Identified Years are:
1982 1991 1995 1997 2013 2014 2020

CAMS-OPI Precip Obs. Tercile for Wet years over WAF during MAM season



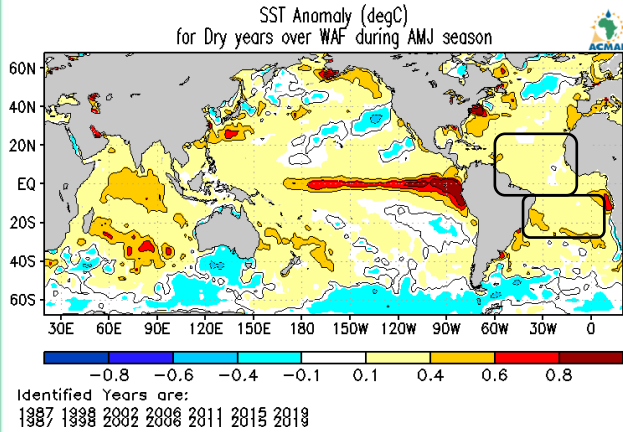
Identified Years are:
1982 1991 1995 1997 2013 2014 2020



Composite analysis (Dry Years) – SSTs & Rainfall (AMJ)

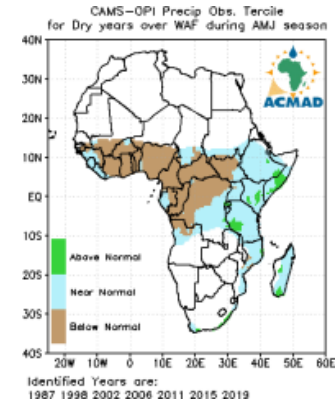
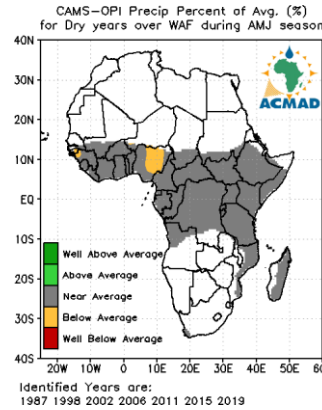


SST Composite

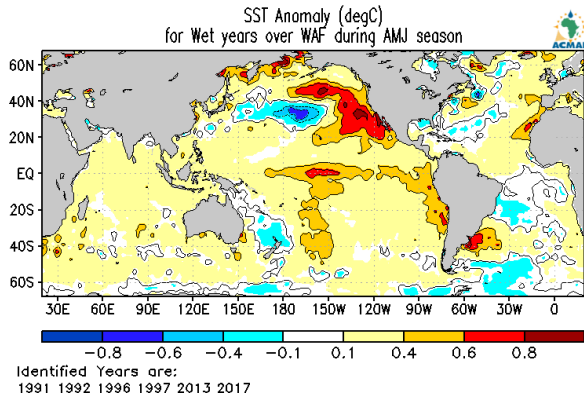


DRY

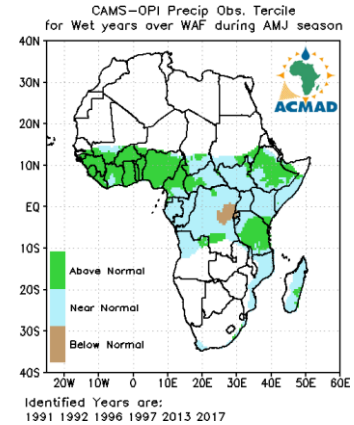
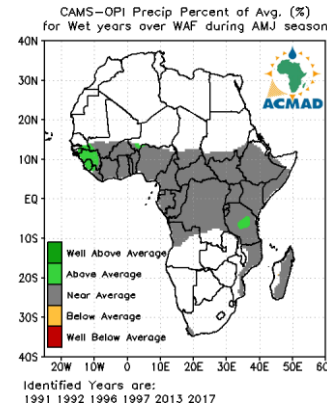
Rainfall Composite



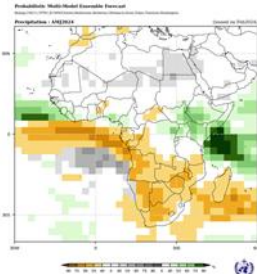
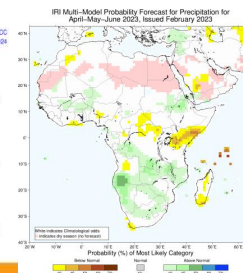
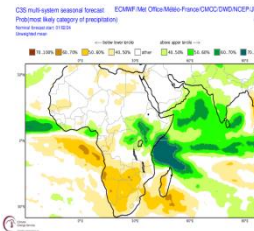
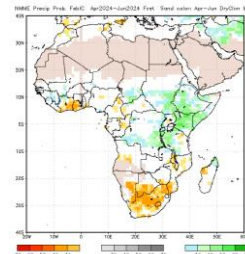
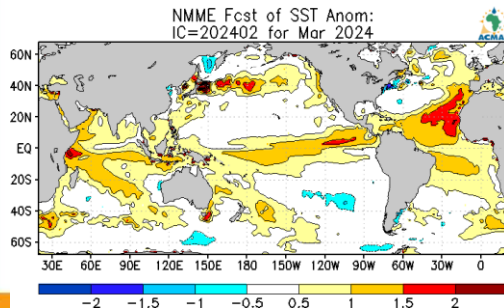
- | |
|------|
| WAF |
| 1987 |
| 1998 |
| 2002 |
| 2006 |
| 2011 |
| 2015 |
| 2019 |



WET



- | |
|------|
| WAF |
| 1991 |
| 1992 |
| 1996 |
| 1997 |
| 2013 |
| 2017 |







Step 3: Analogue Years Analysis

Identification of Analogue Years (2)



Year	DJF	JFM	FMA	MAM	AMJ	MJJ	JJA	JAS	ASO	SON	OND	NDJ
2000	-1.7	-1.4	-1.1	-0.8	-0.7	-0.6	-0.6	-0.5	-0.5	-0.6	-0.7	-0.7
2001	-0.7	-0.5	-0.4	-0.3	-0.3	-0.1	-0.1	-0.1	-0.2	-0.3	-0.3	-0.3
2002	-0.1	0.0	0.1	0.2	0.4	0.7	0.8	0.9	1.0	1.2	1.3	1.1
2003	0.9	0.6	0.4	0.0	-0.3	-0.2	0.1	0.2	0.3	0.3	0.4	0.4
2004	0.4	0.3	0.2	0.2	0.2	0.3	0.5	0.6	0.7	0.7	0.7	0.7
2005	0.6	0.6	0.4	0.4	0.3	0.1	-0.1	-0.1	-0.1	-0.3	-0.6	-0.8
2006	-0.9	-0.8	-0.6	-0.4	-0.1	0.0	0.1	0.3	0.5	0.8	0.9	0.9
2007	0.7	0.2	-0.1	-0.3	-0.4	-0.5	-0.6	-0.8	-1.1	-1.3	-1.5	-1.6
2008	-1.6	-1.5	-1.3	-1.0	-0.8	-0.6	-0.4	-0.2	-0.2	-0.4	-0.6	-0.7
2009	-0.8	-0.8	-0.6	-0.3	0.0	0.3	0.5	0.6	0.7	1.0	1.4	1.6
Year	DJF	JFM	FMA	MAM	AMJ	MJJ	JJA	JAS	ASO	SON	OND	NDJ
2010	1.5	1.2	0.8	0.4	-0.2	-0.7	-1.0	-1.3	-1.6	-1.6	-1.6	-1.6
2011	-1.4	-1.2	-0.9	-0.7	-0.6	-0.4	-0.5	-0.6	-0.8	-1.0	-1.1	-1.0
2012	-0.9	-0.7	-0.6	-0.5	-0.3	0.0	0.2	0.4	0.4	0.3	0.1	-0.2
2013	-0.4	-0.4	-0.3	-0.3	-0.4	-0.4	-0.4	-0.3	-0.3	-0.2	-0.2	-0.3
2014	-0.4	-0.5	-0.3	0.0	0.2	0.2	0.0	0.1	0.2	0.5	0.6	0.7
2015	0.5	0.5	0.5	0.7	0.9	1.2	1.5	1.9	2.2	2.4	2.6	2.6
2016	2.5	2.1	1.6	0.9	0.4	-0.1	-0.4	-0.5	-0.6	-0.7	-0.7	-0.6
2017	-0.3	-0.2	0.1	0.2	0.3	0.3	0.1	-0.1	-0.4	-0.7	-0.8	-1.0
2018	-0.9	-0.9	-0.7	-0.5	-0.2	0.0	0.1	0.2	0.5	0.8	0.9	0.8
2019	0.7	0.7	0.7	0.7	0.5	0.5	0.3	0.1	0.2	0.3	0.5	0.5
Year	DJF	JFM	FMA	MAM	AMJ	MJJ	JJA	JAS	ASO	SON	OND	NDJ
2020	0.5	0.5	0.4	0.2	-0.1	-0.3	-0.4	-0.6	-0.9	-1.2	-1.3	-1.2
2021	-1.0	-0.9	-0.8	-0.7	-0.5	-0.4	-0.4	-0.5	-0.7	-0.8	-1.0	-1.0
2022	-1.0	-0.9	-1.0	-1.1	-1.0	-0.9	-0.8	-0.9	-1.0	-1.0	-0.9	-0.8
2023	-0.7	-0.4	-0.1	0.2	0.5	0.8	1.1	1.3	1.6	1.8	1.9	2.0

Analogue Years

2003

2010

2016

2019

Blue – La Nina

Red – El Nino



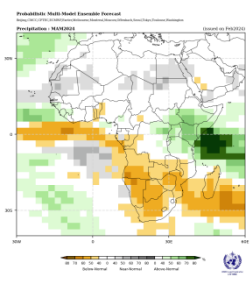
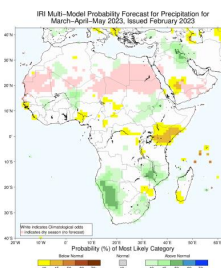
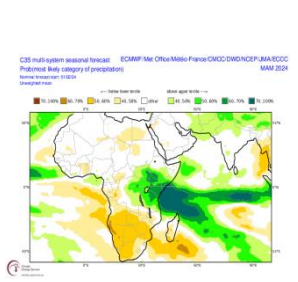
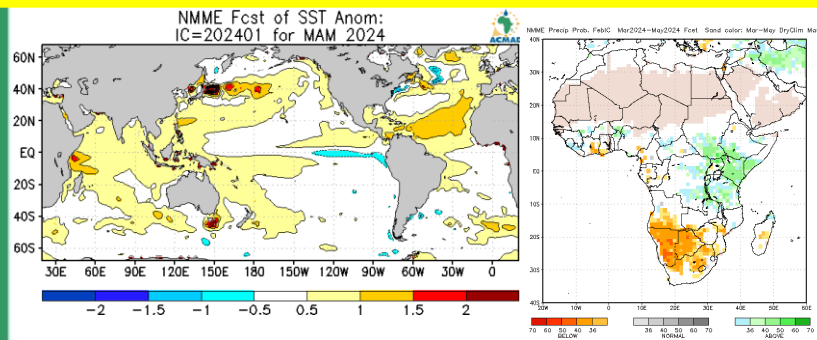
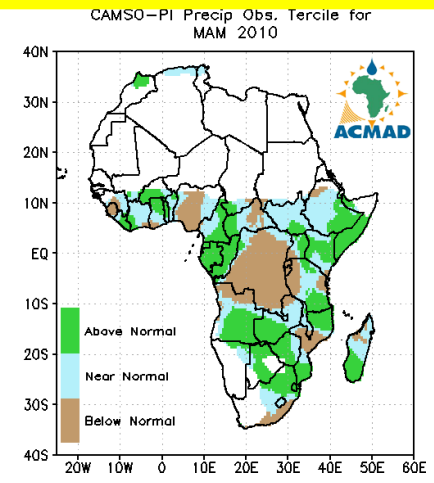
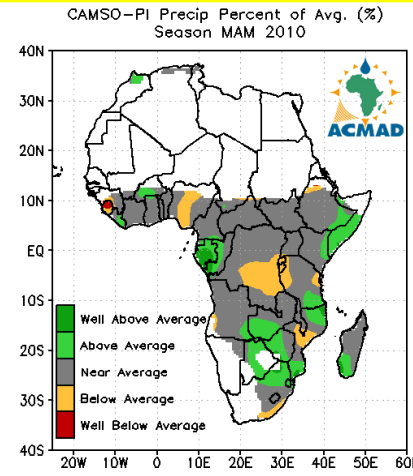
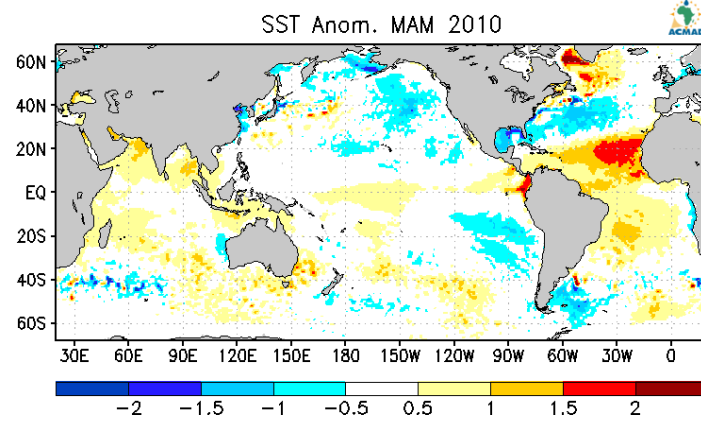
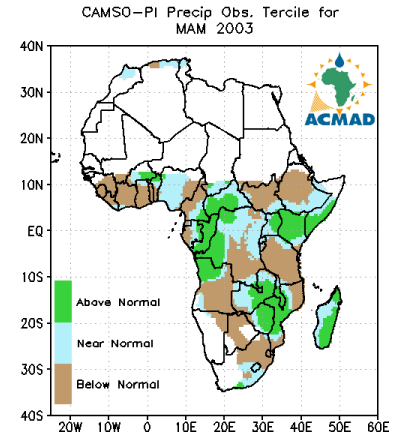
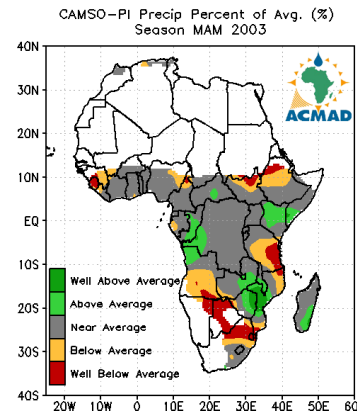
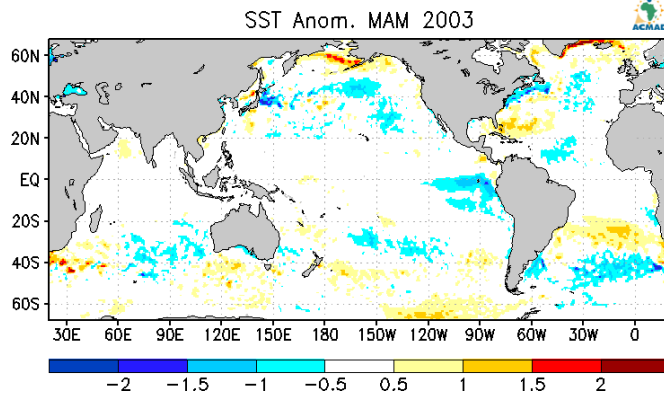
Forecasted SST evolution

Seasons (2024 – 2024)

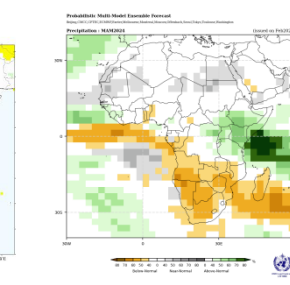
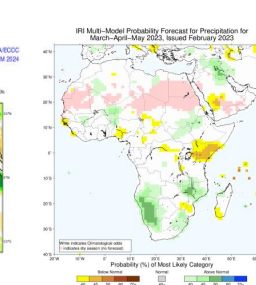
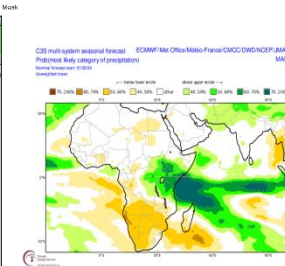
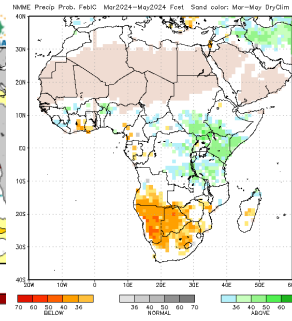
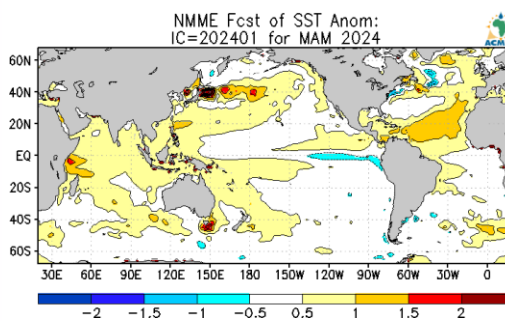
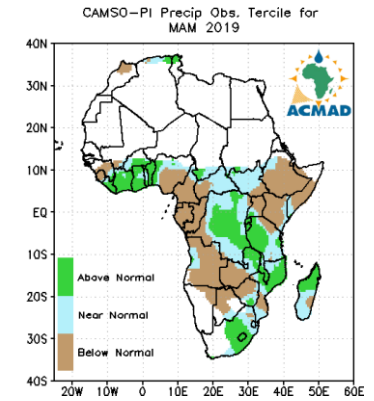
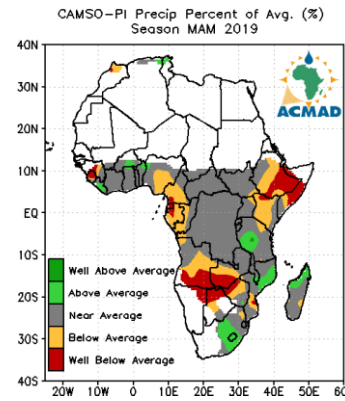
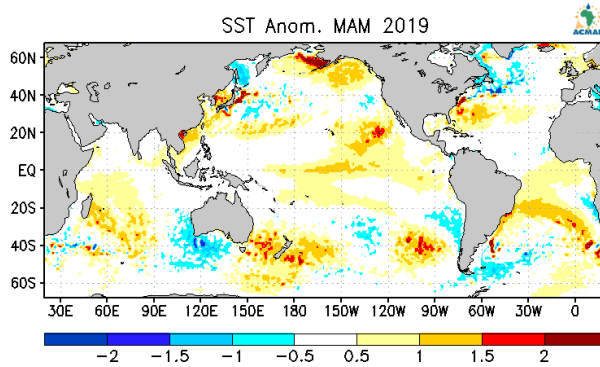
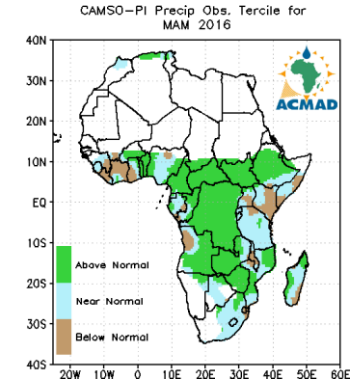
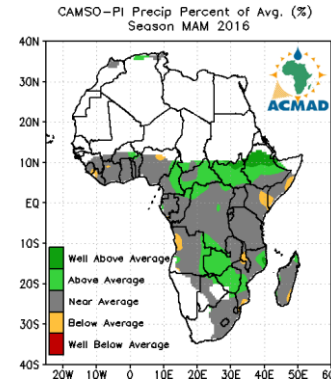
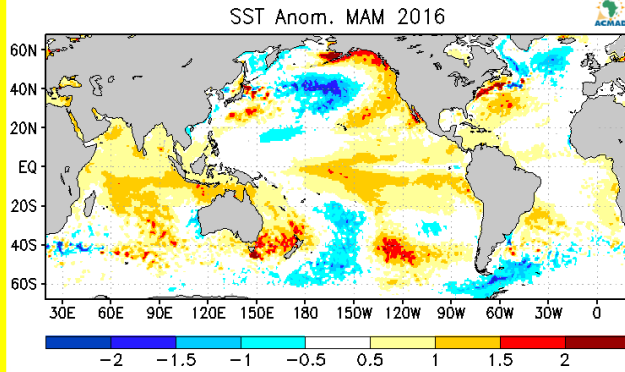
Model	JFM	FMA	MAM	AMJ	MJJ	JJA	JAS	ASO	SON
<i>Average, Dynamical models</i>	1.576	1.178	0.720	0.285	-0.194	-0.617	-0.813	-0.762	-0.827
<i>Average, Statistical models</i>	1.432	1.094	0.728	0.392	0.074	-0.223	-0.465	-0.627	-0.750
<i>Average, All models</i>	1.526	1.149	0.722	0.322	-0.085	-0.430	-0.639	-0.686	-0.783

Forecasted evolution of SSTs during the coming target seasons indicate a transition from an ENSO positive (El Nino) phase to an ENSO Neutral phase during the coming target seasons

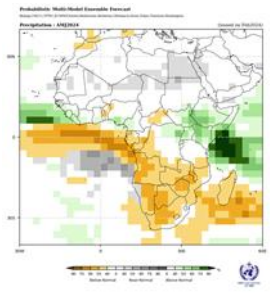
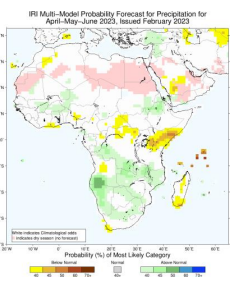
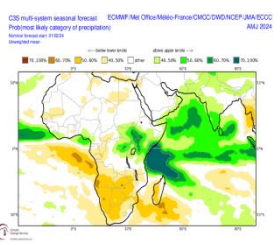
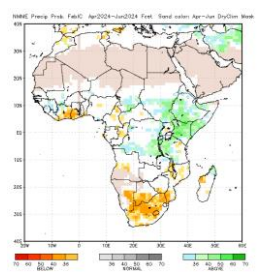
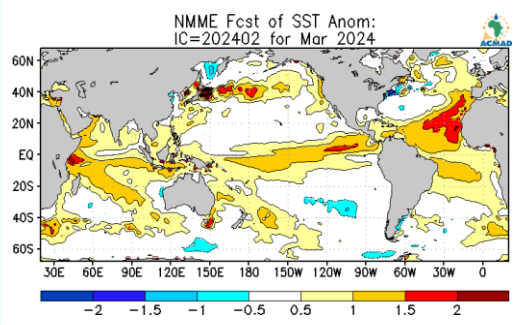
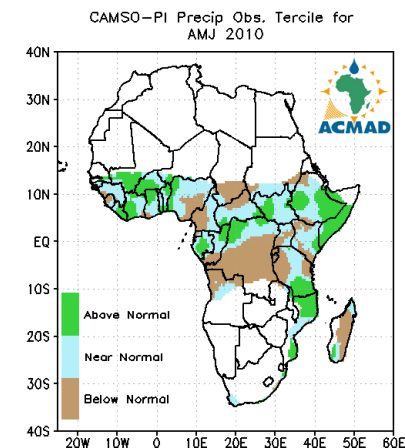
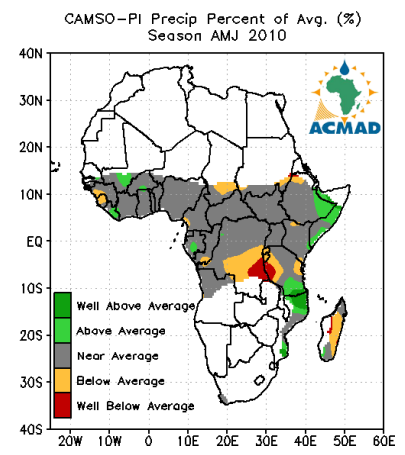
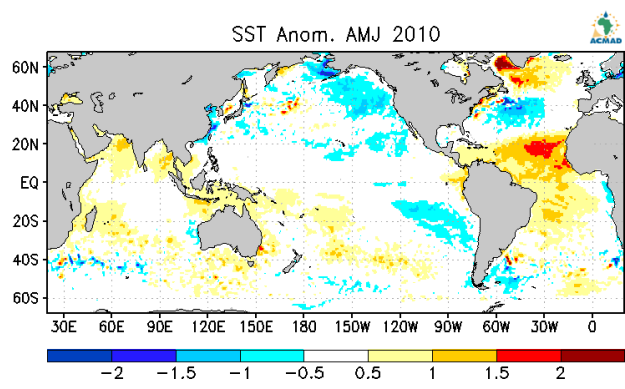
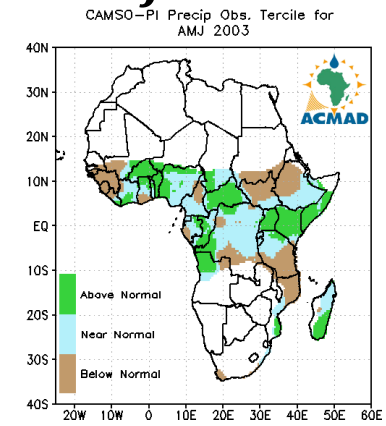
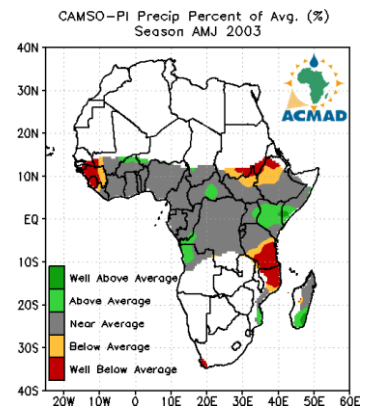
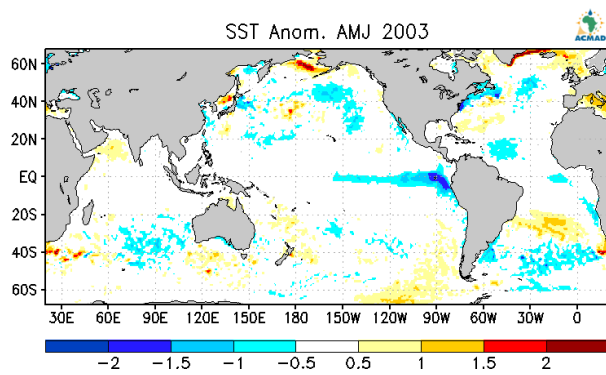
Analogue Analysis (3) - Identical Years- MAM



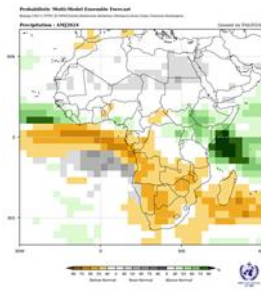
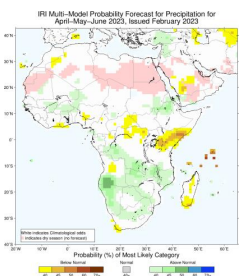
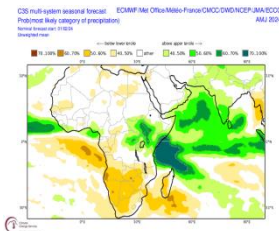
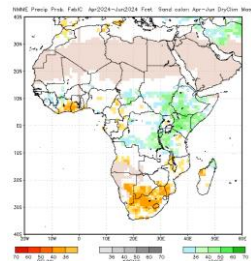
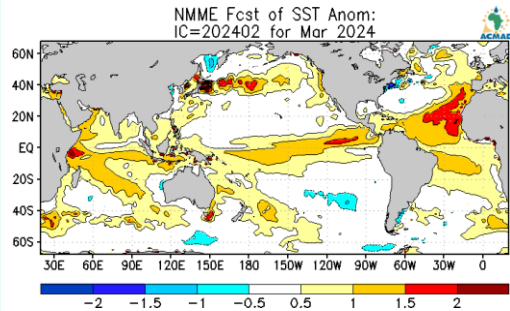
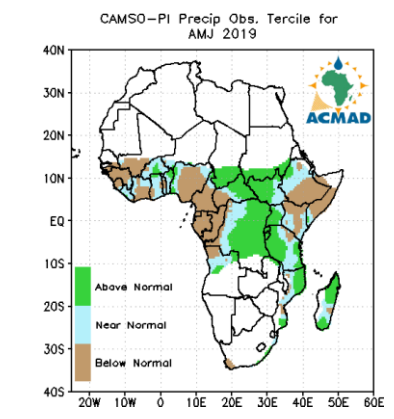
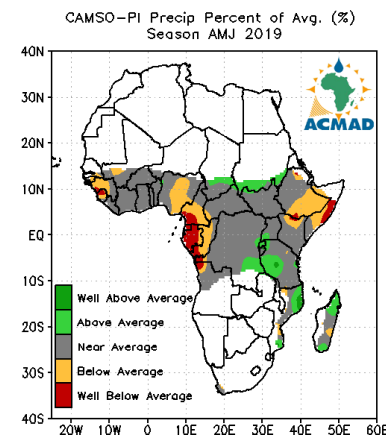
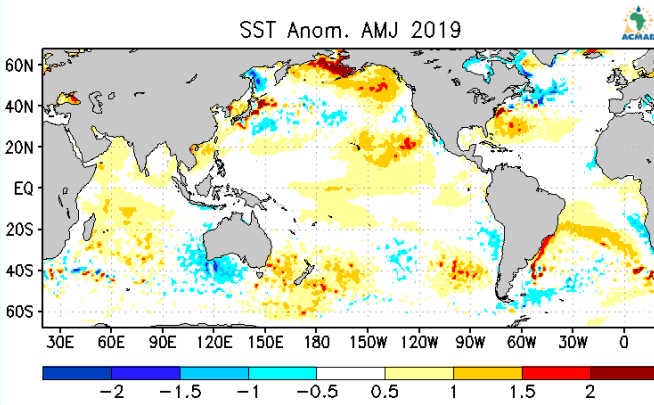
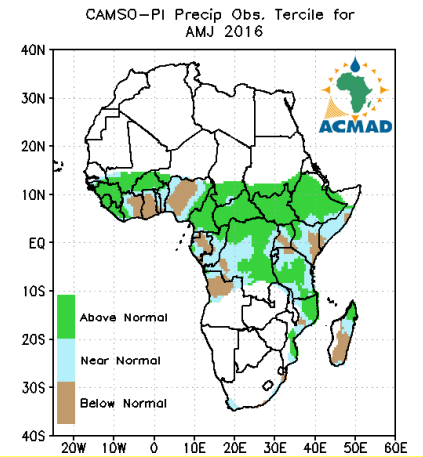
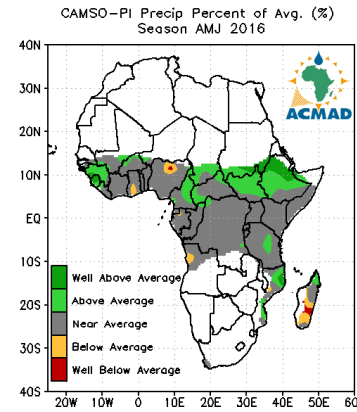
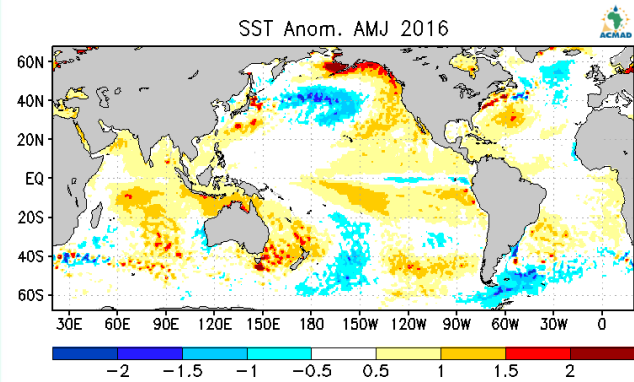
Analogue Analysis (3) - Identical Years- MAM



Analogue Analysis (3) - Identical Years- AMJ

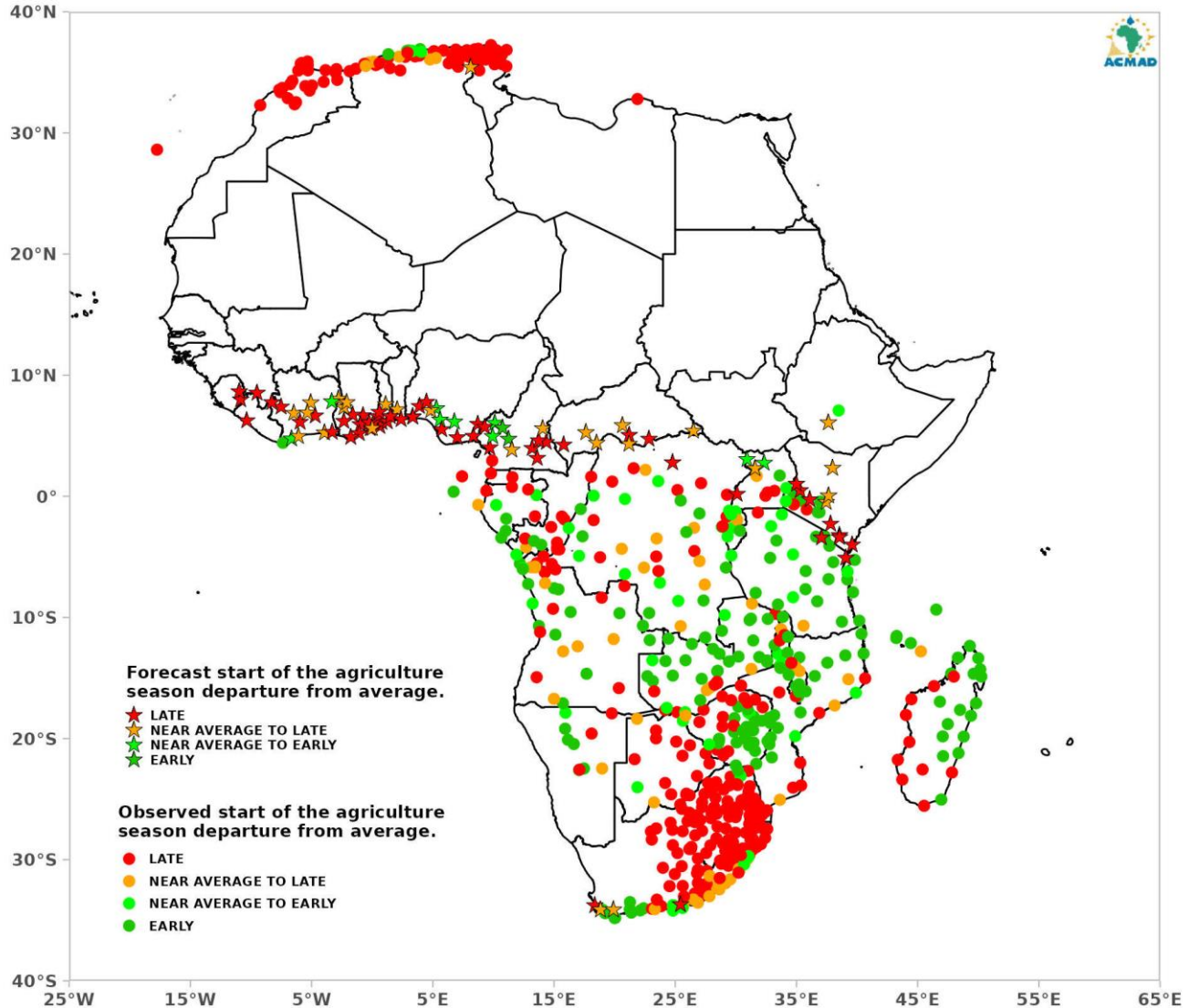


Analogue Analysis (3) - Identical Years- AMJ



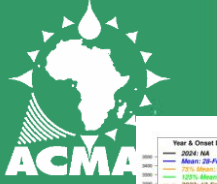
ONSET

MONITORING OF OBSERVED ANOMALIES ON THE START OF THE AGRICULTURE SEASON AND OUTLOOK
MONITORING PERIOD: Jul-2023 to Feb-2024
OUTLOOK VALIDITY PERIOD: From Feb-23-2024 to Mar-08-2024
DATE OF ISSUE: FEB-23-2024.

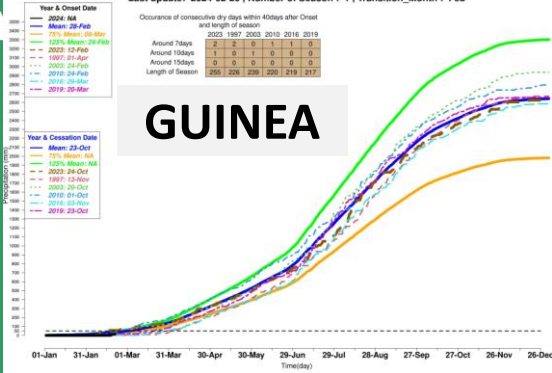


Analog years Analysis

- Analysis of stations profiles for the Analog years (1/3)

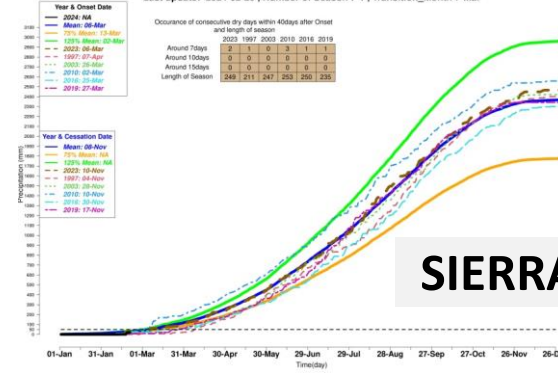


GuineaC : Cumulative precipitation for MACENTA , Data source: TAMSAT
Last update: 2024-02-20 , Number of Season : 1 , Transition_Month : Feb



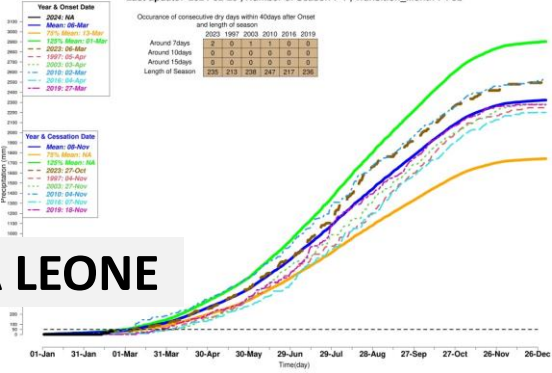
GUINEA

Sierra-Leone : Cumulative precipitation for SEFADU , Data source: TAMSAT
Last update: 2024-02-20 , Number of Season : 1 , Transition_Month : Mar

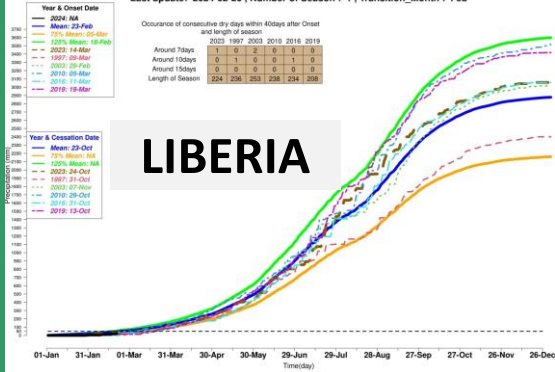


SIERRA LEONE

Sierra-Leone : Cumulative precipitation for DARU , Data source: TAMSAT
Last update: 2024-02-20 , Number of Season : 1 , Transition_Month : Feb

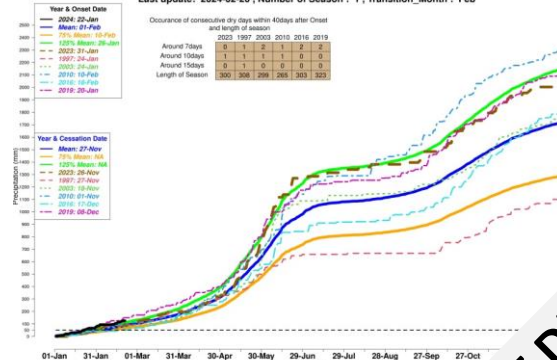


Liberia : Cumulative precipitation for ROBERTS-FIELD , Data source: TAMSAT
Last update: 2024-02-20 , Number of Season : 1 , Transition_Month : Feb



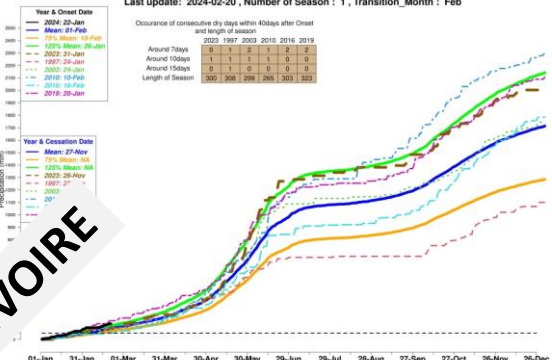
LIBERIA

Cote d'Ivoire : Cumulative precipitation for TABOU , Data source: TAMSAT
Last update: 2024-02-20 , Number of Season : 1 , Transition_Month : Feb

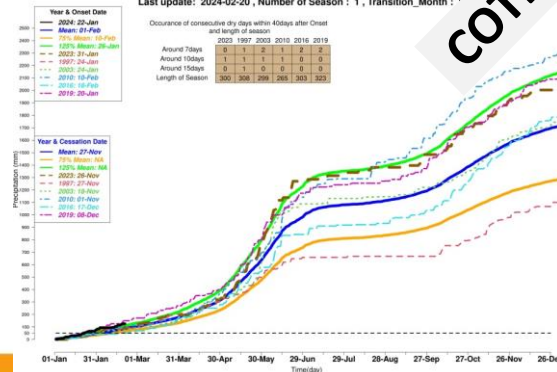


COTE D'IVOIRE

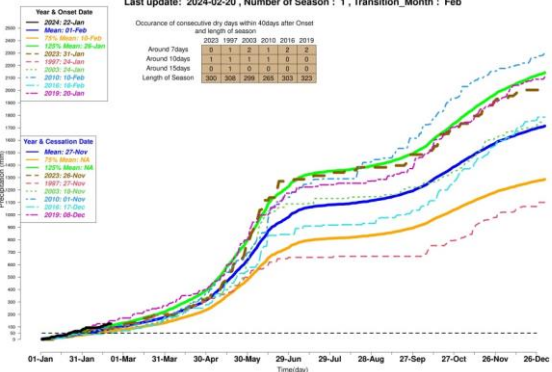
Cote d'Ivoire : Cumulative precipitation for TABOU , Data source: TAMSAT
Last update: 2024-02-20 , Number of Season : 1 , Transition_Month : Feb



Cote d'Ivoire : Cumulative precipitation for TABOU , Data source: TAMSAT
Last update: 2024-02-20 , Number of Season : 1 , Transition_Month : Feb



Cote d'Ivoire : Cumulative precipitation for TABOU , Data source: TAMSAT
Last update: 2024-02-20 , Number of Season : 1 , Transition_Month : Feb

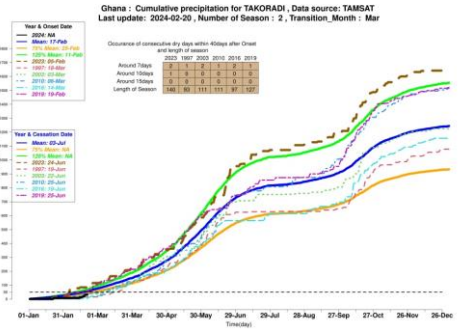
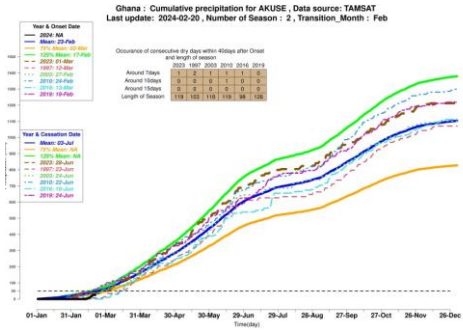
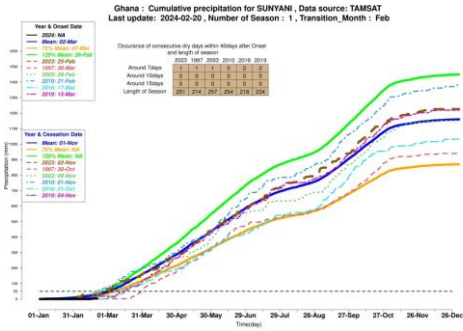
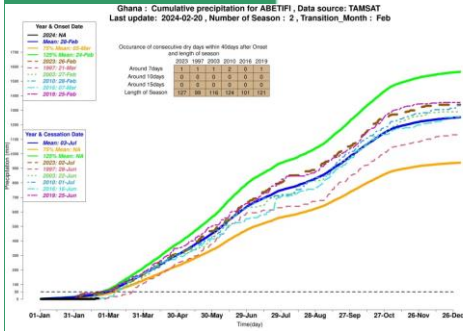


Analog years Analysis

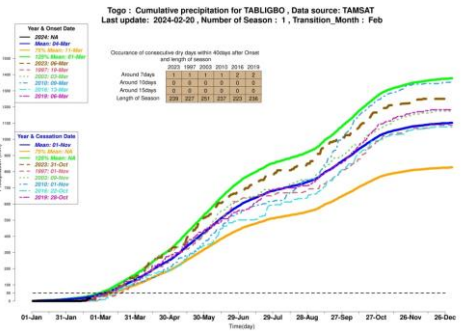
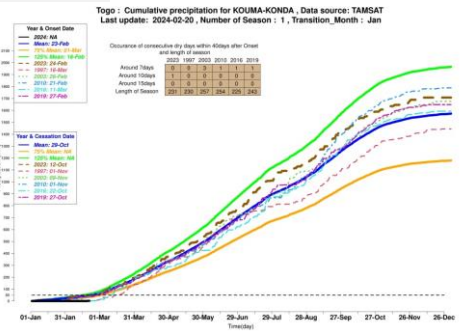
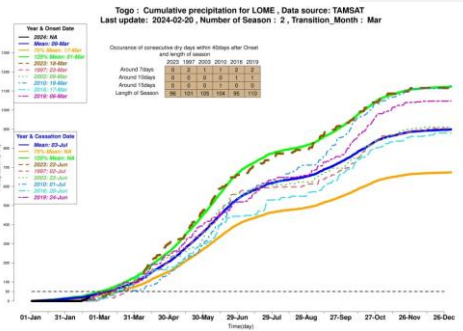
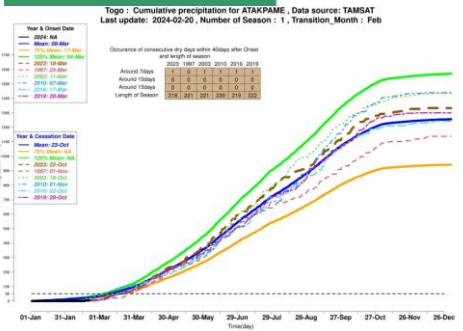
- Analysis of stations profiles for the Analog years (2/3)



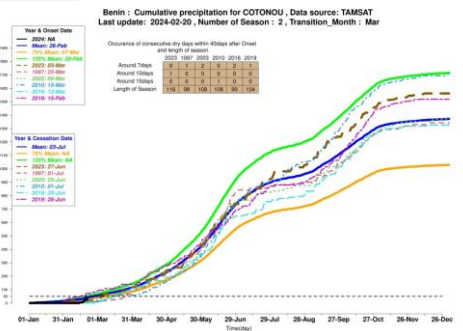
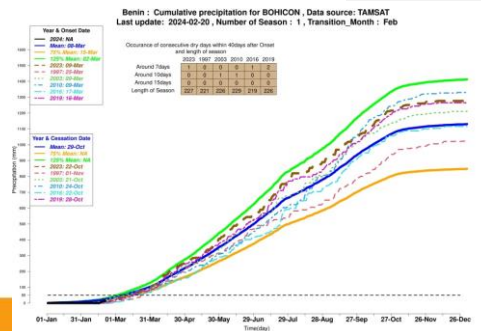
GHANA



TOGO



BENIN







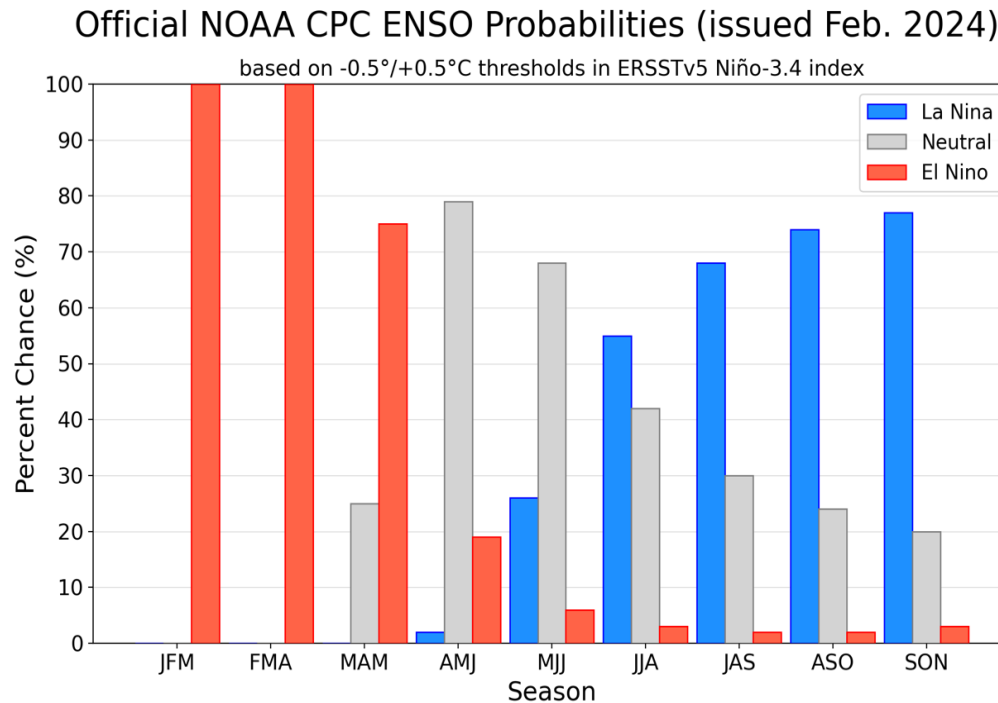
Step 4:

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

CPC Probabilistic ENSO Outlook

Updated: 8 February 2024

A transition from El Niño to ENSO-neutral is expected by April-June season 2024, with ENSO-neutral persisting through May-July 2024. Thereafter, La Niña is favored in June-August, and chances increase through the September-November season.



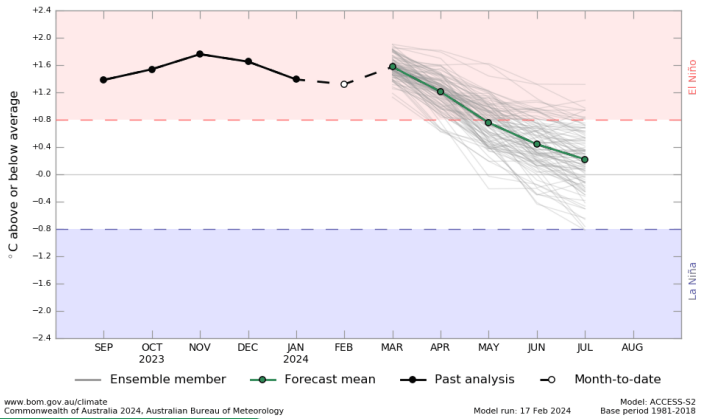
Teleconnections analysis (i,e ENSO TNA and TSA) - Index plumes



ENSO Plumes

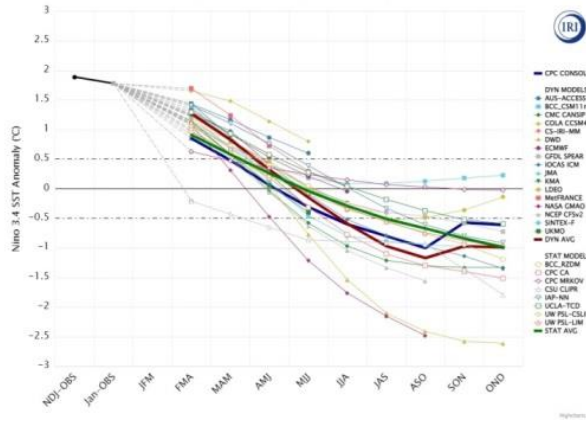
BoM

Monthly sea surface temperature anomalies for NINO3.4 region

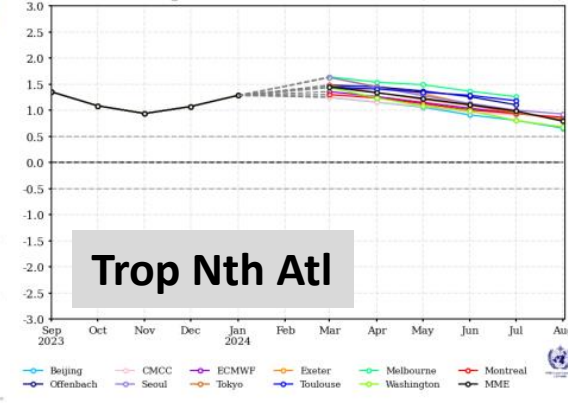


IRI

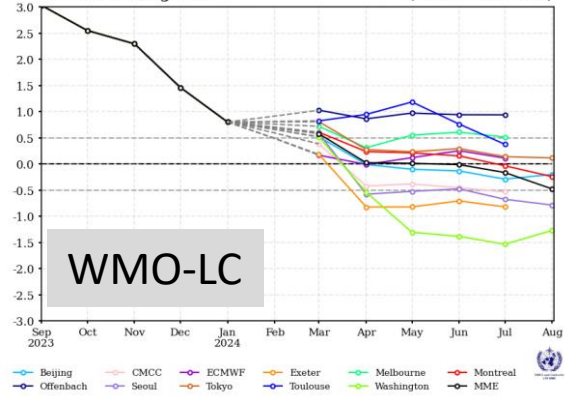
Model Predictions of ENSO from Feb 2024



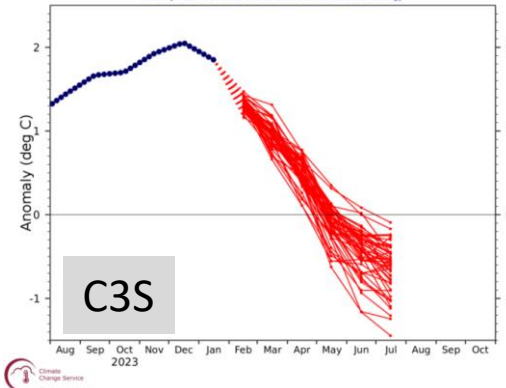
Forecast of TNA (Tropical North Atlantic Index) Mar2024 to Aug2024 (Issued on Feb2024)



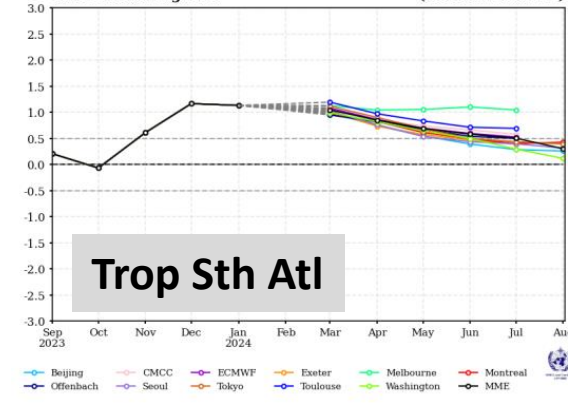
Forecast of Nino1+2 Mar2024 to Aug2024 (Issued on Feb2024)



NINO3.4 SST anomaly plume
C3S: CMCC contribution from 1 Feb 2024
Monthly mean anomalies relative to ERA5 1981-2010 climatology



Forecast of TSA (Tropical South Atlantic Index) Mar2024 to Aug2024 (Issued on Feb2024)



Moderate to neutral El Niño

Positive TNA and TSA

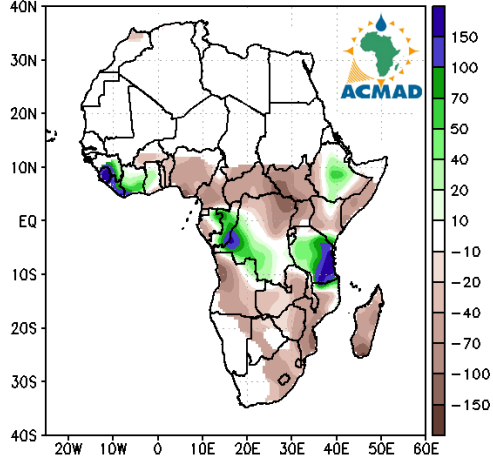


Teleconnections analysis – Likely impacts on the within the region

MAM

Mod El Nino

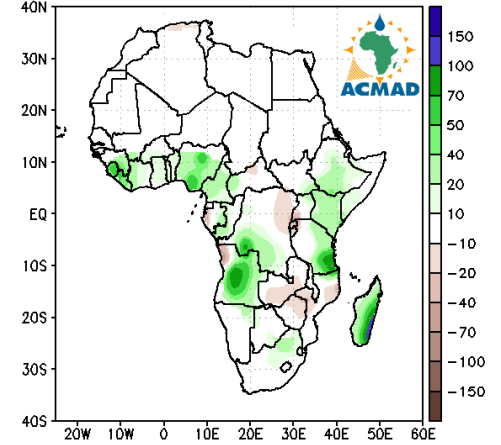
CAMS–OPI Precipitation Anomaly Associated with Moderate El Nino Events during the Season MAM



Identified Years are:
1983 1992

Weak El Nino to Neutral pos

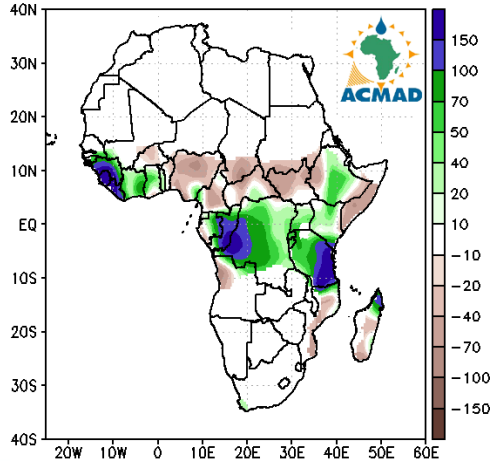
CAMS–OPI Precipitation Anomaly Associated with Neutral (+) Events during the Season MAM



Identified Years are:
1982 1990 1991 1994 1995 1997 2002 2004 2005
2010 2014 2017 2020

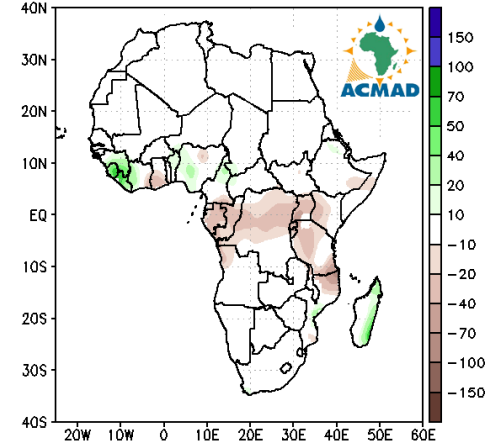
AMJ

CAMS–OPI Precipitation Anomaly Associated with Moderate El Nino Events during the Season AMJ



Identified Years are:
1983 1992

CAMS–OPI Precipitation Anomaly Associated with Neutral (+) Events during the Season AMJ



Identified Years are:
1990 1991 1994 1995 1998 2002 2004 2005 2009
2014 2016 2017

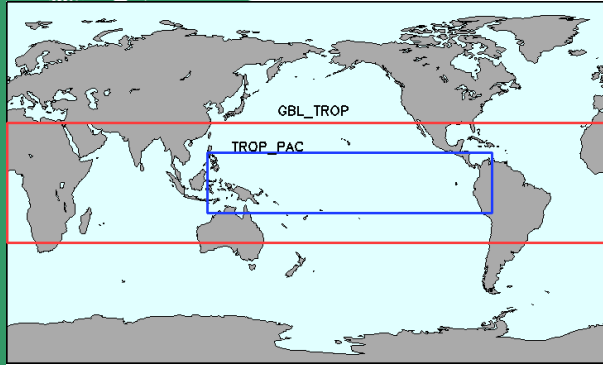




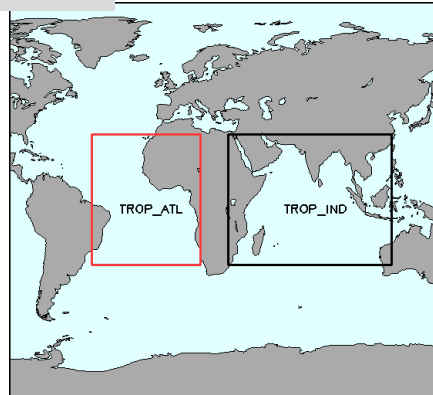
Step 5: **Statistical Forecast –** *Using CPT in CCA Method*



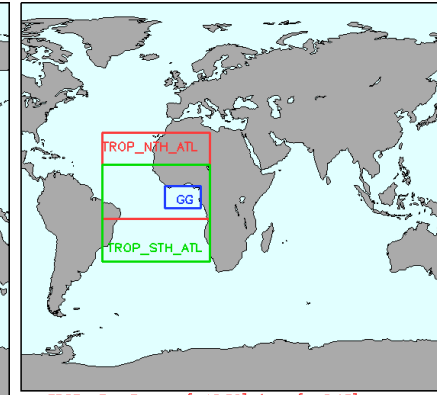
Predictor Domain (with SST as X)



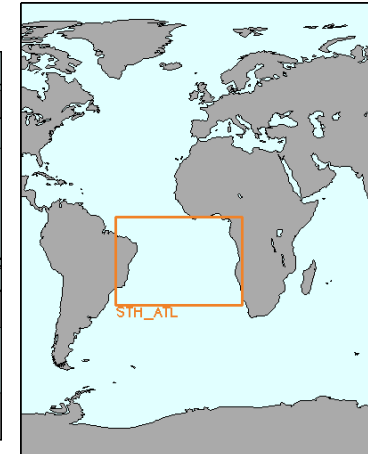
— GBL_TROP : lat [-30;30] / lon [0;360]
 — TROP_PAC : lat [-15;15] / lon [120;-70]



— TROP_IND : lat [-30;30] / lon [30;120]
 — TROP_ATL : lat [-30;30] / lon [-45;15]

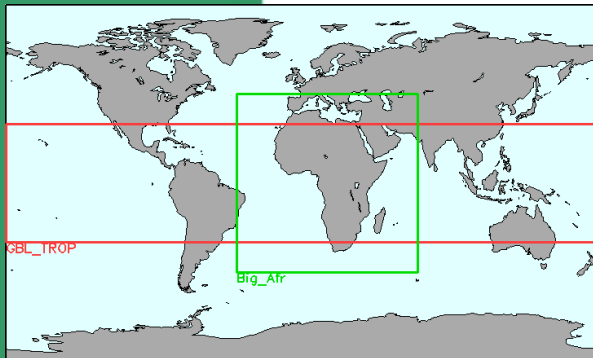


— TROP_NTH_ATL : lat [-10;30] / lon [-45;15]
 — TROP_STH_ATL : lat [-30;15] / lon [-45;15]
 — GG : lat [-5;5] / lon [-10;10]



— STH_ATL : lat [-30;5] / lon [-45;15]

Predictor Domain (with Precip as X)



— GBL_TROP : lat [-30;30] / lon [-180;180]
 — Big_Afr : lat [-45;45] / lon [-40;70]

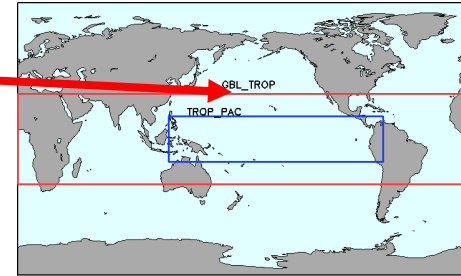
DATA SOURCES FOR EXPERIMENTS

PREDICTAND	Gridded Observed Precipitations from CAMSOP1 , TAMSAT
PREDICTOR	Observed Sea Surface Temperature from ERSSTv5
	Predicted Sea Surface Temperature from NMME (cfsv2, cmc1, cmc2, gfdl, ncar_ccsm4, nmme)
	Predicted Rainfall from NMME (cfsv2, cmc1, cmc2, gfdl, nasa, ncar_ccsm4, nmme)

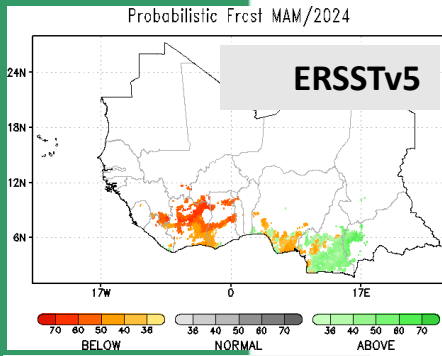


Predictor SST over Global Tropical Ocean

Predictand: MAM Rainfall from TAMSAT

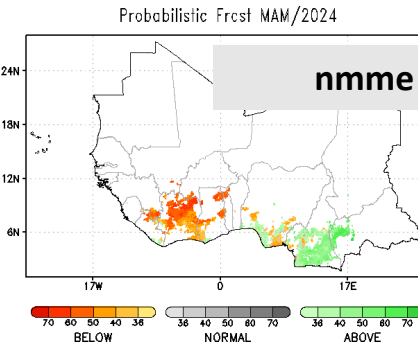
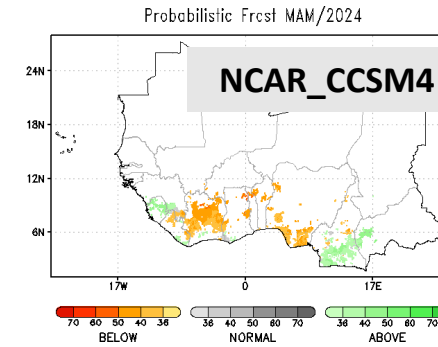
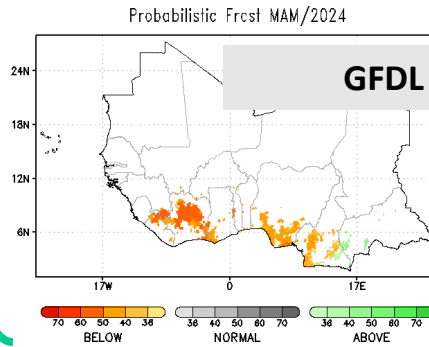
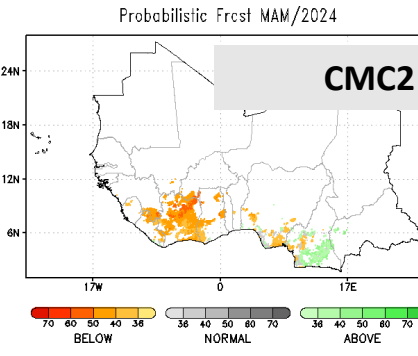
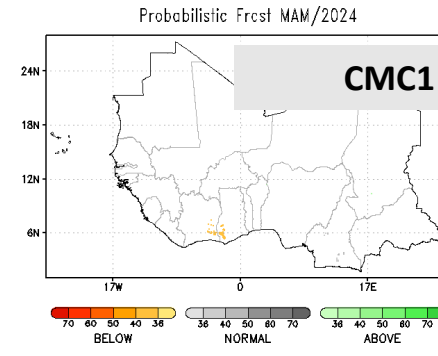
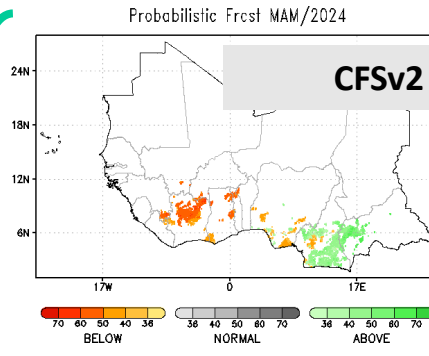


— GBL_TROP : lat [-30;30] / lon [0;360]
— TROP_PAC : lat [-15;15] / lon [120;-70]



Jan Obs. SST as Predictor

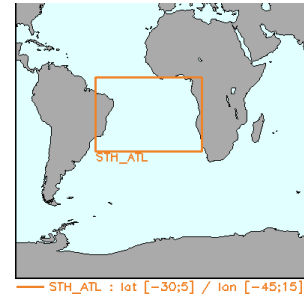
MAM Frst (FebIC) SST as Predictor



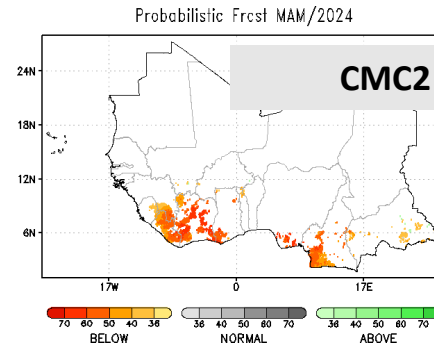
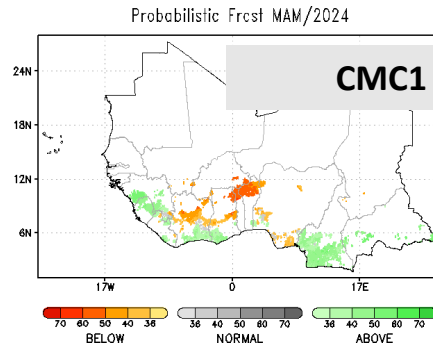
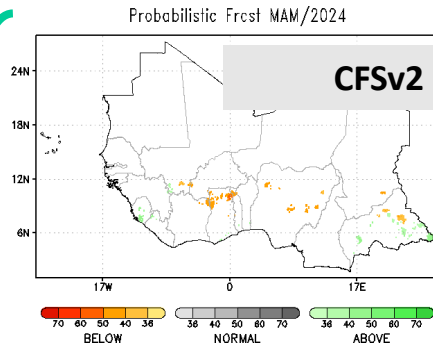
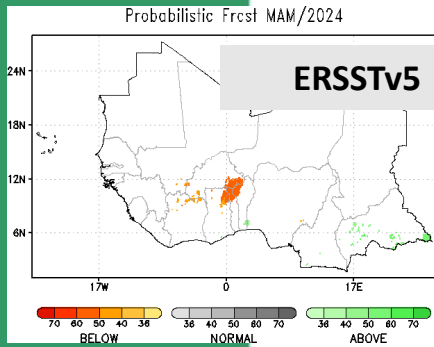
Using a Skill Mask of 0.3



Predictor SST over South Atlantic Ocean

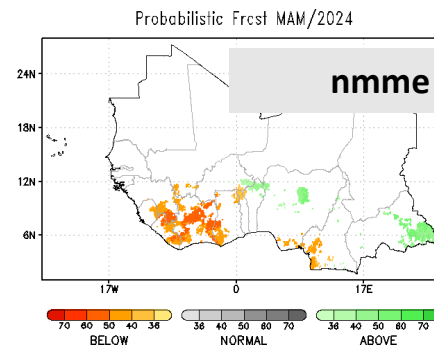
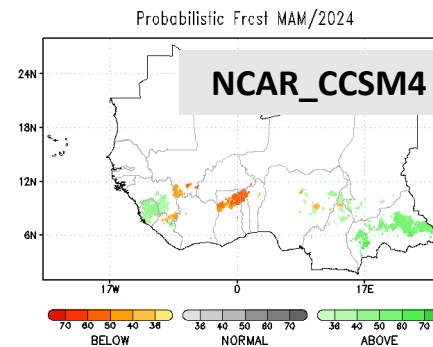
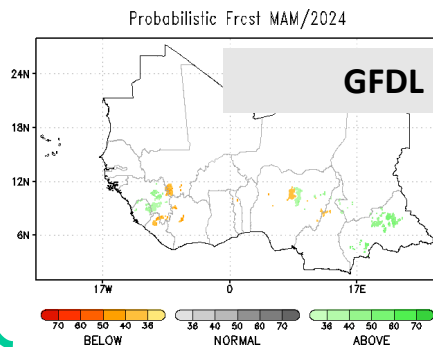


Predictand: MAM Rainfall from TAMSAT



Jan Obs. SST as Predictor

MAM Frst (FebIC) SST as Predictor



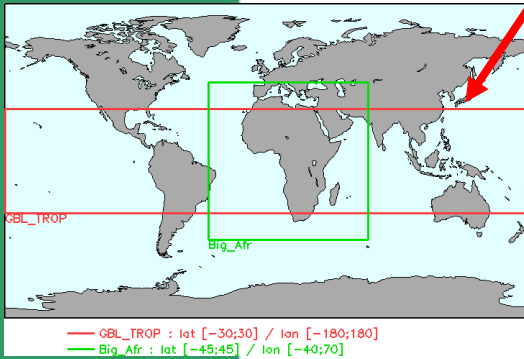
Using a Skill Mask of 0.3



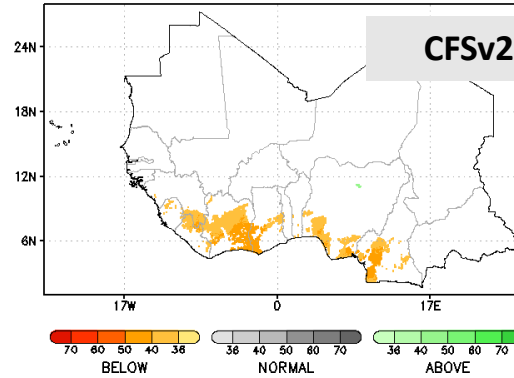
Predictor
Precip over Global Tropical

Predictor (X): MAM Frst (FebIC) Rainfall

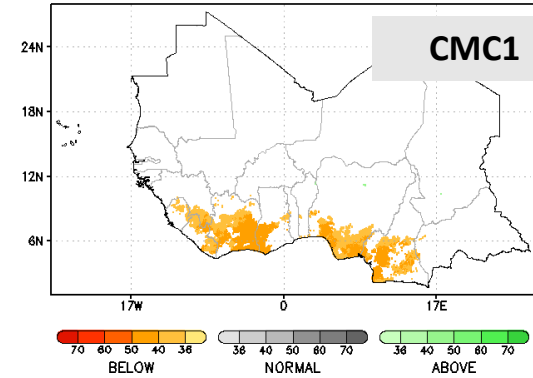
Predictand (Y): MAM Rainfall from TAMSAT



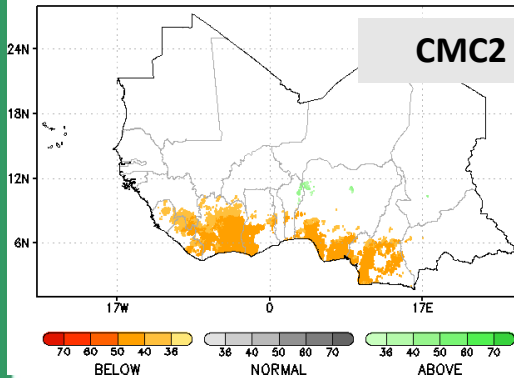
Probabilistic Frst MAM/2024



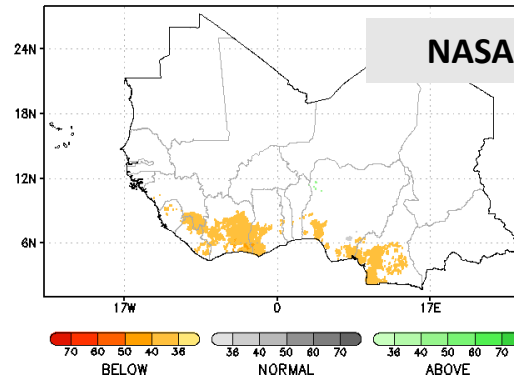
Probabilistic Frst MAM/2024



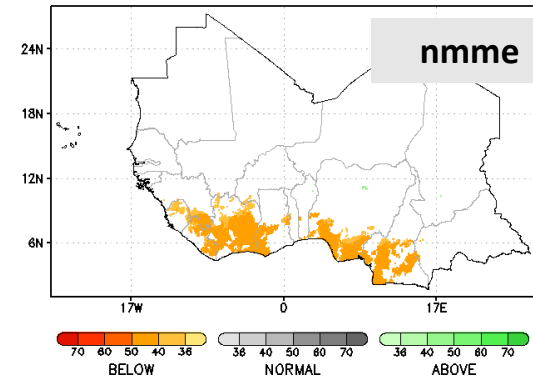
Probabilistic Frst MAM/2024



Probabilistic Frst MAM/2024



Probabilistic Frst MAM/2024

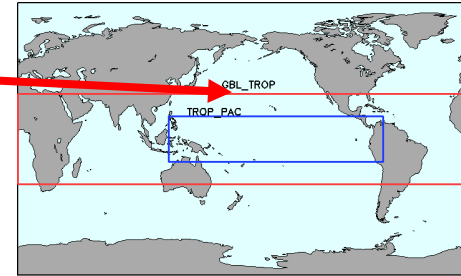


Using a Skill Mask of 0.3



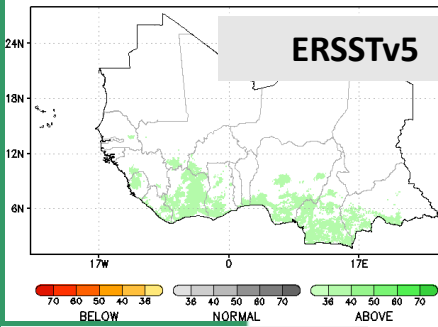
Predictor SST over Global Tropical Ocean

Predictand: AMJ Rainfall from TAMSAT



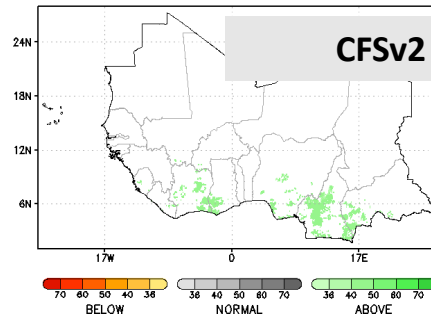
— GBL_TROP : lat [-30;30] / lon [0;360]
— TROP_PAC : lat [-15;15] / lon [120;-70]

Probabilistic Frst AMJ/2024

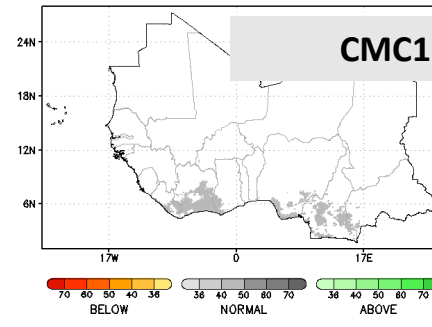


Jan Obs. SST as Predictor

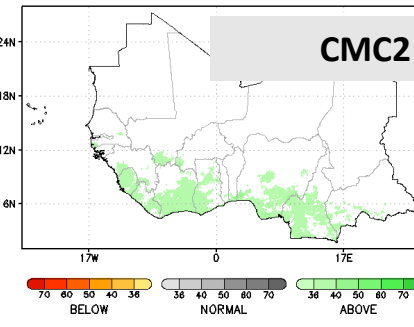
Probabilistic Frst AMJ/2024



Probabilistic Frst AMJ/2024

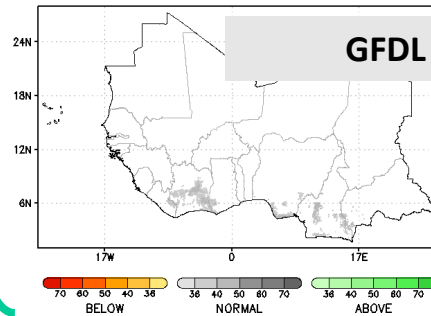


Probabilistic Frst AMJ/2024

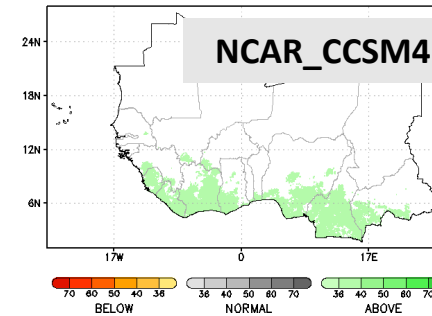


AMJ Frst (FebIC) SST as Predictor

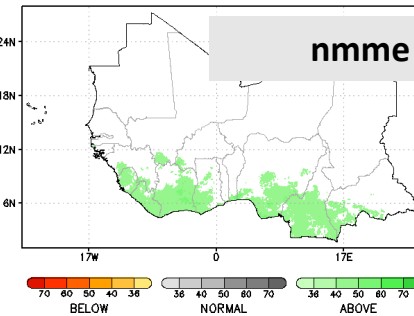
Probabilistic Frst AMJ/2024



Probabilistic Frst AMJ/2024



Probabilistic Frst AMJ/2024

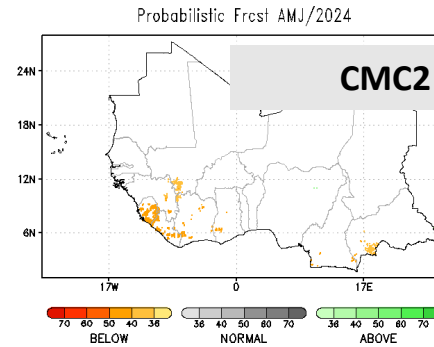
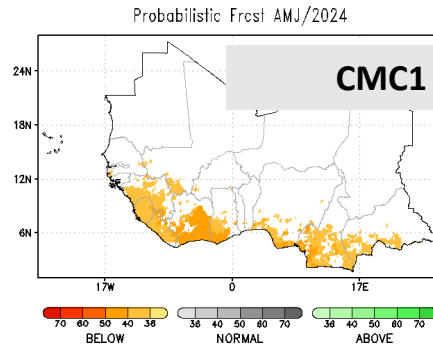
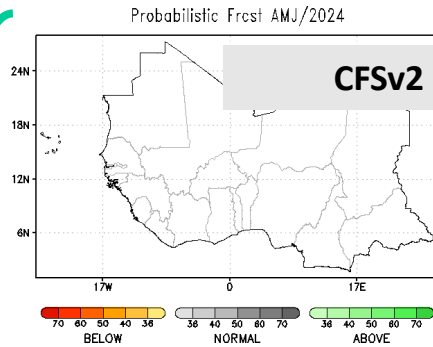
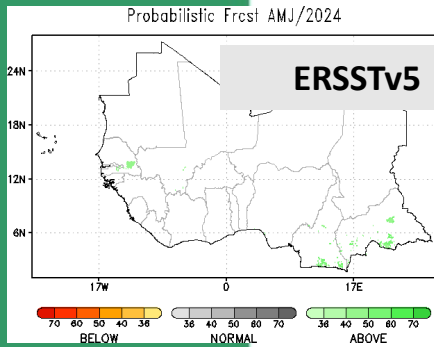
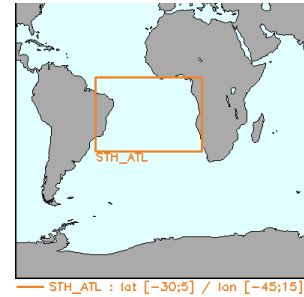


Using a Skill Mask of 0.3



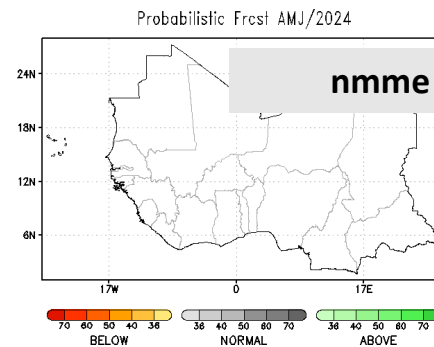
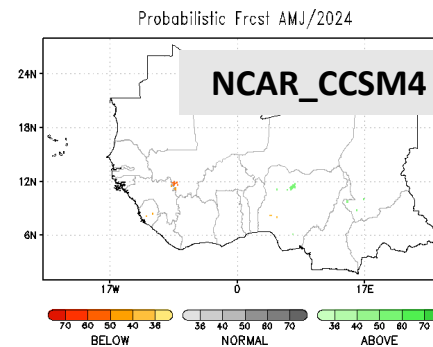
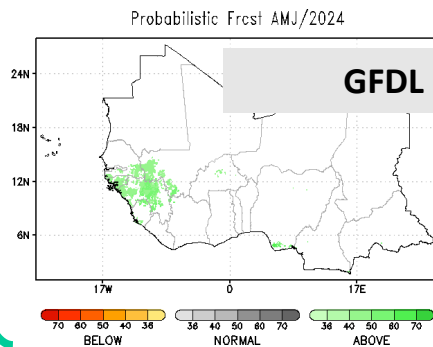
Predictor SST over South Atlantic Ocean

Predictand: AMJ Rainfall from TAMSAT



Jan Obs. SST as Predictor

AMJ Frst (FebIC) SST as Predictor



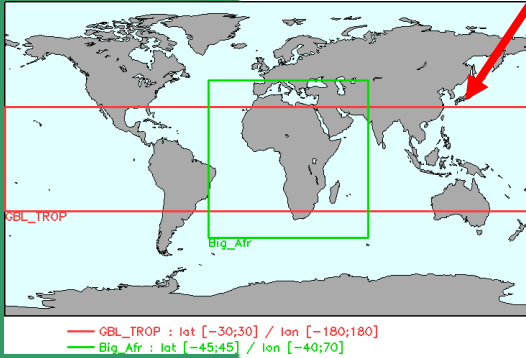
Using a Skill Mask of 0.3



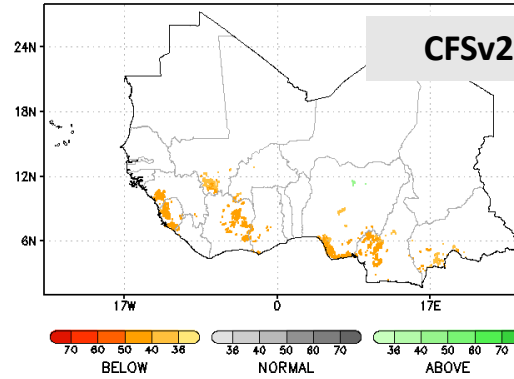
Predictor Precip over Global Tropical

Predictor (X): AMJ Frst (FebIC) Rainfall

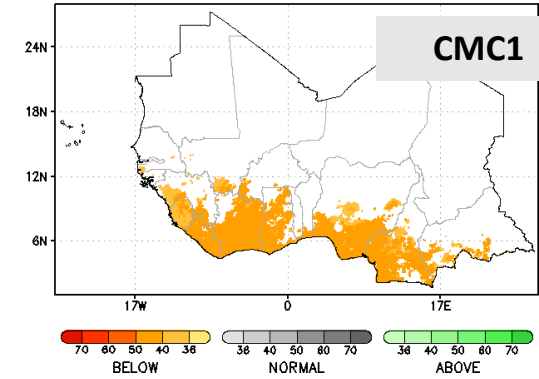
Predictand (Y): MAM Rainfall from TAMSAT



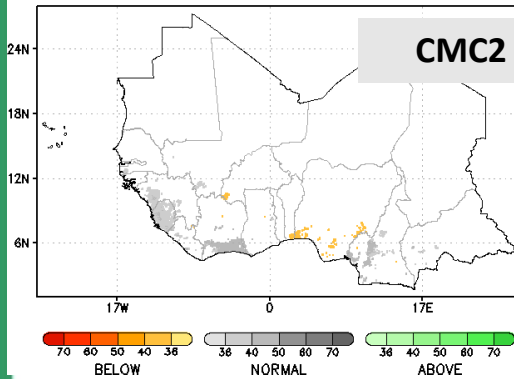
Probabilistic Frst AMJ/2024



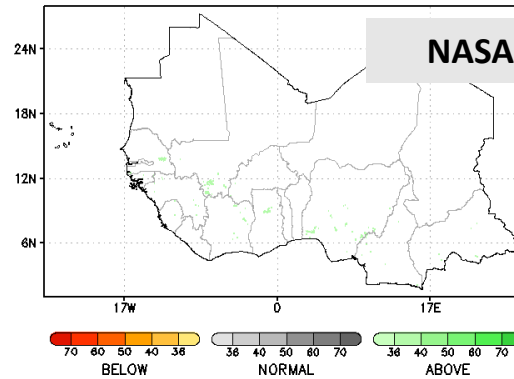
Probabilistic Frst AMJ/2024



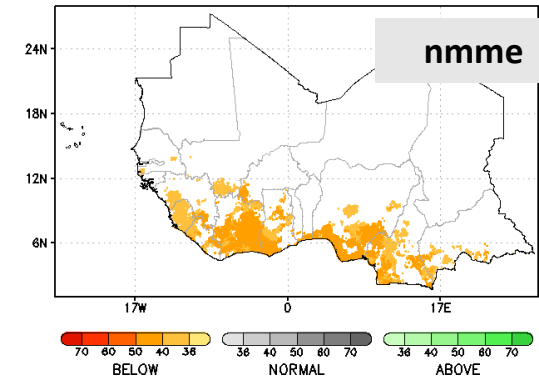
Probabilistic Frst AMJ/2024



Probabilistic Frst AMJ/2024



Probabilistic Frst AMJ/2024



Using a Skill Mask of 0.3





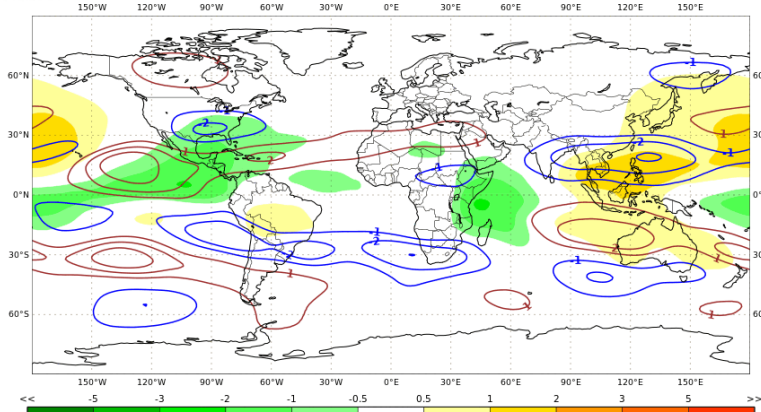
Step 6:
Interactions analysis between seasons and regions for the same target season – Impact of Tropical Activity



Interaction with Tropical Activity – Season 1



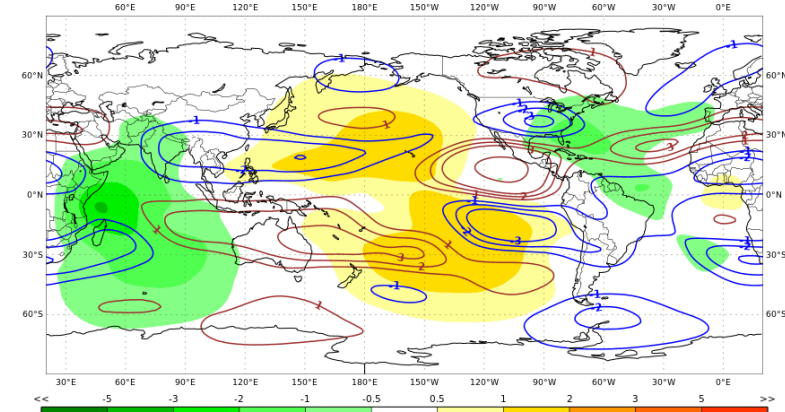
Meteo-France system 8 - Forecast
For MAM 2024 (issued February 2024)



200hPa velocity potential and 200hPa streamfunction - zonal mean
3-months ensemble mean anomaly unit : km2/s



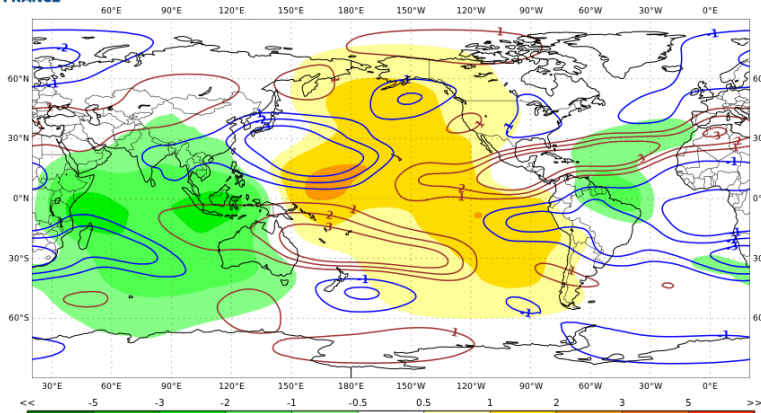
ECMWF SEAS5 - Forecast
For MAM 2024 (issued February 2024)



200hPa velocity potential and 200hPa streamfunction - zonal mean
3-months ensemble mean anomaly unit : km2/s



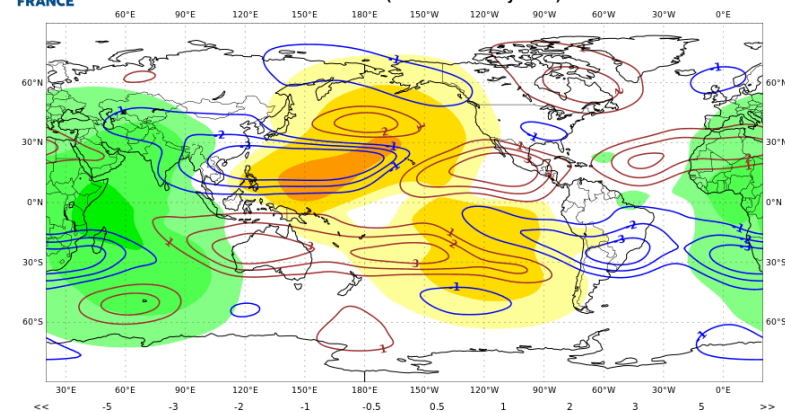
NCEP CFS v2 - Forecast
For MAM 2024 (issued February 2024)



200hPa velocity potential and 200hPa streamfunction - zonal mean
3-months ensemble mean anomaly unit : km2/s



CMCC system 3.5 - Forecast
For MAM 2024 (issued February 2024)



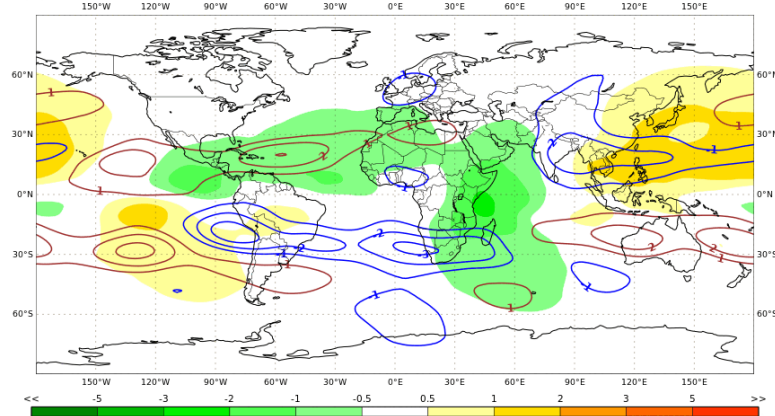
200hPa velocity potential and 200hPa streamfunction - zonal mean
3-months ensemble mean anomaly unit : km2/s



Interaction with Tropical Activity – Season 2



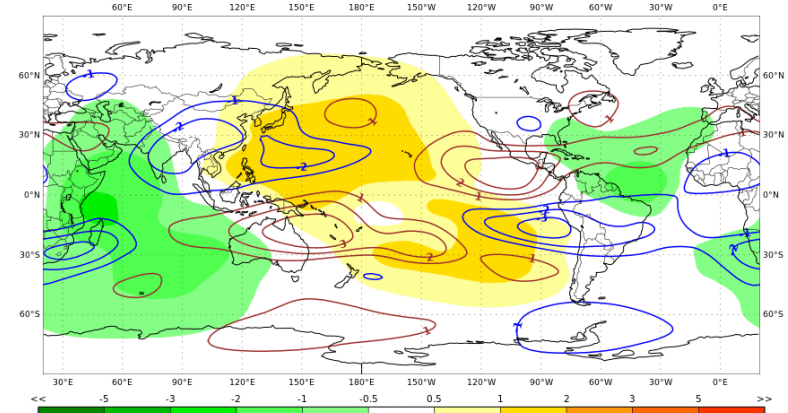
Meteo-France system 8 - Forecast
For AMJ 2024 (issued February 2024)



200hPa velocity potential and 200hPa streamfunction - zonal mean
3-months ensemble mean anomaly unit : km2/s



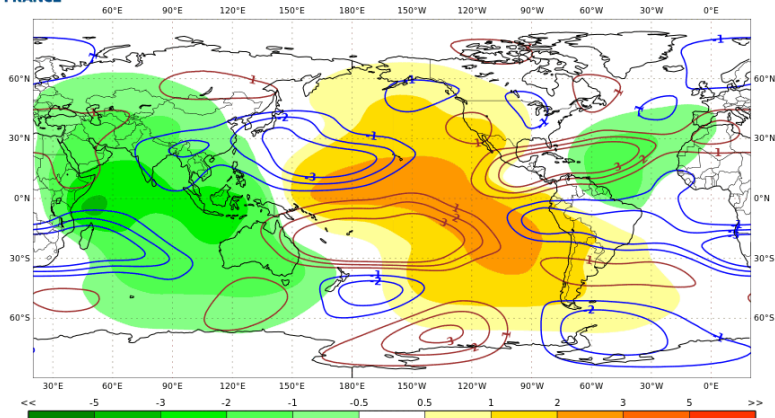
ECMWF SEAS5 - Forecast
For AMJ 2024 (issued February 2024)



200hPa velocity potential and 200hPa streamfunction - zonal mean
3-months ensemble mean anomaly unit : km2/s



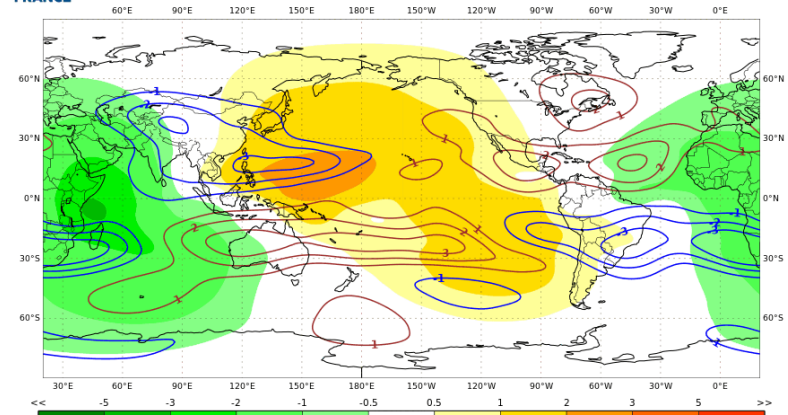
NCEP CFS v2 - Forecast
For AMJ 2024 (issued February 2024)



200hPa velocity potential and 200hPa streamfunction - zonal mean
3-months ensemble mean anomaly unit : km2/s



CMCC system 3.5 - Forecast
For AMJ 2024 (issued February 2024)



200hPa velocity potential and 200hPa streamfunction - zonal mean
3-months ensemble mean anomaly unit : km2/s





Step 7:
**Single Model Ensemble Analysis (i,e ECMWF,
MF, NCEP, UKMET)**
SSTs and Precip Forecast

Single Model Ensemble Analysis (SSTs)



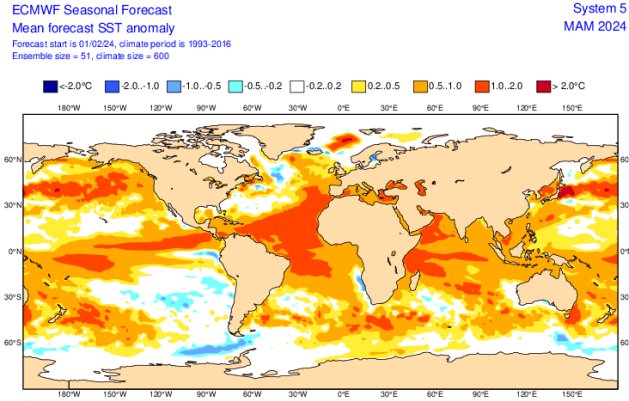
MAM Season

ECMWF

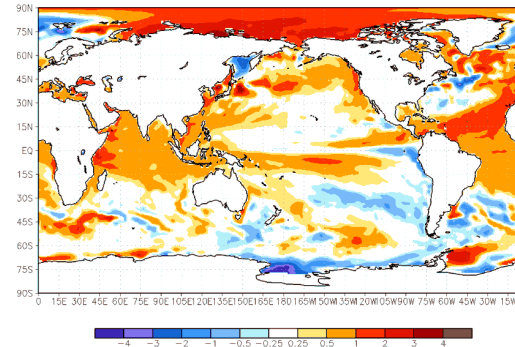
CFSv2

CanCM4i

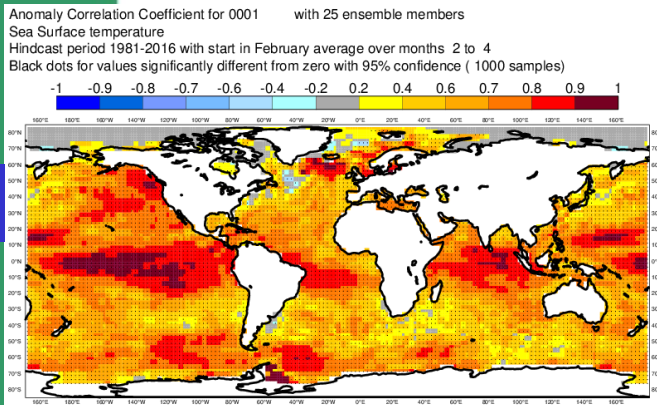
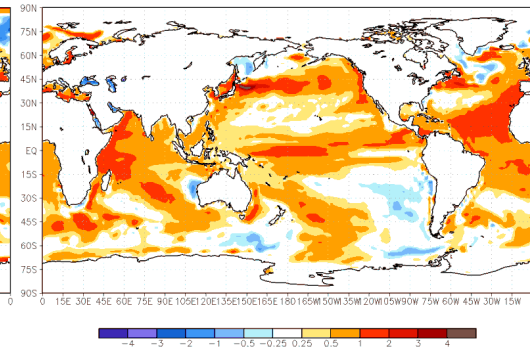
FCST



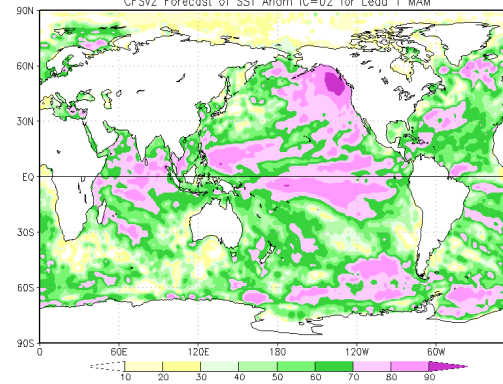
CFSv2 Sea Surface Temperature Anomalies (DecC)
Mar2024-May2024
February2024 initial conditions



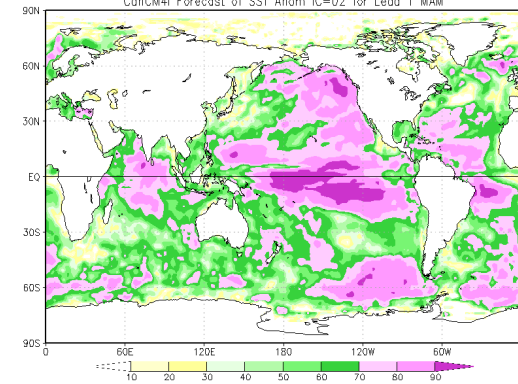
CanCM4i Sea Surface Temperature Anomalies (DecC)
Mar2024-May2024
February2024 initial conditions



CFSv2 Forecast of SST Anom IC=02 for Lead 1 MAM



CanCM4i Forecast of SST Anom IC=02 for Lead 1 MAM



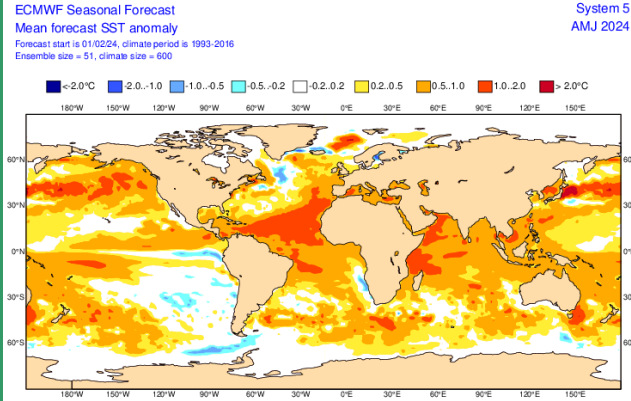
SKILL

Single Model Ensemble Analysis (SSTs)



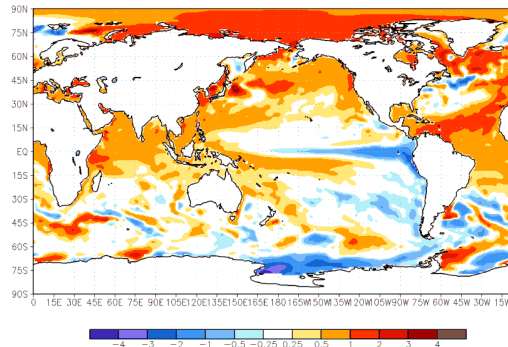
AMJ Season

ECMWF



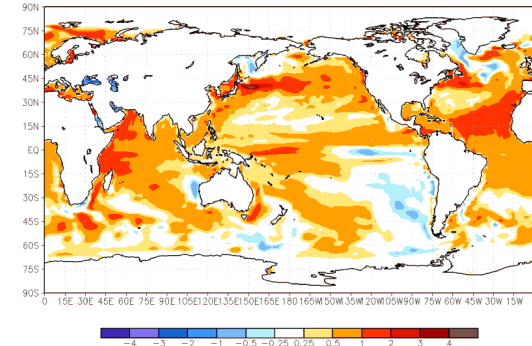
CFSv2

CFSv2 Sea Surface Temperature Anomalies (DecC)
Apr2024-Jun2024
February2024 initial conditions

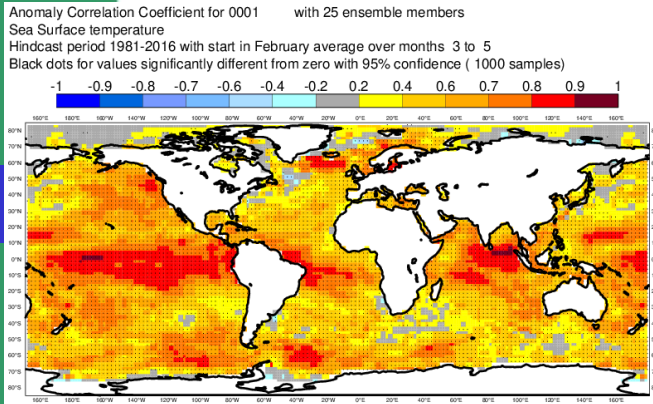


CanCM4i

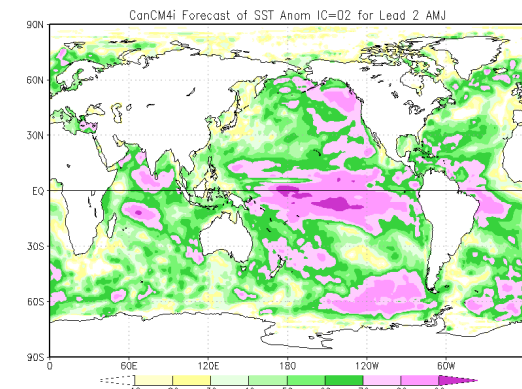
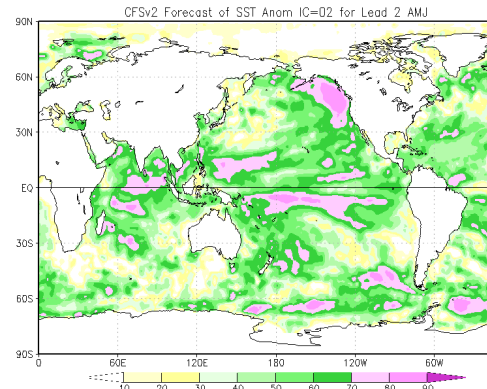
CanCM4i Sea Surface Temperature Anomalies (DecC)
Apr2024-Jun2024
February2024 initial conditions



FCST



SKILL





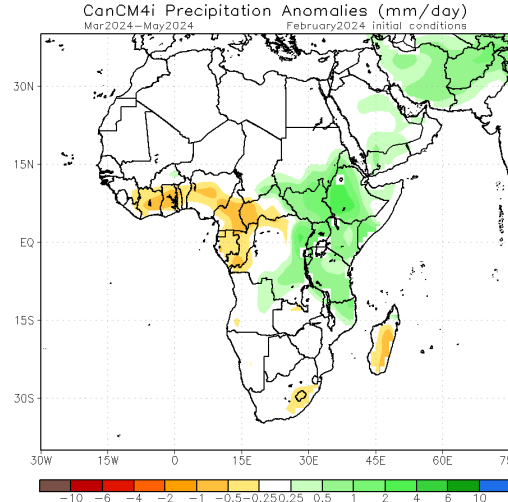
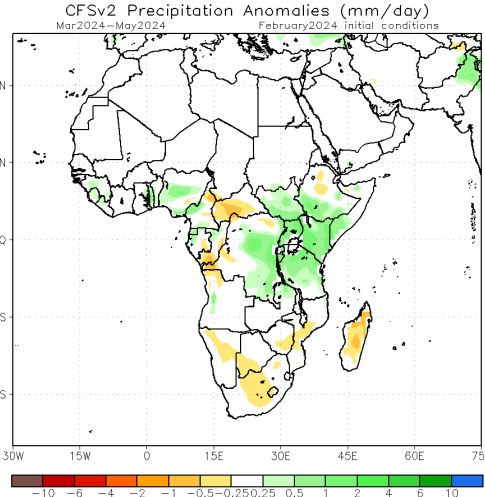
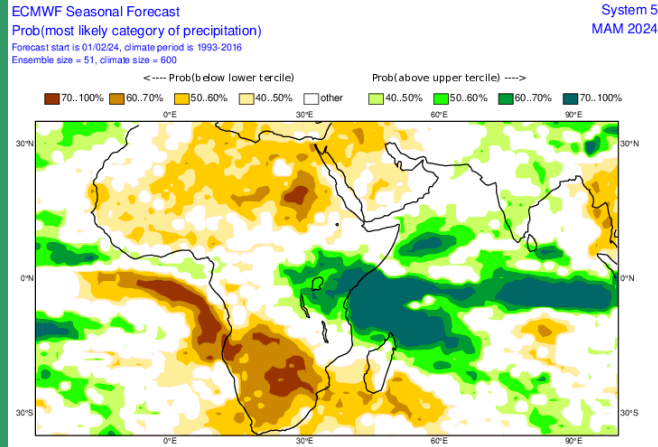
MAM Season

Single model Ensemble Analysis (Rainfall)

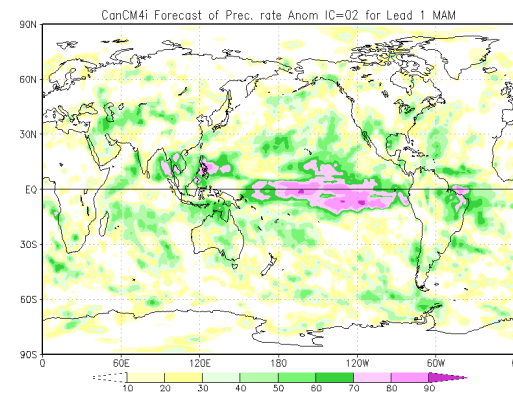
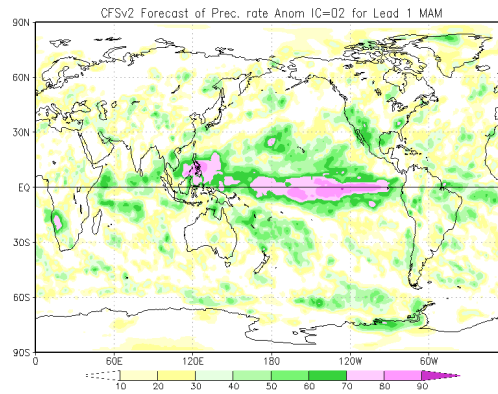
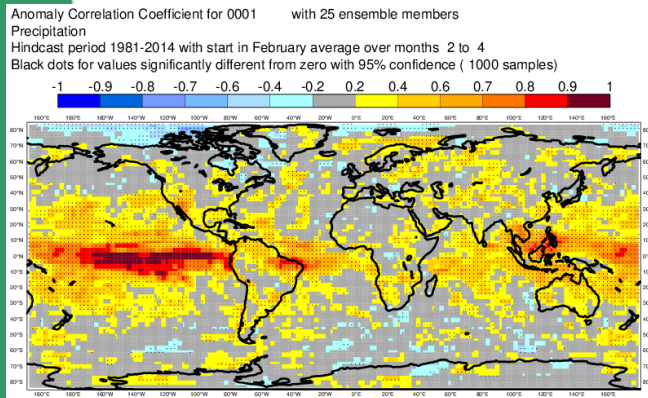
ECMWF

CFSv2

CanCM4i



FCST



SKILL



Single model Ensemble Analysis (Rainfall)

AMJ Season

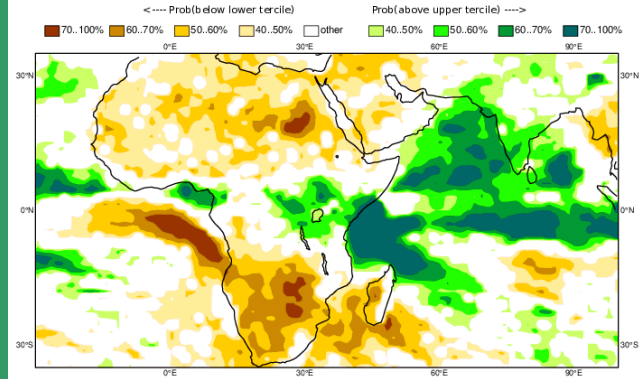
ECMWF

CFSv2

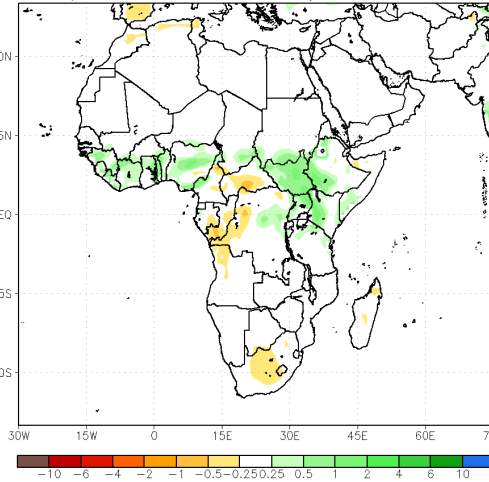
CanCM4i

ECMWF Seasonal Forecast
Prob(most likely category of precipitation)
Forecast start is 01/02/24, climate period is 1993-2016
Ensemble size = 51, climate size = 600

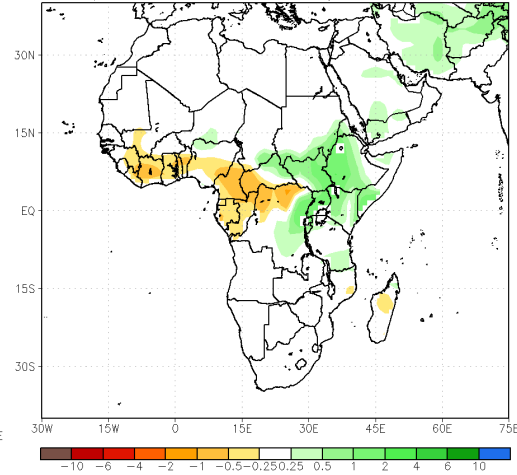
System 5
AMJ 2024



CFSv2 Precipitation Anomalies (mm/day)
Apr2024-Jun2024 February2024 initial conditions

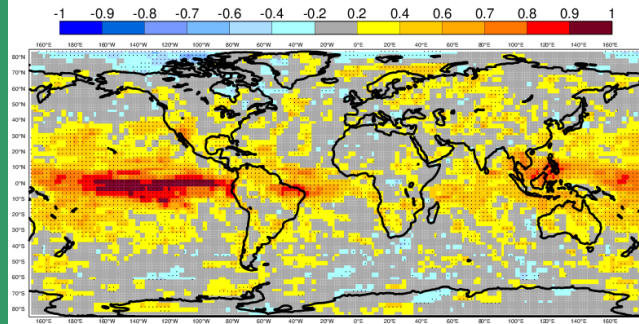


CanCM4i Precipitation Anomalies (mm/day)
Apr2024-Jun2024 February2024 initial conditions

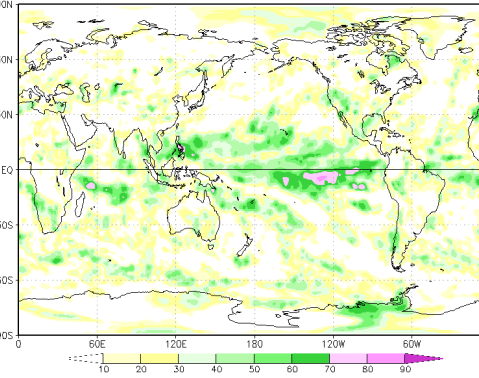


FCST

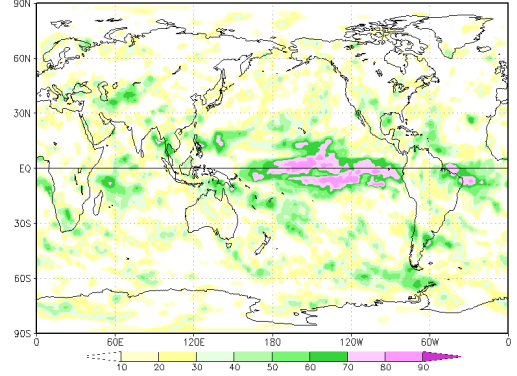
Anomaly Correlation Coefficient for 0001 with 25 ensemble members
Precipitation
Hindcast period 1981-2014 with start in February average over months 2 to 4
Black dots for values significantly different from zero with 95% confidence (1000 samples)



CFSv2 Forecast of Prec. rate Anom IC=02 for Lead 2 AMJ



CanCM4i Forecast of Prec. rate Anom IC=02 for Lead 2 AMJ



SKILL





Step 8:

**Multi Model Ensemble Analysis (i,e C3S,
NMME, WMO-LC)**

SSTs and Precip Forecast

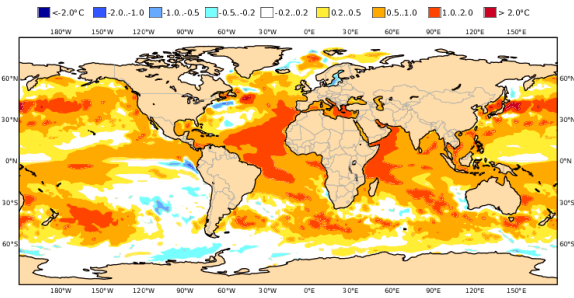
Multimodel Ensemble Analysis (SSTs)



MAM Season

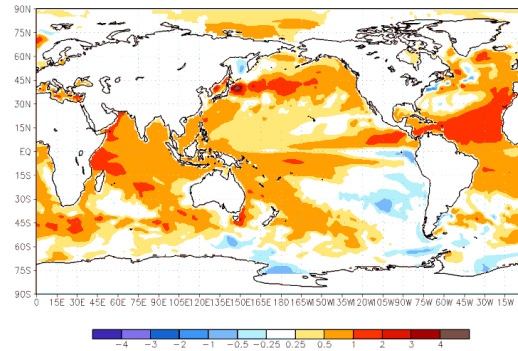
C3S

C3S: CMCC contribution
Mean forecast SST anomaly
Nominal forecast start: 01/02/24
Ensemble size = 50, climate size = 960
MAM 2024

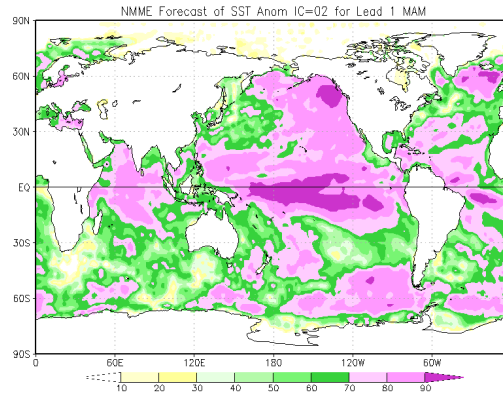


NMME

NMME Sea Surface Temperature Anomalies (DecC)
Mar2024-May2024
February2024 initial conditions



WMO-LC



FCST

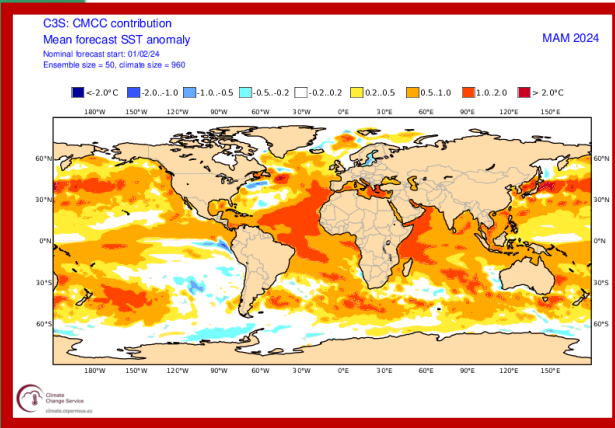
SKILL

Multimodel Ensemble Analysis (SSTs)



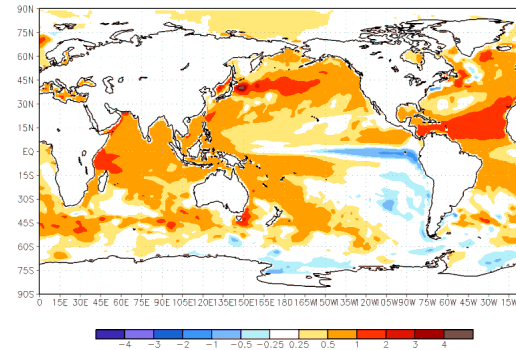
AMJ Season

C3S

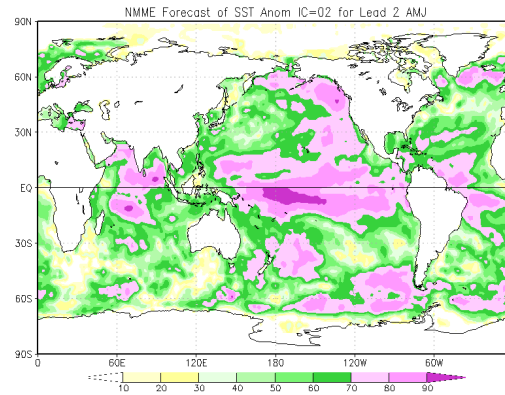


NMME

NMME Sea Surface Temperature Anomalies (DecC)
Apr2024-Jun2024 February2024 initial conditions



WMO-LC



FCST

SKILL

Multimodel Ensemble Analysis(Rainfall)



MAM Season

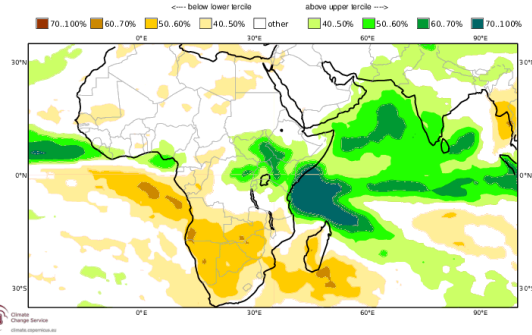
C3S

NMME

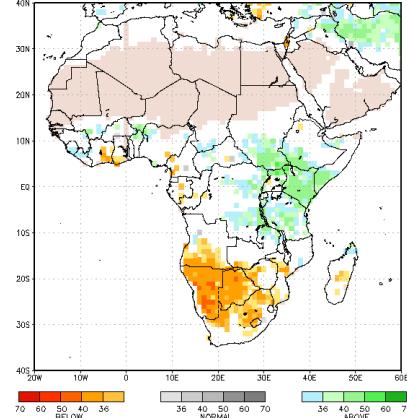
IRI

WMO-LC

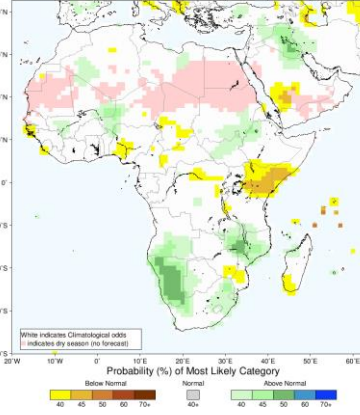
C3S multi-system seasonal forecast ECMWF/Met Office/Météo-France/CMCC/DWD/NCEP/JMA/ECCC
 Prob(most likely category of precipitation) AMJ 2024
 Nominal forecast start: 01/02/24
 Unweighted mean



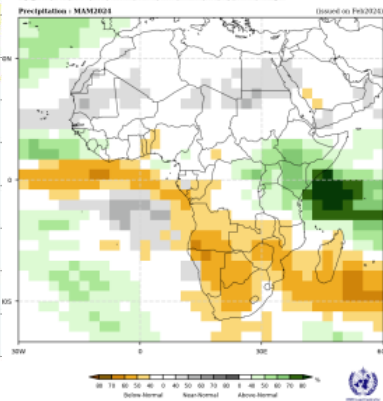
NMME Precip. Prob. Feb16 Mar2024-May2024 Fcst. Sand color; Mar-May Dry/Dim Mask



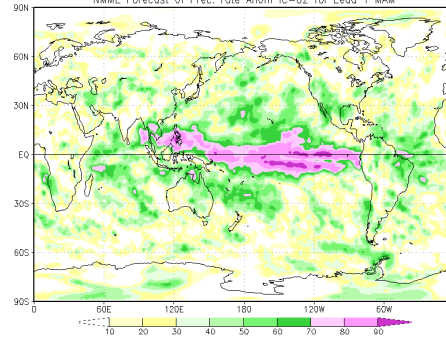
IRI Multi-Model Probability Forecast for Precipitation for March-April-May 2023, Issued February 2023



Probabilistic Multi-Model Ensemble Forecast
 Precipitation - MAM2024



NMME Forecast of Prec. rate Anom IC=02 for Lead 1 MAM



FCST

SKILL

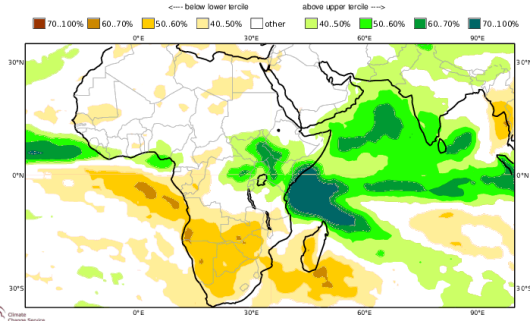
Multimodel Ensemble Analysis(Rainfall)



AMJ Season

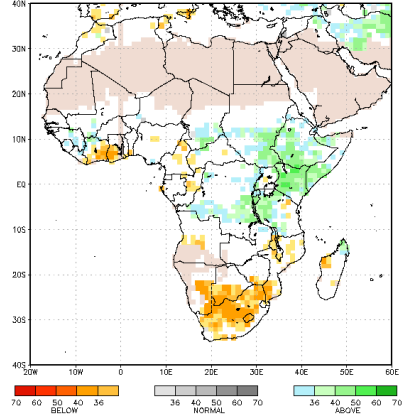
C3S

C3S multi-system seasonal forecast Prob(most likely category of precipitation)
 ECMWF/Met Office/Météo-France/CMCC/DWD/NCEP/JMA/ECCC
 AMJ 2024
 Nominal forecast start: 01/02/24
 Unweighted mean



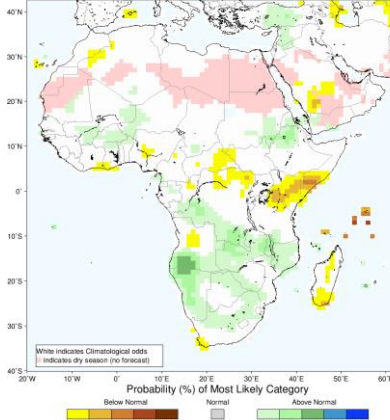
NMME

NMME Precip Prob. Feb1C Apr2024-Jun2024 Feat Sand color: Apr-Jun DryClim Mask

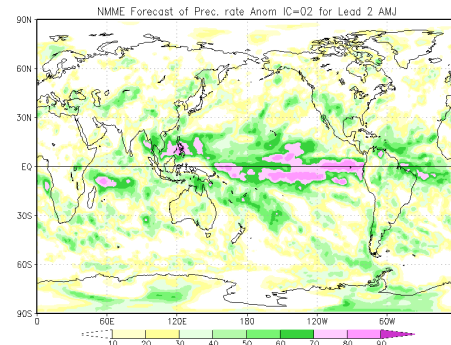
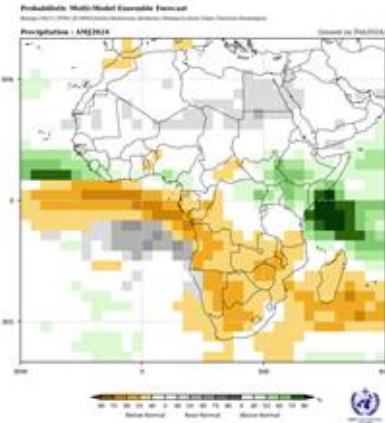


IRI

IRI Multi-Model Probability Forecast for Precipitation for April-May-June 2023. Issued February 2023



WMO-LC



FCST

SKILL



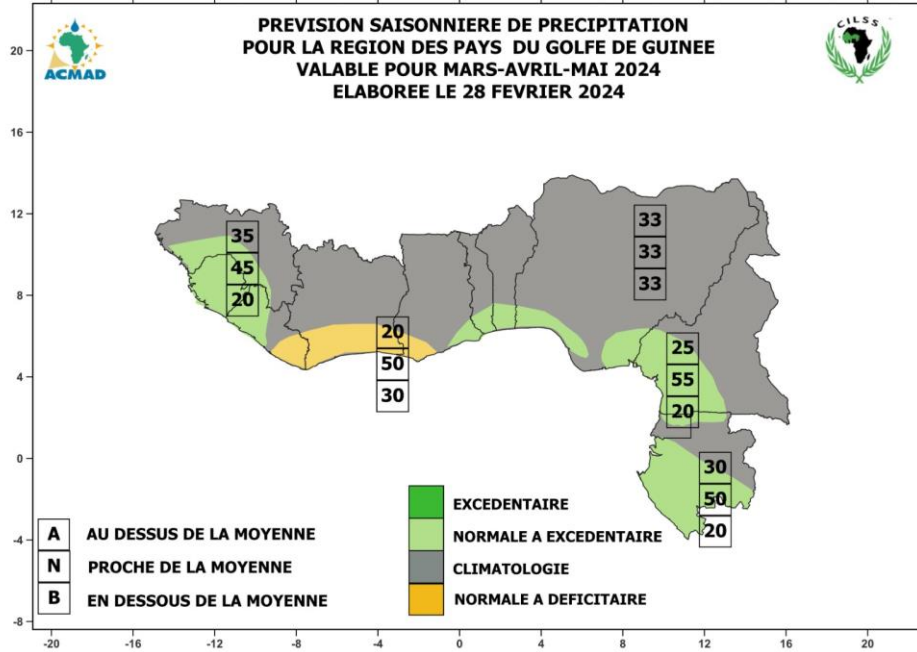


Step 9: Consolidation Analysis of institutional outlook

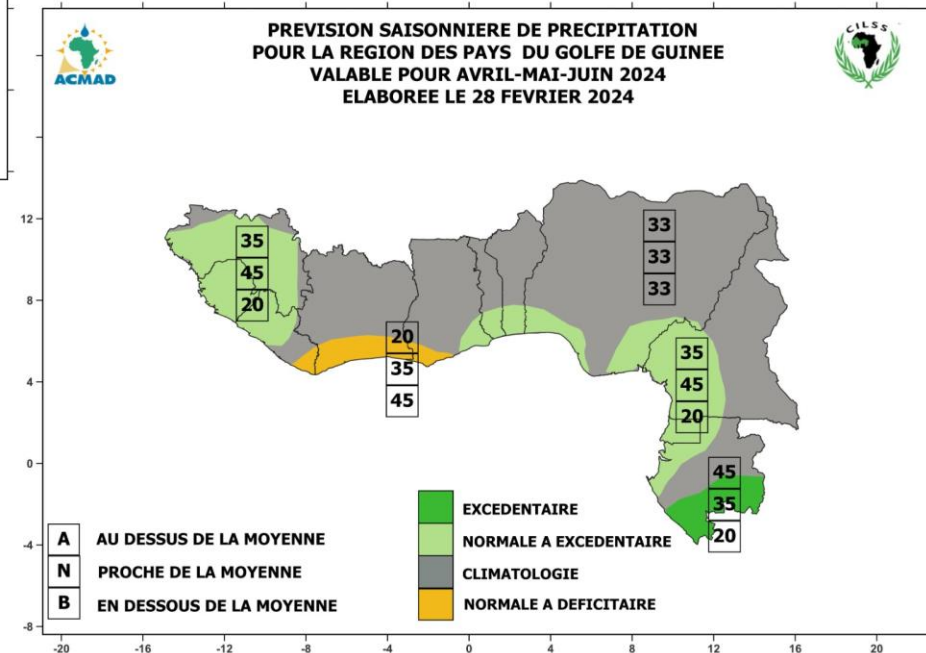
SEASONAL PRECIPITATION OUTLOOK FOR MAM & AMJ 2024



PREVISION SAISONNIERE DE PRECIPITATION
POUR LA REGION DES PAYS DU GOLFE DE GUINEE
VALABLE POUR MARS-AVRIL-MAI 2024
ELABOREE LE 28 FEVRIER 2024



PREVISION SAISONNIERE DE PRECIPITATION
POUR LA REGION DES PAYS DU GOLFE DE GUINEE
VALABLE POUR AVRIL-MAI-JUIN 2024
ELABOREE LE 28 FEVRIER 2024





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