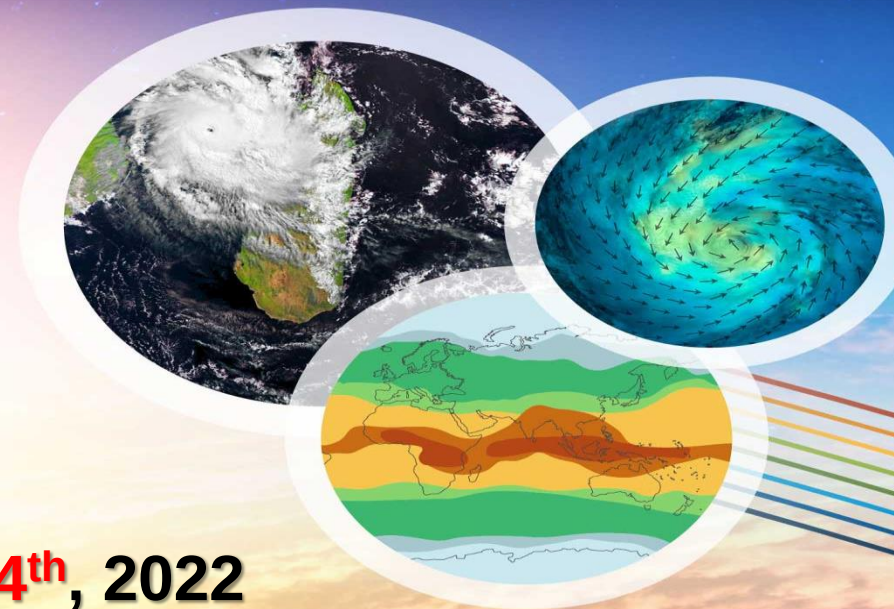
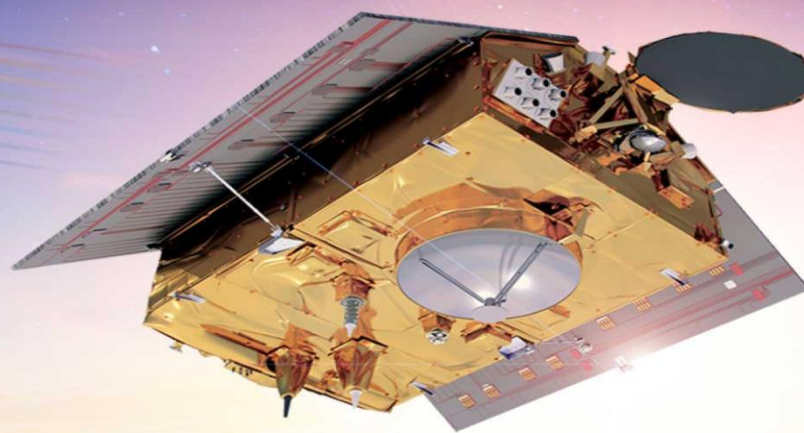


African Centre of Meteorological Applications for Development (ACMAD)

Dekadal Technical Note and Precipitation Outlook for Week 1 and 2



Issued on: **November 4th**, 2022

Contributors

Name	Function	Date
Mr. Hubert N. Kabengela	Thematic Climate Monitoring and Seasonal Forecast expert	04-11-2022
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Dr. Pierre Kamsu	Senior Expert Forecaster	04-11-2022

Versions

Version	Date	By	Descriptions
V0	03-11-2022	CDD Climate Experts	First draft for « Briefing », with all Climate's Expert contributions
Last	04-11-2022	Dr. Pierre Kamsu	Final Review

1. Climate Monitoring

- Forecast Verification
- Observed Mean Sea Level Pressure (MSLP) during last dekad
- Observed 500 hPa Geopotential Height during last dekad
- Observed Precipitation during last dekad
- Observed Temporal Variation of precipitation
- Start of Agricultural Season – Current Status and Outlook
- Observed OLR Anomalies during the passed dekad
- Observed Wind Anomaly at 850 and 700 hPa
- Observed Relative Humidity Anomaly
- Weekly and Monthly SST Anomaly Assessment

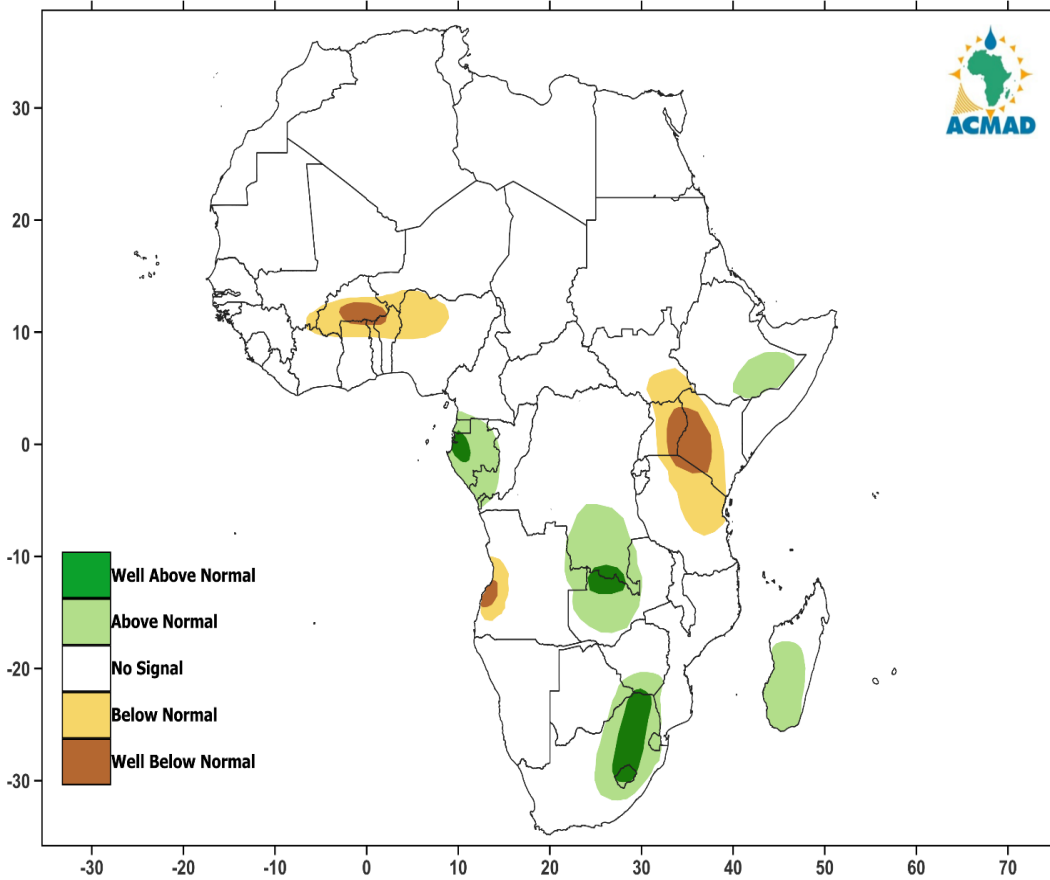
2. Status of Drivers

3. Dynamical Model Forecast : Week 1 and 2

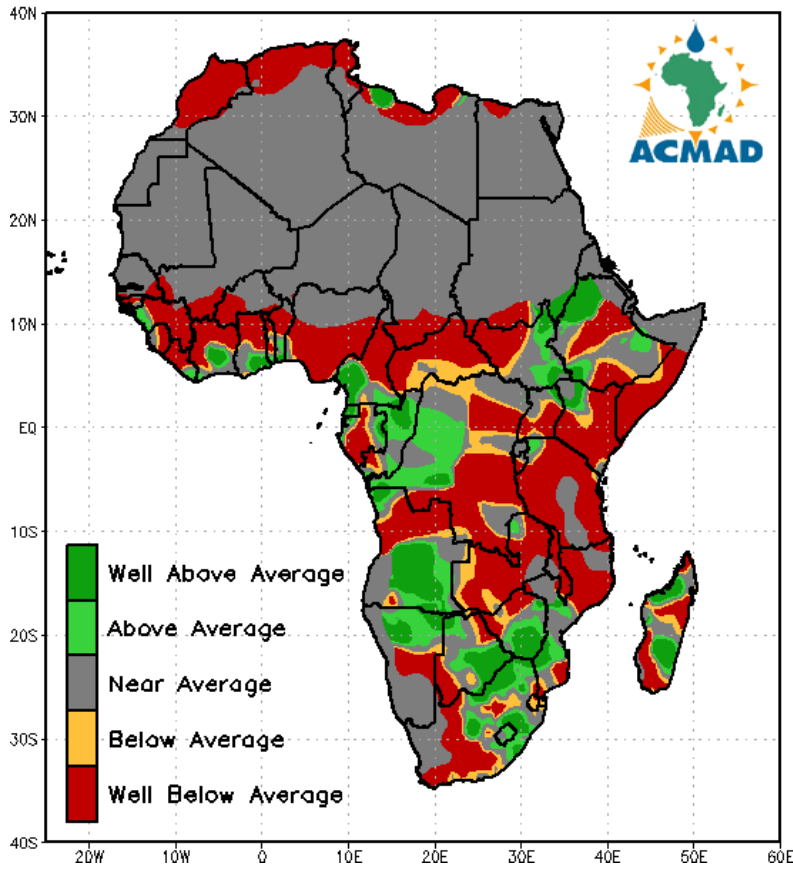
4. Week 1 and 2 Outlook

Forecast Verification

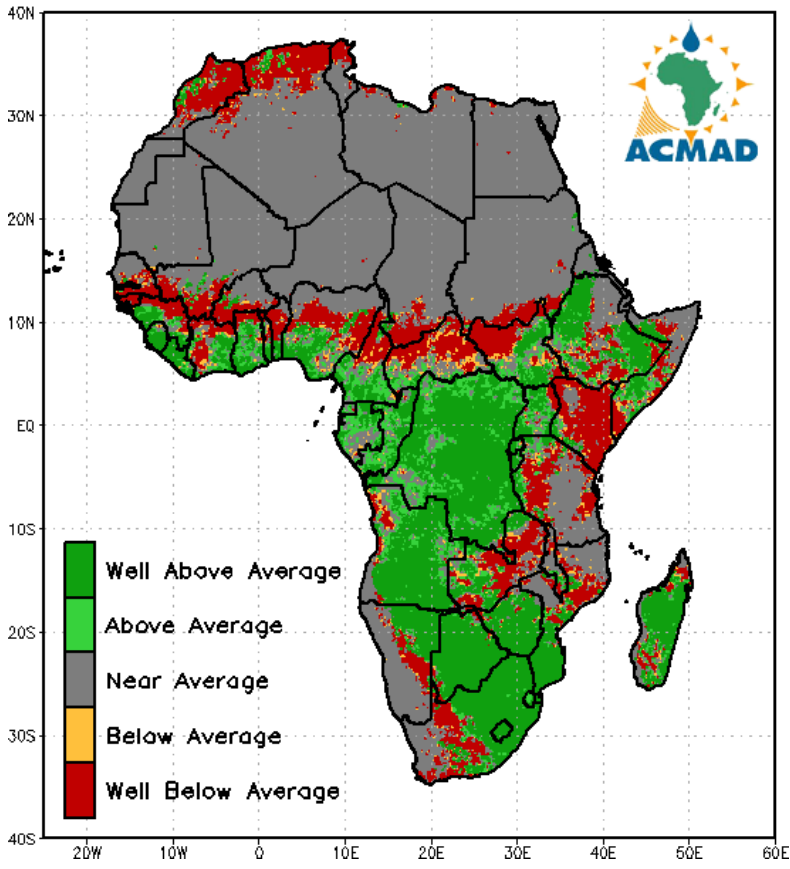
PRCIP FCST WEEK1 22 - 28 OCTOBER 2022



CPC-Uni 7day Precipitation in Percent of Average (%)
Period: 25Oct2022 to 31Oct2022



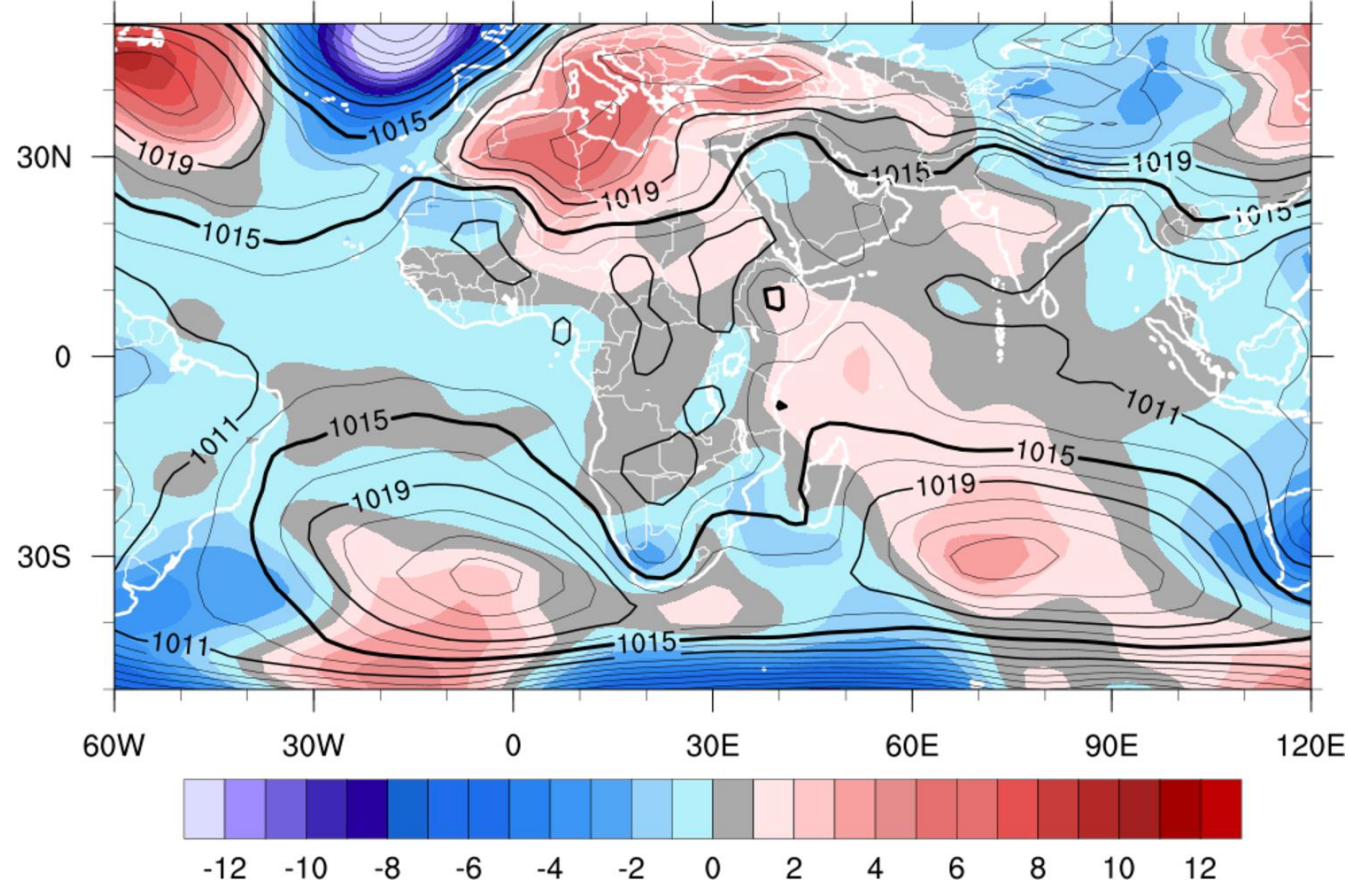
ARC2 7day Precipitation in Percent of Average (%)
Period: 25Oct2022 to 31Oct2022



Mean Sea Level Pressure (MSLP) – Obs & Anom.

Last dekad

MSLP Obs. vs Anom. for the Dekad: 21-31 Oct 2022



Same dekad last year

MSLP Obs. vs Anom. for the Dekad: 21-31 Oct 2021

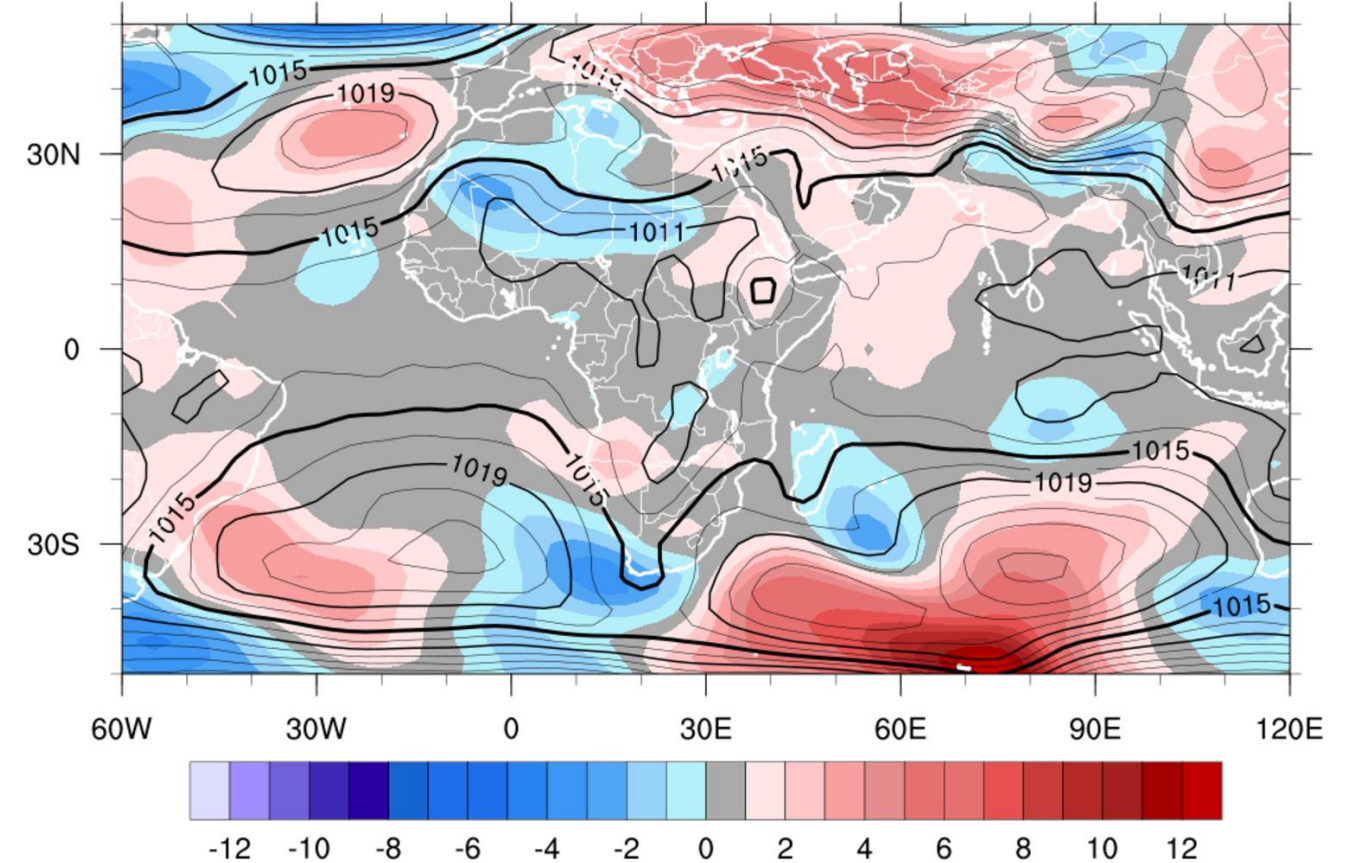


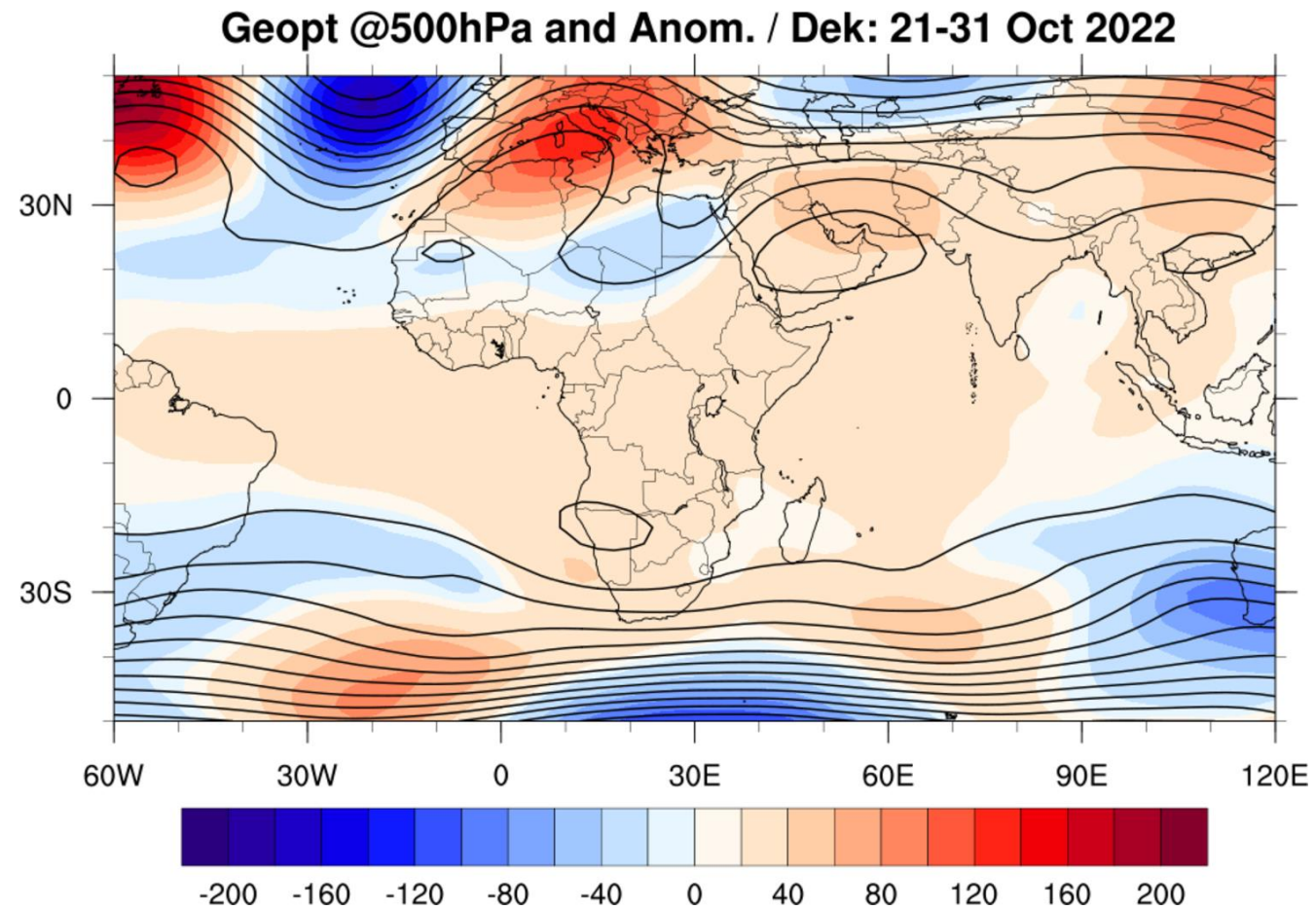
Figure 5: MSLP observation and anomaly

Data source:

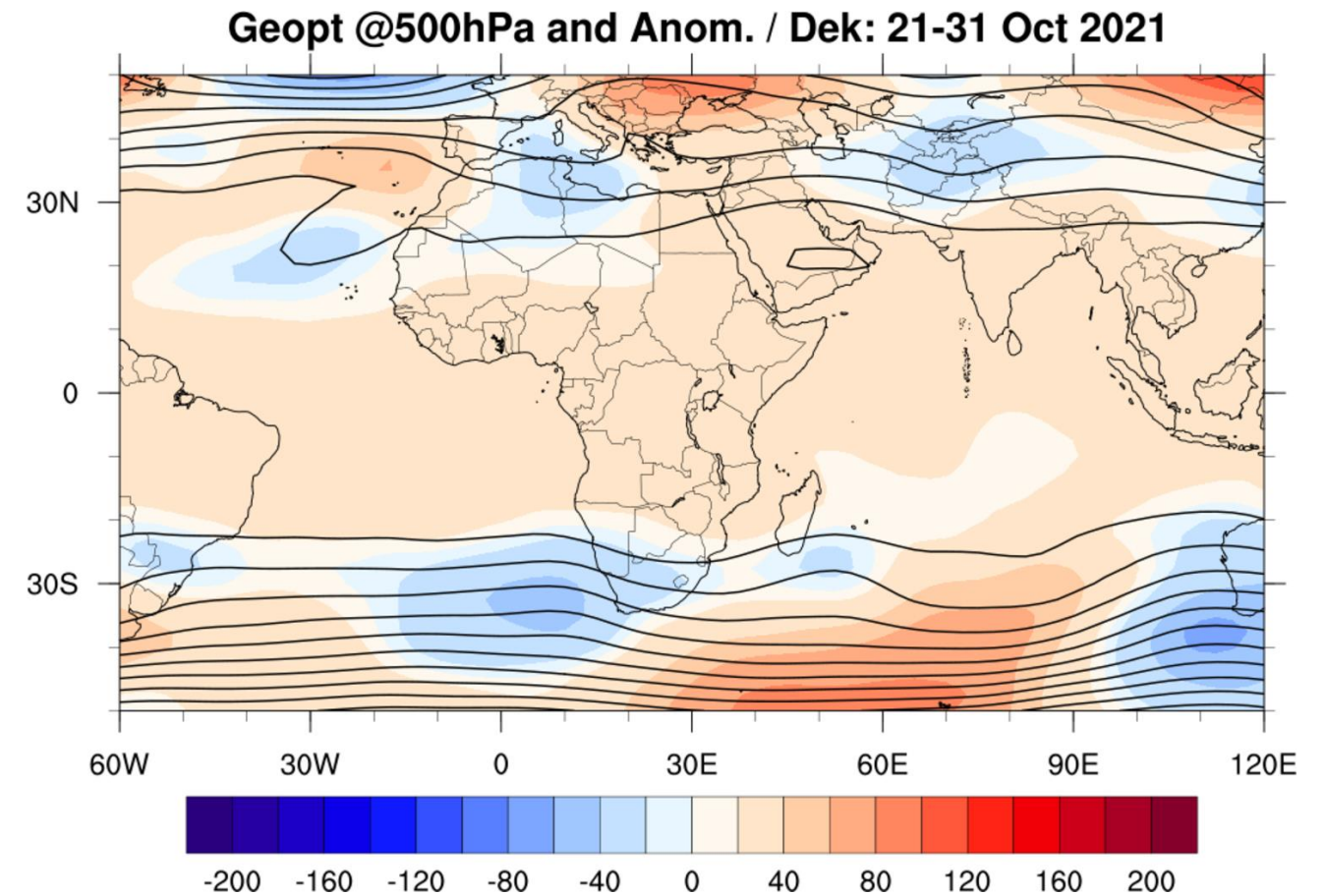
<http://iridl.ldeo.columbia.edu/expert/SOURCES/NOAA/NCEP-NCAR/CDAS-1/DAILY/Intrinsic/MSL/pressure>

500 hPa Geopotential Height (Z500) – Obs vs Anom.

Last dekad



Same dekad last year



Estimated Cumulative Precipitation in % of average for the last Dekad

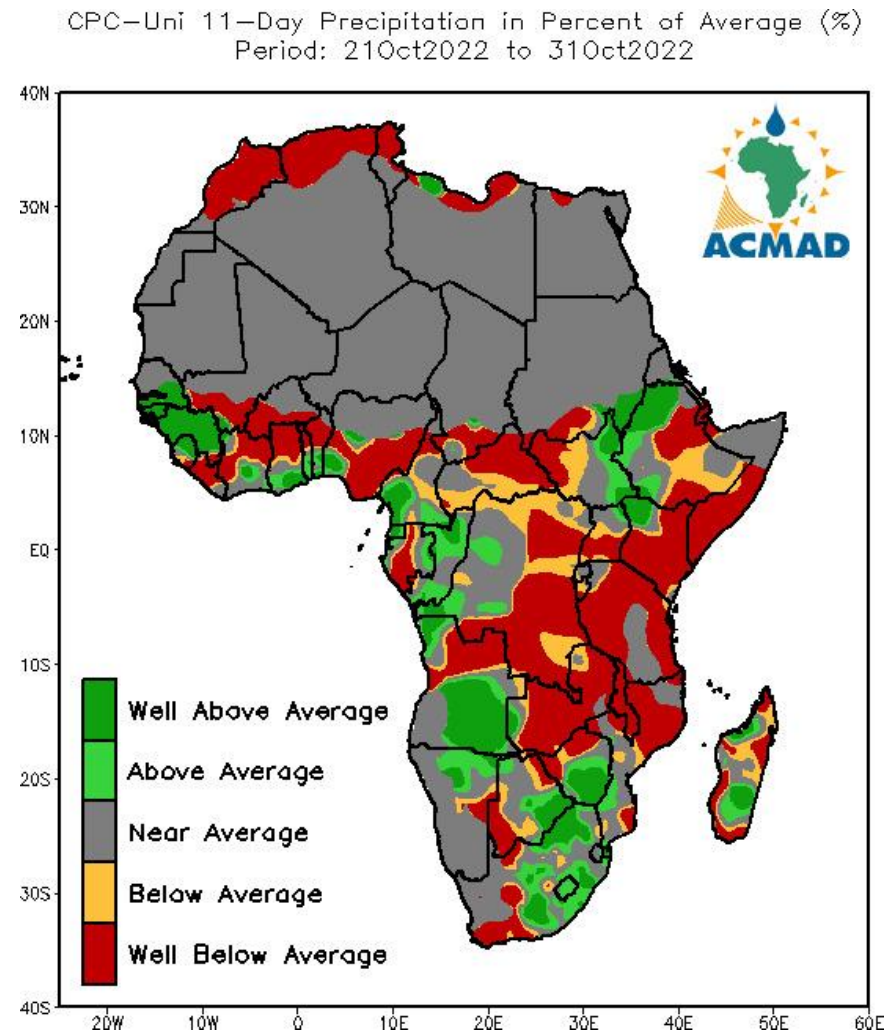


Figure 1: This map displays decadal average precipitation in percent of average

Temporal and Spatial Change of % of Average Precip for the Last Four Dekads

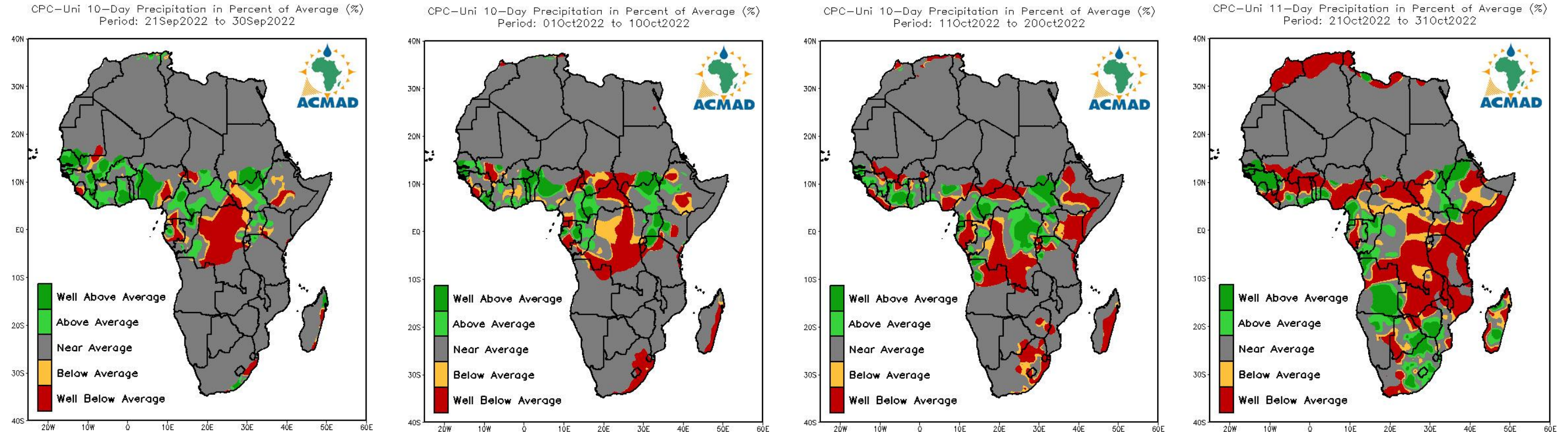


Figure 2: This maps display decadal average precipitation in percent of average

Start of Agricultural Season – Current and Outlook

MONITORING OF OBSERVED ANOMALIES ON THE START OF THE AGRICULTURE SEASON AND OUTLOOK.

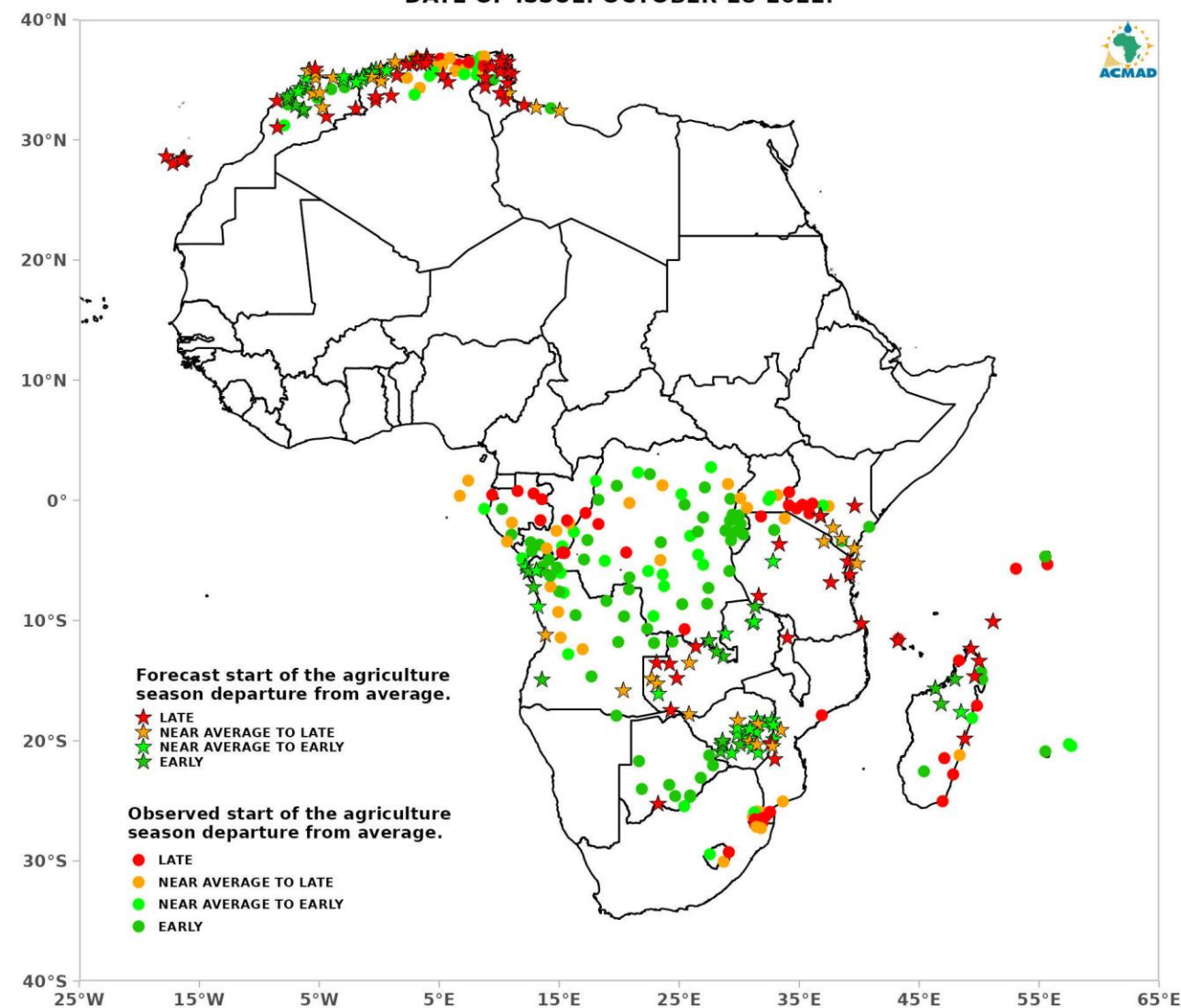
MONITORING PERIOD: JULY-DECEMBER 2022.

OUTLOOK VALIDITY PERIOD: OCTOBER 28 TO NOVEMBER 11 2022 .

DATE OF ISSUE: OCTOBER-28-2022.

Current Year

time



OLR Anomalies During the passed 3 Dekads

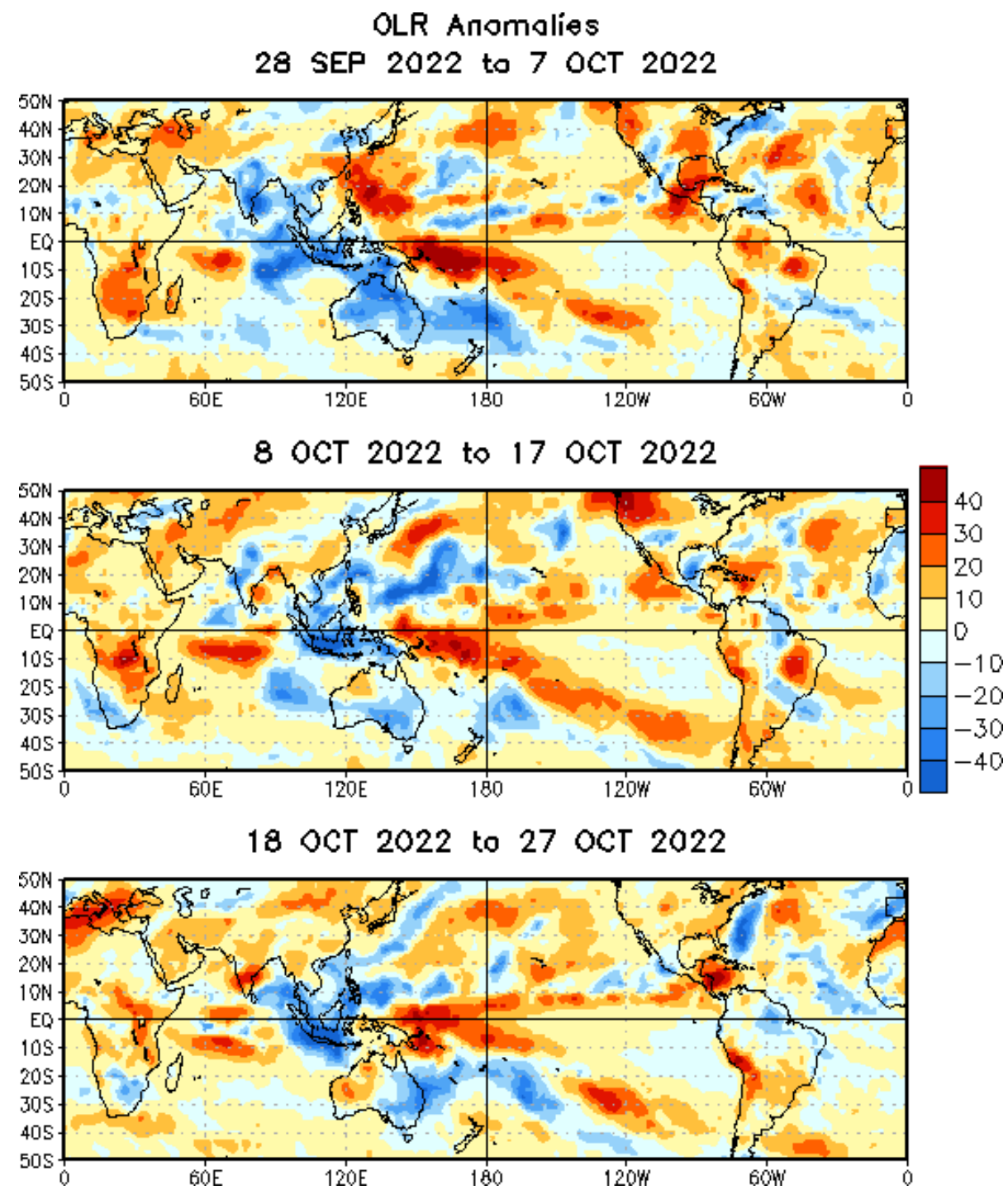
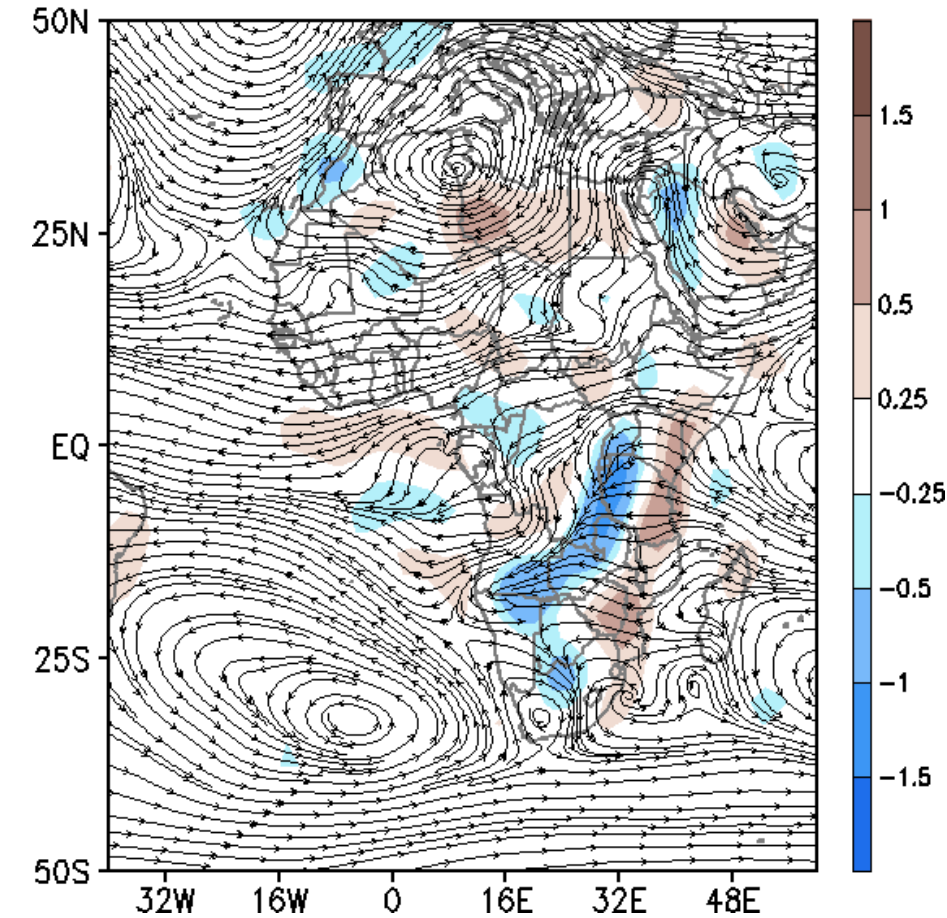


Figure 4: Past 3 weeks OLR anomalies

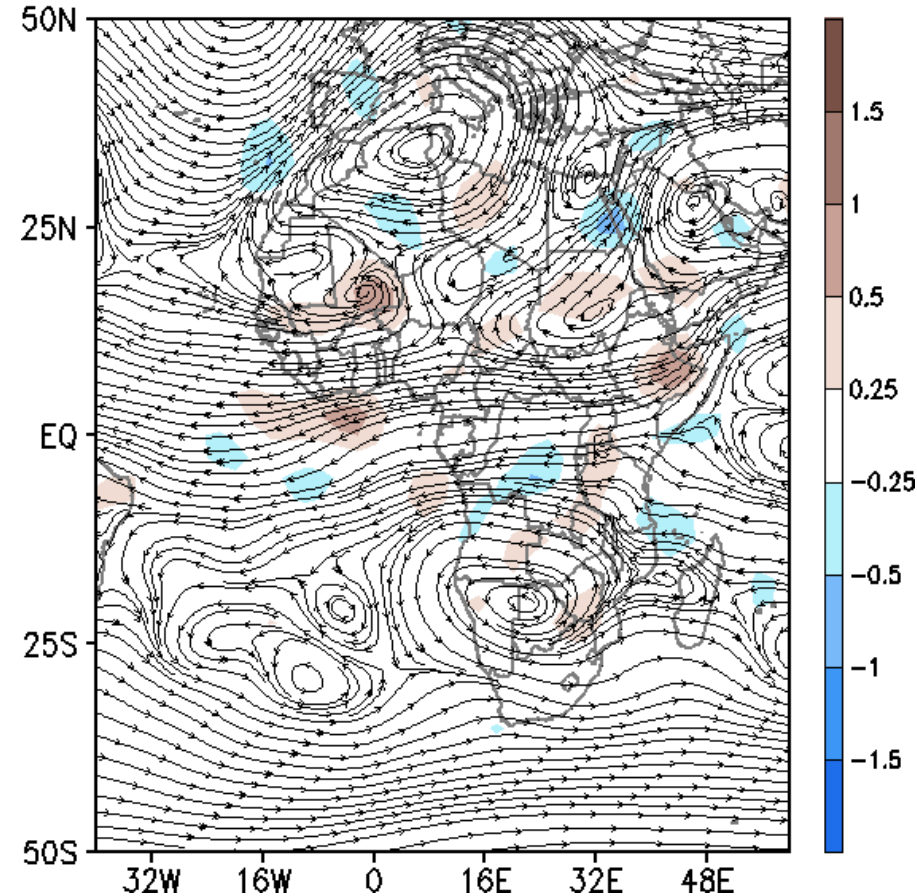
https://www.cpc.ncep.noaa.gov/products/precip/CWlink/MJO/olra_last30days-3plots.gif

Wind Anomalies for the last 7 day period 850hpa, 700hpa and 200hpa

CDAS 850hPa Divergence and Wind Tot.
Dekad: 21–31 Oct 2022



CDAS 700hPa Divergence and Wind Tot.
Dekad: 21–31 Oct 2022



CDAS 200hPa Divergence and Wind Tot.
Dekad: 21–31 Oct 2022

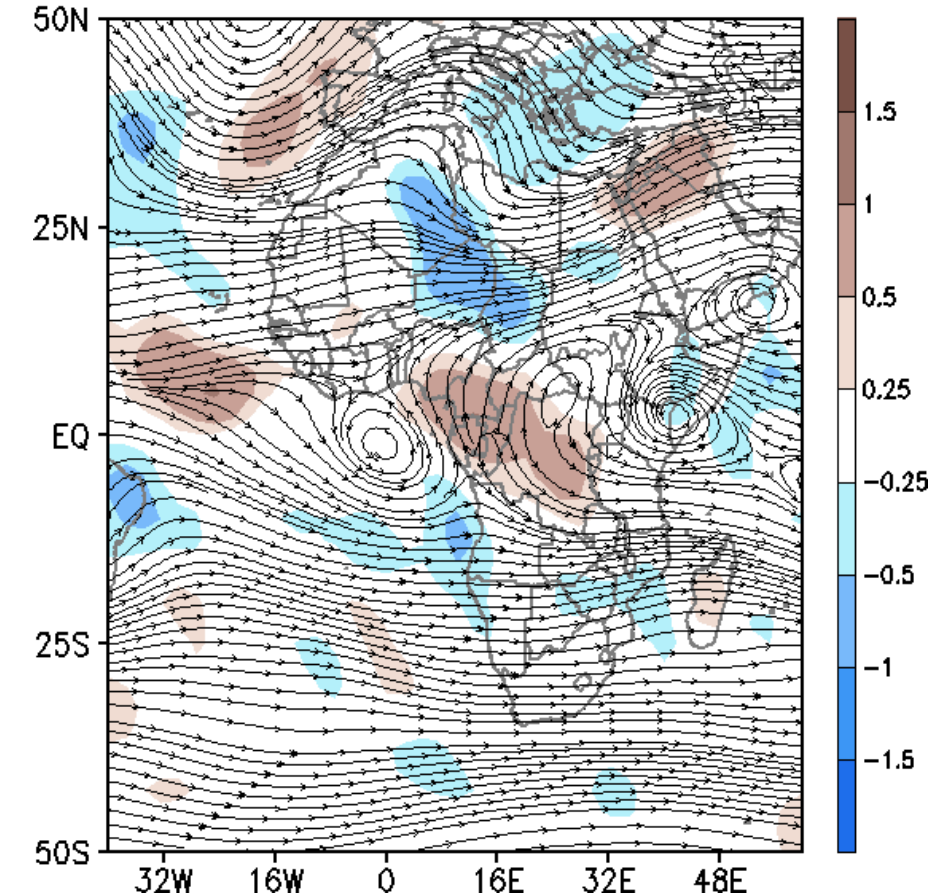


Figure 7: Wind anomalies for 850hpa, 700hPa and 200hpa

<https://www.cpc.ncep.noaa.gov/products/international/africa/africa.shtml>

[Climate Prediction Center - African Desk: SWFDP GFS FORECASTS \(noaa.gov\)](https://www.cpc.ncep.noaa.gov/products/international/africa/africa.shtml)

Relative Humidity (RH) Anomalies at 850hPa and 700hPa for the last Dekad

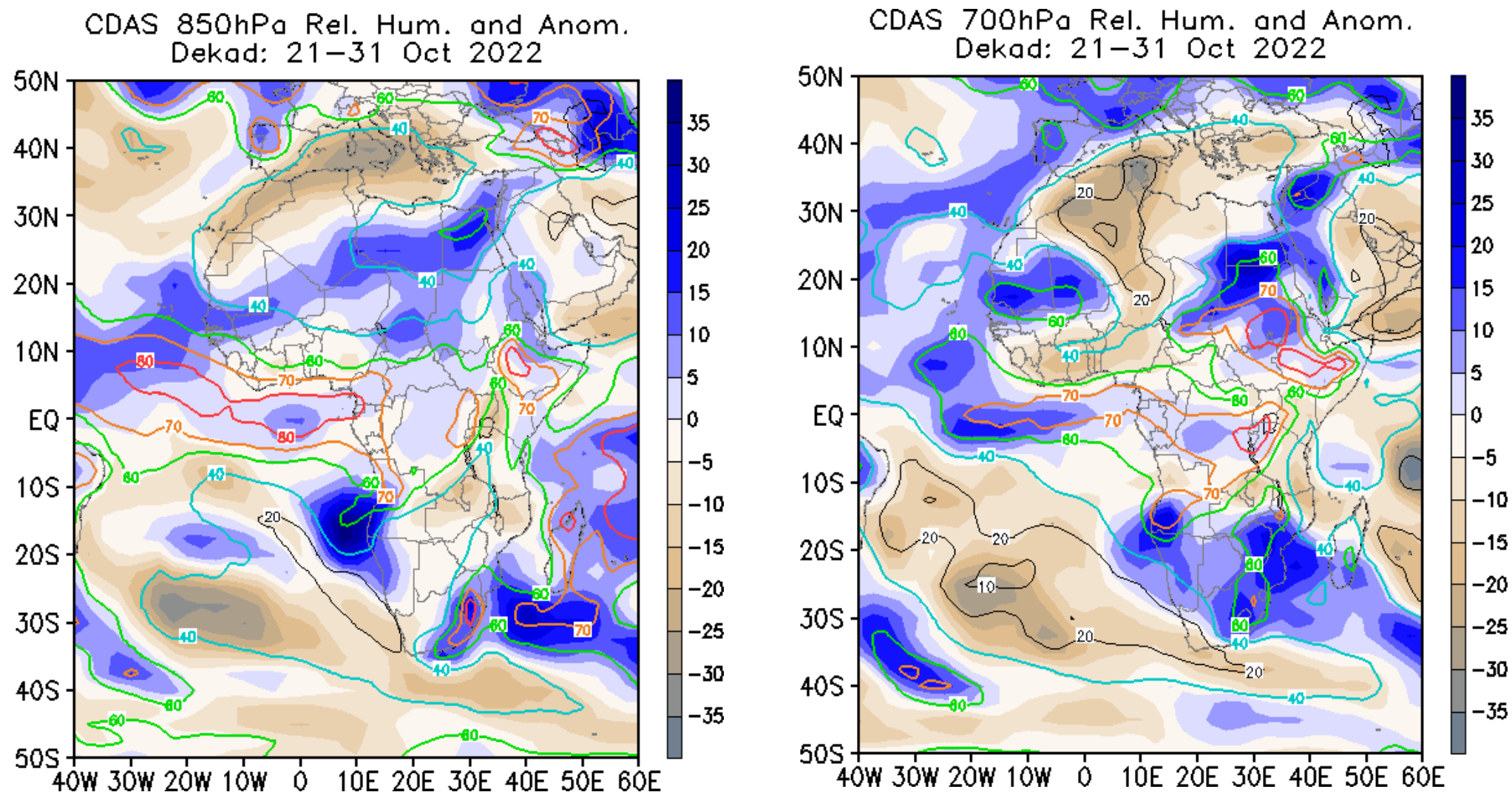
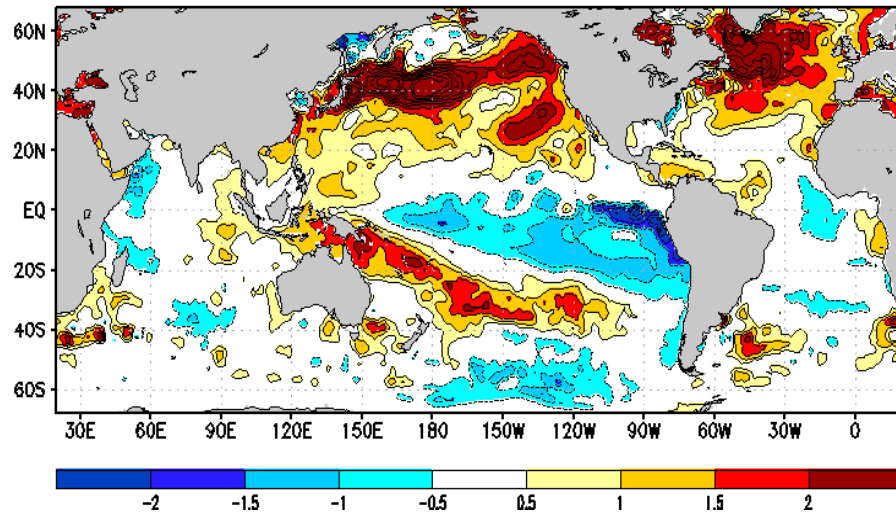


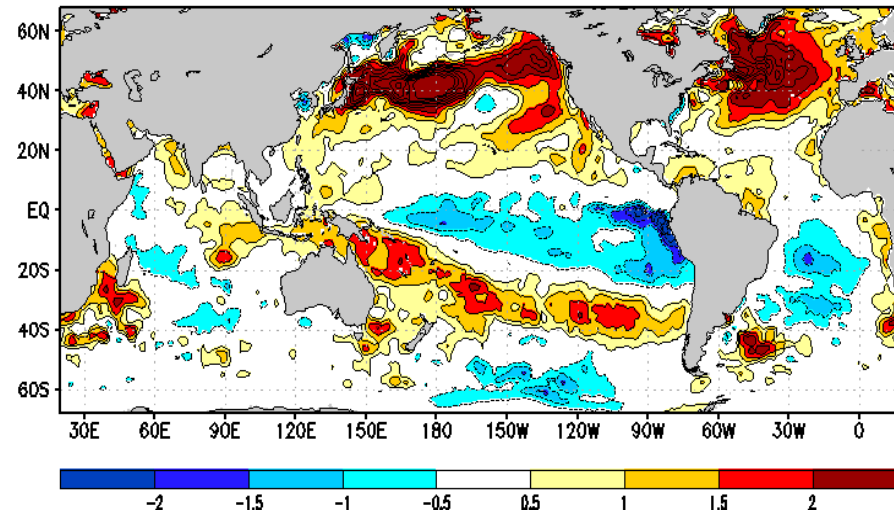
Figure 8: Relative Humidity Anomaly at 850hPa (left) and 700hPa (right)

Weekly Sea Surface Temperature Anomaly during the last four weeks

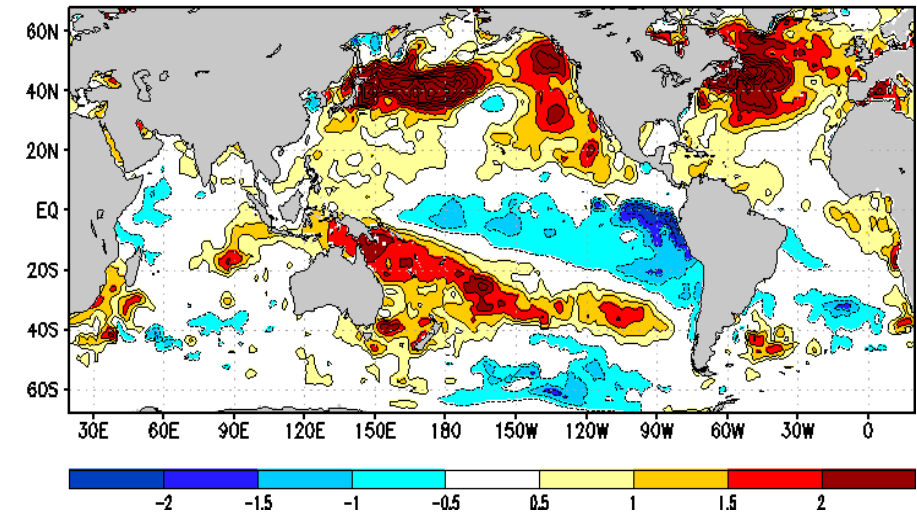
SST Anom. for the Week From 02Oct2022 to 08Oct2022



SST Anom. for the Week From 09Oct2022 to 15Oct2022



SST Anom. for the Week From 16Oct2022 to 22Oct2022



SST Anom. for the Week From 23Oct2022 to 29Oct2022

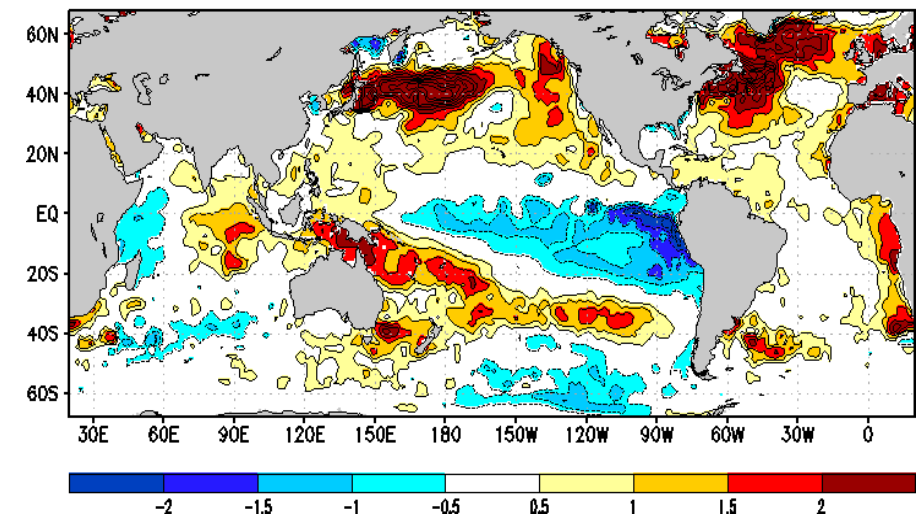


Figure 9: Maps display weekly sea surface temperature anomalies over the globe for last four weeks

<https://psl.noaa.gov/map/clim/sst.shtml>

http://iridl.ldeo.columbia.edu/maproom/Global/Ocean_Temp/Weekly_Anomaly.html

http://sgbd.acmad.org:8080/thredds/fileServer/ACMAD/CDD/ClimateBulletin_TN/OBS_SST_ANOM/weekly/sst_anom_Week1.png

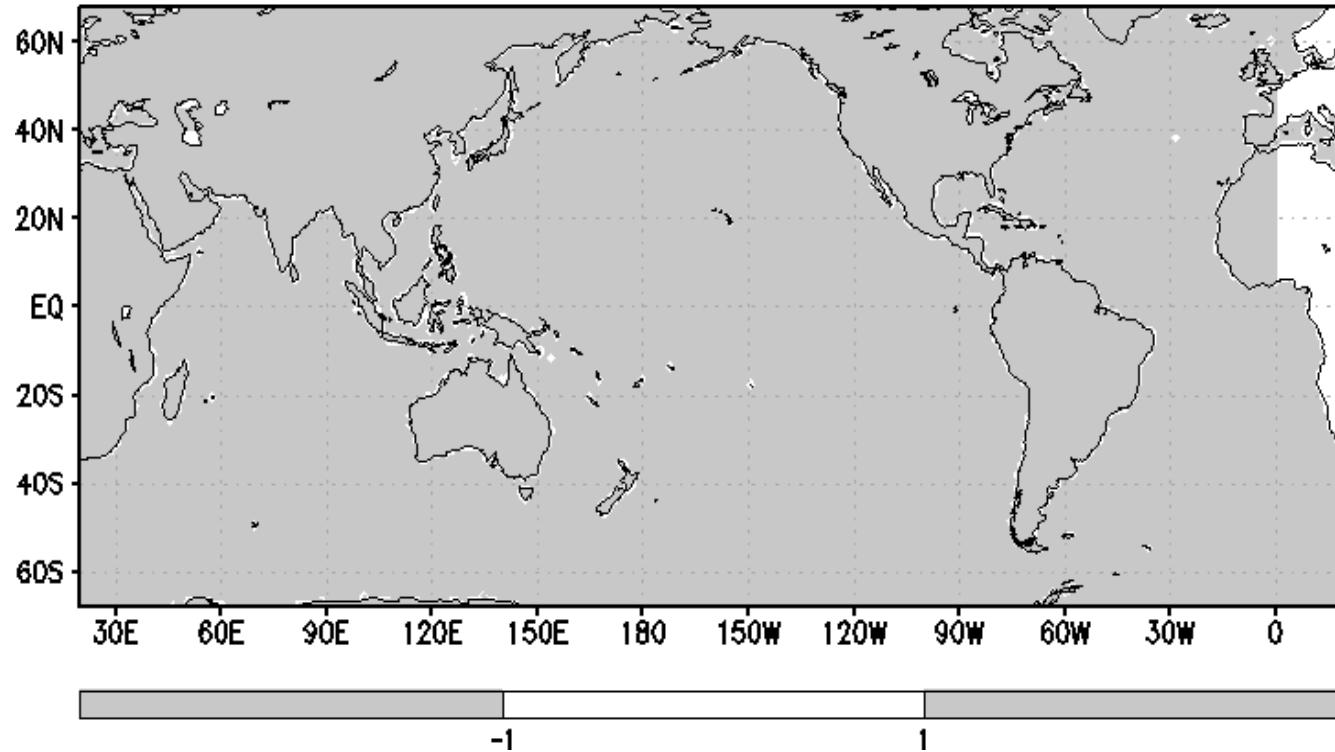
http://sgbd.acmad.org:8080/thredds/fileServer/ACMAD/CDD/ClimateBulletin_TN/OBS_SST_ANOM/weekly/sst_anom_Week2.png

http://sgbd.acmad.org:8080/thredds/fileServer/ACMAD/CDD/ClimateBulletin_TN/OBS_SST_ANOM/weekly/sst_anom_Week3.png

http://sgbd.acmad.org:8080/thredds/fileServer/ACMAD/CDD/ClimateBulletin_TN/OBS_SST_ANOM/weekly/sst_anom_Week4.png

Last Month's Sea Surface Temperatures (SST) Observed

SST Anom. for Oct2022



SST Anom. for the Week From 02Oct2022 to 29Oct2022

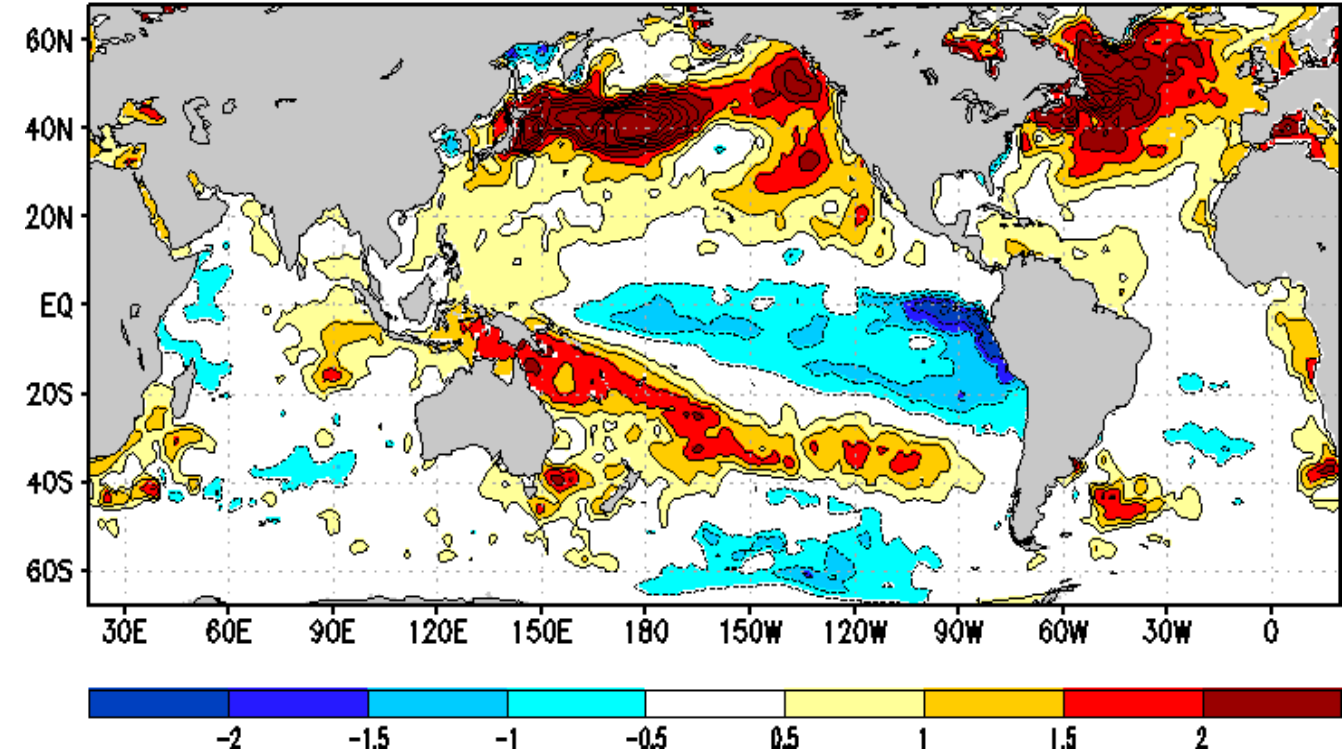


Figure 10 : Maps display monthly sea surface temperature anomalies over the globe.

<https://psl.noaa.gov/map/clim/sst.shtml>

http://iridl.ldeo.columbia.edu/maproom/Global/Ocean_Temp/Anomaly.html

http://sgbd.acmad.org:8080/thredds/fileServer/ACMAD/CDD/ClimateBulletin_TN/OBS_SST_ANOM/weekly/sst_anom_4Weeks.png

http://sgbd.acmad.org:8080/thredds/fileServer/ACMAD/CDD/ClimateBulletin_TN/OBS_SST_ANOM/monthly/mth_ano_vs_9120/sst_anom_last-Month.png

1. Climate Monitoring

2. Status of Drivers

- ENSO - Obs and Forecast
- Current 200 hPa Velocity Potential
- MJO – Current Status and Forecast
- Weekly PWAT – Current Status and Forecast
- Dekadal 200 hPa VP and Tropical waves
- Dekadal Stream Function and Tropical Waves

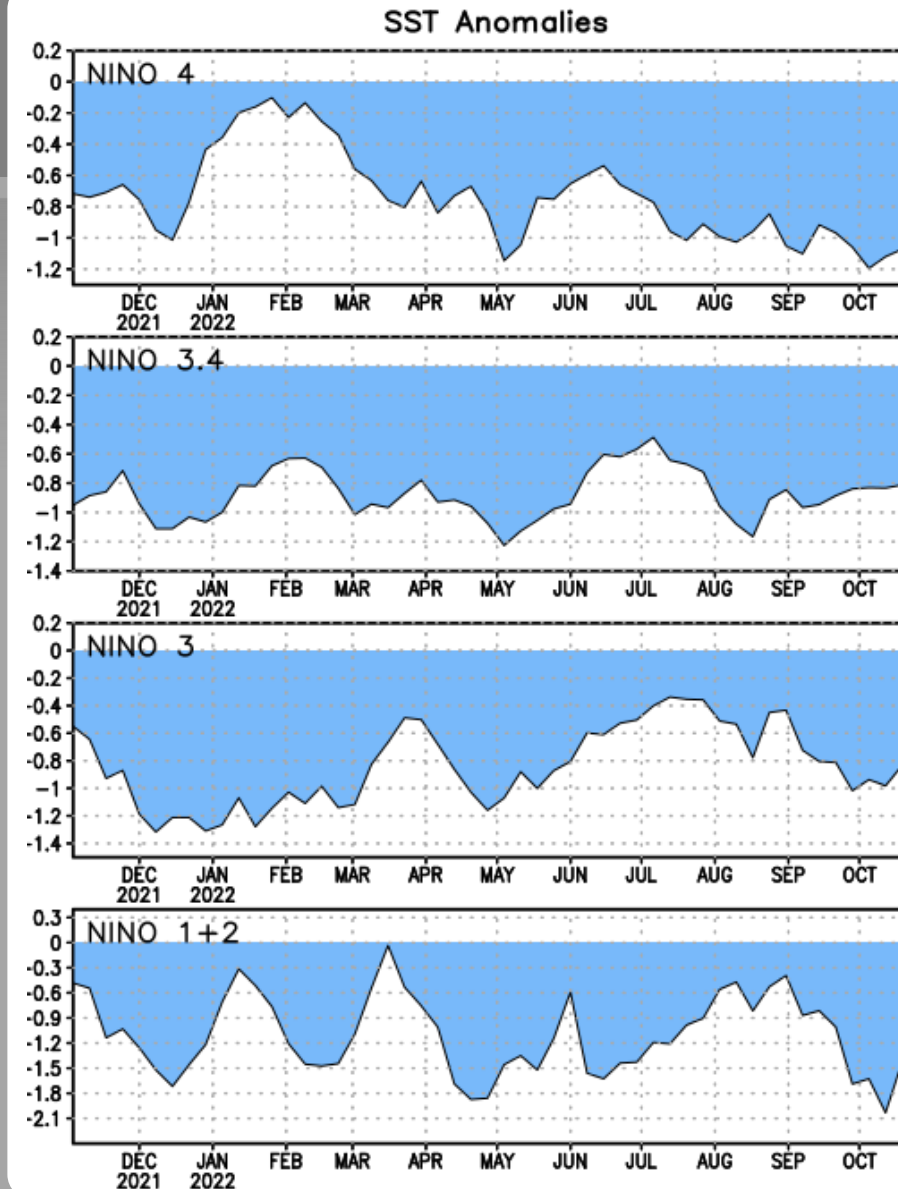
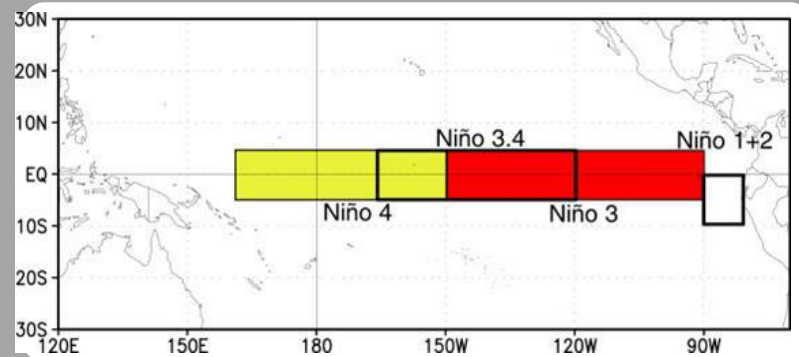
3. Dynamical Model Forecast : Week 1 and 2

4. Week 1 and 2 Outlook

Niño Region SST Departures (°C) Recent Evolution

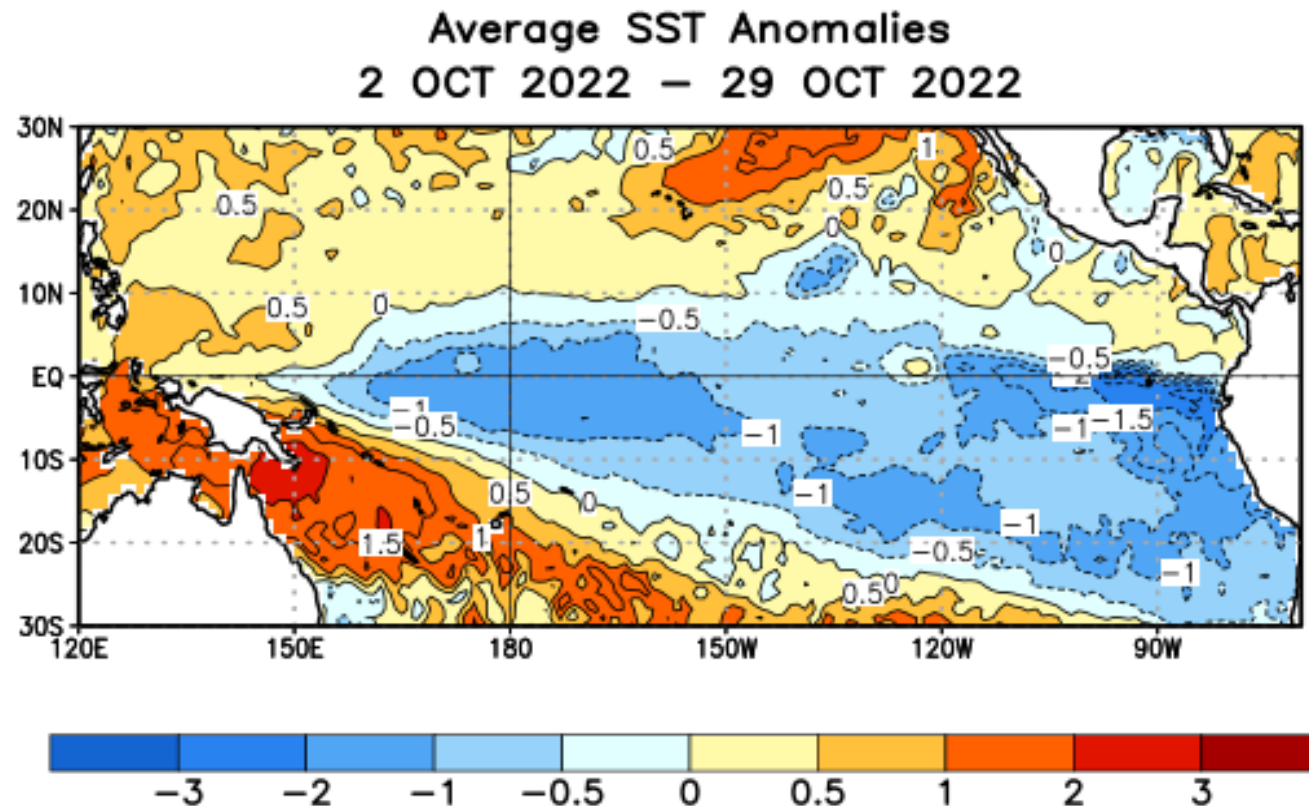
The latest weekly SST departures are:

Niño 4	-1.1°C
Niño 3.4	-1.0°C
Niño 3	-1.0°C
Niño 1+2	-1.8°C



SST Departures (°C) in the Tropical Pacific During the Last Four Weeks

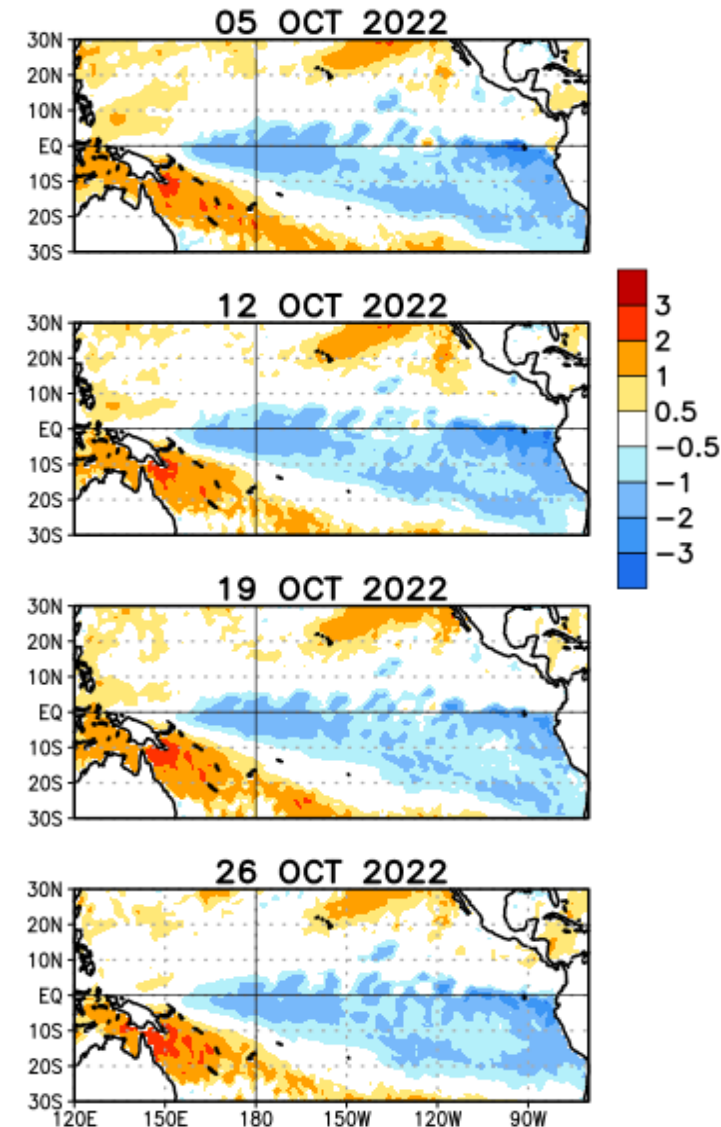
In the last four weeks, equatorial SSTs were below average across most of the Pacific Ocean.



Weekly SST Departures during the Last Four Weeks

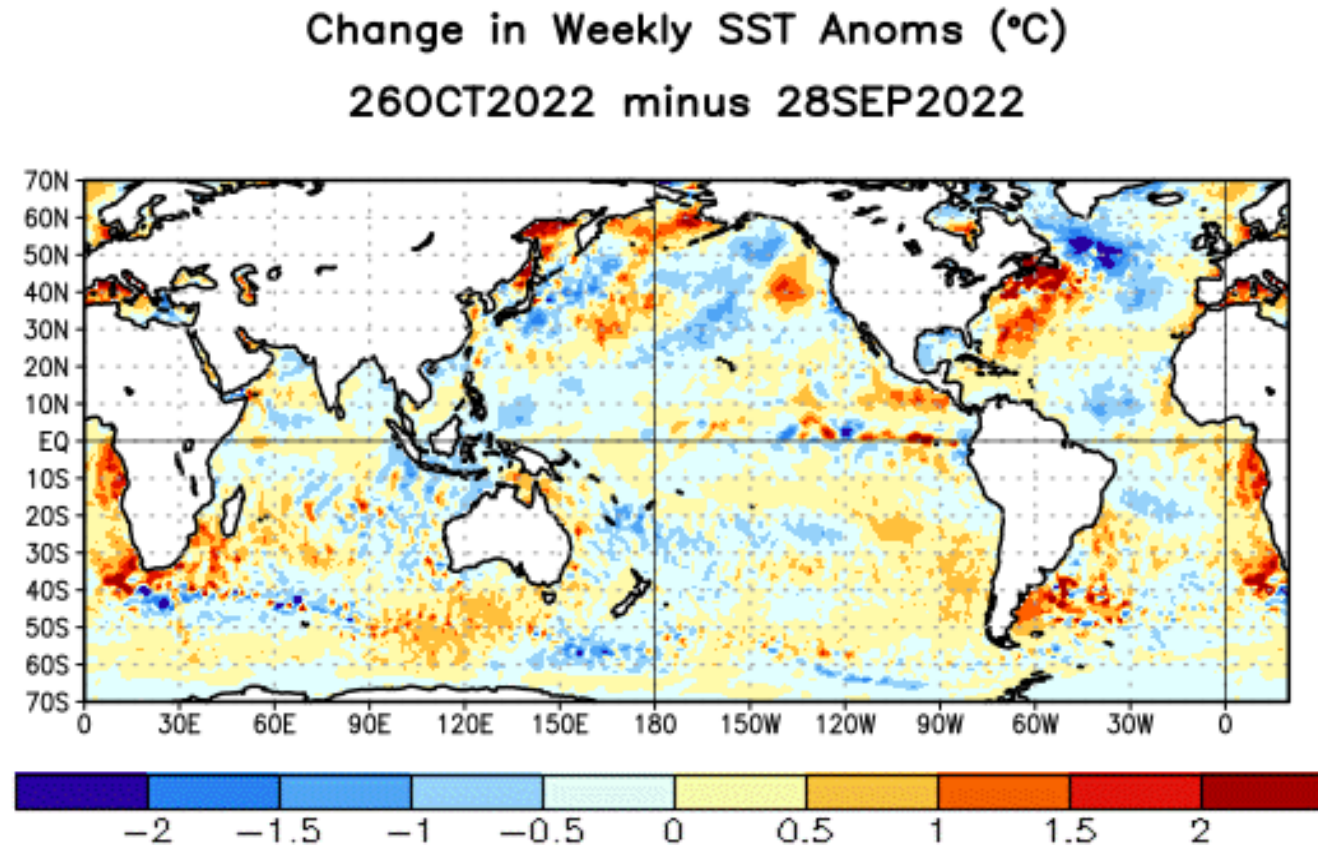
During the last 4 weeks, negative SST anomalies persisted in the central and eastern equatorial Pacific Ocean.

Weekly SST Anomalies (DEG C)



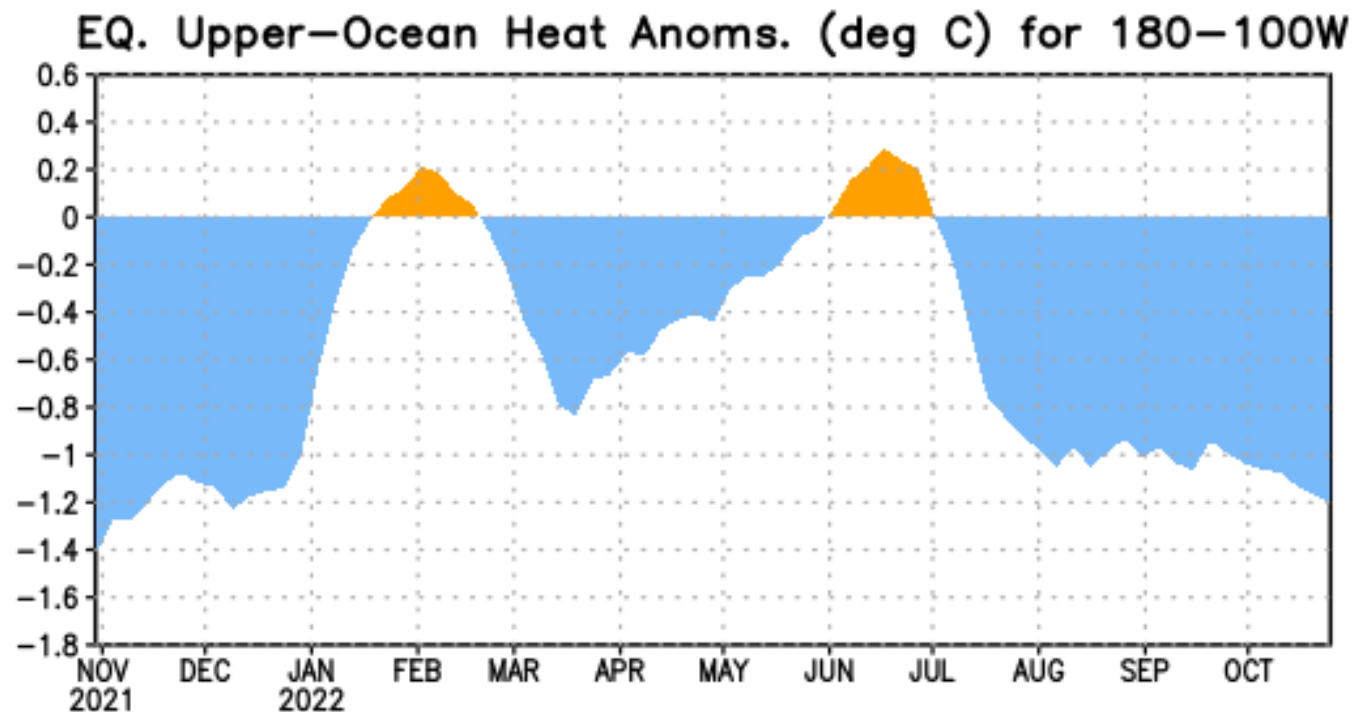
Change in Weekly SST Departures over the Last Four Weeks

During the last four weeks, both positive and negative changes in equatorial SST anomalies were observed in the central and eastern Pacific Ocean.



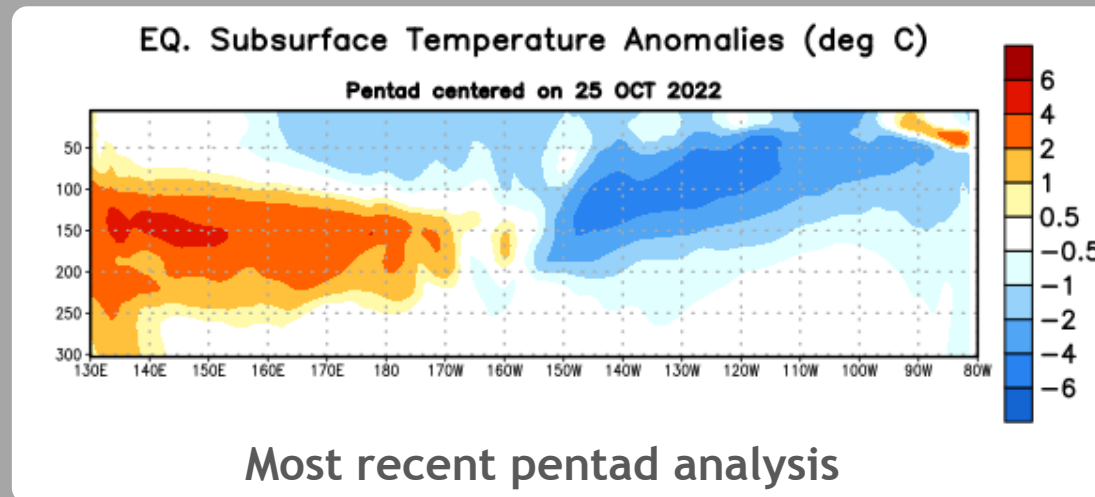
Central and Eastern Pacific Upper-Ocean (0-300 m) Weekly Average Temperature Anomalies

During February 2022 through mid-March, subsurface temperature anomalies decreased and were negative. From mid-March to mid-June, subsurface temperature anomalies increased from negative to positive. Anomalies rapidly decreased from mid-June through July, and since then have generally persisted.

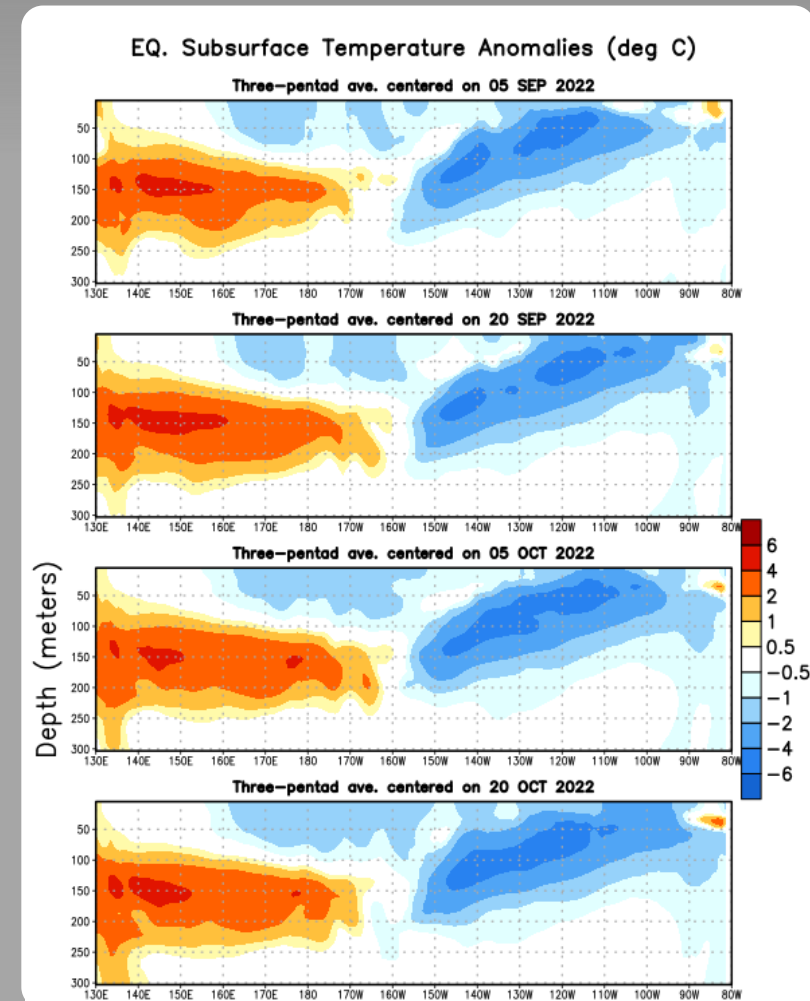


Sub-Surface Temperature Departures in the Equatorial Pacific

During the last two months, negative subsurface temperature anomalies persisted near the surface and at depth in the eastern and east-central Pacific.



Positive subsurface temperature anomalies have mostly persisted, at depth, in the western and central Pacific Ocean.



6-Days Infra-Red (IR) 200hpa and Velocity Potential Anomaly

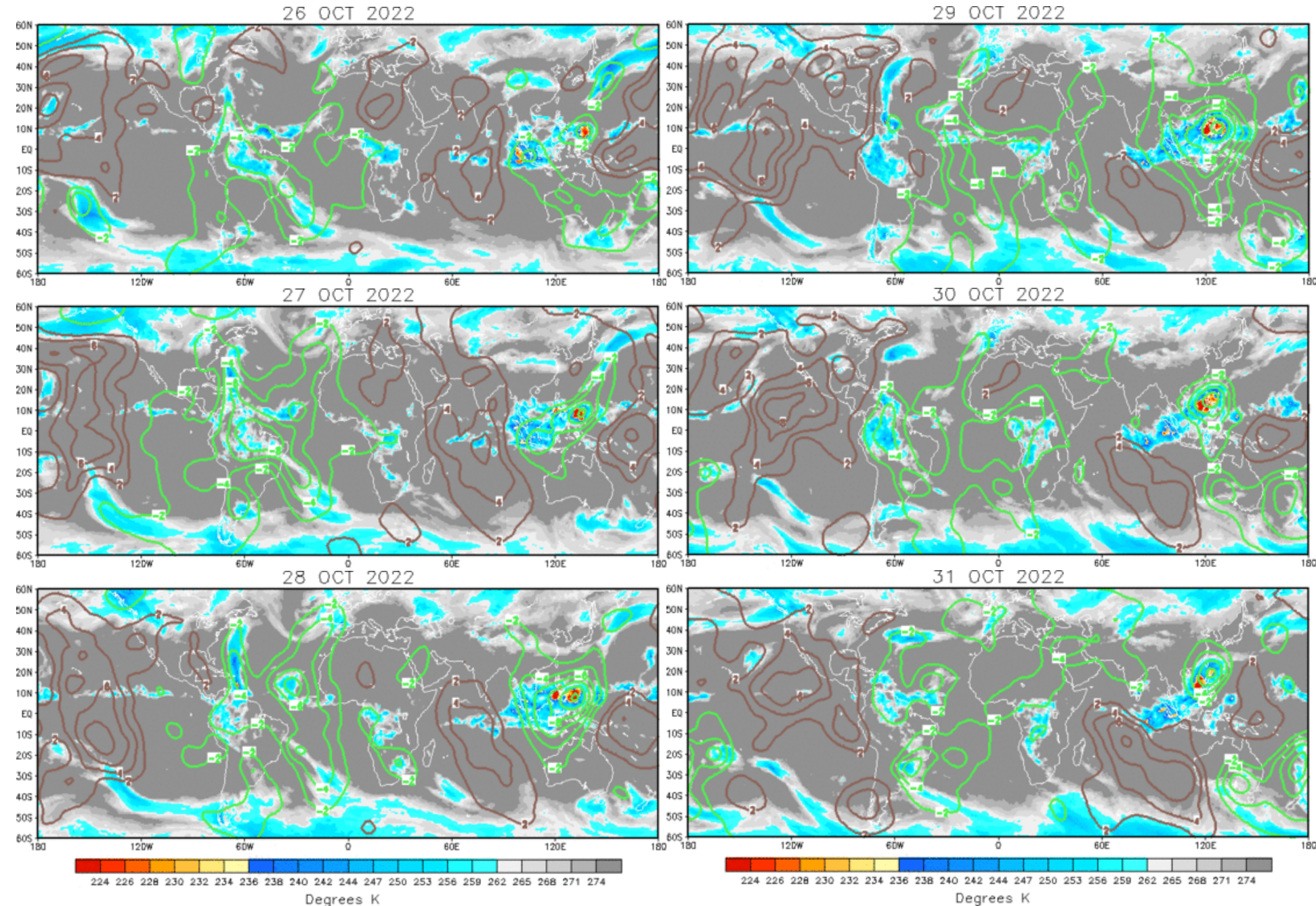


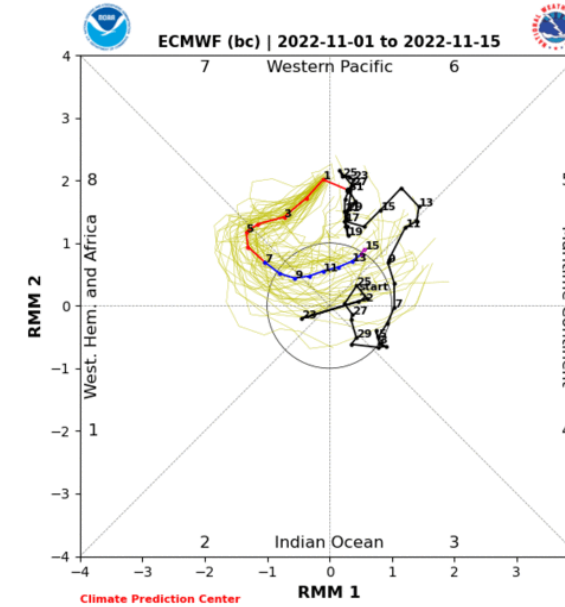
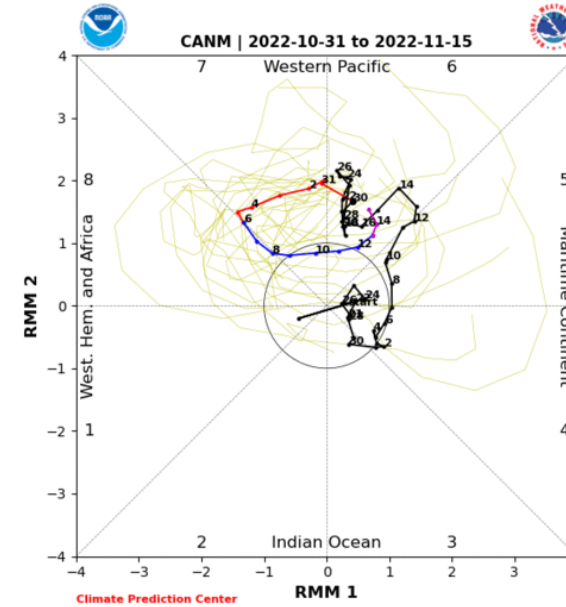
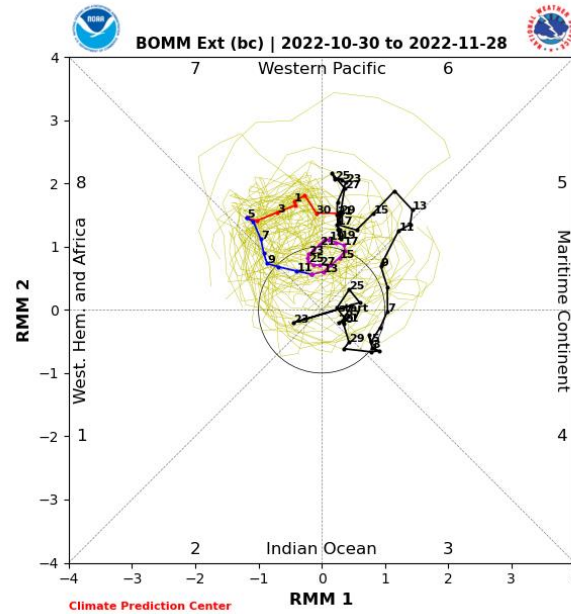
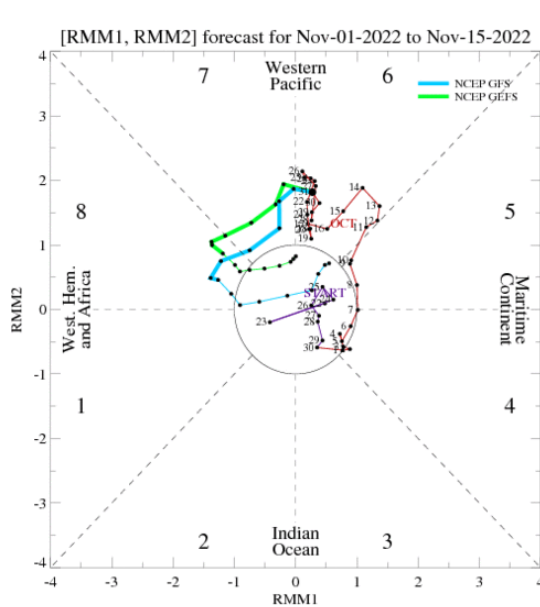
Figure 12: IR image and Velocity Potential anomalies

https://www.cpc.ncep.noaa.gov/products/precip/CWlink/vpotgifs/am_ir_monthly_6.gif
https://www.cpc.ncep.noaa.gov/products/precip/CWlink/vpotgifs/am_ir_monthly_5.gif
https://www.cpc.ncep.noaa.gov/products/precip/CWlink/vpotgifs/am_ir_monthly_4.gif
https://www.cpc.ncep.noaa.gov/products/precip/CWlink/vpotgifs/am_ir_monthly_3.gif
https://www.cpc.ncep.noaa.gov/products/precip/CWlink/vpotgifs/am_ir_monthly_2.gif
https://www.cpc.ncep.noaa.gov/products/precip/CWlink/vpotgifs/am_ir_monthly_1.gif

MJO – Current Status and Forecast

Add BoM, UKMet and DWD

Ensemble GFS Phase Diagram



Operational CFSv2 Phase Diagram.

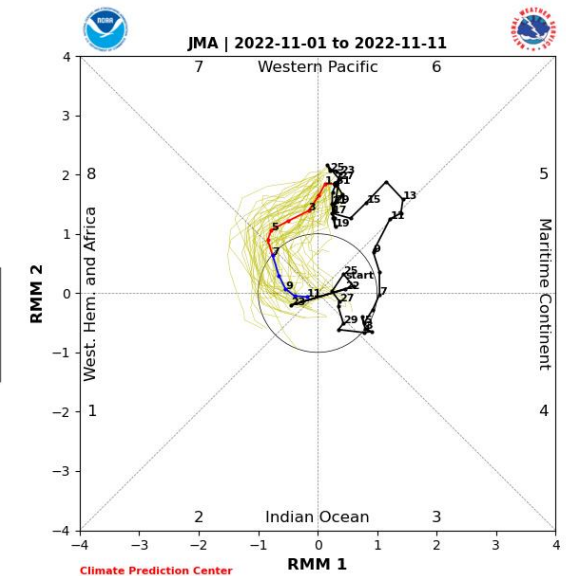
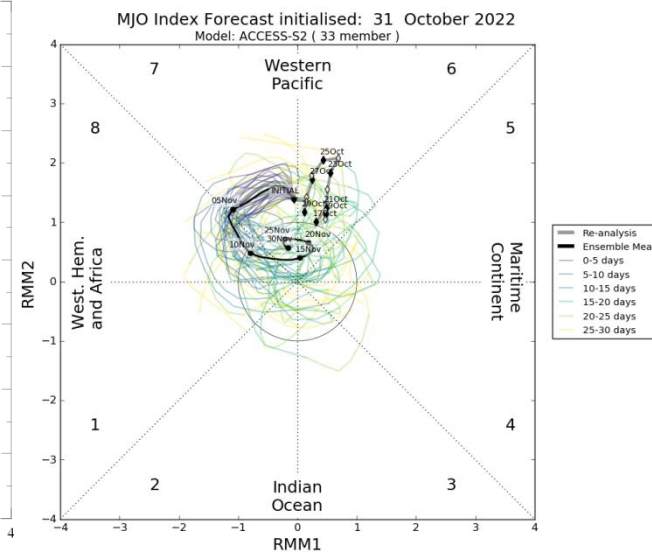
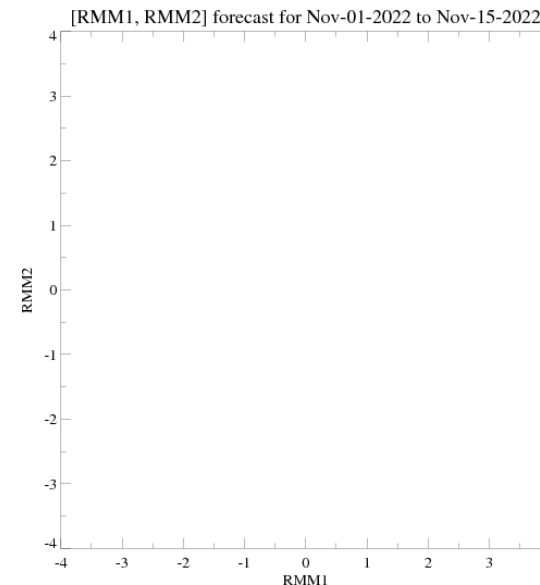


Figure 14: MJO RMM Forecasts from ECMWF, NCEP and UK Met Office, JMA

https://www.cpc.ncep.noaa.gov/products/precip/CWlink/MJO/CLIVAR/clivar_wh.shtml
<https://www.cpc.ncep.noaa.gov/products/precip/CWlink/MJO/mjo.shtml>
https://www.cpc.ncep.noaa.gov/products/precip/CWlink/MJO/CLIVAR/CANM_phase_20m_small.gif
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https://www.cpc.ncep.noaa.gov/products/precip/CWlink/MJO/CLIVAR/ECMWF_phase_MANOM_51m_small.gif
https://www.cpc.ncep.noaa.gov/products/precip/CWlink/MJO/CLIVAR/BOMM_phase_MANOM_33m_small.gif

Dekadal Precipitable Water (PWAT) Anomalies – Obs. and Fcst

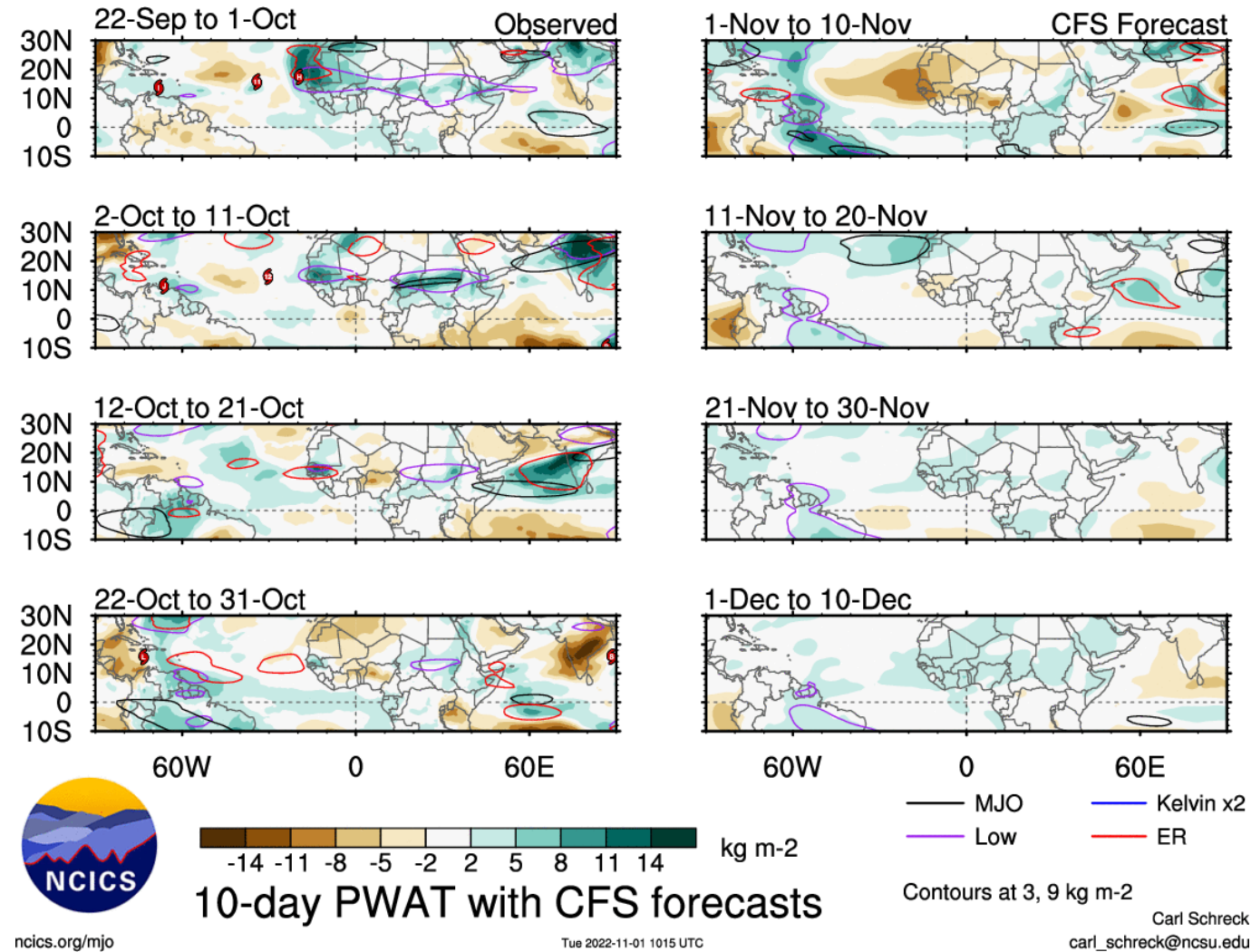


Figure 7a: Africa

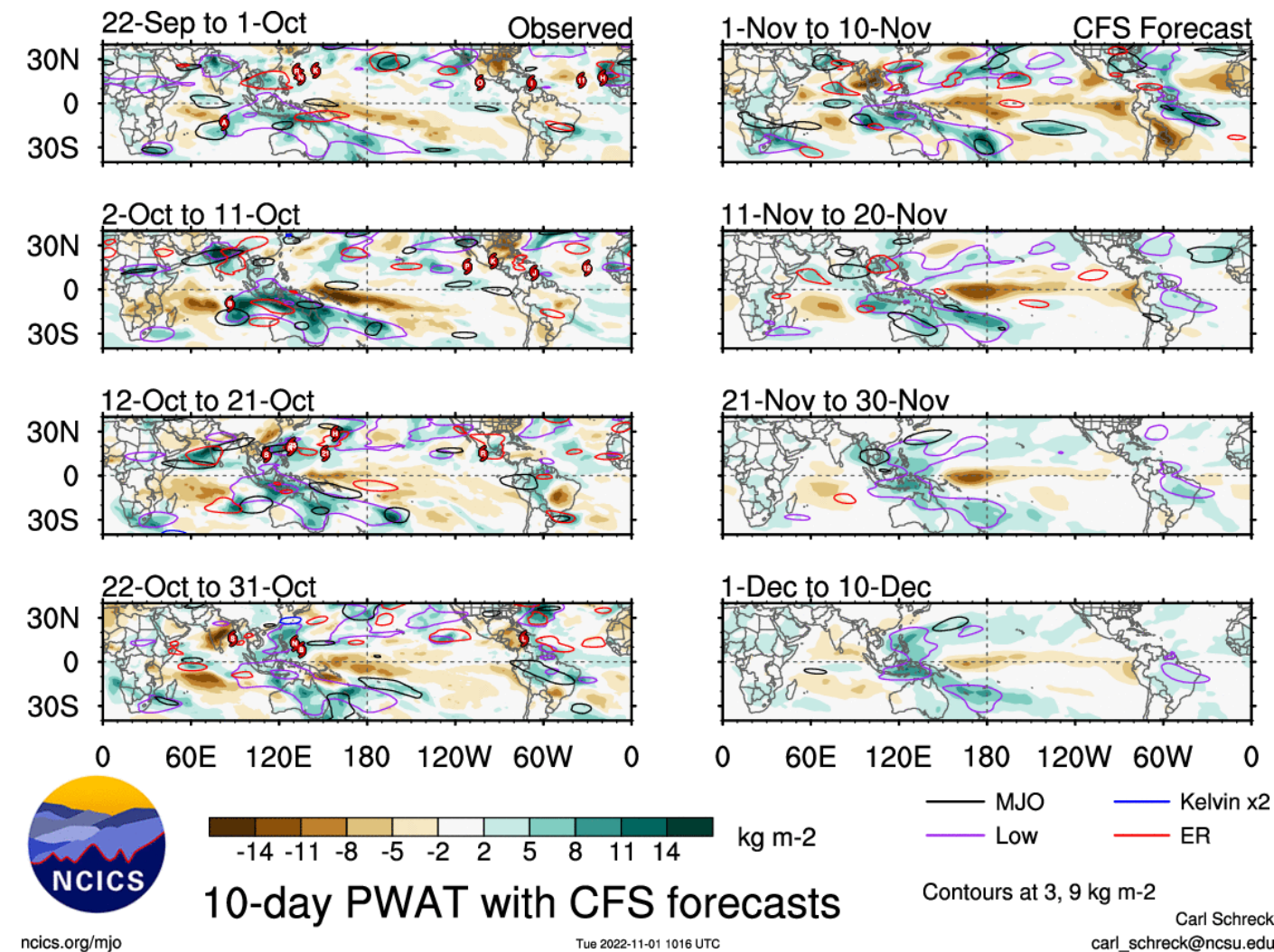


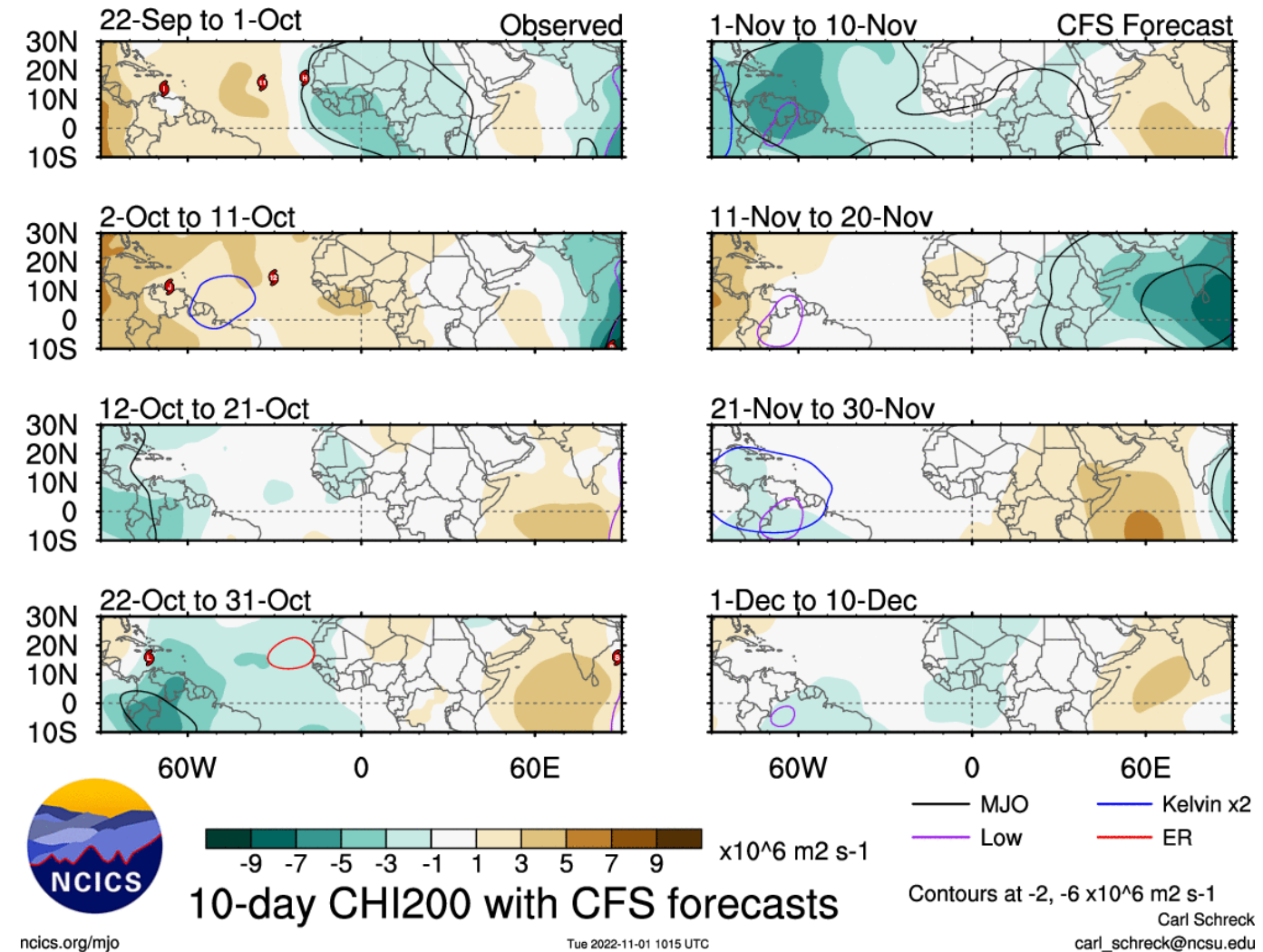
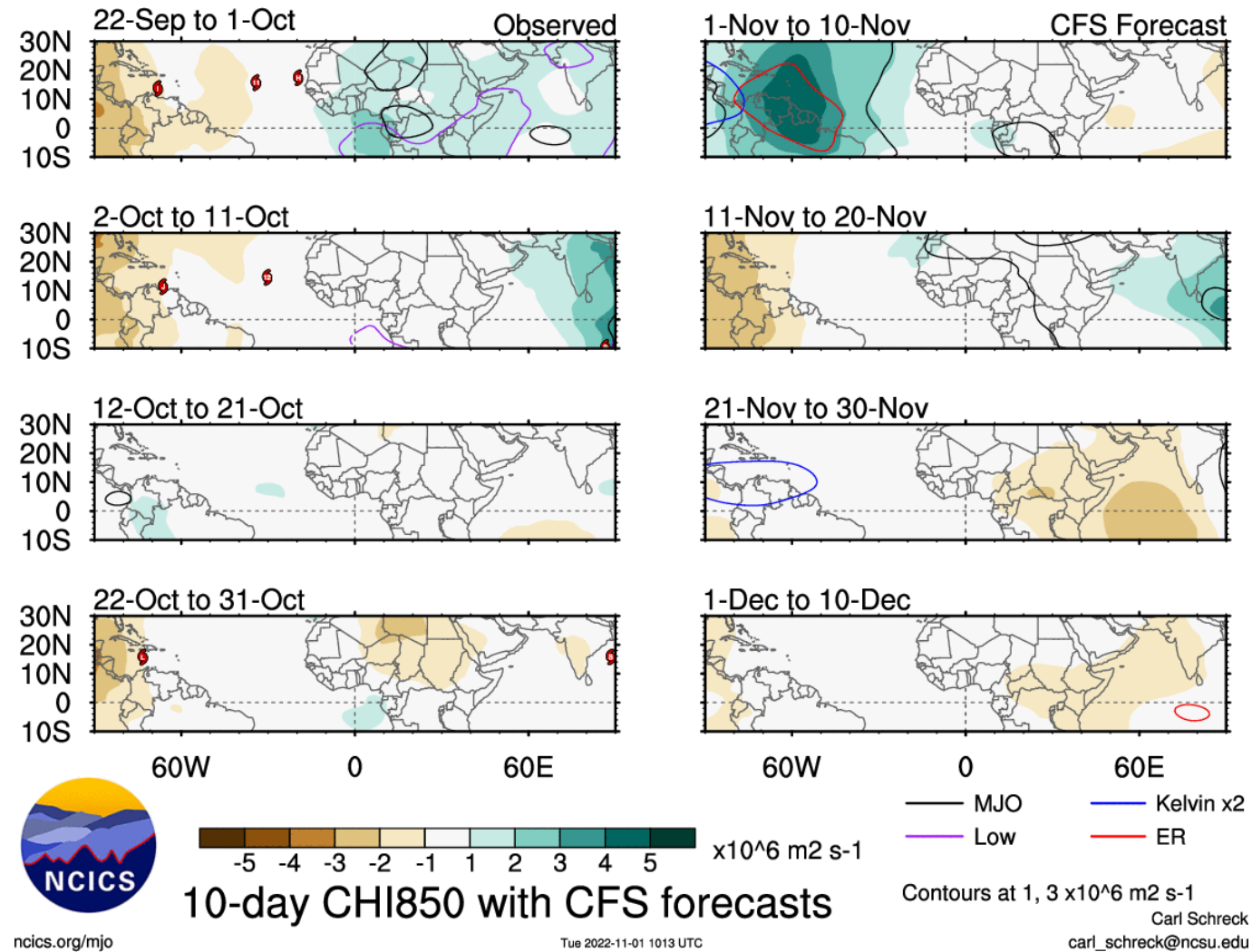
Figure 7b: Global

Figure 17: Past four week Precipitable Water and Outlooks

<https://ncics.org/pub/mjo/v2/map/pwat.cfs.all.africa.10.png>

<https://ncics.org/pub/mjo/v2/map/pwat.cfs.all.global.10.png>

Dekadal Velocity Potential Anomalies – Obs and Fcst

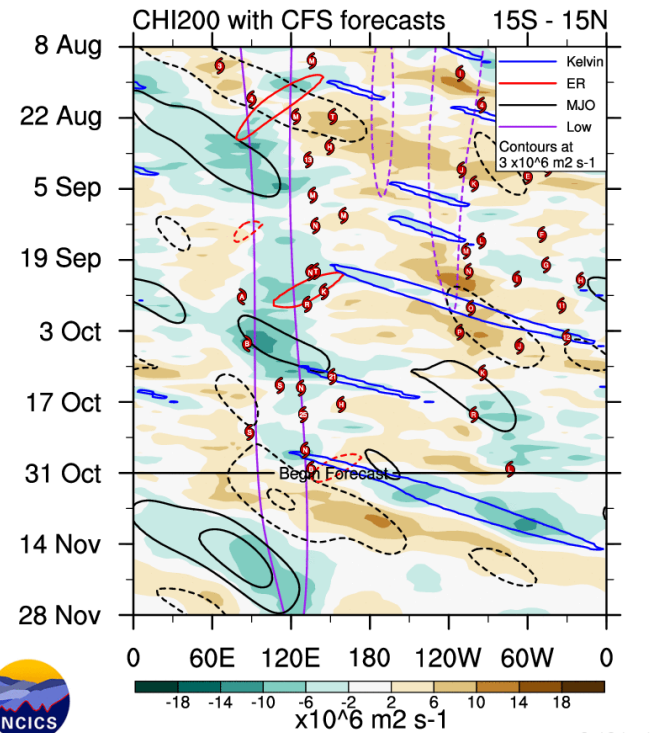
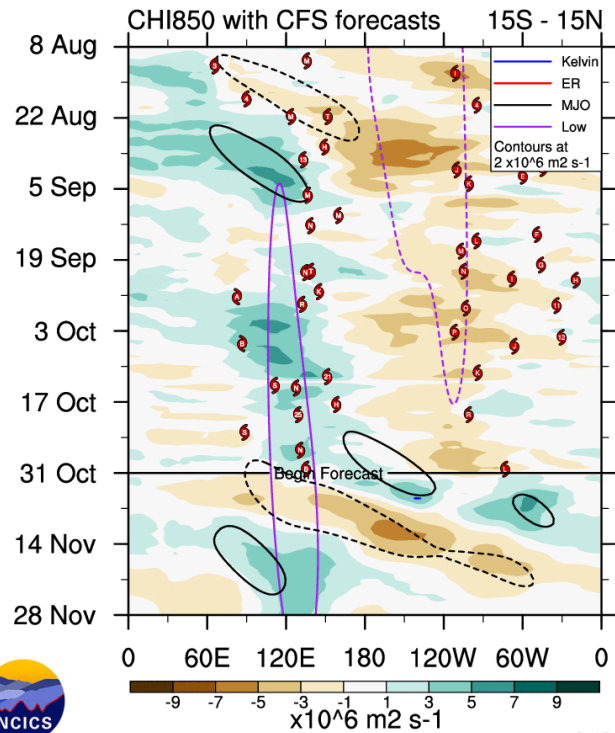


<https://ncics.org/pub/mjo/v2/map/chi850.cfs.all.global.10.png>
<https://ncics.org/pub/mjo/v2/map/chi200.cfs.all.global.10.png>
<https://ncics.org/pub/mjo/v2/map/chi850.cfs.all.africa.10.png>
<https://ncics.org/pub/mjo/v2/map/chi200.cfs.all.africa.10.png>

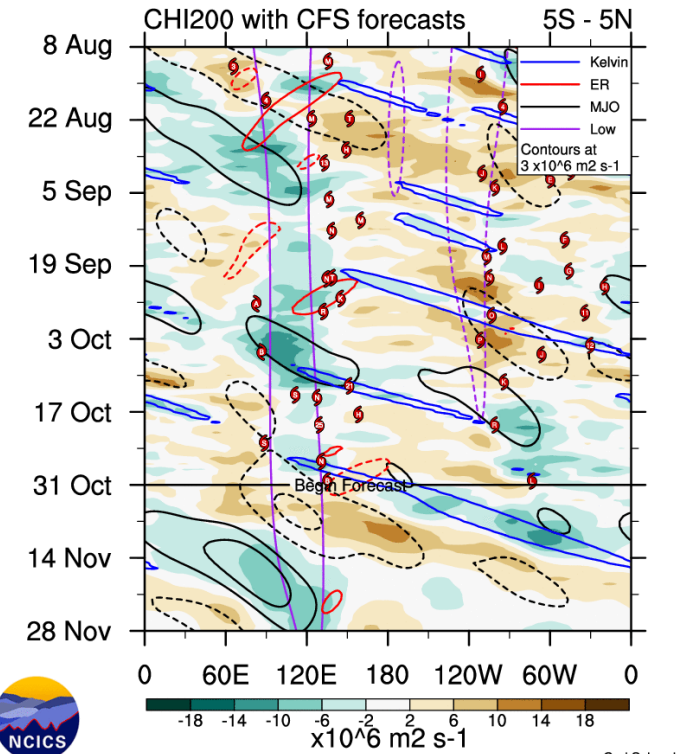
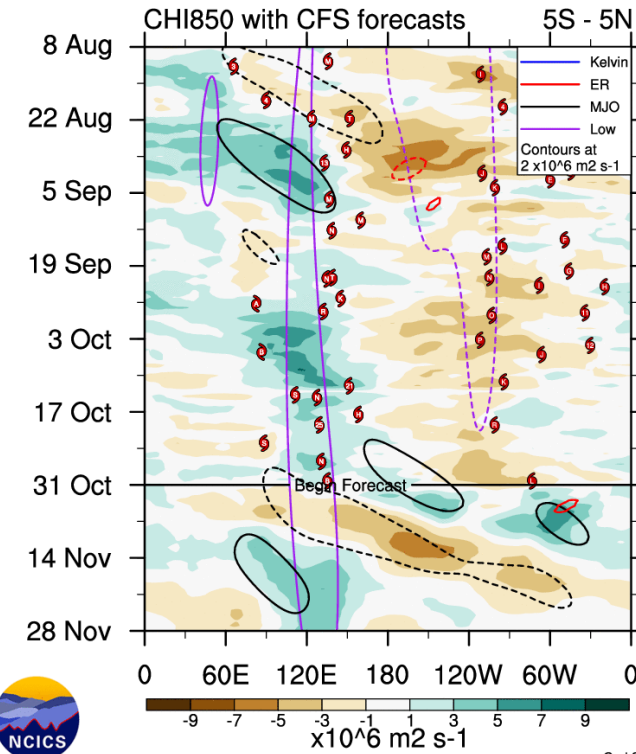
Figure 18a and b: Past four week and month velocity potential

Dekadal Velocity Potential Anomalies – Obs and Fcst: Hovmoller diagram

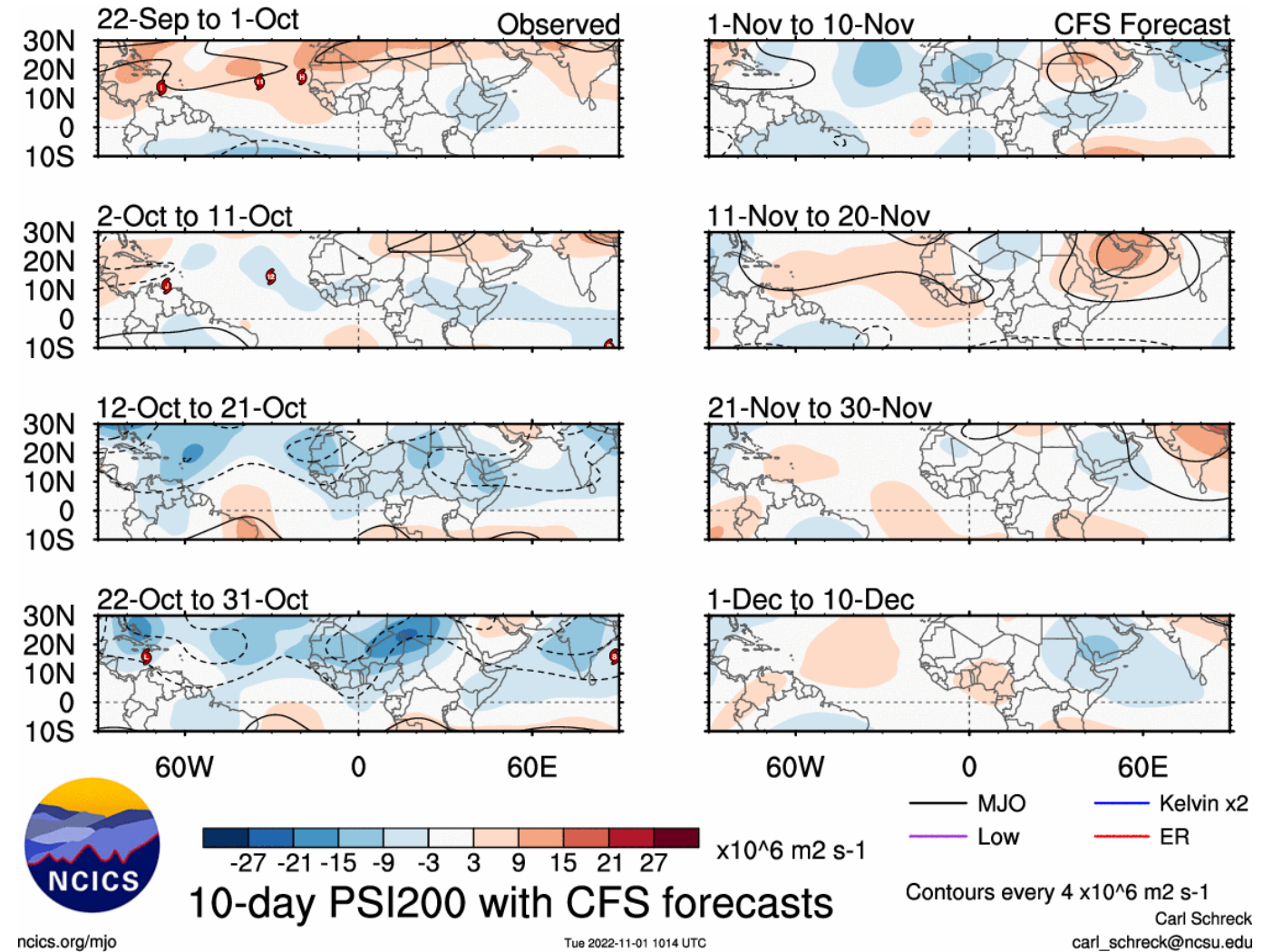
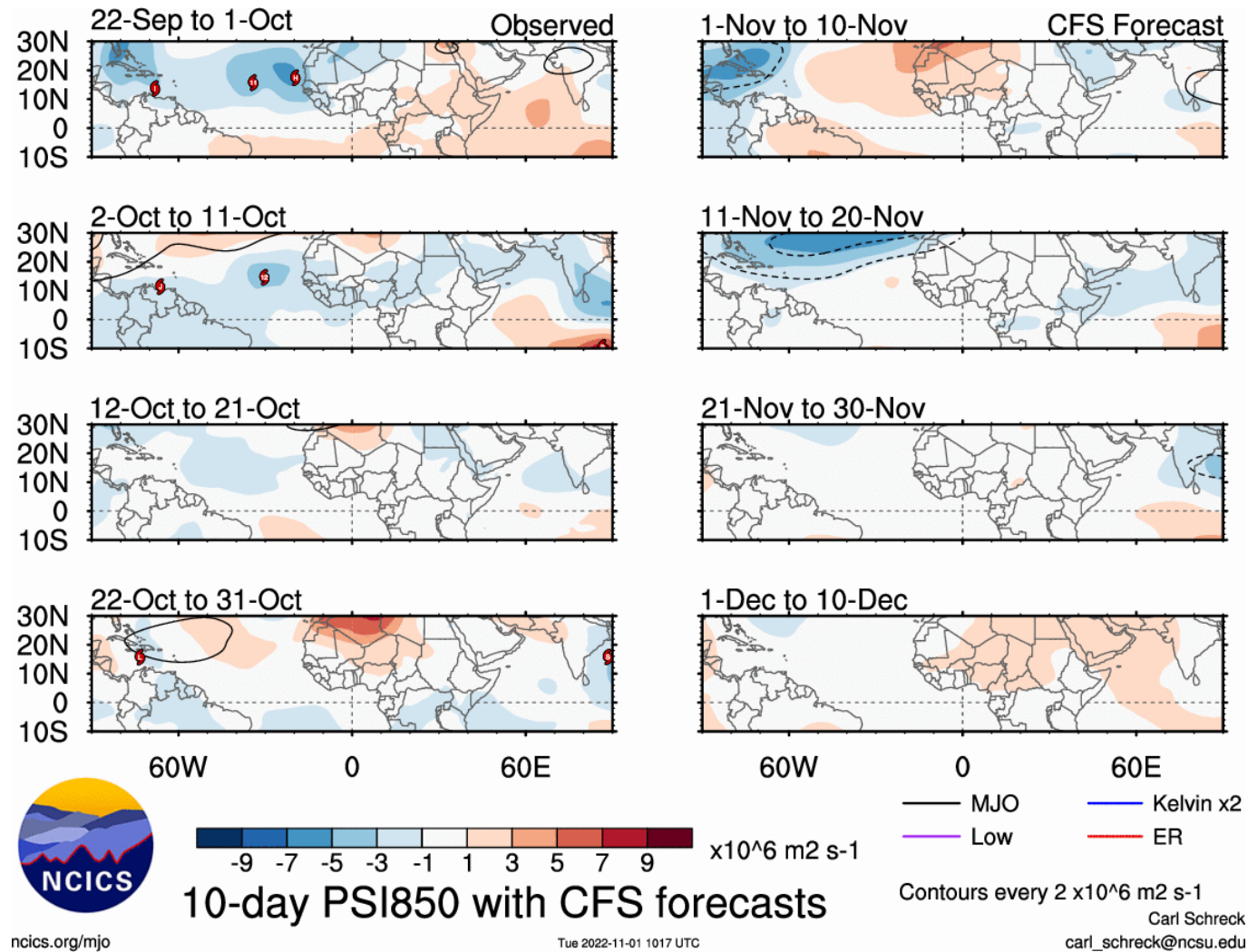
Average Anomalies in the band 15S-15N



Average Anomalies in the band 5S-5N



Dekadal Stream Function Anomalies – Obs. and Fcst



<https://ncics.org/pub/mjo/v2/map/psi850.cfs.all.global.10.png>
<https://ncics.org/pub/mjo/v2/map/psi200.cfs.all.global.10.png>
<https://ncics.org/pub/mjo/v2/map/psi850.cfs.all.africa.10.png>
<https://ncics.org/pub/mjo/v2/map/psi200.cfs.all.africa.10.png>

Figure 18a and b: Past four week and month velocity potential

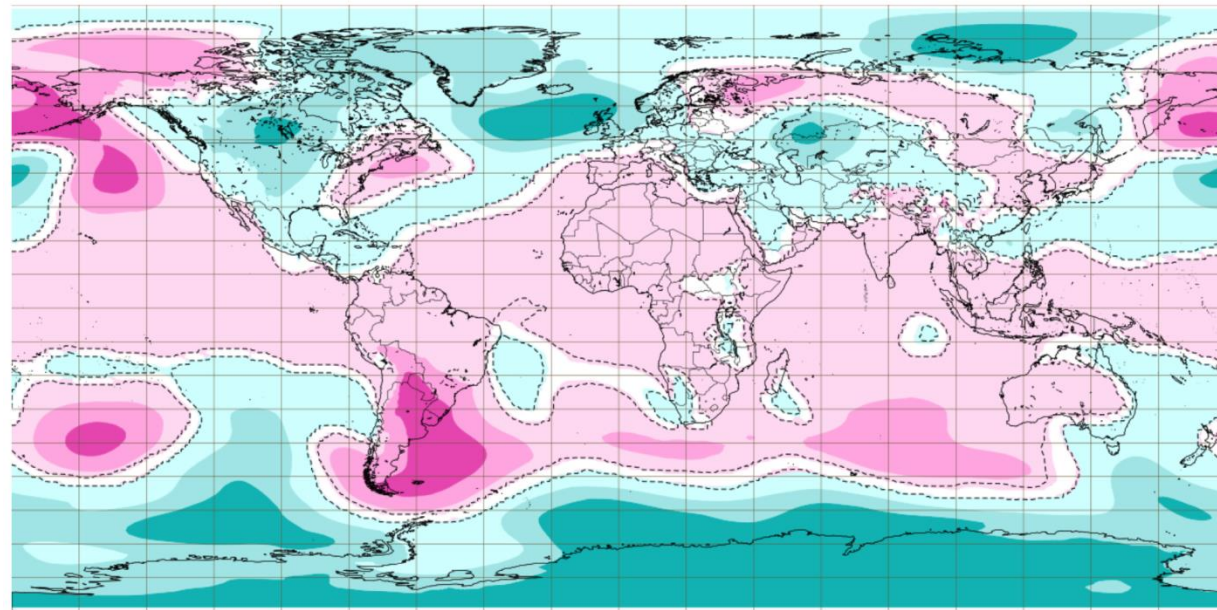
1. Climate Monitoring
2. Status of Drivers
- 3. Dynamical Model Forecast : Week 1 and 2**
4. Week 1 and 2 Outlook

Mean Sea Level Pressure (MSLP) Forecast – Week 1 and 2

Add plot for GFS, BoM, ECMWF, UKMet and DWD

Mean sea level pressure: Weekly mean anomalies

Base time: Mon 31 Oct 2022 Valid time: Mon 31 Oct 2022 - Mon 07 Nov 2022 (+168h) Area : Global

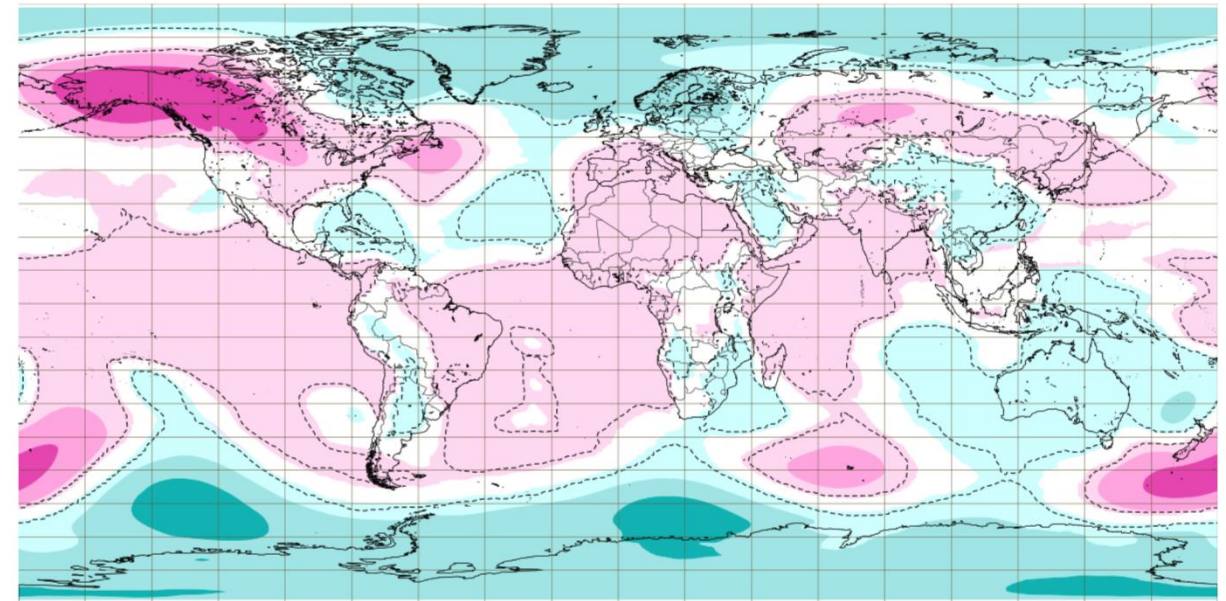


Extended range: MSLP weekly mean anomaly, significance level: 10 % (Pa)

<-40 -40 -20 -10 -5 0 5 10 20 40 >40

Mean sea level pressure: Weekly mean anomalies

Base time: Mon 31 Oct 2022 Valid time: Mon 07 Nov 2022 - Mon 14 Nov 2022 (+336h) Area : Global

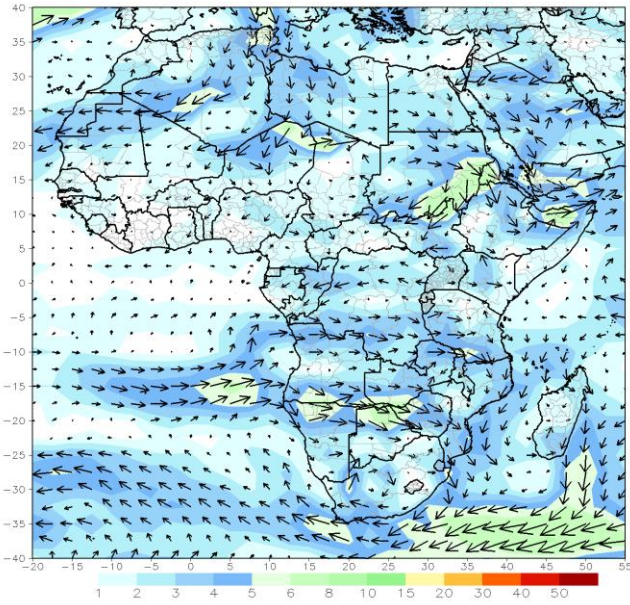


Extended range: MSLP weekly mean anomaly, significance level: 10 % (Pa)

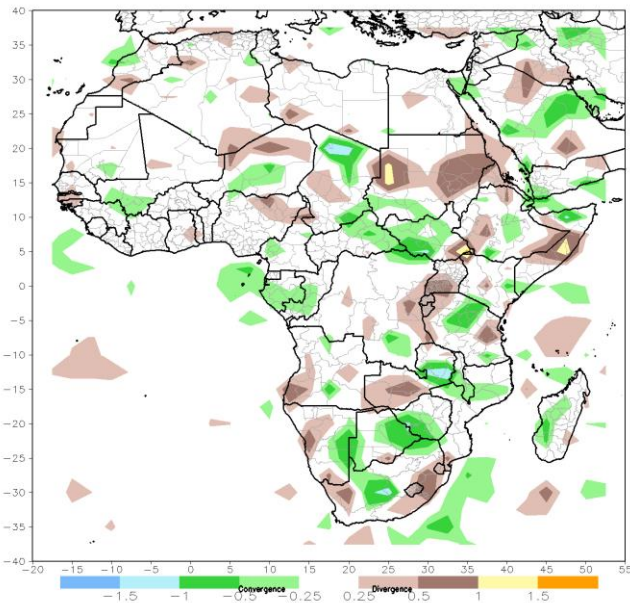
<-40 -40 -20 -10 -5 0 5 10 20 40 >40

Wind Anomalies and divergence Forecast @ 850, 700, 200 hPa - Week1

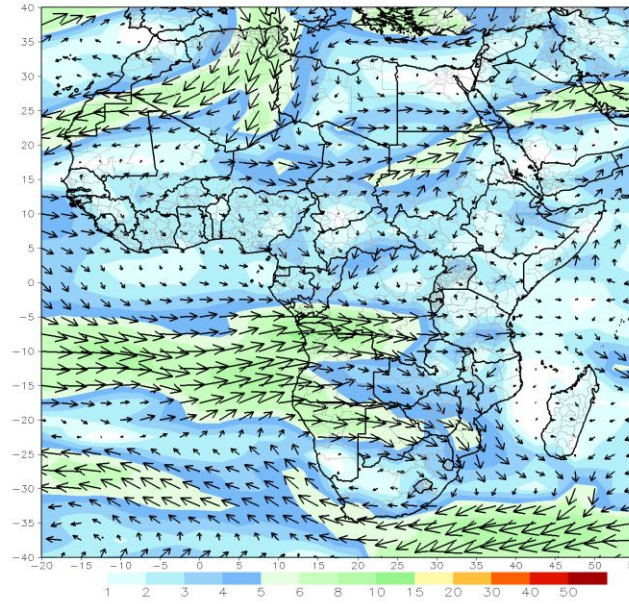
GFS 850mb week1 Mean Vector Wind Anomaly (m/s)
Period: 06z02Nov2022 - 06z08Nov2022



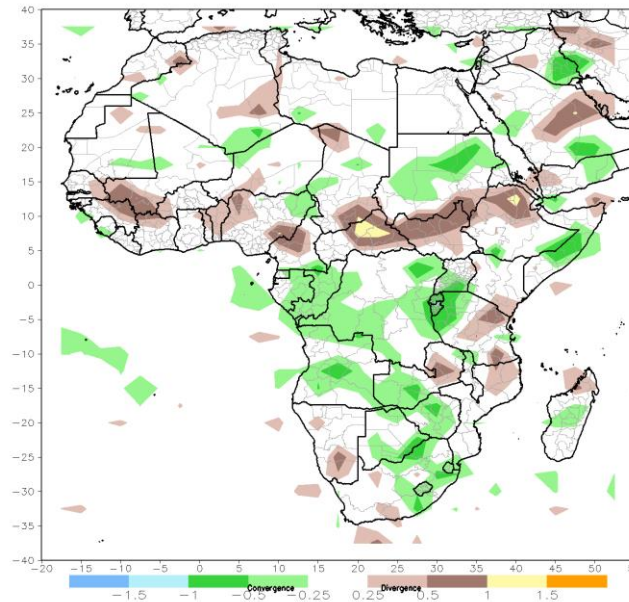
GFS 850mb week1 Mean Divergence Anomaly ($10 \times 10^{-5} / s$)
Period: 06z02Nov2022 - 06z08Nov2022



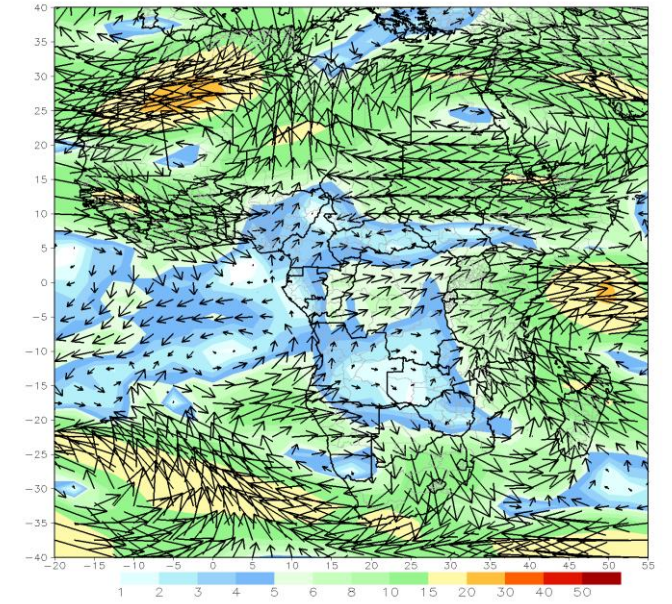
GFS 700mb week1 Mean Vector Wind Anomaly (m/s)
Period: 06z02Nov2022 - 06z08Nov2022



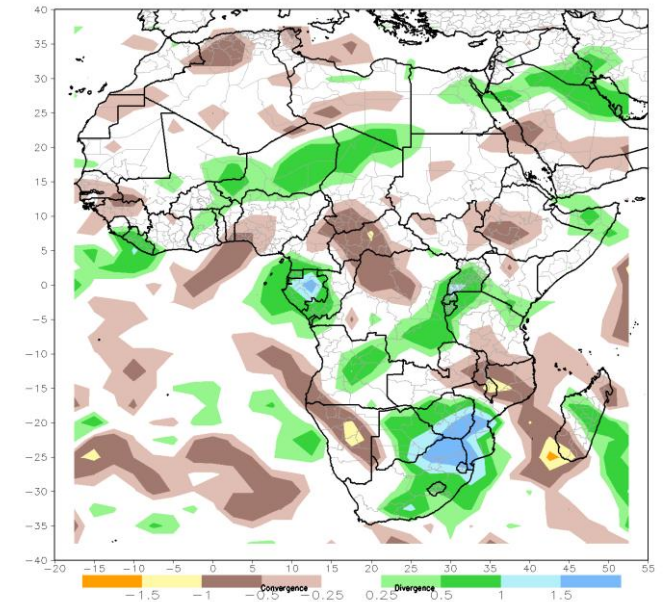
GFS 700mb week1 Mean Divergence Anomaly ($10 \times 10^{-5} / s$)
Period: 06z02Nov2022 - 06z08Nov2022



GFS 200mb week1 Mean Vector Wind Anomaly (m/s)
Period: 06z02Nov2022 - 06z08Nov2022



GFS 200mb week1 Mean Divergence Anomaly ($10 \times 10^{-5} / s$)
Period: 06z02Nov2022 - 06z08Nov2022



NCEP/GFS Bias-Corrected Precipitation Ensemble Forecast - Week 1

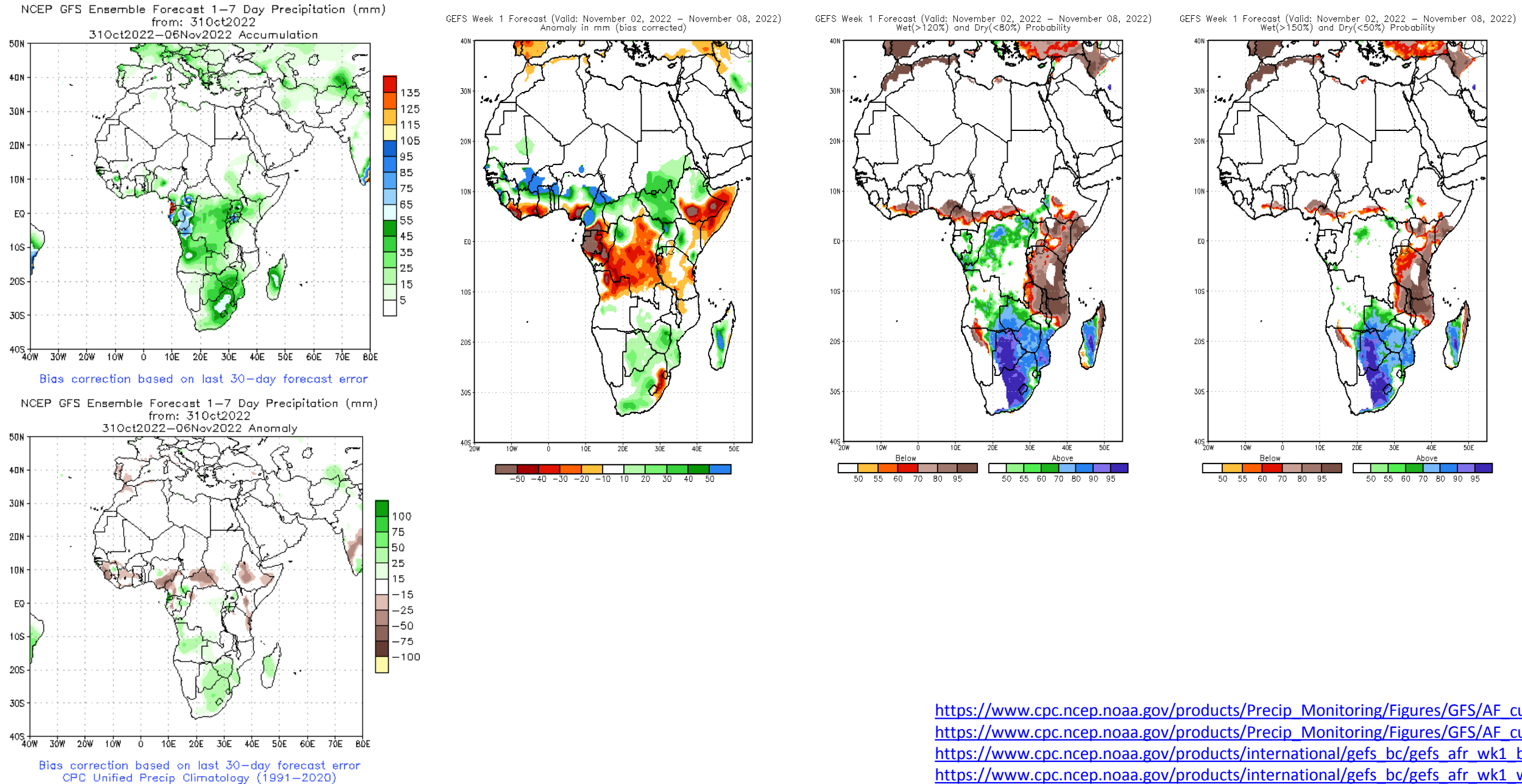


Figure 26: NCEP/GFS Précipitation and Anomaly forecast.

https://www.cpc.ncep.noaa.gov/products/Precip_Monitoring/Figures/GFS/AF_curr.p.gfs1a.gif
https://www.cpc.ncep.noaa.gov/products/Precip_Monitoring/Figures/GFS/AF_curr.p.gfs1b.gif
https://www.cpc.ncep.noaa.gov/products/international/gefs_bc/gefs_afr_wk1_bc_precip.png
https://www.cpc.ncep.noaa.gov/products/international/gefs_bc/gefs_afr_wk1_wdm_precip.png
https://www.cpc.ncep.noaa.gov/products/international/gefs_bc/gefs_afr_wk1_wde_precip.png

Week-1 Precipitation
Probability of Exceedance:
Forecast and Climo

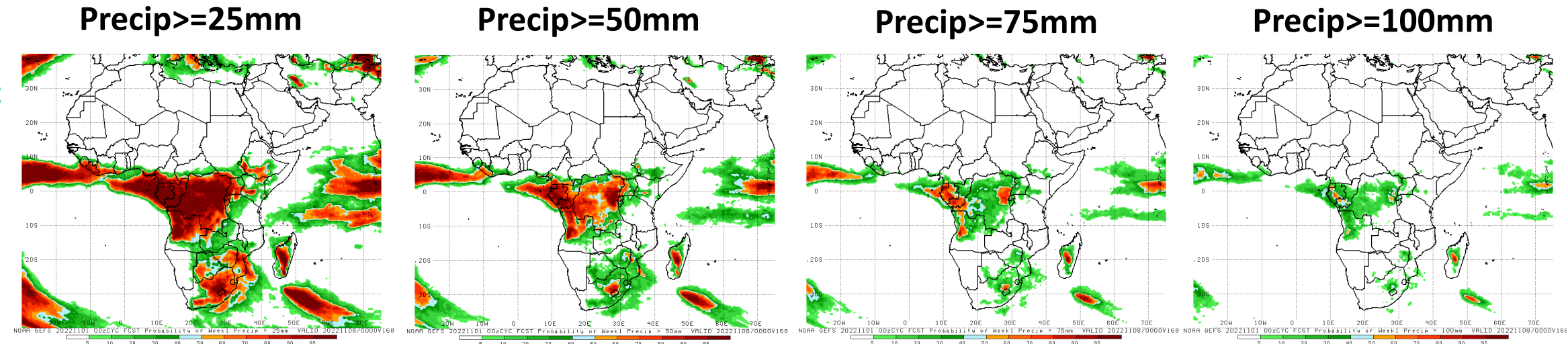
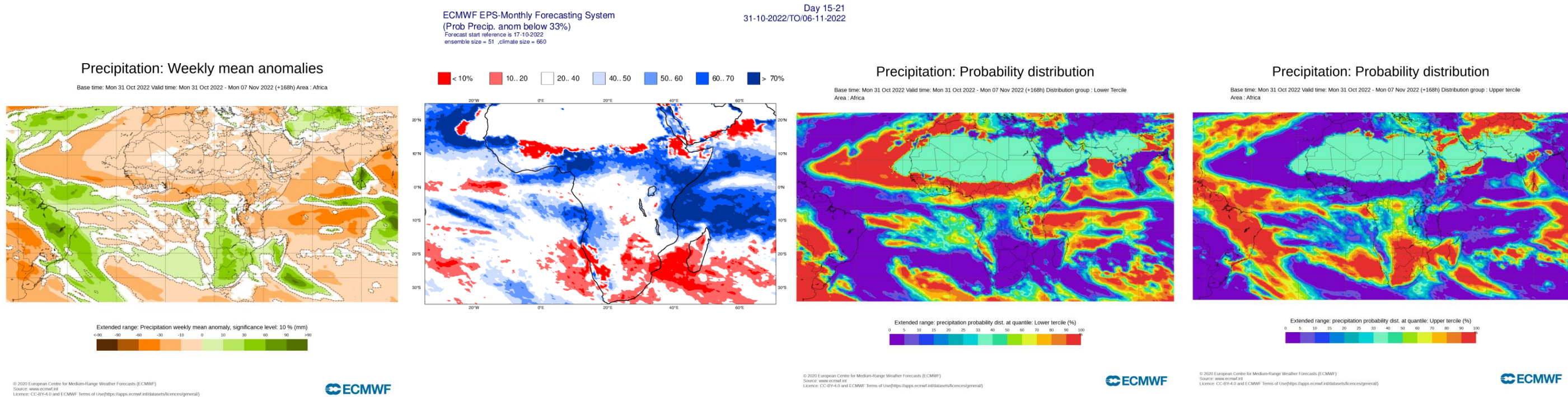


Figure 27: Week1 Precipitation Total Exceedance Probabilities

- https://www.cpc.ncep.noaa.gov/products/international/cpci/data/00/gefs_wk1_precip25mm_prob_africa.html
- https://www.cpc.ncep.noaa.gov/products/international/cpci/data/00/gefs_wk1_precip50mm_prob_africa.html
- https://www.cpc.ncep.noaa.gov/products/international/cpci/data/00/gefs_wk1_precip75mm_prob_africa.html
- https://www.cpc.ncep.noaa.gov/products/international/cpci/data/00/gefs_wk1_precip100mm_prob_africa.html
- http://154.66.220.45:8080/thredds/catalog/ACMAD/CDD/climatemonitoringservice/Probability_of_Exceedance/Weekly/Current/catalog.html

Probability Precipitation Forecasts from ECMWF for week 1 : weekly tercile at below 33% and above 66%



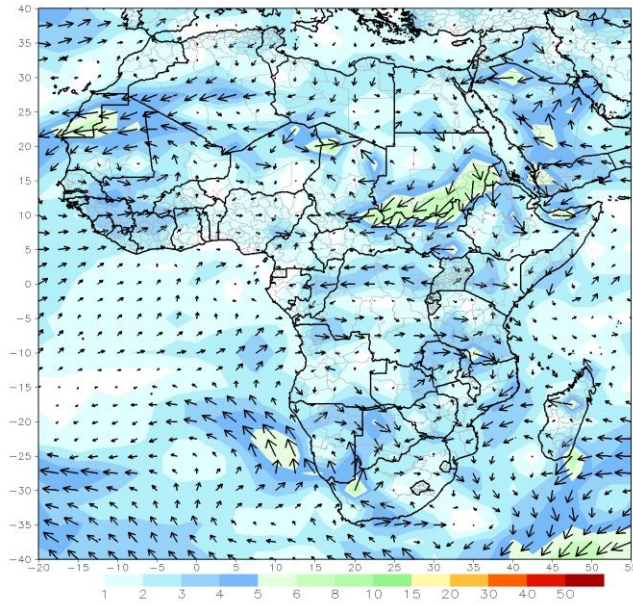
https://www.ecmwf.int/en/forecasts/charts/catalogue/mofc_multi_anomaly?facets=undefined&time=2019081500,408,2019090100&parameter=precipitation&area=Global

https://www.ecmwf.int/en/forecasts/charts/catalogue/mofc_multi_tercile?facets=undefined&time=2021110100,312,2021111400&parameter=precipitation&tercile=1&area=Africa

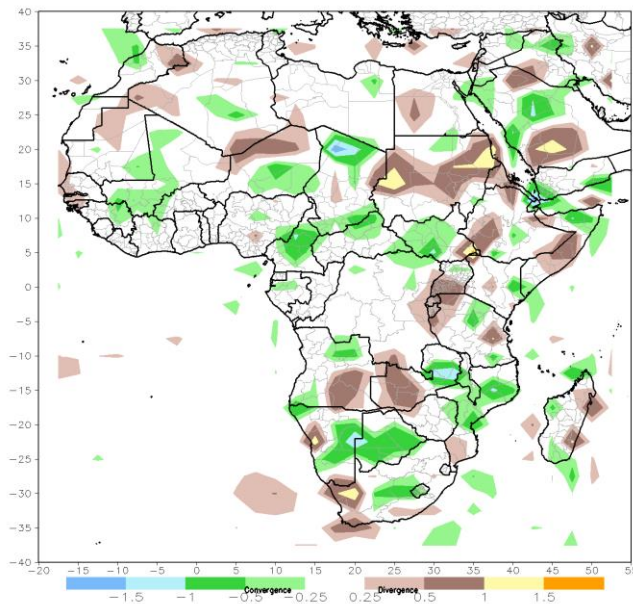
Figure 29: Weekly tercile probability forecast below 33%

Wind Anomalies and divergence Forecast 850, 700, 200 hPa – Week2

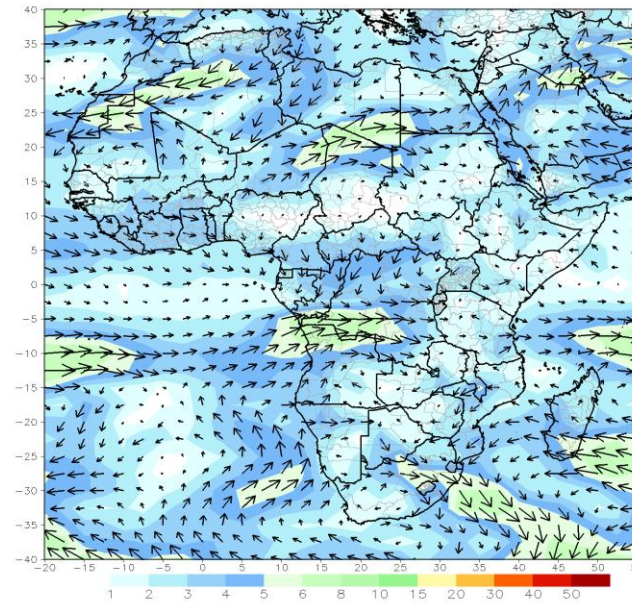
GFS 850mb week2 Mean Vector Wind Anomaly (m/s)
Period: 06z09Nov2022 – 06z15Nov2022



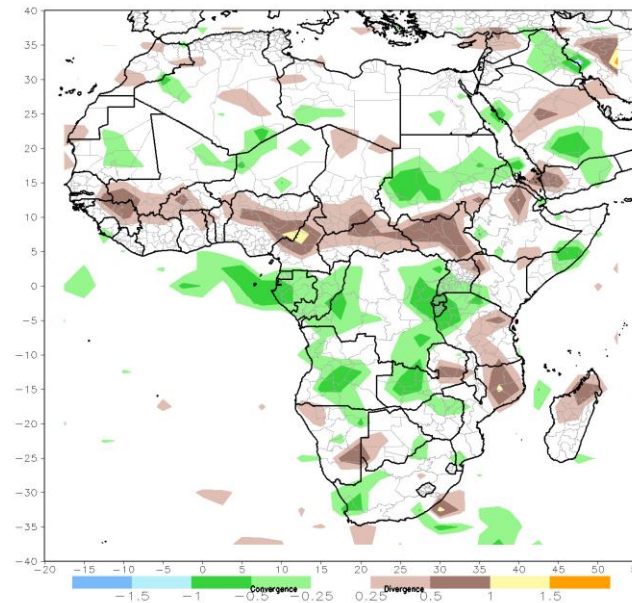
GFS 850mb week2 Mean Divergence Anomaly ($10 \times 10^{-5}/s$)
Period: 06z09Nov2022 – 06z15Nov2022



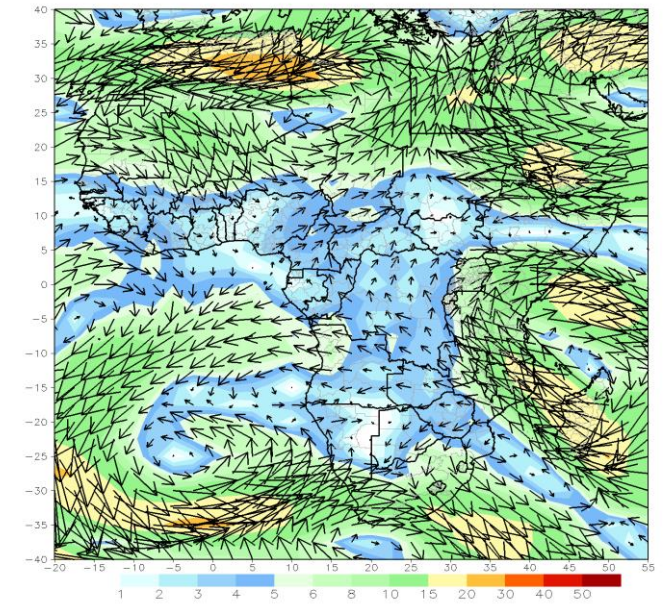
GFS 700mb week2 Mean Vector Wind Anomaly (m/s)
Period: 06z09Nov2022 – 06z15Nov2022



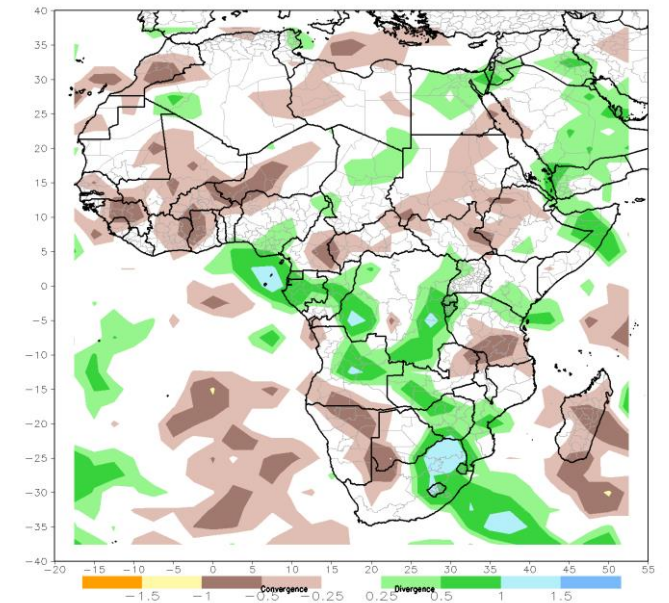
GFS 700mb week2 Mean Divergence Anomaly ($10 \times 10^{-5}/s$)
Period: 06z09Nov2022 – 06z15Nov2022



GFS 200mb week2 Mean Vector Wind Anomaly (m/s)
Period: 06z09Nov2022 – 06z15Nov2022

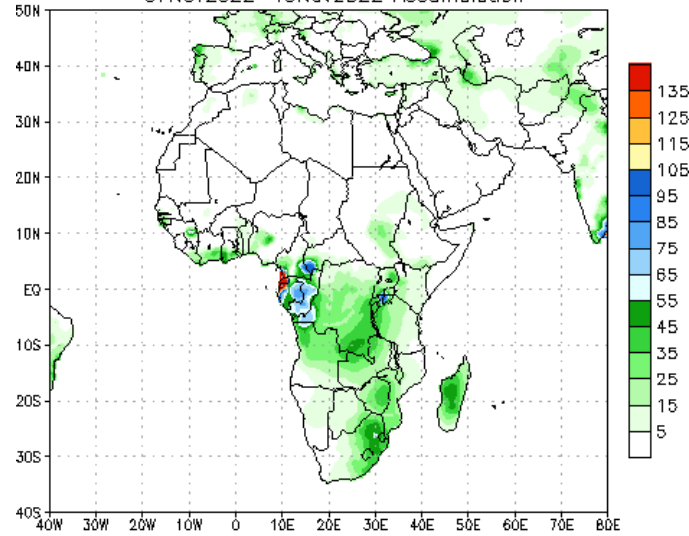


GFS 200mb week2 Mean Divergence Anomaly ($10 \times 10^{-5}/s$)
Period: 06z09Nov2022 – 06z15Nov2022



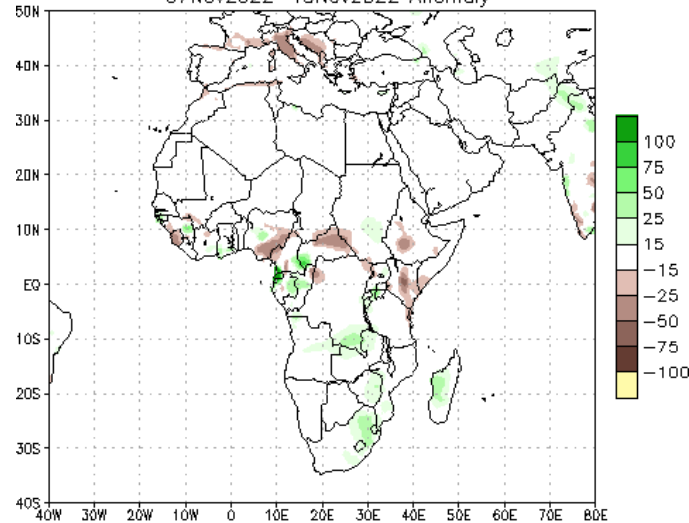
NCEP/GFS Bias-Corrected Precipitation Ensemble Forecast - Week 2

NCEP GFS Ensemble Forecast B-14 Day Precipitation (mm)
from: 31Oct2022
07Nov2022-13Nov2022 Accumulation



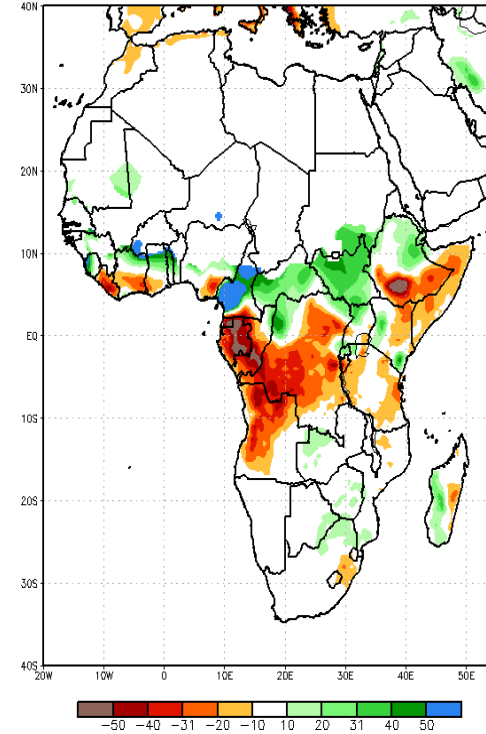
Bias correction based on last 30-day forecast error

NCEP GFS Ensemble Forecast B-14 Day Precipitation (mm)
from: 31Oct2022
07Nov2022-13Nov2022 Anomaly

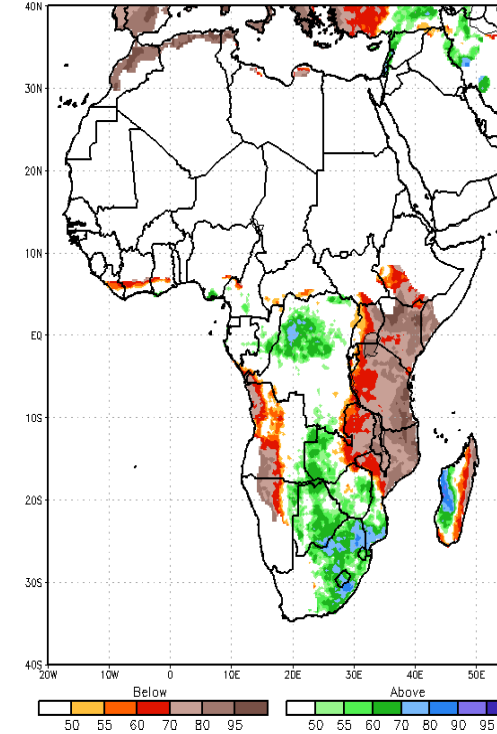


Bias correction based on past 30-day forecast error
CPC Unified Precip Climatology (1991-2020)

GEFS Week 2 Forecast (Valid: November 09, 2022 - November 15, 2022)
Anomaly in mm (bias corrected)



GEFS Week 2 Forecast (Valid: November 09, 2022 - November 15, 2022)
Wet(>120%) and Dry(<80%) Probability



GEFS Week 2 Forecast (Valid: November 09, 2022 - November 15, 2022)
Wet(>150%) and Dry(<50%) Probability

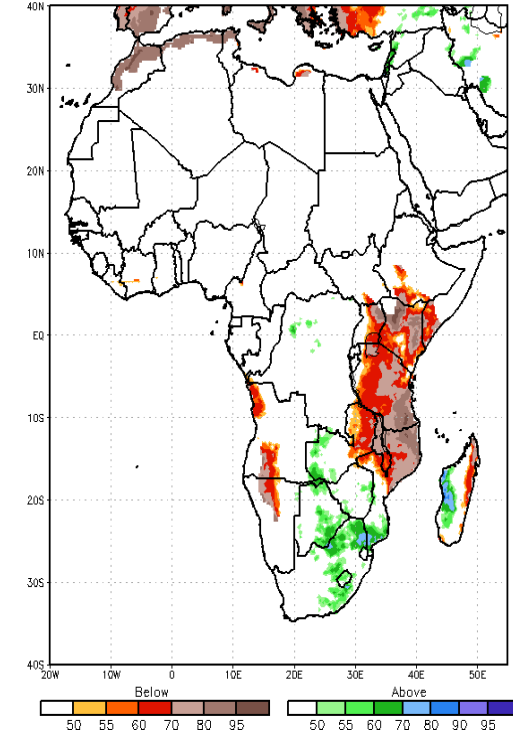


Figure 26: NCEP/GFS Précipitation and Anomaly forecast.

https://www.cpc.ncep.noaa.gov/products/Precip_Monitoring/Figures/GFS/AF_curr.p.gfs2a.gif
https://www.cpc.ncep.noaa.gov/products/Precip_Monitoring/Figures/GFS/AF_curr.p.gfs2b.gif
https://www.cpc.ncep.noaa.gov/products/international/gefs_bc/gefs_afr_wk2_bc_precip.png
https://www.cpc.ncep.noaa.gov/products/international/gefs_bc/gefs_afr_wk2_wdm_precip.png
https://www.cpc.ncep.noaa.gov/products/international/gefs_bc/gefs_afr_wk2_wde_precip.png

Week-2 Precipitation
Probability of Exceedance:
Forecast and Climo

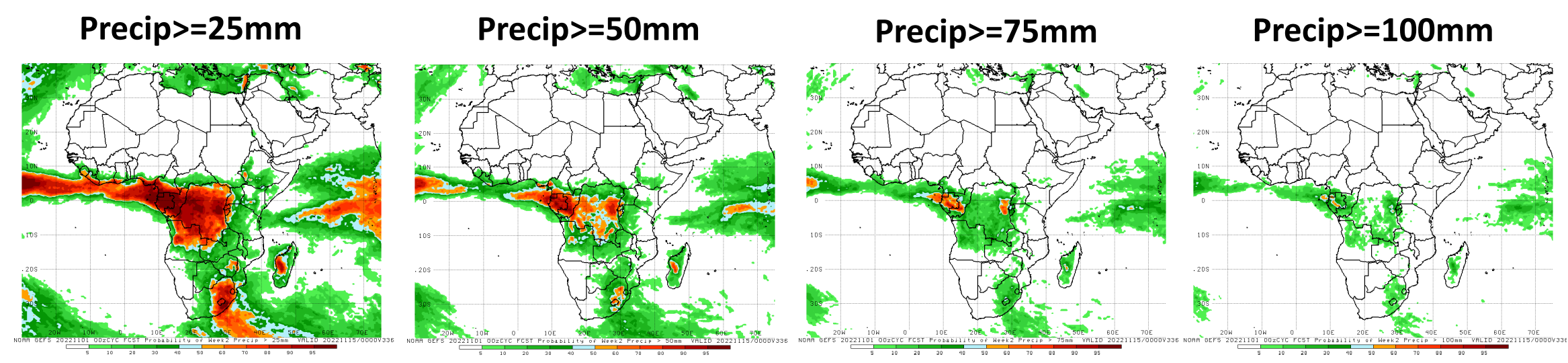
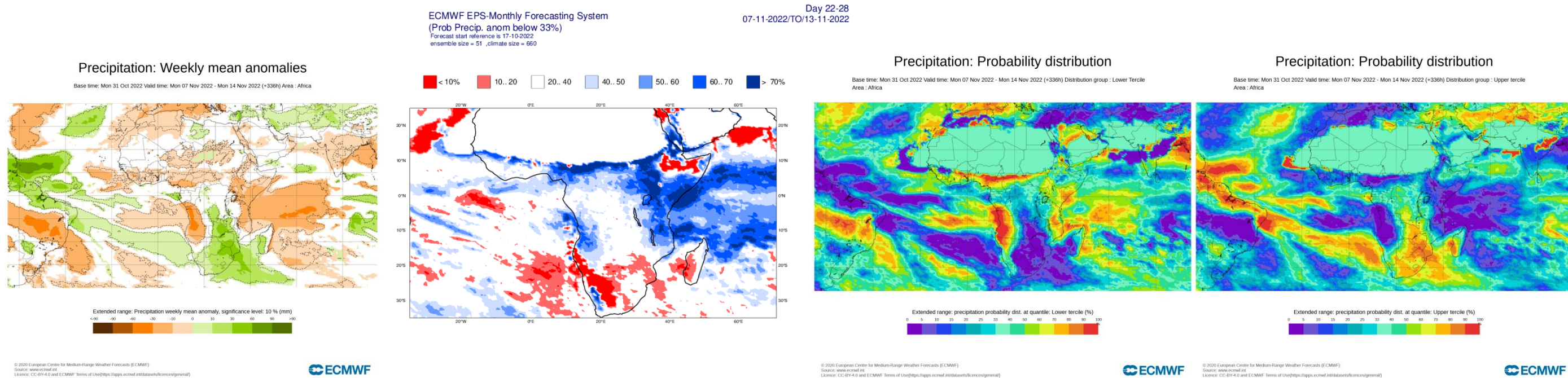


Figure 32: Week2 Precipitation Total Exceedance Probabilities

https://www.cpc.ncep.noaa.gov/products/international/cpci/data/00/gefs_wk1_precip25mm_prob_africa.html
https://www.cpc.ncep.noaa.gov/products/international/cpci/data/00/gefs_wk1_precip50mm_prob_africa.html
https://www.cpc.ncep.noaa.gov/products/international/cpci/data/00/gefs_wk1_precip75mm_prob_africa.html
https://www.cpc.ncep.noaa.gov/products/international/cpci/data/00/gefs_wk1_precip100mm_prob_africa.html
http://154.66.220.45:8080/thredds/catalog/ACMAD/CDD/climatemonitoringservice/Probability_of_Exceedance/Weekly/Current/catalog.html

Probability Precipitation Forecasts from ECMWF for week 2 : weekly tercile at below 33% and above 66%



https://www.ecmwf.int/en/forecasts/charts/catalogue/mofc_multi_anomaly?facets=undefined&time=2019081500,408,2019090100&parameter=precipitation&area=Global

https://www.ecmwf.int/en/forecasts/charts/catalogue/mofc_multi_tercile?facets=undefined&time=2021110100,312,2021111400&parameter=precipitation&tercile=1&area=Africa

Figure 34: Weekly tercile probability forecast below 33%

IRI SubX Precip Forecast : Week 1 and 2

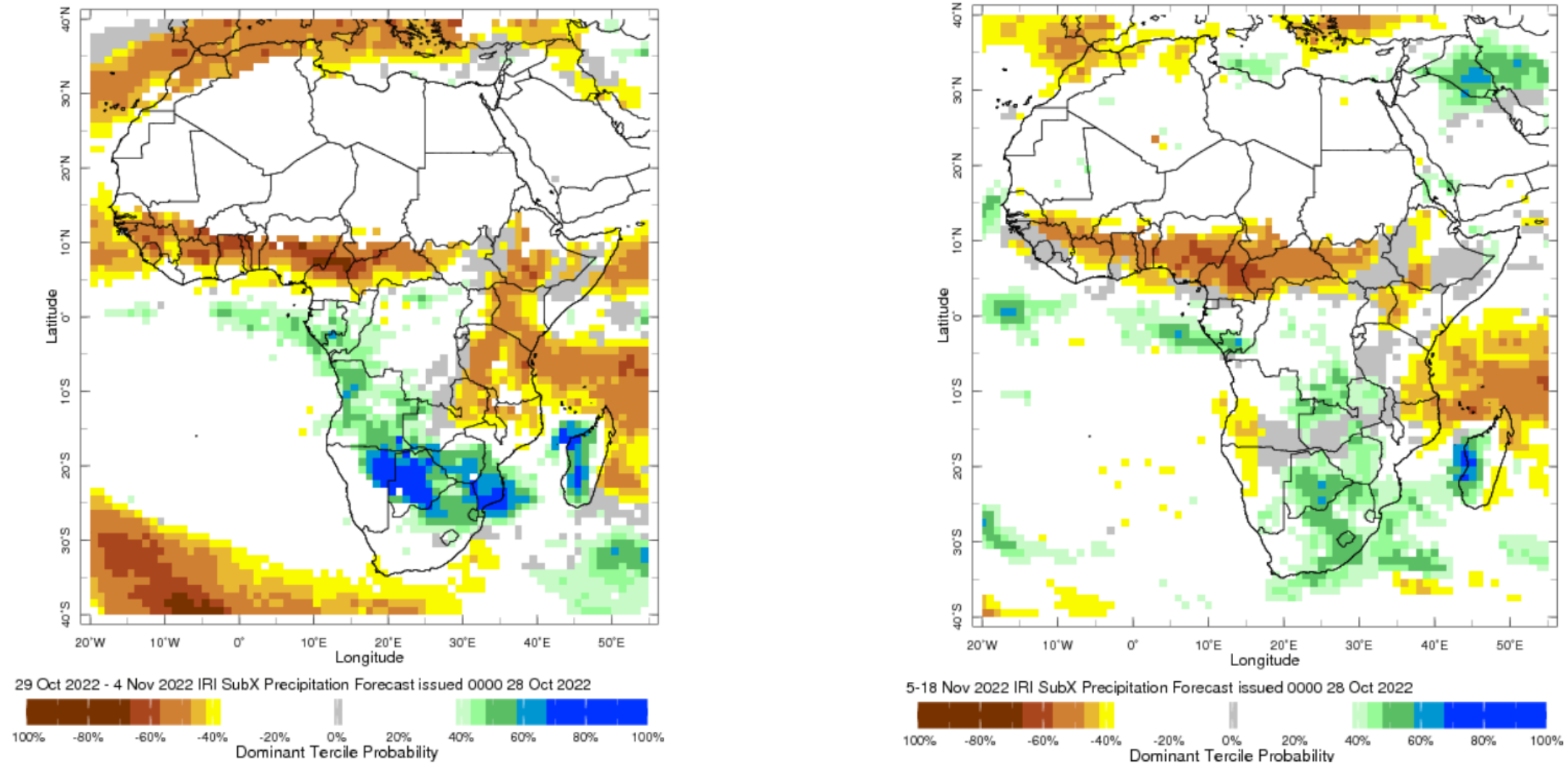
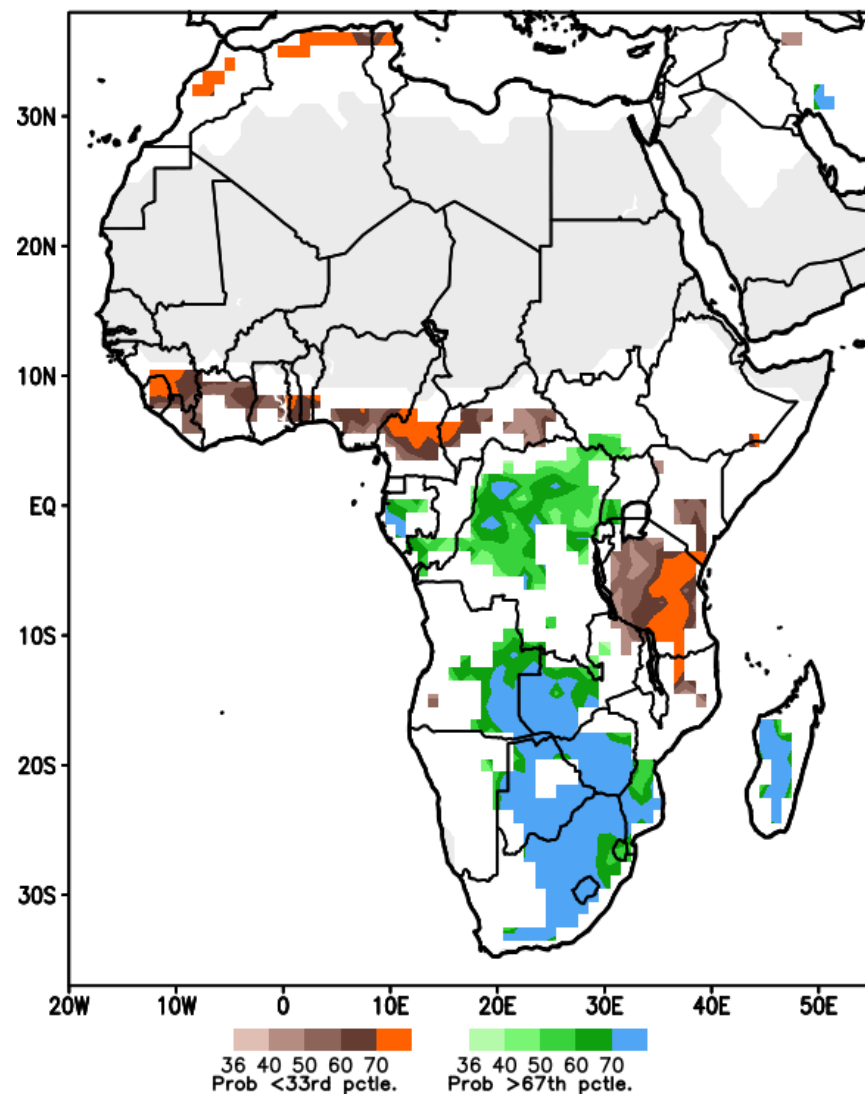


Figure 37: Precipitation and Anomaly forecast

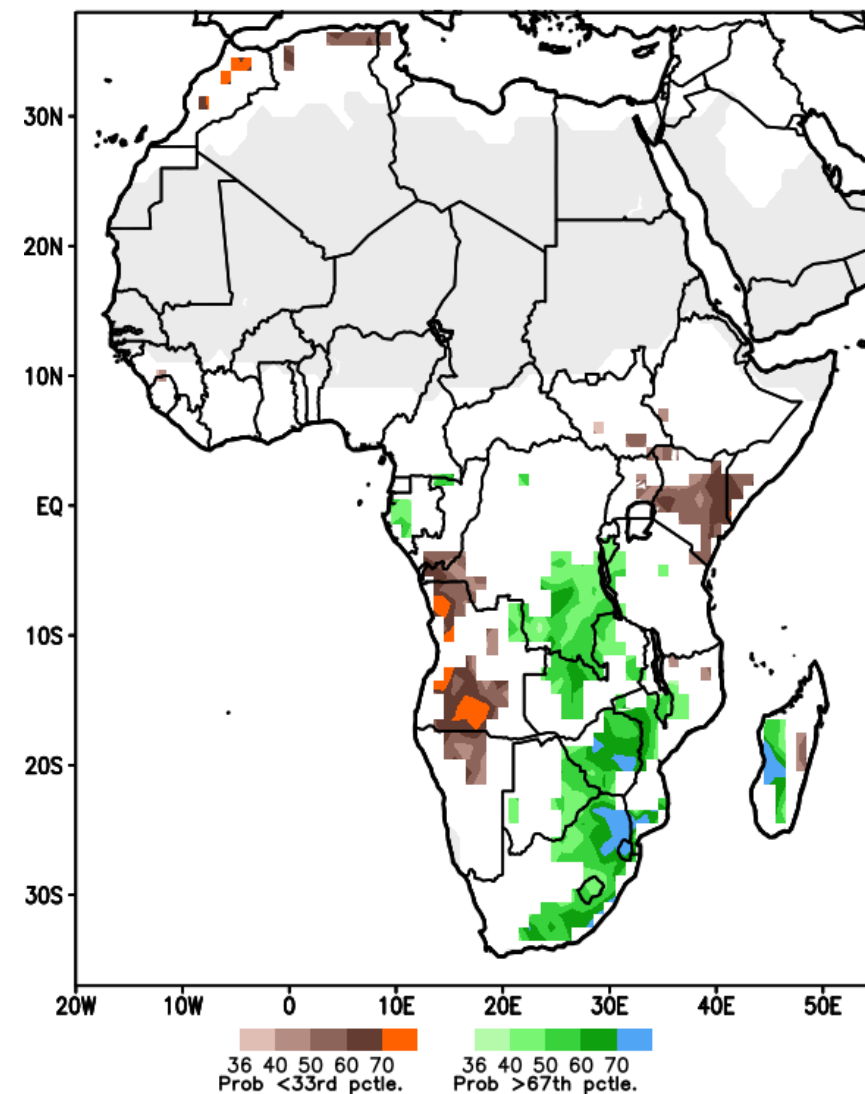
https://iridl.ldeo.columbia.edu/maproom/Global/ForecastsS2S/precip_subx.html?Set-Language=en&bbox=bb%3A-20%3A-40%3A55%3A40%3Abb&S=0000%205%20Feb%202021&region=bb%3A-2%3A30%3A-1%3A31%3Abb

Consolidated Ensemble Forecast: Week 1 and 2

Multi-Model Ensemble Correlation Weighted, Week1
Precip POE <33rd & > 67th Pctl., Valid:02Nov2022-08Nov2022



Multi-Model Ensemble Correlation Weighted, Week2
Precip POE <33rd & > 67th Pctl., Valid:09Nov2022-15Nov2022



https://ftp.cpc.ncep.noaa.gov/International/cons_precip/cons_wk1_afr_prcp_33N67pct.png

https://ftp.cpc.ncep.noaa.gov/International/cons_precip/cons_wk2_afr_prcp_33N67pct.png

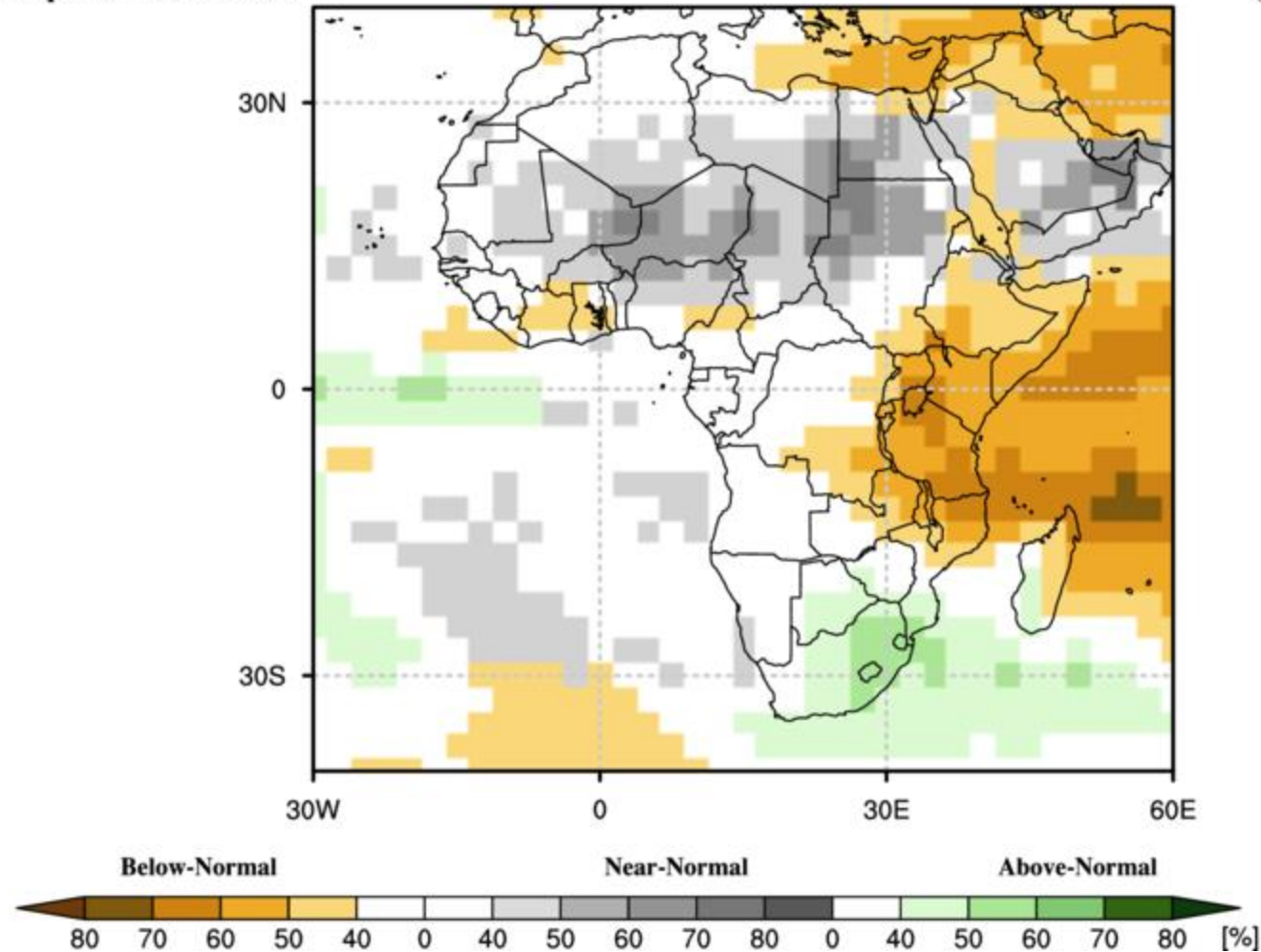
Monthly Forecast from WMO Lead Centre Multi-Model Ensemble

Probabilistic Multi-Model Ensemble Forecast

Beijing,CMCC,CPTEC,ECMWF,Exeter,Melbourne,Montreal,Moscow,Offenbach,Pretoria,Seoul,Tokyo,Toulouse,Washington

Precipitation : Nov2022

(issued on Oct2022)



The LCMM-level model set tells us that part of the Africa region will have average to higher than average rainfall.

Figure 35: Monthly Precipitation forecast

<https://www.wmolc.org/seasonPmmeUI/view?winName=PlotView1566209968309>



1. Climate Monitoring
2. Status of Drivers
3. Dynamical Model Forecast : Week 1 and 2
4. Week 1 and 2 Outlook

CLIMATOLOGY OF PRECIPITATIONS FOR UPCOMING 2 WEEKS

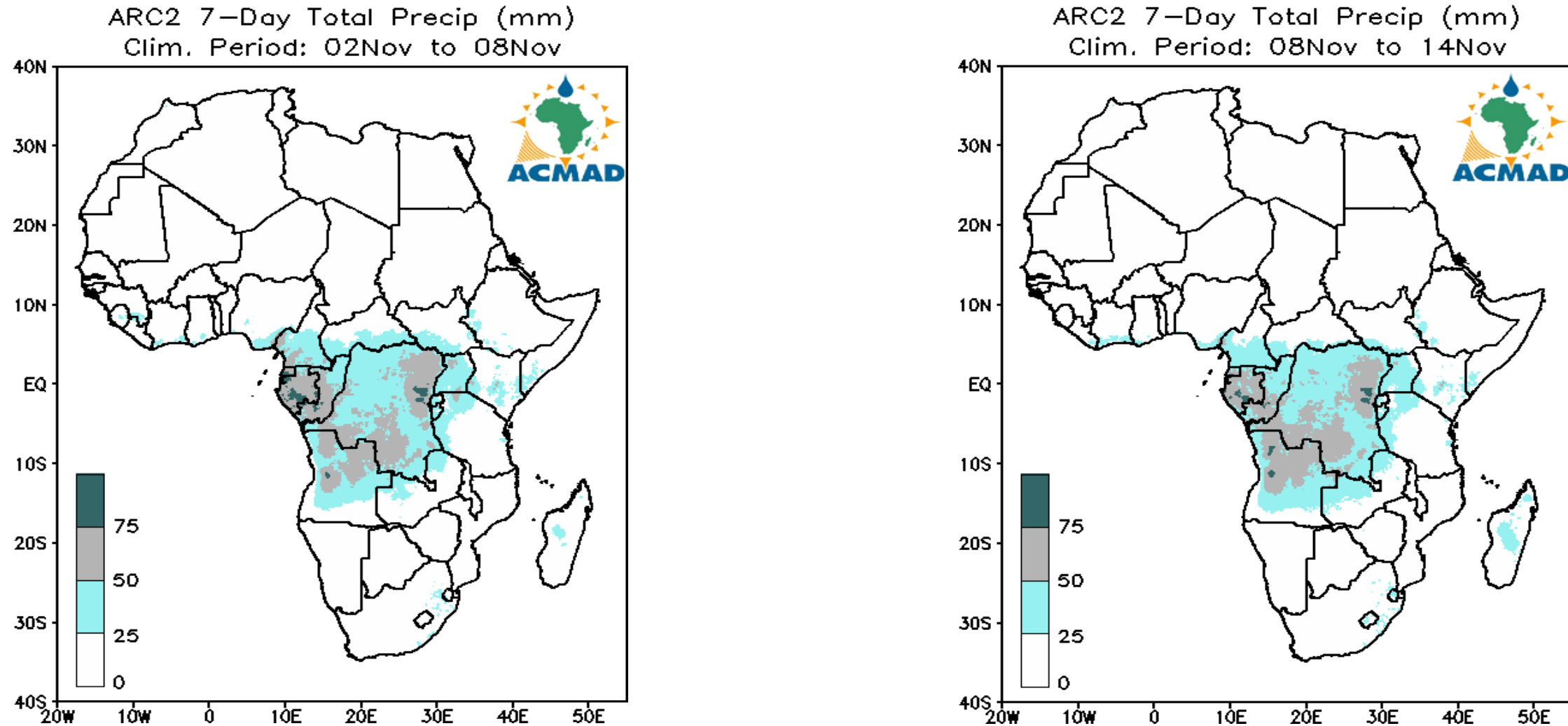


Figure 38: Climatology of Precipitation for week-1(left panel) and week-2 (right panel)

http://sgbd.acmad.org:8080/thredds/fileServer/ACMAD/CDD/ClimateBulletin_TN/Precip_Clim_Next_Days/current/Africa_ARC2_Climo_Wk1.png

http://sgbd.acmad.org:8080/thredds/fileServer/ACMAD/CDD/ClimateBulletin_TN/Precip_Clim_Next_Days/current/Africa_ARC2_Climo_Wk2.png

PRECIPITATIONS FORECAST FOR THE UPCOMING TWO WEEKS

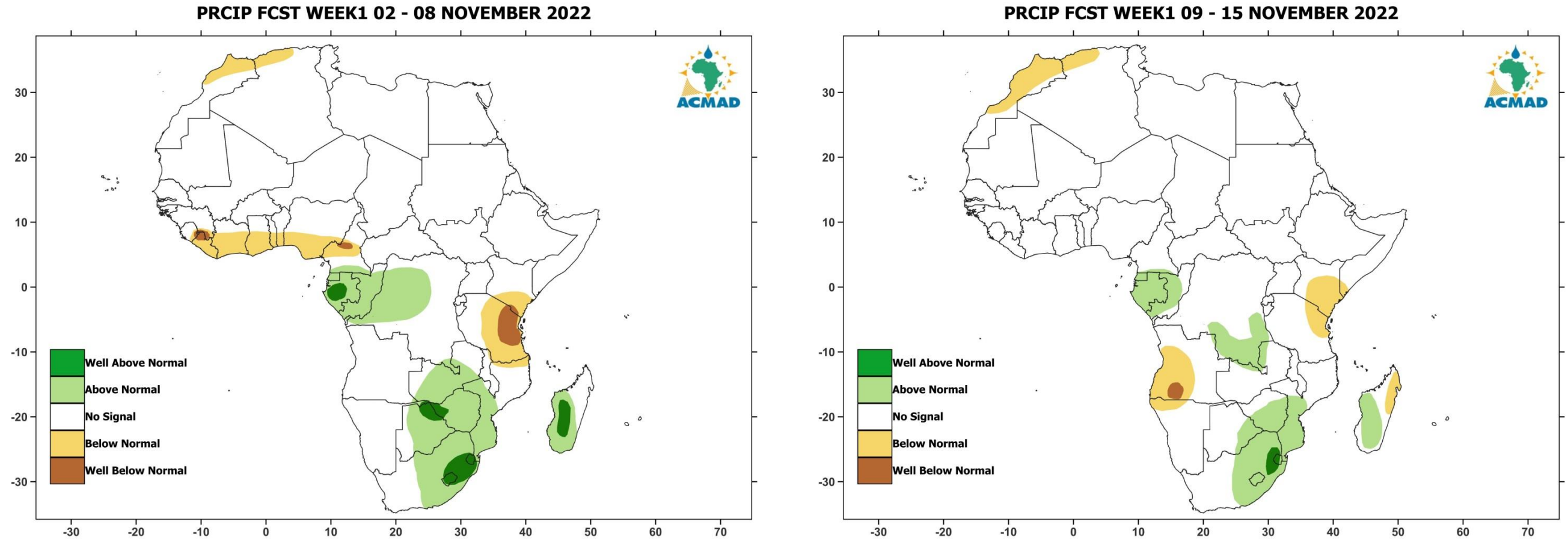


Figure 39: Precipitation Outlook for week-1 (left panel) and week-2 (right panel)