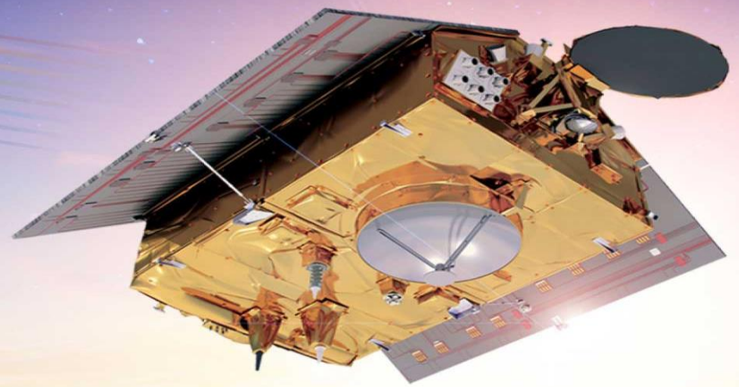
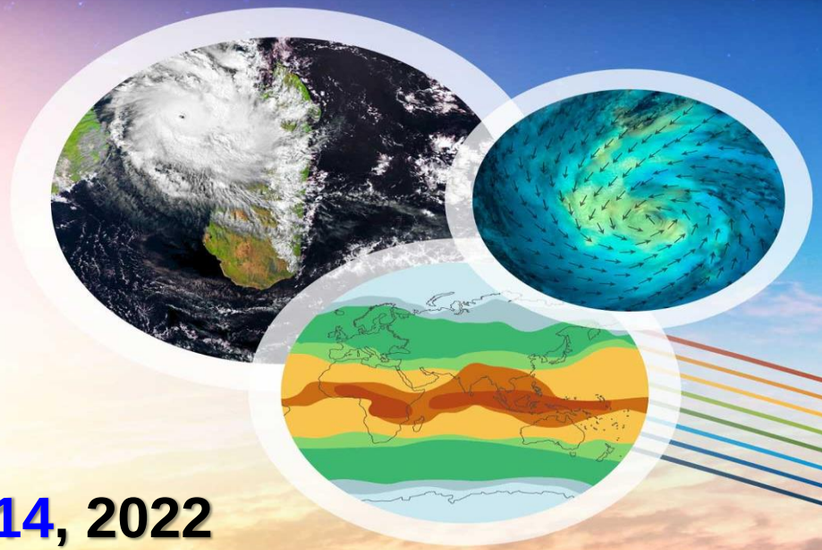
NTRA-ACP CLIMATE SERVICES AND RELATED APPLICATIONS PROGRAMME

African Centre of Meteorological Applications for Development (ACMAD)

Dekadal Technical Note and Precipitation Outlook for Week 1 and 2





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dgacmad@acmad.org www.acmad.org www.climsa.org archive

Contributors

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Versions

Version	Date	By	Descriptions
V0	14-09-2022	CDD Climate Experts	First draft for « Briefing », with all Climate's Expert contributions
Last	14-09-2022	Dr. Pierre Kamsu	Final Review

1. Climate Monitoring

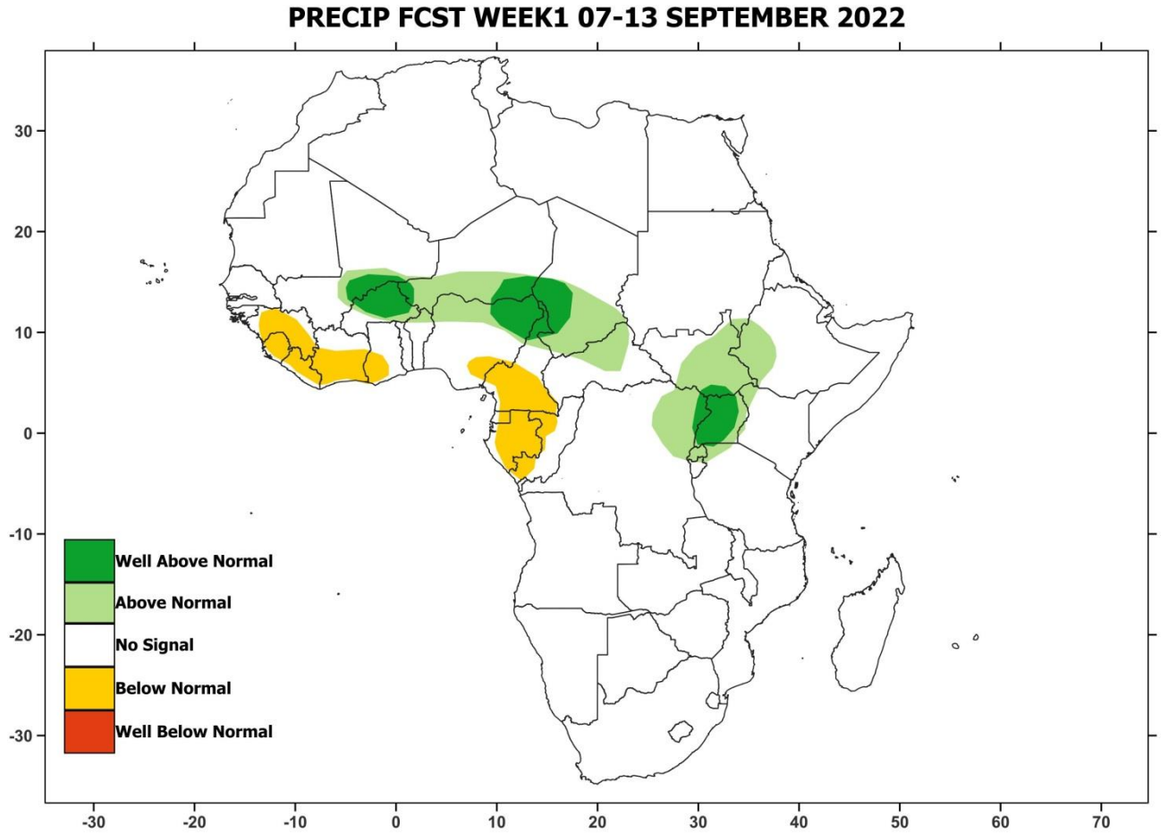
- Forecast Verification
- Observed Mean Sea Level Pressure (MSLP) during last dekad
- Observed 500 hPa Geopotential Height during last dekad
- Observed Precipitation during last dekad
- Observed Temporal Variation of precipitation
- Start of Agricultural Season – Current Status and Outlook
- Observed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

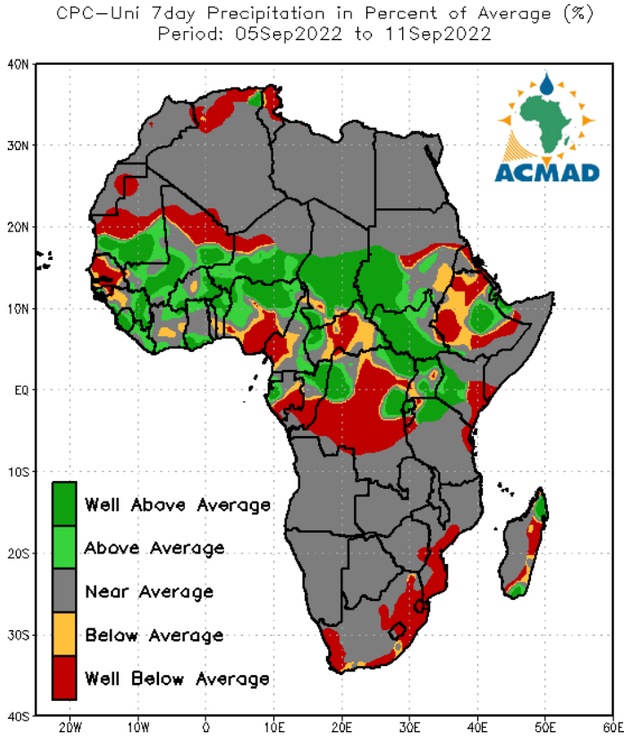
2. Status of Drivers

3. Dynamical Model Forecast : Week 1 and 2

4. Week 1 and 2 Outlook

Forecast Verification





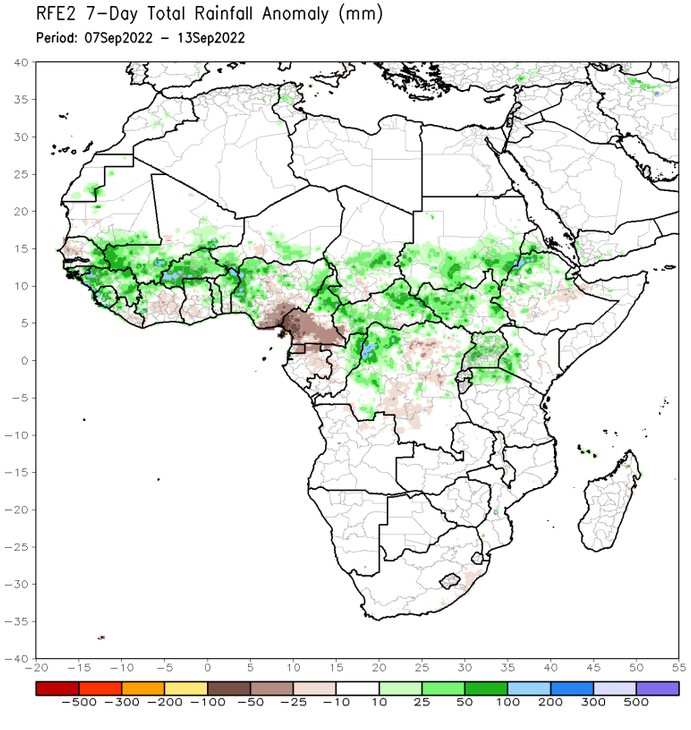
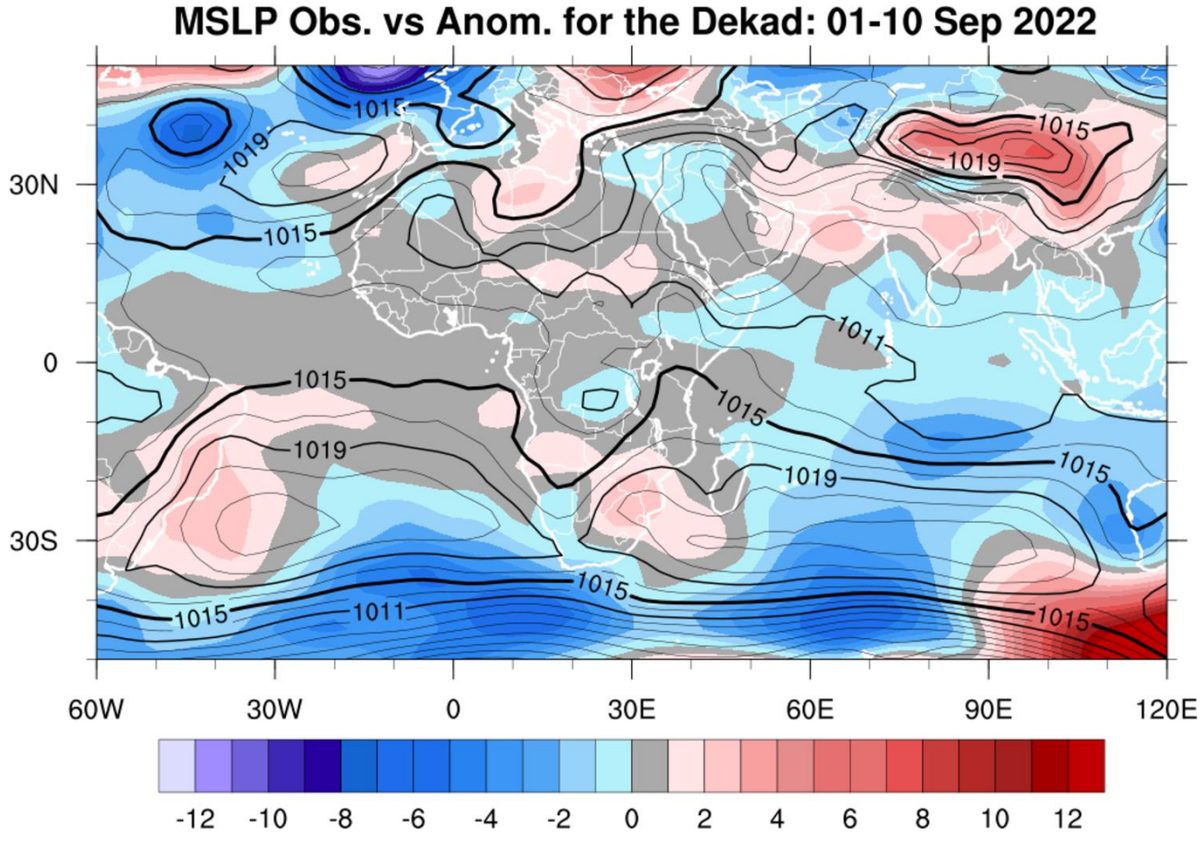


Figure 1: Week 1 Forecast and percent of average for same week

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

Last dekad



Same dekad last year

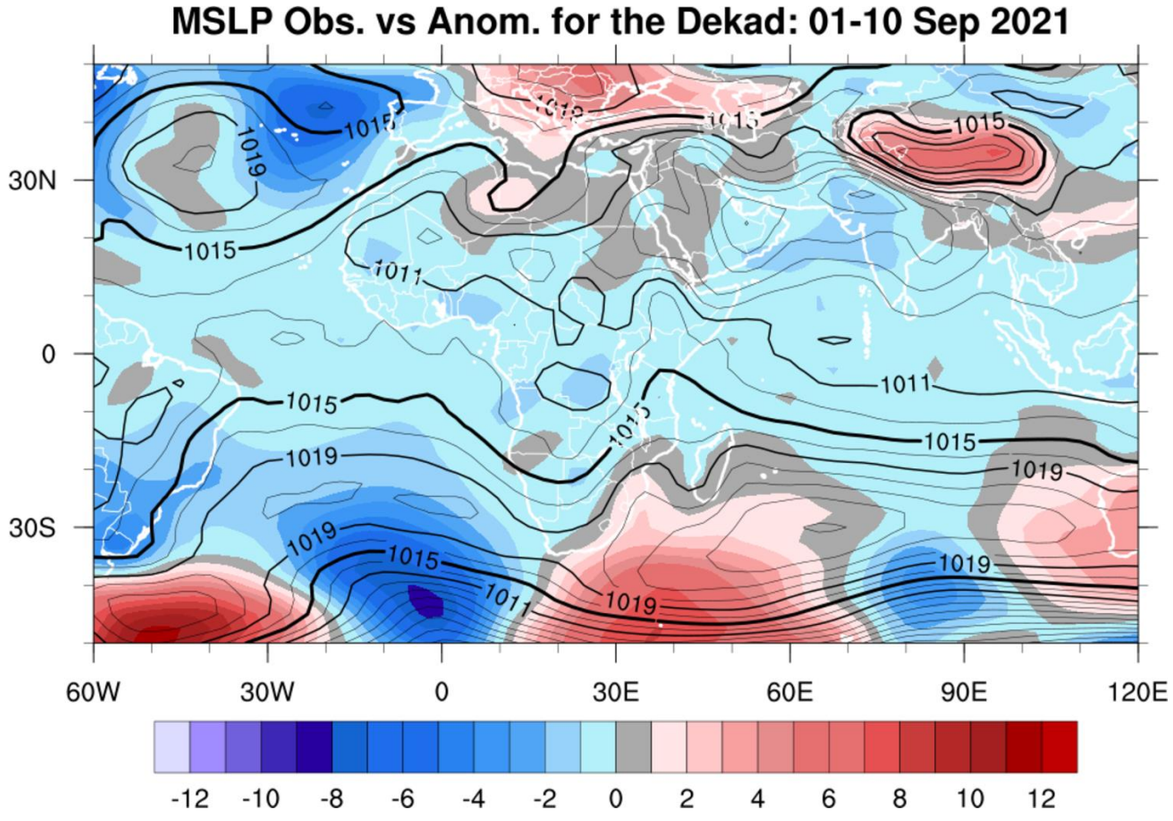
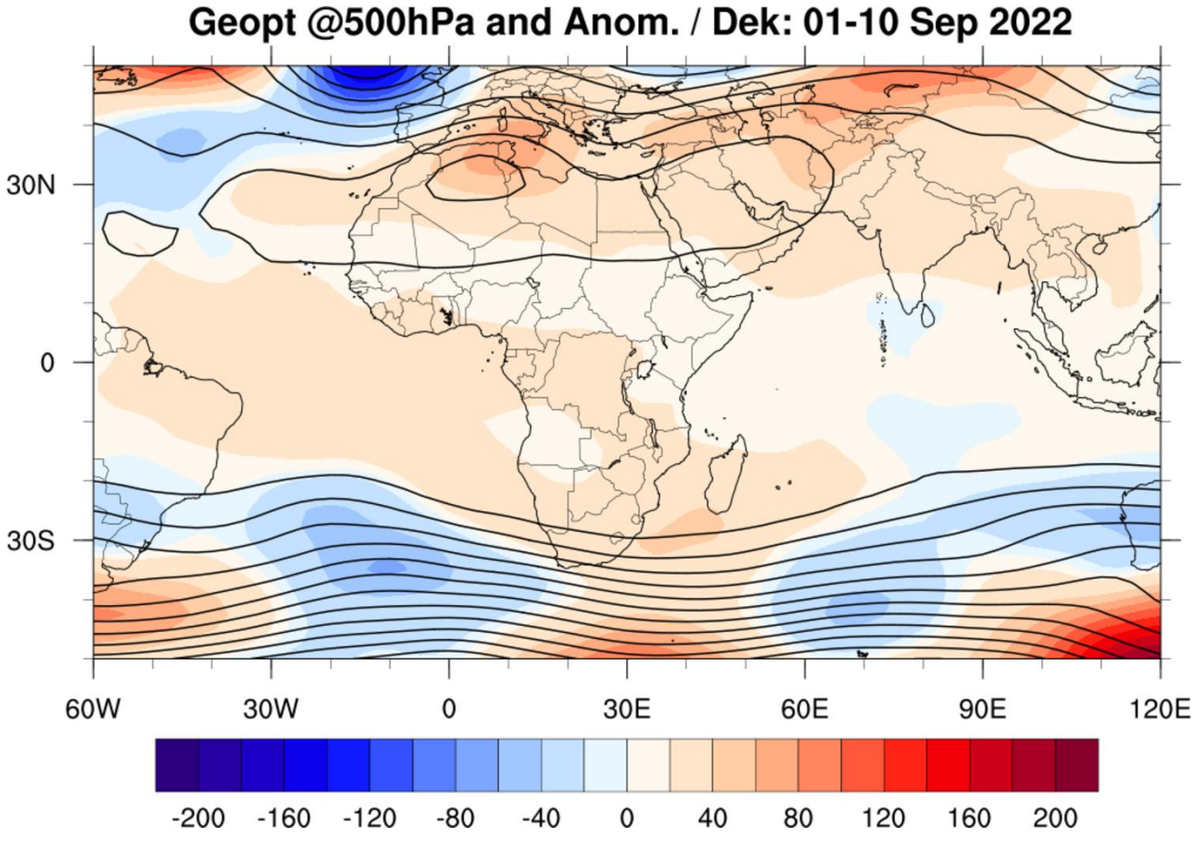


Figure 2: MSLP observation and anomaly

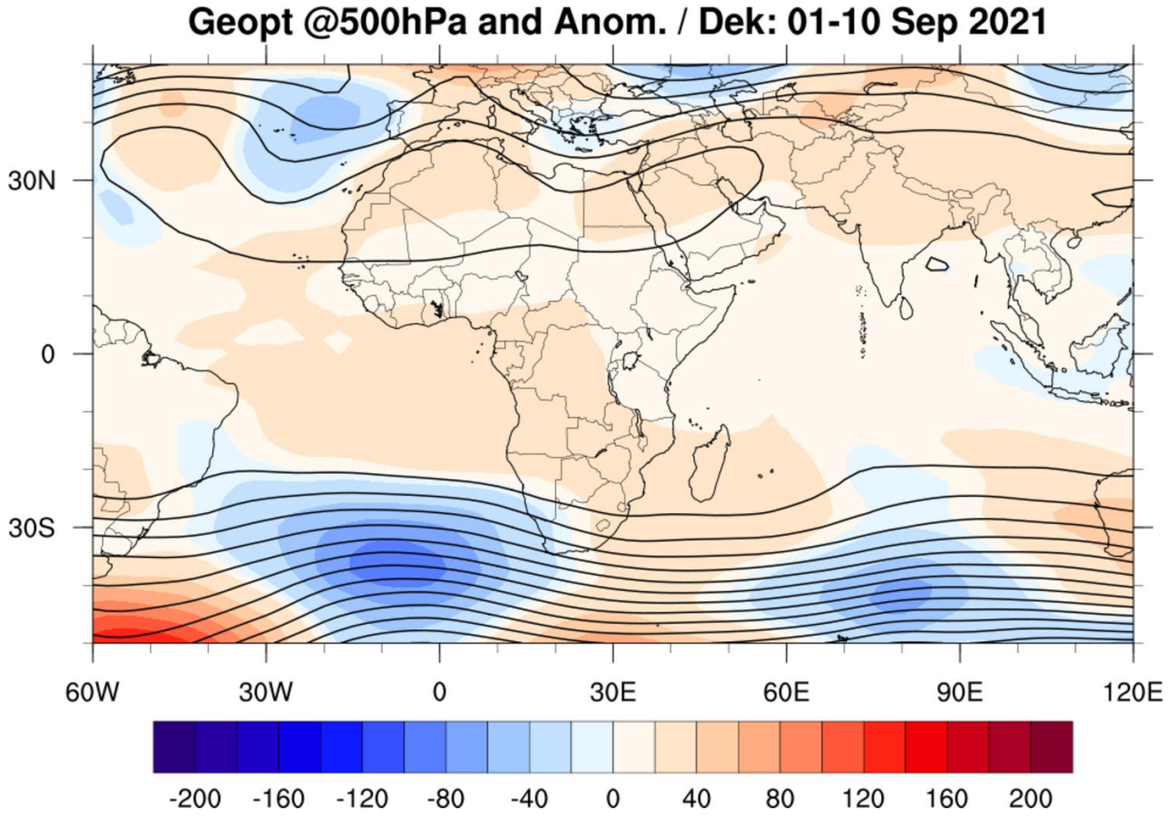
Data source: http://iridl.ldeo.columbia.edu/expert/SOURCES/.NOAA/.NCEP-NCAR/.CDAS-1/.DAILY/.Intrinsic/.MSL/.pressure

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

Last dekad



Same dekad last year



Estimated Cumulative Precipitation in % of average for the last Dekad

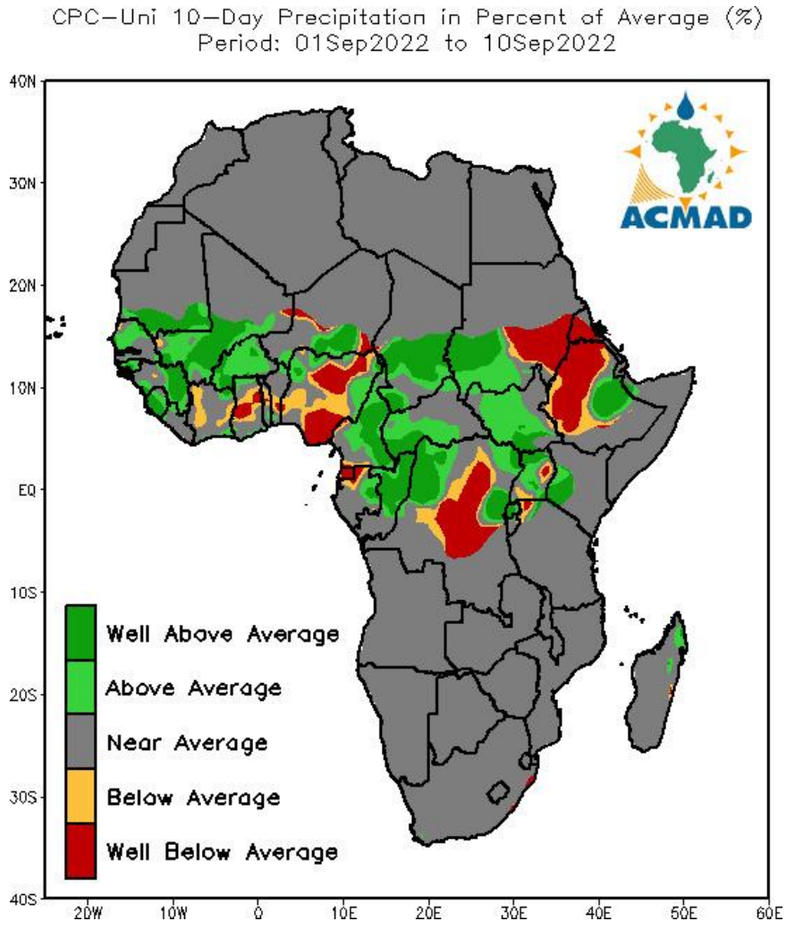


Figure 1: **This map displays decadal average precipitation in percent of average**

Data : SOURCES/.NOAA/.NCEP/.CPC/.FEWS/.Africa/.DAILY/.ARC2/.daily/.est_prcp/X/-20/0.5/70/GRID/Y/-40/0.5/40/GRID/T/%2821-31%20Jul%202014%20%29RANGE/T/SUM/

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

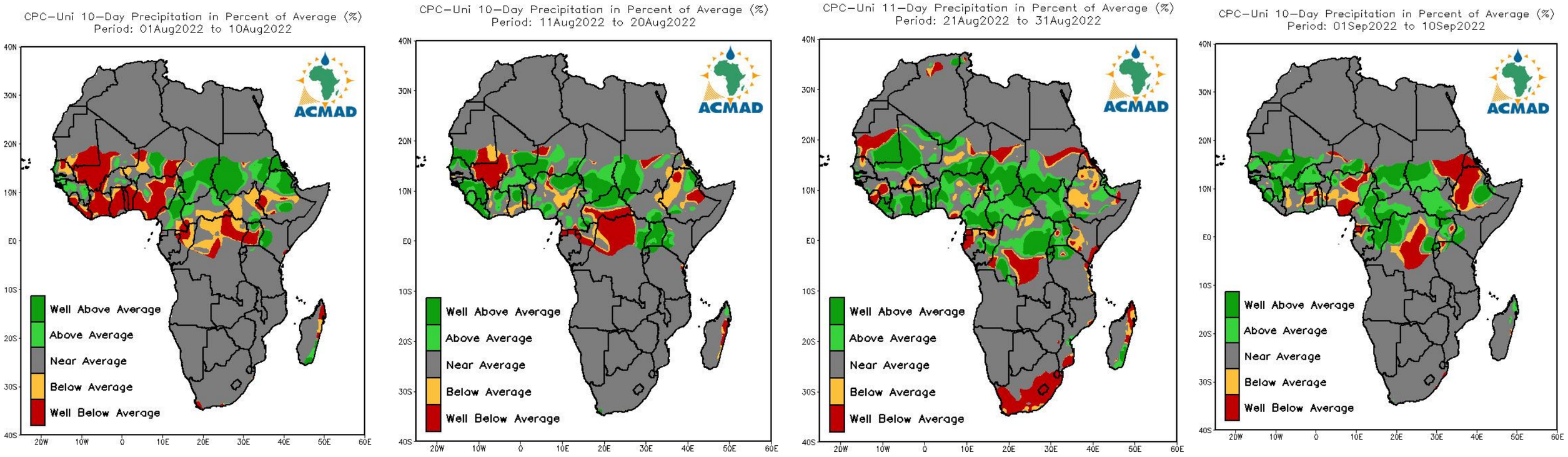
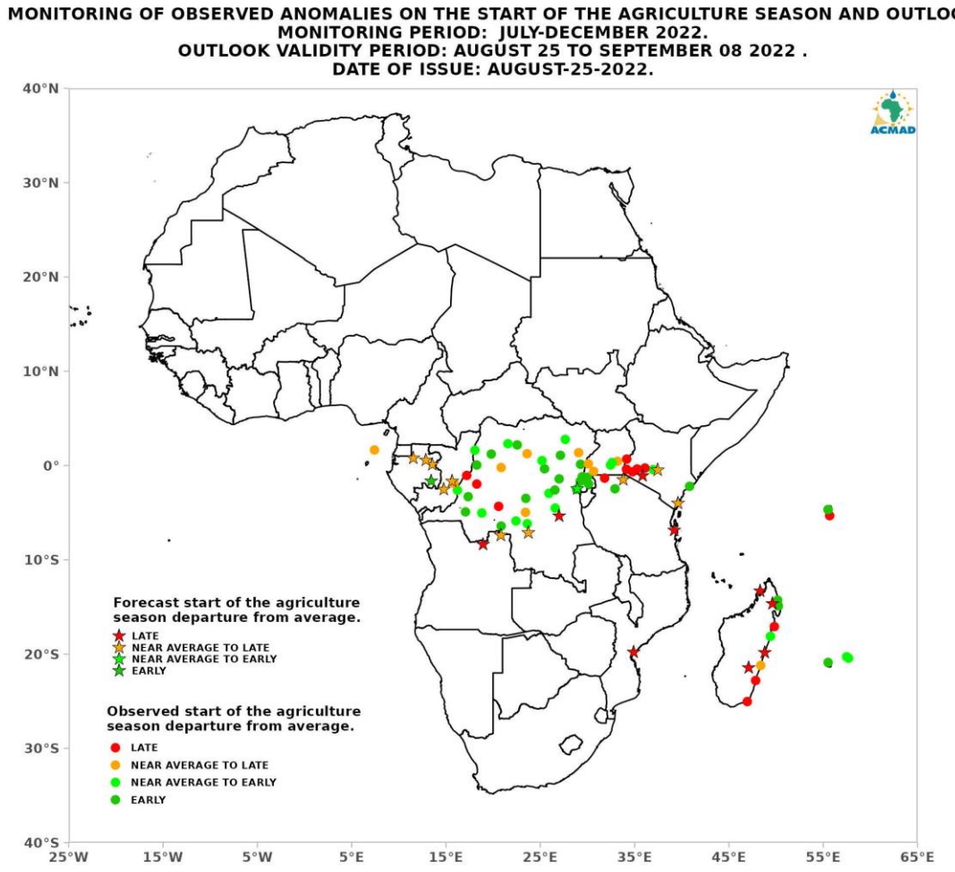


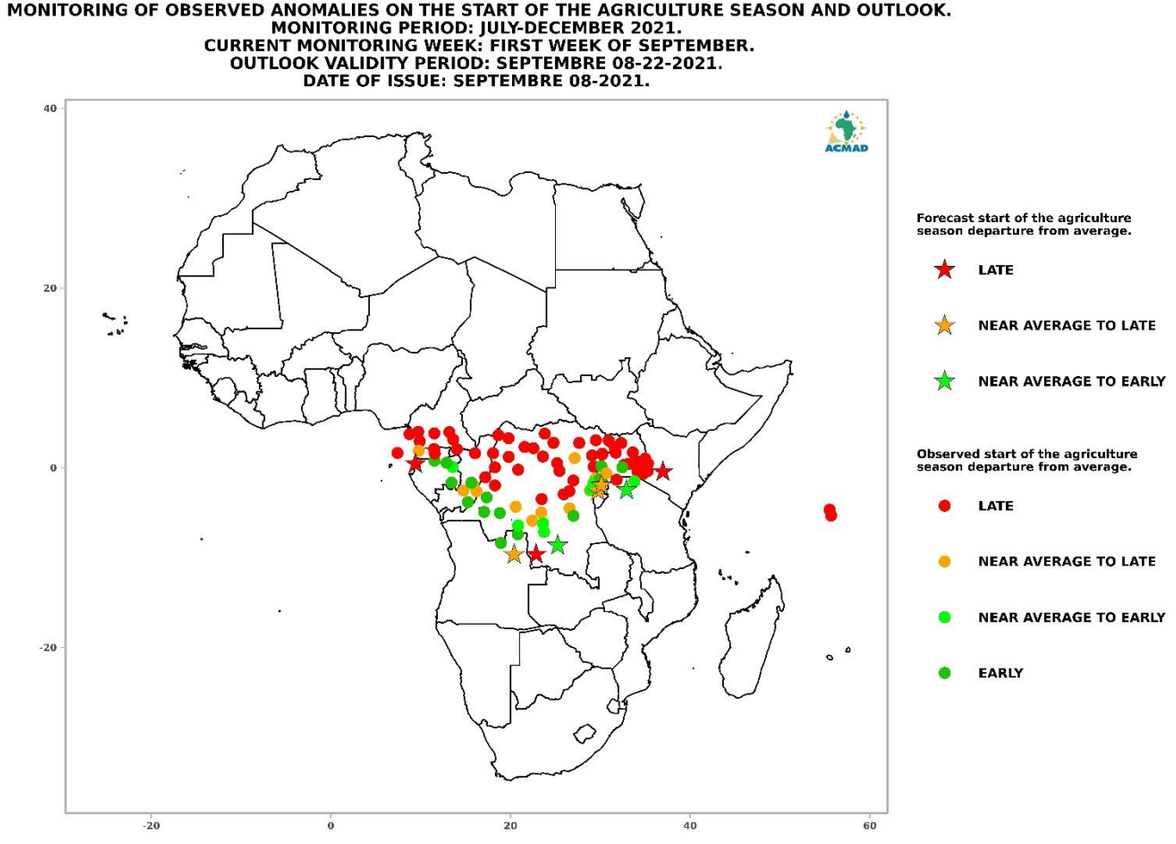
Figure 2: **This maps display decadal average precipitation in percent of average**

Start of Agricultural Season – Current and Outlook

Current Year



Last year at the same time



OLR Anomalies
During the passed 3 Dekads

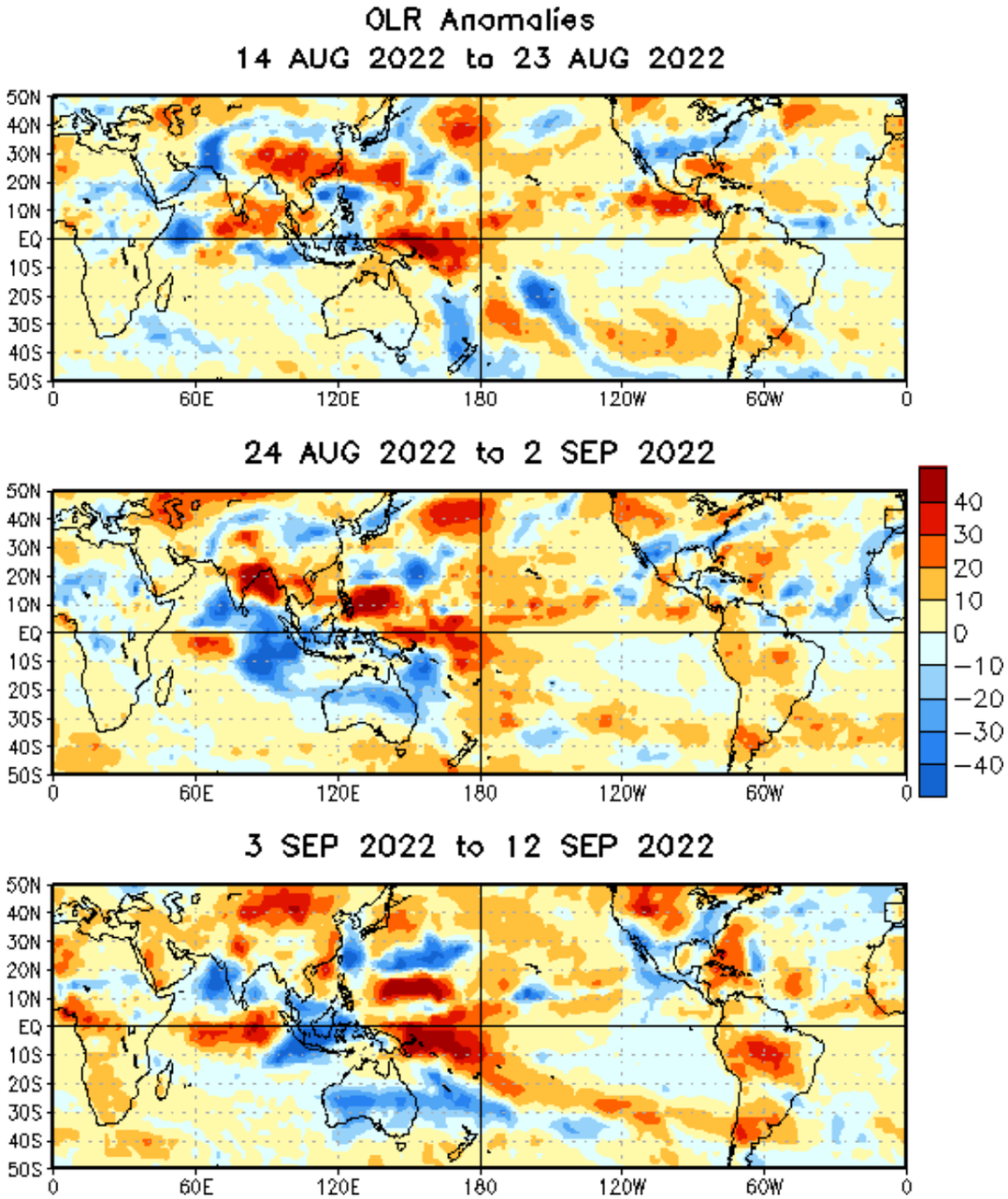
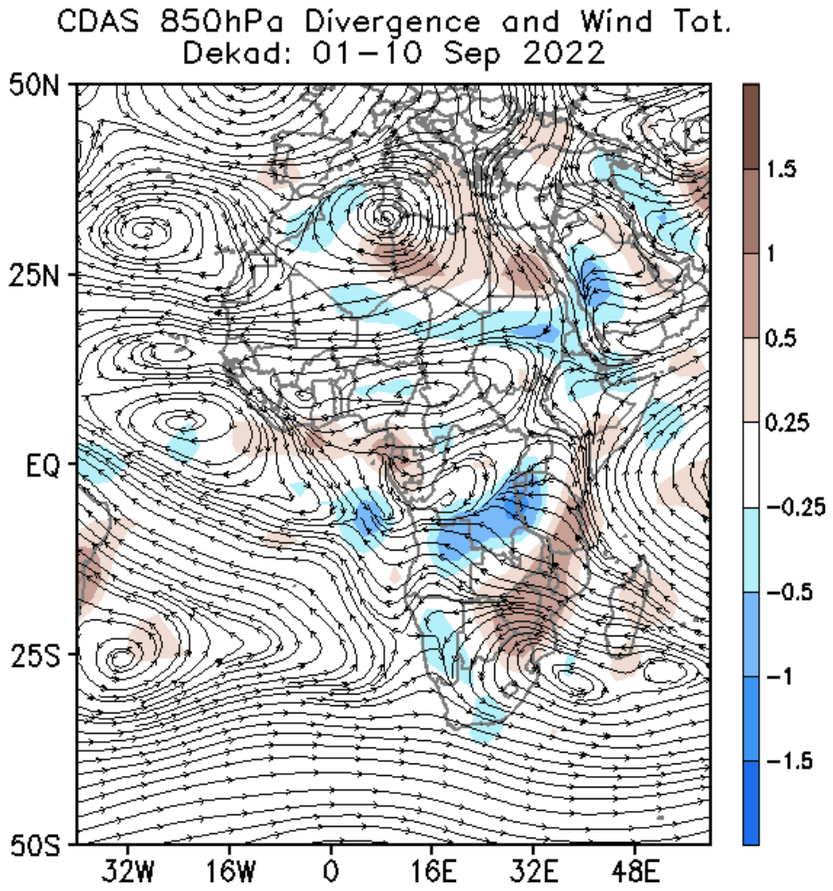
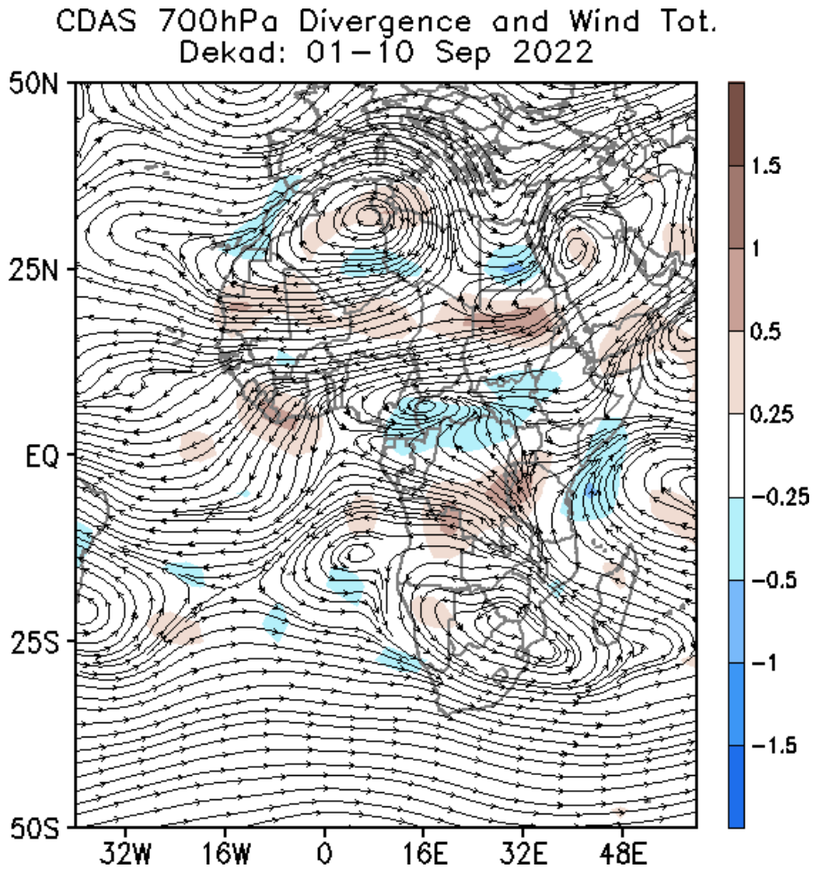


Figure 4: **Past 3 weeks OLR anomalies**

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





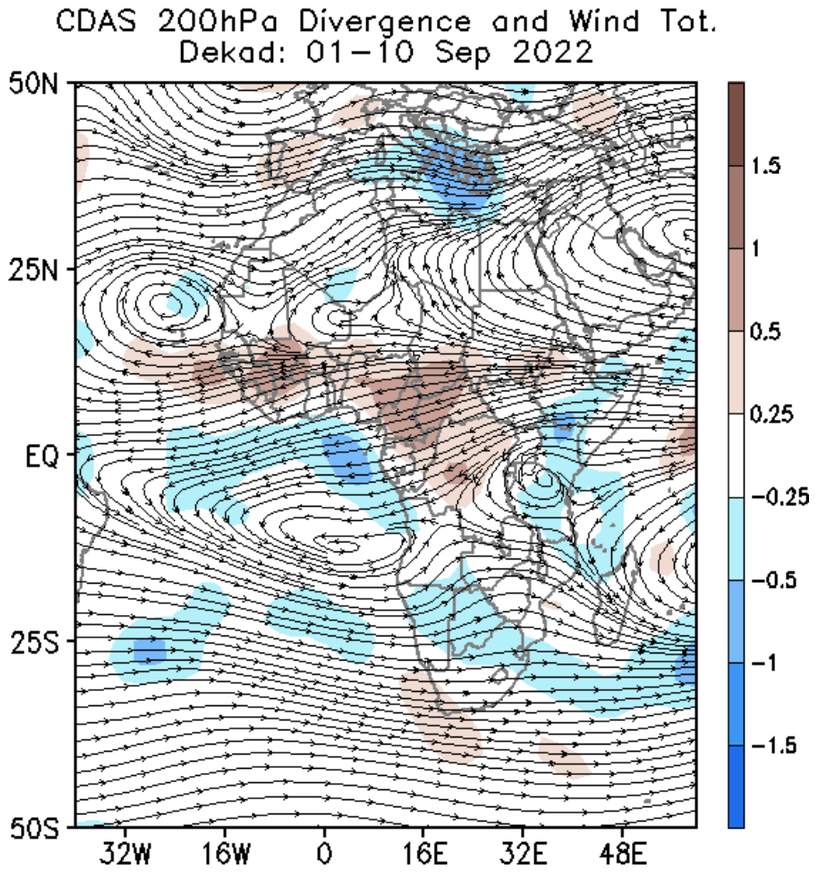


Figure 7: **Wind anomalies for 850hpa, 700hPa and 200hpa**

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

Climate Prediction Center - African Desk: SWFDP GFS FORECASTS (noaa.gov)

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

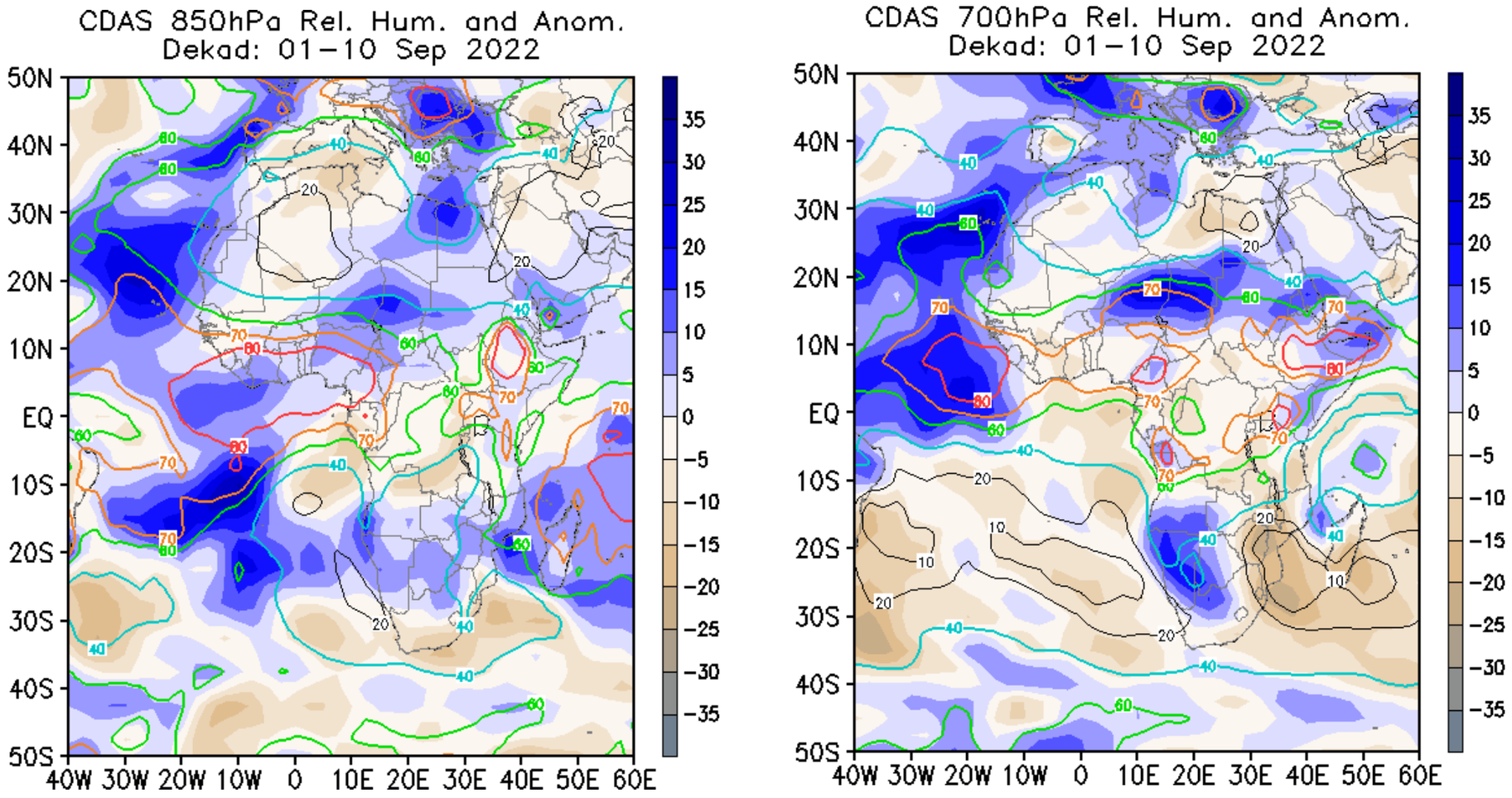
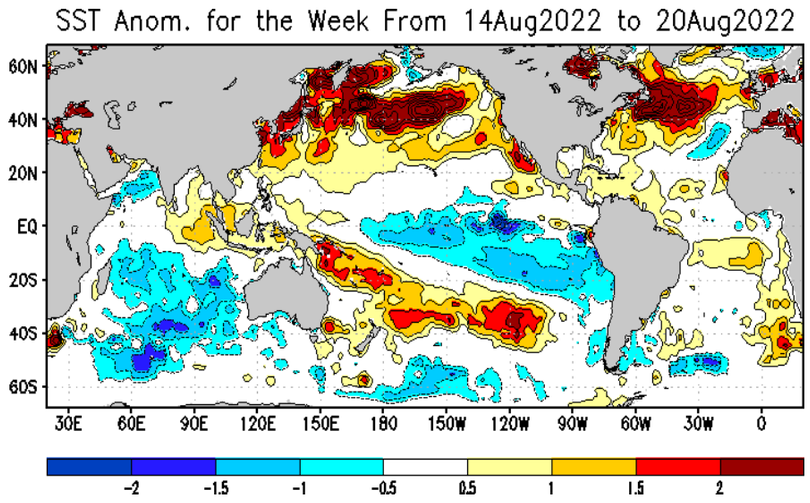
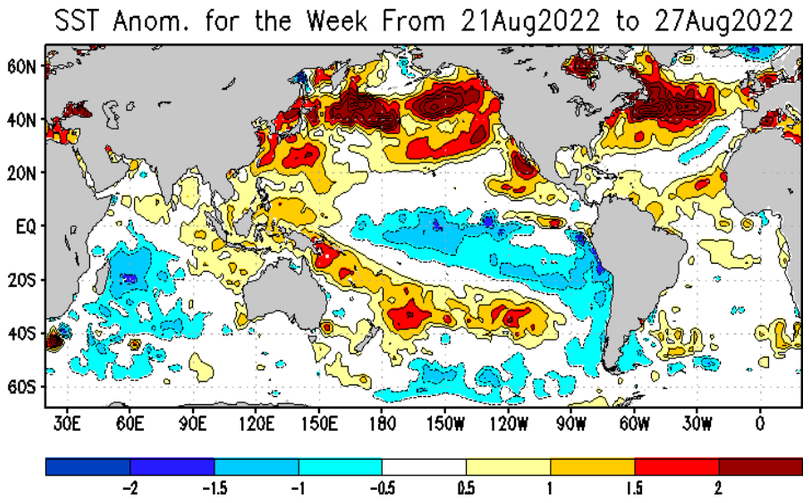


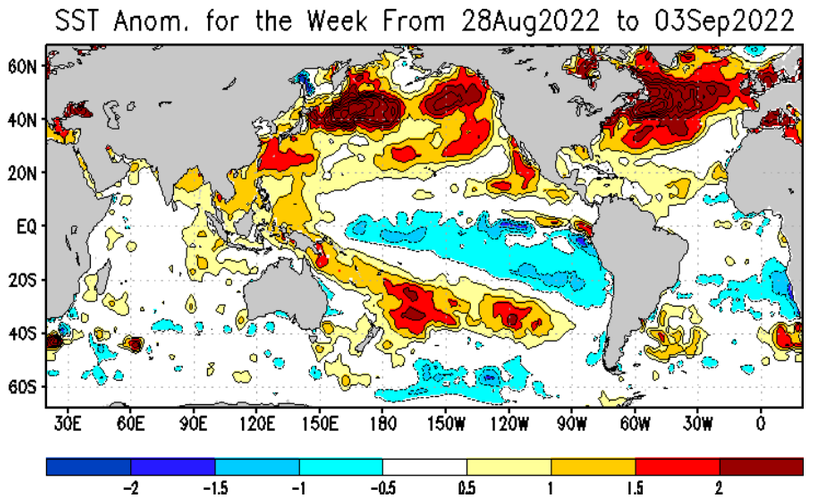
Figure 8: **Relative Humidity Anomaly at 850hPa (left) and 700hPa (right)**

http://iridl.ldeo.columbia.edu/expert/SOURCES/.NOAA/.NCEP-NCAR/.CDAS-1/.DAILY/.Intrinsic/.PressureLevel/.rhum

Weekly Sea Surface Temperature Anomaly during the last four weeks







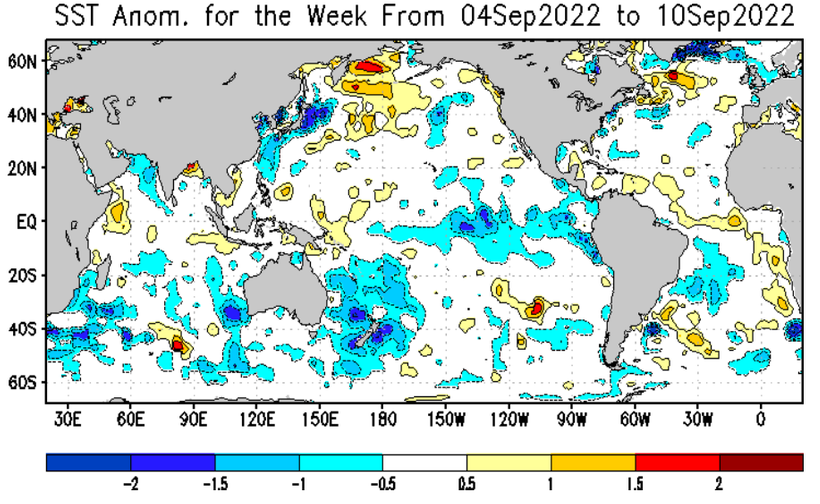
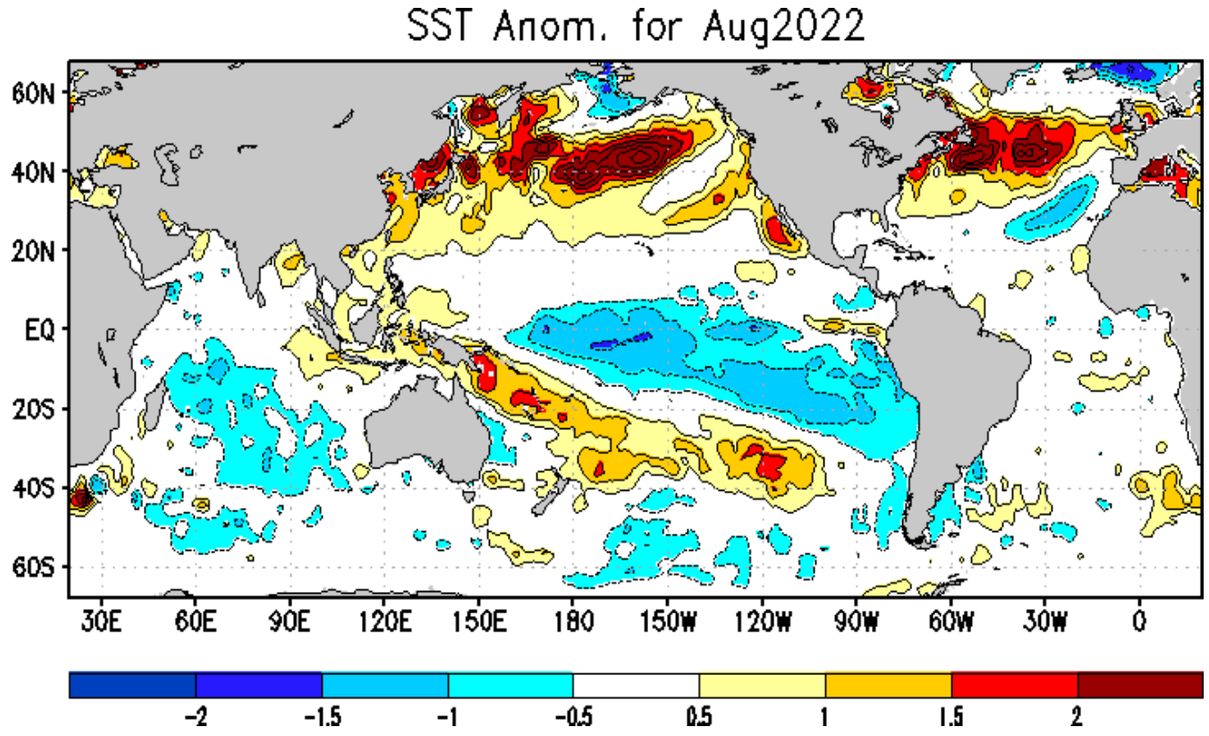


Figure 9: Maps display weekly sea surface temperature anomalies over the globe for last four weeks

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 SurfaceTemperatures (SST) Observed



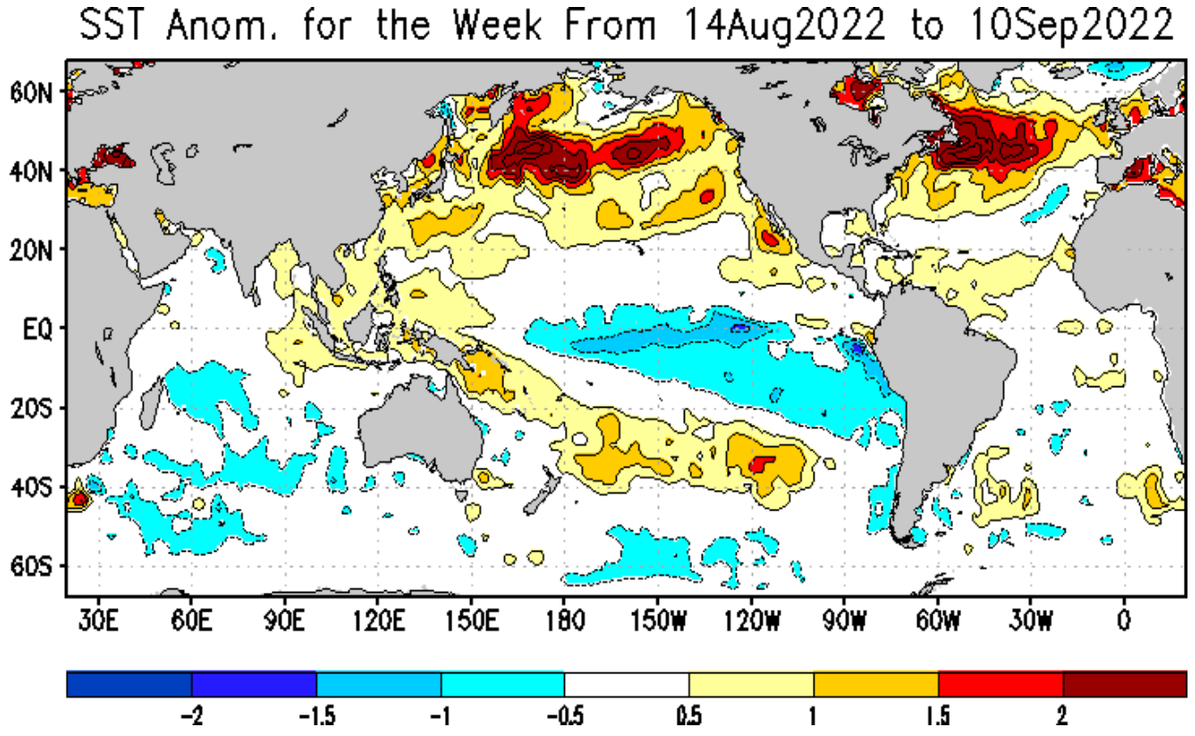


Figure 10 : Maps display monthly sea surface temperature anomalies over the globe.

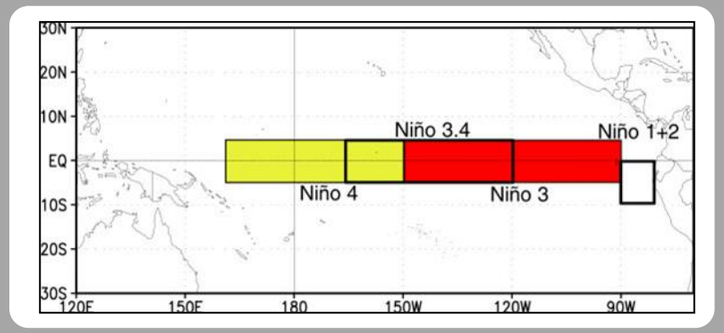
https://psl.noaa.gov/map/clim/sst.shtml
http://iridl.ldeo.columbia.edu/maproom/Global/Ocean_Temp/Anomaly.html
http://sgbd.acmad.org:8080/thredds/fileServer/ACMAD/CDD/ClimateBulletin_TN/OBS_SST_ANOM/weekly/sst_anom_4Weeks.png
http://sgbd.acmad.org:8080/thredds/fileServer/ACMAD/CDD/ClimateBulletin_TN/OBS_SST_ANOM/monthly/mth_ano_vs_9120/sst_anom_last-Month.png

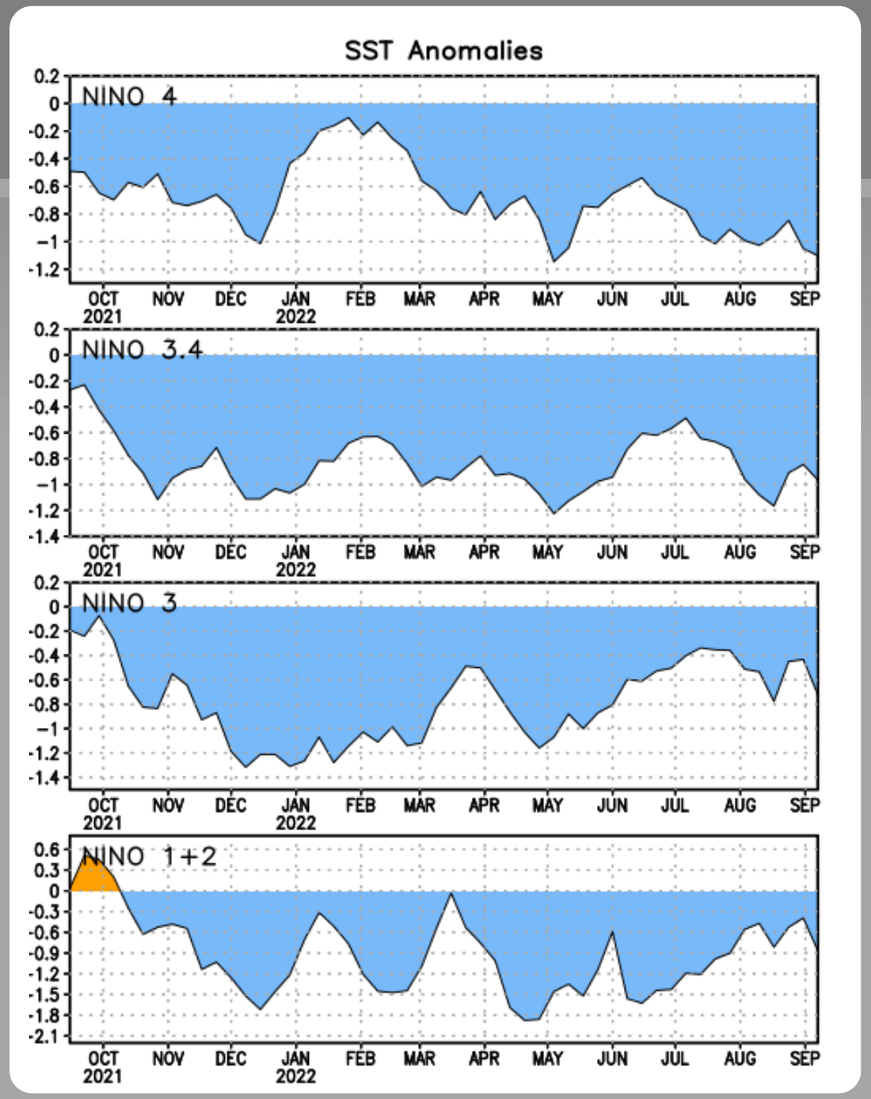
1. Climate Monitoring
2. Status of Drivers
   - ENSO - Obs and Forecast
   - Current 200 hPa Velocity Potential
   - MJO – Current Status and Forecast
   - Weekly PWAT – Current Status and Forecast
   - Dekadal 200 hPa VP and Tropical waves
   - Dekadal Stream Function and Tropical Waves
3. Dynamical Model Forecast : Week 1 and 2
4. Week 1 and 2 Outlook

Niño Region SST Departures (ºC) Recent Evolution

The latest weekly SST departures are:

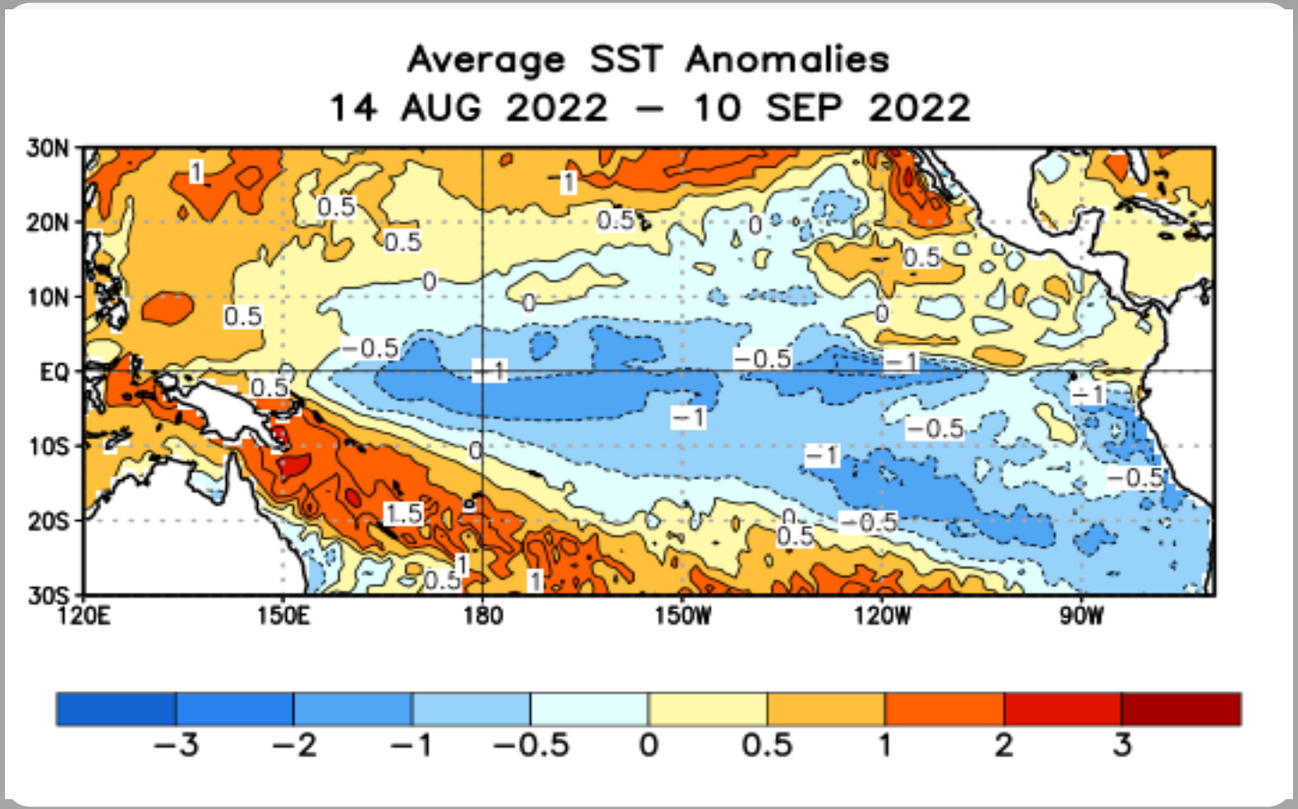
Niño 4	-1.1ºC
Niño 3.4	-1.0ºC
Niño 3	-0.7ºC
Niño 1+2	-0.9ºC





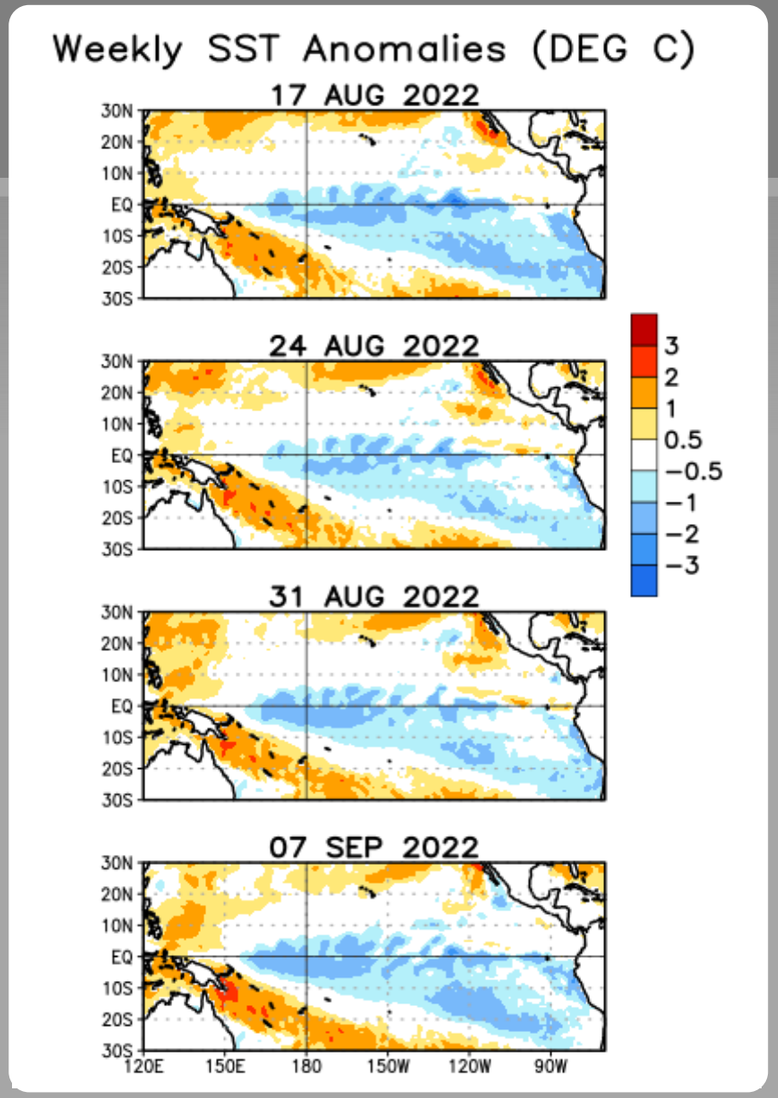
SST Departures (ºC) in the Tropical Pacific During the Last Four Weeks

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



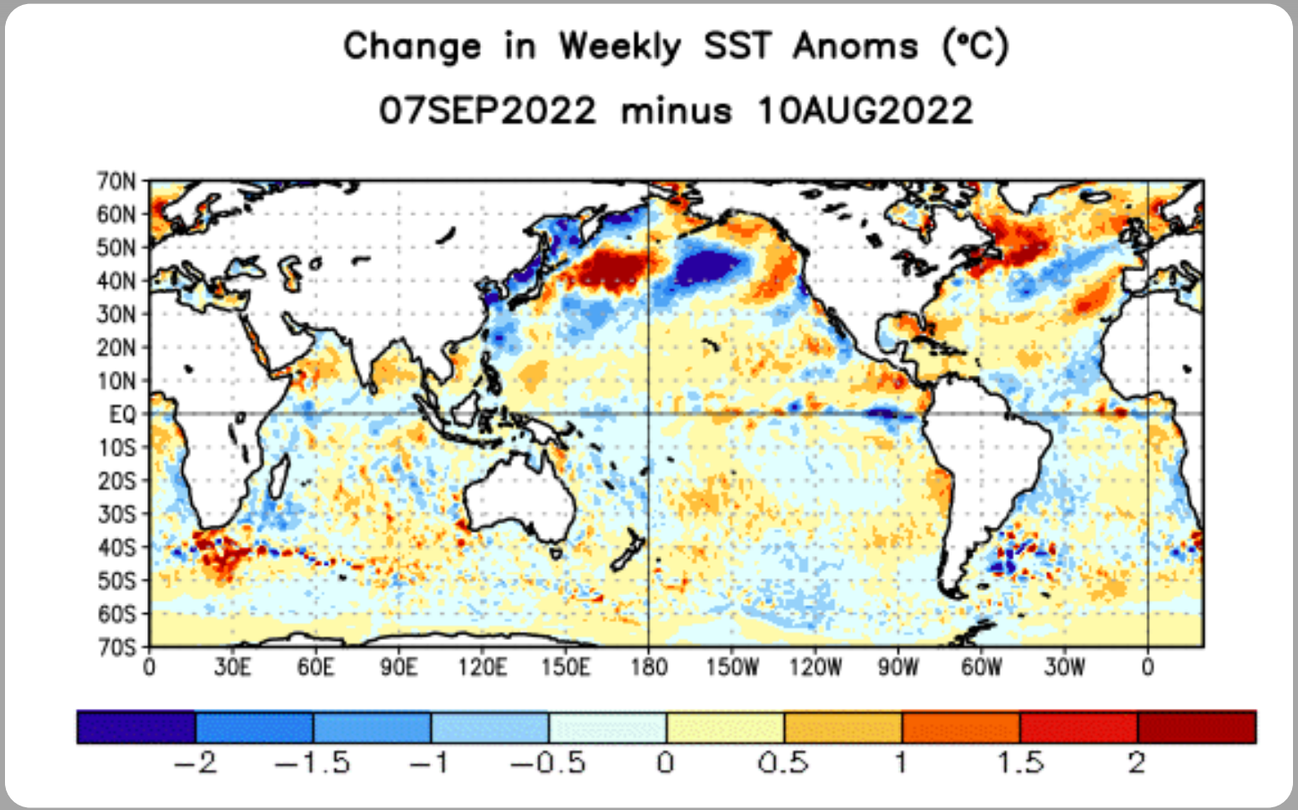
Weekly SST Departures during the Last Four Weeks

During the last 4 weeks, negative SST anomalies have persisted across the central and east-central equatorial Pacific Ocean.



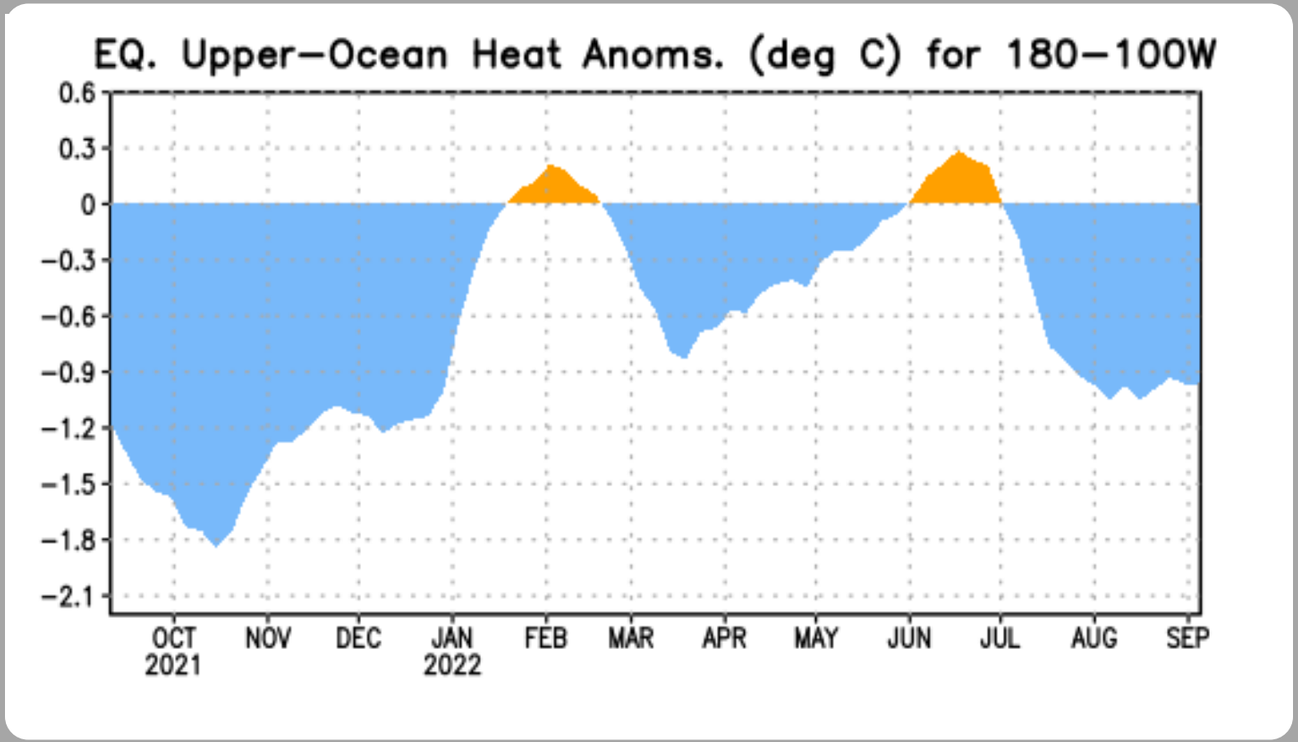
Change in Weekly SST Departures over the Last Four Weeks

During the last four weeks, small regions of positive and negative changes in equatorial SST anomalies were observed across most of the Pacific Ocean. A negative change is evident in the far eastern Pacific Ocean



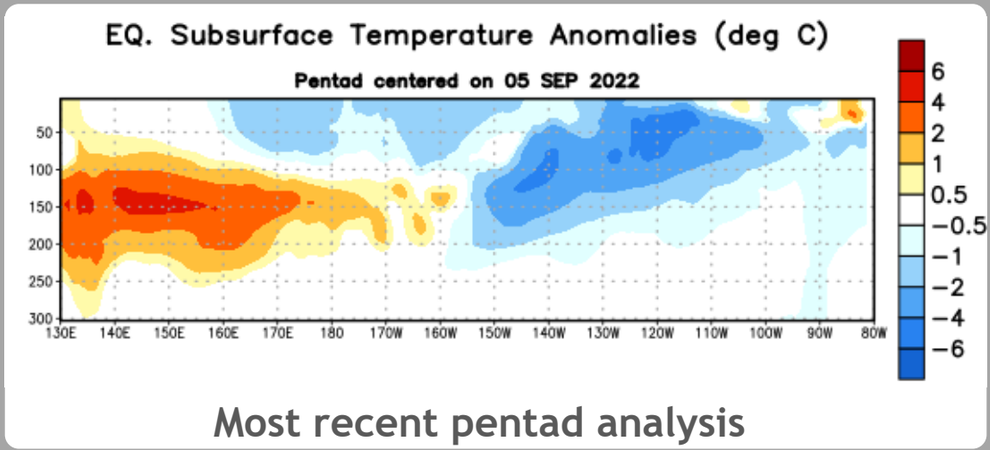
Central and Eastern Pacific Upper-Ocean (0-300 m) Weekly Average Temperature Anomalies

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 decreased from mid-June through July and have remained negative



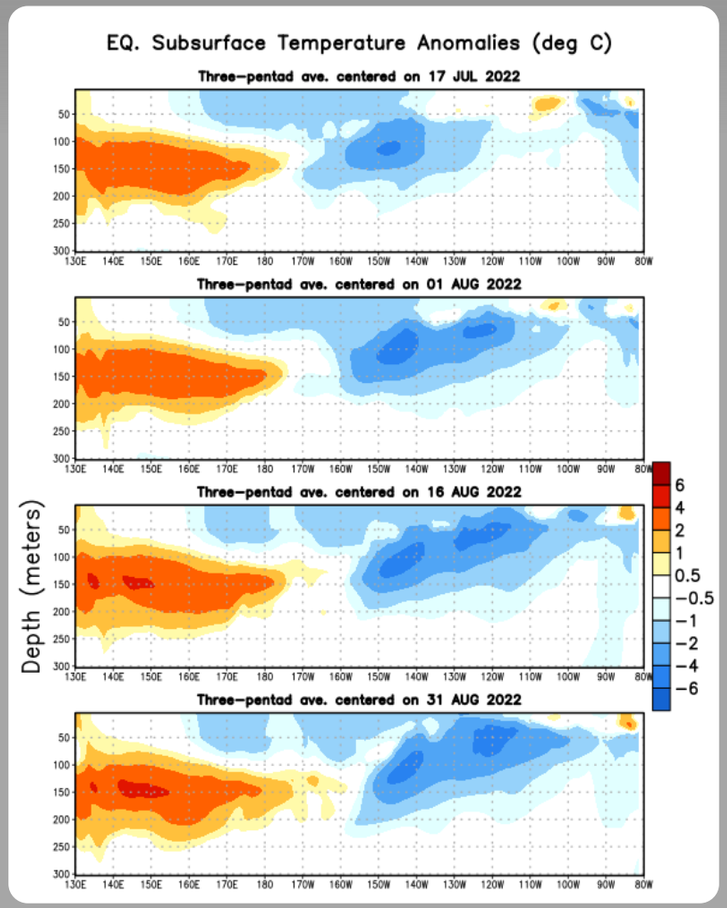
Sub-Surface Temperature Departures in the Equatorial Pacific

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



Most recent pentad analysis

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



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

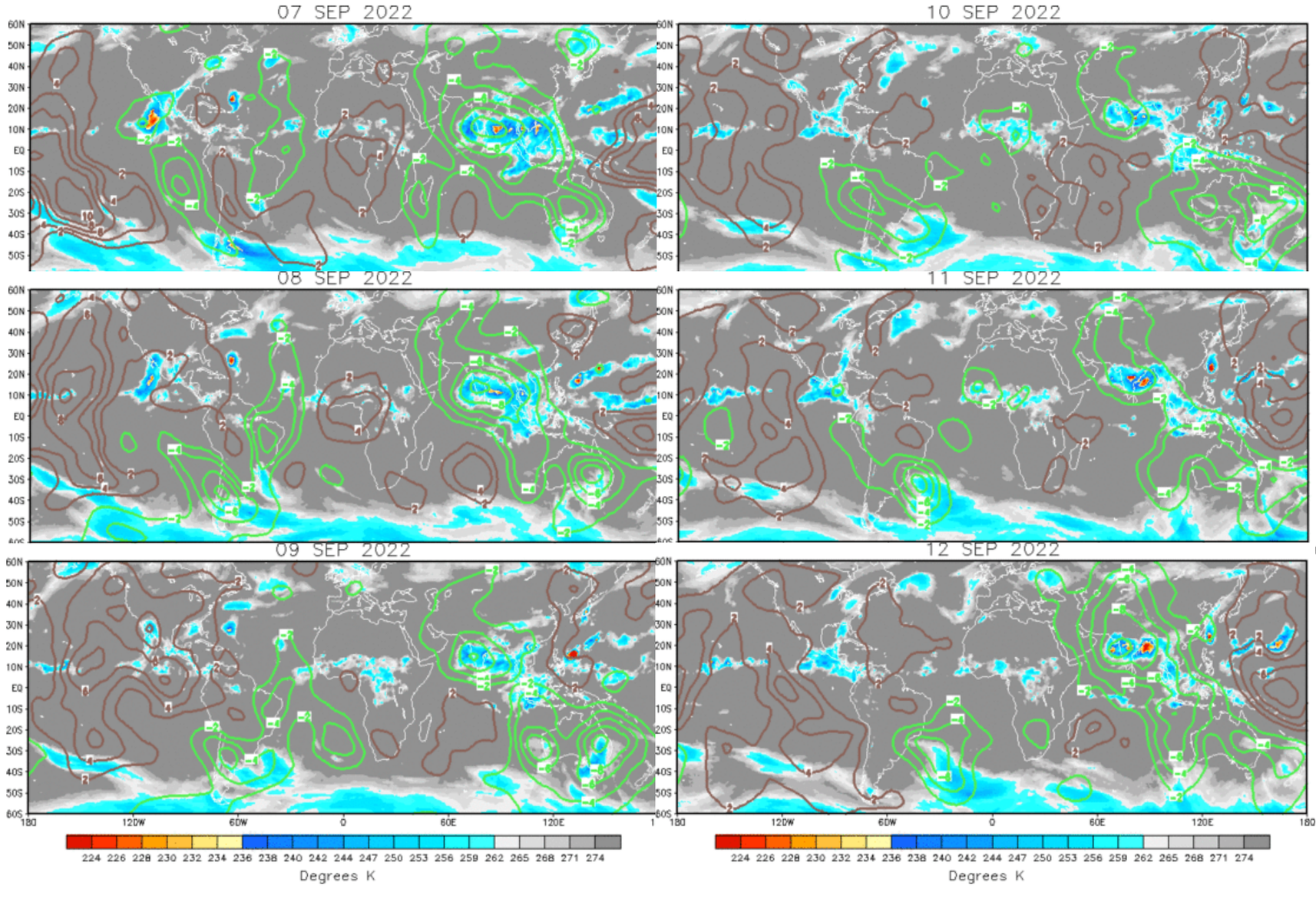


Figure 12: **IR image and Velocity Potential anomalies**

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
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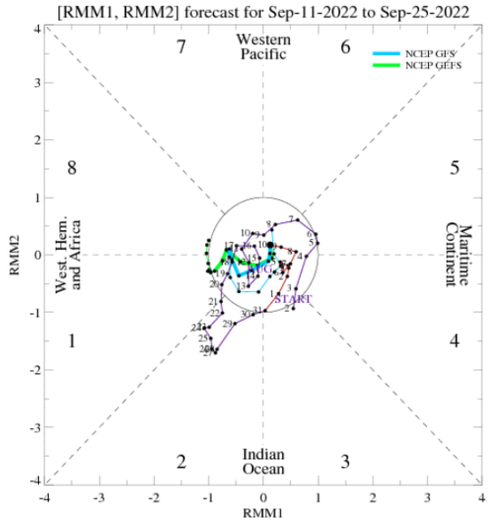
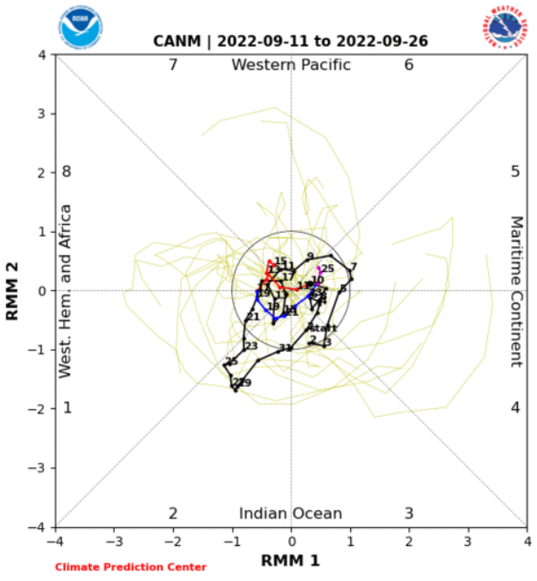
https://www.cpc.ncep.noaa.gov/products/precip/CWlink/vpotgifs/am_ir_monthly_1.gif

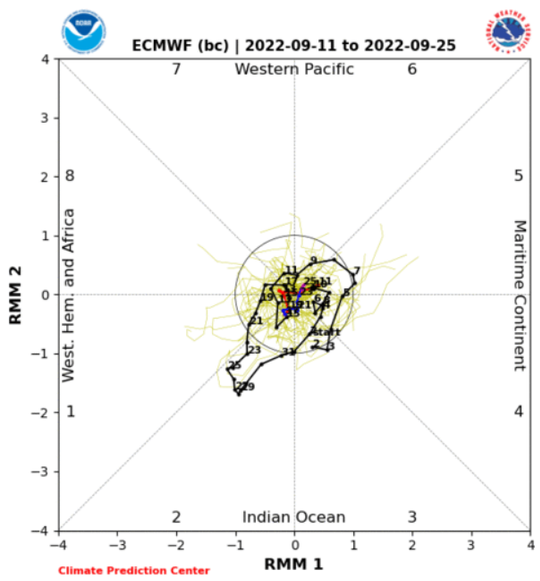
MJO – Current Status and Forecast

Add BoM, UKMet and DWD

Ensemble GFS Phase Diagram







Operational CFSv2 Phase Diagram

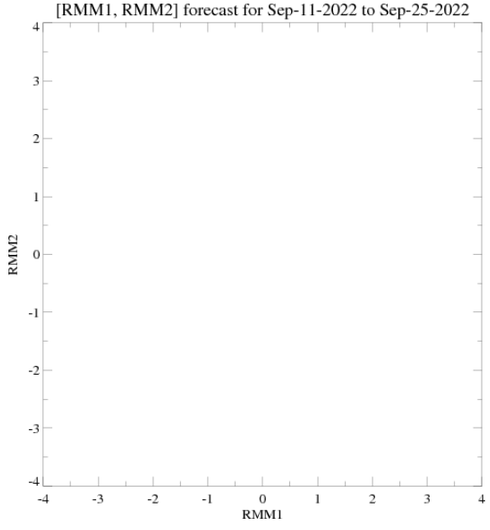


Figure 14: MJO RMM Forecasts from ECMWF, NCEP and UK Met Office, JMA

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

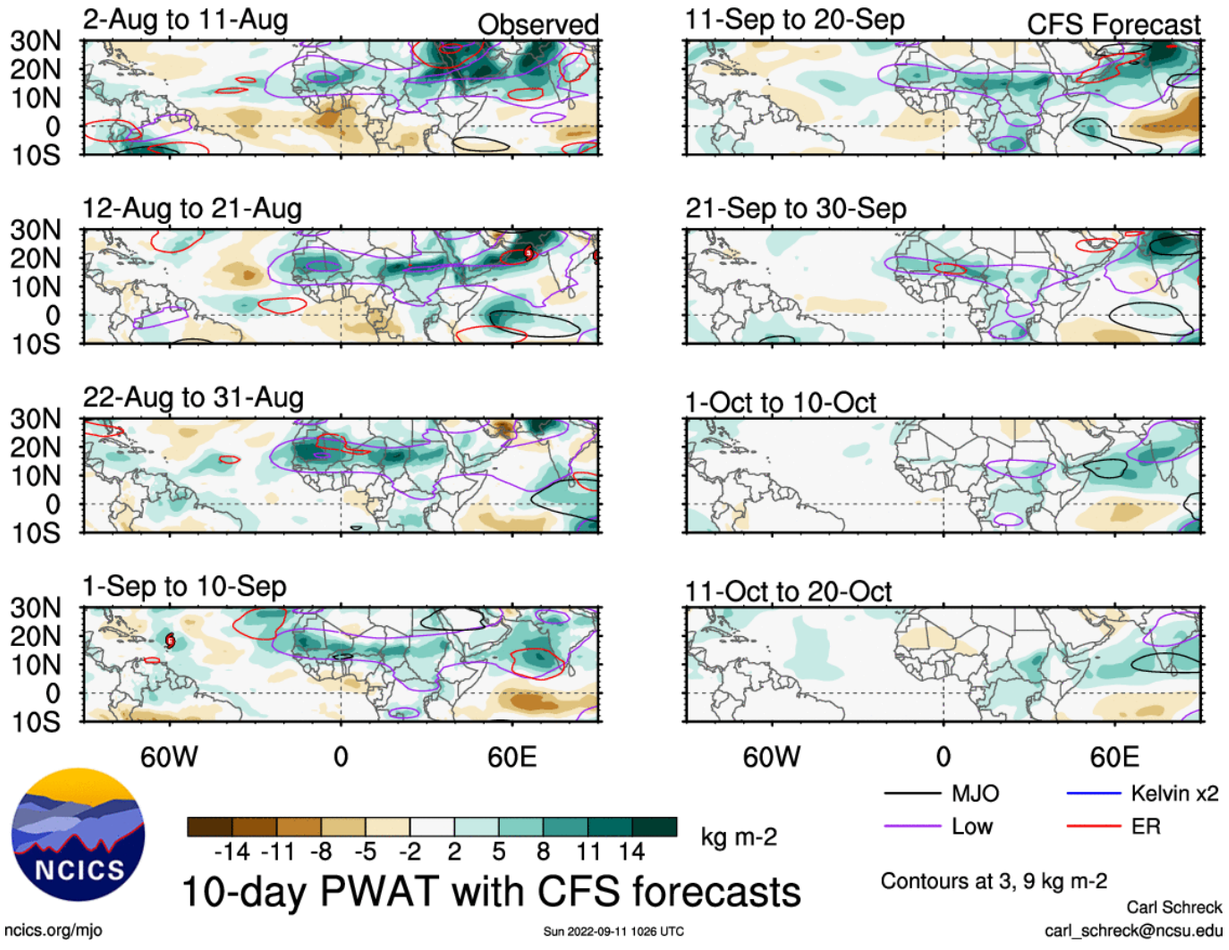


Figure 7a: Africa

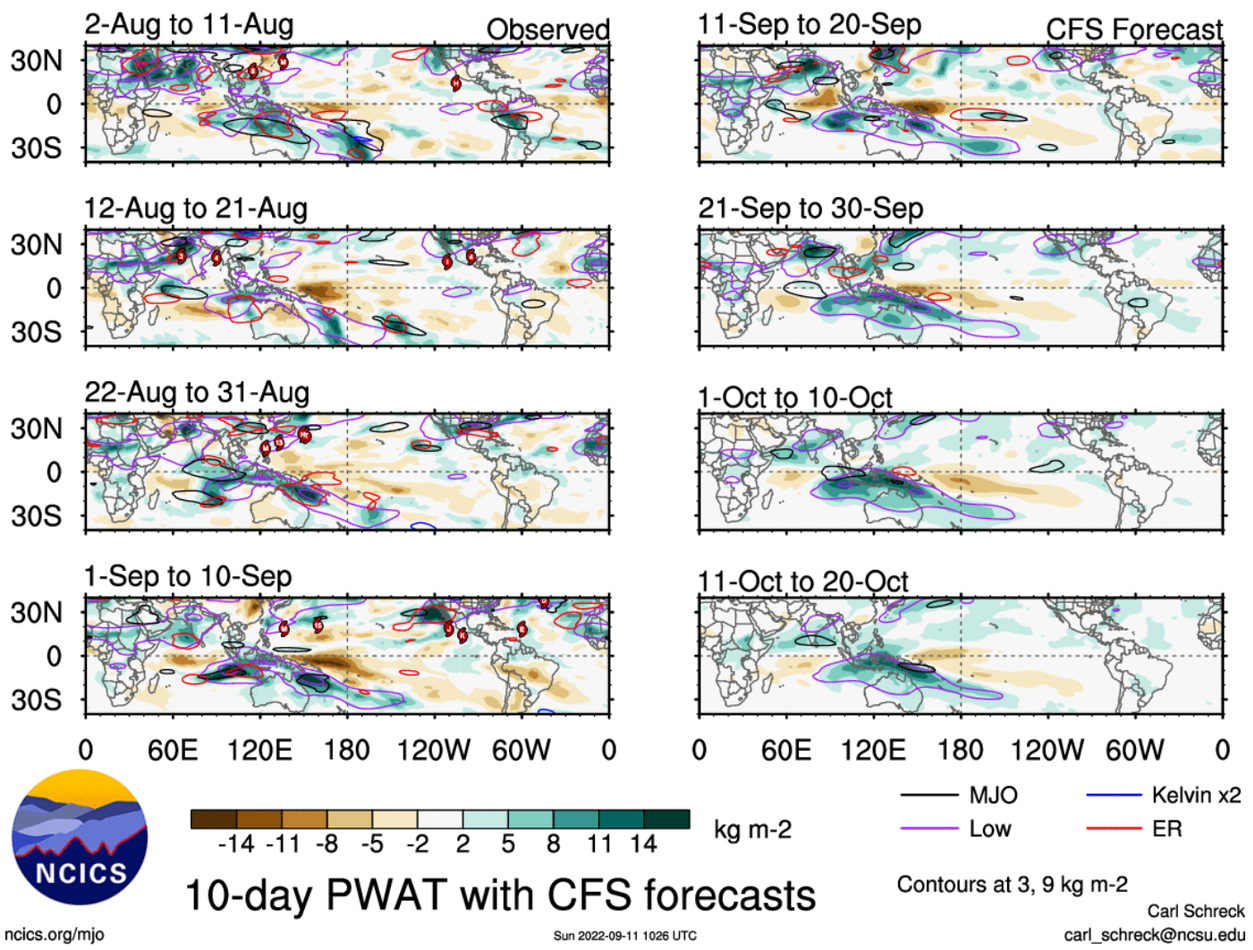
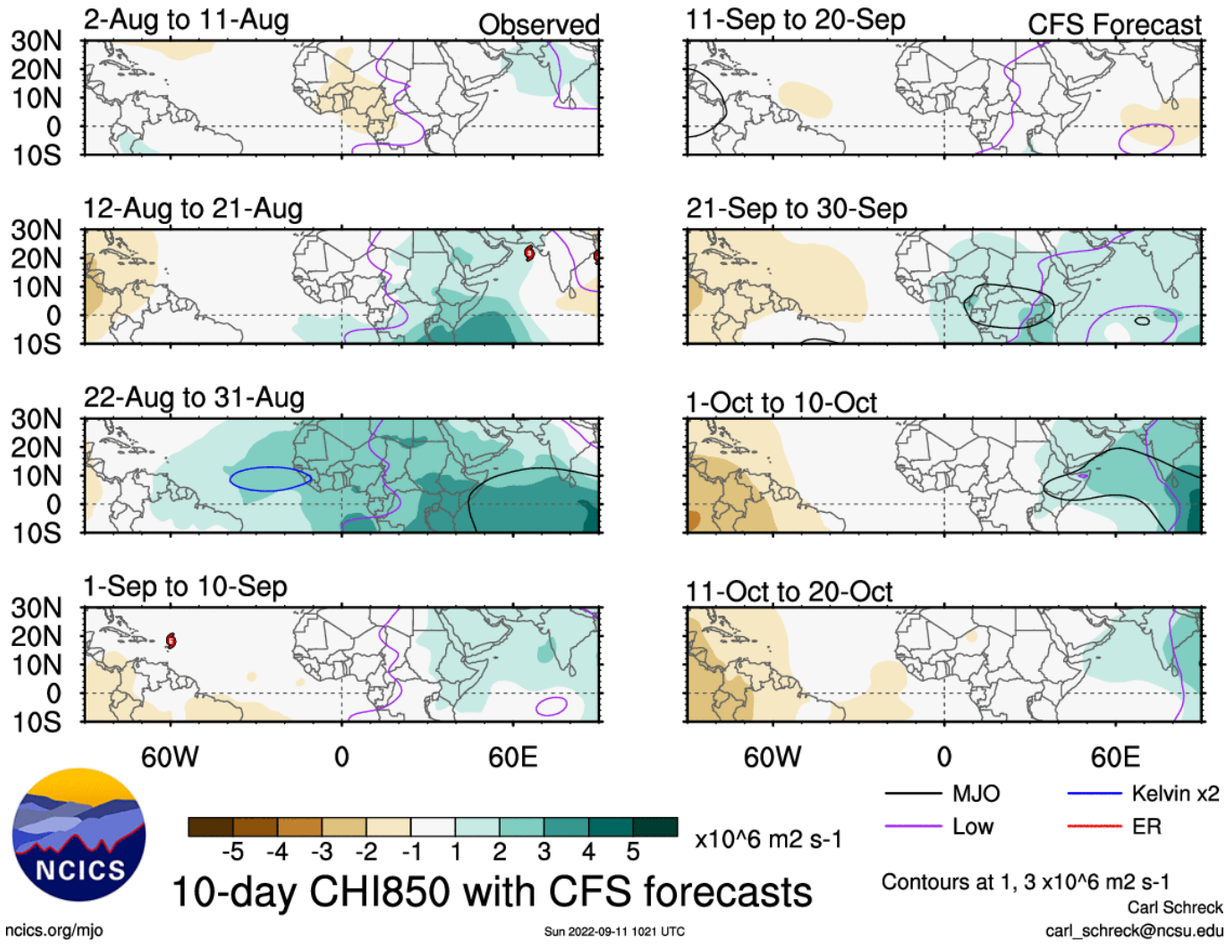


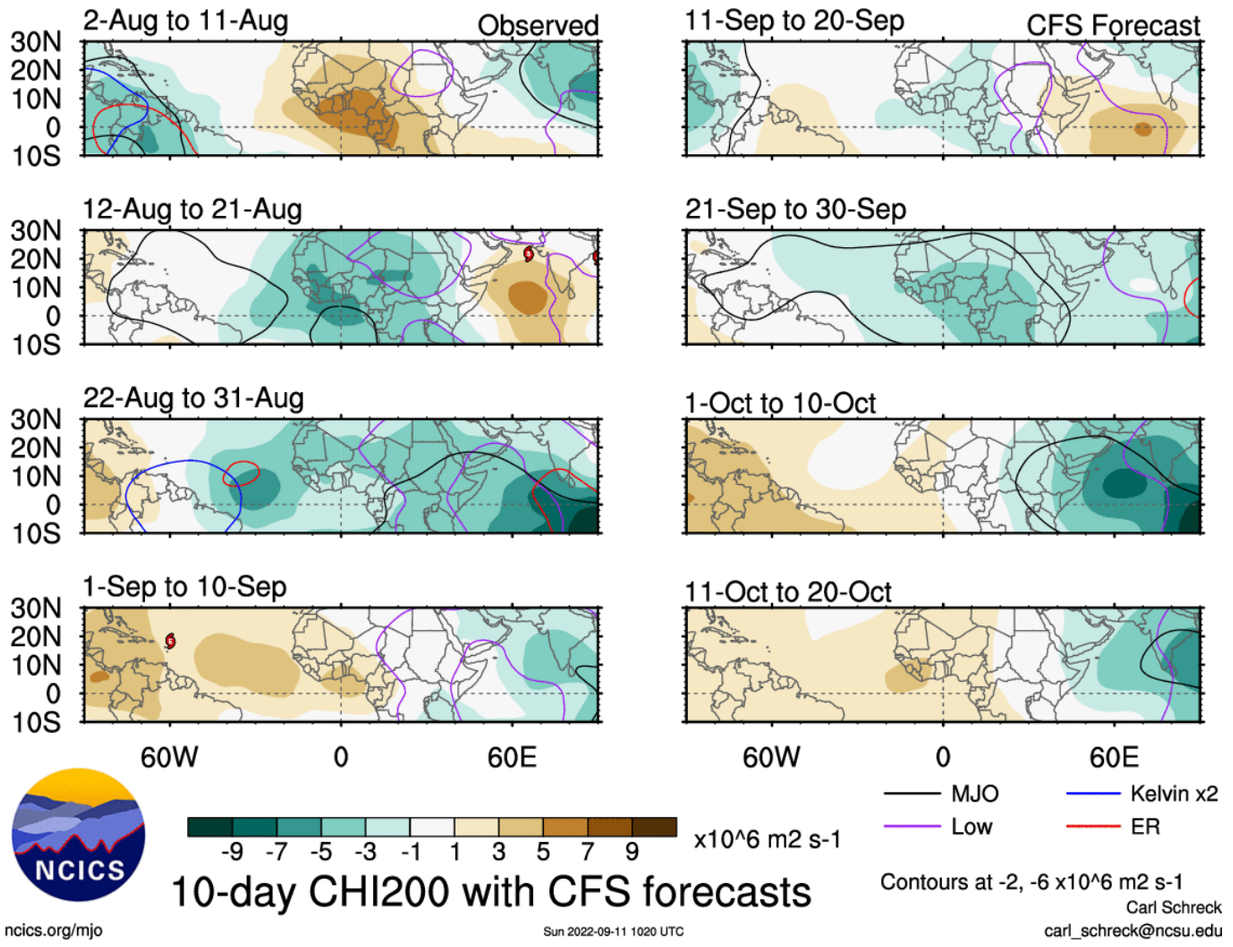
Figure 7b: Global

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



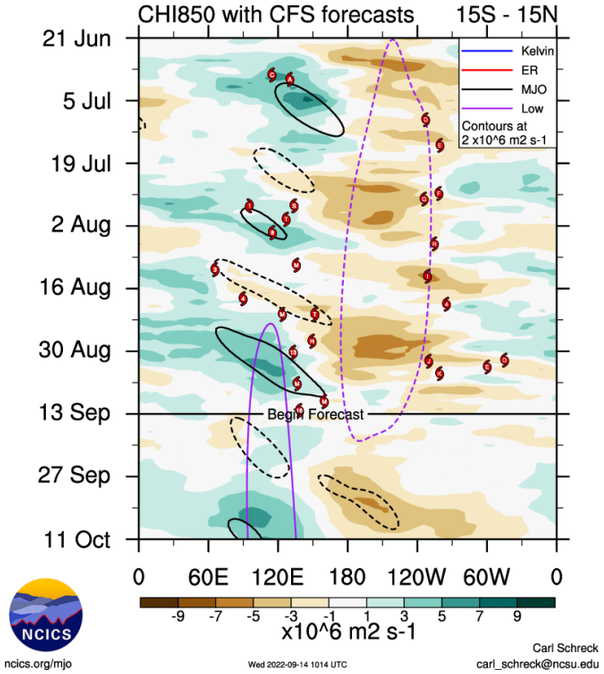


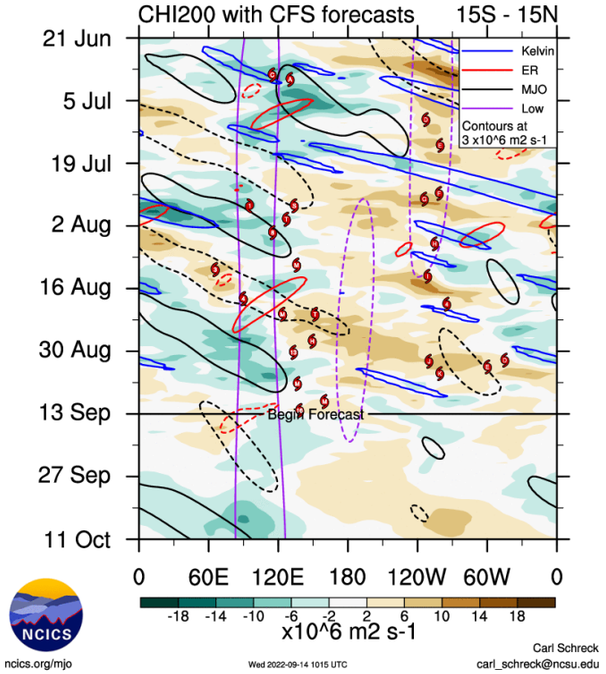
https://ncics.org/pub/mjo/v2/map/chi850.cfs.all.global.10.png
https://ncics.org/pub/mjo/v2/map/chi200.cfs.all.global.10.png
https://ncics.org/pub/mjo/v2/map/chi850.cfs.all.africa.10.png
https://ncics.org/pub/mjo/v2/map/chi200.cfs.all.africa.10.png

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

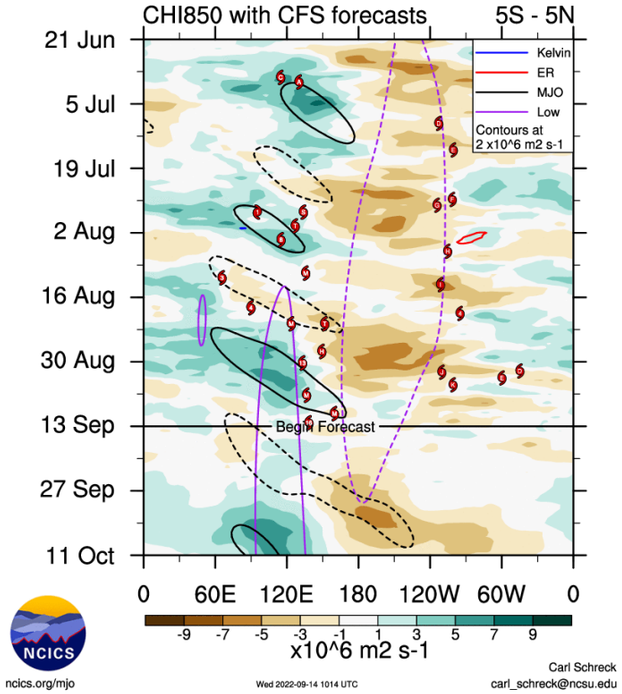
Dekadal Velocity Potential Anomalies – Obs and Fcst: Hovmoller diagram

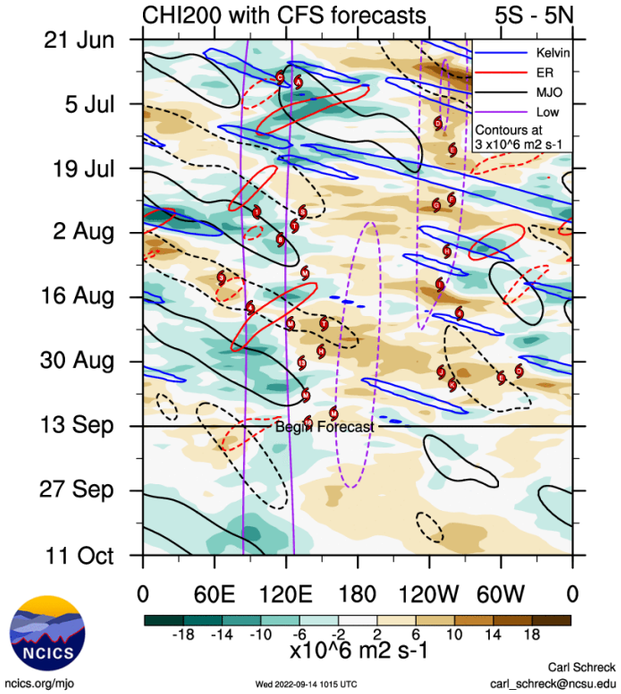
Average Anomalies in the band 15S-15N





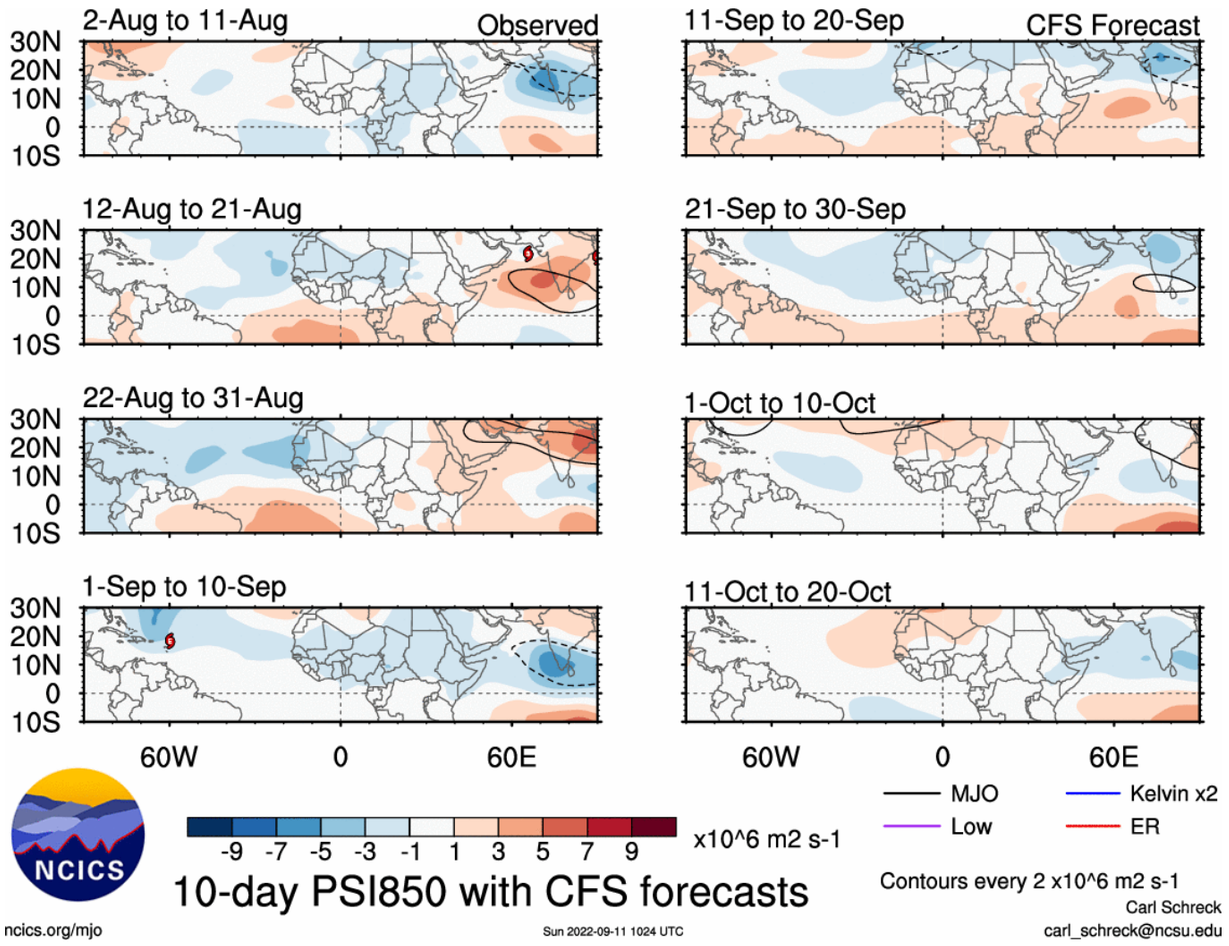
Average Anomalies in the band 5S-5N

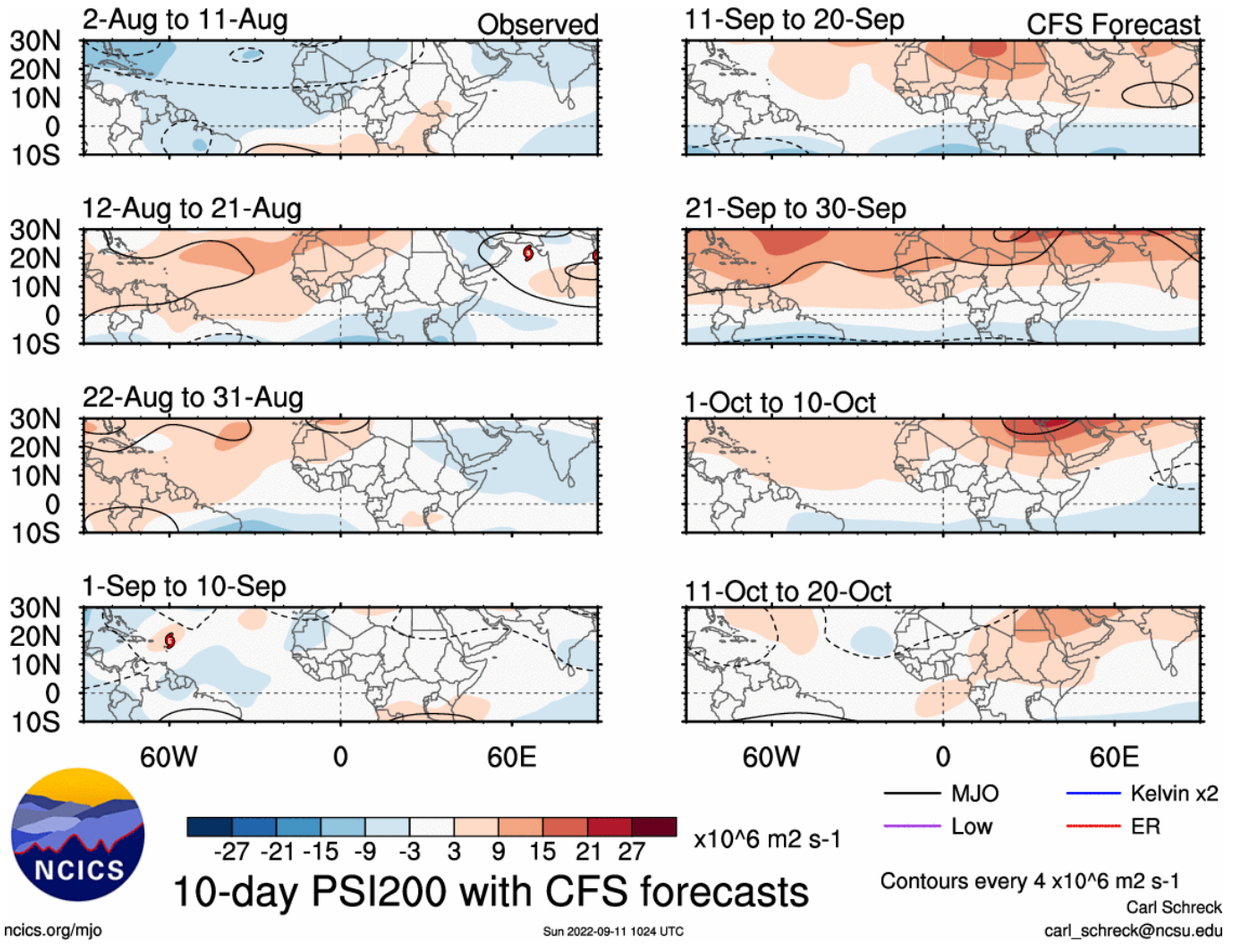




https://ncics.org/pub/mjo/v2/hov/chi850.cfs.wide.png
https://ncics.org/pub/mjo/v2/hov/chi200.cfs.wide.png
https://ncics.org/pub/mjo/v2/hov/chi850.cfs.eqtr.png
https://ncics.org/pub/mjo/v2/hov/chi200.cfs.eqtr.png

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

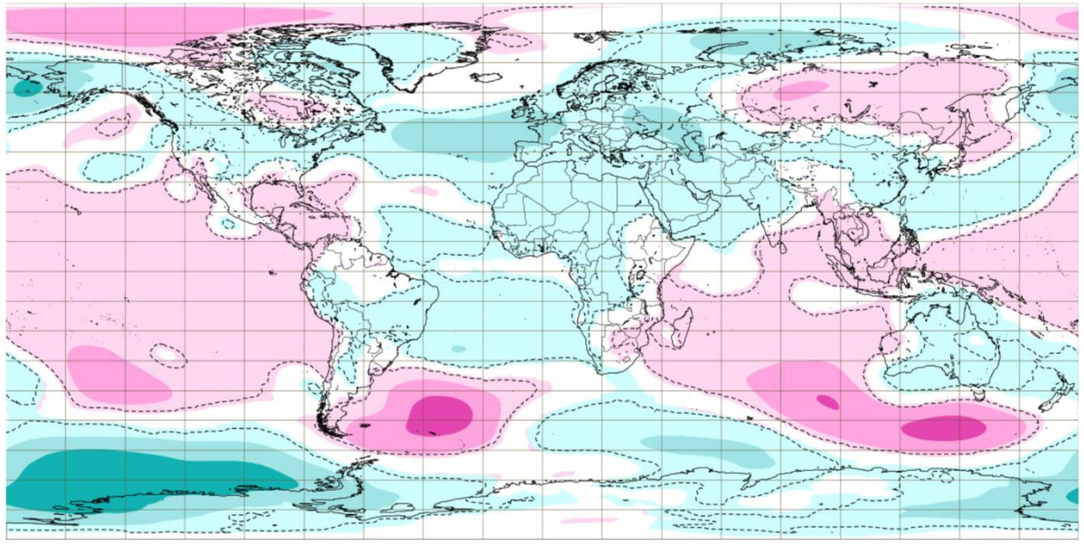
Figure 18a and b: Past four week and month velocity potential

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

Mean sea level pressure: Weekly mean anomalies

Base time: Thu 08 Sep 2022 Valid time: Mon 12 Sep 2022 - Mon 19 Sep 2022 (+264h) Area : Global



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

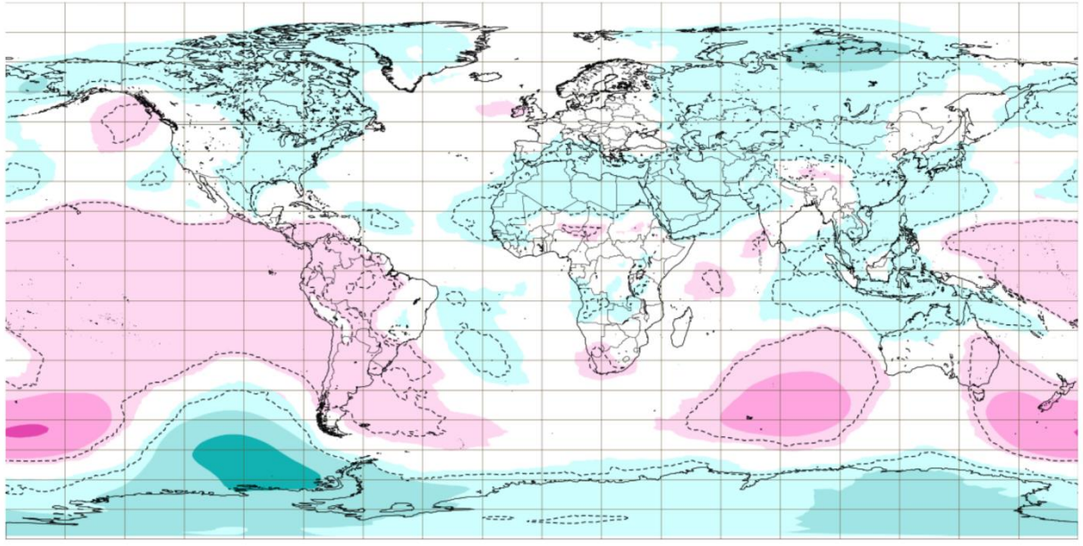
<-40 -40 -20 -10 -5 0 5 10 20 40 >40

© 2020 European Centre for Medium-Range Weather Forecasts (ECMWF)
Source: www.ecmwf.int
Licence: CC-BY-4.0 and ECMWF Terms of Use(https://apps.ecmwf.int/datasets/licences/general/)

ECMWF

Mean sea level pressure: Weekly mean anomalies

Base time: Thu 08 Sep 2022 Valid time: Mon 19 Sep 2022 - Mon 26 Sep 2022 (+432h) Area : Global



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

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

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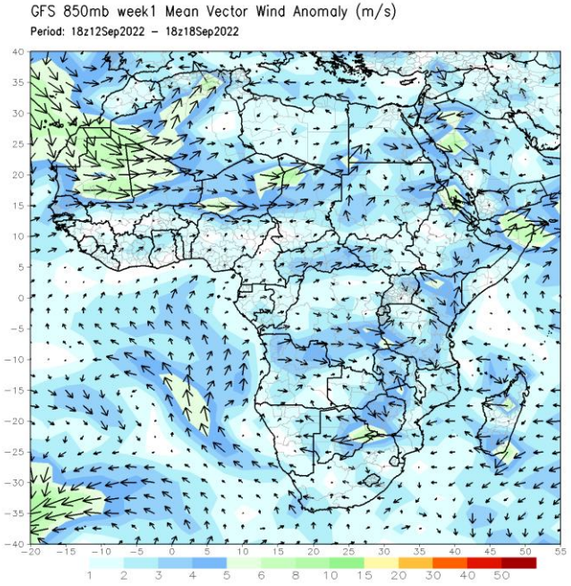
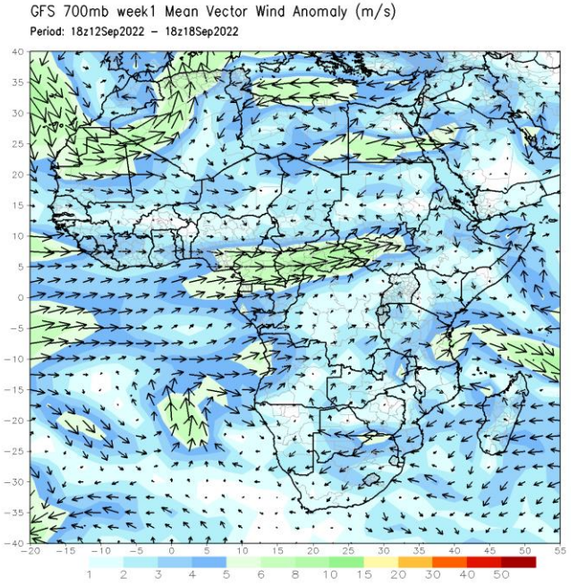
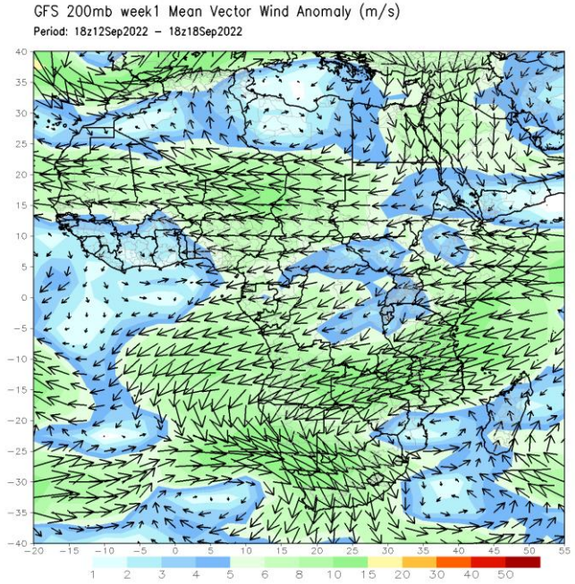
Source: www.ecmwf.int
Licence: CC-BY-4.0 and ECMWF Terms of Use(https://apps.ecmwf.int/datasets/licences/general/)

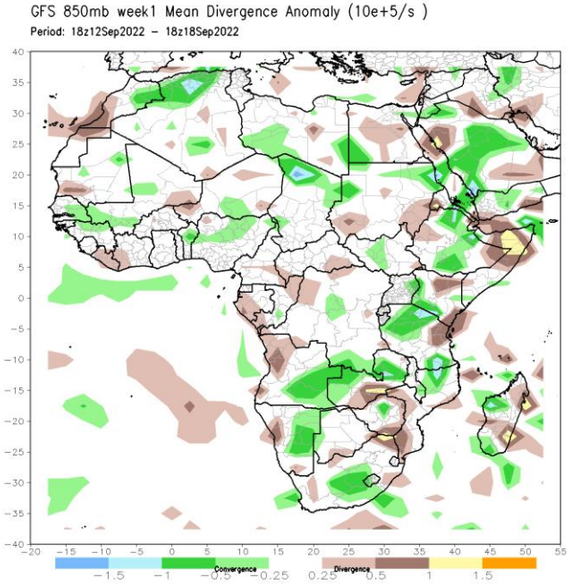
ECMWF

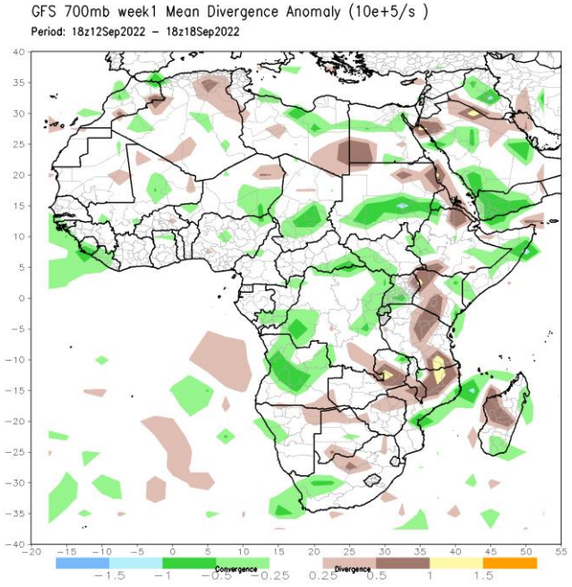
Wind Anomalies and divergence Forecast @850, 700, 200 hPa - Week1

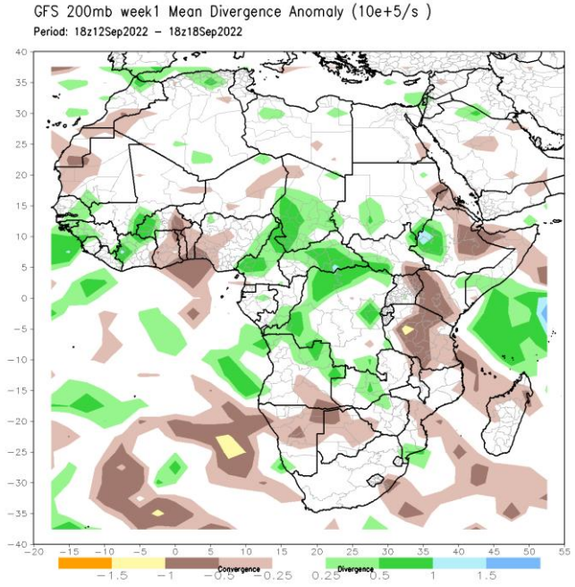








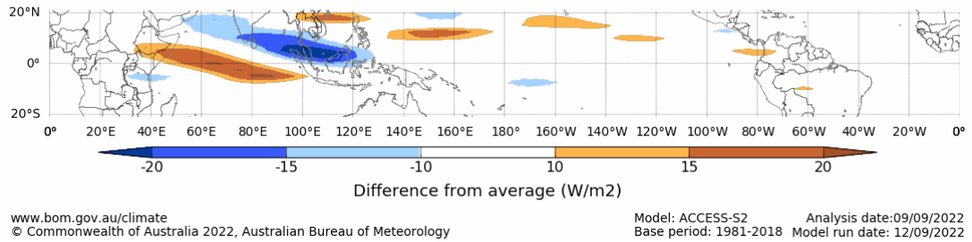




Sep 14th - 27th, 2022

MJO

Observed



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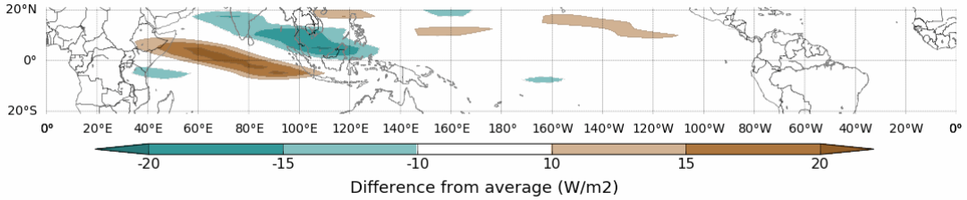
Model: ACCESS-S2 Analysis date:09/09/2022
Base period: 1981-2018 Model run date: 12/09/2022

MJO is anticipated to be weak during the first week but may impact parts of East Africa and tropical Islands

Week 1

D = 0



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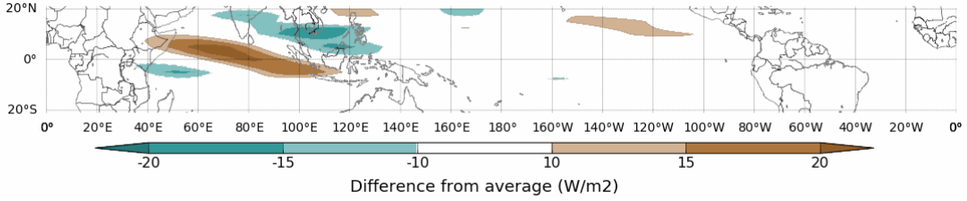
Model: ACCESS-S2 Forecast date:12/09/2022
Base period: 1981-2018 Model run date: 12/09/2022

D = +3



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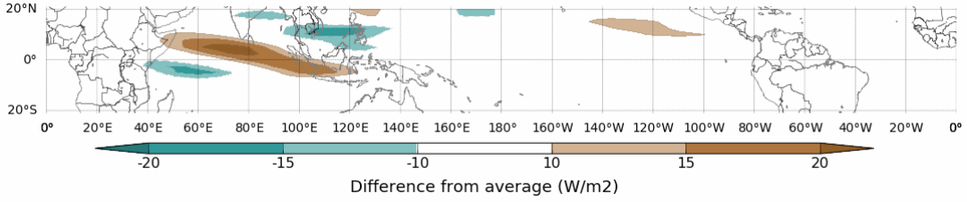
Model: ACCESS-S2 Forecast date:15/09/2022
Base period: 1981-2018 Model run date: 12/09/2022

D = +6



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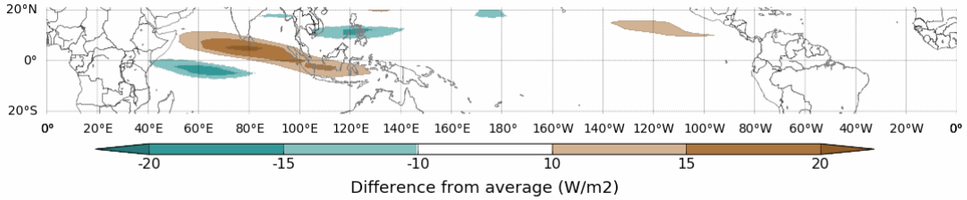
Model: ACCESS-S2 Forecast date:18/09/2022
Base period: 1981-2018 Model run date: 12/09/2022

Week 2

D = +9



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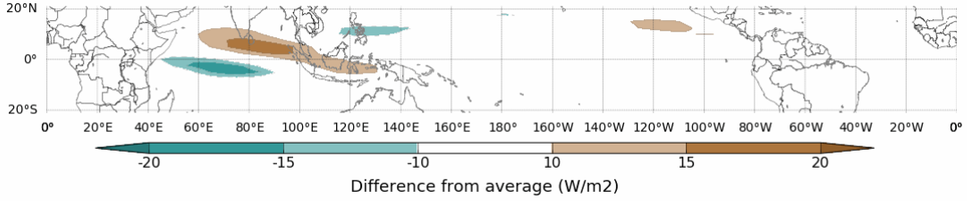
Model: ACCESS-S2 Forecast date:21/09/2022
Base period: 1981-2018 Model run date: 12/09/2022

D = +12



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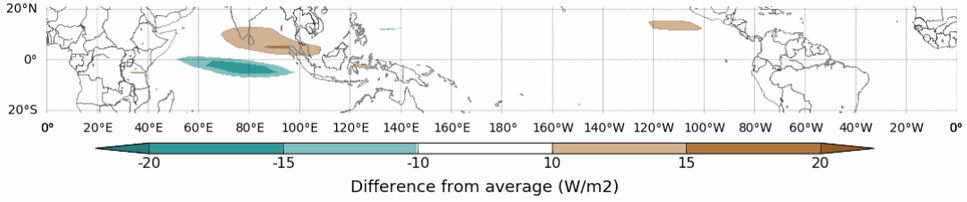
Model: ACCESS-S2 Forecast date:24/09/2022
Base period: 1981-2018 Model run date: 12/09/2022

D = +15



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Model: ACCESS-S2 Forecast date:27/09/2022
Base period: 1981-2018 Model run date: 12/09/2022

Source:
http://www.bom.gov.au/climate/enso/#tabs=Tropics

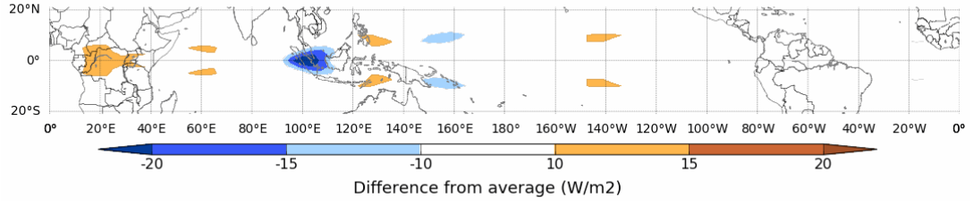
Sep 14th - 27th, 2022

Kelvin

Text

Observed

D = -3



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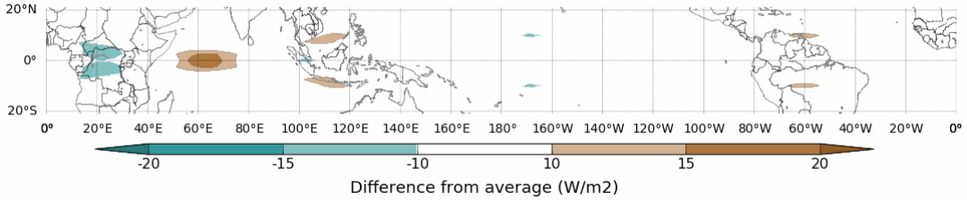
Model: ACCESS-S2 Analysis date:09/09/2022
Base period: 1981-2018 Model run date: 12/09/2022

Week 1

D = 0



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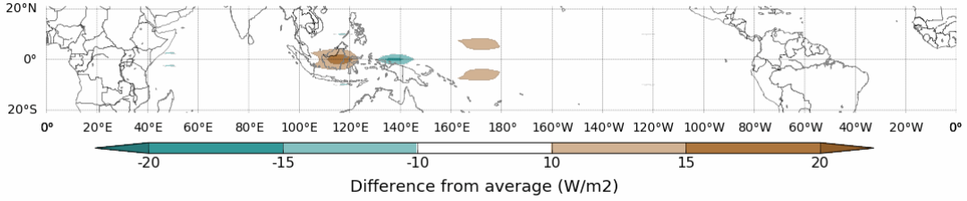
Model: ACCESS-S2 Forecast date:12/09/2022
Base period: 1981-2018 Model run date: 12/09/2022

D = +3



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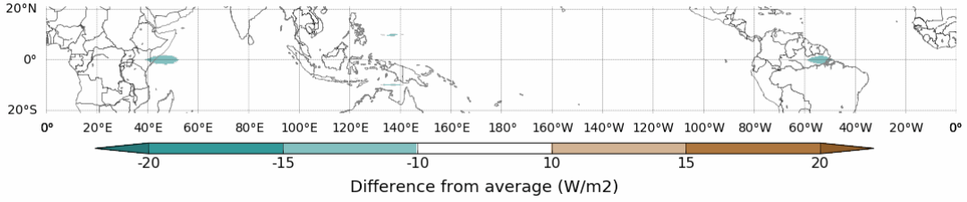
Model: ACCESS-S2 Forecast date:15/09/2022
Base period: 1981-2018 Model run date: 12/09/2022

D = +6



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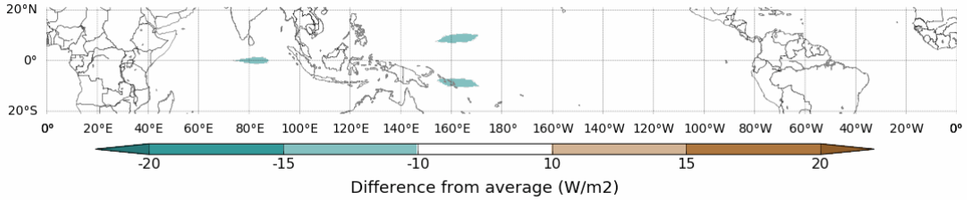
Model: ACCESS-S2 Forecast date:18/09/2022
Base period: 1981-2018 Model run date: 12/09/2022

Week 2

D = +9



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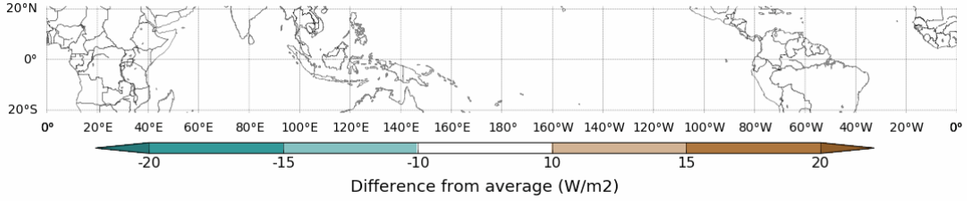
Model: ACCESS-S2 Forecast date:21/09/2022
Base period: 1981-2018 Model run date: 12/09/2022

D = +12



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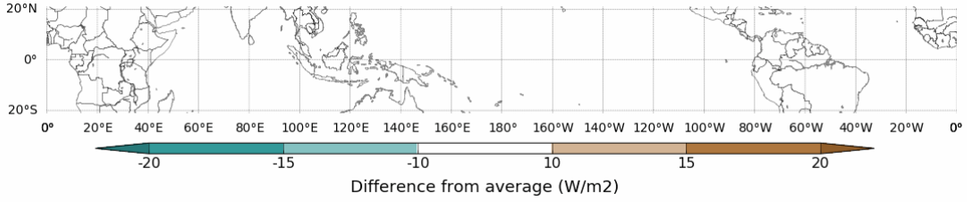
Model: ACCESS-S2 Forecast date:24/09/2022
Base period: 1981-2018 Model run date: 12/09/2022

D = +15



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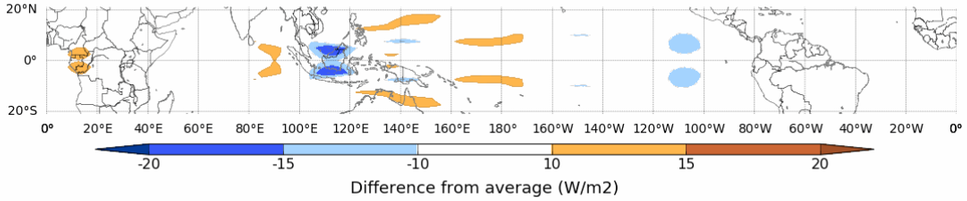
Model: ACCESS-S2 Forecast date:27/09/2022
Base period: 1981-2018 Model run date: 12/09/2022

Source:
http://www.bom.gov.au/climate/enso/#tabs=Tropics

Sep 14th - 27th, 2022

Rossby

Observed



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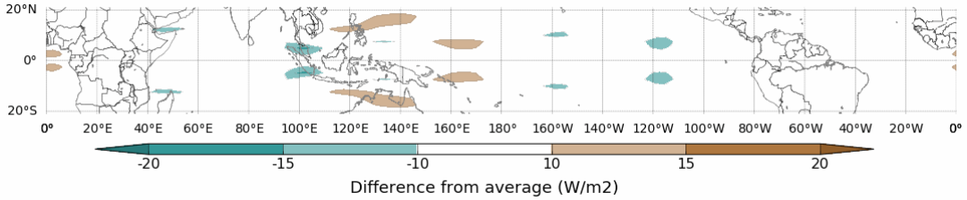
Model: ACCESS-S2 Analysis date:09/09/2022
Base period: 1981-2018 Model run date: 12/09/2022

Text

Week 1

D = 0



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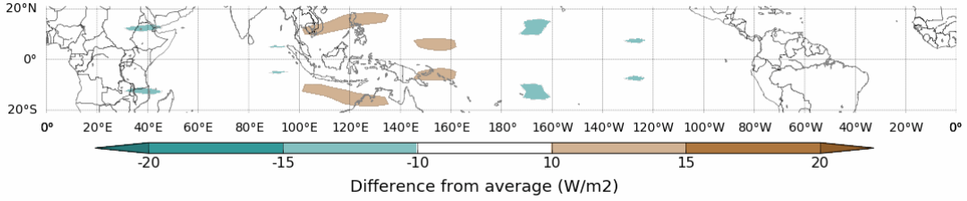
Model: ACCESS-S2 Forecast date:12/09/2022
Base period: 1981-2018 Model run date: 12/09/2022

D = +3



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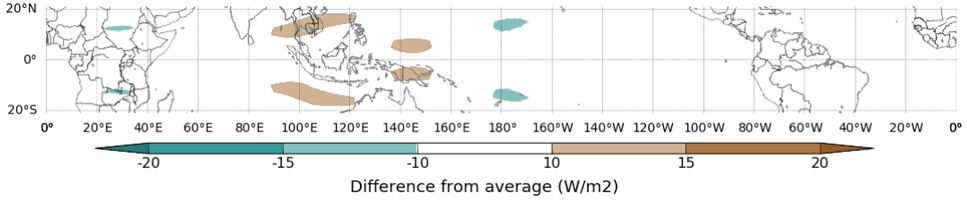
Model: ACCESS-S2 Forecast date:15/09/2022
Base period: 1981-2018 Model run date: 12/09/2022

D = +6



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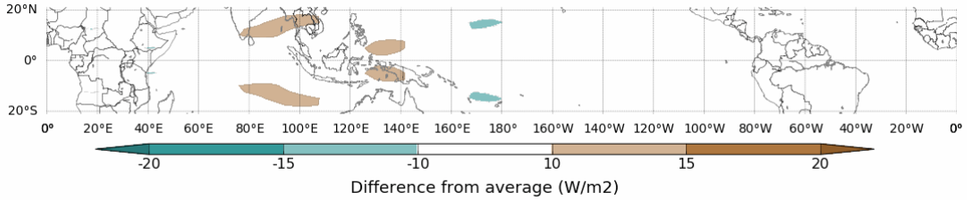
Model: ACCESS-S2 Forecast date:18/09/2022
Base period: 1981-2018 Model run date: 12/09/2022

Week 2

D = +9



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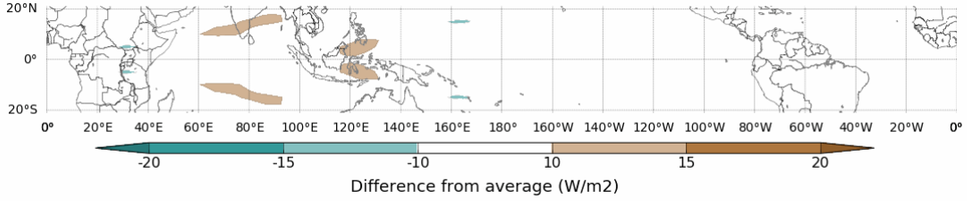
Model: ACCESS-S2 Forecast date:21/09/2022
Base period: 1981-2018 Model run date: 12/09/2022

D = +12



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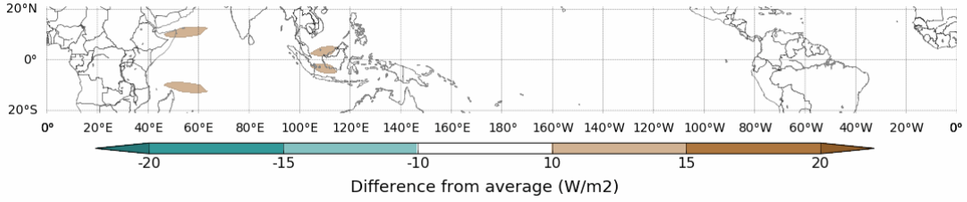
Model: ACCESS-S2 Forecast date:24/09/2022
Base period: 1981-2018 Model run date: 12/09/2022

D = +15



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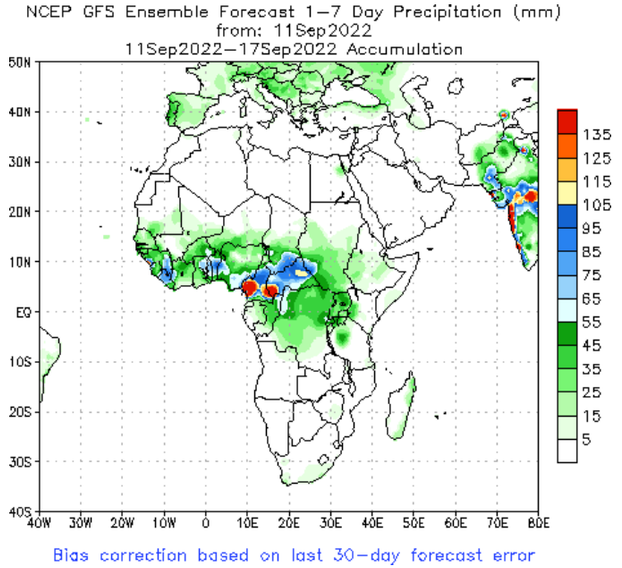
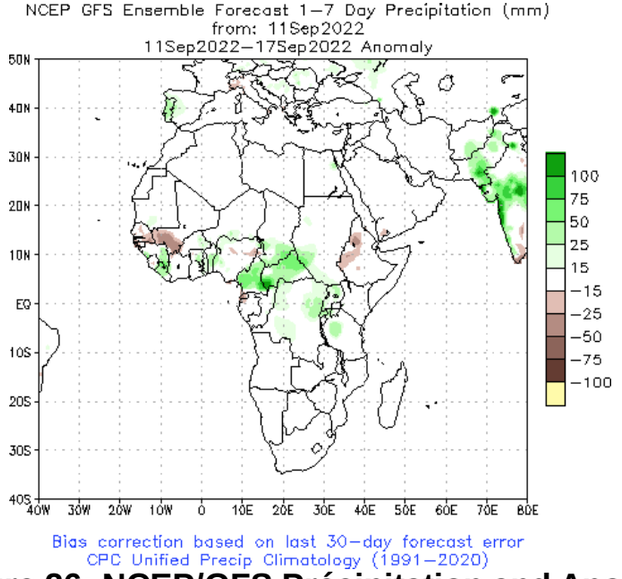
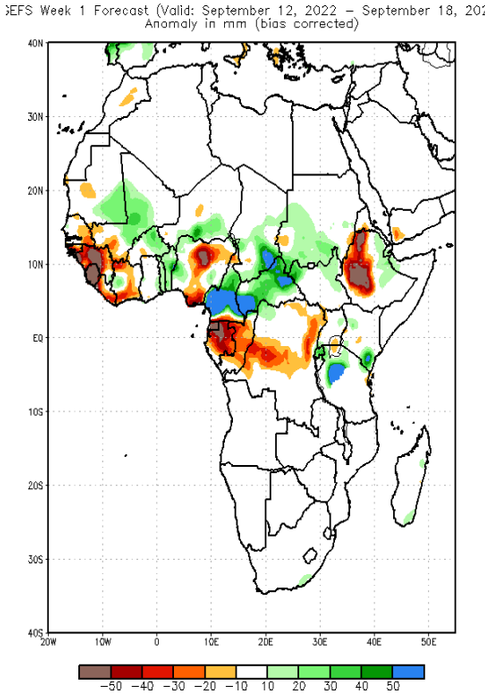
Model: ACCESS-S2 Forecast date:27/09/2022
Base period: 1981-2018 Model run date: 12/09/2022

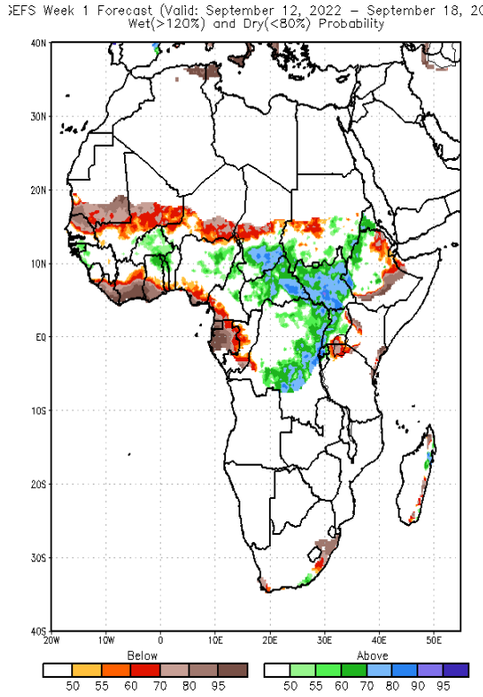
Source:
http://www.bom.gov.au/climate/enso/#tabs=Tropics

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









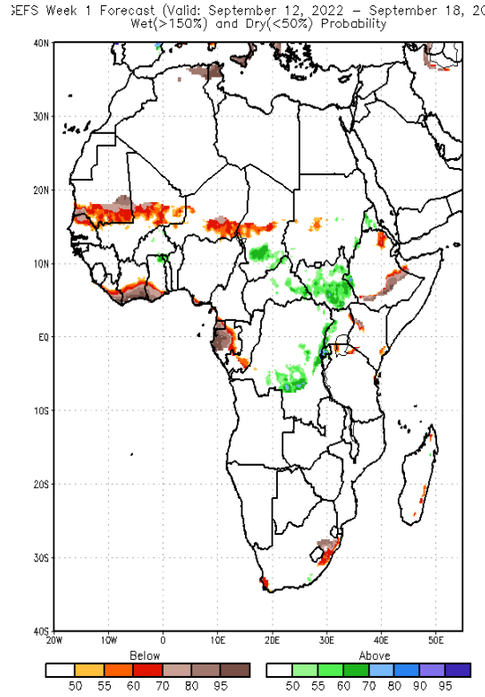


Figure 26: NCEP/GFS Précipitation and Anomaly forecast.

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

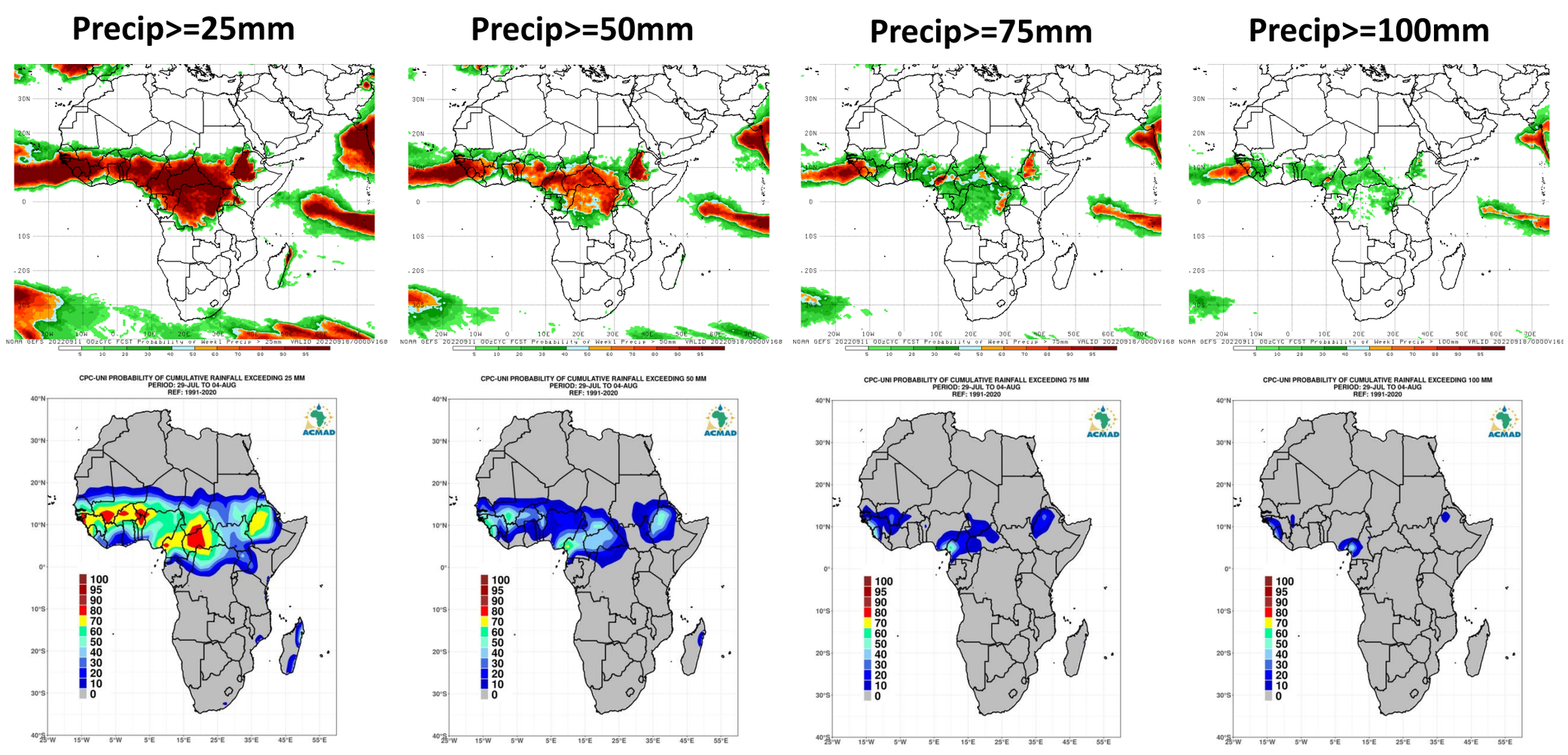
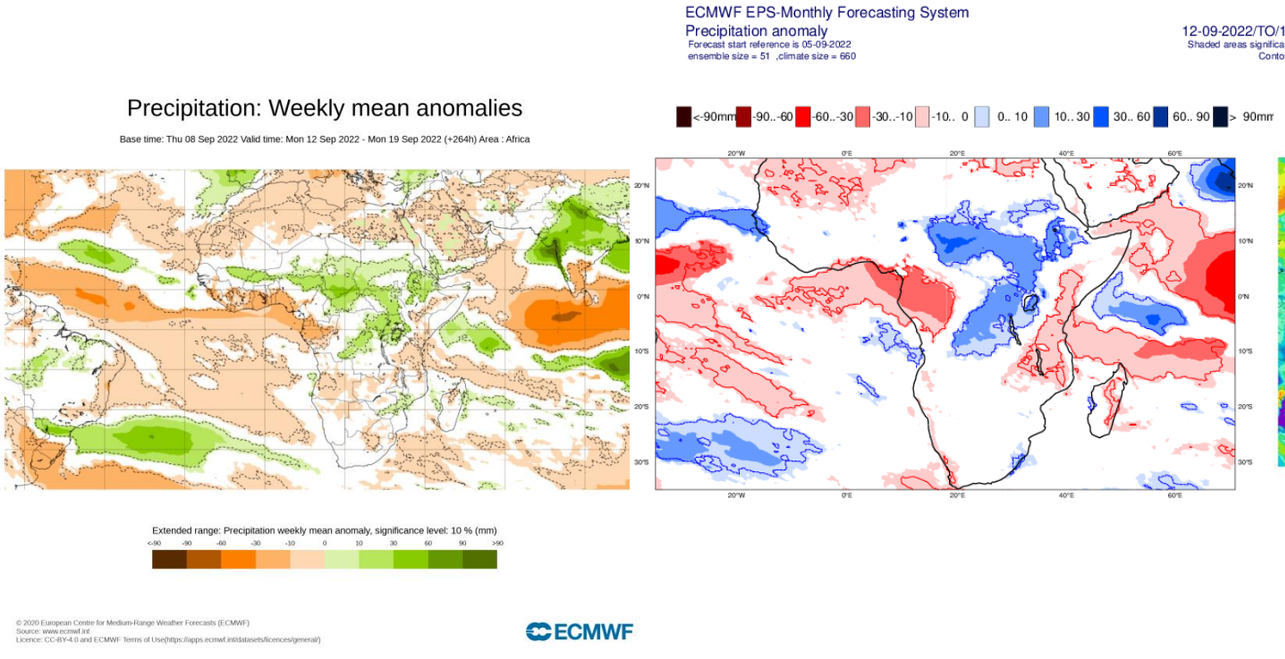
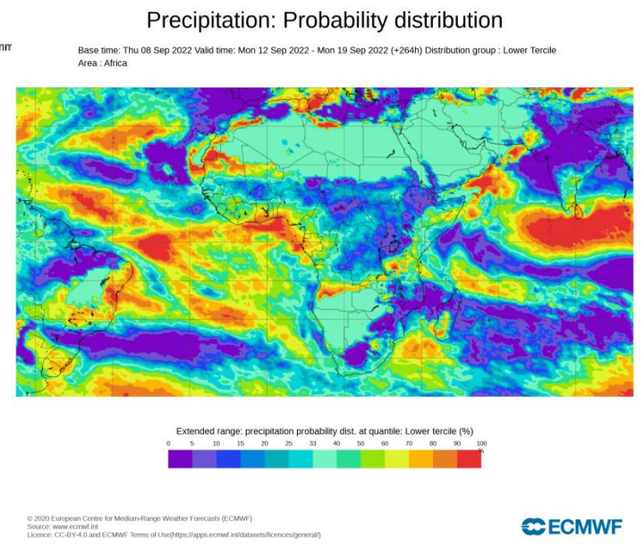


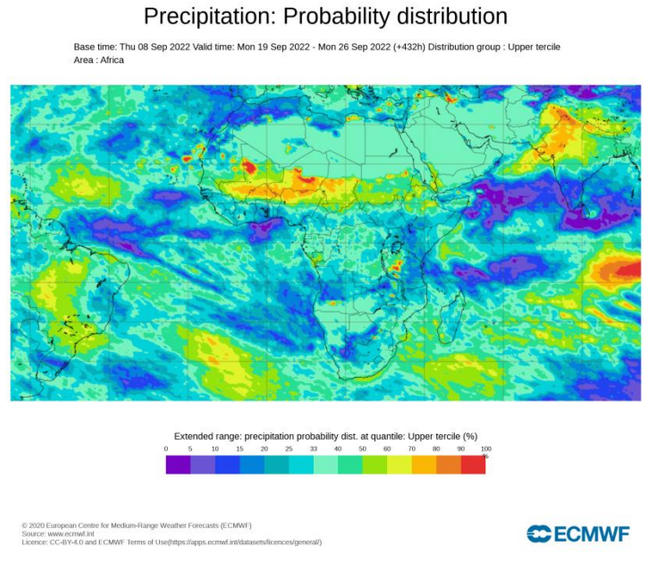
Figure 27: Week1 Precipitation Total Exceedance Probabilities

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%





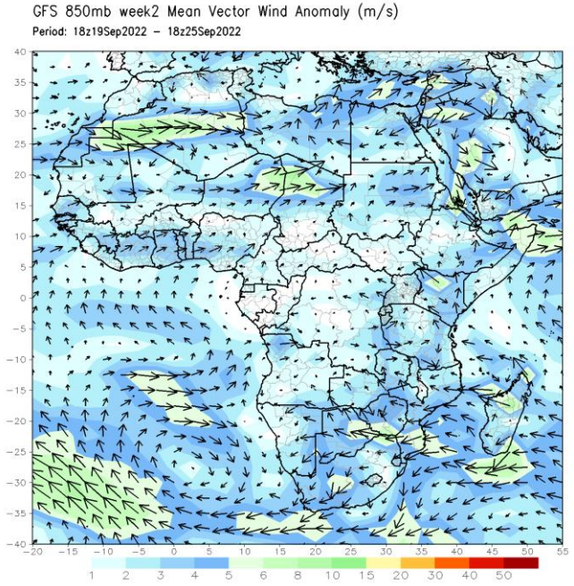


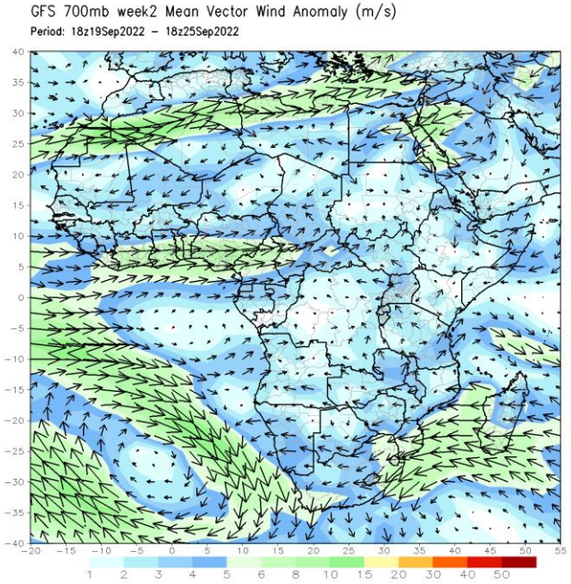
https://www.ecmwf.int/en/forecasts/charts/catalogue/mofc_multi_anomaly?facets=undefined&time=2019081500,408,2019090100&parameter=precipitation&area=Global

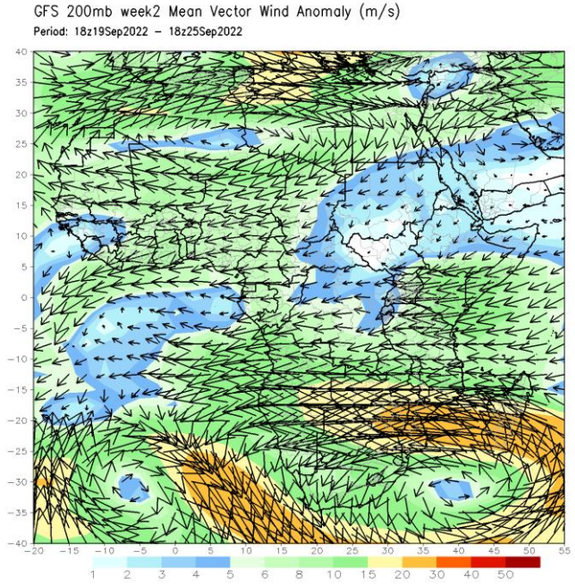
https://www.ecmwf.int/en/forecasts/charts/catalogue/mofc_multi_tercile?facets=undefined&time=2021110100,312,2021111400&parameter=precipitation&tercile=1&area=Africa

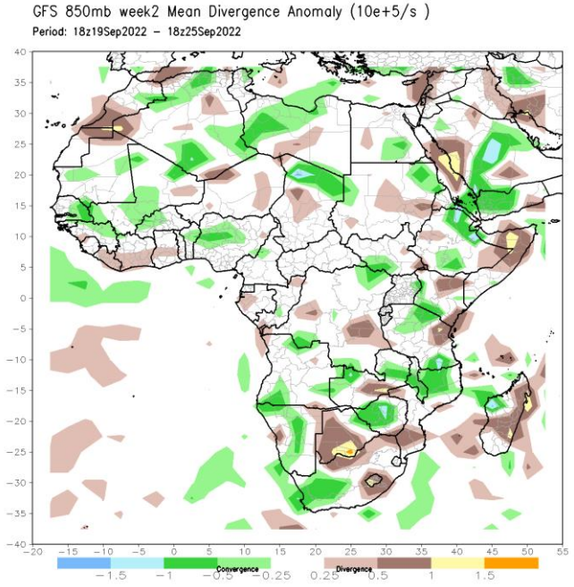
Figure 29: Weekly tercile probability forecast below 33%

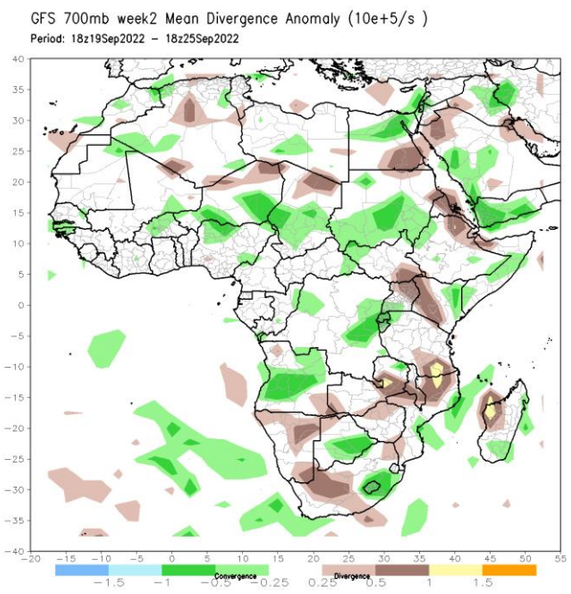
Wind Anomalies and divergence Forecast @ 925, 850, 700, 500, 200 hPa – Week2

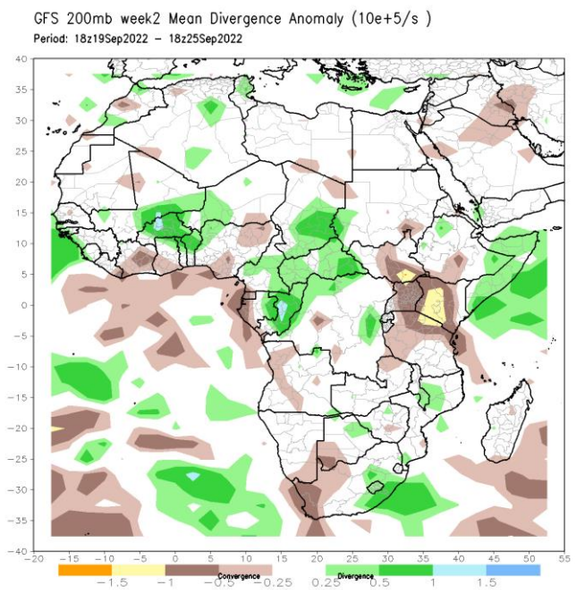




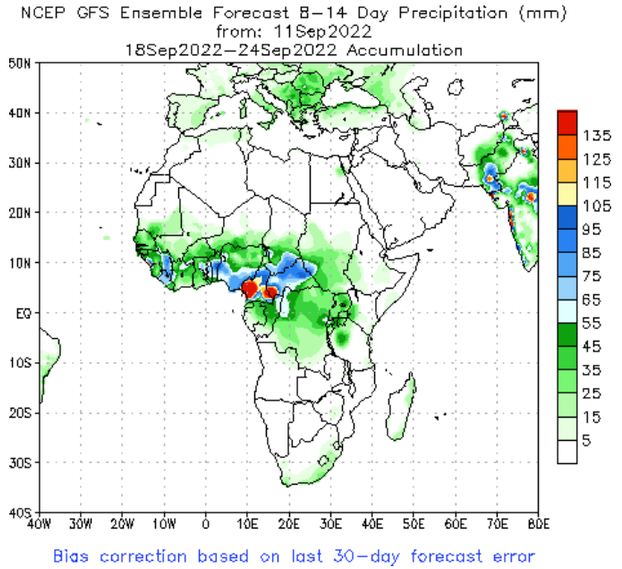


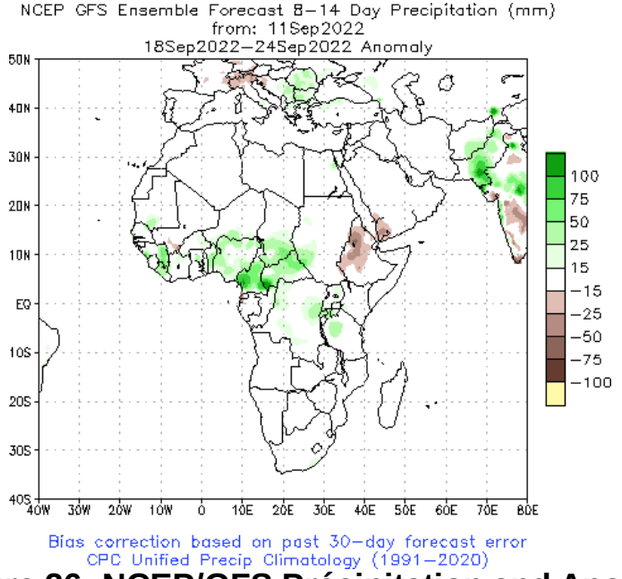


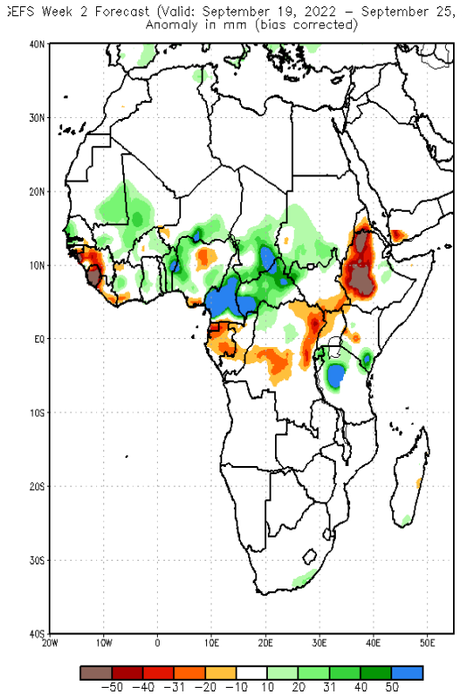


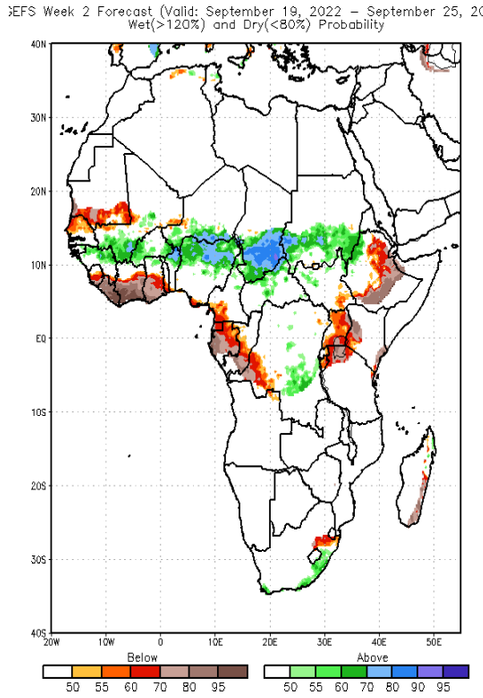


NCEP/GFS Bias-Corrected Precipitation Ensemble Forecast - Week 2









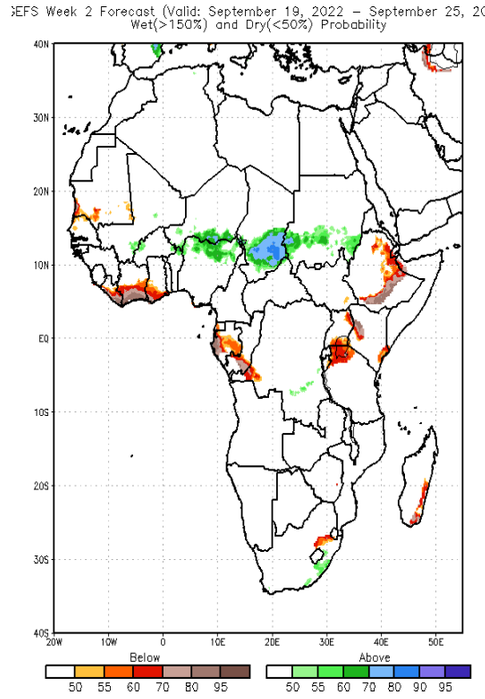


Figure 26: NCEP/GFS Précipitation and Anomaly forecast.

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
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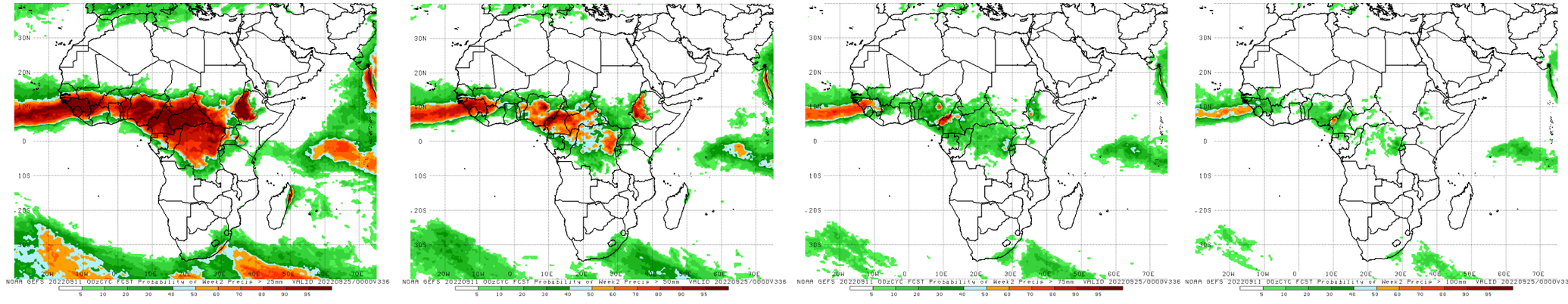
https://www.cpc.ncep.noaa.gov/products/international/gefs_bc/gefs_afr_wk2_wde_precip.png

Week-2 Precipitation Probability of Exceedance: Forecast and Climo

Precip>=25mm | **Precip>=50mm** | **Precip>=75mm** | **Precip>=100mm**



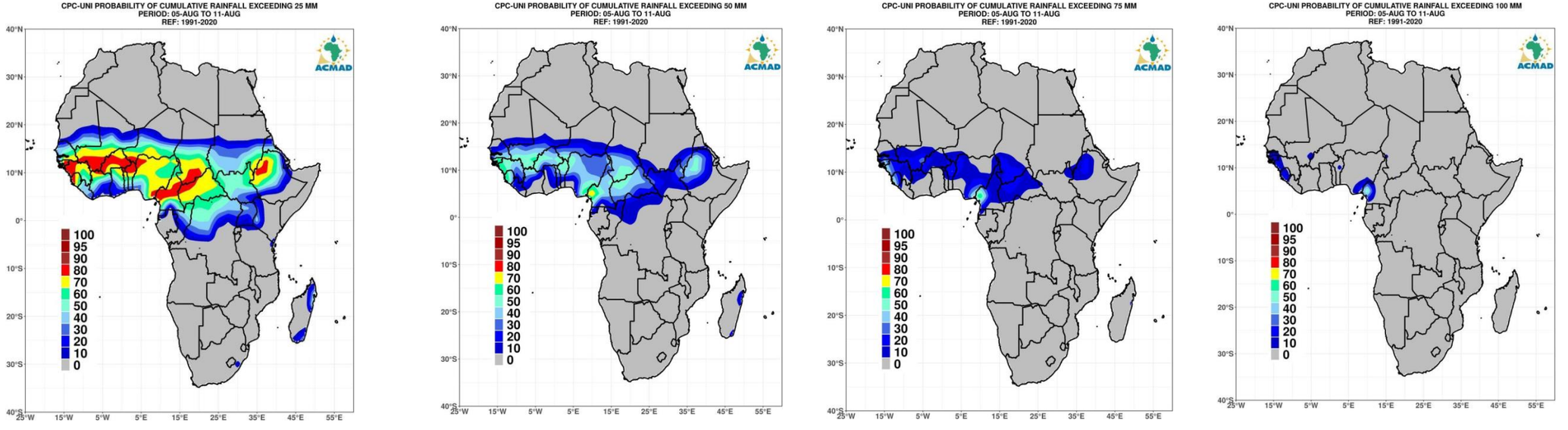
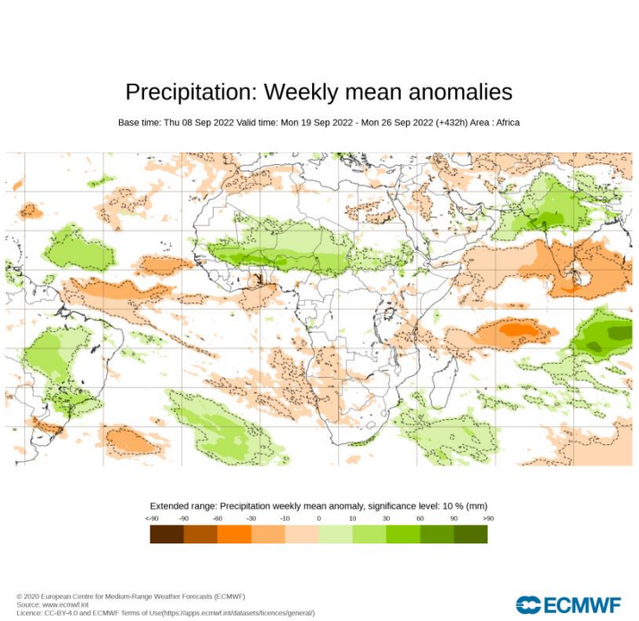
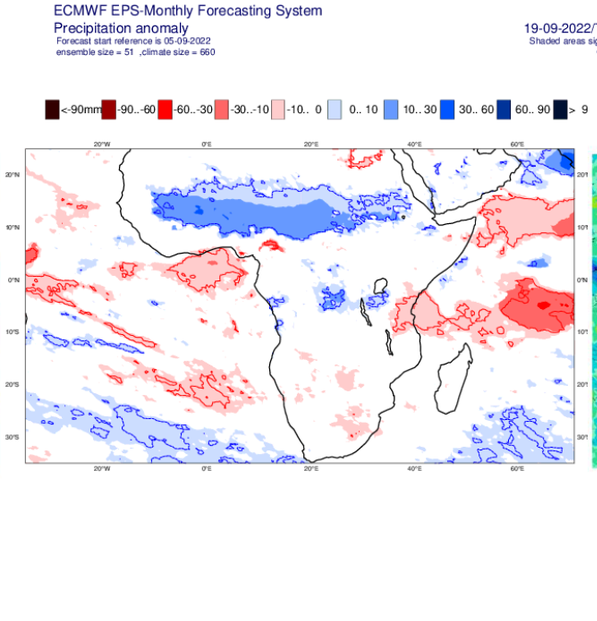


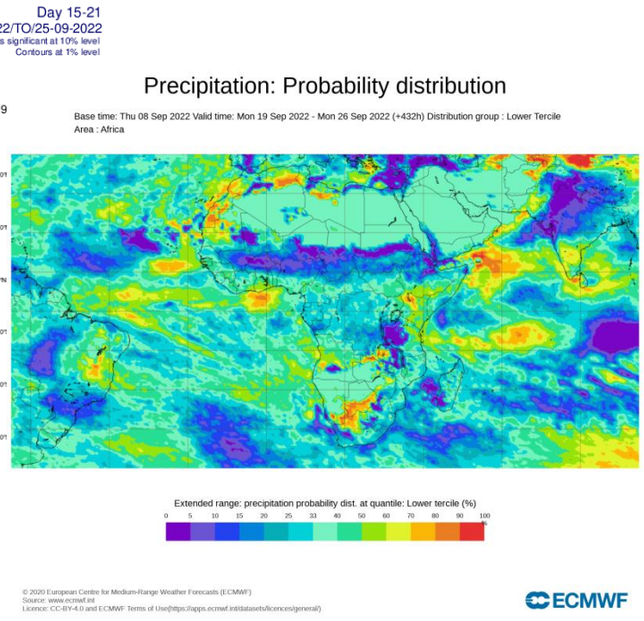
Figure 32: Week2 Precipitation Total Exceedance Probabilities

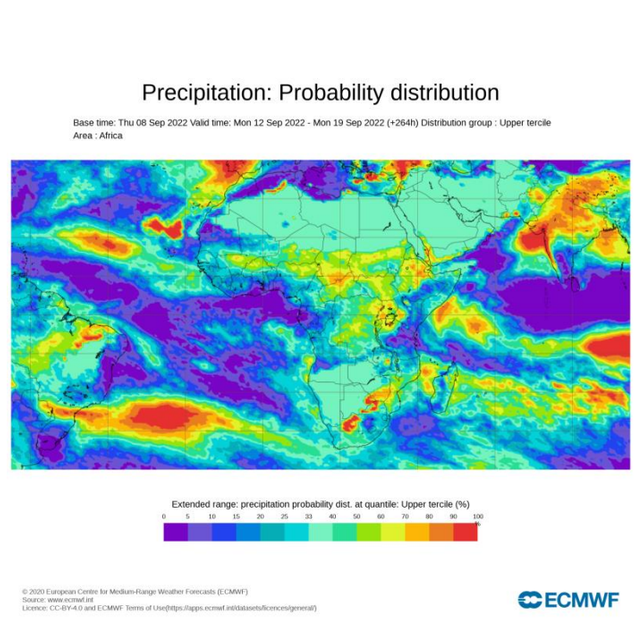
https://www.cpc.ncep.noaa.gov/products/international/cpci/data/00/gefs_wk1_precip25mm_prob_africa.html
https://www.cpc.ncep.noaa.gov/products/international/cpci/data/00/gefs_wk1_precip50mm_prob_africa.html
https://www.cpc.ncep.noaa.gov/products/international/cpci/data/00/gefs_wk1_precip75mm_prob_africa.html
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%









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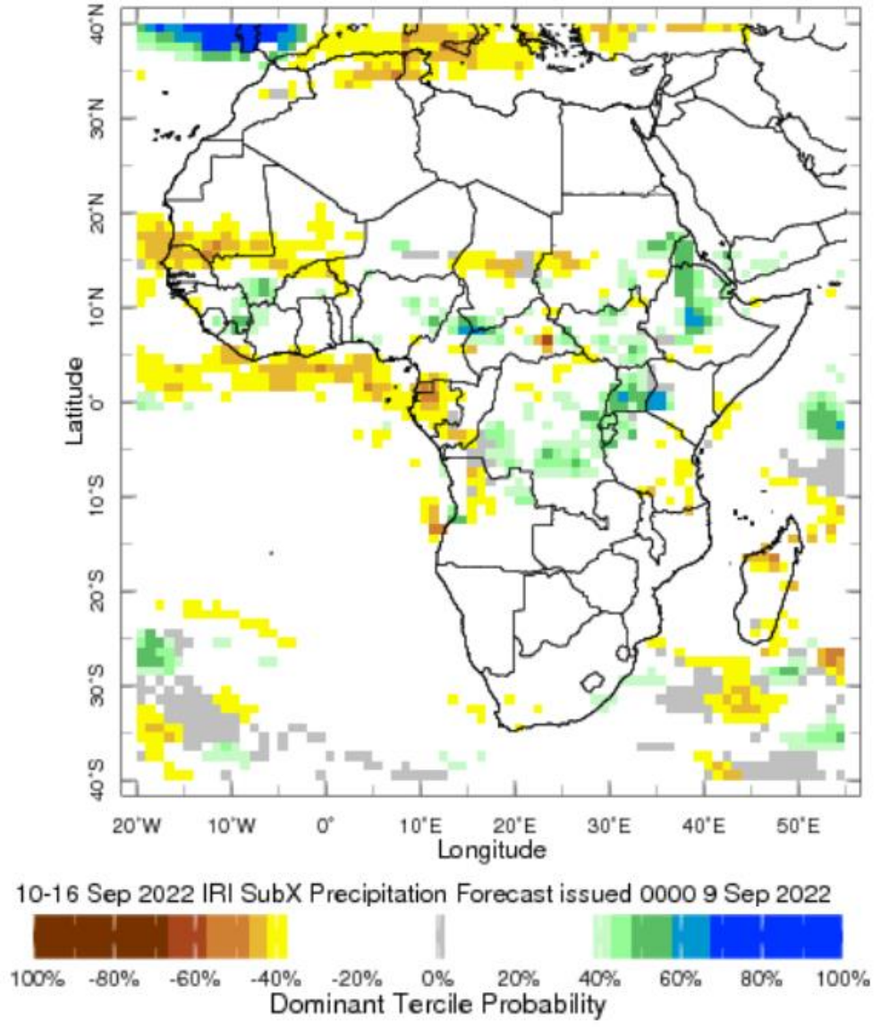
https://www.ecmwf.int/en/forecasts/charts/catalogue/mofc_multi_tercile?facets=undefined&time=2021110100,312,2021111400&parameter=precipitation&tercile=1&area=Africa

Figure 34: Weekly tercile probability forecast below 33%

IRI SubX Precip Forecast : Week 1 and 2



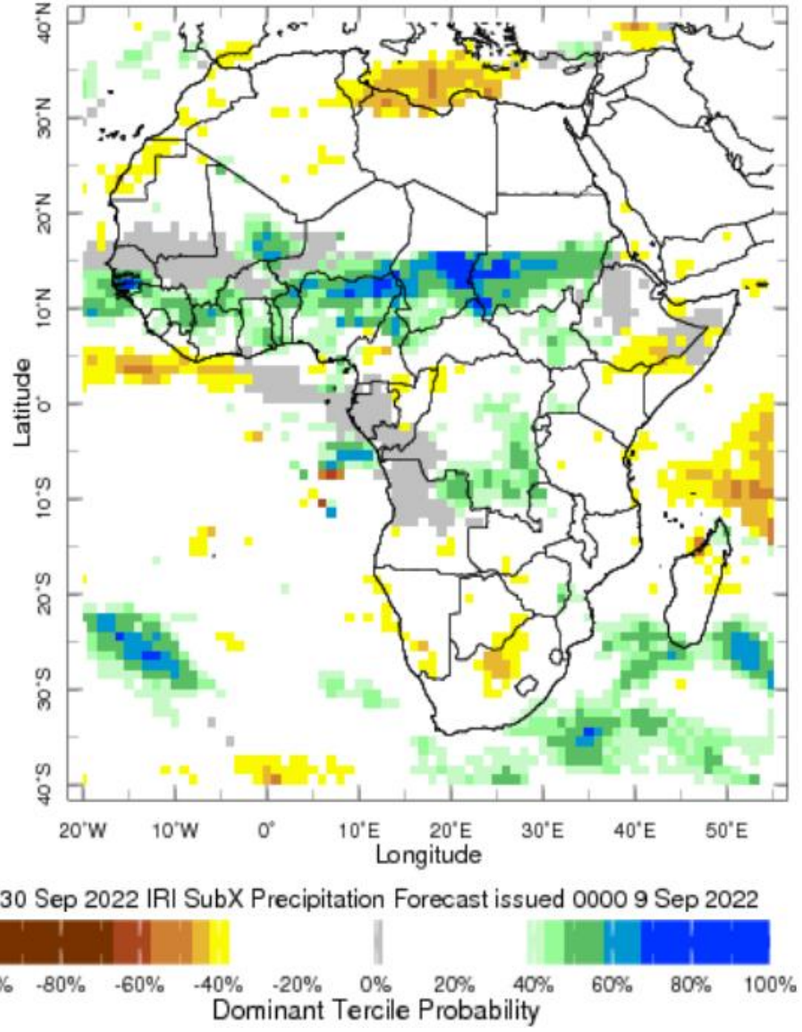
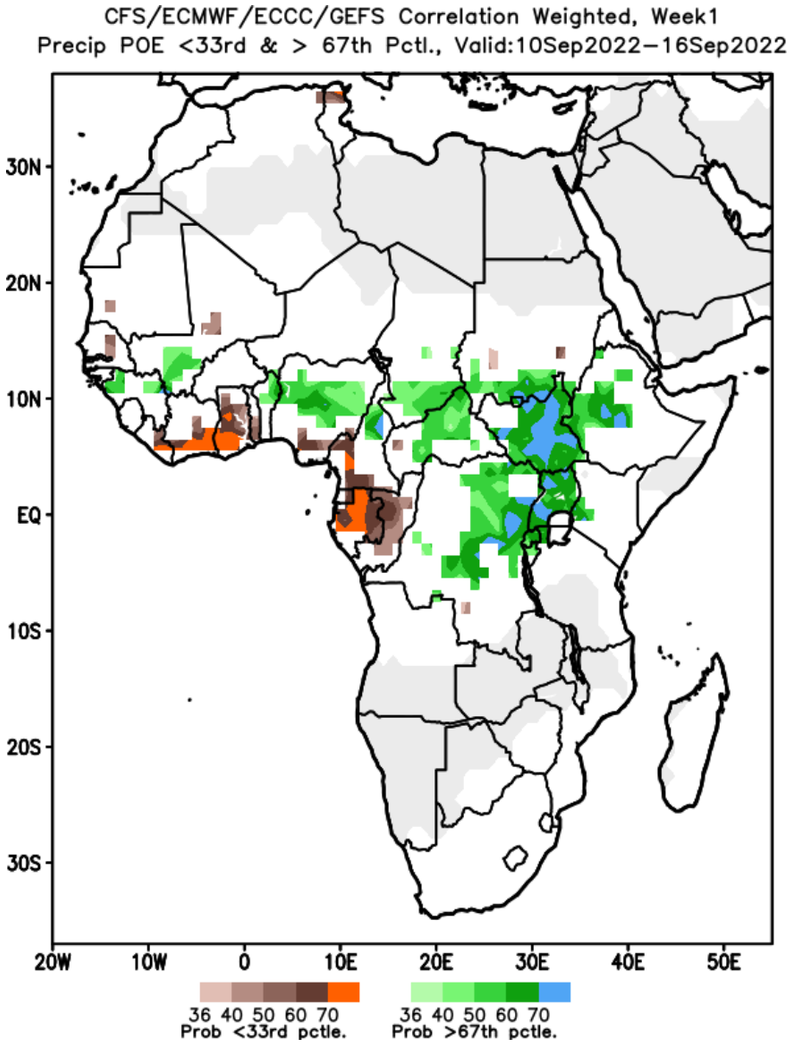
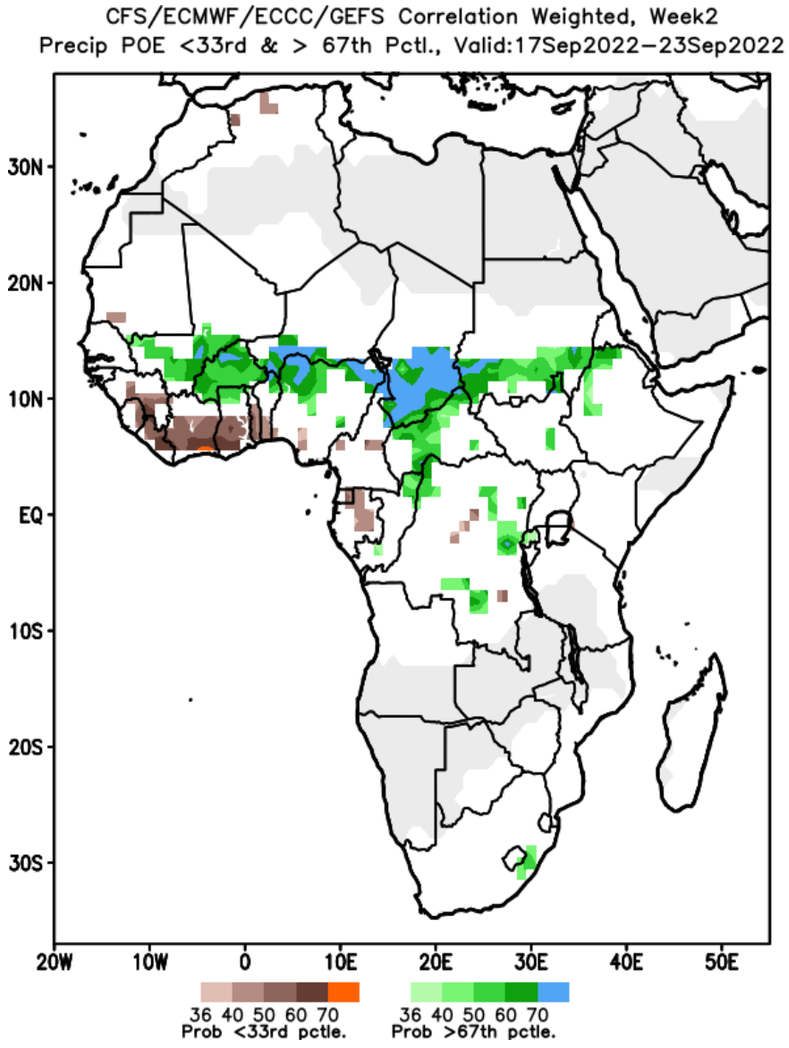


Figure 37: Precipitation and Anomaly forecast

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





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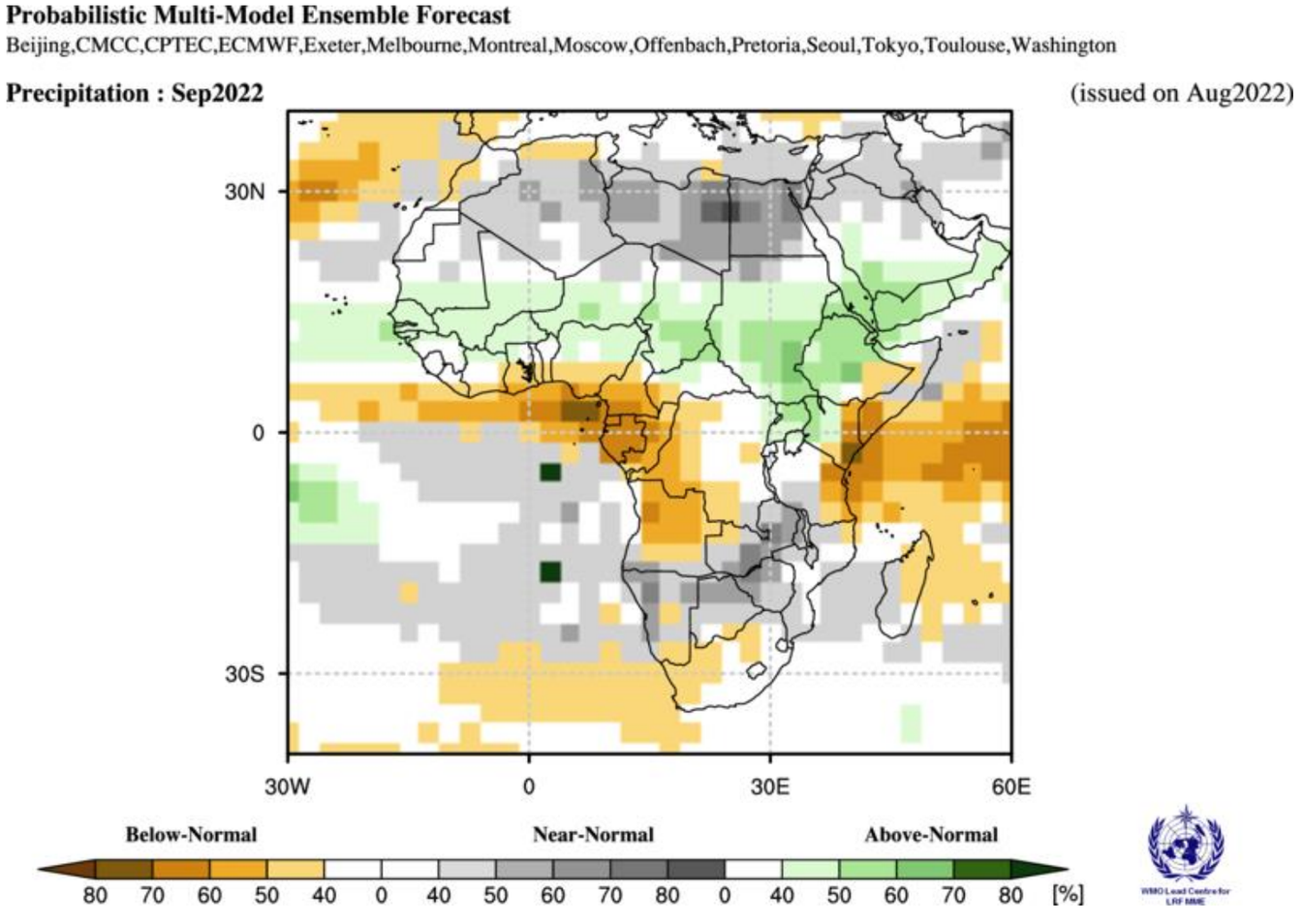
Monthly Forecast from WMO Lead Centre Multi-Model Ensemble



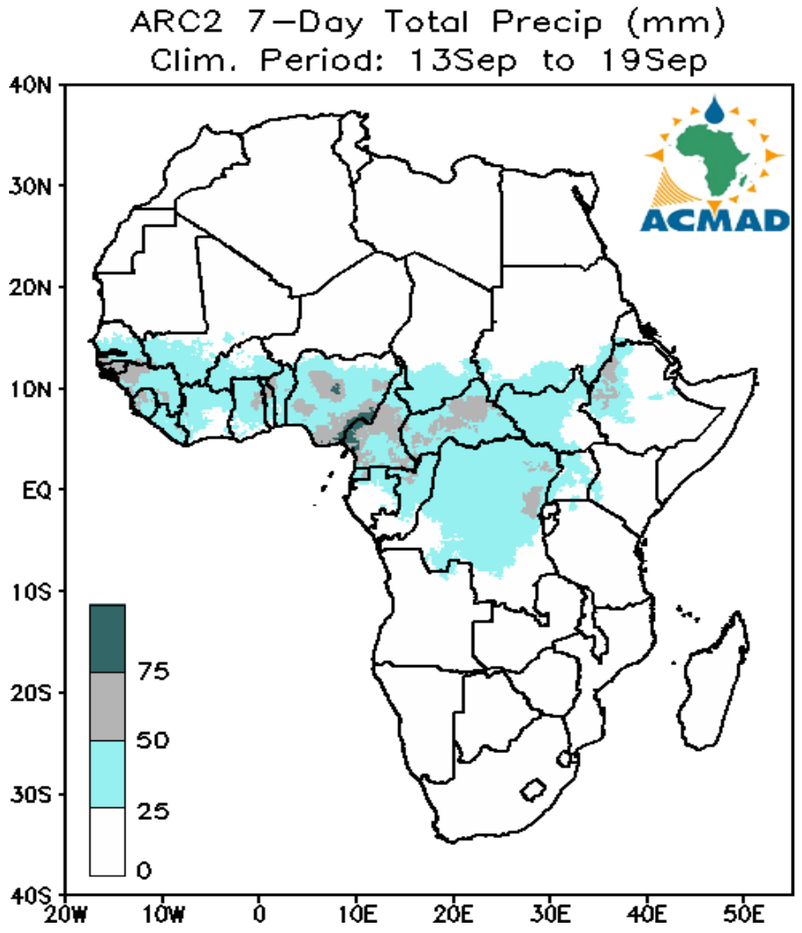
The LCMM-level model set tells us that part of the Africa region will have average to higher than average rainfall.

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 PRECIPITATION FOR UPCOMING 2 WEEKS



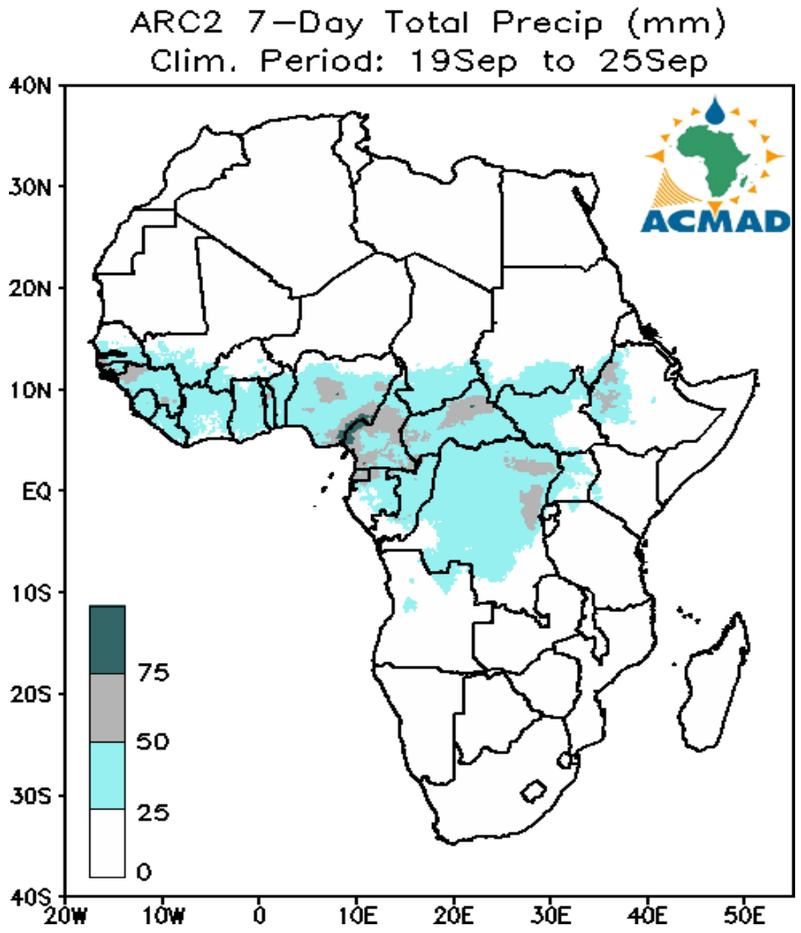
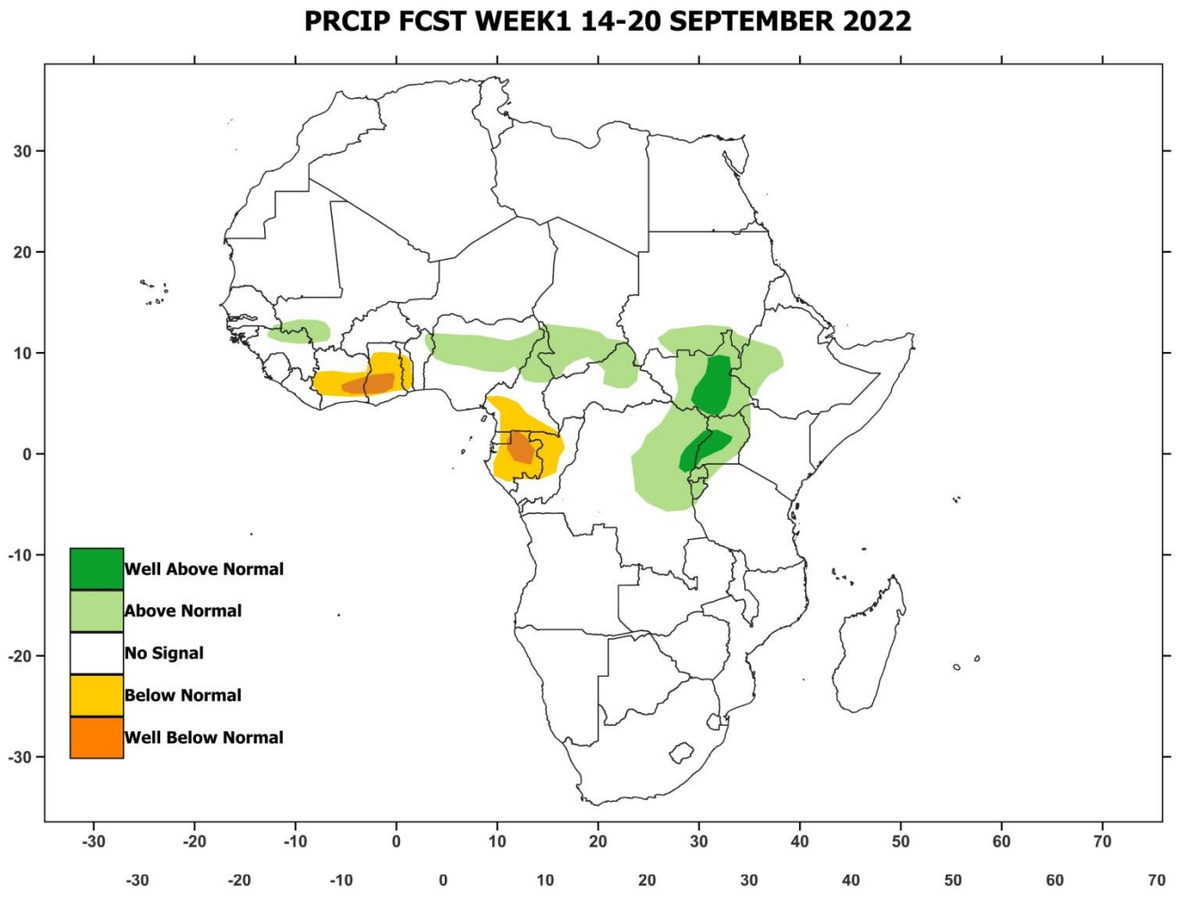


Figure 38: Climatology of Precipation for week-1(left panel) and week-2 (right panel)

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

PRECIPITATION FORECAST FOR THE UPCOMING TWO WEEKS



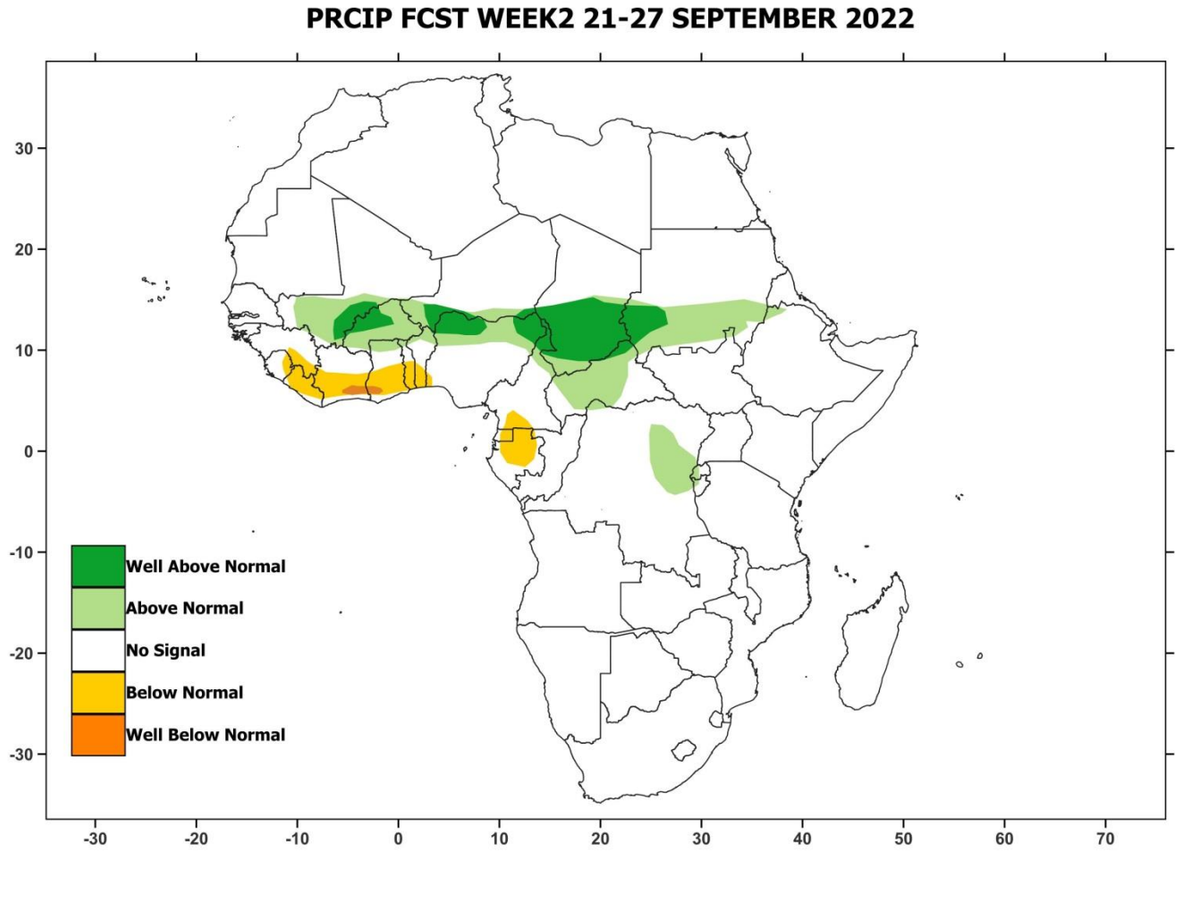


Figure 39: Precipitation Outlook for week-1 (left panel) and week-2 (right panel)

Forecast Basis:

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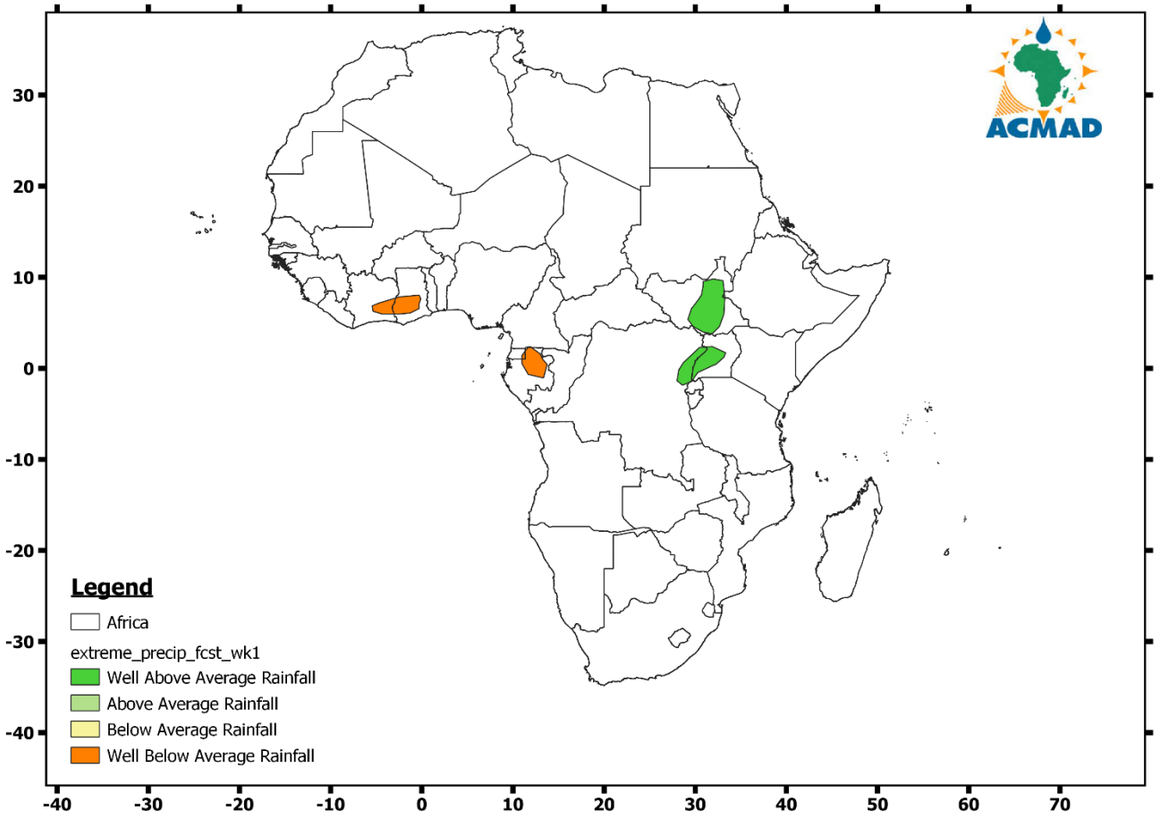
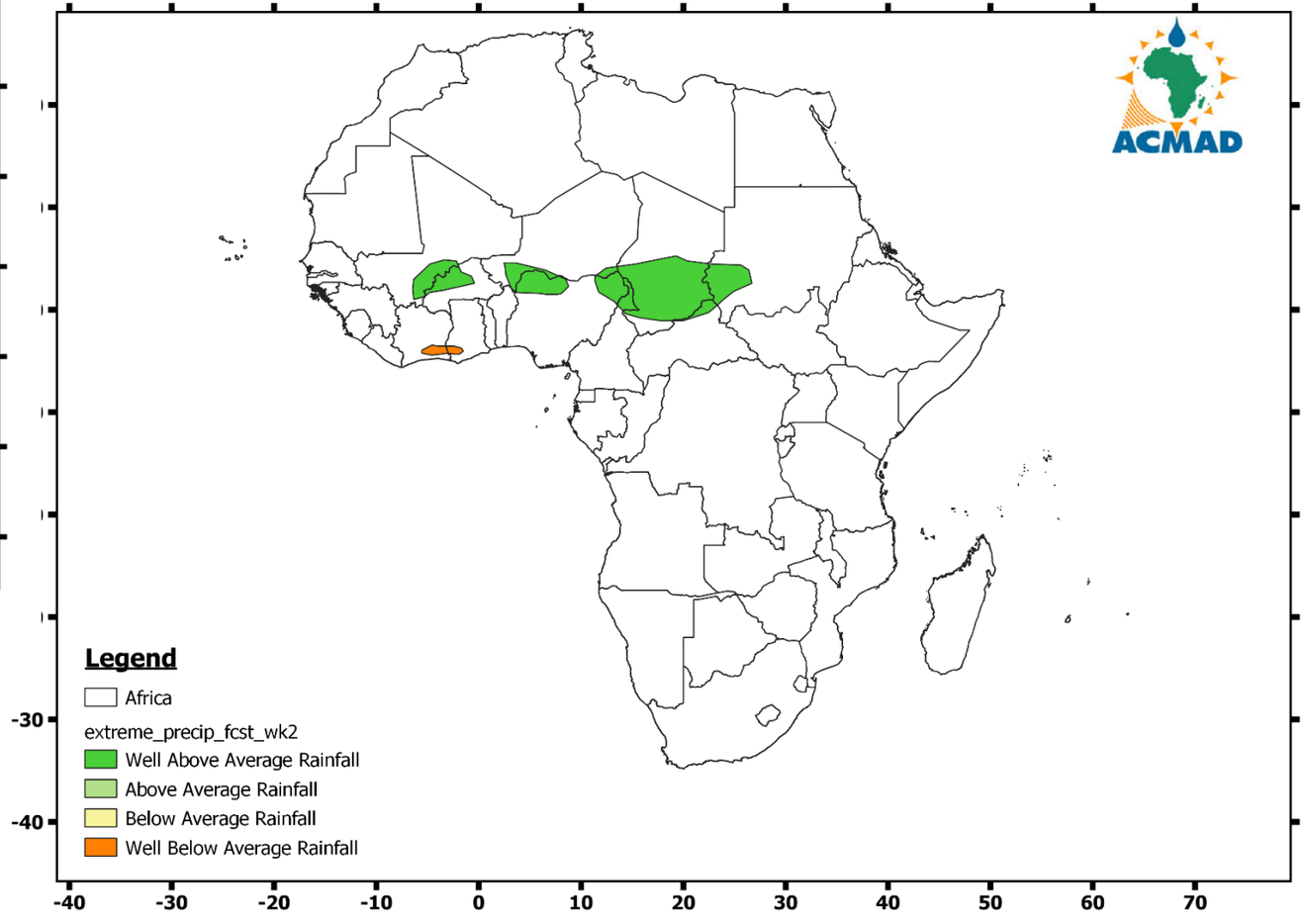
VIGILANCE FOR EXTREME PRECIPITATION

Week 1



Week 2