DEKADAL TECHNICAL NOTE FOR FIRST DEKAD OF JUNE, 2022 AND PRECIPITATION FORECAST FOR WEEK 1 AND 2

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Edited by: Sunshine GAMEDZE, Pierre KAMSU

Content of the Technical Note

1. **Monitoring Climate**

- forecast Verification
- MSLP obs and anom
- Geopotential height 500hpa obs and Anom
- Percent of precipitation
- Temporal variation of precipitation
- Start of Agriculture season and outlook
- Dekadal OLR anomaly
- Wind anomaly at 850 and 700 hPa
- Relative Humidity anomaly
- Weekly and monthly SST anomaly assessment

2. **Status of Drivers**

- Enso obs and forecast
- Current Velocity Potential at 200hPa
- Current MJO Status and Forecast
- Dekadal PWAT observed and outlook
- Dekadal velocity potential with MJO, Kelvin and Rossby Wave
- Dekadal Stream Function with MJO, Kelvin and Rossby Wave

3. **Dynamical Forecast Model Week 1 and 2**

- MSLP anomalies analysis GFS, BoM, ECMWF, UK met, DWD
- Weekly wind anomaly and divergent forecast 925, 850, 700, 500, 200
- Forecast Subseasonal drivers (NCEP, NCSU, UCSB, ECMWF and BoM) (East wave, Equatorial wave)
- Weekly NCEP/GFS bias corrected ensemble forecast
- GEFS weekly precip exceedance forecast
- Weekly Precip Forecast from ECMWF (Anom and Prob.)
- Monthly tercile prob precip anomaly forecast
- IRI SubX precip forecast

4. **Week 1 and 2 Outlook**

- Two week climatology
- Two weeks precip forecast

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

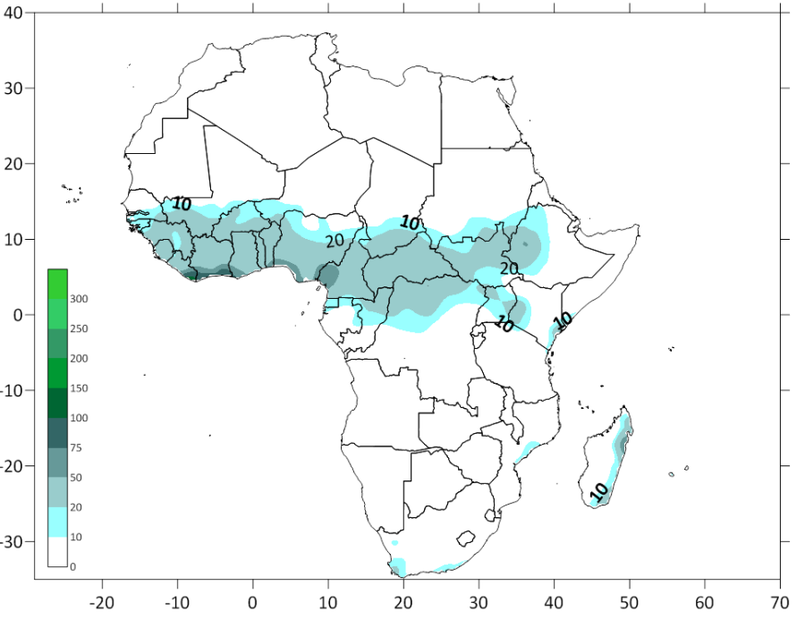
2. Status of Drivers

3. Dynamical Model Forecast : Week 1 and 2

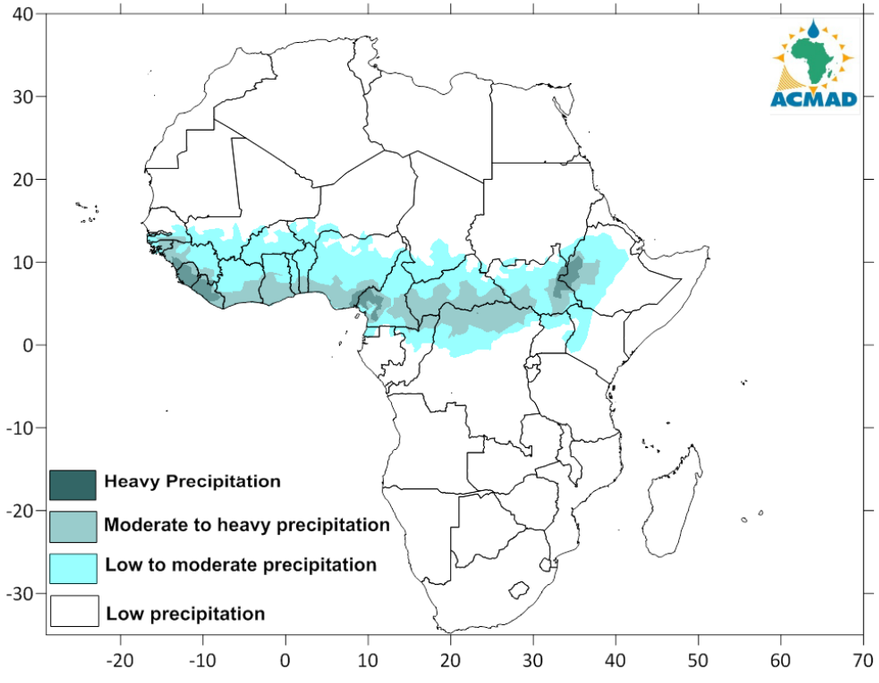
4. Week 1 and 2 Outlook

Forecast Verification

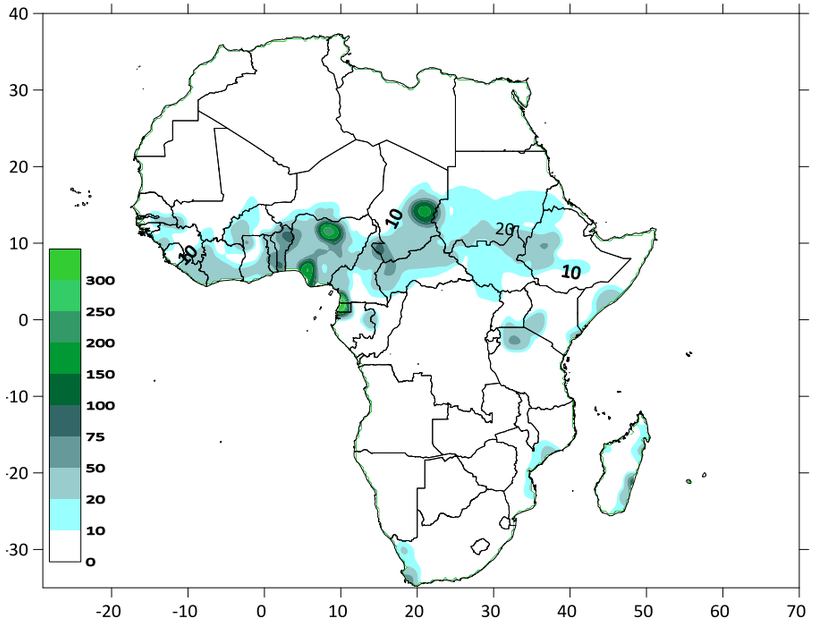
PRECIP CLIM WEEK1 8-14 MAY



PRECIPITATION FORECAST FOR WEEK 1
FROM 8 TO 14 MAY 2022

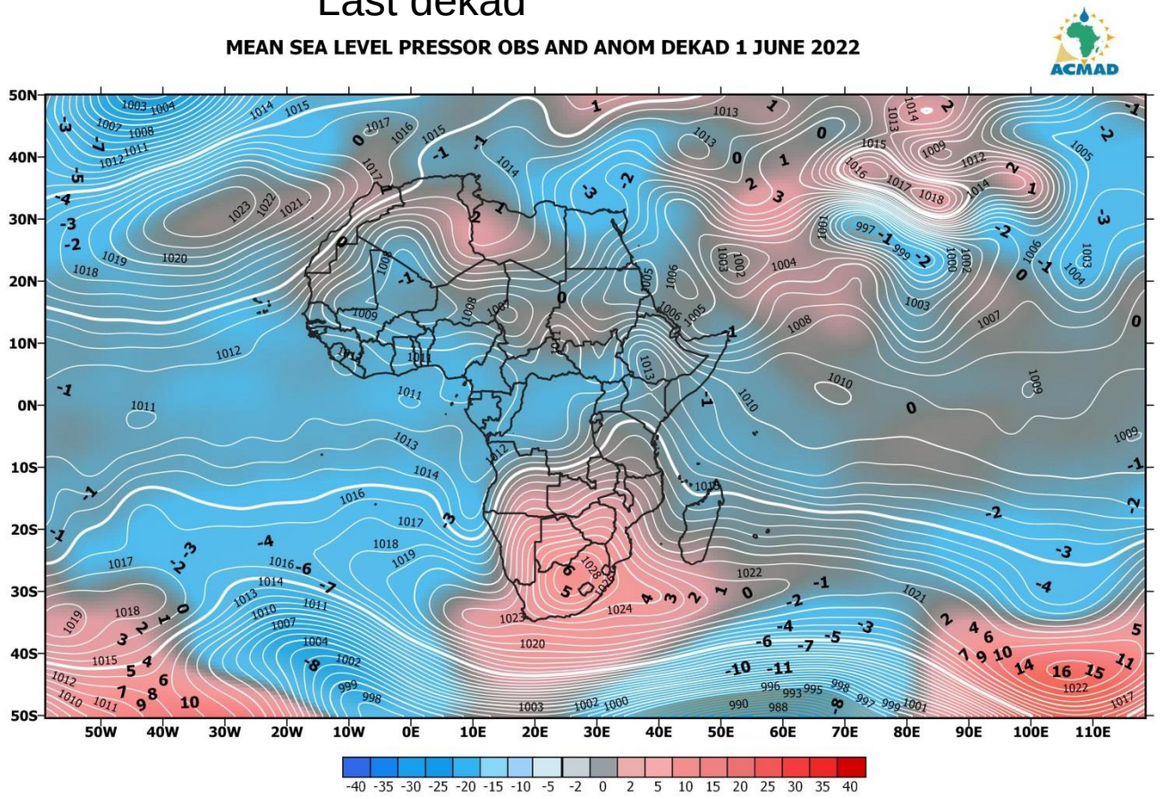


OBSERVED PRECIP DURING 8-14 JUNE 2022



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

Last dekad



Same dekad last year

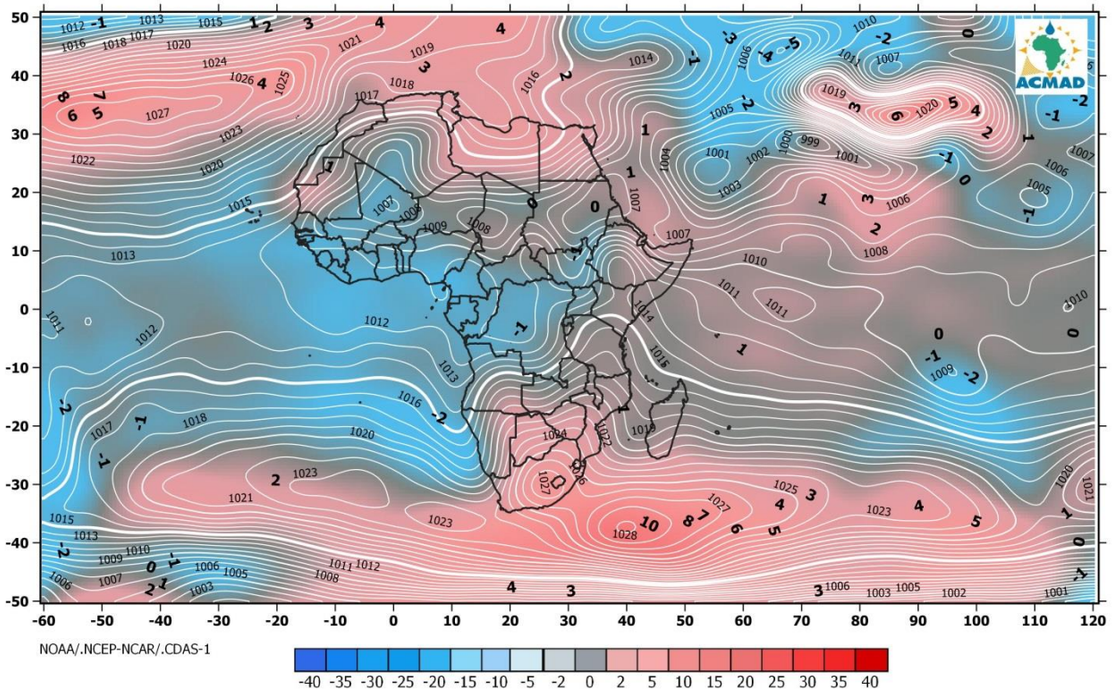


Figure 5: **MSLP observation and anomaly**

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

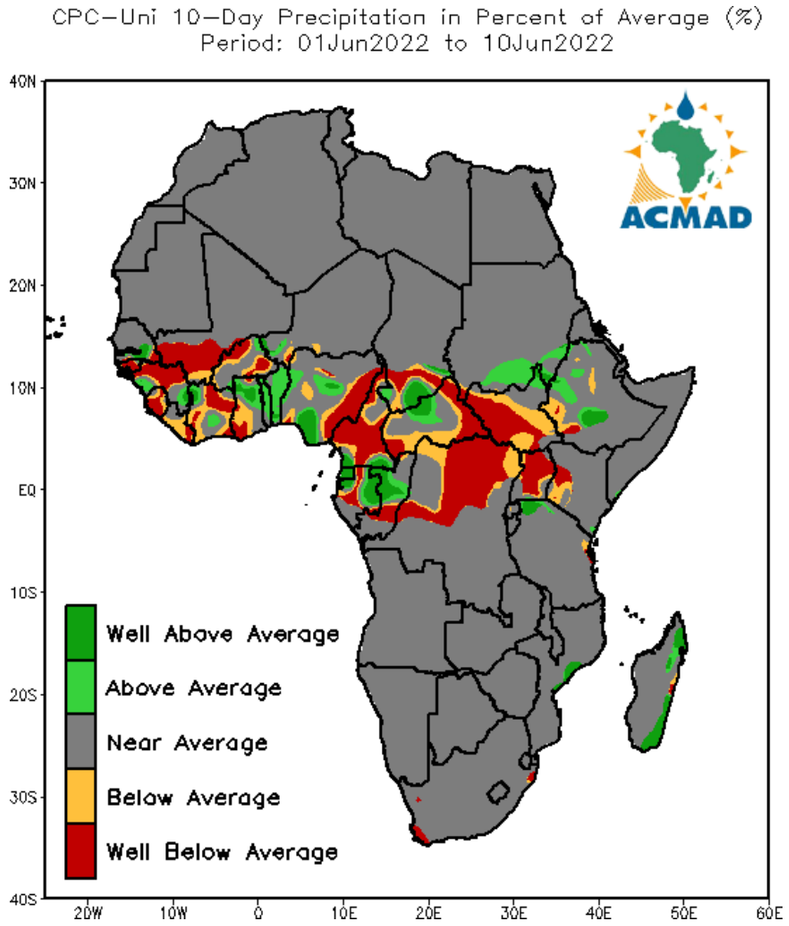


Figure 1: **This map displays decadal average precipitation in percent of average**

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

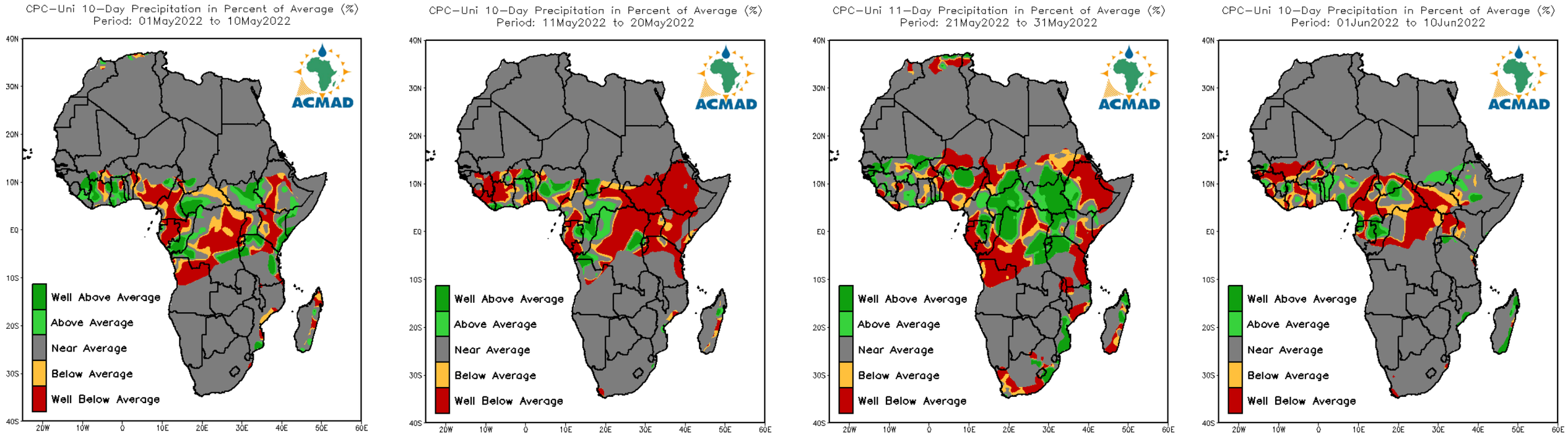
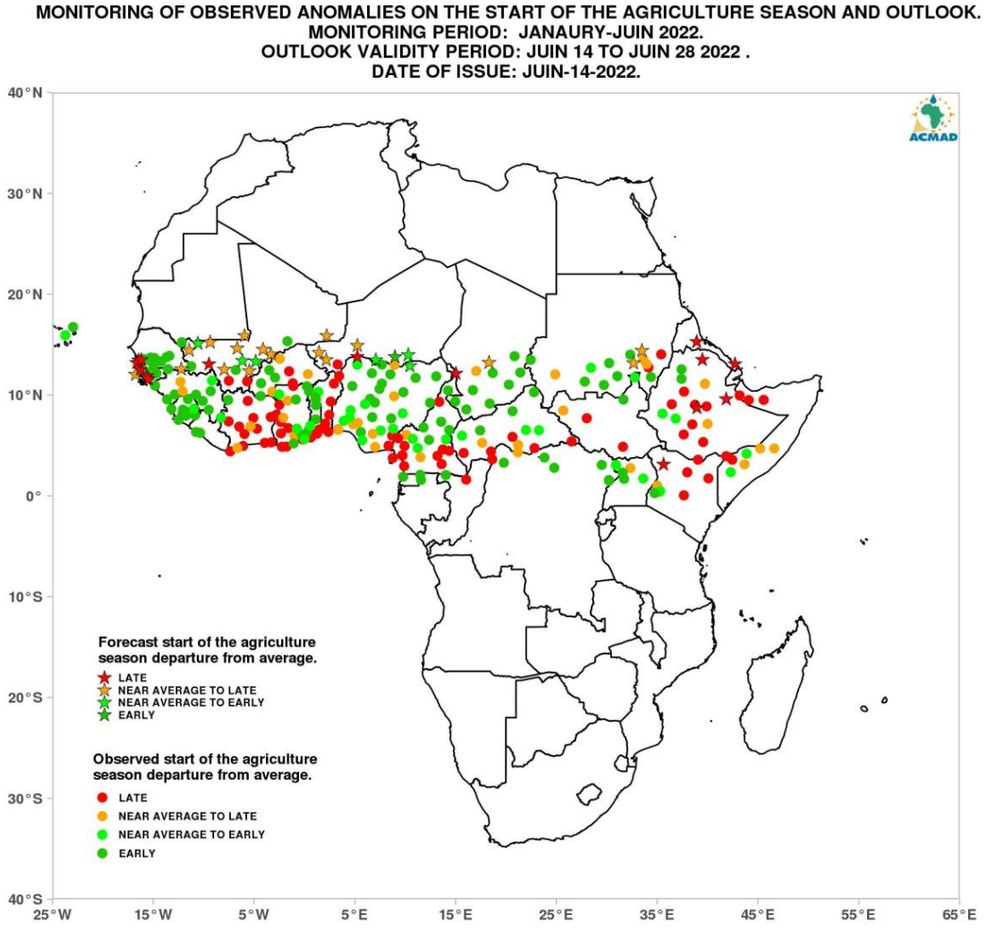


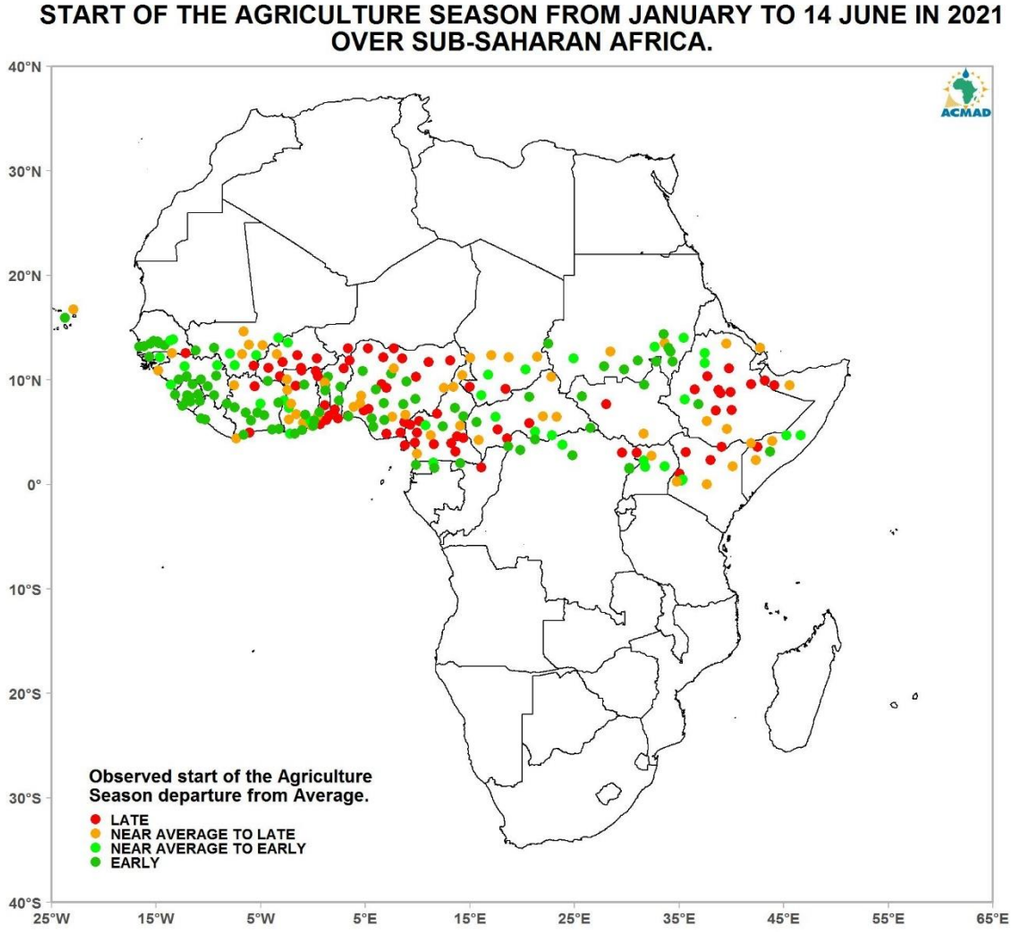
Figure 2: **This maps display decadal average precipitation in percent of average**

Start of Agricultural Season – Current and Outlook

Current Year



Last year at the same time



OLR Anomalies
During the passed 3 Dekads

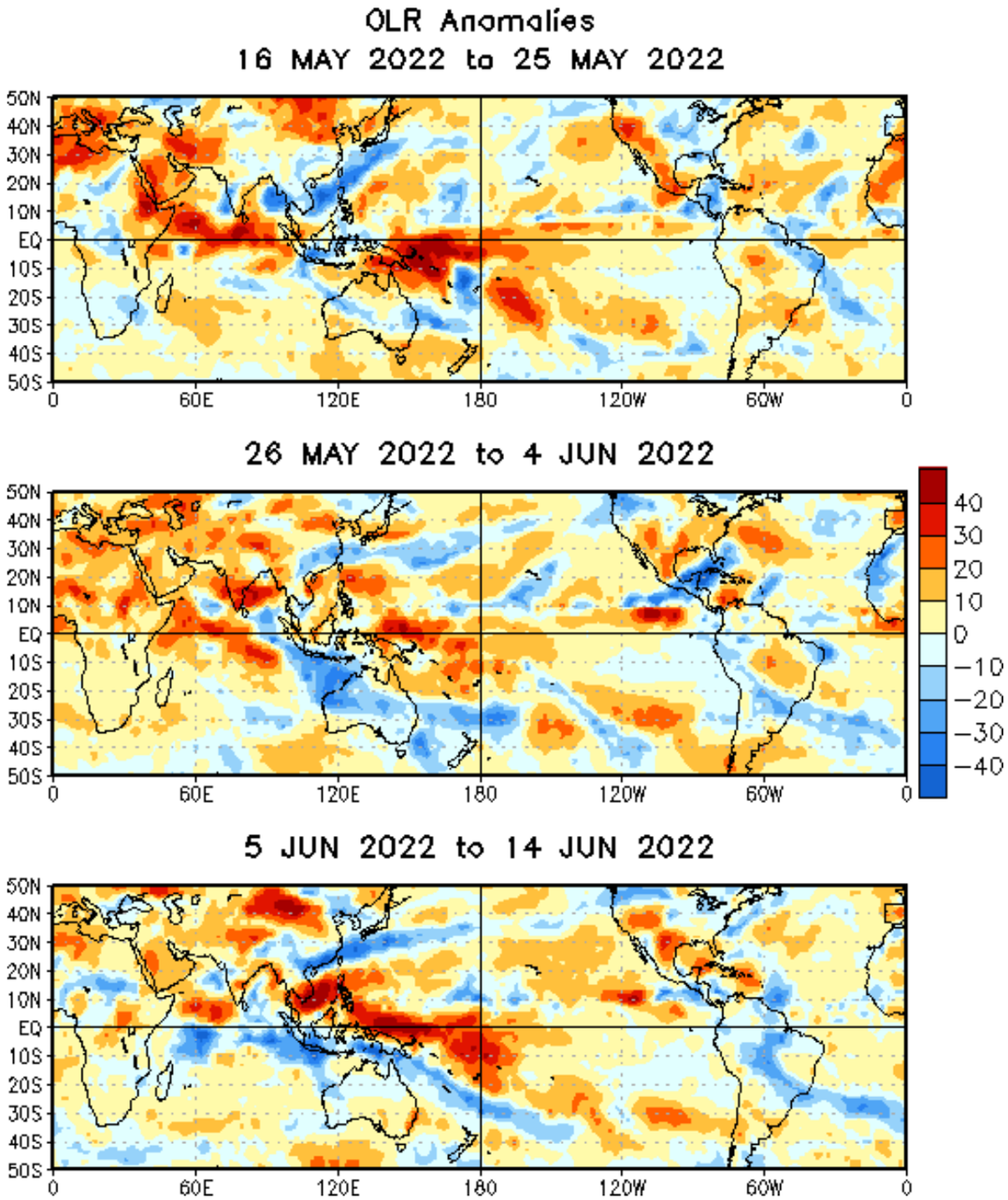


Figure 4: **Past 3 weeks OLR anomalies**

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

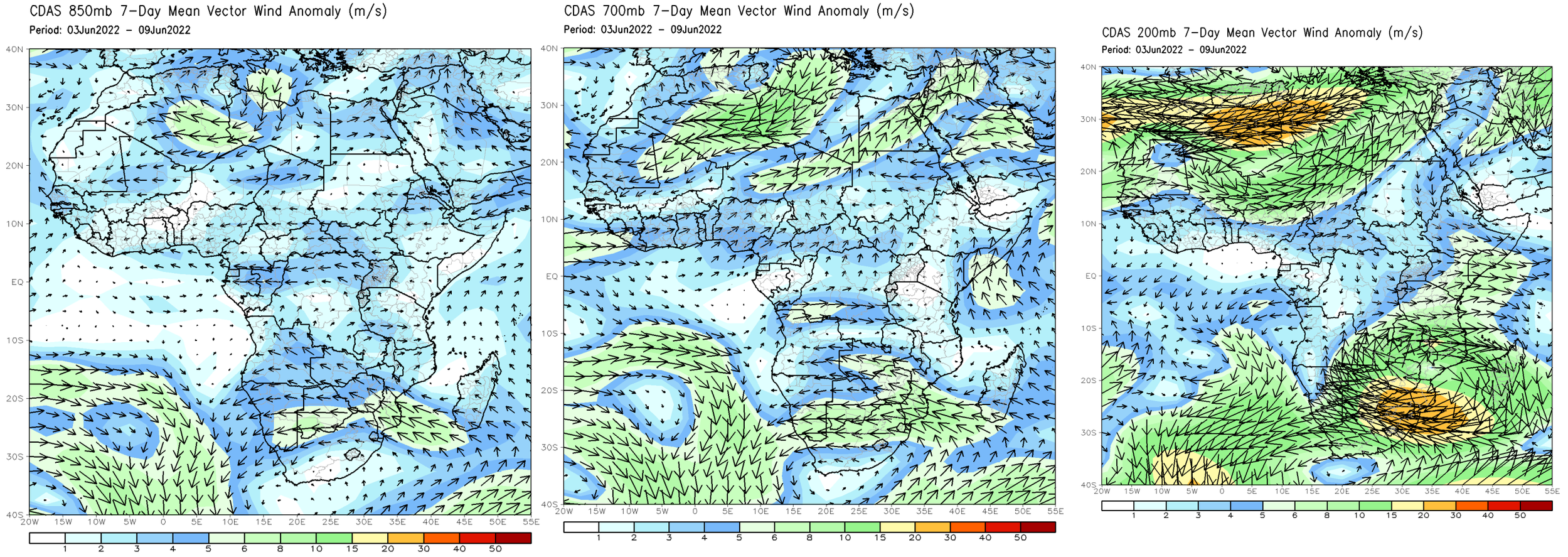


Figure 7: **Wind anomalies for 850hpa, 700hPa and 200hpa**

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

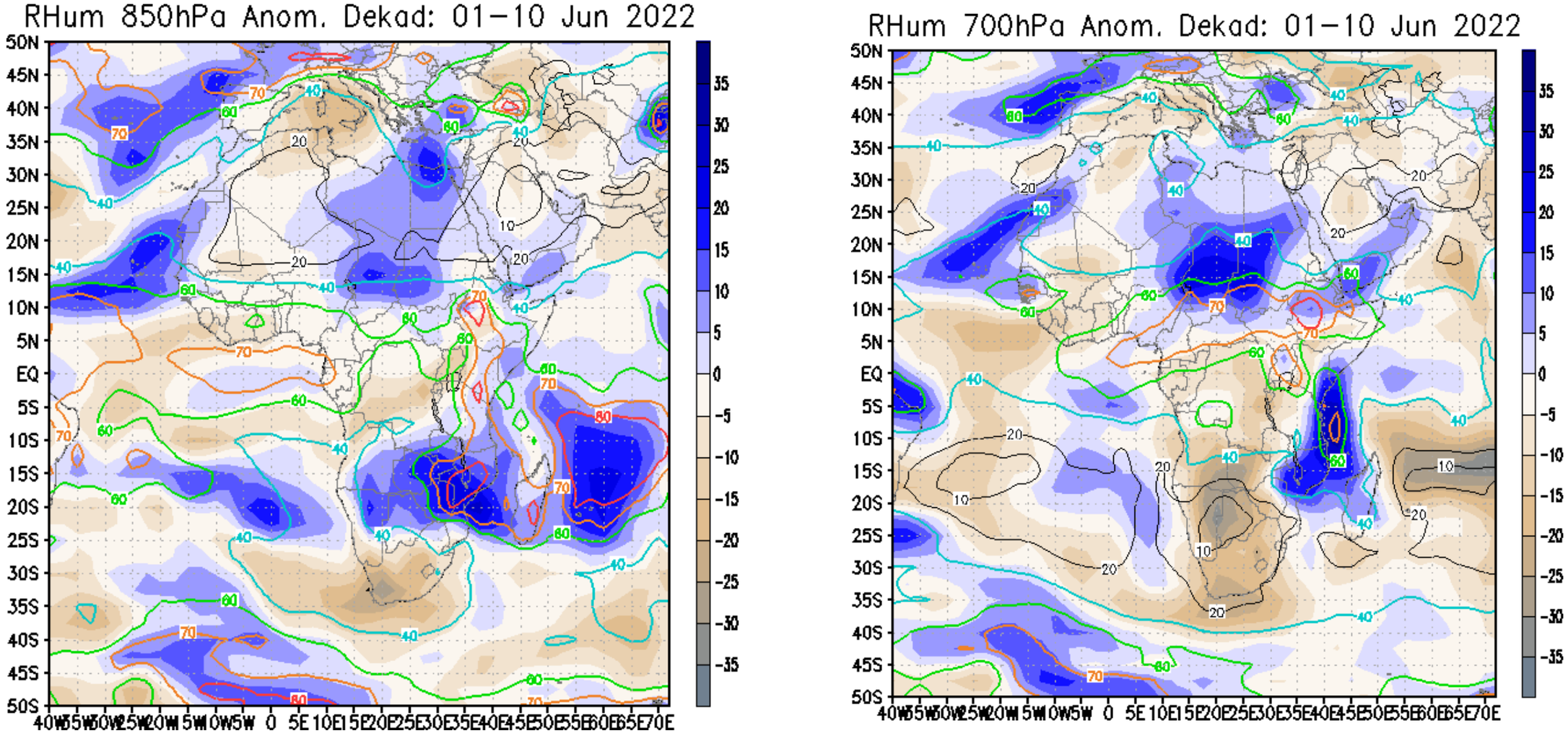
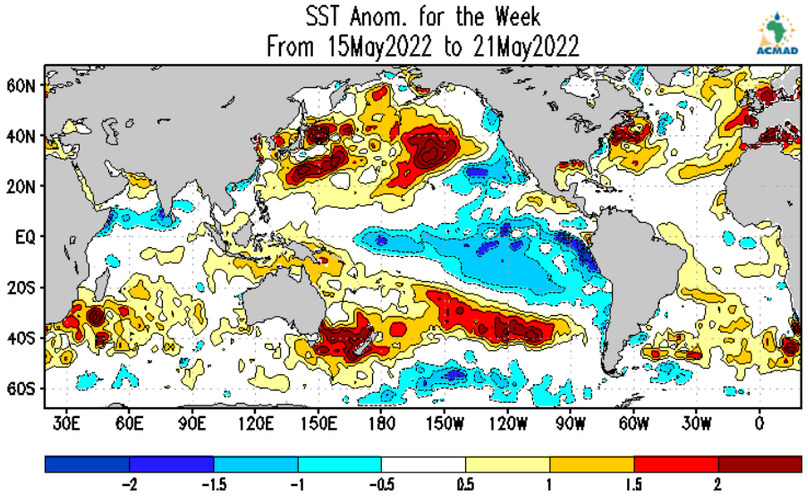
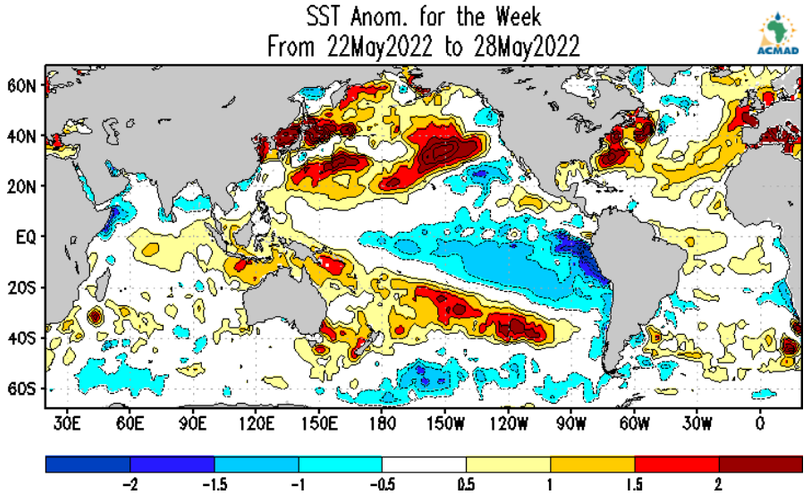


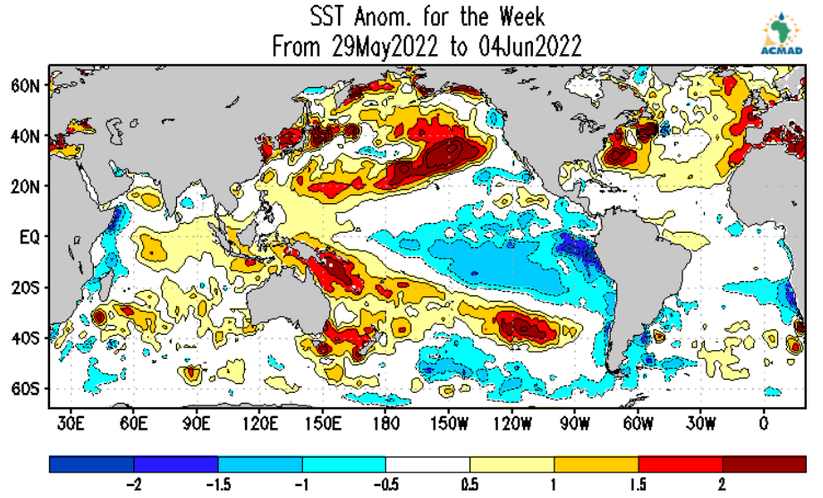
Figure 8: **Relative Humidity Anomaly at 850hPa (left) and 700hPa (right)**

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







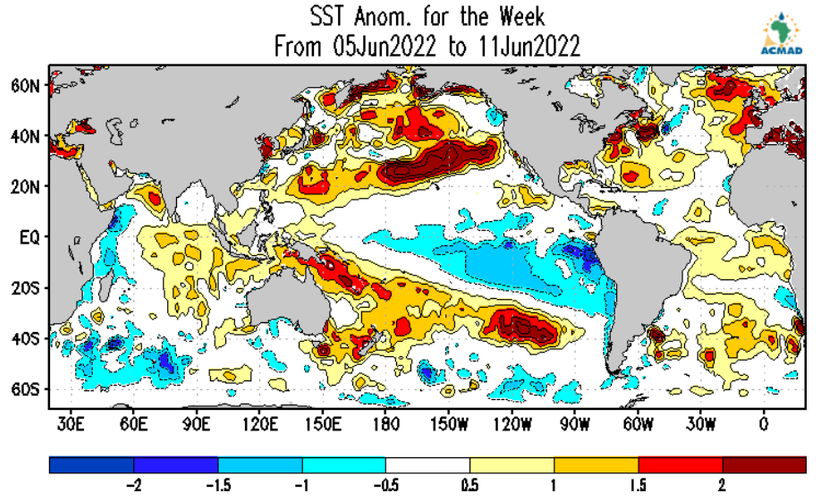
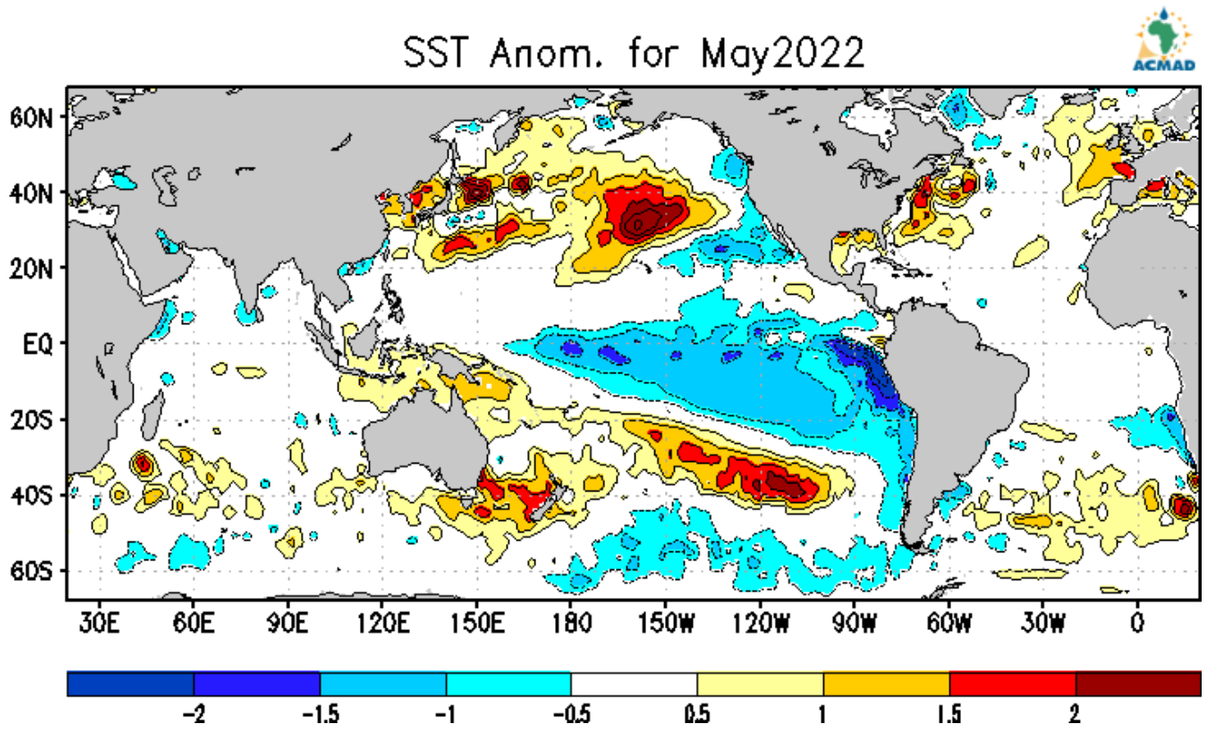


Figure 9: Maps display weekly sea surface temperature anomalies over the globe for last four weeks

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
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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



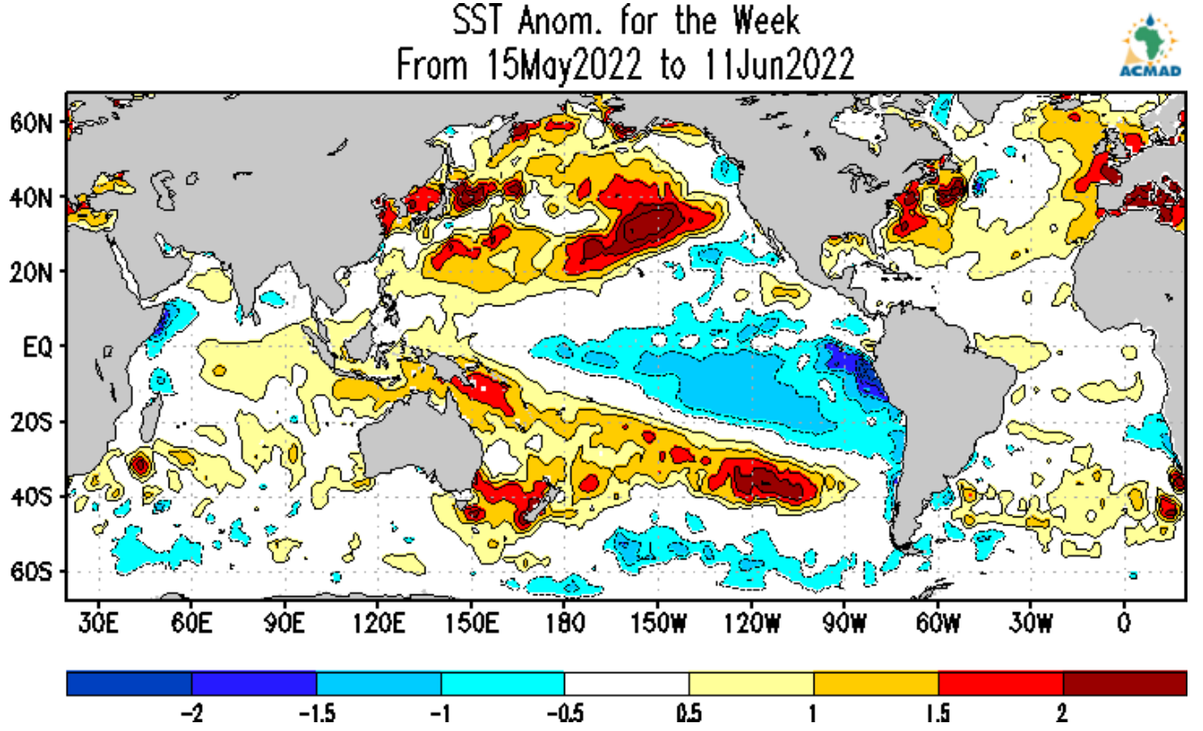


Figure 10 : Maps display monthly sea surface temperature anomalies over the globe.

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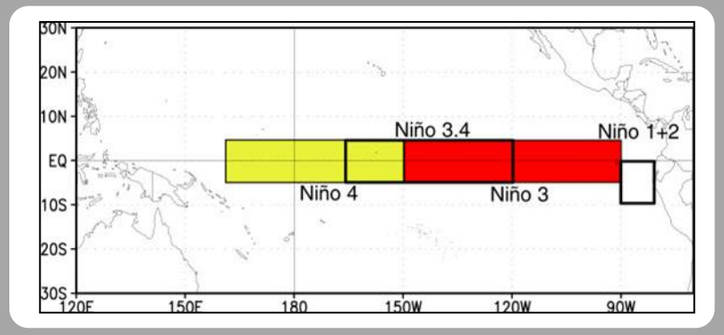
1. Climate Monitoring
2. Status of Drivers
   - ENSO - Obs and Forecast
   - Current 200 hPa Velocity Potential
   - MJO – Current Status and Forecast
   - Weekly PWAT – Current Status and Forecast
   - Dekadal 200 hPa VP and Tropical waves
   - Dekadal Stream Function and Tropical Waves
3. Dynamical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

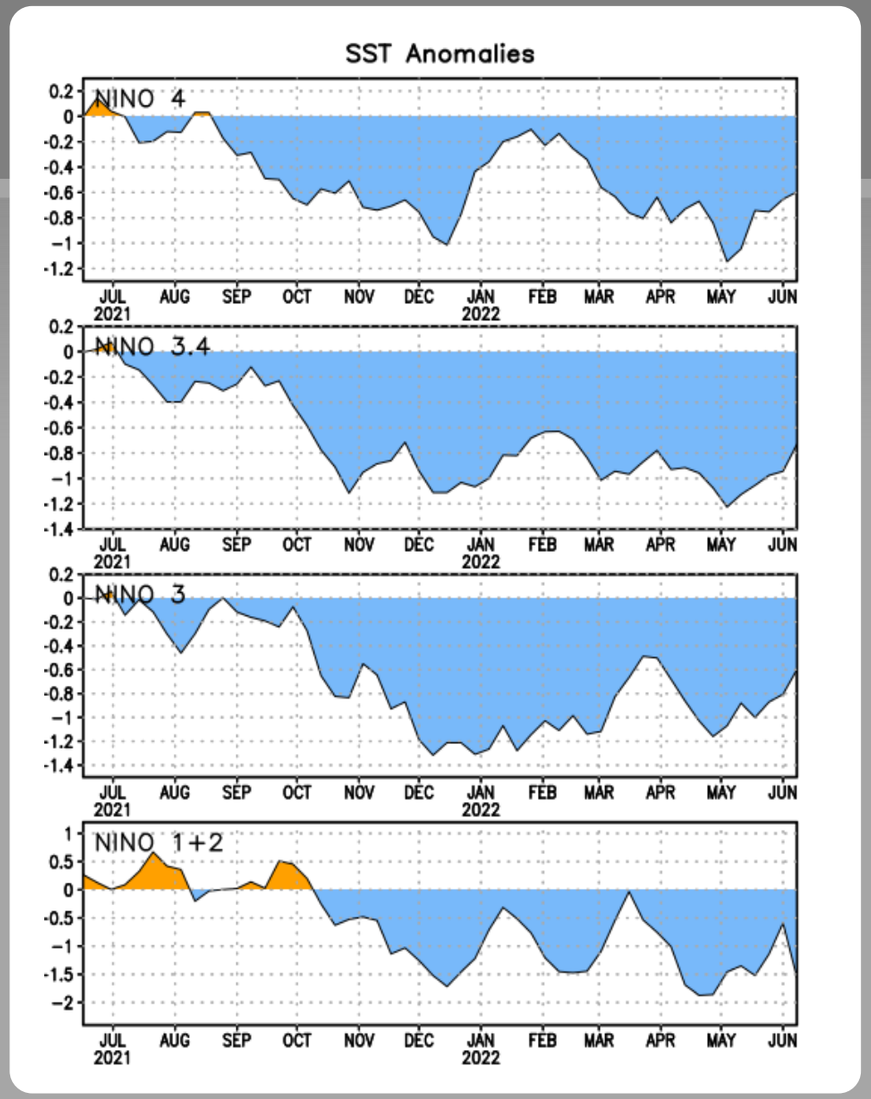
ENSO : Obs. and Forecast

Niño Region SST Departures (ºC) Recent Evolution

The latest weekly SST departures are:

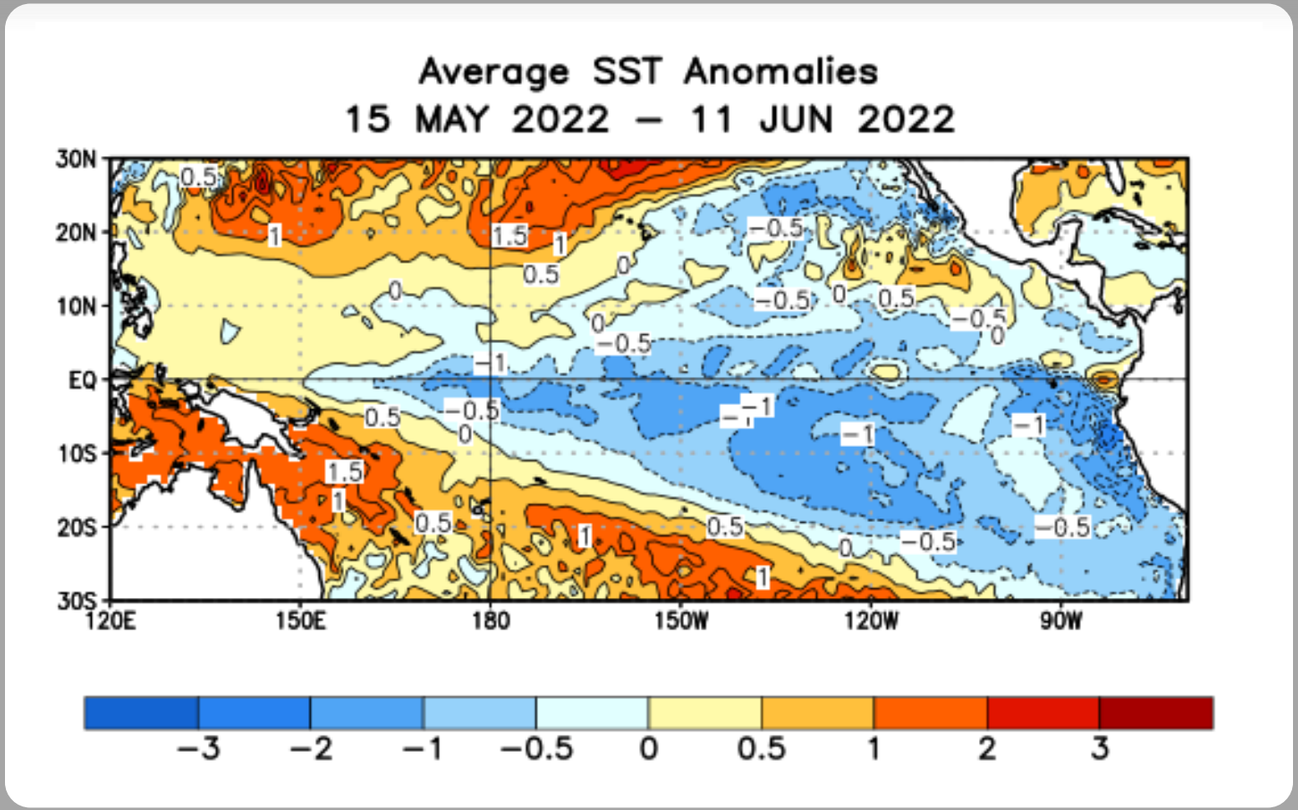
Niño 4	-0.6ºC
Niño 3.4	-0.7ºC
Niño 3	-0.6ºC
Niño 1+2	-1.6ºC





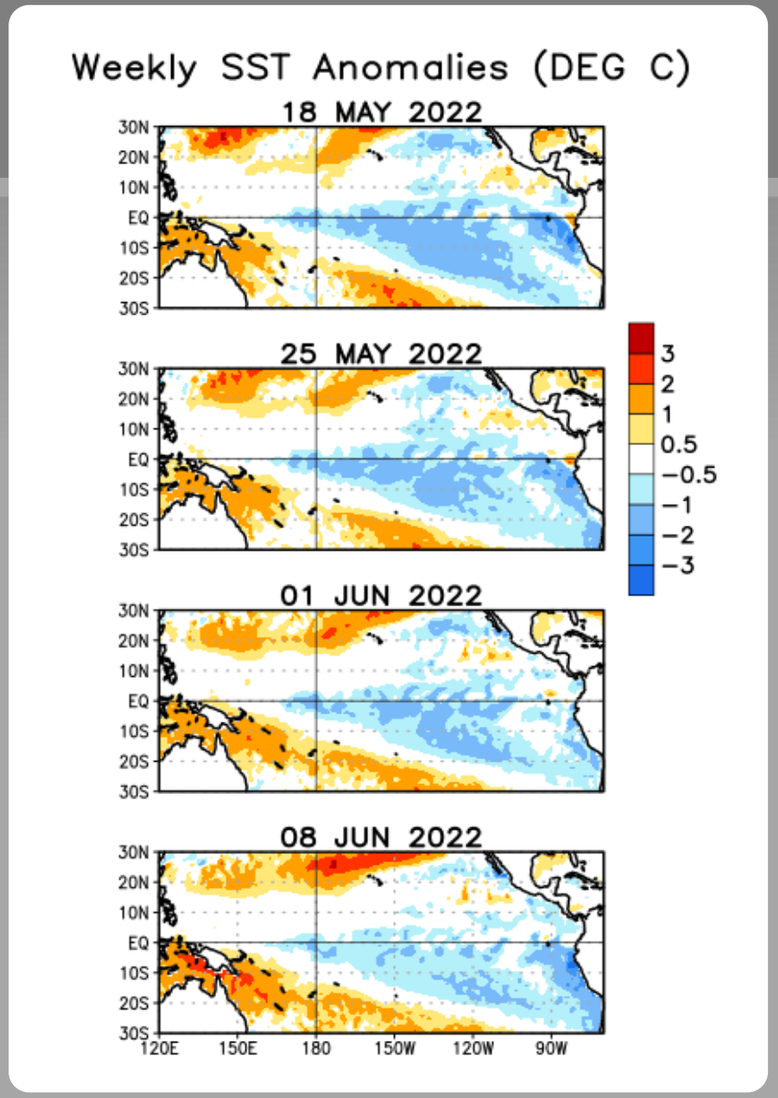
SST Departures (ºC) in the Tropical Pacific During the Last Four Weeks

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



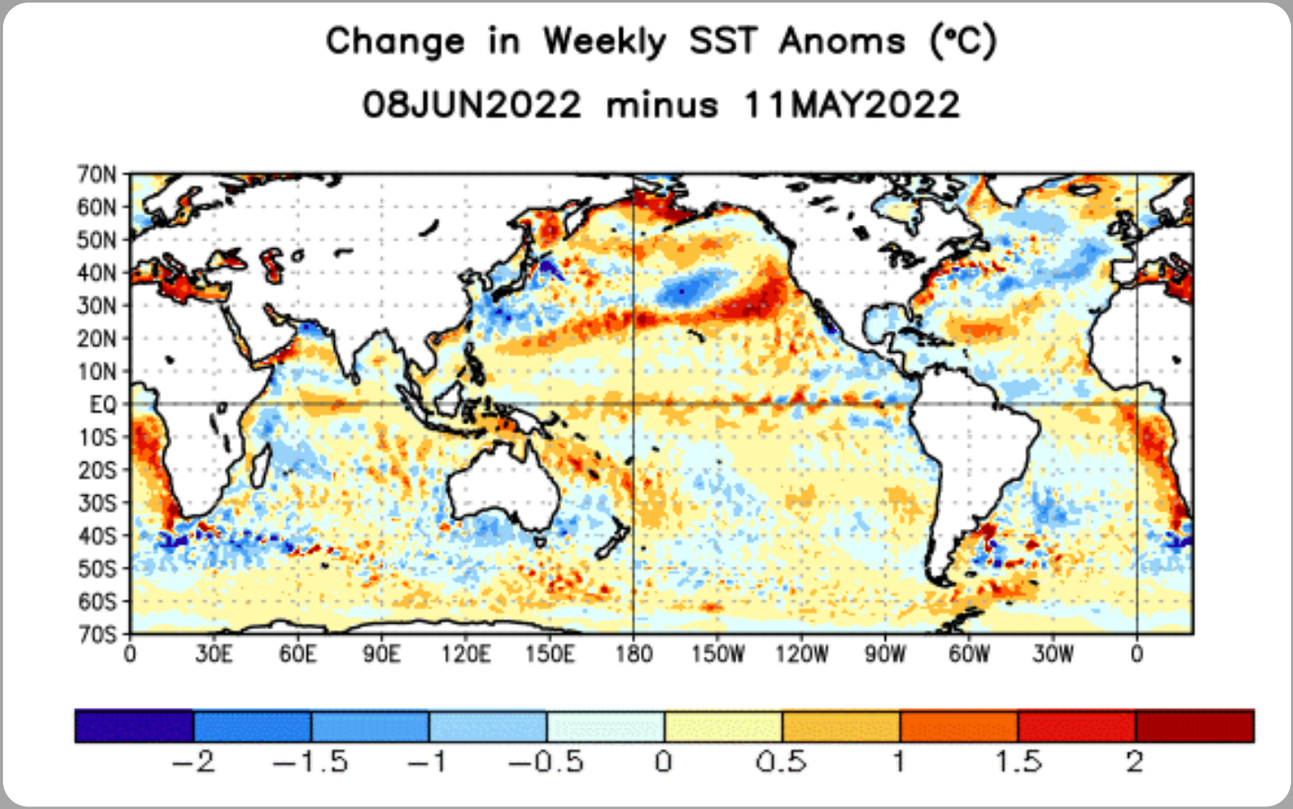
Weekly SST Departures during the Last Four Weeks

During the last 4 weeks, negative SST anomalies have weakened across most of the equatorial Pacific Ocean.



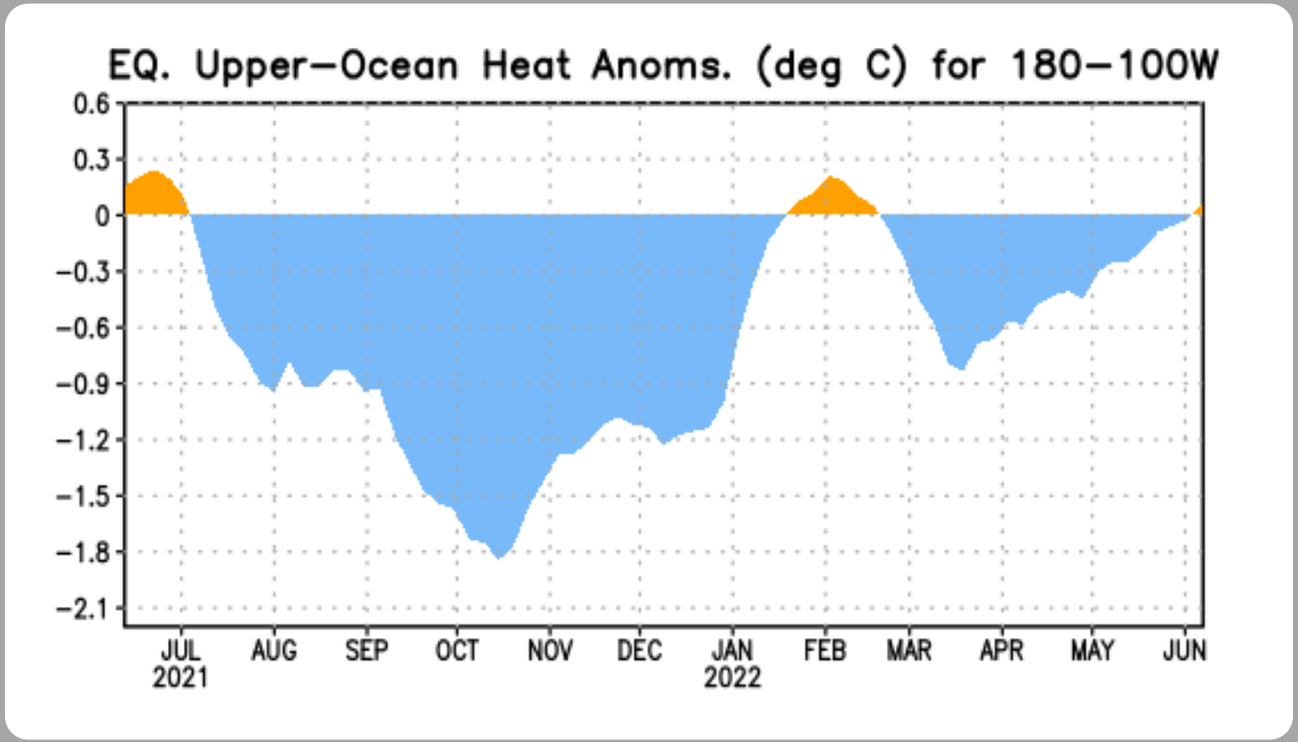
Change in Weekly SST Departures over the Last Four Weeks

During the last four weeks, mostly positive changes in SST anomalies were observed across the equatorial Pacific Ocean.



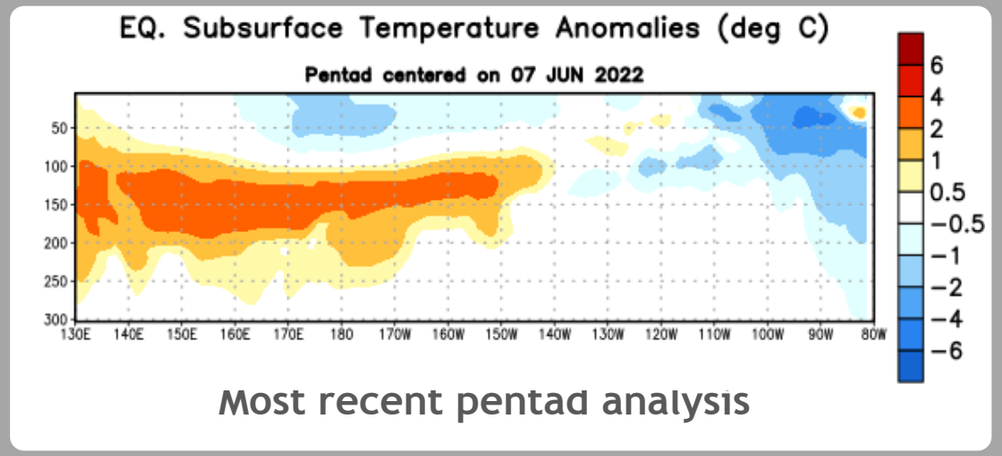
Central and Eastern Pacific Upper-Ocean (0-300 m) Weekly Average Temperature Anomalies

From mid-March to early July 2021, subsurface temperature was above average. Negative temperature anomalies returned in July 2021 and persisted through mid-January 2022. During February through mid-March, subsurface temperature anomalies decreased. Since then, negative anomalies have gradually weakened and are now near zero.



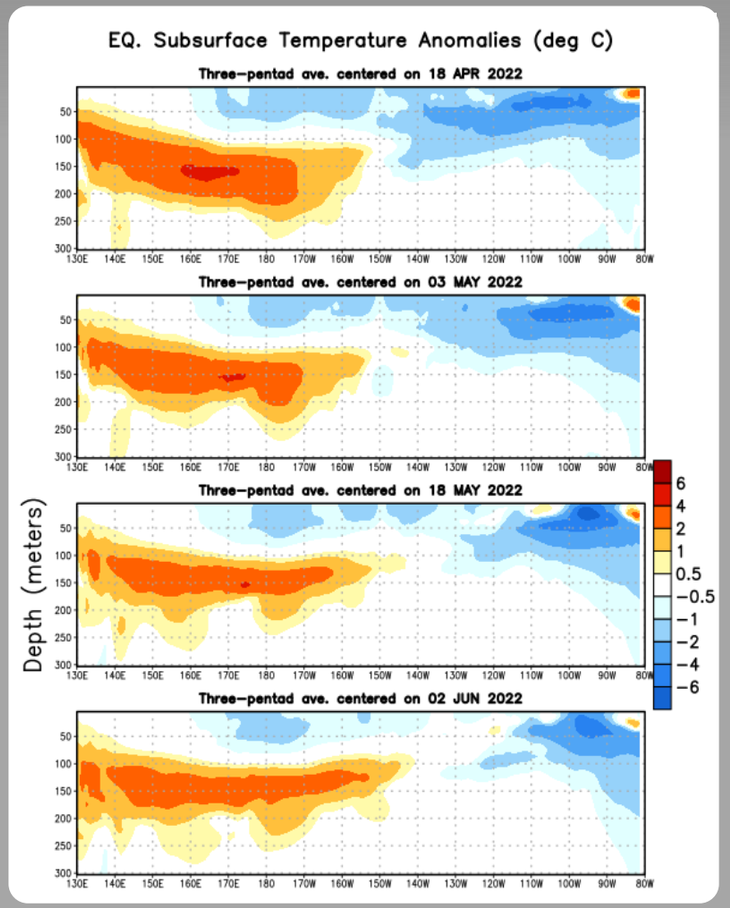
Sub-Surface Temperature Departures in the Equatorial Pacific

During the last two months, negative subsurface temperature anomalies have persisted in parts of the central and eastern equatorial Pacific Ocean.

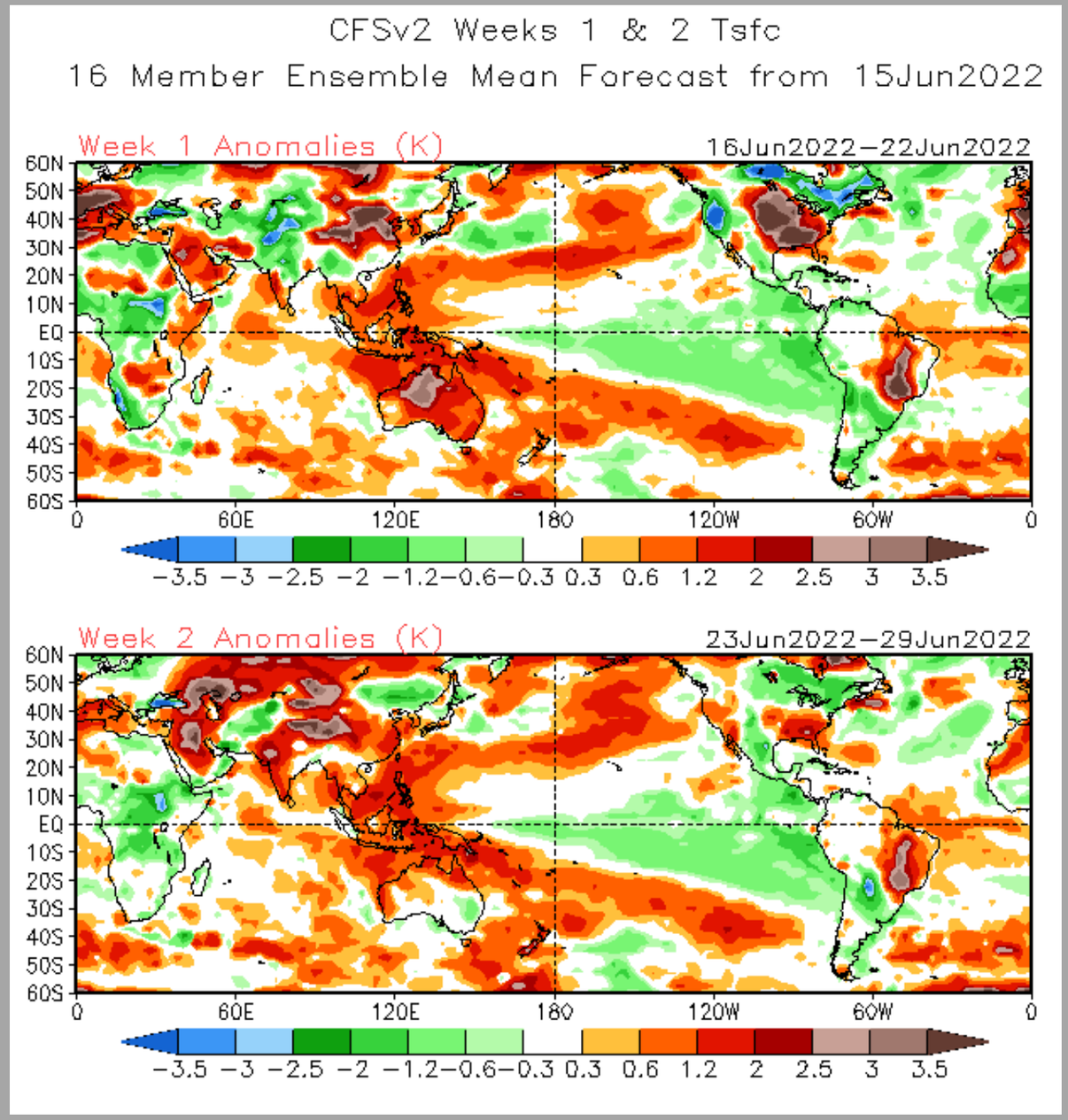


Most recent pentad analysis

Negative subsurface temperature anomalies prevailed near the surface in the central and eastern equatorial Pacific Ocean, though recent weakening was observed in the east-central Pacific. Positive anomalies were mostly observed in the western and central Pacific, at depth.



Sea Surface Temperature forecast



https://origin.cpc.ncep.noaa.gov/products/people/mchen/CFSv2FCST/weekly/

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

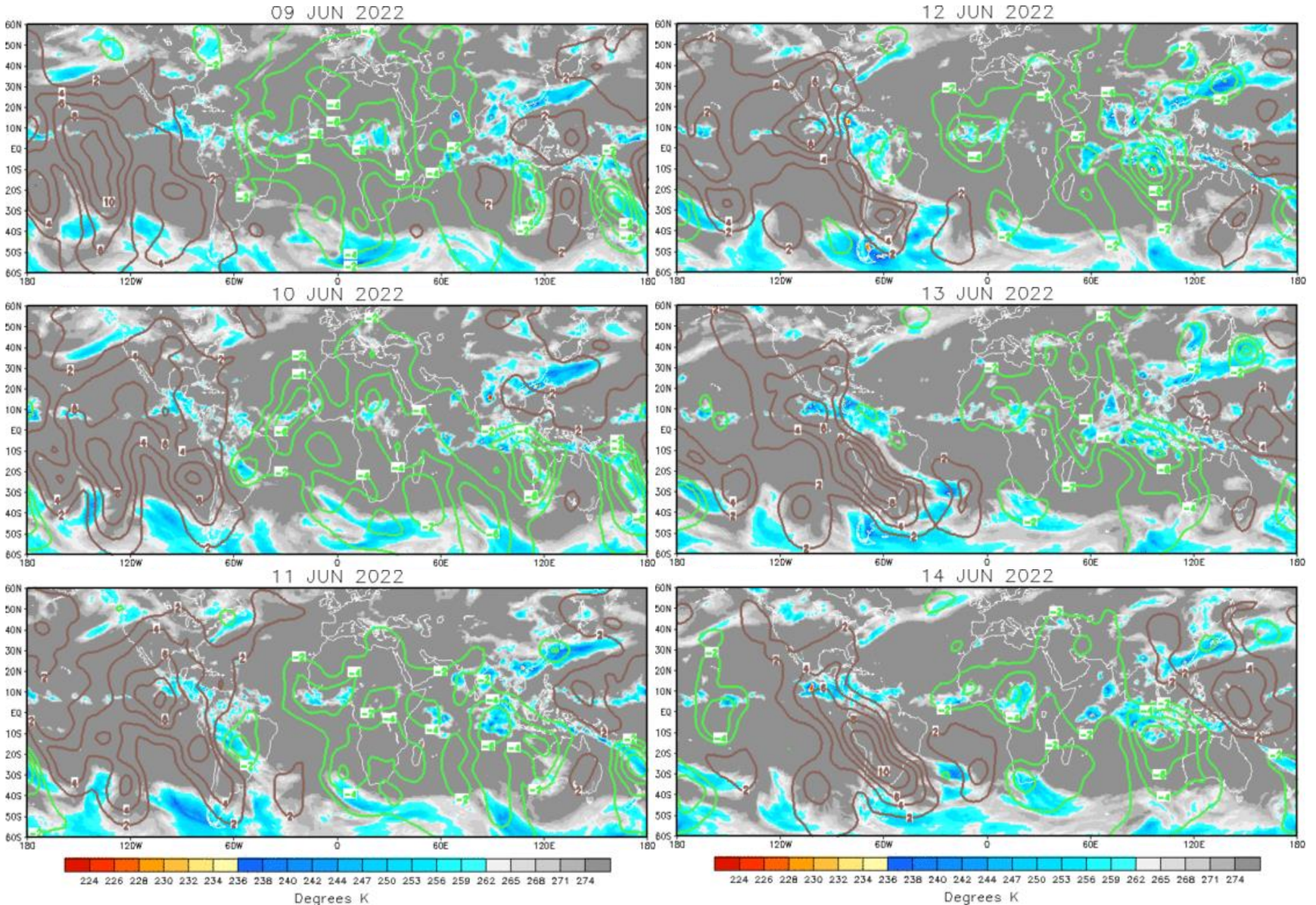
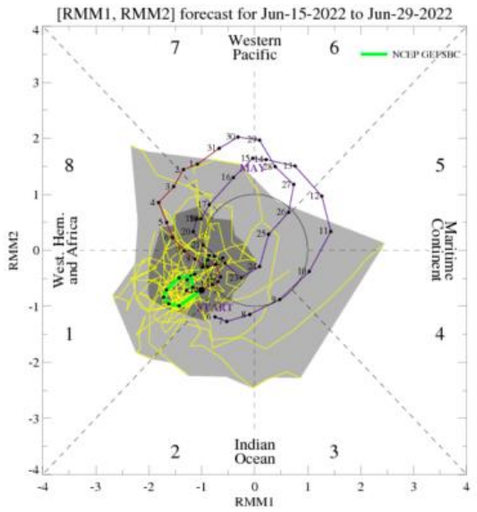


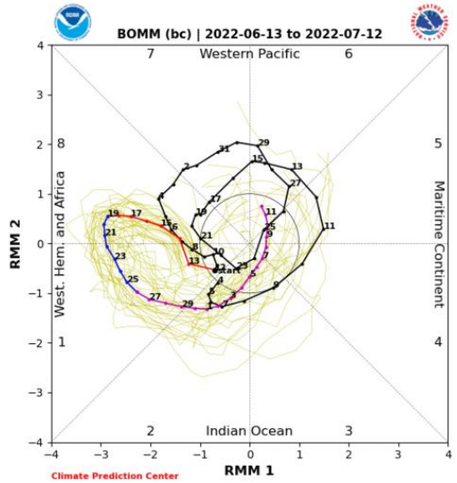
Figure 12: **IR image and Velocity Potential anomalies**

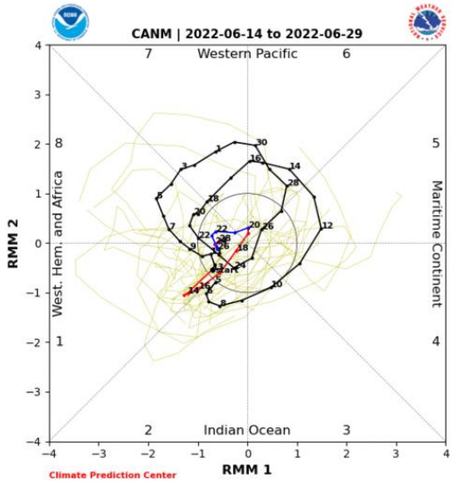
https://www.cpc.ncep.noaa.gov/products/precip/CWlink/vpotgifs/am_ir_monthly_6.gif
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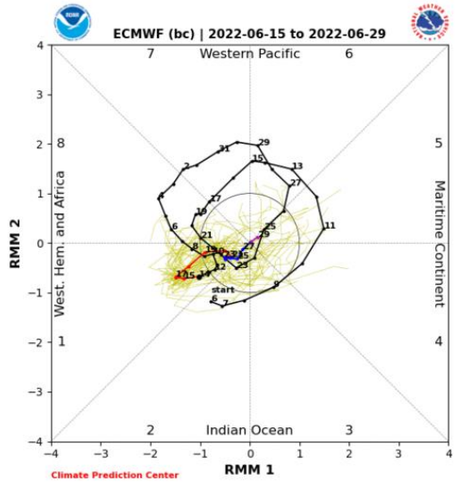
MJO – Current Status and Forecast Add BoM, UKMet and DWD

Ensemble GFS Phase Diagram

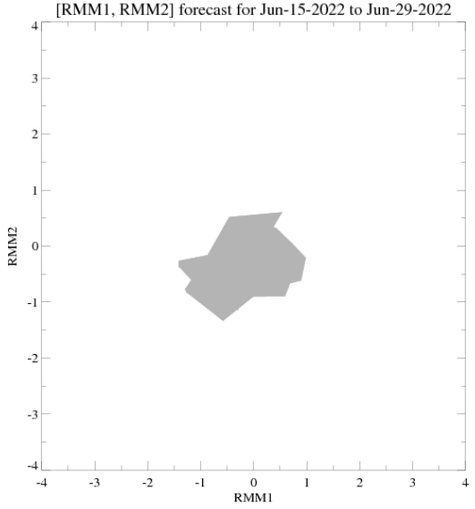


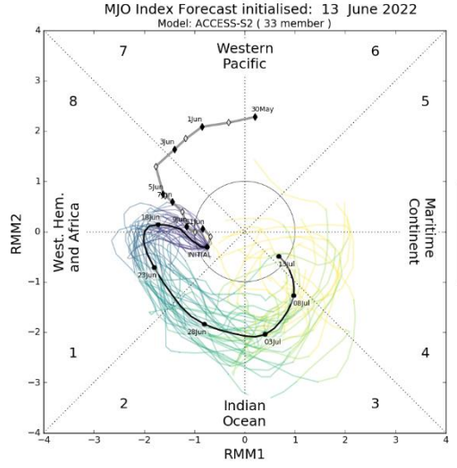


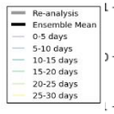




Operational CFSv2 Phase Diagram







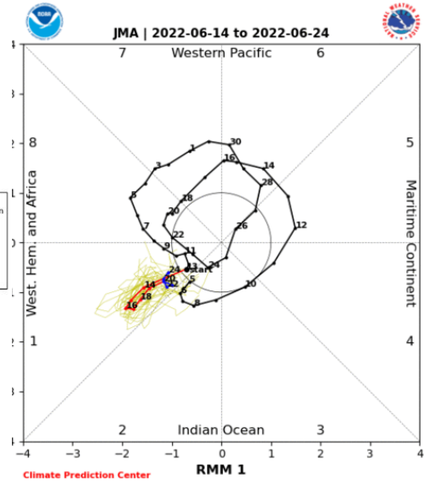


Figure 14: MJO RMM Forecasts from ECMWF, NCEP and UK Met Office, JMA

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

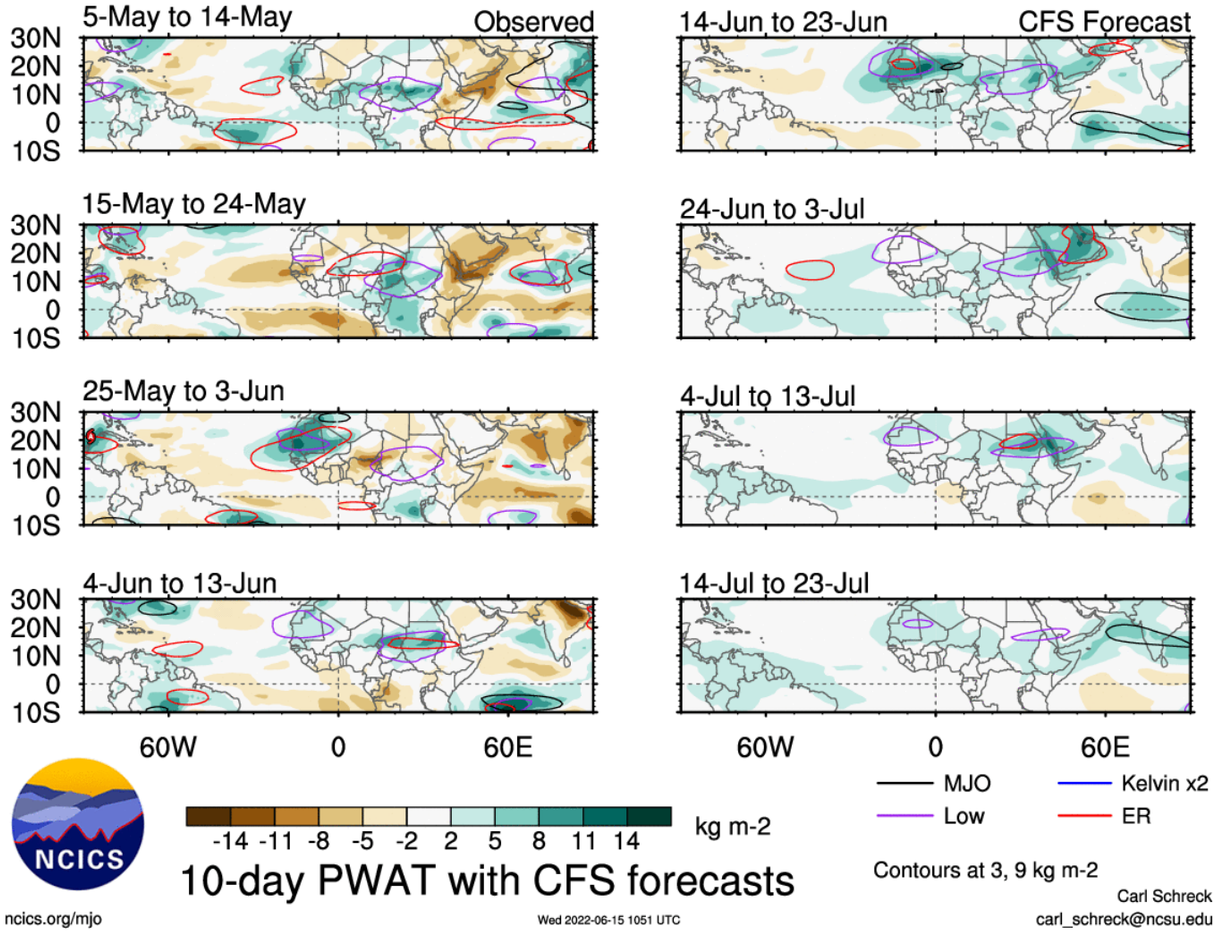


Figure 7a: Africa

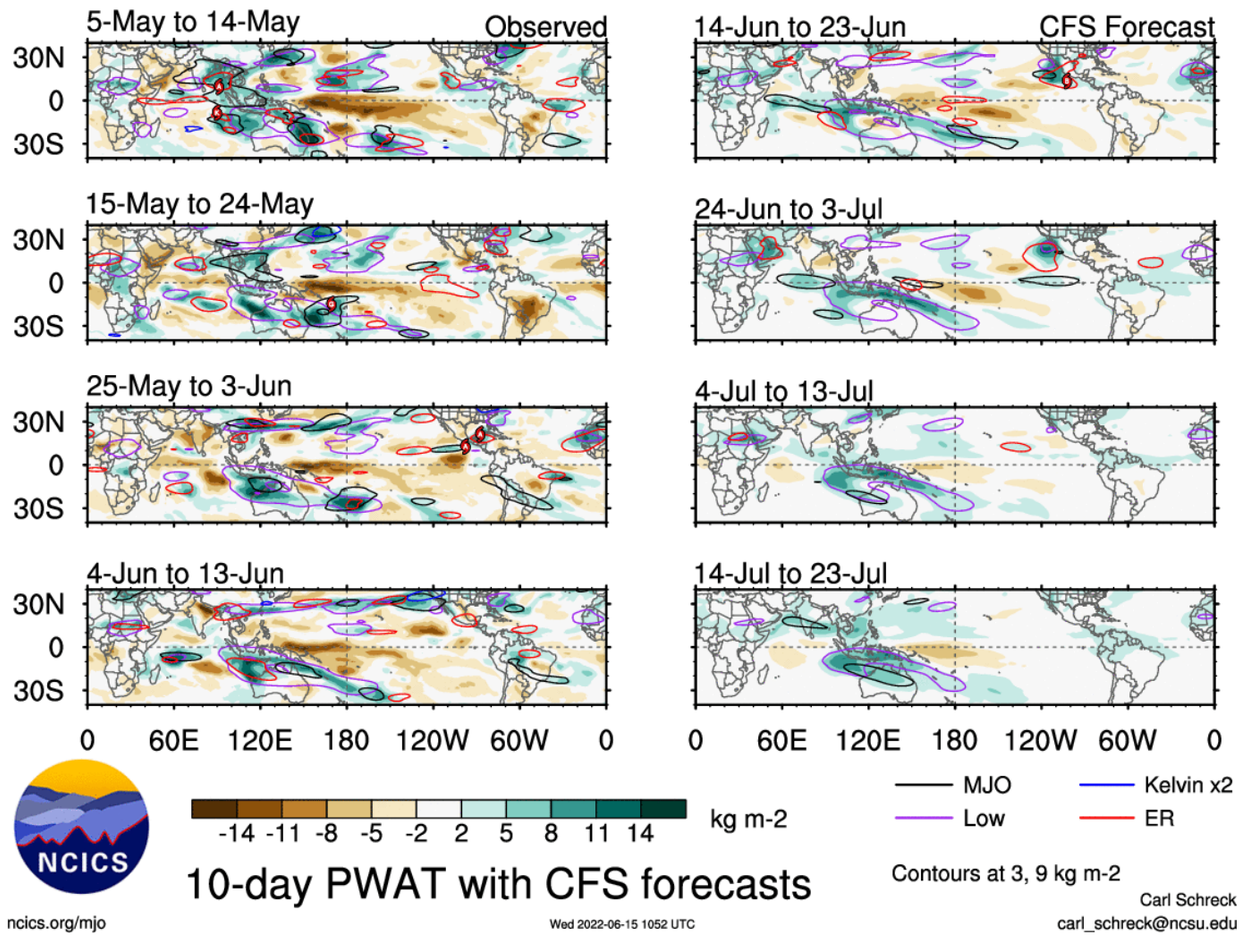
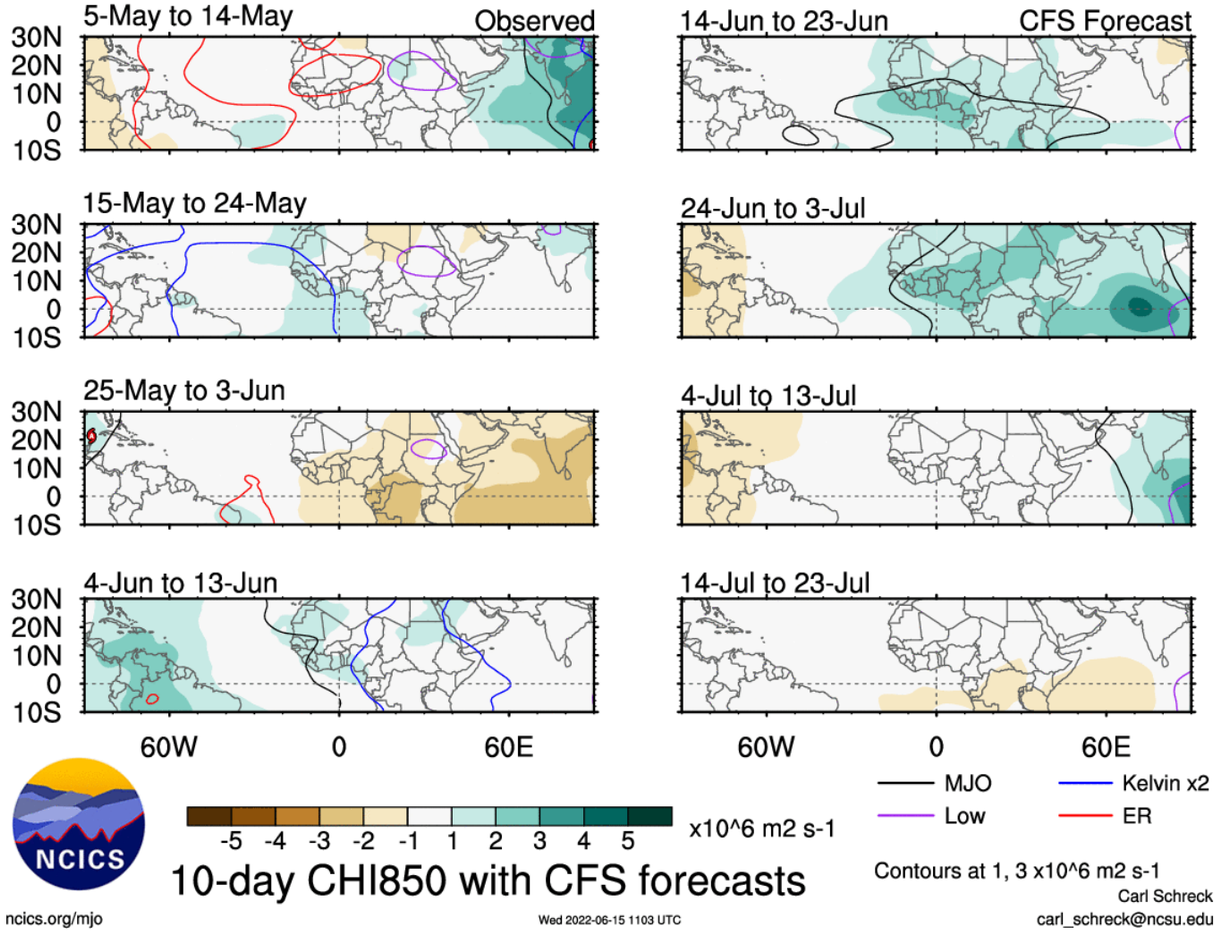


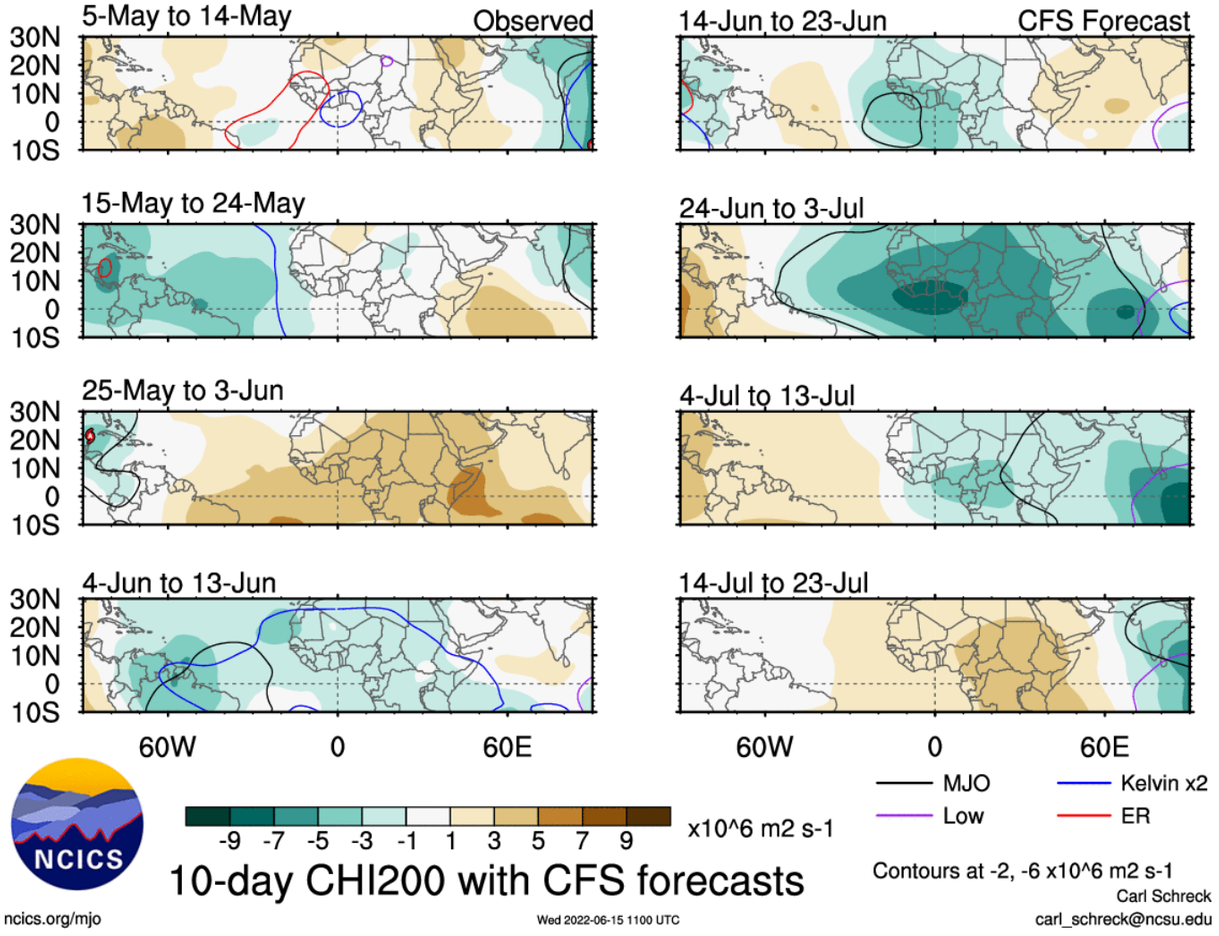
Figure 7b: Global

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



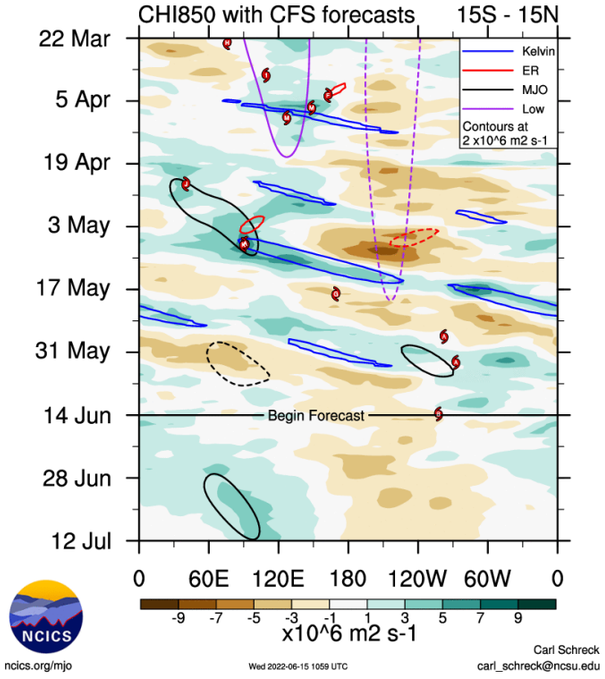


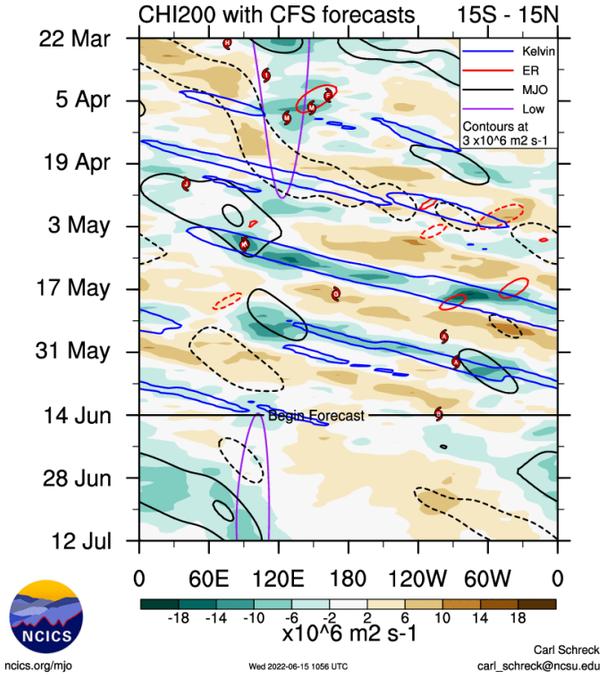
https://ncics.org/pub/mjo/v2/map/chi850.cfs.all.global.10.png
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https://ncics.org/pub/mjo/v2/map/chi850.cfs.all.africa.10.png
https://ncics.org/pub/mjo/v2/map/chi200.cfs.all.africa.10.png

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

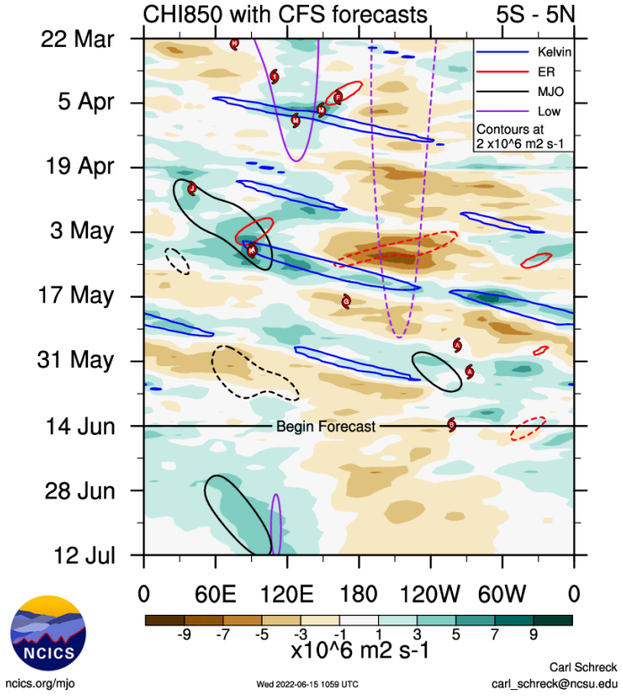
Dekadal Velocity Potential Anomalies – Obs and Fcst: Hovmoller diagram

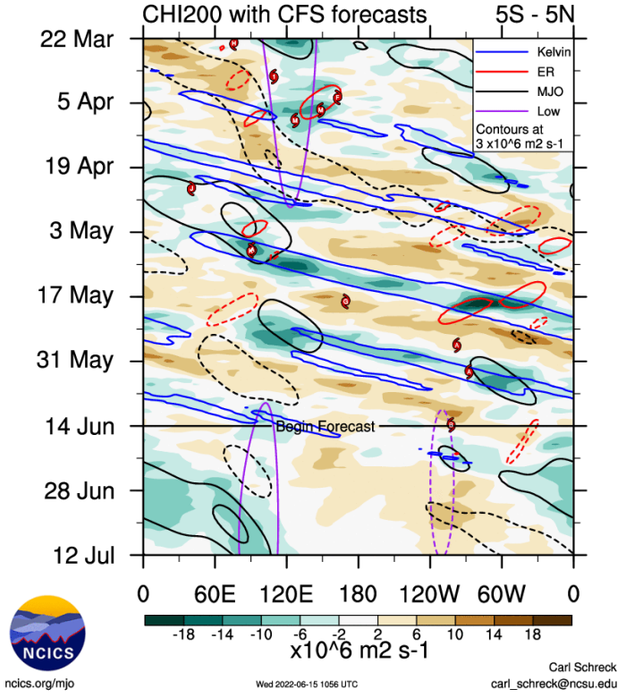
Average Anomalies in the band 15S-15N





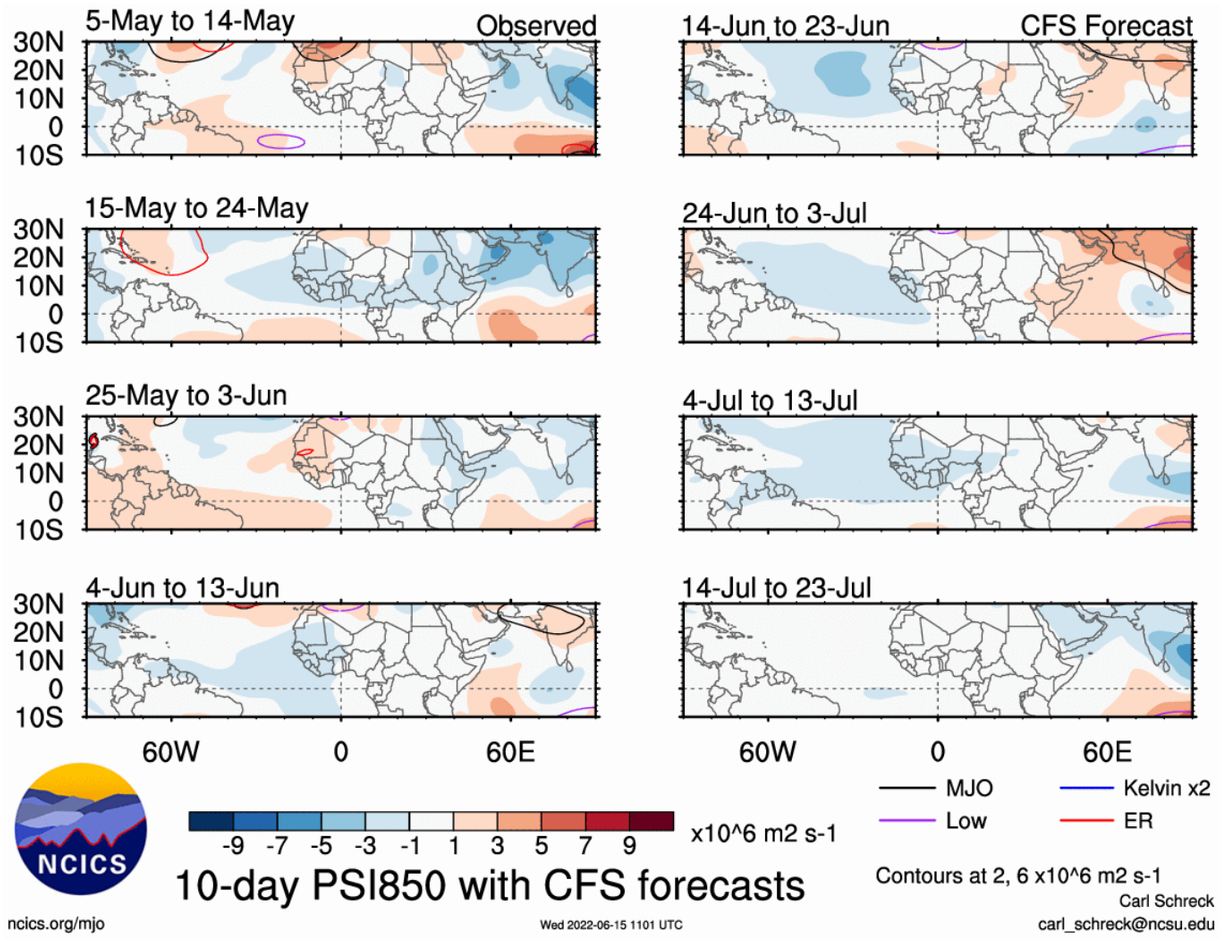
Average Anomalies in the band 5S-5N

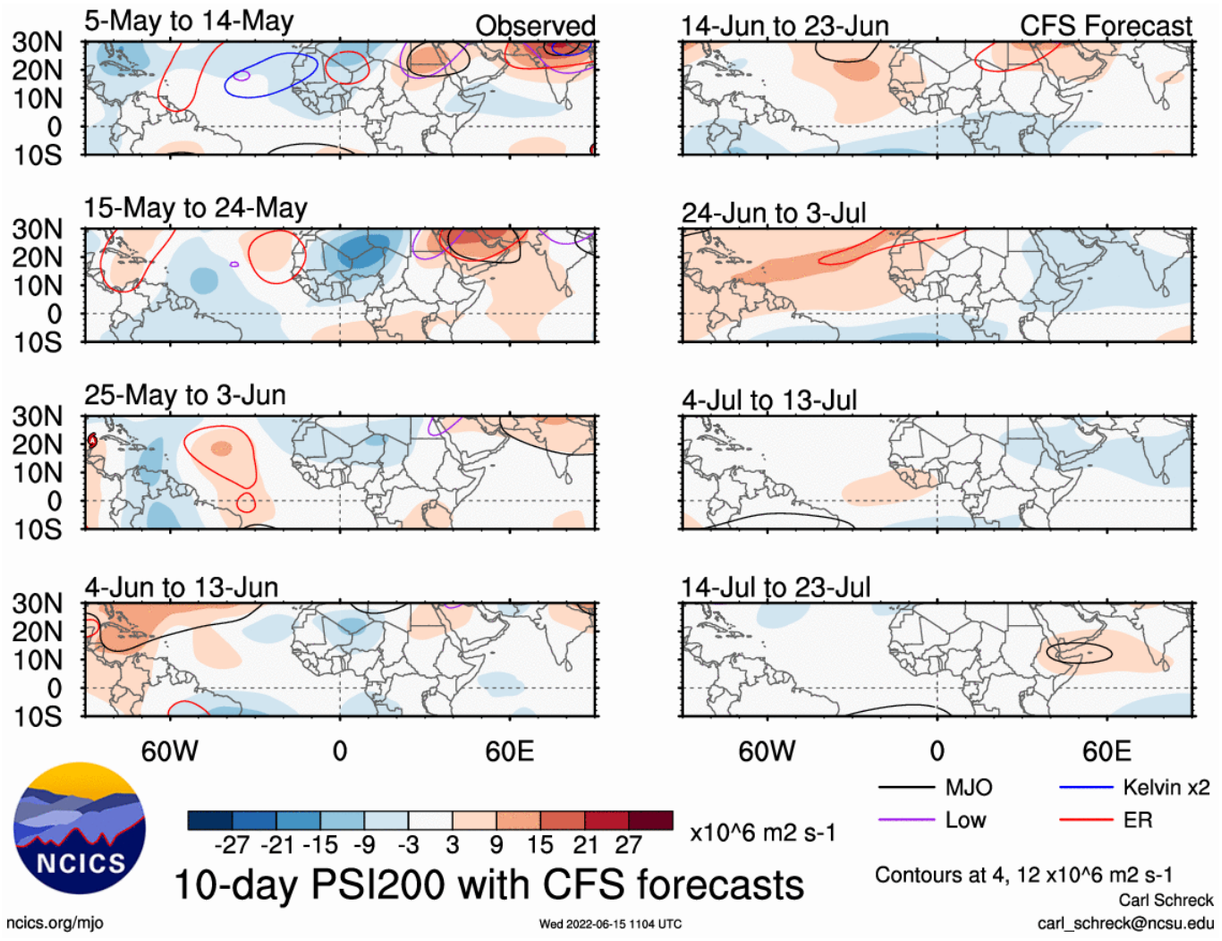




https://ncics.org/pub/mjo/v2/hov/chi850.cfs.wide.png
https://ncics.org/pub/mjo/v2/hov/chi200.cfs.wide.png
https://ncics.org/pub/mjo/v2/hov/chi850.cfs.eqtr.png
https://ncics.org/pub/mjo/v2/hov/chi200.cfs.eqtr.png

Dekadal Stream Function Anomalies – Obs. and Fcst





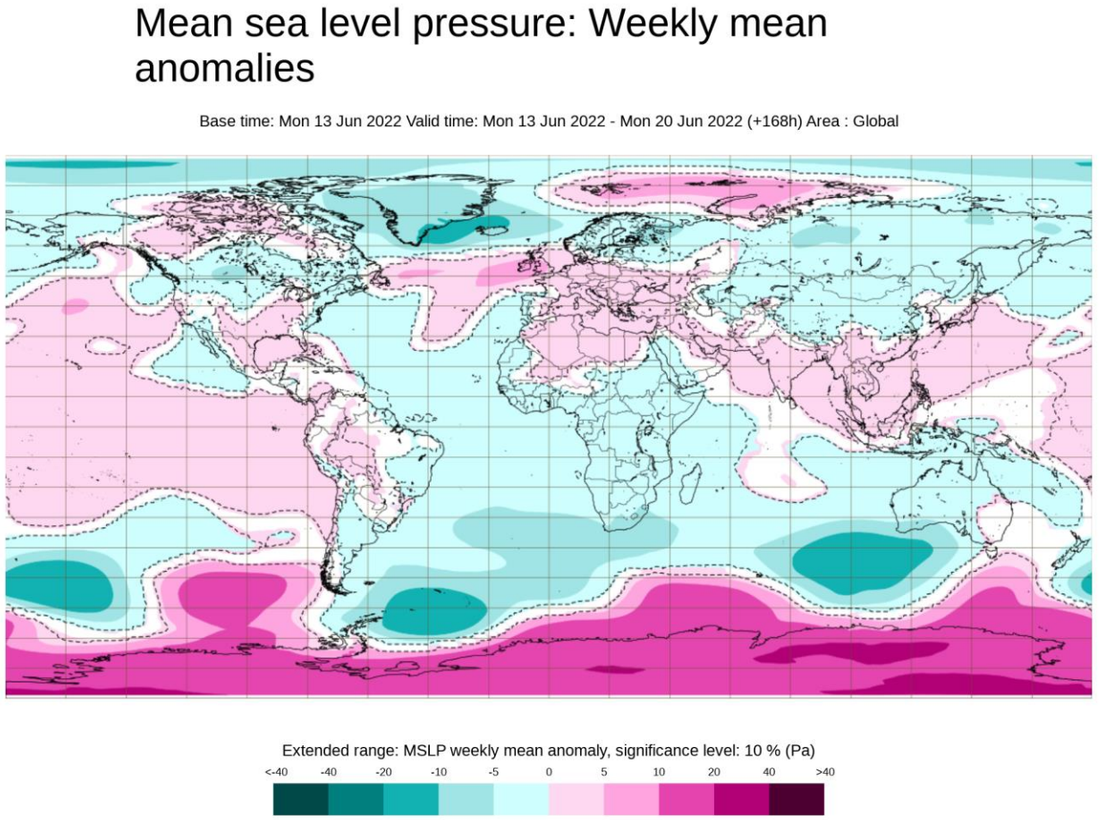
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https://ncics.org/pub/mjo/v2/map/psi200.cfs.all.global.10.png
https://ncics.org/pub/mjo/v2/map/psi850.cfs.all.africa.10.png
https://ncics.org/pub/mjo/v2/map/psi200.cfs.all.africa.10.png

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

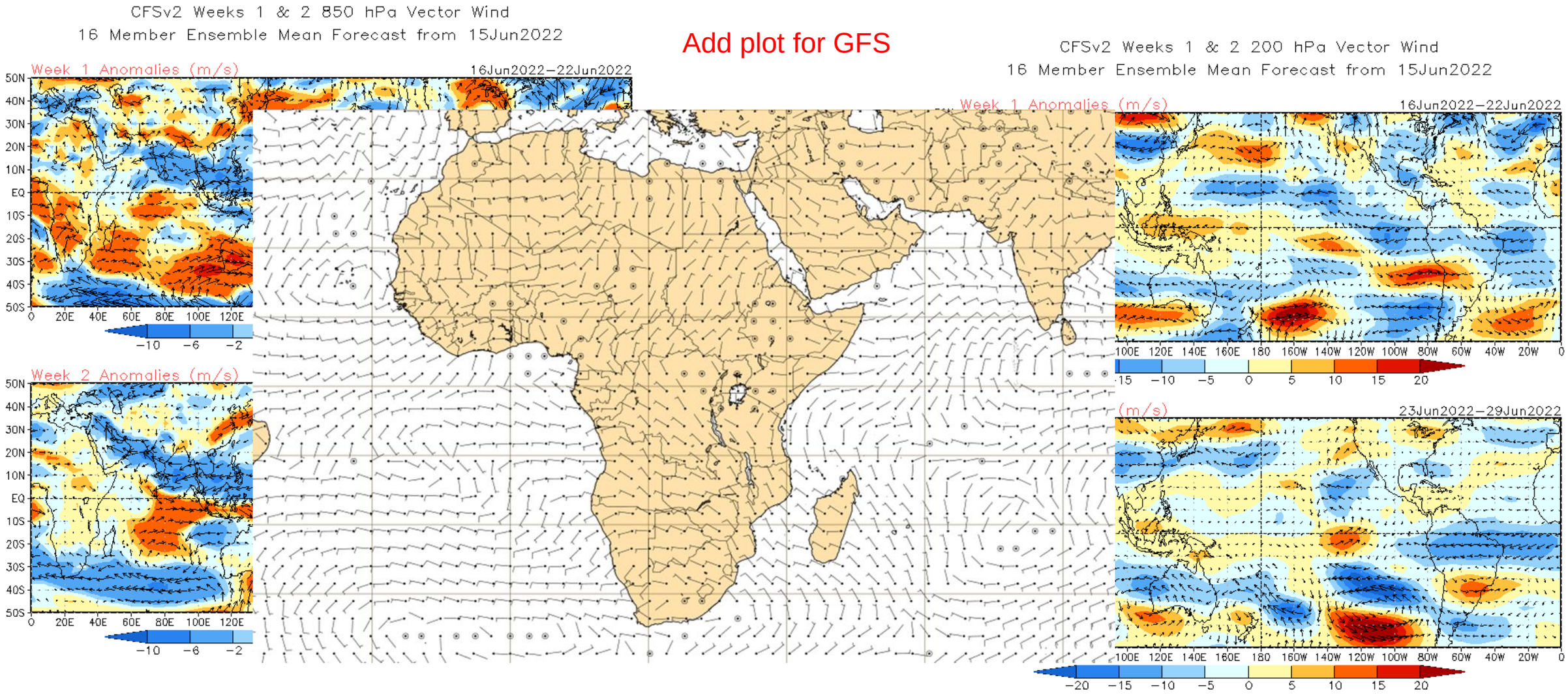
Add plot for GFS, BoM, ECMWF, UKMet and DWD



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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

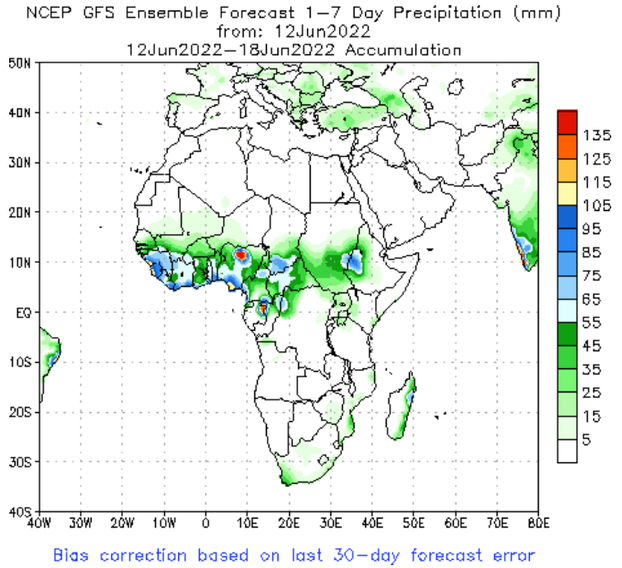
Wind Anomalies and divergence Forecast @ 925, 850, 700, 500, 200 hPa – Week 1 and 2

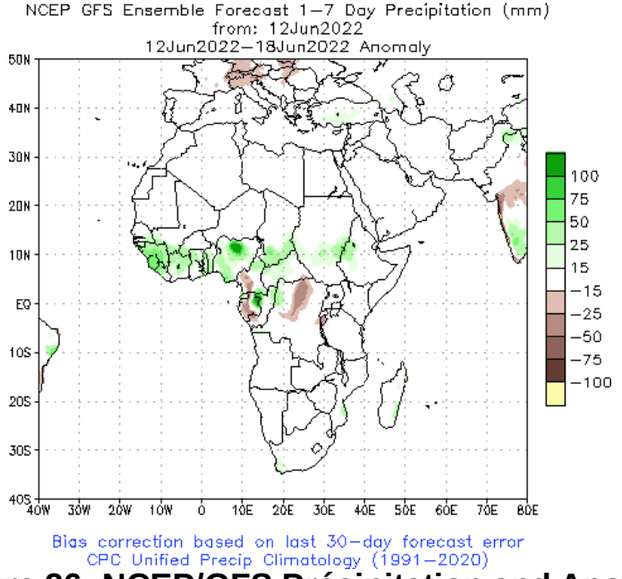


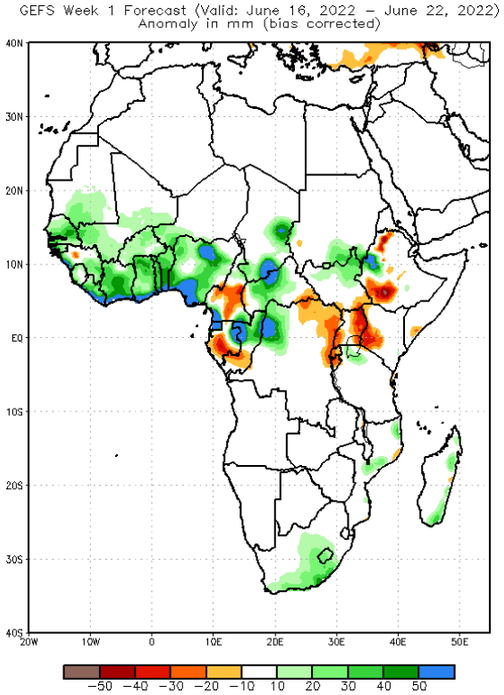
Subseasonal Drivers Forecast – Week 1 and 2

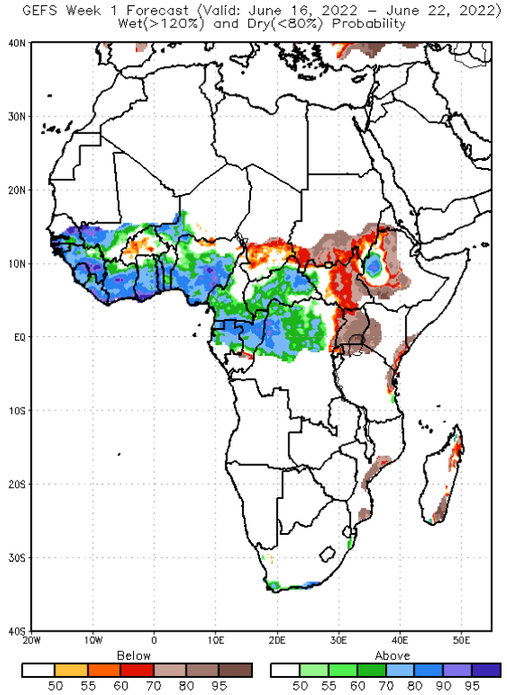
Add plot from NCEP, NCSU, UCSB, ECMWF and BoM (Tropical Waves)

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









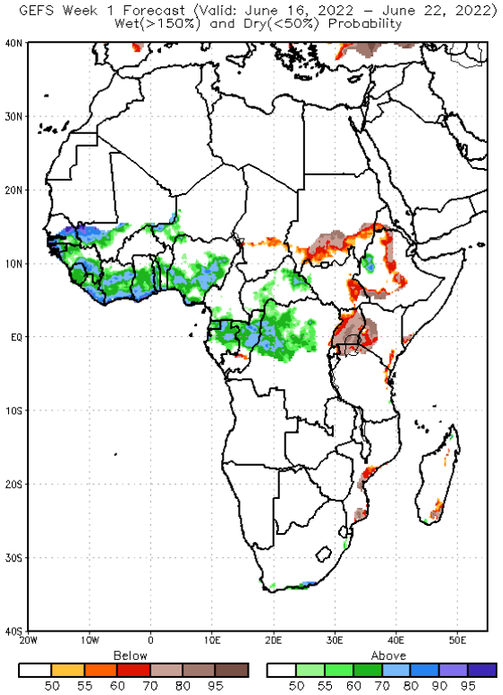


Figure 26: NCEP/GFS Précipitation and Anomaly forecast.

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

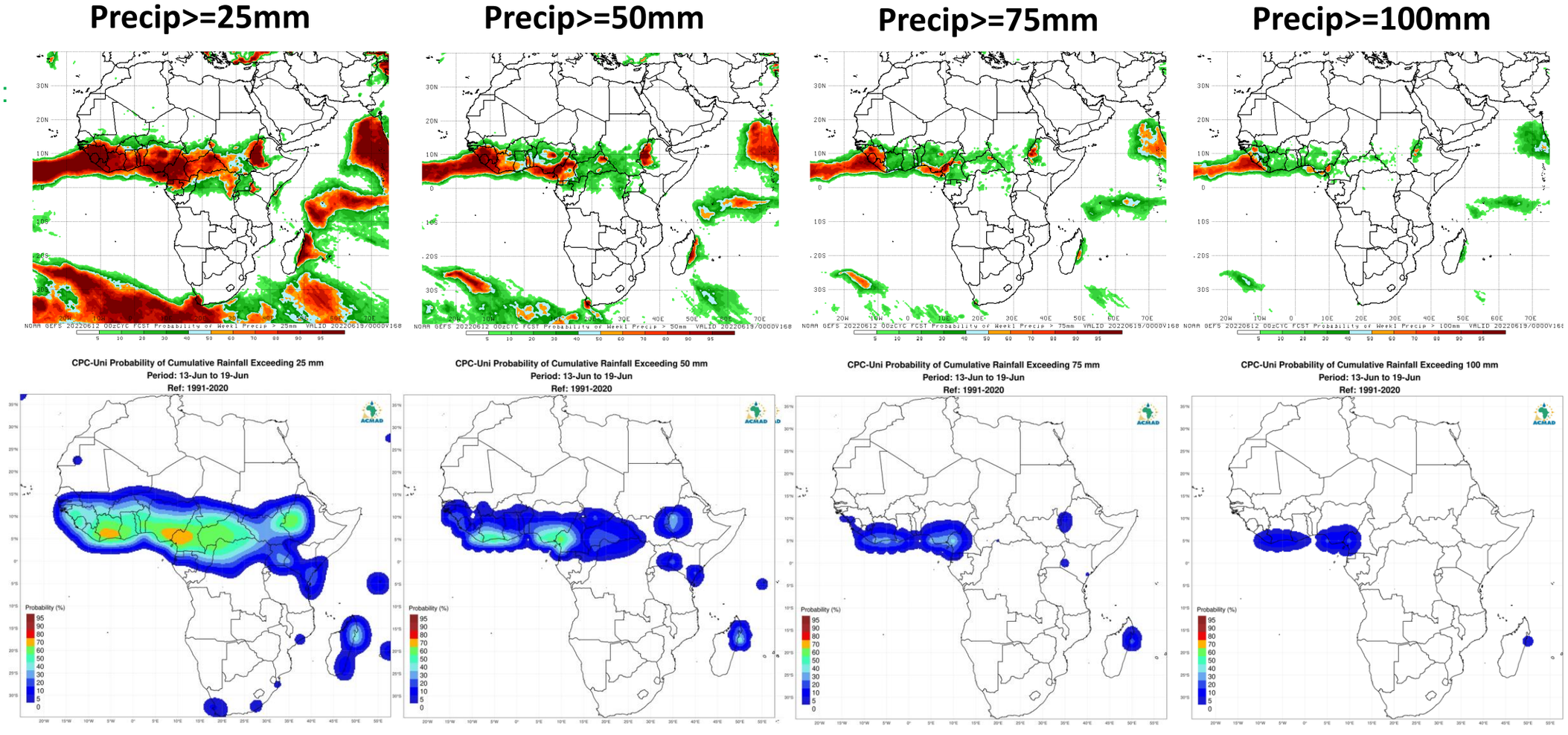
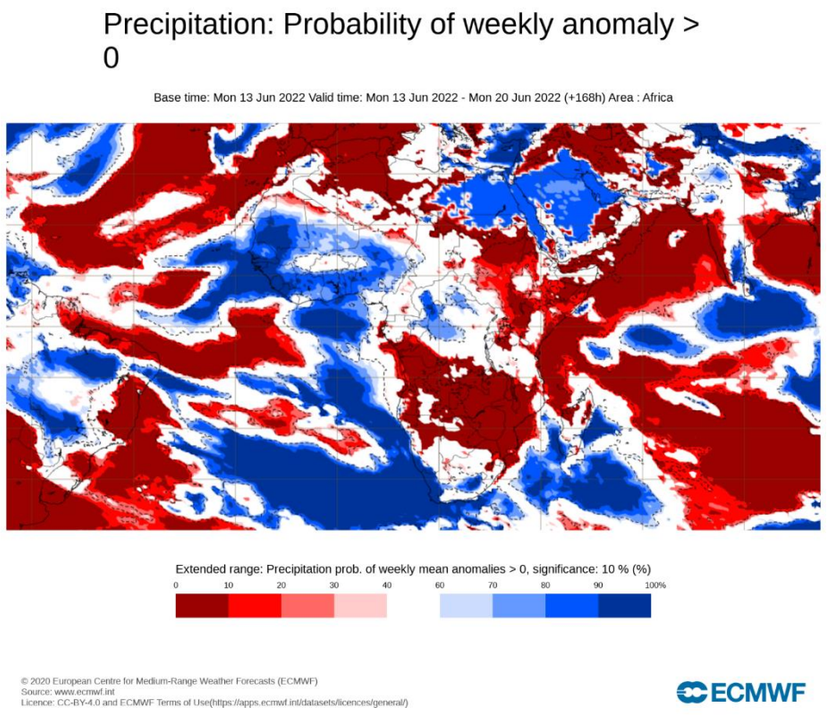
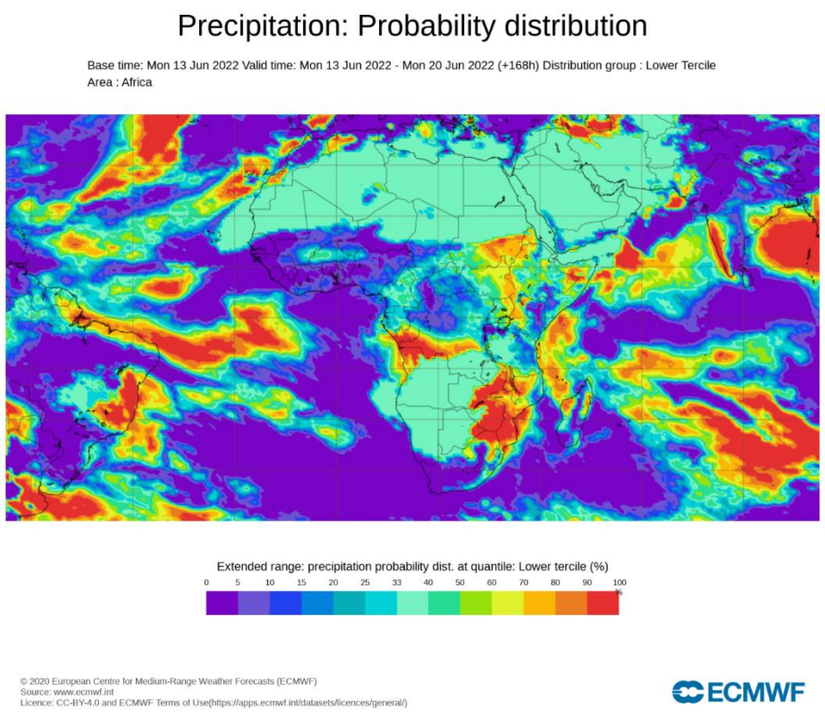


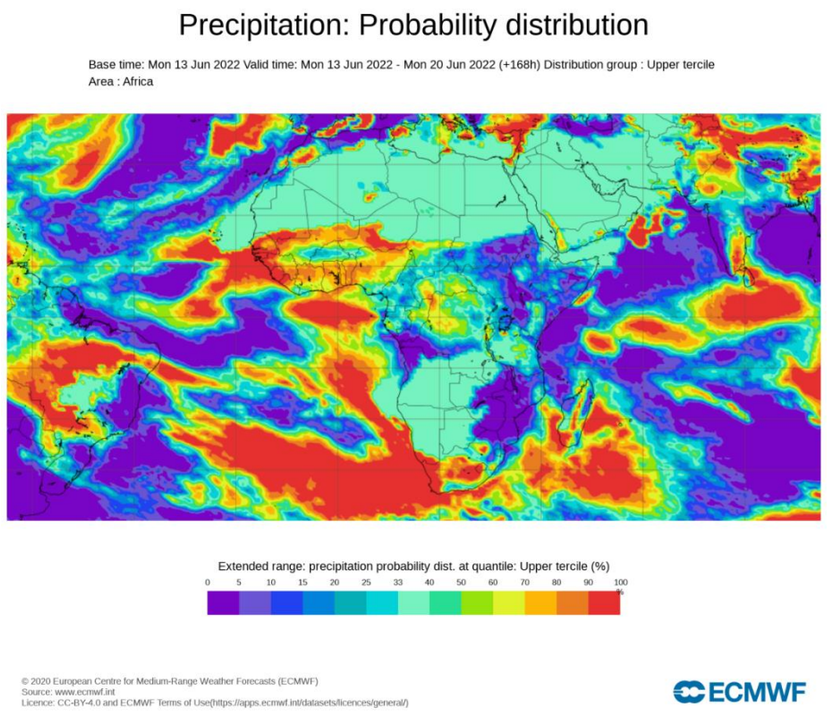
Figure 27: Week1 Precipitation Total Exceedance Probabilities

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%





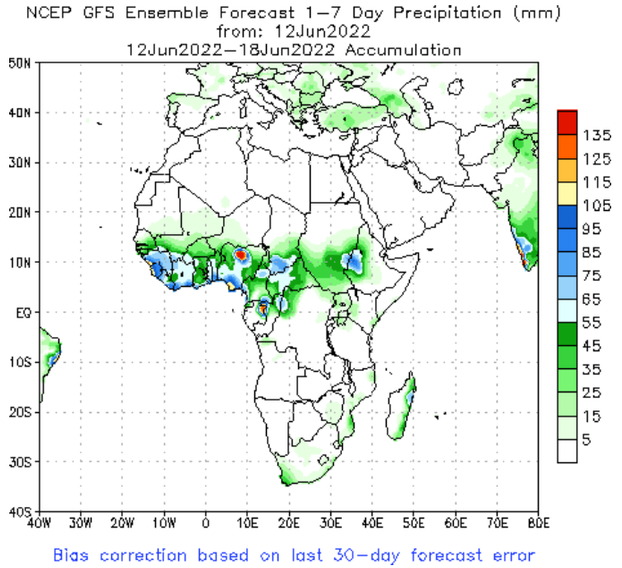


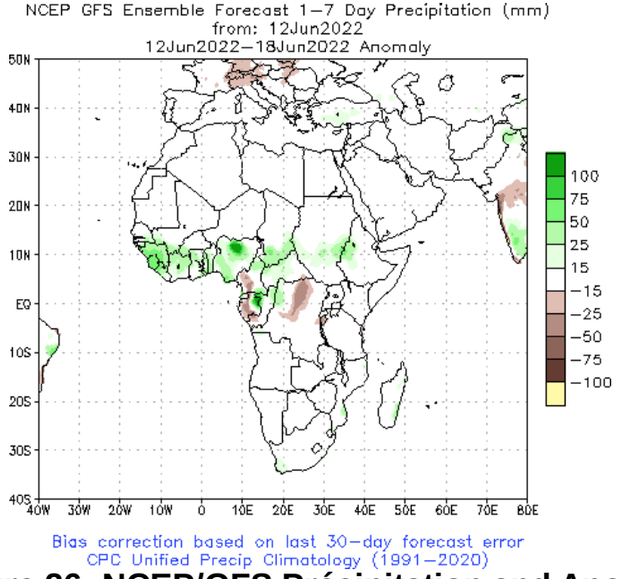
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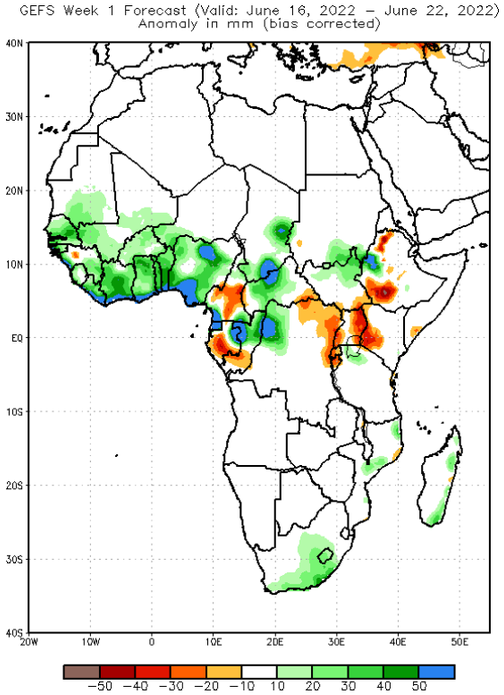
https://www.ecmwf.int/en/forecasts/charts/catalogue/mofc_multi_tercile?facets=undefined&time=2021110100,312,2021111400&parameter=precipitation&tercile=1&area=Africa

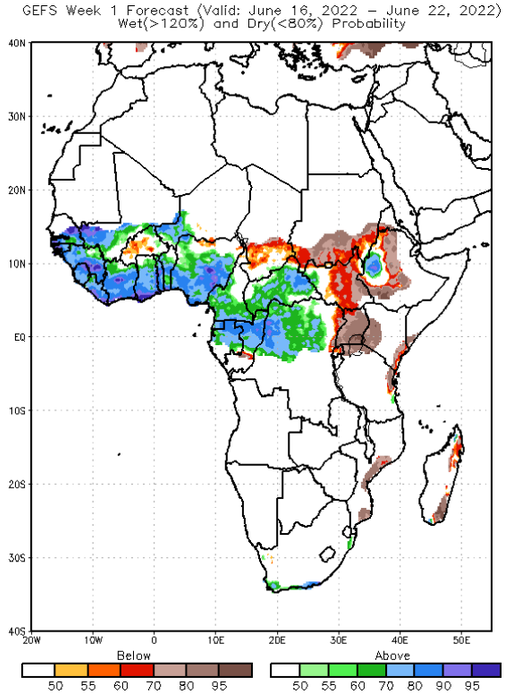
Figure 29: Weekly tercile probability forecast below 33%

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









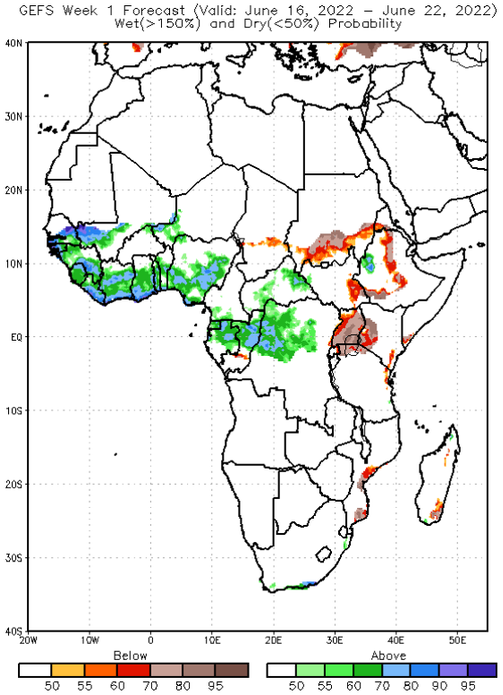


Figure 26: NCEP/GFS Précipitation and Anomaly forecast.

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
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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

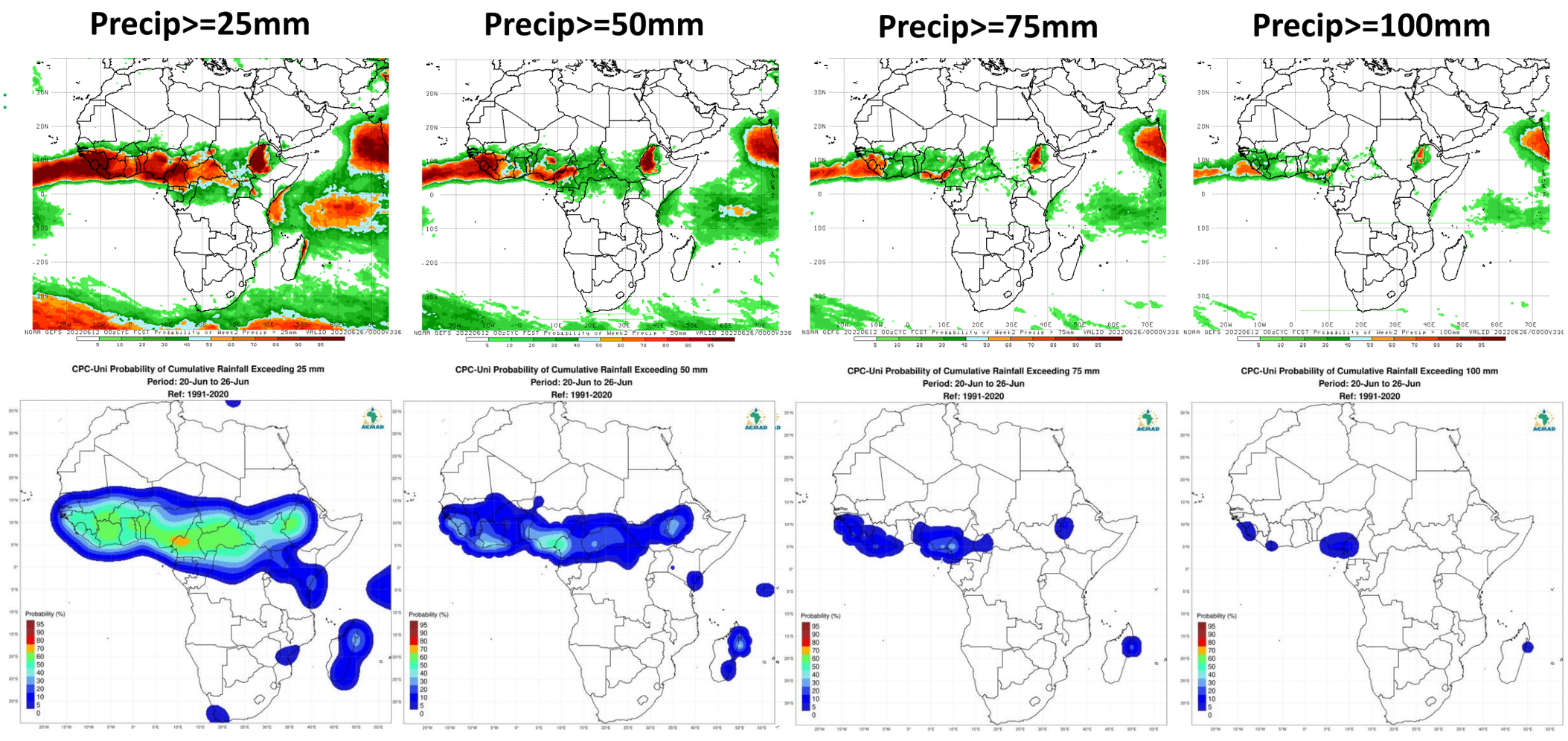


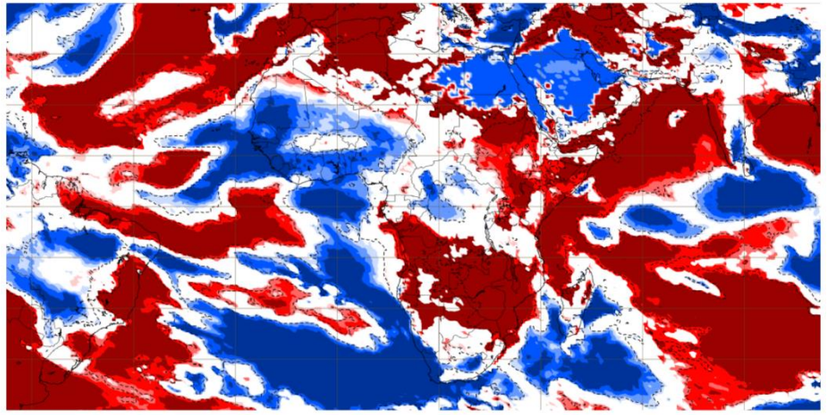
Figure 32: Week2 Precipitation Total Exceedance Probabilities

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
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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%

Precipitation: Probability of weekly anomaly > 0

Base time: Mon 13 Jun 2022 Valid time: Mon 13 Jun 2022 - Mon 20 Jun 2022 (+168h) Area : Africa



Extended range: Precipitation prob. of weekly mean anomalies > 0, significance: 10 % (%)

0 10 20 30 40 60 70 80 90 100%

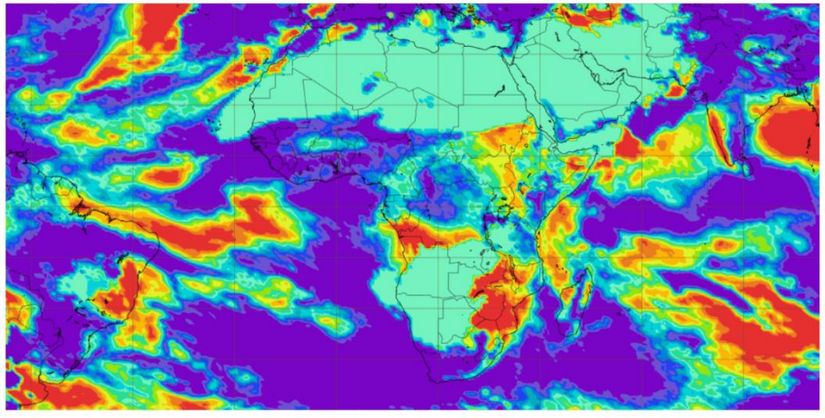
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ECMWF

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

Precipitation: Probability distribution

Base time: Mon 13 Jun 2022 Valid time: Mon 13 Jun 2022 - Mon 20 Jun 2022 (+168h) Distribution group : Lower Tercile
Area : Africa



Extended range: precipitation probability dist. at quantile: Lower tercile (%)

0 5 10 15 20 25 33 40 50 60 70 80 90 100

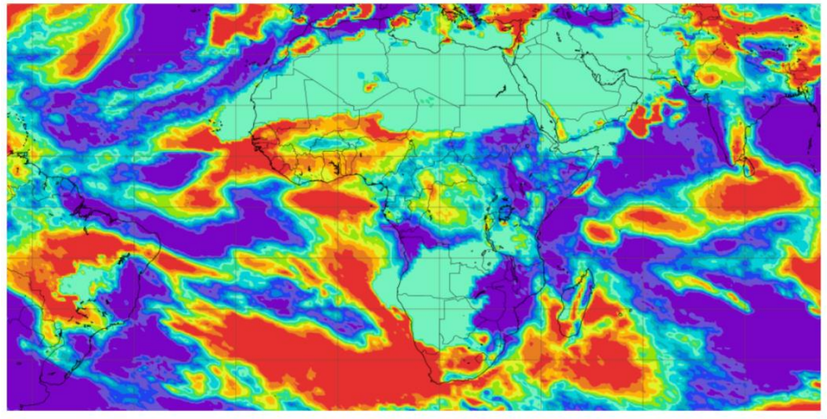
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Source: www.ecmwf.int
Licence: CC-BY-4.0 and ECMWF Terms of Use(https://apps.ecmwf.int/datasets/licences/general/)

ECMWF

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

Precipitation: Probability distribution

Base time: Mon 13 Jun 2022 Valid time: Mon 13 Jun 2022 - Mon 20 Jun 2022 (+168h) Distribution group : Upper tercile
Area : Africa



Extended range: precipitation probability dist. at quantile: Upper tercile (%)

0 5 10 15 20 25 33 40 50 60 70 80 90 100

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ECMWF

Figure 34: Weekly tercile probability forecast below 33%

IRI SubX Precip Forecast : Week 1 and 2

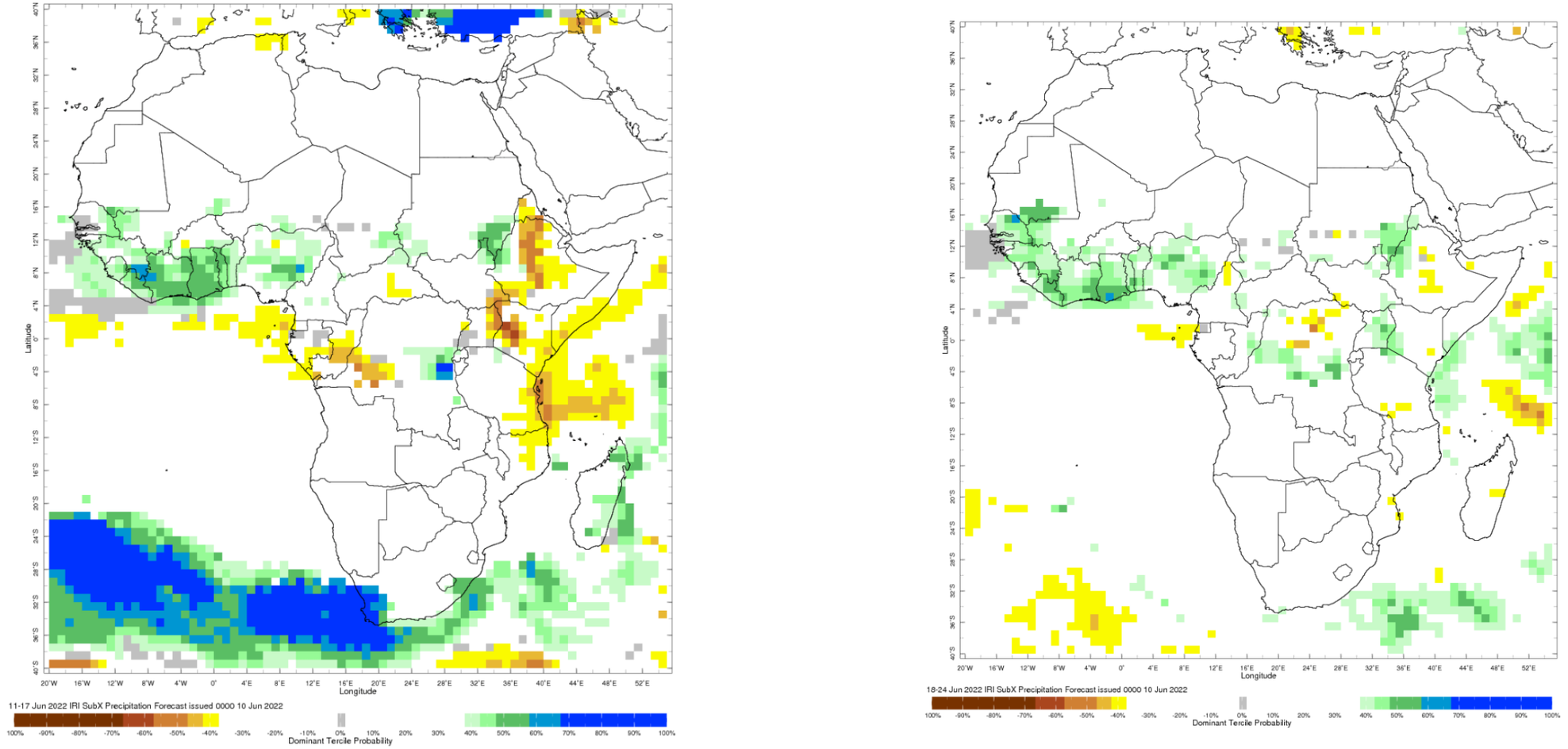
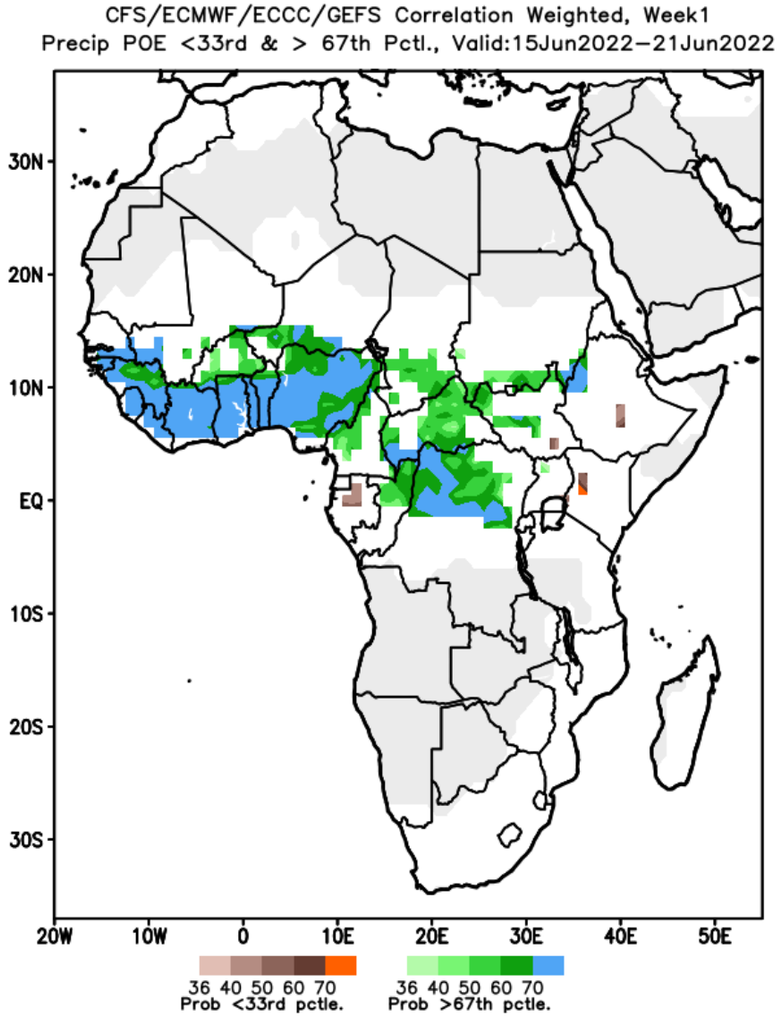
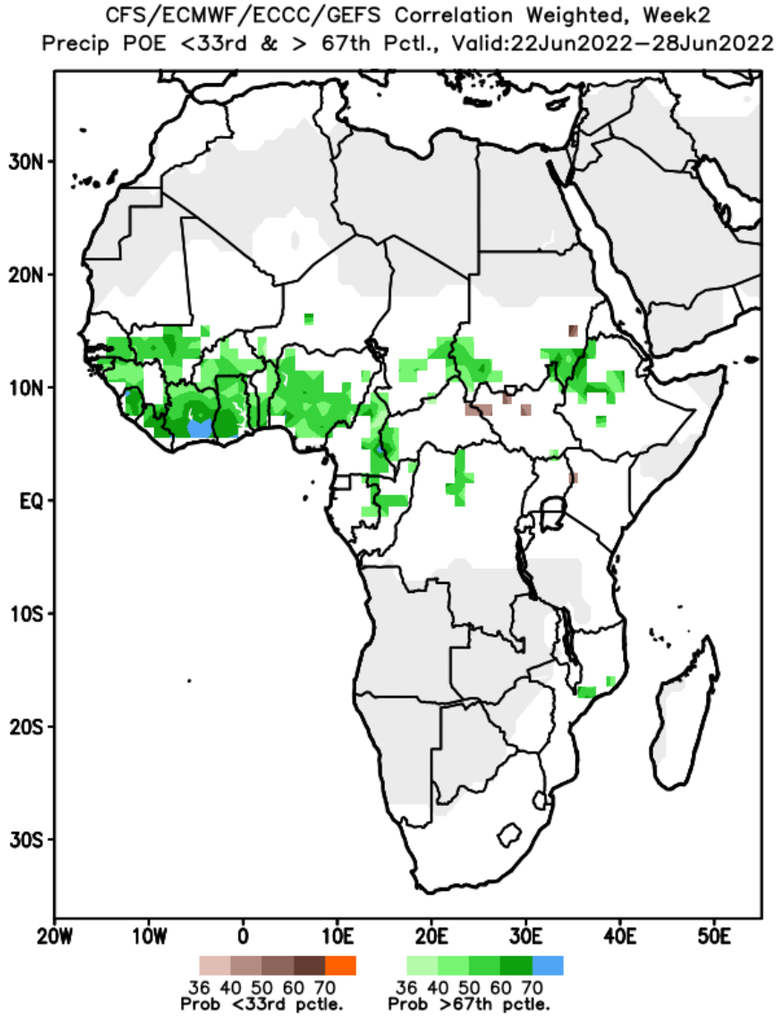


Figure 37: Precipitation and Anomaly forecast

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

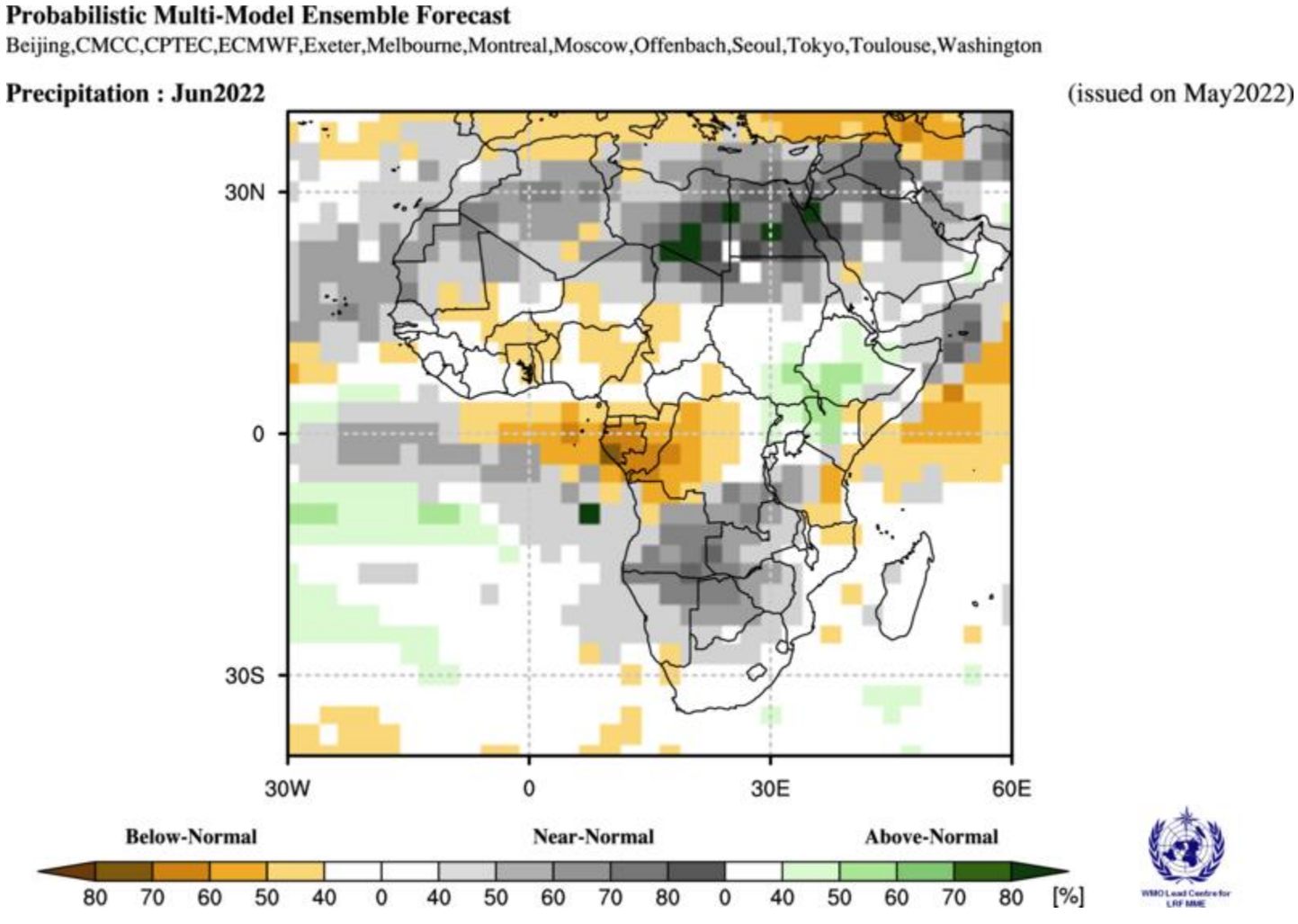
Consolidated Ensemble Forecast: Week 1 and 2





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



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

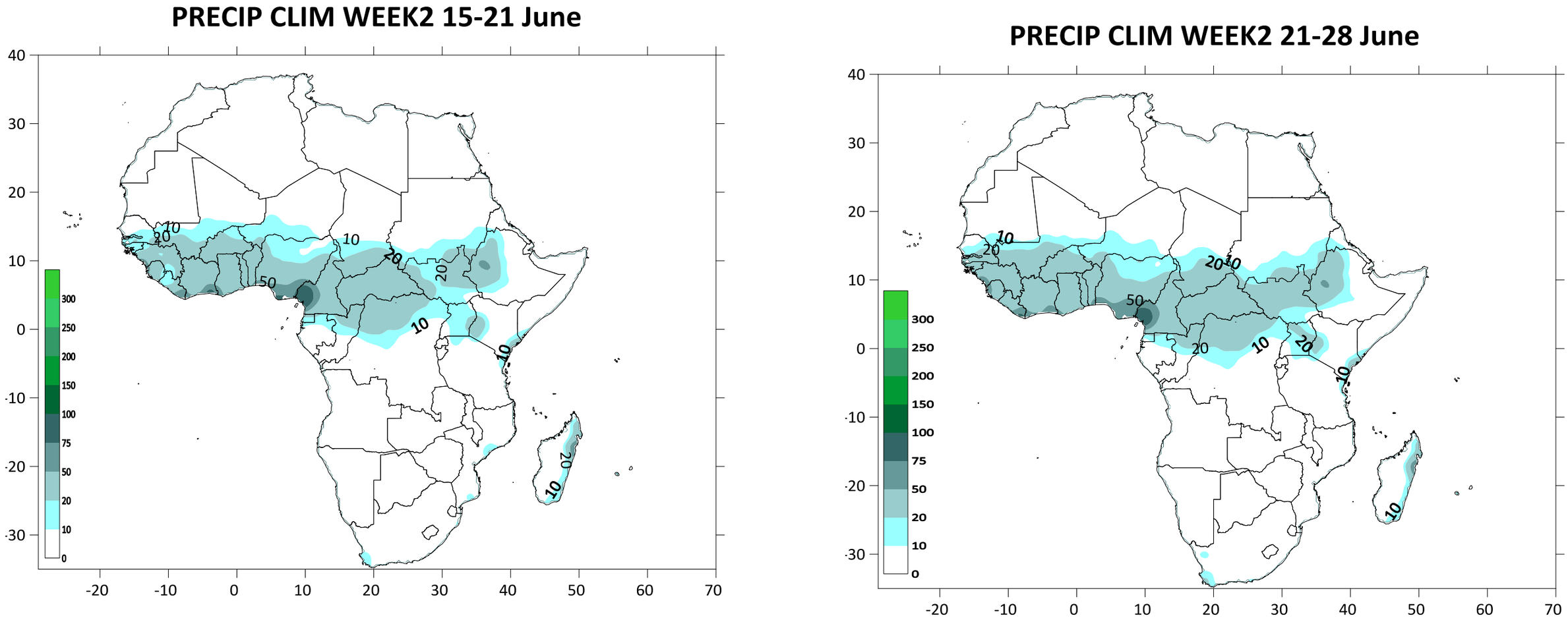
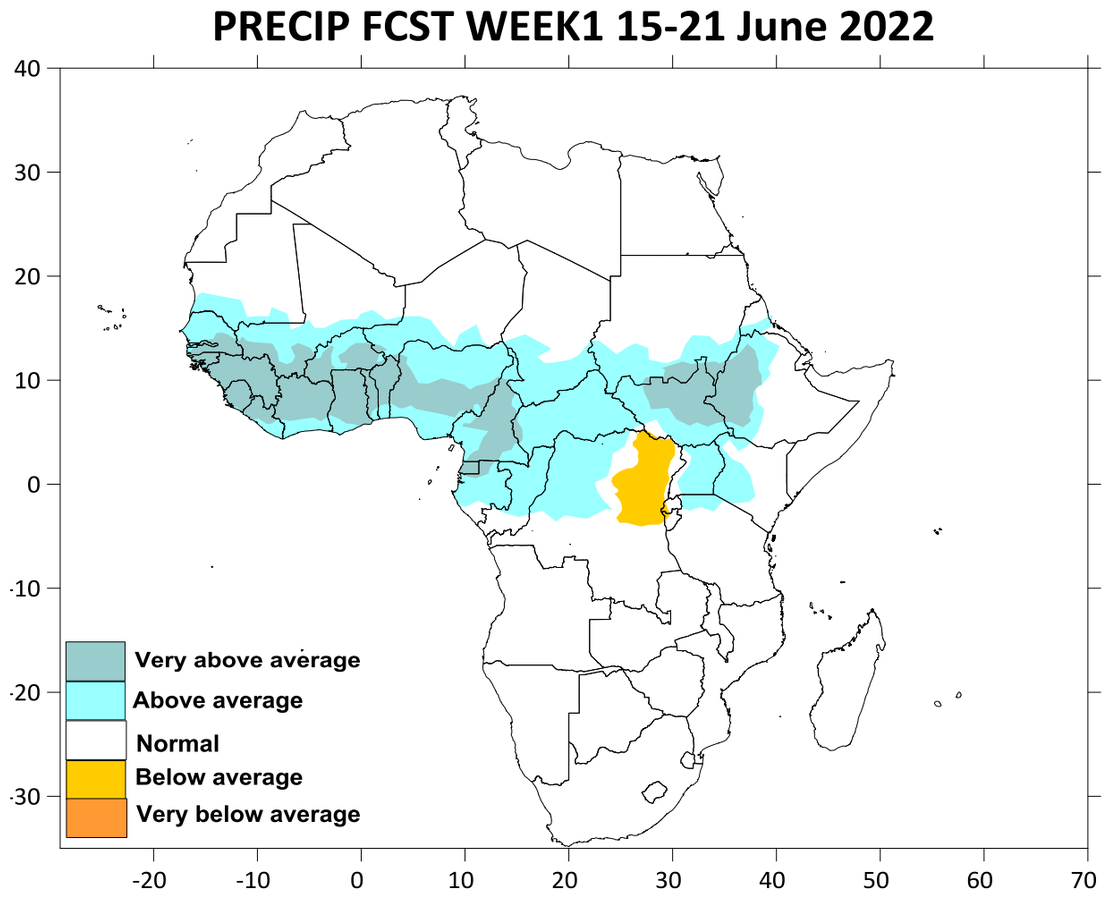


Figure 38: Climatology of Precipation for week-1(left panel) and week-2 (right panel)

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

PRECIPITATIONS FORECAST FOR THE UPCOMING TWO WEEKS



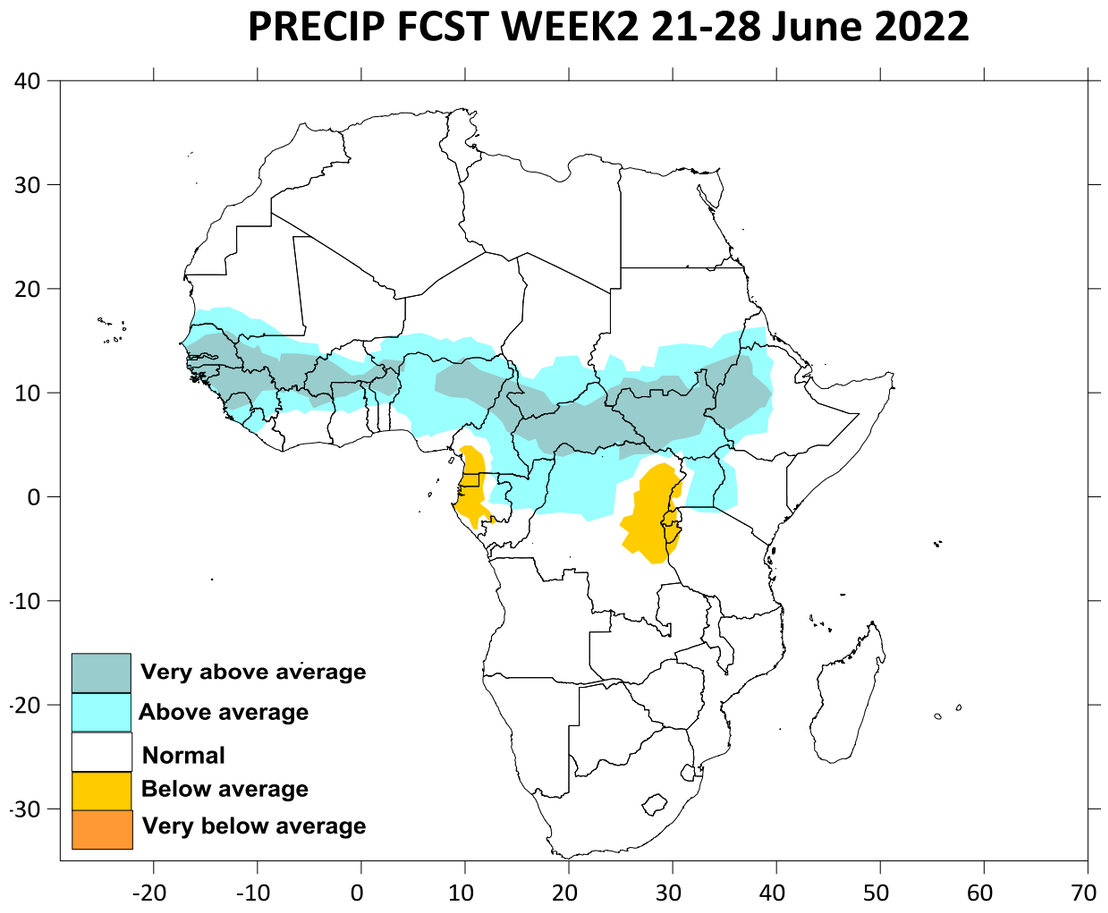


Figure 39: Precipitation Outlook for week-1 (left panel) and week-2 (right panel)