DEKADAL TECHNICAL NOTE FOR SECOND DEKAD OF JULY, 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

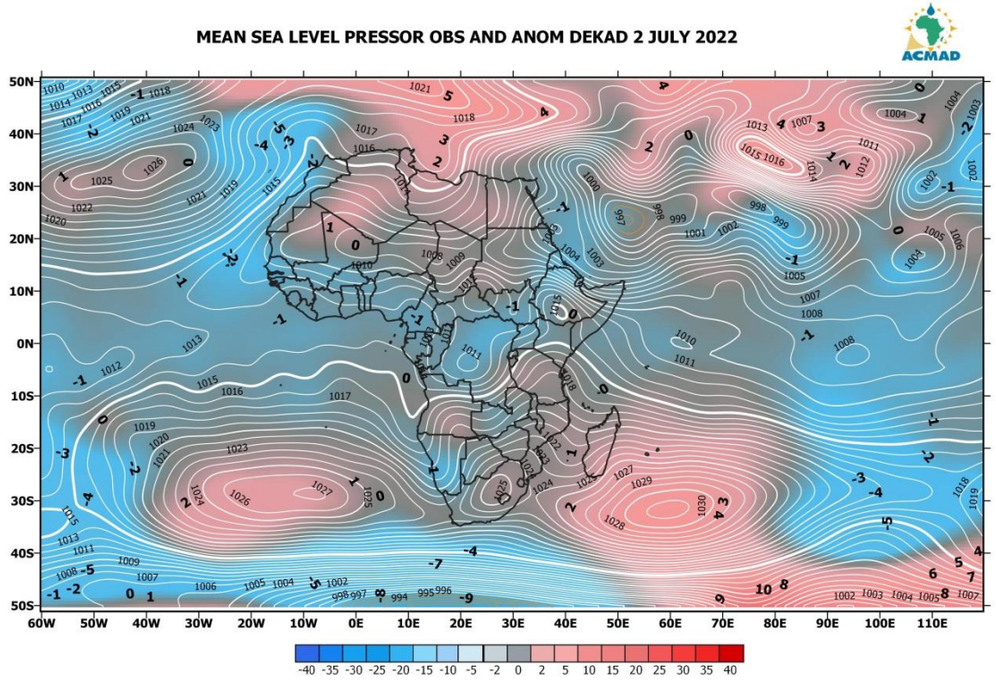
3. Dynamical Model Forecast : Week 1 and 2

4. Week 1 and 2 Outlook

Forecast Verification

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

Last dekad



Same dekad last year

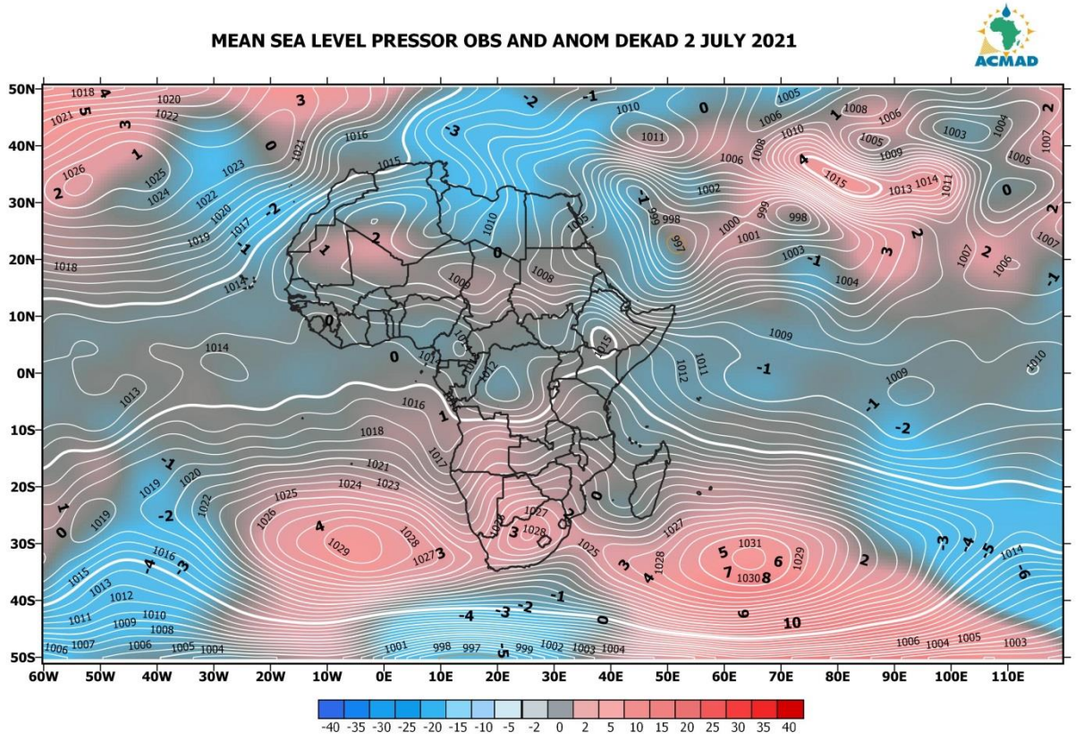
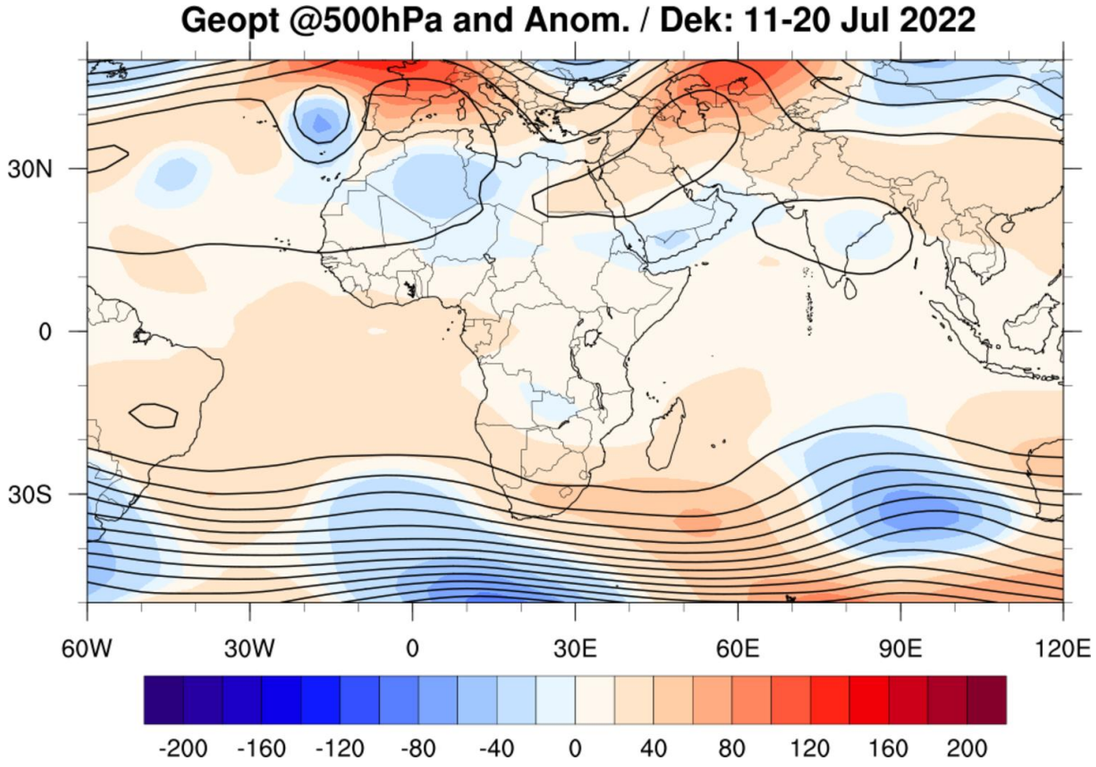


Figure 5: **MSLP observation and anomaly**

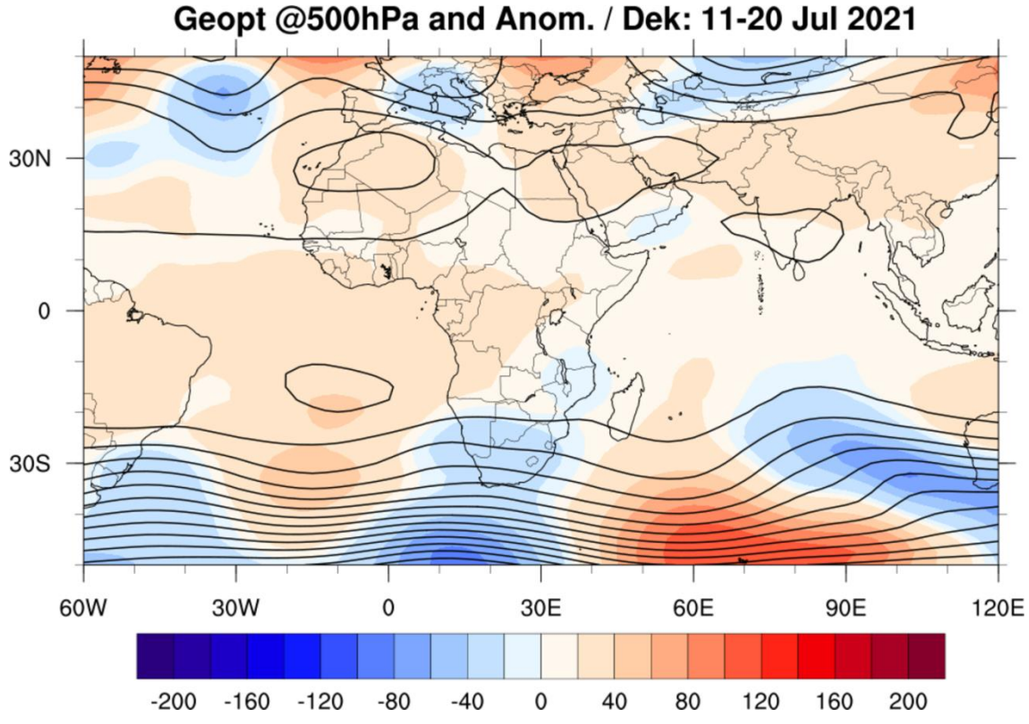
Data source:
http://iridl.ldeo.columbia.edu/expert/SOURCES/.NOAA/.NCEP-NCAR/.CDAS-1/.DAILY/.Intrinsic/.MSL/.pressure

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

Last dekad



Same dekad last year



Estimated Cumulative Precipitation in % of average for the last Dekad

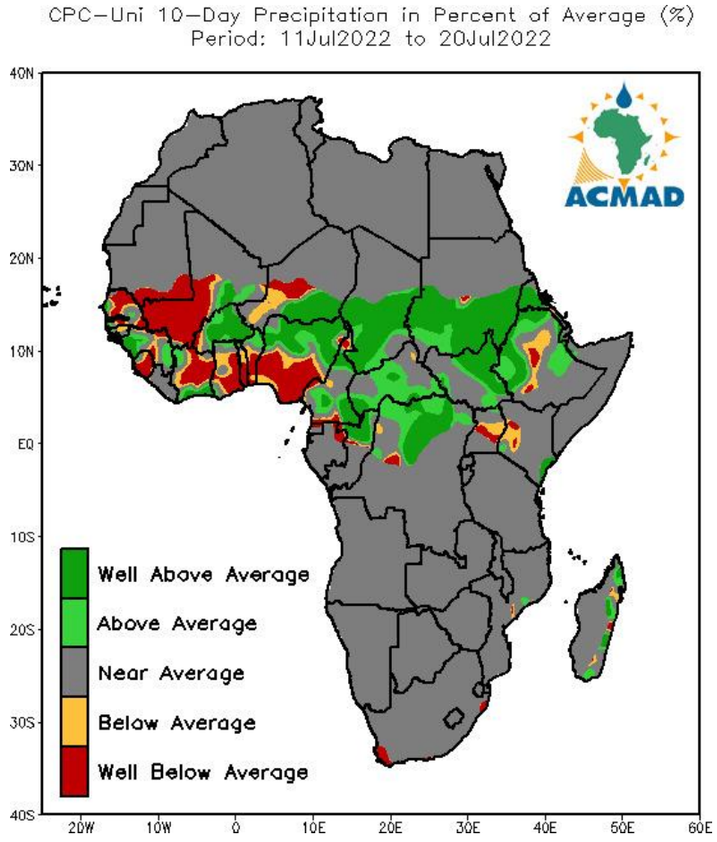


Figure 1: **This map displays decadal average precipitation in percent of average**

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

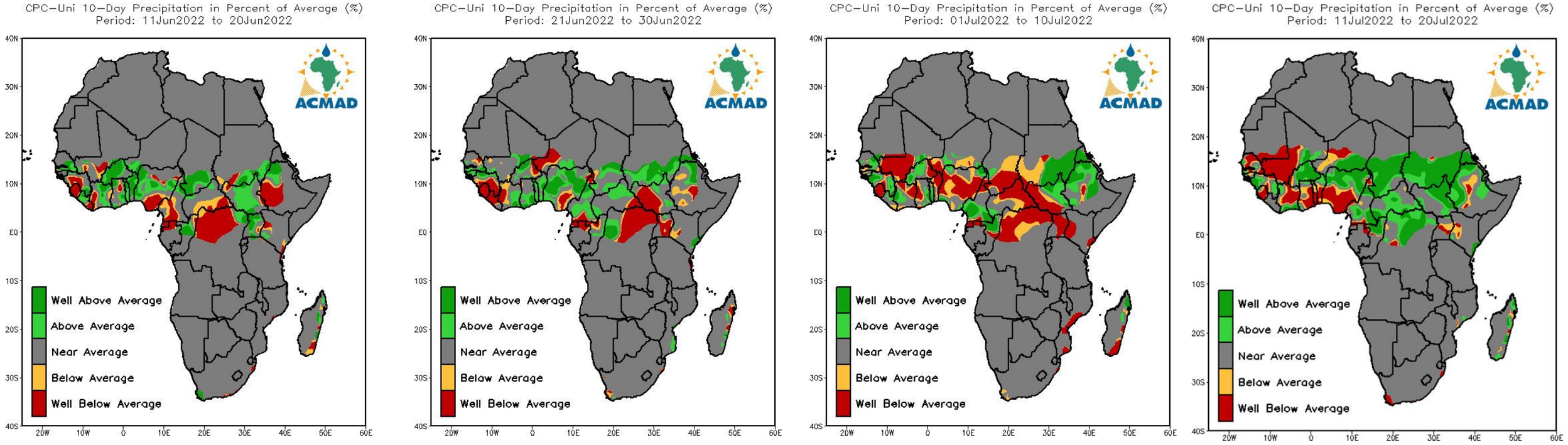
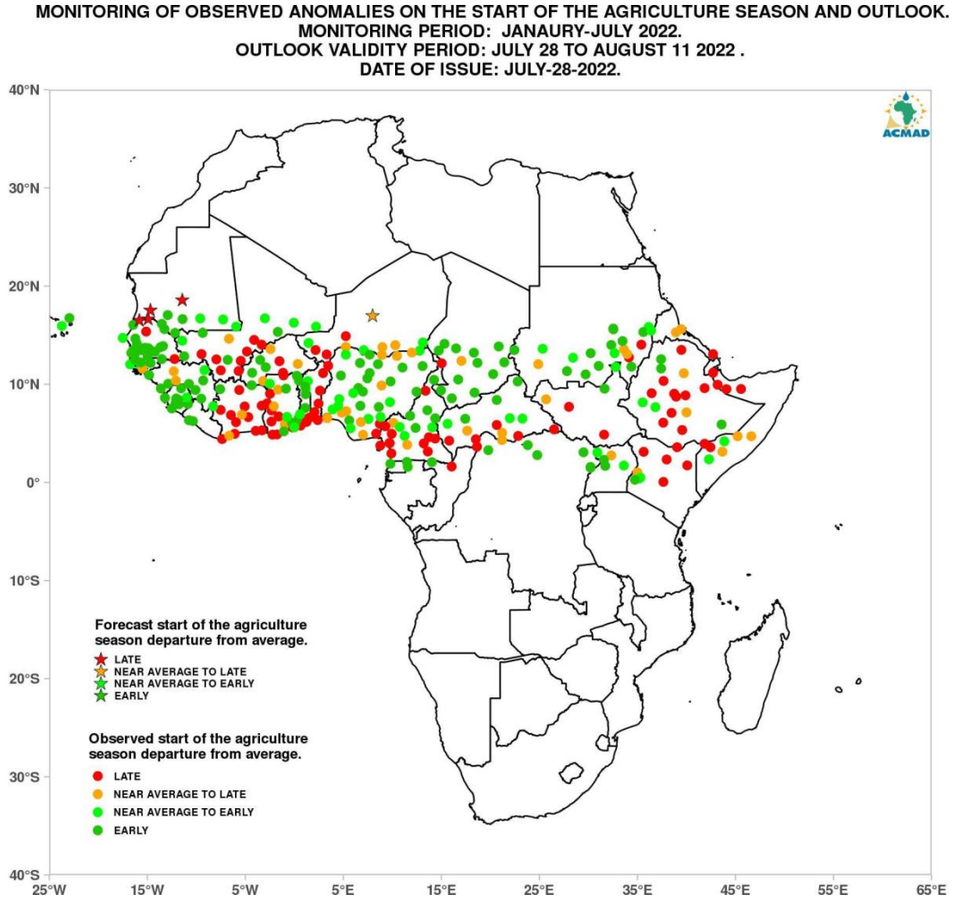


Figure 2: **This maps display decadal average precipitation in percent of average**

Start of Agricultural Season – Current and Outlook

Current Year



Last year at the same time

OLR Anomalies
During the passed 3 Dekads

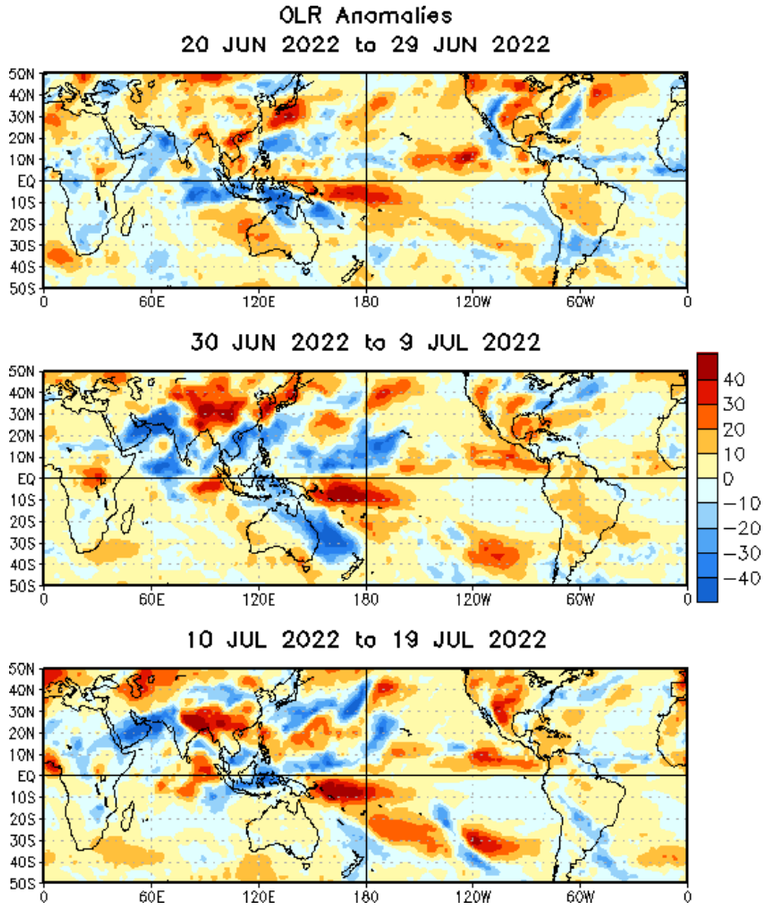


Figure 4: **Past 3 weeks OLR anomalies**

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

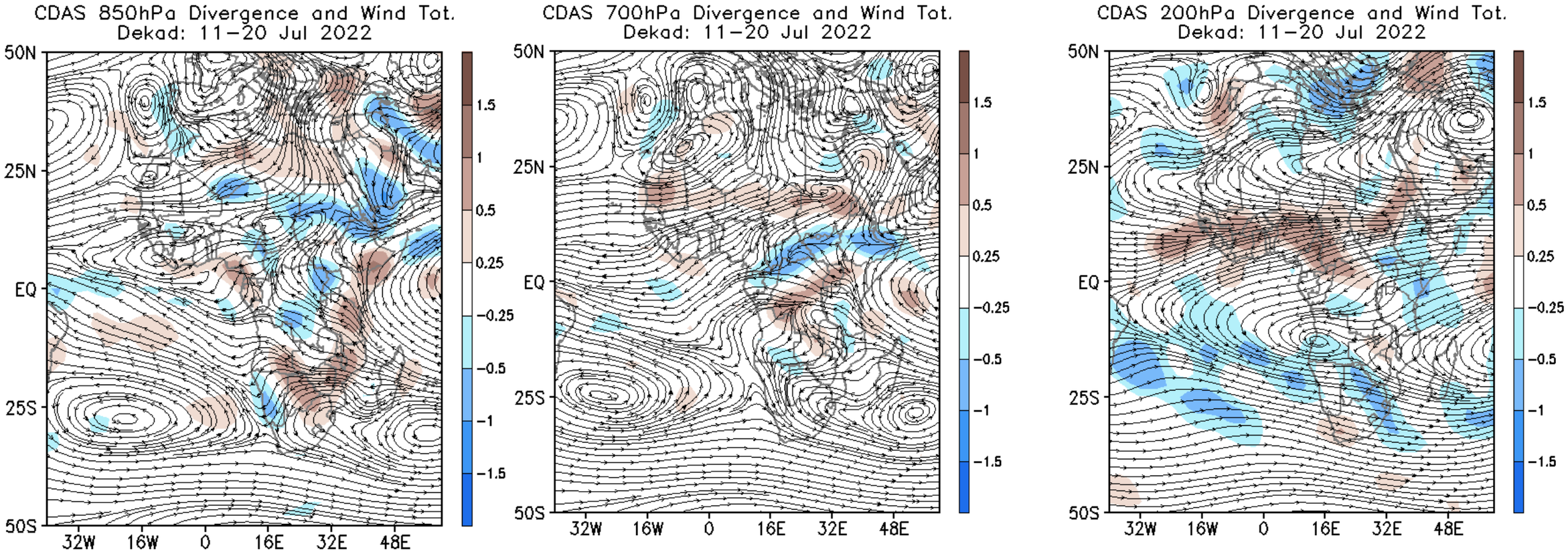
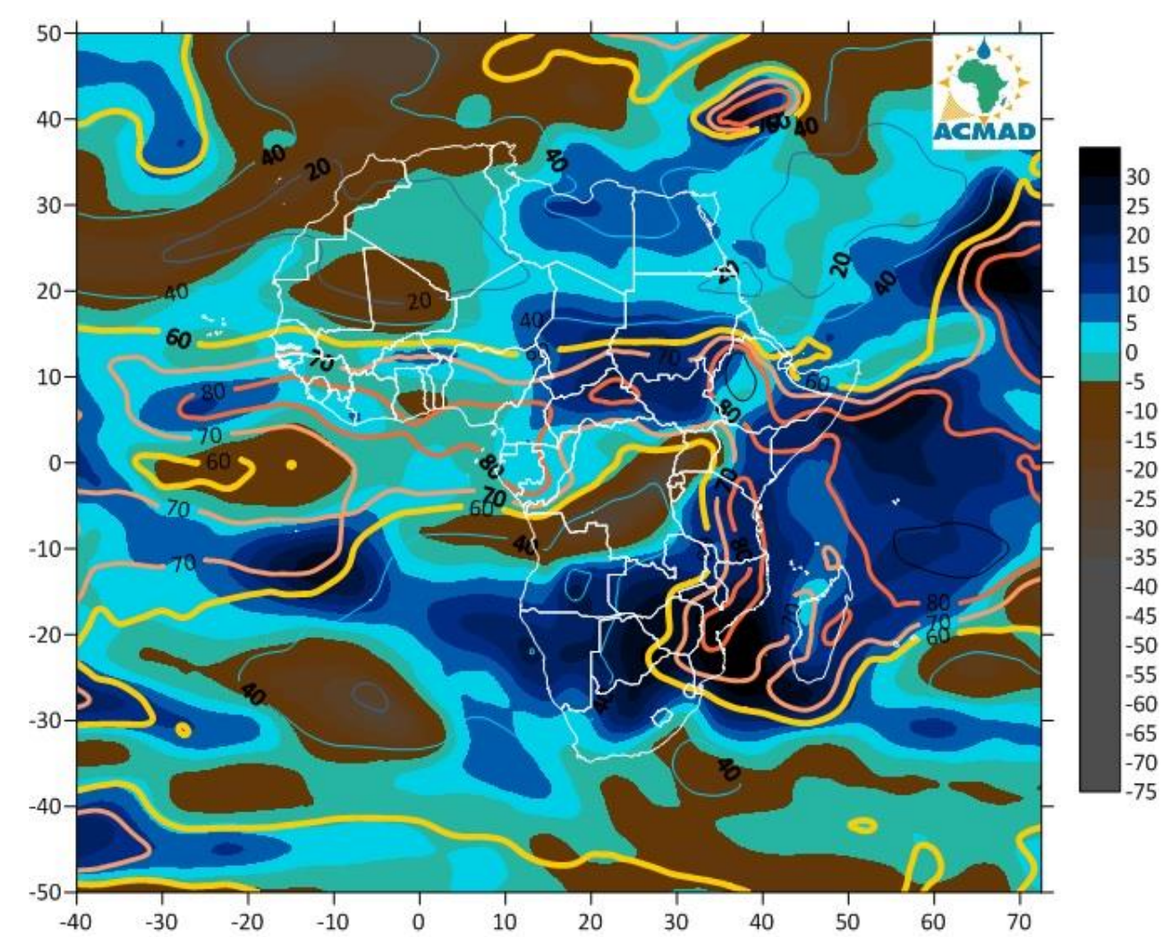


Figure 7: **Wind anomalies for 850hpa, 700hPa and 200hpa**

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



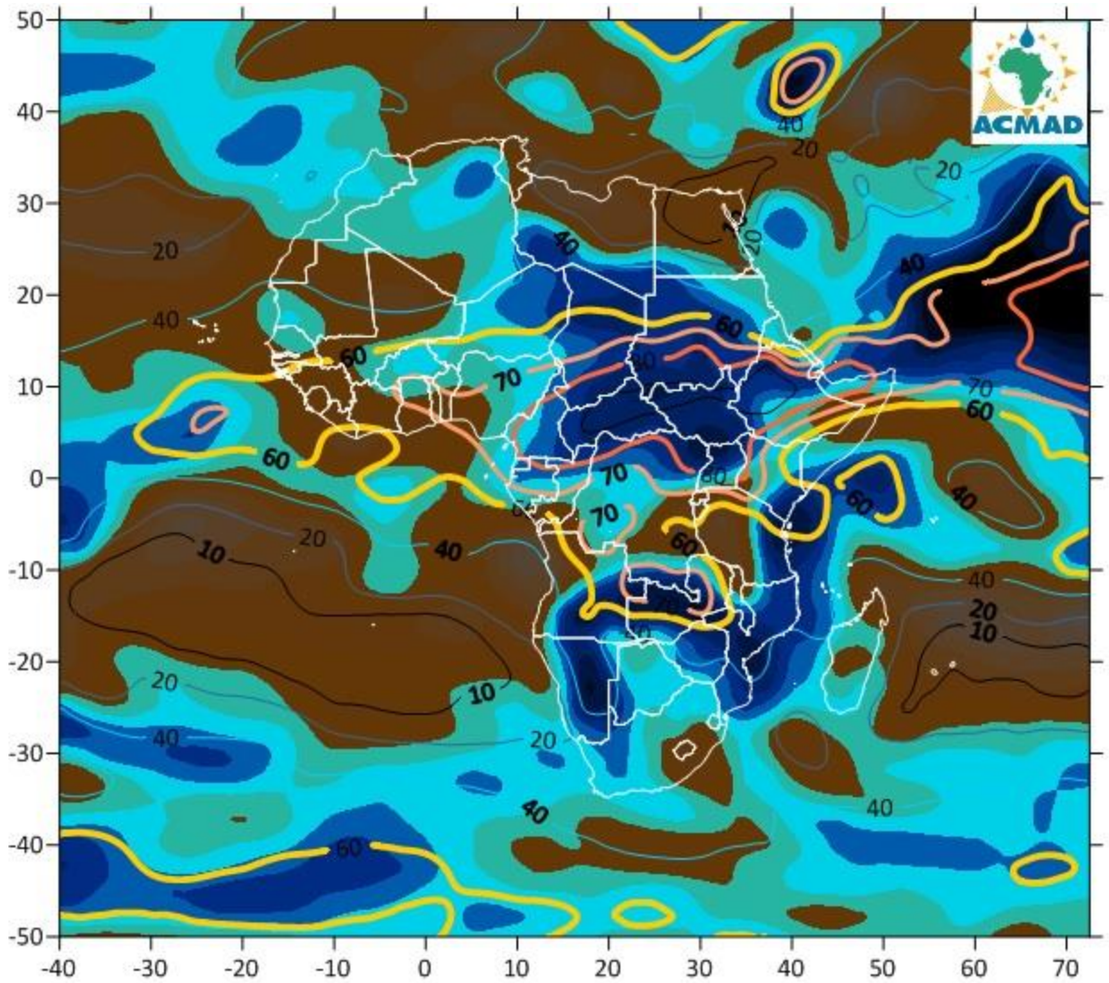
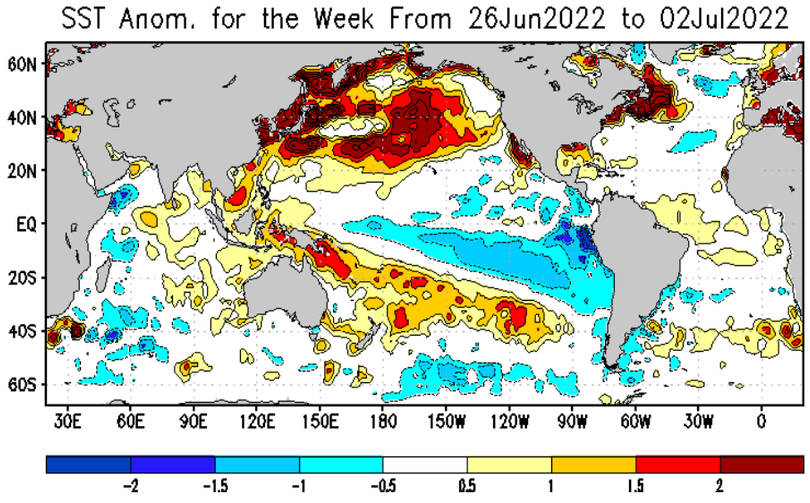
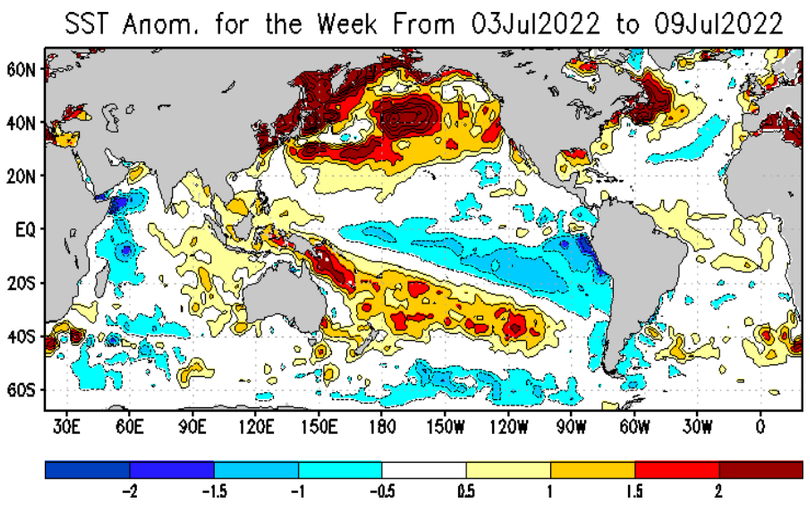


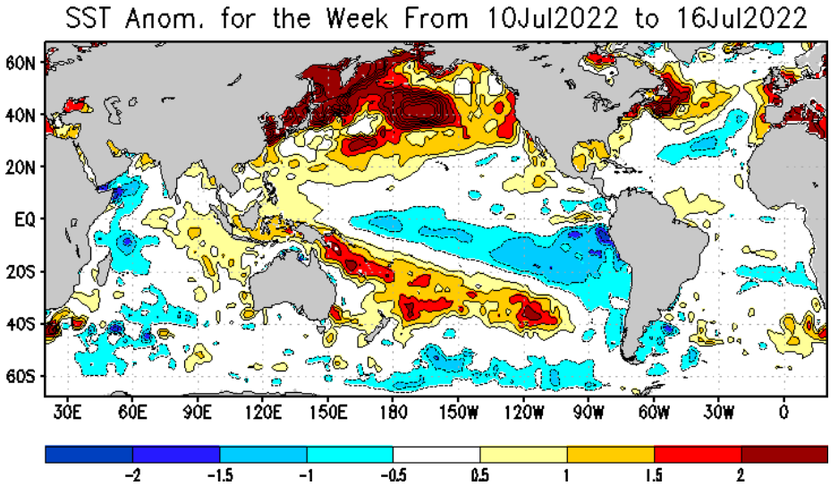
Figure 8: **Relative Humidity Anomaly at 850hPa (left) and 700hPa (right)**

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







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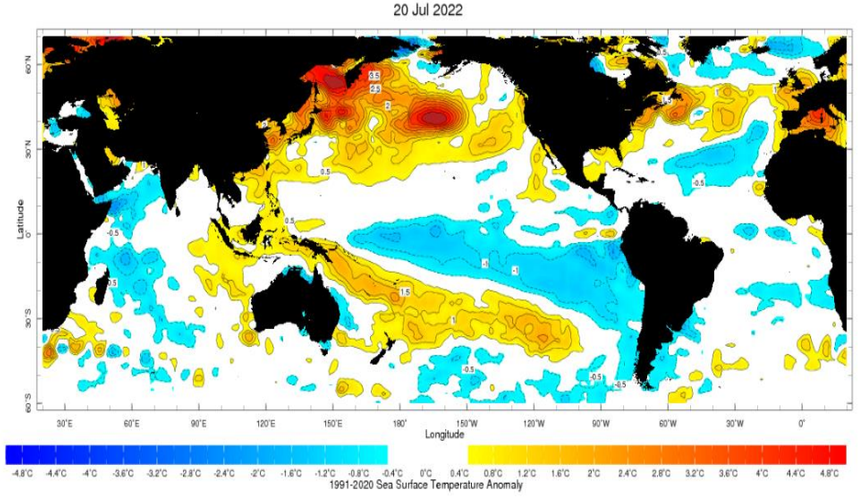
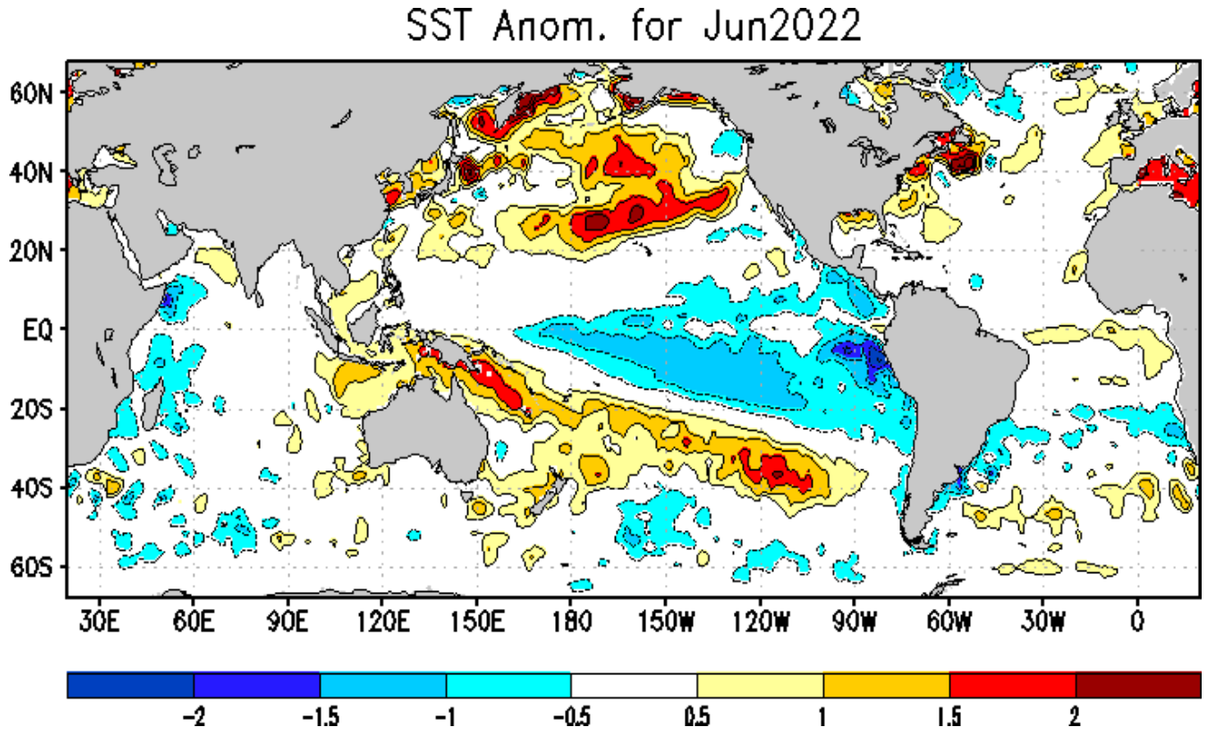


Figure 9: Maps display weekly sea surface temperature anomalies over the globe for last four weeks

https://psl.noaa.gov/map/clim/sst.shtml
http://iridl.ldeo.columbia.edu/maproom/Global/Ocean_Temp/Weekly_Anomaly.html
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Last Month’s Sea SurfaceTemperatures (SST) Observed



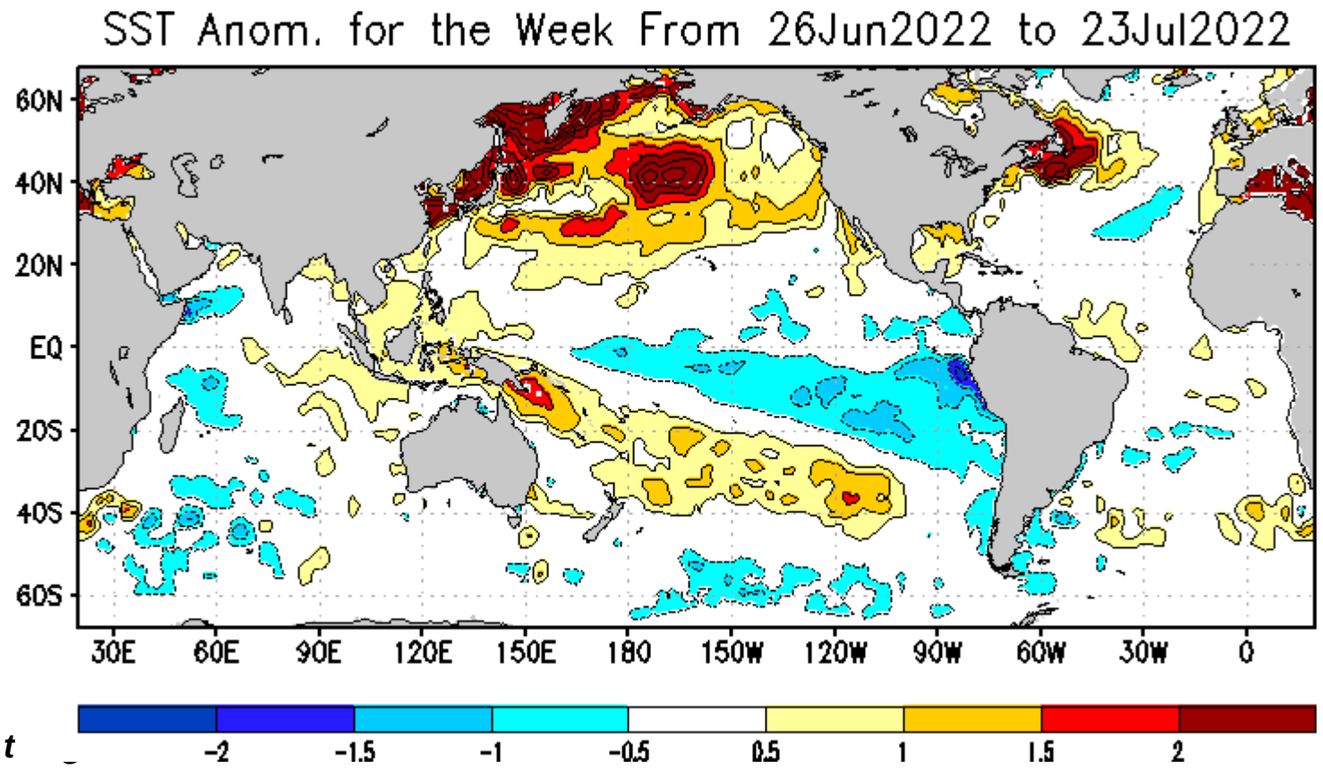


Figure 10 : Maps display monthly sea surface temperature anomalies over t

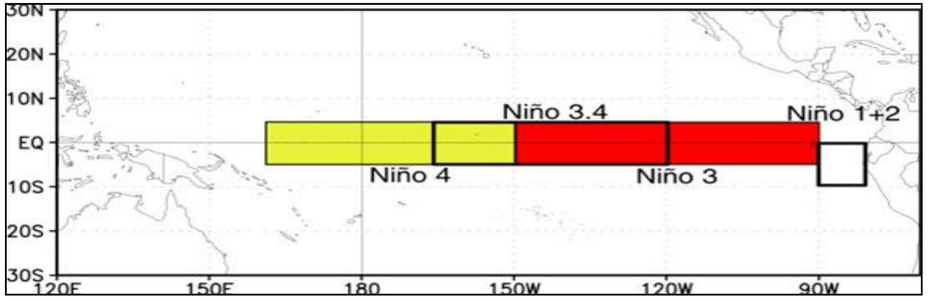
https://psl.noaa.gov/map/clim/sst.shtml
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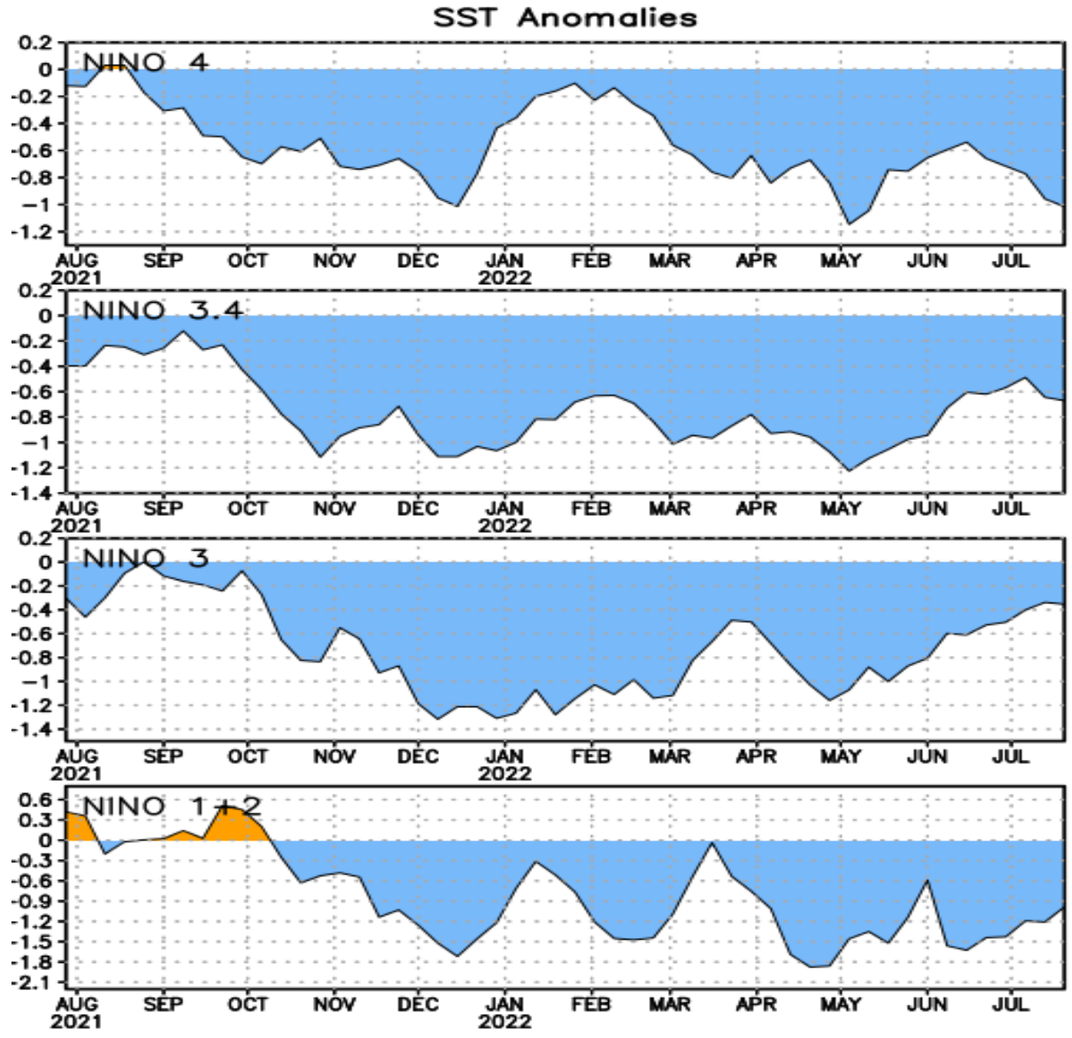
1. Climate Monitoring
2. Status of Drivers
   - ENSO - Obs and Forecast
   - Current 200 hPa Velocity Potential
   - MJO – Current Status and Forecast
   - Weekly PWAT – Current Status and Forecast
   - Dekadal 200 hPa VP and Tropical waves
   - Dekadal Stream Function and Tropical Waves
3. Dynamical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

Niño Region SST Departures (ºC)
Recent Evolution

The latest weekly SST departures are:

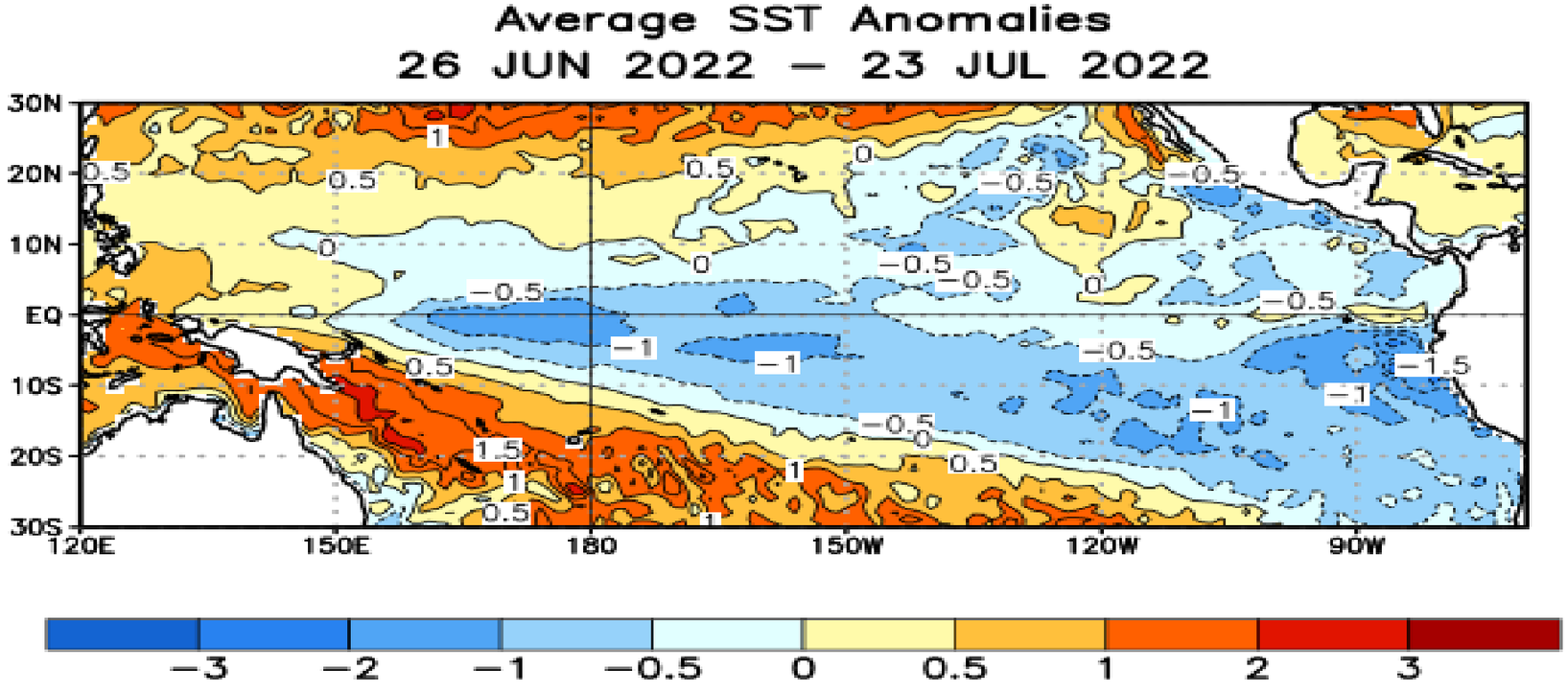
Niño 4	**-1.0ºC**
Niño 3.4	**-0.7ºC**
Niño 3	**-0.4ºC**
Niño 1+2	**1.0ºC**





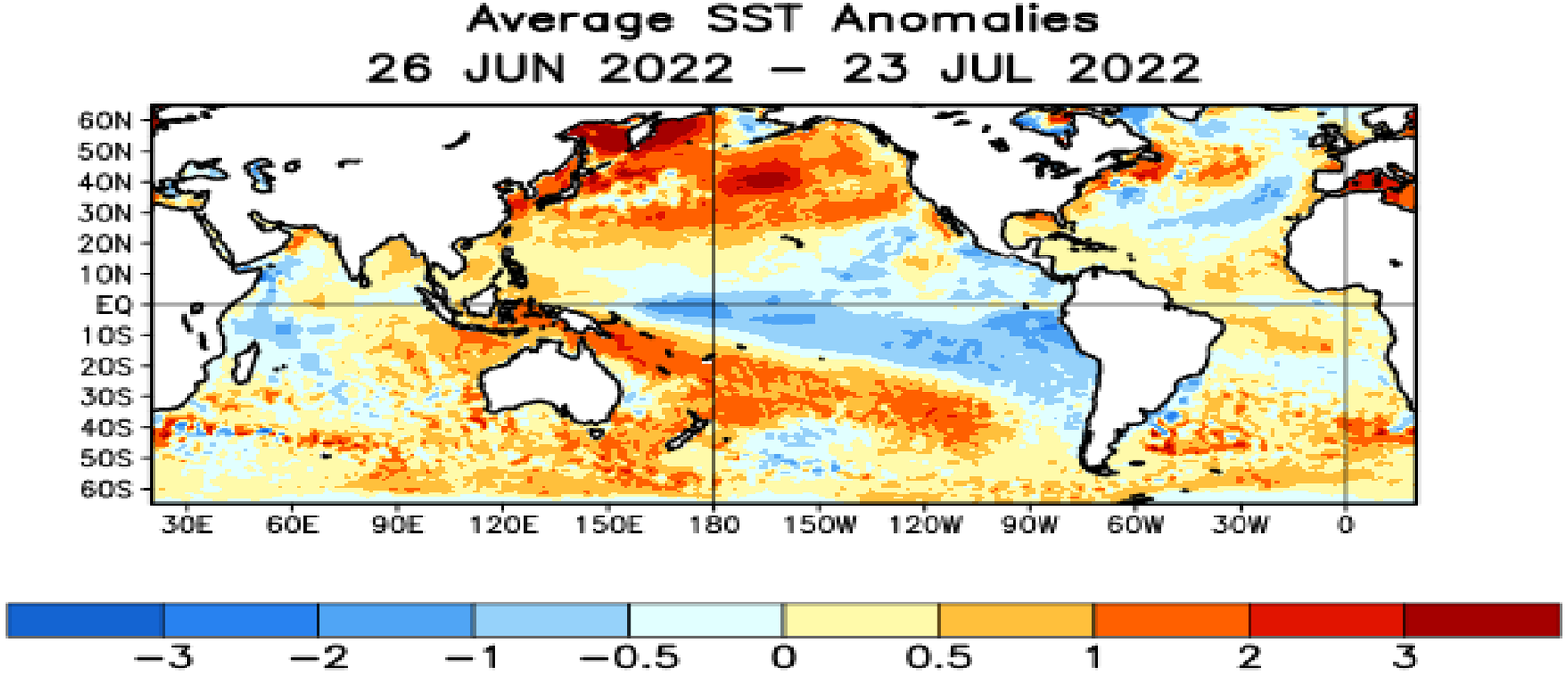
SST Departures (ºC) in the Tropical Pacific During the Last Four Weeks

In the last four weeks, equatorial SSTs were below average in the central and eastern Pacific Ocean, but had returned to near-average in the east-central Pacific.



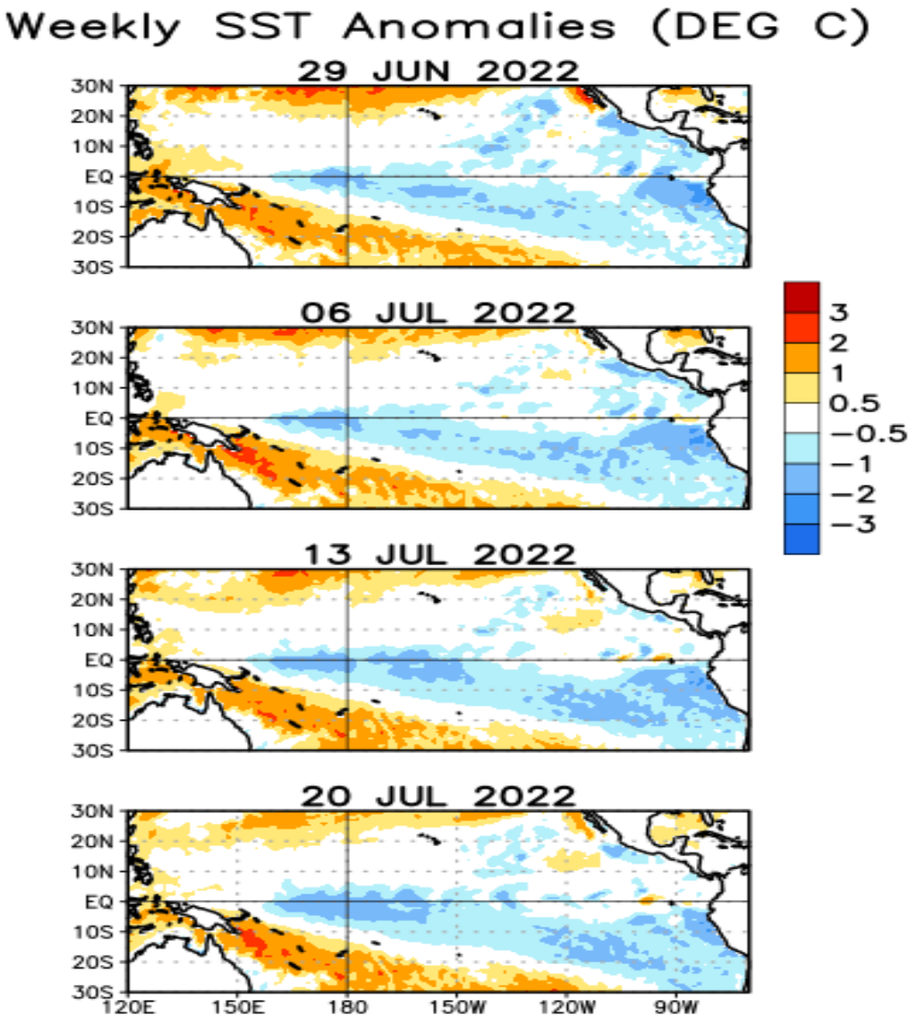
Global SST Departures (°C) During the Last Four Weeks

During the last four weeks, equatorial SSTs were below average across much of the Pacific Ocean. Equatorial SSTs were above average near Indonesia, across much of the Atlantic Ocean, and in the central Indian Ocean.



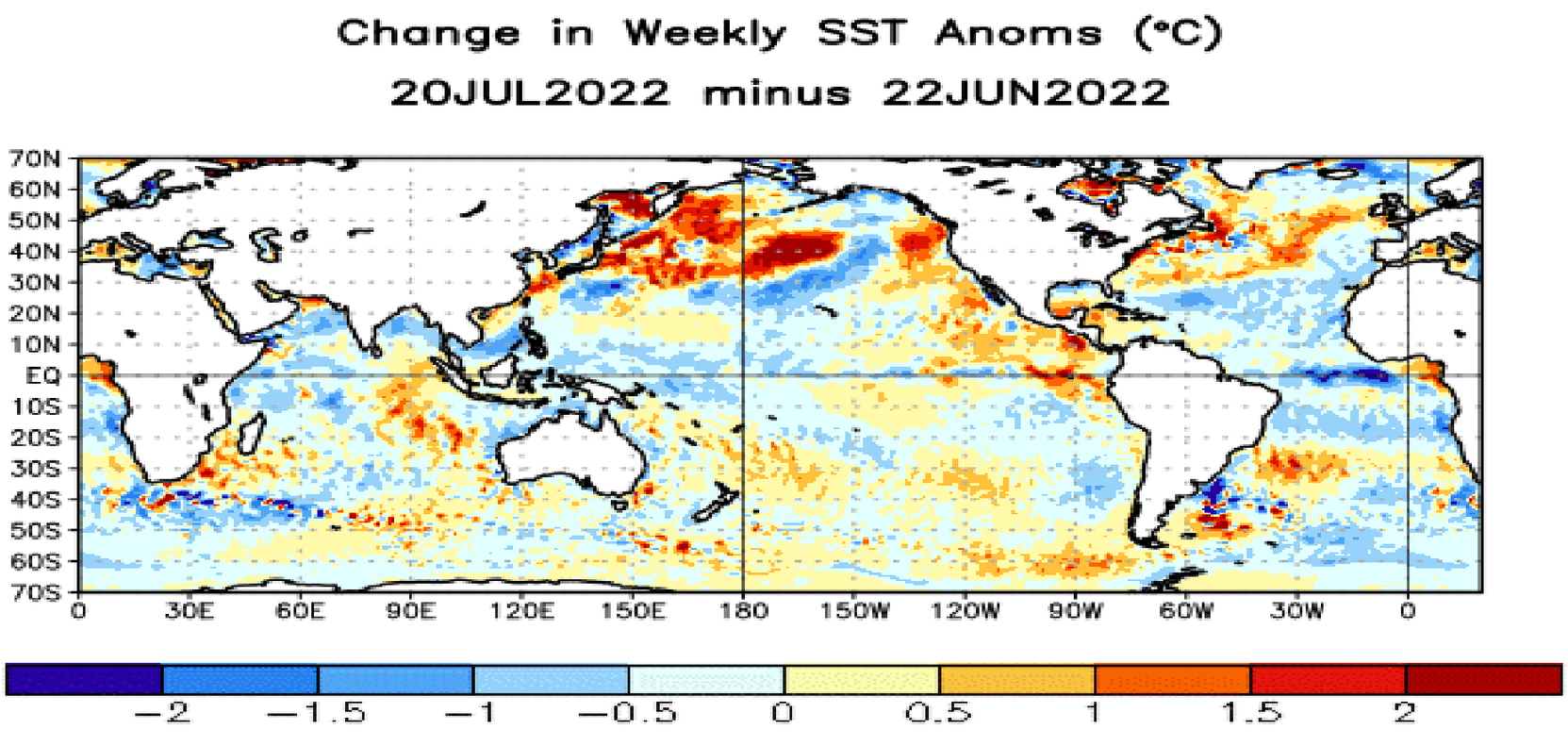
Weekly SST Departures during the Last Four Weeks

During the last 4 weeks, negative SST anomalies have weakened in the eastern equatorial Pacific and strengthened in the central equatorial Pacific.



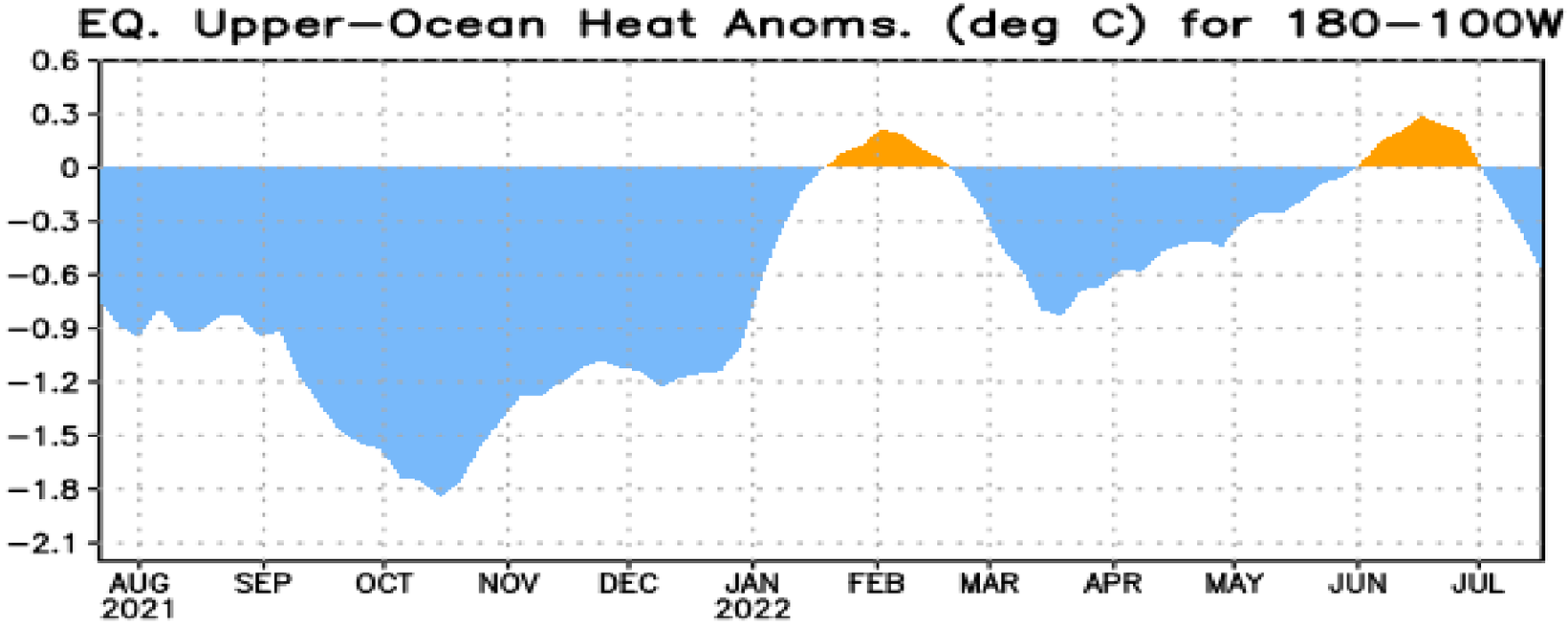
Change in Weekly SST Departures over the Last Four Weeks

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



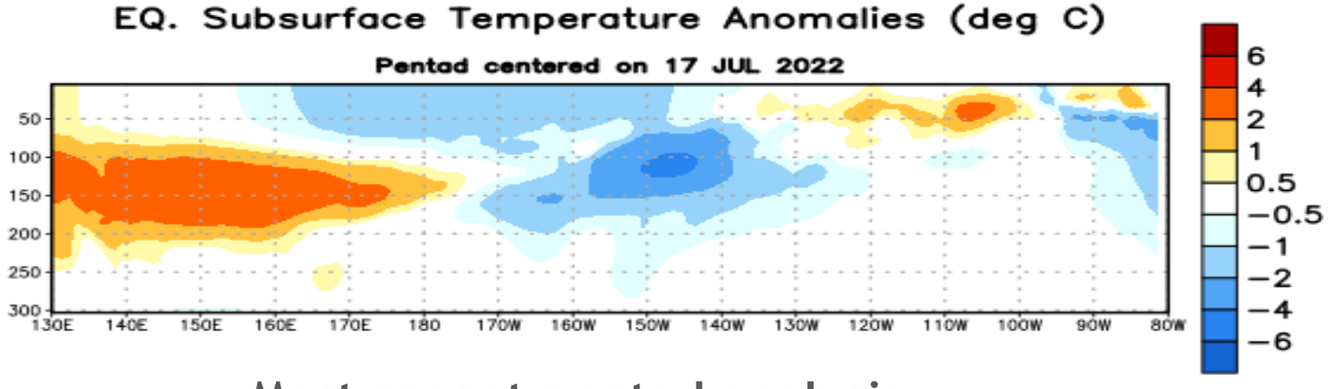
Central and Eastern Pacific Upper-Ocean (0-300 m) Weekly Average Temperature Anomalies

From early July 2021 to mid-January 2022, negative subsurface temperature anomalies were observed. During February 2022 through mid-March, subsurface temperature anomalies decreased. From mid-March to mid-June, subsurface temperature anomalies increased from negative to positive, then decreased to negative again.

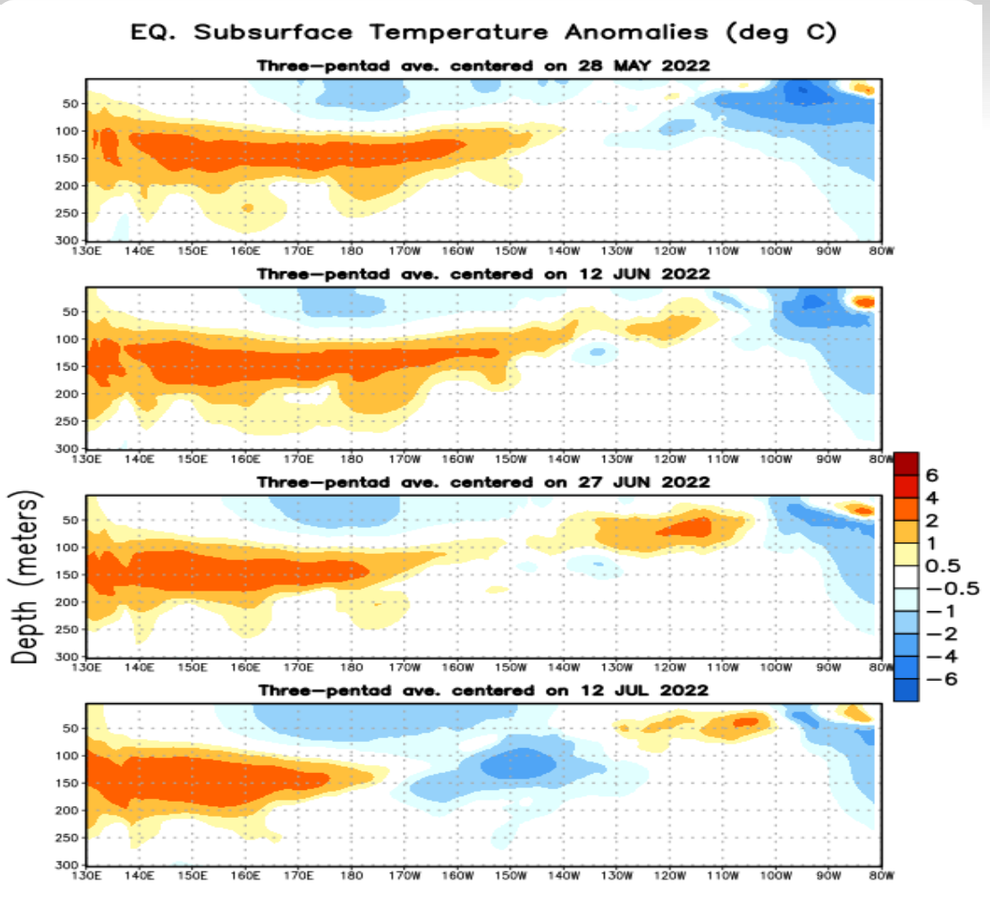


Sub-Surface Temperature Departures in the Equatorial Pacific

During the last two months, positive subsurface temperature anomalies expanded eastward before weakening and becoming negative in the central Pacific at depth.



Most recent pentad analysis



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

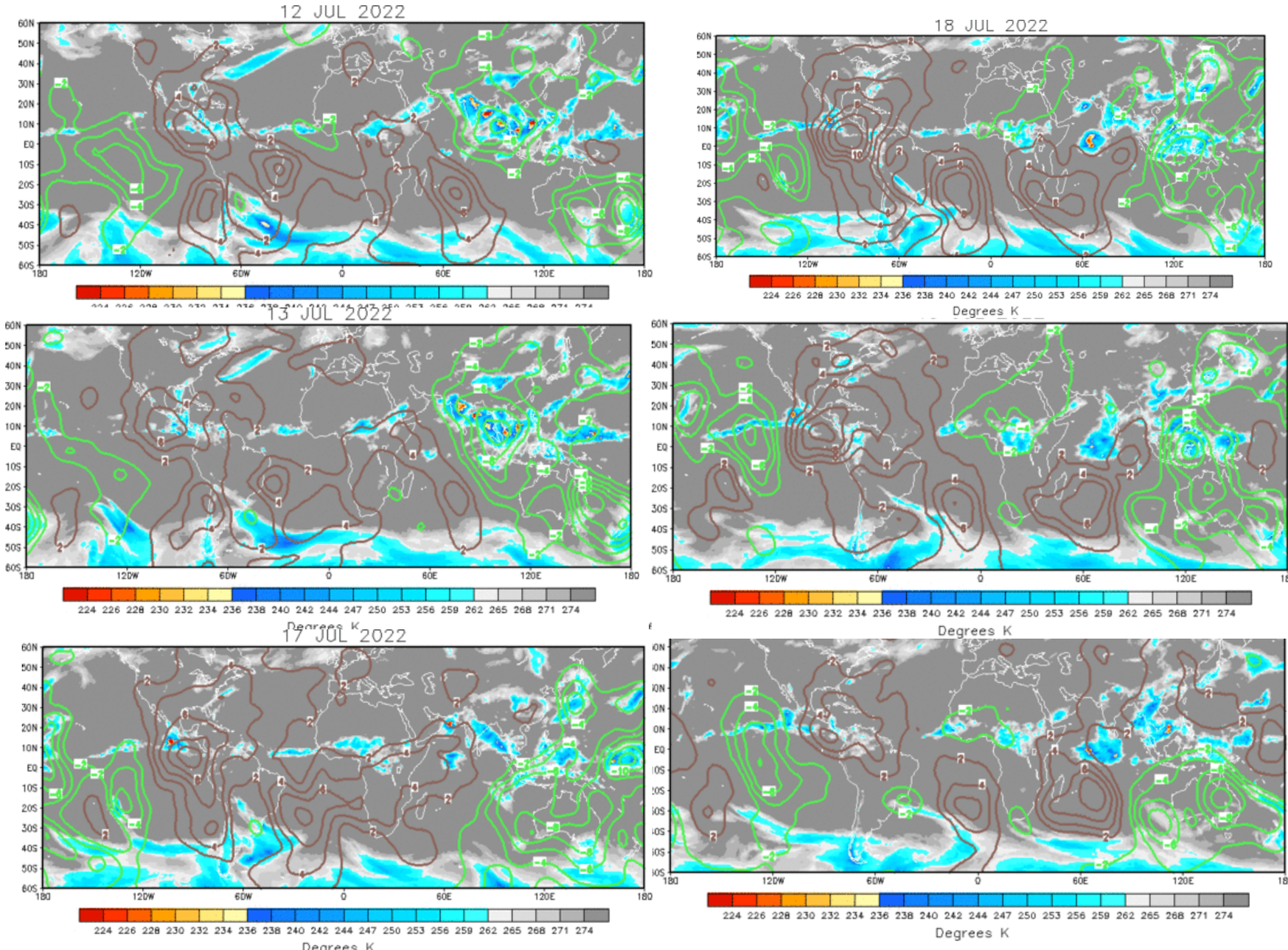


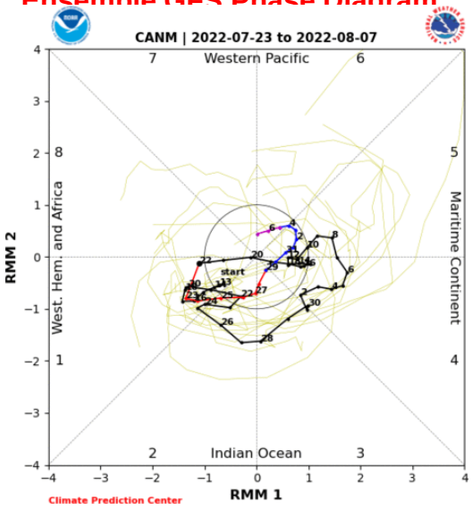
Figure 12: **IR image and Velocity Potential anomalies**

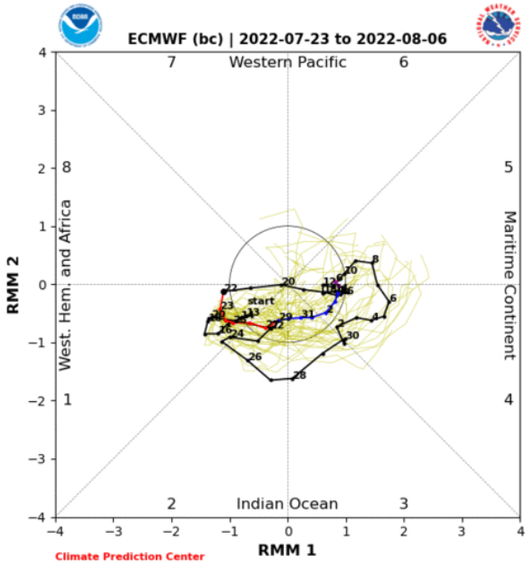
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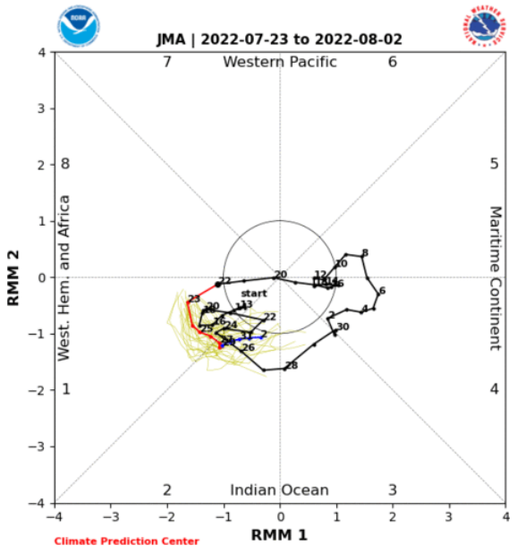
MJO – Current Status and Forecast

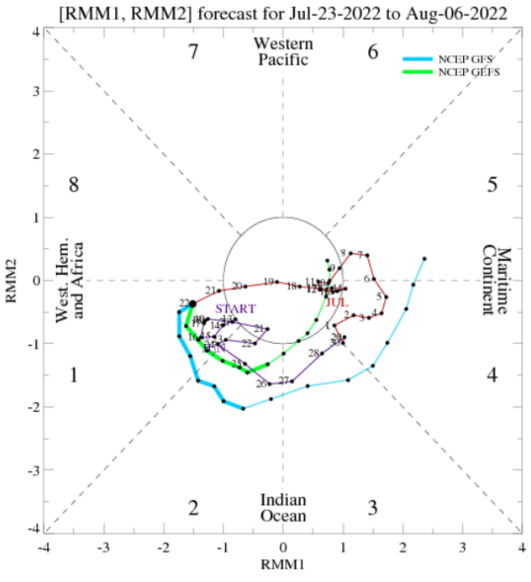
Add BoM, UKMet and DWD

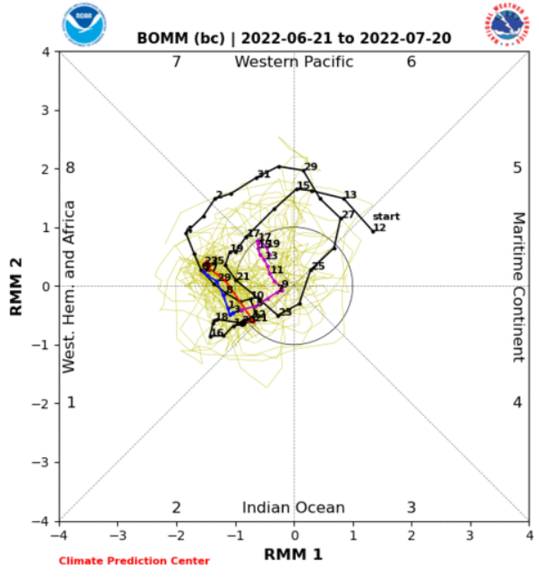
Ensemble GFS Phase Diagram











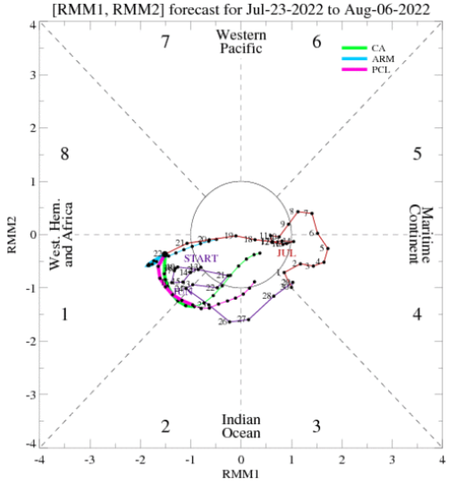


Figure 14: MJO RMM Forecasts from ECMWF, NCEP and UK Met Office, JMA

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

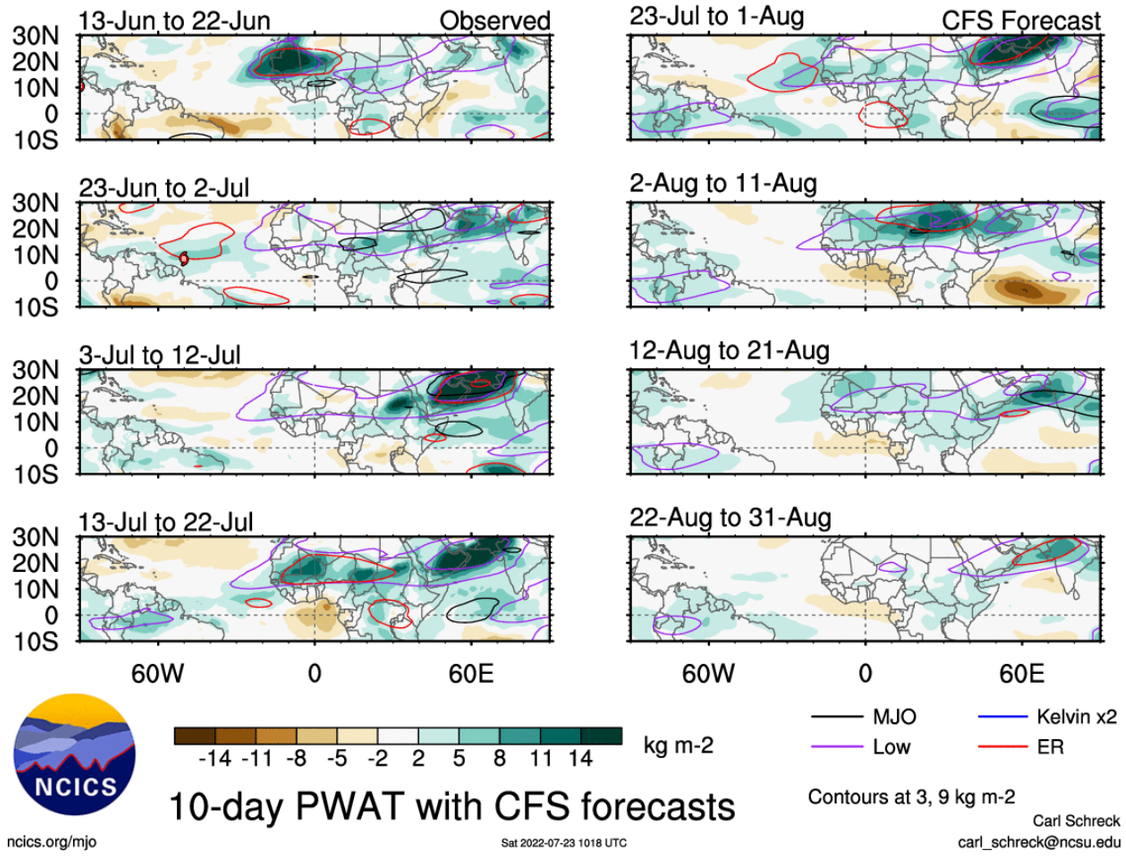


Figure 7a: Africa

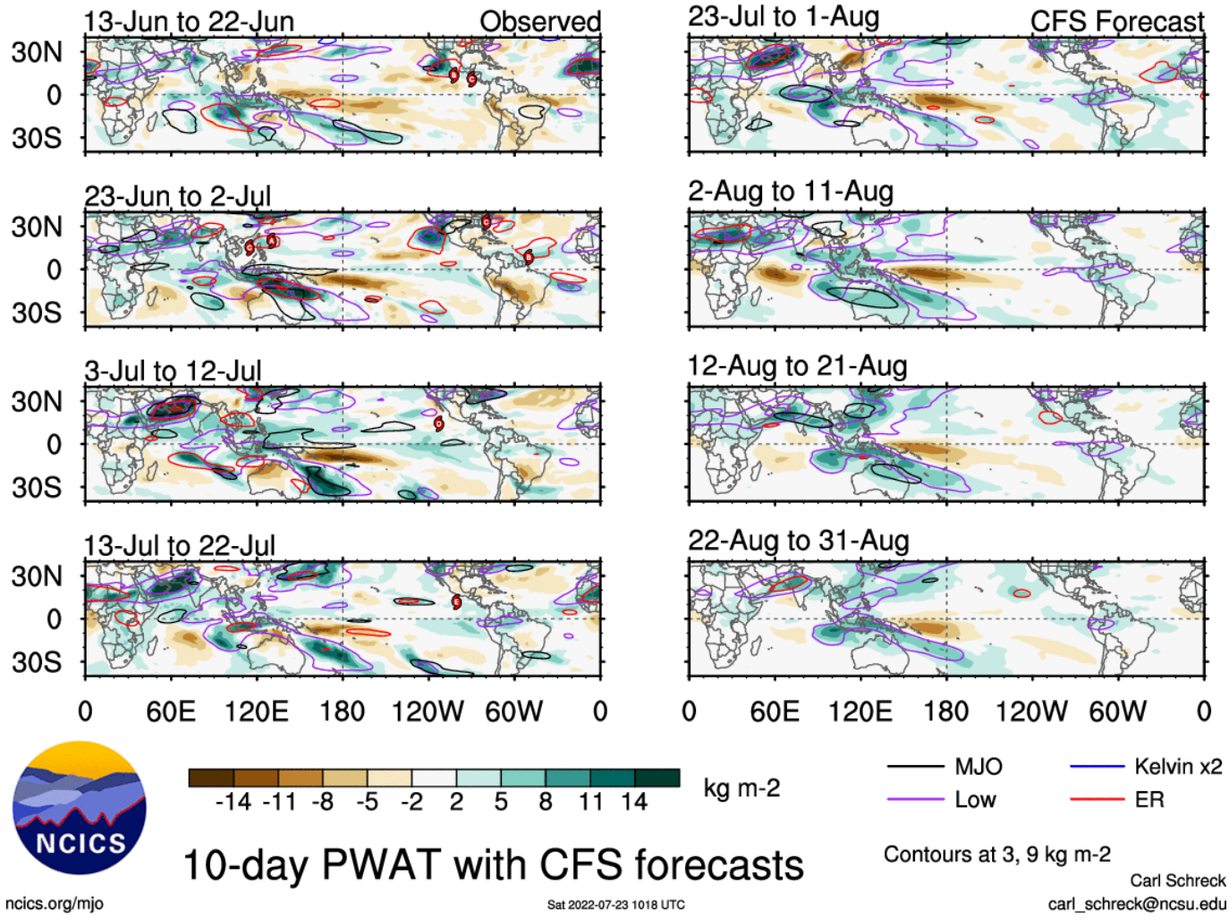
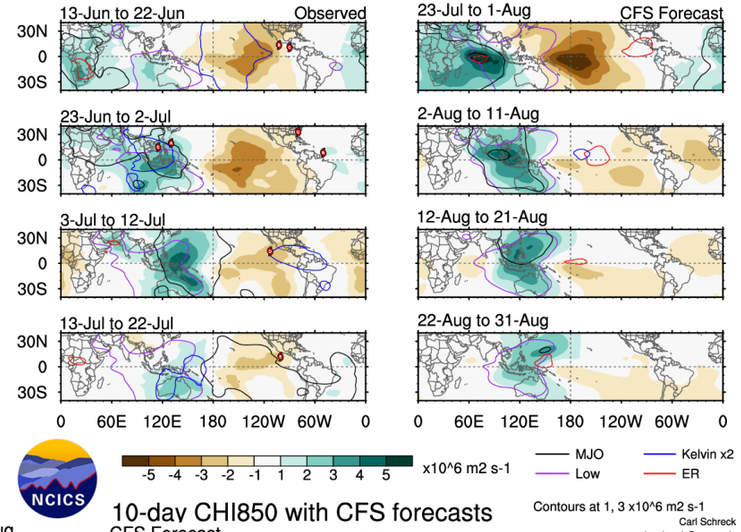


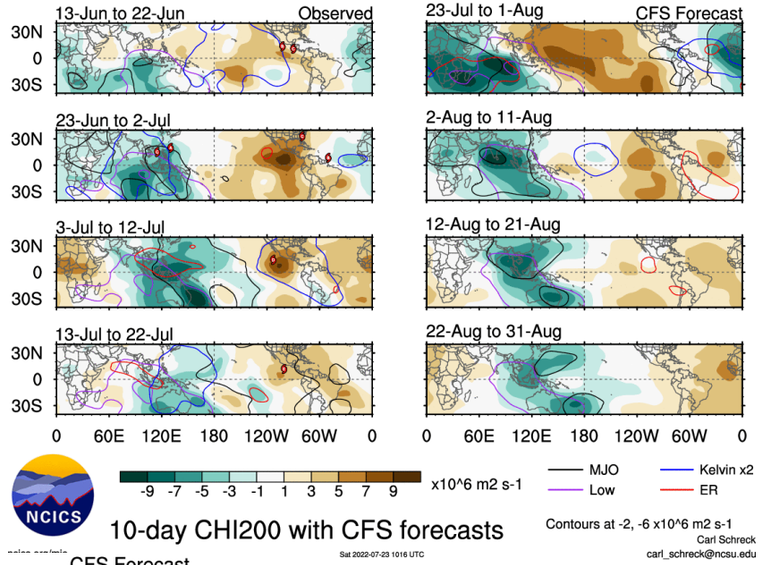
Figure 7b: Global

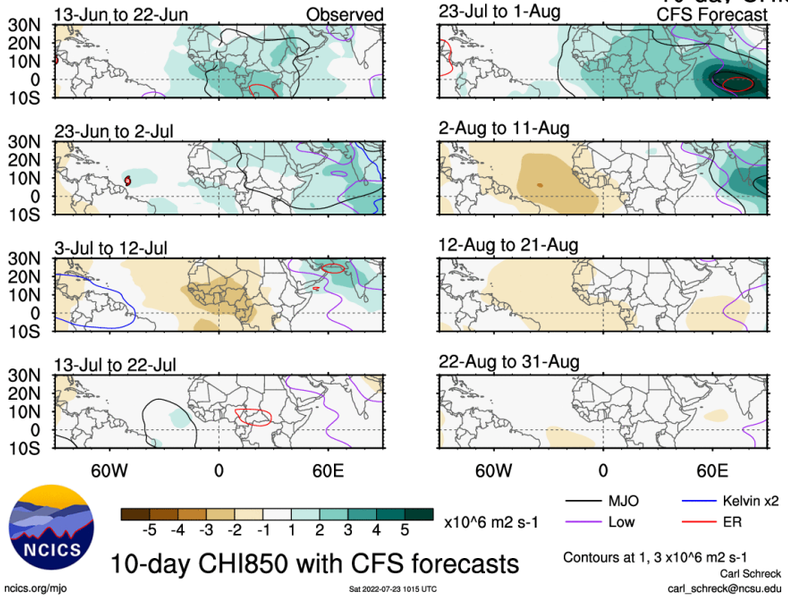
Figure 17: Past four week Precipitable Water and Outlooks

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







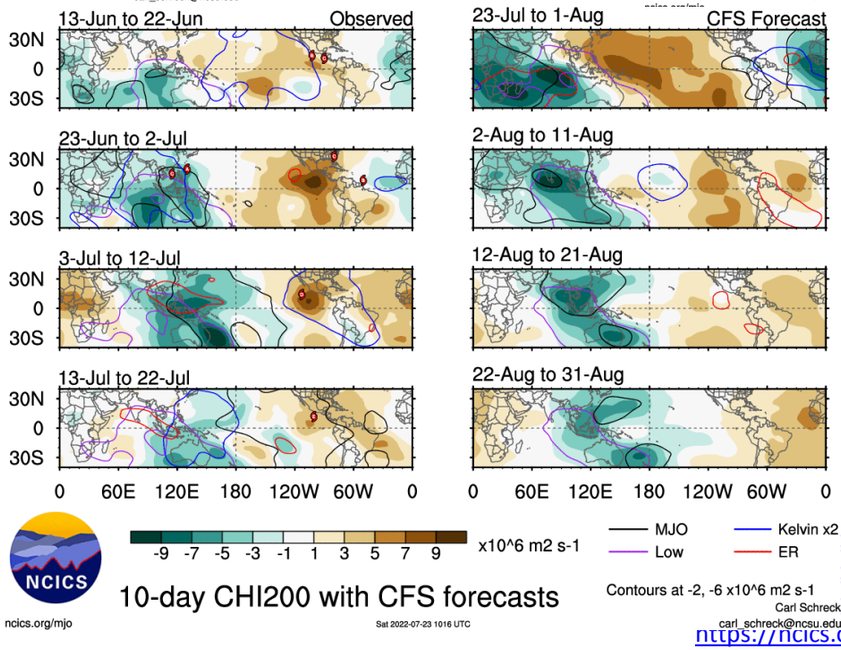
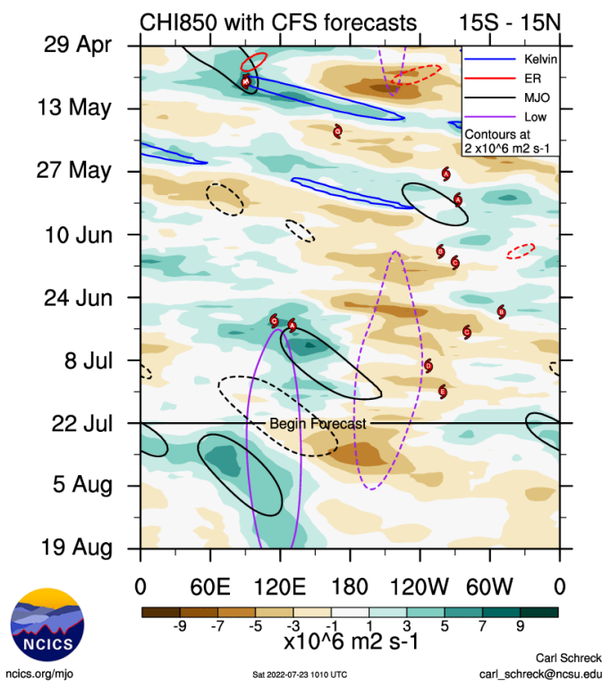


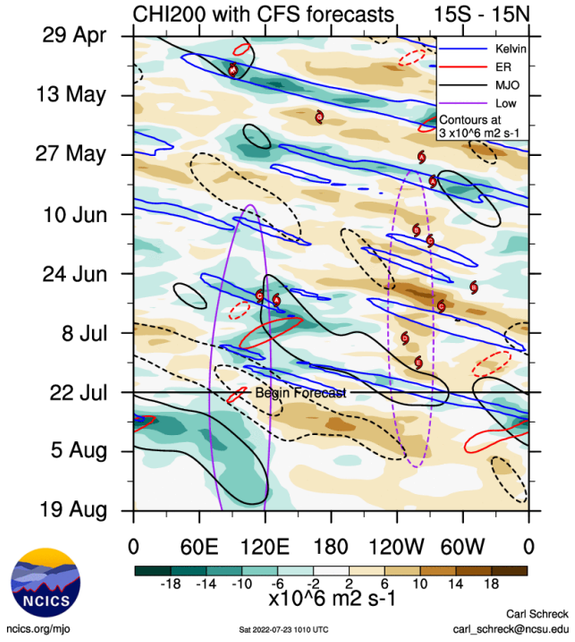
Figure 18a and b: Past four week and month velocity potential

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
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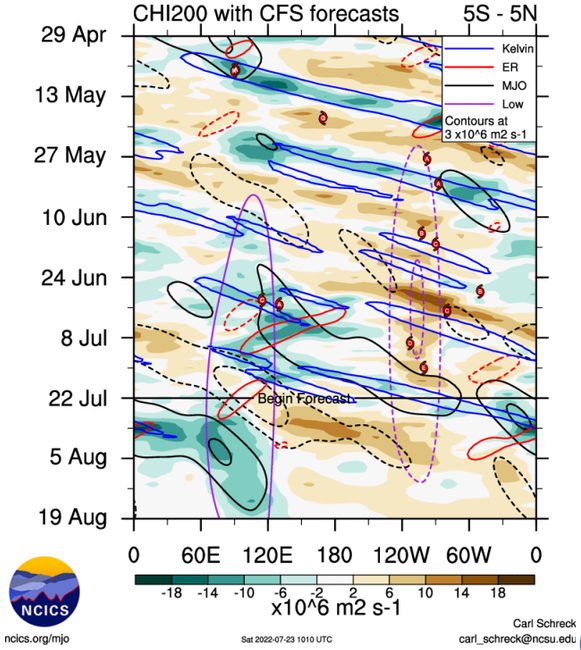
Dekadal Velocity Potential Anomalies – Obs and Fcst: Hovmoller diagram

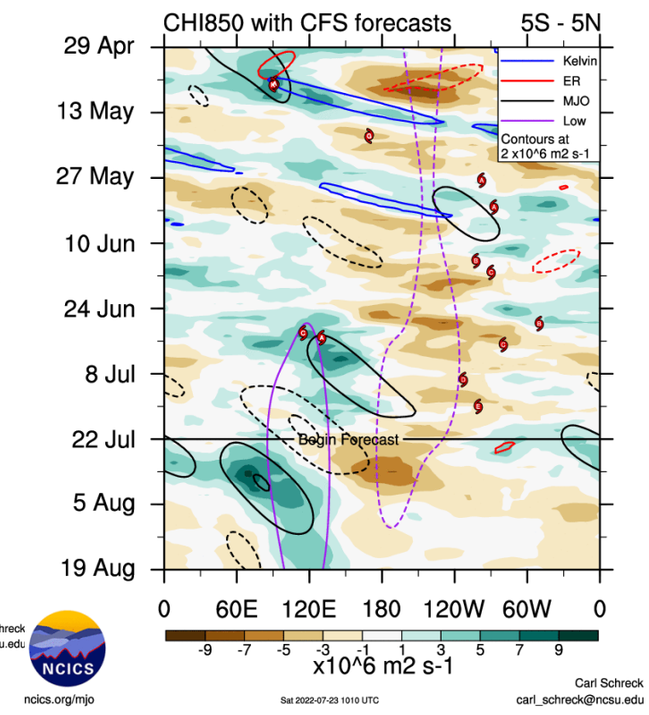
Average Anomalies in the band 15S-15N





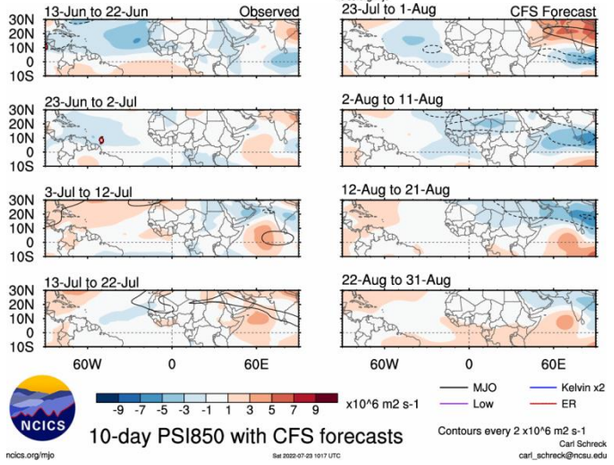
Average Anomalies in the band 5S-5N

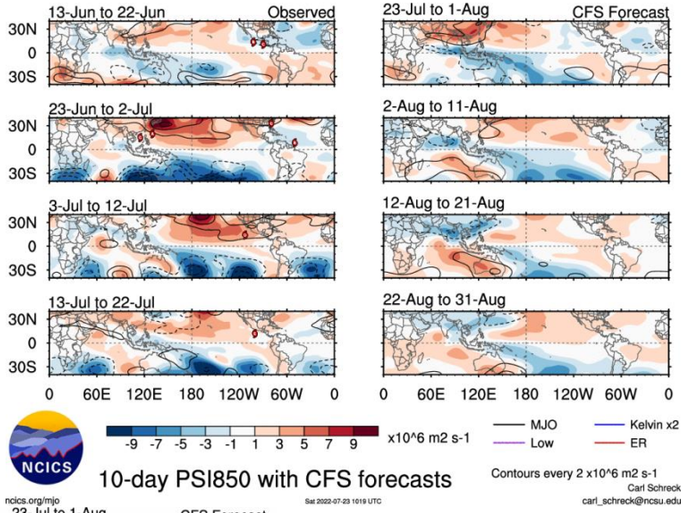


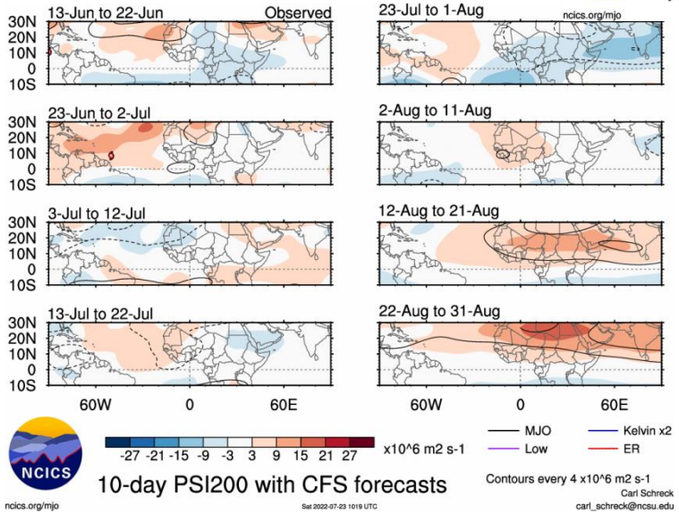


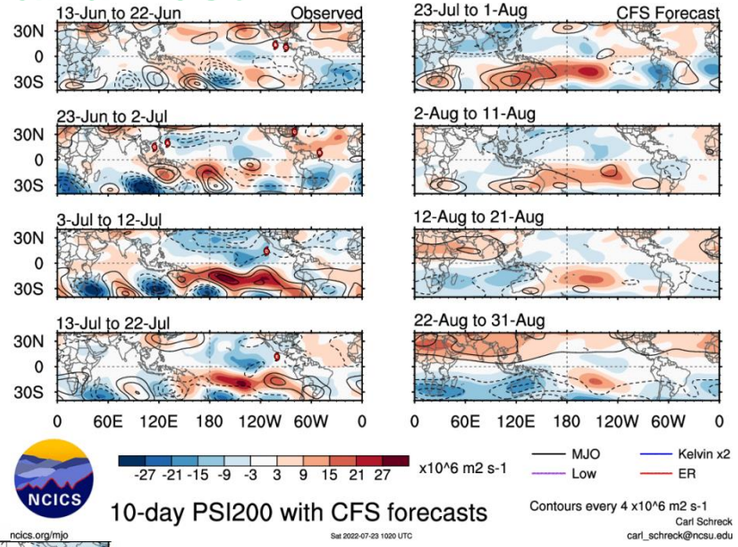
https://ncics.org/pub/mjo/v2/hov/chi850.cfs.wide.png
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https://ncics.org/pub/mjo/v2/hov/chi200.cfs.eqtr.png

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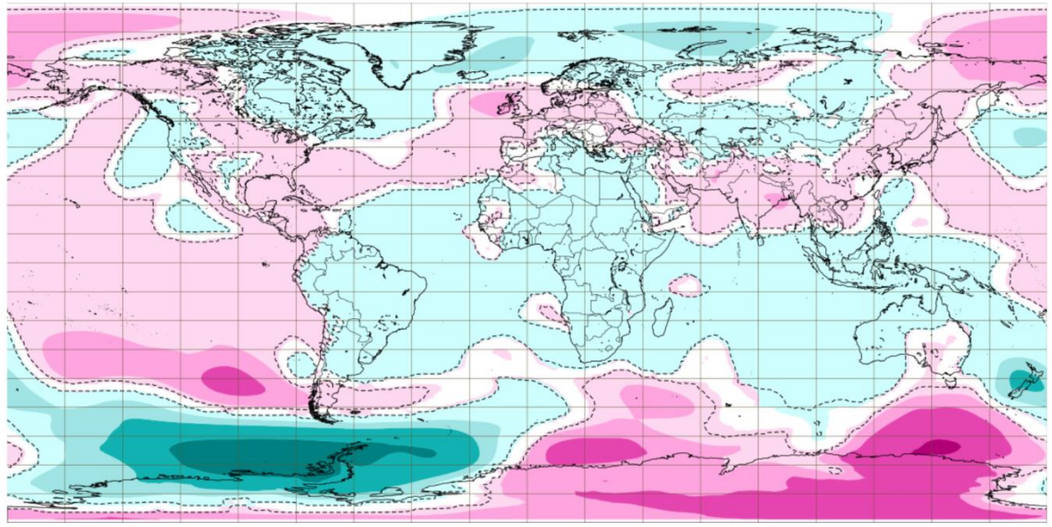
Figure 18a and b: Past four week and month velocity potential

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: Mon 25 Jul 2022 Valid time: Mon 25 Jul 2022 - Mon 01 Aug 2022 (+168h) Area : Global



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

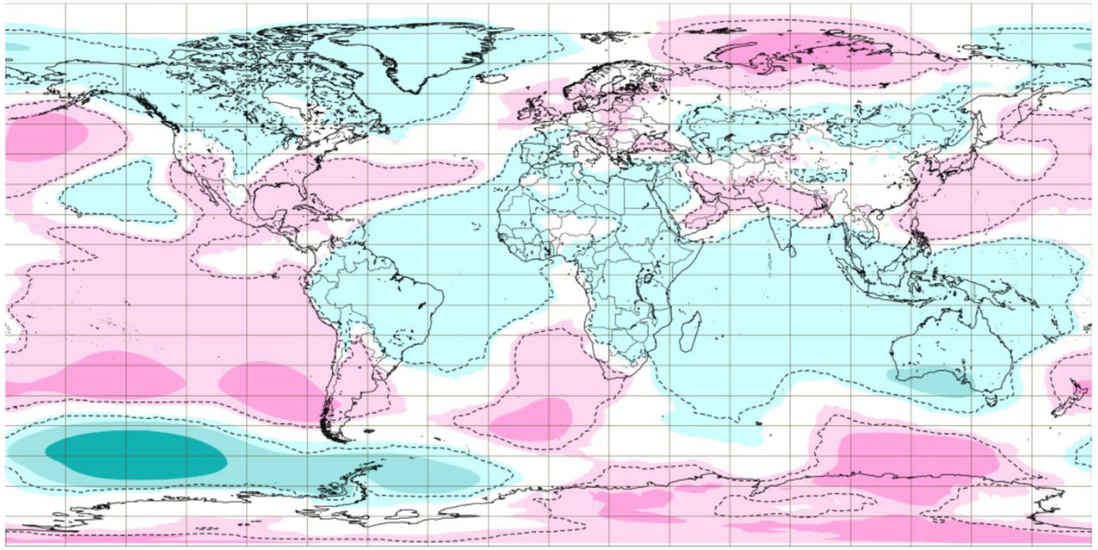
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Mean sea level pressure: Weekly mean anomalies

Base time: Mon 25 Jul 2022 Valid time: Mon 01 Aug 2022 - Mon 08 Aug 2022 (+336h) Area : Global



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

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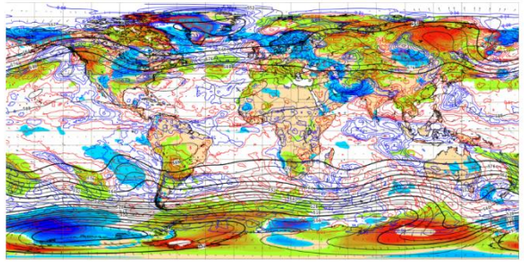
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Subseasonal Drivers Forecast – Week 1 and 2

Multiparam: Weekly mean anomalies

Base time: Mon 25 Jul 2022 Valid time: Mon 25 Jul 2022 - Mon 01 Aug 2022 (+168h) Area : Global



Extended range: 2m temperature weekly mean anomaly

-12 -8 -7 -6 -5 -4 -3 -2 -1 1 2 3 4 5 6 7 8 12

Extended range: Sunshine duration weekly mean of anomalous rate of accumulation

-100 . -30 . -20 . -12 . -4 -1 1 4 . 12 . 20 . 30 .100%

Extended range: 10 metre wind weekly mean anomaly

Black wind arrows

Extended range: 500 hPa geopotential

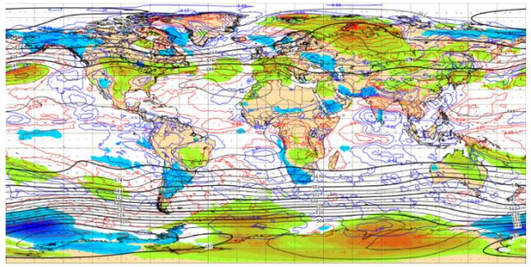
Interval 6, thickness 2

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Multiparam: Weekly mean anomalies

Base time: Mon 25 Jul 2022 Valid time: Mon 01 Aug 2022 - Mon 08 Aug 2022 (+336h) Area : Global



Extended range: 2m temperature weekly mean anomaly

-12 -8 -7 -6 -5 -4 -3 -2 -1 1 2 3 4 5 6 7 8 12

Extended range: Sunshine duration weekly mean of anomalous rate of accumulation

-100 . -30 . -20 . -12 . -4 -1 1 4 . 12 . 20 . 30 .100%

Extended range: 10 metre wind weekly mean anomaly

Black wind arrows

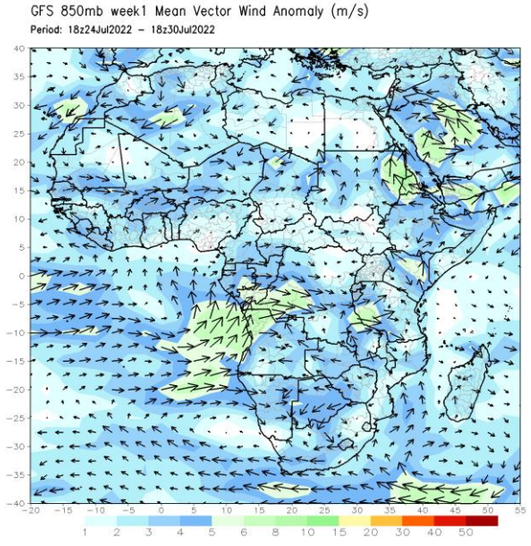
Extended range: 500 hPa geopotential

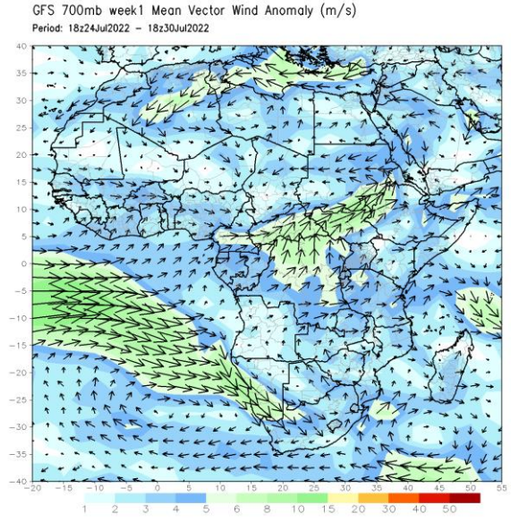
Interval 6, thickness 2

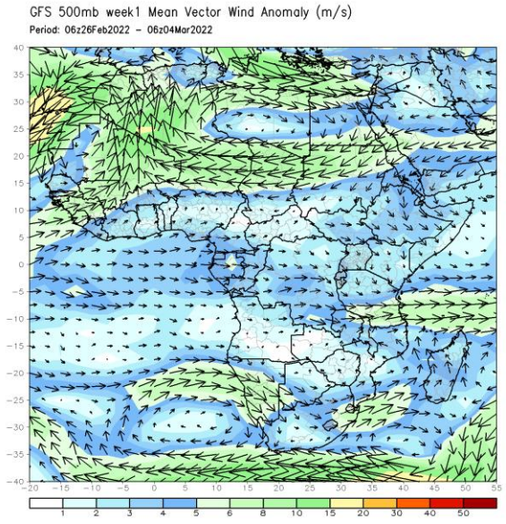
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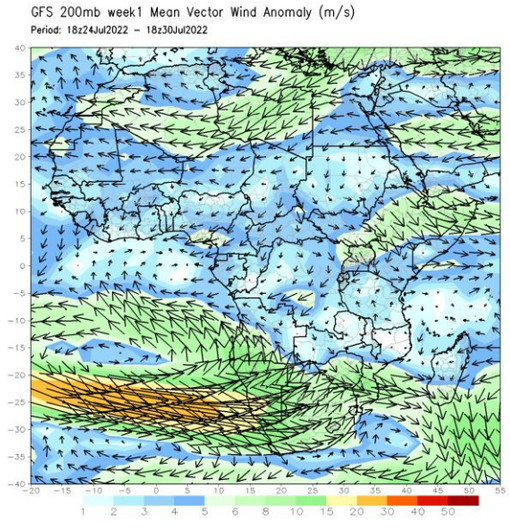
ECMWF

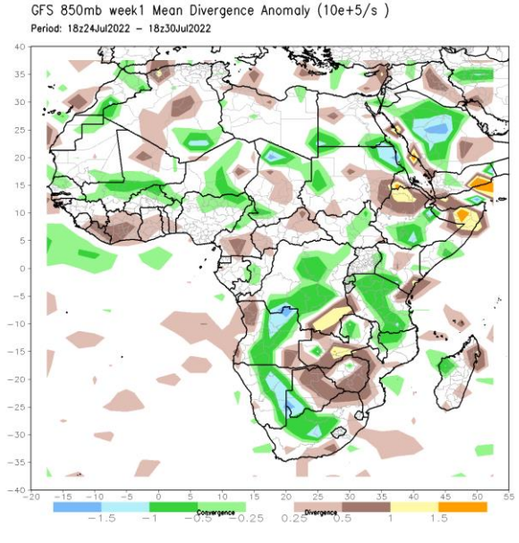
Wind Anomalies and divergence Forecast @ 925, 850, 700, 500, 200 hPa - Week1

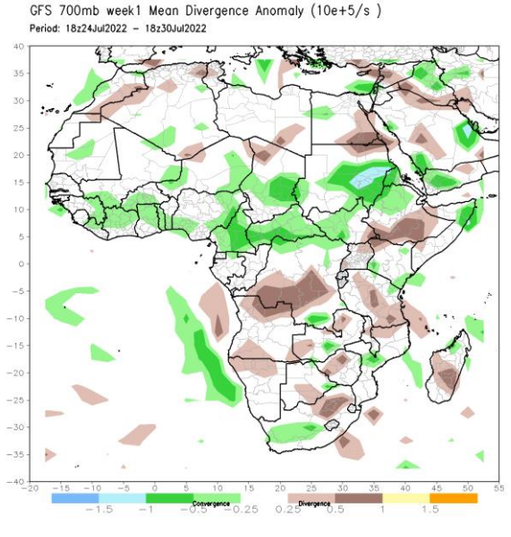


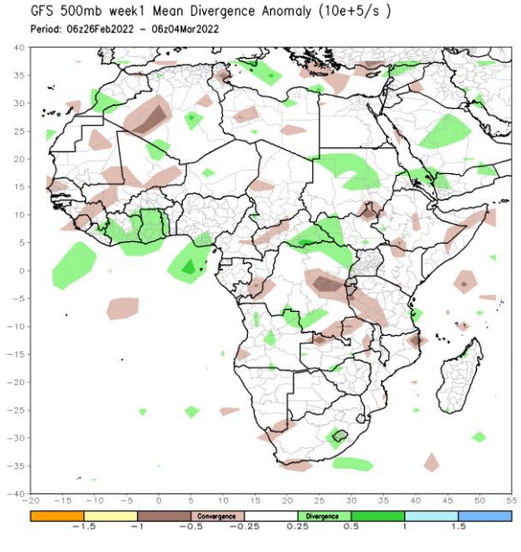


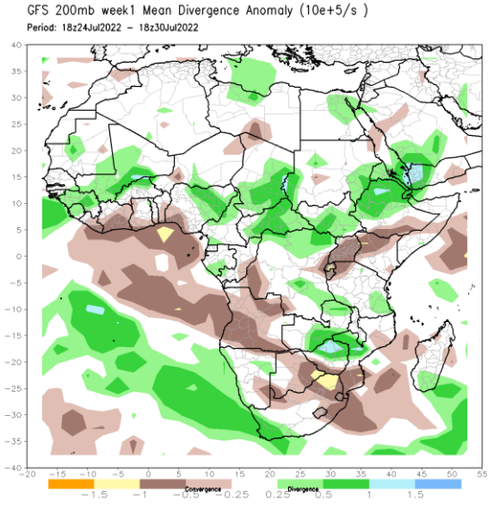




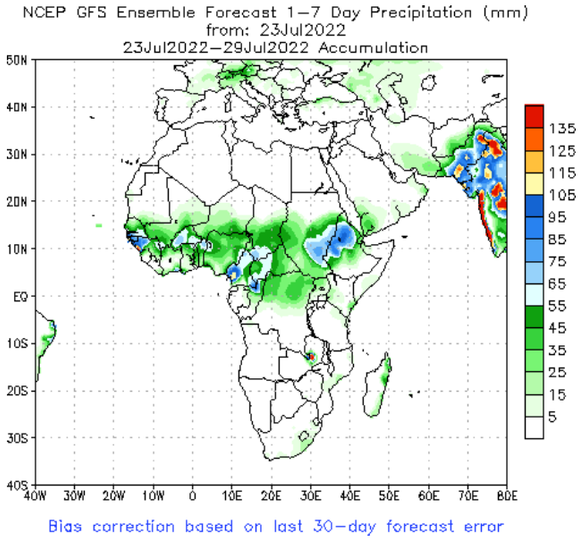


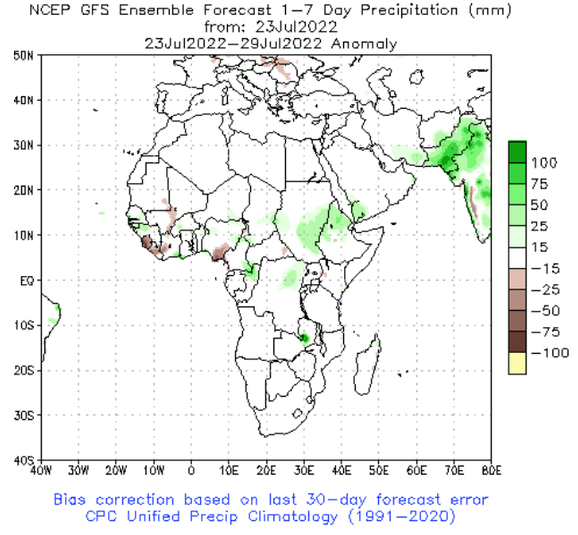


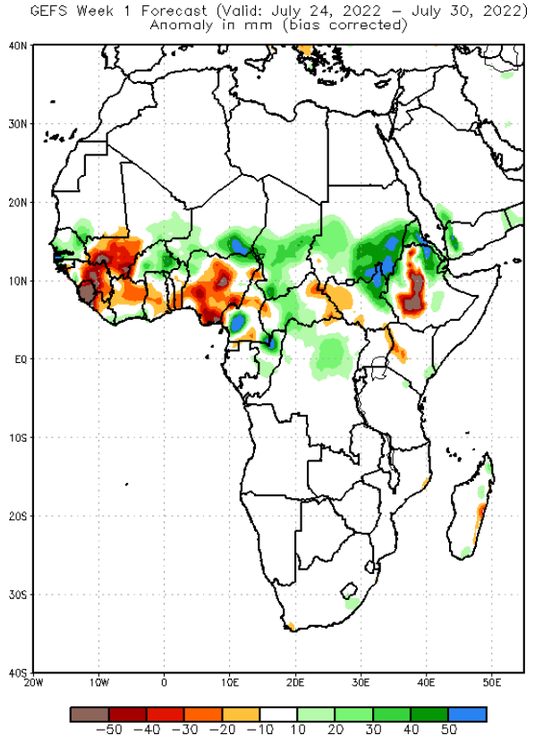


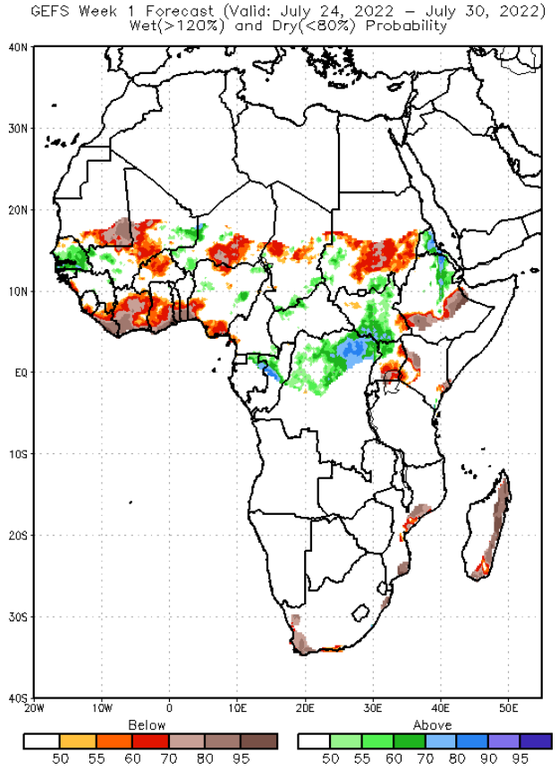


NCEP/GFS Bias-Corrected Precipitation Ensemble Forecast - Week 1









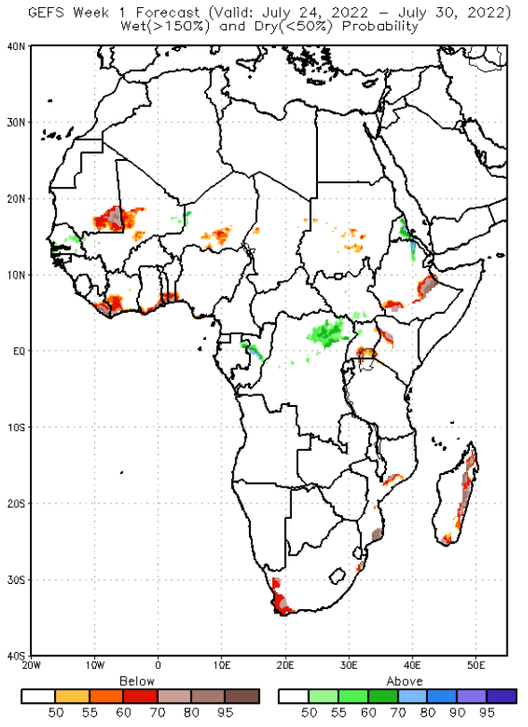


Figure 26: NCEP/GFS Précipitation and Anomaly forecast.

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
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Week-1 Precipitation Probability of Exceedance: Forecast and Climo

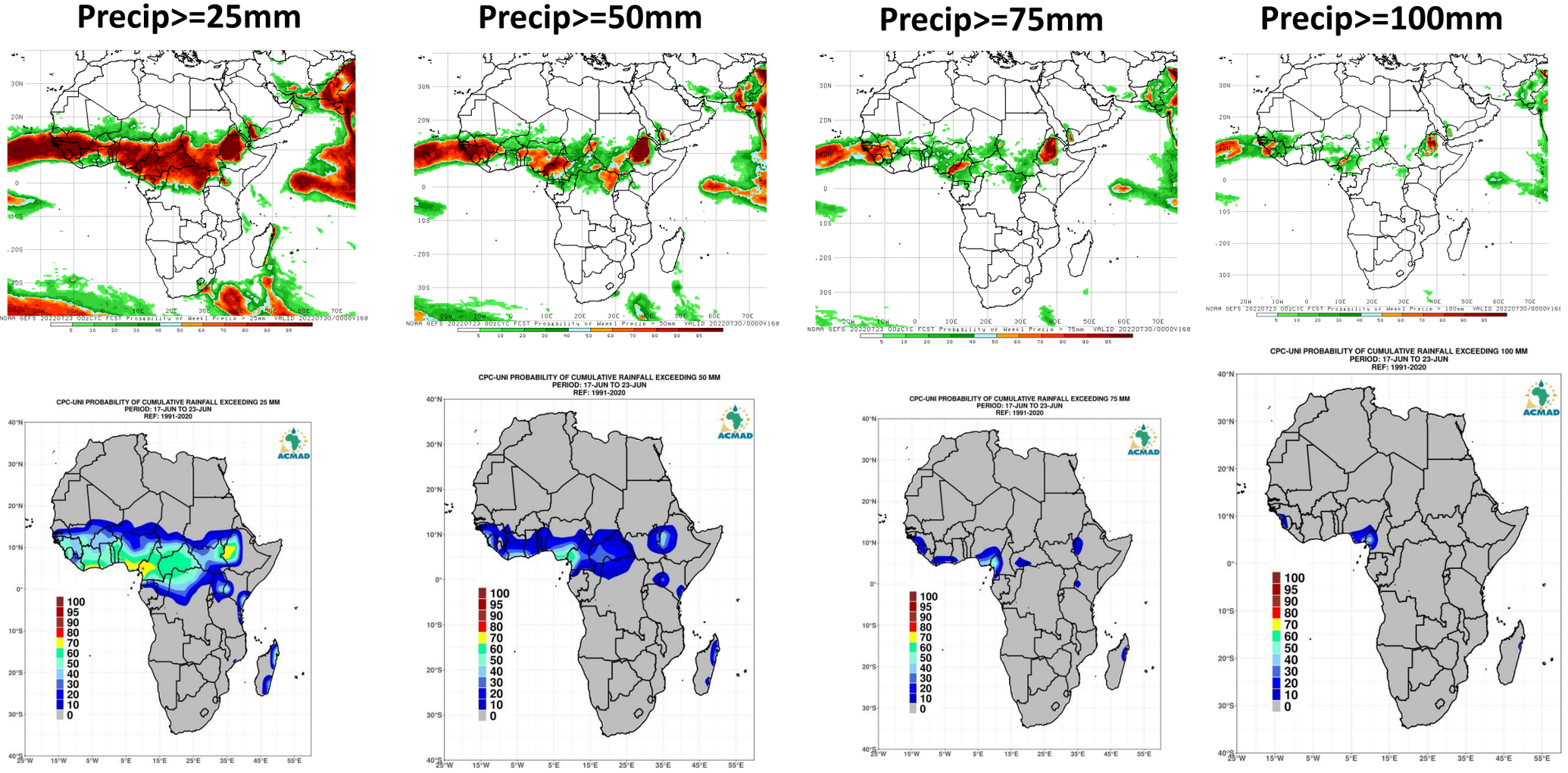


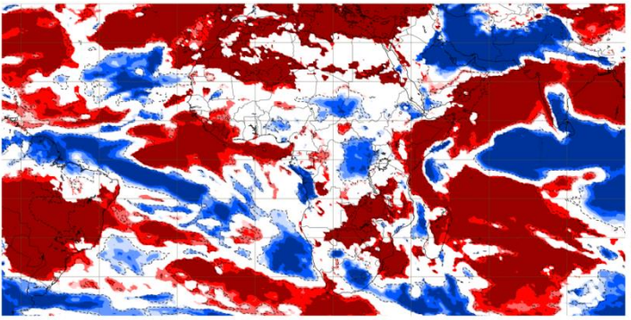
Figure 27: Week1 Precipitation Total Exceedance Probabilities

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
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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 1 :

Precipitation: Probability of weekly anomaly > 0

Base time: Mon 25 Jul 2022 Valid time: Mon 25 Jul 2022 - Mon 01 Aug 2022 (+168h) Area : Africa



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

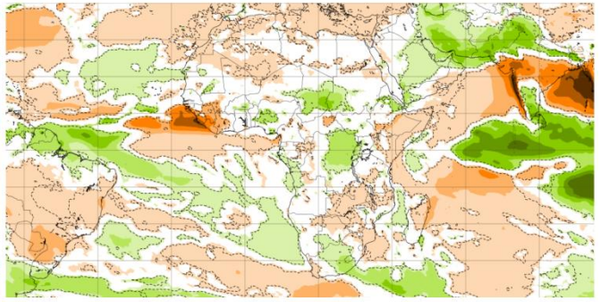
0 10 20 30 40 60 70 80 90 100%

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ECMWF

Precipitation: Weekly mean anomalies

Base time: Mon 25 Jul 2022 Valid time: Mon 25 Jul 2022 - Mon 01 Aug 2022 (+168h) Area : Africa



Extended range: Precipitation weekly mean anomaly, significance level: 10 % (mm)

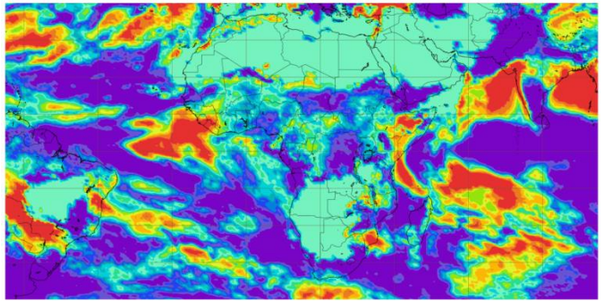
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ECMWF

Precipitation: Probability distribution

Base time: Mon 25 Jul 2022 Valid time: Mon 25 Jul 2022 - Mon 01 Aug 2022 (+168h) Distribution group : Lower Tercile Area : Africa



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

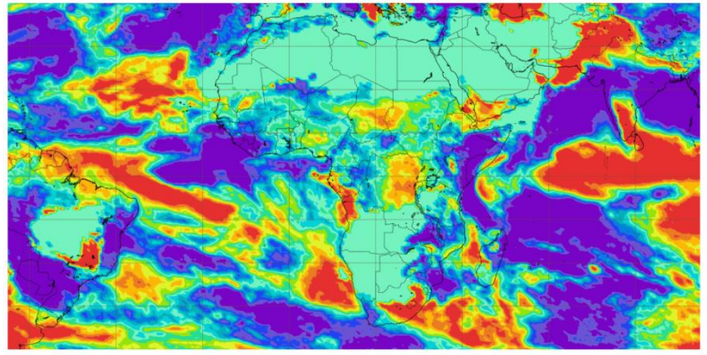
0 5 10 15 20 25 33 40 50 60 70 80 90 100

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ECMWF

Precipitation: Probability distribution

Base time: Mon 25 Jul 2022 Valid time: Mon 25 Jul 2022 - Mon 01 Aug 2022 (+168h) Distribution group : Upper tercile Area : Africa



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

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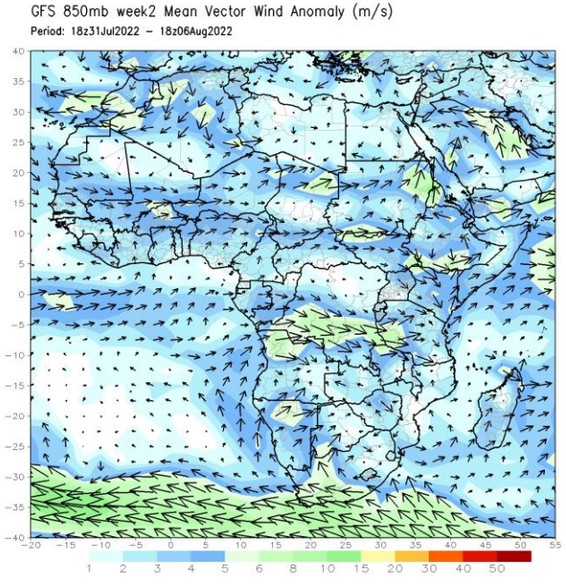
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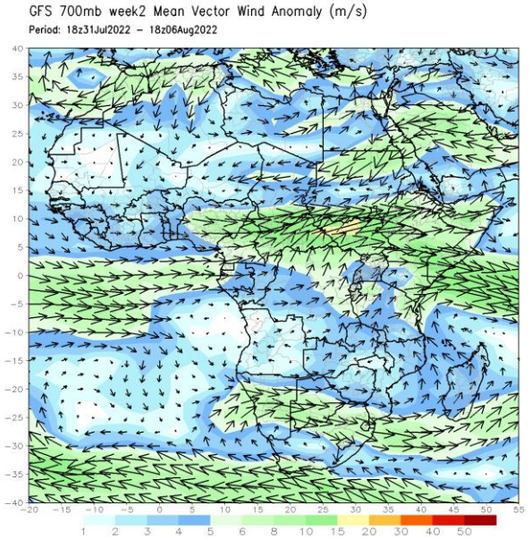
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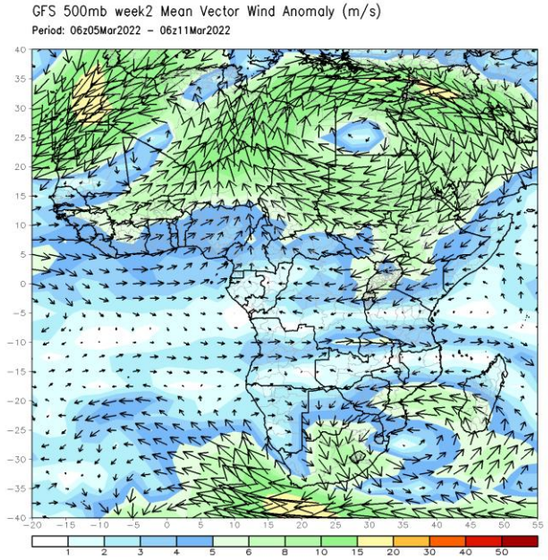
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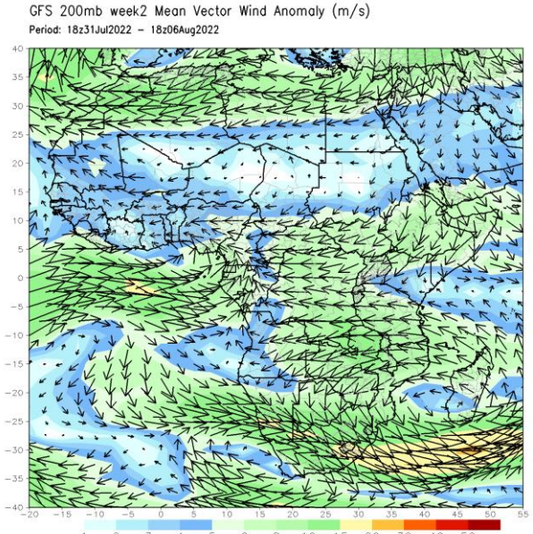
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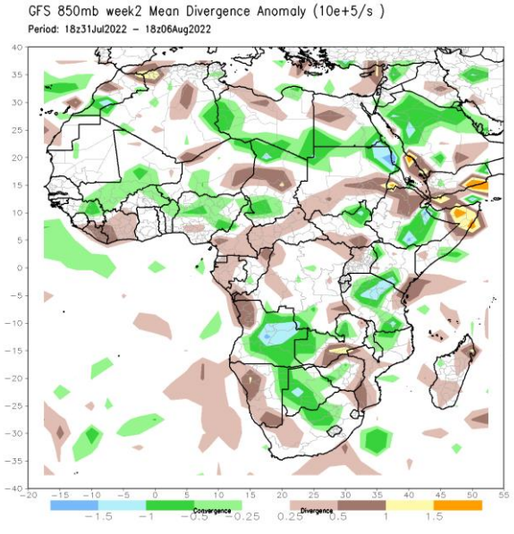
Wind Anomalies and divergence Forecast @ 925, 850, 700, 500, 200 hPa – Week2

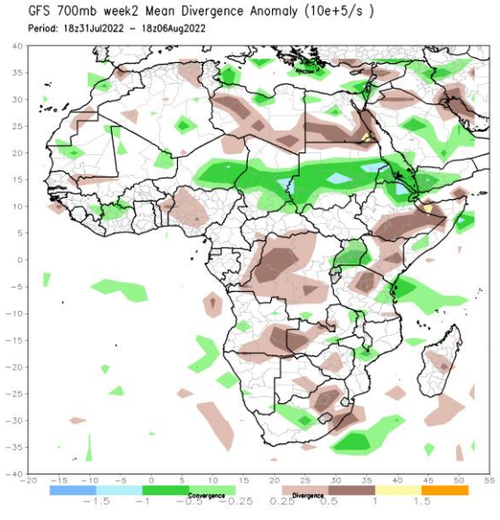


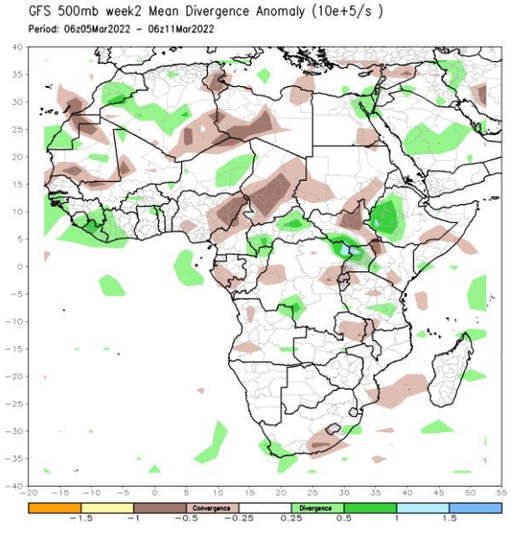


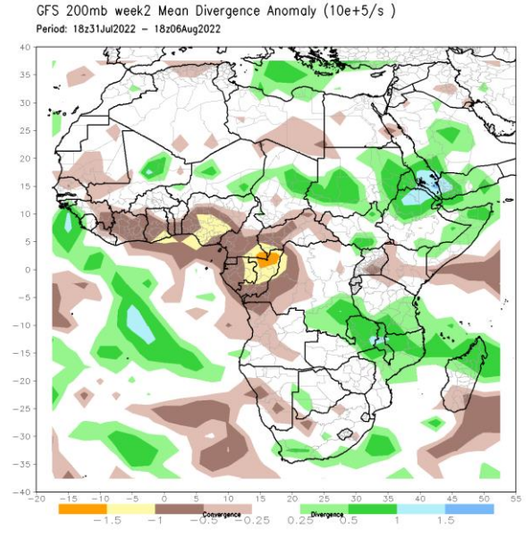




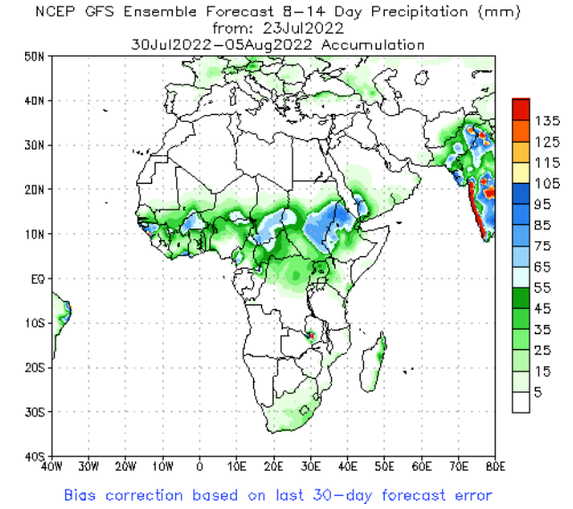


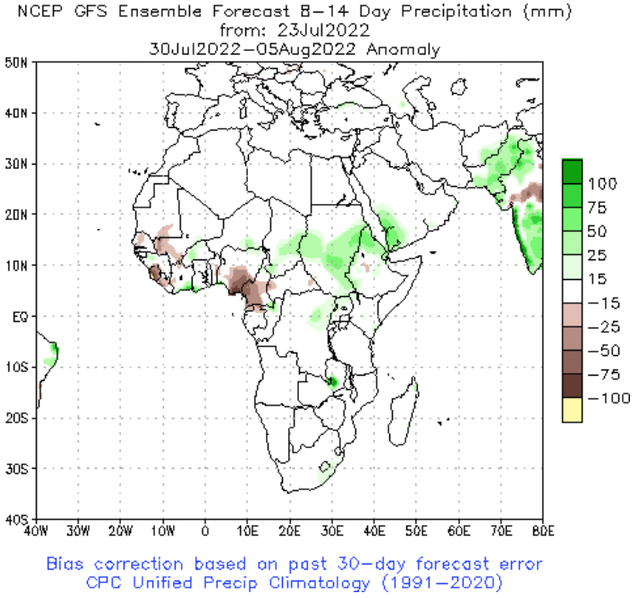


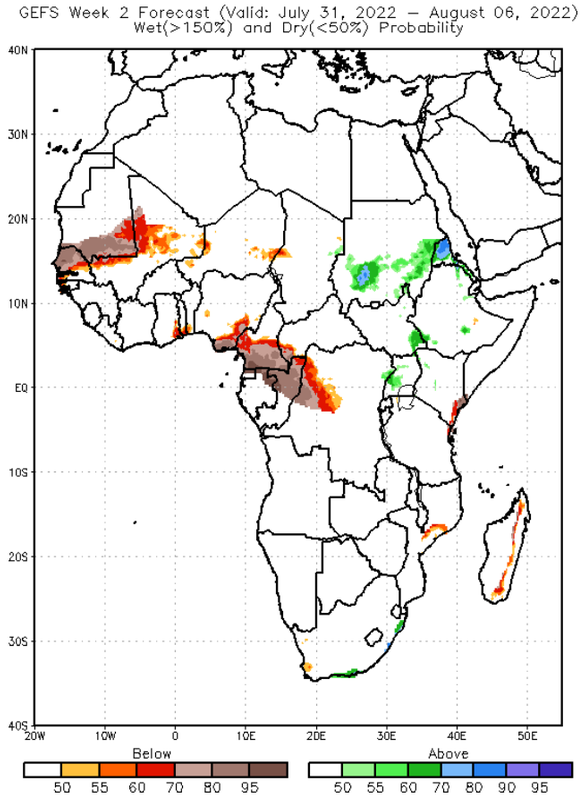


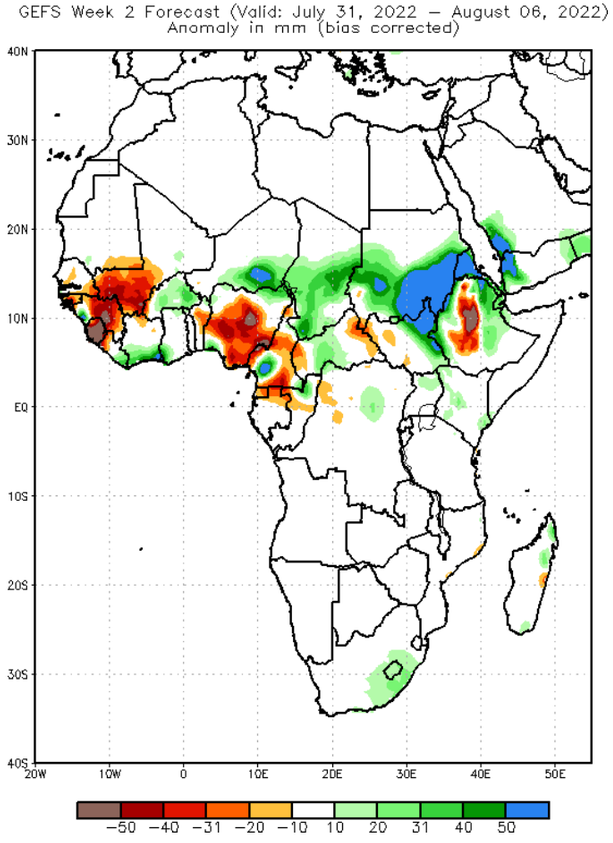


NCEP/GFS Bias-Corrected Precipitation Ensemble Forecast - Week 2









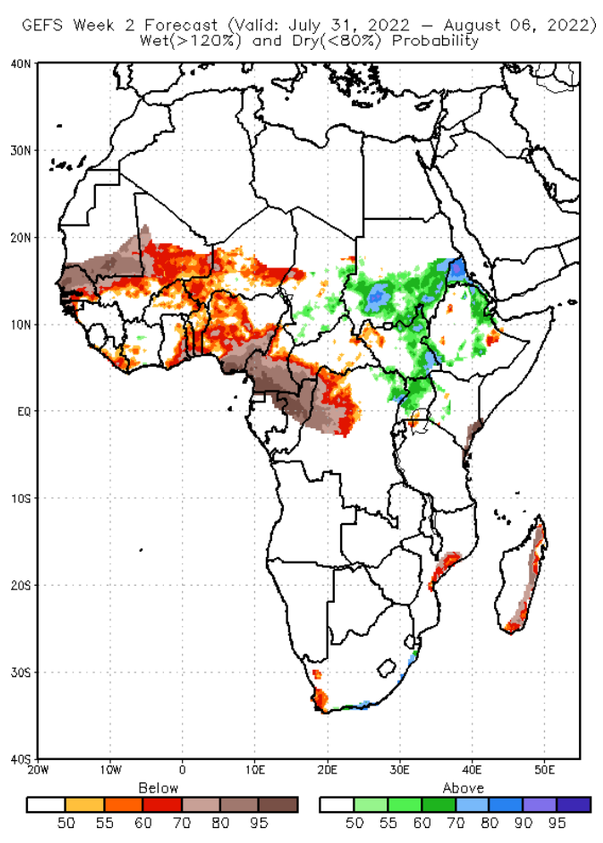


Figure 26: NCEP/GFS Précipitation and Anomaly forecast.

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
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

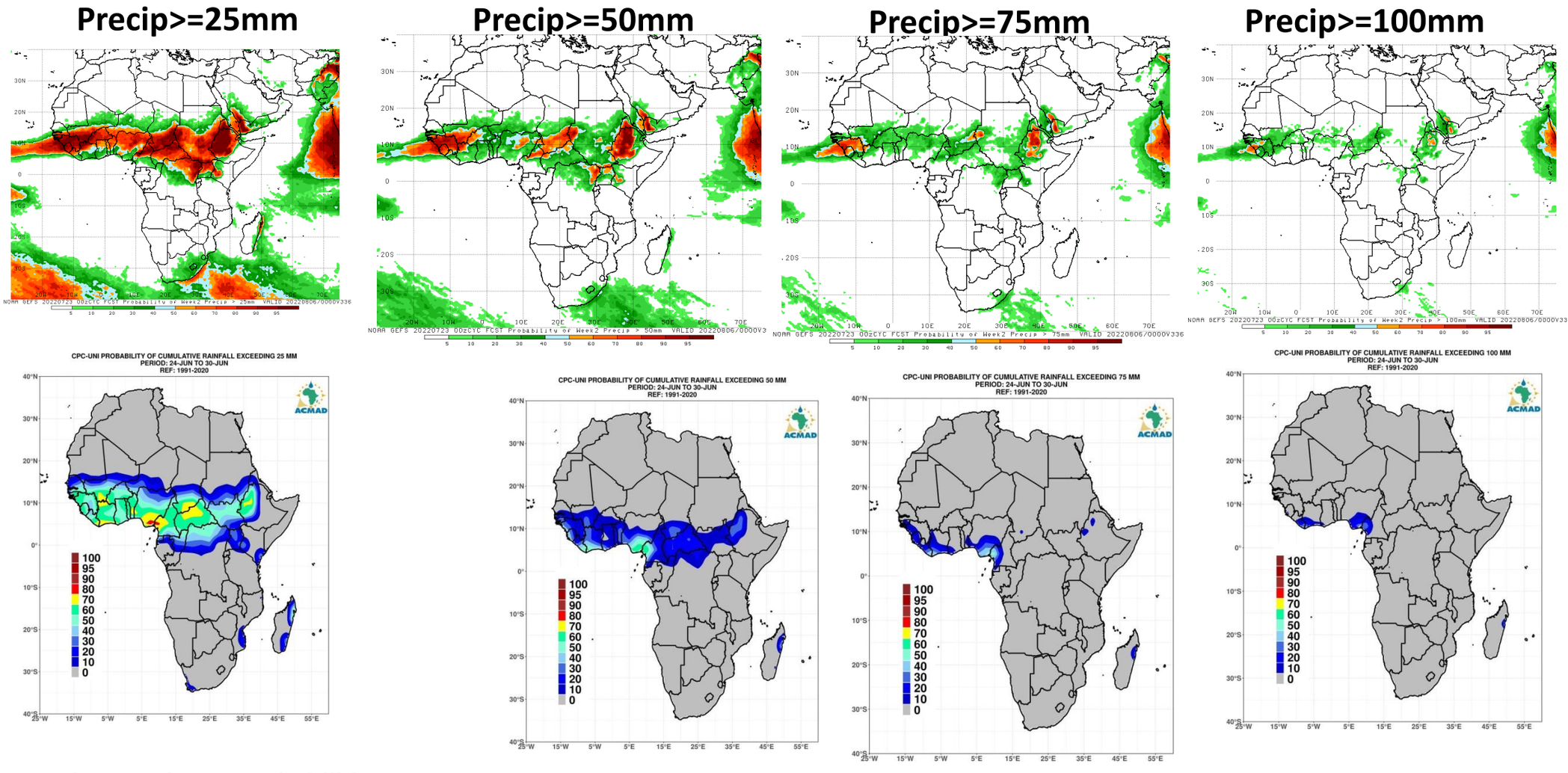
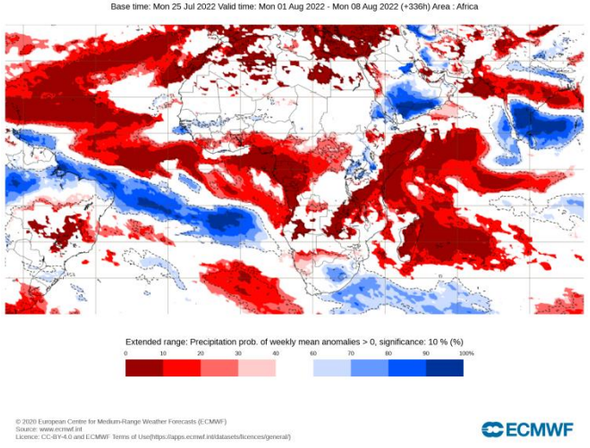


Figure 32: Week2 Precipitation Total Exceedance Probabilities

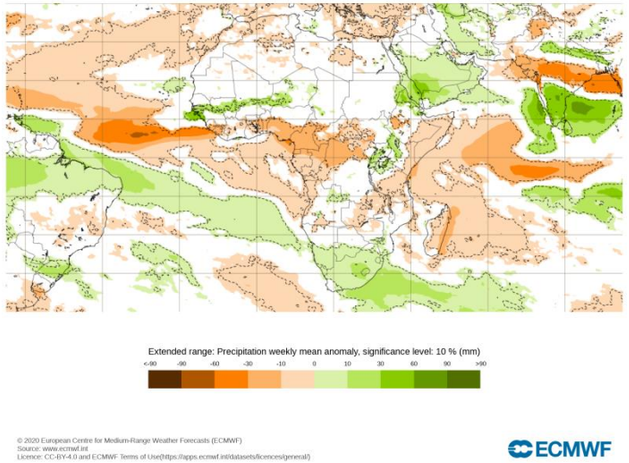
https://www.cpc.ncep.noaa.gov/products/international/cpci/data/00/gefs_wk1_precip25mm_prob_africa.html
https://www.cpc.ncep.noaa.gov/products/international/cpci/data/00/gefs_wk1_precip50mm_prob_africa.html
https://www.cpc.ncep.noaa.gov/products/international/cpci/data/00/gefs_wk1_precip75mm_prob_africa.html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

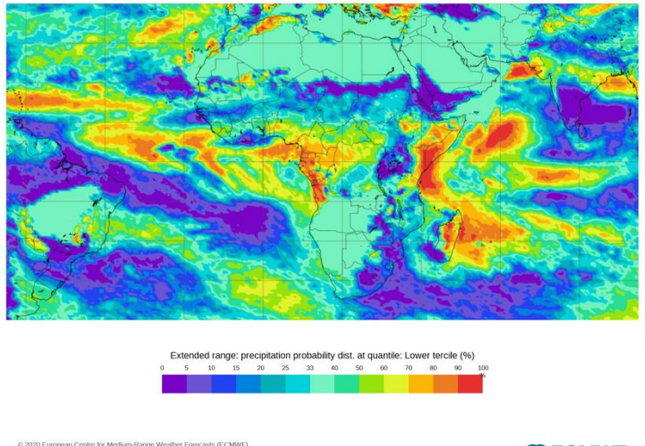
Precipitation: Probability of weekly anomaly > 0



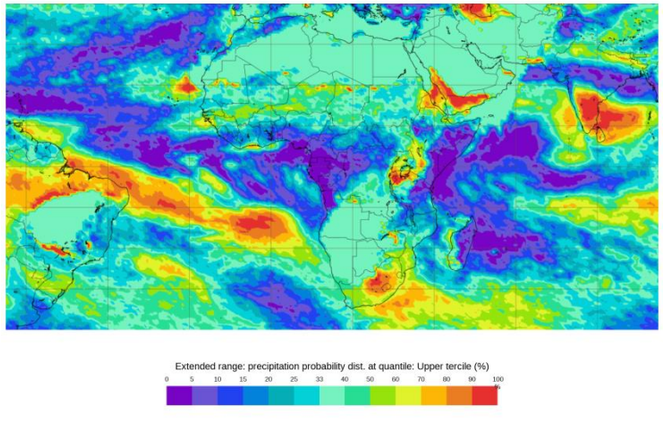
Precipitation: Weekly mean anomalies



Precipitation: Probability distribution



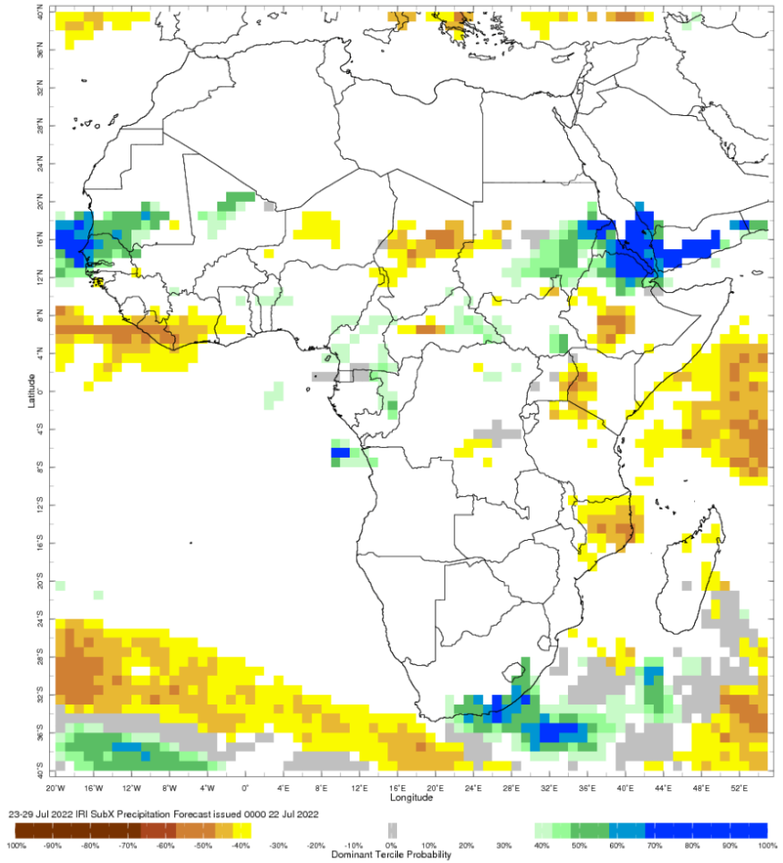
Precipitation: Probability distribution



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

IRI SubX Precip Forecast : Week 1 and 2



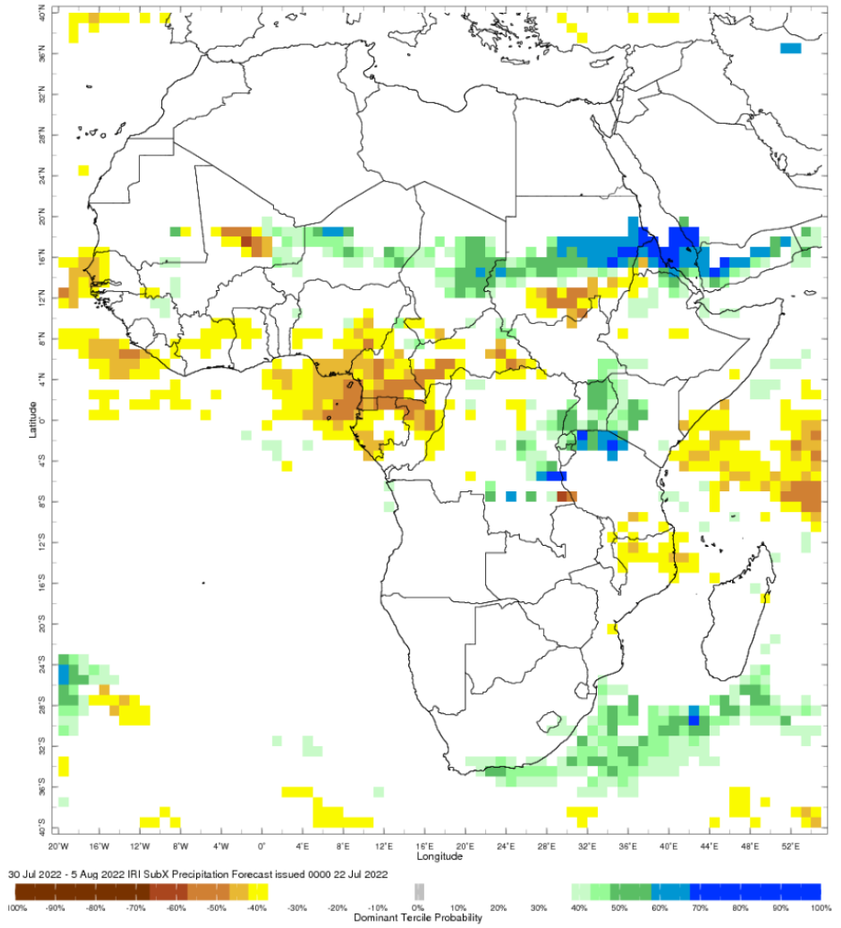
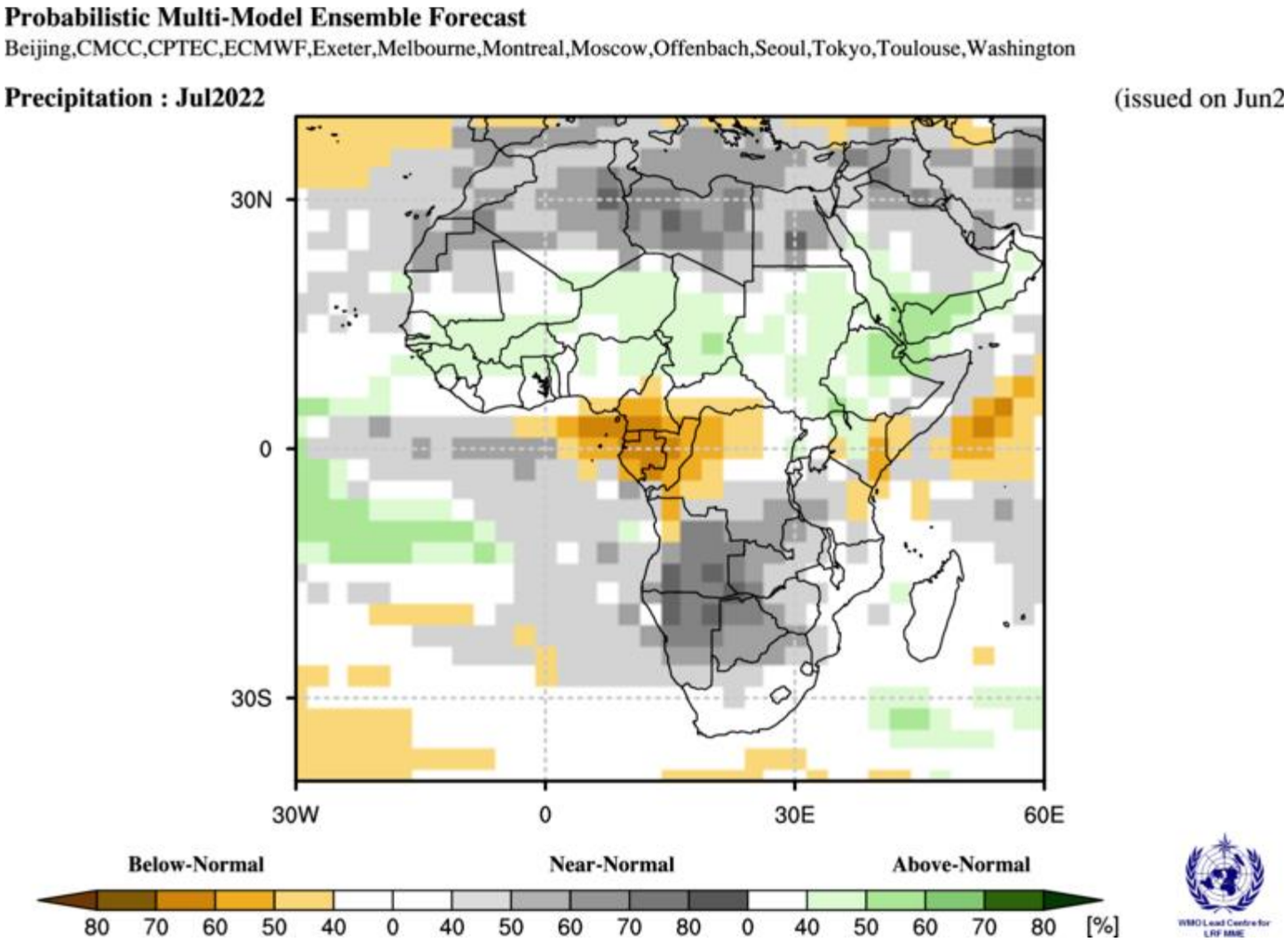


Figure 37: Precipitation and Anomaly forecast

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

Monthly Forecast from WMO Lead Centre Multi-Model Ensemble

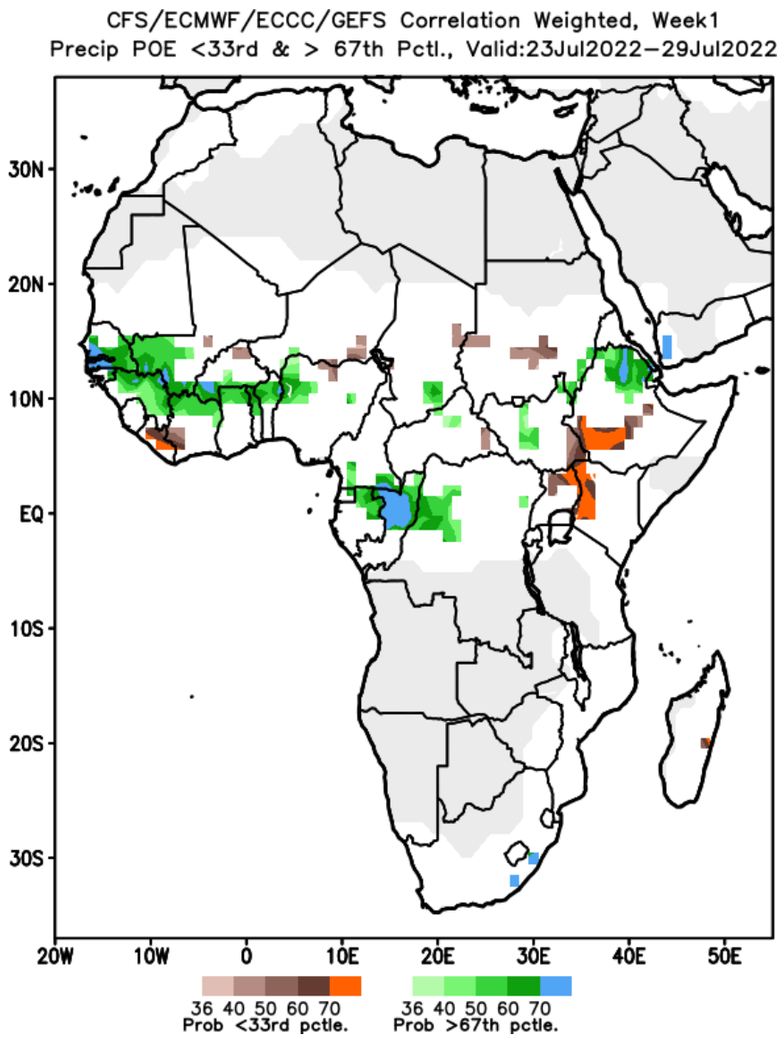


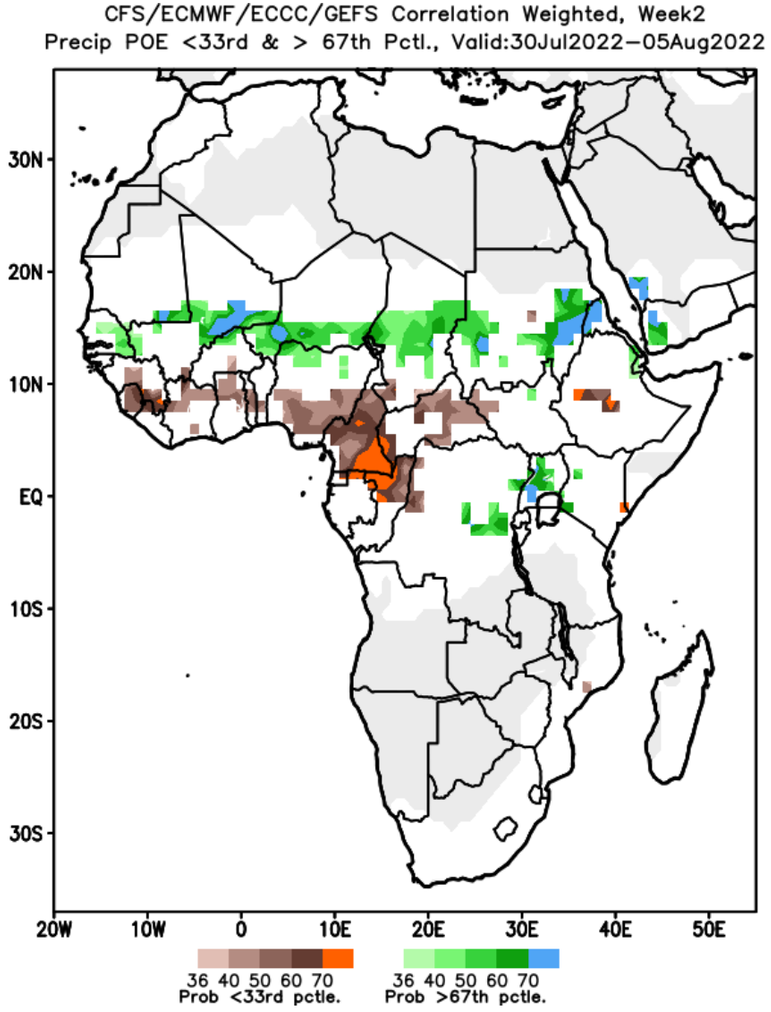
The LCMM-level model set tells us that part of the Africa region will have average to higher than average rainfall.

Figure 35: Monthly Precipitation forecast

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

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

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

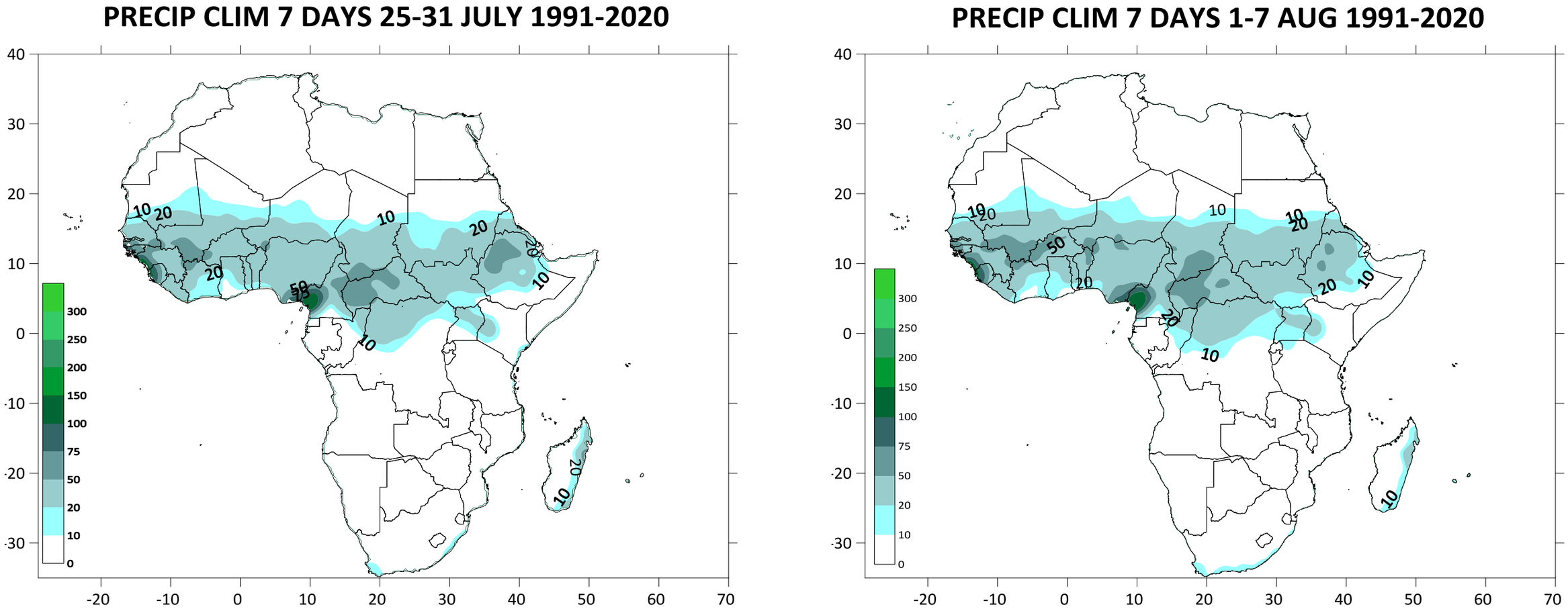


Figure 38: Climatology of Precipation for week-1(left panel) and week-2 (right panel)

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

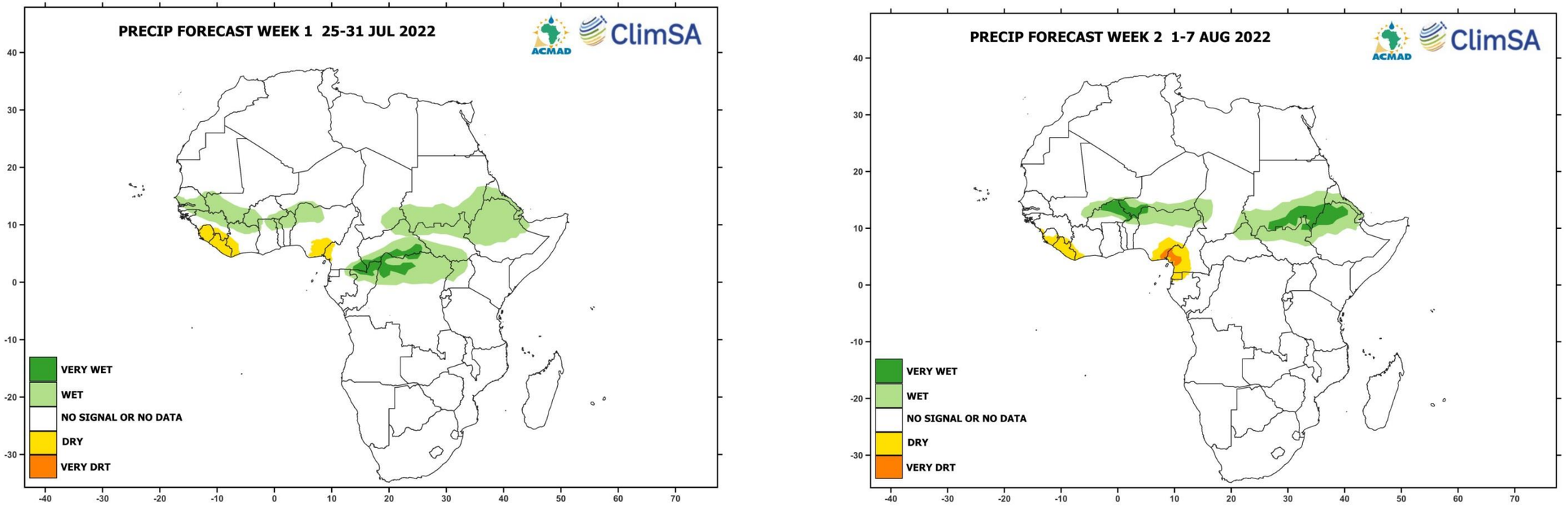


Figure 39: Precipitation Outlook for week-1 (left panel) and week-2 (right panel)